MILITARY COMMUNICATIONS ELECTRONICS BOARD (MCEB)
EQUIPMENT FREQUENCY ALLOCATION GUIDANCE

Military Department	Equipment	Stage
Air Force Navy Army	**AeroVironment Data Link**	4 - Operational

Section 1: ENCLOSURES

Enclosure Number	Description	Dated
1	J/F 12/8057/4	18 August 2004

Section 2: OPERATING CHARACTERISTICS FOR WHICH SUPPORT IS CERTIFIED

Frequency (MHz)	Emission	Power (Mean)	Type of Service	Operating Location
350-399.9 (See Paragraph 5)	15K6F1D	2 W	Aeronautical Mobile	US&P

Section 3: MCEB GUIDANCE

1. The enclosed application is approved for operational systems at the above locations subject to the guidance provided in the following paragraphs.

2. For the intended operation in the Aeronautical Mobile service, the subject equipment is in accordance with the ITU and US Tables of Frequency Allocation.

3. The transmitter does not comply with MIL-STD-461E requirements for spurious emission and harmonic levels.

4. Frequency assignment request must be submitted using Standard Frequency Action Format (SFAF) and coordinated with the cognizant Area Frequency Coordinator (AFC) in accordance with ACP 190 US SUPP-1(C), Guide to Frequency Planning, prior to activation. Prior to selection of factory fixed frequency, the cognizant AFC must be consulted.

Steering Member ESG Working Group MCEB Frequency Panel	Signature Ronald E. Williams	Date APR 20 2005	IRAC/SPS Number Doc. 34274/1 SPS-14857	Page 1 of 2

Downgrading Instructions Classified by: NA Declassify on: NA	Distribution J-12 Holders	MCEB J-12 Number 8057/5

MILITARY COMMUNICATIONS ELECTRONICS BOARD (MCEB)

EQUIPMENT FREQUENCY GUIDANCE

MCEB GUIDANCE CONTINUATION PAGE	Equipment AeroVironment Data Link

Section 3: MCEB GUIDANCE (continued)

5. Use of this system must be in accordance with the channeling plans for the 225-399.9 MHz band. Assignments that do not fit the wideband channels in the 380-399.9 MHz band may be very difficult to obtain. Per SECDEF Memo, 1 Aug 2001, Subj: Policy for Land Mobile Radio, the band 380-399.9 MHz will be heavily used by Land Mobile Radio (LMR) systems in the future. The Program Office might consider moving the uplink of this system to operate in the 225-380 MHz band at the earliest opportunity to ensure future frequency assignments availability. The 225-380 MHz band is heavily used by various space, ground, airborne and sea communication systems; however, there are more channels available in this band than in the 380-399.9 MHz bands.

6. Coordination with NTIA/SPS was completed and the following US certification statements were received:

a. The Spectrum Planning Subcommittee (SPS) has reviewed this system under the provisions of Chapter 10 of the NTIA Manual, the SPS recommends that:
b. NTIA certify Stage 4 spectrum support for the AeroVironment Data Link as specified in Section 2.
c. Air Force work with Military Assignment Group (MAG) to process all frequency assignment actions in accordance with Section 1.4.1 of the NTIA Manual.
d. Air Force ensure that personnel are protected from radiation levels that exceed generally accepted exposure criteria.

7. Authorization for use outside of the US&P is dependent on receiving a statement of supportability from the appropriate COCOM. Host nation frequency support coordination has been initiated.

