averaged 127, as against 150 for those of higher intelligence quotient, the finding is of limited significance.

In this survey, however, on personality traits and sociometric status, the group of superior intelligence quotient were rated by their teachers higher than the more creative, which leads Vernon to suggest that, in England and Wales, some of the more 'original' 18-year-olds may fail to find places at universities because they were unpopular with their head teachers, and not good mixers.

As C. Burt has pointed out, in the researches by Getzels and Jackson, correlations between separate tests for creativity were about on the same level as they were with intelligence tests, so that in these studies Vernon can find no evidence for a factor for creativity distinct from *g* and *v*. He doubts whether those for creativity cover more ground than the typical battery of tests for verbal intelligence, English and arithmetic already in present-day use. His main criticism, however, is that the tests which Getzel, Guilford and others have devised give no support to the assumption that they are valid for creativity in general: follow-up data are not available, and the gap between tests at about the time of entry to the secondary school and true creativity at the university is much too great.

As indications of originality, Prof. Vernon holds that tests like these scarcely go beyond empirical impressions which indicate that, in general, creative people tend to be rather solitary, independent, non-conformist, with strong drives and motivations on distant goals (Taylor); lone wolves with an overriding sense of the worth of their own ideas (Anne Roe); far more given to intuition than sensation type thinking, with a strong streak of femininity, often having suffered from unhappy childhoods and being rebellious at school and university (Mackinnon); and displaying humour and wit, while being unconventional in their attitudes and aspirations (Getzels and Jackson). Besides, such criteria fail to distinguish really creative people from rebels, delinquents, beatniks, introverts, idealists, etc. Prof. Vernon's opinion is that leisure time interests between 12 and 16, like scientific hobbies and research, poetry and artistic activities, may have some predictive value; but, altogether, efforts may be misdirected if they set out to assess creativity in general, for it may turn out to be strongly individual and specific.

In final conclusion, Prof. Vernon disclaims any desire to disparage research into the assessment of creativity, but in his mind the crucial problem is to devise tests which do not require a long follow-up. He feels that present appraisals by schools and universities are heavily biased in favour of conventional attainment, but research into home, leisure and educational backgrounds might be rewarding, and the influence of an inspiring teacher might be tremendously important. R. WEATHERALL

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RECORDINGS FROM SATELLITE *Alouette I*

A Very-low-frequency Plasma Resonance

AN unusual band of noise observed in the *Alouette I* satellite has been reported by Barrington and Belrose[1], who noted that the band had a sharp lower frequency cut-off which usually increased in frequency with decreasing latitude of the satellite. Since this lower cut-off frequency varies consistently with the location of the satellite, it is deduced that the observed changes in this frequency arise from spatial rather than temporal effects. Because the lower cut-off frequency is sharp and changes measurably within a few seconds, we may deduce that the horizontal field of view of the satellite for this band is at most a few tens of kilometres.

From observations of triggering of this band by both atmospherics and whistlers, Brice *et al.*[2] concluded that the noise was generated at the same height as the satellite. Thus the observed noise band is generated in the immediate vicinity of the satellite. Other evidence has been obtained suggesting that triggering of this band is enhanced for triggering signals propagating with large angles between the wave normal and the Earth's magnetic field. Furthermore, from examination of simultaneous very-low-frequency recordings made by the satellite and by ground-based stations, it is found that the *Alouette* hiss band is never observed on ground-based recordings.

The observation of spikes in the *Alouette* top-side sounder at the resonance frequencies for the ambient plasma[3] suggests the *Alouette* hiss band arises from a similar plasma resonance at very low frequencies. The only resonance for the frequencies of interest (5–10 kc/s) at the satellite height is the lower hybrid resonance[4] which defines a cut-off frequency for propagation transverse to the Earth's magnetic field. Other features of this resonance support the hypothesis that the lower cut-off frequency of the *Alouette* hiss band is the lower hybrid resonance for the ambient plasma.

In a subsequent paper, it will be shown that from a knowledge of the electron plasma and gyrofrequencies and the lower hybrid resonance frequency, an effective mass for the ions in the ambient plasma may be determined. Thus this hiss band may provide a powerful diagnostic tool for determining the ionic constituents of the plasma surrounding a satellite.

Assuming that the suggestion made above is correct, the observation of the *Alouette* hiss band provides, to the best of our knowledge, the first experimental confirmation of the existence of the lower hybrid resonance.

We thank Mr. John Katsufrakis of Stanford for pointing out a number of the unusual features of the *Alouette* hiss band.

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Triggered Very-low-frequency Emissions

Barrington and Belrose[1] have reported that on occasion the very-low-frequency recordings from *Alouette I* satellite (altitude, 1,000 km) showed bursts of noise triggered by atmospherics which had propagated upwards to the satellite (that is, short fractional-hop whistlers) suggesting that very-low-frequency emissions were triggered at heights of less than 1,000 km.

