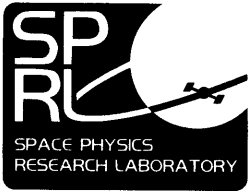


4. Particulars of Operation

**Exhibit A**

Frequency*	Power			Emission	Modulating Signal	Necessary Bandwidth
(A)	(B)	(C)	(D)	(E)	(F)	(G)
kHz	Watts	Watts			kHz	kHz
2130	500	300	Peak	VXX	50	50K0P0N
2230	"	"	"	"	"	"
2430	"	"	"	"	"	"
2650	"	"	"	"	"	"
2680	"	"	"	"	"	"
2840	"	"	"	"	"	"
4800	"	"	"	"	"	"
4830	"	"	"	"	"	"
6780	"	"	"	"	"	"
7380	"	"	"	"	"	"
7820	"	"	"	"	"	"
9150	"	"	"	"	"	"
9180	"	"	"	"	"	"
10150	"	"	"	"	"	"
10180	"	"	"	"	"	"
12050 to 12230	"	"	"	"	"	"
13380	"	"	"	"	"	"
13440 to 13600	"	"	"	"	"	"
13800 to 14000	"	"	"	"	"	"
14530	"	"	"	"	"	"
14560	"	"	"	"	"	"
14590	"	"	"	"	"	"
16590	"	"	"	"	"	"
16620	"	"	"	"	"	"
18120	"	"	"	"	"	"
18150	"	"	"	"	"	"
21770	"	"	"	"	"	"
21800	"	"	"	"	"	"
22800	"	"	"	"	"	"
25200	"	"	"	"	"	"
25230	"	"	"	"	"	"
25260	"	"	"	"	"	"
27600	"	"	"	"	"	"
27630	"	"	"	"	"	"
27660	"	"	"	"	"	"
29720	"	"	"	"	"	"
29750	"	"	"	"	"	"
29780	"	"	"	"	"	"
30600	"	"	"	"	"	"
30630	"	"	"	"	"	"
30660	"	"	"	"	"	"
31900	"	"	"	"	"	"
31930	"	"	"	"	"	"
31960	"	"	"	"	"	"

\*Where single frequencies are listed and are more than 50 kHz apart, we request permission to change frequency by ± 50 kHz to avoid possible interference with other services.



**SPACE PHYSICS RESEARCH LABORATORY  
THE UNIVERSITY OF MICHIGAN**

SPACE RESEARCH BUILDING  
2455 HAYWARD STREET, ANN ARBOR, MI 48109-2143

PHONE: (734) 936-SPRL FAX: (734) 763-5567 EMAIL: sprl@umich.edu



15 December, 1999

**EXHIBIT B**

Dear Sir/Madam,

The attached FCC form 442 requests an experimental radio station authorization. Regarding items 7 and 9 of form 442, the operation of this station is required by and is essential to Office of Naval Research Project (ONR Grant N000-97-1-0375) entitled "Measurement of Ocean and Atmospheric Parameters Using HF Radar and Lidar", being carried out at the University of Michigan. The principal investigator in this research (Prof. John F. Vesecky) and his colleagues (Drs. Calvin Teague, Dan Fernandez, Robert Onstott and Peter Hansen) have operated similar radars in the past under call sign WA2XEJ (file #0122-EX-ST-1999 and #5244-EX-PL-96) and others over some 25 years. A copy of the WA2XEJ license is attached for your reference. Drs. Vesecky, Teague, Fernandez, Onstott and Hansen are electrical engineering professionals and will be in charge of the experimental radio station for which authorization is requested here. We have operated these radars very carefully and have had no complaints in some 25 years of operation. We intend that the station for which we are requesting a license, will be co-located with a somewhat similar Codar Ocean Systems radar station. We intend to compare the performance of these two systems and will coordinate and time share any of the frequencies specified in this application which may also be used by the Codar Ocean Systems radar. We would like to begin operation as soon as possible, and ask that this application be processed as rapidly as possible.

We very much appreciate your urgent attention to this license request so that we may begin testing and operation on schedule as required by our Office of Naval Research contract.

Yours Sincerely,

A handwritten signature in black ink that reads 'John F. Vesecky'.

