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This application will support a National Science Foundation (NSF) funded basic science investigation of the mesosphere and lower thermosphere. The experimental radar described herein will operate on Maui in conjunction with optical instrumentation installed nearby on Mt. Haleakala for joint studies of the altitude region between 80-100 km. Radar echoes from meteor trails will be used to estimate the wind velocity and also to investigate and develop a new method for estimating temperature in the region. The new temperature estimation technique is based on measurements of the decay-time of the meteor echoes. This project will contribute to basic scientific understanding of the mesosphere and lower thermosphere (MALT) region as well as to the development of new radar remote sensing techniques.

The meteor radar transmitting system employs a single 3-element yagi antenna directed at the zenith. The E- and H-plane beamwidths of the antenna polar diagram are 40 degrees and 55 degrees, respectively. Consequently, radiation at low angles and along the horizon will be small. For receiving, the radar employs 5 2-element yagis in an interferometer configuration.

The transmitted pulse has an approximate raised-cosine envelope with duration at the half-amplitude points of 13.33 microseconds. The overall duration of the raised-cosine pulse (base-width) is 26.66 microseconds. The -20 dB bandwidth calculated for a raised-cosine pulse with these parameters is 126 kHz. This estimate is based on an analytical calculation of the Fourier Transform of a raised-cosine pulse.

A separate estimate of the bandwidth of the system was obtained based on the procedures outlined in Annex J - Guidance for determination of necessary bandwidth from NTIA Manual of Regulations & Procedures for Federal Radio Frequency Management. This estimate results in -20 dB bandwidth of 175 kHz for the raised cosine pulse.

The larger of the two estimates has been entered on Form 442.

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