

Exhibit 1 – System Description

AIR-O-SPACE has developed a highly portable aerial imaging system for use in remote sensing of agriculture, forestry, and coastal environments. The imaging system consists of a hand launchable unmanned aerial vehicle (HL-UAV) with onboard multispectral sensor that incorporates attitude reference and GPS data. The system can be transported as check-in luggage on commercial flights, shipped by Federal Express, and operated from a mini-van size vehicle. It is operated from unprepared terrain and will acquire 3 bands of multispectral imagery with a resolution of less than 1-meter possible. Spectral resolution is 10nm from 400nm to 1100nm with field changeable filters.

The air vehicle transmits imagery and data via a microwave link to the ground control station (GCS) in real time. The imagery transmitted is from the forward navigation camera and the multispectral sensor, which is operator selectable during the flight.

The multispectral sensor acquires images from all three cameras simultaneously, stores the image in a frame buffer, and multiplexes the images down one at a time with GPS, heading, roll, and pitch information overlaid on the frames.

Data transmitted includes GPS location, heading, altitude, engine RPM, and on-board battery voltage. Uplink control is transmitted from the GCS to the air vehicle via a hand held controller.

The data is displayed on a lap top computer in the GCS along with updating a moving map display. The video imagery is displayed on a monitor and is used for navigation and target acquisition. The imagery is recorded on a digital VCR for post processing.

Typical operations of the UAV are conducted in rural areas including large acre farms, areas of forest, and long stretches of coastal waters. Other areas flown for purposes of research include government installations such as NASA and USDA. The UAV operations are performed from a location within 1 mile of the site where aerial data will be gathered. All launch and recovery areas are required to be pavement, grass, or hard packed dirt. The areas should be no smaller than 500 ft. X 20 ft. with little or no obstructions, and in the direction of the prevailing winds if possible.

Due to the size of the air vehicle and nature of the flight operations, all flight operations will cease for the following conditions:

- Winds are 15 knots or greater
- Rain is present
- Real threat of thunderstorm exists

Commercial applications of this technology include the production of imaging systems capable of performing remote sensing tasks anywhere in the world in near real time cost effectively. They can be used in aerial remote sensing applications for agriculture, forestry, and water systems as well as other commercial aerial imagery requirements including environmental clean up and monitoring, and land management and maintenance. Very high resolution, small area imagery supplied by the system can greatly supplement that of manned aircraft and satellites.

Operational UAV system includes:

- 1 operator - Pilot/Operations Manager
- 1 trained assistant provided on-site (customer or customer's agent)
- 1 air vehicle (hand launchable, 8 ft. wingspan) including operational payload (3 band multispectral), video transmitter
- 1 GCS system - digital recorder, lap top computer, video display monitor, video receiver, hand held controller associated cables and antennas
- 1 set of ground support equipment - Engine starter, batteries, fuel, tools, etc.
- 1 set of operational spares - flyable airframe structure, engine/fuel system, uplink transmitter (controller)
- Insurance coverage and consumables

Detailed specifications for the Mini-Sensor HL-UAV are as follows:

