

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER
HOUSTON, TX 77058**

COST REIMBURSABLE INDEFINITE-DELIVERY
COST PLUS FIXED FEE DELIVERY ORDER
University of Alabama at Birmingham Center
Contract NNJ05HB42B

<i>Delivery Order Number</i>	<i>Amendment Number</i>	<i>Purchase Request Number</i>
38	7	Funded at Contract Level
<i>SOW WBS</i>	<i>Fiscal Year</i>	<i>Technical Monitor/Division/Extension</i>
	FY10	COTR: Ralph Marak/EC ext:3-9144 Sharon Campana/EC2 ext:4-5508

Delivery Order Title

GLACIER

Description/Purpose

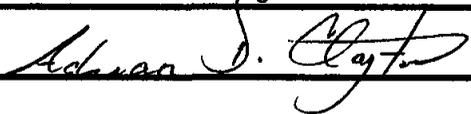
This delivery order revision is to extend the period of performance from March 1, 2010 to September 31, 2010. (June 26, 2008 to September 31, 2010)

The contractor shall perform the subject delivery in accordance with delivery order description.

Summary	Previous	This Action	Current Value
		(Rev 7)	
Cost	b4	b4	b4
Fee			
TOTAL	\$ 4,338,846.34	-	\$ 4,338,846.34

THE CONTRACTOR IS NOT AUTHORIZED TO EXCEED THE DELIVERY ORDER VALUE SPECIFIED HEREIN. THIS IS A COST PLUS FIXED FEE DELIVERY ORDER.

NASA Approval

<i>Contracting Officer</i>	<i>Signature</i>	<i>Date</i>
Adrian D. Clayton		2-16-2010

NNJ05HB42B - UNIVERSITY OF ALABAMA AT BIRMINGHAM

Delivery Order 7

FFP

\$ *b4*

\$

	DATE	ACTION TOTAL	FEE %	DO VALUE		CUM TOTAL	NOTES
				COST	FEE		
DO 7	08/26/05	\$ <i>b4</i>	<i>b4</i>	\$ <i>b4</i>	\$ -	<i>b4</i>	
		TOTAL		\$ 8,908			

Delivery Order 16

Cost Total

\$ *b4*

Fee Total

\$

Total Cost & Fee \$ 3,790,473.17

	DATE	ACTION TOTAL	FEE %	DO VALUE		CUM TOTAL	NOTES
				COST	FEE		
DO 16	09/19/06						
DO 16 R1	05/15/08						
DO 16 R2	08/07/07	<i>b4</i>	<i>b4</i>	<i>b4</i>	<i>b4</i>	<i>b4</i>	<i>b4</i>
DO 16 R3	12/17/08						
DO 16 R4	07/21/09						
DO 16 R5	11/06/09						
DO 16 R6	12/28/09						
DO 16 R7	02/11/09						
		TOTAL		\$ 3,790,473.17	\$ -		

Delivery Order 38

Cost Total

\$ *b4*

Fee Total

\$

Total Cost & Fee \$ 4,338,846.34

	DATE	ACTION TOTAL	FEE %	DO VALUE		CUM TOTAL	NOTES
				COST	FEE		
DO 38	06/26/08						
DO 38 R1	12/15/08						
DO 38 R2	08/07/09	<i>b4</i>	<i>b4</i>	<i>b4</i>	<i>b4</i>	<i>b4</i>	
DO 38 R3	08/19/09						
DO 38 R4	08/20/09						
DO 38 R5	11/17/09						
DO 38 R6	12/28/09						
DO 38 R7	02/12/10						
		TOTAL		\$ 4,338,846.34	\$ -		

TOTAL CONTRACT VALUE \$ 8,138,227.51 \$ - \$ 8,138,227.51

CURRENT TOTAL FUNDING

REMAINDER

b4

b4

b4

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER
HOUSTON, TX 77058**

COST REIMBURSABLE INDEFINITE-DELIVERY
COST PLUS FIXED FEE DELIVERY ORDER
University of Alabama at Birmingham Center
Contract NNJ05HB42B

<i>Delivery Order Number</i>	<i>Amendment Number</i>	<i>Purchase Request Number</i>
38	6	Funded at Contract Level
<i>SOW WBS</i>	<i>Fiscal Year</i>	<i>Technical Monitor/Division/Extension</i>
	FY10	COTR: Ralph Marak/EC ext:3-9144 Sharon Campana/EC2 ext:4-5508

Delivery Order Title

GLACIER

Description/Purpose

This delivery order revision is to execute Option # 7 on the contract will be exercised for 3 months (January 2010 – March 2010).

The contractor shall perform the subject delivery in accordance with delivery order description.

Summary	Previous	This Action	Current Value
		(Rev 5)	
Cost	b4	b4	b4
Fee			
TOTAL	\$ 4,323,196.34	\$ 15,650.00	\$ 4,338,846.34

THE CONTRACTOR IS NOT AUTHORIZED TO EXCEED THE DELIVERY ORDER VALUE SPECIFIED HEREIN. THIS IS A COST PLUS FIXED FEE DELIVERY ORDER.

NASA Approval

<i>Contracting Officer</i>	<i>Signature</i>	<i>Date</i>
J.R. CARPENTIER, C.O.		12-28-09

NNJ05HB42B - UNIVERSITY OF ALABAMA AT BIRMINGHAM

Delivery Order 7
FFP

\$ 64
\$ 64

	DATE	DO VALUE				
		ACTION TOTAL	FEE %	COST	FEE	CUM TOTAL
DO 7	08/26/05	\$ 64	64	\$ 64	\$ 64	\$ 64
TOTAL				\$ 8,908		

NOTES

Delivery Order 16
Cost Total
Fee Total
Total Cost & Fee

64
\$ 3,400,473.01

	DATE	DO VALUE				
		ACTION TOTAL	FEE %	COST	FEE	CUM TOTAL
DO 16	09/19/06					
DO 16 R1	05/15/08					
DO 16 R2	08/07/07	64	64	64	64	64
DO 16 R3	12/17/08					
DO 16 R4	07/21/09					
DO 16 R5	11/06/09					
TOTAL				\$ 3,400,473.01	\$ -	

Delivery Order 38
Cost Total
Fee Total
Total Cost & Fee

64
\$ 4,338,846.34

	DATE	DO VALUE				
		ACTION TOTAL	FEE %	COST	FEE	CUM. TOTAL
DO 38	06/26/0					
DO 38 R1	12/15/01					
DO 38 R2	08/07/09					
DO 38 R3	08/19/09	64	64	64	64	64
DO 38 R4	08/20/09					
DO 38 R5	11/17/09					
DO 38 R6	12/28/09					
TOTAL				\$ 4,338,846.34	\$ -	

TOTAL CONTRACT VALUE: \$ 7,748,227.35 \$ - \$ 7,748,227.35
 CURRENT TOTAL FUNDING:
 REMAINDER

64 64

64

TOTAL ESTIMATED LABOR COST- UAB/CBSE		
CRAVE DO-38, Rev 5- Task 2 Option 7		
3 months FY10 ROCC Support		
OTHER DIRECT COSTS (by FY)		
Note: ODCs are separated by FY to accommodate the different burden rates established for these years.		<i>Materials</i>
		<i>Equipment</i>
		<i>Travel (FY07-FY10)</i>
		<i>Supplies</i>
		<i>Other</i>
		<i>Subcontractor (FY09)</i>
		<i>Subcontractor (FY10)</i>
		TOTAL
ODC Burdens (example G&A)		
		Rate
	<i>Travel/Other F&A</i>	<i>bf</i>
	<i>* Subcontracts F&A</i>	
	<i>* bf</i>	
		TOTAL ODC Burden
		TOTAL Non-labor
	percent	total proposed dollars
FEE *		
		\$ 15,649.68

*Note: Fee shall not exceed NTE Fee Rate

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 LYNDON B. JOHNSON SPACE CENTER
 HOUSTON, TX 77058**

COST REIMBURSABLE INDEFINITE-DELIVERY
 COST PLUS FIXED FEE DELIVERY ORDER
 University of Alabama at Birmingham Center
 Contract NNJ05HB42B

<i>Task Order Number</i>	<i>Amendment Number</i>	<i>Purchase Request Number</i>
38	5	Funded at Contract Level
<i>SOW WBS</i>	<i>Fiscal Year</i>	<i>Technical Monitor/Division/Extension</i>
	FY09	COTR: Ralph Marak/EC ext:3-9144 Sharon Campana/EC2 ext:4-5508

Task Order Title

GLACIER

Description/Purpose

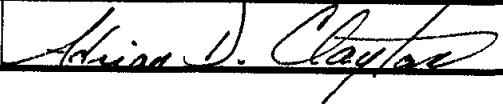
This delivery order revision is to include fabrication of spare Type V Trays, water lines, fan blower motor assemblies, and volume compensators. Execute Option # 2 for ULF5. Option # 7 on the contract will be exercised for 3 months (Oct-Dec).

The contractor shall perform the subject tasks in accordance with delivery order description.

Summary	Previous	This Action	Current Value
		(Rev 5)	
Cost	bf	bf	bf
Fee			
TOTAL	\$ 3,844,023.60	\$ 479,172.74	\$ 4,323,196.34

THE CONTRACTOR IS NOT AUTHORIZED TO EXCEED THE TASK ORDER VALUE SPECIFIED HEREIN. THIS IS A COST PLUS FIXED FEE TASK ORDER.

NASA Approval

<i>Contracting Officer</i>	<i>Signature</i>	<i>Date</i>
Adrian Clayton		12-02-2009

NNJ05HB42B - UNIVERSITY OF ALABAMA AT BIRMINGHAM

Delivery Order 7
FFP

\$ b4
\$ b4

	DATE	DO VALUE					NOTES
		ACTION TOTAL	FEE %	COST	FEE	CUM. TOTAL	
DO 7	08/26/05	\$ b4	b4	\$ b4	b4	b4	
		TOTAL		\$ 8,908			

Delivery Order 16
Cost Total
Fee Total
Total Cost & Fee

b4
\$ 3,400,473.01

	DATE	DO VALUE				
		ACTION TOTAL	FEE %	COST	FEE	CUM. TOTAL
DO 16	09/19/06					
DO 16 R1	05/15/08					
DO 16 R2	08/07/07	b4	b4	b4	b4	b4
DO 16 R3	12/17/08					
DO 16 R4	07/21/09					
DO 16 R5	11/06/09					
		TOTAL		\$ 3,400,473.01	\$ -	

Delivery Order 38
Cost Total
Fee Total
Total Cost & Fee

\$ 4,323,196.34

	DATE	DO VALUE				
		ACTION TOTAL	FEE %	COST	FEE	CUM. TOTAL
DO 38	06/26/08					
DO 38 R1	12/15/08					
DO 38 R2	08/07/09	b4	b4	b4	b4	b4
DO 38 R3	08/19/09					
DO 38 R4	08/20/09					
DO 38 R5	11/17/09					
		TOTAL		\$ 4,323,196.34	\$ -	

TOTAL CONTRACT VALUE: \$ 7,732,577.35 \$ - \$ 7,732,577.35
CURRENT TOTAL FUNDING
REMAINDER: b4

b4 b4

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER
HOUSTON, TX 77058**

COST REIMBURSABLE INDEFINITE-DELIVERY
COST PLUS FIXED FEE DELIVERY ORDER
University of Alabama at Birmingham Center
Contract NNJ05HB42B

<i>Task Order Number</i>	<i>Amendment Number</i>	<i>Purchase Request Number</i>
38	3	Funded at Contract Level
<i>SOW WBS</i>	<i>Fiscal Year</i>	<i>Technical Monitor/Division/Extension</i>
	FY09	COTR: Ralph Marak/EC ext:3-9144 Sharon Campana/EC2 ext:4-5508

Task Order Title

GLACIER

Description/Purpose

This delivery order revision is issued to exercise option #8 as incorporated under revision #2 of this contract. This option is exercised for the following flights: 1) 19A (STS 131) & ULF4 (STS 132).

The contractor shall perform the subject tasks in accordance with delivery order description.

Summary	Previous	This Action	Current Value
		(Rev 3)	
Cost	b4	b4	b4
Fee			
TOTAL	\$ 3,687,023.40	\$ 78,500.10	\$ 3,765,523.50

THE CONTRACTOR IS NOT AUTHORIZED TO EXCEED THE TASK ORDER VALUE SPECIFIED HEREIN. THIS IS A COST PLUS FIXED FEE TASK ORDER.

NASA Approval

<i>Contracting Officer</i>	<i>Signature</i>	<i>Date</i>
RONALD JOHNSON	Ronald Johnson	8/20/

Overhead Template (Composition of Burden Pool)

Company Name UAB/CBSE [] Prime [] Subcontractor

Overhead or Service Center Pool = Non-faculty Base of Application = Labor

* Specify Type of Overhead Burden: Labor, Onsite, Offsite, Engineering, Procurement, Service Center(s), etc.

OFFEROR'S FISCAL YEAR BEGINS OCTOBER 1 AND ENDS SEPTEMBER 30

Cost Elements within the Overhead Burden Pool	Contractor Fiscal Year Pnor Yr 3	Contractor Fiscal Year Pnor Yr 2	Contractor Fiscal Year Pnor Yr 1	Contractor Fiscal Year FY10	Contractor Fiscal Year FY11	Contractor Fiscal Year FY12	Contractor Fiscal Year FY13	Contractor Fiscal Year FY14
Payroll Taxes								
Fringes								
Retirement (Teacher's)								
Health Insurance								
Paid Leave								
Life Insurance and AD&D								
Other- TIAA/CREF								
Other (Identify)								
Salary Continuation Insurance								
State Unemployment Insurance								
On the job injury								
Educational Assistance								
Terminal Vacation Pay								
Employee Training								
New Employee Orientation								
Employee Assistance								
Total Overhead Pool Expenses								
Application Base (\$)								
Contractor FY Rate (%)								
Contractor FY Ceiling Rate (%)								
CONVERSION OF BURDEN RATE TO CONTRACT YEAR				Contract Year 1	Contract Year 2	Contract Year 3	Contract Year 4	Contract Year 5
Proposed Contract Year Rate								
Proposed Contract Year Ceiling Rate								

* NOTE: Fringe rate is estimated from prior year's data for the next year, creating a two year "lag". Contract Year 1 rate is projected for the contract duration.

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 LYNDON B. JOHNSON SPACE CENTER
 HOUSTON, TX 77058**

COST REIMBURSABLE INDEFINITE-DELIVERY
 COST PLUS FIXED FEE DELIVERY ORDER
 University of Alabama at Birmingham Center
 Contract NNJ05HB42B

<i>Task Order Number</i>	<i>Amendment Number</i>	<i>Purchase Request Number</i>
38	4	Funded at Contract Level
<i>SOW WBS</i>	<i>Fiscal Year</i>	<i>Technical Monitor/Division/Extension</i>
	FY09	COTR: Ralph Marak/EC ext:3-9144 Sharon Campana/EC2 ext:4-5508

Task Order Title

GLACIER

Description/Purpose

This delivery order revision is issued to correct revision #2. Option #8 is hereby exercised for the following flights: 1) 19A (STS-131) & ULF-5 (STS-133).

The contractor shall perform the subject tasks in accordance with delivery order description.

Summary	Previous	This Action	Current Value
		(Rev 3)	
Cost			
Fee			
TOTAL	\$ 3,765,523.50	\$ 78,500.10	\$ 3,844,023.60

THE CONTRACTOR IS NOT AUTHORIZED TO EXCEED THE TASK ORDER VALUE SPECIFIED HEREIN. THIS IS A COST PLUS FIXED FEE TASK ORDER.

NASA Approval

<i>Contracting Officer</i>	<i>Signature</i>	<i>Date</i>
Ronald Johnson	<i>Ronald Johnson</i>	9/9/09

NNJ05HB42B - UNIVERSITY OF ALABAMA AT BIRMINGHAM

Delivery Order 7		DO VALUE					NOTES
FFP	\$	ACTION TOTAL	FEE %	COST	FEE	CUM. TOTAL	
	\$						
	\$						
	DATE						
DO 7	08/26/05	\$ 64	64	\$ 64	64	64	
		TOTAL		\$ 8,908			
Delivery Order 16		DO VALUE					
Cost Total	\$ 3,367,572.31						
Fee Total	\$ -						
Total Cost & Fee	\$ 3,367,572.31						
	DATE	ACTION TOTAL	FEE %	COST	FEE	CUM. TOTAL	
DO 16	09/19/06						
DO 16 R1	05/15/08						
DO 16 R2	08/07/07						
DO 16 R3	12/17/08						
DO 16 R4	07/21/09						
		TOTAL		\$ 3,367,572.31	\$ -		
Delivery Order 38		DO VALUE					
Cost Total	\$ 3,844,023.60						
Fee Total	\$ -						
Total Cost & Fee	\$ 3,844,023.60						
	DATE	ACTION TOTAL	FEE %	COST	FEE	CUM. TOTAL	
DO 38	06/26/08						
DO 38 R1	12/15/08						
DO 38 R2	08/07/09						
DO 38 R3	08/19/09						
DO 38 R4	08/20/09						
		TOTAL		\$ 3,844,023.60	\$ -		
TOTAL CONTRACT VALUE.				\$ 7,220,503.91	\$ -	\$ 7,220,503.91	
CURRENT TOTAL FUNDING:							
REMAINDER.							

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 LYNDON B. JOHNSON SPACE CENTER
 HOUSTON, TX 77058**

COST REIMBURSABLE INDEFINITE-DELIVERY
 COST PLUS FIXED FEE DELIVERY ORDER
 University of Alabama at Birmingham Center
 Contract NNJ05HB42B

<i>Task Order Number</i>	<i>Amendment Number</i>	<i>Purchase Request Number</i>
38	3	Funded at Contract Level
<i>SOW WBS</i>	<i>Fiscal Year</i>	<i>Technical Monitor/Division/Extension</i>
	FY09	COTR: Ralph Marak/EC ext:3-9144 Sharon Campana/EC2 ext:4-5508

Task Order Title

GLACIER

Description/Purpose

This delivery order revision is issued to exercise option #8 as incorporated under revision #2 of this contract. This option is exercised for the following flights: 1) 19A (STS 131) & ULF4 (STS 132).

The contractor shall perform the subject tasks in accordance with delivery order description.

Summary	Previous	This Action	Current Value
		(Rev 3)	
Cost	b4	b4	b4
Fee			
TOTAL	\$ 3,687,023.40	\$ 78,500.10	\$ 3,765,523.50

THE CONTRACTOR IS NOT AUTHORIZED TO EXCEED THE TASK ORDER VALUE SPECIFIED HEREIN. THIS IS A COST PLUS FIXED FEE TASK ORDER.

NASA Approval

<i>Contracting Officer</i>	<i>Signature</i>	<i>Date</i>
RONALD JOHNSON	Ronald Johnson	8/20/09

NNJ05HB42B - UNIVERSITY OF ALABAMA AT BIRMINGHAM

Delivery Order 7
FFP

b4

	DATE	ACTION		DO VALUE			NOTES
		TOTAL	FEE %	COST	FEE	CUM TOTAL	
DO 7	08/26/05	\$ b4	b4	b4	b4	b4	
		TOTAL		\$ 8,908			

Delivery Order 16

Cost Total

Fee Total

Total Cost & Fee \$ 3,367,572 31

b4

	DATE	ACTION		DO VALUE		
		TOTAL	FEE %	COST	FEE	CUM. TOTAL
DO 16	09/19/06					
DO 16 R1	05/15/08	b4	b4	b4	b4	b4
DO 16 R2	08/07/07					
DO 16 R3	12/17/08					
DO 16 R4	07/21/09					
		TOTAL		\$ 3,367,572 31	\$ -	

Delivery Order 38

Cost Total \$ 3,765,523.50

Fee Total \$ -

Total Cost & Fee \$ 3,765,523.50

	DATE	ACTION		DO VALUE		
		TOTAL	FEE %	COST	FEE	CUM. TOTAL
DO 38	06/26/08					
DO 38 R1	12/15/08	b4	b4	b4	b4	b4
DO 38 R2	08/07/09					
DO 38 R3	08/19/09					
		TOTAL		\$ 3,765,523.50	\$ -	

TOTAL CONTRACT VALUE- \$ 7,142,003 81 \$ - \$ 7,142,003 81

CURRENT TOTAL FUNDING:

REMAINDER.

b4

MOD #	COST	FEE	Running Cost	Running Fee	CUM FUNDING	Running Total	Notes
1							Admin Change K no
2							includes other admin chgs
3							includes CV on DO 7
4							Admin: wage determination
5							Admin delete/replace drd 40
6							funds slated: DO 16
7							funds slated: DO 16
8							Admin: wage determination
9							funds slated: DO 16
10							funds slated: DO 16
11							funds slated: DO 16
12							Admin: add NFS Security clause
13							funds slated: DO 16
14							funds slated: DO 16
15							funds slated: DO 16
16							funds slated: DO 16
17							Admin: wage determination
18							funds slated: DO 16
19							Admin: NFS clauses, paying office
20							funds slated: DO 38
21							funds slated: DO 16
22							funds slated: DO 16 (232,801.80) /
23							DO 38 (200,000)
24							Admin: NFS clause change
25							funds slated: DO 16 (150k) / DO38
26							(190k)
27							Admin: wage determination
28							Admin: correct recapitulation
29							funds slated: DO 38
30							funds slated: DO 38
31							DO 16

b4

TOTAL
FIRM FIXED PRICE \$

RECAPITULATION OF FUNDING

	Prior Funding	This Action (Mod 30)	Cumulative Funding
Firm Fixed Price	\$		
Cost	\$ b4	b4	b4
Fee	\$ -	\$ -	\$ -
Total	\$ 3,558,318.80	\$ 620,000.00	\$ 4,178,318.80

NNJ05HB42B - UNIVERSITY OF ALABAMA AT BIRMINGHAM

Delivery Order 7

FFP

\$

\$

b4

	DATE	DO VALUE					NOTES
		ACTION TOTAL	FEE %	COST	FEE	CUM TOTAL	
DO 7	08/26/05	\$ b4	b4	\$ b4	\$ b4	\$ b4	
		TOTAL		\$ 8,908			

Delivery Order 16

Cost Total

Fee Total

Total Cost & Fee \$3,367,572.31

b4

	DATE	DO VALUE				
		ACTION TOTAL	FEE %	COST	FEE	CUM TOTAL
DO 16	09/19/06					
DO 16 R1	05/15/08					
DO 16 R2	08/07/07					
DO 16 R3	12/17/08					
DO 16 R4	07/21/09					
		TOTAL		\$3,367,572.31	\$ -	

b4

Delivery Order 38

Cost Total

Fee Total

Total Cost & Fee \$3,687,023.40

b4

	DATE	DO VALUE				
		ACTION TOTAL	FEE %	COST	FEE	CUM TOTAL
DO 38	06/26/08					
DO 38 R1	12/15/08					
DO 38 R2	08/07/09					
		TOTAL		\$3,687,023.40	\$ -	

b4

TOTAL CONTRACT VALUE \$7,063,503.71 \$ - \$7,063,503.71

CURRENT TOTAL FUNDING

REMAINDER:

b4

TOTAL ESTIMATED LABOR COST- UAB/CBSE		\$
CRAVE DO-38, Rev. 2- Option 8		
Additional Unit I & V		
OTHER DIRECT COSTS (by FY)		
Note: ODCs are separated by FY to accommodate	<i>Materials</i>	\$
the different burden rates established for these years.	<i>Equipment</i>	\$
		\$
	<i>Travel (FY07-FY10)</i>	\$
	<i>Supplies</i>	\$
	<i>Other</i>	\$
	<i>Subcontractor (FY09)</i>	\$
	<i>Subcontractor (FY10)</i>	\$
	TOTAL	\$
ODC Burdens (example G&A)		
	Rate	
	<i>Travel/Other F&A</i>	\$
	<i>Subcontracts F&A</i>	\$
	TOTAL ODC Burden	\$
	TOTAL Non-labor	\$
	percent	total proposed dollars
FEE *		
		\$ 78,500.10

bt

*Note: Fee shall not exceed NTE Fee Rate

Item	Estimated Cost
Hardware Parts	\$ -
Input Item Here	\$ -
TOTAL Materials	\$ -

National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, TX 77058

ORDER FOR SUPPLIES OR SERVICES

Page 1 of 2

Order No NNJ05HB42B, DO38 Rev 1	2 Date of Order See Block 10 Below	NOTE: MARK ALL PACKAGES AND PAPERS WITH ORDER NO Certified for National Defense under DPAS (15 CFR 700) DO-C9
3. Issuing Office: NASA Johnson Space Center, 2101 Nasa Parkway Houston, TX 77058-3696 Org /Buyer BH2/Mary Thomas Tel No 281-483-9828 Fax 281-244-0995 E-mail mary.f.thomas@nasa.gov		4 Ship To Transportation Officer, Building 421 NASA Johnson Space Center Houston, TX 77058-3696 Mark For Accountable Property Order No NNJ05HB42B, DO38 Rev 1
5 Contractor: University of Alabama @ Birmingham Center Attn Lee Moradi 1530 3 rd Avenue South Birmingham, Alabama 35294-4400 Phone 205-975-2718 x Fax 205-975-1709 TIN: 63-6005396 CAGE CODE 0DV74		6 Deliver On or Before 7/1/08 to 12/31/09 F O.B. Point Destination Discount Terms Net 30 Days 7 BILLING ADDRESS NASA Johnson Space Center Attn LF231/Accounts Payable Group Houston, TX 77058-3696 Order No NNJ05HB42B, DO38 Rev 1

8 Type of Order:
 PURCHASE Please furnish the following in accordance with the conditions specified on this order Reference _____
 DELIVERY Except for the Terms and Conditions of Purchase Order listed on the following page, this delivery order is subject to instructions contained on this form and is issued subject to the terms and conditions of contract number _____

9 Written acceptance of this order by contractor <input type="checkbox"/> is, <input checked="" type="checkbox"/> is not required Sign below if required and return to contracting officer Name: _____ (Person authorized to sign) Signature _____ Date _____	10 Name: <u>Ronald Johnson</u> Signature <u>Ronald Johnson</u> Date <u>12/15/08</u> CONTRACTING OFFICER
---	---

11 Schedule

ITEM NO	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED																					
1	Revision 1 to DO 38 is issued to exercise Option 2 for two flights Flight ULF3 Flight 20A RECAP OF DO VALUE <table style="width:100%; margin-top: 10px;"> <tr> <td style="width:15%;"></td> <td style="width:15%;">PRIOR</td> <td style="width:15%;">THIS ACTION</td> <td style="width:15%;">CUM VALUE</td> <td colspan="3"></td> </tr> <tr> <td>COST FEE</td> <td></td> <td style="text-align: center;">b4</td> <td></td> <td colspan="3"></td> </tr> <tr> <td>TOTAL</td> <td style="text-align: right;">\$1,555,851.36</td> <td style="text-align: right;">\$661,998.04</td> <td style="text-align: right;">\$2,217,849.40</td> <td colspan="3"></td> </tr> </table>		PRIOR	THIS ACTION	CUM VALUE				COST FEE		b4					TOTAL	\$1,555,851.36	\$661,998.04	\$2,217,849.40						b4		
	PRIOR	THIS ACTION	CUM VALUE																								
COST FEE		b4																									
TOTAL	\$1,555,851.36	\$661,998.04	\$2,217,849.40																								

12 For JSC Internal Use Only Requisition No <u>N/A</u> <input type="checkbox"/> COMP <input type="checkbox"/> PART PPC _____ Issue To <u>EC/Ralph Marak, x39144</u> For <u>EC2/Sharon Campana, x45508</u>	13 Total \$ NTE. \$2,217,849.40
---	------------------------------------

14 Quantities in "Quantity Accepted" Column Have Been
 INSPECTED ACCEPTED RECEIVED
 TO CONFORM TO THE CONTRACT ACCEPTANCE WILL BE AT JSC UNLESS OTHERWISE NOTED BY: _____
 Authorized U.S. Government Representative _____ Date _____

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER
HOUSTON, TX 77058**

COST REIMBURSABLE INDEFINITE-DELIVERY
COST PLUS FIXED FEE DELIVERY ORDER
University of Alabama at Birmingham Center
Contract NNJ05HB42B

<i>Task Order Number</i>	<i>Amendment Number</i>	<i>Purchase Request Number</i>
38	2	Funded at Contract Level
<i>SOW WBS</i>	<i>Fiscal Year</i>	<i>Technical Monitor/Division/Extension</i>
	FY09	COTR: Ralph Marak/EC ext:3-9144 Sharon Campana/EC2 ext:4-5508

Task Order Title

GLACIER

Description/Purpose

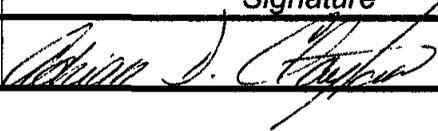
This delivery order: 1) identifies the scope of work to be performed during the period of performance beginning July 1, 2008 through December 31, 2010; 2) incorporates Option 7 and Option 8 within the delivery order description.

The contractor shall perform the subject tasks in accordance with the attached delivery order description.

Summary	Previous	This Action	Current Value
		(Rev 2)	
Cost	b4	b4	b4
Fee			-
TOTAL	\$ 2,217,849.40	\$ 1,469,174.00	\$ 3,687,023.40

THE CONTRACTOR IS NOT AUTHORIZED TO EXCEED THE TASK ORDER VALUE SPECIFIED HEREIN. THIS IS A COST PLUS FIXED FEE TASK ORDER.

NASA Approval

<i>Contracting Officer</i>	<i>Signature</i>	<i>Date</i>
Adrian D. Clayton Contracting Officer		8/7/2009

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

PROPOSAL INSTRUCTIONS: X DRAFT -- COMMENTS DUE BY: 6-12-2009
 FINAL -- PROPOSAL DUE BY: 6-17-2009

DO TITLE: Glacier Services
DO Type: X CPF FFP

DO Contact Information in Addition to the CRAVE Contract Specialist or CO:
TMR: Marie Kowal/EC2 Phone: (281) 483-8875
DO Manager: Sharon Campana/EC2 Phone: (281) 244-5508
DO Mgr. Alternate: Marie Kowal/EC2 Phone: (281) 483-8875

Concurrences:

<u> Sharon Campana/EC2 </u> DO Manager	<u> Marie Kowal/EC2 </u> DO Mgr. Management	<u> Ralph Marak </u> COTR
<u> Marie Kowal/EC2 </u> Division TMR	<u> Steve Miller </u> S & MA	<u> Name </u>

Task Contains Flight Hardware, Flight Software or GSE? X Yes No
Program Supported: X Shuttle X ISS EVA Advanced _____

WBS: 1.0 EVA 2.0 FCE 3.0 EVR ECLSS X 5.0 ATCS 6.0 CHcS

For purposes of complying with FAR 52.232-22, Limitation of Funds, the total amount allotted by the Government to contract is specified in clause B.6, Contract Funding. The funding listed in B.6 is the amount allotted for all Delivery Orders on the contract combined.

All terms and conditions of the contract apply to this Delivery Order. In the event of a conflict between the contract and this Delivery Order, the contract shall prevail.

WBS reporting shall be done in accordance with applicable WBS reporting categories, as shown above and in the contract within Section C, Table 1

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

Narrative Task Description

Background / Problem Description:

Glacier is double middeck locker size payload. It can be flown in the Middeck while maintaining -95 °C, or in an Express Rack where Glacier is capable of maintaining -160 °C. It will be used to transport temperature sensitive payloads to and from ISS. There are currently 4 Class I, 1 Class II, and 1 Class III Glacier systems in inventory. An additional 2 Class I units are planned by August 2009.

Glacier is planned to fly on every shuttle flight from ULF2 to shuttle retirement. Currently, only support of ULF2, 15A, 2 J/A, 17A, ULF3 and 20A have been contracted. This Delivery Order requests the additional services required to provide integration and verification tasks for additional shuttle mission 19A, ULF4, and ULF5 as well as provide sustaining and maintenance activities for all 8 Glacier units through December 2010. The Maintenance and Sustaining Engineering will be awarded on a fiscal year quarterly basis and the Integration and Operations will be awarded on a per mission basis.

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

Task Description:

1. Maintenance & Sustaining Engineering: Provide sustaining engineering activities for a total of 6 Glacier flight units (part number CBSE-F10060-1), 1 qualification unit, and 1 engineering unit. Tasks include:

- a. Maintain Acceptance Data Package, system logs, and user's manual
- b. Provide limited life items tracking
- c. Maintain calibration of all ground related equipment.
- d. Support anomaly resolution when required.
- e. Maintaining spare part and limited life inventory. Items requiring refurbishment include desiccant, desiccant canisters, batteries, fans and fan motors, fan shafts bearings, captive fasteners, small electrical and mechanical components.
- f. Support minor modifications (if any required) to Glacier in the event an experiment has a unique set of requirements not compatible with the existing Glacier design
- g. Provided post flight servicing, refurbishment and data recovery of the GLACIER system.
- h. Provide Constellation and COTS vehicle compatibility assessments, and if necessary, provided design modification proposals and verification requirement updates for new vehicle compatibility compliance.
- i. Provide GLACIER hardware testing and miscellaneous hardware evaluations when required.
- j. Provide 2 sets of ground handles to KSC for handling of Glacier while being transported to and from STS. Right Ground Lift Handle p/n CBSE-G40161-1 and Left Ground Lift Handle p/n CBSE-G40162-1
- k. Period of performance for M&S shall be through 12/31/2010
- l. Provide remote site operations support capability through 9/30/2009

2. Verification & Integration: Conduct all tasks required to provide flight readiness of Glacier Class I units for 3 flights 15A, 2J/A, and 17A. Contract option was executed for additional flights ULF3 and 20A per Revision 1. Revision 2 will be executed for additional flights 19A, ULF4, and ULF5 Glacier will go up active as a sortie Payload or will go up active in the Middeck, transfer to ISS, and the ISS Glacier will transfer to Middeck, and will be active in the Middeck during descent.

a. Flight Delivery

- 1. Maintaining a flight ready inventory – 2 Glacier units are required to be delivered to KSC at ~L-10 days for every active middeck launch. One unit will be used as the

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

prime and the other as a back-up in the event of launch delays. Upon launch, the second unit will be shipped back to the contractor.

2. Prepare necessary shipping paperwork and deliver hardware to KSC per launch schedule. Upon landing, Glacier will be returned the contractor location. An in place 1027 will be used as the quality document to verify flight readiness. The contractor and NASA will use an 1149 as the logistics document to show transfer of property. All shipments involving a Glacier System shall be via Fed Ex White Glove or a similar custom critical service.
3. Support Integration Data Package Development as required.
4. Provide Manifest and Stowage Dataset, as well as mission drawing dataset.

b. Certification of Flight Readiness

1. Conduct tests, analysis, and/or inspections required to provide verification data inputs as required per Glacier ICD SSP 53099 and associated PIRNs.
2. Support ground test requirement and procedure development.
3. Provide COFR submittals (Certificate of Compliance and/or Verification Reports), RCAR, ERCAR, Endorsement Letters, OWTL and Checklists per ISS Program Payload Certification of Flight Readiness Implementation Plan, SSP 52054.
4. Support waiver/PIRN development and implementation.
5. Provide inputs to TGHR, Middeck F2V2
6. Support development of mission specific hardware and software development as well as configuration design drawings for all flight phases.
7. Provide User Handbook and Project Requirements Document updates as required.
8. Support development of facility test requirements and procedures.
9. Support mission specific Shuttle ICA and appropriate Annex documentation development and updating.

c. Experiment Support

1. Support experiment team telecons, requirements reviews, and data product reviews.
2. Support Cold Stowage Management and User Telecons as well as bi-weekly project status meetings.
3. Support Shuttle Middeck Working group meetings when required.
4. Provide mission specific configuration testing and hardware fit checks when required.

d. Quality & Safety

1. Provide non conformance reporting, GIDEP and Alert Tracking and Reporting, and government property inventory management
2. Provide Ground and Flight Reflight Series Safety Assessments, and SVTL reporting and tracking to the PSRP. NASA will be responsible for the Integrated Safety Memo.

