ORDER FOR SUPPLIES OR SERVICES

PAGE OF PAGES 1 7

IMPORTANT: Mark all packages and papers with contract and/or order numbers.

1. DATE OF ORDER: June 8, 2012	2. CONTRACT NO. (If any): NNJ10GA35C
3. ORDER NO.: TO 001, Rev. 1	4. REQUISITION/REFERENCE NO.
5. ISSUING OFFICE (Address correspondence to): NASA JSC Attn: BG/Eric J. Schell, Contracting Officer	

7. TO:

a. NAME OF CONTRACTOR: Dan Wegner	
b. COMPANY NAME: Lockheed Martin	
c. STREET ADDRESS: 2625 Bay Area Blvd.	
d. CITY: Houston	e. STATE: TX; f. ZIP CODE: 77058

6. SHIP

a. NAME OF CONSIGNEE: Transportation Officer, Building 421, NASA-JSC	
b. STREET ADDRESS: 2101 NASA Parkway	
c. CITY: Houston	d. STATE: TX; e. ZIP CODE: 77054
f. SHIP VIA	

8. TYPE OF ORDER

[ ] a. PURCHASE — REFERENCE YOUR: Please furnish the following on the terms and conditions specified on both sides of this order and on the attached sheet, if any, including delivery as indicated.

[X] b. DELIVERY -- Except for billing instructions on the reverse, this delivery order is subject to instructions contained on this side only of this form and is issued subject to the terms and conditions of the above-numbered contract.

9. WRITTEN ACCEPTANCE BY CONTRACTOR:
SIGNATURE: [signature] DATE: 6-8-2012

10. ACCOUNTING AND APPROPRIATION DATA / REQUISITIONING OFFICE: ISS Program Office, BG

11. BUSINESS CLASSIFICATION (Check appropriate box(es))
[ ] a. SMALL [X] b. OTHER THAN SMALL [ ] c. DISADVANTAGED [ ] g. SERVICE-DISABLED VETERAN-OWNED
[ ] d. WOMEN-OWNED [ ] e. HUBZone [ ] f. EMERGING SMALL BUSINESS

12. F.O.B. POINT: DESTINATION

13. PLACE OF		14. GOVERNMENT B/L NO.	15. DELIVER TO F.O.B. POINT ON OR BEFORE (Date)	16. DISCOUNT TERMS
a. INSPECTION: DESTINATION	b. ACCEPTANCE: DESTINATION		December 31, 2013	

17. SCHEDULE (See reverse for Rejections)

ITEM NO. (a)	SUPPLIES OR SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	The contractor shall deliver the following quantities of Flight Bags to NASA:					
	0.5 RCTB P/N SEG33122042-301, Class I	141				
	1.0 RCTB P/N SEG33122043-301, Class I	181				
	3.0 RCTB P/N SEG33122045-301, Class I	110				
	M01 Bag P/N SEG33111805-301, Class I	68				
	M02 Bag P/N SEG33111806-301, Class I	158				
	Jettison Stowage Bag, P/N SEB13100134-305, Class I	100				
	2.0 RCTB P/N SEG33122044-301, Class I	100				
	Estimated Quantity Increase Estimated Price Increase (b) (4)					
	Cost				(b) (4)	
	Fee					
	Total				$3,584,923	

18. SHIPPING POINT	19. GROSS SHIPPING WEIGHT	20. INVOICE NO.		17(h) TOT. (Cont. pages)
SEE BILLING INSTRUCTIONS ON REVERSE	21. MAIL INVOICE TO: NASA Shared Services Center (NSSC) FMD – Accounts Payable Bldg 111, C. Road, Stennis Space Center	d. STATE: MS	e. ZIP CODE: 39529	17(i) GRAND TOTAL: $3,584,923

22. UNITED STATES OF AMERICA BY (Signature): [signature]

23. NAME (Typed): Learon J Comeaux
TITLE: CONTRACTING/ORDERING OFFICER

AUTHORIZED FOR LOCAL REPRODUCTION
PREVIOUS EDITION NOT USABLE

OPTIONAL FORM 347 (REV. 4/2006)
Prescribed by GSA/FAR 48 CFR 53.213(f)

1.0 Title of Effort: Build-to-Print Redesigned Cargo Transfer Bag (RCTB), Jettison Stowage Bags (JSB), and M-bags for International Partners (IPs) and Commercial Vehicle Flights to satisfy NASA logistics needs.

2.0 Proposed Scope and Tasks:

The contractor shall deliver the following quantities of Flight Bags to NASA:

0.5 RCTB P/N SEG33122042-301, Class I	141 ea
1.0 RCTB P/N SEG33122043-301, Class I	181 ea
3.0 RCTB P/N SEG33122045-301, Class I	110 ea
M01 Bag P/N SEG33111805-301, Class I	68 ea
M02 Bag P/N SEG33111806-301, Class I	158 ea
Jettison Stowage Bag, P/N SEB13100134-305, Class I	100 ea
2.0 RCTB P/N SEG33122044-301, Class I	100 ea

2.1 Statement of Work Reference: The bag build work will be performed in accordance with SOW section 5.0.

2.2 Requirements / Deliverables / Schedule:

Milestone schedule – prior to having vendors on contract, the associated bag fabrication schedule is a projection, based on need dates and projected start dates. In addition to flight bag deliveries, CMC will establish other non-recurring milestones, including:

1. Materials procurement
2. Bag cutting layouts
3. Machine programming
4. Quality check units for RCTB and JSB builds
5. First article fabrication

CMC is planning to deliver the requested bags in the following order. The earliest projected need dates are for 3.0 RCTBs, in CY 2012.

1. JSBs (with the material provided through SPOC, then the balance once remaining materials are delivered)
2. RCTBs (with priority for first incremental deliveries of 3.0, 1.0, and 0.5, with some ability to alter the order based on changing flight usage)
3. M-bags (due to long lead material procurements)

The expectation is that each bag type will have incremental deliveries, with the earliest deliveries beginning in the first calendar quarter of 2012. The last bag deliveries will be no later than the end of the fourth calendar quarter of 2013.

2.2.1 Business Management (SOW 1.2)

2.2.1.1 The contractor shall provide overall contract management and administration for this task order. The contractor shall perform all business and administrative functions and integrate these functions across all areas of performance.

2.2.2 Configuration Management (SOW 1.3)

2.2.2.1 The contractor shall develop, implement and administer configuration management operations in accordance with SSP 41170, Configuration Management Requirements; SSP 50123, Configuration Management Handbook; SSP 50010, Standards for ISS Program Documentation; and SSP 50172, Data Management Handbook.

2.2.3 Safety and Mission Assurance (SOW 2.0)

2.2.3.1 The contractor shall develop, maintain, and implement a Mission Assurance and Risk Management (MA&RM) Plan in accordance with NPR 8715.3, NASA General Safety Program Requirements, and DRD C-SA-01, Mission Assurance and Risk Management (MA&RM) Plan. The MA&RM plan shall contain S&MA Management, Risk Management, ISS Safety Program, Reliability and Maintainability, Quality Assurance and Operations Safety.

2.2.3.2 Contractor developed hardware shall be accepted in accordance with SSP 50287, Hardware/Software Acceptance Process. The contractor shall provide an Acceptance Data Package (ADP) in accordance with SSP 30695, Acceptance Data Package Requirements Specification, and DRD C-SA-07, Acceptance Data Package (ADP), for contractor developed hardware. The contractor shall maintain the ADP for hardware sustained and, or maintained on the contract.

2.2.4 Hardware Development and Manufacturing (5.0)

The contractor shall design, manufacture, assemble and certify flight and training hardware, including but not limited to Flight Support Equipment (FSE), stowage accommodations, and FCE as directed by the Government.

2.2.4.1 Design and Manufacturing Requirements

The contractor shall design flight and training hardware, including but not limited to FSE, stowage accommodations, and FCE in compliance with all applicable design requirements including but not limited to the following:

SSP 50835, ISS Pressurized Volume Hardware Common Interface Requirements Document (CIRD),

SSP 50492, General ISS On-orbit Requirements for Non-Pressurized Support Equipment,

SSP 50021, Safety Requirements Document,

SSP 50004, Ground Support Equipment Design Requirements International Space Station,

JSC 27472, Requirements For Submission Of Data Needed For Toxicological Assessment Of Chemicals and Biologicals To Be Flown On Manned Spacecraft,

DX12-SLP-014, Neutral Buoyancy Laboratory Mockup and Training Hardware Requirements,

JSC-28528, Mockup Design and Requirements Document, and

NPR 6000.1, Requirements for Packaging, Handling and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components.

The contractor shall manufacture and assemble flight and training hardware. Facilities, processes and personnel shall be certified in accordance with SSP 50276, Depot/Manufacturing Facility Certification Plan.

2.2.4.2 Hardware/Data Deliveries

For each end item being designed and built, the contractor shall deliver the corresponding data and hardware in accordance with SSP 50287, Hardware/Software Acceptance Process, and DRD C-EL-01, New Hardware Interim Design Review Deliverables.

2.2.4.3 Engineering Drawings/Data

Drawings shall be developed in accordance with ASME Y14.100, Engineering Drawing Practices; ASME Y14.24M, Types and Applications of Engineering Drawings; ASME Y14.34M Associated Lists; and ASME Y14.35M, Revision of Engineering Drawings and Associated Documents; and DRD C-MI-05, Engineering Drawings and Associated Lists. For all engineering drawings and associated engineering products that are delivered to NASA, or to NASA contractors, the contractor shall also transmit them to the Vehicle Master Database (VMDB) in accordance with DRD C-MI-04, ISS Vehicle Engineering Data.

2.2.4.4 CAD Models

The contractor shall deliver all CAD models developed under the Cargo Mission Contract (CMC) for new hardware or hardware modified on the CMC to the United States On-Orbit Segment (USOS) Acceptance and ISS Vehicle Sustaining contractor to maintain in a model library in accordance with DRD C-MI-03, Cargo Integration Cargo CAD Models for Launch, Return and On-orbit Configurations.

2.2.4.5 Safety and Reliability Assessments

The contractor shall perform and deliver safety assessments and FMEA/CIL worksheets in accordance with paragraphs 2.1.2 and 2.1.3, respectively, for contractor developed hardware.

2.2.4.6 Development Schedules

The contractor shall prepare and deliver schedules for all hardware development projects to provide the Government with insight into overall project status in accordance with DRD C-PC-05, Cargo Mission Contract Program Schedules.

3.0 Period of Performance

The period of performance is July 2011 through December 2013.

