

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT		1. CONTRACT ID CODE	PAGE OF PAGES 1 7
2. AMENDMENT/MODIFICATION NO. 2	3. EFFECTIVE DATE 05/10/2010	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (if applicable)
6. ISSUED BY NASA/Johnson Space Center Attn: Peter Hollis/BH2 2101 NASA Parkway Houston TX 77058-3696	CODE JSC	7. ADMINISTERED BY (If other than Item 6) NASA/Johnson Space Center Attn: Peter Hollis/BH2 2101 NASA Parkway Houston TX 77058-3696	CODE JSC
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)		(x) 9A. AMENDMENT OF SOLICITATION NO. NNJ10322844R	
		x 9B. DATED (SEE ITEM 11) 04/22/2010	
		10A. MODIFICATION OF CONTRACT/ORDER NO.	
		10B. DATED (SEE ITEM 13)	
CODE	FACILITY CODE		

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended, is not extended.
 Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

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

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

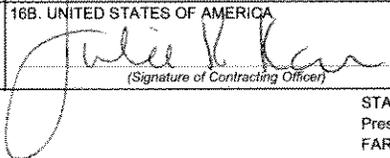
E. IMPORTANT: Contractor is not, is required to sign this document and return _____ copies to the issuing office.

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

The purpose of this amendment is to answer the attached questions submitted in reference to the solicitation. The due date for proposals is extended to May 25, 2010.

Change pages are attached and marked in bold.

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

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Julie K. Karr	
15B. CONTRACTOR/OFFEROR (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA  (Signature of Contracting Officer)	16C. DATE SIGNED 5/10/10

Question 1: Is nomenclature, "Size 1 & Size 2 Rotary Actuator and Gearhead" synonymous with "Gang 1 & Gang 2 Latch EMAs", respectively?

Answer 1: No, these are separate systems.

Question 2: Is 'Latch Torque with Margin vs. Crank Position' plot applicable to both size 1 & 2 EMAs?

Answer 2: No, there are separate plots for each EMA. For the Latch Rotary EMA please see (Latch-Rotary-EMA-Gearhead-System-Torque-Requirements.xls) and for the Lockdown Rotary please see (Lockdown-Rotary-EMA-System-Torque-Requirements.xls)

Question 3: Confirmation, is gearhead portion of EMA the portion sans motors, with female spline output interface?

Answer 3: No. Please refer to C.1 Section 3.1.

Question 4: Do the EMAs include a manual drive interface (smaller female spline w/ c'bore)?

Answer 4: No. Please refer to Please refer to C.1 and C.2 Section 3.1.

Question 5: Is 'Lockdown EMA' image depicting the motor & gearbox segment of entire EMA including protective shield for motors?

Answer 5: Yes. Dimensions referring to external envelope features are generally maximum for an entire EMA.

Question 6: Is 'Lockdown Output Torque w/ Margin vs. Output Positional Position' plot a hard requirement, or can torque augmentation levels be obtained as desired as long as total output meets requirement, plot, per 2 above?

Answer 6: Yes, the 'Lockdown Output Torque w/ Margin vs. Output Positional Position' plot is a hard requirement. There is a plot for each EMA system (see answer to question 2). The plot is meant to depict the required torque of the Lockdown EMA system that use a Size 2 EMA. There is a separate torque plot for the Latch EMA system that use a Size 1 EMA.

Question 7: Page 9. section 3.1.8.2, Gearhead Ratio, refers to 3.1.4.1, 3.1.4.2, 3.1.6.5 & 3.1.6.6. Where can these be found?

Answer 7: See attached SOW change pages. Changes are marked in bold.

Question 8: Attachments L-1 Cost/Price Template and L-2 Traceability Matrix embedded in the RFP will not open. Can these attachments be provided?

Answer 8: These templates are attached with this amendment.

Question 9: In DRD-18 "Configuration Management Plan," reference document EA-WI-027 is specified. This document is not located in the technical library. Could you provide a copy of EA-WI-027 or a link to where it can be downloaded?

Answer 9: This document is now in the technical library

Question 10: Is the structure and interface circled on attached print a manual drive or something else?

Answer 10: No. Please refer to C.1 and C.2 Section 3.1.

Question 11: The sketch titles and the descriptions in section B, paragraph B.3, CLIN table are not consistent. Please clarify.

Answer 11: Section C.1 refers to items with these titles containing and to sketches that have "Latch" denoted.

"Size 1, Dual Motor Velocity Summed Rotary Actuator Hardware"

"Gearhead, Gang 1 with Torque Limiter Hardware"

"Gearhead, Gang 2 with Torque Limiter Hardware"

Section C.2 refers to items with this title containing and to sketches that have "Lockdown" denoted.

"Size 2, Dual Motor Velocity Summed Rotary Actuator Hardware"

Question 12: Is the torque limiter integrated within the gearhead or the motor assembly portion of the EMA?

Answer 12: Torque limiter is integrated with the gearhead of Section C.1 and the torque limiter is integrated with EMA of Section C.2. Please refer to C.1 and C.2 Section 3.1.

