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9 January 2008

Dakota UAV Frequency Allocations

Forms DD-1494

Owner: Dakota Flight Director



Space Dynamics
LABORATORY

Utah State University Research Foundation

1.0 OVERVIEW

The following pages contain forms DD-1494 for the Dakota Unmanned Aerial Vehicle (UAV). These forms are usually required when requesting to operate the Dakota UAV at government ranges. It should be noted that only the DD-1494 for the Freewave frequency (900mhz) has been formally approved and accepted by DOD, the remaining forms are for reference only and provided for consistency of format.

CLASSIFICATION UNCLASSIFIED				PAGE		
RECEIVER EQUIPMENT CHARACTERISTICS						
1. NOMENCLATURE, MANUFACTURER'S MODEL NO. FGR-family of the radio transceivers			2. MANUFACTURER'S NAME FreeWave Technologies, Inc.			
3. RECEIVER INSTALLATION Fixed			4. RECEIVER TYPE Dual Conversion Superheterodyne			
5. TUNING RANGE 902-928 MHz			6. METHOD OF TUNING Digital Synthesizer			
7. RF CHANNELING CAPABILITY 230.4 kHz increments starting form 902.016 MHz			8. EMISSION DESIGNATOR(S) 230KF1D			
9. FREQUENCY TOLERANCE 1.5 ppm			11. RF SELECTIVITY <input type="checkbox"/> CALCULATED <input checked="" type="checkbox"/> MEASURED			
10. IF SELECTIVITY			a. -3 dB 35 MHz			
			b. -20 dB 45 MHz			
			c. -60 dB 55 MHz			
1st (U)			2nd (U)			
a. -3 dB 600 kHz			200 kHz			
b. -20 dB 750 kHz			230 kHz			
c. -60 dB 3.6 MHz			290 MHz			
12. IF FREQUENCY			13. MAXIMUM POST DETECTION FREQUENCY 200 kHz			
a. 1st 30.4 MHz			14. MINIMUM POST DETECTION FREQUENCY NA			
b. 2nd 921.6 kHz			16. MAXIMUM BIT RATE 115.2 kbps			
c. 3rd NA			17. SENSITIVITY			
15. OSCILLATOR TUNED		1st (U)	2nd (U)	3rd (U)	a. SENSITIVITY -110 dBm	
a. ABOVE TUNED FREQUENCY		X			b. CRITERIA 1X10 ⁻⁶ BER	
b. BELOW TUNED FREQUENCY					c. NOISE FIG 1.5 dB	
c. EITHER ABOVE OR BELOW THE FREQUENCY			X		d. NOISE TEMP NA Kelvin	
18. DE-EMPHASIS <input type="checkbox"/> a. YES <input checked="" type="checkbox"/> b. NO				20. SPURIOUS REJECTION 60 dB		
19. IMAGE REJECTION 60 dB				21 REMARKS		
CLASSIFICATION UNCLASSIFIED						