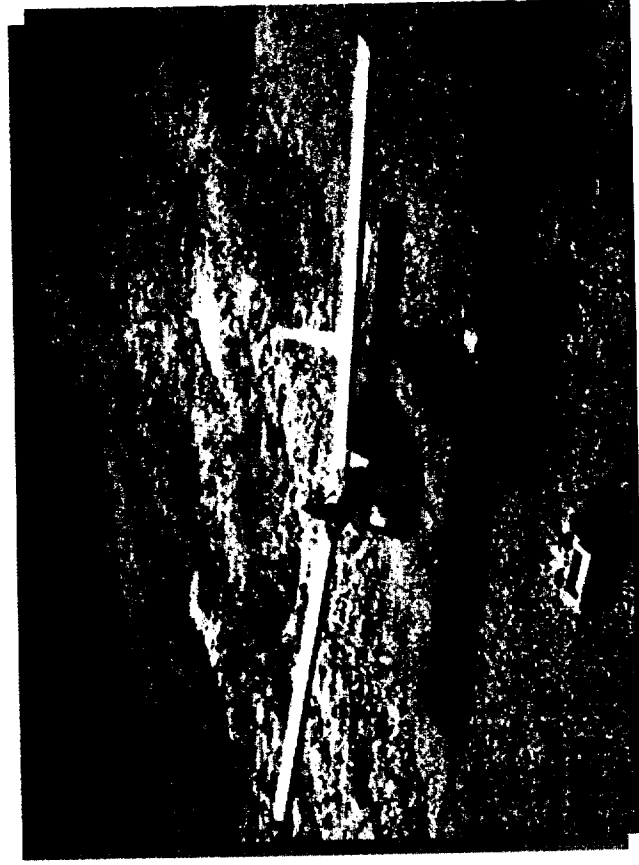
Wing Span:	8 ft.
Wing Area:	9 sq. ft.
Empty Weight:	11 lbs.
Payload Weight:	Up to 10 lbs.
Current payloads include:	Forward Navigation Camera, 3 band multispectral sensor, 35mm camera
Gross Vehicle Weight:	22 lbs., including 1 lb. fuel
Payload Volume:	10" X 6" X 3.5"
Range:	3 mile radius (6 miles), visual line of sight in uncontrolled commercial airspace (approx. 1 mile)
Typical Operating Altitude:	2500 ft. AGL and less
Engine:	0.6cc single two cycle rated at 1 HP
Endurance:	1+ hours
Turn Around Time:	Approx. 30 minutes, fuel/batteries
Structure:	Balsa, Composites, Mylar Covering
Stabilization:	Optical leveler for pitch and roll
Uplink Control:	Manual control with GPS based moving map
Downlink:	Real-time forward tilt navigation camera, multispectral imagery, air vehicle statistics, and GPS information
Take Off:	Hand Launch (Throw), unprepared terrain
Landing:	Conventional gear unprepared terrain, paved or grass area 500' X 20'

The miniaturized multispectral imager developed under the 1997 Phase I SBIR has the following characteristics and specifications:

Cameras:	3 - RS-170 monochrome CCD (Digital output capable).
Resolution:	Approx. 570 V lines x 480 H lines (less than 1 meter/pixel at .5 km swath)
Lenses:	3 - 8.5 mm C mount with adjustable iris (approximately 1:1.1 altitude to FOV)
Filter type:	Interchangeable interference filters
Bands (nm):	Any 3 @ 10 nm bandwidth in the 400 - 1100 nm range
Output:	RS-170 multiplexed
Input:	1 - 2 ms pulse @ 50Hz (standard RC servo)
Data in:	TTL or RS-232 @ 9600 bps
Image Storage:	DVCR 640 H X 480 V each image

AIR-O-SPACE International Unmanned Aerial Vehicles (UAV's)

Stennis Space Center



**AIR-O-SPACE International
Building 2105
Stennis Space Center, Mississippi 39529
228-688-3371 FAX 228-688-7918**

AIR-O-SPACE International

Building 2105

Stennis Space Center, Mississippi 39529

228-688-3371 FAX 228-688-7918

Hand Launched UAV Description

- Auto Return Home Upon Loss of Link
- GPS Navigation with Moving Map
- Current Sensors include: 3-band Multispectral, 35mm SLR, Color Video
- Shippable via Fed-X and as check in luggage on commercial flights

AIR-O-SPACE International Use of Unmanned Aerial Vehicles (UAV's) for Aerial Remote Sensing

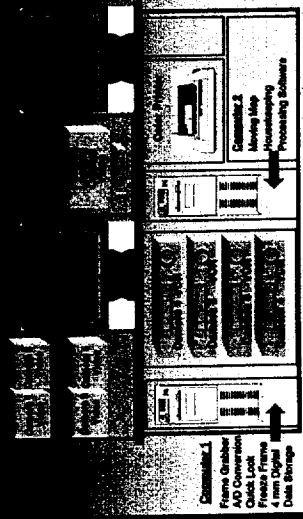
Large Scale UAV



Large Scale UAV Description

- Take-off and Landing: 1000 ft. x 100 ft.
- Auto Return Home Upon Loss of Link
- GPS Navigation with Moving Map
- Current Sensors Include: 4-band Multispectral, 70mm Camera, Color Video