Contract Options: The following tasks shall be priced separately

Task 1: Maintenance & Sustaining: Provide pricing to complete this task per Fiscal Year starting in October 2008.

Task 2: Integration & Verification: Provide pricing and schedule to complete Task 2, Integration and Verification for 3 flights. NASA will exercise Options in this DO to satisfy the maximum mission as defined in part 4 below. It shall be the Contractor's responsibility

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

to ensure availability of, and services for, Glacier systems to support the maximum number of missions during the period starting from DO ATP and ending 12/31/10 .

1) Notes:

- a. Currently, there are only 4 Glacier Class 1 units in development. They are planned to be delivered to NASA in May 2008. Two additional flight units are planned to be delivered to NASA in August 2009.
- b. On STS 15A, the Glacier unit launched in the Middeck will replace the GLACIER unit operating on ISS. On 2J/A, no Glacier will be launched on ascent, but the ISS Glacier will be returned on this flight.
- c. Starting with 17A, Glacier will be launched as a sortie only.
- d. Launch support at KSC will be NASA's responsibilities. Landing support at all three landing locations will be NASA's responsibility
- e. Mission Operations related activities will be NASA responsibilities. These activities include but are not limited to the following;
 - 1) C&DH Coordination
 - 2) KSC Support Requirements Data Set
 - 3) PODF/SODF Procedure Development, Listing and Validation
 - 4) Flight Command Plan
 - 5) Crew and Flight Control Team Training
 - 6) Mission Operations Planning (EPAS and URC inputs)
 - 7) Shuttle FOR Review support
 - 8) Stowage Inventory and Tracking
 - 9) PSIV Coordination and Tracking
 - 10) Payload Regulations and Shuttle Flight Rule development and coordination
 - 11) Flight Control CBT inputs
 - 12) Real Time Mission Operations Change Requests
 - 13) Increment transition testing and certification
- f. NASA provides the Payload Safety Engineer (PSE) who will perform the Integrated Safety Assessments with inputs from the Glacier System Contractor. Specifically the Contractor must provided the stand alone Glacier System Safety Data Package (Flight and Ground packages) and revisions to them.
- g. Glacier's 1st ISS and sortie flight will have already occurred on ULF2. All missions after ULF2 will be considered ISS-Reflights per SSP 57057 Integration template.
- h. Current Launch Dates for the remaining Shuttle Flight Program are as follows.
 - ISS-15A - 12/2008
 - ISS-2 J/A - 6/2009
 - ISS-17A - 8/2009
 - ISS-ULF3 - 11/2009
 - ISS 20A - 2/2010
 - ISS 19A - 3/2010
 - ISS ULF4 - 5/2010
 - ISS ULF5 - 7/2010

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

- 2) Reporting:
 - a. A monthly status report detailing tasks completed, and planned tasks shall be delivered to the DO Manager.
 - b. Per DRD 2, a 533 Report and an overall budget, actual, and Estimate at Complete Report shall also be delivered. FTE data is not required. It is not necessary to show the details per WBS, a top level WBS summary for each of the two tasks identified in this DO is preferred.
- 3) Earliest Availability: For Task 1, the start date is anticipated to be October 2008. For Task 2, the first flight is expected to be 15A, currently scheduled for December 2008. The start date for Task 2 will be upon award of this contract. The Contractor shall provide two systems for launch on 15A (one prime and one back-up). The ISS Integration Template is assumed to be 12 months.
- 4) Maximum Number of Missions: NASA will exercise Options in this DO to satisfy the maximum mission need. It shall be the Contractor's responsibility to ensure availability of and services for, Glacier systems to support the following maximum number of missions during the period starting from DO ATP and ending 12/31/09:
 - a. Seven (7) ISS missions (consisting of powered launch on STS Middeck, as a sortie flight and or transfer to ISS, and ISS Glacier transferred to Middeck, and powered descent on STS Middeck), AND
 - i. One Flight unit shall be available as backup during launch preparations of the prime flight unit for every flight in the event of problems.
- 5) In performance of these tasks the Contractor can assume that:
 - i. Limited Contractor travel to JSC and KSC is required.
 - ii. Bi-Weekly coordination telecons will be held with NASA JSC.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	None anticipated. Contractor to detail any that would be provided in order to provide the Glacier systems and services detailed in the Task Description above	Contractor to propose how to satisfy Task specified above	June 1, 2008	As required by task being fulfilled
Mock Up				
Prototype				
Certification				
Flight	Glacier p/n CBSE-F10060-1	2	Per STS Integration Schedule	I
Training				
Other				
Test	Contractor shall provide the Glacier systems and services detailed in the Task Description above	Contractor to propose how to satisfy Task specified above	June 1, 2008	As required by task being fulfilled
Software				
Other Products	Acceptance Data Packages (or equivalent)	1 per serial number	Draft Due two weeks prior to flight shipment. Final due at Hardware turnover to KSC	

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

SCHEDULE

Start Date: May 28, 2008

Finish Date: Dec 31, 2009

ITERIM MILESTONES	DUE DATES
15A	NLT 12/4/2008
2J/A	NLT 6/13/2009
17A	NLT 8/2009
ULF3	NLT 11/2009
20A	NLT 2/2010
19A	NLT 3/2010
ISS ULF4	NLT 5/2010
ISS ULF5	NLT 7/2010
COFR products	per SSP 57057 Template

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

Government Estimate Located in RFQ File in Microsoft Project File On CRAVE Web Site

The file is titled: N/A

Total Government Estimate for this DO: \$ 3,728,000

- Option 1: N/A (See Attachment 1)**
- Option 2: \$ N/A (See Attachment 2)**
- Option 3: \$ N/A (See Attachment 3)**
- Option 4: \$ N/A (See Attachment 4)**
- Option 5: \$ N/A (See Attachment 5)**
- Option 6: \$ N/A (See Attachment 6)**
- Option 7: \$ N/A (See Attachment 7)**
- Option 8: \$ N/A (See Attachment 8)**

TOTAL COST ESTIMATE FOR THIS DO: \$ 3,728,000

FEE: \$ (If Applicable)

OPTION 1: \$ N/A (See Attachment 1)

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

OPTION 2: \$ N/A (See Attachment 2)

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

DATA REQUIREMENTS

All DRs contained in the contract are applicable and required unless marked N/A below.

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
1	Written Approval	Flight GFE Configuration Management Plan	With Proposal	Once	Attachment J-8	
2	Mandatory Submittal	Regular Status Report/ Summary Review	Thirty (30) days following contract start	Monthly	Y	Summary WBS level information is preferred. FTE data and reporting at lower level WBS is not required.
3	Written Approval	Project Technical Requirements Specification	Per DO schedule	Once with Revisions	Y	Only applies to Revisions
4	Mandatory Submittal	GFE Systems Requirements Data Package	Specified in DO	Once with Revisions	N/A	
5	Written Approval	Flight GFE Projects Requirements & Verification Document	Specified in DO	Once with Revisions	Y	Only applies to Revisions
6	Mandatory Submittal	Preliminary Design Review Data Package	Specified in DO	Once with Revisions	N/A	
7	Written Approval	Flight GFE Workmanship Specifications List	Specified in DO	Once with Revisions	N/A	
8	Written Approval	Project Schedule	PDR or 10% effort complete Milestone	Once w/Revisions (due w/DO proposal, updates & details provided as DO progresses)	N/A	
9	Written Approval	Flight GFE Interface Control Document	Specified in DO	Once with Revisions	N/A	
10	Written Approval	GFE End Item Specification	Provide at time of Proposal	Once with Revisions	N/A	
11	Mandatory Submittal	Flight GFE Failure Analysis Report	As agreed by TMR in DO	As Required	N/A	
12	Written Approval	Flight GFE Verification and Validation Plan	As Specified in EA-023	Once with Revisions	N/A	
13	Written Approval	GFE Software Requirements Specification	Specified in DO	Once with Revisions	N/A	
14	Written Approval	GFE Software Development Plan	Specified in DO	Once with Revisions	N/A	
15	Written Approval	GFE Software Design Document	Specified in DO	As Required	N/A	

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
16	Written Approval	Engineering Drawings	Per flight	Once with Revisions	Y	Only applies to revisions and flight specific drawings. Interface and top assembly) drawings shall be in EDCC
17	Written Approval	EEE Parts Lists and Analysis Report	Specified in DO	As Required	N/A	
18	Mandatory Submittal	Critical Design Review Data Package	Specified in DO	Once with Revisions	N/A	
19	Mandatory Submittal	Engineering Drawing Change Proposal	As needed	As Required	N/A	
20	Written Approval	GFE Qualification Test Procedure	Specified in DO	Once with Revisions	N/A	
21	Written Approval	Flight Product User's Guide	As needed	Once with Revisions	Y	Only applies to Revisions
22	Mandatory Submittal	Software Code	Specified in DO	As Required	N/A	
23	Written Approval	Information Technology (IT) Security Program Plan and Reports	(30) days after DO award, and as specified in JPG 2810.1	JPG 2810.1	Attachment J-4 Due 30 days after DO award	Only applies to Revisions.
24	Written Approval	Certification Plan	Specified in DO	Once with Revisions	N/A	
25	Mandatory Submittal	Certification Report	Specified in DO	Once with Revisions	N/A	
26	Mandatory Submittal	Engineering Analysis	Specified in DO	As Required	N/A	
27	Mandatory Submittal	Acceptance Data Package	Specified in DO	Per flight	Y	Required 2 weeks prior to shipment for flight. Only deltas required
28	Mandatory Submittal	Export Control Audit Results	After award of 1st DO, yearly on Sept. 30 thereafter	Yearly	Y	
29	Written Approval	Quality Plan	With Proposal	Once with Revisions	Attachment J-11	Only applies to Revisions
30	Written Approval	Patent Rights-Retention	As Required	As Required	Y (If Applicable)	

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
31	Written Approval	Shuttle/Station Payload Safety Data Package	Specified in DO	Per flight	Y	
32	Mandatory Submittal	Limited Life Systems List	Specified in DO	As Required	N/A	
33	Written Approval	Space Station GFE Failure Modes and Effects Analysis and Critical Items List	As Early in process as possible.	As Required	N/A	
34	Written Approval	Space Shuttle GFE Safety and Analysis Report & Hazard Report	Specified in DO	As Required	N/A	
35	Written Approval	Software Quality Assurance Plan Report	90 Days Prior to Software Development	Once with Revisions	Y (If Applicable)	Only applies to Revisions
36	Written Approval	ISS Hazard Report	Specified in DO	Per flight	N/A	Covered by Item 31
37	Upon Request	Reliability and Maintainability Plan	With Proposal	One Time	Attachment J-9	Only applies to Revisions
38	Written Approval	Government Certification Approval Request (GCAR)	As required	As Required	Y	Only applies to revisions
39	Written Approval	Risk Assessment Executive Summary Report (RAESR)	Specified in DO	As Required	N/A	
40	Written Approval	Problem Reporting and Corrective Action (PRACA)	2 business days of problem isolation but no later than 10 days after detection	As Required	Y	PAR Process is used for on orbit anomalies. Ground Failures must comply with JSC 28035.
41	Upon Request	Nonconformance Record	Specified in DO	As Required	Y	
42	Mandatory Submittal	Government Industry Data Exchange Program and NASA Advisory Problem Data	Reported one time when discrepancy occurs	Once with Revisions	Y	
43	Written Approval	Electrical, Electronic, and Electromechanical (EEE) Parts Control Plan	Specified in DO	Once with Revisions	N/A	
44	Mandatory Submittal	Certification Data Package	Specified in DO	Once with Revisions	N/A	
45	Written Approval	Certification and Acceptance Requirements Document	At CDR	Once with Revisions	N/A	
46	Upon Request	Wage/Salary and Fringe Benefit Data	Thirty (30) days after issuance of each DO	Once	N/A	
47	Written Approval	GFE Acceptance Test Procedure	Specified in DO	One-Time	N/A	
48	Mandatory Submittal	Flight GFE Verification & Validation Report	Specified in DO	Once with Revisions	N/A	

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
49	Mandatory Submittal	Space Shuttle GFE Failure Modes and Effects Analysis (FMEA) and Critical Items List	Specified in DO	As Required	N/A	
50		Reserved	---	---	---	---
51	Mandatory Submittal	NASA Contractor Financial Management Reporting	After Issuance of 1st DO	Monthly	Y	
52	Written Approval	Government Property Management Plan	With Proposal	Once with Revisions	Attachment J-7	Only applies to Revisions.
53	Mandatory Submittal	System Safety Plan	With Proposal	One Time	Attachment J-10	Only applies to Revisions.
54	Written Approval	R-Quality Plan Template	With Proposal/ Revisions as Required	Only applicable to B-CRAVE contracts in accordance with the SOW and the DRD	Y	Covered by Item 29

Type 1 = Written Approval Type 2 = Mandatory Submittal Type 3 = Submittal Upon Request

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

GOVERNMENT FURNISHED PROPERTY

The CRAVE contracts do not anticipate the Government providing any property or test facilities unless requested by the contractor in their response to a request for bid.

In some rare cases (such as sustaining engineering task) it is known ahead of time that government property will be provided to the contractor. In those cases the following list filled out to allow the proper control of government property:

A. List of Property the Contractor Shall Replace with modified or upgraded versions:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

B. List of Property the Contractor will return in the same configuration:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
Ground Cart	1	\$20k ea.	1 @ Contractor	Award of Contract
Laptop	1	\$1,223 ea	1 @ Contractor	Award of Contract
Glacier	6 Class I 1 Class II 1 Class III [s1]	\$2.7M Class III \$3.5M Class II \$1.1M Class I	6 Class I and 1 Class III at Contractor location, 1 Class II at JSC	3 Class I, 1 Class II, and 1 Class I units at award of Contract Remaining 2 Class I Units will be delivered in August 2009

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.


CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38


GOVERNMENT FURNISHED PROPERTY
(Continued)

C. List of Property the Contractor Shall Replace if Damaged or lost during the course of the effort:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

D. List of Property the Government Will Replace if Damaged or lost during the course of the effort:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

ATTACHMENT 1

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor 15 days before the completion of the Basic delivery order requirement.

OPTION 1 TITLE:

Provide Launch Support for Glacier for 1 Mission

Background / Problem Description:

In conjunction with Contractor performing Glacier tasks per this DO, the contractor is requested to provide a proposal to support the integration and launch of Glacier at KSC for 1 mission. This Option could be executed multiple times if support is needed for more than 1 STS mission.

Task Description: Provide launch site support, condition and integrate payload, and assist in loading Glacier onto the shuttle as required. In the event of launch delays, the contractor shall provide the support necessary to re-supply Glacier as required per KSC launch schedule. Typical launch delays require that the payload should be re-supplied after 48 or 72 hours of delay. This task is defined as 1 mission, and includes launch slips associated with the associated mission.

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

SCHEDULE

Start Date: Launch - 10 days

Finish Date: Launch +1 Day

ITERIM MILESTONES	DUE DATES
Contractor to propose	Contractor to propose
<p>Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.</p>	

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

ATTACHMENT 2

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor 15 days before the completion of the Basic delivery order requirement.

OPTION 2 TITLE:

Integration and Verification of an additional ISS Mission

Background / Problem Description:

In conjunction with Contractor performing the Glacier services task, the Contractor is requested to provide a proposal for supporting Integration and Verification, on a per mission basis, for each remaining STS flight beyond the minimum of three (3) in the basic DO. This option will be awarded mission to mission.

Task Description: Provide Integration and Verification tasks for Glacier in accordance with the basic DO Task Description, for supporting additional missions beyond the 3 minimum missions specified in this DO, and up to the Maximum Number of Missions specified in the DO Task Description. Remaining flights after 17A are:

ULF3 - November 2009

20A – February 2010

19A – March 2010

ULF4 – May 2010 *ULF5 – July 2010*

ULF6 – September 2010


CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

SCHEDULE

Start Date: Launch -12 months

Finish Date: Launch -10 Days

INTERIM MILESTONES	DUE DATES
Provide Glacier services for each ISS mission	December 31, 2010
<p>Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.</p>	

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

ATTACHMENT 3

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor 15 days before the completion of the Basic delivery order requirement.

OPTION 3 TITLE:
Operations Support for Glacier

Background / Problem Description:

In conjunction with Contractor performing this Glacier task, the Contractor is requested to provide a proposal for supporting Operations on ISS for a 12 month period. This option is strictly for all the documentation associated with operating Glacier on ISS and Shuttle. This Option does not include console support during real time Operations.

Task Description: Support Procedure and Cue Card Development, and Procedure Validation. Provide URC, OOS, and EPAS inputs and review. Provide C&DH coordination, PSIV coordination and POIWG support. Review and provide inputs to PTP, and Flight Rules and Regulation.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
 DELIVERY ORDER #: CRAVE-EC2-DO38**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

SCHEDULE

Start Date: ATP

Finish Date: ATP + 12 months

INTERIM MILESTONES	DUE DATES
Provide Glacier services for each ISS mission	December 31, 2009

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

ATTACHMENT 4

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor 15 days before the completion of the Basic delivery order requirement.

OPTION 4 TITLE:
Crew Training for Glacier

Background / Problem Description:

In conjunction with Contractor performing Glacier tasks per this DO, the Contractor is requested to provide a proposal for supporting up to 4 crew training sessions.

Task Description: Provide OBT/CBT development and coordination, training certification, PTDR, and conduct a minimum of four hands on training sessions. Training sessions will be conducted at JSC.




CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			


CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

<u>SCHEDULE</u>	
Start Date: Increment -4 months	Finish Date: Launch – 2 months

INTERIM MILESTONES	DUE DATES
Contractor to propose	Contractor to propose
Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.	

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

ATTACHMENT 5

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor 15 days before the completion of the Basic delivery order requirement.

OPTION 5 TITLE:

Provide Landing Support for Glacier

Background / Problem Description:

In conjunction with Contractor performing Glacier tasks per this DO, the contractor is requested to provide a proposal to support de-integration of the Glacier and conditioned science at all landing locations.

Task Description: Provide support at designated landing locations. Recover payload and maintain temperature requirements of samples until they can be turned over to the Cold Stowage or Experiment Team. There are three primary landing locations, KSC, Dryden Space Flight Center, and White Sands

|
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

SCHEDULE

Start Date: Landing minus 2 days Finish Date: Landing +5 days

ITERIM MILESTONES	DUE DATES
--------------------------	------------------

Contractor to propose

Contractor to propose

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

ATTACHMENT 6

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor 15 days before the completion of the Basic delivery order requirement.

OPTION 6 TITLE:
Real Time Operations

Background / Problem Description:

In conjunction with Contractor performing Glacier tasks per this DO, the contractor is requested to provide real time operations support for a 4 month increment, at the contractor's location.

Task Description: Provide real time operations support for three month increments. This includes real-time engineering support to monitor on-orbit operations, checkout of flight systems and the subsequent on-orbit operations throughout the mission duration. Real time engineering support is provided through coordination and or full control of the GLACIER system from the contractor's Remote Operations site. This support will include investigation, isolation and resolution of anomalies encountered during on-orbit operations. Real time support includes the development and maintenance of ground terminal displays, software systems necessary to provide control of on-orbit systems from the ground, software systems required to support data handling/transition/storage and the systems necessary to perform diagnostics corrective actions from the ground.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

SCHEDULE

Start Date: ATP

Finish Date: ATP +4 months

ITERIM MILESTONES	DUE DATES
Contractor to propose	Contractor to propose
<p>Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.</p>	

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

ATTACHMENT 7

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor 15 days before the completion of the Basic delivery order requirement.

OPTION 7 TITLE:

Limited Remote Site Operations

Background / Problem Description:

In conjunction with Contractor performing Glacier tasks per this DO, the contractor is requested to provide limited backup operations support for monthly increments, at the contractor's location.

Task Description: Provide limited remote site operations necessary to man critical real time operations, provide for backup command and control capabilities to JSC Flight Control team, track real time issues, support limited ground testing provide for flight data storage and archiving, maintain GSP certification, and provide Web based real time telemetry systems.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

SCHEDULE

**Start Date: 6/1/2009 Finish Date: 12/31/2010
(4 months in FY 09 / 12 months in FY 10/3 months in FY 11)**

ITERIM MILESTONES	DUE DATES
Contractor to propose	Contractor to propose
<p>Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.</p>	

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

ATTACHMENT 8

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor 15 days before the completion of the Basic delivery order requirement.

OPTION 8 TITLE:

Integration and Verification for an Additional Flight Unit on a STS Flight

Background / Problem Description:

In conjunction with Contractor performing Glacier tasks per this DO, the contractor is requested to provide a proposal for supporting the Integration and Verification, on a mission basis, for an additional flight unit on an STS flight. This option will be awarded mission to mission.

Task Description: Provide Integration and Verification tasks for Glacier in accordance with the basic DO Task Description for an additional Glacier Flight Unit on an STS Flight. The additional Glacier Flight Unit will be integrated and verified in either a hard mounted or soft stowed location for flight. The unit will be non-powered during ascent.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

<u>SCHEDULE</u>	
Start Date: 6/1/2009	Finish Date: 12/31/2010

ITERIM MILESTONES	DUE DATES
Contractor to propose	Contractor to propose
Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.	

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 LYNDON B. JOHNSON SPACE CENTER
 HOUSTON, TX 77058**

COST REIMBURSABLE INDEFINITE-DELIVERY
 COST PLUS FIXED FEE DELIVERY ORDER
 University of Alabama at Birmingham Center
 Contract NNJ05HB42B

<i>Task Order Number</i>	<i>Amendment Number</i>	<i>Purchase Request Number</i>
38	3	Funded at Contract Level
<i>SOW WBS</i>	<i>Fiscal Year</i>	<i>Technical Monitor/Division/Extension</i>
	FY09	COTR: Ralph Marak/EC ext:3-9144 Sharon Campana/EC2 ext:4-5508

Task Order Title

GLACIER

Description/Purpose

This delivery order revision is issued to exercise option #8 as incorporated under revision #2 of this contract. This option is exercised for the following flights: 1) 19A (STS 131) & ULF4 (STS 132).

The contractor shall perform the subject tasks in accordance with delivery order description.

Summary	Previous	This Action	Current Value
		(Rev 3)	
Cost	b4	b4	b4
Fee			
TOTAL	\$ 3,687,023.40	\$ 78,500.10	\$ 3,765,523.50

THE CONTRACTOR IS NOT AUTHORIZED TO EXCEED THE TASK ORDER VALUE SPECIFIED HEREIN. THIS IS A COST PLUS FIXED FEE TASK ORDER.

NASA Approval

<i>Contracting Officer</i>	<i>Signature</i>	<i>Date</i>
RONALD JOHNSON	Ronald Johnson	3/20/

Overhead Template (Composition of Burden Pool)

Company Name UAB/CBSE Prime Subcontractor

Overhead or Service Center Pool = Non-facility Base of Application = Labor

* Specify Type of Overhead Burden Labor, Onsite, Offsite, Engineering, Procurement, Service Center(s), etc.

OFFEROR'S FISCAL YEAR BEGINS OCTOBER 1 AND ENDS SEPTEMBER 30

Cost Elements within the Overhead Burden Pool	Contractor Fiscal Year Prior Yr 3	Contractor Fiscal Year Prior Yr 2	Contractor Fiscal Year Prior Yr 1	Contractor Fiscal Year FY10	Contractor Fiscal Year FY11	Contractor Fiscal Year FY12	Contractor Fiscal Year FY13	Contractor Fiscal Year FY14
Payroll Taxes								
Fringes								
Retirement (Teacher's)								
Health Insurance								
Paid Leave								
Life Insurance and AD&D								
Other- TIAA/CREF								
Other (Identify)								
Salary Continuation Insurance								
State Unemployment Insurance								
On the job injury								
Educational Assistance								
Terminal Vacation Pay								
Employee Training								
New Employee Orientation								
Employee Assistance								
Total Overhead Pool Expenses								
Application Base (\$)								
Contractor FY Rate (%)								
Contractor FY Ceiling Rate (%)								
CONVERSION OF BURDEN RATE TO CONTRACT YEAR				Contract Year 1	Contract Year 2	Contract Year 3	Contract Year 4	Contract Year 5
Proposed Contract Year Rate								
Proposed Contract Year Ceiling Rate								

* NOTE: Fringe rate is estimated from prior year's data for the next year, creating a two year lag. Contract Year 1 rate is projected for the contract duration

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER
HOUSTON, TX 77058**

COST REIMBURSABLE INDEFINITE-DELIVERY
COST PLUS FIXED FEE DELIVERY ORDER
University of Alabama at Birmingham Center
Contract NNJ05HB42B

<i>Task Order Number</i>	<i>Amendment Number</i>	<i>Purchase Request Number</i>
38	4	Funded at Contract Level
<i>SOW WBS</i>	<i>Fiscal Year</i>	<i>Technical Monitor/Division/Extension</i>
	FY09	COTR: Ralph Marak/EC ext:3-9144 Sharon Campana/EC2 ext:4-5508

Task Order Title

GLACIER

Description/Purpose

This delivery order revision is issued to correct revision #2. Option #8 is hereby exercised for the following flights: 1) 19A (STS-131) & ULF-5 (STS-133).

The contractor shall perform the subject tasks in accordance with delivery order description.

Summary	Previous	This Action	Current Value
		(Rev 3)	
Cost			
Fee			
TOTAL	\$ 3,766,623.60	\$ 78,500.10	\$ 3,844,023.60

THE CONTRACTOR IS NOT AUTHORIZED TO EXCEED THE TASK ORDER VALUE SPECIFIED HEREIN. THIS IS A COST PLUS FIXED FEE TASK ORDER.

NASA Approval

<i>Contracting Officer</i>	<i>Signature</i>	<i>Date</i>
Ronald Johnson	<i>Ronald Johnson</i>	9/9/09

NNJ05HB42B - UNIVERSITY OF ALABAMA AT BIRMINGHAM

Delivery Order 7
FFP

\$ *b4*
\$

	DATE	DO VALUE					NOTES
		ACTION TOTAL	FEE %	COST	FEE	CUM. TOTAL	
DO 7	08/26/05	\$ <i>b4</i>	<i>b4</i>	\$ <i>b4</i>	<i>b4</i>	<i>b4</i>	
		TOTAL		\$ 8,908			

Delivery Order 16

Cost Total \$ 3,367,572.31
Fee Total \$ -
Total Cost & Fee \$ 3,367,572.31

	DATE	DO VALUE				
		ACTION TOTAL	FEE %	COST	FEE	CUM. TOTAL
DO 16	09/19/06					
DO 16 R1	05/15/08					
DO 16 R2	08/07/07					
DO 16 R3	12/17/08					
DO 16 R4	07/21/09					
		TOTAL		\$ 3,367,572.31	\$ -	

Delivery Order 38

Cost Total \$ 3,844,023.60
Fee Total \$ -
Total Cost & Fee \$ 3,844,023.60

	DATE	DO VALUE				
		ACTION TOTAL	FEE %	COST	FEE	CUM. TOTAL
DO 38	06/26/08					
DO 38 R1	12/15/08					
DO 38 R2	08/07/09					
DO 38 R3	08/19/09					
DO 38 R4	08/20/09					
		TOTAL		\$ 3,844,023.60	\$ -	

TOTAL CONTRACT VALUE \$ 7,220,503.91 \$ - \$ 7,220,503.91
CURRENT TOTAL FUNDING
REMAINDER

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 LYNDON B. JOHNSON SPACE CENTER
 HOUSTON, TX 77058**

COST REIMBURSABLE INDEFINITE-DELIVERY
 COST PLUS FIXED FEE DELIVERY ORDER
 University of Alabama at Birmingham Center
 Contract NNJ05HB42B

<i>Task Order Number</i>	<i>Amendment Number</i>	<i>Purchase Request Number</i>
38	3	Funded at Contract Level
<i>SOW WBS</i>	<i>Fiscal Year</i>	<i>Technical Monitor/Division/Extension</i>
	FY09	COTR: Ralph Marak/EC ext:3-9144 Sharon Campana/EC2 ext:4-5508

Task Order Title

GLACIER

Description/Purpose

This delivery order revision is issued to exercise option #8 as incorporated under revision #2 of this contract. This option is exercised for the following flights: 1) 19A (STS 131) & ULF4 (STS 132).

The contractor shall perform the subject tasks in accordance with delivery order description.

Summary	Previous	This Action	Current Value
		(Rev 3)	
Cost	b4	b4	b4
Fee			
TOTAL	\$ 3,687,023.40	\$ 78,500.10	\$ 3,765,523.50

THE CONTRACTOR IS NOT AUTHORIZED TO EXCEED THE TASK ORDER VALUE SPECIFIED HEREIN. THIS IS A COST PLUS FIXED FEE TASK ORDER.

NASA Approval

<i>Contracting Officer</i>	<i>Signature</i>	<i>Date</i>
RONALD JOHNSON	Ronald Johnson	8/20/09

NNJ05HB42B - UNIVERSITY OF ALABAMA AT BIRMINGHAM

Delivery Order 7
FFP

b4

	DATE	DO VALUE				NOTES
		ACTION TOTAL	FEE %	COST	FEE	
DO 7	08/26/05	\$ b4	b4	b4	b4	
TOTAL				\$ 8,908		b4

Delivery Order 16

Cost Total

Fee Total

Total Cost & Fee

\$ 3,367,572.31

b4

	DATE	DO VALUE				NOTES
		ACTION TOTAL	FEE %	COST	FEE	
DO 16	09/19/06					
DO 16 R1	05/15/08	b4	b4	b4	b4	b4
DO 16 R2	08/07/07					
DO 16 R3	12/17/08					
DO 16 R4	07/21/09					
TOTAL				\$ 3,367,572.31	\$ -	

Delivery Order 38

Cost Total

\$ 3,765,523.50

Fee Total

\$

Total Cost & Fee

\$ 3,765,523.50

	DATE	DO VALUE				NOTES
		ACTION TOTAL	FEE %	COST	FEE	
DO 38	06/26/08					
DO 38 R1	12/15/08	b4	b4	b4	b4	b4
DO 38 R2	08/07/09					
DO 38 R3	08/19/09					
TOTAL				\$ 3,765,523.50	\$ -	

TOTAL CONTRACT VALUE

\$ 7,142,003.81 \$ - \$ 7,142,003.81

CURRENT TOTAL FUNDING:

REMAINDER:

b4

MOD #	COST	FEE	Running Cost	Running Fee	CUM FUNDING	Running Total	Notes
1							
2							Admin: Change K no.
3							includes other admin chgs
4							includes CV on DO 7
5							Admin: wage determination
6							Admin delete/replace drd 40
7							funds slated: DO 16
8							funds slated: DO 16
9							Admin wage determination
10							funds slated: DO 16
11							funds slated: DO 16
12							funds slated: DO 16
13							Admin. add NFS Security clause
14							funds slated: DO 16
15							funds slated: DO 16
16							funds slated: DO 16
17							funds slated: DO 16
18							Admin wage determination
19							funds slated: DO 16
20							Admin: NFS clauses, paying office
21							funds slated: DO 38
22							funds slated: DO 16
23							funds slated: DO 16 (232,801.80) / DO 38 (200,000)
24							Admin NFS clause change
25							funds slated: DO 16 (150k) / DO 38 (190k)
26							Admin: wage determination
27							Admin: correct recapitulation
28							funds slated: DO 38
29							funds slated: DO 38
30							DO 16
31							

b4

TOTAL
FIRM FIXED PRICE \$

RECAPITULATION OF FUNDING

	Prior Funding	This Action (Mod 30)	Cumulative Funding
Firm Fixed Price	\$		
Cost	\$ b4	\$ b4	\$ b4
Fee	\$ -	\$ -	\$ -
Total	\$ 3,558,318.80	\$ 620,000.00	\$ 4,178,318.80

NNJ05HB42B - UNIVERSITY OF ALABAMA AT BIRMINGHAM

Delivery Order 7

FFP \$ *b4*
\$

	DATE	DO VALUE					NOTES
		ACTION TOTAL	FEE %	COST	FEE	CUM. TOTAL	
DO 7	08/26/05	\$ <i>b4</i>	<i>b4</i>	\$ <i>b4</i>	\$ <i>b4</i>	\$ <i>b4</i>	
		TOTAL		\$ 8,908			

Delivery Order 16

Cost Total *b4*
Fee Total
Total Cost & Fee \$3,367,572.31

	DATE	DO VALUE				
		ACTION TOTAL	FEE %	COST	FEE	CUM. TOTAL
DO 16	09/19/06					
DO 16 R1	05/15/08					
DO 16 R2	08/07/07					
DO 16 R3	12/17/08					
DO 16 R4	07/21/09					
		TOTAL		\$3,367,572.31	\$ -	

Delivery Order 38

Cost Total *b4*
Fee Total
Total Cost & Fee \$3,687,023.40

	DATE	DO VALUE				
		ACTION TOTAL	FEE %	COST	FEE	CUM. TOTAL
DO 38	06/26/08					
DO 38 R1	12/15/08					
DO 38 R2	08/07/09					
		TOTAL		\$3,687,023.40	\$ -	

TOTAL CONTRACT VALUE \$7,063,503.71 \$ - \$7,063,503.71
CURRENT TOTAL FUNDING: *b4*
REMAINDER.

