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'APPLIANCE NOISE'

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NOISE RADIATION CHARACTERISTICS
OF SOME DOMESTIC APPLIANCES

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The five types of domestic appliance investigated were vacuum cleaners, electric fan heaters, extractor fans, electric razors and spin driers. The last three types are normally used in the reverberant environment of a kitchen or bathroom and the first two in the more absorbent living room. Investigations were made of the three main sound radiation characteristics - directivity, power output and frequency spectrum, each being measured using standard techniques in a free-field room.

The major sources of noise are similar for most domestic appliances. Motor noise is prominent in the low frequencies and usually tonal in character. Air movement noise, of higher frequency, is present particularly in the spectra of extractor fans, vacuum cleaners and fan heaters, but also in spin driers where a pure tone is produced by air passing through the regularly spaced water removal holes in the side of the tub when its walls are not completely covered. A third source of noise is vibration, often intermittent, of the casing of the appliance. These all combine to give broad band spectra with pure tones superimposed. Exceptions to this are the spectra of the electric razors. These are basically line spectra with pure tones of 50 Hz, 100 Hz and multiples, distinguishable up to very high frequencies.

The power output of a source is dependent on its distance from nearby reflecting or absorbing planes. This effect is also dependent on the orientation of a directional sound source with respect to the planes. Most domestic appliances are used on a floor or other surface or, as in the case of extractor fans, attached to a wall or window. It would thus be incorrect to consider the sound source to be the appliance alone without taking into consideration the type of mounting. The apparent power output of fan heaters and vacuum cleaners were measured on both hard reflecting and carpeted floors. An example is given in Table 1 of the difference in power output of two vacuum cleaners due to the two types of base, the actual reduction depending on the variation with frequency of the absorption coefficient of the carpet and the directivity of the appliance.

TABLE 1. OCTAVE BAND POWER OUTPUT (μW) OF VACUUM CLEANERS ON REFLECTING AND ABSORBING BASE

APPLIANCE		OCTAVE BAND MID FREQUENCY Hz							TOTAL μW
		125	250	500	1k	2k	4k	8k	
Reflecting Base	X	6.5	400	25	14	4.9	1.7	0.56	450
	Y	1.2	1.6	26	12	23	27	14	105
Carpet Base	X	5.6	280	16	9.0	2.9	1.4	0.32	315
	Y	0.91	1.4	24	10	14	13	13	76