Mobile Ground Station for Large Scale UAV



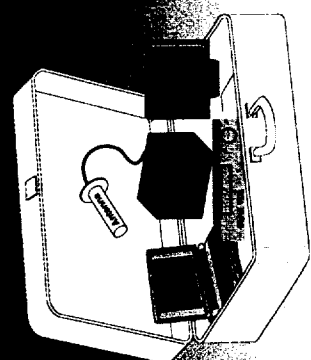
Hand Launched UAV



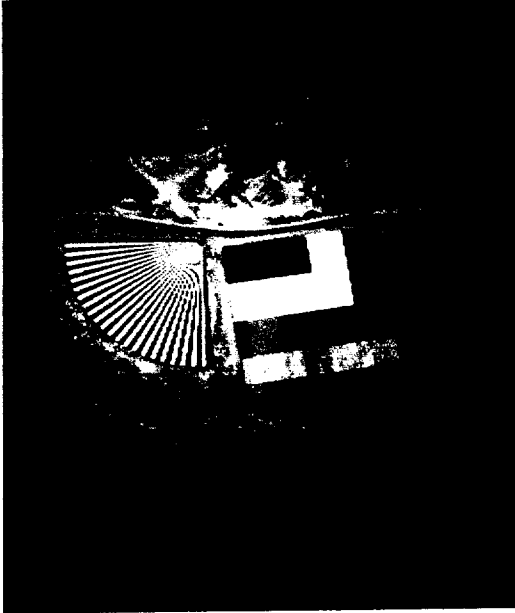
Hand Launched UAV Description

- Auto Return Home Upon Loss of Link
- GPS Navigation with Moving Map
- Current Sensors Include: 3-band Multispectral, 35mm SLR, Color Video
- Shippable via Fed-X and as check in luggage on commercial flights

"Suit Case" Ground Station for Hand Launched UAV



Unmanned Aerial Vehicle (UAV) technology represents a technical and economic revolution in the current process of spatial data acquisition. UAV's have the capability to merge the powerful science of remote sensing with the multimillion-dollar market of desktop mapping.



The AIR-O-SPACE unmanned, airborne vehicle remote-sensing system is a mobile, self-contained system capable of operating in remote areas and providing high-resolution (1-ft. and less) data and quick-look, processed data in real-and near-real-time.

Data Acquisition

Multispectral Sensor System Specification

Image Area:	(ft.)	(ft.)	(ft.)
900	200.0	412.5	
1000	1100.0	400.0	
1500	1000.0	1307.2	
2000	1000.0	1000.0	

Exhibit 2

Experimental Operator License is Required to Fulfill Government Contracts and Research Programs

- **NASA Phase I SBIR Contract #NAS13-98026**
 - *Contract Cover Page*
 - *Modification of Novated Contract*
 - *Related Proposal Summary Page*
- **NASA Earth Sciences Proposal "Detection and Monitoring of Physiological Stress in Crops by Narrow-Band Reflectance, Solar-Excited Fluorescence and Polarimetry"**
 - *Proposal Cover that Demonstrates Air-O-Space Collaboration with HL-UAV Imaging System*
 - *Sample Imagery Included in Proposal*

1. CONTRACT NO. NAS13-98026

2. EFFECTIVE DATE: 4/10/98

3. ISSUING AGENCY: NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Procurement Office/Code DA40
John C. Stennis Space Center
Stennis Space Center, MS 39529-6000

4. Issuing Office Code: DA40

5. Paying Office Code: See Part A, Para. 4

6. DPAS DO-C9

7. Init. Ofc.: Code TA00

8. PPC: HS

9. TPA [_]

10. BVS [NO]

11. Procurement Request No.: J98098, Basic (1F)

12. Vendor Code: 3004528

13. Incr. Funding [N/A]

14. Accounting and Appropriation Data: 808/90110 253-01-00-00-00-64-98-00-00-29-U500-00-2550

15. Contract Type: Firm-fixed-price

16. Submit Invoices To: See Part A, Para. 4

17. Administered By: Same as Block 3.

18. Name, Code, Telephone Number of NASA Contract Administrator:

Frank Oerting/Code DA40/(228)688-1638

19. Items Awarded Under This Contract:

Small Business Innovation Research (SBIR) 97 Phase I Research Study identified in
Part A, Paragraph 1

20. Contractor Name and Address:

Sky High RPA's, LLC
8058 Laurel Lane
Denton, MD 21629

21. Name and Telephone No. of Contract Administrator

Sky High RPA's, LLC Todd McNamee (410) 479-4985

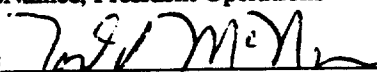
22. Discount Terms: Net 30

23. Contract Value \$70,000.00

24. Name and Title of Person Authorized to Sign

Todd McNamee, President Operations

25. Signature



26. Date

4/3/98

27. UNITED STATES OF AMERICA By

28. Contracting Officer Name: Harold G. Taulbee

29. Signature



30. Date

4/7/98

31. THIS CONTRACT IS AWARDED UNDER THE NASA MIDRANGE PILOT
TEST PROGRAM APPROVED BY THE OFFICE OF FEDERAL PROCUREMENT
POLICY.