TOTAL ESTIMATED LABOR COST- UAB/CBSE		\$
CRAVE DO-38, Rev. 2- Option 8		
Additional Unit I & V		
OTHER DIRECT COSTS (by FY)		
Note: ODCs are separated by FY to accommodate	<i>Materials</i>	\$
the different burden rates established for these years.	<i>Equipment</i>	\$
		\$
	<i>Travel (FY07-FY10)</i>	\$
	<i>Supplies</i>	\$
	<i>Other</i>	\$
	<i>Subcontractor (FY09)</i>	\$
	<i>Subcontractor (FY10)</i>	\$
	TOTAL	\$
ODC Burdens (example G&A)		
	Rate	
	<i>Travel/Other F&A</i>	\$
	<i>Subcontracts F&A</i>	\$
	TOTAL ODC Burden	\$
	TOTAL Non-labor	\$
	percent	total proposed dollars
FEE *		
		\$ 78,500.10

*Note: Fee shall not exceed NTE Fee Rate

Item	Estimated Cost
Hardware Parts	\$ -
Input Item Here	\$ -
TOTAL Materials	\$ -

ORDER FOR SUPPLIES OR SERVICES

Order No. NNJ05HB42B, DO38 Rev 1 2 Date of Order
See Block 10 Below

NOTE: MARK ALL PACKAGES AND PAPERS WITH ORDER NO
Certified for National Defense under DPAS (15 CFR 700) DC-C9

3. Issuing Office
NASA Johnson Space Center, 2101 Nasa Parkway
Houston, TX 77058-3696
Org /Buyer BH2/Mary Thomas

Tel No 281-483-8628 Fax 281-244-0995
E-mail mary.thomas@nasa.gov

4 Ship To
Transportation Officer, Building 421
NASA Johnson Space Center
Houston, TX 77058-3696
Mark For **Accountable Property**
Order No NNJ05HB42B, DO38 Rev 1

5 Contractor
University of Alabama @ Birmingham Center
Attn: Lee Moradi
1530 3rd Avenue South
Birmingham, Alabama 35294-4400

Phone 205-975-2718 x Fax 205-975-1709
TIN: 63-6005396 CAGE CODE 0DV74

6. Deliver On or Before 7/1/09 to 12/31/09
F O B Point: Destination
Discount Terms: Net 30 Days

7 BILLING ADDRESS
NASA Johnson Space Center
Attn: LF231/Accounts Payable Group
Houston, TX 77058-3696
Order No NNJ05HB42B, DO38 Rev 1

8 Type of Order
 PURCHASE Please furnish the following in accordance with the conditions specified on this order Reference _____
 DELIVERY Except for the Terms and Conditions of Purchase Order listed on the following page, this delivery order is subject to instructions contained on this form and is issued subject to the terms and conditions of contract number _____

9. Written acceptance of this order by contractor () is, () is not required. Sign below if required and return to contracting officer
Name: _____ (Person authorized to sign)
Signature _____ Date _____

10 Name: Ronald Johnson
Signature Ronald Johnson Date 12/1/08
CONTRACTING OFFICER

11 Schedule

ITEM NO	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED																					
1	<p style="text-align: center;">GLACIER</p> <p>Revision 1 to DO 38 is issued to exercise Option 2 for two flights</p> <p style="padding-left: 20px;">Flight ULF3</p> <p style="padding-left: 20px;">Flight 20A</p> <p>RECAP OF DO VALUE</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"></td> <td style="width: 15%; text-align: center;">PRIOR</td> <td style="width: 15%; text-align: center;">THIS ACTION</td> <td style="width: 15%; text-align: center;">CUM VALUE</td> <td colspan="3"></td> </tr> <tr> <td style="text-align: right;">COST FEE</td> <td></td> <td style="text-align: center;"><u>b4</u></td> <td></td> <td colspan="3"></td> </tr> <tr> <td style="text-align: right;">TOTAL</td> <td style="text-align: right;">\$1,555,861.36</td> <td style="text-align: right;">\$661,998.04</td> <td style="text-align: right;">\$2,217,849.40</td> <td colspan="3"></td> </tr> </table>		PRIOR	THIS ACTION	CUM VALUE				COST FEE		<u>b4</u>					TOTAL	\$1,555,861.36	\$661,998.04	\$2,217,849.40								
	PRIOR	THIS ACTION	CUM VALUE																								
COST FEE		<u>b4</u>																									
TOTAL	\$1,555,861.36	\$661,998.04	\$2,217,849.40																								

12 For JSC Internal Use Only
Requisition No N/A COMP PART PPC _____
Issue To EC/Ralph Marak, x39144 For EC/Sharon Campana, x45508

13 Total
\$ NTE \$2,217,849.40

14 Quantities in "Quantity Accepted" Column Have Been
 INSPECTED ACCEPTED RECEIVED
TO CONFORM TO THE CONTRACT
ACCEPTANCE WILL BE AT JSC UNLESS OTHERWISE NOTED BY _____
Authorized U.S. Government Representative Date _____

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 LYNDON B. JOHNSON SPACE CENTER
 HOUSTON, TX 77058**

COST REIMBURSABLE INDEFINITE-DELIVERY
 COST PLUS FIXED FEE DELIVERY ORDER
 University of Alabama at Birmingham Center
 Contract NNJ05HB42B

<i>Task Order Number</i>	<i>Amendment Number</i>	<i>Purchase Request Number</i>
38	2	Funded at Contract Level
<i>SOW WBS</i>	<i>Fiscal Year</i>	<i>Technical Monitor/Division/Extension</i>
	FY09	COTR: Ralph Marak/EC ext:3-9144 Sharon Campana/EC2 ext:4-5508

Task Order Title

GLACIER

Description/Purpose

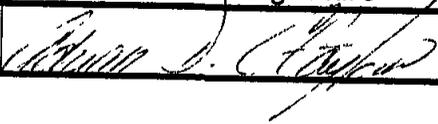
This delivery order: 1) identifies the scope of work to be performed during the period of performance beginning July 1, 2008 through December 31, 2010; 2) incorporates Option 7 and Option 8 within the delivery order description.

The contractor shall perform the subject tasks in accordance with the attached delivery order description.

Summary	Previous	This Action	Current Value
		(Rev 2)	
Cost	b4	b4	b4
Fee			-
TOTAL	\$ 2,217,849.40	\$ 1,469,174.00	\$ 3,687,023.40

THE CONTRACTOR IS NOT AUTHORIZED TO EXCEED THE TASK ORDER VALUE SPECIFIED HEREIN. THIS IS A COST PLUS FIXED FEE TASK ORDER.

NASA Approval

<i>Contracting Officer</i>	<i>Signature</i>	<i>Date</i>
Adrian D. Clayton Contracting Officer		8/7/2009

Delivery Order 38						
Cost Total	bf					
Fee Total	bf					
Total Cost & Fee	\$ 3,687,023.40					
	DATE	DO VALUE				
		ACTION TOTAL	FEE %	COST	FEE	CUM. TOTAL
DO 38	06/26/08					
DO 38 R1	12/15/08	bf	bf	bf	bf	bf
DO 38 R2	08/07/09					
		TOTAL		\$ 3,687,023.40	\$ -	

ORDER FOR SUPPLIES OR SERVICES

1 Order No. NNJ05HB42B, DO38 Rev 1	2 Date of Order See Block 10 Below	NOTE: MARK ALL PACKAGES AND PAPERS WITH ORDER NO. Certified for National Defense under DPAS (15 CFR 700) DO-C9
---------------------------------------	---------------------------------------	--

3 Issuing Office: NASA Johnson Space Center, 2101 Nasa Parkway Houston, TX 77058-3696 Org /Buyer. <u>BH2/Mary Thomas</u> Tel No. <u>281-483-8828</u> Fax <u>281-244-0995</u> E-mail. <u>mary.f.thomas@nasa.gov</u>	4 Ship To Transportation Officer, Building 421 NASA Johnson Space Center Houston, TX 77058-3696 Mark For: Accountable Property Order No.: <u>NNJ05HB42B, DO38 Rev. 1</u>
---	--

5 Contractor. University of Alabama @ Birmingham Center Attn: Lee Moradi 1530 3 rd Avenue South Birmingham, Alabama 35294-4400 Phone. 205-975-2718 x Fax: 205-975-1709 TIN: 63-8005396 CAGE CODE 0DV74	6 Deliver On or Before: <u>7/1/08 to 12/31/09</u> F O B. Point <u>Destination</u> Discount Terms. Net 30 Days. 7 BILLING ADDRESS: NASA Johnson Space Center Attn: LF231/Accounts Payable Group Houston, TX 77058-3696 Order No.: <u>NNJ05HB42B, DO38 Rev 1</u>
---	---

8. Type of Order

PURCHASE Please furnish the following in accordance with the conditions specified on this order Reference: _____

DELIVERY Except for the Terms and Conditions of Purchase Order listed on the following page, this delivery order is subject to instructions contained on this form and is issued subject to the terms and conditions of contract number: _____

9 Written acceptance of this order by contractor [<input type="checkbox"/>] is, [<input checked="" type="checkbox"/>] is not required. Sign below if required and return to contracting officer Name: _____ (Person authorized to sign) Signature: _____ Date: _____	10. Name: <u>Ronald Johnson</u> Signature: <u>Ronald Johnson</u> Date <u>12/15/08</u> CONTRACTING OFFICER
--	---

11 Schedule

ITEM NO	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED
1	GLACIER Revision 1 to DO 38 is issued to exercise Option 2 for two flights. Flight ULF3 Flight 20A RECAP OF DO VALUE PRIOR THIS ACTION CUM VALUE COST <u>b4</u> FEE TOTAL \$1,555,851.36 \$661,998.04 \$2,217,849.40					

12 For JSC Internal Use Only. Requisition No.: <u>N/A</u> <input type="checkbox"/> COMP <input type="checkbox"/> PART PPC: _____ Issue To: <u>EC/Ralph Marak, x39144</u> For: <u>EC2/Sharon Campana, x45508</u>	13. Total \$ NTE \$2,217,849.40
--	--

14. Quantities in "Quantity Accepted" Column Have Been

INSPECTED ACCEPTED RECEIVED

TO CONFORM TO THE CONTRACT.
ACCEPTANCE WILL BE AT JSC UNLESS OTHERWISE NOTED. BY _____

Authorized U.S. Government Representative Date _____

ORDER FOR SUPPLIES OR SERVICES

1. Order No DO-CRAVE-EC2-DO38, Glacier	2. Date of Order See Block 10 Below	NOTE: MARK ALL PACKAGES AND PAPERS WITH ORDER NO. Certified for National Defense under DPAS (15 CFR 700) DO-C9
---	--	---

3. Issuing Office: NASA Johnson Space Center, 2101 Nasa Parkway Houston, TX 77058-3696 Org./Buyer: <u>BH2/Mary Thomas</u> Tel No: <u>281-483-8828</u> Fax <u>281-244-0995</u> E-mail: <u>mary.f.thomas@nasa.gov</u>	4 Ship To: Transportation Officer, Building 421 NASA Johnson Space Center Houston, TX 77058-3696 Mark For: Accountable Property Order No. <u>DO-CRAVE-EC2-DO38, Glacier</u>
--	---

5 Contractor University of Alabama @ Birmingham Center Attn: Lee Moradi 1530 3 rd Avenue South Birmingham, Alabama 35294-4400 Phone: 205-975-2718 x Fax 205-975-1709 TIN 63-6005396 CAGE CODE. 0DV74	6. Deliver On or Before <u>7/1/08 to 12/31/09</u> F O B Point <u>Destination</u> Discount Terms: Net 30 Days. 7 BILLING ADDRESS: NASA Johnson Space Center Attn: LF231/Accounts Payable Group Houston, TX 77058-3696 Order No.. <u>DO-CRAVE-EC-DO38, Glacier</u>
---	---

8. Type of Order

PURCHASE: Please furnish the following in accordance with the conditions specified on this order Reference: _____

DELIVERY: Except for the Terms and Conditions of Purchase Order listed on the following page, this delivery order is subject to instructions contained on this form and is issued subject to the terms and conditions of contract number _____

9. Written acceptance of this order by contractor <input type="checkbox"/> is, <input checked="" type="checkbox"/> is not required. Sign below if required and return to contracting officer. Name: _____ (Person authorized to sign) Signature: _____ Date: _____	10. Name: <u>Ronald Johnson</u> Signature: <u>Ronald Johnson</u> Date: <u>12/15/08</u> CONTRACTING OFFICER
--	--

11. Schedule

ITEM NO	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED
1	<p style="text-align: center;">GLACIER</p> <p>The contractor shall perform and deliver to all base requirements of CRAVE-EC2-DO38 as described in the Statement of Work.</p> <p style="text-align: center;">Period of Performance: July 1, 2008 to December 31, 2009</p> <p>OPTION</p> <p>The Government may require the contractor to continue to perform services under this delivery order. The Contracting Officer may exercise any Option by issuing a revision to the DO. The Government</p> <p style="text-align: right;">(continued next page)</p>			64		

12 For JSC Internal Use Only Requisition No: <u>N/A</u> <input type="checkbox"/> COMP. <input type="checkbox"/> PART PPC. _____ Rissue To: <u>EC/Joe Gensler, x30025</u>	13 Total \$ NTE 1,555,851.36
---	---------------------------------

14. Quantities in "Quantity Accepted" Column Have Been

INSPECTED ACCEPTED RECEIVED

TO CONFORM TO THE CONTRACT ACCEPTANCE WILL BE AT JSC UNLESS OTHERWISE NOTED

BY: _____ Date: _____

Authorized U S Government Representative

SCHEDULE

ITEM	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED											
	reserves the right not to exercise any Options Should an Option be exercised, the delivery order revision will be issued using the cost proposed																
2	Option 1 - Launch Support for Glacier for 1 Mission																
3	Option 2 - Integration and Verification of an Additional ISS Mission																
4	Option 3 - Operations Support for Glacier																
5	Option 4 - Crew Training for Glacier																
6	Option 5 - Landing Support for Glacier																
7	Option 6 - Real Time Operations																
	THIS IS A CPFF DELIVERY ORDER																
	<p>RECAP OF DO VALUE</p> <table border="0"> <tr> <td></td> <td>THIS ACTION</td> <td>CUM VALUE</td> </tr> <tr> <td>COST</td> <td></td> <td></td> </tr> <tr> <td>FEE</td> <td></td> <td></td> </tr> <tr> <td>TOTAL</td> <td>\$1,555,851.36</td> <td>\$1,555,851.36</td> </tr> </table>		THIS ACTION	CUM VALUE	COST			FEE			TOTAL	\$1,555,851.36	\$1,555,851.36				
	THIS ACTION	CUM VALUE															
COST																	
FEE																	
TOTAL	\$1,555,851.36	\$1,555,851.36															

64

64

ORDER FOR SUPPLIES OR SERVICES

1 Order No
DO-CRAVE-EC2-DO38, Glacier

2 Date of Order
See Block 10 Below

NOTE: MARK ALL PACKAGES AND PAPERS WITH ORDER NO

Certified for National Defense under DPAS (15 CFR 700) DO-C9

3 Issuing Office.
NASA Johnson Space Center, 2101 Nasa Parkway
Houston, TX 77058-3696
Org /Buyer BH2/Mary Thomas

4 Ship To.
Transportation Officer, Building 421
NASA Johnson Space Center
Houston, TX 77058-3696
Mark For **Accountable Property**
Order No DO-CRAVE-EC2-DO38, Glacier

Tel No 281-483-8828 Fax 281-244-0995
E-mail. mary.f.thomas@nasa.gov

5 Contractor
University of Alabama @ Birmingham Center
Attn: Lee Moradi
1530 3rd Avenue South
Birmingham, Alabama 35294-4400

6 Deliver On or Before 7/1/08 to 12/31/09
F O B Point Destination
Discount Terms Net 30 Days

Phone 205-975-2718 x Fax. 205-975-1709

7 BILLING ADDRESS.
NASA Johnson Space Center
Attn. LF231/Accounts Payable Group
Houston, TX 77058-3696
Order No.: DO-CRAVE-EC-DO38, Glacier

TIN: 63-6005396 CAGE CODE 0DV74

8. Type of Order
 PURCHASE Please furnish the following in accordance with the conditions specified on this order Reference: _____

DELIVERY Except for the Terms and Conditions of Purchase Order listed on the following page, this delivery order is subject to instructions contained on this form and is issued subject to the terms and conditions of contract number _____

9 Written acceptance of this order by contractor [] is, [] is not required. Sign below if required and return to contracting officer

10 Name. Ronald Johnson

Name. _____ (Person authorized to sign)

Signature: Ronald Johnson Date 6/2/08
CONTRACTING OFFICER

Signature _____ Date. _____

11 Schedule

ITEM NO	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED
1	<p>GLACIER</p> <p>The contractor shall perform and deliver to all base requirements of CRAVE-EC2-DO38 as described in the Statement of Work.</p> <p>Period of Performance July 1, 2008 to December 31, 2009</p> <p>OPTION</p> <p>The Government may require the contractor to continue to perform services under this delivery order. The Contracting Officer may exercise any Option by issuing a revision to the DO The Government</p> <p>(continued next page)</p>			<u>B4</u>		

12. For JSC Internal Use Only

Requisition No. N/A COMP PART PPC _____
Rissue To EC/Joe Gensler, x30025

13 Total
\$ NTE 1,555,851 36

14 Quantities in "Quantity Accepted" Column Have Been
 INSPECTED ACCEPTED RECEIVED
TO CONFORM TO THE CONTRACT
ACCEPTANCE WILL BE AT JSC UNLESS OTHERWISE NOTED BY.

Authorized U S Government Representative _____ Date _____

SCHEDULE

ITEM	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED
	reserves the right not to exercise any Options Should an Option be exercised, the delivery order revision will be issued using the cost proposed					
2	Option 1 - Launch Support for Glacier for 1 Mission					
3	Option 2 - Integration and Verification of an Additional ISS Mission					
4	Option 3 - Operations Support for Glacier					
5	Option 4 - Crew Training for Glacier					
6	Option 5 - Landing Support for Glacier					
7	Option 6 - Real Time Operations					
THIS IS A CPFF DELIVERY ORDER						
RECAP OF DO VALUE						
	COST	THIS ACTION	CUM VALUE			
	FEE					
	TOTAL	\$1,555,851 36	\$1,555,851 36			

b4

b4

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

PROPOSAL INSTRUCTIONS: X DRAFT -- COMMENTS DUE BY: 4-17-2008
 FINAL -- PROPOSAL DUE BY: 5-12-2008

DO TITLE: Glacier Services

DO Type: X CPF FFP

DO Contact Information in Addition to the CRAVE Contract Specialist or CO:

TMR: Marie Kowal/EC2

Phone: (281) 483-8875

DO Manager: Sharon Campana/EC2

Phone: (281) 244-5508

DO Mgr. Alternate: Marie Kowal /EC2

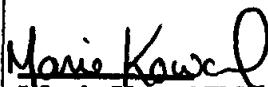
Phone: (281) 483-8875

Concurrences:


 Sharon Campana/EC2
DO Manager


 Marie Kowal/EC2
DO Mgr. Management


 Joe Gensler
COTR


 Marie Kowal/EC2
Division TMR


 Steve Miller
S & MA


 Ronald Johnson
Name

Task Contains Flight Hardware, Flight Software or GSE? X Yes No

Program Supported: Shuttle X ISS EVA Advanced

WBS: 1.0 EVA 2.0 FCE 3.0 EVR ECLSS X 5.0 ATCS 6.0 CHCS

For purposes of complying with FAR 52.232-22, Limitation of Funds, the total amount allotted by the Government to contract is specified in clause B.6, Contract Funding. The funding listed in B.6 is the amount allotted for all Delivery Orders on the contract combined.

All terms and conditions of the contract apply to this Delivery Order. In the event of a conflict between the contract and this Delivery Order, the contract shall prevail.

WBS reporting shall be done in accordance with applicable WBS reporting categories, as shown above and in the contract within Section C, Table 1.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER # CRAVE-EC2-DO38**

PROPOSAL INSTRUCTIONS: X DRAFT -- COMMENTS DUE BY: 4-17-2008
 FINAL -- PROPOSAL DUE BY: 5-12-2008

DO TITLE: Glacier Services

DO Type: X CPFF FFP

DO Contact Information in Addition to the CRAVE Contract Specialist or CO:

TMR: Marie Kowal/EC2

Phone: (281) 483-8875

DO Manager: Sharon Campana/EC2

Phone: (281) 244-5508

DO Mgr. Alternate: Marie Kowal /EC2

Phone: (281) 483-8875

Concurrences:

Sharon Campana/EC2
DO Manager

Marie Kowal/EC2
DO Mgr. Management

Joe Gensler
COTR

Marie Kowal/EC2
Division TMR

Steve Miller
S & MA

Name

Task Contains Flight Hardware, Flight Software or GSE? X Yes No

Program Supported: Shuttle X ISS EVA Advanced

WBS: 1.0 EVA 2.0 FCE 3.0 EVR ECLSS X 5.0 ATCS 6.0 CHeCS

For purposes of complying with FAR 52 232-22, Limitation of Funds the total amount allotted by the Government to contract is specified in clause B 6 Contract Funding. The funding listed in B 6 is the amount allotted for all Delivery Orders on the contract combined.

All terms and conditions of the contract apply to this Delivery Order. In the event of a conflict between the contract and this Delivery Order, the contract shall prevail.

WBS reporting shall be done in accordance with applicable WBS reporting categories as shown above and in the contract within Section C, Table 1

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER # CRAVE-EC2-DO38**

Narrative Task Description

Background / Problem Description:

Glacier is double middeck locker size payload. It can be flown in the Middeck while maintaining -95 °C, or in an Express Rack where Glacier is capable of maintaining -160 °C. It will be used to transport temperature sensitive payloads to and from ISS. There are currently 4 Class I, 1 Class II, and 1 Class III Glacier systems in inventory. An additional 2 Class I units are planned by February 2009.

Glacier is planned to fly on every shuttle flight from ULF2 to shuttle retirement. Currently, only support of ULF2 has been contracted. This Delivery Order requests the services required to provide integration and verification tasks for every shuttle mission, as well as provide sustaining and maintenance activities for all 8 Glacier units.

Task Description:

1. Maintenance & Sustaining Engineering: Provide sustaining engineering activities for a total of 6 Glacier flight units (part number CBSE-F10060-1), 1 qualification unit, and 1 engineering unit. Tasks include:

- a. Maintain Acceptance Data Package, system logs, and user's manual
- b. Provide limited life items tracking
- c. Maintain calibration of all ground related equipment.
- d. Support anomaly resolution when required.
- e. Maintaining spare part and limited life inventory. Items requiring refurbishment include desiccant, desiccant canisters, batteries, fans and fan motors, fan shafts bearings, captive fasteners, small electrical and mechanical components.
- f. Support minor modifications (if any required) to Glacier in the event an experiment has a unique set of requirements not compatible with the existing Glacier design
- g. Provided post flight servicing, refurbishment and data recovery of the GLACIER system
- h. Provide Constellation and COTS vehicle compatibility assessments, and if necessary, provided design modification proposals and verification requirement updates for new vehicle compatibility compliance
- i. Provide GLACIER hardware testing and miscellaneous hardware evaluations when required
- j. Period of performance for M&S shall be through 12/31/2009

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

2. Verification & Integration: Conduct all tasks required to provide flight readiness of Glacier Class I units for 3 flights 15A, 2J/A, and 17A. Contract options will be executed for additional flights. Glacier will go up active in the Middeck, transfer to ISS, and the ISS Glacier will transfer to Middeck, and will be active in the Middeck during descent.

a. Flight Delivery

1. Maintaining a flight ready inventory – 2 Glacier units are required to be delivered to KSC at ~L-10 days for every active middeck launch. One unit will be used as the prime and the other as a back-up in the event of launch delays. Upon launch, the second unit will be shipped back to the contractor.
2. Prepare necessary shipping paperwork and deliver hardware to KSC per launch schedule. Upon landing, Glacier will be returned the contractor location. An in place 1027 will be used as the quality document to verify flight readiness. The contractor and NASA will use an 1149 as the logistics document to show transfer of property. All shipments involving a Glacier System shall be via Fed Ex White Glove or a similar custom critical service.
3. Support Integration Data Package Development as required.
4. Provide Manifest and Stowage Dataset, as well as mission drawing dataset.

b. Certification of Flight Readiness

1. Conduct tests, analysis, and/or inspections required to provide verification data inputs as required per Glacier ICD SSP 53099 and associated PIRNs.
2. Support ground test requirement and procedure development.
3. Provide COFR submittals (Certificate of Compliance and/or Verification Reports), RCAR, ERCAR, Endorsement Letters, OWTL and Checklists per ISS Program Payload Certification of Flight Readiness Implementation Plan, SSP 52054.
4. Support waiver/PIRN development and implementation.
5. Provide inputs to TGHR, Middeck F2V2
6. Support development of mission specific hardware and software development as well as configuration design drawings for all flight phases.
7. Provide User Handbook and Project Requirements Document updates as required.
8. Support development of facility test requirements and procedures.
9. Support mission specific Shuttle ICA and appropriate Annex documentation development and updating.

c. Experiment Support

1. Support experiment team telecons, requirements reviews, and data product reviews.
2. Support Cold Stowage Management and User Telecons as well as bi-weekly project status meetings.
3. Support Shuttle Middeck Working group meetings when required.
4. Provide mission specific configuration testing and hardware fit checks when required.

d. Quality & Safety

1. Provide non conformance reporting, GIDEP and Alert Tracking and Reporting, and government property inventory management
2. Provide Ground and Flight Reflight Series Safety Assessments, and SVTL reporting and tracking to the PSRP. NASA will be responsible for the Integrated Safety Memo.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

Contract Options: The following tasks shall be priced separately

Task 1: Maintenance & Sustaining: Provide pricing to complete this task per Fiscal Year starting in October 2008.

Task 2: Integration & Verification: Provide pricing and schedule to complete Task 2, Integration and Verification for 3 flights. NASA will exercise Options in this DO to satisfy the maximum mission as defined in part 4 below. It shall be the Contractor's responsibility to ensure availability of, and services for, Glacier systems to support the maximum number of missions during the period starting from DO ATP and ending 12/31/09 .

1) Notes:

- a. Currently, there are only 4 Glacier Class 1 units in development. They are planned to be delivered to NASA in May 2008. Two additional flight units are planned to be delivered to NASA in February 2009.
- b. Starting with 15A, the Glacier unit launched in the Middeck will replace the GLACIER unit operating on ISS. This operational scenario will be repeated on all subsequent Shuttle flights.
- c. Launch support at KSC will be NASA's responsibilities. Landing support at all three landing locations will be NASA's responsibility
- d. Mission Operations related activities will be NASA responsibilities. These activities include but are not limited to the following;
 - 1) C&DH Coordination
 - 2) KSC Support Requirements Data Set
 - 3) PODF/SODF Procedure Development, Listing and Validation
 - 4) Flight Command Plan
 - 5) Crew and Flight Control Team Training
 - 6) Mission Operations Planning (EPAS and URC inputs)
 - 7) Shuttle FOR Review support
 - 8) Stowage Inventory and Tracking
 - 9) PSIV Coordination and Tracking
 - 10) Payload Regulations and Shuttle Flight Rule development and coordination
 - 11) Flight Control CBT inputs
 - 12) Real Time Mission Operations Change Requests
 - 13) Increment transition testing and certification
- e. NASA provides the Payload Safety Engineer (PSE) who will perform the Integrated Safety Assessments with inputs from the Glacier System Contractor. Specifically the Contractor must provided the stand alone Glacier System Safety Data Package (Flight and Ground packages) and revisions to them.
- f. Glacier's 1st ISS and sortie flight will have already occurred on ULF2. All missions after ULF2 will be considered ISS-Reflights per SSP 57057 Integration template.
- g. Current Launch Dates for the remaining Shuttle Flight Program are as follows
 - ISS-15A - 12/2008
 - ISS-2 J/A - 4/2009

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

ISS-17A - 7/2009

- 2) **Reporting:**
 - a. A monthly status report detailing tasks completed, and planned tasks shall be delivered to the DO Manager.
 - b. Per DRD 2, a 533 Report and an overall budget, actual, and Estimate at Complete Report shall also be delivered. FTE data is not required. It is not necessary to show the details per WBS, a top level WBS summary for each of the two tasks identified in this DO is preferred.
- 3) **Earliest Availability:** For Task 1, the start date is anticipated to be October 2008. For Task 2, the first flight is expected to be 15A, currently scheduled for December 2008. The start date for Task 2 will be upon award of this contract. The Contractor shall provide two systems for launch on 15A (one prime and one back-up). The ISS Integration Template is assumed to be 12 months.
- 4) **Maximum Number of Missions:** NASA will exercise Options in this DO to satisfy the maximum mission need. It shall be the Contractor's responsibility to ensure availability of and services for, Glacier systems to support the following maximum number of missions during the period starting from DO ATP and ending 12/31/09:
 - a. Five (5) ISS missions (consisting of powered launch on STS Middeck, transfer to ISS, and ISS Glacier transferred to Middeck, and powered descent on STS Middeck), AND
 - i. One Flight unit shall be available as backup during launch preparations of the prime flight unit for every flight in the event of problems.
- 5) In performance of these tasks the Contractor can assume that:
 - i. Limited Contractor travel to JSC and KSC is required.
 - ii. Bi-Weekly coordination telecons will be held with NASA JSC.

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	None anticipated. Contractor to detail any that would be provided in order to provide the Glacier systems and services detailed in the Task Description above	Contractor to propose how to satisfy Task specified above	June 1, 2008	As required by task being fulfilled
Mock Up				
Prototype				
Certification				
Flight	Glacier p/n CBSE-F10060-1	2	Per STS Integration Schedule	I
Training				
Other				
Test	Contractor shall provide the Glacier systems and services detailed in the Task Description above	Contractor to propose how to satisfy Task specified above	June 1, 2008	As required by task being fulfilled
Software				
Other Products	Acceptance Data Packages (or equivalent)	1 per serial number	Draft Due two weeks prior to flight shipment. Final due at Hardware turnover to KSC	

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

SCHEDULE

Start Date: May 28, 2008

Finish Date: Dec 31, 2009

ITERIM MILESTONES	DUE DATES
15A	12/4/2008
2J/A	4/23/2009
17A	9/2009
COFR products	per SSP 57057 Template

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

**Government Estimate Located in RFO File in Microsoft Project File On CRAVE Web Site
The file is titled: N/A**

Total Government Estimate for this DO: \$ 1,625,810

- Option 1: \$ 70,000 (See Attachment 1)**
- Option 2: \$ 315,000 (See Attachment 2)**
- Option 3: \$ 250,000 (See Attachment 3)**
- Option 4: \$ 100,000 (See Attachment 4)**
- Option 5: \$ 25,000 (See Attachment 5)**
- Option 6: \$ 40,000 (See Attachment 6)**

TOTAL COST ESTIMATE FOR THIS DO: \$ 1,625,810

FEE: \$ (If Applicable)

OPTION 1: \$ N/A (See Attachment 1)

OPTION 2: \$ N/A (See Attachment 2)

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

DATA REQUIREMENTS

All DRs contained in the contract are applicable and required unless marked N/A below.

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
1	Written Approval	Flight GFE Configuration Management Plan	With Proposal	Once	Attachment J-8	
2	Mandatory Submittal	Regular Status Report/ Summary Review	Thirty (30) days following contract start	Monthly	Y	Summary WBS level information is preferred. FTE data and reporting at lower level WBS is not required.
3	Written Approval	Project Technical Requirements Specification	Per DO schedule	Once with Revisions	Y	Only applies to Revisions
4	Mandatory Submittal	GFE Systems Requirements Data Package	Specified in DO	Once with Revisions	N/A	
5	Written Approval	Flight GFE Projects Requirements & Verification Document	Specified in DO	Once with Revisions	Y	Only applies to Revisions
6	Mandatory Submittal	Preliminary Design Review Data Package	Specified in DO	Once with Revisions	N/A	
7	Written Approval	Flight GFE Workmanship Specifications List	Specified in DO	Once with Revisions	N/A	
8	Written Approval	Project Schedule	PDR or 10% effort complete Milestone	Once w/Revisions (due w/DO proposal, updates & details provided as DO progresses)	N/A	
9	Written Approval	Flight GFE Interface Control Document	Specified in DO	Once with Revisions	N/A	
10	Written Approval	GFE End Item Specification	Provide at time of Proposal	Once with Revisions	N/A	
11	Mandatory Submittal	Flight GFE Failure Analysis Report	As agreed by TMR in DO	As Required	N/A	
12	Written Approval	Flight GFE Verification and Validation Plan	As Specified in EA-023	Once with Revisions	N/A	
13	Written Approval	GFE Software Requirements Specification	Specified in DO	Once with Revisions	N/A	
14	Written Approval	GFE Software Development Plan	Specified in DO	Once with Revisions	N/A	
15	Written Approval	GFE Software Design Document	Specified in DO	As Required	N/A	

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
16	Written Approval	Engineering Drawings	Per flight	Once with Revisions	Y	Only applies to revisions and flight specific drawings. Interface and top assembly) drawings shall be in EDCC
17	Written Approval	EEE Parts Lists and Analysis Report	Specified in DO	As Required	N/A	
18	Mandatory Submittal	Critical Design Review Data Package	Specified in DO	Once with Revisions	N/A	
19	Mandatory Submittal	Engineering Drawing Change Proposal	As needed	As Required	N/A	
20	Written Approval	GFE Qualification Test Procedure	Specified in DO	Once with Revisions	N/A	
21	Written Approval	Flight Product User's Guide	As needed	Once with Revisions	Y	Only applies to Revisions
22	Mandatory Submittal	Software Code	Specified in DO	As Required	N/A	
23	Written Approval	Information Technology (IT) Security Program Plan and Reports	(30) days after DO award, and as specified in JPG 2810 1	JPG 2810 1	Attachment J-4 Due 30 days after DO award	Only applies to Revisions.
24	Written Approval	Certification Plan	Specified in DO	Once with Revisions	N/A	
25	Mandatory Submittal	Certification Report	Specified in DO	Once with Revisions	N/A	
26	Mandatory Submittal	Engineering Analysis	Specified in DO	As Required	N/A	
27	Mandatory Submittal	Acceptance Data Package	Specified in DO	Per flight	Y	Required 2 weeks prior to shipment for flight. Only deltas required
28	Mandatory Submittal	Export Control Audit Results	After award of 1st DO, yearly on Sept. 30 thereafter	Yearly	Y	
29	Written Approval	Quality Plan	With Proposal	Once with Revisions	Attachment J-11	Only applies to Revisions
30	Written Approval	Patent Rights-Retention	As Required	As Required	Y (If Applicable)	

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
31	Written Approval	Shuttle/Station Payload Safety Data Package	Specified in DO	Per flight	Y	
32	Mandatory Submittal	Limited Life Systems List	Specified in DO	As Required	N/A	
33	Written Approval	Space Station GFE Failure Modes and Effects Analysis and Critical Items List	As Early in process as possible.	As Required	N/A	
34	Written Approval	Space Shuttle GFE Safety and Analysis Report & Hazard Report	Specified in DO	As Required	N/A	
35	Written Approval	Software Quality Assurance Plan Report	90 Days Prior to Software Development	Once with Revisions	Y (If Applicable)	Only applies to Revisions
36	Written Approval	ISS Hazard Report	Specified in DO	Per flight	N/A	Covered by Item 31
37	Upon Request	Reliability and Maintainability Plan	With Proposal	One Time	Attachment J-9	Only applies to Revisions
38	Written Approval	Government Certification Approval Request (GCAR)	As required	As Required	Y	Only applies to revisions
39	Written Approval	Risk Assessment Executive Summary Report (RAESR)	Specified in DO	As Required	N/A	
40	Written Approval	Problem Reporting and Corrective Action (PRACA)	2 business days of problem isolation but no later than 10 days after detection	As Required	Y	PAR Process is used for on orbit anomalies. Ground Failures must comply with JSC 28035.
41	Upon Request	Nonconformance Record	Specified in DO	As Required	Y	
42	Mandatory Submittal	Government Industry Data Exchange Program and NASA Advisory Problem Data	Reported one time when discrepancy occurs	Once with Revisions	Y	
43	Written Approval	Electrical, Electronic, and Electromechanical (EEE) Parts Control Plan	Specified in DO	Once with Revisions	N/A	
44	Mandatory Submittal	Certification Data Package	Specified in DO	Once with Revisions	N/A	
45	Written Approval	Certification and Acceptance Requirements Document	At CDR	Once with Revisions	N/A	
46	Upon Request	Wage/Salary and Fringe Benefit Data	Thirty (30) days after issuance of each DO	Once	N/A	
47	Written Approval	GFE Acceptance Test Procedure	Specified in DO	One Time	N/A	
48	Mandatory Submittal	Flight GFE Verification & Validation Report	Specified in DO	Once with Revisions	N/A	

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
49	Mandatory Submittal	Space Shuttle GFE Failure Modes and Effects Analysis (FMEA) and Critical Items List	Specified in DO	As Required	N/A	
50		Reserved	---	---	---	---
51	Mandatory Submittal	NASA Contractor Financial Management Reporting	After Issuance of 1st DO	Monthly	Y	
52	Written Approval	Government Property Management Plan	With Proposal	Once with Revisions	Attachment J-7	Only applies to Revisions.
53	Mandatory Submittal	System Safety Plan	With Proposal	One Time	Attachment J-10	Only applies to Revisions.
54	Written Approval	R-Quality Plan Template	With Proposal/ Revisions as Required	Only applicable to B-CRAVE contracts in accordance with the SOW and the DRD	Y	Covered by Item 29

Type 1 - Written Approval Type 2 - Mandatory Submittal Type 3 - Submittal Upon Request

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

GOVERNMENT FURNISHED PROPERTY

The CRAVE contracts do not anticipate the Government providing any property or test facilities unless requested by the contractor in their response to a request for bid.

