A SPECIAL DAYTIME WAVEFORM AND THE DISTANCE FROM ITS ORIGIN

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In general a characteristic regular daytime waveform consists of several smooth oscillations rapidly diminishing amplitude, and the International Scientific Radio Union which met in 1954 passed a resolution in which comparison of analyses of waveforms was recommended, and selected data on one type of waveforms to be exchanged was the typical daytime waveform radiated within a distance less than 1000 km. On this point the statement was made, "Some workers consider that these waveforms fit the reflection picture; others that they do not. The point needs further investigation".

The present paper describes the appearance and gives the results of a type of waveform which has characteristic of the regular peaked type. It consists of a characteristic oscillation with two well-defined peakes, and is quite different from the daytime type waveform with sinusoidal oscillations rapidly diminishing amplitude.

Assuming that the first pulse corresponds to the ground wave, and the second pulse with the identical sign to the double reflected sky wave and that the height of the reflected D layer is 65 km, we have studied whether or not it fits into the

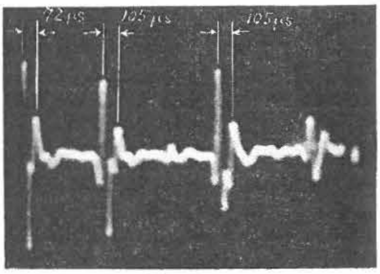

Fig. 1.
Atmospheric 12-10-15

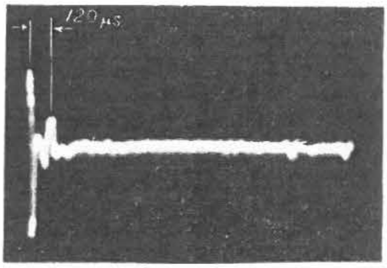

Fig. 2.
Atmospheric 24-10-3

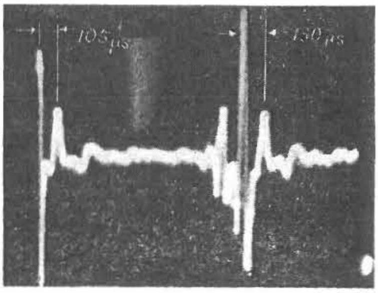

Fig. 3.
Atmospheric 25-10-7

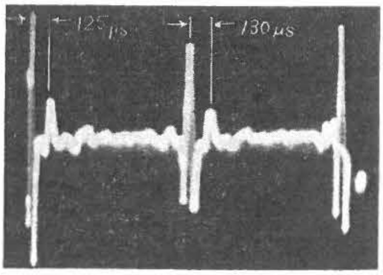

Fig. 4.
Atmospheric 25-10-45

simple reflection theory.

Some examples of this type are shown in Figs. 1, 2, 3 and 4, where the intervals between successive peaks of the same sign are drawn. All the waveforms of this type recorded from 0900 to 1530 June 1955, for which Sferics are available, are tabulated in Table 1, and the distances deduced by analyses were compared with the corresponding Sferics fixes. In Table 1 d_D denotes the distance determined by Sferics fix, and d_W the distance deduced by the analysis by reflection picture.

One can easily see that the distances in the separate example are in fairly good agreement. However, it is necessary to point out that we could not always discriminate between this type and the smooth daytime type with rapidly diminishing amplitude. Some workers at Cavendish Laboratory reported that the ionospheric reflection occurs either at the height of 67 km with a phase-change of π or at the height of 75 km with o phase change, and in the present paper we found that the fairly good agreement between d_W and d_D by assuming the second pulse corresponds to the double reflected sky wave, so our results seem to agree with the former case. However we are now studying whether or not the pulse with the opposite sign after the first pulse corresponds to the single ionospheric reflected wave.

It can be concluded that:

1. The waveforms of this type can sometimes be observed by day, and are distinguishable from those of smooth daytime type,
2. The waveforms of this type originate within a distance less than 2,000 km from the observing station,
3. This type fits into the simple reflection picture and is explained in terms of ionospheric reflection. The most adequate height for the reflection layer seems to be 65 km.

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Table 1

Atmospherics	Date of run	d_D km	d_W km	h km	Pulses used in analyses
8-10-25	17. VI. 55	1,100	1,200	65	G S_2
12-10-63	18. VI. 55	1,800	1,600	65	G S_2
12-10-67	18. VI. 55	900	900	65	G S_2
12-20-13	18. VI. 55	1,350	1,500	65	G S_2
13-10-15	18. VI. 55	1,000~1,500	1,300	65	G S_2
13-10-48	18. VI. 55	1,150	1,200	65	G S_2
17-10-38	19. VI. 55	1,000	1,200	65	G S_2
17-10-59	19. VI. 55	1,950	≧2,000	65	G S_2
17-10-61	19. VI. 55	1,150	1,300	65	G S_2
17-10-54	19. VI. 55	1,600	1,300	65	G S_2
17-20-35	19. VI. 55	1,300	1,000	65	G S_2
18-10-43	19. VI. 55	1,300	1,300	65	G S_2
18-10-44	19. VI. 55	1,200	1,200	65	G S_2

Atmospheics	Date of run	d_D km	d_W km	h km	Pulses used in analyses
18-10-46	19. VI. 55	1,300	1,100	65	G S_2
18-10-50	19. VI. 55	1,100	1,100	65	G S_2
21-10- 4	20. VI. 55	1,100	1,100	65	G S_2
21-10-23	20. VI. 55	1,300	1,000	65	G S_2
21-10-67	20. VI. 55	1,300	1,100	65	G S_2
22-10- 3	20. VI. 55	1,000	1,100	65	G S_2
22-20-60	20. VI. 55	1,100	1,200	65	G S_2
24-10- 2	20. VI. 55	1,000	900	65	G S_2
24-10- 3	20. VI. 55	1,000	1,000	65	G S_2
24-10-12	20. VI. 55	1,000	1,000	65	G S_2
24-10-13	20. VI. 55	1,100	1,100	56	G S_2
24-10-39	20. VI. 55	1,200	1,400	65	G S_2
25-10- 7	20. VI. 55	1,100	1,100	65	G S_2
25-10-10	20. VI. 55	900	900	65	G S_2
25-10-18	20. VI. 55	1,500	1,700	65	G S_2
25-10-32	20. VI. 55	1,100	1,200	65	G S_2
25-10-33	20. VI. 55	1,800	$\geqq$2,000	65	G S_2
25-10-45	20. VI. 55	1,100	1,000	65	G S_2
25-10-59	20. VI. 55	1,400	900	65	G S_2
25-10-86	20. VI. 55	1,500	1,300	65	G S_2
25-20-29	20. VI. 55	1,100	600	65	G S_2
24-10-48	20. VI. 55	1,100	900	65	G S_2
24-10-53	20. VI. 55	1,200	1,300	65	G S_2
26-10- 9	20. VI. 55	1,600	1,400	65	G S_2
26-10-13	20. VI. 55	1,200	1,100	65	G S_2
26-10-19	20. VI. 55	2,400	1,300	65	G S_2
26-10-31	20. VI. 55	1,100	900	65	G S_2
26-10-34	20. VI. 55	1,200	1,150	65	G S_2
26-10-53	20. VI. 55	1,500	1,800	65	G S_2
26-10-54	20. VI. 55	1,000	1,000	65	G S_2
28-10-43	20. VI. 55	1,000	850	65	G S_2
28-20-25	20. VI. 55	1,500	1,500	65	G S_2
32-10-20	22. VI. 55	1,800	$\geqq$2,000	65	G S_2