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT		1 CONTRACT ID CODE	PAGE OF PAGES 1 1
2 AMENDMENT/MODIFICATION NO. 1	3 EFFECTIVE DATE JUL 10 1998	4 REQUISITION/PURCHASE REQ. NO. N/A	5 PROJECT NO. (If applicable)
ISSUED BY	CODE 64	7. ADMINISTERED BY (If other than Item 6)	CODE
NASA Procurement Office/Code DA10 John C. Stennis Space Center Stennis Space Center, MS 39529-6000 Attn: Frank Oerting (601) 688-1638			
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State, and Zip Code)		(x)	9A. AMENDMENT OF SOLICITATION NO.
AIR-O-SPACE International, LLC Building 2105, Room 103B Stennis Space Center, MS 39529-6000			9B. DATED (SEE ITEM 11)
TIN: 64-0886471			10A. MODIFICATION OF CONTRACT/ORDER NO.
		X	NAS13-98026
			10B. DATED (SEE ITEM 13)
			April 10, 1998
CODE 3004839	FACILITY CODE 64		

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

- (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

N/A

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(x)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
X	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)

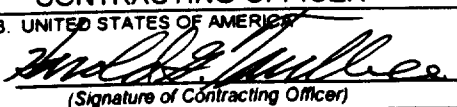
E. IMPORTANT: Contractor ☒ is not, ☐ is required to sign this document and return 3 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The purpose of this revision is to recognize a successor in interest whereby Sky High RPA's, LLC (Transferor) has transferred to Air-O-Space International, LLC (Transferee) the entire portion of the assets involved in performing this contract. A novation agreement has been executed. Contract NAS13-98026 is the only contract affected.

The total amount of the contract and all other terms and conditions remain unchanged.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
		HAROLD G. TAULBEE CONTRACTING OFFICER	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY 	16C. DATE SIGNED 7/10/98
(Signature of person authorized to sign)		(Signature of Contracting Officer)	

Form 9.B Project Summary 1997 NASA SBIR Phase I Proposal

Proposal Number: 97-1 14.02-3732

Electronic Reference Number: 100773

Project Title: Miniaturized multispectral imaging system for small portable UAV

Technical Abstract (Limit 200 words)

The innovation is a miniaturized Multispectral Imaging Sensor System for use on small UAV's for aerial remote sensing of the environment. The airborne sensor will provide imagery in the 400-1100 nm range with 10 nm spectral resolution, less than 1 meter spatial resolution at 0.5 km swath, and weigh 2 kg or less. Filters will be selectable and interchangeable for specific applications. A character generator may be incorporated to insert important information for post processing into each frame of video. All data will be transmitted and stored on the ground at the point of operation.

The system is meant for integration into small UAV's, as such flexibility and timeliness will be dramatically increased for data collection of coastal regions and almost anywhere else as a result of this innovation. Incorporating this system into a small UAV will have the advantage of reduced operating costs and quick transport for data collection. A small UAV is able to operate in many more areas than larger UAVs because the operating area necessary for take off and landing is significantly less. Systems such as these will further increase the remote sensing capability of NASA and other government agencies.

Potential Commercial Applications (Limit 200 words)

Commercial applications of this technology include the production of sensor systems capable of integration into low cost and small fixed, free or rotary wing UAV's. They can be used in aerial remote sensing applications for agriculture and water systems as well as other commercial aerial imagery requirements such as environmental clean up monitoring, and land management and maintenance.

Name and Address of Principal Investigator (Name, Organization Name, Mail Address, City/State/Zip)

Robert Lahnemann
Sky High RPA's, LLC
8673 Commerce Dr, #4
Easton , MD 21601

Name and Address of Offeror (Firm Name, Mail Address, City/State/Zip)

Robert Lahnemann
Sky High RPA's, LLC
8673 Commerce Dr, #4
Easton , MD 21601

A Proposal to the
National Aeronautics and Space Administration
Office of Earth Science

**DETECTION AND MONITORING OF PHYSIOLOGICAL STRESS IN CROPS
BY NARROW-BAND REFLECTANCE, SOLAR-EXCITED FLUORESCENCE
AND POLARIMETRY**