In some rare cases (such as sustaining engineering task) it is known ahead of time that government property will be provided to the contractor. In those cases the following list filled out to allow the proper control of government property:

A. List of Property the Contractor Shall Replace with modified or upgraded versions:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

B. List of Property the Contractor will return in the same configuration:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
Ground Cart	2	\$20k ea.	1 @ KSC 1 @ Contractor	Award of Contract
Laptop	2	\$1,223 ea	1 @ KSC 1 @ Contractor	Award of Contract
Glacier	6 Class I 1 Class II 1 Class III	\$2.7M Class III \$3.5M Class II \$1.1M Class I	Contractor location	3 Class I, 1 Class II, and 1 Class I units at award of Contract Remaining 2 Class I Units will be delivered in February 2009

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

identified and the determination to provide property is determined to be in the best interest of the Government.

**GOVERNMENT FURNISHED PROPERTY
(Continued)**

C. List of Property the Contractor Shall Replace if Damaged or lost during the course of the effort:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

D. List of Property the Government Will Replace if Damaged or lost during the course of the effort:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

ATTACHMENT 1

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor 15 days before the completion of the Basic delivery order requirement.

OPTION 1 TITLE:

Provide Launch Support for Glacier for 1 Mission

Background / Problem Description:

In conjunction with Contractor performing Glacier tasks per this DO, the contractor is requested to provide a proposal to support the integration and launch of Glacier at KSC for 1 mission. This Option could be executed multiple times if support is needed for more than 1 STS mission.

Task Description: Provide launch site support, condition and integrate payload, and assist in loading Glacier onto the shuttle as required. In the event of launch delays, the contractor shall provide the support necessary to re-supply Glacier as required per KSC launch schedule. Typical launch delays require that the payload should be re-supplied after 48 or 72 hours of delay. This task is defined as 1 mission, and includes launch slips associated with the associated mission.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

SCHEDULE

Start Date: Launch - 10 days

Finish Date: Launch +1 Day

ITERIM MILESTONES	DUE DATES
Contractor to propose	Contractor to propose
<p>Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.</p>	

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

ATTACHMENT 2

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor 15 days before the completion of the Basic delivery order requirement.

OPTION 2 TITLE:

Integration and Verification of an additional ISS Mission

Background / Problem Description:

In conjunction with Contractor performing the Glacier services task, the Contractor is requested to provide a proposal for supporting Integration and Verification, on a per mission basis, for each remaining STS flight beyond the minimum of three (3) in the basic DO. This option will be awarded mission to mission.

Task Description: Provide Integration and Verification tasks for Glacier in accordance with the basic DO Task Description, for supporting additional missions beyond the 3 minimum missions specified in this DO, and up to the Maximum Number of Missions specified in the DO Task Description. Remaining flights after 17A are:

ULF3 - September 2009

20A - October 2009

19A - January 2010

ULF4 - March 2010

ULF5 - April 2010

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
 DELIVERY ORDER #: CRAVE-EC2-DO38**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			


CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

<u>SCHEDULE</u>	
Start Date: Launch -12 months	Finish Date: Launch -10 Days

INTERIM MILESTONES	DUE DATES
Contractor to propose	Contractor to propose

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

ATTACHMENT 3

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor 15 days before the completion of the Basic delivery order requirement.

OPTION 3 TITLE:
Operations Support for Glacier

Background / Problem Description:

In conjunction with Contractor performing this Glacier task, the Contractor is requested to provide a proposal for supporting Operations on ISS for a 12 month period. This option is strictly for all the documentation associated with operating Glacier on ISS and Shuttle. This Option does not include console support during real time Operations.

Task Description: Support Procedure and Cue Card Development, and Procedure Validation. Provide URC, OOS, and EPAS inputs and review. Provide C&DH coordination, PSIV coordination and POIWG support. Review and provide inputs to PTP, and Flight Rules and Regulation.


CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

<u>SCHEDULE</u>	
Start Date: ATP	Finish Date: ATP + 12 months

INTERIM MILESTONES	DUE DATES
Provide R/F systems and services for each ISS mission	December 31, 2009
Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.	

CHANGES TO DRDs: NONE

**CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)**

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

ATTACHMENT 4

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor 15 days before the completion of the Basic delivery order requirement.

OPTION 4 TITLE:

Crew Training for Glacier

Background / Problem Description:

In conjunction with Contractor performing Glacier tasks per this DO, the Contractor is requested to provide a proposal for supporting up to 4 crew training sessions.

Task Description: Provide OBT/CBT development and coordination, training certification, PTDR, and conduct a minimum of four hands on training sessions. Training sessions will be conducted at JSC.

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

SCHEDULE

Start Date: Increment -4 months

Finish Date: Launch – 2 months

INTERIM MILESTONES	DUE DATES
Contractor to propose	Contractor to propose

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

CHANGES TO DRDs: NONE

**CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)**

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

ATTACHMENT 5

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor 15 days before the completion of the Basic delivery order requirement.

OPTION 5 TITLE:

Provide Landing Support for Glacier

Background / Problem Description:

In conjunction with Contractor performing Glacier tasks per this DO, the contractor is requested to provide a proposal to support de-integration of the Glacier and conditioned science at all landing locations.

Task Description: Provide support at designated landing locations. Recover payload and maintain temperature requirements of samples until they can be turned over to the Cold Storage or Experiment Team. There are three primary landing locations, KSC, Dryden Space Flight Center, and White Sands

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

<u>SCHEDULE</u>	
Start Date: Launch +10 days	Finish Date: Landing +5 days

ITERIM MILESTONES

Contractor to propose

DUE DATES

Contractor to propose

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

CHANGES TO DRDs: NONE

**CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)**

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

ATTACHMENT 6

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor 15 days before the completion of the Basic delivery order requirement.

OPTION 6 TITLE:

Real Time Operations

Background / Problem Description:

In conjunction with Contractor performing Glacier tasks per this DO, the contractor is requested to provide real time operations support for a 4 month increment, at the contractor's location.

Task Description: Provide real time operations support for three month increments. This includes real-time engineering support to monitor on-orbit operations, checkout of flight systems and the subsequent on-orbit operations throughout the mission duration. Real time engineering support is provided through coordination and or full control of the GLACIER system from the contractor's Remote Operations site. This support will include investigation, isolation and resolution of anomalies encountered during on-orbit operations. Real time support includes the development and maintenance of ground terminal displays, software systems necessary to provide control of on-orbit systems from the ground, software systems required to support data handling/transition/storage and the systems necessary to perform diagnostics corrective actions from the ground.


CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO38**

<u>SCHEDULE</u>	
Start Date: ATP	Finish Date: ATP +4 months

ITERIM MILESTONES	DUE DATES
Contractor to propose	Contractor to propose

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

1. Order No. **DO-CRAVE-EC2-DO38, Glacier**

2. Date of Order
See Block 10 Below

NOTE: MARK ALL PACKAGES AND PAPERS WITH ORDER NO.

Certified for National Defense under DPAS (15 CFR 700) DO-C9

3. Issuing Office:
NASA Johnson Space Center, 2101 Nasa Parkway
Houston, TX 77058-3696
Org./Buyer: **BH2/Mary Thomas**

Tel No.: **281-483-8828** Fax: **281-244-0996**
E-mail: **mary.l.thomas@nasa.gov**

4. Ship To:
Transportation Officer, Building 421
NASA Johnson Space Center
Houston, TX 77058-3696
Mark For: **Accountable Property**
Order No.: **DO-CRAVE-EC2-DO38, Glacier**

5. Contractor:
The University of Alabama at Birmingham Center for
Biophysical Sciences and Engineering CBSE 100, 1530 3rd
Avenue South, Birmingham Alabama 35294-4400

6. Deliver On or Before: **See Block 11 Below**
F.O.B. Point: **Destination**
Discount Terms: **Net 30 Days.**

7. BILLING ADDRESS:
NASA Johnson Space Center
Attn: **LF231/Accounts Payable Group**
Houston, TX 77058-3696
Order No.: **DO-CRAVE-EC-DO38, Glacier**

Phone: (205)975-2718 x Fax: (205)975-1709
TIN: 63-6005398 CAGE CODE: 00V74

8. Type of Order:
 PURCHASE: Please furnish the following in accordance with the conditions specified on this order. Reference: _____
 DELIVERY: Except for the Terms and Conditions of Purchase Order listed on the following page, this delivery order is subject to instructions contained on this form and is issued subject to the terms and conditions of contract number: **NNJ05HB42B**

9. Written acceptance of this order by contractor is, is not required. Sign below if required and return to contracting officer.
Name: **Lynn Stedman** (Person authorized to sign)
Signature: Lynn W. Stedman Date: **5-9-08**

10. Name: **Ronald Johnson**
Signature: _____ Date: _____
CONTRACTING OFFICER

11. Schedule

ITEM NO.	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED
1	<p style="text-align: center;">GLACIER</p> <p>The contractor shall perform and deliver to all base requirements of CRAVE-EC2-DO38 as described in the attached Statement of Work.</p> <p style="text-align: center;">Period of Performance: May 20, 2008 to December 31, 2009 July 1</p> <p>OPTION: The Government may require the contractor to continue to perform services under this delivery order. The Contracting Officer may exercise any Option by issuing a revision to the DO. The Government (continued next page)</p>				64	

12. For JSC Internal Use Only:
Requisition No.: **N/A** COMP. PART. PPC: _____
Issue To: **EC/Joe Gensler, x30025**

13. Total
\$ NTE: _____

14. Quantities in "Quantity Accepted" Column Have Been
 INSPECTED ACCEPTED RECEIVED

TO CONFORM TO THE CONTRACT.
ACCEPTANCE WILL BE AT JSC UNLESS OTHERWISE NOTED

BY: _____ Date: _____
Authorized U.S. Government Representative

Order No.: _____

ORDER FOR SUPPLIES OR SERVICES (CONTINUATION SHEET)

SCHEDULE

ITEM	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED
	reserves the right not to exercise any Options. Should an Option be exercised, the delivery order revision will be issued using the cost proposed.					
2	Option 1 - Launch Support for Glacier for 1 Mission					
3	Option 2 - Integration and Verification of an Additional ISS Mission					
4	Option 3 - Operations Support for Glacier					
5	Option 4 - Crew Training for Glacier					
6	Option 5 - Landing Support for Glacier					
7	Option 6 - Real Time Operations					
	THIS IS A CPFF DELIVERY ORDER					

104

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 LYNDON B. JOHNSON SPACE CENTER
 HOUSTON, TX 77058**

COST REIMBURSABLE INDEFINITE-DELIVERY
 INDEFINITE-QUANTITY (IDIQ) DELIVERY ORDER
 University of Alabama at Birmingham
 Contract NNJ05HB42B

<i>Delivery Order Number</i>	<i>Revision Number</i>	<i>Purchase Request Number</i>
16	7	Funded at Contract Level
<i>SOW WBS</i>	<i>Fiscal Year</i>	<i>Technical Monitor/Division/Extension</i>
	FY10	COTR: Ralph Marak/EC ext:3-9144

Delivery Order Title

REFRIGERATOR – FREEZER SERVICES

Description/Purpose

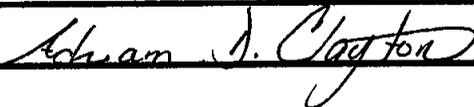
The purpose of this delivery order revision is to extend the period of performance from March 1, 2010 to September 31, 2010. (September 19, 2006 – September 31, 2010)

Delivery Order 16 Value Recapitulation:

	Prior	This Action DO 16, Rev 7	Cum Value
Cost	b4	b4	b4
Fee			
Total	\$3,790,473.17	-	\$3,790,473.17

THE CONTRACTOR IS NOT AUTHORIZED TO EXCEED THE DELIVERY ORDER VALUE SPECIFIED HEREIN. THIS IS A COST PLUS FIXED FEE DELIVERY ORDER.

NASA Approval

<i>Contracting Officer</i>	<i>Signature</i>	<i>Date</i>
Adrian D. Clayton		2-16-2010

NNJ05HB42B - UNIVERSITY OF ALABAMA AT BIRMINGHAM						
Delivery Order 7						
FFP	\$	b4				
	\$					
DATE	DO VALUE			NOTES		
	ACTION TOTAL	FFF %	COST	FEE	CUM TOTAL	
DO 7	08/26/05	\$	b4	\$	b4	b4
	TOTAL		\$ 8,900			
Delivery Order 16						
Cost Total	b4					
Fee Total						
Total Cost & Fee	\$ 3,790,473 17					
DATE	DO VALUE					
	ACTION TOTAL	FEE %	COST	FEE	CUM TOTAL	
DO 16	09/19/06					
DO 16 R1	05/15/08					
DO 16 R2	08/07/07					
DO 16 R3	12/17/08					
DO 16 R4	07/21/09					
DO 16 R5	11/06/09					
DO 16 R6	12/28/09					
DO 16 R7	02/11/09					
	TOTAL		\$ 3,790,473 17	\$ -		
Delivery Order 38						
Cost Total	b4					
Fee Total						
Total Cost & Fee	\$ 4,338,846 34					
DATE	DO VALUE					
	ACTION TOTAL	FEE %	COST	FEE	CUM TOTAL	
DO 38	06/26/08					
DO 38 R1	12/15/08					
DO 38 R2	08/07/09					
DO 38 R3	08/19/09					
DO 38 R4	08/20/09					
DO 38 R5	11/17/09					
DO 38 R6	12/28/09					
	TOTAL		\$ 4,338,846 34	\$ -		
TOTAL CONTRACT VALUE.						
			\$ 8,138,227 51	\$ -	\$ 8,138,227 51	b4
CURRENT TOTAL FUNDING.						
					b4	b4
REMAINDER						

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER
HOUSTON, TX 77058**

COST REIMBURSABLE INDEFINITE-DELIVERY
INDEFINITE-QUANTITY (IDIQ) DELIVERY ORDER
University of Alabama at Birmingham
Contract NNJ05HB42B

<i>Delivery Order Number</i>	<i>Revision Number</i>	<i>Purchase Request Number</i>
16	6	Funded at Contract Level
<i>SOW WBS</i>	<i>Fiscal Year</i>	<i>Technical Monitor/Division/Extension</i>
	FY10	COTR: Ralph Marak/EC ext:3-9144

Delivery Order Title

REFRIGERATOR – FREEZER SERVICES

Description/Purpose

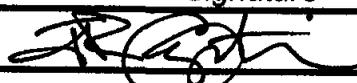
The purpose of this delivery order revision is to execute the delivery required for this revision as identified in the attached revised delivery order description. The recapitulation of the delivery order value is shown below per this revision.

Delivery Order 16 Value Recapitulation:

	Prior	This Action DO 16, Rev 6	Cum Value
Cost	<i>64</i>	<i>64</i>	<i>64</i>
Fee			
Total	\$3,400,473.01	\$390,000.16	\$3,790,473.17

THE CONTRACTOR IS NOT AUTHORIZED TO EXCEED THE DELIVERY ORDER VALUE SPECIFIED HEREIN. THIS IS A COST PLUS FIXED FEE DELIVERY ORDER.

NASA Approval

<i>Contracting Officer</i>	<i>Signature</i>	<i>Date</i>
J.R. CARPENTIER c.o.		12-28-09

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

Narrative Task Description

Background / Problem Description:

Thermal carriers are required to provide transport and on-orbit preservation at refrigerated/frozen conditions of a variety of payloads.

Task Description: Provide refrigerator-freezer R/F system services to EC2 for transport and on-orbit controlled temperature preservation of payloads, for the nominal and off-nominal activities in Section 3.4 and with the additional top level requirements/allowables:

- 1) **Ownership:** Contractor is assumed to own the R/F systems to perform the tasks in this DO. Contractor shall clearly detail NASA's responsibilities, particularly in the event the systems are damaged or destroyed.
- 2) **Minimum Number of Missions:** It shall be the Contractor's responsibility to ensure availability of, and services for, R/F systems to support the following minimum number of missions during the period starting from DO ATP and ending 12/31/09:
 - a. Three (3) Sortie missions (consisting of powered launch on STS Middeck, operation on-orbit in STS Middeck, powered descent on STS Middeck. System is NOT transferred from STS Middeck during a sortie mission), AND
 - i. One Flight unit shall be available as backup during launch preparations of the prime flight unit for every flight in the event of problems.
 - b. One form-fit-function equivalent trainer/engineering unit (non-flight) shall be available at all times.
 - i. Ten (10) training sessions, each for 1/2 day, will be at held at JSC during this period. The R/F system would need to be represented at Crew Training sessions at JSC. The Contractor should plan for each session lasting 4 hours, and covering hardware, software and operations unique to the Contractor's R/F system.
- 3) **Maximum Number of Missions:** NASA will exercise Options in this DO to satisfy the maximum mission need. It shall be the Contractor's responsibility to ensure availability of, and services for, R/F systems to support the following maximum number of missions during the period starting from DO ATP and ending 12/31/09:
 - a. Nine (9) Sortie missions with no more than three (3) in any single year, AND
 - i. One Flight unit shall be available as backup during launch preparations of the prime flight unit for every flight in the event of problems.
 - ~~b.~~ Three (3) ISS missions (consisting of powered launch on STS Middeck, transfer to, and continuous operation in, an on-orbit EXPRESS rack for 18 months, powered descent on STS Middeck) with as many as three (3) missions operating at the same time aboard ISS, ~~AND~~
 - ~~e.~~ ~~b.~~ One form-fit-function equivalent trainer/engineering unit (non-flight) shall be available at all times.
 - i. Twenty (20) training sessions, each for 1/2 day, will be at held at JSC during this period. The R/F system would need to be represented at Crew Training sessions at JSC. The Contractor should plan for each session

■

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6

lasting 4 hours, and covering hardware, software and operations unique to the Contractor's R/F system.

- 4) Earliest Availability: Contractor shall provide one system for sortie launch on STS-118 (13A.1) May 2007 and trainer/engineering unit as early as October 2006.
- 5) Compatibility: Each Contractor provided R/F system shall:
- a. Be certified for launch, landing, and operation in STS middeck as a rear air-cooled hard mounted payload, and operation aboard ISS in an EXPRESS rack (rear air as well as water cooled capability in EXPRESS Rack). Certification is per existing Program processes and must include a Phase III Safety Data Package that has been approved by the Payload Safety Review Panel.
 - b. Be compatible with applicable interfaces STS middeck hard mount, STS middeck or MPLM soft stow, and Spacehab for non-operating transportation.
 - c. Occupy the volume of one (1) STS middeck locker, and provide a controlled temperature volume for payload transport/preservation of not less than 17.24 cm (6.787 in) high x 25.86 cm (10.18 in) wide x 41.91 cm (16.50 in) deep, and with payload mass up to 10kg (22 lbs).
 - d. Be actively powered, and not require more than 9.0 A at 28VDC maximum power during operation.
 - e. Be able to maintain any temperature selectable within in a range of +48°C to -15°C and with ability to remotely and locally (by on-orbit crew) change this during a mission. This range includes an incubation capability to +48°C which is desirable for certain anticipated missions. The Contractor shall specify to what extent this range can be met by the proposed system in the Proposal.
 - f. Provide 12 desiccant packs assemblies for flight on HTV. Certify and verify Desiccant Pack Assembly, P/N 24400-20074-701 for launch on HTV. Certification includes completion of export forms, safety data package, TDS Form, and review and approval of ICD update.
 - g. Provide two (2) sensor wire harnesses, P/N CBSE-F50401-1, to be used as spares for flight units. Sensors shall include four (4) Temperature sensors and one (1) Humidity sensor. One sensor harness will be launched stowed inside the Middeck MERLIN on 19A. Provide all integration and safety documentation required to launch the sensor harness in the Middeck MERLIN and then transfer the harness to the ISS MERLIN. The MERLIN wire harness is unique hardware built especially for Contractor owned flight hardware. Requirements for flight hardware delivery to JSC as specified in this contract is not applicable. Flight Integration, Safety Certification and Flight Certification shall be done through the Contractor organization Space Shuttle and ISS programs in support of the MERLIN services provided under this Statement of Work.
 - g.h. Provide an additional MERLIN to ISS on ULF5 (9/16/2010) including limited Engineering sustaining support through contract end data. MERLIN will launch unpowered in the PLM (Option 3h of this contract). The sensor harness (item g above) will launch stowed installed inside of MERLIN. The unit will be transferred to ISS and operated on an as needed basis through contract expiration 12/2010).
- 6) Integration: Contractor shall provide system engineering and technical support to integrate R/F systems with;

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

- a. R/F Payloads. This includes the development, design, fabrication, and certification of hardware/software that is unique to, or part of, the Contractor provided R/F system. NASA will provide softgoods sample containers, holders, straps, bags, and PPE.
- b. ISS and STS Programs. This includes any verification activities due to changes in applicable Program requirements. Also applies to desiccant packs.
- c. Overall NASA/EC2 integrated controlled temperature stowage effort. This includes the Contractor closely coordinating its provided R/F services with those of a separately NASA contracted local JSC support contractor who is responsible for; MELFI, GLACIER, Coldbag, ICEPAC, and GN2 Cryodewar flight systems. Contractor shall provide all items listed under "Single Locker Refrigerator/Incubator" in JSC 65119 Rev A. with the exception of:
 - i. ~~NASA provides the Payload Safety Engineer (PSE) who performs Series reflight and integrated safety assessments with inputs from the R/F System Contractor, specifically the Contractor must provide the R/F System Safety Data Package and revisions to it.~~
 - ii. NASA provides facility and hardware/software items in Section 3.1.3, 3.3.1, and all tasks under 4.2.
- d. In performance of these tasks the Contractor can assume that:
 - i. NASA will utilize ~~the JSC TeleScienceCenter (TSC) for the systems~~ NASA provides UAB Remote Payload Operations Control Center (POCC) for MERLIN on orbit operations through the duration of this contract.
 - ii. Limited Contractor travel to JSC and STS launch/landing sites is required.
 - iii. Quarterly face-to-face meeting with the NASA JSC ~~is~~ as required.
 - iv. Weekly coordination telecons will be held with NASA JSC.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	None anticipated. Contractor to detail any that would be provided in order to provide the R/F systems and services detailed in the Task Description above	Contractor to propose how to satisfy Task specified above	Starting September 14, 2006	As required by task being fulfilled
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor shall provide the R/F systems and services detailed in the Task Description above	Contractor to propose how to satisfy Task specified above	Starting September 14, 2006	As required by task being fulfilled
Software	Contractor shall provide the R/F systems and services detailed in the Task Description above	Contractor to propose how to satisfy Task specified above	Starting September 14, 2006	As required by task being fulfilled
Other Products	Contractor shall provide the R/F systems and services detailed in the Task Description above	Contractor to propose how to satisfy Task specified above	Starting September 14, 2006	As required by task being fulfilled



CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6

--	--	--	--	--

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

<u>SCHEDULE</u>	
Start Date: Sept 14, 2006	Finish Date: Dec 31, 2010

INTERIM MILESTONES	DUE DATES
Initial R/F System Training Session	September 29, 2006
Provide R/F systems and services for three (3) sortie missions	December 31, 2009
Provide 12 Desiccant Pack Assemblies	NLT July 20, 2009
Provide 1 sensor wire harnesses to support STS-131 flight. 1 spare harness will be maintained at Contractor site.	NLT March 8, 2010
<u>Provide 1 MERLIN for ULF5 launch in PLM.</u>	<u>NLT July 31, 2010</u>
<u>Provide sustaining and operations support for MERLIN operations.</u>	<u>December 31, 2010</u>

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

Government Estimate Located in RFO File in Microsoft Project File On CRAVE Web Site
The file is titled: N/A

Total Government Estimate for this DO: \$ N/A
Option 1: \$ N/A (See Attachment 1)
Option 2: \$ N/A (See Attachment 2)

TOTAL COST ESTIMATE FOR THIS DO: \$

FEE: \$ (If Applicable)

OPTION 1: \$ N/A (See Attachment 1)

OPTION 2: \$ N/A (See Attachment 2)

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

DATA REQUIREMENTS

All DRs contained in the contract are applicable and required unless marked N/A below.

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
1	Written Approval	Flight GFE Configuration Management Plan	With Proposal	Once	Attachment J-8	
2	Mandatory Submittal	Regular Status Report/ Summary Review	Thirty (30) days following contract start	Monthly	Y	
3	Written Approval	Project Technical Requirements Specification	Per DO schedule	Once with Revisions	N/A	
4	Mandatory Submittal	GFE Systems Requirements Data Package	Specified in DO	Once with Revisions	N/A	
5	Written Approval	Flight GFE Projects Requirements & Verification Document	Specified in DO	Once with Revisions	N/A	
6	Mandatory Submittal	Preliminary Design Review Data Package	Specified in DO	Once with Revisions	N/A	
7	Written Approval	Flight GFE Workmanship Specifications List	Specified in DO	Once with Revisions	N/A	
8	Written Approval	Project Schedule	PDR or 10% effort complete Milestone	Once w/Revisions (due w/DO proposal, updates & details provided as DO progresses)	N/A	
9	Written Approval	Flight GFE Interface Control Document	Specified in DO	Once with Revisions	N/A	
10	Written Approval	GFE End Item Specification	Provide at time of Proposal	Once with Revisions	Y	Contractor may propose equivalent
11	Mandatory Submittal	Flight GFE Failure Analysis Report	As agreed by TMR in DO	As Required	N/A	
12	Written Approval	Flight GFE Verification and Validation Plan	As Specified in EA-023	Once with Revisions	N/A	
13	Written Approval	GFE Software Requirements Specification	Specified in DO	Once with Revisions	N/A	
14	Written Approval	GFE Software Development Plan	Specified in DO	Once with Revisions	N/A	
15	Written Approval	GFE Software Design Document	Specified in DO	As Required	N/A	

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
16	Written Approval	Engineering Drawings	6 Months prior to Launch	Once with Revisions	Y	Interface and top assembly drawings shall be placed into the Payload Data Library http://pdprod3.hosc.msfc.nasa.gov:7777/
17	Written Approval	EEE Parts Lists and Analysis Report	Specified in DO	As Required	N/A	
18	Mandatory Submittal	Critical Design Review Data Package	Specified in DO	Once with Revisions	N/A	
19	Mandatory Submittal	Engineering Drawing Change Proposal	As needed	As Required	N/A	
20	Written Approval	GFE Qualification Test Procedure	Specified in DO	Once with Revisions	N/A	
21	Written Approval	Flight Product User's Guide	Provide at time of Proposal	Once with Revisions	Y	
22	Mandatory Submittal	Software Code	Specified in DO	As Required	N/A	
23	Written Approval	Information Technology (IT) Security Program Plan and Reports	(30) days after DO award, and as specified in JPG 2810.1	JPG 2810.1	Attachment J-4 Due 30 days after DO award	
24	Written Approval	Certification Plan	Specified in DO	Once with Revisions	N/A	
25	Mandatory Submittal	Certification Report	Specified in DO	Once with Revisions	N/A	
26	Mandatory Submittal	Engineering Analysis	Specified in DO	As Required	N/A	
27	Mandatory Submittal	Acceptance Data Package	Specified in DO	One Time	N/A	
28	Mandatory Submittal	Export Control Audit Results	After award of 1st DO, yearly on Sept. 30 thereafter	Yearly	Y	
29	Written Approval	Quality Plan	With Proposal	Once with Revisions	Attachment J-11	

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
30	Written Approval	Patent Rights-Retention	As Required	As Required	Y (If Applicable)	
31	Written Approval	Shuttle/Station Payload Safety Data Package	Specified in DO	As Required	Y	
32	Mandatory Submittal	Limited Life Systems List	Specified in DO	As Required	N/A	
33	Written Approval	Space Station GFE Failure Modes and Effects Analysis and Critical Items List	As Early in process as possible	As Required	N/A	
34	Written Approval	Space Shuttle GFE Safety and Analysis Report & Hazard Report	Specified in DO	As Required	N/A	
35	Written Approval	Software Quality Assurance Plan Report	90 Days Prior to Software Development	Once with Revisions	Y (If Applicable)	
36	Written Approval	ISS Hazard Report	Specified in DO	As Required	Y	
37	Upon Request	Reliability and Maintainability Plan	With Proposal	One Time	Attachment J-9	
38	Written Approval	Government Certification Approval Request (GCAR)	Specified in DO	As Required	N/A	
39	Written Approval	Risk Assessment Executive Summary Report (RAESR)	Specified in DO	As Required	N/A	
40	Written Approval	Problem Reporting and Corrective Action (PRACA)	2 business days of problem isolation but no later than 10 days after detection	As Required	Y	Contractor to propose whether PAR process should be used instead
41	Upon Request	Nonconformance Record	Specified in DO	As Required	Y	
42	Mandatory Submittal	Government Industry Data Exchange Program and NASA Advisory Problem Data	Reported one time when discrepancy occurs	Once with Revisions	Y	
43	Written Approval	Electrical, Electronic, and Electromechanical (EEE) Parts Control Plan	Specified in DO	Once with Revisions	N/A	
44	Mandatory Submittal	Certification Data Package	Specified in DO	Once with Revisions	N/A	
45	Written Approval	Certification and Acceptance Requirements Document	At CDR	Once with Revisions	N/A	
46	Upon Request	Wage/Salary and Fringe Benefit Data	Thirty (30) days after issuance of each DO	Once	N/A	
47	Written Approval	GFE Acceptance Test Procedure	Specified in DO	One Time	N/A	
48	Mandatory Submittal	Flight GFE Verification & Validation Report	Specified in DO	Once with Revisions	N/A	

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DOY Y/N	ADDITIONAL REQUIREMENTS
49	Mandatory Submittal	Space Shuttle GFE Failure Modes and Effects Analysis (FMEA) and Critical Items List	Specified in DO	As Required	N/A	
50		Reserved	---	---	---	---
51	Mandatory Submittal	NASA Contractor Financial Management Reporting	After Issuance of 1st DO	Monthly	Y	
52	Written Approval	Government Property Management Plan	With Proposal	Once with Revisions	Attachment J-7	
53	Mandatory Submittal	System Safety Plan	With Proposal	One Time	Attachment J-10	
54	Written Approval	R-Quality Plan Template	With Proposal/Revisions as Required	Only applicable to B-CRAVE contracts in accordance with the SOW and the DRD	Y	

Type 1 = Written Approval Type 2 = Mandatory Submittal Type 3 = Submittal Upon Request

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

GOVERNMENT FURNISHED PROPERTY

The CRAVE contracts do not anticipate the Government providing any property or test facilities unless requested by the contractor in their response to a request for bid.

In some rare cases (such as sustaining engineering task) it is known ahead of time that government property will be provided to the contractor. In those cases the following list filled out to allow the proper control of government property:

A. List of Property the Contractor Shall Replace with modified or upgraded versions:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

B. List of Property the Contractor will return in the same configuration:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
 DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

**GOVERNMENT FURNISHED PROPERTY
 (Continued)**

C. List of Property the Contractor Shall Replace if Damaged or lost during the course of the effort:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

B. List of Property the Government Will Replace if Damaged or lost during the course of the effort:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

ATTACHMENT 1

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor no later than 15 days before the completion of the Basic delivery order requirement.

OPTION 1 TITLE:

Improvements to consolidated Controlled Temperature Transport/Storage of Payloads

Background / Problem Description:

In conjunction with Contractor performing this R/F services task, NASA will consider proposed modifications to stated tasks, or new Options, that can improve, or reduce the cost of, integrated operations of several different controlled temperature transport and storage systems to simultaneously support multiple payload users.

Task Description: NASA is currently interested in; reducing the cost of the sustaining engineering phase, minimizing staffing hours of ground consoles, reducing on-orbit crew time, improving on-orbit lifetime and availability, improving on-orbit maintenance capability, reducing power consumption, expanding maximum or minimum temperature range, improving hold time during power loss, payload logistics, and cross-system compatibility of payloads.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
 DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

SCHEDULE

Start Date: Sept 14, 2006

Finish Date: Dec 31, 20092010

INTERIM MILESTONES

Contractor to propose

DUE DATES

Contractor to propose

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

■
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6

■

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

-

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

ATTACHMENT 2

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor no later than 15 days before the completion of the Basic delivery order requirement.

OPTION 2 TITLE:

Additional Sortie Missions

Background / Problem Description:

In conjunction with Contractor performing this R/F services task, the Contractor is requested to provide a proposal for supporting sortie missions beyond the minimum of three (3) in the basic DO.

Task Description: Provide refrigerator-freezer R/F system services to EC2 for transport and on-orbit controlled temperature preservation of payloads in accordance with the basic DO Task Description, for supporting additional sortie missions beyond those specified in the Minimum Number of Missions in the DO Task Description, and up to the Maximum Number of Missions specified in the DO Task Description.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
 DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

SCHEDULE

Start Date: Sept 14, 2006

Finish Date: Dec 31, 2009

INTERIM MILESTONES

DUE DATES

Provide R/F systems and services for each additional sortie mission

December 31, 2009

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-~~DO16R5~~DO16R6**

CHANGES TO DRDs: NONE

**CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)**

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

ATTACHMENT 3

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor no later than 15 days before the completion of the Basic delivery order requirement.

OPTION 3 TITLE:

ISS Missions

Background / Problem Description:

In conjunction with Contractor performing this R/F services task, the Contractor is requested to provide a proposal for supporting ISS missions.

Task Description: Provide refrigerator-freezer R/F system services to EC2 for transport and on-orbit controlled temperature preservation of payloads in accordance with the basic DO Task Description, for supporting ISS missions up to the Maximum Number of Missions specified in the DO Task Description.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

SCHEDULE

Start Date: Sept 14, 2006

Finish Date: Dec 31, ~~2009~~2010

INTERIM MILESTONES

DUE DATES

Provide R/F systems and services for each ISS mission

December 31, 2009

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

CHANGES TO DRDs: NONE

**CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
*(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)***

—

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

ATTACHMENT 4

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor no later than 15 days before the completion of the Basic delivery order requirement.