CLASSIFICATION UNCLASSIFIED		PAGE	
TRANSMITTER EQUIPMENT CHARACTERISTICS			
1. NOMENCLATURE, MANUFACTURER'S MODEL NO. FGR-family of the radio transceivers		2. MANUFACTURER'S NAME FreeWave Technologies, Inc.	
3. TRANSMITTER INSTALLATION Fixed		4. TRANSMITTER TYPE GFSK Communication	
5. TUNING RANGE 902-928 MHz		6. METHOD OF TUNING Digital Synthesizer	
7. RF CHANNELING CAPABILITY 230.4 kHz increments starting from 902.016 MHz		8. EMISSION DESIGNATOR(S)	
9. FREQUENCY TOLERANCE 1.5 ppm		12. EMISSION BANDWIDTH <div style="text-align: center;"> <input type="checkbox"/> CALCULATED <input checked="" type="checkbox"/> MEASURED </div>	
10. FILTER EMPLOYED <div style="text-align: center;"> <input checked="" type="checkbox"/> a. YES <input type="checkbox"/> b. NO </div>		a. -3 dB 180 kHz	
11. SPREAD SPECTRUM <div style="text-align: center;"> <input checked="" type="checkbox"/> a. YES <input type="checkbox"/> b. NO </div>		b. -20 dB 230 kHz	
13. MAXIMUM BIT RATE 115.2 kbps		c. -40 dB 315 kHz	
14. MODULATION TECHNIQUES AND CODING 2 levels GFSK, frequency hopping		d. -60 dB 400 kHz	
16. PRE-EMPHASIS <div style="text-align: center;"> <input type="checkbox"/> a. YES <input checked="" type="checkbox"/> b. NO </div>		e. OC-BW 230 kHz	
19. POWER a. MEAN Programmed up to 1 Watt		15. MAXIMUM MODULATION FREQUENCY 57.6 kHz	
b. PEP NA		17. DEVIATION RATIO 1	
20. OUTPUT DEVICE MOSFET		18. PULSE CHARACTERISTICS a. RATE NA	
22. SPURIOUS LEVEL -70 dBc		b. WIDTH NA	
23. FCC TYPE ACCEPTANCE NO. KNY-6231812519		c. RISE TIME NA	
24. REMARKS Item 10: Gaussian low-pass filter. Item 11: Frequency hopping is employed using up to 112 discrete channels in an orthogonal hop sequence. Minimum hop band required is not limited. The hopping rate is software defined. Any channel or group of channels can be locked out.		d. FALL TIME NA	
CLASSIFICATION UNCLASSIFIED		PAGE	

APPLICATION FOR EQUIPMENT FREQUENCY ALLOCATION	CLASSIFICATION	DATE Nov 30, 2005	<i>Form Approved</i> <i>OMB No. 0704-0188</i>
			PAGE 1 OF 4 PAGES
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PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS. RETURN COMPLETED FORM TO THE USING AGENCY OR CONTRACTING AGENCY, AS APPROPRIATE.			
DOD GENERAL INFORMATION			
TO		FROM Geneva Aerospace Inc 4240 International Parkway Carrollton, TX 75007	
1. APPLICATION TITLE Radio Control for Manual Take-off and Landing			
2. SYSTEM NOMENCLATURE Remote Pilot Control System			
3. STAGE OF ALLOCATION (X one) <input type="checkbox"/> a. STAGE 1 - CONCEPTUAL <input type="checkbox"/> b. STAGE 2 - EXPERIMENTAL <input type="checkbox"/> c. STAGE 3 - DEVELOPMENTAL <input checked="" type="checkbox"/> d. STAGE 4 - OPERATIONAL			
4. FREQUENCY REQUIREMENTS a. FREQUENCY(IES) One fixed frequency in the 72.01 thru 72.99MHz range b. EMISSION DESIGNATOR(S)			
5. TARGET STARTING DATE FOR SUBSEQUENT STAGES			
a. STAGE 2		b. STAGE 3	c. STAGE 4 TBD
6. EXTENT OF USE Intermittent daily use, continuous during flight opps.			
7. GEOGRAPHICAL AREA FOR			
a. STAGE 2			
b. STAGE 3			
c. STAGE 4 TBD			
8. NUMBER OF UNITS			
a. STAGE 2		b. STAGE 3	c. STAGE 4 Tx-Ground, Rx-Airborne
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/		a. YES b. NO c. NAvail	
b. RELATED J/F 12/			
12. NAMES AND TELEPHONE NUMBERS			
a. PROGRAM MANAGER		(1) COMMERCIAL	(2) AUTOVON
b. PROJECT ENGINEER		(1) COMMERCIAL	(2) AUTOVON
13. REMARKS			
DOWNGRADING INSTRUCTIONS		CLASSIFICATION	