ATTACHMENT 1

Deliverable Items List

LM ID NO	PART NUMBER	SERIAL NUMBER	NOMENCLATURE	QTY	UNIT	DD250 DATE	ACTUAL DELIVERY DATE	REMARKS
CMC0243	SEG33122042 -301		Redesigned Cargo Transfer Bag (0.5 CTB)	20	Each	01/2012		
CMC0244	SEG33122042 -301		Redesigned Cargo Transfer Bag (0.5 CTB)	50	Each	06/2012		
CMC0245	SEG33122042 -301		Redesigned Cargo Transfer Bag (0.5 CTB)	71	Each	03/2013		
CMC0246	SEG33122043 -301		Redesigned Cargo Transfer Bag (1.0 CTB)	30	Each	01/2012		
CMC0247	SEG33122043 -301		Redesigned Cargo Transfer Bag (1.0 CTB)	60	Each	06/2012		
CMC0248	SEG33122043 -301		Redesigned Cargo Transfer Bag (1.0 CTB) 1 Qty.	91	Each	03/2013		
CMC0249	SEG33122045 -301		Redesigned Cargo Transfer Bag (3.0 CTB)	30	Each	01/2012		
CMC0250	SEG33122045 -301		Redesigned Cargo Transfer Bag (3.0 CTB)	40	Each	06/2012		
CMC0251	SEG33122045 -301		Redesigned Cargo Transfer Bag (3.0 CTB)	40	Each	03/2013		
CMC0252	SEB13100134 -305		Jettison Stowage Bags	60	Each	09/2011		
CMC0253	SEB13100134		Jettison Stowage	20	Each	12/2012		

	-305		Bags					
CMC0254	SEB13100134 -305		Jettison Stowage Bags	20	Each	02/2012		
CMC0255	SEG33111805 -301		M01 Stowage Bag	20	Each	11/2012		
CMC0256	SEG33111805 -301		M01 Stowage Bag	30	Each	05/2013		
CMC0257	SEG33111805 -301		M01 Stowage Bag	18	Each	10/2013		
CMC0258	SEG33111806 -301		M02Stowage Bag	30	Each	11/2012		
CMC0259	SEG33111806 -301		M02 Stowage Bag	50	Each	05/2013		
CMC0260	SEG33111806 -301		M02 Stowage Bag	78	Each	10/2013		
CMC0289	SEG33122044 -301		Redesigned Cargo Transfer Bag (2.0 CTB)	50	Each	10/2012		
CMC0290	SEG33122044 -301		Redesigned Cargo Transfer Bag (2.0 CTB)	50	Each	01/2013		

ORDER FOR SUPPLIES OR SERVICES

PAGE OF PAGES 1 6

IMPORTANT: Mark all packages and papers with contract and/or order numbers.

1. DATE OF ORDER: November 18, 2013	2. CONTRACT NO. (If any): NNJ10GA35C
3. ORDER NO.: TO 002, Rev. 1	4. REQUISITION/REFERENCE NO.
5. ISSUING OFFICE (Address correspondence to): NASA JSC Attn: BG/Janet G. Arkinson, Contracting Officer	

7. TO:

a. NAME OF CONTRACTOR: Dan Wegner

b. COMPANY NAME: Lockheed Martin

c. STREET ADDRESS: 2625 Bay Area Blvd.

d. CITY: Houston | e. STATE: TX | f. ZIP CODE: 77058

6. SHIP

a. NAME OF CONSIGNEE: Transportation Officer, Building 421, NASA-JSC

b. STREET ADDRESS: 2101 NASA Parkway

c. CITY: Houston | d. STATE: TX | e. ZIP CODE: 77054

f. SHIP VIA:

8. TYPE OF ORDER

[ ] a. PURCHASE — REFERENCE YOUR: _____ Please furnish the following on the terms and conditions specified on both sides of this order and on the attached sheet, if any, including delivery as indicated.

[X] b. DELIVERY -- Except for billing instructions on the reverse, this delivery order is subject to instructions contained on this side only of this form and is issued subject to the terms and conditions of the above-numbered contract.

9. WRITTEN ACCEPTANCE BY CONTRACTOR: SIGNATURE: DAN WEGNER DATE: 11.20.2013

10. ACCOUNTING AND APPROPRIATION DATA / REQUISITIONING OFFICE: ISS Program Office, BG

11. BUSINESS CLASSIFICATION (Check appropriate box(es))

[ ] a. SMALL [X] b. OTHER THAN SMALL [ ] c. DISADVANTAGED [ ] g. SERVICE-DISABLED VETERAN-OWNED

[ ] d. WOMEN-OWNED [ ] e. HUBZone [ ] f. EMERGING SMALL BUSINESS

12. F.O.B. POINT: DESTINATION

13. PLACE OF		14. GOVERNMENT B/L NO.	15. DELIVER TO F.O.B. POINT ON OR BEFORE (Date)	16. DISCOUNT TERMS
a. INSPECTION	b. ACCEPTANCE			
DESTINATION	DESTINATION		September 30, 2014	

17. SCHEDULE (See reverse for Rejections)

ITEM NO. (a)	SUPPLIES OR SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	This revision 1 to Task Order 2 adds 14 M03 Bags at an estimated price increase of $188,014 (b) (4) cost and (b) (4) fee)					
	The contractor shall deliver the following quantities of Flight Bags to NASA:					
	0.5 RCTB P/N SEG33122042-301, Class I	200				
	1.0 RCTB P/N SEG33122043-301, Class I	175				
	2.0 RCTB P/N SEG33122044-301, Class I	100				
	M02 Bag P/N SEG33111806-301, Class I	75				
	Jettison Stowage Bag, P/N SEB13100134-30X, Class I	150				
	M03 Bag Assembly P/N SEG33117683-301, Class I	14				
		714				
	Cost				(b) (4)	
	Fee					
	Total				$2,239,341	

18. SHIPPING POINT	19. GROSS SHIPPING WEIGHT	20. INVOICE NO.		17(h) TOT. (Cont. pages)
SEE BILLING INSTRUCTIONS ON REVERSE	21. MAIL INVOICE TO:			
	NASA Shared Services Center (NSSC) FMD – Accounts Payable			17(i) GRAND TOTAL
	Bldg 111, C. Road, Stennis Space Center	d. STATE: MS	e. ZIP CODE: 39529	$2,239,341

22. UNITED STATES OF AMERICA BY (Signature):

23. NAME (Typed): Janet G. Arkinson

TITLE: CONTRACTING/ORDERING OFFICER

AUTHORIZED FOR LOCAL REPRODUCTION
PREVIOUS EDITION NOT USABLE

OPTIONAL FORM 347 (REV. 4/2006)
Prescribed by GSA/FAR 48 CFR 53.213(f)

1.0 Title of Effort: Build-to-Print Redesigned Cargo Transfer Bag (RCTB), Jettison Stowage Bags (JSB), and M-bags for International Partners (IPs) and Commercial Vehicle Flights to satisfy NASA logistics needs.

2.0 Proposed Scope and Tasks:

The contractor shall deliver the following quantities of Flight Bags to NASA:

0.5 RCTB P/N SEG33122042-301, Class I	200 ea
1.0 RCTB P/N SEG33122043-301, Class I	175 ea
2.0 RCTB P/N SEG33122044-301, Class I	100 ea
M02 Bag P/N SEG33111806-301, Class I	75 ea
Jettison Stowage Bag, P/N SEB13100134-30X, Class I	150 ea
M03 Bag Assembly P/N SEG33117683-301, Class I	14 ea

2.1 Statement of Work Reference: The bag build work will be performed in accordance with SOW section 5.0.

2.2 Requirements / Deliverables / Schedule:

Milestone schedule – prior to having vendors on contract, the associated bag fabrication schedule is a projection, based on need dates and projected start dates. In addition to flight bag deliveries, CMC will establish other non-recurring milestones, including:

1. Materials procurement
2. Bag cutting layouts
3. Machine programming
4. Quality check units for bag builds
5. First article fabrication

CMC is planning to deliver the requested bags in the following order. The earliest projected need dates are for 0.5 and 1.0 RCTBs by November 12, 2013.

1. 2.0 RCTBs
2. JSBs
3. M-02 Bags
4. M-03 Bag Assemblies

The expectation is that each bag type will have incremental deliveries. The last bag deliveries will be no later than September 30, 2014.

2.2.1 Business Management (SOW 1.2)

2.2.1.1 The contractor shall provide overall contract management and administration for this task order. The contractor shall perform all business and administrative functions and integrate these functions across all areas of performance.

2.2.2 Configuration Management (SOW 1.3)

2.2.2.1 The contractor shall develop, implement and administer configuration management operations in accordance with SSP 41170, Configuration Management Requirements; SSP 50123, Configuration Management Handbook; SSP 50010, Standards for ISS Program Documentation; and SSP 50172, Data Management Handbook.

2.2.3 Safety and Mission Assurance (SOW 2.0)

2.2.3.1 The contractor shall develop, maintain, and implement a Mission Assurance and Risk Management (MA&RM) Plan in accordance with NPR 8715.3, NASA General Safety Program Requirements, and DRD C-SA-01, Mission Assurance and Risk Management (MA&RM) Plan. The MA&RM plan shall contain S&MA Management, Risk Management, ISS Safety Program, Reliability and Maintainability, Quality Assurance and Operations Safety.

2.2.3.2 Contractor developed hardware shall be accepted in accordance with SSP 50287, Hardware/Software Acceptance Process. The contractor shall provide an Acceptance Data Package (ADP) in accordance with SSP 30695, Acceptance Data Package Requirements Specification, and DRD C-SA-07, Acceptance Data Package (ADP), for contractor developed hardware. The contractor shall maintain the ADP for hardware sustained and, or maintained on the contract.

2.2.4 Hardware Development and Manufacturing (5.0)

The contractor shall design, manufacture, assemble and certify flight and training hardware, including but not limited to Flight Support Equipment (FSE), stowage accommodations, and FCE as directed by the Government.

2.2.4.1 Design and Manufacturing Requirements

The contractor shall design flight and training hardware, including but not limited to FSE, stowage accommodations, and FCE in compliance with all applicable design requirements including but not limited to the following:

SSP 50835, ISS Pressurized Volume Hardware Common Interface Requirements Document (CIRD),

SSP 50492, General ISS On-orbit Requirements for Non-Pressurized Support Equipment,

SSP 50021, Safety Requirements Document,

SSP 50004, Ground Support Equipment Design Requirements International Space Station,

JSC 27472, Requirements For Submission Of Data Needed For Toxicological Assessment Of Chemicals and Biologicals To Be Flown On Manned Spacecraft,

DX12-SLP-014, Neutral Buoyancy Laboratory Mockup and Training Hardware Requirements,

JSC-28528, Mockup Design and Requirements Document, and

NPR 6000.1, Requirements for Packaging, Handling and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components.

The contractor shall manufacture and assemble flight and training hardware. Facilities, processes and personnel shall be certified in accordance with SSP 50276, Depot/Manufacturing Facility Certification Plan.

2.2.4.2 Hardware/Data Deliveries

For each end item being designed and built, the contractor shall deliver the corresponding data and hardware in accordance with SSP 50287, Hardware/Software Acceptance Process, and DRD C-EL-01, New Hardware Interim Design Review Deliverables.

2.2.4.3 Engineering Drawings/Data

Drawings shall be developed in accordance with ASME Y14.100, Engineering Drawing Practices; ASME Y14.24M, Types and Applications of Engineering Drawings; ASME Y14.34M Associated Lists; and ASME Y14.35M, Revision of Engineering Drawings and Associated Documents; and DRD C-MI-05, Engineering Drawings and Associated Lists. For all engineering drawings and associated engineering products that are delivered to NASA, or to NASA contractors, the contractor shall also transmit them to the Vehicle Master Database (VMDB) in accordance with DRD C-MI-04, ISS Vehicle Engineering Data.

2.2.4.4 CAD Models

The contractor shall deliver all CAD models developed under the Cargo Mission Contract (CMC) for new hardware or hardware modified on the CMC to the United States On-Orbit Segment (USOS) Acceptance and ISS Vehicle Sustaining contractor to maintain in a model library in accordance with DRD C-MI-03, Cargo Integration Cargo CAD Models for Launch, Return and On-orbit Configurations.

2.2.4.5 Safety and Reliability Assessments

The contractor shall perform and deliver safety assessments and FMEA/CIL worksheets in accordance with paragraphs 2.1.2 and 2.1.3, respectively, for contractor developed hardware.