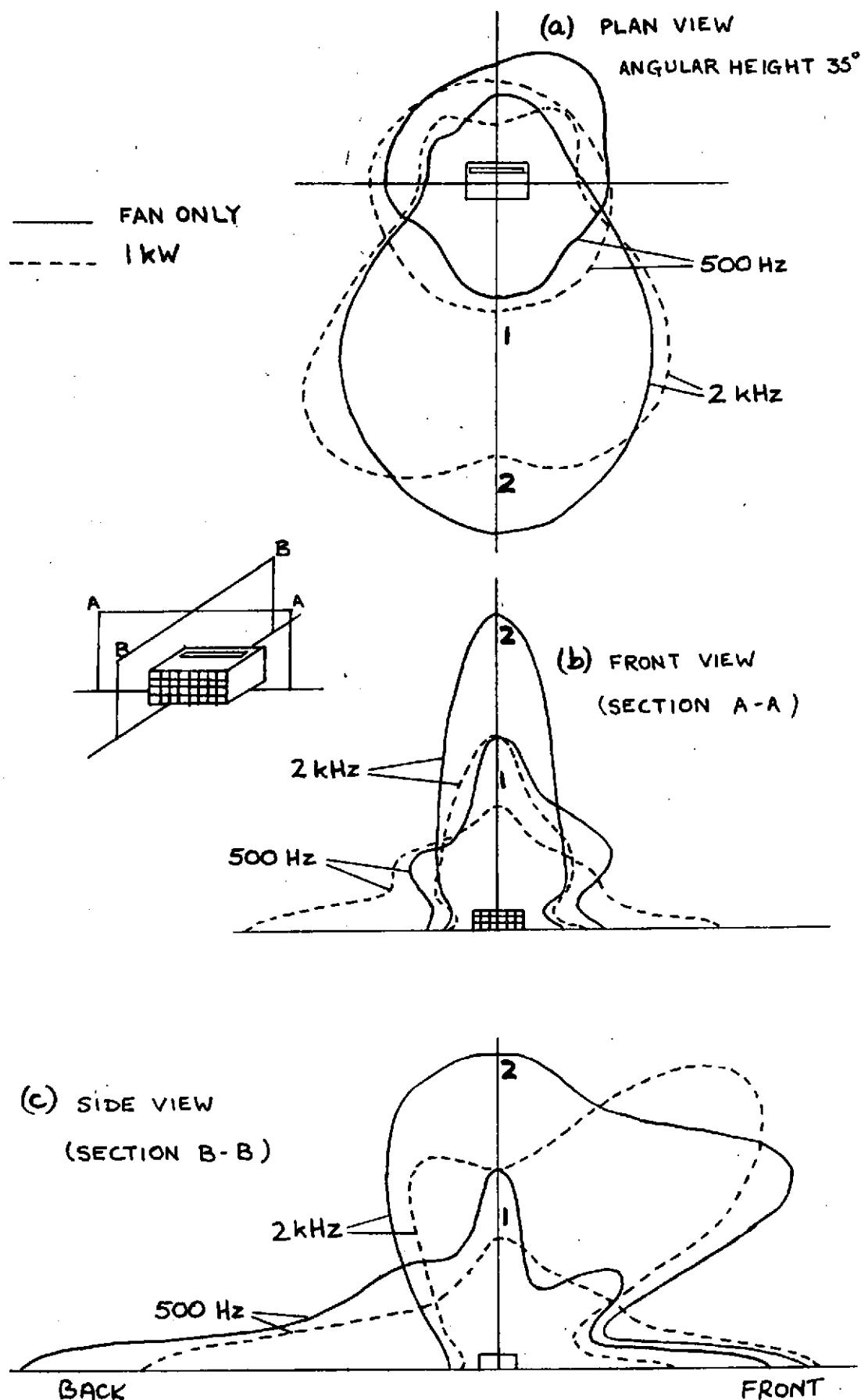


FIG 3. DIRECTIVITY OF ELECTRIC FAN HEATER ON ABSORBING FLOOR

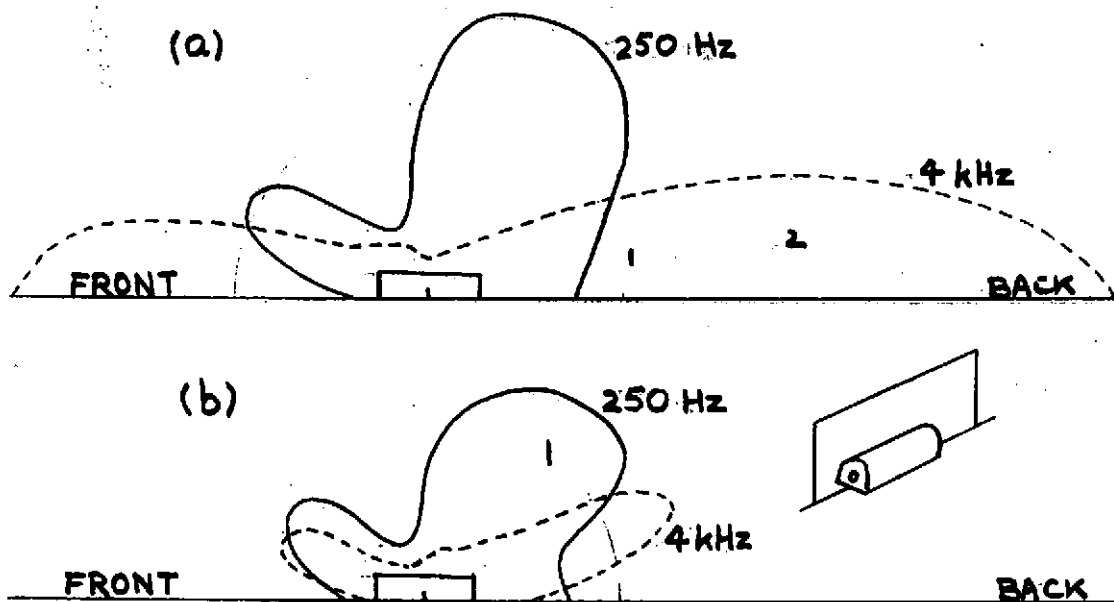


