

EXHIBIT NO. 1

Reference: Item No. 4f

The pulse duration is adjustable from 400 nanoseconds to 12 microseconds. Bi-phase (180°) modulation can be employed in minimum intervals of 400 nanoseconds. However, during operation of the radar in the project described in this application the pulse duration will be fixed at 1 msec.

The pulse repetition frequency is also adjusted to the mode of operation, but cannot exceed 50 KHz. During operation in the project described herein the pulse repetition frequency will be fixed at 1 KHz.

EXHIBIT NO. 2

Reference: Item No. 4g

Simple calculation using the minimum 400 nanosecond pulse/code cell duration yields:

<u>Single Level Below Peak</u>	<u>Bandwidth</u>
-3 dB	2.2 MHz
-10 dB	3.7 MHz
-20 dB	12.7 MHz

These values have been confirmed by measurement.

EXHIBIT NO. 3

Reference: Item No. 6

The antenna system will consist of one steerable micro-patch phased array planar antenna with sidelobe reduction fence. The antenna will be pointed only vertically during the project described in this application. The radar is capable, with electrically switched delays, of being pointed 15.5° off vertical, in planes that are 90° from each other. The antenna has a beamwidth of approximately 8° by 8° and approximately 27 dB of gain.

Normal operation will consist of sequential transmissions in each of three (two oblique, one vertical) or five (four oblique, one vertical) directions. However, for the project described in this application, the off vertical beams will not be used.

EXHIBIT NO. 4

Reference: Item No. 7

The radar will be used as a part of research to be conducted under the following National Aeronautics and Space Administration contract:

Title: Physical Variations in the Raindrop Size Distribution and their Effects on the Quantitative Estimation of Precipitation using Remote Sensing Methods.

Contract Number: NAS 5-7782

Term of contract: Three years

This contract is with the NASA Goddard Space Flight Center and involves a study of the physical processes acting in rainfall that control rainfall type and the form of the raindrop size distribution (DSD). This would involve analysis of experimental surface observations of raindrop size spectra and radar observations aloft to determine the effects of variations in the form of the DSD on remote sensing methods for measurement of rainfall, such as, Z-R (reflectivity factor-rainfall rate) methods. The radar data aloft would be acquired by the instrument for which an FCC Radio Station Authorization is herewith applied. The importance of the radar data lies in its ability to follow the processes which modify the DSD during the descent of the drops to the surface from aloft, such as, evaporation and collision-coalescence. In fact, the radar referred to will be an essential tool for performing the work so as to determine evaporation and to deduce the change in Z-R with altitude in stratiform rain.

The objectives of the research are therefore as follows:

- to study the physical mechanisms responsible for the variability in drop size distributions (DSDs) at the surface and those deduced aloft and the relationship of this variability to Z-R relations.
- to improve the classification of precipitation types and sub-types based upon both profiler and WSR-88D observations.
- to measure evaporation in stratiform portions of mesoscale convective systems
- to assess the effects of the variability of Z-R relations in both convective and stratiform rain on both spaceborne and ground validations rain retrievals.

EXHIBIT NO. 5

Reference: Item No. 9

- (a) The research project for which the authorization is essential is described under Exhibit 4.
- (b) The nature of the research project is also described there.
- (c) The essential nature of the radar for performing the research is apparent from the fact that it is the principal instrument in the research for measuring the effects of evaporation with altitude, one of the major goals of the research. There are no other means available to the research project for making such measurements, i.e., there are, at present, no other communications facilities available to the project for this research.

EXHIBIT NO. 6

Reference: Item No. 18

A previous application for a Radio Station Authorization was "dismissed without prejudice" because precoordination with the Federal Aviation Administration had not been done. In this version of the application precoordination with Mr. James Burchfield of the FAA Southern Region has been accomplished. He has issued Coordination Number NSO-01-0174 with regard to this matter with an expiration date of May 7, 2004.

Mr. Burchfield may be contacted at;

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