APPLICATION FOR EQUIPMENT FREQUENCY ALLOCATION	CLASSIFICATION UNCLASSIFIED	DATE 08-18-2004	J/F 12/08057/4
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DOD GENERAL INFORMATION

TO	FROM
AF Frequency Management Agency AFFMA/DON 2461 Eisenhower Ave., Suite 1203 Alexandria, VA 22331-1500	Aeronautical Systems Center (AFMC) 88CG/SCXI (ASC 2004-023) Area B, Building 47, 2690 K Street Wright Patterson AFB, OH 45433-7661

1. APPLICATION TITLE (U) AeroVironment Data Link

2. SYSTEM NOMENCLATURE (U) Small UAV

3. STAGE OF ALLOCATION (U) [ ] a. STAGE 1 CONCEPTUAL [ ] b. STAGE 2 EXPERIMENTAL [ ] c. STAGE 3 DEVELOPMENTAL [X] d. STAGE 4 OPERATIONAL

4. FREQUENCY REQUIREMENTS
   a. FREQUENCY(IES) (U) 350 MHz - 399.9 MHz
   b. EMISSION DESIGNATORS (U) 15K6F1D

5. TARGET STARTING DATE FOR SUBSEQUENT STAGES

a. STAGE 2 (U) NA	b. STAGE 3 (U) NA	c. STAGE 4 (U) NA

6. EXTENT OF USE (U) Intermittent

7. GEOGRAPHICAL AREA FOR
   a. STAGE 2 (U) NA
   b. STAGE 3 (U) NA
   c. STAGE 4 (U) US&P, Worldwide

8. NUMBER OF UNITS

a. STAGE 2 (U) NA	b. STAGE 3 (U) NA	c. STAGE 4 (U) 1000

9. NUMBER OF UNITS OPERATING SIMULTANEOUSLY IN THE SAME ENVIRONMENT (U) 4

10. OTHER J/F 12 APPLICATION ID(S) TO BE (U)
    [X] a. SUPERSEDED J/F 12/8057/2
    [X] b. RELATED J/F 12/08254

11. IS THERE ANY OPERATIONAL REQUIREMENT AS DESCRIBED IN THE INSTRUCTIONS FOR PARAGRAPH 11? (U)
    [ ] a. YES [X] b. NO [ ] c. NAVAIL

12. NAMES AND TELEPHONE NUMBERS (U)

a. PROGRAM MANAGER Lt Joshua Seder, ASC/RAJA	(1) COMMERCIAL 937-656-3189	(2) DSN 986-3189
b. PROJECT ENGINEER Mr. Willliam Green, ASC/RAJA	(1) COMMERCIAL 937-255-5082	(2) DSN 785-5082

13. REMARKS (U)

Positive control of the air vehicle is maintained by pre-programmed response to loss of the control link. When a loss of the control link is detected, the air vehicle returns to a pre-programmed point and auto-lands.

DOWNGRADING INSTRUCTIONS

TRANSMITTER EQUIPMENT CHARACTERISTICS

1. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) Uplink Transmitter (See Remarks)

2. MANUFACTURER'S NAME
(U) AeroVironment, Inc.

3. TRANSMITTER INSTALLATION
(U) Ground

4. TRANSMITTER TYPE
(U) Digital FM Communication

5. TUNING RANGE
(U) 350 MHz - 400 MHz (See Remarks)

6. METHOD OF TUNING
(U) Synthesizer

7. RF CHANNELING CAPABILITY
(U) (See Remarks)

8. EMISSION DESIGNATORS
(U) 15K6F1D (U) (U)

9. FREQUENCY TOLERANCE
(U) 2.5 ppm

10. FILTER EMPLOYED
(U) [X] a. YES [ ] b. NO

11. SPREAD SPECTRUM
(U) [ ] a. YES [X] b. NO

12. EMISSION BANDWIDTH
[ ] CALCULATED [X] MEASURED

a. -3 dB	(U) 5 KHz	(U)	(U)
b. -20 dB	(U) 12 KHz	(U)	(U)
c. -40 dB	(U) 34 KHz	(U)	(U)
d. -60 dB	(U) 70 KHz	(U)	(U)
e. OC-BW	(U) 17 KHz	(U)	(U)