CLASSIFICATION	PAGE 2
TRANSMITTER EQUIPMENT CHARACTERISTICS	
1. NOMENCLATURE, MANUFACTURER'S MODEL NO. 9CAP	2. MANUFACTURER'S NAME Futaba
3. TRANSMITTER INSTALLATION Handheld portable	4. TRANSMITTER TYPE FM, PCM
5. TUNING RANGE 72.01 -72.99 MHz with module change	6. METHOD OF TUNING Fixed Frequency
7. RF CHANNELING CAPABILITY 48 channels with 20KHz sep	8. EMISSION DESIGNATOR(S) License exempt spectrum
9. FREQUENCY TOLERANCE	
10. FILTER EMPLOYED (<i>X one</i>) <input type="checkbox"/> a. YES <input checked="" type="checkbox"/> b. NO	
11. SPREAD SPECTRUM (<i>X one</i>) <input type="checkbox"/> a. YES <input checked="" type="checkbox"/> b. NO	12. EMISSION BANDWIDTH (<i>X and complete as applicable</i>) <input type="checkbox"/> CALCULATED <input type="checkbox"/> MEASURED
13. MAXIMUM BIT RATE	a. -3 dB b. -20 dB c. -40 dB d. -60 dB e. OC-BW
14. MODULATION TECHNIQUES AND CODING	15. MAXIMUM MODULATION FREQUENCY
16. PRE-EMPHASIS (<i>X one</i>) <input type="checkbox"/> a. YES <input checked="" type="checkbox"/> b. NO	17. DEVIATION RATIO
19. POWER a. MEAN b. PEP 5 Watts max with the linear amp.	18. PULSE CHARACTERISTICS a. RATE b. WIDTH c. RISE TIME d. FALL TIME e. COMP RATIO
20. OUTPUT DEVICE	21. HARMONIC LEVEL a. 2ND b. 3RD c. OTHER
22. SPURIOUS LEVEL	
23. FCC TYPE ACCEPTANCE NO.	
24. REMARKS <p style="text-align: center;">This system is a commercial hobby radio control system operating on a single frequency in the range of 72.01 - 72.99MHz. A modification has been made to the radio output antenna to except the coupling of a linear amplifier.</p>	
CLASSIFICATION	

CLASSIFICATION					PAGE 3	
RECEIVER EQUIPMENT CHARACTERISTICS						
1. NOMENCLATURE. MANUFACTURER'S MODEL NO. FP-R149DP				2. MANUFACTURER'S NAME Futaba Corp		
3. RECEIVER INSTALLATION Vehicles internal payload bay				4. RECEIVER TYPE		
5. TUNING RANGE 72.01 - 72.99MHz				6. METHOD OF TUNING Crystal change		
7. RF CHANNELING CAPABILITY 48 channels, 20KHz sep				8. EMISSION DESIGNATOR(S) Licence Exempt Spectrum		
9. FREQUENCY TOLERANCE IEEE802.11b Standards						
10. IF SELECTIVITY		1ST	2ND	3RD	11. RF SELECTIVITY (<i>X and complete as applicable</i>)	
a. -3 dB					<input type="checkbox"/> CALCULATED <input type="checkbox"/> MEASURED	
b. -20 dB					a. -3 dB	
c. -60 dB					b. -20 dB	
					c. -60 dB	
12. IF FREQUENCY					d. PRESELECTION TYPE	
a. 1ST					13. MAXIMUM POST DETECTION FREQUENCY	
b. 2ND					14. MINIMUM POST DETECTION FREQUENCY	
c. 3RD						
15. OSCILLATOR TUNED		1ST	2ND	3RD	16. MAXIMUM BIT RATE	
a. ABOVE TUNED FREQUENCY					17. SENSITIVITY	
b. BELOW TUNED FREQUENCY					a. SENSITIVITY dBm	
c. EITHER ABOVE OR BELOW TUNED FREQUENCY					b. CRITERIA	
18. DE-EMPHASIS (<i>X one</i>)				c. NOISE FIG dB		
<input type="checkbox"/> a. YES		<input type="checkbox"/> b. NO		d. NOISE TEMP Kelvin		
19. IMAGE REJECTION				20. SPURIOUS REJECTION		
21. REMARKS This is a standard off the shelf hobby grade radio control receiver.						
CLASSIFICATION						

