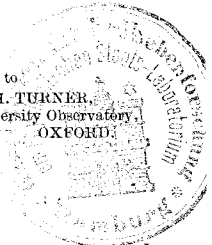


British Association for the Advancement of Science.—Seismological Committee.

Observations and formal business to
J. H. BURGESS,
Earthquake Observatory,
SHIDE, Isle of Wight.

Special inquiries to:
Prof. H. H. TURNER,
University Observatory,
OXFORD.



Monthly Bulletin for January, 1915.

For the large Earthquakes an attempt is here made to compare the readings with theoretical values, as explained in the Nineteenth Report of the Committee to the British Association. The position of the epicentre is adopted from the Pulkovo determination, unless otherwise stated; and the tables of times for P and S are those given by Galitzin in his "Vorlesungen über Seismometrie," p. 137, or by G. W. Walker on p. 54 of his "Modern Seismology." It is shown in the above Report that these tables are sensibly erroneous: but the precise values of the corrections are under discussion and it seems better to await the definitive corrections than to introduce provisional tables. The tables are reproduced in an expanded form on page 10 of this Bulletin. The time of the earthquake at the epicentre is deduced from the Pulkovo records; and applying the tabular times for the distances in the third column (calculated and also measured from a large globe specially made for the purpose), the errors O - C of the observed times are found.

Observers are requested to send a copy of their Registers to Shide *each month*, in order that this collated information may be published as early as possible.

In the Earthquake Chart the stations are arranged in the order of longitude, starting from the Azores and travelling eastward. For the large earthquakes they are arranged in the order of distance from epicentre, as shown in the 3rd column. The azimuth in the 4th column is also read from the globe; and is the azimuth at the epicentre measured from N. towards E., in which the observing station lies.

The letters in the 2nd column stand for: A. = Alfani; Aga. = Agamnone; B. = Bosch; Bif. = Bifilar; B.O. = Bosch-Omori; C. = Cartuja; Ca. = Cancani; C.O. = Cartuja-Omori; G. = Galitzin; L. = Luckmann; M. = Milne; Ma. = Mainka; M.B. = Milne-Burgess; M.Bk. = Milne-Bullock; M.S. = Milne-Shaw; O.A. = Omori-Alfani; O.E. = Omori-Ewing; S. = Stiattesi; V. = Vincentiui; W. = Wiechert.

Guildford and West Bromwich use a modification of the Milne. Hamburg uses machines by Wiechert and von Rebeur-Paschwitz-Hecker. Heidelberg's machine is an astatic pendulum made at the Observatory. Riverview has two Wiecherts and one Mainka.

1915. January 5.

Origin : 16° 5S. 168° 5E., determined by Shide.

Time at Origin : 14h. 32m. 38s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.		O-C.		P.B.		S.		O-C.		L.		M.		Remarks.		
				H.	M.	S.	H.	M.	S.	H.	M.	S.	H.	M.	S.					
Sydney	M.	233	219	14	38	20	+20	14	39	50	14	42	25	14	42	18	14	44	30	15° 0S. 163° 0E.
Riverview	M.	233	219	14	38	20	+24	14	39	50	14	42	25	14	42	18	14	45	34	S.R. 14h. 53m. 48s.
Adelaide	E.	325	230	14	39	36	+7	14	41	48	14	49	0	14	58	36	15	3	48	
Perth	E.	500	242	14	42	0	+15	14	41	48	14	50	4	14	53	24	14	55	0	
Honolulu	M.	501	42	14	42	24	+38	14	50	33	14	50	33	14	53	0	14	56	32	
Manila	M.	563	301	14	42	26	0	14	51	2	14	51	2	14	59	0	15	4	4	
Osaka	W.	671	329	14	42	51	0	14	51	2	14	51	2	14	59	0	15	4	4	
Batavia	W.	717	317	14	43	7	+8	14	51	2	14	51	2	14	59	0	15	4	4	
Edinburgh	W.	618	277	14	43	26	+36	14	51	2	14	51	2	14	59	0	15	4	4	
Zi-kar-wei	W.	657	317	14	43	28	-9	14	51	2	14	51	2	14	59	0	15	4	4	
Victoria	W.	657	317	14	43	28	-9	14	51	2	14	51	2	14	59	0	15	4	4	
Colombo	M.	886	98	14	50	24	+266	14	56	12	14	56	12	14	56	12	15	2	28	
Kodakannal	E.	908	277	14	50	24	+106	14	56	12	14	56	12	14	56	12	15	23	36	
Simla	E.	939	280	14	48	0	+163	14	56	12	14	56	12	14	56	12	15	7	42	
Mauritius	O.E.	996	300	14	50	0	+163	14	56	12	14	56	12	14	56	12	15	4	54	
La Paz	M.	1027	244	14	50	48	+227	14	56	12	14	56	12	14	56	12	15	26	48	
London	S.	1027	244	14	50	48	+589	14	56	12	14	56	12	14	56	12	15	3	38	
Cape Town	M.	1172	118	14	50	53	+171	14	57	28	14	59	36	14	59	36	15	16	54	
Port Elizabeth	M.	1172	118	14	50	53	+171	14	57	28	14	59	36	14	59	36	15	16	54	
Edinburgh	M.	1203	209	14	42	2	-389	14	59	58	14	59	58	14	59	58	15	16	0	
Eschalemmuir	E.	1222	308	14	42	0	+316	14	59	58	14	59	58	14	59	58	15	16	0	
Bidston	E.	1387	295	14	55	0	+370	14	59	58	14	59	58	14	59	58	15	16	0	
Key	E.	1401	353	14	55	0	+370	14	59	58	14	59	58	14	59	58	15	16	0	
Guildford	E.	1407	353	14	52	22	+150	14	59	58	14	59	58	14	59	58	15	29	12	S.R. 15h. 13m. 30s.
Shide	E.	1425	352	14	30	36	-1163	14	59	58	14	59	58	14	59	58	15	16	0	
Guildford	E.	1489	348	14	50	45	+42	14	54	58	13	5	15	15	18	14	56	30	6	
Shide	N.S.	1442	348	14	50	33	+147	14	56	5	13	3	15	15	18	13	56	30	6	
Shide	N.S.	1448	349	14	50	33	+147	14	56	5	13	3	15	15	18	13	56	30	6	

Padova	V.	145.1	331	14 52 30	+141	—	—	—	—	—	—	—	—	—	—	—	—	—
Pompeii	E.	O.A.	147.0	322	14 52 25	+128	—	—	14 53 15	-665	14 55 50	—	—	—	—	—	—	—
	N.	O.A.	147.0	322	14 52 25	+128	—	—	14 53 10	-670	14 55 30	—	—	—	—	—	—	—
Moncalieri	S.		147.2	335	14 53 35	+137	14 55 12	0	15 6 31	+130	15 19 57	15 29 46	—	—	—	—	—	—
Fernando Noronha	E.	M.	151.0	133	—	—	—	—	—	—	—	15 21 0	—	—	—	—	—	—
Barcelona	M.	Ma.	152.4	336	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Grinnada	C.		138.2	343	14 52 52	—	—	—	—	—	—	—	—	—	—	—	—	—
San Fernando	E.	M.	159.5	348	14 53 0	—	—	—	—	—	15 22 0	—	—	—	—	—	—	—
	N.	M.	159.5	348	14 53 0	—	—	—	—	—	15 57 30	16 6 30	—	—	—	—	—	—
											15 55 30	16 9 0	—	—	—	—	—	—

3

1915. January 5-6.

Origin : 25°0N. 119°5E., determined by Shide.

Time at Origin : 23h. 26m. 28s.

Station and Component.	Machine.	Distance ° from Origin.	° Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	s.	H.	M.	S.	H.	M.	S.	s.	H.	M.	S.	H.	M.	S.	
Zi-ka-wei	W.	6.4	15	23 28 14	+ 8	—	—	23 29 26	+ 4	—	—	23 30 42	—	—	—	23 30 42	—	—	—	—	
Manila	W.	10.5	172	23 29 16	+11	—	—	23 31 41	+31	—	—	23 39 59	—	—	—	23 39 59	—	—	—	—	
Osaka	O.	16.8	51	23 29 54	-36	—	—	—	—	—	—	23 34 6	—	—	—	23 34 6	—	—	—	1750 kms.	
Batavia	W.	33.6	203	23 33 20	- 9	—	—	23 37 47	-75	—	—	23 59 0	—	—	—	23 59 0	—	—	—	—	
Simla	O.E.	37.6	280	23 34 6	+ 3	—	—	23 40 0	0	—	—	—	—	—	—	—	—	—	—	—	
Colombo	E.	M.	42.0	281	23 35 30	+51	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Kodaikanal	E.	M.	42.6	257	23 35 54	+71	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Bombay	E.	M.	43.5	269	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Perth	E.	M.	57.1	184	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Baku	G.	59.0	304	23 36 28	- 5	—	—	23 43 48	-27	—	—	23 51 30	—	—	—	23 51 30	—	—	—	—	
Adelaide	E.	M.	62.7	162	23 36 30	-28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Sydney	E.	M.	66.1	152	23 37 0	-20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Riverview	—	66.1	152	23 37 8	-12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Honolulu	E.	M.	74.7	73	23 38 12	- 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Mauritius	E.	M.	74.9	239	23 30 12	-184	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Haiwan	E.	M.	76.3	297	23 40 0	+97	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Padova	V.	83.8	318	23 39 5	- 4	—	—	23 48 42	+33	—	—	23 50 18	—	—	—	23 50 18	—	—	—	—	
Dyce, Aberdeen	E.	Ma.	84.4	332	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	N.	Ma.	84.4	332	23 39 0	-12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Edinburgh	E.	M.	85.7	332	23 39 12	- 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Eskdalemuir	G.	86.0	331	23 39 23	+ 2	—	—	23 43 0	-39	—	—	0 6 0	—	—	—	—	—	—	—	8710 kms.	
	S.	86.0	331	23 40 8	+47	—	—	23 44 12	+35	—	—	0 6 0	—	—	—	—	—	—	—	9300 kms.	
Moncalieri	G.	86.5	319	23 39 23	- 1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Stonyhurst	E.	M.	86.7	350	23 41 0	+95	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Kew	E.	M.	87.1	327	23 38 54	-34	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Bilston	E.	M.S.	87.2	330	23 35 42	-235	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Guildford	M.		87.4	327	23 36 41	-168	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Victoria	E.	M.	87.7	36	23 39 24	- 7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

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Shide	E.	M.S.	88-0	327	23 39 0	-33	---	23 49 35	-45	---	---	---	---	---
	E.	M.B.	88-0	327	23 39 35	+2	---	23 49 35	-45	---	---	0 28 30	---	---
	N.	M.	88-0	327	23 40 0	+27	---	23 49 50	-30	---	---	0 23 30	---	---
Newport, I.W.	E.	M.Bk.	88-0	327	23 39 49	+7	23 45 40	23 50 10	-10	---	0 22 30	0 24 45	S.R. 23h. 51m. 5s.	---
Barcelona	E.	Ma.	91-8	318	---	---	23 47 11	23 51 42	+11	---	23 57 23	---	---	---
Berkeley	---	---	94-5	44	23 39 39	-30	---	---	---	23 49 53	23 52 4	---	---	---
Granada	C.	---	98-0	318	23 39 54	-34	---	23 50 24	-100	---	---	---	19°-7N. 94°-8E.	---
	---	---	---	---	23 40 58	+30	---	23 52 43	-39	0 2 0	0 21 5	---	---	---
Rio Tinto	E.	M.	99-3	320	23 51 0	? 8	---	23 51 0	-77	---	0 40 0	---	---	---
San Fernando	E.	M.	100-0	318	---	---	---	23 52 0	-24	0 25 30	0 34 30	---	---	---
	N.	M.	100-0	318	---	---	---	23 51 0	-84	0 21 30	0 35 0	---	---	---
Ottawa	B.	---	108-2	11	23 45 7	+230	---	23 51 7	-153	23 54 24	---	---	---	---
Toronto	M.	---	109-1	14	23 45 48	+267	---	---	---	23 55 6	0 12 42	---	---	---
Harvard University	E.	B.O.	111-9	8	22 44 56	+201	---	23 50 40	-213	23 54 1	0 18 22	---	---	---
Cape Town	E.	M.	112-3	242	23 55 24	? 8	---	23 55 24	+68	---	0 1 42	---	---	---
Fernando Noronha	E.	M.	145-7	363	23 49 0	---	---	---	---	---	0 9 0	---	---	---
La Paz	---	---	168-9	42	23 45 30	---	---	23 56 30	---	0 10 40	0 47 20	---	---	---

1915. January 13.

Origin : 42°-0N. 13°-5E., determined by G. Agamennone.

A previous determination by Shide agreed within 0°-3.

Time at Origin : 6h. 52m. 38s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Pompeii	E.	O.A.	1-5	150	6 53 10	+ 9	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	N.	O.A.	1-5	150	6 53 10	+ 9	---	---	---	---	---	---	---	---	---	---	---	6 53 41	---	---	---
Padova	V.	---	3-5	341	6 53 41	+16	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Moncalieri	S.	---	5-2	308	6 54 7	+ 9	---	---	---	6 55 13	+13	---	---	---	---	---	---	6 56 0	---	---	---
Malta	E.	M.	6-1	172	6 36 0	-998	---	---	---	---	---	---	---	---	---	---	---	6 57 0	---	---	---
Barcelona	E.	Ma.	8-5	250	6 54 45	-1	---	---	---	6 56 29	+ 1	---	---	---	---	---	---	6 59 7	---	---	---
	N.	Ma.	8-5	250	6 54 47	+ 1	---	---	---	6 56 29	+ 1	---	---	---	---	---	---	6 59 14	---	---	---
Kew	E.	M.	13-3	320	6 55 54	---	---	---	---	---	---	---	---	---	---	---	---	7 1 30	---	---	---
Shide	E.	M.S.	13-4	318	6 55 56	0	---	---	---	6 58 32	+ 1	---	---	---	---	---	---	7 1 30	---	---	---
	N.	M.B.	13-4	318	6 55 56	0	---	---	---	6 58 32	+ 1	---	---	---	---	---	---	---	---	---	---
	E.	M.	13-4	316	6 55 56	0	---	---	---	6 58 36	+ 5	---	---	---	---	---	---	7 1 30	---	---	---
	N.	M.	13-4	316	6 55 56	0	---	---	---	6 58 51	+20	---	---	---	---	---	---	7 1 30	---	---	---
Newport, I.W.	E.	M.Bk.	13-4	316	6 55 55	- 1	---	---	---	6 58 25	- 6	---	---	---	---	---	---	7 1 57	---	---	---
Guildford	M.	---	13-4	319	6 56 35	+39	---	---	---	6 59 25	+54	7 0 57	---	---	---	---	---	7 5 59	---	---	---
Granada	C.	---	14-0	255	6 56 2	- 2	---	---	---	6 58 48	+ 2	6 59 15	---	---	---	---	---	7 1 3	---	---	---
West Bromwich	M.	---	14-8	320	6 56 14	0	---	---	---	6 59 18	+ 3	---	---	---	---	---	---	7 3 26	---	---	---
Stonyhurst	E.	M.	15-9	324	6 56 36	+ 8	---	---	---	---	---	7 1 24	---	---	---	---	---	7 2 42	---	---	---
Bidston	M.S.	---	15-9	322	6 56 18	-10	---	---	---	6 59 36	+ 5	---	---	---	---	---	---	7 3 0	---	---	---
Rio Tinto	E.	M.	16-0	260	6 55 0	-90	---	---	---	---	---	---	---	---	---	---	---	7 2 0	---	---	---
San Fernando	E.	M.	16-2	256	6 56 0	-33	---	---	---	---	---	7 0 0	---	---	---	---	---	7 2 30	---	---	---
	N.	M.	16-2	256	6 56 30	- 3	---	---	---	---	---	7 0 0	---	---	---	---	---	7 9 0	---	---	---
Eskdalemuir	G.	---	17-2	328	6 56 45	0	---	---	---	7 0 2	---	2 7 1 0	---	---	---	---	---	7 5 0	---	---	42°-0N. 14°-0E.
Edinburgh	E.	M.	17-6	328	6 56 54	+ 4	---	---	---	---	---	---	---	---	---	---	---	7 4 24	---	---	---
Dyce, Aberdeen	N.	Ma.	18-3	332	6 56 48	-11	---	---	---	7 0 12	-13	---	---	---	---	---	---	7 5 40	---	---	---
Helwan	E.	M.	18-8	125	6 56 48	-13	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Accra	E.	M.	38-5	203	7 1 18	+58	---	---	---	---	---	---	---	---	---	---	---	7 19 30	Times approx.	---	---
Simla	O.E.	---	51-1	80	6 34 24	-1647	---	---	---	7 8 48	+22	7 20 36	---	---	---	---	---	7 22 30	---	---	---

Harvard University	B.O.	59.9	302	7 2 45	- 4	—	7 11 1	- 1	7 19 21	7 27 48	42°-0N. 13°-0E. T. at O. 6h. 52m. 29s. SR ₂ 7h. 18m. 8s.
Ottawa	B.	61.1	307	7 2 57	0	—	7 11 19	+ 4	7 20 30	—	—
Fernando Noronha	E. M.	61.9	234	7 2 30	-32	—	7 10 30	-55	—	7 34 30	—
Toronto	E. M.	64.2	234	7 12 12	? S	—	7 12 12	+19	7 30 42	7 32 24	—
Colombo	E. M.	67.8	101	7 20 0	+979	—	7 35 36	+1379	7 39 36	7 40 30	—
St. Louis	E. W.	73.6	308	—	...	—	7 11 15	-152	7 20 2	7 36 49	—
Mauritius	E. M.	74.3	137	—	...	—	—	...	—	7 35 36	—
Cape Town	E. M.	76.0	176	7 19 12	+881	—	—	...	—	7 39 30	—
Zi-ka-wai	E. W.	81.3	55	7 5 2	- 1	—	7 15 8	- 8	—	7 37 52	—
Victoria	E. M.	81.9	333	7 15 48	? S	—	7 15 48	+23	7 31 36	7 45 24	—
Osaka	O.	86.7	44	7 3 42	-113	—	7 14 14	-122	7 25 59	7 44 34	—
Berkeley	N.	90.5	327	—	...	—	7 18 9	+72	7 37 48	7 44 54	—
Lick	N.	91.1	326	—	...	—	—	...	—	7 44 45	? S.R. 7h. 29m. 33s.
Manila	W.	92.0	67	7 8 8	+123	—	7 19 19	+126	7 30 36	7 47 47	—
La Paz	—	95.0	257	7 6 15	- 0	7 10 4	7 17 40	-57	7 36 0	7 44 35	—
Batavia	W.	96.5	93	7 6 45	+16	—	—	—	7 51 0	7 53 0	—
Honolulu	E. M.	116.3	351	7 22 54	? S	—	7 22 54	+116	7 45 18	8 3 0	—
Perth	E. M.	119.2	108	Impossible	to distinguish	phases.	—	—	—	—	—
Riverview	—	145.9	86	7 12 18	+126	—	7 26 42	+148	8 1 36	8 12 25	—
Sydney	E. M.	146.0	87	—	...	—	—	...	—	8 17 30	—

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1915. January 27.

Origin : 38°-0N. 19°-5E., determined by Shide.

Time at Origin : 1h. 9m. 48s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Malta	E. M.	4.5	244	0 56 0	-898	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 13 0	—
Pompeii	{ E. O.A. N. O.A.	4.7	306	1 11 7	+ 6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 14 0	—
Padova	V.	9.3	325	1 12 13	+ 5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 14 30	—
Moncalieri	S.	11.2	312	1 12 26	- 9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Helwan	E. M.	12.7	126	1 14 0	+63	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 19 10	—
Barcelona	Ma.	13.8	235	1 13 1	-10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 25 42	—
Granada	C.	18.3	264	1 14 9	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 23 55	—
Guildford	M.	19.3	319	1 14 18	- 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 26 21	—
Kew	E. M.	19.3	320	1 18 0	? S	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 22 30	—
Shide	{ E. M.S. E. M.B. E. M. N. M.	19.4	317	1 14 19	- 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 25 12	—
Newport, I.W.	E. M.Bk.	19.4	317	—	...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 20 39	—
Rio Tinto	E. M.	20.5	263	1 13 57	-25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 23 9	—
San Fernando	{ E. M. N. M.	20.5	264	1 13 0	-95	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 22 39	—
West Bromwich	M.	20.8	321	1 14 22	-17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 24 9	—
Stonyhurst	E. M.	21.8	323	1 15 18	+27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 23 17	—
Bilston	E. M.S.	21.9	322	1 11 6	-226	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 13 0	—
Eskdalemuir	G.	23.1	326	1 15 6	0	1 15 0	—	—	—	—	—	—	—	—	—	—	—	—	—	1 22 30	—
Edinburgh	E. M.	23.4	327	1 16 0	+51	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 23 0	—
Baku	E. G.	23.6	74	1 14 42	-30	1 15 18	—	—	—	—	—	—	—	—	—	—	—	—	—	1 25 0	—
Dyce, Aberdeen	{ E. Ma. N. Ma.	23.9	330	1 15 7	- 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 26 1	—
Accra	M.	37.1	214	1 18 36	+77	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 26 30	—
Simla	O.E.	47.3	80	1 20 36	+119	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 29 30	—
Colombo	E. M.	62.5	104	1 47 0	+1603	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 38 0	—

8

	B. O.	65-9	806	1 24	64	+227	1 37	44	+500	1 49	30	1 53	30
Harvard University	M.	703	311	1 43	30	+1333	1 30	36	+18	1 49	36	1 53	30
Yonkers	M.	719	181	1 45	95	+1373	1 30	36	...	1 52	46	1 55	34
Cape Town	W.	794	58	1 45	95	...	1 31	0	...	1 53	36	2 3	48
Zi-ke-wai	O.	862	48	1 53	0	...	1 31	0	...	2 11	0	2 3	6
Osaka	M.	875	836	1 53	0	+1751	1 31	0	...	2 11	0	2 3	6
Victoria	W.	875	836	1 53	0	...	1 31	0	...	2 11	0	2 3	6
Bechynia	W.	883	256	1 53	0	...	1 31	0	...	2 11	0	2 3	6
La Paz	W.	883	256	1 53	0	...	1 31	0	...	2 11	0	2 3	6

TABLE.

De- grees.	P sec.	S sec.	S - P sec.	De- grees.	P sec.	S sec.	S - P sec.	De- grees.	P sec.	S sec.	S - P sec.
1	15	28	13	51	553	991	438	101	855	1565	710
2	31	55	24	52	560	1004	444	102	860	1575	715
3	47	83	36	53	566	1016	450	103	865	1584	719
4	62	110	48	54	573	1029	456	104	870	1593	723
5	77	137	60	55	579	1041	462	105	874	1602	728
6	92	164	72	56	586	1054	468	106	879	1612	733
7	106	190	84	57	592	1066	474	107	884	1621	737
8	121	217	96	58	599	1079	480	108	888	1630	742
9	136	243	107	59	605	1091	486	109	893	1639	746
10	150	269	119	60	612	1103	491	110	897	1648	751
11	164	294	130	61	619	1116	497	111	902	1657	755
12	179	319	140	62	625	1128	503	112	907	1666	759
13	193	344	151	63	632	1141	509	113	911	1674	763
14	206	368	162	64	638	1153	515	114	916	1682	766
15	219	392	173	65	645	1165	520	115	920	1690	770
16	232	415	183	66	651	1177	526	116	925	1698	773
17	245	438	193	67	658	1190	532	117	929	1706	777
18	257	460	203	68	664	1202	538	118	934	1714	780
19	269	482	213	69	671	1214	543	119	938	1722	784
20	281	503	222	70	677	1226	549	120	942	1729	787
21	293	524	231	71	683	1238	555	121	947	1737	790
22	305	545	240	72	690	1250	560	122	952	1744	792
23	317	565	248	73	696	1262	566	123	957	1752	795
24	328	584	256	74	702	1274	572	124	961	1759	798
25	338	603	265	75	709	1286	577	125	966	1766	800
26	348	622	274	76	715	1297	582	126	970	1773	803
27	358	641	283	77	721	1309	588	127	974	1780	806
28	368	659	291	78	727	1320	593	128	978	1787	809
29	378	677	299	79	733	1332	599	129	983	1794	811
30	388	694	306	80	739	1343	604	130	988	1801	813
31	398	711	313	81	745	1355	610	131	992	1807	815
32	407	728	321	82	750	1366	616	132	996	1814	818
33	416	744	328	83	756	1377	621	133	1001	1821	820
34	425	760	335	84	762	1388	626	134	1005	1827	822
35	433	775	342	85	768	1399	631	135	1009	1833	824
36	442	790	348	86	773	1410	637	136	1014	1840	826
37	450	804	354	87	779	1421	642	137	1018	1846	828
38	458	818	360	88	785	1432	647	138	1023	1852	829
39	466	832	366	89	790	1443	653	139	1027	1858	831
40	475	847	372	90	796	1454	658	140	1031	1864	833
41	483	861	378	91	801	1464	663	141	1035	1869	834
42	491	875	384	92	807	1475	668	142	1039	1875	836
43	498	888	390	93	812	1485	673	143	1043	1881	838
44	506	902	396	94	818	1496	678	144	1047	1886	839
45	513	915	402	95	823	1506	683	145	1051	1892	841
46	520	928	408	96	829	1516	687	146	1055	1897	842
47	527	941	414	97	834	1526	692	147	1059	1902	843
48	534	954	420	98	840	1536	696	148	1063	1907	844
49	540	966	426	99	845	1546	701	149	1067	1912	845
50	547	979	432	100	851	1556	705	150	1071	1917	846

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OXFORD.

Bulletin for February and March, 1915.

For the large Earthquakes an attempt is here made to compare the readings with theoretical values, as explained in the Nineteenth Report of the Committee to the British Association. The position of the epicentre is adopted from the Pulkovo determination, unless otherwise stated; and the tables of times for P and S are those given by Galitzin in his "Vorlesungen über Seismometrie," p. 137, or by G. W. Walker on p. 54 of his "Modern Seismology." It is shown in the above Report that these tables are sensibly erroneous: but the precise values of the corrections are under discussion and it seems better to await the definitive corrections than to introduce provisional tables. The tables are reproduced in an expanded form on page 12 of this Bulletin. The time of the earthquake at the epicentre is deduced from the Pulkovo records; and applying the tabular times for the distances in the third column (calculated and also measured from a large globe specially made for the purpose), the errors O - C of the observed times are found.

Observers are requested to send a copy of their Registers to Shide *each month*, in order that this collated information may be published as early as possible.

In the Earthquake Chart the stations are arranged in the order of longitude, starting from the Azores and travelling eastward. For the large earthquakes they are arranged in the order of distance from epicentre, as shown in the 3rd column. The azimuth in the 4th column is also read from the globe; and is the azimuth at the epicentre measured from N. towards E., in which the observing station lies.

The letters in the 2nd column stand for: A. = Alfani; Aga. = Agamnone; B. = Bosch; Bif. = Bifilar; B.O. = Bosch-Omori; C. = Cartuja; Ca. = Cancani; C.O. = Cartuja-Omori; G. = Galitzin; L. = Luckmann; M. = Milne; Ma. = Mainka; M.B. = Milne-Burgess; M.Bk. = Milne-Bullock; M.S. = Milne-Shaw; O.A. = Omori-Alfani; O.E. = Omori-Ewing; S. = Stiattesi; V. = Vincentini; W. = Wiechert.

Guildford and West Bromwich use a modification of the Milne. Hamburg uses machines by Wiechert and von Rebeur-Paschwitz-Hecker. Heidelberg's machine is an astatic pendulum made at the Observatory. Riverview has two Wiecherts and one Mainka.

1915. February 25.

Origin : 22° 0S. 174° 0E., determined by Shide.

Time at Origin : 20h. 35m. 39s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.			PR ₁			S.			O-C.			I.			M.			Remarks.	
				H.	M.	S.	H.	M.	S.	H.	M.	S.	H.	M.	S.	H.	M.	S.	H.	M.	S.	H.	M.	S.		
Sydney	E.	352	295	20	41	0	+2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Alverton	E.	352	295	20	41	17	+18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
London	E.	335	239	20	45	48	-66	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Honolulu	E.	313	34	20	48	14	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Mainka	W.	63.5	300	20	46	14	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Batavia	W.	68.5	272	20	46	32	-1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Osaka	O.	67.5	326	20	46	22	-18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Taihoku	O.	69.3	310	20	46	16	-36	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Berkeley	O.	84.6	45	20	47	20	-63	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
La Paz	E.	83.6	145	20	47	13	-72	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Eschateau	O.	146.6	357	20	56	55	+216	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
				20	49	0																				
				20	50	20																				
				20	50	18																				
				20	49	30																				
				20	49	48																				
				20	55	4																				
				20	57	6																				
				20	55	2																				
				20	56	31																				
				20	57	34																				
				21	13	13																				
				21	21	0																				

1915. February 25.

Origin : 51°5N. 147°0E., determined by Shide

Time at Origin : 20h. 43m. 20s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Zi-ku-wei	E. W.	27.7	333	20	56	4	+399														
Simla	O.E.	54.0	277									21	0	6	-23						
Victoria	E. M.	54.0	35	20	51	0	-113									20	57	0	20	57	30
Baku	G.	63.4	302	20	53	50	+36					21	0	48	-58						
Dyce, Aberdeen	N. Ma.	68.4	313	20	54	39	+12														
Kodaikanal	E. M.	69.4	260	20	58	42	+48									21	31	30	21	36	54
Edinburgh	E. M.	69.8	343	21	0	0	+324												21	20	0
Eskdalemuir	G.	70.4	343	20	54	39	0	20	58	12		21	3	59	+8	21	21	0			
Colombo	E. M.	70.5	256	20	54	0	-40					21	3	0	-52						
Stonyhurst	E. M.	71.6	342	20	58	0	+193												21	58	0
Ediston	E. M.S.	72.1	342	20	54	36	-15	20	56	54		21	4	12	+1				21	21	42
Kew	E. M.	73.1	339																21	16	30
Gulftford	E. M.	73.6	340	20	53	42	+42					21	4	19	-10	21	26	0	21	29	0
Shide	E. M.B.	74.3	340																21	17	45
	N. M.	74.3	340	20	57	0	+171	20	57	0		21	4	0	-38				21	17	0
Newport, I.W.	E. M.Dk.	74.3	340	20	56	45	+221					21	8	40	+242				21	17	35
Padova	B.	75.7	329	20	54	56	-16					21	4	49	-5						
Ottawa	E. M.	76.3	29	20	59	28	+253					21	9	46	+285	21	23	18			
Toronto	E. M.	76.7	33	20	54	48	-31									21	3	24	21	4	42
St. Louis	W.	77.0	42	20	58	38	+197					21	8	0	+171						
Harvard University	B.O.	80.5	28	20	59	42	+240					21	10	2	+253	21	23	36			
Helwan	E. M.	81.9	308	20	55	0	-45														
Barcelona	N. V.	82.2	334	20	55	30	-21					21	5	16	-52	21	19	24			
Riverview		85.5	175	20	53	34	-40					20	57	52	-532						
Granada	C.	87.6	337	20	55	5	-78					21	5	36	-92	21	21	0	21	29	36
Rio Tinto	E. M.	87.8	339	21	10	0	? S.					21	10	0	+210				21	30	0
Perth	E. M.	87.8	206	21	0	0	+216														
San Fernando	E. M.	88.9	339	20	56	30	+1					21	4	30	-172	21	21	0	21	22	0
	N. M.	88.9	339	20	56	0	-29					21	5	30	-112	21	19	30	21	28	30
Mauritius	E. M.	105.0	356	21	0	42	+168									21	7	18	21	8	24
	N. M.	105.0	256	20	57	6	-48												21	20	51
Accra	E. M.	116.5	323					21	4	24									21	33	36

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1915. February 28.

Origin : 23°6N. 123°5E., determined by Shide.

Time at Origin : 18h. 59m. 5s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Taihoku	O.	2.3	308													19	1	1	19	1	35
Zi-ka-wei	W.	7.8	347	19	1	6	+3					19	2	46	+9				19	5	44
Manila	W.	9.3	195	19	1	22	-3					19	3	0	-16	19	4	28	19	6	22
Nagasaki	O.	10.7	30	19	1	51	+6									19	3	54	19	5	56
Osaka	O.	13.2	40	19	2	51	+4									19	5	35	19	9	11
Batavia	W.	34.0	211	19	7	9	+59					10	11	20	-25	19	22	0			
Simla	O.E.	41.5	291	19	6	0	-72					19	12	12	-81	19	18	42	19	20	42
Colombo	E. M.	45.1	256	19	8	36	+57					19	14	24	+3	19	28	48	19	32	36
Kodaikanal	E. M.	45.9	260													19	14	54	19	32	18
Bombay	E. M.	47.3	275	19	7	55	+1												19	30	18
Adelaide	E. M.	60.2	166	19	14	30	+312												19	29	24
Baku	G.	62.9	305	19	9	32	-4					19	18	6	+1	19	28	0	19	45	31
Sydney	E. M.	63.2	154	19	17	18	? S.					19	17	18	-50	19	29	12	19	51	0
Riverview		63.2	154	19	9	36	-2					19	17	57	-11	19	24	36	19	28	32
Honolulu	E. M.	71.6	74	19	19	54	? S.					19	19	54	+4	19	32	18	19	40	24
Mauritius	E. M.	77.4	241	19	21	54	? S.					19	21	54	-4	19	31	6	19	34	12
Helwan	N. M.	77.4	241	19	18	6	+418									19	30	48	19	34	12
Victoria	E. M.	80.2	298	19	11	0	-25												19	53	30
Padova	E. M.	86.6	38	19	22	24	? S.					19	22	24	-18	19	46	54	20	3	24
Dyce, Aberdeen	V.	87.2	319	19	12	3	-2					19	22	28	-20	19	39	56	19	46	43
Edinburgh	E. M.	88.6	333	19	16	0	+227									19	47	0	19	50	30
Eskdalemuir	G.	89.0	333									19	22	36	-32	19	39	0	19	51	54
												19	23	54	+46				19	48	0
Stonyhurst	E. M.	89.7	331	19	12	30	+11												19	52	12
Moncalieri	S.	90.0	320	19	12	23	+2					19	22	28	-51	19	41	45	19	52	25
Ediston	E. M.S.	90.2	331	19	18	54	+392					19	22	36	-45				19	49	24
Kew	M.S.	90.3	329	19	22	0	? S.					19	22	0	-82				19	52	36
West Bronnwich	E. M.	90.3	330									19	22	30	-52				19	53	0

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Guildford	E.	M.	90.3	329	19 11 35	-47	---	19 21 41	-101	19 39 0	19 59 0	S. of Ishigaki-shima.
Shide	}	E.	M.S.	91.2	329	---	---	19 22 30	-61	19 41 0	19 50 0	---
		E.	M.B.	91.2	329	19 13 25	+58	---	---	19 41 0	19 50 0	---
		N.	M.	91.2	329	---	---	19 23 0	-31	---	---	19 53 30
Newport, I.W.	}	E.	M.Bk.	91.2	329	19 16 32	+245	---	---	19 40 24	19 50 0	S.R. 19h. 30m. 39s.
		E.	Ma.	95.3	320	---	---	---	---	19 43 30	19 52 1	---
Barcelona	N.	Ma.	95.3	320	---	---	---	---	19 43 30	19 51 24	---	
Granada	C.	101.5	320	19 12 28	-54	---	---	19 23 39	-96	19 41 0	19 55 18	---
Rio Tinto	E.	M.	102.8	322	19 24 0	? S	---	19 24 0	-87	---	20 6 0	---
San Fernando	}	E.	M.	103.4	321	---	---	19 27 30	+117	19 56 30	20 5 0	---
		N.	M.	103.4	321	19 19 30	+358	---	---	19 30 30	+297	19 56 0
Ottawa	B.	108.8	14	---	---	---	---	---	---	19 45 42	---	S.R. ? 19h. 18m. 8s.
Toronto	E.	M.	109.6	17	19 24 54	? S	---	19 24 54	-95	? 20 0 24	20 3 12	---
Azores	E.	M.	112.2	334	---	---	---	---	---	---	20 6 6	---
Harvard University	B.O.	112.7	12	---	---	---	---	---	---	19 49 34	---	---
Cape Town	E.	M.	114.9	242	---	---	---	---	---	---	20 14 6	---
La Paz	---	---	167.0	60	19 19 19	---	19 24 34	? 19 34 28	---	20 13 0	20 22 0	S.R. 19h. 44m. 46s.

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1915. March 8.

Origin : 39°0N. 142°0E., determined by Shide.

Time at Origin : 15h. 29m. 43s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Osaka	O.	6.8	233	15 31 32	+6	---	---	---	---	15 33 25	15 33 59	---	---	---	---	---	---	---	---	---	---
Nagasaki	O.	11.7	240	15 33 0	+23	---	---	---	---	15 35 2	15 37 21	---	---	---	---	---	---	---	---	---	---
Zi-kai-wei	E.	18.5	231	15 34 4	-2	---	---	15 37 28	-6	---	15 41 46	---	---	---	---	---	---	---	---	---	---
Taihoiku	O.	22.2	237	---	---	---	---	? 15 37 1	-111	---	---	---	---	---	---	---	---	---	---	---	---
Manila	W.	30.6	223	15 36 12	5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Shuh	O.E.	52.5	282	15 38 18	-48	---	---	15 45 42	-51	16 0 18	16 2 18	---	---	---	---	---	---	---	---	---	---
Honolulu	E.	M.	53.8	93	15 47 12	? S.	---	15 47 12	+23	15 56 30	15 59 48	---	---	---	---	---	---	---	---	---	---
Batavia	W.	55.7	224	15 40 0	+33	---	---	15 47 0	-13	---	---	---	---	---	---	---	---	---	---	---	---
Bombay	E.	M.	62.3	273	15 49 5	? S.	---	15 49 5	+30	---	16 12 17	---	---	---	---	---	---	---	---	---	---
Kodaikanal	E.	M.	63.9	262	16 9 42	? L.	---	---	---	16 9 42	---	---	---	---	---	---	---	---	---	---	---
Colombo	E.	M.	64.2	257	16 10 12	? L.	---	---	---	16 10 12	---	---	---	---	---	---	---	---	---	---	---
Baku	G.	67.3	304	---	---	---	---	---	---	16 3 0	16 11 8	---	---	---	---	---	---	---	---	---	---
Edinburgh	E.	M.	80.6	344	15 52 0	? S.	---	15 52 0	-13	---	16 22 0	---	---	---	---	---	---	---	---	---	---
Eskdalemuir	G.	81.0	341	15 42 10	+2	15 45 24	---	15 52 22	+4	16 7 30.	---	---	---	---	---	---	---	---	---	---	S.R. 15h. 58m. 0s.
Ridston	E.	M.S.	82.7	340	15 41 42	-35	---	15 52 42	+5	16 12 36	16 23 24	---	---	---	---	---	---	---	---	---	---
Kew	E.	M.	83.6	337	15 54 0	? S.	---	15 54 0	+73	---	16 27 6	---	---	---	---	---	---	---	---	---	---
Helwan	E.	M.	85.6	306	15 45 0	+146	---	---	---	---	16 29 0	---	---	---	---	---	---	---	---	---	---
Moncalieri	S.	86.5	330	? 15 52 56	? S.	---	---	15 52 56	-23	16 16 0	16 22 40	---	---	---	---	---	---	---	---	---	---
Granada	C.	97.5	333	---	---	---	---	---	---	16 16 0	16 28 0	---	---	---	---	---	---	---	---	---	---
Rio Tinto	E.	M.	97.9	335	---	---	---	---	---	---	16 33 0	---	---	---	---	---	---	---	---	---	---
San Fernando	E.	M.	98.9	335	---	---	---	---	---	---	16 34 33	---	---	---	---	---	---	---	---	---	---
La Paz	---	---	145.4	58	15 49 33	+137	---	---	---	16 40 0	16 42 30	---	---	---	---	---	---	---	---	---	---

9

British Association for the Advancement of Science.—Seismological Committee.

Observations and formal business to
J. H. BURGESS,
Earthquake Observatory,
SHIDE, Isle of Wight.

Special inquiries to
Prof. H. H. TURNER,
University Observatory,
OXFORD.

Bulletin for April and May, 1915.

For the large Earthquakes an attempt is here made to compare the readings with theoretical values, as explained in the Nineteenth Report of the Committee to the British Association. The position of the epicentre is determined at Shide, unless otherwise stated; and the tables of times for P and S are those given by Galitzin in his "Vorlesungen über Seismometrie," p. 137, or by G. W. Walker on p. 54 of his "Modern Seismology." It is shown in the above Report that these tables are sensibly erroneous: but the precise values of the corrections are under discussion, and it seems better to await the definitive corrections than to introduce provisional tables. The tables are reproduced in an expanded form at the end of this Bulletin. The time of the earthquake at the epicentre is deduced from the distances in the third column (calculated and also measured from a large globe specially made for the purpose), the errors O - C of the observed times are found.

Observers are requested to send a copy of their Registers to Shide *each month*, in order that this collated information may be published as early as possible.

In the Earthquake Chart the stations are arranged in the order of longitude, starting from the Azores and travelling eastward. For the large earthquakes they are arranged in the order of distance from epicentre, as shown in the 3rd column. The azimuth in the 4th column is also read from the globe: and is the azimuth at the epicentre measured from N. towards E., in which the observing station lies.

The letters in the 2nd column stand for: A. = Alfani; Aga. = Agamennone; B. = Bosch; Bif. = Bifilar; B.O. = Bosch-Omori; C. = Cartuja; Ca. = Cancani; C.O. = Cartuja-Omori; G. = Galitzin; L. = Luckmann; M. = Milne; Ma. = Mainka; M.B. = Milne-Burgess; M.Bk. = Milne-Bullock; M.S. = Milne-Shaw; O.A. = Omori-Alfani; O.E. = Omori-Ewing; S. = Stiatresi; V. = Vincentini; W. = Wiechert.

Riverview has two Wiecherts and one Mainka; it is not generally specified from which machine the readings were obtained.

1915. April 3.
Origin: 0°5'N. 100°0'E., determined by Shide.
Time at Origin: 13h. 42m. 32s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.		O-C.		P ₂	S.		O-C.		L.	M.		Remarks.		
				H.	M.	S.	H.		M.	S.	H.	M.		S.	H.		M.	S.
Batavia	W.	9.5	134	13	46	18	7 S.	—	13	46	18	-30	—	13	51	0	—	
Colombo	M.	21.2	289	13	49	48	+141	—	13	49	29	+161	—	13	54	6	—	
Kodaikanal	M.	21.5	295	13	48	6	+1	—	13	50	48	-32	13	53	13	—		
Manilla	W.	25.0	35	13	43	34	-276	—	13	51	24	+104	13	51	24	13	57	6
Bahakra	W.	32.4	309	—	—	—	—	—	13	54	19	+57	13	58	31	14	3	57
Bahoboy	W.	32.4	309	—	—	—	—	—	13	50	19	+57	—	—	—	14	0	27
Zakusai	W.	36.8	3	13	50	2	+2	—	—	—	—	—	—	—	—	14	1	33
Irkutsk	G.	51.9	3	13	51	51	0	—	13	59	7	-8	14	8	30	14	8	33
Sydney	M.	58.3	130	14	14	6	7 S.	—	14	14	6	+811	—	14	23	30	—	
Riverview	W.	59.0	131	14	1	30	7 S.	—	14	1	30	+47	14	17	30	14	23	0
Baku	G.	60.4	318	13	52	25	-22	—	14	9	0	+497	—	—	—	14	18	41
Tiflis	G.	64.4	317	13	53	8	-3	—	14	0	24	-36	14	12	0	14	26	12
Ekaterinburg	G.	64.5	357	13	53	10	-4	—	14	1	29	-21	14	19	0	14	25	12
Helwan	M.	71.3	301	14	3	42	7 S.	—	14	1	34	-17	14	11	0	14	17	13
Pankoro	G.	79.5	331	13	54	44	-4	—	14	3	42	+28	—	—	—	14	26	36
Cape Town	M.	83.3	236	14	24	18	7 S.	—	14	4	37	-23	14	20	0	14	20	38
Moncalieri	S.	91.3	315	14	6	27	7 S.	—	14	24	18	+1126	14	30	55	14	30	48
San Fernando	M.	102.6	308	14	25	0	7 S.	—	14	6	27	+32	14	30	55	14	43	0
									14	19	44	+765						
									14	25	0	+968						

P.S. 14h. 3m. 0s.
1°58'. 99°1E.
98N. 99°E.
Sumatra.
14h. 4m. 42s.