13. MAXIMUM BIT RATE
(U) 9.6 Kbps

14. MODULATION TECHNIQUES AND CODING
(U) Manchester encoded FSK

15. MAXIMUM MODULATION FREQUENCY
(U) 9.6 KHz

16. PRE-EMPHASIS
(U) [ ] a. YES [X] b. NO

17. DEVIATION RATIO
(U) 0.55

18. PULSE CHARACTERISTICS

a. RATE	(U) NA	(U)	(U)
b. WIDTH	(U) NA	(U)	(U)
c. RISE TIME	(U) NA	(U)	(U)
d. FALL TIME	(U) NA	(U)	(U)
e. COMP RATIO	(U) NA	(U)	(U)

19. POWER

a. MEAN	(U) 2 W	(U)	(U)
b. PEP	(U) NA	(U)	(U)

20. OUTPUT DEVICE
(U) Transistor

21. HARMONIC LEVEL

a. 2nd	(U)	-55 dB
b. 3rd	(U)	-70 dB
c. OTHER	(U)	-80 dB

22. SPURIOUS LEVEL
(U) -50 dB

23. FCC TYPE ACCEPTANCE NO.
(U) NA

24. REMARKS (U)

Item 1: For DoD requirement, AeroVironment modified Part No. 55025

Item 5/7: The module has 4 factory preset channels; per module, all 4 channels must be within a 10 MHz band. This 10 MHz window can be set in the 350-399.9 MHz frequency range.

Item 10: 2 pole low pass Butterworth filter with the 3 dB point at approximately 425 MHz. The insertion loss is 2 dB.

RECEIVER EQUIPMENT CHARACTERISTICS

1. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) Uplink Receiver

2. MANUFACTURER'S NAME
(U) AeroVironment, Inc.

3. RECEIVER INSTALLATION
(U) Aircraft

4. RECEIVER TYPE
(U) Double Conversion Superheterodyne

5. TUNING RANGE
(U) 350 MHz - 400 MHz (See Remarks)

6. METHOD OF TUNING
(U) Synthesizer

7. RF CHANNELING CAPABILITY
(U) (See Remarks)

8. EMISSION DESIGNATORS
(U) 15K6F1D

9. FREQUENCY TOLERANCE
(U) 2.5 ppm

10. IF SELECTIVITY

	1st (U)	2nd (U)	3rd (U)
a. -3 dB	50 KHz	7 KHz	NA
b. -20 dB	150 KHz	44 KHz	NA
c. -60 dB	300 KHz	72 KHz	NA

11. RF SELECTIVITY
[ ] CALCULATED [X] MEASURED

a. -3 dB	(U)	10 MHz
b. -20 dB	(U)	74 MHz
c. -60 dB	(U)	250 MHz
d. Preselection Type	(U)	LC Filter