CLASSIFICATION		PAGE 4
ANTENNA EQUIPMENT CHARACTERISTICS		
1. <input checked="" type="checkbox"/> a. TRANSMITTING <input type="checkbox"/> b. RECEIVING <input type="checkbox"/> c. TRANSMITTING AND RECEIVING		
2. NOMENCLATURE, MANUFACTURER'S MODEL NO. K 51 26 4 11	3. MANUFACTURER'S NAME Kathrein	
4. FREQUENCY RANGE 68 -80 MHz	5. TYPE Broadband ground-plane antenna with fiberglass radials	
6. POLARIZATION Vertical	7. SCAN CHARACTERISTICS	
8. GAIN	a. TYPE	
a. MAIN BEAM 0 db	b. VERTICAL SCAN	
b. 1ST MAJOR SIDE LOBE	(1) MAX ELEV	
	(2) MIN ELEV	
	(3) SCAN RATE	
9. BEAMWIDTH	c. HORIZONTAL SCAN	
a. HORIZONTAL	(1) SECTOR SCANNED	
b. VERTICAL Omni	(2) SCAN RATE	
		d. SECTOR BLANKING (<i>X one</i>) <input type="checkbox"/> (1) YES <input type="checkbox"/> (2) NO
10. REMARKS		
CLASSIFICATION		

CLASSIFICATION UNCLASSIFIED		PAGE 1 of 4 Pages	
TRANSMITTER EQUIPMENT CHARACTERISTICS			
1. NOMENCLATURE, MANUFACTURER'S MODEL NO. SD-125U2		2. MANUFACTURER'S NAME Maxon	
3. TRANSMITTER INSTALLATION Ground Based Fixed		4. TRANSMITTER TYPE FM	
5. TUNING RANGE 440-470Mhz		6. METHOD OF TUNING Manually Adjustable Synthesizer	
7. RF CHANNELING CAPABILITY M440-M470MHz, 30/25/15/12.5KHz		8. EMISSION DESIGNATOR(S) 11K0F3E 16K0F3E	
9. FREQUENCY TOLERANCE ±2.5PPM		11K0F3E 16K0F3E	
10. FILTER EMPLOYED (X one) <input type="checkbox"/> a. YES <input checked="" type="checkbox"/> b. NO			
11. SPREAD SPECTRUM (X one) <input type="checkbox"/> a. YES <input checked="" type="checkbox"/> b. NO			
13. MAXIMUM BIT RATE 1.2 MBPS		12. EMISSION BANDWIDTH (X and complete as applicable) <input type="checkbox"/> CALCULATED <input checked="" type="checkbox"/> MEASURED	
14. MODULATION TECHNIQUES AND CODING F3D F3E		a. -3 dB .5 KHz	
		b. -20 dB 1.3 KHz	
		c. -40 dB 1.75 KHz	
		d. -60 dB 3.0 KHz	
		e. OC-BW 5 KHz	
15. MAXIMUM MODULATION FREQUENCY 5KHz		17. DEVIATION RATIO 1.67	
16. PRE-EMPHASIS (X one) <input type="checkbox"/> a. YES <input checked="" type="checkbox"/> b. NO		18. PULSE CHARACTERISTICS	
19. POWER a. MEAN 30.97 dBm b. PEP 36.99 dBm		a. RATE b. WIDTH c. RISE TIME d. FALL TIME e. COMP RATIO	
20. OUTPUT DEVICE Transistor		21. HARMONIC LEVEL	
22. SPURIOUS LEVEL 60dB		a. 2nd -60dB	
23. FCC TYPE ACCEPTANCE NO. F3JSD125U2		b. 3rd -60dB	
		c. OTHER -60dB	
24. REMARKS <div style="margin-top: 20px;"> Line item 5: L-3 Geneva hold an FCC license for the following frequencies, 464.500MHz, 464.550MHz, 469.500MHz and 469.550 MHz Line 7: Operates on 1 of 16 Channels; dip switch selectable. PLL step 5.6.25 KHz. Channel spread is 30MHz </div>			
CLASSIFICATION UNCLASSIFIED			