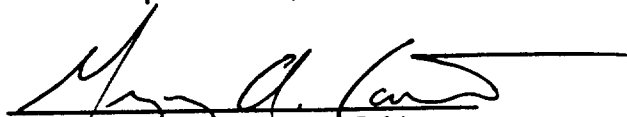
Principal Investigator: Gregory A. Carter (NASA, Stennis Space Center,
MS)

Co-Investigators: James S. Schepers (USDA-ARS, Lincoln, NE)
J. Ray Williford (USDA-ARS, Stoneville, MS)
Andrew Freedman (Aerodyne Research, Inc.,
Billerica, MA)
Frank J. Iannarilli, Jr. (Aerodyne Research, Inc.,
Billerica, MA)

Collaborators: Robert Lahnemann (Air-O-Space Intl., Stennis
Space Center, MS)
Todd McNamee (Air-O-Space Intl., Stennis
Space Center, MS)

Proposed Budget: \$ 598,971

Submitted:
September 8, 1998



Gregory A. Carter (P.I.)
Earth System Science Office
NASA, Stennis Space Center, MS 39529

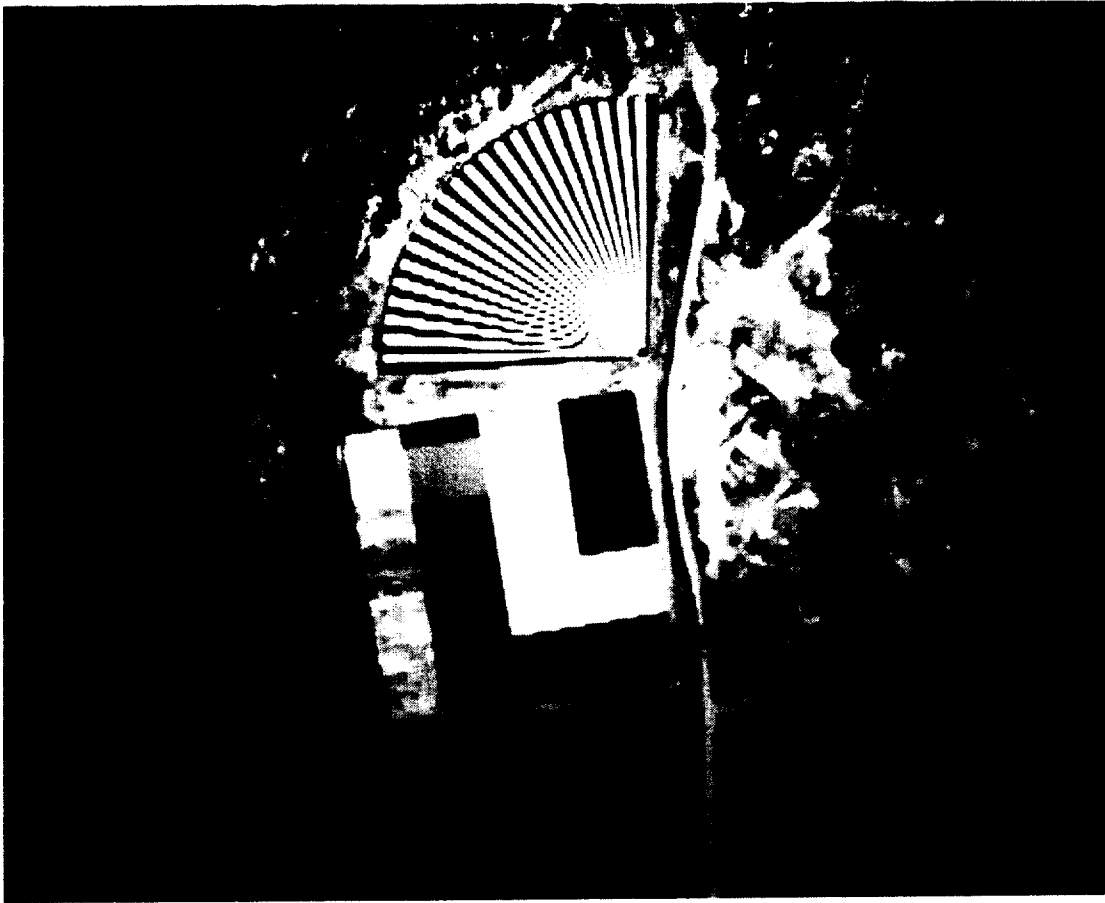


Image of the Stennis Space Center Validation and Verification Site in the 820 ± 5 nm band acquired by the Air-O-Space Miniaturized Multispectral Imaging System. Flight altitude was 2,000 ft. Printer resolution was 600 d.p.i.