12. IF FREQUENCY
a. 1st (U) 86.85 MHz
b. 2nd (U) 455 KHz
c. 3rd (U) NA

13. MAXIMUM POST DETECTION FREQUENCY
(U) 9.792 KHz

14. MINIMUM POST DETECTION FREQUENCY
(U) 9.408 KHz

15. OSCILLATOR TUNED

	1st (U)	2nd (U)	3rd (U)
a. ABOVE TUNED FREQUENCY			
b. BELOW TUNED FREQUENCY	X	X	
c. EITHER ABOVE OR BELOW THE FREQUENCY			

16. MAXIMUM BIT RATE
(U) 9.6 Kbps

17. SENSITIVITY

a. SENSITIVITY	(U)	- 105 dBm
b. CRITERIA	(U)	SNR = 16 dB: 10-5 BER
c. NOISE FIG	(U)	4.5 dB
d. NOISE TEMP	(U)	NA

18. DE-EMPHASIS
(U) [ ] a. YES [X] b. NO

19. IMAGE REJECTION
(U) 73 dB

20. SPURIOUS REJECTION
(U) 60 dB

21. REMARKS (U) Item 5/7: The module operates within 10 MHz band and has a maximum of 4 factory preset channels.

ANTENNA EQUIPMENT CHARACTERISTICS

1. (U) [ ] a. TRANSMITTING [ ] b. RECEIVING [X] c. TRANSMITTING AND RECEIVING

2. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) PN 55017 and 55008

3. MANUFACTURER'S NAME
(U) AeroVironment, Inc.

4. FREQUENCY RANGE
(U) 350 MHz - 400 MHz

5. TYPE (U) Dipole

6. POLARIZATION
(U) Vertical

7. SCAN CHARACTERISTICS

a. TYPE (U) FIXED

b. VERTICAL SCAN (U) NA

(1) Max Elev (U) NA

(2) Min Elev (U) NA

(3) Scan Rate (U) NA

c. HORIZONTAL SCAN (U) NA

(1) Sector Scanned (U) NA

(2) Scan Rate (U) NA

8. GAIN

a. MAIN BEAM
(U) 2.2 dBi

b. 1st MAJOR SIDE LOBE
(U) NA

9. BEAMWIDTH

a. HORIZONTAL
(U) 360 deg

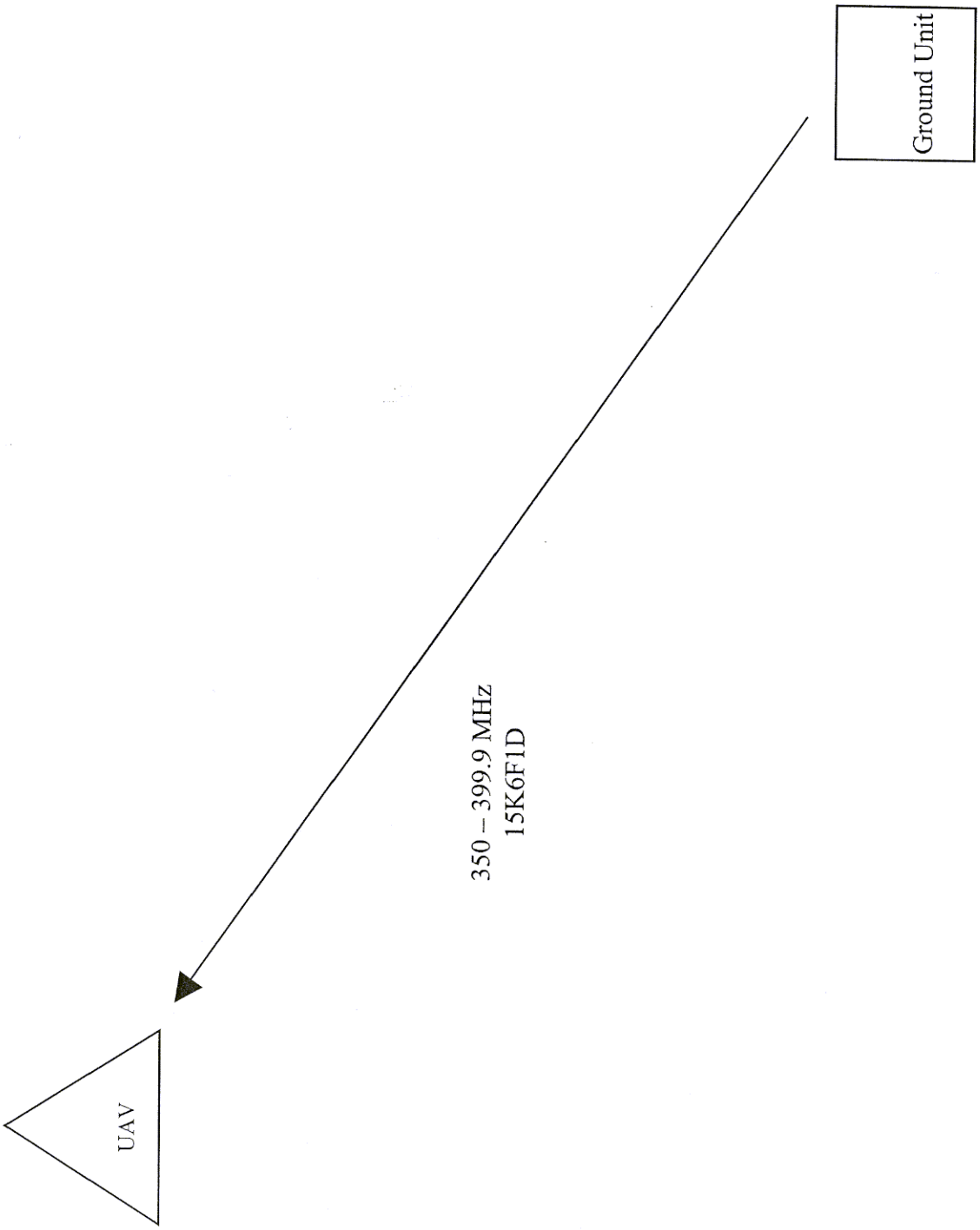
b. VERTICAL
(U) 78 deg

d. SECTOR BLANKING (U) [ ] (1) YES [X] (2) NO

10. REMARKS (U)

Item 2: Both antennas characteristics are identical.
Part Number 55017 is the ground - transmit antenna.
Part Number 55008 is the aircraft - receive antenna.

PICTORIAL LINE DIAGRAM



APPLICATION FOR SPECTRUM REVIEW	CLASSIFICATION UNCLASSIFIED	PAGE 6

NTIA GENERAL INFORMATION

1. APPLICATION TITLE (U) AeroVironment Data Link