FIG 1. DIRECTIVITY OF TYPICAL VACUUM CLEANER ON:- (a) REFLECTING AND (b) ABSORBING FLOOR

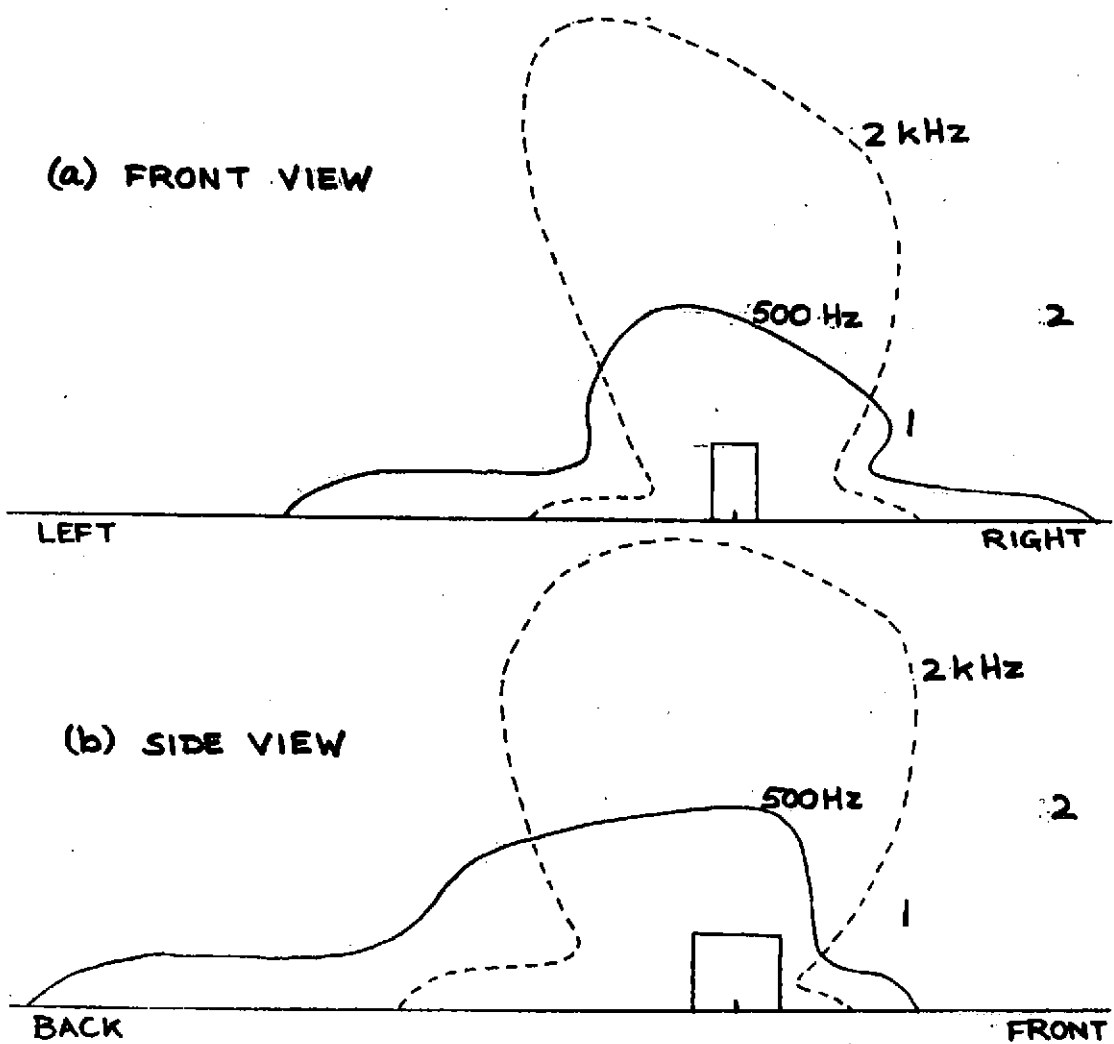


FIG 2. DIRECTIVITY OF SPIN DRIER ON REFLECTING FLOOR