Small Earthquakes which do not give good determinations—

- April 1, 5-6hrs.: Recorded at Eskdalemuir, Edinburgh, Bidston, Shide, Moncalieri, Pulkovo, Helwan, Tiflis, Baku, Irkutsk.
 April 4, 9-10hrs.: San Fernando, Moncalieri, Pulkovo, Helwan, Tiflis, Ekaterinburg, Irkutsk, Zi-ka-wei, Honolulu.
 April 5, 22-23hrs.: San Fernando, Granada, Edinburgh, Guildford, Moncalieri, Cape Town, Pulkovo, Helwan, Tiflis, Baku, Santa Clara, Berkeley, Lick, La Paz.
 April 6, 5-6hrs.: Eskdalemuir, Edinburgh, Stonyhurst, Shide, Kew, Paris, Moncalieri, Pulkovo, Helwan, Tiflis, Baku, Mauritius, Ekaterinburg, Irkutsk, Manila, Zi-ka-wei, Nagasaki, Osaka, La Paz.
 April 7, 16hrs.: San Fernando, Edinburgh, Guildford, Moncalieri, Rocca di Papa, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Irkutsk, Batavia, Manila, Honolulu, Victoria, Toronto, Ottawa, Harvard, La Paz.
 April 8, 14hrs.: San Fernando, Edinburgh, Guildford, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Irkutsk, Sydney, Riverview, Honolulu, Victoria, Toronto, La Paz.
 April 9, 2hrs.: Baku, Ekaterinburg, Irkutsk, Batavia, Manila, La Paz.
 April 9, 23hrs.: San Fernando, Helwan, Tiflis, Baku, Irkutsk.
 April 10, 0hrs.: Tiflis, Baku, Ekaterinburg, Irkutsk, Berkeley, Lick.
 April 12, 13hrs.: Pulkovo, Tiflis, Baku, Ekaterinburg, Irkutsk, Batavia, Manila, Zi-ka-wei, Taihoku.
 April 25, 0hrs.: Edinburgh, Stonyhurst, Paris, Rocca di Papa, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Irkutsk, Batavia, Manila, Zi-ka-wei, Osaka, Riverview, La Paz.
 April 26, 3hrs.: Granada, Eskdalemuir, Edinburgh, Bidston, Stonyhurst, Paris, Rocca di Papa, Pulkovo, Helwan, Baku, Ekaterinburg, La Paz.
 April 27, 11hrs.: Helwan, Ekaterinburg, Irkutsk, Batavia, Sydney, Riverview, Honolulu.
 April 29, 19-20hrs.: San Fernando, Eskdalemuir, Edinburgh, Shide, Paris, Pulkovo, Helwan, Baku, Ekaterinburg, Irkutsk, Zi-ka-wei, Osaka, Honolulu, La Paz.

CS

1915. April 3.

Origin : 48°5N. 171°5W., determined by Shide.

Time at Origin : 20h. 29m. 36s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	S.			O-C.	L.			M.			Remarks.	
				H.	M.	S.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.		
Honolulu	M.	29.2	154	20	41	12	? S.	—	20	41	12	+16	20	45	48	20	50	12	—
Victoria	M.	31.4	72	20	41	54	? S.	—	20	41	54	+20	20	46	54	20	59	54	52°1N. 189°9E.
Irkutsk	G.	50.7	308	20	38	31	-16	—	20	45	39	-24	20	52	30	20	55	29	—
Toronto	M.	60.1	56	20	49	6	? S.	—	20	49	6	+66	21	0	54	21	11	12	—
Ottawa	B.	60.9	53	—	—	—	—	—	—	—	—	—	21	6	42	—	—	—	—
Harvard University	B.O.	65.4	53	—	—	—	—	—	—	—	—	—	21	4	0	—	—	—	—
Ekaterinburg	G.	66.1	332	20	40	24	-4	—	20	48	51	-23	21	3	0	21	5	13	(P.S. 20h. 49m. 32s. Aleutian Islands. 50°3N. 184°0E. 1 20h. 41m. 27s. 47°0N. 168°0E. Epicentre approx. Sea to E. of Kuriles.
Pulkovo	G.	70.3	349	20	40	56	+1	—	20	49	50	-16	21	3	0	21	13	51	—
Edinburgh	M.	75.1	7	20	51	0	? S.	—	20	51	0	-3	—	—	—	21	16	0	—
Stonyhurst	M.	77.2	6	20	33	0	-518	—	—	—	—	—	—	—	—	21	25	42	—
Bidston	M.	77.6	7	20	56	36	? S.	—	20	56	36	+304	—	—	—	21	23	30	—
Kew	M.	79.7	6	21	5	0	? S.	—	21	5	0	+784	—	—	—	21	28	0	—
Baku	G.	83.9	330	20	42	1	-16	—	20	52	22	-21	21	12	0	21	16	5	—
Tiflis	S.	84.2	334	20	43	17	-2	—	20	52	25	-21	21	13	0	21	23	34	—
Moncalieri	S.	86.6	359	20	54	4	? S.	—	20	54	4	+51	21	16	24	21	25	45	—
Batavia	W.	89.1	269	—	—	—	—	—	20	53	0	-40	—	—	—	—	—	—	—
Rocca di Papa	Aga.	89.6	3	20	42	50	0	—	—	—	—	—	—	—	—	—	—	—	—
Granada	C.	93.6	10	—	—	—	—	—	—	—	—	—	21	21	42	21	24	6	—
San Fernando	(N. M.	94.0	12	20	54	0	? S.	—	20	54	0	-32	21	24	0	21	34	0	—
	(N. M.	94.0	12	20	52	0	? S.	—	20	52	0	-152	21	25	0	21	33	30	—
Helwan	M.	98.9	340	20	55	0	? S.	—	20	55	0	-21	—	—	—	—	—	—	—

4

Time at Origin : 21h. 24m. 40s. Repetition of above.

Victoria	M.	31.4	72	21	42	48	? S.	—	21	42	48	+370	21	49	36	—	—	
Irkutsk	G.	50.7	308	21	33	38	-13	—	21	40	41?	-26	21	47	30	21	50	34
Toronto	M.	60.1	56	22	0	0	? S.	—	22	0	0	+1016	22	5	24	22	6	42
Ekaterinburg	G.	66.1	332	21	35	32	0	—	21	43	59	-19	21	56	0	22	1	17
Pulkovo	G.	70.3	349	21	36	12	+13	—	—	—	—	...	21	59	0	22	9	15
Baku	G.	83.9	330	? 21	38	27	+66	—	21	51	14	+207	22	8	0	22	10	47
Tiflis	M.	84.2	334	21	37	23	0	—	21	47	30	-20	22	9	0	22	18	25
Kodaikanal	M.	95.8	292	21	20	30	-1078	—	—	—	—	...	21	24	36	21	28	42
Colombo	M.	97.0	289	21	26	0	-754	—	—	—	—	...	—	—	—	—	—	—

Repetition of foregoing.
Overlaps the previous
quake. Repetition
from the same focus.

Small Earthquakes which do not give good determinations—

- April 30—May 1, 23-0hrs.: Shide, Paris, Padova, Rocca di Papa, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Irkutsk, Batavia, Manila, Zi-ka-wei, Osaka, La Paz.
- May 1, 8-9hrs.: Rio Tinto, Granada, Bidston, Shide, Paris, Padova, Rocca di Papa, Pompeii, Pulkovo, Tiflis, Ekaterinburg, Bombay, Irkutsk, Batavia, Manila, Zi-ka-wei, Victoria, Toronto, Harvard, La Paz.
- May 1, 10hrs.: Bidston, Paris, Rocca di Papa, Pulkovo, Tiflis, Baku, Ekaterinburg, Irkutsk, Batavia, Zi-ka-wei, Toronto.
- May 1, 14hrs.: Pulkovo, Tiflis, Baku, Ekaterinburg, Irkutsk, La Paz.
- May 2, 7-8hrs.: Edinburgh, Stonyhurst, Guildford, Pulkovo, Tiflis, Baku, Ekaterinburg, Irkutsk, Riverview, La Paz.
- May 3, 4hrs.: San Fernando, Granada, Eskdalemuir, Bidston, Stonyhurst, Shide, Newport, Guildford, Paris, Rocca di Papa, Tiflis, Mauritius, Ekaterinburg, Irkutsk, Batavia, Perth, Manila, Zi-ka-wei, Taihoku, Nagasaki, Osaka, Adelaide, Sydney, Riverview, Honolulu, Victoria, Toronto, La Paz.
- May 3, 5-6hrs.: San Fernando, Bidston, Stonyhurst, Shide, Pulkovo, Tiflis, Baku, Ekaterinburg, Irkutsk, Zi-ka-wei, Osaka, Victoria, Toronto.
- May 3, 6-7hrs.: Guildford, Pulkovo, Tiflis, Baku, Ekaterinburg, Irkutsk, Zi-ka-wei, Osaka, La Paz.
- May 3, 12-13hrs.: Bidston, Helwan, Tiflis, Baku, Ekaterinburg, Irkutsk, Batavia, Manila, Zi-ka-wei, Adelaide, Sydney, Riverview, Honolulu, La Paz.
- May 3, 21-22hrs.: Edinburgh, Bidston, Helwan, Tiflis, Baku, Ekaterinburg, Kodaikanal, Irkutsk, Batavia, Manila, Zi-ka-wei, Adelaide, Sydney, Riverview, Honolulu, La Paz.

1915. April 12.

Origin : 45°5N. 158°5E., determined by Shide.

Time at Origin : (1) 22h. 14m. 54s. (2) 22h. 20m. 38s.

22h. 14m. 54s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Irkutsk	G.	35.4	301	22	22	22	+11	—	—	—	22	28	1	+6	22	34	0	22	36	21	—
Ekaterinburg	G.	57.0	320	22	24	43	-3	—	—	—	22	32	37	-3	22	39	0	22	46	41	—
Pulkovo	G.	66.5	334	22	25	43	-6	—	—	—	22	34	15	-7	22	47	0	22	55	36	Probably in Aleutians.
Baku	G.	73.0	311	22	26	26	-4	—	—	—	22	35	41	-15	22	52	0	23	0	58	—

22h. 20m. 38s.

Zi-ka-wei	W.	32.0	257	—	—	—	...	—	—	—	22	32	46	0	—	—	—	—	—	—	—
Pulkovo	G.	66.5	334	22	31	32	-1	—	—	—	22	40	5	-17	22	47	0	22	55	36	Probably in Aleutians.
Baku	G.	73.0	311	22	32	14	0	—	—	—	22	41	31	-9	—	—	—	—	—	—	—
Paris	—	83.4	344	—	—	—	...	—	—	—	—	—	—	...	—	—	—	? 23	2	0	—

1915. April 16.

Origin : 1°0s. 104°5E.

Time at Origin : 13h. 55m. 44s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	s.	s.	H.	M.	s.	H.	M.	s.	s.	H.	M.	s.	H.	M.	s.	
Batavia	W.	5.7	156	14	2	34	+322	—	—	—	14	3	22	+302	—	—	14	7	0	W. Coast Sumatra.	
Manila	W.	22.6	46	14	1	27	+31	—	—	—	14	3	31	-90	14	5	38	14	7	28	—
Colombo	M.	25.9	288	14	4	30	? S.	—	—	—	14	4	30	-94	—	—	—	14	5	18	—
Kodaikanal	M.	29.1	293	—	—	—	...	—	—	—	14	6	0	-63	—	—	—	14	7	30	—
Zi-ka-wei	W.	36.0	25	14	3	13	+7	—	—	—	14	8	59	+5	—	—	—	—	—	—	—
Simla	O.E.	41.2	322	14	8	42	? S.	—	—	—	14	8	42	-86	—	—	—	—	—	—	—
Irkutsk	G.	53.3	360	14	5	20	+8	—	—	—	14	12	51	+7	14	19	0	14	28	28	—
Riverview	—	54.6	132	14	5	24	+3	—	—	—	14	12	57	-3	14	21	30	14	24	30	—
Baku	G.	64.6	317	14	6	10	-16	—	—	—	14	14	33	-31	14	25	0	14	36	52	—
Ekaterinburg	G.	67.7	336	14	6	47	+1	—	—	—	14	15	31	-11	14	28	0	—	—	—	{ 5°2N. 112°5E. S. Chinese Sea.
Tiflis	G.	68.6	316	14	6	47	-5	—	—	—	14	15	34	-19	—	—	—	—	—	—	—
Helwan	M.	75.9	301	14	14	0	? S.	—	—	—	14	14	0	-200	—	—	—	—	—	—	—
Pulkovo	G.	83.0	331	14	8	13	-7	—	—	—	14	18	19	-22	14	35	0	—	—	—	{ 6°0N. 111°0E. S. Chinese Sea.
Rocca di Papa	Aga.	92.0	312	14	19	37	? S.	—	—	—	14	19	37	-42	—	—	—	—	—	—	—
Padova	V.	92.5	315	14	9	13	1	—	—	—	14	19	2	-82	—	—	—	—	—	—	—
Stonyhurst	M.	100.7	323	—	—	—	...	—	—	—	—	—	—	—	—	—	—	15	7	30	—
Edinburgh	M.	100.7	327	—	—	—	...	—	—	—	—	—	—	—	—	—	—	15	6	0	—

1915. April 22.

Origin : 1°5N. 100°0E., determined by Shide.

Time at Origin : 18h. 52m. 24s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	s.	s.	H.	M.	s.	H.	M.	s.	s.	H.	M.	s.	H.	M.	s.	
Batavia	W.	10.3	139	18	56	6	+68	—	—	—	18	59	32	+151	—	—	19	4	0	—	—
Colombo	E.	20.8	286	19	1	0	? S.	—	—	—	19	1	0	-6	19	2	18	19	5	12	—
Kodaikanal	E.	24.1	293	19	1	0	? S.	—	—	—	19	1	0	-70	19	3	36	19	7	6	—
Bombay	E.	31.9	305	19	5	58	? S.	—	—	—	19	5	58	+88	—	—	—	19	11	43	—
Zi-ka-wei	W.	36.0	32	18	59	53	+7	—	—	—	19	6	9	+35	—	—	—	—	—	—	—
Simla	O.E.	36.7	326	—	—	—	...	—	—	—	—	—	—	—	—	—	—	19	10	30	—
Mauritius	E.	46.6	240	19	6	54	? S.	—	—	—	19	6	54	-66	—	—	—	19	14	30	—
Irkutsk	G.	50.9	3	19	1	38	+2	19	3	37	—	—	—	19	23	0	19	24	39	—	—
Sydney	E.	59.6	131	19	24	0	+1287	—	—	—	—	—	—	—	—	—	—	19	31	30	—
Riverview	—	59.6	131	—	—	—	...	—	—	—	—	—	—	—	—	—	—	19	33	8	—
Baku	G.	59.7	317	19	2	15	-19	19	6	11	19	10	10	-33	19	20	0	19	30	42	—
Ekaterinburg	G.	63.6	337	19	3	0	0	—	—	—	19	11	20	-12	19	18	0	19	25	56	{ Sumatra. 3°5N. 99°1E.
Tiflis	G.	63.7	317	19	2	55	-5	—	—	—	19	11	13	-20	19	31	0	—	—	—	—
Helwan	E.	70.8	301	19	13	42	? S.	—	—	—	19	13	42	+42	—	—	—	19	36	18	—
Pulkovo	G.	78.7	331	19	4	34	-1	19	7	54	19	14	14	-18	19	29	0	19	40	15	{ Epicentre probably in Philippines.
Moncalieri	S.	90.6	315	—	—	—	...	—	—	—	—	—	—	—	—	—	—	19	52	13	—
Paris	—	93.8	319	—	—	—	...	—	—	—	—	—	—	—	—	—	—	19	54	0	—
Shide	{ N. M.B.	96.0 96.0	321 321	—	—	—	...	—	—	—	—	—	—	—	—	—	—	19	54	10	—
Stonyhurst	E.	96.1	325	19	9	42	+208	—	—	—	19	18	48	+67	19	53	30	19	55	40	—
Edinburgh	E.	96.2	327	19	19	0	? S.	—	—	—	19	19	0	+78	—	—	—	19	55	0	—
Eskdalemuir	G.	96.3	326	—	—	—	...	—	—	—	19	17	6	-37	—	—	—	19	52	49	—
Bialston	E.	96.6	324	19	17	12	? S.	—	—	—	19	17	12	-34	—	—	—	19	57	0	—
Granada	C.	99.9	308	—	—	—	...	—	—	—	—	—	—	—	—	—	—	19	59	0	—
La Paz	—	161.0	217	19	13	44	+166	—	—	—	19	30	4	+301	20	14	0	20	21	39	—

1915. April 24.

Origin : 35°0N. 143°0E., determined by Shide.

Time at Origin : 17h. 9m. 22s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Osaka	O.	6.2	270	*17	11	7	+10	—	—	—	—	—	—	—	17	12	24	17	12	53	* P.S.
Nagasaki	O.	11.1	262	17	12	31	+23	—	—	—	—	—	—	—	17	14	46	17	15	58	—
Zi-ka-wei	W.	18.4	266	17	12	48	-56	—	—	—	17	16	2	-69	—	—	—	17	20	24	—
Taihoku	G.	21.1	247	17	15	7	+51	—	—	—	—	—	—	—	—	—	—	—	—	—	E. Sea of Tokio.
Irkutsk	G.	32.3	314	17	15	47	-25	—	—	—	17	20	42	-53	17	24	0	17	27	2	—
Honolulu	M.	53.0	88	17	26	54	? S.	—	—	—	? 17	26	54	+36	17	39	30	17	45	30	—
Batavia	W.	53.5	227	17	20	0	+68	—	—	—	17	26	0	-25	—	—	—	—	—	—	—
Ekaterinburg	G.	57.3	320	17	19	11	-5	—	—	—	17	26	52	-20	17	34	0	17	37	36	{ Pui-Kui Islands. 28°-8x. 129°-6x.
Colombo	M.	64.2	260	—	—	—	—	—	—	—	—	—	—	—	—	—	—	17	51	0	—
Baku	G.	70.2	306	17	20	27	-13	17	23	13	17	29	26	-24	17	44	0	17	52	22	—
Pulkovo	G.	70.3	330	17	20	42	+1	—	—	—	17	29	40	-12	17	41	0	17	51	49	P.S. 17h. 30m. 6s.
Tiflis	G.	72.8	309	17	20	49	-8	—	—	—	17	31	49	+87	17	47	0	17	55	1	—
Edinburgh	M.	84.7	342	17	54	0	+1912	—	—	—	—	—	—	—	—	—	—	18	14	0	—
Eskdalemuir	G.	85.1	341	Disturbance from			—	17h. 50m. 0s.	—	—	to 18h. 52m. 0s.	—	—	—	—	—	—	—	—	—	—
Stonyhurst	M.	86.3	340	17	50	12	+1675	—	—	—	17	56	30	+1415	—	—	—	18	5	12	—
Bidston	M.	86.8	349	17	43	54	+1294	—	—	—	17	53	18	+1217	—	—	—	18	54	48	—
Kew	M.	87.7	338	18	3	48	+2483	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Shide	{ N. E. M.B.	88.6 88.6 88.6	338 338 338	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	18 18 18	6 6 9	55 55 20	— — —
Ielwan	M.	88.6	306	17	34	36	? S.	—	—	—	17	34	36	+75	—	—	—	—	—	—	—
Paris	—	89.1	335	17	22	28	-5	—	—	—	—	—	—	—	17	56	0	18	3	4	—
San Fernando	{ E. N.	102.9 102.9	335 335	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	18 18	15 13	0 30	18 18	20 15	0 30	— —

1915. April 23.

Origin : 3°0s. 68°0w., determined by Shide.

Time at Origin : 15h. 28m. 35s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
La Paz	—	13.5	181	15	31	28	-27	—	—	—	—	—	—	—	15	33	0	15	33	10	—
Harvard Univ.	{ E. N.	45.4 45.4	357 357	15	37	23	+12	—	—	—	15	43	45	-10	—	—	—	—	—	—	—
St. Louis	W.	46.3	336	15	37	18	+1	—	—	—	15	43	46	-9	15	48	42	—	—	—	S.R. 15h. 46m. 4s.
Toronto	E.	47.7	349	15	38	48	+91	—	—	—	—	—	—	—	15	46	0	15	46	4	—
Ottawa	{ E. N.	48.9 48.9	353 353	15	37	43	+9	—	—	—	—	—	—	—	15	52	42	16	1	0	—
Azores	E.	56.5	40	15	47	0	? S.	—	—	—	15	44	23	-17	15	49	0	—	—	—	—
Santa Clara	W.	64.1	314	15	39	3	-11	—	—	—	15	47	0	+45	—	—	—	—	—	—	—
Accra	E.	68.2	85	—	—	—	—	—	—	—	—	—	—	—	—	—	—	15	58	0	—
San Fernando	E.	69.5	49	15	40	48	+59	—	—	—	—	—	—	—	15	49	0	15	54	18	—
Rio Tinto	E.	69.7	48	15	39	0	-50	—	—	—	—	—	—	—	—	—	—	15	47	0	—
Victoria	E.	70.2	325	15	40	6	+13	—	—	—	—	—	—	—	15	48	18	15	49	6	—
Granada	C.	71.8	49	15	40	9	+5	—	—	—	15	49	19	-4	15	56	0	16	2	36	? 15°-5s. 68°-5w.
Barcelona	M.	77.3	47	15	40	37	-1	—	—	—	15	50	4	-23	15	54	38	—	—	—	—
Bidston	E.	77.8	34	15	40	42	+1	15	46	48	15	50	12	-21	—	—	—	15	55	42	—
Shide	{ E. M.S. M.B.	77.9 77.9 77.9	37 37 37	15	40	47	+6	15	43	0	15	50	10	-24	—	—	—	—	—	—	—
Newport, I.W.	E.	77.9	37	15	40	50	+9	—	—	—	15	50	15	-19	—	—	—	16	3	30	—
West Bromwich	E.	78.1	35	—	—	—	—	—	—	—	15	50	1	-33	—	—	—	16	24	46	—
Stonyhurst	M.	78.3	33	15	41	0	+16	—	—	—	15	50	36	-3	—	—	—	—	—	—	—
Eskdalemuir	G.	78.5	32	15	40	40	-5	15	43	56	15	50	18	-23	—	—	—	—	—	—	6°0s. 56°0w.
Guildford	M.	78.5	36	15	40	39	-6	—	—	—	15	49	12	-89	15	59	24	16	6	8	—
Edinburgh	E.	78.7	31	15	41	0	+14	—	—	—	—	—	—	—	—	—	—	15	57	30	—
Kew	E.	78.7	36	—	—	—	—	—	—	—	—	—	—	—	—	—	—	16	4	0	—
Paris	—	79.5	39	15	40	49	-2	? 15	43	5	15	50	24	-29	16	0	0	16	0	1	S.R. 15h. 54m. 27s.
Dyce, Aberdeen	{ E. N.	79.7 79.7	30 30	15	40	45	-7	15	42	55	15	50	27	-28	—	—	—	—	—	—	—
Moncalieri	M.	79.7	30	15	40	51	-1	—	—	—	15	50	27	-28	—	—	—	—	—	—	—
Fadova	S.	82.1	44	15	41	4	-2	? 15	45	43	? 15	50	36	-46	—	—	—	15	55	50	—
	V.	85.1	44	15	41	25	+1	—	—	—	15	51	56	+1	16	7	15	—	—	—	—

Rocca di Papa	Aga.	85-1	48	15 41 19	- 5	---	---	15 50 49	- 6	---	---	---	---	---	---	---	---	---	---	---
Cape Town	E. M.	85-4	124	15 50 0	? S.	---	---	15 50 0	-118	---	---	---	---	15 50 18	---	---	---	---	---	---
Pompeii	O.A.	86-3	49	15 41 30	0	---	---	15 51 0	-68	---	---	---	---	---	---	---	---	---	---	---
Honolulu	E. M.	91-1	291	---	---	---	---	---	---	15 50 48	---	---	---	15 53 6	---	---	---	---	---	---
Pulkovo	G.	96-7	30	15 42 12	-16	15 46 35	---	15 54 44	+16	---	---	---	---	---	---	---	---	---	---	18°0s, 70°0w.
Helwan	E. M.	99-6	60	15 49 24	? P.R.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Tiflis	G.	108-8	47	15 45 5	-22	---	---	15 56 41	+49	---	---	---	---	---	---	---	---	---	---	---
Ekaterinburg	G.	111-8	27	15 43 25	-16	---	---	15 57 11	+52	---	---	---	---	---	---	---	---	---	---	---
Baku	G.	113-0	47	---	---	---	---	---	---	16 2 0	---	---	---	---	---	---	---	---	---	---
Sydney	E. M.	127-9	222	15 53 18	? S.	---	---	15 53 18	-303	---	---	---	---	16 9 30	---	---	---	---	---	---
Irkutsk	G.	130-3	6	15 47 28	+144	15 51 3	---	16 5 30	+412	16 13 0	---	---	---	---	---	---	---	---	---	---
Osaka	O.	141-5	328	15 47 45	+113	---	---	---	---	---	---	---	---	15 52 44	---	---	---	---	---	---
Kodaikanal	E. M.	145-0	76	---	---	---	---	---	---	---	---	---	---	16 9 30	---	---	---	---	---	---
Nagasaki	O.	145-9	333	15 50 14	? P.R.	15 50 14	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Colombo	E. M.	147-7	82	---	---	---	---	---	---	---	---	---	---	? 16 4 0	---	---	---	---	---	---
Zi-ka-wei	W.	150-4	344	15 47 18	---	? 15 51 12	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Manila	W.	163-4	323	15 47 0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Batavia	W.	169-5	150	15 48 0	---	---	---	---	---	---	---	---	---	16 3 0	---	---	---	---	---	---

Small Earthquakes which do not give good determinations—

- May 4, 23hrs.: Edinburgh, Guildford, Helwan, Baku, Ekaterinburg, Taihoku, La Paz.
 May 6, 7hrs.: Bidston, Pulkovo, Tiflis, Baku, Ekaterinburg, Simla, Irkutsk.
 May 8, 5-6hrs.: Eskdalemuir, Edinburgh, Bidston, Paris, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Irkutsk, Batavia, Manila.
 May 8, 15-16hrs.: Pulkovo, Tiflis, Baku, Ekaterinburg, Irkutsk, Manila, Honolulu, Victoria, La Paz.
 May 13, 6hrs.: Tiflis, Baku, Ekaterinburg, Irkutsk, Manila, Zi-ka-wei, La Paz.
 May 15, 18-19hrs.: Pulkovo, Tiflis, Baku, Ekaterinburg, Irkutsk, La Paz.
 May 16, 13-14hrs.: Eskdalemuir, Edinburgh, Bidston, Pulkovo, Tiflis, Baku, Ekaterinburg, Irkutsk, Batavia, Manila, Zi-ka-wei, Taihoku.
 May 16, 17hrs.: Eskdalemuir, Edinburgh, Bidston, Paris, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Irkutsk, Honolulu, La Paz.
 May 17, 10hrs.: Edinburgh, Bidston, Paris, Padova, Rocca di Papa, Pompeii, Malta, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Irkutsk.

1915. April 30.

Origin : 44°0N. 101°0E., determined by Shide.

Time at Origin : 1h. 44m. 51s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.			PR ₁			S.			O-C.			L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	H.	M.	S.	H.	M.	S.	H.	M.	S.			
Irkutsk	G.	8-5	14	1 47 4	+	4	---	---	---	1 48 47	+ 6	---	---	---	---	---	---	---	---	---	---	---	---	60°1N. 109°6E.	
Zi-ka-wei	{ E. W.	20-6	122	1 49 39	0	---	---	---	---	1 53 39	+12	---	---	---	---	---	---	---	---	---	1 56 59	---	---	---	
Simla	{ N. W.	20-6	122	1 49 39	0	---	---	---	---	1 53 33	+ 6	---	---	---	---	---	---	---	---	---	1 57 7	---	---	---	
Simla	O.E.	22-7	244	1 49 6	-58	---	---	---	---	1 53 18	-52	1 56 48	---	---	---	---	---	---	---	---	1 58 30	---	---	---	
Nagasaki	O.	25-2	107	1 55 6	? S.	---	---	---	---	1 55 6	+ 8	1 59 8	---	---	---	---	---	---	---	---	1 59 27	---	---	---	
Taihoku	O.	25-8	132	1 45 0	-332	---	---	---	---	---	---	1 48 32	---	---	---	---	---	---	---	---	1 49 18	---	---	---	
Osaka	O.	28-0	98	1 52 23	+84	---	---	---	---	1 56 25	+35	1 59 47	---	---	---	---	---	---	---	---	2 3 6	---	---	---	
Ekaterinburg	G.	28-1	311	1 50 53	- 7	---	---	---	---	1 55 40	-12	1 58 0	---	---	---	---	---	---	---	---	2 0 27	---	---	43°2N. 98°7E.	
Manila	W.	34-0	144	1 51 46	-10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2 8 12	---	---	---	
Bombay	E. M.	34-4	234	Disturbance at	---	about 2h.	---	masked by	---	---	---	tremors.	---	---	---	---	---	---	---	---	---	---	---	---	
Baku	G.	37-4	283	1 52 4	-20	1 53 34	---	1 57 32	-49	2 3 0	---	2 10 32	---	---	---	---	---	---	---	---	2 10 32	---	---	---	
Kodaikanal	E. M.	39-5	218	2 4 54	+732	---	---	---	---	---	---	2 6 48	---	---	---	---	---	---	---	---	2 7 18	---	---	---	
Tiflis	G.	40-5	287	1 52 41	- 9	1 54 18	---	1 58 54	-11	2 3 0	---	2 8 13	---	---	---	---	---	---	---	---	2 8 13	---	---	---	
Colombo	E. M.	41-5	213	2 11 0	+1082	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Pulkovo	G.	44-0	317	1 53 8	-10	1 54 51	---	1 59 42	-11	2 5 0	---	2 12 1	---	---	---	---	---	---	---	---	2 12 1	---	---	39°0N. 92°0E.	
Batavia	W.	50-5	172	1 54 5	+ 4	---	---	---	---	---	---	2 17 0	---	---	---	---	---	---	---	---	2 17 0	---	---	---	
Helwan	E. M.	55-7	280	2 24 0	+1765	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Padova	V.	59-9	306	2 14 26	+1164	---	---	2 17 18	+845	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Dyce, Aberdeen	E. M.	60-3	323	? 1 57 28	+143	---	---	? 2 3 40	+22	2 14 50	---	2 24 0	---	---	---	---	---	---	---	---	2 24 0	---	---	---	
Rocca di Papa	Aga.	61-3	302	1 55 19	+ 7	---	---	---	---	---	---	2 19 24	---	---	---	---	---	---	---	---	---	---	---	---	
Edinburgh	E. M.	61-5	322	2 5 0	+587	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2 25 0	---	---	---	
Eskdalemuir	G.	61-9	321	? 1 55 20	+ 5	---	---	? 2 3 50	+12	? 2 16 0	---	2 25 1	---	---	---	---	---	---	---	---	2 25 1	---	---	---	
Stonyhurst	E. M.	62-5	320	2 14 18	---	---	---	---	---	---	---	2 27 36	---	---	---	---	---	---	---	---	---	2 27 36	---	---	---
Kew	E. M.	62-9	317	2 17 30	---	---	---	---	---	---	---	2 27 54	---	---	---	---	---	---	---	---	---	2 27 54	---	---	---
Bidston	E. M.	63-0	320	1 56 48	+85	---	---	2 4 6	+14	---	---	2 22 42	---	---	---	---	---	---	---	---	2 22 42	---	---	---	
Paris	---	63-0	313	1 55 30	+ 7	---	---	2 5 5	+73	2 18 0	---	2 20 21	---	---	---	---	---	---	---	---	2 20 21	---	---	---	
Guildford	M.	63-1	317	1 56 40	+76	---	---	---	---	2 17 0	---	2 26 27	---	---	---	---	---	---	---	---	---	2 26 27	---	---	---
Newport, I.W.	M.Bk.	63-8	316	2 16 6	+1238	---	---	2 19 6	+904	---	---	2 25 49	---	---	---	---	---	---	---	---	---	2 25 49	---	---	---
Barcelona	Mu.	67-8	307	1 55 57	+ 3	---	---	? 2 5 3	+12	---	---	2 22 12	---	---	---	---	---	---	---	---	---	2 22 12	---	---	---

Granada	C.	74.0	307	1 56 40	+ 7	1 58 25	2 6 23	+18	2 21 0	3 27 24	44°0N. 104°6E.
Rio Tinto	E. M.	75.3	309	2 25 0	+1698	—	—	—	2 27 0	3 27 0	—
San Fernando	E. M.	78.0	308	—	—	—	—	—	2 26 30	2 28 0	—
	E. M.	78.0	308	—	—	—	—	—	2 29 30	2 35 0	—
Victoria	E. M.	79.8	28	2 11 30	+861	—	—	—	2 39 12	—	—
Toronto	E. M.	92.3	360	2 15 48	+1048	—	—	—	3 8 0	3 12 40	—
La Paz	—	151.0	338	2 4 46	+119	—	—	—	—	—	—

Small Earthquakes which do not give good determinations—

- May 17, 13-14hrs.: Edinburgh, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Irkutsk, Victoria, Toronto, Ottawa, La Paz.
- May 18, 14-15hrs.: Edinburgh, Stonyhurst, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Irkutsk, Toronto, Ottawa.
- May 19, 9hrs.: Stonyhurst, Baku, Ekaterinburg, Irkutsk, Zi-ka-wei, Taihoku.
- May 21, 12-13hrs.: Eskdalemuir, Edinburgh, Bidston, Shide, Paris, Pulkovo, Tiflis, Baku, Ekaterinburg, Irkutsk, Batavia, Honolulu, La Paz.
- May 21, 18hrs.: Eskdalemuir, Edinburgh, Bidston, Stonyhurst, Paris, Pulkovo, Tiflis, Baku, Ekaterinburg, Irkutsk, Batavia, La Paz.
- May 26, 18-19hrs.: Granada, Eskdalemuir, Edinburgh, Guildford, Paris, Padova, Rocca di Papa, Pompeii, Cape Town, Pulkovo, Tiflis, Baku, Ekaterinburg.
- May 26, 20hrs.: Eskdalemuir, Edinburgh, Bidston, Pulkovo, Tiflis, Baku, Ekaterinburg, Batavia, Manila, Zi-ka-wei, Adelaide, Sydney, Riverview, La Paz.
- May 27, 14-15hrs.: Eskdalemuir, Edinburgh, Bidston, Padova, Rocca di Papa, Pompeii, Ekaterinburg.
- May 27, 17-18hrs.: Eskdalemuir, Bidston, Pulkovo, Tiflis, Baku, Ekaterinburg, Zi-ka-wei, Nagasaki, Osaka, Lick.
- May 29, 0hrs.: San Fernando, Eskdalemuir, Edinburgh, Bidston, Guildford, Pulkovo, Baku, Ekaterinburg, Toronto, Ottawa, La Paz.
- May 29, 6-7hrs.: Edinburgh, Bidston, Pulkovo, Baku, Ekaterinburg, Victoria, Berkeley, Santa Clara, Toronto, Ottawa.

1915. April 28.

Origin : 34°5N. 96°0E., determined by Shide.

Time at Origin : 3h. 19m. 46s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Simla	O.E.	16.1	264	3 26 6	+117	—	—	—	—	—	—	—	—	—	3 28 24	—	—	—	—	34°5N. 94°0E.	
Irkutsk	G.	18.8	16	3 24 16	+ 3	—	—	—	—	3 27 51	+ 7	—	—	—	3 29 0	—	—	—	—	—	
Zi-ka-wei	W.	21.6	85	3 24 43	- 3	—	—	—	—	3 28 34	- 9	—	—	—	3 31 14	—	—	—	—	—	
Taihoku	O.	24.1	107	3 29 12	? S.	—	—	—	—	3 29 12	-20	—	—	—	3 32 59	—	—	—	—	—	
Bombay	E. M.	25.8	259	3 28 26	+174	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Kodikanal	E. M.	29.6	219	3 33 42	? S.	—	—	—	—	3 33 42	+149	—	—	—	3 36 48	—	—	—	—	—	
Manila	W.	30.1	125	3 26 40	+25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Colombo	E. M.	31.3	212	3 33 12	? S.	—	—	—	—	3 33 12	+90	—	—	—	—	—	—	—	—	—	
Osaka	O.	32.3	78	3 31 12	? S.	—	—	—	—	3 31 12	-47	—	—	—	—	—	—	—	—	—	
Ekaterinburg	G.	32.6	324	3 26 35	- 3	—	—	—	—	3 31 56	- 8	—	—	—	3 37 0	—	—	—	—	31°9N. 90°1E.	
Baku	G.	36.6	293	3 26 57	-16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Tiflis	G.	40.3	296	3 28 7	+24	—	—	—	—	3 33 55	- 2	—	—	—	3 42 0	—	—	—	—	—	
Batavia	W.	41.9	164	3 28 0	+ 4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Pulkovo	G.	48.7	322	3 28 46	+ 2	3 30 45	—	—	—	3 35 55	+ 7	—	—	—	3 44 0	—	—	—	—	SR ₁ 3h. 39m. 42s.	
Helwan	E. M.	53.9	284	3 38 18	? S.	—	—	—	—	3 38 18	+85	—	—	—	—	—	—	—	—	—	
Rocca di Papa	Aga.	63.2	304	3 30 31	+12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Edinburgh	E. M.	68.7	323	3 39 0	? S.	—	—	—	—	3 39 0	-32	—	—	—	—	—	—	—	—	—	
Paris	G.	68.8	314	—	—	—	—	—	—	—	—	—	—	—	3 4 2 0	—	—	—	—	—	
Eskdalemuir	G.	67.0	322	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Kew	E. M.	67.2	318	3 55 12	+1467	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Guildford	M.	67.5	318	3 32 33	+106	—	—	—	—	3 40 25	+43	—	—	—	3 57 23	—	—	—	—	—	
Bidston	E. M.	67.8	320	3 43 24	+755	—	—	—	—	3 51 36	+710	—	—	—	—	—	—	—	—	—	
Shide	E. M.B.	68.1	317	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Barcelona	Ma.	70.5	307	—	—	—	—	—	—	—	—	—	—	—	3 58 7	—	—	—	—	—	
Granada	C.	76.5	306	3 35 45	+241	—	—	—	—	3 42 49	+80	—	—	—	4 1 0	—	—	—	—	—	
San Fernando	E. M.	78.6	307	—	—	—	—	—	—	4 5 0	+1387	—	—	—	4 8 30	—	—	—	—	—	
Victoria	E. M.	90.0	25	4 5 54	+1972	—	—	—	—	—	—	—	—	—	4 9 24	—	—	—	—	—	
Ottawa	B.	101.4	354	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Toronto	E. M.	101.7	357	4 4 30	+1825	—	—	—	—	—	—	—	—	—	4 16 48	—	—	—	—	—	
Harvard University	B.O.	102.3	350	—	—	—	—	—	—	—	—	—	—	—	4 13 28	—	—	—	—	(e) 4h. 10m. 4s.	
La Paz	—	157.0	318	3 41 0	+176	—	—	—	—	—	—	—	—	—	4 42 0	—	—	—	—	—	

1915. May 5.

Origin : 34°0N. 96°0E., determined by Shide.

Time at Origin : 15h. 12m. 8s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.	
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.		
Simla	O.E.	16.1	264	15	18	30	+149	—	—	—	15	20	24	+79	15	21	36	15	22	42	—	
Irkutsk	G.	19.2	16	15	16	40	+1	—	—	—	15	20	14	0	15	22	30	—	—	—	—	
Zi-ka-wei	N.	W.	21.5	90	15	17	5	+2	—	—	—	15	21	5	+2	—	—	15	25	27	P.S. 15h. 21m. 15s.	
		W.	21.5	90	15	17	5	-2	—	—	—	15	21	3	0	—	—	15	25	11	P.S. 15h. 21m. 19s.	
		O.	21.5	90	15	17	8	+1	—	—	—	15	21	14	+11	15	22	31	15	25	23	—
Taihoku	O.	23.9	106	15	21	54	? S.	—	—	—	15	21	54	+4	15	25	10	15	27	23	2005 kms.	
Bombay	E.	M.	25.6	240	? 15	22	18	? S.	—	—	—	15	22	18	-4	—	—	15	28	15	—	
Nagasaki	O.	28.2	83	—	—	—	—	—	—	—	—	—	—	—	15	27	9	15	28	9	—	
Kodaikanal	E.	M.	29.2	220	15	25	36	? S.	—	—	—	15	25	36	+128	15	27	54	15	28	30	—
Colombo	E.	M.	31.0	213	15	25	12	? S.	—	—	—	15	25	12	+73	—	—	—	—	—	—	—
Osaka	O.	32.4	77	15	20	19	+80	—	—	—	—	—	—	—	15	28	31	15	30	15	3940 kms.	
Ekatereburg	G.	33.1	325	15	19	0	-5	—	—	—	—	15	24	24	-10	15	29	0	15	33	21	25°3N. 71°0E.
Baku	G.	36.9	294	15	19	25	-12	—	—	—	—	15	25	22	-9	15	33	0	15	37	9	—
Tiflis	G.	40.6	297	15	20	10	+2	—	—	—	—	15	26	26	+3	15	35	0	15	40	25	—
Batavia	W.	41.5	154	15	20	0	-15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pulkovo	G.	49.6	323	15	21	25	+16	—	—	—	—	? 15	28	13	-2	15	36	0	15	39	41	SR ₁ 15h. 31m. 59s.
Rocca di Papa	Aga.	63.6	304	15	22	57	+13	—	—	—	—	15	26	53	-203	15	54	0	—	—	—	—
Edinburgh	E.	M.	67.1	323	15	40	0	+1013	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Paris	G.	67.2	314	15	33	25	-18	—	—	—	—	—	—	—	15	49	0	15	57	0	—	—
Eskdalemuir	G.	67.4	322	? 15	32	20	+552	—	—	—	—	—	—	—	15	49	0	—	—	—	—	—
Kew	E.	M.	67.6	318	15	49	6	+1556	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Stonyhurst	E.	M.	67.7	321	15	35	36	+746	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Guildford	M.	67.9	318	15	22	45	-26	—	—	—	—	15	30	42	-87	15	46	12	15	54	57	—
Bidston	E.	M.	68.2	321	15	33	0	? S.	—	—	—	15	33	0	+48	—	—	—	—	—	—	—
Shide	M.E.	68.6	318	—	—	—	—	—	—	—	—	15	33	0	+43	—	—	—	—	—	—	—
Honolulu	E.	M.	90.6	64	—	—	—	—	—	—	—	—	—	—	15	53	24	15	54	24	—	—
La Paz	—	157.5	317	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	e 15h. 26m. 30s.

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1915. May 1.

Origin : 46°0N. 156°0E., determined by Shide.