2.2.4.6 Development Schedules

The contractor shall prepare and deliver schedules for all hardware development projects to provide the Government with insight into overall project status in accordance with DRD C-PC-05, Cargo Mission Contract Program Schedules.

3.0 Period of Performance

The period of performance is June 2013 through September 30, 2014.

ATTACHMENT 1

Deliverable Items List

LM ID NO	PART NUMBER	SERIAL NUMBER	NOMENCLATURE	QTY	UNIT	DD250 DATE	ACTUAL DELIVERY DATE	REMARKS
CMC0326	SEG33122042-301		Redesigned Cargo Transfer Bag (0.5 CTB)	200	Each	**11/12/2013**		
CMC0327	SEG33122043-301		Redesigned Cargo Transfer Bag (1.0 CTB)	175	Each	**11/12/2013**		
CMC0328	SEG33122044-301		Redesigned Cargo Transfer Bag (2.0 CTB)	100	Each	**02/12/2014**		
CMC0329	SEB13100134-30X		Jettison Stowage Bags	150	Each	**02/12/2014**		
CMC0330	SEG33111806-301		M02 Stowage Bag	75	Each	**09/30/2014**		
CMC0434	**SEG33117683-301**		**M03 Bag Assembly**	**14**	**Each**	**05/12/2014**		

ORDER FOR SUPPLIES OR SERVICES

PAGE OF PAGES 1 18

IMPORTANT: Mark all packages and papers with contract and/or order numbers.

1. DATE OF ORDER: August 28, 2013	2. CONTRACT NO. (If any): NNJ10GA35C
3. ORDER NO.: TO 003	4. REQUISITION/REFERENCE NO.
5. ISSUING OFFICE (Address correspondence to): NASA JSC Attn: BG/Learon J. Comeaux, Contracting Officer	

7. TO:

a. NAME OF CONTRACTOR: Dan Wegner			
b. COMPANY NAME: Lockheed Martin			
c. STREET ADDRESS: 2625 Bay Area Blvd.			
d. CITY: Houston	e. STATE: TX	f. ZIP CODE: 77058	

6. SHIP

a. NAME OF CONSIGNEE: Transportation Officer, Building 421, NASA-JSC		
b. STREET ADDRESS: 2101 NASA Parkway		
c. CITY: Houston	d. STATE: TX	e. ZIP CODE: 77054
f. SHIP VIA		

8. TYPE OF ORDER

[ ] a. PURCHASE — REFERENCE YOUR: Please furnish the following on the terms and conditions specified on both sides of this order and on the attached sheet, if any, including delivery as indicated.

[X] b. DELIVERY -- Except for billing instructions on the reverse, this delivery order is subject to instructions contained on this side only of this form and is issued subject to the terms and conditions of the above-numbered contract.

9. WRITTEN ACCEPTANCE BY CONTRACTOR:
SIGNATURE: [signature] DAN WEGNER CONTRACTS NEGOTIATOR STAFF DATE 08-28-2013

10. ACCOUNTING AND APPROPRIATION DATA / REQUISITIONING OFFICE: ISS Program Office, BG

11. BUSINESS CLASSIFICATION (Check appropriate box(es))

[ ] a. SMALL [X] b. OTHER THAN SMALL [ ] c. DISADVANTAGED [ ] g. SERVICE-DISABLED VETERAN-OWNED
[ ] d. WOMEN-OWNED [ ] e. HUBZone [ ] f. EMERGING SMALL BUSINESS

12. F.O.B. POINT: DESTINATION

13. PLACE OF		14. GOVERNMENT B/L NO.	15. DELIVER TO F.O.B. POINT ON OR BEFORE (Date)	16. DISCOUNT TERMS
a. INSPECTION: DESTINATION	b. ACCEPTANCE: DESTINATION		August 29, 2014	

17. SCHEDULE (See reverse for Rejections)

ITEM NO. (a)	SUPPLIES OR SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	The contractor shall deliver the following quantities of COTS and EVA Hardware to NASA:					
	Hardware – Deliverable Items List (67 lines, 531 pieces)	1 Lot				
	External High Definition Hardware – Deliverable Items List (5 lines, 50 pieces)	1 Lot				
	Cost				(b) (4)	
	Fee					
	Total				$964,488	

SEE BILLING INSTRUCTIONS ON REVERSE	18. SHIPPING POINT	19. GROSS SHIPPING WEIGHT	20. INVOICE NO.	17(h) TOT. (Cont. pages)
	21. MAIL INVOICE TO:			
	NASA Shared Services Center (NSSC) FMD – Accounts Payable			17(i) GRAND TOTAL
	Bldg 111, C. Road, Stennis Space Center	d. STATE: MS	e. ZIP CODE: 39529	$964,488

22. UNITED STATES OF AMERICA BY (Signature): [signature]

23. NAME (Typed): Janet G. Arkinson
TITLE: CONTRACTING/ORDERING OFFICER

AUTHORIZED FOR LOCAL REPRODUCTION
PREVIOUS EDITION NOT USABLE

OPTIONAL FORM 347 (REV. 4/2006)
Prescribed by GSA/FAR 48 CFR 53.213(f)

1.0 Title of Effort: Procure and Certify New Digital Still Camera System Hardware for International Space Station (ISS) Intra-vehicular Activity (IVA) and Extra-vehicular Activity (EVA) Operations and Utilization and Baseline the associated Applicable Requirements Matrix for Commercial-off-the-Shelf (COTS) and EVA Hardware Certification.

2.0 Proposed Scope and Tasks:

The contractor shall deliver the following quantities of COTS and EVA Hardware to NASA:

Hardware – per attached Deliverable Items List (67 lines, 531 pieces) by 8/29/14 (Attachment A).

External High Definition Hardware – per attached Deliverable Items List (5 lines, 50 pieces) by 11/29/13 (Attachment A).

Filter kit shall contain six filters of 77mm in diameter and one 95m filter.

2.1 Statement of Work Reference: The Hardware development and delivery work will be performed in accordance with SOW section 5.0.

2.2 Requirements / Deliverables / Schedule:

Milestone schedule – per dates specified in attached Deliverable Items List (Attachment A).

2.2.1 Business Management (SOW 1.2)

2.2.1.1 The contractor shall provide overall contract management and administration for this task order. The contractor shall perform all business and administrative functions and integrate these functions across all areas of performance.

2.2.2 Configuration Management (SOW 1.3)

2.2.2.1 The contractor shall develop, implement and administer configuration management operations in accordance with SSP 41170, Configuration Management Requirements; SSP 50123, Configuration Management Handbook; SSP 50010, Standards for ISS Program Documentation; and SSP 50172, Data Management Handbook.

2.2.3 Safety and Mission Assurance (SOW 2.0)

2.2.3.2 Contractor developed hardware shall be accepted in accordance with SSP 50287, Hardware/Software Acceptance Process. Only an Acceptance Review and DD250 shall be performed for hardware delivered under this task order. No Acceptance Data shall be required.

2.2.4 Hardware Development and Manufacturing (5.0)

2.2.4.1 Design and Manufacturing Requirements

The contractor shall design flight and training hardware, including but not limited to FSE, stowage accommodations, and FCE in compliance with all applicable design requirements including but not limited to the following:

SSP 50835, ISS Pressurized Volume Hardware Common Interface Requirements Document (CIRD),

SSP 50492, General ISS On-orbit Requirements for Non-Pressurized Support Equipment,

SSP 50021, Safety Requirements Document,

SSP 50004, Ground Support Equipment Design Requirements International Space Station,

JSC 27472, Requirements For Submission Of Data Needed For Toxicological Assessment Of Chemicals and Biologicals To Be Flown On Manned Spacecraft,

DX12-SLP-014, Neutral Buoyancy Laboratory Mockup and Training Hardware Requirements,

JSC-28528, Mockup Design and Requirements Document, and

NPR 6000.1, Requirements for Packaging, Handling and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components.

The contractor shall manufacture and assemble flight and training hardware. Facilities, processes and personnel shall be certified in accordance with SSP 50276, Depot/Manufacturing Facility Certification Plan.

Deviations, exceptions or waivers to the requirements in the above documents shall be documented per the processes in SSP 41170, "Configuration Management Requirements".

The hardware delivered under this task order shall be certified using the streamlined Commercial Off-the-Shelf (COTS) certification process per SSP 50835, Appendix M with associated Applicable Requirements Matrix in Task Order Attachment B.

2.2.4.2 Hardware/Data Deliveries

For each end item being designed and built, the contractor shall deliver the corresponding data and hardware in accordance with SSP 50287, Hardware/Software Acceptance Process, and DRD C-EL-01, New Hardware Interim Design Review Deliverables.

2.2.4.3 Engineering Drawings/Data

Drawings shall be developed in accordance with ASME Y14.100, Engineering Drawing Practices; ASME Y14.24M, Types and Applications of Engineering Drawings; ASME Y14.34M Associated Lists; and ASME Y14.35M, Revision of Engineering Drawings and Associated Documents; and DRD C-MI-05, Engineering Drawings and Associated Lists. For all engineering drawings and associated engineering products that are delivered to NASA, or to NASA contractors, the contractor shall also transmit them to the Vehicle Master Database (VMDB) in accordance with DRD C-MI-04, ISS Vehicle Engineering Data. All training, testing, and Ground Support Equipment (GSE) for hardware delivered under this task order shall maintain the COTS part number.

2.2.4.4 CAD Models

The contractor shall deliver all CAD models developed under the Cargo Mission Contract (CMC) for new hardware or hardware modified on the CMC to the United States On-Orbit Segment (USOS) Acceptance and ISS Vehicle Sustaining contractor to maintain in a model library in accordance with DRD C-MI-03, Cargo Integration Cargo CAD Models for Launch, Return and On-orbit Configurations.

2.2.4.5 Safety and Reliability Assessments

The contractor shall perform and deliver safety assessments and FMEA/CIL worksheets in accordance with paragraphs 2.1.2 and 2.1.3, respectively, for contractor developed hardware.

2.2.4.6 Development Schedules

The contractor shall prepare and deliver schedules for all hardware development projects to provide the Government with insight into overall project status in accordance with DRD C-PC-05, Cargo Mission Contract Program Schedules.

3.0 Period of Performance

The period of performance is August 29, 2013 through August 29, 2014.

