

Warren H Ziegler
157 Plain Road
Wayland, MA 01778
(508) 816 3862
wziegler@ix.netcom.com
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Question 7:

Exhibit Detailing Program of Research for Part 5 Application

Addendum: Clarification of lack of alternatives to proposed experimental license.

The proposed program of research into two-way narrowband signaling techniques at LF **CANNOT** be achieved by any other route. The Part 15 rules permitting one watt into a 15 meter antenna in the 160-190 kHz band is **NOT** a substitute for the proposed experimental allocation for the following reasons:

- Due to the extremely short antenna (15 meters maximum) the electrical efficiency of a Part 15 antenna is less than .1%. One watt into a 15 meter antenna yields an e.r.p. of less than 1 milliwatt. I am requesting an e.r.p. of 10 watts which is more than 4 orders of magnitude greater. Greater signal strength is essential to permitting two-way communication and overcoming high ambient noise levels. The higher e.r.p. will permit the study of more marginal propagation modes and spanning greater distances than would be possible with the sub-milliwatt e.r.p.
- The longwave broadcast band is populated with extremely strong signals at 153, 162, 171, 183, and 189 kHz. The longwave broadcast stations are running output powers as much as 2000 kW. These stations have AM sidebands that extend approximately +/- 5 kHz either side of the carrier frequency and easily cover up Part 15 stations in the 160-190 kHz region. This is especially important for the proposed experiment, which envisions trans-Atlantic tests with European experimenters. The longwave broadcast signals in Europe will certainly swamp any European receivers.

It is for these reasons and the lack of a suitable alternative that I respectfully request a Part 5 experimental license in the 136-140 kHz band.