Time at Origin : 4h. 59m. 50s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.	
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.		
Osaka	O.	19.2	242	—	—	—	—	—	—	—	—	—	—	—	5	9	5	5	18	18	P.S. 5h. 4m. 39s.	
Naga-aki	O.	24.0	254	—	—	—	—	—	—	—	—	—	—	—	5	8	32	5	10	10	P.S. 5h. 5m. 25s.	
Zi-ka-wei	N.	W.	30.4	254	5	6	21	-1	—	—	—	5	11	17	-14	—	—	5	16	41	46°N. 153°0E.	
		O.	30.4	254	5	6	21	1	—	—	—	5	11	26	-5	5	14	10	5	16	50	P.S. 5h. 12m. 16s.
		G.	33.7	309	5	6	29	-23	—	—	—	—	—	—	—	—	—	—	—	—	—	34°3N. 139°6E.
Irkutsk	O.	33.7	309	5	6	29	-23	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Taihoku	O.	31.6	245	5	7	6	+6	—	—	—	—	5	12	37	-2	—	—	5	16	41	—	
Manila	W.	42.9	235	5	8	14	+7	—	—	—	—	5	14	45	-2	5	20	48	5	28	32	—
Honolulu	E.	M.	44.7	198	5	9	0	+39	—	—	—	5	15	54	+53	5	21	30	5	25	0	—
Victoria	E.	M.	52.3	36	5	8	30	-42	—	—	—	5	15	48	-50	5	20	24	5	35	30	—
Ekatereburg	G.	55.5	319	5	9	26	+7	—	—	—	—	5	16	54	-24	—	—	—	—	—	—	47°6N. 152°6E.
Berkeley	N.	—	—	58.6	66	5	10	6	+13	—	—	5	18	3	+7	5	24	41	5	30	15	—
		—	—	58.6	66	5	9	59	+6	—	—	5	18	0	+4	5	24	42	5	28	50	—
		—	—	—	59.2	66	5	10	10	+14	—	—	5	18	12	+9	5	25	0	5	30	50
Santa Clara	W.	59.2	66	5	10	10	+14	—	—	—	—	5	17	24	-61	5	29	30	5	33	0	—
Simla	O.E.	60.9	286	5	9	24	-44	—	—	—	—	5	19	6	-14	5	27	30	—	—	—	47°3N. 152°7E.
Pulkovo	G.	65.4	333	5	10	36	-1	5	12	56	—	—	—	—	—	—	—	—	—	—	—	—
Batavia	W.	68.0	234	5	11	13	+19	—	—	—	—	5	20	16	+24	5	32	0	6	1	0	—
Baku	G.	71.4	309	5	11	8	-8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bombay	E.	M.	71.9	279	5	9	41	-98	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Tiflis	G.	72.8	313	5	11	26	+1	—	—	—	—	5	20	52	+2	5	32	0	5	40	17	43°2N. 152°5E.
Kodaikanal	E.	M.	74.8	268	5	11	54	+16	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Dyce, Aberdeen	M.	75.2	345	5	11	50	+10	—	—	—	—	5	21	12	-6	5	24	0	5	44	18	—
Colombo	M.	75.3	265	5	11	13	-24	5	14	42	—	—	—	—	5	26	36	5	50	12	—	—
Edinburgh	E.	M.	76.6	348	5	11	48	-1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
St. Louis	W.	76.8	47	5	11	55	+5	—	—	—	—	5	21	30	-4	5	35	0	5	42	36	—
Eskdalemuir	G.	77.2	348	5	11	49	-3	? 5	14	38	—	—	—	—	5	21	30	-11	5	37	0	—
Toronto	E.	M.	77.8	38	5	12	24	+28	—	—	—	? 5	22	12	+24	5	31	12	5	51	42	47°0N. 153°0E.
Ottawa	B.	77.9	34	5	11	56	0	—	—	—	—	5	21	37	-12	5	33	30	5	53	0	—
Stonyhurst	E.	M.	78.5	317	5	11	6	-54	—	—	—	—	—	—	—	—	—	—	—	—	—	—

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Bidston	E.	M.	79-0	347	5 11 42	-21	? 5 14 42	5 21 18	-44	—	5 50 36	—
West Bromwich	E.	M.	79-7	347	5 12 5	-2	—	5 21 52	-18	—	5 52 0	—
Sydney	E.	M.	79-9	184	5 12 12	+4	—	5 22 18	+6	5 33 48	5 55 30	—
Riverview	E.	W.	79-9	184	5 12 18	+10	5 15 41	5 22 34	+22	5 37 42	5 44 4	47°0N. 165°0E.
Kew	E.	M.	80-5	345	5 11 42	-30	—	—	—	—	5 55 30	—
Guildford	E.	M.	80-7	345	5 11 20	-53	—	5 21 17	-64	5 38 0	6 2 20	—
Haslemere	E.	M.	80-9	345	5 15 36	+82	—	5 23 0	+36	—	5 55 0	—
Cork	E.	M.	81-2	350	5 11 0	-76	—	5 21 0	-87	—	5 48 30	—
Shide	E.	M.S.	81-3	346	5 12 18	+2	—	5 22 13	-15	—	5 56 30	—
Newport, I.W.	E.	M.	81-3	346	5 12 13	-3	—	5 22 18	-10	—	5 56 30	—
	E.	M.	81-3	346	5 12 13	-3	—	5 22 18	-10	—	5 55 30	—
	E.	M.Bk.	81-3	346	5 12 16	0	—	5 22 16	-12	—	5 55 30	—
Harvard Univ.	E.	R.O.	82-2	33	5 12 21	0	—	5 22 25	-13	5 37 29	—	S.R. 5h. 28m. 14s.
	E.	B.O.	82-2	33	5 12 16	-5	—	—	—	—	5 46 15	—
Adelaide	E.	M.	82-1	194	5 12 36	+14	—	5 22 48	+8	—	5 51 18	—
Paris	E.	—	82-5	343	5 12 21	-2	5 15 22	5 22 25	-17	5 40 0	5 45 46	47°6N. 152°5E.
Padova	E.	V.	83-3	336	5 12 26	-2	—	5 22 20	-30	5 35 59	5 52 40	—
Perth	E.	M.	86-0	213	5 13 24	+41	—	5 23 36	+16	5 43 30	6 17 0	—
Rocca di Papa	E.	Aga.	86-3	333	5 12 37	-8	—	5 23 4	-19	5 38 42	5 56 6	—
Pompeii	E.	O.A.	86-8	332	5 12 43	-5	—	5 23 0	-29	5 34 0	5 50 0	—
Helwan	E.	M.	86-8	332	5 12 42	-6	—	5 23 14	-15	5 34 0	5 59 0	—
	E.	M.	89-0	315	5 13 0	0	—	5 23 6	-47	—	5 58 12	—
Barcelona	E.	Ma.	89-5	340	5 12 53	-10	—	5 23 34	-24	5 38 37	5 53 33	—
Rio Tinto	E.	M.	91-8	346	5 12 0	-92	—	—	—	—	6 10 0	—
Granada	E.	C.	94-8	344	5 13 22	-10	—	5 24 8	-6	5 40 36	5 53 30	49°8N. 154°8E.
San Fernando	E.	M.	96-0	346	5 13 0	-39	—	—	—	5 54 30	6 1 12	—
Azores	E.	M.	96-3	1	5 16 12	+152	—	—	—	—	5 25 18	—
Seychelles	E.	M.	100-5	275	—	—	—	—	—	—	6 2 0	—
Mauritius	E.	M.	109-8	261	5 12 6	-100	—	—	—	5 26 30	6 1 12	—
La Paz	E.	—	133-0	66	5 19 25	+174	—	5 33 50	-219	5 56 30	6 7 15	—
Ascension	E.	M.	141-1	245	5 19 0	+115	—	—	—	—	5 24 0	—
Cape Town	E.	M.	143-7	276	5 20 0	+137	—	—	—	—	6 23 48	—

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1915. May 2.

Origin : 46°0N. 155°0E., determined by Shide.

Time at Origin : 3h. 58m. 50s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Osaka	O.	18-6	240	4 3 52	+38	—	—	4 10 34	+231	—	4 16 32	4 20 30	—	—	—	—	—	—	—	—	
Zi-ka-wei	W.	29-8	252	4 5 30	+14	—	—	4 10 44	+23	—	—	4 20 26	—	—	—	—	—	—	—	—	
Irkutsk	O.	29-8	252	4 5 57	+41	—	—	—	—	—	—	4 18 58	—	—	—	—	—	—	—	—	
	G.	33-1	300	4 5 36	-11	—	—	—	—	—	—	4 17 1	—	—	—	—	—	—	—	—	
Manila	W.	42-4	233	4 7 0	-4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Honolulu	E.	M.	45-3	107	4 14 24	+419	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Victoria	E.	M.	52-8	56	4 32 24	? S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Ekaterinburg	G.	54-7	318	4 8 31	+4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Simla	O.E.	60-2	285	5? 9 24	+21	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Pulkovo	G.	61-7	333	4 9 41	+8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Bombay	E.	M.	71-2	278	4 36 26	? S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Tiflis	G.	72-2	313	4 10 32	+11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Kodiakanal	E.	M.	74-1	268	4 44 36	? S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Edinburgh	E.	M.	76-5	348	4 21 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Eskdalemuir	G.	76-6	347	4 10 53	+4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Toronto	E.	M.	78-3	37	4 31 12	? S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Ottawa	B.	78-3	34	? 4 10 19	-40	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Stonyhurst	E.	M.	78-4	347	4 21 0	? S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Bidston	E.	M.	78-8	347	4 12 30	+88	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Riverview	W.	79-9	183	4 43 42	? S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Kew	E.	M.	80-3	345	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Guildford	E.	M.	80-6	345	4 13 0	+107	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Shide	E.	M.	80-7	345	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Paris	E.	M.B.	80-7	345	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	E.	—	81-8	342	4 11 25	+6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Rocca di Papa	E.	Aga.	85-6	333	4 11 43	+2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Pompeii	E.	O.A.	86-0	331	4 50 49	? S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Helwan	E.	M.	88-6	313	4 23 0	? S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Barcelona	E.	Ma.	88-8	340	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

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Granada	C.	94-6	343	4 29 43	+492	—	4 29 42	+360	4 46 0	4 53 24	—
Rio Tinto	E.	94-6	343	4 38 0	? S.	—	4 38 0	+848	—	5 1 0	—
San Fernando	N.	95-8	345	4 23 30	+612	—	4 51 0	+1616	5 0 30	5 7 30	—
La Paz	N.	95-8	345	4 23 30	+612	—	4 51 30	+1646	5 0 0	5 3 0	—
La Paz	—	133-7	65	4 18 30	+176	—	4 22 0	-435	5 15 0	5 26 40	—

1915. May 3.

Origin : 47°0N. 155°5E., determined by Shide.

Time at Origin : 3h. 14m. 14s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Osaka	O.	19-7	237	3 19 4	+13	—	—	3 22 58	+27	3 26 13	3 28 35	—	—	—	—	—	—	—	—	—	—
Nagasaki	O.	24-4	242	3 19 47	+1	—	—	—	—	3 23 40	3 29 28	2240 kms.	—	—	—	—	—	—	—	—	—
Zi-ka-wei	W.	30-6	250	3 20 46	-2	—	—	3 25 48	-10	3 28 20	3 31 2	—	—	—	—	—	—	—	—	—	—
Irkutsk	O.	30-6	250	3 21 4	+16	—	—	—	—	—	3 34 2	—	—	—	—	—	—	—	—	—	—
Taihoku	G.	32-7	298	3 20 50	-17	—	3 22 18	3 25 57	-36	3 31 30	3 32 7	—	—	—	—	—	—	—	—	—	—
Manila	O.	35-0	242	—	—	—	—	—	—	—	—	e 3h. 28m. 50s.	—	—	—	—	—	—	—	—	—
Honolulu	W.	43-6	233	3 22 39	+2	—	—	—	—	3 31 30	—	—	—	—	—	—	—	—	—	—	—
Victoria	M.	45-4	199	3 29 36	? S.	—	—	3 29 36	+2	3 37 18	3 40 12	—	—	—	—	—	—	—	—	—	—
Ekaterinburg	M.	51-7	57	3 33 0	+688	—	—	—	—	3 43 24	3 51 54	—	—	—	—	—	—	—	—	—	—
Simla	G.	54-1	318	3 23 48	0	—	—	3 31 16	-8	3 40 0	3 45 32	47°-5N. 152°-3E.	—	—	—	—	—	—	—	—	—
Pulkovo	O.E.	60-0	284	—	—	—	—	3 31 36	-61	—	3 51 42	—	—	—	—	—	—	—	—	—	—
Batavia	G.	63-2	333	3 24 54	+7	—	3 27 40	3 33 24	+7	3 44 0	3 56 13	48°-0N. 155°-0E.	—	—	—	—	—	—	—	—	—
Baku	W.	68-7	238	3 25 0	-23	—	3 27 53	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bombay	G.	70-2	309	3 25 24	-8	—	—	3 34 39	-3	3 49 0	3 58 40	—	—	—	—	—	—	—	—	—	—
Tiifts	E.	71-4	278	3 35 43	? S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kodaikanal	G.	71-8	313	3 25 48	+5	—	—	3 35 43	+46	3 40 0	3 54 55	—	—	—	—	—	—	—	—	—	—
Edinburgh	E.	74-5	268	3 41 18	+918	—	—	3 35 9	+7	3 50 0	3 56 26	—	—	—	—	—	—	—	—	—	—
Colombo	E.	75-1	348	3 36 0	? S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Eskdalemuir	E.	75-3	264	4 1 0	+2095	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Toronto	G.	75-6	348	3 26 11	+4	—	3 29 22	3 35 50	+3	3 51 0	4 10 0	—	—	—	—	—	—	—	—	—	—
Ottawa	M.	76-8	37	3 45 54	+1180	—	—	—	—	3 55 6	4 5 42	—	—	—	—	—	—	—	—	—	—
Stonyhurst	B.	76-8	34	3 26 14	0	—	—	3 36 6	+5	3 50 30	—	—	—	—	—	—	—	—	—	—	—
Bidston	E.	77-0	347	3 26 30	+15	—	—	3 36 30	+27	—	4 6 0	—	—	—	—	—	—	—	—	—	—
Kew	E.	77-4	347	3 26 12	-5	—	—	3 36 0	7	—	4 7 30	—	—	—	—	—	—	—	—	—	—
Guildford	M.	78-9	345	3 36 48	+1822	—	—	—	—	—	4 10 0	—	—	—	—	—	—	—	—	—	—
Guildford	M.	79-2	346	3 31 45	-317	—	—	3 42 4	+336	4 1 35	4 9 30	—	—	—	—	—	—	—	—	—	—

Barcelona	M.	121.3	317	—	—	—	—	—	—	12 16 48	—	—	—	—	—	—	—	—	—
Granada	C.	127.2	315	—	—	—	—	—	—	12 9 0	12 26 24	11h. 23m. 4s.	—	—	—	—	—	—	—
San Fernando	M.	129.4	315	—	—	—	—	—	—	12 20 0	12 24 30	—	—	—	—	—	—	—	—
Toronto	N.	129.4	315	11 43 0	+1041	—	—	—	—	12 19 30	12 33 30	—	—	—	—	—	—	—	—
	E.	132.5	31	12 4 48	+2335	—	—	—	—	12 20 12	12 30 48	—	—	—	—	—	—	—	—
Ottawa	B.	132.9	26	? 11 32 8	+373	—	—	—	—	11 55 0	—	—	—	—	—	—	—	—	—
Harvard University	B.O.	137.6	21	—	—	—	—	—	—	11 53 50	—	—	—	—	—	—	—	—	—
La Paz	—	151.7	138	11 29 13	+121	—	—	—	—	12 22 0	12 43 50	—	—	—	—	—	—	—	—

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1915. May 6.

Origin : 38°5N. 128°5W., determined by Shide.

Time at Origin : 12h. 8m. 43s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	FR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Berkeley	N.	5.0	102	12 9 59	— 1	—	—	12 10 55	— 5	12 12 0	12 14 14	—	—	—	—	—	—	—	—	—	—
	E.	5.0	102	12 10 1	+ 1	—	—	12 10 43	-17	12 11 56	12 13 59	—	—	—	—	—	—	—	—	—	—
	V.	5.0	102	12 10 3	+ 3	—	—	12 10 53	- 7	—	—	—	—	—	—	—	—	—	—	—	—
Santa Clara	W.	5.3	103	12 10 11	+ 6	—	—	—	—	12 10 16	12 14 16	—	—	—	—	—	—	—	—	—	—
Lick	N.	5.6	101	12 10 14	+ 5	—	—	—	—	12 11 58	12 14 42	—	—	—	—	—	—	—	—	—	—
Victoria	W.	5.6	101	12 10 15	+ 6	—	—	12 11 12	- 4	—	—	—	—	—	—	—	—	—	—	—	—
	E.	10.6	19	12 12 54	? S.	—	—	12 12 54	-33	12 13 24	12 14 54	—	—	—	—	—	—	—	—	—	—
St. Louis	W.	29.0	76	12 15 1	- 9	—	—	? 12 20 3	-12	12 23 0	12 25 24	—	—	—	—	—	—	—	—	—	—
Honolulu	E.	M.	30.6	245	12 17 0	+103	—	—	—	12 23 0	12 25 36	—	—	—	—	—	—	—	—	—	—
Toronto	E.	M.	36.8	66	12 17 30	+79	—	—	—	12 29 24	12 31 48	—	—	—	—	—	—	—	—	—	—
Ottawa	B.	39.1	63	12 16 15	-15	—	—	12 22 0	-37	12 27 36	12 29 42	—	—	—	—	—	—	—	—	—	—
Harvard University	B.O.	43.0	66	12 16 26	-35	? 12 19 55	—	12 22 58	-33	12 33 44	12 33 59	—	—	—	—	—	—	—	—	—	—
Osaka	O.	73.3	301	—	—	—	—	—	—	—	12 53 33	—	—	—	—	—	—	—	—	—	—
Edinburgh	E.	M.	74.8	28	12 29 0	? S.	—	? 12 29 0	-67	12 42 0	12 52 42	—	—	—	—	—	—	—	—	—	—
Eskdalemuir	G.	75.2	29	12 20 38	+ 5	—	—	12 30 10	- 1	12 42 0	12 53 0	S.R. 12h. 33m. 6s.	—	—	—	—	—	—	—	—	—
Azores	E.	M.	75.9	53	—	—	—	—	—	12 50 12	—	—	—	—	—	—	—	—	—	—	—
Bidston	E.	M.	76.7	30	12 25 0	+258	—	12 30 24	- 4	—	12 54 48	—	—	—	—	—	—	—	—	—	—
Stonyhurst	E.	M.	76.7	29	12 31 0	? S.	—	12 31 0	+32	? 14 42 6	12 50 18	—	—	—	—	—	—	—	—	—	—
Irkutsk	G.	78.3	330	12 20 58	+ 6	12 23 56	—	—	—	12 30 51	12 46 0	—	—	—	—	—	—	—	—	—	—
La Paz	—	78.7	122	12 21 12	+18	—	—	12 31 50	+59	12 45 0	12 55 30	—	—	—	—	—	—	—	—	—	—
Guildford	M.	79.4	30	12 19 19	-99	—	—	12 28 20	-159	12 48 3	12 51 42	—	—	—	—	—	—	—	—	—	—
Shide	F.	M.B.	79.5	30	—	—	—	—	—	—	12 55 0	—	—	—	—	—	—	—	—	—	—
Newport, I.W.	M.	79.5	30	—	—	—	—	12 31 0	- 1	12 48 0	12 56 0	—	—	—	—	—	—	—	—	—	—
	M.Bk.	79.5	30	—	—	—	—	—	—	—	12 56 38	—	—	—	—	—	—	—	—	—	—
Kew	E.	M.	79.7	30	—	—	—	—	—	—	12 55 30	—	—	—	—	—	—	—	—	—	—
Pulkovo	G.	80.2	11	12 21 9	+ 6	—	—	12 30 53	-15	12 41 0	12 46 10	8480 kms.	—	—	—	—	—	—	—	—	—
Paris	G.	82.5	30	12 21 18	+ 2	—	—	12 31 32	- 3	12 45 0	12 47 58	—	—	—	—	—	—	—	—	—	—
Ekaterinburg	G.	84.3	5	12 21 27	+ 0	—	—	12 31 41	-13	12 43 0	12 48 11	—	—	—	—	—	—	—	—	—	—
Zi-ka-wei	O.	84.7	306	—	—	—	—	—	—	—	12 49 37	—	—	—	—	—	—	—	—	—	—

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San Fernando	{ E. M. 88°0 43	12 32 30	? S.	—	12 32 30	-- 5	12 53 0	12 57 0	—
	{ N. M. 88°0 43	12 31 30	? S.	—	12 31 30	-65	12 54 0	13 2 0	—
Barcelona	M. 88°3 35	—	...	—	12 32 28	-10	12 51 43	12 59 15	—
Granada	C. 88°8 36	12 21 55	+ 3	—	12 32 33	-11	12 52 0	13 0 42	{ 16°8N. 100°4W. or 39°8N. 123°4W.
Tifis	G. 99°5 5	12 26 30	+219	—	—	...	12 48 0	—	—
Baku	G. 101°1 1	12 33 6	? S.	—	12 33 6	-103	12 52 0	13 0 36	—
Helwan	E. M. 109°2 19	12 38 0	? S.	—	12 38 0	+116	—	—	—

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1915. May 8.

Origin : 26°0s. 38°0E., determined by Shide.

Time at Origin : 13h. 42m. 44s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.		O-C.	PR ₁	S.		O-C.	L.	M.	Remarks.
				H.	M.	S.	H.	M.	S.	H.	M.	S.	
Cape Town	E. M.	18·5	241	13 46 54	—13	—	—	13 50 42	+ 7	—	—	13 55 42	—
Colombo	E. M.	52·3	57	13 59 0	? S.	—	—	13 59 0	-32	14 11 6	—	14 13 0	—
Ascension	E. M.	52·8	280	14 13 0	? L.	—	—	—	...	14 13 0	—	14 20 0	—
Kodiakanal	E. M.	52·9	52	14 0 6	? S.	—	—	14 0 6	+27	14 8 54	—	14 13 18	—
Helwan	E. M.	56·4	353	13 52 54	+22	—	—	—	...	—	—	14 12 12	—
Malta	E. M.	65·9	339	13 56 0	? P.R.	13 56 0	—	—	...	—	—	14 15 0	—
Baku	G.	67·5	19	13 53 25	-20	—	—	14 2 3	-37	14 15 0	—	14 21 14	S.R. 14h. 7m. 6s.
Tifis	G.	67·9	5	13 53 40	-7	—	—	14 2 21	-24	14 15 0	—	14 19 26	i 14h. 8m. 55s.
Batavia	W.	68·2	86	—	...	—	—	—	...	14 18 0	—	—	—
Rocca di Papa	Aga.	71·6	340	13 53 57	-14	—	—	14 2 54	-35	14 20 48	—	—	—
Granada	C.	74·4	327	13 54 20	-9	—	—	14 3 41	-22	14 18 42	—	14 21 54	—
Barcelona	M.	75·2	330	—	...	—	—	14 3 39	-33	14 19 40	—	14 27 17	—
San Fernando	{ E. M. 75·2 325	—	—	—	...	—	—	14 13 0	? S.R.	14 23 30	—	14 29 0	—
	{ N. M. 75·2 325	13 56 30	+116	—	...	—	—	14 12 0	? S.R.	14 21 30	—	14 28 0	—
Rio Tinto	E. M.	75·4	325	—	...	—	—	—	...	—	—	14 28 0	—
Padova	V.	75·4	341	13 54 26	-9	—	—	14 3 43	-31	—	—	14 32 30	—
Paris	—	80·4	337	13 54 57	-8	—	—	14 4 51	-21	14 19 0	—	14 21 22	—
Shide	E. M.B.	84·3	337	? 13 55 25	-3	—	—	14 5 30	-25	14 22 0	—	14 34 50	—
Newport, I.W.	E. M.Bk.	84·3	337	—	...	—	—	—	...	—	—	14 35 8	—
Kew	E. M.	84·6	338	—	...	—	—	—	...	—	—	14 38 48	—
Ekaterinburg	G.	84·9	12	13 55 20	-11	—	—	14 5 31	-31	14 22 0	—	14 26 58	21°6s. 36°3E.
Pulkovo	G.	85·9	356	13 55 29	-8	13 58 38	—	14 5 38	-35	14 23 0	—	14 29 26	—
West Bromwich	E. M.	86·1	337	—	...	—	—	—	...	—	—	—	—
Bidston	E. M.	87·1	337	13 55 24	-20	—	—	14 5 54	+610	—	—	14 37 36	—
Stonyhurst	E. M.	87·2	338	—	...	—	—	—	...	14 27 12	—	14 32 30	—
Eskdalemuir	G.	88·7	338	13 55 35	-17	13 58 51	—	14 6 0	-44	14 24 30	—	14 28 0	S.R. 14h. 12m. 0s.
Edinburgh	E. M.	89·2	339	14 5 0	? S.	—	—	14 5 0	-109	—	—	14 32 0	—
Dyce, Aberdeen	S. Ma.	90·0	340	—	...	—	—	—	...	14 35 0	—	—	—
La Paz	—	96·5	248	13 56 36	+1	—	—	14 8 0	-5	14 25 25	—	14 41 26	—

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Ykutak	G.	97.2	34	13	55	26	-73	14	0	17	14	6	16	-116	14	21	0	14	21	28	—
Harvard University	B.O.	120.9	308	—	—	—	—	—	—	—	—	—	—	—	?	14	44	42	—	—	—
Ottawa	P.	124.5	311	—	—	—	—	—	—	—	—	—	—	—	—	14	41	0	—	—	—
Toronto	M.	127.1	309	—	—	—	—	—	—	—	—	—	—	—	—	14	48	54	14	52	36

1915. May 12.

Origin : 0°1s. 27°0w., determined by Shide.

Time at Origin : 10h. 28m. 21s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.	
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.		
Ascension	E. M.	14.8	122	10	32	0	+ 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
St. Helena	E. M.	26.3	128	10	40	0	? S.	—	—	—	10	40	0	+71	—	—	—	—	—	—	—	—
Azores	E. M.	37.9	2	—	—	—	—	—	—	—	—	—	—	—	10	46	24	—	—	—	—	—
San Fernando	E. M.	41.3	26	10	38	30	—	10	38	30	—	—	—	—	10	50	0	—	—	—	—	—
	N. M.	41.3	26	10	37	0	+34	—	—	—	—	—	—	—	10	49	30	—	—	—	—	—
Rio Tinto	E. M.	42.3	24	10	36	0	-31	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Granada	C.	43.1	28	10	36	55	+15	—	—	—	? 10	43	20	+10	10	48	0	—	—	—	—	—
La Paz	—	43.7	246	10	38	13	? P.R.	10	38	13	10	43	19	+12	10	51	0	—	—	—	—	—
Barcelona	Ma.	49.2	29	—	—	—	—	—	—	—	10	44	32	+ 2	? 10	51	22	—	—	—	—	—
Malta	E. M.	52.7	42	10	39	0	+75	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cape Town	E. M.	54.3	133	10	40	42	? P.R.	10	40	42	—	—	—	—	—	—	—	—	—	—	—	—
Cork	E. M.	54.3	14	10	39	30	+94	—	—	—	10	45	30	- 4	—	—	—	—	—	—	—	—
	M.	54.3	14	—	—	—	—	10	42	15	—	—	—	—	—	—	—	—	—	—	—	—
Paris	—	55.1	23	10	38	25	+24	—	—	—	10	46	2	+19	10	55	0	—	—	—	—	—
Rocca di Papa	E. M.	55.1	36	10	38	18	+17	—	—	—	? 10	45	45	+ 2	10	56	6	—	—	—	—	—
Shide	E. M.B.	55.3	20	—	—	—	—	—	—	—	10	46	30	+44	—	—	—	—	—	—	—	—
Newport, I.W.	E. M.B.	55.3	20	10	46	34	? S.	—	—	—	10	46	34	+48	—	—	—	—	—	—	—	—
Pompeii	E. O.A.	55.6	38	10	38	0	- 4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	N. O.A.	55.6	38	10	38	0	- 4	—	—	—	—	—	—	—	10	56	0	—	—	—	—	—
Haslemere	E. M.	55.8	20	10	47	0	? S.	—	—	—	10	47	0	+68	—	—	—	—	—	—	—	—
Guildford	M.	56.0	20	10	39	50	+103	—	—	—	10	46	23	+28	11	1	30	—	—	—	—	—
Kew	E. M.	56.3	20	10	46	0	? S.	—	—	—	10	46	0	+ 1	—	—	—	—	—	—	—	—
West Bromwich	M.	56.7	18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Padova	V.	57.0	32	10	38	40	+27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bidston	E. M.	57.1	17	10	38	42	+28	—	—	—	10	43	12	—	—	—	—	—	—	—	—	—
Harvard Univ.	B.O.	58.1	323	10	39	29	+ 8	? 10	42	14	—	—	—	—	10	55	23	—	—	—	—	—
Eskdalemuir	G.	58.7	16	10	39	7	+43	? 10	42	21	10	46	56	+28	—	—	—	—	—	—	—	—
Edinburgh	M.	59.3	15	10	45	0	? S.	—	—	—	10	45	0	-96	—	—	—	—	—	—	—	—
Dyce, Aberdeen	Ma.	60.7	15	—	—	—	—	—	—	—	10	47	20	+27	10	58	0	—	—	—	—	—

Ottawa	B.	62.5	324	? 10	40	13	+84	—	—	—	11	4	36	—	—			
Helwan	B.	62.5	324	—	—	—	—	—	—	—	10	37	0	—	—			
Toronto	M.	63.0	56	10	33	24	+31	—	—	—	—	—	—	11	4	24		
Pulkovo	G.	63.9	320	10	43	54	? P.R.	10	43	54	—	—	—	11	4	12		
Tiflis	G.	74.3	26	10	40	31	+29	—	—	—	10	49	51	—	—	11	4	34
Baku	G.	76.6	47	10	40	29	+9	—	—	—	10	50	0	—	—	11	9	49
Mauritius	G.	82.9	48	10	40	41	-10	—	—	—	10	50	36	-31	—	11	3	0
Ekaterinburg	M.	85.1	110	10	49	6	? S.	—	—	—	10	49	6	-155	—	11	5	18
Victoria	G.	88.8	33	10	41	49	+19	—	—	—	10	52	18	-4	—	11	8	0
Bombay	M.	94.3	319	—	—	—	—	—	—	—	—	—	—	—	—	11	24	6
Simla	M.	99.3	71	10	45	41	+193	—	—	—	—	—	—	—	—	11	22	18
Kodaikanal	O.E.	102.1	58	—	—	—	—	—	—	—	—	—	—	—	—	11	20	30
Colombo	M.	104.2	79	—	—	—	—	—	—	—	—	—	—	—	—	11	27	24
Irkutsk	M.	106.7	83	—	—	—	—	—	—	—	—	—	—	—	—	11	28	12
Honolulu	G.	114.0	30	10	43	51	+24	—	—	—	10	57	39	+76	—	11	22	0
Perth	M.	127.7	299	11	41	36	? L.	—	—	—	—	—	—	—	—	11	41	36
Batavia	M.	132.5	186	—	—	—	—	—	—	—	? 11	2	20	+222	—	—	—	—
Zi-ka-wei	W.	135.5	98	—	—	—	—	10	51	0	—	—	—	—	—	11	23	0
Osaka	O.	136.9	41	—	—	—	—	10	52	19	—	—	—	—	—	—	—	—
Manila	O.	141.7	24	—	—	—	—	—	—	—	—	—	—	—	—	12	1	42
Sydney	W.	145.2	64	—	—	—	—	—	—	—	—	—	—	—	—	11	46	8
Riverview	M.	146.0	177	—	—	—	—	—	—	—	—	—	—	—	—	12	5	0
	W.	146.0	177	10	52	30	? P.R.	10	52	30	—	—	—	—	—	11	28	48

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1915. May 12.

Origin : 43°0N. 154°0E., determined by Shide.

Time at Origin : 16h. 24m. 55s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Osaka	O.	16.6	247	16	29	57	+62	—	—	—	16	34	52	+168	16	38	52	16	41	32	—
Zi-ka-wei	W.	28.3	256	—	—	—	—	—	—	—	16	36	34	+35	—	—	—	—	—	—	—
Irkutsk	G.	34.0	303	16	31	47	-13	16	32	49	16	37	9	-26	16	43	0	16	45	51	—
Manila	W.	40.1	235	16	26	0	-411	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Victoria	M.	55.1	53	16	56	6	-1291	—	—	—	—	—	—	—	17	0	36	17	1	36	—
Ekaterinburg	G.	56.8	319	16	34	44	-2	—	—	—	16	42	26	-13	16	52	0	17	1	2	46°1N. 154°0E.
Pulkovo	G.	67.4	333	16	35	53	-2	16	38	48	16	44	31	-19	16	58	0	17	9	54	48°0N. 158°0E.
Baku	G.	72.2	309	—	—	—	—	—	—	—	16	45	41	-6	17	4	0	17	18	33	—
Tiflis	G.	74.0	313	16	36	45	+8	—	—	—	16	46	8	-1	16	56	0	17	13	13	—
Edinburgh	M.	79.2	347	17	7	0	+1791	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bidston	M.	79.8	346	17	8	42	? S.	—	—	—	17	8	42	+1007	—	—	—	17	20	18	—
Toronto	M.	81.0	32	17	7	42	? S.	—	—	—	17	7	42	+932	17	15	36	17	16	30	—
Paris	G.	82.3	341	16	37	38	+11	—	—	—	16	47	49	+5	17	15	0	17	24	25	—
Guildford	M.	83.1	344	16	42	44	+312	—	—	—	16	53	3	+310	17	13	45	17	21	21	—

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1915. May 14.

Origin : 45°0N. 156°0E., determined by Shide.

Time at Origin : 6h. 40m. 34s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.		O-C.	PR ₁		S.		O-C.	L.		M.		Remarks.					
				H.	M.	S.	H.	M.	S.	H.	M.	S.	H.	M.	S.						
Osaka	O.	18-4	243	6	45	37	+35	—	6	52	21	+227	6	57	33	7	9	55	—		
Zi-ka-wei	W.	30-2	255	6	47	15	+11	—	6	52	19	+8	—	—	—	—	—	—	—		
Irkutsk	G.	34-2	301	6	47	16	-25	—	6	53	36	+19	6	58	0	7	1	38	—		
Manila	W.	42-4	255	6	49	0	+12	—	—	—	—	—	—	—	—	—	—	—	—		
Honolulu	E. M.	44-4	107	6	56	42	+459	—	7	0	12	+271	7	4	0	7	6	48	—		
Victoria	E. M.	53-0	55	7	7	42	+1062	—	—	—	—	—	7	13	12	7	17	12	—		
Ekaterinburg	G.	56-2	319	6	50	19	-2	—	6	58	54	+44	7	5	0	7	13	42	43°7N. 158°5E.		
Pulkovo	G.	66-2	333	6	51	26	-3	6	55	43	7	0	0	-14	7	12	0	7	23	4	48°8N. 159°4E.
Batavia	W.	67-5	255	6	52	21	+46	—	—	—	—	—	—	—	—	—	—	—	—	—	
Baku	G.	72-0	310	6	51	56	-8	6	55	9	7	1	12	-12	7	15	0	7	32	58	—
Bombay	E. M.	72-1	279	7	12	51	+1246	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Tiflis	G.	73-8	313	6	52	16	+1	—	7	1	43	-3	7	19	0	7	28	49	—	—	
Kodaikanal	E. M.	74-8	268	7	27	42	+2120	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Colombo	E. M.	75-4	265	7	27	0	+2075	—	—	—	—	—	—	—	—	7	31	36	—	—	—
Edinburgh	E. M.	77-6	348	7	11	0	+1101	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Eskdalemuir	G.	78-2	318	6	52	44	+2	6	53	5	7	2	31	-3	—	—	—	—	—	—	—
Toronto	E. M.	78-6	37	7	12	0	+1155	—	—	—	—	—	7	21	0	7	32	6	—	—	—
Ottawa	B.	78-7	34	6	52	49	+4	—	—	—	—	—	7	21	0	—	—	—	—	—	—
Stonyhurst	E. M.	79-5	347	6	50	30	-140	—	—	—	—	+68	7	26	36	7	35	0	—	—	—
Bidston	E. M.	80-0	347	6	54	0	+67	—	—	—	7	5	6	+129	—	—	—	—	—	—	—
Kew	E. M.	81-4	345	7	27	18	+2657	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Shide	M.B.	82-3	346	—	—	—	Record spoilt	by	air	tremors.	7	3	25	-10	7	29	0	7	39	0	—
Paris	—	83-4	343	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Padova	V.	84-2	336	6	53	8	-9	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rocca di Papa	Aga.	87-2	333	6	53	31	-3	—	—	—	—	—	7	32	6	—	—	—	—	—	—
Barcelona	C.	89-6	341	—	—	—	—	—	—	—	—	—	7	28	30	7	39	56	—	—	—
Granada	M.	95-8	344	7	58	5	+223	—	7	9	16	+208	—	—	—	—	—	—	—	—	—
San Fernando	N. M.	97-0	316	7	22	30	+1682	—	—	—	—	—	7	38	0	7	48	0	—	—	—
La Paz	—	133-4	67	7	0	56	+219	—	—	—	—	—	7	57	0	8	4	40	—	—	—

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1915. May 14.

Origin : 45°0N. 157°5E., determined by Shide.

Time at Origin : 14h. 22m. 50s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.		O-C.	PR ₁		S.		O-C.	L.		M.		Remarks.						
				H.	M.	S.	H.	M.	S.	H.	M.	S.	H.	M.	S.							
Osaka	O.	19-7	247	14	28	5	+38	—	—	—	—	—	—	—	14	40	54	—	—	—	—	
Zi-ka-wei	W.	31-2	257	—	—	—	—	—	14	34	23	-21	—	—	—	—	—	—	—	—	—	—
Irkutsk	G.	35-1	302	14	29	21	-43	—	—	—	—	+12	14	41	0	14	41	44	—	—	—	
Honolulu	M.	43-1	107	—	—	—	—	—	—	—	—	—	14	47	0	14	54	36	—	—	—	
Ekaterinburg	G.	56-9	319	14	32	38	-3	—	—	—	—	—	14	51	0	14	58	28	—	—	—	
Pulkovo	G.	66-7	334	14	33	45	-1	—	—	—	—	-15	14	48	0	15	9	13	—	—	—	
Baku	G.	72-8	310	14	34	23	-2	—	—	—	—	—	15	1	0	15	13	43	—	—	—	
Tiflis	G.	74-5	314	14	34	38	+2	—	—	—	—	—	15	2	0	15	13	46	—	—	—	
Edinburgh	M.	77-8	349	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Eskdalemuir	G.	78-3	349	Disturbance	from	—	—	14h. 15m. 0s.	to	15h. 45m. 0s.	—	—	—	—	—	—	—	—	—	—	—	
Bidston	M.	80-2	348	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Helwan	M.	90-5	316	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
La Paz	—	132-5	69	14	46	2	+393	—	—	—	—	—	—	—	15	21	18	—	—	—	—	
															15	20	0	—	—	—	—	—

32

1915. May 19.

Origin : 38°5N. 40°0E., determined by Shide.

Time at Origin : 4h. 48m. 21s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Tiflis	G.	4.9	47	4 48 51		+14	—	4 51 30	+55	—	4 52 16	37°0N. 36°2E.									
Baku	G.	7.9	72	4 50 25		+4	—	4 51 21	-34	4 52 42	4 56 54	—									
Helwan	M.	11.1	223	4 52 42		? S.	—	4 52 42	-36	—	5 1 18	—									
Rocca di Papa	Aga.	21.0	287	4 52 53		-21	—	4 52 18	+313	—	—	—									
Padova	Aga.	21.0	287	4 53 4		-10	—	4 57 12	+7	5 1 54	—	—									
Padova	V.	21.9	298	4 53 21		-4	—	5 3 4	+340	—	—	—									
Pulkovo	G.	22.2	247	4 53 26		-2	—	4 57 25	-5	4 59 0	5 1 21	39°0N. 40°0E.									
Ekaterinburg	G.	22.9	30	4 53 36		-1	—	4 57 48	+4	5 0 0	5 3 45	—									
Paris	—	28.7	303	—		—	—	4 59 16	-17	5 5 0	5 6.7	—									
Barcelona	Ma.	28.9	287	—		—	—	4 59 23	+8	—	5 7 33	—									
Kew	M.	30.8	308	—		—	—	—	—	—	5 9 6	—									
Shide	M.B.	31.3	306	—		—	—	—	—	—	5 9 30	—									
Newport, I.W.	M.Bk.	31.9	306	—		—	—	—	—	—	5 9 0	—									
Stonyhurst	M.	32.5	312	5 4 0		? L.	—	—	—	5 4 0	5 14 30	—									
Bidston	M.	32.8	311	5 1 18		? S.	—	5 1 18	+36	—	5 15 18	—									
Eskdalemuir	G.	33.2	315	5 0 18		? S.	—	5 0 18	-30	5 4 30	—	—									
Edinburgh	M.	33.3	316	5 1 0		? S.	—	5 3 33	+165	—	—	—									
Granada	G.	34.1	381	5 0 42		? S.	—	5 1 0	+10	—	5 15 0	—									
Kodaikanal	M.	43.8	120	—		—	—	5 0 42	-21	5 6 24	5 11 27	—									
Irkutsk	G.	45.6	50	—		—	—	4 45	+222	—	5 16 36	—									
Cape Town	M.	75.1	198	4 56 56		-2	—	5 3 36	-8	5 13 30	5 14 28	—									
				—		—	—	—	—	—	5 29 42	—									

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1915. May 21.

Origin : 4°0N. 32°0E., determined by Shide.

Time at Origin : 4h. 18m. 44s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Helwan	E. M.	25.9	359	4 26 30		? P.R.	4 26 30	4 29 54	+45	—	4 33 18	—									
Accra	M.	32.2	275	4 36 36		? S.	—	4 36 36	+341	—	4 47 42	—									
Mauritius	E. M.	35.0	134	4 31 0±		? S.	—	4 31 0±	-39	—	4 35 0±	—									
Malta	E. M.	35.7	335	4 32 0		? S.	—	4 32 0	+19	—	4 44 0	—									
Tiflis	G.	39.4	15	4 26 34		0	—	4 32 30	-12	4 36 0	4 40 26	—									
Baku	G.	39.8	21	—		—	—	—	—	4 37 0	4 46 54	—									
Cape Town	E. M.	40.0	198	4 34 0		? S.	—	4 34 0	+69	—	4 41 30	—									
Rocca di Papa	Aga.	41.5	338	4 26 40		-11	—	—	—	4 42 6	4 48 20	—									
Bombay	E. M.	42.5	66	—		—	—	—	—	4 44 30	4 44 1	—									
Padova	V.	45.0	346	4 27 12		-5	—	4 33 41	-18	—	—	—									
Kodaikanal	E. M.	45.5	80	4 38 12		? S.	—	4 38 12	+246	4 43 18	4 48 0	—									
Barcelona	Ma.	46.0	329	4 29 8		? P.R.	4 29 8	4 33 52	-20	4 39 55	4 47 12	—									
Granada	G.	46.5	320	4 27 24		-3	—	4 34 10	-8	4 38 48	4 44 36	12°0N. 41°0E.									
Colombo	E. M.	47.6	85	4 39 0		? S.	—	4 39 0	+267	4 46 30	4 47 42	—									
Ascension	E. M.	47.8	255	4 49 0		—	—	—	—	—	4 52 0	—									
San Fernando	E. M.	47.8	318	—		—	—	4 34 0	-27	4 43 0	4 47 0	—									
	E. M.	47.8	318	—		—	—	—	—	4 43 0	4 47 0	—									
Rio Tinto	E. M.	48.8	319	4 27 0		-43	—	—	—	—	4 47 0	—									
Simla	O.E.	50.3	52	4 35 0		? S.	—	4 35 0	-7	—	—	—									
Paris	—	51.3	335	4 27 57		-2	4 29 59	4 35 14	—	—	4 46 47	Abyssinia.									
Shide	E. M.S.	51.4	335	—		—	—	—	—	4 48 0	—	—									
Newport, I.W.	E. M.	54.4	335	4 36 58		? S.	—	4 36 58	+60	—	4 53 0	—									
Kew	M.Bk.	54.4	335	4 36 0		? S.	—	4 36 0	+2	—	4 52 30	—									
Haslemere	E. M.	54.5	335	4 40 15		? S.	—	4 40 15	+256	—	4 49 0	—									
Pulkovo	E. M.	54.6	336	4 39 0		? S.	—	4 39 0	+180	—	4 52 6	—									
Bidston	E. M.	55.8	339	4 28 28		-1	4 30 40	4 36 10	-5	4 44 0	4 55 28	5°0N. 34°E.									
Stonyhurst	E. M.	57.2	336	4 28 54		-17	—	4 35 54	-39	—	4 56 42	—									
	M.	57.2	337	4 35 42		? S.	—	4 35 42	-51	—	4 50 54	—									

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British Association for the Advancement of Science.—Seismological Committee.

Observations and formal business to
J. H. BURGESS,
Earthquake Observatory,
SHIDE, Isle of Wight.

Special inquiries to
Prof. H. H. TURNER,
University Observatory,
OXFORD.

Bulletin for June, July, and August, 1915.

For the large Earthquakes an attempt is here made to compare the readings with theoretical values, as explained in the Nineteenth Report of the Committee to the British Association. The position of the epicentre is determined at Shide, unless otherwise stated; and the tables of times for P and S are those given by Galitzin in his "Vorlesungen über Seismometrie," p. 137, or by G. W. Walker on p. 54 of his "Modern Seismology." It is shown in the above Report that these tables are sensibly erroneous: but the precise values of the corrections are under discussion, and it seems better to await the definitive corrections than to introduce provisional tables. The tables are reproduced in an expanded form at the end of this Bulletin. The time of the earthquake at the epicentre is deduced from the best records; and applying the tabular times for the distances in the third column (calculated and also measured from a large globe specially made for the purpose), the errors O - C of the observed times are found.

Observers are requested to send a copy of their Registers to Shide *each month*, in order that this collated information may be published as early as possible.

For the large earthquakes the stations are arranged in the order of distance from epicentre, as shown in the 3rd column. The azimuth in the 4th column is also read from the globe; and is the azimuth at the epicentre measured from N. towards E., in which the observing station lies. The Earthquake Chart formerly given has been discontinued in favour of brief notes for the smaller earthquakes, the stations being arranged in the order of longitude.

The letters in the 2nd column stand for: A. = Alfani; Aga. = Agamennone; B. = Bosch; Bif. = Bifilar; B.O. = Bosch-Omori; C. = Cartuja; Ca. = Cancani; C.O. = Cartuja-Omori; G. = Galitzin; L. = Luckmann; M. = Milne; Ma. = Mainka; M.B. = Milne-Burgess; M.Bk. = Milne-Bullock; M.S. = Milne-Shaw; O.A. = Omori-Alfani; O.E. = Omori-Ewing; S. = Stiattesi; V. = Vincentini; W. = Wiechert.

Riverview has two W. and one Ma.; it is not generally specified from which machine the readings were obtained.

1915. June 1.

Origin: 77°0N. 7°0E., determined by Shide.

