monoxide flame gases results from continual recombination after dissociation of the carbon dioxide. Weston's experiments do not appear to support this view, for a large amount of dissociation and recombination must be taking place in the high temperature carbon monoxide – hydrogen – oxygen flame gases.)

A further indication that hot normal carbon dioxide does not emit luminous radiation may be derived from flame photographs, which show remarkable variations in the intensity of the after-glow in carbon monoxide flame gases resulting from explosions in a glass tube. One such photograph taken by Dr. A. S. Leah is reproduced herewith. His experiments have shown that the temperature of the gases showing almost negligible after-glow is higher than that of the gases in the immediate neighbourhood which show a strong after-glow. There can be little doubt that the carbon dioxide in the former gases is much more normal than the carbon dioxide in the latter gases[5].

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[3] "Spectroscopy and Combustion Theory" (Chapman and Hall, 1942).

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Diffraction of Ultra-Short Radio Waves

WE have pointed out[1] that ultra-short radio waves polarized with the electric vector vertical are propagated into the shadow of hills more readily than horizontally polarized waves. We have since observed the opposite effect for receiver positions beyond hills but just outside their shadow. Fig. 1 represents

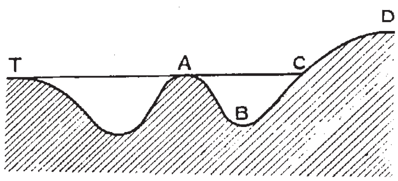

Fig. 1.

roughly the terrain over which these results, shown in the table, were obtained. The transmitter T was near the top of one ridge and the field strength investigated over the region $ABCD$; horizontally and vertically polarized radiation was emitted in turn from the transmitter on a wave-length of 3 metres, and the aerial at the receiver oriented to correspond for each measurement with the appropriate transmitter polarization. Over the region ABC within the geometrical shadow of the ridge having a crest at A, the vertical electric field, in agreement with our earlier note, was greater than the horizontal field, the ratio of these two fields, as will be seen from the table, being unity near the edge of the shadow at A and C and a maximum near the bottom of the valley at B. Just outside, however, the horizontal field was greater than the vertical, the ratio showing a flat maximum.

These experimental results are similar to those found both theoretically[2] and experimentally[3] in the diffraction by a straight edge or wedge of radiation in the visible spectrum. As the radius of the curvature of the ridge in our experiments was large compared with the wave-length, similar results would be obtained if the obstruction caused by the ridge is assumed to represent that due to the earth's curvature. It may be concluded, therefore, that for an elevated transmitter T (Fig. 2) and receiver positions

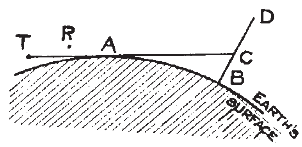

Fig. 2.

within the shadow ABC cast by the earth's curvature, vertical polarization should be used, but for positions just outside that shadow, horizontal polarization is more efficient. Horizontal polarization may, in practice, be the better for transmitter and receiver positions such as T and R (Fig. 2) well within optical range of one another if R is at such a height as to be just outside the shadow caused by the continuous diffraction due to undulation of the ground, houses, etc. In addition, horizontally polarized radiation may be better over tree-clad country, under the above conditions, on account of the materially greater attenuation caused by trees to vertically polarized radiation at ultra-short wave-lengths.

Position	Field-strength in microvolts per metre		Ratio Vertical/ Horizontal fields	Remarks
	Vertical polarization	Horizontal polarization		
1	32,000	31,000	1·03	Position A } in shadow
2	6,300	4,100	1·54	
3	2,500	950	2·63	
4	1,200	500	2·40	
5	1,080	530	2·04	Position B
6	1,900	1,400	1·36	
7	7,900	8,400	0·94	Position C } outside shadow
8	9,800	11,500	0·85	
9	12,000	19,700	0·61	
10	9,800	17,500	0·56	
11	6,500	9,800	0·66	
12	2,000	2,220	0·90	
13	740	710	1·04	Position D

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