OPTION 4 TITLE:
ISS Mission Extension

Background / Problem Description:

In conjunction with Contractor performing this R/F services task, the Contractor is requested to provide a proposal for extending an ISS mission by 2 months. This would be in addition to the Government exercising OPTION 3 (ISS Missions)

Task Description: Provide refrigerator-freezer R/F system services to EC2 for transport and on-orbit controlled temperature preservation of payloads in accordance with the basic DO Task Description, for extending ISS missions (OPTION 3) by two (2) months.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
 DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

SCHEDULE

Start Date: Sept 14, 2006

Finish Date: Dec 31, 2009

INTERIM MILESTONES

DUE DATES

Provide R/F systems and services for each ISS mission 2 month extension

December 31, 2009

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

■
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5DO16R6

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

NNJ05HB42B - UNIVERSITY OF ALABAMA AT BIRMINGHAM											
Delivery Order 7											
FFP	\$	8,908									
	\$	8,908									
	DATE	ACTION TOTAL	FEE %	DO VALUE		CUM. TOTAL	NOTES				
				COST	FEE						
DO 7	08/26/05	\$ 8,908	0 0%	\$ 8,908	\$ -	\$ 8,908					
		TOTAL		\$ 8,908							
Delivery Order 16											
Cost Total	\$	3,790,473 17									
Fee Total	\$	-									
Total Cost & Fee	\$	3,790,473 17									
	DATE	ACTION TOTAL	FEE %	DO VALUE		CUM TOTAL					
				COST	FEE						
DO 16	09/19/06	\$ 1,793,479	0 0%	\$ 1,793,479	\$ -	\$ 1,793,479 11					
DO 16 R1	05/15/08	\$ 1,045,766	0 0%	\$ 1,045,766	\$ -	\$ 2,839,245 11			Exercised Opt 3e & 4		
DO 16 R2	08/07/07	\$ 100,485	0.0%	\$ 100,485	\$ -	\$ 2,939,730 11					
DO 16 R3	12/17/08	\$ 397,900	0.0%	\$ 397,900		\$ 3,337,630 11					
DO 16 R4	07/21/09	\$ 29,942		\$ 29,942		\$ 3,367,572 31					
DO 16 R5	11/06/09	\$ 32,901		\$ 32,901		\$ 3,400,473 01					
DO 16 R6	12/28/09	\$ 390,000		\$ 390,000		\$ 3,790,473 17					
		TOTAL		\$ 3,790,473 17	\$ -						
Delivery Order 38											
Cost Total	\$	4,338,846 34									
Fee Total	\$	-									
Total Cost & Fee	\$	4,338,846 34									
	DATE	ACTION TOTAL	FEE %	DO VALUE		CUM TOTAL					
				COST	FEE						
DO 38	06/26/08	\$ 1,555,851	0 0%	\$ 1,555,851	\$ -	\$ 1,555,851 36					
DO 38 R1	12/15/08	\$ 661,998	0 0%	\$ 661,998	\$ -	\$ 2,217,849 40					
DO 38 R2	08/07/09	\$ 1,469,174	0 0%	\$ 1,469,174	\$ -	\$ 3,687,023 40					
DO 38 R3	08/19/09	\$ 78,500	0 0%	\$ 78,500	\$ -	\$ 3,765,523 50					
DO 38 R4	08/20/09	\$ 78,500	0.0%	\$ 78,500		\$ 3,844,023 60					
DO 38 R5	11/17/09	\$ 479,173		\$ 479,173		\$ 4,323,196 34					
DO 38 R6	12/28/09	\$ 15,650		\$ 15,650		\$ 4,338,846 34					
		TOTAL		\$ 4,338,846 34	\$ -						
TOTAL CONTRACT VALUE				\$ 8,138,227.51	\$ -	\$ 8,138,227.51	\$ 21,454.00		\$ 8,116,773.51		
CURRENT TOTAL FUNDING						\$ 4,806,029.01					
REMAINDER						\$ 3,332,198.50					

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 LYNDON B. JOHNSON SPACE CENTER
 HOUSTON, TX 77058**

COST REIMBURSABLE INDEFINITE-DELIVERY
 INDEFINITE-QUANTITY (IDIQ) TASK ORDER
 University of Alabama at Birmingham
 Contract NNJ05HB42B

<i>Delivery Order Number</i>	<i>Revision Number</i>	<i>Purchase Request Number</i>
16	5	Funded at Contract Level
<i>SOW WBS</i>	<i>Fiscal Year</i>	<i>Technical Monitor/Division/Extension</i>
	FY09	COTR: Ralph Marak/EC ext:3-9144

Task Order Title

REFRIGERATOR – FREEZER SERVICES

Description/Purpose

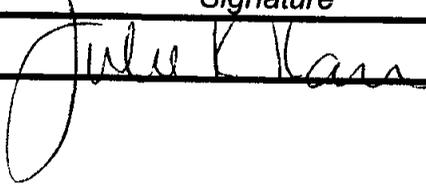
The purpose of this delivery order revision is to execute the tasks required for this revision as identified in the attached revised delivery order description. The recapitulation of the delivery order value is shown below per this revision.

Delivery Order 16 Value Recapitulation.

	Prior	This Action DO 16, Rev 5	Cum Value
Cost	b4	b4	b4
Fee			
Total	\$3,367,572.31	\$32,900.70	\$3,400,473.01

THE CONTRACTOR IS NOT AUTHORIZED TO EXCEED THE TASK ORDER VALUE SPECIFIED HEREIN. THIS IS A COST PLUS FIXED FEE TASK ORDER.

NASA Approval

<i>Contracting Officer</i>	<i>Signature</i>	<i>Date</i>
Julie K. Karr		11/9/09

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

PROPOSAL INSTRUCTIONS: **DRAFT--COMMENTS DUE BY: October 27, 2009**
 FINAL --PROPOSAL DUE BY: October 30, 2009

DO TITLE: Refrigerator-Freezer Services

DO Type: CPFF FFP

DO Contact Information in Addition to the CRAVE Contract Specialist or CO:

TMR: Marie Kowal/EC2

Phone: (281) 483-8875

DO Manager: Sharon Campana/EC2

Phone: (281) 483-3662

DO Mgr. Alternate: Marie Kowal/EC2

Phone: (281) 483-8875

Concurrences:

Sharon Campana/EC2
DO Manager

Marie Kowal/EC2
DO Mgr. Management

Ralph Marak
COTR

Sharon Campana/EC2
Division TMR

Steve Miller
S & MA

Name

Task Contains Flight Hardware, Flight Software or GSE? Yes No

Program Supported: Shuttle ISS EVA Advanced _____

WBS: 1.0 EVA 2.0 FCE 3.0 EVR ECLSS 5.0 ATCS 6.0 CHeCS

For purposes of complying with FAR 52.232-22, Limitation of Funds, the total amount allotted by the Government to contract is specified in clause B.6, Contract Funding. The funding listed in B.6 is the amount allotted for all Delivery Orders on the contract combined.

All terms and conditions of the contract apply to this Delivery Order. In the event of a conflict between the contract and this Delivery Order, the contract shall prevail.

WBS reporting shall be done in accordance with applicable WBS reporting categories, as shown above and in the contract within Section C, Table 1.

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5

Narrative Task Description

Background / Problem Description:

Thermal carriers are required to provide transport and on-orbit preservation at refrigerated/frozen conditions of a variety of payloads.

Task Description: Provide refrigerator-freezer R/F system services to EC2 for transport and on-orbit controlled temperature preservation of payloads, for the nominal and off-nominal activities in Section 3.4 and with the additional top level requirements/allowables:

- 1) **Ownership:** Contractor is assumed to own the R/F systems to perform the tasks in this DO. Contractor shall clearly detail NASA's responsibilities, particularly in the event the systems are damaged or destroyed.
- 2) **Minimum Number of Missions:** It shall be the Contractor's responsibility to ensure availability of, and services for, R/F systems to support the following minimum number of missions during the period starting from DO ATP and ending 12/31/09:
 - a. Three (3) Sortie missions (consisting of powered launch on STS Middeck, operation on-orbit in STS Middeck, powered descent on STS Middeck. System is NOT transferred from STS Middeck during a sortie mission), AND
 - i. One Flight unit shall be available as backup during launch preparations of the prime flight unit for every flight in the event of problems.
 - b. One form-fit-function equivalent trainer/engineering unit (non-flight) shall be available at all times.
 - i. Ten (10) training sessions, each for 1/2 day, will be at held at JSC during this period. The R/F system would need to be represented at Crew Training sessions at JSC. The Contractor should plan for each session lasting 4 hours, and covering hardware, software and operations unique to the Contractor's R/F system.
- 3) **Maximum Number of Missions:** NASA will exercise Options in this DO to satisfy the maximum mission need. It shall be the Contractor's responsibility to ensure availability of, and services for, R/F systems to support the following maximum number of missions during the period starting from DO ATP and ending 12/31/09:
 - a. Nine (9) Sortie missions with no more than three (3) in any single year, AND
 - i. One Flight unit shall be available as backup during launch preparations of the prime flight unit for every flight in the event of problems.
 - b. Three (3) ISS missions (consisting of powered launch on STS Middeck, transfer to, and continuous operation in, an on-orbit EXPRESS rack for 18 months, powered descent on STS Middeck) with as many as three (3) missions operating at the same time aboard ISS, AND
 - c. One form-fit-function equivalent trainer/engineering unit (non-flight) shall be available at all times.
 - i. Twenty (20) training sessions, each for 1/2 day, will be at held at JSC during this period. The R/F system would need to be represented at Crew Training sessions at JSC. The Contractor should plan for each session

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

lasting 4 hours, and covering hardware, software and operations unique to the Contractor's R/F system.

- 4) **Earliest Availability:** Contractor shall provide one system for sortie launch on STS-118 (13A.1) May 2007 and trainer/engineering unit as early as October 2006.
- 5) **Compatibility:** Each Contractor provided R/F system shall:
 - a. Be certified for launch, landing, and operation in STS middeck as a rear air-cooled hard mounted payload, and operation aboard ISS in an EXPRESS rack (rear air as well as water cooled capability in EXPRESS Rack). Certification is per existing Program processes and must include a Phase III Safety Data Package that has been approved by the Payload Safety Review Panel.
 - b. Be compatible with applicable interfaces STS middeck hard mount, STS middeck or MPLM soft stow, and Spacehab for non-operating transportation.
 - c. Occupy the volume of one (1) STS middeck locker, and provide a controlled temperature volume for payload transport/preservation of not less than 17.24 cm (6.787 in) high x 25.86 cm (10.18 in) wide x 41.91 cm (16.50 in) deep, and with payload mass up to 10kg (22 lbs).
 - d. Be actively powered, and not require more than 9.0 A at 28VDC maximum power during operation.
 - e. Be able to maintain any temperature selectable within in a range of +48°C to -15°C and with ability to remotely and locally (by on-orbit crew) change this during a mission. This range includes an incubation capability to +48°C which is desirable for certain anticipated missions. The Contractor shall specify to what extent this range can be met by the proposed system in the Proposal.
 - f. Provide 12 desiccant packs assemblies for flight on HTV. Certify and verify Desiccant Pack Assembly, P/N 24400-20074-701 for launch on HTV. Certification includes completion of export forms, safety data package, TDS Form, and review and approval of ICD update.
 - f.g. Provide two (2) sensor wire harnesses, P/N CBSE-F50401-1, to be used as spares for flight units. Sensors shall include four (4) Temperature sensors and one (1) Humidity sensor. One sensor harness will be launched stowed inside the Middeck MERLIN on 19A. Provide all integration and safety documentation required to launch the sensor harness in the Middeck MERLIN and then transfer the harness to the ISS MERLIN
- 6) **Integration:** Contractor shall provide system engineering and technical support to integrate R/F systems with;
 - a. R/F Payloads. This includes the development, design, fabrication, and certification of hardware/software that is unique to, or part of, the Contractor provided R/F system. NASA will provide softgoods sample containers, holders, straps, bags, and PPE.
 - b. ISS and STS Programs. This includes any verification activities due to changes in applicable Program requirements. Also applies to desiccant packs.
 - c. Overall NASA/EC2 integrated controlled temperature stowage effort. This includes the Contractor closely coordinating its provided R/F services with those of a separately NASA contracted local JSC support contractor who is responsible for; MELFI, GLACIER, Coldbag, ICEPAC, and GN2 Cryodewar flight systems. Contractor shall provide all items listed under "Single Locker Refrigerator/Incubator" in JSC 65119 Rev A. with the exception of:

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

- i. NASA provides the Payload Safety Engineer (PSE) who performs Series reflight and integrated safety assessments with inputs from the R/F System Contractor, specifically the Contractor must provided the R/F System Safety Data Package and revisions to it.
 - ii. NASA provides facility and hardware/software items in Section 3.1.3, 3.3.1, and all tasks under 4.2.
 - d. In performance of these tasks the Contractor can assume that:
 - i. NASA will utilize the JSC TeleScienceCenter (TSC) for the systems NASA provides.
 - ii. Limited Contractor travel to JSC and STS launch/landing sites is required.
 - iii. Quarterly face-to-face meeting with the NASA JSC is required.
 - iv. Weekly coordination telecons will be held with NASA JSC.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	None anticipated. Contractor to detail any that would be provided in order to provide the R/F systems and services detailed in the Task Description above	Contractor to propose how to satisfy Task specified above	Starting September 14, 2006	As required by task being fulfilled
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor shall provide the R/F systems and services detailed in the Task Description above	Contractor to propose how to satisfy Task specified above	Starting September 14, 2006	As required by task being fulfilled
Software	Contractor shall provide the R/F systems and services detailed in the Task Description above	Contractor to propose how to satisfy Task specified above	Starting September 14, 2006	As required by task being fulfilled
Other Products	Contractor shall provide the R/F systems and services detailed in the Task Description above	Contractor to propose how to satisfy Task specified above	Starting September 14, 2006	As required by task being fulfilled

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5

--	--	--	--	--

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

<u>SCHEDULE</u>	
Start Date: Sept 14, 2006	Finish Date: Dec 31, 2009

INTERIM MILESTONES	DUE DATES
Initial R/F System Training Session	September 29, 2006
Provide R/F systems and services for three (3) sortie missions	December 31, 2009
Provide 12 Desiccant Pack Assemblies	NLT July 20, 2009
<u>Provide 2 sensor wire harnesses</u>	<u>NLT March 8, 2010</u>

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

Government Estimate Located in RFQ File in Microsoft Project File On CRAVE Web Site
The file is titled: N/A

Total Government Estimate for this DO: \$ N/A
Option 1: \$ N/A (See Attachment 1)
Option 2: \$ N/A (See Attachment 2)

TOTAL COST ESTIMATE FOR THIS DO: \$

FEE: \$ (If Applicable)

OPTION 1: \$ N/A (See Attachment 1)

OPTION 2: \$ N/A (See Attachment 2)

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

DATA REQUIREMENTS

All DRs contained in the contract are applicable and required unless marked N/A below.

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
1	Written Approval	Flight GFE Configuration Management Plan	With Proposal	Once	Attachment J-8	
2	Mandatory Submittal	Regular Status Report/ Summary Review	Thirty (30) days following contract start	Monthly	Y	
3	Written Approval	Project Technical Requirements Specification	Per DO schedule	Once with Revisions	N/A	
4	Mandatory Submittal	GFE Systems Requirements Data Package	Specified in DO	Once with Revisions	N/A	
5	Written Approval	Flight GFE Projects Requirements & Verification Document	Specified in DO	Once with Revisions	N/A	
6	Mandatory Submittal	Preliminary Design Review Data Package	Specified in DO	Once with Revisions	N/A	
7	Written Approval	Flight GFE Workmanship Specifications List	Specified in DO	Once with Revisions	N/A	
8	Written Approval	Project Schedule	PDR or 10% effort complete Milestone	Once w/Revisions (due w/DO proposal, updates & details provided as DO progresses)	N/A	
9	Written Approval	Flight GFE Interface Control Document	Specified in DO	Once with Revisions	N/A	
10	Written Approval	GFE End Item Specification	Provide at time of Proposal	Once with Revisions	Y	Contractor may propose equivalent
11	Mandatory Submittal	Flight GFE Failure Analysis Report	As agreed by TMR in DO	As Required	N/A	
12	Written Approval	Flight GFE Verification and Validation Plan	As Specified in EA-023	Once with Revisions	N/A	
13	Written Approval	GFE Software Requirements Specification	Specified in DO	Once with Revisions	N/A	
14	Written Approval	GFE Software Development Plan	Specified in DO	Once with Revisions	N/A	
15	Written Approval	GFE Software Design Document	Specified in DO	As Required	N/A	

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
16	Written Approval	Engineering Drawings	6 Months prior to Launch	Once with Revisions	Y	Interface and top assembly drawings shall be placed into the Payload Data Library http://pd prod3.hosc.msfc.nasa.gov:7777/
17	Written Approval	EEE Parts Lists and Analysis Report	Specified in DO	As Required	N/A	
18	Mandatory Submittal	Critical Design Review Data Package	Specified in DO	Once with Revisions	N/A	
19	Mandatory Submittal	Engineering Drawing Change Proposal	As needed	As Required	N/A	
20	Written Approval	GFE Qualification Test Procedure	Specified in DO	Once with Revisions	N/A	
21	Written Approval	Flight Product User's Guide	Provide at time of Proposal	Once with Revisions	Y	
22	Mandatory Submittal	Software Code	Specified in DO	As Required	N/A	
23	Written Approval	Information Technology (IT) Security Program Plan and Reports	(30) days after DO award, and as specified in JPG 2810.1	JPG 2810.1	Attachment J-4 Due 30 days after DO award	
24	Written Approval	Certification Plan	Specified in DO	Once with Revisions	N/A	
25	Mandatory Submittal	Certification Report	Specified in DO	Once with Revisions	N/A	
26	Mandatory Submittal	Engineering Analysis	Specified in DO	As Required	N/A	
27	Mandatory Submittal	Acceptance Data Package	Specified in DO	One Time	N/A	
28	Mandatory Submittal	Export Control Audit Results	After award of 1st DO, yearly on Sept. 30 thereafter	Yearly	Y	
29	Written Approval	Quality Plan	With Proposal	Once with Revisions	Attachment J-11	

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
30	Written Approval	Patent Rights-Retention	As Required	As Required	Y (If Applicable)	
31	Written Approval	Shuttle/Station Payload Safety Data Package	Specified in DO	As Required	Y	
32	Mandatory Submittal	Limited Life Systems List	Specified in DO	As Required	N/A	
33	Written Approval	Space Station GFE Failure Modes and Effects Analysis and Critical Items List	As Early in process as possible.	As Required	N/A	
34	Written Approval	Space Shuttle GFE Safety and Analysis Report & Hazard Report	Specified in DO	As Required	N/A	
35	Written Approval	Software Quality Assurance Plan Report	90 Days Prior to Software Development	Once with Revisions	Y (If Applicable)	
36	Written Approval	ISS Hazard Report	Specified in DO	As Required	Y	
37	Upon Request	Reliability and Maintainability Plan	With Proposal	One Time	Attachment J-9	
38	Written Approval	Government Certification Approval Request (GCAR)	Specified in DO	As Required	N/A	
39	Written Approval	Risk Assessment Executive Summary Report (RAESR)	Specified in DO	As Required	N/A	
40	Written Approval	Problem Reporting and Corrective Action (PRACA)	2 business days of problem isolation but no later than 10 days after detection	As Required	Y	Contractor to propose whether PAR process should be used instead
41	Upon Request	Nonconformance Record	Specified in DO	As Required	Y	
42	Mandatory Submittal	Government Industry Data Exchange Program and NASA Advisory Problem Data	Reported one time when discrepancy occurs	Once with Revisions	Y	
43	Written Approval	Electrical, Electronic, and Electromechanical (EEE) Parts Control Plan	Specified in DO	Once with Revisions	N/A	
44	Mandatory Submittal	Certification Data Package	Specified in DO	Once with Revisions	N/A	
45	Written Approval	Certification and Acceptance Requirements Document	At CDR	Once with Revisions	N/A	
46	Upon Request	Wage/Salary and Fringe Benefit Data	Thirty (30) days after issuance of each DO	Once	N/A	
47	Written Approval	GFE Acceptance Test Procedure	Specified in DO	One Time	N/A	
48	Mandatory Submittal	Flight GFE Verification & Validation Report	Specified in DO	Once with Revisions	N/A	

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
49	Mandatory Submittal	Space Shuttle GFE Failure Modes and Effects Analysis (FMEA) and Critical Items List	Specified in DO	As Required	N/A	
50		Reserved	---	---	---	---
51	Mandatory Submittal	NASA Contractor Financial Management Reporting	After Issuance of 1st DO	Monthly	Y	
52	Written Approval	Government Property Management Plan	With Proposal	Once with Revisions	Attachment J-7	
53	Mandatory Submittal	System Safety Plan	With Proposal	One Time	Attachment J-10	
54	Written Approval	R-Quality Plan Template	With Proposal/ Revisions as Required	Only applicable to B-CRAVE contracts in accordance with the SOW and the DRD	Y	

Type 1 = Written Approval Type 2 = Mandatory Submittal Type 3 = Submittal Upon Request

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

GOVERNMENT FURNISHED PROPERTY

The CRAVE contracts do not anticipate the Government providing any property or test facilities unless requested by the contractor in their response to a request for bid.

In some rare cases (such as sustaining engineering task) it is known ahead of time that government property will be provided to the contractor. In those cases the following list filled out to allow the proper control of government property:

A. List of Property the Contractor Shall Replace with modified or upgraded versions:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

B. List of Property the Contractor will return in the same configuration:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

**GOVERNMENT FURNISHED PROPERTY
(Continued)**

C. List of Property the Contractor Shall Replace if Damaged or lost during the course of the effort:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

B. List of Property the Government Will Replace if Damaged or lost during the course of the effort:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5

ATTACHMENT 1

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor no later than 15 days before the completion of the Basic delivery order requirement.

OPTION 1 TITLE:

Improvements to consolidated Controlled Temperature Transport/Storage of Payloads

Background / Problem Description:

In conjunction with Contractor performing this R/F services task, NASA will consider proposed modifications to stated tasks, or new Options, that can improve, or reduce the cost of, integrated operations of several different controlled temperature transport and storage systems to simultaneously support multiple payload users.

Task Description: NASA is currently interested in; reducing the cost of the sustaining engineering phase, minimizing staffing hours of ground consoles, reducing on-orbit crew time, improving on-orbit lifetime and availability, improving on-orbit maintenance capability, reducing power consumption, expanding maximum or minimum temperature range, improving hold time during power loss, payload logistics, and cross-system compatibility of payloads.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

SCHEDULE

Start Date: Sept 14, 2006

Finish Date: Dec 31, 2009

INTERIM MILESTONES

Contractor to propose

DUE DATES

Contractor to propose

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

ATTACHMENT 2

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor no later than 15 days before the completion of the Basic delivery order requirement.

OPTION 2 TITLE:

Additional Sortie Missions

Background / Problem Description:

In conjunction with Contractor performing this R/F services task, the Contractor is requested to provide a proposal for supporting sortie missions beyond the minimum of three (3) in the basic DO.

Task Description: Provide refrigerator-freezer R/F system services to EC2 for transport and on-orbit controlled temperature preservation of payloads in accordance with the basic DO Task Description, for supporting additional sortie missions beyond those specified in the Minimum Number of Missions in the DO Task Description, and up to the Maximum Number of Missions specified in the DO Task Description.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

SCHEDULE

Start Date: Sept 14, 2006

Finish Date: Dec 31, 2009

INTERIM MILESTONES

Provide R/F systems and services for each additional sortie mission

DUE DATES

December 31, 2009

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.



**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

ATTACHMENT 3

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor no later than 15 days before the completion of the Basic delivery order requirement.

OPTION 3 TITLE:
ISS Missions

Background / Problem Description:

In conjunction with Contractor performing this R/F services task, the Contractor is requested to provide a proposal for supporting ISS missions.

Task Description: Provide refrigerator-freezer R/F system services to EC2 for transport and on-orbit controlled temperature preservation of payloads in accordance with the basic DO Task Description, for supporting ISS missions up to the Maximum Number of Missions specified in the DO Task Description.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

SCHEDULE

Start Date: Sept 14, 2006

Finish Date: Dec 31, 2009

INTERIM MILESTONES

Provide R/F systems and services for each ISS mission

DUE DATES

December 31, 2009

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

CHANGES TO DRDs: NONE

**CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
*(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)***

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

ATTACHMENT 4

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor no later than 15 days before the completion of the Basic delivery order requirement.

OPTION 4 TITLE:
ISS Mission Extension

Background / Problem Description:

In conjunction with Contractor performing this R/F services task, the Contractor is requested to provide a proposal for extending an ISS mission by 2 months. This would be in addition to the Government exercising OPTION 3 (ISS Missions)

Task Description: Provide refrigerator-freezer R/F system services to EC2 for transport and on-orbit controlled temperature preservation of payloads in accordance with the basic DO Task Description, for extending ISS missions (OPTION 3) by two (2) months.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

SCHEDULE

Start Date: Sept 14, 2006

Finish Date: Dec 31, 2009

INTERIM MILESTONES

Provide R/F systems and services for each ISS mission 2 month extension

DUE DATES

December 31, 2009

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R5**

CHANGES TO DRDs: NONE

**CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
*(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)***

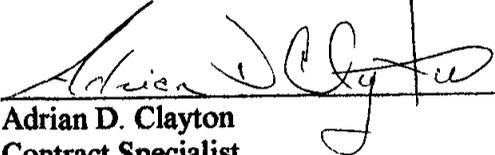
MEMO TO FILE

SUBJECT: COST ANALYSIS ON CRAVE DO-16, Revision 5

A detailed review of the revision proposal in the area of cost to support manufacturing, testing, development of crew procedures, and submit safety and ISS verifications for the sensor harness was done for this revision. The proposal requires 360 hours of project management, technical specialist, technicians, and clerical support. The labor hours and skill mix are all appropriate for the tasks called out in this DO revision. The labor rates proposed by the University of Alabama for DO 16 were compared to the negotiated rates in the base contract. The proposed rates did not exceed the negotiated rates.

The contractor also proposed a material cost of \$1,200 for wire and sensors. Per the technical expertise it is deemed appropriate, fair, and reasonable for the quantity and cost for this effort.

Since Universities are not permitted to charge a fee, the contractor followed regulations by not proposing a fee. The overall skill mix proposed by the contractor was evaluated by the technical evaluator and found to be acceptable.


Adrian D. Clayton
Contract Specialist

11-6-2009
Date

**Technical Analysis
NNJ05HB39B – Hamilton Sundstrand
Crew, Robotics and Vehicle Equipment (CRAVE)**

TO: Adrian Clayton/BH & Ronald Johnson/BH
FROM: Sharon Campana/EC
SUBJECT: DO16 Refrigerator/Freezer Services Revision 5

Scope of Analysis:

UAB-CBSE Response to Refrigerator/Freezer Services 16, Revision 5 Request for Quotation. The changes proposed in Revision 5 added the development and delivery to of 2 temperature sensor harnesses to KSC.

Evaluation of Technical & Management (T&M) Approach:

Evaluator's recommendation:

- Acceptable
- Unacceptable
- Marginally acceptable

Evaluator's comments:

The cost proposed by UAB is fair and reasonable. The materials, hours, and skill mix are consistent with similar proposals submitted by UAB.

Evaluation of Resources Approach:

Labor (quantity and skill mix):

A detailed review of the revision proposal was performed in the area of the cost to support manufacturing, testing, development of crew procedures, and submit safety and ISS verifications for the sensor harness. The proposal requires 360 hours of project management, technical specialist, technicians, and clerical support. The labor hours and skill mix are all appropriate for the tasks called out in this DO revision. The skill mix is comparable to proposals submitted on DO#38 by UAB.

Overall the Labor skill mix and cost are considered acceptable.

Materials:

The proposed material cost of \$1200 and is an acceptable price for wire, sensors,

Other Direct Costs (travel, software, equipment, etc.):

N/A -- no additional costs are called out in this proposal

Conclusion:

The overall cost and technical content of this proposal is determined to be acceptable.

Sharon Campana/EC2/TM

Evaluator's Name and Title

11-4-09
Date

Scampana
Signature

TOTAL ESTIMATED LABOR COST- UAB/CBSE		\$	31,700.70
CRAVE DO-16, Rev 5			
OTHER DIRECT COSTS (by FY)			
Note: ODCs may be separated by FY to accommodate the burden rates established for future years.		<i>Materials</i>	\$ 1,200.00
		<i>Equipment</i>	\$ -
		<i>Travel (FY2009)</i>	\$ -
		<i>Travel (FY10-11)</i>	\$ -
		<i>Supplies (FY 2009)</i>	\$ -
		<i>Supplies (FY10-11)</i>	\$ -
		<i>Subcontracts (w/ID)</i>	\$ -
		<i>Subcontracts</i>	\$ -
		<i>Other (S&H)</i>	\$ -
		<i>Other</i>	\$ -
		TOTAL	\$ 1,200.00
ODC Burdens (example G&A)			
		Rate	
	<i>item 1- Travel F&A</i>	<i>45.00%</i>	\$ -
	<i>item 2- Subs F&A</i>	<i>45.00%</i>	\$ -
	<i>item 2- Other F&A</i>	<i>45.00%</i>	\$ -
		TOTAL ODC Burden	\$ -
		TOTAL Non-labor	\$ 1,200.00
	percent	total proposed dollars	
FEE *			
			\$ 32,900.70

***Note: Fee shall not exceed NTE Fee Rate**



VOLUME IV
COST/PRICE

Refrigerator/Freezer Services

Submitted via E-mail to:

CRAVE@ems.jsc.nasa.gov

Lyndon B. Johnson Space Center
Houston, Texas 77058-3696
No Later Than 11:00 AM, November 13, 2009

In Response to:

**CRAVE Contract Delivery Order No. CRAVE-EC2-DO16 (Rev 5)
Under Contract NNJ05HB42B**

Technical Point of Contact:

**Lee Moradi, CRAVE Program Manager
Center for Biophysical Sciences & Engineering
The University of Alabama at Birmingham
CBSE 100
1530 3rd Ave. South
Birmingham, AL 35294-4400
TEL: (205) 975-2718
FAX: (205) 975-1709**

moradi@cbse.uab.edu
**http://www.cbse.uab.edu/engineering-
division.shtml**

Administrative Point of Contact:

**Tim Parker
Grants & Contracts Officer
The University of Alabama at Birmingham
AB 1170
1530 3rd Ave. South
Birmingham, AL 35294-0111
TEL: (205) 934-6793
FAX: (205) 975-5977**

tmparker@uab.edu

NOTICE

This proposal includes data that shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed- in whole or in part- for any purpose other than to evaluate this proposal. If, however, an order is awarded to UAB/CBSE as a result of, or in connection with, the submission of this data, the Government shall have the right to duplicate, use, or disclose these data to the extent provided in the resulting contract. This restriction does not limit the Government's right to use information contained in these data if it is obtained from another source without restriction. The data subject to this restriction are contained on all pages.

Labor Category- UAB/CBSE	FY1		FY2		FY3		FY4		FY5		FY6		FY7		TOTAL Estimated Hours	TOTAL FOR RES
	Estimated Hours	Negotiated Rate														
Program Manager	0	\$ 130.42	0	\$ 135.82	0	\$ 139.98	0	\$ 144.78	16	\$ 149.73	16	\$ 2,395.68	16	\$ 2,395.68	16	\$ 2,395.68
Manager	0	\$ 108.16	0	\$ 112.80	0	\$ 116.05	0	\$ 120.01	48	\$ 124.10	48	\$ 5,956.80	48	\$ 5,956.80	48	\$ 5,956.80
Supervisor	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Technical Professional III	0	\$ 97.77	0	\$ 101.51	0	\$ 104.70	0	\$ 108.30	80	\$ 112.02	80	\$ 8,961.60	80	\$ 8,961.60	80	\$ 8,961.60
Technical Professional II	0	\$ 65.02	0	\$ 67.58	0	\$ 69.64	0	\$ 71.99	100	\$ 74.42	100	\$ 7,442.00	100	\$ 7,442.00	100	\$ 7,442.00
Technical Professional I	0	\$ 50.86	0	\$ 52.83	0	\$ 54.43	0	\$ 56.24	0	\$ 58.12	0	\$ -	0	\$ -	0	\$ -
Analyst	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Technician III	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Technician II	0	\$ 56.80	0	\$ 59.10	0	\$ 60.85	0	\$ 62.87	24	\$ 64.97	24	\$ 1,559.28	24	\$ 1,559.28	24	\$ 1,559.28
Technician I	0	\$ 48.87	0	\$ 50.82	0	\$ 52.32	0	\$ 54.04	32	\$ 55.83	32	\$ 1,786.56	32	\$ 1,786.56	32	\$ 1,786.56
IT Professional III	0	\$ 109.48	0	\$ 113.85	0	\$ 117.38	0	\$ 121.42	0	\$ 125.59	0	\$ -	0	\$ -	0	\$ -
IT Professional II	0	\$ 91.93	0	\$ 95.62	0	\$ 98.56	0	\$ 101.93	0	\$ 105.41	0	\$ -	0	\$ -	0	\$ -
IT Professional I	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Secretary	0	\$ 49.04	0	\$ 51.00	0	\$ 52.51	0	\$ 54.24	4	\$ 56.03	4	\$ 224.12	4	\$ 224.12	4	\$ 224.12
Clerk	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Business Specialist	0	\$ 71.93	0	\$ 74.87	0	\$ 77.11	0	\$ 79.71	16	\$ 82.39	16	\$ 1,318.24	16	\$ 1,318.24	16	\$ 1,318.24
Data/Documents Management	0	\$ 44.78	0	\$ 46.57	0	\$ 47.93	0	\$ 49.50	18	\$ 51.13	18	\$ 920.34	18	\$ 920.34	18	\$ 920.34
Manager I	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Sr Designer	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Designer	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Secretary I	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Secretary II	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Secretary III	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Secretary IV	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Business Specialist I	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Clerk I	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Clerk II	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Clerk III	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Clerk IV	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Designer III	0	\$ 81.34	0	\$ 84.66	0	\$ 87.22	0	\$ 90.17	0	\$ 93.21	0	\$ -	0	\$ -	0	\$ -
Designer II	0	\$ 52.25	0	\$ 54.35	0	\$ 55.95	0	\$ 57.80	0	\$ 59.72	0	\$ -	0	\$ -	0	\$ -
Precision Machinist	0	\$ 45.00	0	\$ 46.58	0	\$ 48.21	0	\$ 49.89	22	\$ 51.64	22	\$ 1,136.08	22	\$ 1,136.08	22	\$ 1,136.08
Scientist Technical Specialist III	0	\$ 156.99	0	\$ 162.41	0	\$ 168.59	0	\$ 174.41	0	\$ 180.43	0	\$ -	0	\$ -	0	\$ -
Scientist Technical Specialist III	0	\$ 112.25	0	\$ 116.10	0	\$ 120.50	0	\$ 124.63	0	\$ 128.93	0	\$ -	0	\$ -	0	\$ -
Other categories listed in Section B of	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -

* FBR = Fully Burdened Labor Rate, as specified in Section B of Contract

Item	Estimated Cost
Parts & materials	\$ 1,200.00
Input Item Here	\$ -
TOTAL Materials	\$ 1,200.00

Clayton, Adrian D. (JSC-BH111)

From: Bowers, Rick [bowers@cbse.uab.edu]
Sent: Tuesday, November 03, 2009 2:56 PM
To: Clayton, Adrian D. (JSC-BH111)
Cc: connor@cbse.uab.edu; moradi@cbse.uab.edu; Campana, Sharon E. (JSC-EC211)
Subject: FW: DO-16 SOW
Attachments: CRAVE RFS DO-16 Revision 5, Sensor Harness- October 2009.pdf

Importance: High

Mr. Clayton,

Attached is the proposal with the estimated hours and cost for the work addressed in the DO-16 revision 5 SOW referenced below. Please respond if you have any questions or need additional information.

