

## EXPLANATION OF PURPOSE

- a. The complete program of research and experimentation proposed including description of equipment and theory of operation.

This experimental program aims to generate wind models of the Boca Chica Range using data from a "Tropospheric Radar Wind Profiler". This instrument depends on the scattering of a transmitted signal by irregularities in the index of refraction of the air. The irregularities are caused by turbulent eddies created by the wind. By receiving the scattered signal and determining the Doppler frequency, the speed of the wind can be determined.

This meteorological instrument is comprised of the following subsystems: an antenna subsystem consisting of a vertically-looking antenna, whereby transmissions occur within 15 degrees or less boresight-offset from zenith (or 75 degrees or more from the horizon); a transmitter subsystem utilizing a solid-state commercial pulsed radar transmitter, frequency controlled by fixed crystal, capable of unmodulated and phase-modulated pulses; a specialized low-noise receiver subsystem having matched filtering capability; a signal processing subsystem performing target parameter extraction and identification, and a data processing/communication subsystem for charting, recording, and long-line transmission of results.

Special precautions were taken in the design of the Radar Wind Profiler to control the frequency spectrum skirts and near-horizontal antenna pattern sidelobes so that the antenna, transmitter, and receiver subsystems comply with the criteria in the RSEC-E for this type of radars. In particular, the transmitter modulated emissions fall within the authorized 2-MHz bandwidth with a center frequency of 449 MHz. Additionally, the Radar Wind Profiler manufacturer has verified compliance with FCC radio exposure limits.

- b. The specific objectives sought to be accomplished.

Generate historical wind models at the Boca Chica Range.

- c. How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion or utilization of the radio art, or is along line not already investigated.

The experimental use of the Radar Wind Profiler will contribute to the development of the Starship program, with the ultimate goal of making mankind a multi-planetary species, in the areas of flight safety and reliability by providing accurate, reliable wind speed/direction data.