EXHIBIT NO. 1

Reference: Item No. 4f

The pulse duration is adjustable from 400 nanseconds to 12 microseconds. Bi-phase (180°) modulation may be employed in minimum intervals of 400 nanoseconds.

The pulse repetition frequency is also adjusted to the mode of operation, but cannot exceed 50 KHz.

EXHIBIT NO. 2

Reference: Item No. 4g

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

Single Level Below Peak	Bandwidth
-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 sidelob reduction fence. The antenna will be pointed vertically, with electrically switched delays introduced to point it 15.5° off vertical, in planes that are 90° from each other. The antenna will have 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.

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 rejected because the information in the application was incomplete and, in some cases, inaccurate. For example, the transmitter power was given as 400 kW which was in error; the actual value should have been listed as 400 Watts. This and other errors have been corrected in the current application.

In addition, the FCC determined that the frequency of operation might conflict with the FAA air traffic control (ATC) radar near Atlanta, GA. However, extensive experimentation with Darwin Grant of the FAA center in Atlanta using the ATC radar together with the radar described in this application determined that the output power of the Clemson University radar was so low and was pointing in such a direction (vertical or 15° off vertical) that it could not be detected by the FAA radar. On that basis Mr. Grant issued a temporary coordination number for the Clemson radar. The ouput power of the radar in typical operating conditions is about the same as a 100 Watt light bulb and so can not be detected by the FAA radar at the range of the Clemson radar.