Time at Origin: 14h. 43m. 45s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.		O-C.		PR ₁	S.		O-C.		L.		M.		Remarks.
				U.	M.	S.	S.		H.	M.	S.	H.	M.	S.			
Pulkovo	C.	18.9	143	14 48 27	+14	14 52 4	+19	14 54 0	14 52 17	14 54 0	14 30 24	79°1N. 8°5E.					
Dyce, Aberdeen	G.	18.9	142	14 48 33	+17	14 52 17	+32	14 54 48	14 53 0	14 54 48	15 3 0						
Edinburgh	Ma.	20.0	193	14 41 48	+25	14 52 48	+40	14 54 48	14 53 0	14 54 48	15 2 0						
Eskdalemuir	E.	21.4	195	14 39 7	-533	14 52 48	+40	14 54 48	14 53 0	14 54 48	15 0 0						
Bakston	G.	23.0	196	14 49 7	+17	14 53 38	+18	14 54 48	14 53 38	14 54 48	15 1 0						
Kew	M.S.	23.9	195	14 49 35	+24	14 53 24	+3	14 54 48	14 53 24	14 54 48	15 6 24						
Guildford	S.	25.7	191	14 53 0	? S.	14 53 0	-61	14 54 48	14 53 0	14 54 48	15 1 0						
Haslemere	M.	25.9	191	14 39 13	-619	14 53 58	-547	14 54 48	14 46 24	14 54 48	15 15 19						
Shide	M.L.	25.9	191	14 40 38	-534	14 46 24	-461	14 54 48	14 46 24	14 54 48	15 0 0						
Newport, I.W.	E.	26.5	191	14 54 36	? S.	14 51 36	+27	14 54 48	14 51 36	14 54 48	15 9 0						
Ekaterinburg	M.B.	26.5	192	14 49 7	+9	14 54 17	0	14 56 34	14 54 17	14 56 34	15 4 37						
Paris	E.	26.5	192	14 49 7	+31	14 54 27	+10	14 56 7	14 54 27	14 56 7	15 1 4						
Padova	E.	27.3	196	14 49 45	-1	14 54 21	-10	14 57 0	14 54 21	14 57 0	15 3 46						
Moncalieri	G.	28.3	186	14 49 53	-3	14 58 9	+200	15 4 0	14 58 9	15 4 0	15 10 0						
Rocca di Papa	V.	31.7	174	14 48 30	-119	14 57 27	+99	14 58 8	14 57 27	14 58 8	15 5 44						
Barcelona	S.	32.0	179	14 50 32	0	14 54 29	-84	14 59 24	14 54 29	14 59 24	15 13 0						
Viñe	Agg.	35.3	173	14 50 59	-2	14 56 48	+3	15 9 48	14 56 48	15 9 48	15 11 28						
Granada	Ma.	35.6	185	14 51 6	+3	14 56 34	+3	15 10 0	14 56 34	15 10 0	15 15 42						
Baku	G.A.	37.6	133	14 51 33	+13	14 56 30	-47	15 1 0	14 56 30	15 1 0	15 15 42						
Guatemala	M.	39.7	197	14 35 0	-997	14 58 22	+29	15 1 0	14 58 22	15 1 0	15 13 45						
Baku	M.C.	40.1	193	14 51 52	+11	14 57 52	-11	15 1 0	14 57 52	15 1 0	15 13 45						
Baku	G.	40.8	127	14 51 43	-3	14 57 52	-11	15 1 0	14 57 52	15 1 0	15 13 45						

San Fernando	{ N. M.	40.9	196	14 51 48	+ 1	—	—	—	—	15 9 30	15 13 48	—
	{ M.	40.9	196	14 52 7	+20	—	—	—	—	15 9 40	15 14 24	—
	{ G.	41.1	67	14 51 31	+ 3	14 53 26	—	—	—	15 3 30	15 6 38	—
Irkutsk				14 51 34	+ 3	—	—	—	—	—	—	—
Azores	{ E. M.	41.8	220	15 3 0	+666	—	—	—	—	—	15 21 0	—
Ottawa	{ N. B.	44.5	276	14 52 3	-12	14 53 49	—	—	—	15 4 54	15 10 0	—
	{ B.	44.5	276	14 52 7	0	—	—	—	—	15 4 48	15 7 30	—
Harvard Univ.	{ N. B.O.	46.3	274	14 52 29	+ 2	—	—	—	—	15 5 6	15 12 33	—
	{ B.O.	46.3	274	14 52 29	+ 2	—	—	—	—	15 7 9	—	—
Toronto	{ E. M.	47.0	279	14 57 36	? S.	—	—	—	—	15 7 30	15 11 18	—
Victoria	{ E. M.	50.8	319	15 0 18	? S.	—	—	—	—	15 7 48	15 10 48	—
St. Louis	{ E. W.	54.1	287	—	—	—	—	—	—	15 4 30	15 14 12	—
Simla	{ O.E.	55.3	101	—	—	—	—	—	—	—	15 22 18	—
Berkeley		60.9	316	? 14 53 1	-62	—	—	—	—	15 2 40	15 17 31	—
Osaka	{ O.	63.9	46	14 54 1	-21	—	—	—	—	15 3 18	15 20 3	—
Zi-ka-wei	{ W.	64.8	59	14 54 30	+ 1	—	—	—	—	15 3 19	15 18 45	—
										15 3 25	—	—
										15 3 17	15 19 7	—
Bombay	{ E. O.	64.8	59	14 54 46	+17	—	—	—	—	—	15 28 58	—
Taihoku	{ M.	66.2	109	—	—	—	—	—	—	—	—	—
Manila	{ O.	70.9	61	—	—	—	—	—	—	—	—	—
Honolulu	{ W.	80.9	61	14 56 45	+36	—	—	—	—	15 4 38	15 27 22	—
La Paz	{ M.	81.2	346	14 59 6	+175	—	—	—	—	15 6 36	15 27 30	—
				15 2 30	+261	—	—	—	—	15 11 18	15 27 30	—
				15 2 47	+278	—	—	—	—	15 12 12	15 35 12	—
										—	—	—

S.R. 15h. 2m. 41s.
S.R. 15h. 2m. 37s.

33

1915. June 3.
Origin : 37°0N. 72°0E., determined by Shide.
Time at Origin : 8h. 8m. 4s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.	
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.		
Simla	O.E.	7.2	142	8	9	54	+ 1	—	—	—	?	8	11	12	- 7	—	—	—	—	—	—	
Baku	G.	17.5	288	8	12	7	- 8	—	—	—	8	15	23	-10	? 8	19	0	—	—	—	—	
				8	12	11	- 4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Bombay	E. M.	18.1	177	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Ekaterinburg	G.	21.2	343	8	13	9	+10	8	13	34	8	17	1	+ 9	—	—	—	—	—	8	18	53
Tiflis	G.	21.5	291	8	13	3	0	—	—	—	8	16	56	- 3	—	—	—	—	—	—	—	—
Helwan	M.	34.4	271	8	23	0	? S.	—	—	—	8	23	0	+130	—	—	—	—	—	—	—	—
Pulkovo	G.	34.9	324	8	15	14	- 2	—	—	—	8	20	36	-22	8	22	0	8	23	49	—	—
Edinburgh	E. M.	52.2	347	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	45	0
Stonyhurst	E. M.	52.3	314	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	42	0
Shide	{ E. M.	52.3	310	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	{ M.S.	52.3	310	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	{ E. M.B.	52.3	310	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bidston	{ N. M.S.	53.4	314	8	35	18	+1065	—	—	—	—	—	—	—	—	—	—	—	—	8	41	0

Paint traces.

4

Paris	—	85.5	337	22	10	29	—	1	—	22	20	48	-16	22	40	0	22	52	0	—
Ottawa	E.	B.	86.8	28	—	—	—	—	—	22	21	22	+4	—	—	—	22	58	0	—
Toronto	E.	M.	86.9	31	22	30	6	+1169	—	—	—	—	—	22	44	48	22	56	0	—
Moncalieri	—	S.	87.2	332	22	20	54	? S.	—	(22	20	51	-28	22	39	51	22	52	42
Helwan	E.	M.	87.5	308	22	22	30	? S.	—	22	32	28	+666	—	—	—	22	48	7	—
Rocca di Papa	—	Ag.	87.9	327	22	10	43	0	—	22	22	30	+64	—	—	—	22	11	3	—
Barcelona	—	Ma.	92.2	333	—	—	—	—	—	22	22	0	-628	22	42	35	—	—	—	—
Granada	—	C.	87.9	336	—	—	—	—	—	? 22	23	28	+14	22	44	0	22	51	48	—
San Fernando	E.	M.	90.4	338	22	46	0	+2054	—	—	—	—	—	22	56	30	23	1	30	—
—	N.	M.	90.4	338	22	47	0	+2114	—	—	—	—	—	22	58	0	23	2	30	—
La Paz	—	—	142.2	62	22	18	0	+181	—	—	—	—	—	23	6	0	23	9	30	—

Small Earthquakes which do not give good determinations—

- June 3, 23hrs.: Stonyhurst, Paris, Rocca di Papa, Baku, Zi-ka-wei, Sydney, Riverview, Honolulu, Lick.
- June 4, 0hrs.: San Fernando, Bidston, Stonyhurst, Pulkovo, Helwan, Baku, La Paz.
- June 6, 6hrs.: Edinburgh, Stonyhurst, Paris, Moncalieri, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Sydney, Riverview, Honolulu, La Paz.
- June 6, 8hrs.: San Fernando, Granada, Eskdalemuir, Edinburgh, Bidston, Stonyhurst, Shide, Guildford, Kew, Paris, Pulkovo, Helwan, Tiflis, Baku, Mauritius, Ekaterinburg, Colombo, Honolulu, La Paz.
- June 6, 19-20hrs.: Edinburgh, Bidston, Shide, Paris, Rocca di Papa, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Batavia, Sydney, Riverview, Honolulu, Victoria, Toronto, Ottawa, Harvard University, La Paz.
- June 7, 11-12hrs.: Edinburgh, Stonyhurst, Shide, Guildford, Paris, Rocca di Papa, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Riverview, Toronto, Ottawa.
- June 8, 2-3hrs.: Edinburgh, Pulkovo, Baku, Ekaterinburg, Manila, Taihoku.
- June 11, 15-16hrs.: San Fernando, Edinburgh, Stonyhurst, Paris, Moncalieri, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Riverview, Honolulu, La Paz.
- June 13, 19hrs.: Granada, Guildford, Barcelona, Paris, Padova, Rocca di Papa, Malta, Pulkovo, Tiflis, Baku, Ekaterinburg.
- June 14, 3-4hrs.: Bidston, Paris, Rocca di Papa, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Batavia, Manila, Sydney, Riverview, Honolulu, La Paz.

1915. June 6.

Origin : 19°0s. 69°0w., determined by Shide.

Time at Origin : 21h. 28m. 46s. First 'quake. See also pages 10 and 11.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.			PR ₁			S.			O-C.			L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	H.	M.	S.		
La Paz	—	2.6	17	21	30	22	+55	—	—	—	—	21	30	41	+43	21	31	0	—	—	—	—	—	20°0s. 69°5w.	
Ascension	E.	M.	54.0	86	21	37	0	-79	—	—	—	—	—	—	—	—	—	—	22	0	0	—	—	—	
St. Helena	M.	60.1	98	21	42	0	+181	—	—	—	—	—	—	—	—	—	—	—	22	11	30	—	—	—	
St. Louis	E.	W.	60.9	341	? 21	39	26	-1.22	—	—	—	—	—	—	—	21	47	24	21	47	38	—	—	—	
Harvard Univ.	E.	B.O.	61.8	358	21	39	34	+24	—	—	—	21	47	34	+2	21	54	14	—	—	—	—	—	—	
—	N.	B.O.	61.8	358	21	39	32	+22	—	—	—	21	47	32	0	? 21	54	30	—	—	—	—	—	—	
Toronto	E.	M.	63.4	352	21	40	48	+88	—	—	—	—	—	—	—	21	49	24	21	51	30	—	—	—	
Ottawa	E.	B.	61.8	355	—	—	—	—	—	—	—	—	—	—	—	21	56	42	—	—	—	—	—	—	
—	N.	B.	64.8	355	21	39	53	+23	—	—	—	21	48	19	+10	21	56	12	—	—	—	—	—	—	
Azores	E.	M.	60.9	35	—	—	—	—	—	—	—	—	—	—	—	—	—	—	21	49	42	—	—	—	
Berkeley	E.	—	75.7	319	21	41	4	+25	—	—	—	—	—	—	—	—	—	—	21	41	47	—	—	—	
Cape Town	E.	M.	77.6	122	21	41	18	+27	—	—	—	21	41	54	-528	—	—	—	21	50	54	—	—	—	
San Fernando	N.	M.	81.1	46	21	41	0	-12	—	—	—	—	—	—	—	21	51	30	21	52	30	—	—	—	
Rio Tinto	E.	M.	81.6	45	21	39	0	-134	—	—	—	—	—	—	—	—	—	—	21	54	0	—	—	—	
Victoria	E.	M.	83.0	327	21	42	24	+62	—	—	—	—	—	—	—	21	43	24	21	43	24	—	—	—	
—	E.	M.	83.0	327	21	50	0	+518	—	—	—	—	—	—	—	21	52	0	21	53	30	—	—	—	
Granada	—	C.	83.3	47	21	41	42	+18	—	—	—	21	51	55	+9	22	5	18	22	10	30	—	—	16°0s. 68°0w.	
Barcelona	—	Ma.	89.3	45	21	42	6	+8	—	—	—	21	52	23	-29	22	7	0	22	15	41	—	—	—	
Shide	N.	M.	91.5	36	? 21	42	3	-7	—	—	—	21	52	43	-33	—	—	—	22	30	36	—	—	—	
—	E.	M.S.	91.5	36	21	42	16	+6	—	—	—	21	52	33	-43	—	—	—	22	18	42	—	—	—	
—	E.	M.B.	91.5	36	21	42	16	+6	—	—	—	21	52	36	40	—	—	—	22	18	46	—	—	—	
Newport, I.W.	E.	M.Bk.	91.5	36	21	42	15	+5	—	—	—	21	52	35	-41	—	—	—	22	19	5	—	—	—	
Bidston	N.	M.S.	91.9	33	21	42	24	+12	21	49	18	21	52	42	-38	—	—	—	22	0	30	—	—	—	
West Bromwich	E.	M.	92.0	34	21	42	28	+15	—	—	—	? 21	52	50	-31	—	—	—	—	—	—	—	—	—	
Haslemere	E.	M.	92.0	36	21	42	0	-13	—	—	—	—	—	—	—	—	—	—	22	20	0	—	—	—	
Guildford	E.	N.	92.2	36	21	37	8	-306	—	—	—	21	45	41	-462	? 22	1	15	22	3	30	—	—	First 'quake.	
—	E.	M.	92.2	36	21	44	14	+120	—	—	—	? 21	52	43	-40	? 22	8	48	22	13	12	—	—	Second 'quake.	
Kew	E.	M.	92.4	36	21	46	0	+225	—	—	—	—	—	—	—	—	—	—	22	23	30	—	—	—	
Stonyhurst	E.	M.	92.4	33	21	43	24	+69	—	—	—	—	—	—	—	—	—	—	22	20	42	—	—	—	
Eskdalemuir	E.	G.	92.7	31	21	42	25	+8	21	46	8	21	52	34	-54	21	53	30	22	9	0	—	—	11°0s. 58°0w.	

Paris			92.8	39	21 42 26	+ 9	21 46 20	21 52 43	-46	22 6 0	22 19 0		
Edinburgh	E.	M.	93.1	31	21 42 0	-19					22 23 0		
Dyce, Aberdeen	E.	Ma.	94.2	30	21 43 0	+35		21 52 20	-84		21 59 52		
Moncalieri	S.	Ma.	94.2	30	21 42 28	+ 3		21 52 20	-84		21 59 52		
Honolulu	E.	M.	94.4	44	21 42 26	0		21 52 46	-60	22 0 38	22 22 35		
Rocca di Papa	E.	Agg.	96.7	48	21 42 40	+ 1		21 47 36	-386	21 53 0	21 54 48		
Padova	V.		97.4	44	21 42 49	+ 7		21 53 2	-67	22 9 30	22 29 50		
Pompeii	E.	O.A.	97.6	49	21 43 33	+49		21 53 10	-66				
	S.	O.A.	97.6	49	21 42 0	-44		21 53 33	-45	22 8 5			
Helwan	M.		108.1	64	21 48 36 ?	+301		21 53 44	-34				
Pulkovo	G.		111.0	32	21 43 48	0	21 47 55	21 54 18	-99		22 39 12		
	G.		111.0	32	21 44 28	+40	21 49 1	21 55 48	-35	22 10 0	22 15 32		
Sydney	E.	M.	114.7	216	21 49 48	+343		21 57 0	+37				1st Origin: 12°-0s. 66°-0w.
Riverview	W.		114.7	216	21 48 54	+289	21 51 55	21 55 30	-84	21 58 42	22 0 30		2nd " 18°-0s. 70°-0w.
					21 49 0	+295		21 58 34	+100	22 18 12	22 33 8		P.S. 21h. 59m. 36s.
Mauritius	E.	M.	114.9	124	21 49 12	+306				21 56 6	21 59 48		
	S.	M.	114.9	124	21 49 0	+294		21 55 48	-67	21 58 6	21 59 42		
Adelaide	E.	M.	120.0	206	21 49 30	+302					22 5 48		
Tiflis	G.		120.1	54	21 44 31	+ 2				22 1 0	22 46 52		
Baku	G.		124.0	54							22 45 43		i 21h. 48m. 7s.
Ekaterinburg	G.		127.1	32	21 45 3	+ 3				22 20 0	22 22 31		
					21 45 41	+41					22 24 12		
Bombay	E.	M.	143.9	83	21 49 0	+167					22 53 56		
Kodakanal	E.	M.	146.4	101	21 48 34	+151				21 59 6	22 53 12		
Sinla	O.E.		147.2	62	21 48 48	+142				22 30 36	22 53 0		
Colombo	E.	M.	147.3	108	21 48 48	+142		22 10 48	+619	21 59 0	22 13 48		
	M.		147.3	108							22 56 36		Two shocks.
Osaka	O.		153.3	311	21 49 27	+157		22 37 36	+2226	22 47 24	22 18 24		
Batavia	W.		154.4	170	21 49 19	+147		22 1 54	+57	22 12 24	22 35 0		
Zi-ka-wei	W.		164.6	224	21 49 20	+111	21 50 9						
	O.		164.6	224	21 50 21	+172							
Taihoku	G.		168.6	303	21 48 12	-29							
Manila	W.		169.5	247	21 49 45	+119					22 16 4		

1915. June 6.

Origin : 17°-0s. 60°-0w., determined by Shide.

Time at Origin : 21h. 29m. 26s. Second 'quake. See also pages 8 and 9.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	I.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
La Paz		7.8	270	21	30	22	-62														
Ascension	E.	M.	45.3	85	21	37	0	-61													
St. Helena	M.		51.9	97	21	42	0	+195													
Harvard Univ.	E.	B.O.	60.2	351	21	39	34	- 5			21 47 34	-18									
	S.	B.O.	60.2	351	21	39	32	- 7			21 47 32	-20									
St. Louis	W.		62.3	334	? 21	39	26	-27													
Toronto	E.	M.	63.2	314	21	40	48	+49													
Azores	E.	M.	63.5	39	21	41	6	+65													
Ottawa	E.	B.	64.0	348																	
	S.	B.	64.0	348	21	39	53	-11			21 48 19	-20									
Cape Town	W.	M.	71.2	121	21	41	18	+25			21 41 54	-492									
San Fernando	S.	M.	73.7	43	21	41	0	- 6													
Rio Tinto	E.	M.	74.2	41	21	39	0	-129													
Granada	C.		75.8	43	21	41	42	+22			21 51 55	+54									
Berkeley	E.		80.0	315	21	41	4	-41													
Barcelona	Ma.		81.8	42	21	42	6	+11			21 52 23	+13									
Shide	E.	M.	85.0	33	? 21	42	3	- 11			21 52 43	- 2									
	S.	M.S.	85.0	33	21	42	16	+ 2			21 52 33	-12									
	E.	M.B.	85.0	33	21	42	16	+ 2			21 52 36	- 9									
Newport, I.W.	E.	M.Bk.	85.0	33	21	42	15	+ 1			21 52 35	-10									
Haslemere	E.	M.	85.4	33	21	42	0	-16													
Guildford	M.		85.6	33	21	37	8	-309			21 45 41	-431									
	M.		85.6	33	21	44	14	+117			? 21 52 43	- 9									
Bidston	N.	M.S.	85.6	30	21	42	24	+ 7	21 49 18		21 52 42	-10									
West Bromwich	M.		85.6	31	21	42	28	+11			? 21 52 50	- 2									
Kew	E.	M.	85.8	33	21	46	0	-222													
Paris	E.		85.9	36	21	42	26	+ 7	21 46 20		21 52 43	-12									
Stonyhurst	E.	M.	86.1	30	21	43	24	-64			21 47 30	-327									
Victoria	S.	M.	86.2	323	21	42	24	+ 4													
	E.	M.	86.2	323	21	50	0	+160													

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Eskdalemuir	G.	86.7	29	21 42 25	+ 2	21 46 8	21 52 34	-30		
Edinburgh	M.	87.0	28	21 42 0	-25	---	---	---		
Moncalieri	S.	87.1	41	21 42 26	0	---	21 52 46	-22		
Dyce, Aberdeen	E. Ma.	88.2	27	21 43 0	+28	---	---	-60		
	N. Ma.	88.2	27	21 42 28	-4	---	21 52 20	-60		
Rocca di Papa	E. Aga.	89.0	45	21 42 40	+ 4	---	21 53 2	-27		
Pompeii	N. O.A.	89.8	47	21 43 33	-52	---	21 53 33	- 5		
	O.A.	89.8	47	21 42 0	-41	---	21 53 44	+ 6		
Ladova	V.	90.0	42	21 42 49	+ 7	---	21 53 10	-30		
Helwan	M.	99.4	61	21 48 36?	+303	---	21 54 18	-58		
Honolulu	E. M.	103.3	289	21 43 30	-23	---	21 47 36	-497		
Pulkovo	G.	104.7	31	21 43 48	-11	21 47 55	21 55 48	-17		
	G.	104.7	31	21 44 28	+29	21 49 1	21 57 0	+55		
Mauritius	E. M.	108.7	119	21 49 12	+294	---	---	---		
	N. M.	108.7	119	21 49 0	+282	---	21 55 48	-54		
Tiflis	G.	112.1	51	21 44 31	- 2	---	---	---		
Baku	G.	115.9	53	---	---	---	---	---		
Ekaterinburg	G.	120.8	33	21 45 3	- 9	21 49 1	---	---		
				21 45 41	+29	---	---	---		
Sydney	E. M.	121.1	210	21 49 48	+274	---	21 55 30	-174		
Riverview	W.	121.1	210	21 48 54	+220	21 51 55	21 58 34	+10		
				21 49 0	+226	---	---	---		
Adelaide	E. M.	125.2	199	21 49 30	+237	---	---	---		
Bombay	E. M.	133.2	80	21 49 0	+164	---	---	---		
Simla	O.E.	137.6	60	21 48 48	+141	---	22 10 48	+632		
Kodaikanal	E. M.	138.2	94	21 48 54	+144	---	---	---		
Colombo	E. M.	139.5	99	21 48 48	+133	---	21 48 48	-699		
	W.	139.5	99	---	---	---	22 37 36	+2229		
Batavia	W.	153.4	150	21 49 19	+108	---	---	---		
Osaka	O.	157.6	325	21 49 27	+101	---	22 1 54	+ 1		
Zi-ka-wei	W.	165.8	5	21 49 20	+67	21 50 9	---	---		
	O.	165.8	5	21 50 21	+128	---	---	---		
Taihoku	G.	171.9	350	21 48 12	-22	---	---	---		
Manila	W.	177.4	158	21 49 45	+50	---	---	---		

11

1915. June 7.

Origin : 42°5N. 149°0E., determined by Shide.

Time at Origin : 21h. 59m. 6s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.		O-C.		Pr ₁		S.		O-C.		L.		M.		Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	H.	M.	S.	H.	
Osaka	O.	13.1	239	22 3 4	+44	---	---	---	---	---	---	---	---	22 6 4	22 7 30	---	---	
Zi-ka-wei	W.	24.6	252	22 5 4	+24	---	---	---	---	22 9 30	+29	---	---	---	---	---	---	
	O.	24.6	252	22 5 6	+26	---	---	---	---	22 9 54	+53	---	---	---	---	---	---	
Manila	W.	36.9	229	22 5 45	-50	---	---	---	---	22 9 23	-186	22 13 11	22 17 30	---	---	---	---	
Honolulu	E. M.	48.8	99	22 15 0	S.	---	---	---	---	22 15 0	-10	22 22 12	22 28 36	---	---	---	---	
Ekaterinburg	G.	54.7	318	22 8 43	0	---	---	---	---	22 16 10	-13	22 24 0	22 28 34	44°1N. 146°8E.	22 33 18	---	---	
	G.	54.7	318	22 8 47	+ 4	---	---	---	---	---	---	---	---	---	---	---	---	
Simla	O.E.	56.9	284	---	---	---	---	---	---	---	---	22 26 0	---	---	---	---	---	
Pulkovo	G.	66.1	331	22 9 56	- 2	22 12 14	?	22 18 28	-16	22 28 0	---	22 28 0	22 32 26	---	---	---	---	
Baku	G.	69.6	307	22 10 15	- 6	22 13 41	?	22 19 17	-10	22 34 0	---	22 34 0	22 43 44	---	---	---	---	
	G.	69.6	307	22 10 20	- 1	---	---	---	---	---	---	---	---	---	---	---	---	
Tiflis	G.	71.7	310	22 10 42	+ 8	22 15 10	---	22 19 56	+ 4	22 26 0	---	22 26 0	22 43 53	55°2N. 163°6E.	---	---	---	
	G.	71.7	310	22 10 47	+13	---	---	---	---	---	---	22 38 0	---	---	---	---	---	
Edinburgh	E. M.	78.8	345	22 21 0	S.	---	---	22 21 0	-16	---	---	---	22 50 0	---	---	---	---	
Eskdalemuir	G.	79.4	344	22 11 22	+ 1	---	---	22 21 3	-19	22 38 30	---	22 38 30	22 47 30	---	---	---	---	
	G.	79.4	344	---	---	---	---	22 22 1	+39	---	---	---	---	---	---	---	---	
Stonyhurst	M.	80.6	343	22 15 6	P.R.	22 15 6	---	---	---	---	---	---	22 54 24	---	---	---	---	
Bigston	N. M.S.	81.1	344	---	---	---	---	22 23 6	---	---	---	---	22 51 24	---	---	---	---	
Kew	E. M.	82.3	341	22 19 0	+442	---	---	---	---	---	---	---	22 56 0	---	---	---	---	
Guildford	M.	82.6	341	22 16 13	+273	---	---	---	---	---	---	22 37 45	22 39 36	---	---	---	---	
Shide	E. M.S.	83.2	342	---	---	---	---	22 21 51	-14	22 41 48	---	---	22 48 48	---	---	---	---	
	E. M.B.	83.2	342	---	---	---	---	---	---	---	---	---	22 48 48	---	---	---	---	
Newport, I.W.	E. M.Bk.	83.2	342	---	---	---	---	---	---	---	---	---	23 5 16	---	---	---	---	
Toronto	E. M.	83.5	33	---	---	---	---	---	---	---	---	22 48 54	22 52 42	---	---	---	---	
				---	---	---	---	---	---	---	---	22 52 0	---	---	---	---	---	
Paris	---	84.1	339	22 11 50	+ 1	---	---	22 21 59	-16	22 38 0	---	22 38 0	---	---	---	---	---	
Moncalieri	S.	86.0	333	22 11 55	- 4	---	---	22 22 9	-27	22 32 5	---	22 32 5	22 53 14	---	---	---	---	
				---	---	---	---	---	---	---	---	---	22 51 0	---	---	---	---	
Rocca di Papa	E. Aga.	86.9	329	22 12 2	- 2	---	---	---	---	---	---	---	---	---	---	---	---	

12

Helwan	E.	M.	87-7	310	22	22	42	? S.	—	22	22	42	-13	—	—	—	—	—	
Barcelona	E.	M.	90-9	335	—	—	—	—	—	22	23	2	-27	22	44	24	22	57	8
Granada	C.		96-5	338	—	—	—	—	—	22	23	39	-48	22	43	0	22	59	0
San Fernando	E.	M.	97-8	310	—	—	—	—	—	—	—	—	—	22	54	30	22	59	0
	N.	M.	97-8	340	22	29	0	+95.5	—	—	—	—	—	22	34	0	22	57	30
La Paz	—	—	139-1	62	22	23	2	+409	—	—	—	—	—	22	58	0	23	—	0

Small Earthquakes which do not give good determinations—

- June 17, 5-6hrs.: Paris, Helwan, Baku, Ekaterinburg, La Paz.
 June 17-18, 23-0hrs.: San Fernando, Paris, Pulkovo, Helwan, Tiflis, Baku, Mauritius, Ekaterinburg, Bombay, Simla, Colombo, Batavia, Manila, Zi-ka-wei, Taihoku, Osaka, Sydney.
 June 18, 0hrs.: Granada, Eskdalemuir, Edinburgh, Bidston, Stonyhurst, Shide, Newport, Guildford, Kew, Manila, Honolulu.
 June 19, 16hrs.: Pulkovo, Helwan, Tiflis, Ekaterinburg, Zi-ka-wei, Osaka, La Paz.
 June 21, 7hrs.: Pulkovo, Tiflis, Baku, Ekaterinburg, Bombay, Zi-ka-wei, Osaka.
 June 22, 3hrs.: San Fernando, Eskdalemuir, Edinburgh, Bidston, Stonyhurst, Shide, Newport, Kew, Paris, Barcelona, Moncalieri, Padova, Rocca di Papa, Cape Town, Pulkovo, Helwan, Tiflis, Ekaterinburg, Bombay, Irkutsk, Batavia, Manila, Zi-ka-wei, Victoria, St. Louis, Toronto, Ottawa, Harvard University, La Paz.
 June 22, 21hrs.: Stonyhurst, Pulkovo, Tiflis, Ekaterinburg, Irkutsk, Manila, Zi-ka-wei, Osaka, La Paz.
 June 23, 4hrs.: San Fernando, Granada, Eskdalemuir, Edinburgh, Stonyhurst, Bidston, Newport, Guildford, Kew, Paris, Moncalieri, Pulkovo, Helwan, Baku, Ekaterinburg, Irkutsk, Honolulu, Victoria, Berkeley, Santa Clara, Lick, St. Louis, Toronto, Ottawa, Harvard University, La Paz.
 June 23, 5hrs.: San Fernando, Granada, Eskdalemuir, Edinburgh, Bidston, Stonyhurst, Shide, Kew, Paris, Moncalieri, Pulkovo, Helwan, Honolulu, Victoria, Berkeley, Santa Clara, Lick, St. Louis, Toronto, Ottawa, Harvard University, La Paz.
 June 26, 4hrs.: Moncalieri, Padova, Pulkovo, Helwan, Baku, Ekaterinburg, La Paz.
 June 26, 23hrs.: Stonyhurst, Pulkovo, Baku, Ekaterinburg, Irkutsk, Zi-ka-wei.
 June 29, 14hrs.: San Fernando, Edinburgh, Bidston, Stonyhurst, Shide, Paris, Moncalieri, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Irkutsk, Batavia, Manila, Zi-ka-wei, Osaka, Adelaide, Sydney, Riverview, Honolulu, Victoria, Toronto, La Paz.

13

1915. June 24.

Origin : 35°0N. 24°0E., determined by Shide.

Time at Origin : 5h. 20m. 24s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.	
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.		
Helwan	E.	M.	8-1	129	5	23	0	+33	—	—	—	—	—	—	—	—	—	—	—	—	—	
Pompeii	E.	O.A.	9-4	310	5	23	10	+24	—	—	5	27	0	+143	—	—	—	—	—	—	—	
	N.	O.A.	9-4	310	5	23	10	+24	—	—	—	—	—	—	—	—	—	—	—	—	—	
Rocca di Papa	Aga.		11-1	311	5	23	29	+19	—	—	—	—	—	—	5	28	18	—	—	—	—	
Padova	V.		13-8	322	5	24	17	+30	—	—	5	30	4	+217	—	—	—	—	—	—	—	
Moncalieri	S.		15-9	314	5	24	30	+15	—	—	5	27	27	+10	5	30	2	5	32	23	—	
Tiflis	G.		17-5	62	5	24	35	0	—	—	5	27	53	0	5	30	0	5	32	20	—	
Barcelona	V.		18-3	297	? 5	25	1	+16	—	—	—	—	—	—	5	28	35	—	—	—	—	
Paris	—		20-9	317	5	25	27	+11	—	—	5	29	21	+15	5	33	0	5	34	0	Time ± 7 sec.	
					5	29	35	+29	—	—	—	—	—	—	—	—	—	—	—	—	—	
Baku	G.		21-1	68	5	25	3	-15	5	25	55	5	28	54	-16	5	31	0	5	42	28	—
Granada	C.		22-3	283	5	25	44	+11	—	—	5	29	49	+14	5	33	6	5	37	5	—	—
Guildford	M.		23-9	320	—	—	—	—	—	—	5	30	22	+16	—	—	—	—	—	—	—	—
Kew	E.	M.	23-9	321	5	29	30	? S.	—	—	5	29	30	-36	—	—	—	5	38	18	—	—
Shide	N.	M.	24-0	318	—	—	—	—	—	—	5	30	18	+10	—	—	—	—	—	—	—	—
	E.	M.S.	24-0	318	5	26	9	+17	—	—	5	30	18	+10	5	34	13	—	—	—	—	—
	E.	M.B.	24-0	318	—	—	—	—	—	—	5	30	18	+10	5	34	13	—	—	—	—	—
Newport, I.W.	E.	M.BK.	24-0	318	5	25	30	-22	—	—	5	30	45	+37	5	35	40	—	—	—	—	—
Pulkovo	G.		25-1	7	5	26	1	-2	—	—	5	30	32	+3	5	33	0	—	—	—	—	—
Stonyhurst	M.		26-3	324	—	—	—	—	—	—	5	31	12	+20	—	—	—	5	33	54	36°2N. 15°2E.	
Bidston	N.	M.S.	26-4	322	5	26	36	+20	5	31	54	5	35	48	+294	—	—	5	41	24	—	
Eskdalemuir	G.		27-6	326	—	—	—	—	—	—	5	31	10	-6	5	34	30	5	37	0	e 5h. 31m. 36s.	
Edinburgh	E.	M.	27-9	327	5	31	0	? S.	—	—	5	31	0	-21	—	—	—	5	38	0	—	
Dyce, Aberdeen	Ma.		28-3	330	—	—	—	—	—	—	—	—	—	—	—	—	—	5	38	0	—	
Ekaterinburg	G.		32-9	37	5	27	9	-10	—	—	5	32	14	-32	5	35	0	—	—	—	—	

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1915. June 24. Probably repetition of preceding 'quake.
 Origin : 35°0N. 24°0E., determined by Shide.
 Time at Origin : 6h. 17m. 16s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Pompeii	O.A.	9.4	310	6	20	20	+42	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rocca di Papa	Aga.	11.1	311	6	20	30	+28	—	—	6	26	50	+277	—	—	—	—	—	—	—	—
Padova	V.	13.8	322	6	22	5	+86	—	—	6	27	24	+245	—	—	—	—	—	—	—	—
Moncalieri	S.	15.9	314	6	22	0	+53	—	—	6	24	27	+18	—	6	26	15	6	29	8	—
Tiflis	G.	17.5	62	6	21	33	+6	—	—	6	24	56	+11	—	6	26	0	6	29	13	—
Paris	—	20.9	317	6	22	23	+15	—	—	6	26	17	+19	—	6	30	0	—	—	—	—
Baku	G.	21.1	68	6	21	55	-15	—	—	6	23	50	-12	—	6	29	0	—	—	—	—
Pulkovo	M.S.	25.1	7	6	22	58	+3	—	—	6	27	25	+4	—	6	30	0	6	31	50	—
Bidston	G.	26.4	322	6	33	48	? L.	—	—	—	—	—	—	—	6	33	48	6	37	30	—
Ekaterinburg	G.	32.9	37	6	24	1	-10	—	—	6	29	16	-22	—	6	35	0	—	—	—	—

15

1915. June 27.
 Origin : 43°5N. 153°0E., determined by Shide.
 Time at Origin : 15h. 25m. 15s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.	
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.		
Osaka	O.	16.2	243	15	29	18	+8	—	—	—	—	—	—	15	32	21	15	34	52	—	—	
Irkutsk	G.	33.2	303	15	31	54	-19	15	33	17	15	37	19	-23	15	41	30	15	43	42	—	—
Manila	W.	39.8	233	15	31	57	-71	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Honolulu	M.	46.0	102	15	41	30	? S.	—	—	—	15	41	30	+47	15	48	54	15	55	0	—	
Victoria	M.	55.4	53	15	53	0	+1083	—	—	—	—	—	—	—	16	4	30	16	6	0	—	
Pulkovo	G.	66.6	332	15	36	10	0	15	38	30	15	44	40	-20	15	56	30	16	5	35	45°0N. 147°0E.	
Baku	G.	71.4	308	15	36	28	-13	15	39	20	15	45	29	-29	16	0	0	16	6	35	—	
Tiflis	G.	73.3	312	15	36	56	+3	—	—	—	15	46	4	-17	15	52	0	16	10	10	—	
Riverview	W.	77.3	182	—	—	—	—	—	—	—	15	46	30	-37	15	52	36	16	5	24	—	
Edinburgh	M.	78.6	347	15	47	0	? S.	—	—	—	15	47	0	-22	—	—	—	16	14	0	—	
Eskdalemuir	G.	79.1	346	15	37	31	+2	15	40	27	? 15	47	15	-13	16	5	0	16	14	0	—	
	G.	79.1	346	—	—	—	—	—	—	—	? 15	47	42	+14	—	—	—	—	—	—	—	
	G.	79.1	346	—	—	—	—	—	—	—	? 15	48	7	+39	—	—	—	—	—	—	—	
Stonyhurst	M.	80.5	346	15	45	30	? S.	—	—	—	15	45	30	-134	—	—	—	16	19	0	—	
Bidston	M.S.	81.0	346	15	37	42	+2	15	44	24	15	47	36	-14	—	—	—	16	16	24	—	
Toronto	M.	81.1	35	—	—	—	—	—	—	—	—	—	—	—	16	16	36	16	18	36	—	
Kew	M.	82.3	344	16	10	54	? L.	—	—	—	—	—	—	—	16	10	54	16	16	0	—	
Guildford	M.	82.6	344	15	42	2	+253	—	—	—	15	52	6	+238	16	13	24	16	24	0	—	
Shide	M.S.	83.2	344	—	—	—	—	—	—	—	15	48	10	-4	16	8	42	16	14	57	—	
	M.B.	83.2	344	—	—	—	—	—	—	—	15	48	12	-2	—	—	—	—	—	—	—	
Paris	—	84.2	341	15	38	0	+2	—	—	—	15	48	10	-15	15	59	0	16	16	0	—	
Harvard University	B.O.	85.5	31	—	—	—	—	—	—	—	—	—	—	—	15	51	16	—	—	—	—	
Moncalieri	S.	86.4	336	15	38	7	-3	—	—	—	? 15	48	20	-29	15	58	13	16	19	7	—	
Granada	C.	96.6	341	—	—	—	—	—	—	—	—	—	—	—	16	11	0	16	19	24	—	
San Fernando	M.	97.8	343	—	—	—	—	—	—	—	16	10	0	+1151	16	20	30	16	24	30	—	
	M.	97.8	343	15	50	0	? S.	—	—	—	15	50	0	-49	16	21	0	16	23	0	—	
La Paz	—	136.0	65	15	44	0	+111	—	—	—	—	—	—	—	16	31	0	16	34	0	—	
	—	—	—	15	48	47	+398	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

16

1915. July 2.

Origin : 21°0N. 127°0E., determined by Shide.

Time at Origin : 13h. 22m. 59s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.		O-C.	PR ₁	S.		O-C.	L.	M.		Remarks.		
				H.	M.	S.		S.	H.	M.		S.	H.		M.	S.
Manila	W.	8.6	223	13	24	58	-11	—	13	26	14	-38	13	27	44	20°3N. 121°8E. Registered at Taihoku and Batavia.
Zi-ka-wei	W.	11.4	335	13	26	5	+16	—	13	28	41	+38	—	—	—	
	O.	11.4	335	13	26	26	+37	—	—	—	—	—	13	30	49	
Osaka	O.	15.6	27	13	27	52	+66	—	—	—	—	—	13	33	6	
Batavia	W.	33.6	218	—	—	—	—	—	13	35	0	-33	—	—	—	
Irkutsk	G.	35.9	336	13	30	17	—	—	13	35	52	-16	13	42	0	
Ekaterinburg	G.	59.7	324	13	33	15	+6	—	13	41	13	5	13	52	30	
	G.	59.7	324	—	—	—	—	—	—	—	—	—	14	11	30	
Baku	G.	67.0	306	13	33	42	-15	—	13	42	21	-28	13	56	0	
	G.	67.0	306	13	33	46	-11	—	—	—	—	—	14	19	57	
Honolulu	M.	69.2	74	—	—	—	—	—	—	—	—	—	14	10	12	
Tiflis	G.	70.5	308	13	34	20	+1	—	—	—	—	—	14	9	49	
Pulkovo	G.	75.3	329	13	35	0	-10	13	39	18	—	—	14	4	23	
Edinburgh	M.	92.4	355	—	—	—	—	—	13	44	0	-28	14	0	0	
Eskdalemuir	G.	92.8	334	—	—	—	—	—	—	—	—	—	14	16	0	
Stonyhurst	M.	93.5	333	—	—	—	—	—	—	—	—	—	14	16	0	
Moncalieri	S.	94.0	322	—	—	—	—	—	—	—	—	—	14	18	2	
Bidston	M.S.	94.1	333	—	—	—	—	—	—	—	—	—	14	23	30	
Guildford	M.	94.3	330	13	46	0	? S.	—	13	46	0	-118	14	20	0	
Paris	—	94.5	327	—	—	—	—	—	—	—	—	—	14	23	0	
Shide	E.	95.1	330	—	—	—	—	—	—	—	—	—	14	24	35	
	E.	95.1	330	—	—	—	—	—	—	—	—	—	14	24	35	
Granada	C.	105.6	321	—	—	—	—	—	—	—	—	—	14	10	0	

17

1915. July 7.

Origin : 42°5N. 14°5E., determined by Shide.

Time at Origin : 16h. 42m. 47s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.		O-C.	PR ₁	S.		O-C.	L.	M.		Remarks.		
				H.	M.	S.		S.	H.	M.		S.	H.		M.	S.
Rocca di Papa	Aga.	1.5	243	16	43	49	+39	—	16	44	32	+63	16	54	6	—
Pompeii	O.A.	1.8	182	16	43	40	+25	—	—	—	—	—	16	44	18	
	O.A.	1.8	182	16	43	39	+24	—	—	—	—	—	16	44	24	
Moncalieri	S.	3.5	299	16	44	52	+25	—	—	—	—	—	16	46	24	
	S.	3.5	299	16	44	52	+25	—	—	—	—	—	16	46	29	
Barcelona	Ma.	9.2	269	16	45	7	+1	—	16	46	56	+1	? 16	47	28	
Paris	—	10.4	311	16	45	42	+19	—	16	47	51	+25	16	49	0	
Shide	M.	13.6	313	—	—	—	—	—	—	—	—	—	16	53	3	
	M.S.	13.6	313	16	46	10	+2	—	16	48	58	+13	16	50	23	
Granada	C.	14.9	254	16	46	13	-12	—	16	48	44	-33	16	49	30	
	C.	14.9	254	16	46	17	-8	—	—	—	—	—	—	—	—	
Bidston	M.S.	16.0	319	16	46	36	-3	—	16	49	42	0	—	16	53	6
San Fernando	M.	17.0	256	—	—	—	—	—	—	—	—	—	16	48	30	
	M.	17.0	256	16	46	48	—	—	—	—	—	—	16	49	42	
Edinburgh	M.	17.6	326	—	—	—	—	—	—	—	—	—	16	52	30	
Pyce, Aberdeen	Ma.	18.1	330	16	47	10	+5	—	—	—	—	—	16	55	0	
Helwan	M.	18.5	128	16	48	0	+50	—	16	50	40	+11	16	54	30	
Pulkovo	G.	19.8	24	16	47	23	-3	16	49	1	—	—	16	52	0	
Tiflis	G.	22.4	81	16	47	31	-26	—	16	51	18	-42	16	55	0	
Baku	G.	26.4	83	16	47	54	-45	16	49	0	—	—	—	—	—	
Ekaterinburg	G.	32.3	47	16	49	9	-28	16	50	34	—	—	—	—	—	
	G.	32.3	47	16	49	9	-28	—	16	54	7	-53	16	57	0	

18

1915. July 8.

Origin : 34°0N. 142°5E., determined by Shide.

