



Special Temporary Authority to Test Radar Instrumentation

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A. Purpose of Operation and Need for License

The purpose of this application is to request authorization from the FCC for CReSIS (Center for Remote Sensing of Ice Sheets) at the University of Kansas to operate aircraft-mounted radar systems during 5 to 10 flights (8 hours each flight) between March 5th and April 4th, 2016, off the northern coast of Alaska over sea ice.

The primary objectives of the project are to perform radar measurements as a part of NASA's OIB (Operation ICE Bridge) program over the Arctic and Antarctic sea ice and ice sheets (NASA contract number NNX13AD53A). The radar data are to be used to determine ice thickness and to map both near surface and deep internal layers of ice sheets, as well as to map the snow-air and snow-ice interfaces for estimating the thickness of snow over sea ice.

Some of the Arctic sea ice data collection requires that the radar operate within 200 nautical miles (nm) of the U.S. coastline, requiring authorization from the FCC.

B. Previously Approved Experimental Special Temporary Authorizations (STA)

CReSIS/KU has been granted the following experimental Special Temporary Authorizations to operate in the same geographic region in the past:

Experimental Special Temporary Authorization, Call Sign: WF9XMV

File number: 0520-EX-ST-2012

- Effective date range: Dec. 14, 2012 to May 14, 2013
- Geographic region: Arctic Management Area (same polygon as being requested in the current STA)
- Frequency Information:

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance
2-8 GHz	MO	6G00F3X	1W (ERP)	+/- 0.005%
12-18 GHz	MO	6G00F3X	2.51 W (ERP)	+/- 0.00166667%

- Special conditions (relevant to this geographic region):
 - 2700-2900 MHz must be notched
 - Future operations outside of these areas will require further notching of other frequency bands used by FAA.
 - This radio system shall not be used for functional development beyond the scope of this ice sheet testing.

Experimental Special Temporary Authorization, Call Sign: WG9XGN

File number: 0025-EX-ST-2013

- Effective date range: March 1, 2013 to April 13, 2013
- Geographic region: Arctic Management Area (same polygon as being requested in the current STA)
- Frequency Information:

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance
180-210 MHz	MO	30M0Q3N	9048 W (ERP)	none listed

- Special conditions (relevant to this geographic region):
 - Operation is subject to prior coordination with the Society of Broadcast Engineers, Inc.

(SBE); ATTN: Executive Director; 9102 North Meridian Street, Suite 305; Indianapolis, IN 46260; telephone, (866) 632-4222; Fax, (317) 846-9120; e-mail, executivedir@sbe.org; information, www.sbe.org

Additional granted permits will be attached with the submitted application.

C. Locations of Proposed Operation

A 29-day STA is requested to allow the collection of sea ice data using aircraft-mounted ultra wideband radar and for the calibration and testing of the radar. The height of the transmitter will be at a nominal flight altitude of 1500 feet AGL. The locations of operation are outlined in Table 1.

Table 1 – Summary of Proposed Operation Locations

Proposed Location	
1. Arctic Management Area	Within two hundred nautical miles off the Northern Coast of Alaska as shown in Figure 1. Coordinates are provided in section F.1

The area of operation is located along the northern coast of Alaska as shown in Figure 1. The operation will be limited to between 5 and 10 flights (8 hours each) between March 5th and April 4th, 2016.



Figure 1 - Proposed Site (Arctic Management Area)

D. Technical Specifications

1. Frequency of Operation

CRISIS requests authorization to operate from 12 – 18 GHz, 2 – 8 GHz, and 165 – 215 MHz bands.

2. Effective Radiated Power (ERP)

The effective radiated power (ERP) will not exceed 12 W peak for 12 – 18 GHz.

The effective radiated power (ERP) will not exceed 1 W peak for 2 – 8 GHz.

The effective radiated power (ERP) will not exceed 4000 W peak for 165 – 215 MHz.

3. Modulation Signal Description and Emissions

For 12 – 18 GHz, and 2 – 8 GHz, the signal is an FMCW (frequency modulated continuous wave) radar signal with a pulse width of 250 μ s, duty cycle of 100%, and a pulse repetition frequency of 4 kHz. The primary emission designator is 6G00F3X for 12 – 18 GHz and 2 – 8 GHz.