ATTACHMENT 1

Deliverable Items List

LM ID NO	PART NUMBER	SERIAL NUMBER	NOMENCLATURE	QTY	UNIT	DD250 DATE	ACTUAL DELIVERY DATE	REMARKS
CMC0326	SEG33122042 -301		Redesigned Cargo Transfer Bag (0.5 CTB)	200	Each	11/12/2013		
CMC0327	SEG33122043 -301		Redesigned Cargo Transfer Bag (1.0 CTB)	175	Each	11/12/2013		
CMC0328	SEG33122044 -301		Redesigned Cargo Transfer Bag (2.0 CTB)	100	Each	2/12/2014		
CMC0329	SEB13100134 -30X		Jettison Stowage Bags	150	Each	2/12/2014		
CMC0330	SEG33111806 -301		M02 Stowage Bag	75	Each	5/12/2014		
CMC0333	TBD	TBD	D4 Camera – Flight Configuration	20	Each	8/29/2014		
CMC0334	TBD	TBD	D4 Camera – COTS Configuration	8	Each	8/29/2014		
CMC0335	TBD	TBD	D4 Battery – Flight Configuration	63	Each	8/29/2014		
CMC0389	TBD	TBD	D4 Battery – COTS Configuration	23	Each	8/29/2014		
CMC0336	TBD	TBD	D4 Battery Charger – Flight Configuration	6	Each	8/29/2014		
CMC0337	TBD	TBD	D4 Battery Charger – COTS Configuration	22	Each	8/29/2014		
CMC0338	TBD	TBD	D4 Power Supply – Flight Configuration	9	Each	8/29/2014		
CMC0339	TBD	TBD	D4 Power Supply – COTS Configuration	5	Each	8/29/2014		
CMC0340	TBD	TBD	AC Battery Insert –	9	Each	8/29/2014		

			Flight Configuration					
CMC0390	TBD	TBD	AC Battery Insert – COTS Configuration	5	Each	8/29/2014		
CMC0341	TBD	TBD	Compact Flash Cards – Flight Configuration	40	Each	8/29/2014		
CMC0391	TBD	TBD	Compact Flash Cards – COTS Configuration	28	Each	8/29/2014		
CMC0342	TBD	TBD	Lens, 16 mm EVA – Flight Configuration	5	Each	8/29/2014		
CMC0392			Lens, 16 mm EVA – COTS Configuration	1	Each	8/29/2014		
CMC0343	SED33105019 - 301	TBD	Lens, 28 mm f/2.8 EVA – Flight Configuration	7	Each	8/29/2014		
CMC0393	TBD	TBD	Lens, 28 mm f/2.8 EVA – COTS Configuration	1	Each	8/29/2014		
CMC0344	TBD	TBD	52 mm Lens Filter Ring – Flight Configuration	6	Each	8/29/2014		
CMC0394	TBD	TBD	52 mm Lens Filter Ring – COTS Configuration	1	Each	8/29/2014		
CMC0345	TBD	TBD	Lens, 24 mm f/1.4 – Flight Configuration	5	Each	8/29/2014		
CMC0395	TBD	TBD	Lens, 24 mm f/1.4 – COTS Configuration	4	Each	8/29/2014		
CMC0346	SEZ33121954 -301	TBD	Lens, 14-24 mm – Flight Configuration	5	Each	8/29/2014		
CMC0396	TBD	TBD	Lens, 14-24 mm – COTS Configuration	4	Each	8/29/2014		
CMC0347	TBD	TBD	Lens, 24-70 mm – Flight Configuration	6	Each	8/29/2014		
CMC0397	TBD	TBD	Lens, 24-70 mm –	6	Each	8/29/2014		

			COTS Configuration					
CMC0348	TBD	TBD	Lens Bumper Cap, 77 mm – Flight Configuration	15	Each	8/29/2014		
CMC0398	TBD	TBD	Lens Bumper Cap, 77 mm – COTS Configuration	6	Each	8/29/2014		
CMC0349	TBD	TBD	Lens Bumper Cap, 52 mm – Flight Configuration	6	Each	8/29/2014		
CMC0399	TBD	TBD	Lens Bumper Cap, 52 mm – COTS Configuration	2	Each	8/29/2014		
CMC0350	TBD	TBD	50-500 Sigma – Flight Configuration	3	Each	8/29/2014		
CMC0400	TBD	TBD	50-500 Sigma COTS Configuration	3	Each	8/29/2014		
CMC0351	TBD	TBD	Lens Bumper Cap, 95 mm – Flight Configuration	3	Each	8/29/2014		
CMC0401	TBD	TBD	Lens Bumper Cap, 95 mm – COTS Configuration	2	Each	8/29/2014		
CMC0352	TBD	TBD	Lens – 70-200 mm – Flight Configuration	4	Each	8/29/2014		
CMC0402	TBD	TBD	Lens – 70-200 mm – COTS Configuration	2	Each	8/29/2014		
CMC0353	TBD	TBD	Lens, 800 mm – Flight Configuration	3	Each	8/29/2014		
CMC0403	TBD	TBD	Lens, 800 mm – COTS Configuration	1	Each	8/29/2014		
CMC0354	TBD	TBD	Flash Ring Adapter – Flight Configuration	4	Each	8/29/2014		
CMC0404	TBD	TBD	Flash Ring Adapter – COTS Configuration	3	Each	8/29/2014		
CMC0355	TBD	TBD	800 mm Lens Cap –	3	Each	8/29/2014		

			Flight Configuration					
CMC0405	TBD	TBD	800 mm Lens Cap – COTS Configuration	1	Each	8/29/2014		
CMC0356	TBD	TBD	Lens, 1.4x Tele-converters – Flight Configuration	3	Each	8/29/2014		
CMC0406	TBD	TBD	Lens, 1.4x Tele-converters – COTS Configuration	1	Each	8/29/2014		
CMC0362	TBD	TBD	Circular Polarizer Filter 77 mm – Flight Configuration	8	Each	8/29/2014		
CMC0407	TBD	TBD	Circular Polarizer Filter 77 mm – COTS Configuration	8	Each	8/29/2014		
CMC0408	TBD	TBD	52 mm to 77 mm Filter Ring Adapter – Flight Configuration	4	Each	8/29/2014		
CMC0409	TBD	TBD	52 mm to 77 mm Filter Ring Adapter – COTS Configuration	4	Each	8/29/2014		
CMC0410	TBD	TBD	62 mm to 77 mm Filter Ring Adapter – Flight Configuration	4	Each	8/29/2014		
CMC0411	TBD	TBD	62 mm to 77 mm Filter Ring Adapter – COTS Configuration	4	Each	8/29/2014		
CMC0412	TBD	TBD	72 mm to 77 mm Filter Ring Adapter – Flight Configuration	8	Each	8/29/2014		
CMC0413	TBD	TBD	72 mm to 77 mm Filter Ring Adapter – COTS Configuration	8	Each	8/29/2014		
CMC0363	TBD	TBD	Circular Polarizer Filter 95 mm – Flight Configuration	4	Each	8/29/2014		

CMC0414	TBD	TBD	Circular Polarizer Filter 95 mm – COTS Configuration	4	Each	8/29/2014		
CMC0415	TBD	TBD	SC – 29 Flash cord – Flight Configuration	6	Each	8/29/2014		
CMC0416	TBD	TBD	SC – 29 Flash cord – COTS Configuration	4	Each	8/29/2014		
CMC0367	TBD	TBD	Compact Flash Card reader – COTS Configuration	5	Each	8/29/2014		
CMC0368	TBD	TBD	95 mm Bumper Ring – Flight Configuration	2	Each	8/29/2014		
CMC0417	TBD	TBD	95 mm Bumper Ring – COTS Configuration	2	Each	8/29/2014		
CMC0369	TBD	TBD	77 mm Bumper Ring – Flight Configuration	15	Each	8/29/2014		
CMC0370	TBD	TBD	52 mm Bumper Ring – Flight Configuration	7	Each	8/29/2014		
CMC0372	TBD	TBD	Camera Thermal Blanket – Flight Configuration	5	Each	8/29/2014		
CMC0418	TBD	TBD	Camera Thermal Blanket – COTS Configuration	2	Each	8/29/2014		
CMC0374	TBD	TBD	Lens cap – Flight Configuration	5	Each	8/29/2014		
CMC0419	TBD	TBD	Lens cap – COTS Configuration	2	Each	8/29/2014		
CMC0375	TBD	TBD	Lens Accessory Pouch – Flight Configuration	2	Each	8/29/2014		
CMC0420	TBD	TBD	Lens Accessory	2	Each	8/29/2014		

			Pouch – COTS Configuration					
CMC0376	TBD	TBD	EVA Flash battery replacement – Flight Configuration	60	Each	8/29/2014		
CMC0421	TBD	TBD	EVA Flash battery replacement – COTS Configuration	2	Each	8/29/2014		
CMC0422	TBD	TBD	D4 Camera	10	Each	11/29/2013		
CMC0423	TBD	TBD	Lens, 28-300 mm f/3.5/5	10	Each	11/29/2013		
CMC0424	TBD	TBD	MC7 AF 2.0 DGX 2X Telephoto Converter	10	Each	11/29/2013		
CMC0425	TBD	TBD	D4 Power Supply	10	Each	11/29/2013		
CMC0426	TBD	TBD	AC Batter Insert (Nikon EP-6)	10	Each	11/29/2013		

	A	B	E	F	G	H	I	M
1	SSCN13767 Hardware Requirements Matrix							
2	Requirement Number	Document (1)	Paragraph Title	Applicability	Shall Statement	Verification Success Criteria	Verification Method	Comments/Notes for Simple COTS Verification
3	SSP 50835 C RD Certification Requirements							
4	1	SSP 50835	Pressure Loading – Pressurization Rates	A	Integrated end items must maintain positive margins of safety when pressure effects (operational and pressurization/depressurization environments) are combined, when applicable, with induced dynamic and thermal loads. Pressure effects are applicable for both launch and landing. B. Integrated end items shall maintain positive margins of safety when exposed to a depressurization rate of 13.3 kPa/second (116 pounds per square inch (psi)/minute) as shown in Table E.2.7-1 of SSP 50835. The end item may verify to different rates with approval from the VCB in accordance with the PMP.	An analysis shall be conducted which shows that the integrated end item maintains a positive margin of safety for depress/repress rates identified in 3.1.1.2.1.5.B of SSP 50835. Verification shall be considered successful when an analysis determines the maximum delta pressure from within to outside the integrated end item does not exceed 3.5 kPa (0.5 psi), or by inspection of design drawings for intact and unblocked pressure relief valves, or an analysis shall be conducted which determines positive margins of safety are maintained for the maximum delta pressure from within to outside the integrated end item. Integrated end items that intentionally contain trapped volumes are not included in this item and are to be treated as pressurized systems, which fall under requirement in SSP 52005, Payload Flight Equipment Requirements and Guidelines for Safety-Critical Structures, paragraph 3.1.1.	A	Perform Qual testing. No acceptance testing. Rely on Nikons quality system for acceptance. Exception for Acceptance testing of hardware. To be performed on the Nikon D4 and 16mm EVA lens only.
5	2	SSP 50835	Electromagnetic Interference for On-Orbit	A	EPCE end items in their on-orbit configuration shall meet all EMI requirements of SSP 30237, Space Station Electromagnetic Emission and Susceptibility Requirements. Alternately, the EPCE end items may choose to accept a minimal increase of EMI risk with a somewhat less stringent Electric Field Radiated Susceptibility (RS03) requirement on equipment considered to be non-safety critical to the vehicle and crew. The tailored RS03 requirement, shown below, will hereafter be denoted RS03PL. FREQUENCY RS03PL LIMIT (V/m) 14 kHz - 400 MHz 5 400 MHz - 450 MHz 30 450 MHz - 1 GHz 5 1 GHz - 5 GHz 25 5 GHz - 6 GHz 60 6 GHz - 10 GHz 20 13.7 GHz - 15.2 GHz 25 COMMENT: The less stringent RS03PL limit was developed to envelope the electric fields generated by ISS transmitters and ground-based radars tasked to perform space surveillance and tracking. Ground-based radars that are not tasked to track the ISS and search radars that could momentarily sweep over the ISS are not enveloped by the relaxed RS03PL. For most end items, the minimal increase of EMI risk for the reduced limits is acceptable, but must be determined with consideration of the end item's criticality and function. The RS03PL limit does not account for module electric field shielding effectiveness that could theoretically reduce the limits even more. Although shielding effectiveness exists, it is highly dependent on the EPCE end item location within the module with respect to ISS windows.	The Electromagnetic Interference of the end item EPCE in its on-orbit configuration shall be verified by test and analysis. Tests shall be performed and data submitted for conducted susceptibility and radiated susceptibility, in addition to that for conducted emissions and radiated emissions. This data shall be evaluated against the limits of SSP 30237. The test results shall be documented in the EMI test plan/report. The test shall be considered successful when the results show requirements of SSP 30237 are met. Note: EMI test plan/report details are located in the PMP. The analysis of each integrated end item shall be performed using sub-integrated equipment test data as mentioned in the above paragraph. The analysis shall be considered successful when the results show requirements of SSP 30237 are met. This analysis includes evaluating the degree of isolation from 30 Hz to 400 Megahertz (MHz) provided by the EPCE end item for power ripple and transients to the equipment using isolated power. An analysis of the isolation in conjunction with the equipment conducted requirements should be submitted in the EMC Control Plan to verify the requirements of this IRD are met. The EMI test methods shall be as specified in SSP 30238, Space Station Electromagnetic Techniques.	T & A	EMI certification by Similarity to previous Nikon camera and AC Adapter equipment. EMI testing will be completed with the battery charger.