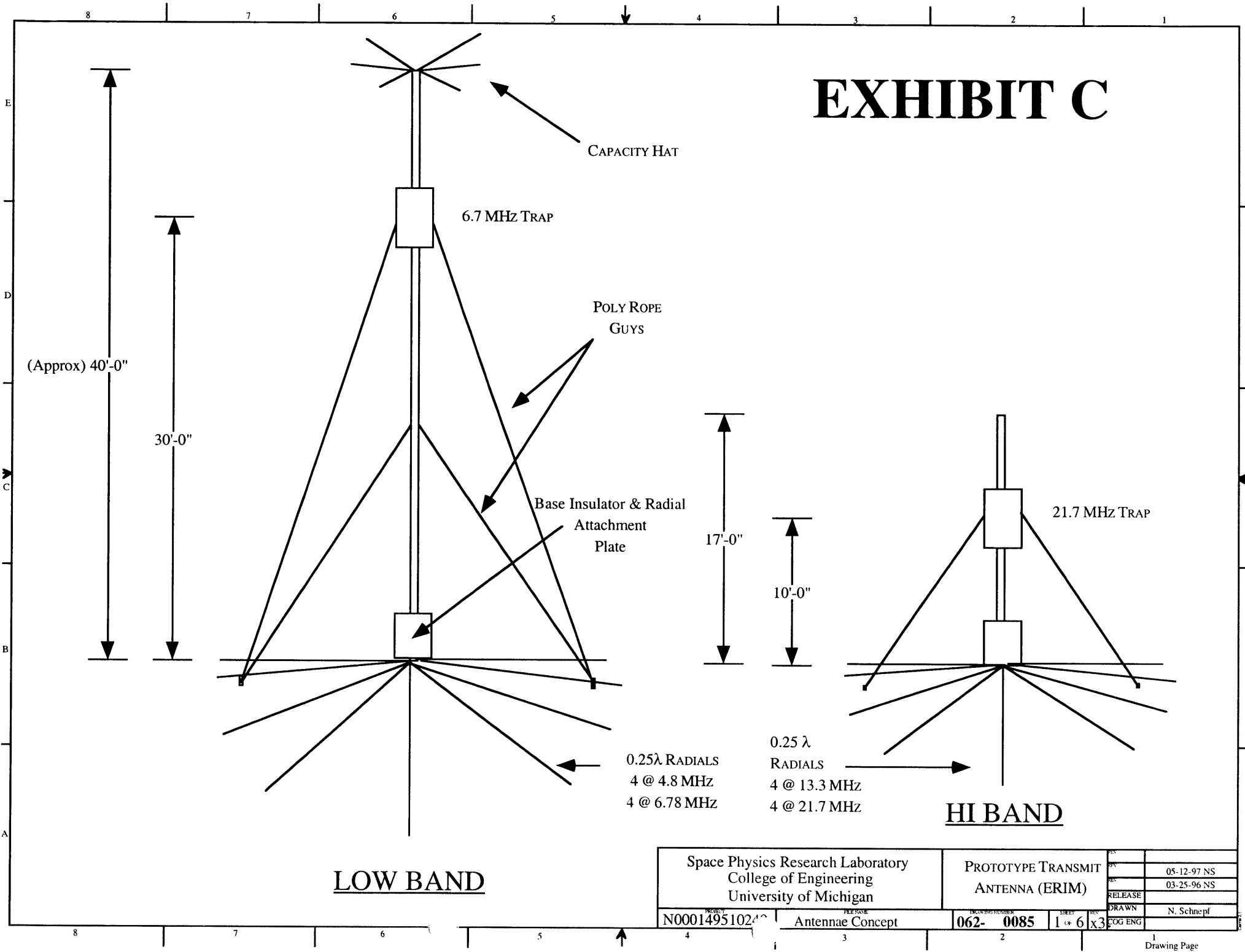
John F. Vesecky

Professor

Phone: 734-764-5151

Email: jfv@engin.umich.edu

# EXHIBIT C



Space Physics Research Laboratory College of Engineering University of Michigan	PROTOTYPE TRANSMIT ANTENNA (ERIM)	REV	
		DATE	05-12-97 NS
N00014951024	Antennae Concept	REV	03-25-96 NS
		RELEASE	
		DRAWN	N. Schnepf
		EOG ENG	

# TRANSMIT ANTENNA NOTES

# EXHIBIT C

## ANTENNA CONSTRUCTION:

Telescoping aluminum tubing  
 Stainless steel hose clamps  
 PVC Base Insulator Section

## TRAP CONSTRUCTION:

Tubular phenolic insulator section  
 Coaxial cable capacitor  
 Air Wound Coils  
 All connections weather protected  
 Stainless hardware

## INSTALLATION:

1. Radial attachment plate with hinged, insulated coupler.
2. Polypropylene guy ropes to driven pipe guy anchors.
3. Radials : 8, 14 Ga wires held at the ends with tent stakes.

Space Physics Research Laboratory College of Engineering University of Michigan		PROTOTYPE TRANSMIT ANTENNA (ERIM)		REV	
				REV	05-12-97 NS
				REV	03-25-96 NS
				RELEASE	
				DRAWN	N. Schnepf
				COG ENG	
N00014951024	Antenna Construction Notes	062- 0085	2 of 6	X3	