Time at Origin : 22h. 19m. 40s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Osaka	O.	5.9	279	22	21	41	+30	—	—	—	—	—	—	—	22	23	11	22	24	6	—
Zi-ka-wei	W.	17.9	269	22	24	16	+20	—	—	—	22	27	41	+26	—	—	—	22	23	48	—
	O.	17.9	269	22	24	16	+20	—	—	—	22	27	49	+31	—	—	—	22	32	37	—
Manila	W.	27.5	230	—	—	—	—	22	26	34	—	—	—	—	—	—	—	—	—	—	—
Irkutsk	G.	32.8	316	22	26	16	-18	—	—	—	22	31	17	-44	22	36	0	—	—	—	—
Batavia	W.	52.5	227	22	29	0	-3	—	—	—	22	36	0	-30	—	—	—	22	37	0	—
Honolulu	M.	53.5	36	22	36	36	? S.	—	—	—	22	36	36	-7	22	45	12	22	57	48	—
Simla	O.E.	54.2	280	—	—	—	—	—	—	—	—	—	—	—	22	47	0	—	—	—	—
Ekaterinburg	G.	57.8	320	22	29	36	-2	—	—	—	22	37	19	-17	22	45	0	22	55	34	38°5N. 143°6E.
Colombo	M.	63.6	260	23	1	0	+1844	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daku	G.	70.6	306	22	30	46	-15	—	—	—	22	40	8	-5	22	53	0	23	3	7	Seconds ±
Pulkovo	G.	71.0	330	22	31	3	0	22	33	33	—	—	—	—	22	54	0	23	3	38	—
Tiflis	G.	73.2	309	22	31	22	+5	—	—	—	? 22	40	57	+13	22	56	0	22	59	42	—
Edinburgh	M.	83.5	341	22	43	0	? S.	—	—	—	22	43	0	-5	—	—	—	—	—	—	—
Eskdalemuir	G.	86.0	341	22	32	29	-4	—	—	—	22	42	50	-20	—	—	—	23	2	30	—
Stonyhurst	M.	87.2	340	22	43	30	? S.	—	—	—	22	43	30	+7	—	—	—	23	15	6	—
Bidston	M.S.	87.6	340	22	32	42	-1	—	—	—	22	43	0	-28	—	—	—	23	13	30	—
Kew	M.	88.5	338	—	—	—	—	—	—	—	—	—	—	—	—	—	—	23	16	12	—
Guildford	M.	88.8	338	22	36	20	-211	—	—	—	22	46	22	+161	23	7	13	23	19	7	—
Shide	M.B.	89.5	338	—	—	—	—	—	—	—	22	43	28	-21	23	10	23	23	19	3	—
Haslemere	M.	89.7	338	—	—	—	—	—	—	—	—	—	—	—	—	—	—	23	10	30	—
Paris	—	89.9	335	22	32	50	-5	—	—	—	22	43	13	-40	23	5	0	23	14	0	—
Moncalieri	S.	91.1	330	22	41	53	+531	—	—	—	22	54	20	+615	23	7	6	23	17	50	—
Rocca di Papa	Aga.	91.3	325	22	32	53	-10	—	—	—	—	—	—	—	23	16	37	—	—	—	—
Barcelona	Ma.	96.3	331	—	—	—	—	—	—	—	—	—	—	—	23	2	18	—	—	—	—
Harvard University	B.O.	97.7	24	—	—	—	—	—	—	—	—	—	—	—	23	8	41	—	—	—	—
Granada	C.	102.2	333	? 22	26	13	-468	22	38	4	—	—	—	—	23	11	0	23	14	48	—
Rio Tinto	M.	102.7	335	—	—	—	—	—	—	—	—	—	—	—	—	—	—	23	21	0	—
San Fernando	M.	103.7	334	—	—	—	—	—	—	—	—	—	—	—	23	23	30	—	—	—	—
La Paz	—	147.4	65	22	40	0	+159	—	—	—	—	—	—	—	—	—	—	—	—	—	—

19

1915. July 11.

Origin : 34°5N. 10°0W., determined by Shide.

Time at Origin : 11h. 28m. 5s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
San Fernando	E. M.	3.7	56	11	29	0	-3	—	—	—	—	—	—	—	11	30	30	11	32	0	—
	S. M.	3.7	56	11	29	38	? S.	—	—	—	11	29	38	-9	11	30	30	11	32	0	—
Rio Tinto	E. M.	4.3	39	? 11	29	0	-12	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Granada	C.	5.8	62	11	30	8	+34	—	—	—	11	31	24	+40	11	31	36	11	31	48	—
Barcelona	Ma.	11.8	50	11	31	12	-11	—	—	—	11	33	31	+12	11	34	16	11	36	24	—
Paris	—	17.0	29	11	32	7	-3	—	—	—	11	34	58	-25	11	35	24	—	—	—	—
Moncalieri	S.	17.1	47	11	32	22	+11	—	—	—	11	35	51	+26	11	37	33	11	39	17	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11	40	40	—
Shide	E. M.	17.4	19	11	32	12	-3	—	—	—	11	35	20	-12	—	—	—	—	—	—	—
	E. M.S.	17.4	19	11	32	12	-3	—	—	—	11	35	7	-25	11	36	22	11	38	12	—
	E. M.B.	17.4	19	11	32	12	-3	—	—	—	11	35	7	-25	—	—	—	11	38	12	—
Guildford	M.	18.1	19	11	30	17	-126	—	—	—	11	32	8	-219	11	33	19	11	33	23	—
Kew	E. M.	18.4	19	11	36	24	? S.	—	—	—	11	36	24	+27	—	—	—	11	40	0	—
Rocca di Papa	Aga.	19.2	61	11	32	50	+14	—	—	—	—	—	—	—	—	—	—	11	32	54	—
Bidston	N. M.S.	19.6	12	11	32	18	-23	—	—	—	11	35	42	-38	—	—	—	11	37	30	—
Padova	V.	19.9	50	11	33	7	+22	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pompeii	E. O.A.	20.3	65	11	33	2	+12	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	N. O.A.	20.3	65	11	33	3	+13	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Eskdalemuir	E. G.	21.4	11	11	32	49	-14	—	—	—	11	36	30	-27	—	—	—	11	39	0	—
Edinburgh	E. M.	21.9	10	11	37	0	? S.	—	—	—	11	37	0	-8	—	—	—	11	39	48	—
Dyce, Aberdeen	S. Ma.	23.3	11	11	33	10	-15	—	—	—	11	37	5	+31	11	39	0	—	—	—	—
Helwan	E. M.	35.0	86	11	42	0	? S.	—	—	—	11	42	0	+60	—	—	—	—	—	—	—
Pulkovo	G.	36.3	33	11	35	18	-11	11	36	37	11	40	51	-28	11	43	0	11	45	51	36°0N. 8°0W.
Tiflis	G.	43.0	63	11	36	27	+4	—	—	—	11	43	2	+9	11	52	0	11	55	36	—
Daku	G.	47.1	64	11	36	47	-6	11	38	55	11	43	53	+6	? 11	53	0	11	57	23	—
Ekaterinburg	G.	51.4	41	11	37	22	+1	—	—	—	11	44	40	-1	11	50	0	11	55	20	31°8N. 5°5W.
La Paz	—	75.2	238	11	40	25	+30	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Irkutsk	G.	76.1	35	11	40	4	+3	—	—	—	11	49	46	+3	12	4	30	12	9	26	—

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Small Earthquakes which do not give good determinations—

- June 30, 20hrs.: Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Irkutsk.
 July 3, 21hrs.: San Fernando, Eskdalemuir, Shide, Moncalieri, Pulkovo, Baku, Ekaterinburg, La Paz.
 July 4, 2hrs.: Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Irkutsk, Batavia, Manila, Honolulu, La Paz.
 July 7, 6hrs.: Edinburgh, Padova, Rocca di Papa, Baku, Ekaterinburg, La Paz.
 July 10, 0-1hrs.: Pulkovo, Baku, Ekaterinburg, Irkutsk, Honolulu.
 July 10, 10hrs.: Edinburgh, Shide, Paris, Moncalieri, Padova, Rocca di Papa, Pompeii, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Manila.
 July 11, 16hrs.: Pulkovo, Baku, Ekaterinburg, Irkutsk, Batavia, Manila.
 July 12, 20hrs.: San Fernando, Granada, Stonyhurst, Pulkovo, Helwan, Baku, Ekaterinburg, Irkutsk, Manila, La Paz.
 July 13, 19-20hrs.: Eskdalemuir, Stonyhurst, Paris, Pulkovo, Helwan, Tiflis, Irkutsk, Honolulu.
 July 14, 4hrs.: Helwan, Baku, Ekaterinburg, Batavia, Manila, La Paz.
 July 14, 12hrs.: Pulkovo, Baku, Irkutsk, Zi-ka-wei, Osaka.
 July 21, 4hrs.: Pulkovo, Baku, Tiflis, Batavia, Irkutsk, La Paz.
 July 21, 21hrs.: San Fernando, Paris, Moncalieri, Rocca di Papa, Pulkovo, Baku, Ekaterinburg, Irkutsk.
 July 22, 4hrs.: Eskdalemuir, Edinburgh, Bidston, Shide, Kew, Paris, Pulkovo, Ekaterinburg, Toronto, Ottawa, Harvard University.
 July 23, 17hrs.: Edinburgh, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Irkutsk, Zi-ka-wei, Osaka.
 July 24, 19-20hrs.: San Fernando, Granada, Eskdalemuir, Edinburgh, Bidston, Stonyhurst, Paris, Moncalieri, Pulkovo, Tiflis, Baku, Ekaterinburg, Irkutsk, Batavia, Honolulu, Riverview, La Paz.
 July 25, 6hrs.: Malta, Pulkovo, Helwan, Ekaterinburg, Colombo, Batavia, Zi-ka-wei.

21

1915. July 31.

Origin : 50°5N. 164°0E., determined by Shide.

Time at Origin : 1h. 31m. 6s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.		O-C.	PR ₁		S.		O-C.	L.		M.		Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	H.	M.	
Osaka	O.	26.1	244	1 37	14	+19	—	1 41	54	+24	1 44	38	1 46	38	—	—
Irkutsk	G.	36.2	297	1 38	12	-18	—	1 43	29	-50	1 48	0	—	—	—	—
Zi-ka-wei	W.	36.9	255	1 38	38	+3	—	1 44	28	-1	1 48	8	1 53	20	—	—
	O.	36.9	255	1 38	45	+10	—	1 44	30	+1	1 48	1	1 51	54	—	—
Honolulu	M.	41.6	120	1 40	12	+58	—	1 46	18	+43	1 52	30	1 56	24	—	—
Victoria	M.	45.4	63	1 39	48	+6	—	1 46	24	-2	1 50	36	1 57	48	—	—
Manila	W.	49.9	240	1 40	36	+24	—	1 46	52	-32	1 54	24	2 4	10	—	—
Berkeley	N.	52.1	74	1 40	40	-13	—	1 48	9	+18	1 55	45	1 59	5	—	—
	—	52.1	74	1 40	45	+18	—	1 48	14	+23	1 55	55	1 58	42	—	—
Santa Clara	W.	52.6	74	1 40	45	+15	—	—	—	—	1 56	30	1 58	37	—	—
	W.	52.6	74	1 40	55	+3	—	—	—	—	1 56	30	1 59	3	—	—
Lick	W.	53.9	74	1 41	38	+66	—	1 48	38	+36	1 56	43	1 58	33	—	—
Ekaterinburg	G.	55.5	320	1 40	38	-11	—	1 47	54	-40	—	—	—	—	—	—
Pulkovo	G.	63.5	336	1 41	34	-7	1 44	8	1 49	50	-23	1 58	0	2 6	15	52°0N, 159°0E.
Sinla	O.F.	64.6	289	1 41	48	0	—	1 50	12	14	1 55	24	2 6	48	—	—
Toronto	W.	70.9	43	1 41	48	-40	—	1 51	48	+5	2 1	0	2 15	6	—	—
Ottawa	B.	71.0	40	1 42	32	+3	1 45	20	1 51	37	-7	1 59	42	—	—	—
Dyce, Aberdeen	Ma.	71.7	353	1 42	37	+3	1 45	13	1 51	35	-17	—	—	—	—	—
Baku	G.	72.4	313	1 42	22	-16	—	1 51	34	-27	—	—	—	—	—	—
	—	72.4	313	1 42	24	-14	—	—	—	—	—	—	—	—	—	—
Tiflis	G.	73.6	317	1 42	43	-3	—	1 52	9	-6	2 7	0	2 11	48	48°0N, 155°0E.	—
Eskdalemuir	G.	73.6	353	1 42	42	-4	—	1 51	57	-18	—	—	—	—	—	—
	M.S.	73.6	353	1 42	45	-1	—	1 51	50	-25	—	—	—	—	—	—
Stonyhurst	M.	73.9	252	1 44	0	+65	—	1 54	0	+88	2 11	12	2 16	54	—	—
Harvard Univ.	R.O.	75.4	39	1 42	58	+1	1 45	48	1 52	28	-8	2 3	2	—	—	Near 53°0N, 168°0E.
	R.O.	75.4	39	1 43	0	+3	1 52	23	1 52	40	+4	2 3	56	—	—	—
Bidston	M.S.	75.5	353	1 42	48	-10	—	1 52	18	-20	—	—	2 16	30	—	—
Bombay	M.	76.3	283	1 42	36	-27	—	—	—	—	—	—	2 20	1	—	—
Kew	M.	77.1	350	1 44	0	+52	—	—	—	—	—	—	2 18	24	—	—
Guildford	M.	77.4	350	1 42	55	-14	—	1 52	43	-16	2 7	35	2 24	44	—	—

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Haslemere	E. M.	77-5	350	1 47 0	+230	--	1 52 0	-61	--	2 14 30	--
Shide	N. M.	78-0	350	1 43 12	--	--	1 52 50	-16	2 16 0	2 26 40	--
	E. M.S.	78-0	350	1 43 10	--	--	1 52 45	-21	2 1 17	2 16 32	--
	M.B.	78-0	350	1 43 12	--	--	1 52 45	-21	2 1 20	2 16 55	--
Paris	--	79-4	348	1 43 13	-8	--	1 52 57	-25	2 7 0	2 13 0	--
	--	--	--	--	--	--	1 53 1	-21	--	--	--
Kodikanal	E. M.	80-0	274	1 42 54	-31	--	--	--	2 12 36	2 19 48	--
Padova	V.	81-0	341	1 43 25	-6	--	1 53 23	-18	--	2 17 1	--
Colombo	E. M.	81-0	270	1 44 12	+41	--	1 53 12	-29	2 25 54	2 28 36	--
Moncalieri	S.	82-3	243	1 43 39	+1	--	1 56 5	-130	2 10 33	2 29 27	--
Rocca di Papa	Aga.	84-0	339	1 43 44	-4	--	1 53 51	-23	2 0 28	2 21 8	--
Pompeii	E. O.A.	84-9	337	1 43 59	+6	--	1 54 10	-14	2 12 26	2 22 6	--
	N. O.A.	84-9	337	1 43 58	+5	--	1 53 36	-48	2 10 26	2 19 26	--
Riverview	Mn.	85-1	191	1 44 18	+23	--	1 54 47	+21	2 7 18	2 19 25	P.S. 1h. 56m. 13s.
Barcelona	E. M.	86-7	346	1 43 53	-10	--	1 54 18	-26	2 4 34	2 19 29	--
Adelaide	E. M.	88-4	201	1 55 6	+8	--	1 55 6	+4	--	2 31 18	--
Helwan	E. M.	89-3	320	1 43 30	-48	--	1 51 48	-24	--	2 30 12	--
Malta	E. M.	89-4	336	1 46 0	+102	--	--	--	--	1 59 0	--
Azores	E. M.	91-3	8	1 43 42	-47	--	--	--	--	--	--
Rio Tinto	E. M.	91-3	353	--	--	--	--	--	--	2 28 0	--
Granada	C.	91-6	350	1 44 26	-5	--	1 55 14	-25	2 12 30	2 22 38	P.S. 1h. 56m. 41s.
San Fernando	E. M.	92-5	352	1 43 30	-66	--	1 55 0	-46	2 17 0	2 33 0	--
Seychelles	N. M.	92-5	352	1 43 0	-96	--	1 54 9	-106	2 17 0	2 34 0	--
	M.	105-1	282	1 52 0	+379	--	--	--	--	3 10 0	--
Mauritius	E. M.	115-4	267	1 52 12	+344	--	--	--	--	--	--
La Paz	N. M.	115-4	267	1 51 0	+272	? 1 51 0	--	--	2 29 12	2 40 30	--
	M.	126-4	70	1 50 34	+196	1 52 45	2 2 31	-109	2 21 0	2 28 10	--
Cape Town	M.	150-0	290	1 50 48	+111	--	--	--	--	2 53 18	--

23

1915. August 3.

Origin : 4°0s. 138°0E., determined by Shide.

Time at Origin : 13h. 4m. 49s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Manila	W.	25-1	317	13 10 6	-22	--	--	13 14 16	-38	13 18 25	13 21 20	--	--	--	--	--	--	--	--	--	--
Adelaide	E. M.	50-9	179	13 16 36	? S.	--	--	13 16 36	-2	--	13 23 12	--	--	--	--	--	--	--	--	--	--
Batavia	W.	31-3	263	13 10 56	-34	--	--	--	--	--	13 18 0	--	--	--	--	--	--	--	--	--	--
Riverview	W.	32-2	159	13 11 38	0	13 13 6	13 16 54	+6	13 18 54	13 26 43	5°0s. 138°0E.	--	--	--	--	--	--	--	--	--	--
Sydney	E. M.	32-3	159	13 11 6	-33	--	13 16 42	-20	13 21 48	13 25 48	--	--	--	--	--	--	--	--	--	--	--
Perth	E. M.	34-8	214	13 12 4	+4	--	13 17 36	-5	13 23 30	13 24 0	--	--	--	--	--	--	--	--	--	--	--
Zi-ka-wei	W.	38-6	237	13 12 11	-21	13 13 50	13 17 54	-41	13 20 58	13 27 0	--	--	--	--	--	--	--	--	--	--	--
Osaka	O.	38-6	237	13 12 14	-18	--	13 17 55	-40	13 20 52	13 23 51	--	--	--	--	--	--	--	--	--	--	--
	O.	38-8	257	13 12 16	-17	--	13 18 5	-32	13 23 26	13 24 52	--	--	--	--	--	--	--	--	--	--	--
Colombo	E. M.	59-1	280	13 14 0	-55	--	--	--	13 22 0	13 30 0	--	--	--	--	--	--	--	--	--	--	--
Kodikanal	E. M.	62-0	284	13 14 30	-44	--	--	--	13 22 0	13 31 6	--	--	--	--	--	--	--	--	--	--	--
Irkutsk	G.	63-1	338	13 15 16	-6	--	13 23 33	-18	13 33 0	13 34 58	--	--	--	--	--	--	--	--	--	--	--
Honolulu	E. M.	67-5	63	13 16 56	+46	--	13 25 42	+37	13 37 30	13 46 12	--	--	--	--	--	--	--	--	--	--	--
Simla	O.E.	67-7	305	13 15 42	-9	--	13 24 24	-23	13 32 6	--	--	--	--	--	--	--	--	--	--	--	--
Bombay	E. M.	68-1	292	13 8 19	-155	--	--	--	--	13 47 5	--	--	--	--	--	--	--	--	--	--	--
Mauritius	E. M.	79-3	250	13 17 0	-4	--	--	--	13 44 54	13 48 6	--	--	--	--	--	--	--	--	--	--	--
	N. M.	79-3	250	13 19 48	+104	--	--	--	--	13 47 42	--	--	--	--	--	--	--	--	--	--	--
Ekaterinburg	G.	86-5	328	13 17 23	-22	--	13 27 53	-32	13 40 0	13 58 23	2°1s. 134°0E.	--	--	--	--	--	--	--	--	--	--
Baku	G.	91-2	310	13 17 28	-43	? 13 21 7	13 28 10	-65	13 46 0	13 56 30	--	--	--	--	--	--	--	--	--	--	--
Tiflis	G.	95-0	312	13 18 13	-19	--	13 28 47	-68	13 37 0	14 9 15	21°2N. 148°52E.	--	--	--	--	--	--	--	--	--	--
Victoria	E. M.	98-7	41	13 34 24	+931	--	--	--	13 50 0	--	--	--	--	--	--	--	--	--	--	--	--
	M.	100-0	32	--	--	--	13 51 48	+1276	13 59 24	14 8 54	--	--	--	--	--	--	--	--	--	--	--
Berkeley	G.	102-3	331	13 18 47	-24	13 22 56	13 29 22	-85	--	--	--	--	--	--	--	--	--	--	--	--	--
Pulkovo	G.	102-3	331	13 18 47	-24	--	13 30 17	-50	13 49 0	13 55 30	1°0s. 131°0E.	--	--	--	--	--	--	--	--	--	--
Helwan	E. G.	106-3	300	13 21 0	+90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Padova	V.	117-6	320	13 24 34	+193	--	13 30 30	-170	--	--	--	--	--	--	--	--	--	--	--	--	--
Dyce, Aberdeen	E. Ma.	118-2	337	13 25 0	+276	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	N. Ma.	118-2	337	13 24 40	+256	13 30 40	13 34 32	+67	--	--	--	--	--	--	--	--	--	--	--	--	--
Rocca di Papa	Aga.	118-4	316	13 28 36	+491	--	13 28 47	-279	--	13 28 54	--	--	--	--	--	--	--	--	--	--	--

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Barcelona		M.	118.9	323	13	25	23	+296			13	36	44	+194	13	47	48	14	26	46		
Edinburgh	E.	M.	119.5	336	13	25	0	+271	? 13	25	0							14	20	24		
Eskdalemuir	G.	M.S.	119.9	336	13	24	45	+254	? 13	24	45	13	34	38	+61	14	5	0	14	16	0	
		S.	119.9	336	13	24	56	+265	? 13	24	56	13	34	43	+66				14	20	0	
Noncalieri		S.	120.4	321	13	25	5	+272										13	41	0	14	
																			14	21	0	
Stonyhurst	E.	M.	120.7	334	13	25	24	+289	? 13	25	24	13	36	18	+154				14	17	18	
Bidston	N.	M.S.	121.0	334	13	24	24	+228				13	34	18	+32				14	23	18	
Kew	E.	M.	121.3	331	13	25	0	+262	? 13	25	0								14	18	18	
Paris			121.5	327	13	25	15	+276	13	30	45	13	40	1	+371	14	2	0	14	21	0	
																14	6	0				
Guildford		M.	121.5	331	13	24	13	+214				13	33	50	0	14	4	0	14	27	18	
Haslemere	E.	M.	121.7	331															14	6	0	
Shide	E.	M.S.	122.2	331															14	20	26	
	E.	M.B.	122.2	331															14	23	31	
Toronto	E.	M.	128.5	34	? 13	27	18	+368								13	43	30				
Ottawa	B.	129.2	30	13	26	22	+309					13	31	22	-202	13	36	6				
Granada	C.	131.7	318	13	23	40	+136	13	27	17		13	38	17	+196	13	50	0	14	16	48	
					13	23	42	+138														
					13	24	0	+149											14	30	0	
Rio Tinto	E.	M.	133.3	321												14	16	4				
Harvard University	B.O.	133.7	30				+326									14	19	30	14	33	30	50°0s. 138°0E.
San Fernando	E.	M.	133.9	319	13	27	0	+296								14	19	30	14	31	18	
	N.	M.	133.9	319	13	26	30	+296											14	31	18	
La Paz			147.0	129	13	24	53	+147				13	38	34	+123	14	10	0	14	40	10	

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1915. August 6.

Origin : 43°0N. 150°5E., determined by Shide.

Time at Origin : 13h. 12m. 7s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.		H.	M.	S.	H.	M.	S.		H.	M.	S.	H.	M.	S.	
Osaka	O.	14.4	239	13	15	42	+ 4								13	18	24	13	19	44	
Zi-ka-wei	W.	25.9	252	13	17	45	- 9	13	18	26	13	22	12	-15	13	24	47	13	27	42	
	O.	25.9	252	13	17	47	- 7				13	22	15	-12							
Irkutsk	G.	31.0	303	13	17	38	-75				13	22	11	-16				13	27	33	
Manila	W.	38.1	231	13	19	33	-13				13	22	38	-95							
Honolulu	E.	M.	47.7	100	13	28	18	? S.			13	25	42	- 4	13	31	33	13	37	49	
Ekaterinburg	G.	55.1	318	13	21	51	+ 4				13	28	18	+21	13	38	30	13	40	30	
Victoria	E.	M.	57.2	52	13	40	18	+1098			13	29	21	- 8	13	37	30	13	47	38	43°7N. 147°2E.
Simla	O.E.	57.9	284	13	21	48	-17								13	49	18	13	52	18	
Batavia	W.	63.1	230	13	22	49	+ 9											13	47	48	
Berkeley	N.	63.5	62	13	22	56	+14											13	26	0	
	E.	63.5	62																		
Pulkovo	G.	66.2	331	13	23	10	+11	13	27	44	13	31	46	+32				13	54	2	38°4N. 138°5E.
Bombay	E.	M.	68.4	276	13	32	39	? S.			13	31	54	+ 7	13	43	0	14	0	39	
Baku	G.	70.2	307	13	23	18	- 7				13	32	39	+25				13	57	17	
Kodaikanal	E.	M.	70.7	266	13	32	54	? S.			13	32	31	- 4	13	48	0	13	58	42	
Colombo	E.	M.	71.3	262	13	55	0	+1888			13	32	54	+13	13	57	42	14	2	0	
Tifis	G.	71.9	311	13	23	43	+ 7				13	33	3	+ 7	13	47	0	13	52	56	37°5N. 144°1E.
Stonyhurst	E.	M.	73.6	343	13	22	12	-95			13	34	6	+50				14	5	18	
Riverview	W.	76.8	172	13	24	18	+11				? 13	34	30	+36	13	51	12	13	53	4	
Edinburgh	E.	M.	78.6	345	13	25	0	+42										14	7	0	
Eskdalemuir	G.	79.2	345	13	24	27	+ 6	13	27	31	13	34	27	+ 6	13	52	30	14	4	0	42°0N. 143°0E.
	M.S.	79.2	345	13	24	29	+ 8				13	34	23	+ 2							
Bidston	N.	M.S.	81.0	344	13	25	12	+40			13	31	30	-192				14	7	0	
Dyce, Aberdeen	E.	M.	81.2	346	13	24	6	-18			13	34	8	-27	13	53	0				
	N.	M.	81.2	346	13	24	18	- 6			13	34	8	-27	13	52	0	13	58	0	
Kew	E.	M.	82.2	342	13	26	54	+136										14	8	36	
Guildford	M.	82.5	342	13	25	40	+60				13	36	4	+65	13	57	0	14	14	16	
Ottawa	B.	82.5	31	13	24	48	+ 8	13	28	6	13	35	7	+ 8	13	55	12				

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Toronto	E.	M.	82.5	34	13	44	48	+1208	---	13	51	0	+961	13	58	54	14	8	24
Haslemere	E.	M.	82.6	342	13	38	0	+739	---	---	---	---	---	---	---	---	14	2	0
Shide	E.	M.	83.1	342	13	25	0	+16	---	13	35	10	+5	---	---	---	---	---	---
	E.	M.S.	83.1	342	13	24	53	+9	---	13	35	10	+5	13	56	40	14	6	0
	E.	M.B.	---	---	---	---	---	---	---	13	35	10	+5	13	56	37	14	6	0
Paris			84.0	339	13	24	53	+4	---	13	35	14	-1	15	56	0	14	2	0
Padova	V.	S.	84.3	332	13	24	54	+3	---	13	35	20	+2	---	---	---	14	9	0
Moncalieri	S.	S.	86.0	335	13	25	3	+3	---	13	35	31	-6	13	46	10	14	7	47
Harvard University	B.O.		86.8	29	13	23	25	-100	---	13	35	9	-37	13	55	18	14	10	50
Rocca di Papa	Aga.		87.1	330	13	25	7	0	---	---	---	---	---	14	2	48	14	9	0
Helwan	E.	M.	88.2	311	13	26	0	+47	---	---	---	---	---	---	---	---	---	---	---
Barcelona	E.	Ma.	90.9	337	13	25	24	-4	---	13	36	23	-7	13	44	43	14	6	20
Granada	C.		96.5	339	13	26	43	+44	---	13	38	11	+43	14	1	0	14	13	12
									---	13	38	35	+79	---	---	---	---	---	---
Rio Tinto	E.	M.	96.6	342	13	38	0	? S.	---	13	38	0	+31	---	---	---	14	9	30
San Fernando	E.	M.	97.8	341	13	38	0	? S.	---	13	38	0	+19	14	13	30	14	18	30
	N.	M.	97.8	341	13	34	30	+504	---	---	---	---	---	14	11	0	14	19	0
Mauritius	E.	M.	105.4	257	13	55	±	+1697	---	---	---	---	---	---	---	---	14	14	18
	N.	M.	105.4	257	13	44	±	+1037	---	---	---	---	---	---	---	---	---	---	---
La Paz			137.8	63	13	32	0	+171	---	13	45	10	+132	14	20	0	14	42	30
Ascension	E.	M.	142.5	335	13	42	0	? S.	---	13	42	0	-85	---	---	---	13	45	0

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1915. August 7.
 Origin : 39°0N. 20°5E., determined by Shide.
 Time at Origin : 15h. 4m. 3s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Pompeii	E. O.A.	4.9	292	15	2	20	-179	---	---	15	5	40	-37	15	6	14	---	---	---	---	
	N. O.A.	4.9	292	15	5	19	0	---	---	15	5	47	-30	15	7	0	---	---	---	---	
Malta	E. M.	5.6	240	15	6	0	+31	---	---	---	---	---	---	---	---	---	15	16	0	---	
Rocca di Papa	E. Aga.	6.5	297	15	5	48	+6	---	---	15	7	11	+11	(Pen off the paper).			---	---	---	---	
Padova	V.	9.0	318	15	6	27	+8	---	---	15	8	9	+3	---	---	---	---	---	---	---	
Moncalieri	S.	11.2	306	15	6	55	+5	---	---	15	9	4	+2	15	10	6	15	12	23	---	
																	15	14	8	---	
Helwan	E. M.	12.7	132	15	7	0	-12	---	---	15	12	6	+146	---	---	---	15	19	48	---	
Barcelona	E. Ma.	14.2	285	15	7	31	-1	---	---	15	10	9	-7	15	10	35	15	15	1	---	
Paris		16.2	313	15	8	1	+3	---	---	15	11	12	+9	15	13	0	---	---	---	---	
																	---	---	---	---	
Tifis	G.	18.6	74	15	8	32	+5	---	---	15	12	7	+11	15	15	0	15	15	58	39°0N. 19°0E.	
Granada	C.	19.0	273	15	8	31	1	---	---	15	12	7	+2	15	15	0	15	22	20	38°4N. 21°0E.	
Haslemere	E. M.	19.1	316	15	0	0	-313	---	---	---	---	---	---	---	---	---	15	14	35	---	
Guildford	E. M.	19.1	316	15	7	51	-42	---	---	---	---	---	---	15	13	0	15	16	18	---	
Kew	E. M.	19.1	317	15	7	54	-39	---	---	---	---	---	---	---	---	---	15	17	12	---	
Shide	E. M.	19.2	314	15	8	45	+11	---	---	15	12	15	+6	15	17	10	15	18	20	---	
	N.						+6	---	---	15	12	15	+6	15	15	0	15	18	10	---	
	E.	M.S.	19.2	314	15	8	40	+6	---	15	12	15	+6	15	15	0	15	18	10	---	
	E.	M.B.	19.2	314	15	8	40	+6	---	15	12	15	+6	15	14	35	15	17	45	Times obtained by measurement.	
Rio Tinto	E. M.	21.2	276	15	8	30	-28	---	---	---	---	---	---	---	---	---	15	18	30	---	
San Fernando	E. M.	21.2	273	15	9	6	+8	---	---	15	15	0	+9	15	16	30	15	19	0	---	
	N.	M.	21.2	273	15	9	6	+8	---	15	14	0	-69	15	17	0	15	19	18	---	
Stonyhurst	E. M.	21.5	321	15	8	18	-44	---	---	15	12	12	-46	15	15	42	15	17	0	---	
Bidston	N. M.S.	21.6	320	15	7	36	-87	---	---	---	---	---	---	---	---	---	---	---	---	---	
Pulkovo	G.	21.7	13	15	9	3	-1	---	---	15	12	59	...	3	15	14	30	15	16	25	
Baku	G.	22.6	77	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Eskdalemuir	G.	22.7	324	15	9	15	-1	---	---	15	13	23	+1	15	17	30	15	18	0	39°0N. 22°0E.	
	M.S.	22.7	324	15	9	16	0	---	---	15	13	19½	-2½	---	---	---	---	---	---	---	

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Edinburgh	E.	M.	23-0	325	15	9	0	-20	—	—	—	—	—	—	15	18	36	—	
Dyce, Aberdeen	E.	Ma.	23-5	328	15	9	24	-2	—	—	15	13	34	-4	15	18	0	—	
	N.	G.	31-6	42	15	9	24	-2	—	—	15	13	36	-2	15	18	0	—	
Ekaterinburg	E.	M.	35-8	282	15	10	36	-10	—	—	15	15	50	-14	15	18	0	39°-2N, 21°-2E.	
Azores	E.	O.E.	46-3	82	—	—	—	+709	15	14	18	—	—	—	—	—	—	—	
Simla	E.	M.	49-2	99	—	—	—	Beginning lost.	—	—	—	—	—	—	15	23	6	—	
Bombay	E.	M.	56-7	47	15	13	57	+4	15	17	20	—	—	—	—	—	—	—	
Irkutsk	E.	G.	62-0	105	15	15	0	+32	—	—	—	—	—	—	—	—	—	—	
Colombo	E.	M.	65-9	306	—	—	—	—	—	—	—	—	—	—	15	39	27	—	
Harvard University	E.	B.O.	67-1	311	15	23	58	? S.	—	—	—	—	—	—	15	37	0	—	
Ottawa	E.	B.	70-2	311	—	—	—	—	—	—	—	—	—	—	15	46	42	—	
Toronto	E.	M.	72-9	182	15	29	12	+814	—	—	—	—	—	—	—	—	—	—	
Cape Town	E.	M.	78-5	59	15	16	17	+4	—	—	—	—	—	—	—	—	—	—	
Zi-ka-wei	E.	W.	78-5	59	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	N.	O.	84-9	48	15	16	23	+10	—	—	—	—	—	—	15	50	56	—	
Osaka	E.	O.	86-9	337	15	17	15	+25	15	34	21	+420	15	48	12	15	58	17	
Victoria	E.	M.	91-0	97	15	27	24	? S.	15	27	24	-19	15	52	24	15	56	24	
Batavia	E.	W.	99-3	256	15	18	0	+36	—	—	—	—	—	—	—	—	—	—	
La Paz	—	—	—	—	15	21	45	-215	—	—	—	—	—	—	15	29	0	—	
									15	31	1	-69	15	50	0	15	54	35	—

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1915. August 10.

Origin : 39°-0N. 20°-5E., determined by Shide.

Time at Origin : Oh. 47m. 55s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.		
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.			
Malta	E.	M.	5-6	240	0	50	0	+39	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Rocca di Papa	E.	Aga.	6-5	297	0	49	41	+7	—	—	—	?	0	51	38	+46	—	—	—	0	55	0	—
Fadova	E.	V.	9-0	318	0	50	26	+15	—	—	—	0	53	41	+103	—	—	—	—	0	52	42	—
Moncalieri	E.	S.	11-2	306	0	50	53	+11	—	—	—	0	53	4	+10	0	54	31	0	56	47	—	
Holwan	E.	M.	12-7	132	0	54	0	? S.	—	—	—	0	54	0	+23	—	—	—	1	2	24	—	
Barcelona	E.	Ma.	14-2	285	0	51	25	+1	—	—	—	—	—	—	—	0	55	5	0	57	43	—	
Paris	E.	—	16-2	313	0	51	59	+9	—	—	—	0	55	(5)	+10?	0	57	0	0	59	0	—	
	E.	—	16-2	313	0	52	5	+15	—	—	—	—	—	—	—	—	—	—	1	0	0	—	
Tiflis	E.	G.	18-6	74	0	52	24	+5	—	—	—	0	56	2	+14	0	59	0	1	0	35	38°-0N, 19°-4E.	
Granada	E.	C.	19-0	272	0	52	25	+1	—	—	—	0	56	1	+4	0	58	48	1	2	48	—	
Guildford	E.	M.	19-1	316	0	53	13	+48	—	—	—	0	56	39	+40	0	58	59	1	0	3	—	
Haslemere	E.	M.	19-1	316	0	58	0	+335	—	—	—	—	—	—	—	—	—	—	1	0	0	—	
Kew	E.	M.	19-1	317	0	57	6	? S.	—	—	—	0	57	6	+67	—	—	—	1	4	0	—	
Shide	E.	M.	19-2	314	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	50	—	
	E.	M.S.	19-2	314	0	52	37	+11	—	—	—	0	56	12	+11	0	59	7	1	0	17	—	
	E.	M.B.	19-2	314	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Quake recorded, but film illegible.	
San Fernando	E.	M.	21-2	273	—	—	—	—	—	—	—	—	—	—	1	0	0	1	3	30	—		
	N.	M.	21-2	273	0	53	0	+10	—	—	—	—	—	—	1	0	0	1	3	0	—	—	
Stonyhurst	E.	M.	21-5	321	0	54	30	+96	—	—	—	0	57	0	+10	1	0	0	1	2	42	—	
Bidston	N.	M.S.	21-6	320	0	53	0	+5	—	—	—	0	57	0	+8	—	—	—	1	1	36	—	
Pulkovo	E.	G.	21-7	13	0	52	56	0	—	—	—	0	56	54	0	0	58	54	1	0	5	39°-3N, 18°-9E.	
Baku	E.	G.	22-6	77	0	52	51	-16	—	—	—	—	—	—	1	0	0	1	3	54	—		
	E.	G.	22-7	324	0	52	55	-12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Eskdalemuir	E.	G.	22-7	324	0	53	9	+1	—	—	—	0	57	18	+4	—	—	—	—	—	—	—	
	N.	M.S.	22-7	324	0	53	8	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Edinburgh	E.	M.	23-0	325	0	58	0	? S.	—	—	—	0	58	0	+40	—	—	—	—	—	—	—	
Dyce, Aberdeen	E.	Ma.	23-5	328	0	53	18	0	—	—	—	0	57	36	+7	1	2	20	—	—	—	—	
Ekaterinburg	E.	G.	31-6	42	0	54	28	-10	—	—	—	0	59	37	-19	1	4	0	1	8	14	41°-2N, 19°-6E.	
Irkutsk	E.	G.	56-7	47	0	56	59	-46	1	0	15	1	4	42	-55	1	18	0	1	23	40	—	

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July 25, 21hrs.: San Fernando, Edinburgh, Bidston, Stonyhurst, Shide, Paris, Moncalieri, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Irkutsk, Honolulu, Victoria, Toronto, Ottawa, Harvard University, La Paz.
July 26, 5hrs.: Stonyhurst, Shide, Pulkovo, Tiflis, Baku, Ekaterinburg, Bombay, Irkutsk, Osaka.
July 28, 9hrs.: Edinburgh, Paris, Moncalieri, Rocca di Papa, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Adelaide, Riverview, Honolulu, La Paz.
July 29, 11hrs.: Edinburgh, Haslemere, Pulkovo, Ekaterinburg, Ottawa, Harvard University, La Paz.
August 2, 7hrs.: Eskdalemuir, Pulkovo, Tiflis, Baku, Ekaterinburg, Manila, Zi-ka-wei.
August 3, 15-16hrs.: Stonyhurst, Shide, Haslemere, Kew, Ekaterinburg, Sydney, Riverview, La Paz.
August 4, 12-13hrs.: Eskdalemuir, Shide, Paris, Pulkovo, Baku, Ekaterinburg, La Paz.
August 7, 4-5hrs.: Granada, Eskdalemuir, Edinburgh, Stonyhurst, Shide, Pulkovo, Helwan, Tiflis, Ekaterinburg, Zi-ka-wei, Osaka.
August 7, 19hrs.: Moncalieri, Padova, Rocca di Papa, Pompeii, Pulkovo, Tiflis, Ekaterinburg, Lick.
August 7, 20hrs.: Moncalieri, Padova, Rocca di Papa, Pompeii, Pulkovo, Tiflis, Ekaterinburg.
August 7, 22hrs.: Moncalieri, Padova, Rocca di Papa, Pompeii, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Irkutsk.
August 8, 0-1hrs.: Pulkovo, Helwan, Baku, Ekaterinburg, Irkutsk, Zi-ka-wei, Sydney, Riverview, La Paz.
August 8, 3hrs.: Eskdalemuir, Stonyhurst, Shide, Paris, Moncalieri, Rocca di Papa, Padova, Pompeii, Pulkovo, Baku, Ekaterinburg, Tiflis.
August 8, 4hrs.: Paris, Moncalieri, Rocca di Papa, Padova, Pompeii, Pulkovo, Baku, Tiflis.
August 8, 5hrs.: Paris, Moncalieri, Rocca di Papa, Padova, Pompeii, Pulkovo, Baku, Ekaterinburg, Tiflis.
August 8, 12hrs.: Paris, Moncalieri, Rocca di Papa, Padova, Pompeii, Pulkovo, Baku, Ekaterinburg, Tiflis.
August 9, 6hrs.: Eskdalemuir, Paris, Rocca di Papa, Padova, Pulkovo, Baku, Ekaterinburg, Tiflis.
August 9, 9hrs.: Paris, Rocca di Papa, Pulkovo, Helwan, Baku, Ekaterinburg, Tiflis, Irkutsk, Zi-ka-wei, La Paz.
August 9, 10hrs.: Rio Tinto, Rocca di Papa, Pompeii, Tiflis, Baku, Ekaterinburg, La Paz.
August 10, 2hrs.: Granada, Rocca di Papa, Pompeii, Cape Town, Batavia, Zi-ka-wei, Honolulu, Victoria, Toronto, La Paz.

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1915. August 10th.

Origin : 39°0N. 19°5E., determined by Shide.