	A	B	E	F	G	H	I	M
1	SSCN13767 Hardware Requirements Matrix							
2	Requirement Number	Document (1)	Paragraph Title	Applicability	Shall Statement	Verification Success Criteria	Verification Method	Comments/Notes for Simple COTS Verification
6	3	SSP 50835	DC Magnetic Fields for Russian Launch Vehicles	A	End items launching or returning on a Russian vehicle and containing devices that intentionally generate magnetic fields (electromagnets and permanent magnets) shall not generate DC magnetic fields that exceed 1 Oersted (100 A/m) in the Soyuz descent module and 2 Oersteds (200 A/m) in the Soyuz orbital module and Progress cargo bay. The requirement applies at a distance of 3 cm from a point on the enclosure of the equipment case nearest to source of the field. Note: 1 Oersted = 1.0E-04 Tesla	The DC magnetic fields requirement for integrated end items as defined in paragraph 3.2.4.7.2 shall be verified by test. The measurement of DC magnetic fields shall be performed at 3 cm from a point on the enclosure of the generating equipment nearest the source of the field. For equipment that exceed the design requirement of paragraph 3.2.4.7.2, measurements shall be repeated by increasing the distance by 1 cm increments from the enclosure of the generating equipment nearest the source of the field until the requirements in paragraph 3.2.4.7.2 (1 Oersted (100 A/m) (1.0E-04 Tesla) for Soyuz return; 2 Oersteds (200 A/m) (2.0E-01 Tesla) for Soyuz/Progress launch) are met. Approval of any exceedances shall be coordinated with the Russian side via the JCCT. The verification shall be considered successful when test results show the generated DC magnetic fields do not exceed the design requirement of paragraph 3.2.4.7.2. A certificate of compliance stating the DC magnetic field does not exceed the design requirement will be sufficient for equipment that meets the requirement. An ISS Interface Certificate is required for end items that exceed the threshold identified in 3.2.4.7.2. Coordination and approval of the Interface Certificate is conducted via the JCCT. Depending on the magnitude of the exceedance, packing and transfer constraints are imposed and documented on the Interface Certificate.	T	Need to measure magnetic field strength via engineering evaluation (no pass/fail).
7	4	SSP 50835	Batteries	A	Portable end items shall meet the requirements for batteries, as specified in JSC 20793, Crewed Space Vehicle Battery Safety Handbook.	Batteries shall be verified by analysis and test. Verification shall be considered successful when analysis and test show that the batteries meet the requirements specified in JSC 20793. Completion of Test Plan/SOW J. Jeevarajan to S. Young, April 2012 and submittal of test data to EPS11. Completion and submittal of EPS Battery Design Evaluation Form, EP-Form-03 per Battery Processing work instruction EA-CWI-033.	T & A	To be verified for the EVA Flash battery, and the EVA/IVA camera battery. No positive pressure testing will be performed.
8	5	SSP 50835	Materials and Processes Use and Selection	A	Integrated end item materials and processes shall be in accordance with SSP 30233.	Materials and processes shall be verified by inspection of the end item drawings and the applicable Materials Identification and Usage Lists (MIUL) and Material Usage Agreements (MUA). Verification shall be considered successful when all materials identified on the end item drawings are listed on the applicable MIUL and, if appropriate, have approved MUAs as specified in SSP 30233. JSC Government Furnished Equipment (GFE) supplied hardware shall be verified by JSC Materials and Fracture control Certification as specified in JSC 27301, Materials Control Plan for JSC Flight Hardware.	I	Certification by Similarity to previous Nikon equipment. No Outgas or Offgas testing to be performed.
9	6	SSP 50835	Cleanliness	A	Exterior surfaces of integrated end items shall conform to Generally Clean (GC) cleanliness requirements as specified in SN-C-0005 if the hardware has no interface with ISS systems or ISS utilities. Note: These requirements do not supersede any unique hardware requirements for cleanliness. The GC level should not be designated for hardware that is sensitive to contamination.	Cleanliness requirements shall be verified by an inspection of the end item drawings. Verification shall be considered successful when it has been shown that the cleanliness processes defined by the end item drawings for exterior surfaces of flight articles that do not interface with ISS systems or ISS utilities provide a surface that meets the GC requirements as specified in SN-C-0005.	I	Drawing inspection.
10	7	SSP 50835	Continuous /Incidental Contact – High Temperature	A	When integrated end item surfaces whose temperature exceeds 49°C (120°F), which are subject to continuous or incidental contact, are exposed to crewmember's bare skin contact, protective equipment shall be provided to the crew. This also applies to surfaces not normally exposed to the cabin in accordance with the NASA IVA Touch Temperature Safety interpretation letter, MA2-95-048, Thermal Limits for Intravehicular Activity (IVA) Touch Temperatures.	Verification of this requirement shall be by inspection if the integrated end item does not have power dissipation; or by analysis if the integrated end item has power dissipation. Verification of this requirement shall be performed and submitted to the SRP. Verification shall be considered successful when hazard reports and safety data, that are presented to the SRP during the phased safety reviews, are approved.	A	
11	8	SSP 50835	Continuous/Incidental Contact - High Temperature	A	When integrated end item surfaces whose temperature exceeds 45ºC (113ºF), which are subject to continuous or incidental contact, are exposed to crewmember's bare skin contact, warning labels shall be provided at the surface site. This also applies to surfaces not normally exposed to the cabin in accordance with the NASA IVA Touch Temperature Safety interpretation letter, MA2-95-048.	1. Certification that an inspection of the end item drawings or hardware confirmed the presence of warning labels. This can be verified on the HFIT CoC or End Item Developer-provided product showing label approval by Form 1496 per SSP 50783. 2. Certification that hazard reports are closed and safety data presented to the SRP during the phased safety reviews has been approved.	I	

	A	B	E	F	G	H	I	M
1	SSCN13767 Hardware Requirements Matrix							
2	Requirement Number	Document (1)	Paragraph Title	Applicability	Shall Statement	Verification Success Criteria	Verification Method	Comments/Notes for Simple COTS Verification
12	9	SSP 50835	Identification Labeling	A	Integrated end items, loose equipment, stowage trays, consumables, ORUs, crew accessible connectors and cables, switches, indicators, and controls must be labeled. Labels are markings of any form (including Inventory Management System (IMS) barcodes) such as decals and placards, which can be adhered, "silk screened", engraved, or otherwise applied directly onto the hardware. SSP 50783, Labeling of Intravehicular International Space Station (ISS) Hardware: Design Development Process, provides instructions for label and decal design and approval. B. Equipment labeling for the on-orbit crew interface shall be in accordance with SSP 50005, paragraph 9.5.3.1. See SSP 41000, appendix B for the exceptions to this requirement.	Labels on integrated end items, loose equipment, consumables, ORUs, crew accessible connectors and cables, switches, indicators, and controls shall be verified by inspection. The inspection shall be of the HFIT approval documentation. The verification shall be considered successful when integrated end items, loose equipment, consumables, ORUs, crew accessible connectors and cables, switches, indicators, and controls have been shown to have HFIT approved labels. The instructions for labeling review process to follow in granting approval of labels are located in SSP 50783.	I	
13	10	SSP 50835	Identification Labeling	A	Integrated end items, loose equipment, stowage trays, consumables, ORUs, crew accessible connectors and cables, switches, indicators, and controls must be labeled. Labels are markings of any form (including Inventory Management System (IMS) barcodes) such as decals and placards, which can be adhered, "silk screened", engraved, or otherwise applied directly onto the hardware. SSP 50783, Labeling of Intravehicular International Space Station (ISS) Hardware: Design Development Process, provides instructions for label and decal design and approval. C. IMS barcode labels shall be applied to any loose equipment, consumables, and ORUs that transfer to ISS in accordance with SSP 50007, Space Station Inventory Management System Bar Code Label Requirements and Specification.	Labels on integrated end items, loose equipment, consumables, ORUs, crew accessible connectors and cables, switches, indicators, and controls shall be verified by inspection. The inspection shall be of the HFIT approval documentation. The verification shall be considered successful when integrated end items, loose equipment, consumables, ORUs, crew accessible connectors and cables, switches, indicators, and controls have been shown to have HFIT approved labels. The instructions for labeling review process to follow in granting approval of labels are located in SSP 50783.	I	
14	11	SSP 50835	Sharp Edges and Corners Protection	A	Integrated end item design within a pressurized module shall protect crewmembers from sharp edges and corners during all crew operations in accordance with SSP 50021, Appendix J.	Verification that the hardware meets the sharp edges and corners requirements specified in SSP 50021, Appendix J shall be performed and submitted to the SRP. Verification shall be considered successful when the hazard reports and safety data presented to the SRP during the phased safety reviews are approved.	A&I	
15	12	SSP 50835	Burrs	A	Exposed surfaces shall be free of burrs.	Verification shall be by inspection. The verification shall be considered successful when the inspection shows that all edges have been properly deburred.	I	
16	JSC 64267 Laptop interface requirements							
17	13	JSC 64267	T61p Laptop Hardware Interface Certification Update Request Process	A	Hardware interfacing with the T61p Laptop shall comply with the Table 4.1-1, T61p Laptop Hardware Interface Requirements for Certification Updates Matrix in JSC 64267 and Table 4.1-2, Checklist for T61p Laptop Hardware Interface Requirements Matrix Updates.	The verification that the hardware meets the laptops requirements in JSC 64267 shall be completed by analysis. The agreement for updates to the T61p Laptop Hardware Interface Matrix is coordinated through the OD project office with the Manager of Computer Resources for ISS via the Computer Resource Control Panel (CRCP). Verification will be deemed completed when matrix is approved by the Computer Resources Manager and International Space Station Division (NE) of the Safety & Mission Assurance (S&MA) Directorate.	A	
18	JSC 66202 Power Inverter Interface Requirements							
19	14	SSP 66202	Inverter Interface requirements	A	Hardware interfacing to the ISS Power Inverter shall meet the interface requirements in JSC 66202.	The verification that the hardware meets the ISS Power Inverter requirements in JSC 66202 shall be completed by recommend verification method listed in JSC 66202 section 5.0 and if applicable, section 6.7 for interfacing to the GFCI cable.		This 1 requirement can take the place of requirements 18-27
20	Camera project specific requirements							
21	15	SSP 50492	Pressure	A	The Digital EVA/IVA Camera System shall meet the performance requirements when exposed to an on-orbit minimum pressure environment of 5.5X10^-12 lbs per square inch absolute (psia) (2.7X10^-10 Torr) as specified in SSP 30425, Table 10.0-2 for 400 km altitude.	This requirement shall be considered successful when the hardware passes Thermal/Vac testing.	T	Perform Qual testing. No acceptance testing. Rely on Nikons quality system for acceptance. Exception for Acceptance testing of hardware