Thanks,

Rick Bowers
Project Manager II
UAB/CBSE
Ph: 205-975-2677

From: Clayton, Adrian D. (JSC-BH111) [mailto:adrian.d.clayton@nasa.gov]
Sent: Tuesday, November 03, 2009 1:23 PM
To: Moradi, Lee; Moradi, Lee
Subject: FW: DO-16 SOW

Good Afternoon

I am resubmitting the revised delivery order description for DO# 16. Please be advised that the deadline to submit your proposal is Nov. 13, 2009. If you have any questions, comments, and/or concerns, contact me via the information below.

Respectfully,

Adrian D. Clayton
Contracting Officer
NASA-Johnson Space Center

Projects Procurement Office
Mail Code. BH2
2101 NASA Parkway
Houston, TX 77058
(P) 281-483-8498
(F) 281-483-2138/281-244-0995
Adrian.D.Clayton@nasa.gov

"Patience and perseverance have a magical effect before which difficulties disappear and obstacles vanish. A little knowledge that acts is worth infinitely more than much knowledge that is idle." -- John Quincy Adams

Notice This communication may contain information that is proprietary, privileged and exempt from disclosure under applicable law. Any viewing, distribution or copying of or reliance on this message by unintended recipients is strictly prohibited. If you have received this message in error, please notify us immediately by responding to this message and deleting it from your computer. Thank you.

This email was scanned with McAfee's Anti-Virus appliance, but this is no guarantee that no virus exists. You are asked to make sure you have virus protection and that it is up to date.

NNJ05HB42B - UNIVERSITY OF ALABAMA AT BIRMINGHAM

Delivery Order 7

FFP \$ 8,908

\$ 8,908

	DATE	DO VALUE					NOTES
		ACTION TOTAL	FEE %	COST	FEE	CUM TOTAL	
DO 7	08/26/05	\$ 8,908	0 0%	\$ 8,908	\$ -	\$ 8,908	
		TOTAL		\$ 8,908			

Delivery Order 16

Cost Total \$3,400,473.01

Fee Total \$ -

Total Cost & Fee \$3,400,473.01

	DATE	DO VALUE					NOTES
		ACTION TOTAL	FEE %	COST	FEE	CUM TOTAL	
DO 16	09/19/06	\$ 1,793,479	0 0%	\$ 1,793,479	\$ -	\$ 1,793,479 11	
DO 16 R1	05/15/08	\$ 1,045,766	0.0%	\$ 1,045,766	\$ -	\$ 2,839,245 11	Exercised Opt 3e & 4
DO 16 R2	08/07/07	\$ 100,485	0 0%	\$ 100,485	\$ -	\$ 2,939,730 11	
DO 16 R3	12/17/08	\$ 397,900	0 0%	\$ 397,900		\$ 3,337,630 11	
DO 16 R4	07/21/09	\$ 29,942		\$ 29,942		\$ 3,367,572 31	
DO 16 R5	11/06/09	\$ 32,901		\$ 32,901		\$ 3,400,473.01	
		TOTAL		\$ 3,400,473.01	\$ -		

Delivery Order 38

Cost Total \$3,844,023.60

Fee Total \$ -

Total Cost & Fee \$3,844,023.60

	DATE	DO VALUE					NOTES
		ACTION TOTAL	FEE %	COST	FEE	CUM TOTAL	
DO 38	06/26/08	\$ 1,555,851	0 0%	\$ 1,555,851	\$ -	\$ 1,555,851 36	
DO 38 R1	12/15/08	\$ 661,998	0 0%	\$ 661,998	\$ -	\$ 2,217,849 40	
DO 38 R2	08/07/09	\$ 1,469,174	0.0%	\$ 1,469,174	\$ -	\$ 3,687,023 40	
DO 38 R3	08/19/09	\$ 78,500	0.0%	\$ 78,500	\$ -	\$ 3,765,523 50	
DO 38 R4	08/20/09	\$ 78,500	0 0%	\$ 78,500		\$ 3,844,023 60	
		TOTAL		\$ 3,844,023 60	\$ -		

TOTAL CONTRACT VALUE	\$7,253,404.61	\$ -	\$7,253,404 61	\$ 21,454.00	\$7,231,950.61
CURRENT TOTAL FUNDING			\$4,641,732 01		
REMAINDER			\$2,611,672.60		

MEMO TO FILE

SUBJECT: COST ANALYSIS ON CRAVE DO-16, Revision 5

A detailed review of the revision proposal in the area of cost to support manufacturing, testing, development of crew procedures, and submit safety and ISS verifications for the sensor harness was done for this revision. The proposal requires 360 hours of project management, technical specialist, technicians, and clerical support. The labor hours and skill mix are all appropriate for the tasks called out in this DO revision. The labor rates proposed by the University of Alabama for DO 16 were compared to the negotiated rates in the base contract. The proposed rates did not exceed the negotiated rates.

The contractor also proposed a material cost of \$1,200 for wire and sensors. Per the technical expertise it is deemed appropriate, fair, and reasonable for the quantity and cost for this effort.

Since Universities are not permitted to charge a fee, the contractor followed regulations by not proposing a fee. The overall skill mix proposed by the contractor was evaluated by the technical evaluator and found to be acceptable.



Adrian D. Clayton
Contract Specialist

11-10-2009
Date

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 LYNDON B. JOHNSON SPACE CENTER
 HOUSTON, TX 77058**

COST REIMBURSABLE INDEFINITE-DELIVERY
 INDEFINITE-QUANTITY (IDIQ) TASK ORDER
 University of Alabama at Birmingham
 Contract NNJ05HB42B

<i>Delivery Order Number</i>	<i>Revision Number</i>	<i>Purchase Request Number</i>
16	4	Funded at Contract Level
<i>SOW WBS</i>	<i>Fiscal Year</i>	<i>Technical Monitor/Division/Extension</i>
	FY09	COTR: Ralph Marak/EC ext:3-9144

Task Order Title

REFRIGERATOR – FREEZER SERVICES

Description/Purpose

The purpose of this delivery order revision is to execute the tasks required for this revision as identified in the attached revised delivery order description. The recapitulation of the delivery order value is shown below per this revision.

Delivery Order 16 Value Recapitulation:

	Prior	This Action DO 16, Rev 4	Cum Value
Cost	<i>bf</i>	<i>bf</i>	<i>bf</i>
Fee			
Total	\$ 3,337,630.11	\$ 29,942.20	\$ 3,367,572.31

THE CONTRACTOR IS NOT AUTHORIZED TO EXCEED THE TASK ORDER VALUE SPECIFIED HEREIN. THIS IS A COST PLUS FIXED FEE TASK ORDER.

NASA Approval

<i>Contracting Officer</i>	<i>Signature</i>	<i>Date</i>
Ronald Johnson	<i>Ronald Johnson</i>	<i>7/30/09</i>

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4**

Narrative Task Description

Background / Problem Description:

Thermal carriers are required to provide transport and on-orbit preservation at refrigerated/frozen conditions of a variety of payloads.

Task Description: Provide refrigerator-freezer R/F system services to EC2 for transport and on-orbit controlled temperature preservation of payloads, for the nominal and off-nominal activities in Section 3.4 and with the additional top level requirements/allowables:

- 1) **Ownership:** Contractor is assumed to own the R/F systems to perform the tasks in this DO. Contractor shall clearly detail NASA's responsibilities, particularly in the event the systems are damaged or destroyed.
- 2) **Minimum Number of Missions:** It shall be the Contractor's responsibility to ensure availability of, and services for, R/F systems to support the following minimum number of missions during the period starting from DO ATP and ending 12/31/09:
 - a. Three (3) Sortie missions (consisting of powered launch on STS Middeck, operation on-orbit in STS Middeck, powered descent on STS Middeck. System is NOT transferred from STS Middeck during a sortie mission), AND
 - i. One Flight unit shall be available as backup during launch preparations of the prime flight unit for every flight in the event of problems.
 - b. One form-fit-function equivalent trainer/engineering unit (non-flight) shall be available at all times.
 - i. Ten (10) training sessions, each for 1/2 day, will be at held at JSC during this period. The R/F system would need to be represented at Crew Training sessions at JSC. The Contractor should plan for each session lasting 4 hours, and covering hardware, software and operations unique to the Contractor's R/F system.
- 3) **Maximum Number of Missions:** NASA will exercise Options in this DO to satisfy the maximum mission need. It shall be the Contractor's responsibility to ensure availability of, and services for, R/F systems to support the following maximum number of missions during the period starting from DO ATP and ending 12/31/09:
 - a. Nine (9) Sortie missions with no more than three (3) in any single year, AND
 - i. One Flight unit shall be available as backup during launch preparations of the prime flight unit for every flight in the event of problems.
 - b. Three (3) ISS missions (consisting of powered launch on STS Middeck, transfer to, and continuous operation in, an on-orbit EXPRESS rack for 18 months, powered descent on STS Middeck) with as many as three (3) missions operating at the same time aboard ISS, AND
 - c. One form-fit-function equivalent trainer/engineering unit (non-flight) shall be available at all times.
 - i. Twenty (20) training sessions, each for 1/2 day, will be at held at JSC during this period. The R/F system would need to be represented at Crew

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4

Training sessions at JSC. The Contractor should plan for each session lasting 4 hours, and covering hardware, software and operations unique to the Contractor's R/F system.

- 4) Earliest Availability: Contractor shall provide one system for sortie launch on STS-118 (13A.1) May 2007 and trainer/engineering unit as early as October 2006.
- 5) Compatibility: Each Contractor provided R/F system shall:
 - a. Be certified for launch, landing, and operation in STS middeck as a rear air-cooled hard mounted payload, and operation aboard ISS in an EXPRESS rack (rear air as well as water cooled capability in EXPRESS Rack). Certification is per existing Program processes and must include a Phase III Safety Data Package that has been approved by the Payload Safety Review Panel.
 - b. Be compatible with applicable interfaces STS middeck hard mount, STS middeck or MPLM soft stow, and Spacehab for non-operating transportation.
 - c. Occupy the volume of one (1) STS middeck locker, and provide a controlled temperature volume for payload transport/preservation of not less than 17.24 cm (6.787 in) high x 25.86 cm (10.18 in) wide x 41.91 cm (16.50 in) deep, and with payload mass up to 10kg (22 lbs).
 - d. Be actively powered, and not require more than 9.0 A at 28VDC maximum power during operation.
 - e. Be able to maintain any temperature selectable within in a range of +48°C to -15°C and with ability to remotely and locally (by on-orbit crew) change this during a mission. This range includes an incubation capability to +48°C which is desirable for certain anticipated missions. The Contractor shall specify to what extent this range can be met by the proposed system in the Proposal.
 - f. Provide 12 desiccant packs assemblies for flight on HTV. Certify and verify Desiccant Pack Assembly, P/N 24400-20074-701 for launch on HTV. Certification includes completion of export forms, safety data package, TDS Form, and review and approval of ICD update.
- 6) Integration: Contractor shall provide system engineering and technical support to integrate R/F systems with;
 - a. R/F Payloads. This includes the development, design, fabrication, and certification of hardware/software that is unique to, or part of, the Contractor provided R/F system. NASA will provide softgoods sample containers, holders, straps, bags, and PPE.
 - b. ISS and STS Programs. This includes any verification activities due to changes in applicable Program requirements. Also applies to desiccant packs.
 - c. Overall NASA/EC2 integrated controlled temperature stowage effort. This includes the Contractor closely coordinating its provided R/F services with those of a separately NASA contracted local JSC support contractor who is responsible for; MELFI, GLACIER, Coldbag, ICEPAC, and GN2 Cryodewar flight systems. Contractor shall provide all items listed under "Single Locker Refrigerator/Incubator" in JSC 65119 Rev A. with the exception of:
 - i. NASA provides the Payload Safety Engineer (PSE) who performs Series reflight and integrated safety assessments with inputs from the R/F System Contractor, specifically the Contractor must provided the R/F System Safety Data Package and revisions to it.

TU
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4

- ii. NASA provides facility and hardware/software items in Section 3.1.3, 3.3.1, and all tasks under 4.2.
- d. In performance of these tasks the Contractor can assume that:
 - i. NASA will utilize the JSC TeleScienceCenter (TSC) for the systems NASA provides.
 - ii. Limited Contractor travel to JSC and STS launch/landing sites is required.
 - iii. Quarterly face-to-face meeting with the NASA JSC is required.
 - iv. Weekly coordination telecons will be held with NASA JSC.

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	None anticipated. Contractor to detail any that would be provided in order to provide the R/F systems and services detailed in the Task Description above	Contractor to propose how to satisfy Task specified above	Starting September 14, 2006	As required by task being fulfilled
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor shall provide the R/F systems and services detailed in the Task Description above	Contractor to propose how to satisfy Task specified above	Starting September 14, 2006	As required by task being fulfilled
Software	Contractor shall provide the R/F systems and services detailed in the Task Description above	Contractor to propose how to satisfy Task specified above	Starting September 14, 2006	As required by task being fulfilled

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4

Other Products	Contractor shall provide the R/F systems and services detailed in the Task Description above	Contractor to propose how to satisfy Task specified above	Starting September 14, 2006	As required by task being fulfilled

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4

SCHEDULE

Start Date: Sept 14, 2006

Finish Date: Dec 31, 2009

INTERIM MILESTONES	DUE DATES
Initial R/F System Training Session	September 29, 2006
Provide R/F systems and services for three (3) sortie missions	December 31, 2009
<u>Provide 12 Desiccant Pack Assemblies</u>	<u>NLT July 20, 2009</u>

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

Government Estimate Located in RFO File in Microsoft Project File On CRAVE Web Site

The file is titled: N/A

Total Government Estimate for this DO: \$ N/A

Option 1: \$ N/A (See Attachment 1)

Option 2: \$ N/A (See Attachment 2)

TOTAL COST ESTIMATE FOR THIS DO: \$

FEE: \$ (If Applicable)

OPTION 1: \$ N/A (See Attachment 1)

OPTION 2: \$ N/A (See Attachment 2)

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4

DATA REQUIREMENTS

All DRs contained in the contract are applicable and required unless marked N/A below.

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
1	Written Approval	Flight GFE Configuration Management Plan	With Proposal	Once	Attachment J-8	
2	Mandatory Submittal	Regular Status Report/ Summary Review	Thirty (30) days following contract start	Monthly	Y	
3	Written Approval	Project Technical Requirements Specification	Per DO schedule	Once with Revisions	N/A	
4	Mandatory Submittal	GFE Systems Requirements Data Package	Specified in DO	Once with Revisions	N/A	
5	Written Approval	Flight GFE Projects Requirements & Verification Document	Specified in DO	Once with Revisions	N/A	
6	Mandatory Submittal	Preliminary Design Review Data Package	Specified in DO	Once with Revisions	N/A	
7	Written Approval	Flight GFE Workmanship Specifications List	Specified in DO	Once with Revisions	N/A	
8	Written Approval	Project Schedule	PDR or 10% effort complete Milestone	Once w/Revisions (due w/DO proposal, updates & details provided as DO progresses)	N/A	
9	Written Approval	Flight GFE Interface Control Document	Specified in DO	Once with Revisions	N/A	
10	Written Approval	GFE End Item Specification	Provide at time of Proposal	Once with Revisions	Y	Contractor may propose equivalent
11	Mandatory Submittal	Flight GFE Failure Analysis Report	As agreed by TMR in DO	As Required	N/A	
12	Written Approval	Flight GFE Verification and Validation Plan	As Specified in EA-023	Once with Revisions	N/A	
13	Written Approval	GFE Software Requirements Specification	Specified in DO	Once with Revisions	N/A	
14	Written Approval	GFE Software Development Plan	Specified in DO	Once with Revisions	N/A	
15	Written Approval	GFE Software Design Document	Specified in DO	As Required	N/A	


CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
16	Written Approval	Engineering Drawings	6 Months prior to Launch	Once with Revisions	Y	Interface and top assembly drawings shall be placed into the Payload Data Library http://pdprod3.hosc.msfc.nasa.gov:7777/
17	Written Approval	EEE Parts Lists and Analysis Report	Specified in DO	As Required	N/A	
18	Mandatory Submittal	Critical Design Review Data Package	Specified in DO	Once with Revisions	N/A	
19	Mandatory Submittal	Engineering Drawing Change Proposal	As needed	As Required	N/A	
20	Written Approval	GFE Qualification Test Procedure	Specified in DO	Once with Revisions	N/A	
21	Written Approval	Flight Product User's Guide	Provide at time of Proposal	Once with Revisions	Y	
22	Mandatory Submittal	Software Code	Specified in DO	As Required	N/A	
23	Written Approval	Information Technology (IT) Security Program Plan and Reports	(30) days after DO award, and as specified in JPG 2810.1	JPG 2810.1	Attachment J-4 Due 30 days after DO award	
24	Written Approval	Certification Plan	Specified in DO	Once with Revisions	N/A	
25	Mandatory Submittal	Certification Report	Specified in DO	Once with Revisions	N/A	
26	Mandatory Submittal	Engineering Analysis	Specified in DO	As Required	N/A	
27	Mandatory Submittal	Acceptance Data Package	Specified in DO	One Time	N/A	
28	Mandatory Submittal	Export Control Audit Results	After award of 1st DO, yearly on Sept. 30 thereafter	Yearly	Y	
29	Written Approval	Quality Plan	With Proposal	Once with Revisions	Attachment J-11	

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4**

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
30	Written Approval	Patent Rights-Retention	As Required	As Required	Y (If Applicable)	
31	Written Approval	Shuttle/Station Payload Safety Data Package	Specified in DO	As Required	Y	
32	Mandatory Submittal	Limited Life Systems List	Specified in DO	As Required	N/A	
33	Written Approval	Space Station GFE Failure Modes and Effects Analysis and Critical Items List	As Early in process as possible.	As Required	N/A	
34	Written Approval	Space Shuttle GFE Safety and Analysis Report & Hazard Report	Specified in DO	As Required	N/A	
35	Written Approval	Software Quality Assurance Plan Report	90 Days Prior to Software Development	Once with Revisions	Y (If Applicable)	
36	Written Approval	ISS Hazard Report	Specified in DO	As Required	Y	
37	Upon Request	Reliability and Maintainability Plan	With Proposal	One Time	Attachment J-9	
38	Written Approval	Government Certification Approval Request (GCAR)	Specified in DO	As Required	N/A	
39	Written Approval	Risk Assessment Executive Summary Report (RAESR)	Specified in DO	As Required	N/A	
40	Written Approval	Problem Reporting and Corrective Action (PRACA)	2 business days of problem isolation but no later than 10 days after detection	As Required	Y	Contractor to propose whether PAR process should be used instead
41	Upon Request	Nonconformance Record	Specified in DO	As Required	Y	
42	Mandatory Submittal	Government Industry Data Exchange Program and NASA Advisory Problem Data	Reported one time when discrepancy occurs	Once with Revisions	Y	
43	Written Approval	Electrical, Electronic, and Electromechanical (EEE) Parts Control Plan	Specified in DO	Once with Revisions	N/A	
44	Mandatory Submittal	Certification Data Package	Specified in DO	Once with Revisions	N/A	
45	Written Approval	Certification and Acceptance Requirements Document	At CDR	Once with Revisions	N/A	
46	Upon Request	Wage/Salary and Fringe Benefit Data	Thirty (30) days after issuance of each DO	Once	N/A	
47	Written Approval	GFE Acceptance Test Procedure	Specified in DO	One Time	N/A	
48	Mandatory Submittal	Flight GFE Verification & Validation Report	Specified in DO	Once with Revisions	N/A	

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4**

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
49	Mandatory Submittal	Space Shuttle GFE Failure Modes and Effects Analysis (FMEA) and Critical Items List	Specified in DO	As Required	N/A	
50		Reserved				
51	Mandatory Submittal	NASA Contractor Financial Management Reporting	After Issuance of 1st DO	Monthly	Y	
52	Written Approval	Government Property Management Plan	With Proposal	Once with Revisions	Attachment J-7	
53	Mandatory Submittal	System Safety Plan	With Proposal	One Time	Attachment J-10	
54	Written Approval	R-Quality Plan Template	With Proposal/Revisions as Required	Only applicable to B-CRAVE contracts in accordance with the SOW and the DRD	Y	

Type 1 = Written Approval Type 2 = Mandatory Submittal Type 3 = Submittal Upon Request

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4**

GOVERNMENT FURNISHED PROPERTY

The CRAVE contracts do not anticipate the Government providing any property or test facilities unless requested by the contractor in their response to a request for bid.

In some rare cases (such as sustaining engineering task) it is known ahead of time that government property will be provided to the contractor. In those cases the following list filled out to allow the proper control of government property:

A. List of Property the Contractor Shall Replace with modified or upgraded versions:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

B. List of Property the Contractor will return in the same configuration:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.


CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4


GOVERNMENT FURNISHED PROPERTY
(Continued)

C. List of Property the Contractor Shall Replace if Damaged or lost during the course of the effort:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

B. List of Property the Government Will Replace if Damaged or lost during the course of the effort:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

||| |||
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4

ATTACHMENT 1

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor no later than 15 days before the completion of the Basic delivery order requirement.

OPTION 1 TITLE:

Improvements to consolidated Controlled Temperature Transport/Storage of Payloads

Background / Problem Description:

In conjunction with Contractor performing this R/F services task, NASA will consider proposed modifications to stated tasks, or new Options, that can improve, or reduce the cost of, integrated operations of several different controlled temperature transport and storage systems to simultaneously support multiple payload users.

Task Description: NASA is currently interested in; reducing the cost of the sustaining engineering phase, minimizing staffing hours of ground consoles, reducing on-orbit crew time, improving on-orbit lifetime and availability, improving on-orbit maintenance capability, reducing power consumption, expanding maximum or minimum temperature range, improving hold time during power loss, payload logistics, and cross-system compatibility of payloads.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

SCHEDULE

Start Date: Sept 14, 2006

Finish Date: Dec 31, 2009

INTERIM MILESTONES

Contractor to propose

DUE DATES

Contractor to propose

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4**

ATTACHMENT 2

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor no later than 15 days before the completion of the Basic delivery order requirement.

OPTION 2 TITLE:

Additional Sortie Missions

Background / Problem Description:

In conjunction with Contractor performing this R/F services task, the Contractor is requested to provide a proposal for supporting sortie missions beyond the minimum of three (3) in the basic DO.

Task Description: Provide refrigerator-freezer R/F system services to EC2 for transport and on-orbit controlled temperature preservation of payloads in accordance with the basic DO Task Description, for supporting additional sortie missions beyond those specified in the Minimum Number of Missions in the DO Task Description, and up to the Maximum Number of Missions specified in the DO Task Description.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

SCHEDULE

Start Date: Sept 14, 2006

Finish Date: Dec 31, 2009

INTERIM MILESTONES

DUE DATES

Provide R/F systems and services for each additional sortie mission

December 31, 2009

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4

ATTACHMENT 3

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor no later than 15 days before the completion of the Basic delivery order requirement.

OPTION 3 TITLE:
ISS Missions

Background / Problem Description:

In conjunction with Contractor performing this R/F services task, the Contractor is requested to provide a proposal for supporting ISS missions.

Task Description: Provide refrigerator-freezer R/F system services to EC2 for transport and on-orbit controlled temperature preservation of payloads in accordance with the basic DO Task Description, for supporting ISS missions up to the Maximum Number of Missions specified in the DO Task Description.

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

SCHEDULE

Start Date: Sept 14, 2006

Finish Date: Dec 31, 2009

INTERIM MILESTONES

DUE DATES

Provide R/F systems and services for each ISS mission

December 31, 2009

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4

ATTACHMENT 4

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor no later than 15 days before the completion of the Basic delivery order requirement.

OPTION 4 TITLE:
ISS Mission Extension

Background / Problem Description:

In conjunction with Contractor performing this R/F services task, the Contractor is requested to provide a proposal for extending an ISS mission by 2 months. This would be in addition to the Government exercising OPTION 3 (ISS Missions)

Task Description: Provide refrigerator-freezer R/F system services to EC2 for transport and on-orbit controlled temperature preservation of payloads in accordance with the basic DO Task Description, for extending ISS missions (OPTION 3) by two (2) months.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

SCHEDULE

Start Date: Sept 14, 2006

Finish Date: Dec 31, 2009

INTERIM MILESTONES

DUE DATES

Provide R/F systems and services for each ISS mission 2 month extension

December 31, 2009

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

CREW, ROBOTS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16R4

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

BOE- CRAVE-EC2-DO16R4

The attached proposal includes our cost basis of estimation for the additional task items identified in the modification to Section 5 of the DO-16 Statement of Work, Revision 4. This cost estimation is based on Certifying and verifying the MERLIN Desiccant Pack Assembly (PN - 24400-20074-701) for launch on the JAXA HTV-1 vehicle. This Certification and verification will be performed in compliance with SSP 50438 for launch aboard the HTV vehicle, and well as SSP 57000 for use of this hardware on board the ISS.

The Following tasks identified in SSP 50438 and SSP 57000 are not included in this cost estimation since. These activities will be performed by EC2 personnel.

- PTP Coordination
- HVR/Bench Review Support
- HAMR Review
- ISS Manifest Data Products
- Stowage Drawings
- Manifest Datasets

The Options described in this Statement of Work Revision have been previously estimated during the original proposal. Costs for those Options are currently assumed to be the same as proposed. There are no cost changes to these Options as a result of these added Tasks.



VOLUME IV
COST/PRICE

Refrigerator/Freezer Services

Submitted via E-mail to:

CRAVE@ems.jsc.nasa.gov

Lyndon B. Johnson Space Center
Houston, Texas 77058-3696
No Later Than 11:00 AM, July 15, 2009

In Response to:

**CRAVE Contract Delivery Order No. CRAVE-EC2-DO16 (Rev 4)
Under Contract NNJ05HB42B**

Technical Point of Contact:

Lee Moradi, CRAVE Program Manager
Center for Biophysical Sciences & Engineering
The University of Alabama at Birmingham
CBSE 100
1530 3rd Ave. South
Birmingham, AL 35294-4400
TEL: (205) 975-2718
FAX: (205) 975-1709

moradi@cbse.uab.edu
[http://www.cbse.uab.edu/engineering-
division.shtml](http://www.cbse.uab.edu/engineering-division.shtml)

Administrative Point of Contact:

Tim Parker
Grants & Contracts Officer
The University of Alabama at Birmingham
AB 1170
1530 3rd Ave. South
Birmingham, AL 35294-0111
TEL: (205) 934-6793
FAX: (205) 975-5977

tmparker@uab.edu

NOTICE

This proposal includes data that shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed- in whole or in part- for any purpose other than to evaluate this proposal. If, however, an order is awarded to UAB/CBSE as a result of, or in connection with, the submission of this data, the Government shall have the right to duplicate, use, or disclose these data to the extent provided in the resulting contract. This restriction does not limit the Government's right to use information contained in these data if it is obtained from another source without restriction. The data subject to this restriction are contained on all pages.

TOTAL ESTIMATED LABOR COST- UAB/CBSE		\$ 29,652.20
CRAVE DO-16		
OTHER DIRECT COSTS (by FY)		
Note: ODCs may be separated by FY to accommodate the burden rates established for future years.	<i>Materials</i>	\$ -
	<i>Equipment</i>	\$ -
	<i>Travel (FY2009)</i>	\$ -
	<i>Travel (FY10-11)</i>	\$ -
	<i>Supplies (FY 2009)</i>	\$ -
	<i>Supplies (FY10-11)</i>	\$ -
	<i>Subcontracts (w/ID)</i>	\$ -
	<i>Subcontracts</i>	\$ -
	<i>Other (S&H)</i>	\$ 200.00
	<i>Other</i>	\$ -
	TOTAL	\$ 200.00
ODC Burdens (example G&A)		
		Rate
	<i>item 1- Travel F&A</i>	45.00%
	<i>item 2- Subs F&A</i>	45.00%
	<i>item 2- Other F&A</i>	45.00%
	TOTAL ODC Burden	\$ 90.00
	TOTAL Non-labor	\$ 290.00
	percent	total proposed dollars
FEE *		
		\$ 29,942.20

*Note: Fee shall not exceed NTE Fee Rate

Labor Category- UAB/CBSE	FY 1		FY 2		FY 3		FY 4		FY 5		FY 6		FY 7		TOTAL		TOTAL FOR RFS
	Estimated Hours	Negotiated FBR															
Program Manager	0	\$ 130.42	0	\$ 135.82	0	\$ 139.98	0	\$ 144.78	16	\$ 149.73	0	\$ -	16	\$ 149.73	\$ 2,395.68	16	\$ 2,395.68
Manager	0	\$ 108.16	0	\$ 112.60	0	\$ 116.05	0	\$ 120.01	70	\$ 124.10	0	\$ -	70	\$ 124.10	\$ 8,687.00	70	\$ 8,687.00
Supervisor	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Technical Professional III	0	\$ 97.77	0	\$ 101.51	0	\$ 104.70	0	\$ 108.30	136	\$ 112.02	0	\$ -	136	\$ 112.02	\$ 15,234.72	136	\$ 15,234.72
Technical Professional II	0	\$ 65.02	0	\$ 67.58	0	\$ 69.64	0	\$ 71.99	0	\$ 74.42	0	\$ -	0	\$ -	\$ -	0	\$ -
Technical Professional I	0	\$ 50.86	0	\$ 52.83	0	\$ 54.43	0	\$ 56.24	0	\$ 58.12	0	\$ -	0	\$ -	\$ -	0	\$ -
Analyst	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Technician III	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Technician II	0	\$ 56.80	0	\$ 59.10	0	\$ 60.85	0	\$ 62.87	8	\$ 64.97	0	\$ -	8	\$ 64.97	\$ 519.76	8	\$ 519.76
Technician I	0	\$ 48.87	0	\$ 50.82	0	\$ 52.32	0	\$ 54.04	0	\$ 55.83	0	\$ -	0	\$ -	\$ -	0	\$ -
IT Professional III	0	\$ 109.48	0	\$ 113.85	0	\$ 117.38	0	\$ 121.42	0	\$ 125.59	0	\$ -	0	\$ -	\$ -	0	\$ -
IT Professional II	0	\$ 91.93	0	\$ 95.62	0	\$ 98.56	0	\$ 101.93	0	\$ 105.41	0	\$ -	0	\$ -	\$ -	0	\$ -
IT Professional I	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Secretary	0	\$ 49.04	0	\$ 51.00	0	\$ 52.51	0	\$ 54.24	4	\$ 56.03	0	\$ -	4	\$ 56.03	\$ 224.12	4	\$ 224.12
Clerk	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Business Specialist	0	\$ 71.93	0	\$ 74.87	0	\$ 77.11	0	\$ 79.71	24	\$ 82.39	0	\$ -	24	\$ 82.39	\$ 1,977.36	24	\$ 1,977.36
Data/Documents Management	0	\$ 44.78	0	\$ 46.57	0	\$ 47.93	0	\$ 49.50	12	\$ 51.13	0	\$ -	12	\$ 51.13	\$ 613.56	12	\$ 613.56
Manager I	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Sr Designer	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Designer	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Secretary I	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Secretary II	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Secretary III	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Secretary IV	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Business Specialist I	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Clerk I	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Clerk II	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Clerk III	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Clerk IV	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Designer III	0	\$ 81.34	0	\$ 84.66	0	\$ 87.22	0	\$ 90.17	0	\$ 93.21	0	\$ -	0	\$ -	\$ -	0	\$ -
Designer II	0	\$ 52.25	0	\$ 54.35	0	\$ 55.95	0	\$ 57.80	0	\$ 59.72	0	\$ -	0	\$ -	\$ -	0	\$ -
Precision Machinist	0	\$ 45.00	0	\$ 46.58	0	\$ 48.21	0	\$ 49.89	0	\$ 51.64	0	\$ -	0	\$ -	\$ -	0	\$ -
Scientist Technical Specialist III	0	\$ 156.99	0	\$ 162.41	0	\$ 168.59	0	\$ 174.41	0	\$ 180.43	0	\$ -	0	\$ -	\$ -	0	\$ -
Scientist Technical Specialist III	0	\$ 112.25	0	\$ 116.10	0	\$ 120.50	0	\$ 124.63	0	\$ 128.93	0	\$ -	0	\$ -	\$ -	0	\$ -
Other categories listed in Section B of	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -
Other	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	\$ -	0	\$ -

* FBR = Fully Burdened Labor Rate as specified in Section B of Contract

Item	Estimated Cost
Parts & materials	\$ -
Input Item Here	\$ -
TOTAL Materials	\$ -

NNJ05HB42B - UNIVERSITY OF ALABAMA AT BIRMINGHAM

Delivery Order 7

FFP \$ 8,908

\$ 8,908

	DATE	DO VALUE					NOTES
		ACTION TOTAL	FEE %	COST	FEE	CUM. TOTAL	
DO 7	08/26/05	\$ 8,908	0.0%	\$ 8,908	\$ -	\$ 8,908	
	TOTAL			\$ 8,908			

Delivery Order 16

Cost Total \$ 3,367,572.31

Fee Total \$ -

Total Cost & Fee \$ 3,367,572.31

	DATE	DO VALUE					NOTES
		ACTION TOTAL	FEE %	COST	FEE	CUM TOTAL	
DO 16	09/19/06	\$ 1,793,479	0.0%	\$ 1,793,479	\$ -	\$ 1,793,479.11	
DO 16 R1	05/15/08	\$ 1,045,766	0.0%	\$ 1,045,766	\$ -	\$ 2,839,245.11	Exercised Opt 3e & 4
DO 16 R2	08/07/07	\$ 100,485	0.0%	\$ 100,485	\$ -	\$ 2,939,730.11	
DO 16 R3	12/17/08	\$ 397,900	0.0%	\$ 397,900		\$ 3,337,630.11	
DO 16 R4	07/21/09	\$ 29,942		\$ 29,942		\$ 3,367,572.31	
	TOTAL			\$ 3,367,572.31	\$ -		

Delivery Order 38

Cost Total \$ 2,217,849.40

Fee Total \$ -

Total Cost & Fee \$ 2,217,849.40

	DATE	DO VALUE					NOTES
		ACTION TOTAL	FEE %	COST	FEE	CUM. TOTAL	
DO 38	06/26/08	\$ 1,555,851	0.0%	\$ 1,555,851	\$ -	\$ 1,555,851.36	
DO 38 R1	12/15/08	\$ 661,998	0.0%	\$ 661,998	\$ -	\$ 2,217,849.40	
	TOTAL			\$ 2,217,849.40	\$ -		

TOTAL CONTRACT VALUE. \$ 5,594,329.71 \$ - \$ 5,594,329.71

CURRENT TOTAL FUNDING \$ 4,178,318.80

REMAINDER. \$ 1,416,010.91

MOD #	COST	FEE	Running Cost	Running Fee	CUM FUNDING	Running Total	Notes
1	\$ -	\$ -	\$ 2.00	\$ -	\$ -	\$ 2.00	Admin. Change K no.
2	\$ 24,998.00	\$ -	\$ 25,000.00	\$ -	\$ 24,998.00	\$ 25,000.00	includes other admin chgs
3	\$ 8,954.00	\$ -	\$ 33,954.00	\$ -	\$ 8,954.00	\$ 33,954.00	includes CV on DO 7
4	\$ -	\$ -	\$ 33,954.00	\$ -	\$ -	\$ 33,954.00	Admin wage determination
5	\$ -	\$ -	\$ 33,954.00	\$ -	\$ -	\$ 33,954.00	Admin: delete/replace drd 40
6	\$ 275,000.00	\$ -	\$ 308,954.00	\$ -	\$ 275,000.00	\$ 308,954.00	funds slated. DO 16
7	\$ 200,000.00	\$ -	\$ 508,954.00	\$ -	\$ 200,000.00	\$ 508,954.00	funds slated: DO 16
8	\$ -	\$ -	\$ 508,954.00	\$ -	\$ -	\$ 508,954.00	Admin wage determination
9	\$ 200,000.00	\$ -	\$ 708,954.00	\$ -	\$ 200,000.00	\$ 708,954.00	funds slated DO 16
10	\$ 131,132.00	\$ -	\$ 840,086.00	\$ -	\$ 131,132.00	\$ 840,086.00	funds slated DO 16
11	\$ 133,984.00	\$ -	\$ 974,070.00	\$ -	\$ 133,984.00	\$ 974,070.00	funds slated DO 16
12	\$ -	\$ -	\$ 974,070.00	\$ -	\$ -	\$ 974,070.00	Admin add NFS Security clause
13	\$ 100,000.00	\$ -	\$ 1,074,070.00	\$ -	\$ 100,000.00	\$ 1,074,070.00	funds slated DO 16
14	\$ 64,331.00	\$ -	\$ 1,138,401.00	\$ -	\$ 64,331.00	\$ 1,138,401.00	funds slated DO 16
15	\$ 107,416.00	\$ -	\$ 1,245,817.00	\$ -	\$ 107,416.00	\$ 1,245,817.00	funds slated: DO 16
16	\$ 170,000.00	\$ -	\$ 1,415,817.00	\$ -	\$ 170,000.00	\$ 1,415,817.00	funds slated. DO 16
17	\$ -	\$ -	\$ 1,415,817.00	\$ -	\$ -	\$ 1,415,817.00	Admin: wage determination
18	\$ 500,000.00	\$ -	\$ 1,915,817.00	\$ -	\$ 500,000.00	\$ 1,915,817.00	funds slated. DO 16
19	\$ -	\$ -	\$ 1,915,817.00	\$ -	\$ -	\$ 1,915,817.00	Admin NFS clauses, paying office
20	\$ 100,000.00	\$ -	\$ 2,015,817.00	\$ -	\$ 100,000.00	\$ 2,015,817.00	funds slated: DO 38
21	\$ 200,000.00	\$ -	\$ 2,215,817.00	\$ -	\$ 200,000.00	\$ 2,215,817.00	funds slated DO 16
22	\$ 432,501.80	\$ -	\$ 2,648,318.80	\$ -	\$ 432,501.80	\$ 2,648,318.80	funds slated DO 16 (232,801.80) / DO 38 (200,000)
23	\$ -	\$ -	\$ 2,648,318.80	\$ -	\$ -	\$ 2,648,318.80	Admin NFS clause change
24	\$ 340,000.00	\$ -	\$ 2,988,318.80	\$ -	\$ 340,000.00	\$ 2,988,318.80	funds slated: DO 16 (150k) / DO38 (190k)
25	\$ -	\$ -	\$ 2,988,318.80	\$ -	\$ -	\$ 2,988,318.80	Admin: wage determination
26	\$ -	\$ -	\$ 2,988,318.80	\$ -	\$ -	\$ 2,988,318.80	Admin correct recapitulation
27	\$ 200,000.00	\$ -	\$ 3,188,318.80	\$ -	\$ 200,000.00	\$ 3,188,318.80	funds slated: DO 38
28	\$ 270,000.00	\$ -	\$ 3,458,318.80	\$ -	\$ 270,000.00	\$ 3,458,318.80	funds slated DO 38
29	\$ 100,000.00	\$ -	\$ 3,558,318.80	\$ -	\$ 100,000.00	\$ 3,558,318.80	DO 16
30	\$ 620,000.00	\$ -	\$ 4,178,318.80	\$ -	\$ 620,000.00	\$ 4,178,318.80	
TOTAL			\$ 4,178,318.80	\$ -			
FIRM FIXED PRICE	\$ 21,454.00	\$ 4,156,864.80					

RECAPITULATION OF FUNDING

	Prior Funding	This Action (Mod 30)	Cumulative Funding
Firm Fixed Price	\$ 21,454.00	\$ -	\$ 21,454.00
Cost	\$ 3,536,864.80	\$ 620,000.00	\$ 4,156,864.80
Fee	\$ -	\$ -	\$ -
Total	\$ 3,558,318.80	\$ 620,000.00	\$ 4,178,318.80

Technical Analysis
NNJ05HB39B – Hamilton Sundstrand
Crew, Robotics and Vehicle Equipment (CRAVE)

TO: Adrian Clayton/BH & Ronald Johnson/BH
FROM: Sharon Campana/EC
SUBJECT: DO16 Refrigerator/Freezer Services Revision 4

Scope of Analysis:

UAB-CBSE Response to Refrigerator/Freezer Services 16, Revision 4 Request for Quotation. The changes proposed in Revision 4 included certifying and delivering desiccant packs for a new vehicle (HTV), providing all the necessary Payload documentation to the program, including safety approval, export control, and verifications.