Time at Origin : 2h. 2m. 34s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.		
				H.	M.	s.	s.	H.	M.	s.	H.	M.	s.	s.	H.	M.	s.	H.	M.	s.			
Pompeii	E. & S.	—	4-1	292	2	3	59	+21	—	—	—	2	4	35	+8	2	5	5	—	—	—	—	
Malta	E.	M.	5-3	230	2	4	30	+34	—	—	—	—	—	—	—	—	—	—	2	14	0	—	
Rocca di Papa	Aga.	V.	5-9	301	2	4	21	+16	—	—	—	?	2	6	21	+66	?	2	12	54	(Pen went off the paper).	—	
Padova	S.	V.	8-5	321	2	5	2	+19	—	—	—	2	8	27	+123	—	—	—	—	—	—	—	
Moncalieri	S.	S.	10-6	308	2	5	28	+16	—	—	—	2	7	40	+22	2	9	6	—	—	—	—	
Barcelona	Ma.	—	13-4	285	2	6	5	+13	—	—	—	?	2	8	42	+14	2	9	47	—	—	—	
Helwan	E.	M.	13-4	180	2	5	0	-32	—	—	—	—	—	—	—	—	—	—	—	2	19	0	
Paris	—	—	13-6	314	2	6	45	+24	—	—	—	2	9	47	+27	2	12	0	—	—	—	—	
Granada	C.	—	18-2	270	2	7	11	+18	—	—	—	2	10	42	+24	2	13	0	—	—	—	—	
Kew	E.	M.	18-5	318	2	7	54	+57	—	—	—	—	—	—	—	—	—	—	—	2	19	0	
Guildford	M.	—	18-6	318	2	7	12	+14	—	—	—	2	10	39	+12	2	12	50	—	—	—	—	
Haslemere	E.	M.	18-6	317	2	9	0	? S.	—	—	—	2	9	0	-87	—	—	—	—	—	2	14	34
Shide	E.	M.	18-7	315	2	7	12	+13	—	—	—	—	—	—	—	—	—	—	—	2	16	47	
	E.	M.S.	18-7	315	2	7	18	+19	—	—	—	2	10	50	+21	2	12	7	—	—	—	—	
	E.	M.B.	18-7	315	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Tiflis	E.	G.	19-4	74	2	7	8	0	—	—	—	2	10	45	+1	2	13	0	—	—	2	14	25
Rio Tinto	E.	M.	20-1	266	2	6	0	-80	—	—	—	—	—	—	—	—	—	—	—	—	2	17	0
San Fernando	E.	M.	20-4	269	2	8	0	+40	—	—	—	2	12	0	+55	2	15	30	—	—	—	—	—
	N.	M.	20-4	269	2	7	0	-20	—	—	—	2	12	30	+85	2	16	0	—	—	—	—	—
	M.	—	21-0	322	2	5	36	-111	—	—	—	2	10	18	-60	2	14	30	—	—	—	—	—
Stonyhurst	S.	M.S.	21-1	320	2	7	40	+12	—	—	—	2	11	40	+20	—	—	—	—	—	2	15	36
Bidston	G.	—	21-8	15	2	7	39	+2	—	—	—	2	11	38	+3	2	14	0	—	—	—	—	—
Pulkovo	G.	—	22-2	324	2	7	50	+9	—	—	—	2	11	59	+16	—	—	—	—	—	—	—	—
Eskdalemuir	G.	—	22-2	324	2	7	48	+7	—	—	—	2	12	0	+17	—	—	—	—	—	—	—	—
	M.S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Edinburgh	E.	M.	22-6	326	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	17	18
Dyce, Aberdeen	E.	M.A.	23-0	329	2	8	0	+9	—	—	—	2	12	20	+21	2	16	16	—	—	—	—	—
Baku	G.	—	23-8	77	2	7	35	-19	—	—	—	2	11	45	-20	—	—	—	—	—	2	21	26

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Ekaterinburg	G.	32.1	43	2	9	11	-11	—	2	14	7	-37	2	18	0	2	20	59	40°2N. 21°7E.
Simla	O.E.	47.1	81	—	—	—	—	—	2	17	0	-76	—	—	—	—	—	—	—
Irkutsk	G.	57.2	46	2	12	31	+4	—	2	20	27	+4	2	31	0	—	—	—	—
Toronto	E.	M.	69.6	310	—	—	—	—	—	—	—	—	2	45	36	2	47	18	—
Cape Town	E.	M.	72.9	179	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Zi-ka-wei	W.	79.1	59	—	—	—	—	—	—	—	—	—	2	45	?	—	—	—	—
Victoria	E.	M.	86.5	336	—	—	—	—	—	—	—	—	2	51	30	2	59	30	—
Batavia	W.	91.7	196	—	—	—	—	—	2	27	0	-6	—	—	—	2	29	0	—
La Paz	W.	98.5	256	—	—	—	—	—	2	29	35	+80	2	50	0	2	52	26	—
Honolulu	E.	M.	119.9	3	—	—	—	—	—	—	—	—	2	59	42	3	5	24	—

Small Earthquakes which do not give good determinations—

- August 10, 3hrs.: Shide, Moncalieri, Padova, Rocca di Papa, Pompeii, Pulkovo, Tiflis, Baku, Ekaterinburg.
- August 10, 14hrs.: Accra, Padova, Rocca di Papa, Pompeii, Pulkovo, Baku, Ekaterinburg, Batavia.
- August 10, 16hrs.: Padova, Rocca di Papa, Pompeii, Pulkovo, Baku, Ekaterinburg.
- August 11, 8hrs.: Paris, Moncalieri, Padova, Rocca di Papa, Pompeii, Pulkovo, Ekaterinburg, Fanning Island.
- August 11, 13hrs.: Stonyhurst, Moncalieri, Padova, Rocca di Papa, Pompeii, Pulkovo, Helwan, Tiflis, Ekaterinburg.
- August 11, 17hrs.: Moncalieri, Padova, Rocca di Papa, Pompeii, Pulkovo, Helwan, Tiflis, Ekaterinburg, Irkutsk.
- August 11, 18-19hrs.: Rocca di Papa, Pompeii, Pulkovo, Ekaterinburg, Irkutsk, Osaka, La Paz.
- August 12, 12hrs.: Moncalieri, Padova, Rocca di Papa, Pompeii, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Irkutsk.
- August 12, 13hrs.: Granada, Eskdalemuir, Edinburgh, Bidston, Pulkovo, Tiflis, Baku, Mauritius, Ekaterinburg, Kodai-kanal, Colombo, Irkutsk, Batavia, Manila, Zi-ka-wei, Riverview.
- August 12, 21-22hrs.: San Fernando, Granada, Eskdalemuir, Bidston, Kew, Moncalieri, Padova, Rocca di Papa, Pompeii, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg, Irkutsk.
- August 13, 19hrs.: Rocca di Papa, Pulkovo, Helwan, Baku, Simla, Irkutsk.
- August 14, 16hrs.: Moncalieri, Padova, Pulkovo, Helwan, Tiflis, Baku, Ekaterinburg.
- August 14, 20hrs.: Moncalieri, Padova, Rocca di Papa, Pompeii, Pulkovo, Tiflis, Baku, Ekaterinburg.
- August 16, 0hrs.: Eskdalemuir, Edinburgh, Bidston, Shide, Paris, Pulkovo, Baku, Irkutsk.
- August 16, 2hrs.: Rio Tinto, Granada, Eskdalemuir, Bidston, Paris, Pompeii, Pulkovo, Baku, Mauritius.
- August 16, 3hrs.: Granada, Eskdalemuir, Edinburgh, Bidston, Kew, Paris, Pulkovo.
- August 16, 5hrs.: Eskdalemuir, Edinburgh, Bidston, Shide, Paris, Pulkovo, Baku, Irkutsk, Zi-ka-wei.
- August 17, 2-3hrs.: Paris, Moncalieri, Padova, Rocca di Papa, Pulkovo, Tiflis, Baku, Ekaterinburg, Osaka.

1915. August 11.

Origin : 39°3N. 18°0E., determined by Shide.

Time at Origin : 9h. 10m. 15s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.		
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.			
Malta	E.	M.	4.4	220	9	12	0	+37	—	—	—	—	—	—	—	9	18	30	—	—	—		
Rocca di Papa	Aga.	4.7	363	9	12	13	?	S.	—	—	—	—	—	—	—	9	14	57	—	—	—		
Padova	V.	7.6	326	9	12	43	+38	—	—	—	—	—	—	—	—	9	16	24	—	—	—		
Moncalieri	S.	9.5	310	9	13	22	+44	—	—	—	—	—	—	—	—	9	15	19	—	—	—		
Barcelona	Ma.	12.2	283	9	13	49	-32	—	—	—	—	—	—	—	?	9	19	3	—	—	—		
Helwan	E.	M.	14.4	127	9	12	48	-58	—	—	—	—	—	—	—	9	15	30	—	—	—		
Paris	—	14.6	316	9	14	30	+41	—	—	—	—	—	—	—	—	9	17	33	—	—	—		
Guildford	M.	17.6	319	?	9	14	35	-8	—	—	—	—	—	—	—	?	9	17	48	—	—	—	
Haslemere	E.	M.	17.6	318	9	15	34	+67	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Shide	E.	M.S.	17.7	316	9	15	8	+40	—	—	—	—	—	—	—	?	9	18	42	—	—	—	
San Fernando	E.	M.	19.2	270	9	16	0	+74	—	—	—	—	—	—	—	9	19	30	—	—	—	—	
Stonyhurst	E.	M.S.	20.1	323	9	16	0	+63	—	—	—	—	—	—	—	9	19	48	—	—	—	—	
Bidston	N.	M.S.	20.2	322	9	15	42	+44	—	—	—	—	—	—	—	9	19	48	—	—	—	—	
Tiflis	G.	20.4	75	9	15	0	-1	—	—	—	—	—	—	—	—	9	18	42	—	—	—	—	
Eskdalemuir	G.	21.4	326	9	15	57	+44	—	—	—	—	—	—	—	—	?	9	19	42	—	—	—	
	M.S.	21.4	326	9	15	42	+29	—	—	—	—	—	—	—	—	9	19	44	—	—	—	—	
Edinburgh	E.	M.	21.7	327	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pulkovo	G.	21.9	17	9	15	27	+8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ekaterinburg	G.	32.7	43	9	17	2	-6	—	—	—	—	—	—	—	—	9	19	25	—	—	—	—	—
Simla	O.E.	45.2	81	—	—	—	—	—	—	—	—	—	—	—	—	9	22	23	—	—	—	—	—
Bombay	E.	M.	50.8	94	—	—	—	—	—	—	—	—	—	—	—	9	26	0	—	—	—	—	—
Kodaikanal	E.	M.	60.0	102	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Colombo	E.	M.	64.0	103	9	50	0	? M.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ottawa	B.	65.4	310	—	—	—	—	—	—	—	—	—	—	—	—	9	44	54	—	—	—	—	—
Toronto	E.	M.	68.6	310	—	—	—	—	—	—	—	—	—	—	—	9	52	18	—	—	—	—	—
Mauritius	E.	M.	70.0	140	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cape Town	E.	M.	73.2	180	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Zi-ka-wei	W.	80.0	58	—	9	22	48	+14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Batavia	W.	93.0	95	—	9	24	0	+13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
La Paz	—	97.5	255	—	9	28	0	+228	—	—	—	—	—	—	—	10	1	0	—	—	—	—	—

1915. August 11.

Origin : 39°0N. 20°5E., determined by Shide.

Time at Origin : 9h. 58m. 10s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁	S.			O-C.	L.	M.			Remarks.	
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	H.	M.	S.		
Pompeii	{ E. N. E.	O.A.	4.9	292	9	59	36	+10	—	—	—	—	—	10	0	55	—	
		O.A.	4.9	292	9	59	29	+3	—	—	—	—	—	10	1	16		
Malta	{ E. N. E.	M.	5.6	240	10	0	0	+24	—	—	—	—	—	10	6	0	—	
		Aga.	6.5	297	9	59	52	+3	—	—	?	10	2	5	+58	10		2
Rocca di Papa	V.	9.0	318	10	0	22	-4	—	—	10	3	38	+85	—	—	—	—	
Padova	V.	9.0	318	10	0	22	-4	—	—	10	3	38	+85	—	—	—	—	
Moncalieri	S.	11.2	306	10	0	12	-45	—	—	10	2	24	-45	10	4	13	{ 10 7 10 10 5 50 10 9 0	—
Paris	—	16.2	313	10	2	7	+2	—	—	10	5	19	+9	10	7	30		
Tiflis	G.	13.6	74	10	2	35	+1	—	—	10	6	8	+5	10	8	30	10 10 47	—
Guildford	M.	19.1	317	10	2	18	-22	—	—	10	6	13	-1	10	8	58	10 11 27	
Shide	{ E. E.	M.S.	19.2	314	10	2	47	+6	—	10	6	30	+14	—	—	—	10 11 27	—
		M.B.	19.2	314	—	—	—	—	—	—	—	—	—	—	—	—		
Bidston	N.	M.S.	21.6	320	—	—	—	—	—	10	7	18	+11	—	—	—	10 13 36	—
Pulkovo	G.	21.7	13	10	3	6	-5	—	—	10	7	5	-4	10	9	0	10 10 18	
Eskdalemuir	G.	22.7	324	10	3	26	+3	—	—	10	7	26	-3	10	10	49	—	—
Dyce, Aberdeen	Ma.	23.5	328	10	3	24	-9	—	—	10	7	42	+2	10	12	42		
Ekaterinburg	G.	31.6	42	10	4	39	-14	—	—	10	10	25	+14	10	14	0	10 18 25	

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{Quake recorded, but film illegible.

1915. August 12.

Origin : 2°0s. 124°5E., determined by Shide.

Time at Origin : 7h. 36m. 10s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁	S.			O-C.	L.	M.			Remarks.	
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	H.	M.	S.		
Manila	W.	17.0	348	7	40	36	+21	—	—	7	43	53	+25	7	47	42	7 50 21	—
Batavia	W.	18.4	253	7	39	27	-65	—	—	? 7	42	52	-77	—	—	—	7 45 0	
Zi-ka-wei	{ V. W.	33.2	355	7	43	10	+2	—	—	7	48	35	-2	—	—	—	—	—
		33.2	355	7	43	8	0	7 44 36	—	7	48	52	+15	7 52 12	—	—	7 52 22	
Adelaide	O.	33.2	355	7	43	27	+19	—	—	7	48	39	+2	—	—	—	7 31 15	—
Osaaka	M.	35.2	160	7	49	12	? S.	—	—	7	49	12	+4	—	—	—	7 58 42	
Riverview	G.	37.9	15	7	44	8	+21	—	—	7	53	20	+213	8	0	44	8 9 25	—
Kolombo	W.	40.1	145	7	44	30	+24	—	—	7	51	0	+42	7	58	30	8 2 36	
Kodaikanal	E. M.	45.6	282	7	46	0	+73	—	—	7	54	30	+177	8	3	30	8 5 12	—
Bombay	E. M.	48.5	286	7	47	24	+137	—	—	—	—	—	—	7	58	54	8 3 42	
Simla	O.E.	55.0	295	7	44	36	-73	—	—	—	—	—	—	—	—	—	8 7 42	—
Irkutsk	G.	55.8	310	7	45	12	-43	—	—	—	—	—	—	—	—	—	8 10 12	
Ekaterinburg	G.	56.8	345	7	46	5	+4	—	—	7	53	55	+1	8	5	0	—	—
Honolulu	E. M.	77.6	330	7	48	9	-6	—	—	7	57	48	-18	8	11	0	8 26 31	
Baku	G.	79.6	68	7	59	36	? S.	—	—	7	59	36	+80	8	19	24	8 24 54	—
Tiflis	G.	83.5	312	7	43	39	+12	—	—	? 7	58	21	-8	8 ? 16	0	—	8 ? 19 58	
Pulkovo	G.	83.5	312	7	48	37	-12	7 51 46	—	7	58	40	-33	8	29	0	—	—
Helwan	E. M.	93.5	300	7	49	0	-45	7 53 19	—	8	0	25	-36	8	20	0	8 25 9	
Rocca di Papa	Aga.	107.1	314	7	51	36	+42	—	—	? 7	53	15	-597	—	—	—	7 53 24	—
Padova	V.	107.7	317	7	53	45	+168	—	—	—	—	—	—	—	—	—	—	
Moncalieri	S.	109.7	318	7	55	10	+244	—	—	? 8	10	1	+386	8	32	17	8 50 24	—
Dyce, Aberdeen	Ma.	110.2	332	7	55	30	+262	—	—	8	3	10	-30	8	5	18	8 5 0	
Edinburgh	E. M.	112.3	331	8	1	0	? S.	—	—	8	1	0	-178	—	—	—	8 6 0	—
Paris	G.	112.5	323	—	—	—	—	—	—	—	—	—	—	8	37	0	—	
Eskdalemuir	G.	112.6	331	7	55	36	+257	7 57 56	—	8	4	49	+48	8	32	0	8 40 0	—
Stonyhurst	E. M.	113.0	329	8	3	0	? S.	—	—	8	3	0	-64	—	—	—	8 48 30	
Bidston	N. M.S.	113.5	329	8	3	18	? S.	—	—	8	3	18	-50	—	—	—	8 11 36	—
Shide	E. M.S.	113.9	326	—	—	—	—	—	—	—	—	—	—	—	—	—	8 48 15	
Granada	C.	121.3	313	7	55	9	+190	—	—	8	5	21	+12	8	46	30	8 49 30	—
San Fernando	E. M.	123.5	313	—	—	—	—	—	—	—	—	—	—	8	55	0	8 59 0	
La Paz	—	157.6	146	7	56	36	+126	7 57 18	—	—	—	—	—	8	18	0	8 22 20	

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e 7h. 55m. 26s.

1915. August 12.

Origin : 7°0N. 94°0E., determined by Shide.

Time at Origin : 9h. 16m. 43s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Colombo	E. M.	14-1	268	9	22	0	+110	—	—	9	23	18	+25	9	24	12	9	25	54	—	
Kodaikanal	E. M.	16-7	283	9	22	48	? S.	—	—	9	22	48	-66	9	23	6	9	26	42	—	
Batavia	W.	18-3	135	9	23	31	? S.	—	—	9	23	31	-59	—	—	—	9	29	0	—	
Bombay	M.	23-8	302	9	22	16	+7	—	—	—	—	—	—	—	—	—	9	30	8	—	
Manila	E. W.	27-5	72	9	23	24	+38	—	—	9	27	42	+9	9	31	4	9	37	4	—	
Simla	O.E.	28-8	329	9	22	30	-29	—	—	9	27	18	-38	9	32	12	9	33	48	—	
Zi-ka-wei	W.	35-2	43	9	24	5	+7	—	—	9	29	39	-2	—	—	—	—	—	—	—	
Irkutsk	W.	35-2	43	—	—	—	—	9	25	35	—	—	+16	9	34	45	9	43	6	—	
	O.	35-2	43	—	—	—	—	—	—	9	29	51	+10	—	—	—	—	—	—	—	
Osaka	O.	46-0	9	9	25	(17?)	-6	—	—	9	32	8	-3	9	41	0	—	—	—	—	
Baku	O.	47-0	48	9	25	53	+23	—	—	9	34	20	+116	9	41	30	9	47	48	—	
Tiflis	G.	51-6	317	9	26	13	+13	—	—	? 9	33	35	+13	9	41	0	9	46	57	—	
Ekaterinburg	G.	55-6	317	9	26	23	-3	—	—	9	33	57	-15	9	45	0	9	53	41	—	
Helwan	E. M.	56-2	339	9	26	27	-3	—	—	9	34	7	-12	9	43	0	9	49	3	7°1N. 93°2E.	
Riverview	—	62-9	300	—	—	—	—	—	—	—	—	—	—	—	—	—	9	53	42	—	
Pulkovo	G.	67-7	49	9	37	18	? S.	—	—	9	37	18	+37	9	51	12	9	56	42	—	
Rocca di Papa	Aga.	71-0	332	9	28	3	-3	—	—	9	37	3	-18	9	51	0	9	55	40	—	
Padova	—	78-9	311	9	28	48	-7	—	—	—	—	—	—	—	—	—	—	—	—	—	
Moncalieri	V.	79-5	315	9	28	53	-6	—	—	9	48	38	+543	10	2	11	10	5	52	—	
Paris	S.	82-5	315	9	39	6	+590	—	—	9	39	30	-40	10	5	0	10	7	0	—	
Kew	—	85-7	319	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Guildford	E. M.	87-2	322	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Dyce, Aberdeen	Ma.	87-5	327	—	—	—	—	—	—	—	—	—	—	10	0	30	10	5	50	—	
Shide	E. M.S.	87-9	321	—	—	—	—	—	—	9	40	23	-11	—	—	—	—	—	—	{ Paper changed during quake.	
Eskdalemuir	G.	88-2	326	—	—	—	—	—	—	—	—	—	—	—	—	—	10	12	30	—	
Bidston	N. M.S.	88-6	324	—	—	—	—	—	—	—	—	—	—	—	—	—	10	15	42	—	
Granada	C.	91-8	308	9	33	1	+172	—	—	? 9	35	3	-373	10	4	0	10	6	30	—	
Honolulu	E. M.	104-0	66	—	—	—	—	—	—	—	—	—	—	10	9	0	10	19	30	—	
La Paz	—	160-2	240	9	27	38	-454	—	—	9	44	5	-315	—	—	—	—	—	—	—	

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1915. August 16.

Origin : 48°5N. 179°0W., determined by Shide.

Time at Origin : 0h. 56m. 22s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Honolulu	E. M.	31-9	141	1	9	6	? S.	—	—	1	9	6	+38	1	13	18	1	18	12	—	
Victoria	E. M.	36-1	69	—	—	—	—	—	—	1	11	0	+152	—	—	—	—	—	—	—	
Osaka	O.	36-2	264	1	3	47	+1	—	—	1	9	24	-9	1	15	24	1	16	24	—	
Berkeley	E. —	41-7	83	—	—	—	—	—	—	1	9	28	-7	1	13	34	1	18	48	—	
Irkutsk	G.	46-8	305	1	4	52	-16	1	6	42	1	11	6	-54	1	17	0	1	20	58	
Zi-ka-wei	W.	47-6	272	1	5	16	+3	—	—	—	1	12	10	-1	—	—	1	51	34	—	
Toronto	O. M.	47-6	272	1	5	20	+7	—	—	—	—	—	—	—	—	—	—	—	—	—	
Ottawa	E. M.	64-1	52	1	15	6	? S.	—	—	—	1	15	6	-30	—	—	1	30	12	—	
Pulkovo	B. G.	64-8	49	—	—	—	—	—	—	—	1	15	44	-1	—	—	1	31	54	—	
Simla	O.E.	69-2	345	1	7	32	-2	1	10	16	1	16	22	-16	1	28	0	1	36	52	
Edinburgh	E. M.	75-5	301	—	—	—	—	—	—	—	1	16	6	-108	—	—	—	—	—	{ 52°0N. 136°0E. S.R. 1h. 21m. 6s.	
Eskdalemuir	G.	75-5	2	1	18	0	? S.	—	—	—	1	18	0	+6	—	—	1	49	0	—	
Stonyhurst	E. M.S.	76-1	2	1	8	16	-2	—	—	—	1	17	47	-13	—	—	—	—	—	{ 51°0N. 177°0E. S.R. 1h. 23m. 0s.	
Bidston	N. M.S.	76-1	2	1	8	16	-2	—	—	—	1	17	47	-13	—	—	—	—	—	—	
Kew	E. M.	77-7	2	1	19	30	? S.	—	—	—	1	19	30	+71	—	—	1	54	48	—	
Guildford	M.	78-0	3	1	8	42	+13	—	—	—	1	29	0	+641	—	—	—	—	—	—	
Shide	W. M.S.	80-0	1	—	—	—	—	—	—	—	1	18	36	+14	—	—	—	—	—	—	
Baku	G.	80-0	1	—	—	—	—	—	—	—	36m. 0s. to 2h. 38m. 0s.	—	—	—	—	—	—	—	—	—	
Tiflis	G.	80-2	1	—	—	—	—	—	—	—	1	17	22	-85	—	—	1	44	0	—	
Paris	—	80-2	1	—	—	—	—	—	—	—	1	25	38	+411	—	—	—	—	—	—	
Riverview	—	80-8	1	—	—	—	—	—	—	—	1	18	32	-23	—	—	—	—	—	—	
—	—	80-8	1	—	—	—	—	—	—	—	1	18	42	-13	—	—	—	—	—	—	
—	—	81-3	324	1	8	34	-15	1	12	0	? 1	18	3	-57	1	35	0	1	49	18	
—	—	82-0	329	1	8	52	0	—	—	—	1	18	57	-11	1	37	0	1	50	30	
—	—	82-7	359	1	8	54	-2	—	—	—	1	18	55	-21	1	45	0	1	48	0	
—	—	—	—	—	—	—	—	—	—	—	1	19	13	-3	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	—	1	20	24	+25	1	41	18	1	44	0	

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Edinburgh	E.	M.	22-8	325	6 52 0	? S.	6 48 58	6 52 0	+23	6 54 0	6 56 42
Baku		G.	22-9	77	6 47 16	-16	---	6 51 34	-5	---	6 57 18
Ekaterinburg		G.	31-9	42	6 47 21	-11	---	---	---	6 55 0	7 2 51
Irkutsk		G.	57-0	47	---	---	---	---	---	7 12 0	7 14 17
Cape Town	E.	M.	72-9	181	6 52 18	+10	6 55 36	7 0 12	+10	---	7 23 54
La Paz		---	98-9	256	---	---	---	---	---	7 32 0	7 45 45

1915. August 31.

Origin : 4°0N. 123°0E., determined by Shide.

Time at Origin : 20h. 39m. 46s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Manila	W.	10-8	350	20	42	36	+9	---	---	20	44	37	+2	20	45	44	20	51	53	4°0N 120°0E.	
Batavia	W.	19-1	238	20	44	16	0	---	---	20	45	27	-143	---	---	---	20	53	0		
Zi-ka-wai	W.	27-2	357	20	45	43	-3	---	---	20	50	29	-2	---	---	---	---	---	---		
Osaka	W.	27-2	357	---	---	---	---	20	46	37	---	---	---	---	---	---	---	---	---		
	O.	27-2	357	20	45	50	+4	---	---	---	---	---	---	---	---	---	---	---	---		
Colombo	O.	32-8	19	20	45	12	-88	---	---	---	---	---	---	---	---	---	---	---	---		
Kodaikanal	E.	M.	43-1	276	20	54	0	? S.	---	---	20	54	0	-35	---	---	21	17	0		
Sydney	E.	M.	45-6	281	20	50	48	+145	---	---	---	---	---	---	21	5	36	21	10	30	
Riverview	E.	M.	46-3	147	20	58	0	? S.	---	---	20	58	0	+162	---	---	---	---	---		
Irkutsk	W.	46-3	147	20	56	6	+458	---	---	20	59	24	+246	21	3	12	21	4	33		
Simla	G.	50-7	345	20	48	53	-4	20	51	46	20	56	7	-6	21	4	0	21	6	43	
Bombay	O.E.	59-8	308	20	55	30	---	---	---	---	20	55	30	-45	---	---	---	---	---		
Mauritius	E.	M.	51-2	291	20	55	40	? S.	---	---	20	55	40	-40	---	---	21	11	17		
Honolulu	E.	M.	68-2	247	21	0	42	? S.	---	---	21	0	42	+52	---	---	21	17	36		
Tiflis	E.	M.	78-3	69	21	3	18	? S.	---	---	21	3	18	+88	21	22	30	21	28	18	
Pulkovo	G.	78-5	312	20	51	54	-2	---	---	---	---	---	---	---	21	26	0	21	33	10	
Helwan	G.	87-9	330	20	52	49	-1	20	56	12	21	3	15	-22	21	17	0	---	---		
Moncalieri	H.	M.	89-3	300	21	3	0	? S.	---	---	21	3	0	-52	---	---	---	---	---		
Eskdalemuir	S.	104-6	319	20	58	39	+261	---	---	---	21	7	22	+58	21	18	0	21	43	21	
Paris	G.	106-1	331	---	---	---	---	---	---	---	21	5	50	-49	21	30	0	21	36	0	
Guildford	---	106-3	327	---	---	---	---	---	---	---	21	6	0	-41	21	35	0	21	39	0	
Bidston	M.	106-9	327	20	57	7	+157	---	---	---	21	6	17	-29	21	28	10	21	44	22	
Shide	N.	M.S.	107-1	330	21	3	54	? S.	---	---	21	3	54	-174	---	---	---	21	51	12	
La Paz	E.	M.	107-5	327	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	Traces of earthquake movement.	
	E.	M.S.	107-5	327	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
	E.	M.B.	107-5	327	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		

TABLE.

De- grees.	P sec.	S sec.	S - P sec.	De- grees.	P sec.	S sec.	S - P sec.	De- grees.	P sec.	S sec.	S - P sec.
1	15	28	13	51	553	991	438	101	855	1565	710
2	31	55	24	52	560	1004	444	102	860	1575	715
3	47	83	36	53	566	1016	450	103	865	1584	719
4	62	110	48	54	573	1029	456	104	870	1593	723
5	77	137	60	55	579	1041	462	105	874	1602	728
6	92	164	72	56	586	1054	468	106	879	1612	733
7	106	190	84	57	592	1066	474	107	884	1621	737
8	121	217	96	58	599	1079	480	108	888	1630	742
9	136	243	107	59	605	1091	486	109	893	1639	746
10	150	269	119	60	612	1103	491	110	897	1648	751
11	164	294	130	61	619	1116	497	111	902	1657	755
12	179	319	140	62	625	1128	503	112	907	1666	759
13	193	344	151	63	632	1141	509	113	911	1674	763
14	206	368	162	64	638	1153	515	114	916	1682	766
15	219	392	173	65	645	1165	520	115	920	1690	770
16	232	415	183	66	651	1177	526	116	925	1698	773
17	245	438	193	67	658	1190	532	117	929	1706	777
18	257	460	203	68	664	1202	538	118	934	1714	780
19	269	482	213	69	671	1214	543	119	938	1722	784
20	281	503	222	70	677	1226	549	120	942	1729	787
21	293	524	231	71	683	1238	555	121	947	1737	790
22	305	545	240	72	690	1250	560	122	952	1744	792
23	317	565	248	73	696	1262	566	123	957	1752	795
24	328	584	256	74	702	1274	572	124	961	1759	798
25	338	603	265	75	709	1286	577	125	966	1766	800
26	348	622	274	76	715	1297	582	126	970	1773	803
27	358	641	283	77	721	1309	588	127	974	1780	806
28	368	659	291	78	727	1320	593	128	978	1787	809
29	378	677	299	79	733	1332	599	129	983	1794	811
30	388	694	306	80	739	1343	604	130	988	1801	813
31	398	711	313	81	745	1355	610	131	992	1807	815
32	407	728	321	82	750	1366	616	132	996	1814	818
33	416	744	328	83	756	1377	621	133	1001	1821	820
34	425	760	335	84	762	1388	626	134	1005	1827	822
35	433	775	342	85	768	1399	631	135	1009	1833	824
36	442	790	348	86	773	1410	637	136	1014	1840	826
37	450	804	354	87	779	1421	642	137	1018	1846	828
38	458	818	360	88	785	1432	647	138	1023	1852	829
39	466	832	366	89	790	1443	653	139	1027	1858	831
40	475	847	372	90	796	1454	658	140	1031	1864	833
41	483	861	378	91	801	1464	663	141	1035	1869	834
42	491	875	384	92	807	1475	668	142	1039	1875	836
43	498	888	390	93	812	1485	673	143	1043	1881	838
44	506	902	396	94	818	1496	678	144	1047	1886	839
45	513	915	402	95	823	1506	683	145	1051	1892	841
46	520	928	408	96	829	1516	687	146	1055	1897	842
47	527	941	414	97	834	1526	692	147	1059	1902	843
48	534	954	420	98	840	1536	696	148	1063	1907	844
49	540	966	426	99	845	1546	701	149	1067	1912	845
50	547	979	432	100	851	1556	705	150	1071	1917	846

British Association for the Advancement
of Science.—Seismological Committee.

Observations and formal business to
J. H. BURGESS,
Earthquake Observatory,
SHIDE, Isle of Wight.

Special inquiries to
Prof. H. H. TURNER,
University Observatory,
OXFORD.

Bulletin for Sept., Oct., Nov., and Dec., 1915.

For the large Earthquakes an attempt is here made to compare the readings with theoretical values, as explained in the Nineteenth Report of the Committee to the British Association. The position of the epicentre is determined at Shide, unless otherwise stated; and the tables of times for P and S are those given by Galitzin in his "Vorlesungen über Seismometrie," p. 137, or by G. W. Walker on p. 54 of his "Modern Seismology." It is shown in the above Report that these tables are sensibly erroneous: but the precise values of the corrections are under discussion, and it seems better to await the definitive corrections than to introduce provisional tables. The tables are reproduced in an expanded form on page 2 of this Bulletin. The time of the earthquake at the epicentre is deduced from the best records; and applying the tabular times for P and S from the distances in the third column (calculated and also measured from a large globe specially made for the purpose), the errors O - C of the observed times are found.

Observers are requested to send a copy of their Registers to Shide *each month*, in order that this collated information may be published as early as possible.

For the large earthquakes the stations are arranged in the order of distance from epicentre, as shown in the 3rd column. The azimuth in the 4th column is also read from the globe; and is the azimuth at the epicentre measured from N. towards E., in which the observing station lies. The Earthquake Chart formerly given has been discontinued in favour of brief notes for the smaller earthquakes, the stations being arranged in the order of longitude.

The letters in the 2nd column stand for: A. = Alfani; Aga. = Agamennone; B. = Bosch; Bif. = Biflar; B.O. = Bosch-Omori; C. = Cartuja; Ca. = Cancani; C.O. = Cartuja-Omori; G. = Galitzin; L. = Luckmann; M. = Milne; Ma. = Mainka; M.B. = Milne-Burgess; M.Bk. = Milne-Bullock; M.S. = Milne-Shaw; O.A. = Omori-Alfani; O.E. = Omori-Ewing; S. = Stiattesi; V. = Vincentini; W. = Wiechert.

Riverview has two W. and one Ma.; it is not generally specified from which machine the readings were obtained.

TABLE.

De- grees.	P sec.	S sec.	S - P sec.	De- grees.	P sec.	S sec.	S - P sec.	De- grees.	P sec.	S sec.	S - P sec.
1	15	28	13	51	553	991	438	101	855	1565	710
2	31	55	24	52	560	1004	444	102	860	1575	715
3	47	83	36	53	566	1016	450	103	865	1584	719
4	62	110	48	54	573	1029	456	104	870	1593	723
5	77	137	60	55	579	1041	462	105	874	1602	728
6	92	164	72	56	586	1054	468	106	879	1612	733
7	106	190	84	57	592	1066	474	107	884	1621	737
8	121	217	96	58	599	1079	480	108	888	1630	742
9	136	243	107	59	605	1091	486	109	893	1639	746
10	150	269	119	60	612	1103	491	110	897	1648	751
11	164	294	130	61	619	1116	497	111	902	1657	755
12	179	319	140	62	625	1128	503	112	907	1666	759
13	193	344	151	63	632	1141	509	113	911	1674	763
14	206	368	162	64	638	1153	515	114	916	1682	766
15	219	392	173	65	645	1165	520	115	920	1690	770
16	232	415	183	66	651	1177	526	116	925	1698	773
17	245	438	193	67	658	1190	532	117	929	1706	777
18	257	460	203	68	664	1202	538	118	934	1714	780
19	269	482	213	69	671	1214	543	119	938	1722	784
20	281	503	222	70	677	1226	549	120	942	1729	787
21	293	524	231	71	683	1238	555	121	947	1737	790
22	305	545	240	72	690	1250	560	122	952	1744	792
23	317	565	248	73	696	1262	566	123	957	1752	795
24	328	584	256	74	702	1274	572	124	961	1759	798
25	338	603	265	75	709	1286	577	125	966	1766	800
26	348	622	274	76	715	1297	582	126	970	1773	803
27	358	641	283	77	721	1309	588	127	974	1780	806
28	368	659	291	78	727	1320	593	128	978	1787	809
29	378	677	299	79	733	1332	599	129	983	1794	811
30	388	694	306	80	739	1343	604	130	988	1801	813
31	398	711	313	81	745	1355	610	131	992	1807	815
32	407	728	321	82	750	1366	616	132	996	1814	818
33	416	744	328	83	756	1377	621	133	1001	1821	820
34	425	760	335	84	762	1388	626	134	1005	1827	822
35	433	775	342	85	768	1399	631	135	1009	1833	824
36	442	790	348	86	773	1410	637	136	1014	1840	826
37	450	804	354	87	779	1421	642	137	1018	1846	828
38	458	818	360	88	785	1432	647	138	1023	1852	829
39	466	832	366	89	790	1443	653	139	1027	1858	831
40	475	847	372	90	796	1454	658	140	1031	1864	833
41	483	861	378	91	801	1464	663	141	1035	1869	834
42	491	875	384	92	807	1475	668	142	1039	1875	836
43	498	888	390	93	812	1485	673	143	1043	1881	838
44	506	902	396	94	818	1496	678	144	1047	1886	839
45	513	915	402	95	823	1506	683	145	1051	1892	841
46	520	928	408	96	829	1516	687	146	1055	1897	842
47	527	941	414	97	834	1526	692	147	1059	1902	843
48	534	954	420	98	840	1536	696	148	1063	1907	844
49	540	966	426	99	845	1546	701	149	1067	1912	845
50	547	979	432	100	851	1556	705	150	1071	1917	846

1915. September 5.

Origin : 9°·5N. 128°·0E., determined by Shide.

Time at Origin : 12h. 16m. 56s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.		O-C.	PR ₁		S.		O-C.	L.		M.		Remarks.			
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	H.	M.		S.		
Manila	W.	8·6	308	12	19	11	+ 5	—	12	21	24	+35	12	23	21	12	25	17	—
Zi-ka-wei	W.	22·5	345	12	22	8	+ 1	—	12	26	18	+ 7	—	—	—	—	—	—	—
Batavia	W.	26·3	234	12	17	29	-318	—	—	—	—	—	—	—	—	12	25	0	—
Irkutsk	G.	46·9	340	12	25	38	- 4	12	27	36	— 3	12	43	0	—	12	43	26	—
Sydney	E.	48·6	154	12	35	0	? S.	—	12	35	0	+123	—	—	—	—	—	—	—
Tiflis	G.	78·6	311	12	29	10	+ 3	—	12	38	53	-10	12	55	0	13	7	38	—
Makeyevka	G.	82·9	318	12	29	34	+ 3	—	12	39	37	-15	13	0	0	13	8	17	—
Pulkovo	G.	85·7	330	12	29	49	+ 1	12	33	17	—	-12	13	0	0	13	1	24	10°·0N. 123°·0E. ca.
Helwan	E.	90·9	299	12	40	0	? S.	—	12	40	0	-79	—	—	—	—	—	—	—
Edinburgh	E.	103·1	334	—	—	—	—	—	—	—	—	—	—	—	—	13	24	0	—
Eskdalemuir	G.	103·5	334	—	—	—	—	—	—	—	—	—	—	—	—	? 13	7	0	—
Bidston	N.	M.S.	104·6	332	—	—	—	—	—	—	—	—	—	—	—	13	27	0	—
Paris	—	104·6	326	—	—	—	—	—	—	—	—	—	13	14	0	—	—	—	—
Shide	E.	M.B.	105·5	329	—	—	—	—	—	—	—	—	—	—	—	? 13	25	15	—
La Paz	—	162·8	115	12	35	28	- 5	—	—	—	—	—	—	—	—	—	—	—	i 12h. 38m. 15s. i 12h. 42m. 20s.

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1915. September 7.

Origin : 14°·5N. 91°·0W., determined by Shide.

Time at Origin : 1h. 20m. 27s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.		O-C.	PR ₁		S.		O-C.	L.		M.		Remarks.					
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	H.	M.		S.				
Toronto	E.	M.	30·9	16	1	27	48	+44	—	1	32	42	+26	1	34	36	1	39	54	—	
Harvard Univ.	E.	B.O.	32·8	28	1	27	19	- 2	1	27	51	+66	1	34	23	—	1	35	54	—	
	N.	B.O.	32·8	28	1	27	21	0	—	1	32	41	- 7	1	37	1	—	1	39	42	—
Ottawa	E.	B.	33·6	20	1	27	27	- 1	1	27	58	1	33	0	- 1	1	36	6	1	40	30
	N.	B.	33·6	20	1	27	29	+ 1	—	—	—	—	—	—	—	1	36	30	1	40	30
Läck	B.O.	35·3	315	1	28	0	+17	—	1	33	47	+20	1	38	15	—	1	40	27	—	
Santa Clara	W.	35·7	315	1	28	0	+14	—	—	—	—	—	1	39	0	—	1	42	36	—	
Berkeley	W.	36·2	316	1	27	57	+ 6	—	1	33	47	+ 7	1	38	17	—	1	40	43	—	
La Paz	—	38·3	143	1	27	59	- 8	1	29	34	1	33	56	-13	1	38	0	1	41	25	
Victoria	E.	M.	43·1	329	1	29	12	+26	—	1	35	42	+26	1	38	42	—	1	49	12	
Azores	E.	M.	61·8	55	1	30	42	- 9	—	—	—	—	—	—	—	—	—	1	49	54	
Honolulu	E.	M.	63·6	287	1	31	36	+33	—	1	40	30	+55	1	50	48	—	1	54	6	
Rio Tinto	E.	M.	76·9	54	1	33	30	+63	—	—	—	—	—	—	—	—	—	2	10	30	
Eskdalemuir	G.	76·9	36	1	32	35	+ 8	—	1	35	56	— 8	—	—	—	—	—	1	58	0	
Edinburgh	E.	M.	76·9	35	1	33	0	+33	—	—	—	—	—	—	—	—	—	2	8	51	
San Fernando	E.	M.	77·3	55	1	33	0	+30	—	1	42	0	-19	1	58	0	—	2	9	0	
	N.	M.	77·3	55	1	33	6	+36	—	1	43	0	+41	1	57	18	—	2	8	0	
Bidston	M.S.	77·3	39	1	31	48	-42	—	1	37	48	+11	—	—	—	—	—	2	9	42	
West Bromwich	M.	78·0	39	1	32	30	+16	—	—	—	—	—	—	—	—	—	—	—	—	—	
Shide	E.	M.S.	78·7	40	1	32	38	0	—	—	—	—	—	—	—	—	—	2	3	0	
	E.	M.B.	78·7	40	1	32	38	0	—	—	—	—	—	—	—	—	—	2	3	0	
Newport, I.W.	M.Bk.	78·7	40	1	32	46	+ 8	—	—	—	—	—	—	—	—	—	—	2	2	46	
Haslemere	E.	M.	79·0	40	1	35	0	+140	—	1	45	0	+141	—	—	—	—	2	5	0	
Guildford	E.	M.	79·1	40	1	31	46	-55	—	1	42	0	-40	1	55	45	—	2	12	27	
Kew	E.	M.	79·2	38	1	35	0	+19	—	—	—	—	—	—	—	—	—	2	9	0	
Ascension	E.	M.	79·2	101	1	34	0	+79	—	—	—	—	—	—	—	—	—	1	44	30	
Granada	C.	79·3	54	1	32	48	+ 6	—	—	1	42	45	+ 3	1	49	0	—	1	58	18	
Paris	—	81·5	42	1	32	58	+ 3	—	—	—	—	—	—	—	—	—	—	2	0	0	
Barcelona	Ma.	82·8	49	1	33	1	- 1	—	—	1	43	16	- 6	1	51	57	—	2	3	14	

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Moncalieri	S.	85.9	45	1 33 20	0	—	—	1 43 45	-11	1 50 3	2 9 50	—
Padova	V.	88.6	43	1 33 39	+ 4	—	—	1 44 1	-25	—	1 55 25	—
Acra	M.	89.4	79	1 43 30	+591	—	—	—	—	—	2 9 0	—
Rocca di Papa	Aga.	90.5	46	1 33 40	- 5	—	—	1 44 22	-22	1 50 42	2 11 18	—
Pompeii	O.A.	92.0	47	1 32 0	-114	—	—	1 42 0	-182	2 2 0	2 5 0	—
Pulkovo	G.	92.2	26	1 33 54	- 1	1 37 40	—	1 44 38	-26	2 3 0	2 5 48	19°0N. 89°2W.
Malta	M.	93.7	52	1 35 0	+57	—	—	—	—	—	1 50 0	—
Makeyevka	G.	102.9	32	1 34 46	- 5	1 39 20	—	—	—	1 48 0	2 11 17	—
Helwan	M.	108.1	50	1 34 12	-64	—	—	—	—	—	2 33 24	—
Tiflis	G.	110.6	34	1 35 17	-10	—	—	—	—	2 0 0	2 17 14	i lh. 39m. 55s.
Irkutsk	G.	112.0	350	1 35 51	+17	1 40 41	—	? 1 50 19	+126	—	—	—
Osaka	O.	114.0	319	1 40 43	+300	—	—	1 57 0	+511	2 11 22	2 28 48	—
Cape Town	M.	114.0	121	1 39 42	+239	—	—	1 48 42	+13	—	2 25 0	—
Sydney	M.	120.9	239	1 38 42	+148	—	—	1 49 0	-23	2 14 0	2 17 30	—
Riverview	W.	120.9	239	—	—	1 42 53	—	1 51 18	+115	2 16 30	2 17 44	c lh. 39m. 42s.
Zi-ka-wei	W.	124.7	326	1 39 51	+200	—	—	1 53 31	+220	2 21 17	2 32 47	—
Adelaide	O.	124.7	326	1 40 15	+224	—	—	1 53 55	+244	2 20 33	2 32 41	—
Simla	O.E.	133.1	14	1 42 24	+315	—	—	—	—	—	2 33 6	—
Manila	W.	137.0	311	1 40 22	+177	—	—	—	—	2 19 6	2 47 18	—
Bombay	M.	143.1	26	1 40 46	+175	—	—	1 55 31	+258	2 16 7	2 50 54	—
Perth	M.	149.7	229	1 40 30	+133	—	—	1 54 59	+190	—	2 40 30	—
Mauritius	M.	149.9	105	1 40 42	+145	—	—	1 57 48	+350	—	2 48 54	—
Kodikanal	M.	152.9	26	1 41 0	+151	—	—	1 48 24	-235	2 38 42	2 56 0	—
Colombo	M.	156.8	24	1 40 36	+112	—	—	—	—	2 3 48	2 50 24	—
Batavia	W.	160.6	294	1 41 52	+175	—	—	2 0 54	+483	—	3 4 0	—

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1915. September 12.

Origin : 8°0N. 37°5W., determined by Shide.

Time at Origin : 20h. 43m. 34s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.	
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.		
Ascension	E. M.	28.0	134	20 55 0	? S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
La Paz	E. M.	39.0	231	20 51 13	- 7	—	—	20 52 29	—	—	—	20 55 0	+27	—	—	—	21 0 0	—	—	—	—	
San Fernando	E. M.	40.2	49	—	—	—	—	—	—	—	—	20 57 16	-10	—	—	21 3 9	21 5 35	—	—	—	—	
	N. M.	40.2	40	20 52 0	+29	—	—	—	—	—	—	20 57 30	-14	—	—	21 8 30	21 11 0	—	—	—	—	
Rio Tinto	E. M.	40.8	38	20 51 30	- 5	—	—	—	—	—	—	—	—	—	—	21 9 0	21 10 30	—	—	—	—	
Granada	C.	42.6	41	20 51 43	- 6	—	—	—	—	—	—	—	—	—	—	—	21 8 30	—	—	—	—	
Barcelona	Ma.	48.4	40	20 52 20	-10	—	—	—	—	—	—	—	—	—	—	—	21 4 6	—	—	—	—	
Ottawa	B.	49.8	325	20 52 39	- 1	—	—	—	—	—	—	—	—	—	—	—	21 10 0	—	—	—	—	
Toronto	E. M.	51.0	322	20 59 54	? S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Shide	N. M.	52.2	28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	E. M.S.	52.2	28	20 52 56	+ 1	—	—	—	—	—	—	—	—	—	—	—	21 13 0	—	—	—	—	
	E. M.E.	52.2	28	20 52 56	+ 1	—	—	—	—	—	—	—	—	—	—	—	21 8 26	—	—	—	—	
Haslemere	E. M.	52.7	38	20 59 0	? S.	—	—	—	—	—	—	—	—	—	—	—	21 8 41	—	—	—	—	
Paris	E. M.	52.7	38	20 59 0	- 1	—	—	—	—	—	—	—	—	—	—	—	21 11 20	—	—	—	—	
	E. M.	52.8	32	20 52 58	- 1	—	—	—	—	—	—	—	—	—	—	—	21 9 0	—	—	—	—	
	E. M.	52.8	32	20 53 1	+ 2	—	—	—	—	—	—	—	—	—	—	—	21 10 0	—	—	—	—	
Guildford	M.	52.9	28	20 52 23	-36	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Kew	E. M.	53.1	28	21 0 0	? S.	—	—	—	—	—	—	—	—	—	—	—	21 6 16	21 8 0	—	—	—	
Bidston	N. M.S.	53.2	25	20 53 48	+47	—	—	—	—	—	—	—	—	—	—	—	21 17 0	—	—	—	—	
Moncalieri	S.	53.7	39	20 53 0	- 5	—	—	—	—	—	—	—	—	—	—	—	21 8 54	—	—	—	—	
Stonyhurst	E. M.	53.8	25	21 0 0	? S.	—	—	—	—	—	—	—	—	—	—	—	21 13 29	—	—	—	—	
Eskdalemuir	G.	54.5	23	20 53 22	+12	—	—	—	—	—	—	—	—	—	—	—	21 12 24	—	—	—	—	
Malta	E. M.	54.9	51	20 54 0	+48	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6°0N. 35°0W.	
Edinburgh	E. M.	55.0	23	21 1 0	? S.	—	—	—	—	—	—	—	—	—	—	—	21 11 0	—	—	—	—	
Rocca di Papa	Aga.	55.6	44	20 53 22	+ 5	—	—	—	—	—	—	—	—	—	—	—	21 8 36	—	—	—	—	
Pompeii	N. O.A.	56.5	46	20 53 20	- 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	E. O.A.	56.5	46	20 53 10	-13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cape Town	E. M.	67.4	132	21 3 12	? S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Helwan	E. M.	67.7	61	20 55 0	+24	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Pulkovo	G.	72.0	29	20 55 6	+ 2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11°0N. 45°0W.

