February 23, 1938
212 W. Seminary Ave.
Wheaton, Illinois

Mr. Karl G. Jansky
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Dear Sir:

I have been interested in the problem of stellar static for some time. Your original papers gave a maximum value of noise strength as .39uv/meter/kc bd. This is equivalent to $4.0 \times 10^{-13}$ ergs/sec/cm$^2$/kc bd. Taking an approximately circular acceptance cone of the array to include 1100 (30x37) circular degrees the intensity becomes $3.6 \times 10^{-16}$ ergs/sec/cm$^2$/kc.bd./circular degree arriving from the galactic center.

After reading your Dec. 1937 paper and checking back on the Bruce, Beck & Lowry paper I conclude that 31.5MC below $10^{-12}$watt (fig.3) is equivalent to approximately .01uv/meter/kc bd noise strength. This is equivalent to $2.6 \times 10^{-18}$ ergs/sec/cm$^2$/kc bd. Taking the acceptance cone of the rhombic to include 110 (10x11) circular degrees the intensity is $2.4 \times 10^{-18}$ ergs/sec/cm$^2$/kc bd/circular degree arriving from the region of Cygnus. This is a difference of 150 to 1 in the intensity of radiation arriving from these two regions. The frequency ratio is 1.2 to 1 so this could not account for it. Greenstein & Whipple have shown that black body radiation where the intensity is proportional to $f^3$ is definitely not the cause of the disturbance.

Recently I have been doing some theoretical work on this problem by application of Kramers theory on the continuous

X-ray spectrum to the motion of particles in interstellar space and have been able to show the intensity is not a function of frequency but only cycles band width. The results of calculation based on astronomical datashow this effect to be about the correct order of magnitude. However before a final check can be made the actual measured intensity must be fixed to at least within 2 to 1 as the astronomical data is that good. I am rather doubtful of my conversion of micromicrowatts to microvolts/meter/kc bd. Please look into this and let me know the right conversion factor.

One other point seems to be in some doubt. On page 1931 Dec. 32 IRE you show a zero noise level of 25.2DB below luv/meter/kc bd. This agrees within two DB of zero given in fig 6 page 1924 and is appearantly the limit set by circuit noise, being .055uv/meter/kc bd. Now inspection of these graphs and those given in the Oct. 1933 & 1935 Proc. IRE show a maximum peak of 4.8DB above circuit noise. Assuming that circuit and stellar noises add as square root of the sum of the squares (continuous spectra derived from different sources) the resultant maximum signal intensity is .078uv/meter/kc bd. This is only 20% of your stated maximum value. Since intensity is proportional to $E^2$ this will reduce the discrepancy to 6 tol between the two sets of measures.

I have also gone over the data published by Friis & Feldman in the July 1937 BTJ. While I do not place much value on the data on static due to uncertanties of the

complex antenna system and QRM being present the results point to larger intensity than your stated .39uv/meter/kc bd. The region of this test was also Cygnus, practically identical with your last set of measures.

I hope to hear from you on these points at your earliest convenience.

Yours truly,

Grote Reber