

Experimental Low Interference HF Ionospheric Radar Sounder
MIT Haystack Observatory
FCC Form 422 Information

1.0 Application Purpose

New License

2.0 Government Contract

Yes

3.0 Foreign Government Use

No

4.0 Research Project (comms)

No

5.0 Exhibit Information (if no to 2 to 4)

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

b. The specific objectives to be accomplished.

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

6.0 Estimated Duration

24 months

7.0 Environmental Impact

No

8.0 Manufacturer

List transmitting equipment to be installed and if experimental so state.

<i>Manufacturer</i>	<i>Model No</i>	<i>No Units</i>	<i>Experimental?</i>
Ettus Research	N200 / Basic TX	1	No
Minicircuits	ZX60-100VH+	1	No
Drake	TV-3300-LP	1	No

MIT MIT-HAY-HF1X 1 Yes (experimental antenna)

9.0 Station Id

No

10.0 Applicant Type

Other

11. Foreign Government

No

12. License Denied or Revoked

No

13. Owner and Operator

Yes

14. Contact Information

Frank Lind
Research Engineer
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15. Drug Abuse Certification Question

Yes

16. Station Location Information

City : Westford
State : MA
Latitude : 42.6235 N
Longitude : -71.486459 W
Mobile : No
Street : Millstone Hill Road
County : Middlesex
Radius of operation : 0 km / not mobile
Datum : NAD 83
Is a directional antenna used (other than radar) : No / RADAR
Exhibit submitted : No
Half power beam width :
H-plane orientation : zenith pointing
V-plane orientation : zenith pointing

Will the antenna be more than 6 meters above the ground : No
 Antenna tip height above ground :
 Ground elevation (meters) : 131 meters
 Distance to nearest aircraft LZ : ~ 10 km
 Natural formations or man made structures : None

Emission Information

Action	Frequency	Station Class	Output Power /ERP	Mean / Peak	Freq Tol (+/-%)	Emission Designator	Modulating Signal
NEW	2000 – 29999 kHz	XR	1 W	Peak	0.0000000100	500KV1N	

Joe :

Not sure about the station class designation. EX is actually the closest but there is a note about not using it on applications. Hopefully I got the emission designator more or less right. Emission is digitally amplitude and phase coded with noise like modulation patterns to 150 kHz bandwidth (3 dB) and 500 kHz (20 dB ; 400 kHz measured with some margin) with periodic or aperiodic emission patterns. Duty cycle is between 0.05 and 20%. A significant part of what we wish to investigate with this experimental system relates to advanced coding methods to make ionospheric sounding / HF radar low interference.

***** Excluded Frequency Bands**

*We are willing to follow excluded frequency bands as necessary. Our waveforms will be very much lower in interference (i.e. not likely to interfere) compared to the Lowell Digisonde. The Digisonde excluded bands are as follows (approximate) :
 The following bands, all in KHz, are excluded 2175-2190, 2495-2505, 2850-3155, 3400-3500, 4000-4150, 4650-4750, 4995-5005, 5450-5730, 6200-6765, 8355-8370, 8815-9040, 9995-10100, 11175-11400, 13200-13410, 14990-15100, and 17900-18030
 We could use guidance on how to specify this for the experimental license. Do they get specified for us by the governing authority?*

Exhibit 1

QUESTION 4: STATEMENT REGARDING GOVERNMENT CONTRACT

The proposed experiment supports work being sponsored under the program entitled “Geospace Facilities Program” for the National Science Foundation under NSF Award Number AGS-1242204. The program operates scientific facilities for study of the ionosphere and near space environment including radar and radio facilities. The program includes technology development efforts to implement next generation capabilities for study of the ionosphere and space environment.

Exhibit 2

QUESTION 12: STATEMENT OF APPLICANT CLASSIFICATION

MIT Lincoln Laboratory is designated a Department of Defense (DoD) Federally Funded Research and Development Center (FFRDC) and a DoD Research and Development Laboratory. MIT Lincoln Laboratory is sponsored by the Under Secretary of Defense for Acquisition, Technology & Logistics and is administered by the Massachusetts Institute of Technology.