2. SYSTEM NOMENCLATURE (U) Small UAV

3. STAGE OF ALLOCATION (U) [ ] a. STAGE 1 CONCEPTUAL [ ] b. STAGE 2 EXPERIMENTAL [ ] c. STAGE 3 DEVELOPMENTAL [X] d. STAGE 4 OPERATIONAL

4. FREQUENCY REQUIREMENTS
   a. FREQUENCY(IES) (U) 350 MHz - 399.9 MHz
   b. EMISSION DESIGNATORS (U) 15K6F1D

5. PURPOSE OF SYSTEM, OPERATIONAL AND SYSTEM CONCEPTS
   (U) Provide the capability to command and control small UAVs
   (WARTIME USE) [X] a. YES [ ] b. NO

6. INFORMATION TRANSFER REQUIREMENTS (U) 9.6 Kbps data

7. ESTIMATED INITIAL COST OF THE SYSTEM (U) $4000

8. TARGET DATE FOR

a. APPLICATION APPROVAL	b. SYSTEM ACTIVATION	c. SYSTEM TERMINATION
(U) 04-30-2005	(U) ASAP	(U) 2030

9. SYSTEM RELATIONSHIP AND ESSENTIALITY (U) NA

10. REPLACEMENT INFORMATION (U) Will eventually supersede J/F 12/08057/2

11. RELATED ANALYSIS AND/OR TEST DATA (U) NA

12. NUMBER OF MOBILE UNITS (U) 1000

13. GEOGRAPHICAL AREA FOR
    a. STAGE 2 (U) NA
    b. STAGE 3 (U) NA
    c. STAGE 4 (U) US&P; Worldwide

14. LINE DIAGRAM (U) See Page(s) 5	15. SPACE SYSTEMS (U) See Page(s) NA
16. TYPE OF SERVICE(S) FOR STAGE 4 (U) Aeronautical Mobile	17. STATION CLASS(ES) FOR STAGE 4 (U) FAD

18. REMARKS ()

Positive control of the air vehicle is maintained by pre-programmed response to loss of the control link. When a loss of the control link is detected, the air vehicle returns to a pre-programmed point and auto-lands.

The module has 4 factory preset channels; per module, all 4 channels must be within a 10 MHz band. This 10 MHz window can be set in the 350-399.9

DOWNGRADING INSTRUCTIONS

NTIA REMARK OVERFLOW PAGE

MHz frequency range.

Use of this system must be in accordance with the channeling plans for the 225-399.9 MHz band. Assignments that do not fit the wideband channels in the 380-399.9 MHz band may be difficult to obtain.