Rockwell Collins, Inc.
Form 442
Exhibit 1

DESCRIPTION OF EXPERIMENT

Rockwell Collins, Inc. ("Rockwell Collins") has been engaged in conducting experiments, tests, and demonstrations of Wideband HF ("WBHF") technology and developmental products. Ground tests of WBHF technology have been conducted under an experimental license, call sign WF2XMP.

Rockwell Collins now wishes to conduct experiments, tests, and demonstrations of WBHF technology and developmental products on airborne platforms, primarily for US Government applications. Airborne platforms may include fixed and rotary wing aircraft that will be operating in US airspace at various altitudes and flight conditions. Rockwell Collins has been advised that the participating military aircraft would fly over U.S. territory and possibly up to 200 miles from shore over international waters.

WBHF technology brings enhanced beyond-line-of-sight communications capability to US military and public service aircraft that will result in direct benefits to the US public. Applications for new WBHF technology include full motion streaming video, fast file transfers, chat, email, and other IP based applications. Real world uses for WBHF had already been identified by the US Department of Defense and anticipate implementing this new technology as soon as it becomes available. Approval of experimental frequencies for aeronautical use is vital to bringing this new and important technology to our military and public servants.

The airborne demonstrations will permit real-time verification of WBHF communication performance that has, to date, only been tested using HF channel simulators in the laboratory.

Description of the Technology

A new US military HF data modem standard, MIL-STD-188-110C Appendix D, defining a family of WBHF data waveforms supporting bandwidths from 3 kHz to 24 kHz in increments of 3 kHz was ratified in September 2011. The motivation of the expanded HF bandwidths was to provide an increased data throughput capability alternative for Beyond-Line-Of-Sight (BLOS) data communications. Prior to the larger bandwidths offered by the emerging WBHF technology, a protocol referred to as Automatic Link Establishment (ALE) using Over-The-Air (OTA) probes called sounding identified the optimal propagating HF frequency for setting up a link between two or more HF systems. The primary interference avoidance function with respect to the 3 kHz channel ALE protocols is to "listen before transmit" to ensure the transmission was not initiated on a channel with existing traffic.

In support of the WBHF ALE technology, two tools, spectral sensing and bandwidth adaptation, have been developed for locating desired bandwidth with no existing HF signals. When a desired frequency and bandwidth is identified, both the transmitting location and the receiving location scan the desired spectrum range to ensure the transmission does not interfere with incumbent HF signals.

For WBHF, the ALE signaling and probe waveforms will remain as 3 kHz bandwidth modes. A new, integrated ALE protocol for supporting WBHF is under development by Rockwell Collins and in the definition stage by the MIL-STD-188-141D Technical Advisory Committee (TAC) for inclusion into the US HF radio military standard.

The specific experiment contemplated by this application will consist of installation of a proof-of-concept Wideband HF receiver/exciter assembly into existing HF systems on military aircraft such as the C-130 and KC-135. The airborne HF system will communicate with ground stations also equipped with Wideband HF radios. Links will be established between the air and ground stations using the above-described 4th generation ALE ("4G ALE") protocols.

Each step of the spectrum scan, channel selection, bandwidth adaptation, dial frequency offset, and ALE link are executed automatically on a noninterfering basis. The process is instituted by both the transmitting and receiving systems due to the fact the spectrum occupancy profiles are often different. Rockwell Collins uses this technology to operate on a noninterfering basis under its experimental ground license. It has employed this algorithm of bandwidth and dial frequency adaptation with no complaints from primary users of the spectrum used for research.

Requested Frequencies

There are up to twelve HF bandwidth options for exploiting unoccupied bandwidth for OTA operation on a noninterfering basis: 3, 6, 9, 12, 15, 18, 21, 24, (30), (36), (42), and (48) kHz channels. The parenthesized bandwidths are currently authorized for the fixed site ground experimentation and validation campaign, and would be used with experimental airborne tests if authorized.

Rockwell Collins requests the following frequencies for use in this experiment, subject to the special conditions noted below the table.

Start (kHz)	Stop (kHz)
2398	2800
3075	3171
3260	3350
3550	4050
4576	4611
4750	4950
5100	5315
5760	5960

6060	6160
6770	6970
7410	7483
7990	8060
9050	9350
10200	10400
10600	10800
11550	12090
13850	14550
15760	15860
15960	16060
16160	17450
18040	18610
19460	20460
20960	21860
22860	23160
23460	24460
25230	26490
26910	27440
27990	29720

Special Conditions:

(1) The station identification requirements of Section 5.115 of the Commissions' Rules are waived.

(2) In lieu of frequency tolerance, the occupied bandwidth of the emission shall not extend beyond the band limits set forth above.

(3) Licensee should be aware that other stations may be licensed on these frequencies and if any interference occurs, the licensee of this authorization will be subject to immediate shut down.

(4) The following frequency bands must be notched out:

2495 - 2505 kHz

19990 - 20010 kHz

(5) The designated point-of-contact to terminate transmissions if interference occurs is Mr. Randy Nelson at (319) 295-5760.