Evaluation of Technical & Management (T&M) Approach:

Evaluator's recommendation:

- Acceptable
- Unacceptable
- Marginally acceptable

Evaluator's comments:

The cost proposed by UAB is fair and reasonable. The HTV mission requires 12 new forms be filled out and submitted, updates to safety data package, delta certification, and verification to new requirements.

Evaluation of Resources Approach:

Labor (quantity and skill mix):

A detailed review of the revision proposal was performed in the area of the cost to support the delta certification of the desiccant packs. The proposal requires 270 hours of project management, technical specialist, and clerical support. The labor hours and skill mix are all appropriate for the tasks called out in this DO revision. In addition, the cost of this proposal is comparable to proposals submitted by ESCG for DO 191.

Overall the Labor skill mix, and cost are considered acceptable.

Materials:

N/A – no materials called out in this proposal.

Other Direct Costs (travel, software, equipment, etc.):

N/A – no additional costs are called out in this proposal

Conclusion:

The overall cost and technical content of this proposal is determined to be acceptable.

Sharon Campana/EC2/TM

Evaluator's Name and Title

Date

Signature

ORDER FOR SUPPLIES OR SERVICES

1 Order No. NNJ05HB42B, CRAVE DO16R3	2 Date of Order See Block 10 Below	NOTE: MARK ALL PACKAGES AND PAPERS WITH ORDER NO Certified for National Defense under DPAS (15 CFR 700) DO-C9
---	---------------------------------------	--

3 Issuing Office NASA Johnson Space Center, 2101 Nasa Parkway Houston, TX 77058-3696 Org./Buyer: <u>BH2/Mary Thomas</u> Tel No. <u>281-483-8828</u> Fax: <u>281-244-0995</u> E-mail: <u>mary.f.thomas@nasa.gov</u>	4 Ship To. Transportation Officer, Building 421 NASA Johnson Space Center Houston, TX 77058-3696 Mark For Accountable Property Order No. <u>NNJ05HB42B, CRAVE DO16R3</u>
---	--

5 Contractor: University of Alabama @ Birmingham Center Attn: Lee Moradi, CBSE 100 1530 3 rd Avenue South Birmingham, Alabama 35294-4400 Phone: 205-975-2718 x Fax: 205-975-1709 TIN: 63-6005396 CAGE CODE: 0DV74	6. Deliver On or Before: <u>9/14/06 to 12/31/09</u> F.O B Point: <u>DESTINATION</u> Discount Terms. Net 30 Days. 7 BILLING ADDRESS. NASA Johnson Space Center Attn: LF231/Accounts Payable Group Houston, TX 77058-3696 Order No : <u>NNJ05HB39B, CRAVE DO16R3</u>
--	---

8. Type of Order:

PURCHASE: Please furnish the following in accordance with the conditions specified on this order Reference: _____

DELIVERY: Except for the Terms and Conditions of Purchase Order listed on the following page, this delivery order is subject to instructions contained on this form and is issued subject to the terms and conditions of contract number _____

9. Written acceptance of this order by contractor [<input type="checkbox"/>] is, [<input checked="" type="checkbox"/>] is not required. Sign below if required and return to contracting officer. Name: _____ (Person authorized to sign) Signature: _____ Date _____	10 Name: <u>Ronald Johnson</u> Signature: <u>Ronald Johnson</u> Date <u>12/17/08</u> CONTRACTING OFFICER
---	--

11. Schedule

ITEM NO	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED															
1	REFRIGERATOR-FREEZER SERVICES Revision 3 to DO 16 is issued to increase the DO value by \$397,900 from \$2,939,730.11 to \$3,337,630.11. This change is a result of the revised manifest. All other terms and conditions of the DO remain unchanged. RECAP OF DO VALUE <table style="width:100%"> <tr> <td></td> <td style="text-align:center">Prior</td> <td style="text-align:center">This Action</td> <td style="text-align:center">CUM Value</td> <td></td> </tr> <tr> <td style="text-align:right">Cost Fee</td> <td style="text-align:center"><u>64</u></td> <td style="text-align:center"><u>64</u></td> <td style="text-align:center"><u>64</u></td> <td></td> </tr> <tr> <td style="text-align:right">TOTAL</td> <td style="text-align:right">\$2,939,730.11</td> <td style="text-align:right">\$397,900</td> <td style="text-align:right">\$3,337,630.11</td> <td></td> </tr> </table>		Prior	This Action	CUM Value		Cost Fee	<u>64</u>	<u>64</u>	<u>64</u>		TOTAL	\$2,939,730.11	\$397,900	\$3,337,630.11		<u>64</u>			<u>64</u>	
	Prior	This Action	CUM Value																		
Cost Fee	<u>64</u>	<u>64</u>	<u>64</u>																		
TOTAL	\$2,939,730.11	\$397,900	\$3,337,630.11																		

12. For JSC Internal Use Only Requisition No. <u>N/A</u> <input type="checkbox"/> COMP <input type="checkbox"/> PART. PPC. _____ Rissue To: <u>EC/Ralph Marak, x39144</u> FOR <u>EC2/Sharon Campana, x45508</u>	13 Total \$ 3,337,630.11 NTE
--	---------------------------------

14 Quantities in "Quantity Accepted" Column Have Been

INSPECTED ACCEPTED RECEIVED

TO CONFORM TO THE CONTRACT ACCEPTANCE WILL BE AT JSC UNLESS OTHERWISE NOTED.

BY: _____
Authorized U S. Government Representative Date _____

TOTAL ESTIMATED LABOR COST- UAB/CBSE			\$
CRAVE DO-16			
OTHER DIRECT COSTS (by FY)			
Note: ODCs may be separated by FY to accommodate the burden rates established for future years.	Materials		\$
	Equipment		\$
	Travel (FY2009)		\$
	Travel (FY10-11)		\$
	Supplies (FY 2009)		\$
	Supplies (FY10-11)		\$
	Subcontracts (w/ID)		\$
	Subcontracts		\$
	Other (FY2009)		\$
	Other (FY10-11)		\$
	TOTAL		\$
ODC Burdens (example G&A)			
		<u>Rate</u>	
	item 1- Travel F&A		\$
	item 2- Subs F&A		\$
	item 2- Other F&A		\$
		TOTAL ODC Burden	\$
		TOTAL Non-labor	\$
	percent	total proposed dollars	
FEE *			
			\$ 397,900.17

b4

b4

***Note: Fee shall not exceed NTE Fee Rate**



Item	Estimated Cost
Procurement and parts	
costs associated with	
H/W upgrades in	
excess of proposed	
estimates	
Input Item Here	
TOTAL Materials	

bf

ORDER FOR SUPPLIES OR SERVICES

1. Order No. NNJ05HB42B, CRAVE DO16R2	2. Date of Order See Block 10 Below	NOTE: MARK ALL PACKAGES AND PAPERS WITH ORDER NO. Certified for National Defense under DPAS (15 CFR 700) DO-C9
--	--	---

3 Issuing Office. NASA Johnson Space Center, 2101 Nasa Parkway Houston, TX 77058-3696 Org /Buyer <u>BH2/Mary Thomas</u> Tel No : <u>281-483-8828</u> Fax <u>281-483-4173</u> E-mail: <u>mary.f.thomas@nasa.gov</u>	4 Ship To: Transportation Officer, Building 421 NASA Johnson Space Center Houston, TX 77058-3696 Mark For: Accountable Property Order No <u>NNJ05HB42B, CRAVE DO16R2</u>
---	--

5. Contractor: University of Alabama @ Birmingham Center Attn: Lee Moradi 1530 3 rd Avenue South Birmingham, Alabama 35294-4400 Phone 205-975-2718 x Fax: 205-975-1709 TIN. 63-6005396 CAGE CODE: 0DV74	6 Deliver On or Before: <u>9/14/06 to 12/31/09</u> F O B Point: <u>DESTINATION</u> Discount Terms: Net 30 Days
--	--

7 BILLING ADDRESS. NASA Johnson Space Center Attn: LF231/Accounts Payable Group Houston, TX 77058-3696 Order No.: NNJ05HB39B, CRAVE DO16R2
--

8 Type of Order:

PURCHASE. Please furnish the following in accordance with the conditions specified on this order. Reference: _____

DELIVERY: Except for the Terms and Conditions of Purchase Order listed on the following page, this delivery order is subject to instructions contained on this form and is issued subject to the terms and conditions of contract number _____

9 Written acceptance of this order by contractor [<input type="checkbox"/>] is, [<input checked="" type="checkbox"/>] is not required. Sign below if required and return to contracting officer Name: _____ (Person authorized to sign) Signature: _____ Date: _____	10. Name: <u>Ronald Johnson</u> Signature: <u>Ronald Johnson</u> Date: <u>8/2/07</u> CONTRACTING OFFICER
--	--

11 Schedule

ITEM NO	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED
	REFRIGERATOR-FREEZER SERVICES Period of Performance 9/14/06 to 12/31/09 Revision 2 to DO 16 is issued to increase the DO value as a result of Sortie flights 13A 1, 15A, and 1J/A Sortie flight 1J/A has been exceledated The DO value is increased by <u>64</u> to \$2,939,730.11	<u>64</u>				<u>64</u>

12 For JSC Internal Use Only. Requisition No : <u>N/A</u> <input type="checkbox"/> COMP <input type="checkbox"/> PART. PPC: _____ Rissue To <u>EC/Joe Gensler, x30025</u> FOR: <u>EC/Warren Ruummele, x33662</u>	13 Total \$ 2,939,730.11
---	--

14. Quantities in "Quantity Accepted" Column Have Been

INSPECTED ACCEPTED RECEIVED

TO CONFORM TO THE CONTRACT ACCEPTANCE WILL BE AT JSC UNLESS OTHERWISE NOTED.

BY: _____

Authorized U S Government Representative Date _____

DO 16 VALUE

NNJ05HB42B - UNIVERSITY OF ALABAMA

Cost Total	
Fee Total	\$ <u>bf</u>
Total Cost & Fee	2,939,730.11

DATE		DO VALUE				
	ACTION TOTAL	FEE %	COST	FEE	CUM. TOTAL	
DO 16	09/16/06					
DO 16/1	06/04/07	bf	bf	bf	bf	
DO 16/2	08/06/07					
TOTAL			\$ 2,939,730	\$ -		

ORDER FOR SUPPLIES OR SERVICES

1. Order No.
NNJ05HB42B, CRAVE DO16R1

2. Date of Order
See Block 10 Below

NOTE: MARK ALL PACKAGES AND PAPERS WITH ORDER NO
Certified for National Defense under DPAS (15 CFR 700) DO-C9

3. Issuing Office:
NASA Johnson Space Center, 2101 Nasa Parkway
Houston, TX 77058-3696
Org /Buyer BH2/Mary Thomas

Tel No: 281-483-8828 Fax. 281-483-4173
E-mail: mary.f.thomas@nasa.gov

4. Ship To:
Transportation Officer, Building 421
NASA Johnson Space Center
Houston, TX 77058-3696
Mark For: **Accountable Property**
Order No.. NNJ05HB42B, CRAVE DO16R1

5 Contractor:
University of Alabama @ Birmingham Center
Attn: Lee Moradi
1530 3rd Avenue South
Birmingham, Alabama 35294-4400

6. Deliver On or Before. 9/14/06 to 12/31/09
F O B Point. DESTINATION
Discount Terms: Net 30 Days.

Phone: 205-975-2718 x Fax. 205-975-1709

7 BILLING ADDRESS:
NASA Johnson Space Center
Attn: LF231/Accounts Payable Group
Houston, TX 77058-3696
Order No. NNJ05HB39B, CRAVE DO16R1

TIN: 63-6005396 CAGE CODE. 0DV74

8. Type of Order:
 PURCHASE: Please furnish the following in accordance with the conditions specified on this order. Reference: _____
 DELIVERY: Except for the Terms and Conditions of Purchase Order listed on the following page, this delivery order is subject to instructions contained on this form and is issued subject to the terms and conditions of contract number: _____

9 Written acceptance of this order by contractor [] is, [] is not required Sign below if required and return to contracting officer.

10. Name: Ronald Johnson

Name. _____ (Person authorized to sign)
Signature. _____ Date _____

Signature: Ronald Johnson Date 4/4/07
CONTRACTING OFFICER

11. Schedule

ITEM NO	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED
	REFRIGERATOR-FREEZER SERVICES					
	Period of Performance <u>9/14/06 to 12/31/09</u>					
	Revision 1 to DO16 is issued to exercise the following prepriced Options which will provide Galley refrigerator/freezer services to the ISS program The ISS Mission will begin on ULF2 (STS-126) currently scheduled for launch 10/9/08 or 10/23/08					
1	Option 3e, One ISS FY09 First ISS Mission					
2	Option 4, Three ISS Mission Extensions (6 months worth of extensions to provide a total of 24 months of-on-orbit operation)					
	(continued)					

12. For JSC Internal Use Only:
Requisition No. N/A COMP PART PPC _____
Rissue To: EC/Joe Gensler, x30025 FOR. EC/Warren Ruemmele, x33662

13 Total
\$ 2,839,245 11 NTE

14 Quantities in "Quantity Accepted" Column Have Been
 INSPECTED ACCEPTED RECEIVED
TO CONFORM TO THE CONTRACT
ACCEPTANCE WILL BE AT JSC UNLESS BY _____
OTHERWISE NOTED.

Authorized U S Government Representative _____ Date _____

SCHEDULE

ITEM	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED
	<p>RECAP OF DELIVERY ORDER VALUE:</p> <p>BASE <i>b4</i> Option 3e Option 4</p> <p>CUM TOTAL: \$2,839,245 11</p> <p>THIS IS A CPFF DELIVERY ORDER</p>					



Flight Assignment Working Group (FAWG) Planning Manifest

NASA Official: John Caggshall
Prepared by: USDOCC/Barton K. Gilman
Chart updated: 9-May-2007



103

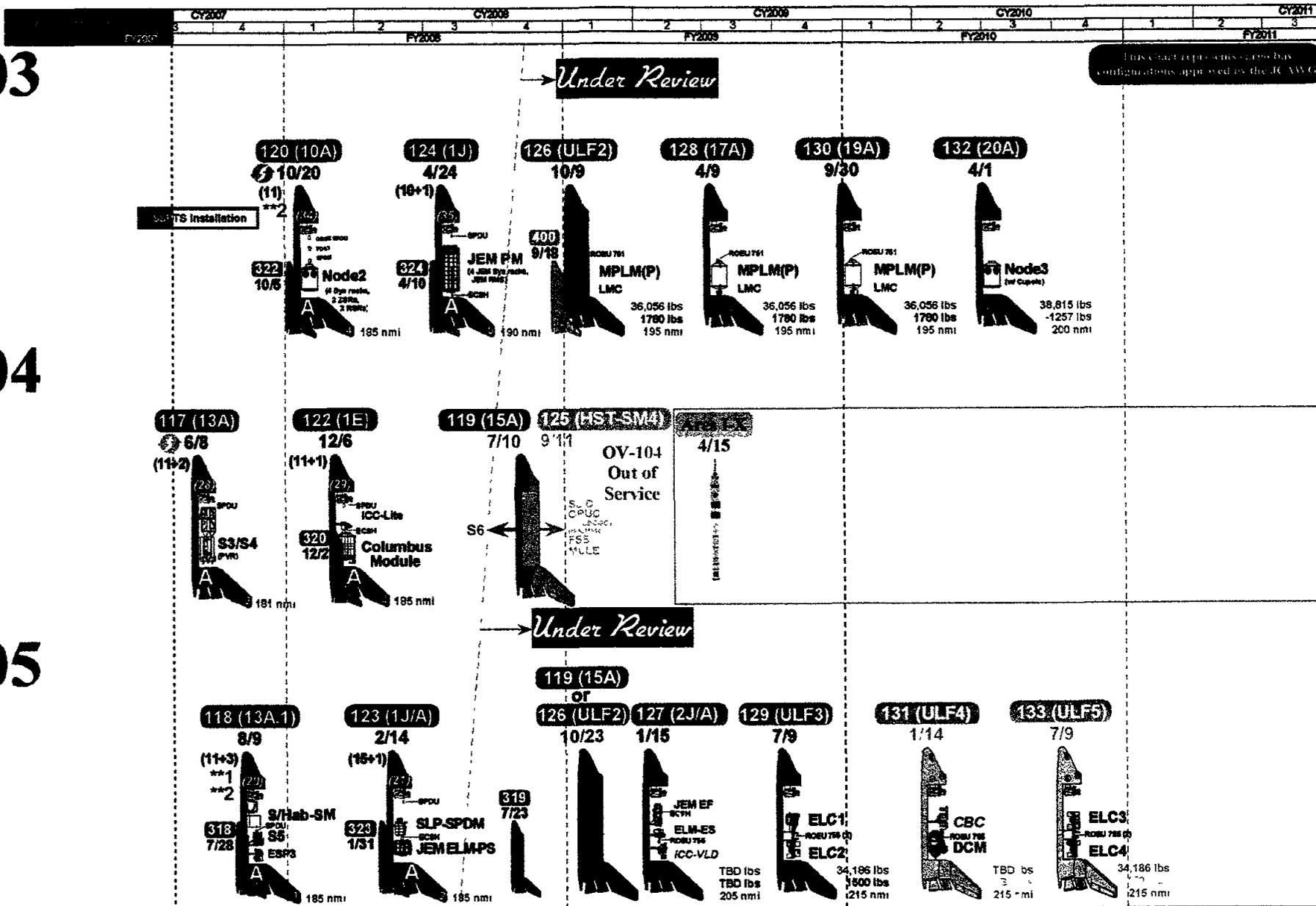
Discovery

104

Atlantis

105

Endeavour



This chart represents current configurations approved by the FAWG

Flight Rate:	FY-5/CY-4	FY-5/CY-4	FY-3/CY-3	FY-0/CY-0
Launch/Avg/Cont*	22/7 18/4	11/30 10/22		

Legend:

- Contingency Logistic Flights
- Contingency Shuttle Crew Support (GSCS) (Empty Cargo Bay)
- FORN Launch Date (Assigned) → Launch Date
- Mission duration → # of times the OV has flown
- STS# (ISS#)
- Crew Rotation
- Assessed launch date
- Cargo Bay Element(s)
- Launch Pad
- Crew Augmentation
- Not to be Pinned in the FORD
- ISS Chargeable weight (lbs) APW (lbs)
- Rendezvous attach (P/R)
- Software OV
- Incident/Contingency

Footnotes:

- * Under Review
- Green APW: Flight specific vehicle & launch month
- Black APW: Generic specific vehicle & launch month
- ** New Capabilities: (JMCS controlled)
- 1 Avionics Bay 1, 2 & 3A Enhanced Cooling (Rear Air-Breathing) Capability
- 2 Station/Shuttle Power Transfer System (SSPTS) Capability - extends flight duration 15 days (STS-118; (13A.1) & subs except OV-104 flights)

ORDER FOR SUPPLIES OR SERVICES

1 Order No DO-CRAVE-EC2-0016	2 Date of Order See Block 10 Below	NOTE: MARK ALL PACKAGES AND PAPERS WITH ORDER NO Certified for National Defense under DPAS (15 CFR 700) DO-C9
---------------------------------	---------------------------------------	--

3. Issuing Office NASA Johnson Space Center 2101 Nasa Parkway Houston, TX 77058-1696 Org./Buyer BH2/Mary Thomas Tel No.: 281-483-8028 Fax: 281-244-3995 E-mail: mary.f.thomas@nasa.gov	4 Ship To Transportation Officer, Building 421 NASA Johnson Space Center Houston, TX 77058-3696 Mark For Accountable Property Order No <u>DO-CRAVE EC2 DO16</u>
--	--

5. Contractor The University of Alabama at Birmingham Center for Biophysical Sciences and Engineering CBSE 100, 1530 3 rd Avenue South, Birmingham, Alabama 35294-4400 Phone: (205)975-2718 Fax: (205)975-1709 TIN: 63-6006396 CAGE CODE 00V74	6 Deliver On or Before <u>See Statement of Work</u> F O B Point <u>Destination</u> Discount Terms <u>Net 30 Days</u> 7 BILLING ADDRESS NASA Johnson Space Center Attn: LF231/Accounts Payable Group Houston, TX 77058-3696 Order No.. DO-CRAVE-EC2-DO16
---	--

8. Type of Order:
 PURCHASE: Please furnish the following in accordance with the conditions specified on this order. Reference: _____
 DELIVERY: Except for the Terms and Conditions of Purchase Order listed on the following page, this delivery order is subject to the instructions contained on this form and is issued subject to the terms and conditions of contract number: NNJ05HR42B

9. Written acceptance of this order by contractor [<input checked="" type="checkbox"/>] is, [<input type="checkbox"/>] is not required. Sign below if required and return to contracting officer Name: <u>Jane Fant</u> (Person authorized to sign) Signature: <u>[Signature]</u> Date: <u>11-16-06</u>	10 Name. <u>Robert Kolb</u> Signature: _____ Date _____ CONTRACTING OFFICER
--	--

11 Schedule						
ITEM NO	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED
1	DO-CRAVE-EC2-DO16, Refrigerator-Freezer Services Basic: The contractor shall perform and deliver to all requirements for DO-CRAVE-EC2-DO16, Refrigerator Freezer Services Option: NASA will exercise options in this DO to satisfy the maximum mission need. The government may exercise the priced option described on the next page by notification to the contractor no later than 15 days before the completion of the basic delivery order requirement. The government may also elect to exercise an option more than once. Period of Performance 9/14/06 to 12/31/09			64		

12. For JSC Internal Use Only: Requisition No.: _____ <input type="checkbox"/> COMP <input type="checkbox"/> PART. PPC _____ Issue To: <u>EC/Joe W. Gensler, x30025</u> For: <u>EC/Warren Ruesmele, x33682</u>	13 Total \$ _____
---	-----------------------------

14. Quantities in "Quantity Accepted" Column Have Been
 INSPECTED ACCEPTED RECEIVED
 TO CONFORM TO THE CONTRACT.
 ACCEPTANCE WILL BE AT JSC UNLESS OTHERWISE NOTED. BY: _____
 Authorized U S Government Representative Date _____

ORDER FOR SUPPLIES OR SERVICES
(CONTINUATION SHEET)

SCHEDULE

LINE	DESCRIPTION	QUANTITY	UNIT	VAL UNIT	QUANTITY ACCEPTED
	<p>Option 1a. ROCC Separate Upgrade for sortie flight support</p> <p>Option 1b. MERLIN Galley Food Warmer (FY 08 rates)</p> <p>Option 1c. MERLIN Galley Food Warmer First ISS Mission * ** (FY08 rates)</p> <p>Option 2a. One additional FY07 STS Sortie *</p> <p>Option 2b. One additional FY08 STS Sortie *</p> <p>Option 2c. One additional FY09 STS Sortie *</p> <p>Option 2d. One additional FY10 STS Sortie *</p> <p>Option 3a. One ISS FY07 First ISS Mission *</p> <p>Option 3b. One ISS FY07 ISS Mission (not first) *</p> <p>Option 3c. One ISS FY08 First ISS Mission *</p> <p>Option 3d. One ISS FY08 ISS Mission (not first) *</p> <p>Option 3e. One ISS FY09 First ISS Mission *</p> <p>Option 3f. One ISS FY09 ISS Mission (not first) *</p> <p>Option 3g. One ISS FY10 First ISS Mission *</p> <p>Option 3h. One ISS FY10 ISS Mission (not first) *</p> <p>Option 4. One ISS Mission Extension</p> <p>PERIOD OF PERFORMANCE: 9/14/06 to 12/31/09</p> <p>* = Unit price uses rates in effect at end date of Sortie or ISS Mission Actual price shall use CRAVE rate schedules</p> <p>ISS or Reflight options assume the Base Option is active</p> <p>Additional costs would be incurred on FY10 flights due to the Basic Option ending at 12/31/09 (i.e. quarterly reviews, Management, etc.)</p> <p>** = Assumes option for first ISS mission for MERLIN has been exercised</p>				

b4

REQUEST FOR QUOTATIONS
(THIS IS NOT AN ORDER)

THIS RFO IS IS NOT A SMALL BUSINESS-SET-ASIDE

PAGE 1 OF 1 PAGE(S)
1 1

1. REQUEST NO
DO-CRAVE-EC2-016

2. DATE ISSUED

3. REQUISITION/PURCHASE REQUEST

4. CERT. FOR NAT. DEF. UNDER BDSA REG. 2 AND/OR DMS REG. 1 ⇒

RATING
DO-C9

5a. ISSUED BY
**Lyndon B. Johnson Space Center/NASA/BH2
Houston, TX 77058**

6. DELIVER BY (Date)
See Attached DO

7. DELIVERY
 FOB DESTINATION OTHER (See Schedule)

8. NAME OF CONSIGNEE

9. TO: (Name, Address, City, State, ZIP Code)

a. NAME
CRAVE CONTRACTORS

b. COMPANY

b. STREET ADDRESS

c. CITY

d. CITY

e. STATE

f. ZIP CODE

d. STATE

e. ZIP CODE

10. PLEASE FURNISH QUOTATIONS TO THE ISSUING OFFICE IN BLOCK 5A ON OR BEFORE CLOSE OF BUSINESS (Date)

IMPORTANT: This is a request for information, and quotations furnished are not offers. If you are unable to quote, please so indicate on this form and return it to the address in Block 5A. This request does not commit the Government to pay any costs incurred in the preparation of the submission of this quotation or to contract for supplies or services. Supplies are of domestic origin unless otherwise indicated by quote. Any representations and/or certifications attached to this Request for Quotations must be completed by the quote.

11. SCHEDULE (Include applicable Federal, State and local taxes)

ITEM NO. (a)	SUPPLIES/SERVICES (b)	QUANTITY (c)	UNIT (d)
001	<p>DO Title: Refrigerator-Freezer System Services</p> <p>Basic Option</p> <p>Option 1a. ROCC Separate Upgrade</p> <p>Option 1b. MERLIN Galley Food Warmer (Development, FY08 rates)</p> <p>Option 1c. MERLIN Galley Oven Food Warmer First ISS Mission</p> <p>Option 2a. One additional FY07 STS Sortie</p> <p>Option 2b. One additional FY08 STS Sortie</p> <p>Option 2c. One additional FY09 STS Sortie</p> <p>Option 2d. One additional FY10 STS Sortie</p> <p>Option 3a. One ISS FY07 First ISS Mission</p> <p>Option 3b. One ISS FY07 ISS Mission (not first)</p> <p>Option 3c. One ISS FY08 First ISS Mission</p> <p>Option 3d. One ISS FY08 ISS Mission (not first)</p> <p>Option 3e. One ISS FY09 First ISS Mission</p> <p>Option 3f. One ISS FY09 ISS Mission (not first)</p> <p>Option 3g. One ISS FY10 First ISS Mission</p> <p>Option 3h. One ISS FY10 ISS Mission (not first)</p> <p>Option 4. One ISS Mission Extension</p>		

NOTE: Additional provisions and representations are are not attached.

9. TO: (Name, Address, City, State, ZIP Code)

ORDER FOR SUPPLIES OR SERVICES

1. Order No.
DO-CRAVE-EC2-DO16

2. Date of Order
See Block 10 Below

NOTE: MARK ALL PACKAGES AND PAPERS WITH ORDER NO.

Certified for National Defense under DPAS (15 CFR 700) DO-C9

3. Issuing Office:
NASA Johnson Space Center, 2101 Nasa Parkway
Houston, TX 77058-3696
Org./Buyer: BH2/Mary Thomas

Tel No.: 281-483-8828 Fax: 281244-0895
E-mail: mary.f.thomas@nasa.gov

4. Ship To:
Transportation Officer, Building 421
NASA Johnson Space Center
Houston, TX 77058-3696
Mark For: Accountable Property
Order No.: DO-CRAVE-EC2-DO16

5. Contractor:
The University of Alabama at Birmingham Center for
Biophysical Sciences and Engineering CBSE 100, 1530 3rd
Avenue South, Birmingham, Alabama 35294-4400

Phone: (205)975-2718 x Fax: (205)975-1709

TIN: 63-6005396 CAGE CODE: 0DV74

6. Deliver On or Before: See Statement of Work

F.O.B. Point: Destination

Discount Terms: Net 30 Days.

7. BILLING ADDRESS:

NASA Johnson Space Center
Attn: LF231/Accounts Payable Group
Houston, TX 77058-3696
Order No.: DO-CRAVE-EC2-DO16

8. Type of Order:

PURCHASE: Please furnish the following in accordance with the conditions specified on this order. Reference: _____

DELIVERY: Except for the Terms and Conditions of Purchase Order listed on the following page, this delivery order is subject to instructions contained on this form and is issued subject to the terms and conditions of contract number: NNJ05HB42B

9. Written acceptance of this order by contractor is, is not required. Sign below if required and return to contracting officer.

