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Reference: 5224.6.25

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Mr. G. Reber
212 W. Seminary Avenue
Wheaton, Illinois

Dear Mr. Reber:

Your letter to Dr. Harrison has been referred to me for answering. It is true that secrecy restrictions have been relaxed since your previous letter.

We can build klystrons having gains of 20 db per tube, in fact we can build them with much higher gains than that. Furthermore, they can be built at frequencies well below 1000 mc and at frequencies up to at least 10,000 mc. However, it seems to me that you don't really want klystron rf amplifiers for your experiments. What you want is a receiver with the best possible noise figure. It turns out that for the frequencies in which you are interested, a klystron rf amplifier does not give as good a NF as other methods do.

One method is to start off with a crystal mixer immediately in a double superhet scheme. If the IF input circuits are properly designed and the right type of crystal is chosen, it is possible to get noise figures of something like 8 - 10 db (relative to $KTA\nu$) up to frequencies like 10,000 mc. At frequencies below about 700 mc it is better to use special triodes as rf amplifiers before the crystal mixer. In this connection have you seen the following paper? "Microwave Radiation from The Sun" Journal of the Franklin Institute, April 1945, G. C. Southworth.

Another article you might be interested in is "Departure of Long Wave Solar Radiation from Black Body Intensity" - Sir Edward Appleton, Nature - November 3, 1945.

Another question is, how do you propose to measure the increase in noise obtained from space in the presence of receiver noise? There are several ways of doing this which might interest you.

Very truly yours,

Edward Barlow

Edward Barlow

EB/lv