

APPLICATION FOR EQUIPMENT FREQUENCY ALLOCATION	CLASSIFICATION UNCLASSIFIED	DATE 01/2401	<i>Form Approved</i> <i>OMB No. 0704-0188</i>
			PAGE 1 OF 9 PAGES
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DOD GENERAL INFORMATION			
TO		FROM	
1. APPLICATION TITLE WINSAR (Wideband Interferometric Synthetic Aperture Radar)			
2. SYSTEM NOMENCLATURE NUWSAR (Navy Ultra-wideband Sythetic Aperture Radar)			
3. STAGE OF ALLOCATION (X one) ☐ a. STAGE 1 - CONCEPTUAL ☐ b. STAGE 2 - EXPERIMENTAL ☐ c. STAGE 3 - DEVELOPMENTAL ☒ d. STAGE 4 - OPERATIONAL			
4. FREQUENCY REQUIREMENTS a. FREQUENCY(IES) 1325 MHz, 3300 MHz, 8750 MHz, 9750 MHz b. EMISSION DESIGNATOR(S) 50MQ8N, 400MQ8N, 500MQ8N, 500MQ8N			
5. TARGET STARTING DATE FOR SUBSEQUENT STAGES			
a. STAGE 2 N/A		b. STAGE 3 N/A	
		c. STAGE 4 05/01/01	
6. EXTENT OF USE Intermittent - As required to support U.S. government remote sensing test programs			
7. GEOGRAPHICAL AREA FOR			
a. STAGE 2			
b. STAGE 3			
c. STAGE 4 Warrenton, VA; Duck, NC; Cheasapeake Bay Entrance; Cape Henelope, NJ; See Exhibit # 1			
8. NUMBER OF UNITS			
a. STAGE 2		b. STAGE 3	
		c. STAGE 4 1	
9. NUMBER OF UNITS OPERATING SIMULTANEOUSLY IN THE SAME ENVIRONMENT 1			
10. OTHER J/F 12 APPLICATION NUMBER(S) TO BE		11. IS THERE ANY OPERATIONAL REQUIREMENT AS DESCRIBED IN THE INSTRUCTIONS FOR PARAGRAPH 11?	
☐ a. SUPERSEDED J/F 12/ ☐ b. RELATED J/F 12/		☐ a. YES ☒ b. NO ☐ c. N/A	
12. NAMES AND TELEPHONE NUMBERS			
a. PROGRAM MANAGER Dr. Dennis Triana, ONR & NRL		(1) COMMERCIAL (703) 696-8380	(2) AUTOVON
b. PROJECT ENGINEER Raymond L. Harris		(1) COMMERCIAL (703) 293-9040	(2) AUTOVON
13. REMARKS WINSAR is a research tool that will serve as a test-bed for advanced DoD remote sensing programs. Prime applications are research on hidden target detection and oceanographic research including littoral measuements. The WINSAR waveform is 125 MHz linear FM chirp on a center frequency that is varied across the allowed frequency bands. The center frequency can jump from on band to another. This SAR transmits using fixed antennas which only transmit out one side of the aircraft. See exhibit # 1 The radar is turned off when the aircraft turns to line up for another run and does not collecting data until it is in position for the run.			
DOWNGRADING INSTRUCTIONS		CLASSIFICATION	
		UNCLASSIFIED	

CLASSIFICATION		PAGE 2 of 9	
TRANSMITTER EQUIPMENT CHARACTERISTICS			
1. NOMENCLATURE, MANUFACTURER'S MODEL NO. Series 9100/95335 RF Microwave Amplifier		2. MANUFACTURER'S NAME Quarterwave Corp.	
3. TRANSMITTER INSTALLATION Aircraft		4. TRANSMITTER TYPE Frequency-Agile Pulsed Doppler Radar (TWT)	
5. TUNING RANGE 800 MHz - 18,000 MHz		6. METHOD OF TUNING Synthesizer Locked to Crystal Oscillator	
7. RF CHANNELING CAPABILITY 800 MHz Continuous		8. EMISSION DESIGNATOR(S) 50MQ8N 400MQ8N 500MQ8N 500MQ8N	
9. FREQUENCY TOLERANCE 0.1 ppm			
10. FILTER EMPLOYED (X one) ☐ a. YES ☒ b. NO			
11. SPREAD SPECTRUM (X one) ☐ a. YES ☒ b. NO			
13. MAXIMUM BIT RATE N/A		12. EMISSION BANDWIDTH (X and complete as applicable) ☒ CALCULATED ☐ MEASURED	
14. MODULATION TECHNIQUES AND CODING Frequency Agile Center Frequency & 125 MHz Linear FM Chirp on Pulse		a. -3 dB 125 MHz	
		b. -20 dB 150 MHz min, 950 MHz max *	
		c. -40 dB 500 MHz min, 1300 MHz max *	
		d. -60 dB 800 MHz min, 1600 MHz max *	
		e. OC-BW 130 MHz	
		15. MAXIMUM MODULATION FREQUENCY 125 MHz	
16. PRE-EMPHASIS (X one) ☐ a. YES ☒ b. NO		17. DEVIATION RATIO over 1 usec, linear ramp 0-125 MHz* over pulse length	
19. POWER a. MEAN 30 W b. PEP 200 W		18. PULSE CHARACTERISTICS a. RATE 500-50,000 pps b. WIDTH 1-32 usec c. RISE TIME 0.2 usec d. FALL TIME 0.2 usec e. COMP RATIO 128 to 4096	
20. OUTPUT DEVICE 3 TWT Amplifiers: 800-2000 MHz; 2000 - 8000 MHz; 8000-18000 MHz		21. HARMONIC LEVEL a. 2ND -25 dB b. 3RD -60 dB c. OTHER -70 dB (estimate)	
22. SPURIOUS LEVEL less than -50 dB			
23. FCC TYPE ACCEPTANCE NO. N/A			
24. REMARKS Multi-band radar with interleaved pulses in each band. Radar waveform is 1-33 microsecond pulse with 0-125 Mhz linear FM chirp and pulse-to-pulse frequency agility of 0-800 MHz; this waveform can be interleaved with waveforms from other frequency bands. Bandwidth will be reduced to comply with individual frequency band allocations.			
CLASSIFICATION			