CLASSIFICATION UNCLASSIFIED				PAGE 2 of 4 Pages	
RECEIVER EQUIPMENT CHARACTERISTICS					
1. NOMENCLATURE, MANUFACTURER'S MODEL NO. SD-125U2			2. MANUFACTURER'S NAME MAXON ELECTRONICS		
3. RECEIVER INSTALLATION AIRBORNE			4. RECEIVER TYPE FM		
5. TUNING RANGE 440-470MHz			6. METHOD OF TUNING MANUALLY ADJUSTABLE SYNTHESIZER		
7. RF CHANNELING CAPABILITY M440-M470, 30/25/15/12.5KHz			8. EMISSION DESIGNATOR(S) 16KOF3E 11KOF3E		
9. FREQUENCY TOLERANCE 2.5PPM					
10. IF SELECTIVITY	1st	2nd	3rd	11. RF SELECTIVITY (X and complete as applicable) <input checked="" type="checkbox"/> CALCULATED <input type="checkbox"/> MEASURED	
a. -3 dB	SEE REMARK			a. -3 dB	
b. -20 dB				b. -20 dB	
c. -60 dB				c. -60 dB	
12. IF FREQUENCY				d. Preselection Type	
a. 1st 45.1MHz				13. MAXIMUM POST DETECTION FREQUENCY	
b. 2nd 455KHz				14. MINIMUM POST DETECTION FREQUENCY	
c. 3rd N/A				16. MAXIMUM BIT RATE <div style="text-align: right;">9600</div>	
15. OSCILLATOR TUNED	1st	2nd	3rd	17. SENSITIVITY	
a. ABOVE TUNED FREQUENCY				a. SENSITIVITY -116 dBm	
b. BELOW TUNED FREQUENCY	12.8MH Z			b. CRITERIA 12Db Sinad	
c. EITHER ABOVE OR BELOW THE FREQUENCY				c. NOISE FIG dB	
18. DE-EMPHASIS (X one) <input type="checkbox"/> a. YES <input checked="" type="checkbox"/> b. NO				d. NOISE TEMP Kelvin	
19. IMAGE REJECTION <div style="text-align: right;">70dB</div>				20. SPURIOUS REJECTION <div style="text-align: right;">70Db (100KHz-4GHz)</div>	
21. REMARKS Line 7. Operates on 1 of 16 Channels; dip switch selectable. PLL step 5/6.25 KHz. Channel spread is 30MHz. 10/11 > 50dB at 12.5KHz > 60dB at 25KHz					

CLASSIFICATION UNCLASSIFIED		PAGE 3 of 4 Pages
ANTENNA EQUIPMENT CHARACTERISTICS		
1. <input checked="" type="checkbox"/> a. TRANSMITTING <input type="checkbox"/> b. RECEIVING <input type="checkbox"/> c. TRANSMITTING AND RECEIVING		
2. NOMENCLATURE, MANUFACTURER'S MODEL NO. BSL450XL4.5-C	3. MANUFACTURER'S NAME COMTELCO	
4. FREQUENCY RANGE 450-480MHz	5. TYPE FIBERGLASS OMNI	
6. POLARIZATION VERTICAL	7. SCAN CHARACTERISTICS	
8. GAIN	a. TYPE	
a. MAIN BEAM 4.5dBd	b. VERTICAL SCAN	
b. 1st MAJOR SIDE LOBE -16dBd	(1) Max Elev	
	(2) Min Elev	
	(3) Scan Rate	
9. BEAMWIDTH	c. HORIZONTAL SCAN	
a. HORIZONTAL 360 DEG	(1) Sector Scanned	
b. VERTICAL 30 DEG	(2) Scan Rate	
	d. SECTOR BLANKING (<i>X one</i>) <input type="checkbox"/> (1) YES <input type="checkbox"/> (2) NO	
10. REMARKS		
CLASSIFICATION UNCLASSIFIED		

