

398 Paulus Court
Boca Raton, Fla. 33432
October 3, 1977.

Mr. Grote Reber
411 W. Colfax Street
Palatine, Ill. 60067

Dear Mr. Reber:

Thanks for your nice "rather chatty" letter. I certainly do remember the time I spent with you at NRAO, which I enjoyed very much. I'll try to answer your questions as well as I can by "consulting with my memory", or at least what remains of it.

It is my firm belief that the original Jansky "merry-go-round" never did have pneumatic tires. The ones used on it were semi-solid tires having circular recessed openings about an inch or more in diameter, closely spaced around the circumference of the tire side walls. These openings did not go all the way through the tire, so no light could be seen through them. They show clearly in several of the photos of the structure taken when I used it about 1935, but I am not sure of the exact date. In addition, the well-known picture to which you refer, a copy of which is enclosed for you, also shows them clearly in the original photo, of which I have one original print. However, in the copies usually seen, like the enclosed one, enough detail has been lost to obscure this fact. But, if you will look closely at the wheels on this photo copy, another fact also shows that they were not pneumatic tires, because it is evident that there is no valve stem for their inflation. This photo was taken on June 6, 1933. I think that this is the picture on the wall at NRAO if I remember correctly, and if it is still there in the Jansky Laboratory building.

I am very sorry that your 1956 inquiries about Jansky's recordings did not come to my attention, I was never aware of them. In 1962 Harlan J. Smith of the Yale University Observatory asked Bell Labs about them, for he was working on the Jupiter emissions, and the question was then referred to me. Yes, Southworth was right, they were stored at one time in the red barn. When Holmdel grew, it became necessary to tear down the red barn, I don't know the date of that now. When it was cleaned out, I took the Jansky recordings and put them in my personal storage area in the attic of the main laboratory building at Holmdel. They were well packed, very clearly marked "DO NOT DESTROY" in large letters, and they had my name as well as Jansky's name on the outside of the boxes. They were stored with other things of mine in the attic, but not in a separate locked area, as all of us used the common attic for storage purposes. When Harlan Smith's request came to me, I went to my storage area to get the recordings, and found them missing, as well as some other things of mine that I thought were there. Then I learned that a new area manager had cleaned out the attic a short time before. He had no memory of the items that had been removed, but one of the workmen told me that he had burned them at the area manager's orders, and that he remembered seeing the boxes with Jansky's and my names on them when they were burned. I felt very badly about it, but it was too late then, so they are lost forever.

With regard to the Jansky antenna replica at NRAO, I think you might be interested in some of its history, so I am enclosing a copy of the text of a Bell Labs Memorandum for File which I wrote in 1966, and a copy of the remarks of W. O. Baker when it was formally presented. When we built it, I did not attempt to include the feed arrangements, as we did not feel that it would be used for receiving signals at that late date. Bruce arrays of this type were being used for long distance circuits in the Bell System before Jansky's time with the company, so Jansky used the same feed arrangements as those on all the other Bruce antennas. They are fairly well described in Jansky's paper "Directional Studies of Atmospherics at High Frequencies." I am enclosing a copy of the Bell System monograph of this article for you. The termination circuits of the array were inside a weatherproof wooden box with a sloping roof about two feet on a side, and it shows clearly near the center of the antenna on the enclosed photo. A coaxial transmission line was used between the antenna and the receiver. Jansky refers to it on page 3 as a 3/8-inch copper concentric pipe transmission line about 275 feet long. It can be seen entering the top of the receiver from above on Fig. 5 of his paper. The center conductor was copperweld wire, air spaced for the most part, but using low loss, ~~hard~~ steatite, beads crimped in place every few inches for support. Its impedance was about 75 ohms. This line, and all the others we used at Holmdel, were made in our own shop. Fig. 4 of Jansky's paper gives the schematic of the arrangement. Take-off from the antenna was from a connection at the center bottom of the front curtain and a horizontal counterpoise about a half wavelength long at the bottom of the structure, which is hidden by the wooden members of the structure in the photos. We did not attempt to put one on the replica. The counterpoise was made of the same telescoping tubing as that used on the array, and its length was adjusted in use to tune out any reactive component of the impedance so a good match could be obtained. As shown on Fig. 4, two coupled tuned circuits were used as a step-down transformer to match into the coaxial line. These were mounted on a standard relay rack panel about ten or twelve inches wide as I remember. The coils were made of copper wire about 1/8 inch in diameter wound on low loss steatite spiders with grooves on the ends of some five or six spokes to hold the wire in place, and, as I recall, about three inches in outside diameter. I do not remember the number of turns, possibly about half a dozen or more. The coil forms had a center hole about half an inch in diameter as well as being cut out so that the coils were mostly air spaced. The two coils were mounted on a low loss ceramic rod so that the coupling could be adjusted by moving them together or apart. The variable capacitors were mounted on the same panel with their adjustment knobs and dials on the front, and this panel with the whole assembly was mounted inside the box on the array. The coils and capacitors were covered with a five-sided copper box fitting against the panel for complete shielding. The coaxial line from this box can be seen if you look closely at the photo at the center of the antenna as it went down through the center bearing of the structure. At this point there was a rotary joint in the coaxial line to permit antenna rotation. There were no slip rings, but sleeves on both the 3/8-inch outside conductor and the center conductor were used for the joint, and were designed to maintain the correct impedance.

So much for the original installation. Of course now much simpler methods could be used to match the antenna to the line. Suitable matching transformers are probably available, good commercial transmission lines and rotating joints no doubt can be found which would make the replica operable if historical accuracy were not desired. To duplicate Jansky's original arrangement would not be as easy as something like that.

As for my comb antenna tests, recordings were never made. The purpose was to develop the antenna, the receiver was mounted directly on the structure, and it was rotated, (usually by hand), to determine its directional characteristics. Jansky and I did look for what he called "star noise" at a wavelength of about four meters using this comb antenna, with the thought of recording it if possible, but due to the noise figure of the receivers then available and the low signal gain of the comb antenna, we did not detect it at that wavelength.

Thanks again for your letter. My wife and I have been in reasonably good health, we have been able to do some traveling, partly because we have a son who is a Western Airlines Captain, and we have had a busy and happy retirement in Florida. It was good to hear from you, and we wish you the best of everything in Tasmania and at NRAO next summer.

Sincerely,



Alfred C. Beck