Name: _____ (Person authorized to sign)

Signature: [Signature] Date: 9-18-06

10. Name: Robert Kolb

Signature: [Signature] Date: 9-19-06
CONTRACTING OFFICER

11. Schedule

ITEM NO	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED
1	<p>DO-CRAVE-EC2-DO16, Refrigerator-Freezer Services</p> <p>Basic: The contractor shall perform and deliver to all requirements for DO-CRAVE-EC2-DO16, Refrigerator-Freezer Services.</p> <p>Option: NASA may exercise options in this DO to satisfy the maximum mission need. The government may exercise the prepriced option described on the next page by notification to the contractor no later than 15 days before the completion of the basic delivery order requirement. The government may also elect to exercise an option more than once.</p> <p>Period of Performance: 9/14/06 to 12/31/09</p>			64		

12. For JSC Internal Use Only:

Requisition No.: _____ COMP. PART. PPC: _____

Rissue To: EC/Joe W. Gensler, x30025 For: EC/Warren Ruenmele, x33662

13. Total

\$1,793,479.11

14. Quantities in "Quantity Accepted" Column Have Been

INSPECTED ACCEPTED RECEIVED

TO CONFORM TO THE CONTRACT.
ACCEPTANCE WILL BE AT JSC UNLESS
OTHERWISE NOTED

BY _____

Authorized U.S. Government Representative

Date _____

Order No.: _____

ORDER FOR SUPPLIES OR SERVICES (CONTINUATION SHEET)

SCHEDULE

ITEM	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED
	<p>Option 1a, ROCC Separate Upgrade for sortie flight support</p> <p>Option 1b, MERLIN Galley Food Warmer (FY 08 rates)</p> <p>Option 1c MERLIN Galley Food Warmer First ISS Mission * ** (FY08 rates)</p> <p>Option 2a, One additional FY07 STS Sortie *</p> <p>Option 2b, One additional FY08 STS Sortie *</p> <p>Option 2c, One additional FY09 STS Sortie *</p> <p>Option 2d, One additional FY10 STS Sortie *</p> <p>Option 3a, One ISS FY07 First ISS Mission *</p> <p>Option 3b, One ISS FY07 ISS Mission (not first) *</p> <p>Option 3c, One ISS FY08 First ISS Mission *</p> <p>Option 3d, One ISS FY08 ISS Mission (not first) *</p> <p>Option 3e, One ISS FY09 First ISS Mission *</p> <p>Option 3f, One ISS FY09 ISS Mission (not first) *</p> <p>Option 3g, One ISS FY10 First ISS Mission *</p> <p>Option 3h, One ISS FY10 ISS Mission (not first) *</p> <p> </p> <p>PERIOD OF PERFORMANCE: 9/14/06 to 12/31/09</p> <p> </p> <p>* = Unit price uses rates in effect at end date of Sortie or ISS Mission Actual price shall use CRAVE rate schedules.</p> <p>ISS or Reflight options assume the Base Option is active.</p> <p>Additional costs would be incurred on FY10 flights due to the Basic Option ending at 12/31/09 (i.e. quarterly reviews, Management, etc.)</p> <p>** = Assumes option for first ISS mission for MERLIN has been exercised.</p>					

bf

ORDER FOR SUPPLIES OR SERVICES

1. Order No.
DO-CRAVE-EC2-DO16

2 Date of Order
See Block 10 Below

NOTE: MARK ALL PACKAGES AND PAPERS WITH ORDER NO.
Certified for National Defense under DPAS (15 CFR 700) DO-C9

3 Issuing Office:
NASA Johnson Space Center, 2101 Nasa Parkway
Houston, TX 77058-3696
Org./Buyer: BH2/Mary Thomas

Tel No 281-483-8828 Fax. 281244-0995
E-mail. mary.fthomas@nasa.gov

4 Ship To:
Transportation Officer, Building 421
NASA Johnson Space Center
Houston, TX 77058-3696
Mark For: **Accountable Property**
Order No.: DO-CRAVE-EC2-DO16

5. Contractor:
The University of Alabama at Birmingham Center for
Biophysical Sciences and Engineering CBSE 100, 1530 3rd
Avenue South, Birmingham, Alabama 35294-4400

Phone: (205)975-2718 x Fax. (205)975-1709

TIN: 63-6005396 CAGE CODE: 0DV74

6 Deliver On or Before: See Statement of Work
F O.B Point: Destination
Discount Terms: Net 30 Days.

7 BILLING ADDRESS:
NASA Johnson Space Center
Attn LF231/Accounts Payable Group
Houston, TX 77058-3696
Order No.: DO-CRAVE-EC2-DO16

8 Type of Order:

PURCHASE. Please furnish the following in
accordance with the conditions specified on this order
Reference: _____

DELIVERY: Except for the Terms and Conditions of Purchase
Order listed on the following page, this delivery order is subject to
instructions contained on this form and is issued subject to the
terms and conditions of contract number: NNJ05HB42B

9 Written acceptance of this order by contractor [] is, [] is not
required Sign below if required and return to contracting officer.

Name: Jane Fant (Person authorized to sign)

Signature: [Signature] Date: 11-16-06

10. Name: Robert Kolb

Signature: _____ Date: _____
CONTRACTING OFFICER

11. Schedule

ITEM NO	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED
1	<p>DO-CRAVE-EC2-DO16, Refrigerator-Freezer Services</p> <p>Basic: The contractor shall perform and deliver to all requirements for DO-CRAVE-EC2-DO16, Refrigerator-Freezer Services</p> <p>Option: NASA will exercise options in this DO to satisfy the maximum mission need The government may exercise the prepriced option described on the next page by notification to the contractor no later than 15 days before the completion of the basic delivery order requirement The government may also elect to exercise an option more than once</p> <p>Period of Performance 9/14/06 to 12/31/09</p>			64		

12 For JSC Internal Use Only:

Requisition No : _____ COMP. PART. PPC _____
Rissue To: EC/Joe W. Gensler, x30025 For: EC/Warren Ruummele, x33662

13. Total
\$ _____

14. Quantities in "Quantity Accepted" Column Have Been

INSPECTED ACCEPTED RECEIVED

TO CONFORM TO THE CONTRACT
ACCEPTANCE WILL BE AT JSC UNLESS
OTHERWISE NOTED

BY _____

Authorized U S Government Representative

Date _____

Order No.: _____

ORDER FOR SUPPLIES OR SERVICES
(CONTINUATION SHEET)

SCHEDULE

ITEM	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED
	Option 1a, ROCC Separate Upgrade for sortie flight support					
	Option 1b, MERLIN Galley Food Warmer (FY 08 rates)					
	Option 1c MERLIN Galley Food Warmer First ISS Mission * ** (FY08 rates)					
	Option 2a, One additional FY07 STS Sortie *					
	Option 2b, One additional FY08 STS Sortie *					
	Option 2c, One additional FY09 STS Sortie *					
	Option 2d, One additional FY10 STS Sortie *					
	Option 3a, One ISS FY07 First ISS Mission *					
	Option 3b, One ISS FY07 ISS Mission (not first) *					
	Option 3c, One ISS FY08 First ISS Mission *					
	Option 3d, One ISS FY08 ISS Mission (not first) *					
	Option 3e, One ISS FY09 First ISS Mission *					
	Option 3f, One ISS FY09 ISS Mission (not first) *					
	Option 3g, One ISS FY10 First ISS Mission *					
	Option 3h, One ISS FY10 ISS Mission (not first) *					
	Option 4, One ISS Mission Extension					
	PERIOD OF PERFORMANCE. 9/14/06 to 12/31/09					
	* = Unit price uses rates in effect at end date of Sortie or ISS Mission. Actual price shall use CRAVE rate schedules.					
	ISS or Reflight options assume the Base Option is active.					
	Additional costs would be incurred on FY10 flights due to the Basic Option ending at 12/31/09 (i.e. quarterly reviews, Management, etc.)					
	** = Assumes option for first ISS mission for MERLIN has been exercised					

64

REQUEST FOR QUOTATIONS
(THIS IS NOT AN ORDER)

THIS RFQ IS IS NOT A SMALL BUSINESS-SET-ASIDE

PAGE 1 OF 1 PAGE(S)
1 1

1 REQUEST NO **DO-CRAVE-EC2-016** 2 DATE ISSUED 3 REQUISITION/PURCHASE REQUEST 4 CERT FOR NAT DEF UNDER BDSA REG 2 AND/OR DMS REG 1 ⇒ RATING **DO-C9**

5a ISSUED BY
Lyndon B. Johnson Space Center/NASA/BH2
Houston, TX 77058

6 DELIVER BY (Date)
See Attached DO

5b- FOR INFORMATION CALL (NO COLLECT CALLS)

7 DELIVERY
 FOB DESTINATION OTHER (See Schedule)

8 NAME TELEPHONE NUMBER
Mary Thomas
CRAVE@ems.jsc.nasa.gov
AREA CODE NUMBER
281 483-8828

9 DESTINATION

a NAME OF CONSIGNEE
CRAVE CONTRACTORS

b COMPANY

b STREET ADDRESS

c STREET ADDRESS

c CITY

d. CITY e STATE f. ZIP CODE d. STATE e. ZIP CODE

10 PLEASE FURNISH QUOTATIONS TO THE ISSUING OFFICE IN BLOCK 5A ON OR BEFORE CLOSE OF BUSINESS (Date)

IMPORTANT: This is a request for information, and quotations furnished are not offers. If you are unable to quote, please so indicate on this form and return it to the address in Block 5A. This request does not commit the Government to pay any costs incurred in the preparation of the submission of this quotation or to contract for supplies or services. Supplies are of domestic origin unless otherwise indicated by quoter. Any representations and/or certifications attached to this Request for Quotations must be completed by the quoter.

11. SCHEDULE (Include applicable Federal, State and local taxes)

ITEM NO. (a)	SUPPLIES/SERVICES (b)	QUANTITY (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)
001	<p>DO Title. Refrigerator-Freezer System Services</p> <p>Basic Option</p> <p>Option 1a. ROCC Separate Upgrade</p> <p>Option 1b. MERLIN Galley Food Warmer (Development, FY08 rates)</p> <p>Option 1c. MERLIN Galley Oven Food Warmer First ISS Mission</p> <p>Option 2a. One additional FY07 STS Sortie</p> <p>Option 2b. One additional FY08 STS Sortie</p> <p>Option 2c. One additional FY09 STS Sortie</p> <p>Option 2d. One additional FY10 STS Sortie</p> <p>Option 3a. One ISS FY07 First ISS Mission</p> <p>Option 3b. One ISS FY07 ISS Mission (not first)</p> <p>Option 3c. One ISS FY08 First ISS Mission</p> <p>Option 3d. One ISS FY08 ISS Mission (not first)</p> <p>Option 3e. One ISS FY09 First ISS Mission</p> <p>Option 3f. One ISS FY09 ISS Mission (not first)</p> <p>Option 3g. One ISS FY10 First ISS Mission</p> <p>Option 3h. One ISS FY10 ISS Mission (not first)</p> <p>Option 4. One ISS Mission Extension</p>				

12 DISCOUNT FOR PROMPT PAYMENT

a 10 CALENDAR DAYS (%) b 20 CALENDAR DAYS (%) c 30 CALENDAR DAYS (%) d CALENDAR DAYS

NUMBER PERCENTAGE

NOTE: Additional provisions and representations are are not attached.

13. NAME AND ADDRESS OF QUOTER

a. NAME OF QUOTER
The Board of Trustees of The University of Alabama for The University of Alabama at Birmingham

b. STREET ADDRESS
1530 3rd Avenue South AB1170

c. COUNTY
Jefferson

d. CITY
Birmingham

e. STATE
AL

f. ZIP CODE
35294-0111

14. SIGNATURE OF PERSON AUTHORIZED TO SIGN QUOTATION
Jane Fant

15. DATE OF QUOTATION
11-16-06

16. SIGNER
Jane Fant

b. TELEPHONE
AREA CODE
205
NUMBER
934-5266

c. TITLE (Type or print)
Asst. V.P. for Sponsored Research Admin.

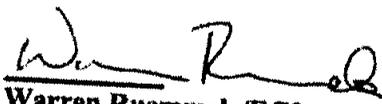
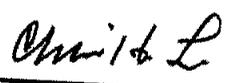
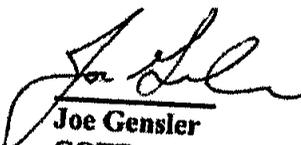
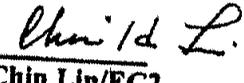
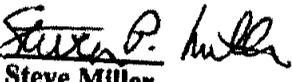
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16

PROPOSAL INSTRUCTIONS: DRAFT - COMMENTS DUE BY: August 15, 2006
 X FINAL - PROPOSAL DUE BY: August 31, 2006

DO TITLE: Refrigerator-Freezer Services
DO Type: X CPFF FFP

DO Contact Information in Addition to the CRAVE Contract Specialist or CO:
TMR: Chin Lin/EC2 Phone: (281) 483-9126
DO Manager: Warren Ruemmele/EC2 Phone: (281) 483-3662
DO Mgr. Alternate: Chin Lin/EC2 Phone: (281) 483-9126

Concurrences:

 Warren Ruemmele/EC2 DO Manager	 Chin Lin/EC2 DO Mgr. Management	 Joe Gensler COTR
 Chin Lin/EC2 Division TMR	 Steve Miller S & MA	_____ Name

Task Contains Flight Hardware, Flight Software or GSE? X Yes No
Program Supported: Shuttle X ISS EVA Advanced
WBS: 1.0 EVA 2.0 FCE 3.0 EVR ECLSS X 5.0 ATCS 6.0 CHcS

For purposes of complying with FAR 52.232-22, Limitation of Funds, the total amount allotted by the Government to contract is specified in clause B.6, Contract Funding. The funding listed in B.6 is the amount allotted for all Delivery Orders on the contract combined.

All terms and conditions of the contract apply to this Delivery Order. In the event of a conflict between the contract and this Delivery Order, the contract shall prevail.

WBS reporting shall be done in accordance with applicable WBS reporting categories, as shown above and in the contract within Section C, Table 1.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16**

Narrative Task Description

Background / Problem Description:

Thermal carriers are required to provide transport and on-orbit preservation at refrigerated/frozen conditions of a variety of payloads.

Task Description: Provide refrigerator-freezer R/F system services to EC2 for transport and on-orbit controlled temperature preservation of payloads, for the nominal and off-nominal activities in Section 3.4 and with the additional top level requirements/allowables:

- 1) **Ownership:** Contractor is assumed to own the R/F systems to perform the tasks in this DO. Contractor shall clearly detail NASA's responsibilities, particularly in the event the systems are damaged or destroyed.
- 2) **Minimum Number of Missions:** It shall be the Contractor's responsibility to ensure availability of, and services for, R/F systems to support the following minimum number of missions during the period starting from DO ATP and ending 12/31/09:
 - a. Three (3) Sortie missions (consisting of powered launch on STS Middeck, operation on-orbit in STS Middeck, powered descent on STS Middeck. System is NOT transferred from STS Middeck during a sortie mission), AND
 - i. One Flight unit shall be available as backup during launch preparations of the prime flight unit for every flight in the event of problems.
 - b. One form-fit-function equivalent trainer/engineering unit (non-flight) shall be available at all times.
 - i. Ten (10) training sessions, each for 1/2 day, will be at held at JSC during this period. The R/F system would need to be represented at Crew Training sessions at JSC. The Contractor should plan for each session lasting 4 hours, and covering hardware, software and operations unique to the Contractor's R/F system.
- 3) **Maximum Number of Missions:** NASA will exercise Options in this DO to satisfy the maximum mission need. It shall be the Contractor's responsibility to ensure availability of, and services for, R/F systems to support the following maximum number of missions during the period starting from DO ATP and ending 12/31/09:
 - a. Nine (9) Sortie missions with no more than three (3) in any single year, AND
 - i. One Flight unit shall be available as backup during launch preparations of the prime flight unit for every flight in the event of problems.
 - b. Three (3) ISS missions (consisting of powered launch on STS Middeck, transfer to, and continuous operation in, an on-orbit EXPRESS rack for 18 months, powered descent on STS Middeck) with as many as three (3) missions operating at the same time aboard ISS, AND
 - c. One form-fit-function equivalent trainer/engineering unit (non-flight) shall be available at all times.
 - i. Twenty (20) training sessions, each for 1/2 day, will be at held at JSC during this period. The R/F system would need to be represented at Crew

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16**

GOVERNMENT FURNISHED PROPERTY

The CRAVE contracts do not anticipate the Government providing any property or test facilities unless requested by the contractor in their response to a request for bid.

In some rare cases (such as sustaining engineering task) it is known ahead of time that government property will be provided to the contractor. In those cases the following list filled out to allow the proper control of government property:

A. List of Property the Contractor Shall Replace with modified or upgraded versions:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

B. List of Property the Contractor will return in the same configuration:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16**

**GOVERNMENT FURNISHED PROPERTY
(Continued)**

C. List of Property the Contractor Shall Replace if Damaged or lost during the course of the effort:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

B. List of Property the Government Will Replace if Damaged or lost during the course of the effort:

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
N/A				

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16**

ATTACHMENT 1

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor no later than 15 days before the completion of the Basic delivery order requirement.

OPTION 1 TITLE:

Improvements to consolidated Controlled Temperature Transport/Storage of Payloads

Background / Problem Description:

In conjunction with Contractor performing this R/F services task, NASA will consider proposed modifications to stated tasks, or new Options, that can improve, or reduce the cost of, integrated operations of several different controlled temperature transport and storage systems to simultaneously support multiple payload users.

Task Description: NASA is currently interested in; reducing the cost of the sustaining engineering phase, minimizing staffing hours of ground consoles, reducing on-orbit crew time, improving on-orbit lifetime and availability, improving on-orbit maintenance capability, reducing power consumption, expanding maximum or minimum temperature range, improving hold time during power loss, payload logistics, and cross-system compatibility of payloads.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

SCHEDULE

Start Date: Sept 14, 2006

Finish Date: Dec 31, 2009

INTERIM MILESTONES

Contractor to propose

DUE DATES

Contractor to propose

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16**

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16**

ATTACHMENT 2

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor no later than 15 days before the completion of the Basic delivery order requirement.

OPTION 2 TITLE:
Additional Sortie Missions

Background / Problem Description:

In conjunction with Contractor performing this R/F services task, the Contractor is requested to provide a proposal for supporting sortie missions beyond the minimum of three (3) in the basic DO.

Task Description: Provide refrigerator-freezer R/F system services to EC2 for transport and on-orbit controlled temperature preservation of payloads in accordance with the basic DO Task Description, for supporting additional sortie missions beyond those specified in the Minimum Number of Missions in the DO Task Description, and up to the Maximum Number of Missions specified in the DO Task Description.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

SCHEDULE

Start Date: Sept 14, 2006

Finish Date: Dec 31, 2009

INTERIM MILESTONES

DUE DATES

Provide R/F systems and services for each additional sortie mission

December 31, 2009

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16**

CHANGES TO DRDs: NONE

CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16**

ATTACHMENT 3

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor no later than 15 days before the completion of the Basic delivery order requirement.

OPTION 3 TITLE:
ISS Missions

Background / Problem Description:

In conjunction with Contractor performing this R/F services task, the Contractor is requested to provide a proposal for supporting ISS missions.

Task Description: Provide refrigerator-freezer R/F system services to EC2 for transport and on-orbit controlled temperature preservation of payloads in accordance with the basic DO Task Description, for supporting ISS missions up to the Maximum Number of Missions specified in the DO Task Description.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

SCHEDULE

Start Date: Sept 14, 2006

Finish Date: Dec 31, 2009

INTERIM MILESTONES

DUE DATES

Provide R/F systems and services for each ISS mission

December 31, 2009

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16**

CHANGES TO DRDs: NONE

**CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)**

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16**

ATTACHMENT 4

The Government may exercise the option described below for the option value listed on the DO cover page by written notification to the contractor no later than 15 days before the completion of the Basic delivery order requirement.

OPTION 4 TITLE:
ISS Mission Extension

Background / Problem Description:

In conjunction with Contractor performing this R/F services task, the Contractor is requested to provide a proposal for extending an ISS mission by 2 months. This would be in addition to the Government exercising OPTION 3 (ISS Missions)

Task Description: Provide refrigerator-freezer R/F system services to EC2 for transport and on-orbit controlled temperature preservation of payloads in accordance with the basic DO Task Description, for extending ISS missions (OPTION 3) by two (2) months.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware	Contractor to propose			
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
Test	Contractor to propose			
Software	Contractor to propose			
Other Products	Contractor to propose			

SCHEDULE

Start Date: Sept 14, 2006

Finish Date: Dec 31, 2009

INTERIM MILESTONES

DUE DATES

Provide R/F systems and services for each ISS mission 2 month extension

December 31, 2009

Milestones, along with subjective measurements, are to be used for measuring performance. For schedule detail see Microsoft Project file located on the CRAVE web site for this DO listed under the Government Cost Estimate below.

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EC2-DO16**

CHANGES TO DRDs: NONE

**CHANGES TO GOVERNMENT FURNISHED PROPERTY: NONE
*(IF YES, THEN INSERT GOVERNMENT FURNISHED PROPERTY TABLES)***

ORDER FOR SUPPLIES OR SERVICES

1 Order No.
DO-CRAVE-EB2-007

2 Date of Order
SEE BLOCK 10

NOTE: MARK ALL PACKAGES AND PAPERS WITH ORDER NO.

Certified for National Defense under DPAS (15 CFR 700) DO-C9

3 Issuing Office
NASA Johnson Space Center, 2101 Nasa Parkway
Houston, TX 77058-3696
Org /Buyer BH2/Mike Ballard

4 Ship To
Transportation Officer, Building 421
NASA Johnson Space Center
Houston, TX 77058-3696
Mark For **Accountable Property**
Order No DO-CRAVE-EB2-007

Tel No 281-244-5350 Fax _____
E-mail michael.d.ballard@nasa.gov

5 Contractor
The University of Alabama at Birmingham Center for
Biophysical Sciences and Engineering CBSE 100, 1530 3rd
Avenue South Birmingham, Alabama 35294-4400

6 Deliver On or Before SEE BLOCK 11
F O B Point Birmingham, Alabama
Discount Terms Net 30 Days.

Phone: (205) 975-2718 x _____ Fax (205) 975-1709
TIN 63-6005396 CAGE CODE 0DV74

7 BILLING ADDRESS:
NASA Johnson Space Center
Attn: LF231/Accounts Payable Group
Houston, TX 77058-3696
Order No DO-CRAVE-EB2-007

8 Type of Order
 PURCHASE: Please furnish the following in
accordance with the conditions specified on this order
Reference: _____

DELIVERY Except for the Terms and Conditions of Purchase
Order listed on the following page, this delivery order is subject to
instructions contained on this form and is issued subject to the
terms and conditions of contract number NNJ05HB42B

9 Written acceptance of this order by contractor [] is, [] is not
required Sign below if required and return to contracting officer.
Name: Richard Marchese, Ph.D. (Person authorized to sign)
Signature [Signature] Date: 8-18-05

10. Name. N L Dawn Alexander
Signature. [Signature] Date 8/26/05
CONTRACTING OFFICER

11 Schedule

ITEM NO	DESCRIPTION	QUANTITY ORDERED	UNIT	UNIT PRICE	AMOUNT	QUANTITY ACCEPTED
	The Contractor shall perform and deliver to all requirements for DO-CRAVE-EB2-007 The Period of Performance for this DO is 8/29/2005 - 10/31/2005 (excluding any options)			64		

12 For JSC Internal Use Only
Requisition No _____ COMP PART PPC _____
Rissue To _____

13 Total
\$ 8,908 _____

14 Quantities in "Quantity Accepted" Column Have Been
 INSPECTED ACCEPTED RECEIVED
TO CONFORM TO THE CONTRACT
ACCEPTANCE WILL BE AT JSC UNLESS
OTHERWISE NOTED BY _____

Authorized U S Government Representative _____ Date _____

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EB2-07

DO TITLE: Manufacturing of Acceptance Vibration Test (AVT) Fixtures for Advanced Resistive Exercise Device (ARED)

DO Type: ___ CPFF X FFP

DO Contact Information in Addition to the CRAVE Contract Specialist or CO:

TMR: Debbie Berdich

Phone: (281) 483-0025

DO Manager: Dave Young, EB2

Phone: (281) 483-9047

DO Mgr. Alternate: Tony Dao, EB2

Phone: (281) 483-8839

Concurrences:

Dave Young
DO Manager

Scott Swan
DO Mgr. Management

Joe Gensler
COTR

Debbie Berdich
Division TMR

Steve Miller
S & MA

Task Contains Flight Hardware, Flight Software or GSE? X Yes ___ No

Program Supported: ___ Shuttle X ISS ___ EVA ___ Advanced _____

WBS: ___ 1.0 EVA ___ 2.0 FCE ___ 3.0 EVR ___ ECLSS ___ 5.0 ATCS X 6.0 CHeCS

For purposes of complying with FAR 52.232-22, Limitation of Funds, the total amount allotted by the Government to contract is specified in clause B.6, Contract Funding. The funding listed in B.6 is the amount allotted for all Delivery Orders on the contract combined.

All terms and conditions of the contract apply to this Delivery Order. In the event of a conflict between the contract and this Delivery Order, the contract shall prevail.

WBS reporting shall be done in accordance with applicable WBS reporting categories, as shown above and in the contract within Section C, Table 1.

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EB2-07

Narrative Task Description

Background / Problem Description:

**MANUFACTURING OF GSE HARDWARE (PLATFORM AVT FIXTURE) FOR
ADVANCED RESISTIVE EXERCISE DEVICE (ARED)**

Task Description:

Fabricate and assemble per drawing. Note: vendor to procure fasteners as specified on drawings.

Drawings are available at the CRAVE Homepage.

Deliver to JSC Receiving using DD250.

Notes:

Vendor shall provide weekly schedule and cost status.

Vendor shall provide weekly status of Non-Conformance Records (NCR) and issues in the form of an E-mail to the DO Manager.

NCR's shall be communicated to the ARED Project in sufficient details to allow for resolution without requiring ARED personnel to be at vendor facility.

If required, Material Review Board (MRB) personnel for the disposition of NCR's shall be provided by the ARED Project.

ARED Project will provide vendor with NCR resolution within 48 hours of being notified in order to minimize work stoppage.

ADP shall consist of Certificate of Compliance for Materials, Dimensional Inspection Record, and closed NCR's.

NCR's open at the time of ADP delivery will be transferred into the NASA Quality System by NASA or NASA-designated QA personnel.

All technical correspondence shall be directed to Mr. Dave Young (281-483-9047 and david.w.young@nasa.gov) and Mr. Tony Dao (281-483-8839, anthony.x.dao@nasa.gov).

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EB2-07**

Deliverables/Products:

Product	Description	Qty	Due	Class
Hardware				
Mock Up				
Prototype				
Certification				
Flight				
Training				
Other				
GSE	SDG38117902-001	2	10/31/2005	GSE
	SDG38117903-001	2		
	SDG38117904-001	2		
	SDG38117907-301	1		
	SDG38117908-301	1		
	SDG38117909-001	1		
Test				
Software				
Other Products				

CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EB2-07

SCHEDULE

Start Date: August 29, 2005

Finish Date: October 31, 2005

ITERIM MILESTONES	DUE DATES

Milestones, along with subjective measurements, are to be used for measuring performance.

Total Government Estimate for this DO: \$8,954

Option 1: \$ N/A (See Attachment 1)

Option 2: \$ N/A (See Attachment 2)

TOTAL COST ESTIMATE FOR THIS DO: N/A

FEE: N/A (If Applicable)

OPTION 1: \$ N/A (See Attachment 1)

OPTION 2: \$ N/A (See Attachment 2)

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER # CRAVE-EB2-07**

DATA REQUIREMENTS

All DRDs contained in the contract are applicable and required unless marked N/A below.

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
1	Written Approval	Flight GFE Configuration Management Plan	With Proposal	Once	Attachment J-8	
2	Mandatory Submittal	Regular Status Report/ Summary Review	Thirty (30) days following contract start	Monthly	Y	
3	Written Approval	Project Technical Requirements Specification	Per DO schedule	Once with Revisions	N	
4	Mandatory Submittal	GFE Systems Requirements Data Package	Specified in DO	Once with Revisions	N	
5	Written Approval	Flight GFE Projects Requirements & Verification Document	Specified in DO	Once with Revisions	N	
6	Mandatory Submittal	Preliminary Design Review Data Package	Specified in DO	Once with Revisions	N	
7	Written Approval	Flight GFE Workmanship Specifications List	Specified in DO	Once with Revisions	Y	
8	Written Approval	Project Schedule	PDR or 10% effort complete Milestone	Once w/Revisions (due w/DO proposal; updates & details provided as DO progresses)	Y	
9	Written Approval	Flight GFE Interface Control Document	Specified in DO	Once with Revisions	N	
10	Written Approval	GFE End Item Specification	Specified in DO	Once with Revisions	N	
11	Mandatory Submittal	Flight GFE Failure Analysis Report	As agreed by TMR in DO	As Required	N	
12	Written Approval	Flight GFE Verification and Validation Plan	As Specified in EA-023	Once with Revisions	N	
13	Written Approval	GFE Software Requirements Specification	Specified in DO	Once with Revisions	N	
14	Written Approval	GFE Software Development Plan	Specified in DO	Once with Revisions	N	
15	Written Approval	GFE Software Design Document	Specified in DO	As Required	N	

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EB2-07**

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
16	Written Approval	Engineering Drawings	At PDR, as specified in DO	Once with Revisions	N	
17	Written Approval	EEE Parts Lists and Analysis Report	Specified in DO	As Required	N	
18	Mandatory Submittal	Critical Design Review Data Package	Specified in DO	Once with Revisions	N	
19	Mandatory Submittal	Engineering Drawing Change Proposal	As needed	As Required	Y	
20	Written Approval	GFE Qualification Test Procedure	Specified in DO	Once with Revisions	N	
21	Written Approval	Flight Product User's Guide	Specified in DO	Once with Revisions	N	
22	Mandatory Submittal	Software Code	Specified in DO	As Required	N	
23	Written Approval	Information Technology (IT) Security Program Plan and Reports	(30) days after DO award, and as specified in JPG 2810.1	JPG 2810.1	Attachment J-4 Due 30 days after DO award	
24	Written Approval	Certification Plan	Specified in DO	Once with Revisions	N	
25	Mandatory Submittal	Certification Report	Specified in DO	Once with Revisions	N	
26	Mandatory Submittal	Engineering Analysis	Specified in DO	As Required	N	
27	Mandatory Submittal	Acceptance Data Package	Specified in DO	One Time	Y	
28	Mandatory Submittal	Export Control Audit Results	After award of 1st DO, yearly on Sept. 30 thereafter	Yearly	N	
29	Written Approval	Quality Plan	With Proposal	Once with Revisions	Attachment J-11	
30	Written Approval	Patent Rights-Retention	As Required	As Required	N (If Applic'ble)	

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EB2-07**

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
31	Written Approval	Shuttle/Station Payload Safety Data Package	Specified in DO	As Required	N	
32	Mandatory Submittal	Limited Life Systems List	Specified in DO	As Required	N	
33	Written Approval	Space Station GFE Failure Modes and Effects Analysis and Critical Items List	As Early in process as possible.	As Required	N	
34	Written Approval	Space Shuttle GFE Safety and Analysis Report & Hazard Report	Specified in DO	As Required	N	
35	Written Approval	Software Quality Assurance Plan Report	90 Days Prior to Software Development	Once with Revisions	N (If Applic'ble)	
36	Written Approval	ISS Hazard Report	Specified in DO	As Required	N	
37	Upon Request	Reliability and Maintainability Plan	With Proposal	One Time	Attachment J-9	
38	Written Approval	Government Certification Approval Request (GCAR)	Specified in DO	As Required	N	
39	Written Approval	Risk Assessment Executive Summary Report (RAESR)	Specified in DO	As Required	N	
40	Written Approval	Problem Reporting and Corrective Action (PRACA)	2 business days of problem isolation but no later than 10 days after detection	As Required	Y	
41	Upon Request	Nonconformance Record	Specified in DO	As Required	Y	
42	Mandatory Submittal	Government Industry Data Exchange Program and NASA Advisory Problem Data	Reported one time when discrepancy occurs	Once with Revisions	N	
43	Written Approval	Electrical, Electronic, and Electromechanical (EEE) Parts Control Plan	Specified in DO	Once with Revisions	N	
44	Mandatory Submittal	Certification Data Package	Specified in DO	Once with Revisions	N	
45	Written Approval	Certification and Acceptance Requirements Document	At CDR	Once with Revisions	N	
46	Upon Request	Wage/Salary and Fringe Benefit Data	Thirty (30) days after issuance of each DO	Once	N	
47	Written Approval	GFE Acceptance Test Procedure	Specified in DO	One Time	N	
48	Mandatory Submittal	Flight GFE Verification & Validation Report	Specified in DO	Once with Revisions	N	

**CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE) CONTRACT
DELIVERY ORDER #: CRAVE-EB2-07**

DRD #	DATA TYPE	DRD TITLE	DUE	FREQUENCY	REQUIRED FOR DO? Y/N	ADDITIONAL REQUIREMENTS
49	Mandatory Submittal	Space Shuttle GFE Failure Modes and Effects Analysis (FMEA) and Critical Items List	Specified in DO	As Required	N	
50		Reserved	---	---	---	---
51	Mandatory Submittal	NASA Contractor Financial Management Reporting	After Issuance of 1st DO	Monthly	Y	
52	Written Approval	Government Property Management Plan	With Proposal	Once with Revisions	Attachment J-7	
53	Mandatory Submittal	System Safety Plan	With Proposal	One Time	Attachment J-10	
54	Written Approval	R-Quality Plan Template	With Proposal/ Revisions as Required	Only applicable to B-CRAVE contracts in accordance with the SOW and the DRD	Y	

Type 1 = Written Approval Type 2 = Mandatory Submittal Type 3 = Submittal Upon Request

Requesting Organization: EB72
 Release: Released

Purchase Request	
System Generated Number	Date
4200125270	08/02/2005
Procurement Contact/Telephone	
Created By: Leslie Alvarado	
281-483-3353	

Deliver to:
 NASA
 Lyndon B. Johnson Space Center
 2101 NASA Parkway
 Houston, TX 77058-3696

Total Estimated Values: \$8,954.00 → *Mud 3*
 Total Committed Amount: \$8,954.00
 Reference: IDIQ/BOA/BPA No. _____

State of Alabama
Contract # ? NN 3054B423
Delivery Order # ?

Attachments: Yes No
 (e.g., Statement of Work, Specifications, JOFOC)

Suggested Vendors (Name/Address/Point of Contact/E-mail address):
 CRAVE Contract
 CRAVE COTR: Joe Gensler 281-483-0025
 CO: Dawn Alexander 281-244-7689
 Contract Specialist: Mike Ballard 281-244-5350

Item	Item Cat	Acct. Assign Cat	Description				Material Group			
Delivery Date	Qty	Unit of Measure	Price per Unit	Total per Line Item						
ALI Amount	G/L Acct	BA	Commit Item	WBS Element	Internal Order	Cost Ctr	Fund Center	Fund	Earmark Funds/Doc Item	Network/Activity

1	Z	P	SDG38117902-001							Aircraft Components and Accessories
08/10/2005	2 000	EA	885 00		1,770 00					
1,770 00	6100 3100	72	3100	72-477-17-RD	FC400000	72EB11	72-477	EXCX22005D		
2	Z	P	SDG38117903-001							Aircraft Components and Accessories
08/10/2005	2 000	EA	617.50		1,235 00					
1,235 00	6100 3100	72	3100	72-477-17-RD	FC400000	72EB11	72-477	EXCX22005D		

Item	Item Cat	Acct Assign Cat	Description				Material Group			
Delivery Date	Qty	Unit of Measure	Price per Unit	Total per Line Item						
ALI Amount	G/L Acct	BA	Commit Item	WBS Element	Internal Order	Cost Ctr	Fund Center	Fund	Earmar Funds/Doc Item	Network/Activity

3	Z	P	SDG38117904-001				Aircraft Components and Accessories			
08/10/2005	2 000	EA	625 00	1,250 00						
1,250 00	6100 3100	72	3100	72-477-17-RD	FC400000	72EB11	72-477	EXCX22005D		
4	Z	P	SDG38117907-301				Aircraft Components and Accessories			
08/10/2005	1 000	EA	2,270.00	2,270 00						
2,270 00	6100 3100	72	3100	72-477-17-RD	FC400000	72EB11	72-477	EXCX22005D		
5	Z	P	SDG38117908-301				Aircraft Components and Accessories			
08/10/2005	1 000	EA	1,510 00	1,510 00						
1,510 00	6100 3100	72	3100	72-477-17-RD	FC400000	72EB11	72-477	EXCX22005D		
6	Z	P	SDG38117909-001				Aircraft Components and Accessories			
08/10/2005	1 000	EA	105 00	105 00						
105 00	6100 3100	72	3100	72-477-17-RD	FC400000	72EB11	72-477	EXCX22005D		
7	D	P	Inspection, self verification records				Research and Development			
08/10/2005	1 000	JOB	814 00	814 00						
814.00	6100.2550	72	2550	72-477-17-RD	FC400000	72EB11	72-477	EXCX22005D		