22nd March 1961

Dear Mr. Boyle:

Mywork at Green Bank was completed in October and shortly thereafter I came down here. Presently, I am organizing some cosmic static experiments at the lower frequencies. These should become increasingly available over the next few years. Your letter of the 5th January finally found its way to me after much forwarding. Thank you for the report.

I have seen a variety of suggestions for using a ball to support a radio telescopes but yours is rather different from any of the others. It is not clear to me if the ball is to float in the bearing or be supported on a hydrostatic layer maintained by pumping a fluid.

The general idea looses attractiveness when item 4 of your letter is investigated. A simple formula for wind pressure is $P = v^2/300$ pounds per square foot, where v is wind velocity in miles per hour. This is a reasonable approximation for flat surfaces. For long thin cylinders multiply by 2/3 and for spheres by 1/2. Not only will the wind forces be large, but highly irregular in direction and magnitude due to gusts. This means large non-uniform horizontal forces must be dealt with. These are bad enough on the mirror alone, and much increased by presence of the large ball.

It must be remembered that only the skin surface of the mirror does any good. All the rest of the structure is used merely for holding the useful part in position. An economical design requires that the ratio of (rest of structure)/ (skin surface) be minimized. In this regard ball designs are quite poor, especially for large sizes.

I do not wish to throw cold water on your ideas, but I believe there are other avenues of approach which are much more profitable, such as the following.

A parabola of revolution approximates a section of a sphere with a radius equal to twice the focal length of the parabola. This parabola could be suitably mounted in a spherical hole in the ground and appropriately moved about. For reasonable hole sizes the region of viewing would be limited to about 40 degrees from the zenith which is quite useful. The above design minimizes the ratio as best as I am able to conceive. I have made a number of studies of this affair for a dish 1000 feet diameter. The main objections seem to be that the design is unorthodox. If the scheme strikes your fancy, perhaps you would like to make your own study. Then we can compare notes.

In any case, thank you for your letter and I await your comments.

Very truly yours,

Grote Reber

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