	A	B	E	F	G	H	I	M
1	SSCN13767 Hardware Requirements Matrix							
2	Requirement Number	Document (1)	Paragraph Title	Applicability	Shall Statement	Verification Success Criteria	Verification Method	Comments/Notes for Simple COTS Verification
22	16	Project Specific Operations Requirement	Ops Requirement - IVA Mechanical Interface	A	The Digital EVA/IVA Camera System shall have a Standard Rail Mount Shoe for interfacing with slide assemblies on IVA camera multi-use bracket and the flexible lock-line bracket.	This requirement shall be considered successful when it is demonstrated that the Digital EVA/IVA Camera System shall have a Standard Rail Mount Shoe for interfacing with slide assemblies on IVA camera multi- use bracket and the flexible lock- line bracket.	D	
23	17	SSP 50835	Corona	N	Electrical and electronic subsystems, equipment, and systems shall be designed to preclude damaging or destructive corona in its operating environment. Note: Guidance for meeting the corona requirement is found in MSFC-STD-531, High Voltage Design Criteria.	Verification is successful when inspection of the manufacturer specifications and HDVS drawings shows there are no high voltages (greater than 190 volts).	Inspection	No Flash, therefore no longer required
24	18	SSP 50835	Intentional Receiving and Radiation Certification	N	An end item that has intentional radio frequency (RF) radiating and/or receiving devices shall be approved and certified by the NASA Johnson Space Center (JSC) Frequency Spectrum Manager for the use of a specified frequency band.	Verification is successful when safety documentation shows approval documentation from the NASA Johnson Space Center (JSC) Frequency Spectrum Manager.	Inspection	No longer needed since eliminating WIFI capability all together
25	19	SSP 50835	Ionizing Radiation Dose	N	The integrated end item shall meet the performance requirements specified herein when exposed to the radiation dose environment specified in SSP 30512 "Space Station Ionizing Radiation Design Environment" paragraph 3.1 with a radiation dose design margin of two applied.	Verification is successful when testing shows performance requirements specified herein are met when exposed to the radiation dose environment specified in SSP 30512 "Space Station Ionizing Radiation Design Environment" paragraph 3.1 with a radiation dose design margin of two applied.	Test	Reliability of hardware not a safety requirement
26	20	SSP 50835	Single Event Effects (SEE) Ionizing Radiation	N	The integrated end item shall meet specified performance when exposed to the nominal SEE environments as specified in SSP 30512.	The verification is successful when testing shows performance requirements specified herein are met when exposed to the nominal SEE environments as specified in SSP 30512.	Test	Reliability of hardware not a safety requirement
27	21	JSC 66202	Plug Dimensions	A	All loads shall have an electrical interface connection compatible with Figure 4.2-1 or Figure 4.2-2 . Rationale: These are standard COTS dimensions. (Figure reference is to JSC 66202)	An inspection of the drawings or a demonstration shall be performed to show that the plug interfacing with the receptacle of the inverter has an electrical connection compatible with a flight like inverter or NEMA socket equivalent. The verification shall be considered successful with the inspection or demonstrations shows that the plug that interfaces with the inverters has an electrical connection compatible with Figure 4.2-1 or Figure 4.2-2 in section 4.2.1. A plug that is U/L listed will be considered for successful verification of plug-inverter interface. (Figure reference is to JSC 66202)	Inspection or Demonstration	
28	22	JSC 66202	Connector cover interference	A	The portion of the load that connects to the inverter shall mate with the inverter receptacle so that it does not interfere with the connector cover as shown in Figure 4.2-3. Rationale: In order to maintain adequate electrical conductivity for both safety and functionality the load interface (plug) should not be prevented from fully mating with the inverter output (receptacle) due to size and/or shape configurations. (Figure reference is to JSC 66202)	An inspection of the drawings or a demonstration shall be performed to show that the part of the load that interfaces with the inverter does not interfere with the receptacle cover as shown in Figure 4.2-3. The verification shall be considered successful when the inspection of drawings or the demonstration shows that the part of the load that interfaces with the inverter does not interfere with the receptacle cover show in Figure 3.2-3. (Figure reference is to JSC 66202)	Inspection or Demonstration	
29	23	JSC 66202	Mechanical Envelope	A	The physical dimensions of the electrical connection to the inverter shall fit within the mechanical envelope in Figure 4.2-1. Rationale: Loads must be able to plug in next to other loads as well as be placed in any socket on the inverter. If an adapter is used as the electrical connection to the inverter, then the adapter's physical dimensions need to meet this requirement. (Figure reference is to JSC 66202)	An inspection of the drawings or a demonstration shall be performed to show that the physical dimensions of the electrical interface to the inverter meets the mechanical envelope shown in Figure 3.4-2. The verification shall be considered successful when the inspection of drawings or the demonstration shows that the physical dimensions of the electrical interface to the inverter meets the mechanical envelope shown in Figure 3.4-2. (Figure reference is to JSC 66202)	Inspection or Demonstration	
30	24	JSC 66202	Inadvertent Back-out Protection	A	For long duration ac loads, the ac load project shall provide a cable restraint method that is commensurate with the ac load duration, such as a hook/loop strap or tie wrap. Rationale: The utilization of the commercial ac outlet design does not meet the requirements for being two fault tolerant to electrical shock. Therefore, NCR-IPVR-001 was developed to document rationale as well as the additional requirements for cable restraint depending upon the operations of the ac load. The crew will be instructed to restrain the ac load cable based on the duration. Short term use applications (e.g. vacuum cleaner) do not require additional cable restraint. Long term or overnight use applications (e.g. wireless access point) require cable restraint at or near the ac connector to minimize risk of inadvertent disconnection with more permanent loads utilizing a more permanent method, such as a tie wrap.	An inspection or demonstration of the securing method shall be performed to show that the potentially powered plug blades will not be visible after securing and during expected operation. The verification shall be considered successful when the inspection or demonstration shown that pins or sockets are not visible during nominal operation and the method has been approved by the safety panel. Background: Lab demonstration of the power inverter with a sampling of ac power plugs has shown that a dual Velcro cable strap configuration provided sufficient strength to not allow the ac power plug to become unseated. The recommended cable restraint configuration routed one cable strap through the titanium switch guard and another cable strap in the opposite direction (caddy-corner) and affixing to the loop patches located on the side of the power inverter.	Inspection or Demonstration	

	A	B	E	F	G	H	I	M
1	SSCN13767 Hardware Requirements Matrix							
2	Requirement Number	Document (1)	Paragraph Title	Applicability	Shall Statement	Verification Success Criteria	Verification Method	Comments/Notes for Simple COTS Verification
31	25	JSC 66202	Reverse Output Power	A	The load shall operate without supplying continuous reverse power to the inverter. Rationale: The inverter is not designed to handle any power from the load other than quadrature power from load reactance. If the load current has a current waveform with the fundamental component more than 90 degrees out of phase with the voltage, then the load will send real power back into the inverter. The inverter does not have any load dump resistors or other means for disposing of this energy and will fail as a result. Loads that drive mechanical systems, particularly pumps, can potentially supply energy. It is important to note that terrestrial ac systems can usually handle reverse power so that COTS loads may not be designed to prevent reverse power flow.	A test shall be performed to show that the load does not supply continuous reverse power to the inverter. The verification shall be considered successful when the test data shows that the load does not supply continuous reverse power to the inverter.	Test	
32	26	JSC 66202	Reverse Output Energy	A	The load shall operate without supplying more than 2.7 watt seconds (Joules) of reverse energy to the inverter before drawing that energy back from the inverter. Rationale: The inverter can absorb brief energy flow from the load such as will be produced by loads with a sinusoid current that is not completely in phase with the inverter output voltage (power factor < 1.0). Any reverse power or energy will charge up the capacitors on the inverter's internal200VDC bus. Both the 28Vand 120V inverters have 1360 microfarads of capacitance on that bus. Assuming that a 10V change in voltage is the maximum acceptable, this corresponds to a charge of 13.6 millicoulombs. At an average voltage of 205 volts, this corresponds to a change in stored energy of 2.7 Joules. Note that the load must draw more than this energy from the inverter before dumping this amount of energy again.	For electromechanical devices, a test shall be performed to show that the load does not supply more than 2.7 W*s (Joules) of reverse energy to the inverter. For devices containing no electromechanical devices, analysis shall be performed to show that the load does not supply any reverse energy to the inverter. The verification shall be considered successful when the test data shows that the load does not supply more than 2.7 W*s (Joules) of reverse energy to the inverter, or analysis proves the load does not supply any reverse energy to the inverter.	Test or Analysis	
33	27	JSC 66202	Operation at 60Hz	A	The load shall be capable of operating at 60Hz +/- 1Hz. Rationale: The inverter produces a 60Hz ac output.	An inspection of the load specification or a test shall be performed to show that the load can operate at 60 Hz +/- 1Hz. The verification shall be considered successful when the inspection of the load specification or a test shows that the load can operate at 60Hz +/- 1Hz.	Inspection or Test	
34	28	JSC 66202	Capable of running at reduced voltage	A	The load shall operate normally with an input voltage of 105Vac. Rationale: Testing shows that ac adapters often have high peak currents (but low RMS currents) because they have internal bridge rectifiers connected to large internal capacitors. It is possible to have four 100W loads with high peak current cause peak currents over 12A. This would result in a small amount of waveform distortion that would slightly lower the effective voltage. The worst case would be perfect rectification into infinite capacitance. In this case with 400W, the current would be I2A for 1.5msec at the peak of every half cycle. This would reduce the peak of the sine wave about 7 volts.	An inspection of the load specification or data sheet or a test shall be performed to show that the load can operate at 105 Vrms. The verification shall be considered successful when the inspection of the load specification or the test shows that the load can operate at J05 Vrms.	Inspection or Test	
35	29	JSC 66202	Capable of undisturbed operation when power skips one cycle	A	The load shall operate normally when exposed to an interruption of ac power for one ac cycle. Note that 'undisturbed operation' is defined by the user of the load. Certain loads, such as battery chargers or ac adapters for devices with batteries may be considered to operate undisturbed if the only result of skipped cycles is the 'charge' indication momentarily going out. Rationale: Testing ac adapters shows that even loads with very small powers can have peak currents when first connected to the ac load that exceed 3A. Loads with less than loOW nominal power can have peak inrush currents that exceed 12A and cause waveform distortion for one ac cycle. This means that if three loads were being powered by the inverter and a fourth such load was connected, the three original loads could see a lower voltage for one cycle. A missing cycle is being used to stand in for the complicated voltage notches that such a load can make.	A test shall be performed to show that the load can operate when power skips one cycle. The verification shall be considered successful when the test shows that the load can operate when power skips one cycle.	Test	
36	30	JSC 66202	AC Grounding and Bonding	A	The ac load, including cabling, shall be assessed to the criteria in Figure 4.3-1 for hardware selection or determination of any hardware modifications required to control the shock hazard. Rationale: The AC system does not meet the requirements for grounding and bonding as per SSP 30240 and SSP 30245, respectively. NCR-IPVR-001 documents the control strategy for the AC systems which is dependent upon the AC design. The key determination factors are construction material (metallic versus non-metallic housing), the presence of double insulation, and isolation of the AC device and the AC cable.	At a minimum, an inspection of the ac load and ac cabling shall be performed to assess which criteria is met in Figure 4.3-1. Depending upon the resulting category of the ac COTS hardware, determines the required verifications. Category 1 and 2 requires inspection of the AC hardware design. Category 3 will require additional testing for grounding/bonding, additional testing for isolation and additional inspection or test for the implementation of the GFCI or redundant green wire. Categories in the order of precedence (most desirable) for ac COTS hardware, but not required, is: 1. All Plastic / Nonmetallic / Non-Conductive with Double Insulation. 2. Some metallic / conductive external surfaces / Double Insulated / Isolated (hot / return / chassis lines). 3. All other ac COTS hardware. Double insulation may be verified by inspecting the hardware and showing that it is marked with the UL Double Insulation mark (square within a square).	Test	