For 165 – 215 MHz, the signal is a linear FM pulse. Each pulse will be 10 μ s with a pulse repetition frequency of 12 kHz (nominal operation). The emission designator for this signal is 30M0Q3N.

4. Antenna Information

12 – 18 GHz: The antenna used is a Pasternak PE9854/SF-20 horn antenna. The antenna exhibits 20 dBi of gain with a 18.8° azimuth beam width and 18.9° elevation beam width. The antenna will be radiating nadir, toward the surface of the earth.

2 – 8 GHz: The antenna used is an ETS Lindgren 3115 Horn antenna. The antenna exhibits 10 dBi of gain with a 45° Az/EI beam width. The antenna will be radiating nadir, toward the surface of the earth.

165 – 215 MHz: The transmit antenna is a 7-element element dipole array. This configuration produces approximately 11 dB of gain. The beam width is 17 degrees in the cross track direction and 50 degrees in the long track direction. The antenna is pointed nadir, toward the surface of the earth.

5. Equipment Utilized

Equipment used for these systems are custom built at CReSIS. One unit will be used for each frequency band under this STA application.

6. Station Class

This station will be Aeronautical Mobile in the areas described in section C, with a nominal altitude of 1500 feet AGL.

E. Contact Information

For questions about this application or in the unlikely event interference concerns should arise, please contact:

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F. Appendix

1. Arctic Management Area Coordinates

Below is all the coordinates that make up the Management Area. Please see above picture for a more general idea.

72.949 N 137.581 W
73.194 N 139.093 W
73.367 N 140.822 W
73.442 N 142.004 W

73.461 N 143.222 W
73.652 N 144.593 W
73.746 N 145.907 W
73.800 N 147.229 W
73.813 N 147.313 W
73.944 N 148.281 W
74.058 N 149.321 W
74.112 N 149.939 W
74.280 N 150.872 W
74.464 N 152.097 W
74.566 N 153.164 W
74.668 N 154.441 W
74.682 N 155.029 W
74.713 N 156.505 W
74.672 N 158.111 W
74.562 N 159.817 W
74.390 N 161.295 W
74.193 N 162.462 W
73.977 N 163.474 W
73.885 N 163.775 W
73.765 N 164.505 W
73.632 N 165.338 W
73.397 N 166.349 W
73.297 N 166.769 W
73.239 N 166.925 W
73.176 N 167.358 W
73.027 N 168.012 W
72.939 N 168.402 W
72.782 N 168.934 W
72.740 N 168.966 W
69.977 N 168.959 W
66.061 N 168.968 W
65.503 N 168.952 W
65.663 N 168.110 W
65.701 N 168.080 W
65.826 N 167.464 W
66.007 N 166.925 W
66.196 N 166.288 W
66.214 N 166.145 W
66.241 N 166.121 W
66.377 N 165.613 W
66.475 N 165.058 W
66.553 N 164.574 W
66.582 N 164.313 W
66.576 N 163.914 W

66.530 N 163.741 W
66.384 N 163.826 W
66.189 N 163.881 W
66.057 N 163.727 W
66.056 N 163.110 W
66.078 N 162.792 W
66.029 N 162.576 W
66.018 N 162.289 W
66.015 N 161.811 W
66.233 N 161.507 W
66.217 N 161.278 W
66.180 N 160.986 W
66.245 N 160.952 W
66.561 N 161.144 W
67.032 N 161.738 W
67.040 N 161.913 W
67.034 N 162.854 W
67.121 N 163.714 W
67.405 N 163.804 W
67.611 N 164.051 W
67.894 N 164.316 W
68.142 N 164.955 W
68.326 N 165.773 W
68.645 N 165.531 W
68.701 N 164.415 W
68.826 N 163.544 W
69.243 N 162.567 W
69.582 N 162.479 W
69.910 N 162.032 W
70.076 N 161.513 W
70.123 N 160.752 W
70.471 N 159.483 W
70.595 N 158.714 W
70.698 N 157.515 W
70.668 N 156.478 W
69.880 N 149.737 W
69.695 N 144.907 W
69.431 N 141.002 W
69.657 N 141.023 W
70.186 N 140.271 W
70.478 N 140.175 W
70.818 N 139.838 W
70.961 N 139.815 W
70.961 N 139.798 W
72.210 N 138.428 W



72.771 N 137.486 W

72.949 N 137.581 W