June 24, 1946
212 W. Seminary Ave.
Wheaton, Illinois

Dr. G. C. Southworth
Box 107
Red Bank, New Jersey

Dear Dr. Southworth:

In some of our past correspondence
I mentioned that improved apparatus for measuring
Cosmic Static was being built.   This has now been
completed and the first positive results at 480mc
have been secured.

Referring to my 160mc data it will be observed
that the apparent intensities of radiation from the
Sun and Sagittarius are about equal.   See 3rd graph,
figure 5, page 286, Ap. J. 1944.   That this should be
so, is a merely fortuitous circumstance involving a
happy choice of frequency and a lucky size of mirror.
In any case it is a starting point.

At 480mc this situation is markedly different.
The apparent intensity from Sagittarius is only about
one percent the apparent intensity of the sun.   About
9 : 1 of this discrepancy may be accounted for by the
increase in resolving power.   A further 9 : 1 may be
attributed to the larger solar intensity if $I \propto f^2$ as
seems likely from your work.   Thus, as a first esti-
mate, I would say the absolute intensity of Cosmic
Static from Sagittarius to be the same at 160mc and
480mc.   After a few further apparatus improvements
are made and an accurate absolute calibration secured,
I expect to embark on a comprehensive survey of the
Galaxy at 480mc.

Unfortunately the above estimate on intensity
does not substantiate Townes' idea of $I \propto f^{-2}$.   In
any case, Dr. Townes will probably be interested in
these results so please pass the information on to
him.

The sun spot cycle seems to be increasing
rapidly and it is quite likely there will soon be an
opportunity to make measurements as a large group of
spots goes across the sun again.   If you can set up
your microwave apparatus I am sure that very import-
ant information can be secured.   Some people (Hey,
Nature, Jan 12, 1946, p 47 and Pawsey, Nature, Feb.
9, 1946, p 158) think the sun radiates much more
strongly in the radio spectrum when spots are present .
I expect to follow this phenomena here at 480mc.

Sincerely yours

Grote Reber

Internal noise volts = 0.1300 volt.

Total noise from sun = 0.3000 volt.

Voltage from sun = $(.30^2 - .13^2)^{1/2}$ = .271 volt.

Total noise from Sag. = .1320 volt

Voltage from Sag. = $(.1320^2 - .1300^2)^{1/2}$ = .0226 volt.

Power ratio = $\left(\dfrac{.271}{.0226}\right)^2$ = 12.0^2 = 144 times

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Sun $I \propto f^2$ or up nine times

Area $\propto f^{-2}$ or down nine times

Sag $I \propto f^{-2}$ or down nine times

Total ratio 9^3 = 729 times

if Total noise from Sag = .1318 volt.

Power ratio becomes 733 times