SSCN13767 Hardware Requirements Matrix

	A	B	E	F	G	H	I	M
2	Requirement Number	Document (1)	Paragraph Title	Applicability	Shall Statement	Verification Success Criteria	Verification Method	Comments/Notes for Simple COTS Verification
37	31	SSP 50492	Ionizing Radiation	N	The Digital Camera Equipment shall meet specified performance when exposed to the radiation dose environment as specified in SSP 30512, paragraph 3.1.	An analysis of equipment shall be performed using the operational lifetime and parts characterization data to assure that the design meets the specified performance when exposed to the radiation dose environment. For materials, existing literature from similar applications shall be analyzed to show that the materials meet the specified performance when exposed to the radiation dose environment. The verification shall be considered successful when the analysis shows that equipment performance, including design margins, is met in the specified environment. An analysis of equipment shall be performed using parts characterization data to assure that the design meets specified performance when exposed to the nominal SEE environment. The verification shall be considered successful when the analysis shows that equipment performance is met in the specified environment.	I, A	Reliability of hardware not a safety requirement.
38	32	JSC 28918	Thermal Environment	N	Two specific thermal requirements exist with regards to EVA compatibility. EVA compatible external hardware shall function properly over the entire design temperature range, which requires use of thermally compatible lubricants and materials.	Paragraphs 4.4.1 and 4.4.2 explain the methods for determining the appropriate design temperature range. The hardware provider shall also ensure touch temperature compliance per 4.4.4 and 4.4.5.	T	No verification to be performed. Certification by similarity to D2Xs. Braycote lubrication to be added to EVA lenses and camera.
39	33	JSC 28918	EMI/EMC Radiated Emissions	N	Hardware providers shall design or use only hardware that is compatible with the EMU Electromagnetic interference (EMI) emissivity as defined in JSC SL-E-0002 (part of ICD-2-19001), "Shuttle Orbiter/Cargo Standard Interfaces, Specifications, Electromagnetic Interference Characteristics, Requirements of Hardware for the Space Shuttle Vehicle."	This requirement shall be considered successful when testing shows that the hardware meets the requirements of SL-E-0002, Book 3, Space Shuttle Specification Electromagnetic Compatibility Characteristics, Requirements for Equipment.	T	Use of EMI/EMC data from IVA tests. No additional support/tests to be performed for certification.
40	34	JSC 28918	Sharp Edges - EVA	N	The hardware provider shall protect the EV crewmember from sharp edges by meeting the requirements in Table 3-1, Figure 3-1, and Table 3-2 for hardware located within 24 inches of a translation path (Figure 4-6), within a worksite envelope (Figure 4-15), and on each equipment item needing an EVA interface.	Verification shall be by analysis and inspection. An analysis shall be performed using data from drawings, integration documentation, and operational procedures to identify hardware edges and corners requiring rounding, the use of guards, or covers due to location in crewmember translation paths and maintenance EVA worksites. A drawing inspection shall show that the required edge and corner rounding, deburring, or cover installation has been accomplished or proper guards are in place. Verification shall be considered successful when analysis and inspection show that all required edges or corners have been properly machined, covered, or guarded.	A&I	Internal sharp edge inspection performed. Blanket will cover camera body.
41	35	SSP 50492	Inadvertent Contact Loads	N	The Digital EVA Camera System hardware shall withstand an inadvertent (bump or impulse) load of 125 lb (556 N) in any direction. (see Exceptions) 1. Exception: Photographic, optoelectronic, binocular, and television lenses are exempt from this requirement when in use, but must be protected by suitable covers when not in use. 2. Exception: The Digital EVA Camera System shall be exempt from this requirement, however, it shall be certified to withstand an inadvertent (bump or impulse) load of 50 LB (222 N). The camera is mounted on the mini-workstation, which has an exception to the 125 LB requirement defined by the EVA GDRD (JSC26626A). Reference JSC-38720E, Modular Mini-Workstation System (MMWS) Certification and Acceptance Requirements Document, E3.6.1.6 Inadvertent Contact Loads - "Each MMWS component shall withstand an inadvertent, 50-pound load (bump or impulse) in any direction."	This requirement shall be considered successful when it is shown by either test or analysis that the Digital EVA/IVA Camera can withstand an inadvertent load of 50 lbs. Note: All testing and exemptions hold only for when lens covers are in place protecting lens. Note: Lens cover will be provided in accordance with Paragraph 3.2.3.13 of JSC 64021.	T, A	Do not perform. Certification by Similarity to Nikon D2Xs.
42	36	SSP 50492	Humidity	N	The Digital EVA/IVA Camera System shall meet the performance requirements when exposed to 0% relative humidity.	The requirement shall be considered successful when analysis shows that the hardware meets the performance requirements.	A	Known acceptable data by manufacturer. No need to verify. Product selection.
43	37	SSP 50492	Alignment marking	N	Test, adjustment, and alignment points shall be identified and labeled in accordance with SSP 50005 paragraph 9.5.3.1.5.1 item c.	The Support Equipment labeling and product marking requirements shall be verified by inspection of Support Equipment drawings. The verification shall be considered successful when the inspection shows that labels and product markings are incorporated into the design as specified.	I	All connections and alignments will be assembled IVA. No assembly or disassembly EVA.
44	38	Project Specific Operations Requirement	Ops Requirement: EVA Mechanical Interface	N	For EVA Operations the Digital EVA/IVA Camera System shall have a Standard Rail Mount Shoe for mechanical interface to Slide Assemblies on EVA camera mount or Flash Bracket per JSC 62028, Camera Mount and Camera/Flash Bracket Assembly to EVA Digital Camera and Flash Interface Control Document.	This requirement shall be considered successful when it is demonstrated that the Digital EVA/IVA Camera System shall have a Standard Rail Mount Shoe for mechanical interface to Slide Assemblies on EVA camera mount or Flash Bracket per JSC 62028, Camera Mount and Camera/Flash Bracket Assembly to EVA Digital Camera and Flash Interface Control Document, and a fit check of each shoe manufactured with one bracket, one L-mount, and one IVA fitting.	D	Satisfied by IVA test in PDA.
45	39	Project Specific Operations Requirement	Ops Requirement: EVA Picture Capacity	N	The Digital EVA/IVA Camera shall provide the capability to take a minimum of 150 pictures in RAW format over a 6 1/2 minute period without replacing the internal memory card.	This requirement shall be considered successful when it is shown by test that the camera meets the requirement of being capable of taking a minimum of 100 pictures over a 7 hour period following a 5 hour power on time (approximate 3 hour pre-EVA/depress time) with no usage of the camera without requiring change-out of the battery or compact flash memory storage card.	T	No need to demonstrate. Capability of camera verified by vendor data.

	A	B	E	F	G	H	I	M
1	SSCN13767 Hardware Requirements Matrix							
2	Requirement Number	Document (1)	Paragraph Title	Applicability	Shall Statement	Verification Success Criteria	Verification Method	Comments/Notes for Simple COTS Verification
46	40	Project Specific Operations Requirement	Ops Requirement Photo Requirement	N	The Digital EVA/IVA Camera shall provide the capability to take a minimum of 150 pictures in RAW format over a 6 1/2 minute period without replacing the internal memory card (R-bar Pitch Maneuver photography).	This requirement shall be considered successful when it is shown by test that the Digital EVA/IVA Camera has the capability to take a minimum of 150 pictures in RAW format over a 6 1/2minute period without replacing the internal memory card.	T	No need to demonstrate. Capability of camera, verified by vendor data.
47	41	Project Specific Operations Requirement	Ops Requirement Camera Firmware Maintainability	N	The Digital EVA/IVA Camera System design shall allow on-orbit firmware updates, Charge Coupled Device (CCD) and other cleaning and battery charging procedures.	This requirement shall be considered successful when shown by demonstration that the Digital EVA/IVA Camera System design allows on-orbit firmware updates, CCD and other cleaning, and battery charging procedures.	D	Function of Camera system provided by manufacturer. No need to demonstrate.
48	42	Project Specific Operations Requirement	Ops Requirement EVA Pointing Device Capabilities	N	The Digital EVA/IVA Camera System shall provide a pointing device to assist EVA crewmember focusing through the EMU helmet frame an image prior to exposure.	This requirement shall be considered successful when it has demonstrated that a pointing device for the D4 has been provided to assist the EVA crewmember, and is functional with the EMU.	D	Already exists. Know that it integrates to D4 camera. No need to verify/demonstrate.
49	43	Project Specific Operations Requirement	Ops Requirement Lens Protection	N	All IVA lenses shall have bumper ring protection.	Verification in engineering that bumper rings are required for camera lenses.	Inspection	Bumper ring capability being delivered as part of 13767. No need to verify.

ORDER FOR SUPPLIES OR SERVICES

PAGE OF PAGES 1 6

IMPORTANT: Mark all packages and papers with contract and/or order numbers.

1. DATE OF ORDER: September 24, 2015
2. CONTRACT NO. (If any): NNJ10GA35C
3. ORDER NO.: TO 004
4. REQUISITION/REFERENCE NO.:
5. ISSUING OFFICE (Address correspondence to): NASA JSC Attn: BG/Learon J. Comeaux, Contracting Officer

7. TO:
a. NAME OF CONTRACTOR: Dan V. Wegner
b. COMPANY NAME: Lockheed Martin
c. STREET ADDRESS: 2625 Bay Area Blvd.
d. CITY: Houston
e. STATE: TX
f. ZIP CODE: 77058

6. SHIP
a. NAME OF CONSIGNEE: Transportation Officer, Building 421, NASA-JSC
b. STREET ADDRESS: 2101 NASA Parkway
c. CITY: Houston
d. STATE: TX
e. ZIP CODE: 77054
f. SHIP VIA:

8. TYPE OF ORDER
[ ] a. PURCHASE — REFERENCE YOUR: Please furnish the following on the terms and conditions specified on both sides of this order and on the attached sheet, if any, including delivery as indicated.
[X] b. DELIVERY -- Except for billing instructions on the reverse, this delivery order is subject to instructions contained on this side only of this form and is issued subject to the terms and conditions of the above-numbered contract.