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Makeyevka	G.	74.4	42	30	55	22	+ 3	---	21	4	58	+ 5	21	20	0	21	26	13	---		
Victoria	M.	81.3	318	21	12	54	? S.	---	21	12	54	+402	21	26	30	21	35	0	---		
Simla	O.E.	106.4	54	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	i 21h. 40m. 0s.		
Irkutsk	G.	111.5	24	21	2	58	+259	21	9	59	21	12	24	---	21	32	0	21	36	6	
Kodaikanal	M.	112.8	75	---	---	---	---	---	---	---	---	---	---	---	---	---	---	?	21	42	48
Batavia	W.	144.5	88	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	e 21h. 4m. 0s.

Small Earthquakes which do not give good determinations—

- September 1, 1hr.:* Eskdalemuir, Bidston, Shide, Paris, Moncalieri, Rocca di Papa, Cape Town, Pulkovo, Helwan, Tiflis, Bombay, Simla, Kodaikanal, Colombo, Irkutsk, Batavia, Manila, Zi-ka-wei, Riverview, La Paz.
- September 3, 2hrs.:* Shide, Moncalieri, Rocca di Papa, Pompeii, Pulkovo, Helwan, Makeyevka, Tiflis, Irkutsk.
- September 3, 11hrs.:* Eskdalemuir, Bidston, Guildford, Paris, Moncalieri, Pulkovo, Makeyevka, Tiflis, Irkutsk, Manila, Zi-ka-wei, Osaka.
- September 3, 22hrs.:* Eskdalemuir, Paris, Moncalieri, Pulkovo, Helwan, Makeyevka, Tiflis, Irkutsk, Batavia, Manila, Zi-ka-wei, Osaka, Riverview, Fanning Island, Honolulu, La Paz.
- September 6, 17hrs.:* Rio Tinto, San Fernando, Granada, Eskdalemuir, Edinburgh, Bidston, Shide, Guildford, Kew, Paris, Moncalieri, Rocca di Papa, Padova, Cape Town, Pulkovo, Helwan, Makeyevka, Tiflis, Mauritius, Kodaikanal, Irkutsk, Batavia, Perth, Manila, Zi-ka-wei, Adelaide, Sydney, Riverview, Honolulu, Victoria, Berkeley, Toronto, Ottawa, Harvard University, La Paz.
- September 7, 4hrs.:* Victoria, Toronto, Ottawa, Harvard University, La Paz.
- September 7, 5hrs.:* Victoria, Toronto, Ottawa, Harvard University, La Paz.
- September 7, 13hrs.:* San Fernando, Granada, Eskdalemuir, Edinburgh, Guildford, Kew, Paris, Moncalieri, Rocca di Papa, Pulkovo, Helwan, Makeyevka, Tiflis, Irkutsk, Victoria, Berkeley, Toronto, Ottawa, La Paz.
- September 7, 20hrs.:* San Fernando, Eskdalemuir, Edinburgh, Guildford, Kew, Moncalieri, Pulkovo, Helwan, Makeyevka, Tiflis, Irkutsk, Victoria, Toronto, Ottawa, Harvard University, La Paz.
- September 8, 12hrs.:* Edinburgh, Rocca di Papa, Helwan, Osaka, Lick, Toronto, Ottawa, La Paz.
- September 10, 22hrs.:* Eskdalemuir, Moncalieri, Helwan, Tiflis, Fanning Island, La Paz.
- September 12, 0hrs.:* Granada, Eskdalemuir, Edinburgh, Bidston, Shide, Kew, Paris, Moncalieri, Rocca di Papa, Pulkovo, Helwan, Makeyevka, Tiflis, Bombay, Simla, Kodaikanal, Irkutsk, Batavia, Manila, Zi-ka-wei, Osaka, Riverview, Honolulu, La Paz.

1915. September 23.

Origin : 16°0N. 38°5E., determined by Shide.

Time at Origin : 8h. 14m. 43s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O. C.	PR ₁			S.			O. C.	I.			M.			Remarks.
				H.	M.	S.		H.	M.	S.	H.	M.	S.		H.	M.	S.	H.	M.	S.	
Helwan	E. M.	15.2	335	8	18	48	+23	---	---	---	8	22	36	-176	---	---	---	8	49	36	---
Tiflis	G.	26.2	11	8	20	30	-3	---	---	---	? 8	25	23	+14	8	20	0	8	32	9	? 3140 kms.
Malta	E. M.	29.1	517	8	26	0	---	---	---	---	8	26	0	-2	---	---	---	8	36	30	---
Pompeii	N. O.A.	32.2	325	8	21	0	32	---	---	---	8	29	30	+156	---	---	---	---	---	---	---
Bombay	E. O.A.	32.2	325	8	21	0	-32	---	---	---	8	29	0	+126	---	---	---	---	---	---	---
Rocca di Papa	E. M.	32.8	80	8	24	23	+166	---	---	---	? 8	27	0	-4	---	---	---	8	27	0	? S.
Kodaikanal	E. Aga.	34.0	325	8	21	39	-9	---	---	---	---	---	---	---	8	38	36	---	---	---	---
Simla	E. M.	38.3	92	8	29	0	? S.	---	---	---	8	29	0	+35	---	---	---	---	---	---	---
Moncalieri	S.	38.3	60	8	22	0	-23	---	---	---	8	28	18	-7	8	38	18	8	39	18	---
Barcelona	S.	38.8	325	8	22	24	-3	---	---	---	8	28	32	0	8	38	8	8	44	4	---
Colombo	E. Ma.	40.3	317	8	22	28	12	---	---	---	? 8	28	51	0	8	38	4	8	44	2	---
Granada	E. M.	41.4	98	---	---	---	---	---	---	---	8	43	0	+830	---	---	---	8	43	42	---
Paris	C.	42.7	308	8	22	54	-5	---	---	---	8	29	34	+7	8	39	24	8	45	25	---
Pulkovo	E. ---	43.9	326	8	23	1	-7	---	---	---	8	29	42	-2	8	(46)	0	8	48	0	---
Ekatorinburg	G.	43.9	326	8	23	11	+3	---	---	---	---	---	---	---	---	---	---	---	---	---	---
San Fernando	E. G.	44.1	351	8	23	6	-4	8	24	55	8	29	43	-3	8	36	0	8	36	12	15°7s. 31°8e.
Rio Tinto	E. M.	44.1	17	8	23	3	-7	---	---	---	8	29	20	-26	8	37	0	8	42	41	---
Kew	N. M.	44.5	306	8	26	0	+167	---	---	---	8	37	30	+158	8	40	30	8	44	30	---
Shide	E. N. M.	44.5	306	8	25	0	+107	---	---	---	8	37	0	+128	8	38	0	8	45	0	---
Bidston	E. M.	45.1	308	8	30	30	? S.	---	---	---	8	30	30	+31	---	---	---	8	49	0	---
Edinburgh	E. M.	46.9	328	8	28	42	? S.	---	---	---	8	28	42	-101	---	---	---	8	51	0	---
Victoria	E. M.	46.9	326	8	23	30	0	---	---	---	8	30	25	+1	---	---	---	---	---	---	---
Toronto	N. M.	47.0	326	8	23	30	0	---	---	---	8	30	30	+6	---	---	---	---	---	---	---
Ottawa	E. M.S.	47.0	326	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	Beyond the edge of the paper.
Harvard University	E. M.B.	47.0	326	---	---	---	---	---	---	---	8	30	27	+3	---	---	---	8	49	22	---
La Paz	E. M.	49.3	329	8	32	0	? S.	---	---	---	8	32	0	+67	---	---	---	8	47	0	---
London	N. M.S.	49.4	329	8	21	0	-166	---	---	---	8	31	0	+6	---	---	---	8	59	42	---
San Francisco	G.	50.5	331	8	23	58	+5	---	---	---	? 8	31	16	+8	---	---	---	---	---	---	---
San Diego	E. M.	50.8	331	8	31	0	? S.	---	---	---	8	31	0	-12	---	---	---	8	49	0	---

Cape Town	E.	M.	53.5	201	8	36	18	+725	—	8	42	30	+656	—	8	43	48	—		
Azores	M.	M.	60.0	305	—	—	—	—	—	—	—	—	—	—	8	52	6	—		
Irkutsk	G.	G.	62.6	39	8	25	17	+5	8	27	39	8	33	42	+3	8	54	57	—	
Batavia	W.	W.	71.1	102	8	26	0	—	7	—	—	—	—	—	—	8	37	0	—	
Zi-ka-wei	W.	W.	75.8	61	8	26	46	+9	8	29	36	8	36	24	+6	—	9	4	42	
Toronto	E.	M.	97.7	320	—	—	—	—	—	—	—	—	—	—	9	14	18	—		
La Paz	—	—	109.9	258	8	34	42	+302	—	—	—	—	—	—	9	9	0	9	11	5
Victoria	E.	M.	113.3	347	—	—	—	—	—	—	—	—	—	—	9	29	6	9	36	0

Small Earthquakes which do not give good determinations—

- September 15, 22hrs.: Edinburgh, Pulkovo, Makeyevka, Irkutsk, Honolulu, La Paz.
- September 16, 10hrs.: Eskdalemuir, Edinburgh, Shide, Paris, Moncalieri, Rocca di Papa, Pulkovo, Helwan, Makeyevka, Tiflis, Irkutsk, Victoria, Toronto.
- September 17, 4hrs.: Irkutsk, Batavia, Manila, Zi-ka-wei, Riverview, La Paz.
- September 17, 5hrs.: Edinburgh, Pulkovo, Helwan, Makeyevka, Victoria, Toronto.
- September 19, 11hrs.: Shide, Haslemere, Moncalieri, Padova, Rocca di Papa, Pulkovo, Helwan, Tiflis.
- September 19, 12hrs.: Moncalieri, Pulkovo, Helwan, Makeyevka, Tiflis, Irkutsk.
- September 20, 22-23hrs.: Bidston, Stonyhurst, Moncalieri, Helwan, Irkutsk, La Paz.
- September 21, 18-19hrs.: Granada, Eskdalemuir, Edinburgh, Shide, Kew, Paris, Moncalieri, Rocca di Papa, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Manila, La Paz.
- September 22, 15hrs.: Pulkovo, Makeyevka, Ekaterinburg, Irkutsk, Batavia, Zi-ka-wei, La Paz.
- September 25, 20hrs.: San Fernando, Eskdalemuir, Bidston, Paris, Moncalieri, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Irkutsk.
- September 28, 9hrs.: Bidston, Shide, Pulkovo, Helwan, Makeyevka, Ekaterinburg, Honolulu, Victoria, Toronto.
- September 28, 22hrs.: San Fernando, Pulkovo, Helwan, Makeyevka, Ekaterinburg, Simla.
- September 30, 14hrs.: Edinburgh, Stonyhurst, Pulkovo, Tiflis, Ekaterinburg, Irkutsk.

1915. October 3.

Origin : 36°8N. 114°3W., determined by Shide.

Time at Origin : 1h. 47m. 51s.

Station and Component	Mach.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Lick	(N. W.)	5.9	279	1	49	33	+11	—	—	—	—	—	—	—	1	50	30	1	50	44	—
	(E. W.)	5.9	279	1	49	39	+17	—	—	—	—	—	—	—	1	50	28	1	50	32	—
Santa Clara	(E. W.)	6.1	277	1	49	33	+9	—	—	—	—	—	—	—	1	50	37	1	50	43	—
	(N. W.)	6.1	277	1	49	36	+12	—	—	—	—	—	—	—	1	50	35	1	51	3	—
Berkeley	(E. W.)	6.4	280	1	49	23	-6	—	—	1	50	1	-44	—	1	50	33	1	51	15	—
	(N. W.)	6.4	280	1	49	33	+4	—	—	—	—	—	—	—	1	50	38	1	51	13	—
Victoria	E. M.	13.3	333	1	52	30	+82	—	—	—	—	—	—	—	1	52	54	1	53	48	—
Toronto	E. M.	27.3	64	1	59	42	+350	—	—	2	4	24	+347	—	2	6	6	2	6	42	—
Ottawa	B.	30.0	61	? 1	56	40	+141	—	—	1	59	46	+21	—	2	4	0	—	—	—	—
Harvard Univ.	E. B.O.	33.4	68	—	—	—	—	—	—	2	6	35	+374	—	—	—	—	—	—	—	e 2h. 3m. 17s.
Honolulu	E. M.	40.8	261	—	—	—	—	—	—	—	—	—	—	—	2	5	36	2	10	0	—
La Paz	—	68.8	192	—	—	—	—	—	—	—	—	—	—	—	2	29	0	2	34	25	e 2h. 1m. 49s.
Edinburgh	E. M.	70.5	34	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	30	0	—
Eskdalemuir	G.	70.8	34	? 1	50	18	+5	—	—	2	8	28	+1	—	—	—	—	2	28	30	—
Bidston	N. M.S.	72.1	36	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	33	30	—
Shide	E. M.B.	74.6	37	—	—	—	—	—	—	2	9	9	-3	—	—	—	—	2	33	36	—
Paris	—	77.8	37	—	—	—	—	—	—	—	—	—	—	—	2	31	0	—	—	—	e 2h. 10m. 30s.
Pulkovo	G.	79.2	17	2	0	10	+5	—	—	2	9	58	-7	—	2	25	0	2	26	58	43°0N. 131°0W.
Rio Tinto	E. M.	80.0	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	49	0	—
San Fernando	(E. M.)	81.0	51	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	35	0	—
	(N. M.)	81.0	51	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	47	0	—
Granada	C.	82.1	49	2	1	46	+84	—	—	2	11	47	+69	—	2	27	0	2	31	0	—
Moncalieri	S.	83.0	37	—	—	—	—	—	—	—	—	—	—	—	2	31	23	2	37	50	e 2h. 6m. 41s.
Irkutsk	G.	84.8	337	2	0	26	-12	—	—	—	—	—	—	—	2	30	0	—	—	—	—
Ekaterinburg	G.	86.3	3	2	0	43	-3	—	—	2	11	1	-23	—	2	27	0	2	40	32	40°3N. 119°4W.
Makeyevka	G.	91.7	18	2	1	20	+4	—	—	2	12	16	-7	—	2	36	0	2	42	22	—
Tiflis	G.	99.3	16	—	—	—	—	—	—	2	14	0	+20	—	2	40	0	—	—	—	e ₁ 2h. 6m. 0s.

Small Earthquakes which do not give good determinations—

- October 2, 2hrs.: Eskdalemuir, Bidston, Pulkovo, Helwan, Ekaterinburg, Irkutsk, Batavia, Manila.
 October 2, 23hrs.: Edinburgh, Stonyhurst, Paris, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Manila, Victoria, Berkeley, Santa Clara, Lick, Toronto, Ottawa, Harvard University.
 October 3, 0hrs.: Eskdalemuir, Edinburgh, Stonyhurst, Paris, Moncalieri, Makeyevka, Tiflis, Manila.
 October 5, 13-14hrs.: San Fernando, Granada, Eskdalemuir, Edinburgh, Bidston, Shide, Kew, Paris, Moncalieri, Rocca di Papa, Pompeii, Cape Town, Pulkovo, Helwan, Makeyevka, Tiflis, Ekaterinburg, Simla, Kodaikanal, Colombo, Irkutsk, Batavia, Perth, Manila, Zi-ka-wei, Osaka, Adelaide, Sydney, Riverview, Honolulu, Victoria, Berkeley, Toronto, La Paz.
 October 8, 0hrs.: San Fernando, Pulkovo, Helwan, Tiflis, La Paz.
 October 8, 5hrs.: Tiflis, Mauritius, Ekaterinburg, Irkutsk, Berkeley, Santa Clara, Lick.
 October 9, 4hrs.: Granada, Eskdalemuir, Edinburgh, Bidston, Stonyhurst, Shide, Kew, Paris, Pulkovo, Tiflis, Manila, Zi-ka-wei, La Paz.
 October 10, 5-6hrs.: Eskdalemuir, Edinburgh, Bidston, Stonyhurst, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Manila, Sydney, Riverview, Honolulu, Victoria, Toronto.
 October 10, 9-10hrs.: Eskdalemuir, Edinburgh, Bidston, Shide, Moncalieri, Pulkovo, Helwan, Ekaterinburg, Irkutsk, Honolulu, Victoria, Toronto, La Paz.
 October 11, 16-17hrs.: Eskdalemuir, Edinburgh, Bidston, Moncalieri, Rocca di Papa, Pulkovo, Helwan, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Osaka, Honolulu.
 October 12, 2hrs.: Edinburgh, Bidston, Rocca di Papa, Pulkovo, Helwan, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Berkeley, La Paz.
 October 12, 6-7hrs.: Shide, Helwan, Ekaterinburg, Bombay, Irkutsk, Batavia, Riverview.
 October 13, 1-2hrs.: Edinburgh, Pulkovo, Helwan, Ekaterinburg, Irkutsk, Manila, Sydney, Riverview.
 October 13, 6hrs.: Shide, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Zi-ka-wei, La Paz.
 October 13, 11hrs.: Shide, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Zi-ka-wei.
 October 13, 12hrs.: Shide, Pulkovo, Makeyevka, Ekaterinburg, Irkutsk, Zi-ka-wei, Osaka.
 October 13, 19hrs.: Stonyhurst, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Zi-ka-wei, Osaka.
 October 14, 16hrs.: Edinburgh, Bidston, Stonyhurst, Shide, Moncalieri, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Zi-ka-wei, Osaka, La Paz.
 October 14, 18-19hrs.: San Fernando, Granada, Edinburgh, Bidston, Stonyhurst, Shide, Moncalieri, Pulkovo, Helwan, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Zi-ka-wei, Osaka, La Paz.

1915 October 3.

Origin : 36°5N. 118°0W., determined by Shide.

Time at Origin : 6h. 52m. 49s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O—C.	I ₁ .			S.	O—C.	I.			M.			Remarks.		
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	H.	M.	S.					
Lick	W.	3.0	287	6	54	27	+51	—	—	—	6	55	17	+65	6	55	36	6	55	42	—
Santa Clara	W.	3.3	286	6	54	25	+44	—	—	—	—	—	—	—	6	54	40	6	55	30	—
Berkeley	—	3.7	294	6	54	31	+44	—	—	—	6	55	34	+63	6	55	51	6	56	8	—
Victoria	E. M.	12.5	313	6	54	54	+61	—	—	—	—	—	—	—	6	57	12	7	0	48	—
Toronto	E. M.	30.1	64	6	59	36	+18	—	—	—	7	4	30	+5	7	7	12	7	10	30	—
Ottawa	E. B.	32.7	61	6	59	34	+8	—	—	—	7	4	40	+28	7	9	18	7	12	42	—
Harvard Univ.	E. B.	32.7	61	6	59	35	+7	—	—	—	7	4	40	+28	7	9	12	7	11	36	—
Honolulu	E. B.O.	36.2	66	7	0	6	+7	—	—	—	7	5	40	+22	7	10	36	7	12	11	—
La Paz	E. M.	37.9	258	7	1	30	+64	—	—	—	—	—	—	—	7	10	12	7	13	24	—
Edinburgh	—	70.8	129	7	4	51	+40	7	7	40	7	14	19	+54	7	28	0	7	33	0	Felt in Nevada.
Eskdalemuir	E. M.	72.3	32	7	4	0	+21	—	—	—	—	—	—	—	—	—	—	7	32	36	—
Bidston	E. M.S.	72.7	33	7	4	25	+2	7	7	4	7	13	45	+2	—	—	—	7	35	0	—
Stonyhurst	E. M.S.	74.0	34	7	4	36	+5	—	—	—	7	14	2	+1	—	—	—	7	36	0	—
West Bromwich	E. M.	74.0	34	7	3	36	+55	—	—	—	7	13	0	+63	7	23	0	7	31	0	—
Shide	E. M.	75.1	35	7	4	44	+5	—	—	—	7	14	7	+9	—	—	—	—	—	—	—
Haslemere	E. M.	76.6	36	7	4	51	+3	—	—	—	7	14	34	+1	7	30	39	7	39	51	—
Guildford	E. M.	76.6	36	7	4	54	+6	—	—	—	7	14	30	+3	7	31	19	—	—	—	—
Kew	E. M.B.	76.6	36	7	4	51	+3	—	—	—	7	14	29	+4	7	30	19	7	40	19	—
Paris	E. M.	76.6	35	7	4	0	+48	—	—	—	7	19	0	+267	—	—	—	7	31	24	—
Pulkovo	E. M.	76.6	35	7	5	4	+16	—	—	—	7	15	42	+69	7	29	0	—	—	—	—
Rio Tinto	E. M.	76.6	35	7	3	54	+54	—	—	—	—	—	—	—	—	—	—	7	36	18	—
San Fernando	E. M.	79.7	35	7	5	6	0	—	—	—	7	15	0	+9	7	23	0	7	33	0	—
Ottawa	E. M.	79.7	35	7	5	16	+10	—	—	—	7	15	23	+14	—	—	—	—	—	—	—
Pulkovo	E. G.	80.2	16	7	5	6	+3	7	8	1	7	15	4	+10	7	28	0	7	39	13	39°2N. 119°8W. S.R. 7h. 20m. 17s.
Ottawa	E. G.	80.2	16	7	5	10	+1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ottawa	E. O.	81.0	307	7	5	32	+18	—	—	—	7	15	32	+8	7	23	18	7	48	32	—
Rio Tinto	E. M.	82.4	48	7	4	0	+81	—	—	—	—	—	—	—	—	—	—	7	41	0	—
San Fernando	E. M.	83.4	49	7	5	0	+27	—	—	—	7	16	30	+40	7	31	30	7	38	30	—
San Fernando	E. M.	83.4	49	7	5	0	+27	—	—	—	7	16	18	+28	7	32	0	7	38	30	—
Irkutsk	E. G.	83.9	336	7	5	29	+1	7	8	30	7	15	42	+14	7	29	0	7	32	58	—

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12

Granada	G.	84.5	47	7	5	35	+ 1	---	7	15	52	-11	7	28	48	7	35	50	37°0s. 114°5w.
Barcelona	Ma.	84.7	41	7	5	37	+ 2	---	7	16	0	- 5	7	21	32	7	33	45	---
Moncalieri	S.	84.9	35	7	5	46	+10	---	7	16	7	0	7	22	8	7	44	40	---
Padova	V.	86.5	33	7	5	48	+ 3	---	7	16	14	-11	7	28	14	7	43	13	---
Ekaterinburg	G.	86.6	1	7	5	39	- 7	---	7	16	3	-23	7	26	0	7	---	---	39°5N. 114°3W.
Rocca di Papa	Agat.	89.6	34	7	5	43	-20	---	7	16	44	-15	7	29	12	7	50	12	---
Zi-ka-wei	W.	92.4	312	7	6	21	+ 3	---	7	17	2	-26	7	---	---	7	46	15	---
	O.	92.4	312	7	6	37	+ 9	---	7	17	5	-23	7	31	50	7	46	15	---
Makeyevka	G.	93.8	16	7	6	21	+ 1	7 9 53	7	17	19	-13	7	31	0	7	43	3	---
Malta	M.	95.2	37	7	16	0	? S.	---	7	16	0	-117	---	---	---	7	56	30	---
Tifis	G.	100.2	13	7	7	19	+18	7 11 13	7	18	19	-28	7	30	0	7	46	18	Seconds ±
Manila	W.	104.6	301	---	---	---	---	---	7	23	35	+248	7	34	10	7	44	10	e 7h. 11m. 37s.
Ascension	M.	105.7	88	7	7	0	-27	---	---	---	---	---	---	---	---	7	53	0	---
Helwan	M.	107.6	28	7	7	0	-35	---	---	---	---	---	---	---	---	---	---	---	---
Riverview	---	109.9	242	? 7	11	24	+218	---	7	22	6	+110	7	39	30	7	49	40	S.R. 7h. 28m. 6s.
Sydney	M.	110.0	242	7	22	12	? S.	---	7	22	12	+115	7	46	48	7	51	12	---
Simla	O.E.	110.9	346	7	12	0	+249	---	---	---	---	---	7	47	30	7	50	30	---
Adelaid	M.	118.9	246	7	22	42	? S.	---	7	22	42	+72	---	---	---	8	4	24	---
Bombay	M.	123.7	348	7	15	27	+398	---	---	---	---	---	---	---	---	8	4	27	---
Batavia	W.	129.2	295	---	---	---	---	---	---	---	---	---	7	40	0	8	13	0	e 7h. 13m. 0s.
Kodalkanal	M.	131.1	340	7	24	0	? S.	---	7	24	0	+63	---	---	---	8	15	48	---
Colombo	M.	133.5	335	7	15	48	+376	---	---	---	---	---	---	---	---	8	17	48	---
Perth	M.	135.8	259	7	17	0	+438	---	---	---	---	---	---	---	---	---	---	---	---
Cape Town	M.	144.6	99	7	12	48	+150	---	8	6	48	? L.	---	---	---	8	13	12	---
Mauritius	M.	162.2	13	7	36	42	? L.	---	---	---	---	---	7	36	42	---	---	---	---

13

1915. October 8.

Origin : 36°0N. 138°0E., determined by Shide.

Time at Origin : 15h. 35m. 52s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.		H.	M.	S.	H.	M.	S.		H.	M.	S.	H.	M.	S.	
Osaka	O.	2.5	239	15	37	6	+35	---	---	---	---	---	---	15	37	51	15	38	32	360 kms.	
Zi-ka-wei	W.	14.6	256	15	39	22	- 4	---	---	15	41	58	-16	---	---	---	15	46	7	---	
	O.	14.6	256	15	39	26	0	---	---	15	42	7	- 7	---	---	---	15	45	31	---	
Manila	W.	26.3	220	15	41	0	-43	---	---	15	45	54	-26	---	---	---	15	48	36	---	
Irkutsk	G.	28.7	315	15	41	52	-15	15 43 18	---	15	46	50	-11	15 34 30	---	---	15	56	11	37°1N. 138°0E. i 15h. 47m. 0s.	
Simla	O.E.	50.1	283	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Batavia	W.	51.4	221	15	44	32	-36	---	---	15	51	12	-76	---	---	---	15	52	0	---	
Ekaterinburg	G.	53.9	319	15	45	19	- 5	---	---	15	52	49	-11	16 3 0	---	---	16	12	38	---	
Honolulu	M.	57.0	86	15	54	12	? S.	---	---	15	54	12	+34	15 59 12	---	---	15	59	42	---	
Pulkovo	G.	67.4	329	15	46	49	- 3	15 49 29	---	15	55	37	-10	16 10 0	---	---	16	15	8	38°0N. 141°0E. ? 16h. 30m. 0s.	
Tifis	G.	69.0	307	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Makeyevka	G.	69.9	315	15	47	5	- 3	15 51 34	---	15	56	6	-11	16 16 0	---	---	---	---	---	---	
Edinburgh	M.	82.3	339	15	58	0	? S.	---	---	15	58	0	-41	---	---	---	15	59	0	---	
Eskdalemuir	G.	82.8	339	---	---	---	---	---	---	15	58	25	-22	16 4 9	---	---	16	20	0	---	
Bidston	M.S.	84.4	338	15	57	42	? S.	---	---	15	57	42	-82	---	---	---	16	30	24	---	
Helwan	M.	84.7	344	15	49	0	-22	---	---	---	---	---	---	---	---	---	---	---	---	---	
Padova	V.	85.1	325	15	51	6	+145	---	---	15	58	26	-46	---	---	---	---	---	---	---	
Kew	M.	85.2	335	15	58	0	? S.	---	---	15	58	0	-73	---	---	---	16	26	30	---	
Guildford	M.	85.4	335	15	48	2	-40	---	---	15	57	54	-81	---	---	---	15	33	42	---	
Shide	M.	86.2	335	---	---	---	---	---	---	15	58	56	-28	---	---	---	---	---	---	---	
	M.	86.2	335	---	---	---	---	---	---	15	58	56	-28	---	---	---	---	---	---	---	
	M.S.	86.2	335	---	---	---	---	---	---	15	58	48	-36	---	---	---	---	---	---	---	
	M.B.	86.2	335	---	---	---	---	---	---	15	58	51	-33	---	---	---	---	---	---	---	
Paris	---	86.4	332	---	---	---	---	---	---	15	58	56	-30	16 24 0	---	---	16	27	0	---	
Rocca di Papa	Agat.	87.5	322	15	48	48	- 6	---	---	---	---	---	---	---	---	---	---	---	---	---	
Granada	C.	98.5	360	---	---	---	---	---	---	---	---	---	---	16 20 0	---	---	---	---	---	± 3 secs. e 15h. 53m. 36s.	
La Paz	---	149.7	57	15	55	33	+111	---	---	---	---	---	---	---	---	---	---	---	---	---	

14

1915. October 11.

Origin : 8°0N. 39°0W., determined by Shide.

Time at Origin : 2h. 37m. 44s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.			
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.				
Ascension	M.	29.2	122	2	46	0	+116											2	53	0				
Azores	M.	32.1	20	2	51	30	? S.																	
La Paz		37.8	236	2	45	31	+11	2	47	1								2	58	0	3	0	50	
San Fernando	(E. M.)	41.2	41																					
	(N. M.)	41.2	41																					
Rio Tinto	E. M.	41.7	40	2	51	0	? S.																	
Granada	C.	43.3	42	2	45	41	-23											2	57	30	3	2	48	
Ottawa	B.	49.0	326	2	47	11	+27											3	0	30				
Toronto	E. M.	50.0	322															3	5	42	3	8	0	
Shide	(E. M.)	52.9	29	2	47	7	-2																	
	(E. M.B.)	52.9	29	2	47	5	-4											2	59	30	3	4	20	
	(E. M.)	52.9	29																					
Guildford	M.	53.6	29	2	37	19	-595											2	57	58	3	4	33	
Paris		53.6	33															3	1	0	3	4	0	
Kew	E. M.	53.8	29	2	54	0	? S.																	
Bidston	N. M.S.	53.9	236	2	55	0	? S.											2	3	1	18	3	11	36
Stonyhurst	E. M.	54.4	26	2	55	30	? S.											2	3	2	6	3	8	0
Eskdalemuir	G.	55.1	24	2	47	24	0											3	0	0				
Moncalieri	S.	55.2	39	2	47	29	+5											2	59	54	3	7	42	
Edinburgh	E. M.	55.6	23	2	55	0	? S.																	
Rocca di Papa	Aga.	56.6	44	2	47	27	-7											3	8	18				
Cape Town	E. M.	68.6	131																					
Helwan	E. M.	69.0	61	2	57	36	? S.											2	57	36	3	23	42	
Pulkovo	G.	72.7	30	2	49	19	+1											2	58	40	3	16	44	
Makeyevka	G.	75.4	42	2	49	33	-2											2	59	4	3	17	0	
Tiflis	G.	80.1	49	2	49	59	-5											2	59	51	3	18	0	
Victoria	E. M.	80.3	318															3	14	12	3	22	18	
Ekatérinburg	G.	88.5	33	2	50	46	-6											3	1	13	3	22	42	
Irkutsk	G.	112.0	23	2	51	8	-103											3	0	28	3	32	9	

15

1915. October 11.

Origin : 18°0N. 69°5W., determined by Shide.

Time at Origin : 19h. 32m. 50s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.			
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.				
Harvard Univ.	N. B.O.	24.4	357	19	38	25	+3											19	42	24	-18	19	45	22
Toronto	E. M.	27.0	344	19	40	6	+78											19	43	42	+11	19	50	39
Ottawa	B.	27.9	351	19	40	0	+63											19	43	36	-11	19	46	6
La Paz		34.5	178	19	40	18	+19	19	41	58								19	45	32	-6	19	51	10
Azores	M.	43.0	33															19	47	30	8			
Berkeley	N. M.	49.9	305	19	43	56	+120											19	49	21	+13	19	58	6
Victoria	E. M.	52.9	318															19	58	30	+525	20	8	18
Rio Tinto	E. M.	57.9	56																					
San Fernando	(E. M.)	58.2	58															19	51	30	+39	20	3	30
	(N. M.)	58.2	58	19	44	0	+70											19	51	0	+9	20	4	0
Granada	C.	60.2	57	19	43	4	+1											19	51	5	-9	19	58	30
Bidston	N. M.S.	61.6	38															19	51	36	+3			
Eskdalemuir	G.	61.8	36	19	43	9	-5											19	51	26	-10			
Edinburgh	E. M.	62.0	36	19	51	0	? S.											19	51	0	-58			
Stonyhurst	E. M.	62.1	35	19	43	30	+14											19	52	6	+27	20	3	6
Shide	(E. M.)	62.4	42	19	43	25	+7											19	51	50	+7			
	(E. M.S.)	62.4	42	19	43	25	+7											19	51	35	-8	20	3	20
	(E. M.B.)	62.4	42	19	43	22	+4											19	51	35	-8	20	2	0
Guildford	E. M.	63.0	41															19	59	25		20	13	12
Kew	E. M.	63.1	41	19	51	30	? S.											19	51	30	-22			
Barcelona	Ma.	64.6	52															20	5	29		20	12	38
Paris	(E. M.)	64.8	44	19	43	33	-1											19	51	59	-14			
	(N. M.)	64.8	44	19	43	40	+6											19	52	7	-6	20	3	0
Moncalieri	S.	68.5	48	19	44	7	+9											19	52	55	-3	20	6	11
Rocca di Papa	Aga.	72.4	51	19	44	18	-4											19	53	32	-13	20	9	0
Pulkovo	G.	79.3	30	19	45	5	0											19	54	55	-10	20	8	0
Honolulu	E. M.	82.2	290															20	14	36		20	30	6
Makeyevka	G.	87.8	40	19	45	49	-5											19	56	11	-29	20	13	0
Helwan	E. M.	90.1	58	19	56	0	? S.											19	56	0	-65			

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Ekaterinburg	G.	94.5	25	19 45 22	-69	—	19 56 52	-59	20 13 0	20 24 3	16°8N. 72°2W.
Tiflis	G.	95.0	43	19 46 21	-12	19 50 5	19 56 58	-58	20 18 30	20 25 11	1 1/2 19h. 58m. 52s.
Cape Town	M.	98.3	57	—	—	—	—	—	—	20 40 36	—
Irkutsk	G.	109.5	4	19 45 59	-106	19 52 10	19 55 22	-292	20 20 0	20 25 7	—
Simla	G.E.	121.4	33	—	—	—	—	—	—	20 37 24	—
Zi-ka-wei	W.	129.7	348	—	—	—	—	—	20 26 41	—	—
Kodaikanal	M.	136.9	52	—	—	—	—	—	—	? 20 52 48	—

17

1915. October 12.

Origin : 38°0N. 145°0E., determined by Shide.

Time at Origin : 21h. 28m. 51s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Osaka	O.	8.4	250	21 31 4	+ 6	—	—	—	—	—	—	—	—	21 32 59	—	21 33 47	—	—	—	870 kms.	
Zi-ka-wei	W.	20.5	258	21 33 36	- 2	21 34 30	—	21 37 30	+ 5	21 39 33	—	21 41 5	—	21 39 33	—	21 41 5	—	—	—	—	
Irkutsk	O.	20.5	258	21 33 38	0	—	—	21 37 33	+ 8	21 38 38	—	21 42 38	—	21 38 38	—	21 42 38	—	—	—	—	
Honolulu	G.	31.5	310	21 30 13	-321	21 31 2	—	21 35 13	-338	21 40 0	—	21 42 56	—	21 40 0	—	21 42 56	—	—	—	41°1N. 144°2E.	
Simla	M.	51.4	98	—	—	—	—	—	—	21 45 48	—	21 46 42	—	—	—	—	—	—	—	—	
Ekaterinburg	O.E.	55.1	285	—	—	—	—	—	—	21 55 0	—	—	—	21 55 0	—	—	—	—	—	—	
Victoria	G.	56.1	319	21 38 39	+ 1	21 40 45	—	21 46 19	- 7	21 55 0	—	22 4 53	—	21 55 0	—	22 4 53	—	—	—	38°3N. 142°7E.	
Colombo	M.	63.6	48	—	—	—	—	—	—	—	—	22 9 0	—	—	—	22 9 0	—	—	—	—	
Pulkovo	M.	66.4	260	22 14 0	+2055	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Tiflis	G.	68.6	331	21 39 59	0	21 42 37	—	21 48 52	- 8	22 3 0	—	22 8 6	—	22 3 0	—	22 8 6	—	—	—	39°0N. 145°0E.	
Edinburgh	G.	72.2	309	21 40 22	0	21 42 0	—	21 49 38	- 5	22 7 0	—	22 18 58	—	22 7 0	—	22 18 58	—	—	—	40°2N. 145°9E.	
Makeyevka	G.	72.4	318	21 40 24	+ 1	21 42 59	—	21 49 42	- 4	22 8 0	—	22 9 21	—	22 8 0	—	22 9 21	—	—	—	S.R. 21h. 54m. 23s.	
Edinburgh	E.	82.3	343	21 51 0	? S.	—	—	21 51 0	-40	—	—	22 25 0	—	—	—	22 25 0	—	—	—	—	
Eskaalemuir	G.	82.8	342	—	—	—	—	—	—	—	—	—	—	? 22 13 0	—	—	—	—	—	—	
Bikston	N.	82.8	341	—	—	—	—	—	—	—	—	—	—	—	—	22 18 0	—	—	—	—	
Stonyhurst	M.	84.0	341	21 42 30?	+57	—	—	21 52 30	+31	22 17 0	—	22 20 0	—	—	—	22 20 0	—	—	—	—	
Kew	M.	85.5	339	—	—	—	—	—	—	—	—	22 22 0	—	—	—	22 22 0	—	—	—	—	
Guildford	M.	85.8	339	21 42 37	+54	—	—	21 52 3	-16	22 13 31	—	22 18 20	—	—	—	22 18 20	—	—	—	—	
Haslemere	E.	86.0	339	—	—	—	—	—	—	—	—	22 18 0	—	—	—	22 18 0	—	—	—	—	
Shide	E.	86.5	339	—	—	—	—	21 52 19	- 8	—	—	22 22 0	—	—	—	22 22 0	—	—	—	—	
Paris	M.S.	86.5	339	—	—	—	—	—	—	—	—	22 18 24	—	—	—	22 18 24	—	—	—	P. and S. lost in ats.	
Tirolwan	M.B.	86.5	339	21 41 39	- 8	—	—	21 52 19	- 8	—	—	22 19 4	—	—	—	22 19 4	—	—	—	—	
Moncalieri	E.	87.1	336	—	—	—	—	21 52 19	-14	22 16 0	—	22 19 0	—	—	—	22 19 0	—	—	—	—	
Rocca di Papa	M.	88.1	307	21 52 0	—	—	—	21 52 0	-44	—	—	—	—	—	—	—	—	—	—	—	
Harvard Univ.	S.	88.6	331	21 52 16	? S.	—	—	21 52 16	-84	22 15 26	—	22 25 41	—	—	—	22 25 41	—	—	—	S? 22h. 3m. 15s.	
Barcelona	Aza.	89.2	327	21 41 56	- 6	—	—	? 21 52 33	-23	22 18 42	—	—	—	—	—	—	—	—	—	—	
Granada	B.O.	93.2	26	—	—	—	—	—	—	—	—	—	—	? 22 22 0	—	—	—	—	—	—	
San Fernando	Ma.	93.6	333	—	—	—	—	—	—	—	—	—	—	—	—	22 22 15	—	—	—	—	
	C.	99.5	335	21 42 56	- 3	21 46 42	—	? 21 54 11	-31	22 15 0	—	22 23 42	—	—	—	22 15 0	—	—	—	—	
	M.	100.9	337	—	—	—	—	—	—	—	—	22 35 0	—	—	—	22 35 0	—	—	—	—	
	N.	100.9	337	—	—	—	—	—	—	—	—	22 35 0	—	—	—	22 35 0	—	—	—	—	

18

Small Earthquakes which do not give good determinations—

- October 15, 16-17hrs.: Edinburgh, Bidston, Stonyhurst, Moncalieri, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Zi-ka-wei, Osaka.
- October 16, 15hrs.: Shide, Moncalieri, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Osaka.
- October 16, 18hrs.: Pulkovo, Makeyevka, Ekaterinburg, Irkutsk, Manila, Zi-ka-wei, Osaka.
- October 17, 23hrs.: San Fernando, Granada, Eskdalemuir, Edinburgh, Bidston, Stonyhurst, Shide, Moncalieri, Pulkovo, Helwan, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Zi-ka-wei.
- October 19, 22-23hrs.: Bidston, Edinburgh, Rocca di Papa, Helwan, Ekaterinburg, Irkutsk, Sydney, Riverview.
- October 23, 2-3hrs.: Eskdalemuir, Edinburgh, Bidston, Stonyhurst, Shide, Paris, Moncalieri, Pulkovo, Makeyevka, Tiflis, Irkutsk, Zi-ka-wei, Osaka.
- October 23, 11-12hrs.: Edinburgh, Bidston, Shide, Moncalieri, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Batavia, Zi-ka-wei, Riverview, Honolulu.
- October 26, 12-13hrs.: Eskdalemuir, Bidston, Shide, Cape Town, Helwan, Ekaterinburg, Tiflis, Irkutsk, Osaka, La Paz.
- October 26, 22hrs.: San Fernando, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Simla, Irkutsk.
- October 31, 8-9hrs.: San Fernando, Granada, Eskdalemuir, Bidston, Stonyhurst, Shide, Kew, Moncalieri, Rocca di Papa, Malta, Pulkovo, Helwan, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Sydney, Riverview, Victoria, La Paz.
- October 31, 15-16hrs.: Edinburgh, Bidston, Stonyhurst, Shide, Moncalieri, Pulkovo, Helwan, Makeyevka, Ekaterinburg, Sydney, La Paz.
- November 1, 9hrs.: Granada, Shide, Haslemere, Guildford, Rocca di Papa, Makeyevka, Tiflis, Mauritius, Bombay, Batavia, Manila, Zi-ka-wei, Osaka, Victoria, Toronto, La Paz.
- November 1, 15-16hrs.: San Fernando, Granada, Edinburgh, Bidston, Stonyhurst, Shide, Paris, Moncalieri, Pulkovo, Helwan, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Zi-ka-wei, Osaka.
- November 2, 4hrs.: Edinburgh, Moncalieri, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Zi-ka-wei, Osaka.
- November 3, 5hrs.: Shide, Pulkovo, Makeyevka, Ekaterinburg, Irkutsk, Zi-ka-wei, Osaka.
- November 3, 20hrs.: Edinburgh, Shide, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Zi-ka-wei, Osaka.
- November 4, 2hrs.: Eskdalemuir, Edinburgh, Shide, Moncalieri, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Zi-ka-wei, Osaka.
- November 4, 4hrs.: San Fernando, Granada, Kew, Barcelona, Bombay.
- November 4, 14hrs.: San Fernando, Granada, Edinburgh, Shide, Barcelona, Paris, Padova, Makeyevka, Ekaterinburg.
- November 6, 9-10hrs.: Ekaterinburg, Irkutsk, Batavia, Manila, Sydney, Honolulu, La Paz.

19

1915. November 1.

Origin : 38°0N. 144°0E., determined by Shide.