CLASSIFICATION UNCLASSIFIED		PAGE _____ of Pages
ANTENNA EQUIPMENT CHARACTERISTICS		
1. <input type="checkbox"/> a. TRANSMITTING <input type="checkbox"/> b. RECEIVING <input checked="" type="checkbox"/> c. TRANSMITTING AND RECEIVING		
2. NOMENCLATURE, MANUFACTURER'S MODEL NO. EAN0900SQ	3. MANUFACTURER'S NAME Freewave	
4. FREQUENCY RANGE 902 – 928 MHz	5. TYPE OMNI	
6. POLARIZATION VERTICAL	7. SCAN CHARACTERISTICS	
	a. TYPE	
8. GAIN	b. VERTICAL SCAN	
a. MAIN BEAM 0dBd	(1) Max Elev	
b. 1st MAJOR SIDE LOBE 0dBd	(2) Min Elev	
	(3) Scan Rate	
9. BEAMWIDTH	c. HORIZONTAL SCAN	
a. HORIZONTAL 360 DEG	(1) Sector Scanned	
b. VERTICAL	(2) Scan Rate	
	d. SECTOR BLANKING (<i>X one</i>) <input type="checkbox"/> (1) YES <input type="checkbox"/> (2) NO	
10. REMARKS		
CLASSIFICATION UNCLASSIFIED		

CLASSIFICATION UNCLASSIFIED		PAGE _____ of Pages
ANTENNA EQUIPMENT CHARACTERISTICS		
1. <input type="checkbox"/> a. TRANSMITTING <input type="checkbox"/> b. RECEIVING <input checked="" type="checkbox"/> c. TRANSMITTING AND RECEIVING		
2. NOMENCLATURE, MANUFACTURER'S MODEL NO. FG9026	3. MANUFACTURER'S NAME ANTENEX	
4. FREQUENCY RANGE 902 – 928 MHz	5. TYPE OMNI	
6. POLARIZATION VERTICAL	7. SCAN CHARACTERISTICS	
8. GAIN	a. TYPE	
a. MAIN BEAM 6dBd	(1) Max Elev	
b. 1st MAJOR SIDE LOBE -14dBd	(2) Min Elev	
9. BEAMWIDTH	(3) Scan Rate	
a. HORIZONTAL 360 DEG	c. HORIZONTAL SCAN	
b. VERTICAL 40 DEG	(1) Sector Scanned	
10. REMARKS	(2) Scan Rate	
d. SECTOR BLANKING (<i>X one</i>) <input type="checkbox"/> (1) YES <input type="checkbox"/> (2) NO		
10. REMARKS		
CLASSIFICATION UNCLASSIFIED		

CLASSIFICATION UNCLASSIFIED		PAGE of Pages
ANTENNA EQUIPMENT CHARACTERISTICS		
1. <input type="checkbox"/> a. TRANSMITTING <input type="checkbox"/> b. RECEIVING <input checked="" type="checkbox"/> c. TRANSMITTING AND RECEIVING		
2. NOMENCLATURE, MANUFACTURER'S MODEL NO. MAX-9085	3. MANUFACTURER'S NAME Maxrad	
4. FREQUENCY RANGE 896-940 MHz	5. TYPE OMNI	
6. POLARIZATION VERTICAL	7. SCAN CHARACTERISTICS	
8. GAIN	a. TYPE	
a. MAIN BEAM 5dBd	b. VERTICAL SCAN	
b. 1st MAJOR SIDE LOBE -1dBd	(1) Max Elev	
	(2) Min Elev	
	(3) Scan Rate	
9. BEAMWIDTH	c. HORIZONTAL SCAN	
a. HORIZONTAL 360 DEG	(1) Sector Scanned	
b. VERTICAL 27 DEG	(2) Scan Rate	
	d. SECTOR BLANKING (<i>X one</i>) <input type="checkbox"/> (1) YES <input type="checkbox"/> (2) NO	
10. REMARKS		
CLASSIFICATION UNCLASSIFIED		

2.0 CHANGE RECORD

REV	DESCRIPTION OF CHANGE	DATE	CHANGED BY
-	Original release		Jason Wooden