9. WRITTEN ACCEPTANCE BY CONTRACTOR:
SIGNATURE: [signature] DATE: 9-25-2015

10. ACCOUNTING AND APPROPRIATION DATA / REQUISITIONING OFFICE: ISS Program Office, BG

11. BUSINESS CLASSIFICATION (Check appropriate box(es))
[ ] a. SMALL [X] b. OTHER THAN SMALL [ ] c. DISADVANTAGED [ ] g. SERVICE-DISABLED VETERAN-OWNED
[ ] d. WOMEN-OWNED [ ] e. HUBZone [ ] f. EMERGING SMALL BUSINESS

12. F.O.B. POINT: DESTINATION

13. PLACE OF
a. INSPECTION: DESTINATION
b. ACCEPTANCE: DESTINATION

14. GOVERNMENT B/L NO.:

15. DELIVER TO F.O.B. POINT ON OR BEFORE (Date): March 31, 2018

16. DISCOUNT TERMS:

17. SCHEDULE (See reverse for Rejections)

ITEM NO. (a)	SUPPLIES OR SERVICES	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	The contractor shall deliver the following quantities of Cargo Transfer Bags to NASA:					
	Cygnus Standoff Bag	40 Bags				
	3rd Gen – JSB Bag	1,089 Bags				
	3rd Gen – 0.5 CTB Bag	409 Bags				
	3rd Gen – 1.0 CTB Bag	596 Bags				
	3rd Gen – 2.0 CTB Bag	125 Bags				
	3rd Gen – 3.0 CTB Bag	11 Bags				
	3rd Gen – 4 CTBE Bag	55 Bags				
	3rd Gen – 6 CTBE Bag	35 Bags				
	3rd Gen – 6 CTBE Bag	140 Bags				
	8 CTBE Bag	30 Bags				
	8 CTBE Bag	18 Bags				
	3rd Gen – 10 CTBE Bag	20 Bags				
	3rd Gen – 10 CTBE Bag	42 Bags				
	Cost				(b) (4)	
	Fee					
	Total				$3,145,241	

18. SHIPPING POINT:
19. GROSS SHIPPING WEIGHT:
20. INVOICE NO.:

17(h) TOT. (Cont. pages):

SEE BILLING INSTRUCTIONS ON REVERSE

21. MAIL INVOICE TO:
NASA Shared Services Center (NSSC) FMD – Accounts Payable
Bldg 111, C. Road, Stennis Space Center
d. STATE: MS
e. ZIP CODE: 39529

$3,145,241

17(i) GRAND TOTAL

22. UNITED STATES OF AMERICA BY (Signature): LEARON COMEAUX
Digitally signed by LEARON COMEAUX
DN: c=US, o=U.S. Government, ou=NASA, ou=PIV, cn=LEARON COMEAUX, 0.9.2342.19200300.100.1.1=lcomeaux
Date: 2015.09.25 13:31:33 -05'00'

23. NAME (Typed): Learon J. Comeaux
TITLE: CONTRACTING/ORDERING OFFICER

AUTHORIZED FOR LOCAL REPRODUCTION
PREVIOUS EDITION NOT USABLE

OPTIONAL FORM 347 (REV. 4/2006)
Prescribed by GSA/FAR 48 CFR 53.213(f)

1.0 Title of Effort: Build Third Generation (3rd Gen) Cargo Transfer Bags (CTBs), Jettison Stowage Bags (JSBs), and M-bags for International Partners (IPs) and Commercial Vehicle Flights to satisfy NASA's logistics needs through FY2020 based on current usage rates and traffic models.

2.0 Background: Third Generation (3rd Gen) Cargo Transfer Bags (CTBs), Jettison Stowage Bags (JSBs), and M-bags projection needs for the ISS Program are based on launch frequencies, planned vehicles and their stowage capabilities for launch, return and disposal. In order to meet the projected FY2020 demand, additional quantities of each type of bag need to be manufactured. Authorizing a long term bag build now will reduce bag fabrication costs (due to economies of scale) and give NASA sufficient inventory to support projected flight manifests through FY2020. Furthermore, during the evaluation period, the Mission Integration & Operations Office/OC requested the development of a new 8 Cargo Transfer Bag Equivalent (CTBE) M-bag and additional Cygnus standoff bags. The new 8 CTBE M-bag allows the use of one bag instead of two M02 bags positioned side by side. The Cygnus standoff bags maximize the use of available space in the Orbital Cygnus vehicle while reducing cost to the program by utilizing customized low cost bags instead of high cost bags not suited for these cargo areas.

3.0 Proposed Scope and Tasks:

The Contractor shall:

- Build and deliver the Cygnus standoff bags.
- Design, certify, build and deliver the new 8 CTBE M-bags, and the 3rd Gen CTBs, JSBs and M-bags.
- Create drawings for the new 8 CTBE M-bag, and the 3rd Gen CTBs, JSBs and M-bags.

Reference:

Attachment A, Section J, Attachment J-9, Hardware List

Attachment B, Section J, Attachment J-16, Deliverable Items List

3.1 Statement of Work Reference: The Hardware development and delivery work will be performed in accordance with SOW section 5.0.

3.2 Requirements / Deliverables / Schedule:

Milestone schedule – per dates specified in attached Deliverable Items List (Attachment B).

3.2.1 Business Management (SOW 1.2)

3.2.1.1 The contractor shall provide overall contract management and administration for this task order. The contractor shall perform all business and administrative functions and integrate these functions across all areas of performance.

3.2.2 Configuration Management (SOW 1.3)

3.2.2.1 The contractor shall develop, implement and administer configuration management operations in accordance with SSP 41170, ISS Program Configuration Management Requirements; SSP 50010, Standards for ISS Program Documentation; SSP 50123, Configuration Management Handbook; and SSP 50172, Data Management Handbook. The

contractor shall develop and maintain a Configuration Management Plan in accordance with DRD C-CM-01, Configuration Management Plan.

3.2.3 Safety and Mission Assurance (SOW 2.0)

3.2.3.1 Contractor developed hardware shall be accepted in accordance with SSP 50287, Hardware/Software Acceptance Process. Only an Acceptance Review and DD250 shall be performed for hardware delivered under this task order. No Acceptance Data shall be required.

3.2.4 Hardware Development and Manufacturing (5.0)

3.2.4.1 Design and Manufacturing Requirements

The contractor shall design flight and training hardware, including but not limited to FSE, stowage accommodations, and FCE in compliance with all applicable design requirements including but not limited to the following:

SSP 50835, ISS Pressurized Volume Hardware Common Interface Requirements Document (CIRD),

SSP 50492, General ISS On-orbit Requirements for Non-Pressurized Support Equipment,

SSP 50021, Safety Requirements Document,

SSP 50004, Ground Support Equipment Design Requirements International Space Station,

JSC 27472, Requirements For Submission Of Data Needed For Toxicological Assessment Of Chemicals and Biologicals To Be Flown On Manned Spacecraft,

DX12-SLP-014, Neutral Buoyancy Laboratory Mockup and Training Hardware Requirements,

JSC-28528, Mockup Design and Requirements Document, and

NPR 6000.1, Requirements for Packaging, Handling and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components.

The contractor shall manufacture and assemble flight and training hardware. Facilities, processes and personnel shall be certified in accordance with SSP 50276, Depot/Manufacturing Facility Certification Plan.

3.2.4.2 Hardware/Data Deliveries

For each end item being designed and built, the contractor shall deliver the corresponding data and hardware in accordance with SSP 50287, Hardware/Software Acceptance Process, and DRD C-EL-01, New Hardware Interim Design Review Deliverables.

3.2.4.3 Engineering Drawings/Data

Drawings shall be developed in accordance with ASME Y14.100, Engineering Drawing Practices; ASME Y14.24M, Types and Applications of Engineering Drawings; ASME Y14.34M Associated Lists; and ASME Y14.35M, Revision of Engineering Drawings and Associated Documents; and DRD C-MI-05, Engineering Drawings and Associated Lists. For all engineering drawings and associated engineering products that are delivered to NASA, or to NASA contractors, the contractor shall also transmit them to the Vehicle Master Database (VMDB) in accordance with DRD C-MI-04, ISS Vehicle Engineering Data.

3.2.4.4 CAD Models

The contractor shall deliver all CAD models developed under the Cargo Mission Contract (CMC) for new hardware or hardware modified on the CMC to the United States On-Orbit Segment (USOS) Acceptance and ISS Vehicle Sustaining contractor to maintain in a model library in accordance with DRD C-MI-03, Cargo Integration Cargo CAD Models for Launch, Return and On-orbit Configurations.

3.2.4.5 Safety and Reliability Assessments

The contractor shall perform and deliver safety assessments and FMEA/CIL worksheets in accordance with paragraphs 2.5, respectively, for contractor developed hardware.

3.2.4.6 Development Schedules

The contractor shall prepare and deliver schedules for all hardware development projects to provide the Government with insight into overall project status in accordance with DRD C-PC-05, Cargo Mission Contract Program Schedules.

4.0 Period of Performance

The period of performance is September 25, 2015 through March 31, 2018.

Section J, Attachment J-9, Hardware List

Item Number	Description	Drawing/Part Number	Sustain
TABLE 1.1-A Stowage Accommodations			
TBD	Cygnus Standoff Bag	TBD	Sustaining shall begin post DD250 of hardware.
TBD	3rd Gen – JSB	TBD	Sustaining shall begin post DD250 of hardware.
TBD	3rd Gen - 0.5 CTB	TBD	Sustaining shall begin post DD250 of hardware.
TBD	3rd Gen -1.0 CTB	TBD	Sustaining shall begin post DD250 of hardware.
TBD	3rd Gen - 2.0 CTB	TBD	Sustaining shall begin post DD250 of hardware.
TBD	3rd Gen - 3.0 CTB	TBD	Sustaining shall begin post DD250 of hardware.
TBD	3rd Gen - 4 CTBE Bag	TBD	Sustaining shall begin post DD250 of hardware.
TBD	3rd Gen – 6 CTBE Bag	TBD	Sustaining shall begin post DD250 of hardware.
TBD	8 CTBE Bag	TBD	Sustaining shall begin post DD250 of hardware.
TBD	3rd Gen-10 CTBE Bag	TBD	Sustaining shall begin post DD250 of hardware.

Section J, Attachment J-16, Deliverable Items List

CHANGE NUMBER	PART NUMBER	SERIAL NUMBER	LM ID NO*	NOMENCLATURE	QTY	UNIT	DD250 DATE
15051	SEG33124764	TBD	CMC0528	Cygnus Standoff Bag	40	Each	9/30/2016
15051	TBD	TBD	CMC0529	3rd Gen – JSB	102	Each	9/30/2016
15051	TBD	TBD	CMC0530	3rd Gen – JSB	300	Each	9/29/2017
15051	TBD	TBD	CMC0531	3rd Gen – JSB	687	Each	3/30/2018
15051	TBD	TBD	CMC0532	3rd Gen - 0.5 CTB	102	Each	9/29/2017
15051	TBD	TBD	CMC0533	3rd Gen – 0.5 CTB	307	Each	3/30/2018
15051	TBD	TBD	CMC0534	3rd Gen -1.0 CTB	202	Each	9/29/2017
15051	TBD	TBD	CMC0535	3rd Gen - 1.0 CTB	394	Each	3/30/2018
15051	TBD	TBD	CMC0536	3rd Gen - 2.0 CTB	10	Each	9/29/2017
15051	TBD	TBD	CMC0537	3rd Gen - 2.0 CTB	115	Each	3/30/2018
15051	TBD	TBD	CMC0538	3rd Gen - 3.0 CTB	11	Each	3/30/2018
15051	TBD	TBD	CMC0539	3rd Gen - 4 CTBE Bag	55	Each	3/30/2018
15051	TBD	TBD	CMC0540	3rd Gen - 6 CTBE Bag	35	Each	9/29/2017
15051	TBD	TBD	CMC0541	3rd Gen – 6 CTBE Bag	140	Each	3/30/2018
15051	TBD	TBD	CMC0542	8 CTBE Bag	30	Each	9/29/2017
15051	TBD	TBD	CMC0543	8 CTBE Bag	18	Each	3/30/2018
15051	TBD	TBD	CMC0544	3rd Gen-10 CTBE Bag	20	Each	9/29/2017
15051	TBD	TBD	CMC0545	3rd Gen -10 CTBE Bag	42	Each	3/30/2018