CLASSIFICATION				PAGE 3 of 9	
RECEIVER EQUIPMENT CHARACTERISTICS					
1. NOMENCLATURE, MANUFACTURER'S MODEL NO. WINSAR			2. MANUFACTURER'S NAME METRATEK, INC.		
3. RECEIVER INSTALLATION AIRCRAFT			4. RECEIVER TYPE Pulsed Radar, Dual Conversion Heterodyne		
5. TUNING RANGE 150 -18000 MHz			6. METHOD OF TUNING Synthesizer Locked to Crystal Oscillator		
7. RF CHANNELING CAPABILITY 200 MHz Continuous			8. EMISSION DESIGNATOR(S) 50MQ8N 400MQ8N 500MQ8N 500MQ8N		
9. FREQUENCY TOLERANCE 0.1 ppm					
10. IF SELECTIVITY	1ST	2ND	3RD	11. RF SELECTIVITY (<i>X and complete as applicable</i>)	
a. -3 dB	50-400MHz	400 MHz		☒ CALCULATED ☐ MEASURED	
b. -20 dB	50-500MHz	500 MHz		a. -3 dB 2.0 GHz when < 4GHZ, 4 GHz when > 4GHz	
				b. -20 dB 2.2 GHz when < 4GHZ, 4.4 GHz when > 4GHz	
c. -60 dB	80-600MHz	600 MHz		c. -60 dB 2.7 GHz when < 4GHZ, 5.4 GHz when > 4GHz	
12. IF FREQUENCY			d. PRESELECTION TYPE 200 MHz Preamplifier Filter		
a. 1ST 3 GHz except 10 GHz @ 2-4 GHz			13. MAXIMUM POST DETECTION FREQUENCY 62.5 MHz		
b. 2ND 3 GHz @ 2-4GHz			14. MINIMUM POST DETECTION FREQUENCY DC		
c. 3RD			16. MAXIMUM BIT RATE N/A		
15. OSCILLATOR TUNED	1ST	2ND	3RD	17. SENSITIVITY	
a. ABOVE TUNED FREQUENCY				a. SENSITIVITY -76 to -71 dBm	
b. BELOW TUNED FREQUENCY				b. CRITERIA 12 dB SINAD	
c. EITHER ABOVE OR BELOW TUNED FREQUENCY	X	X		c. NOISE FIG 3 to 8 dB	
18. DE-EMPHASIS (<i>X one</i>)			d. NOISE TEMP N/A Kelvin		
☐ a. YES ☒ b. NO					
19. IMAGE REJECTION 60 dB			20. SPURIOUS REJECTION 60 dB		
21. REMARKS Computer-Tuned and locked to crystal oscillator					
CLASSIFICATION					

CLASSIFICATION		PAGE 4 of 9	
ANTENNA EQUIPMENT CHARACTERISTICS			
1. ☐ a. TRANSMITTING ☐ b. RECEIVING ☒ c. TRANSMITTING AND RECEIVING			
2. NOMENCLATURE, MANUFACTURER'S MODEL NO. (a) Ridged Horn, TECOM # 201821 (b) Ridged Horn, CONDOR # AS48410		3. MANUFACTURER'S NAME (a) TECOM, Inc. (b) CONDOR Systems, Inc.	
4. FREQUENCY RANGE (a) 1.7 - 18 GHz (Four Antennas) (b) 0.75 - 4.5 GHz (Two Antennas)		5. TYPE (a) Ridged Horn (b) Ridged Horn	
6. POLARIZATION H and V		7. SCAN CHARACTERISTICS	
8. GAIN		a. TYPE Fixed	
a. MAIN BEAM (a) 8 to 24 dB (b) 7 to 13 dB		b. VERTICAL SCAN	
b. 1ST MAJOR SIDE LOBE (a) -5 to +11 dBi (b) -6 to 0 dBi		(1) MAX ELEV N/A (2) MIN ELEV N/A (3) SCAN RATE N/A	
9. BEAMWIDTH		c. HORIZONTAL SCAN	
a. HORIZONTAL (a) 50-7.5 degrees (b) 35-75 degrees		(1) SECTOR SCANNED N/A (2) SCAN RATE N/A	
b. VERTICAL (a) 50 - 7.5 degrees (b) 35-75 degrees		d. SECTOR BLANKING (X one) ☐ (1) YES ☒ (2) NO	
10. REMARKS Airborne Synthetic Aperture Radar - Antenna beam is pointed perpendicular to the aircraft direction of flight and downward at 10-30 degree angle. Ground-based preflight checkout - Antenna beam will be pointed at zero degrees at a calibration target on the ground.			
CLASSIFICATION			

WINSAR Block Diagram