Since some hypotheses for the generation of very-low-frequency emissions suggested generation in or near the ionospheric *F*-region[2,3], while for other hypotheses generation is more likely near the top of a magnetic field line path[4–6], it might be suggested that triggered emissions observed in *Alouette* could help to identify the mechanism responsible for generation of very-low-frequency emissions observed on ground-based recordings. However, further

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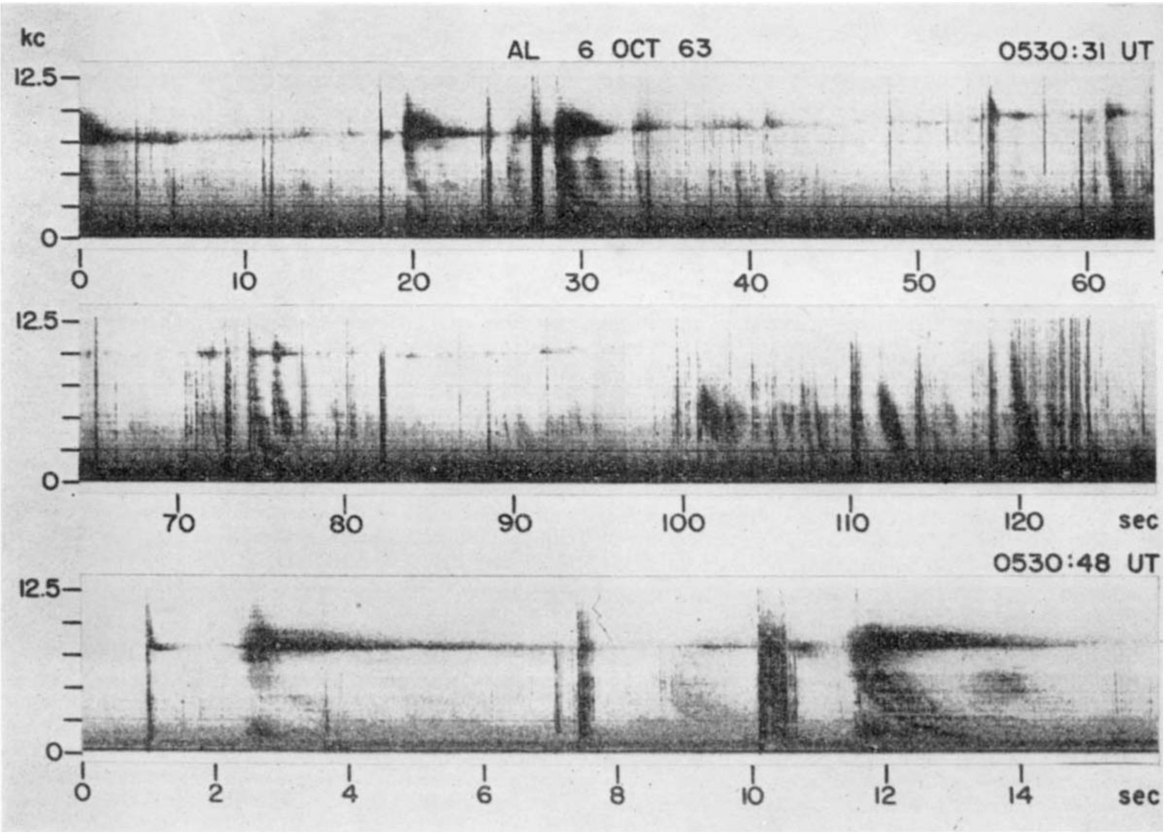

Fig. 1. Very-low-frequency spectra from *Alouette I* showing triggering by atmospherics and whistlers

investigation indicates that emissions triggered by atmospherics observed in *Alouette* are not related to very-low-frequency emissions observed on ground-based recordings[7].

Barrington and Belrose[8] reported an unusual band of noise found in *Alouette* very-low-frequency recordings. This band showed a sharp lower frequency cut-off which increased in frequency as the satellite moved to lower latitudes. This band will be tentatively referred to as the *Alouette* hiss band. Barrington and Belrose[1] noted that the frequency of emissions triggered by atmospherics varied with the satellite location in a manner similar to that of the *Alouette* hiss band already noted here. It has now been found that these phenomena are even more closely related, in that on several occasions the emissions triggered by atmospherics were, in fact, enhancements of the *Alouette* hiss band. Furthermore, this band may also be triggered by whistlers as is illustrated in Fig. 1. The lower record of Fig. 1 is a section of the upper record (17–33 sec) shown with an expanded time-scale. Fig. 1 shows spectra obtained during a north–south pass over Stanford, California, and shows the characteristic increase of frequency with decreasing latitude and the sharp lower frequency cut-off of the hiss band. The range of L values for which the noise is seen in Fig. 1 (3·15–2·59) is consistent with that reported for the *Alouette* hiss band by Barrington *et al.*[9]. The triggering by atmospherics (propagating upwards) indicates that the hiss is generated at or below the satellite (as had been suggested by Barrington and Belrose[1]) and triggering by whistlers (believed to be propagating downwards) suggests generation at or above the satellite. Thus we may deduce that the observed noise band is generated at the same height as the satellite.

Barrington *et al.*[9] reported that examination of very-low-frequency recordings obtained during a pole-to-pole pass showed evidence that the sharp lower-frequency cut-off of the *Alouette* hiss band was very closely related to the magnetic L value and that for a given value of L the lower frequency cut-off appeared to be the same in both hemispheres. Further investigation of other recordings has shown that the close conjugate relationship with L does not always hold. A possible generation mechanism which does not require magnetic conjugacy is discussed in a companion paper by Brice and Smith[7].

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