Time at Origin : 7h. 23m. 43s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Osaka	G.	7.7	257	7	25	40	0	—	—	—	—	—	—	—	7	27	30	7	28	0	38°5N. 142°0E.
	W.	19.8	256	7	28	14	-3	7	28	40	7	31	48	-14	7	32	36	7	35	24	
Zi-ka-wei	G.	19.8	256	7	28	11	-11	7	24	46	7	31	15	-47	7	33	13	7	36	21	—
Irkutsk	G.	31.0	311	7	24	0	-381	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	W.	31.1	227	7	30	12	-10	—	—	—	7	36	8	+32	7	42	10	7	46	6	—
Manila	M.	52.2	93	7	33	36	+32	—	—	—	7	36	30	-239	7	40	36	8	2	24	—
Honolulu	E.	54.3	284	7	33	12	-6	—	—	—	7	40	48	-8	7	52	24	7	57	48	—
Simla	O.E.	55.6	319	7	33	34	+8	—	—	—	7	41	11	-1	—	—	—	—	—	—	38°7N. 142°3E.
Ekaterinburg	G.	55.6	319	7	33	34	+8	—	—	—	7	41	11	-1	—	—	—	—	—	—	
Batavia	W.	56.1	226	7	33	37	+7	—	—	—	7	41	17	-1	—	—	—	7	42	0	—
Bombay	E.	64.0	275	7	34	32	+11	—	—	—	—	—	—	—	—	—	—	8	5	16	—
Victoria	E.	64.2	47	7	34	0	-22	—	—	—	7	42	42	-16	8	0	54	8	4	36	—
Kodakikanal	E.	65.4	263	7	35	6	+56	—	—	—	—	—	—	—	7	55	36	8	8	54	—
Colombo	E.	65.6	259	7	34	30	-2	—	—	—	—	—	—	—	8	8	24	8	11	24	—
Pulkovo	G.	68.2	330	7	34	45	-3	7	37	15	7	43	39	-8	7	53	0	8	6	7	37°0N. 140°0E.
Berkeley	E.	70.2	57	7	35	27	+26	—	—	—	7	44	25	+14	7	54	8	8	0	49	
Lick	N.	70.2	57	7	35	28	+27	—	—	—	7	44	22	+11	7	53	33	8	0	48	—
	W.	71.2	58	7	35	31	+24	—	—	—	7	44	34	+11	7	54	41	8	2	32	—
Tiflis	G.	71.6	309	7	35	6	-4	7	41	10	7	45	16	+48	7	57	0	8	8	50	24°4N. 156°3E.
Makeyevka	G.	71.8	317	7	35	10	-2	7	38	8	7	44	42	+11	7	54	0	8	14	32	
Sydney	M.	72.2	174	7	44	30	? S.	—	—	—	7	44	30	-5	8	0	18	8	5	0	36°5N. 146°5E. S.R. 7h. 56m. 30s. P.S. 7h. 45m. 10s.
Riverview	W.	72.2	174	7	35	36	+22	—	—	—	7	44	42	+7	7	53	30	8	3	0	
Perth	E.	74.7	265	7	26	39	-340	7	45	0	? 7	45	0	-3	8	16	30	8	20	30	—
Dyce, Aberdeen	N.	80.6	342	7	36	5	-1	—	—	—	7	46	7	-6	8	2	9	8	16	11	—
	E.	80.6	342	7	36	7	+1	—	—	—	7	46	7	-6	8	2	11	8	16	11	—
Edinburgh	E.	82.0	342	7	36	0	-13	—	—	—	—	—	—	—	—	—	—	8	13	42	—
Eskdalemuir	M.S.	82.6	342	7	36	12	-5	7	39	30	7	46	22	-14	—	—	—	8	13	0	149°0E. 41°0N.
Stonyhurst	E.	83.7	341	7	33	42	-161	—	—	—	7	44	6	-162	8	9	30	8	15	54	
Bidston	N.	M.S.	84.3	341	7	36	0	-27	—	—	7	40	54	0	—	—	—	8	17	0	—
West Bromwich	M.	84.8	340	7	36	20	-10	—	—	—	7	46	46	-14	—	—	—	—	—	—	—
Kew	E.	85.3	339	7	36	42	+9	—	—	—	—	—	—	—	—	—	—	8	20	6	—

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Haslemere	E.	M.	85.7	339	7 46 50	? S.	...	7 46 50	-20	? 8 10 0	8 15 10	---
Padova	V.	N.	86.7	331	7 36 19	-18	---	7 46 52	-22	---	8 18 29	---
Shide	E.	M.	86.2	339	7 36 43	+ 6	---	7 47 33	+18	---	8 20 0	---
		M.	86.2	339	7 36 33	- 4	---	---	---	---	8 22 30	---
Paris	E.	M.S.	86.2	339	7 36 28	- 9	---	---	---	---	8 15 30	---
		M.	86.7	336	7 36 34	- 6	7 39 59	---	7 46 58	-17	8 4 0	8 13 0
Helwan	E.	M.	87.5	307	7 35 48	-57	---	7 46 12	-78	---	8 29 0	---
Moncalieri	S.	S.	88.2	331	7 36 39	-10	---	7 47 19	-18	8 11 58	8 20 22	---
Rocca di Papa	Aga.	S.	88.7	326	7 36 56	+ 4	---	7 47 10	-33	8 11 36	8 20 36	---
Ottawa	B.	M.	89.2	27	7 37 3	+ 9	---	7 47 30	-18	8 7 36	8 27 0	S.R. 7h. 53m. 35s.
Toronto	E.	M.	89.3	30	7 47 48	? S.	---	7 47 48	- 1	8 13 18	8 24 12	---
Malta	E.	M.	92.6	321	7 39 0	+107	---	---	---	---	7 50 30	---
Barcelona	E.	Ma.	93.3	332	---	---	---	7 48 6	-25	8 7 57	8 22 30	---
Harvard Univ.	N.	B.O.	93.5	25	7 37 13	- 5	---	7 47 52	-42	8 9 59	8 20 28	---
Granada	C.	C.	99.1	334	7 37 45	- 4	7 48 35	7 49 27	- 3	8 8 0	8 19 30	38°7N. 145°5E.
Rio Tinto	E.	M.	99.5	337	7 45 30	? S.	---	7 45 30	-244	---	8 33 0	---
San Fernando	E.	M.	100.6	336	7 42 0	+244	---	7 49 30	-14	8 20 30	8 27 0	---
		N.	M.	100.6	336	7 38 0	+ 4	---	7 48 30	-74	8 18 30	8 28 30
Azores	M.	M.	103.8	352	7 50 0	? S.	---	7 50 0	-14	---	8 15 30	---
Cape Town	E.	M.	136.4	259	7 43 12	+153	---	8 39 12	+2687	---	9 3 12	---
		M.	144.5	62	7 43 42	+150	7 46 47	7 59 15	+243	8 25 8	8 34 35	---

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1915. November 4.

Origin : 37°0N. 144°5E., determined by Shide.

Time at Origin : 3h. 11m. 44s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	s.	H.	M.	S.	H.	M.	S.	s.	H.	M.	S.	H.	M.	S.	
Osaka	O.	7.7	256	3 13 49	+ 8	---	---	---	---	---	---	---	---	3 15 42	---	---	3 16 30	---	---	860 kms.	
Zi-ka-wei	W.	19.9	260	3 16 24	0	---	---	---	3 20 0	- 5	---	---	3 21 8	---	---	---	3 23 41	---	---	---	
		19.9	260	3 16 24	0	---	---	---	---	---	---	---	3 21 44	---	---	---	3 25 25	---	---	---	
Irkutsk	G.	31.9	312	3 12 7	-383	---	---	---	3 17 4	-406	---	---	3 24 52	---	---	---	3 24 52	---	---	40°6N. 143°0E.	
Honolulu	E.	M.	51.1	91	3 29 6	? S.	---	---	3 29 6	+50	---	---	---	---	---	---	3 30 0	---	---	---	
Sinla	O.E.	54.9	285	---	---	---	---	---	---	---	---	---	---	---	---	---	3 43 0	---	---	---	
Ekaterinburg	G.	56.6	321	3 21 37	+ 3	---	---	---	3 29 19	- 6	---	3 38 0	---	---	---	---	3 47 46	---	---	---	
Pulkovo	G.	68.3	330	3 22 50	0	3 25 19	---	---	3 31 47	- 3	3 44 0	---	---	---	---	---	3 51 11	---	---	37°9N. 143°3E.	
Tiflis	G.	72.5	309	3 23 14	- 3	---	---	---	3 32 30	-10	---	3 50 0	---	---	---	---	3 56 42	---	---	35°6N. 141°2E.	
Makeyevka	G.	72.8	318	3 23 15	- 4	3 25 49	---	---	3 32 29	-15	3 44 0	---	---	---	---	---	3 52 48	---	---	42°0N. 148°0E.	
Edinburgh	E.	M.	83.1	342	3 34 0	? S.	---	---	3 34 0	-42	---	---	---	---	---	---	4 4 0	---	---	---	
Stonyhurst	E.	M.	84.8	341	3 31 42	? S.	---	---	3 31 42	-189	---	---	---	---	---	---	4 1 0	---	---	---	
Bidsion	N.	M.S.	85.3	341	3 31 48	+434	---	---	3 36 12	+66	---	---	---	---	---	---	4 2 30	---	---	---	
Kew	E.	M.	86.3	339	---	---	---	---	---	---	---	---	---	---	---	---	4 7 0	---	---	---	
Shide	E.	M.	87.2	341	---	---	---	---	3 35 8	-19	---	---	---	---	---	---	4 13 13	---	---	---	
		M.	87.2	339	---	---	---	---	3 35 3	-24	---	---	---	---	---	---	4 16 33	---	---	---	
		M.S.	87.2	339	---	---	---	---	3 35 10	-17	---	---	---	---	---	---	4 2 0	---	---	---	
		M.B.	87.2	339	---	---	---	---	3 35 8	-19	---	---	---	---	---	---	4 2 0	---	---	---	
Paris	---	---	87.8	336	---	---	---	3 35 5	-29	4 0 0	---	---	---	---	---	4 1 0	---	---	---		
Helwan	E.	M.	88.4	307	3 35 48	? S.	---	---	3 35 48	+ 8	---	---	---	---	---	---	4 7 0	---	---	e 3h. 57m. 39s.	
Moncalieri	S.	S.	89.2	331	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Barcelona	Ma.	C.	94.3	333	---	---	---	---	---	---	---	---	---	---	---	---	4 4 54	---	---	---	
Granada	C.	C.	100.1	335	---	---	---	---	---	---	---	---	---	---	---	---	4 9 0	---	---	---	
San Fernando	E.	M.	101.6	336	---	---	---	---	---	---	---	---	---	---	---	---	4 9 30	---	---	---	
		N.	M.	101.6	336	---	---	---	---	---	---	---	---	---	---	---	---	4 10 30	---	---	---
La Paz	---	---	144.7	64	3 31 46	+152	---	---	---	---	---	---	---	---	---	---	4 15 30	---	---	---	

22

Small Earthquakes which do not give good determinations—

November 7, 7-8hrs.: Edinburgh, Bidston, Shide, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Sydney, Riverview, Honolulu.
 November 11, 18-19hrs.: Bidston, Rocca di Papa, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Osaka.
 November 11, 23hrs.: Padova, Irkutsk, Osaka, Sydney, La Paz.
 November 13, 10-11hrs.: Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Batavia, Manila, Zi-ka-wei, Honolulu.
 November 13, 14hrs.: Shide, Tiflis, Ekaterinburg, Irkutsk, Zi-ka-wei, Osaka.
 November 16, 1-2hrs.: San Fernando, Edinburgh, Bidston, Stonyhurst, Shide, Pulkovo, Helwan, Makeyevka, Tiflis, Ekaterinburg, Osaka, La Paz.
 November 18, 1hr.: Edinburgh, Pulkovo, Makeyevka, Ekaterinburg, Manila, La Paz.
 November 20, 14-15hrs.: Ascension, San Fernando, Eskdalemuir, Edinburgh, Bidston, Shide, Pulkovo, Helwan, Makeyevka, Ekaterinburg, Bombay, Kodaikanal, Sydney, Riverview, Berkeley.
 November 20, 22hrs.: Ascension, Eskdalemuir, Edinburgh, Stonyhurst, Shide, Kew, Accra, Paris, Moncalieri, Rocca di Papa, Pompeii, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, La Paz.
 November 26, 19hrs.: Ascension, Eskdalemuir, Edinburgh, Bidston, Shide, Pulkovo, Makeyevka, Ekaterinburg, Irkutsk, Ottawa, Harvard University, La Paz.
 November 26, 20hrs.: Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Simla, Irkutsk.
 November 29, 22hrs.: San Fernando, Edinburgh, Bidston, Shide, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Sydney, Riverview.
 November 30, 4-5hrs.: Edinburgh, Stonyhurst, Shide, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Honolulu, Ottawa, La Paz.
 November 30, 17-18hrs.: Bidston, Shide, Pulkovo, Makeyevka, Ekaterinburg, Bombay, Irkutsk, Batavia.
 November 30, 20hrs.: Shide, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Bombay, Simla, Irkutsk, La Paz.
 December 4, 16hrs.: Azores, Edinburgh, Shide, Rocca di Papa, Pulkovo, Makeyevka, Ekaterinburg.
 December 5, 11-12hrs.: Ekaterinburg, Irkutsk, Batavia, Zi-ka-wei, Osaka.
 December 7, 12-13hrs.: Ascension, San Fernando, Edinburgh, Shide, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Simla, Irkutsk.
 December 9, 13-14hrs.: San Fernando, Eskdalemuir, Edinburgh, Bidston, Stonyhurst, Shide, Pulkovo, Helwan, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Sydney, Riverview, Honolulu, La Paz.

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1915. November 18.

Origin : 37°0N. 143°0E., determined by Shide.

Time at Origin : 4h. 2m. 19s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	I.			M.			Remarks.		
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.			
Osaka	O.	6.5	254	4	4	9	+11	—	—	—	—	—	—	4	6	2	—	—	—	4	7	16	860 kms. S.R. 4h. 11m. 1s.
Zi-ka-wei	W.	18.7	259	4	6	47	+3	—	—	—	4	10	13	-1	4	11	55	—	—	4	13	35	
Manila	O.	18.7	259	4	6	44	0	—	—	—	4	10	23	+9	—	—	—	—	—	4	15	46	—
Honolulu	W.	29.8	227	4	8	47	+2	—	—	—	4	13	46	-4	4	16	9	—	—	4	19	17	—
Simla	M.	53.0	88	4	11	42	-3	—	—	—	—	—	—	—	4	19	42	—	—	4	20	36	—
Batavia	O.E.	55.8	284	—	—	—	—	—	—	—	—	—	—	—	4	32	30	—	—	4	36	18	i 4h. 18m. 42s.
Ekaterinburg	W.	54.8	226	4	12	4	+7	—	—	—	4	19	48	+10	—	—	—	—	—	4	22	0	—
Bombay	G.	55.8	319	4	11	55	-9	—	—	—	4	19	35	-15	—	—	—	—	—	4	34	59	—
Kodaikanal	M.	63.2	274	4	19	52	? S.	—	—	—	4	19	52	-90	—	—	—	—	—	4	45	40	—
Pulkovo	M.	64.4	265	4	21	30	? S.	—	—	—	4	21	30	-7	4	41	18	—	—	4	45	54	—
Berkeley	G.	68.7	330	4	13	22	-6	4 15 49	—	—	4	22	18	-11	4	37	0	—	—	4	44	45	40°2N. 149°1E. e 4h. 32m. 28s.
Makeyevka	G.	72.0	317	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Edinburgh	M.	82.7	342	4	25	0	? S.	—	—	—	4	25	0	-13	4	40	0	—	—	4	43	53	—
Eskdalemuir	G.	83.3	341	—	—	—	—	—	—	—	4	25	6	-13	—	—	—	—	—	4	48	0	—
Stonyhurst	M.	84.4	340	4	14	30	-33	—	—	—	—	—	—	—	—	—	—	—	—	4	57	0	—
Bidston	N.	M.S.	84.9	340	4	16	48	+102	—	—	4	25	54	+17	—	—	—	—	—	4	54	6	—
Kew	M.	85.9	338	4	24	30	? S.	—	—	—	4	24	30	-78	—	—	—	—	—	4	52	54	—
Haslemere	M.	86.4	338	4	49	50	? L.	—	—	—	—	—	—	—	4	49	50	—	—	4	54	48	—
Padova	V.	86.6	328	4	15	7	-9	—	—	—	4	25	19	-37	—	—	—	—	—	4	58	20	—
Shide	M.	86.8	338	—	—	—	—	—	—	—	4	25	37	-21	—	—	—	—	—	5	2	59	—
	M.S.	86.8	338	—	—	—	—	—	—	—	4	25	35	-23	? 4	48	10	—	—	5	2	10	—
	M.B.	86.8	338	—	—	—	—	—	—	—	4	25	38	-20	? 4	49	10	—	—	4	52	30	—
Paris	—	87.3	335	4	15	14	-6	—	—	—	4	25	34	-29	4	47	0	—	—	4	57	0	—
Helwan	M.	87.5	306	4	24	24	? S.	—	—	—	4	24	24	-102	—	—	—	—	—	—	—	—	—
Moncalieri	S.	88.6	330	4	25	34	? S.	—	—	—	4	25	34	-44	4	45	10	—	—	4	59	15	S. 4h. 34m. 56s.
Rocca di Papa	Aga.	89.0	325	? 4	15	30	-1	—	—	—	? 4	25	36	-46	4	51	0	—	—	4	59	24	—
Ottawa	B.	90.5	26	—	—	—	—	—	—	—	4	26	6	—	—	—	—	—	—	4	55	0	—
Barcelona	Ma.	93.8	332	—	—	—	—	—	—	—	—	—	—	—	4	52	54	—	—	4	58	40	—

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Small Earthquakes which do not give good determinations—

- December 12, 17hrs.: Ekaterinburg, Irkutsk, Manila, Osaka.
 December 12, 21hrs.: Pulkovo, Helwan, Makeyevka, Ekaterinburg, Irkutsk, Berkeley, Lick, Ottawa, Harvard University, La Paz.
 December 16, 13-14hrs.: Ascension, Malta, Pulkovo, Ekaterinburg, Irkutsk, Riverview, La Paz.
 December 17, 11-12hrs.: Pulkovo, Makeyevka, Ekaterinburg, Irkutsk, Manila, La Paz.
 December 17, 19hrs.: Edinburgh, Bidston, Stonyhurst, Kew, Paris, Moncalieri, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Bombay, Irkutsk.
 December 18, 9-10hrs.: Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Irkutsk.
 December 18, 18hrs.: Ascension, San Fernando, Granada, Eskdalemuir, Edinburgh, Stonyhurst, Shide, Kew, Barcelona, Paris, Moncalieri, Rocca di Papa, Pulkovo, Helwan, Makeyevka, Tiflis, Ekaterinburg, Kodaikanal, Irkutsk, La Paz.
 December 18, 21-22hrs.: San Fernando, Moncalieri, Pulkovo, Helwan, Makeyevka, Ekaterinburg, Irkutsk, La Paz.
 December 21, 9hrs.: Irkutsk, Manila, Sydney, Riverview, Honolulu.
 December 22, 11-12hrs.: Helwan, Tiflis, Ekaterinburg, Irkutsk, Batavia, Riverview, Honolulu.
 December 22, 20hrs.: Ascension, Helwan, Tiflis, Ekaterinburg, Irkutsk, La Paz.
 December 26, 9hrs.: San Fernando, Eskdalemuir, Edinburgh, Bidston, Stonyhurst, Shide, Kew, Moncalieri, Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, La Paz.
 December 27, 3-4hrs.: Shide, Pulkovo, Makeyevka, Ekaterinburg, Irkutsk, Zi-ka-wei, Adelaide, Sydney, Riverview, Honolulu, La Paz.
 December 27, 9hrs.: Pulkovo, Makeyevka, Tiflis, Ekaterinburg, Simla, Zi-ka-wei.
 December 28-29, 23-0hrs.: Azores, San Fernando, Granada, Eskdalemuir, Edinburgh, Bidston, Stonyhurst, Shide, Kew, Barcelona, Paris, Rocca di Papa, Pulkovo, Helwan, Makeyevka, Tiflis, Ekaterinburg, Irkutsk, Batavia, Manila, Zi-ka-wei, Sydney, Riverview, Honolulu, Ottawa, Harvard University, La Paz.
 December 29, 22hrs.: Irkutsk, Manila, Riverview, Honolulu, Berkeley.
 December 30, 2hrs.: Edinburgh, Shide, Pulkovo, Helwan, Makeyevka, Tiflis, Simla, Irkutsk.
 December 31, 23hrs.: San Fernando, Granada, Edinburgh, Shide, Paris, Moncalieri, Rocca di Papa, Pulkovo, Helwan, Makeyevka, Tiflis, Ekaterinburg, Simla, Colombo, Irkutsk, Batavia, Perth, Manila, Zi-ka-wei, Riverview, Honolulu, Berkeley, Ottawa, Harvard University, La Paz.

27

1915. November 21.

Origin : 32°0n. 119°0w., determined by Shide.

Time at Origin : 0h. 13m. 32s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.			PR ₁			S.			O-C.			I.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	H.	M.	S.		
Lick	W.	5.5	338	0	16	0	+63	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Felt in California— Arizona line. Uncertain.	
Santa Clara	(N. W.)	5.9	336	1	15	45	+42	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Berkeley	(E. W.)	5.9	336	1	15	45	+42	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
	(N. —)	6.4	336	0	15	45	+33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
	(E. —)	6.4	336	0	15	47	+37	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
	(V. —)	6.4	336	0	15	47	+37	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Ottawa	B.	35.8	55	0	20	34	-18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Honolulu	E. M.	36.3	263	0	21	6	+10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Harvard Univ.	R. B.O.	39.0	61	0	20	46	-32	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
La Paz	—	68.7	127	0	24	31	-10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Azores	E. M.	73.4	56	0	53	18	+1688	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Dyce, Aberdeen	Ma.	76.1	30	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Edinburgh	K. M.	76.6	31	0	35	0	? S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Eskdalemuir	G.	76.9	32	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Bidston	N. M.S.	78.2	33	0	35	30	? S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Stonyhurst	E. M.	78.2	33	0	34	36	? S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Shide	(M. —)	80.8	35	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
	(E. M.B.)	80.8	35	0	25	12	—44	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Haslemere	E. M.	80.8	34	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Kew	E. M.	80.8	34	0	37	0	? S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Paris	N. —	83.9	34	0	26	16	+3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Pulkovo	G.	84.8	15	0	26	22	+3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
San Fernando	E. M.	87.0	48	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Granada	C.	88.2	46	0	26	27	-11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Barcelona	Ma.	88.7	40	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Moncalieri	S.	89.1	35	? 0	29	5	+142	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Ekaterinburg	G.	91.2	36.0	0	26	49	-5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Rocca di Papa	Aga.	95.8	34	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		

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San Fernando	{ E. M. 78.5	306	—	—	—	3 10 0	+515	3 25 30	3 31 0	—
	{ N. M. 78.5	306	—	—	—	3 11 0	+575	3 24 30	3 33 0	—
Riverview	—	84.8	134	2 51 48	-18	3 2 34	-2	3 17 30	3 24 2	S.R. ? 3h. 7m. 30s.
Cape Town	E. B.	93.6	333	3 30 0	+2225	—	—	—	3 31 24	—
Honolulu	E. B.O.	96.0	61	3 3 30	? S.	—	—	—	3 33 24	—
Ottawa	—	104.2	351	? 3 12 32	+1122	3 3 30	-65	3 28 0	—	? 7500 kms.
Harvard Univ.	N. M.	106.4	347	—	—	—	—	3 34 42	—	—
La Paz	M.	157.3	300	2 59 54	+136	3 14 14	+149	3 52 15	4 3 10	—

31

1915. December 6.

Origin : 41°5N. 146°0E., determined by Shide.

Time at Origin : 20h. 58m. 5s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁	S.			O-C.	L.	M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	H.	M.	S.	
Osaka	O.	10.7	235	—	—	—	—	—	—	—	—	—	21 3 18	—	—	21 4 44	? S. 21h. 1m. 4s.
Zi-ka-wci	W.	22.2	251	21 3 7	—	—	—	—	21 7 3	—	-11	—	21 8 0	—	—	21 13 11	—
Irkutsk	G.	30.0	306	20 58 16	-377	—	—	—	21 3 22	-377	—	—	21 8 0	—	—	21 8 54	43°4N. 147°5E.
Honolulu	E. M.	50.0	96	21 15 18	? S.	—	—	—	21 15 18	+43	—	—	21 23 42	—	—	21 27 18	—
Ekaterrinburg	G.	54.0	318	21 7 34	-4	—	—	—	21 15 2	-12	—	—	21 23 0	—	—	21 28 45	i 21h. 15m. 18s.
Simla	O.E.	55.0	283	—	—	—	—	—	—	—	—	—	—	—	—	—	i 21h. 21m. 24s.
Pulkovo	G.	65.9	330	21 8 57	+2	—	—	—	21 17 36	-5	—	—	21 30 0	—	—	21 35 28	—
Makeyevka	G.	70.3	317	21 9 31	+7	—	—	—	21 18 47	+12	—	—	21 35 0	—	—	21 37 46	—
Tiflis	G.	70.6	309	21 9 27	+1	—	—	21 11 3	21 18 35	-3	—	—	21 30 0	—	—	21 44 38	25°2N. 88°2E.
Edinburgh	E. M.	79.2	343	21 45 0	+2081	—	—	—	—	—	—	—	—	—	—	21 54 0	—
Eskdalemuir	G.	79.7	343	21 30 0	to 22h. 15m. 0s.	—	—	—	—	—	—	—	—	—	—	—	—
Stonyhurst	E. M.	80.9	342	21 19 0	? S.	—	—	—	21 19 0	-99	—	—	—	—	—	21 46 0	—
Bidston	N. M.S.	81.4	342	21 19 0	? S.	—	—	—	21 19 0	-104	—	—	—	—	—	21 48 0	—
Kew	E. M.	82.5	340	21 43 0	+1942	—	—	—	—	—	—	—	—	—	—	21 50 0	—
Shide	E. M.B.	83.5	340	21 10 35	-9	—	—	—	21 20 55	-13	—	—	—	—	—	21 45 40	—
Paris	—	84.1	337	—	—	—	—	—	—	—	—	—	21 44 0	—	—	—	—
Moncalieri	S.	85.8	332	21 21 42	? S.	—	—	—	21 21 42	+9	—	—	21 43 8	—	—	21 53 53	—
Rocca di Papa	Aga.	86.6	327	—	—	—	—	—	—	—	—	—	21 52 30	—	—	21 54 30	—
Harvard Univ.	E. B.O.	89.7	26	—	—	—	—	—	—	—	—	—	21 49 15	—	—	—	110°0E. 10°0S.
Granada	C.	96.5	336	—	—	—	—	—	—	—	—	—	21 48 0	—	—	22 7 0	—
San Fernando	{ E. M.	98.0	338	21 51 30	+2365	—	—	—	—	—	—	—	21 57 0	—	—	21 59 30	—
	{ N. M.	98.0	338	21 50 30	+2305	—	—	—	—	—	—	—	21 55 0	—	—	21 57 30	—
La Paz	—	141.5	60	21 18 0	+158	—	—	—	—	—	—	—	—	—	—	—	—

32

1915. December 7.

Origin : 9°0N. 44°5W., determined by Shide.

Time at Origin : 10h. 38m. 0s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
La Paz	—	34.6	223	10	45	41	+31	10	47	9	10	51	39	+50	10	58	0	11	0	10	—
Harvard Univ.	E. B.O.	40.7	330	10	46	20	+19	—	—	—	10	52	37	+20	10	57	8	—	—	—	—
San Fernando	E. M.	44.2	46	—	—	—	—	—	—	—	10	52	0	-65	10	59	0	11	10	30	—
Rio Tinto	E. M.	44.6	44	10	49	0	+150	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ottawa	B.	45.3	329	10	47	7	+32	—	—	—	10	54	6	+47	10	59	42	11	7	0	—
Granada	C.	46.4	46	10	46	19	-24	—	—	—	10	52	46	-47	10	54	42	10	58	38	9°0N. 38°5W.
Barcelona	Ma.	52.3	44	—	—	—	—	—	—	—	10	54	13	-35	11	0	29	11	5	22	—
Shide	M.	54.8	32	—	—	—	—	—	—	—	10	55	7	-12	—	—	—	—	—	—	—
	E. M.S.	54.8	32	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	P. and S. in ats.
	E. M.B.	54.8	32	10	47	20	18	—	—	—	10	54	54	-25	—	—	—	—	—	—	—
Bidston	E. M.S.	55.5	29	—	—	—	—	—	—	—	10	55	12	-16	—	—	—	—	—	—	—
Kew	E. M.	55.7	32	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Paris	—	55.8	36	—	—	—	—	—	—	—	10	55	11	-20	11	4	0	11	7	0	—
Stonyhurst	E. M.	56.0	29	10	46	0	-106	—	—	—	10	55	0	-34	—	—	—	—	—	—	—
Eskdalemuir	G.	56.5	27	11	0	0	to 11h. 10m. 0s.	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Edinburgh	E. M.	56.9	26	10	55	0	—	—	—	—	10	55	0	-45	—	—	—	—	—	—	—
Moncalieri	S.	57.4	42	—	—	—	—	—	—	—	10	55	19	-32	11	2	35	11	8	49	—
Rocca di Papa	Aga.	59.8	46	10	48	6	-5	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pulkovo	G.	74.6	30	10	49	46	0	—	—	—	10	59	11	-10	11	12	0	11	18	17	P.S. 10h. 59m. 30s.
Makoyevka	G.	78.5	43	10	50	1	-9	—	—	—	10	59	43	-23	11	11	0	—	—	—	—
Tiflis	G.	83.5	49	10	50	25	-14	10	53	35	11	0	31	-32	11	16	0	11	34	39	e 11h. 5m. 47s.
Ekaterinburg	G.	90.6	32	10	52	8	+10.5	—	—	—	11	1	43	-37	11	14	30	—	—	—	—
Mauritius	E. N.	104.5	109	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	E. N.	104.5	109	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Irkutsk	G.	113.1	20	10	51	39	-93	—	—	—	11	1	7	-288	—	—	—	—	—	—	e 11h. 7m. 7s.
Sydney	E. M.	151.2	208	—	—	—	—	—	—	—	—	—	—	—	11	58	42	12	0	48	—
Riverview	—	151.3	208	—	—	—	—	—	—	—	—	—	—	—	11	58	30	12	2	29	—
Batavia	W.	151.4	86	10	56	0	+3	—	—	—	—	—	—	—	—	—	—	—	—	—	—

33

1915. December 17.

Origin : 42°0N. 79°5E., determined by Shide.

Time at Origin : 7h. 4m. 47s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Simla	O.E.	11.0	190	7	7	36	+5	—	—	—	7	9	30	-11	7	11	0	7	12	0	—
Ekaterinburg	G.	19.1	327	7	9	26	+9	—	—	—	7	13	3	+12	7	15	0	7	19	0	—
Irkutsk	G.	19.6	50	7	3	35	-348	—	—	—	7	7	10	-552	7	9	30	7	11	10	43°6N. 77°7E.
Bombay	E. M.	23.8	196	7	14	40	? S.	—	—	—	7	14	40	+13	—	—	—	7	20	10	—
Makoyevka	G.	29.6	296	7	11	9	-2	—	—	—	7	16	12	-2	7	20	0	7	22	17	46°7N. 82°1E.
Kodaikanal	E. M.	31.9	184	7	16	36	? S.	—	—	—	7	16	36	-17	7	22	0	7	25	54	—
Pulkovo	G.	34.7	318	7	11	52	-6	7	13	9	7	17	22	-16	7	21	0	7	26	39	43°7N. 79°5E.
Zi-ka-wei	W.	34.9	93	7	11	54	-5	—	—	—	7	17	28	-13	—	—	—	7	29	57	—
Colombo	E. M.	35.1	181	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	21	0	—
Osaka	W.	43.7	80	7	10	48	? S.	—	—	—	7	19	48	+10	—	—	—	7	33	25	—
Manila	W.	44.9	115	7	13	21	+2	—	—	—	7	22	5	+124	7	31	13	7	37	46	—
Pompeii	E. O.A.	47.6	291	7	13	36	-2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rocca di Papa	Aga.	48.4	294	7	13	44	+1	—	—	—	7	20	41	-5	7	35	2	—	—	—	—
Moncalieri	S.	50.4	289	7	14	1	+5	—	—	—	7	23	49	+158	7	31	38	7	36	32	—
Paris	—	52.2	306	7	14	15	+7	—	—	—	7	21	42	+9	7	37	0	7	38	0	e 7h. 32m. 56s.
Edinburgh	E. M.	52.6	316	7	14	0	-11	—	—	—	—	—	—	—	—	—	—	7	35	35	—
Kew	E. M.	52.8	310	7	24	0	? S.	—	—	—	7	24	0	+139	—	—	—	7	37	30	—
Eskdalemuir	G.	52.9	315	7	14	18	+6	—	—	—	7	21	46	+4	7	31	0	—	—	—	—
Stonyhurst	E. M.	53.0	313	7	15	30	+77	—	—	—	—	—	—	—	—	—	—	7	40	6	—
Haslemere	E. M.	53.2	310	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	40	0	—
Bidston	N. M.S.	53.5	313	7	15	18	+61	—	—	—	7	22	12	+22	—	—	—	7	39	0	—
Shide	E. M.	53.6	309	? 7	14	14	-3	—	—	—	? 7	21	41	-10	—	—	—	7	39	20	—
	E. M.B.	53.6	309	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	39	20	—
Batavia	W.	54.2	146	—	—	—	—	—	—	—	—	—	—	—	7	39	0	7	42	0	e 7h. 13m. 0s.
Barcelona	Ma.	55.6	297	—	—	—	—	—	—	—	—	—	—	—	7	35	58	7	41	0	e 7h. 33m. 5s.
Granada	C.	61.6	296	7	15	28	+18	—	—	—	—	—	—	7	41	0	7	45	12	—	i 7h. 18m. 0s.
Rio Tinto	E. M.	63.3	298	7	19	0	+219	—	—	—	—	—	—	—	—	—	—	7	49	0	—
Azores	—	75.3	308	7	45	18	+1720	—	—	—	—	—	—	—	—	—	—	7	53	24	—
Ottawa	B.	89.8	343	—	—	—	—	—	—	—	? 7	55	4	+1566	7	58	0	—	—	—	—
Harvard Univ.	E. B.O.	91.6	339	—	—	—	—	—	—	—	—	—	—	—	8	0	36	—	—	—	—
Honolulu	E. M.	97.4	53	7	44	0	+1517	—	—	—	7	52	6	+1309	—	—	—	8	1	42	—
La Paz	—	142.4	303	7	24	47	+159	—	—	—	—	—	—	—	8	19	0	8	25	15	i 7h. 25m. 42s.

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1915. December 19.

Origin : 3°·5N. 98°·0E., determined by Shide.

Time at Origin : 20h. 13m. 18s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.		O-C.	PR ₁		S.		O-C.	L.		M.		Remarks.		
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	H.	M.		S.	
Batavia	W.	13·1	138	20	16	33	+ 1	—	?	20	17	38	—	20	23	0	—	
Kodaikanal	E. M.	21·5	290	20	21	18	? S.	—	—	20	21	18	—	20	27	12	—	
Manila	W.	25·2	63	20	19	10	+12	—	—	20	22	33	—	20	23	23	—	
Bombay	E. M.	29·1	304	20	22	11	+154	—	—	—	—	—	—	20	31	51	—	
Simla	O.E.	33·9	327	20	25	24	? S.	—	—	20	25	24	—	20	33	42	—	
Zi-ka-wei	W.	35·4	36	20	20	34	- 1	—	—	20	26	48	+29	20	38	20	—	
Irkutsk	G.	49·1	5	20	22	15	- 4	20	24	14	20	29	28	+ 3	20	44	0	P.S. 20h. 33m. 23s.
Ekaterinburg	G.	61·0	328	20	23	35	- 2	—	—	—	20	31	55	+ 1	20	39	0	—
Riverview	W.	62·4	151	20	32	6	? S.	—	—	—	20	32	6	- 5	20	46	30	—
Makeyevka	G.	67·8	321	20	24	16	- 5	—	—	—	20	33	10	- 8	20	51	0	—
Helwan	E. M.	68·1	301	20	33	0	? S.	—	—	—	20	33	0	-21	—	—	—	—
Pulkovo	G.	75·9	331	20	25	8	- 4	20	28	7	20	34	48	- 6	20	49	0	S.R. 20h. 38m. 30s.
Rocca di Papa	Aga.	84·2	312	20	22	9	-232	—	—	—	—	—	—	—	—	—	—	—
Moncalieri	S.	87·8	315	20	36	46	? S.	—	—	—	20	36	46	-22	21	1	31	—
Kew	E. M.	92·4	322	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Edinburgh	E. M.	93·3	327	20	53	0	+1568	—	—	—	—	—	—	—	—	—	—	—
Stonyhurst	E. M.	93·3	324	21	11	42	+2690	—	—	—	—	—	—	—	—	—	—	—
Eskdalemuir	G.	93·5	326	? 20	37	46	? S.	—	—	—	20	37	46	-23	20	59	0	† e 20h. 44m. 2s. † e 20h. 55m. 36s.
Shide	E. M.	93·7	321	—	—	—	—	—	—	—	20	37	40	-31	—	—	—	—
	E. M.S.	93·7	321	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bidston	S.	93·8	324	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Honolulu	E. M.	101·8	68	—	—	—	—	—	—	—	—	—	—	21	7	36	—	P. and S. in ats.
Harvard Univ.	S.	133·1	11	—	—	—	—	—	—	—	—	—	—	? 21	23	0	—	—
La Paz	—	161·1	225	20	34	0	+131	—	—	—	—	—	—	—	—	—	—	—

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1915. December 25.

Origin : 37°·0N. 35°·5E., determined by Shide.

Time at Origin : 6h. 6m. 1s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.		O-C.	PR ₁		S.		O-C.	L.		M.		Remarks.				
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	H.	M.		S.			
Helwan	E. M.	7·9	207	6	12	0	? S.	—	—	6	12	0	+145	—	—	—	—			
	N. M.	7·9	207	6	8	0	- 1	—	—	—	—	—	—	—	—	—	—			
Tiflis	G.	8·5	55	6	8	15	+ 5	—	—	6	19	15	+564	—	—	—	—			
Makeyevka	G.	11·2	9	6	8	51	+ 3	—	—	6	11	13	+13	6	14	0	6	14	55	36°·0N. 33°·0E.
Rocca di Papa	Aga.	12·2	292	6	10	30	+10	—	—	—	—	—	—	—	—	—	—	—		
Padova	V.	19·5	303	6	10	47	+11	—	—	—	—	—	+182	—	—	—	—	—		
Moncalieri	S.	22·3	300	? 6	11	54	+44	—	—	—	—	—	+41	6	19	22	6	21	13	
Pulkovo	G.	23·0	353	—	—	—	—	—	—	? 6	15	53	+13	6	20	0	6	23	14	
Ekaterinburg	G.	25·9	32	6	11	41	- 7	—	—	6	15	39	+13	6	19	30	6	23	55	
Shide	E. M.	29·4	309	—	—	—	—	—	—	6	16	7	-14	—	—	—	6	24	30	
	E. M.S.	29·4	309	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	M.B.	29·4	309	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Edinburgh	E. M.	39·0	319	6	22	0	? S.	—	—	6	22	0	+231	—	—	—	6	30	0	Lost in ats.
Irkutsk	G.	49·2	49	6	15	0	- 2	—	—	6	22	7	- 3	6	31	0	6	34	34	—

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1915. December 31.

Origin : 44°5N. 86°5E., determined by Shide.

Time at Origin : 18h. 50m. 40s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Irkutsk	G.	14-1	50	18	54	33	+26	—	—	—	18	57	36	+46	18	59	0	19	0	42	45°7N. 81°9E.
Simla	O.E.	15-2	212	18	55	30	+68	—	—	—	—	—	—	—	18	59	48	19	0	18	—
Ekaterinburg	G.	20-3	316	18	55	24	—	1	—	—	18	59	6	—	19	1	0	—	—	—	43°5N. 84°2E.
	G.	20-3	316	—	—	—	—	—	—	—	—	—	—	—	20	3	0	—	—	—	—
Bombay	M.	23-0	209	19	5	0	—	to 19h.	9m. 0s.	—	—	—	—	—	—	—	—	—	—	—	—
Tiflis	G.	30-2	279	18	56	57	-13	—	—	—	19	1	58	-19	19	3	30	—	—	—	—
Zi-ka-wei	W.	30-3	104	18	57	18	+7	—	—	—	19	8	2	+343	—	—	—	19	10	4	—
Makeyevka	G.	33-1	293	18	57	32	-5	—	—	—	—	—	—	—	19	7	0	—	—	—	e 19h. 3m. 52
Pulkovo	G.	36-4	315	18	57	54	-11	—	—	—	19	3	34	-22	19	6	0	19	10	18	—
Helwan	M.	45-3	269	19	17	0	+1065	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	M.	45-3	269	19	20	0	+1245	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Moncalieri	S.	53-6	300	—	—	—	—	—	—	—	—	—	—	—	19	55	38	19	59	10	e 19h. 51m. 0s.
Edinburgh	M.	54-4	316	19	20	0	+1185	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bidston	M.S.	55-5	314	19	8	36	? S.	—	—	—	19	8	36	+28	—	—	—	—	—	—	—
Shide	M.	55-9	310	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	M.B.	55-9	310	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	M.B.	55-9	310	—	—	—	—	—	—	—	19	8	9	-4	—	—	—	—	—	—	—

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1915. December 31.

Origin : 38°0N. 127°0W., determined by Shide.

Time at Origin : 12h. 19m. 30s.

Station and Component.	Machine.	Distance from Origin.	Azimuth.	P.			O-C.	PR ₁			S.			O-C.	L.			M.			Remarks.
				H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	S.	H.	M.	S.	H.	M.	S.	
Berkeley	—	3-7	91	12	21	3	+35	—	—	—	—	—	—	—	12	21	59	12	23	29	—
Santa Clara	N.E. W.	4-0	97	12	21	15	+43	—	—	—	—	—	—	—	12	22	30	12	23	24	—
Lick	W.	4-4	102	12	21	22	+44	—	—	—	—	—	—	—	12	22	19	12	54	50	—
Honolulu	E. M.	31-5	247	12	27	54	+101	—	—	—	12	30	48	-42	12	34	6	12	37	42	—
Ottawa	B.	38-3	62	12	27	3	-7	12	28	27	12	32	50	-22	12	33	0	12	40	42	—
Georgetown	W.	38-6	73	12	27	9	-4	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Harvard University	B.O.	42-1	66	12	27	38	-4	12	28	57	12	34	0	-6	12	41	13	12	45	3	—
Edinburgh	E. M.	74-7	29	12	41	0	? S.	—	—	—	12	41	0	+8	—	—	—	13	0	24	—
Eskdalemuir	G.	75-0	29	12	45	0	to 13h.	15m. 0s.	—	—	—	—	—	—	—	—	—	—	—	—	—
Azores	E. M.	75-6	53	12	54	42	? L.	—	—	—	—	—	—	—	12	54	42	13	9	24	—
Bidston	N. M.S.	76-5	31	12	41	6	? S.	—	—	—	12	41	6	-7	? 12	51	42	13	2	36	—
Stonyhurst	M.	76-5	30	—	—	—	—	—	—	—	12	40	42	-31	—	—	—	13	1	24	—
La Paz	—	77-5	123	12	31	10	-24	—	—	—	12	42	6	+41	12	55	0	13	14	24	—
	—	77-5	123	12	32	14	+40	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kew	E. M.	79-1	31	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	51	30	—
Shide	E. M.S.	79-3	27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13	5	37	—
	E. M.B.	79-3	27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13	5	25	—
Irkutsk	G.	79-3	331	12	30	54	-51	—	—	—	12	41	42	-3	12	56	0	12	57	6	—
Pulkovo	G.	80-6	12	12	31	55	+2	12	35	16	12	41	46	-14	12	58	0	13	2	36	S.R. 12h. 47m. 18s.
Paris	—	82-3	31	—	—	—	—	—	—	—	—	—	—	—	12	55	0	13	5	0	—
Ekaterinburg	G.	84-7	356	12	32	20	+4	—	—	—	12	42	31	-15	12	55	0	13	4	45	—
Zi-ka-wei	W.	85-9	301	12	32	32	+9	—	—	—	12	44	27	+88	13	1	32	13	45	40	—
Rio Tinto	E. M.	86-4	43	12	41	0	? S.	—	—	—	12	41	0	-124	—	—	—	13	13	0	—
San Fernando	E. M.	87-5	44	12	44	0	? S.	—	—	—	12	44	0	+43	13	5	30	13	9	0	—
	N. M.	87-5	44	12	43	30	? S.	—	—	—	12	43	30	+13	13	5	30	13	8	0	—
Moncalieri	S.	87-5	30	? 12	27	11	-321	—	—	—	—	—	—	—	12	54	32	13	7	14	—
Barcelona	Ma.	88-0	36	—	—	—	—	—	—	—	—	—	—	—	13	2	38	13	9	30	—
Granada	C.	88-4	42	12	33	9	+32	—	—	—	—	—	—	—	12	53	0	13	4	24	—
Rocca di Papa	Aga.	92-1	29	—	—	—	—	—	—	—	—	—	—	—	13	11	6	—	—	—	—

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