Question 13: What is the difference between Size 1 rotary actuator (CLIN 1) and size 2 rotary actuator (CLIN 4)? From the sketches it appears they are the same physical size.

Answer 13: Please refer to answers from Q1, Q2, and Q10. An update to the sketch grouping in the technical library will help clarify the differences between Section C.1 and C.2

- 3.1.8.2 Gearhead Ratio. The gearhead ratio shall be determined by optimizing the system configuration sketch depicted **in the technical library per requirements 3.1.8.4.1, 3.1.8.4.2, 3.1.8.5, 3.1.8.6.**
- 3.1.8.3 Factor of Safety. The gearhead shall have a factor of safety applied to the operational torque (as determined from the load limiter maximum setting) of 1.1 against yield failure and 1.5 against ultimate failure.
- 3.1.8.4 Load Limiting Device. The gearhead shall contain a load limiting device.
- 3.1.8.4.1 Minimum Setting. The load limiter shall have a minimum setting to provide the required torque per requirement 3.1.6.5 to the output.
- 3.1.8.4.2 Maximum Setting. The load limiter's maximum setting shall be used to determine the operational torque capability of the gearhead.
- 3.1.8.5 Output Torque. The gearhead minimum output torque shall be determined from the Table and Figure in the Latch Rotary EMA Gearhead system excel file with an operating torque margin of 0.0 at the output.
- 3.1.8.6 Output Speed. The gearhead output shall not experience speeds greater than 2.0 RPM.
- 3.2 Electrical.
- 3.2.1 Motors.
- 3.2.1.1 Nominal Voltage. The two motors nominal voltage shall be 28 VDC.
- 3.2.1.2 Voltage Range. The two motors voltage range shall be from 24 VDC to 32 VDC.
- 3.2.1.3 Current. The current at peak torque shall not exceed 25 Amperes per motor at maximum voltage. The current at locked rotor shall not exceed 50 Amperes per motor at maximum voltage.
- 3.2.2 Electrical Cable Acceptance Tests. The rotary actuator shall comply with the requirements specified in JPR 8080.5, Standard number E-24.
- 3.2.3 Radiated Emissions. The radiated emissions of the size 1, rotary actuator shall be less than that specified in Figure 1 at the specified frequencies.

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	Spacecraft, Payloads, and Flight Equipment
NASA-STD-5017	Design and Development Requirements for Mechanisms
NASA-STD-5019	Fracture Control Requirements for Spaceflight Hardware
NASA-STD-6008	NASA Fastener Procurement, Receiving Inspection, and Storage Practices for Spaceflight Hardware
NASA-STD-6016	Standard Materials and Processes Requirements For Spacecraft
NASA-STD-8739.4	Crimping, Interconnecting Cables, Harnesses, and Wiring
Scotch-Weld™ 2216 B/A Translucent Epoxy Adhesive	3M™ Scotch-Weld™ Epoxy Adhesive 2216 B/A Technical Data Sheet (per DOD-A-82720)
SO300-BT-PRO-010 GIDEP	Operations Manual
SO300-BU-GYD-010 GIDEP	Requirements Guide
SSP 30695	ISS Acceptance Data Package Requirements Specification

2.1 Order of precedence. If there is any conflict between content in this document versus information from any of the above standard documents, this document takes precedence.

3 REQUIREMENTS

3.1 Mechanical. For reference, the rotary actuator is arranged as depicted in a system configuration schematic.

3.1.1 Dimensions.

3.1.1.1 Rotary Actuator. The size 2, rotary actuator shall be dimensioned as indicated in the Size 2, Rotary Actuator Sketch.

3.1.1.2 Mounting Locations. The mounting locations shall be controlled per the Size 2, Rotary Actuator Sketch.

3.1.2 Materials, Processes, and Parts. All materials used in the size 2, rotary actuators shall comply with the requirements specified in NASA-STD-6016.

3.1.3 Threaded Fasteners. All threaded fasteners used in the size 2, rotary actuator shall comply with the requirements in JPR 8080.5, MS-5 and NASA-STD-

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5017, section 4.7.2 and 4.7.6.

- 3.1.4 Fastener Integrity. All fasteners used in the size 2, rotary actuator shall comply with NASA-STD-6008.
- 3.1.5 Weight. The total weight of the size 2, rotary actuator shall not exceed 1.5 lbs.
- 3.1.6 Motors.
 - 3.1.6.1 Quantity. There shall be a quantity of two DC brushed motors (one for System A and one for System B).
 - 3.1.6.2 Configuration. The two motors shall be arranged in a velocity summed configuration. A single motor shall provide the rated performance with the second motor powered off.
 - 3.1.6.3 Banding Porches.
 - 3.1.6.3.1 Exiting Cable. For each motor there shall be "pigtail" leads composed of twisted shielded pair 22AWG "pigtails" (p/n MS27500-22RC2S09) 20 feet long. The shield shall not be terminated to the case.
 - 3.1.6.3.2 Securing the Exiting Cable. The exiting cable shall be secured by potting it inside the banding porch using 3M Scotch-weld 2216B/A, Translucent per the manufacturer's instructions. A record shall be maintained of all Shore D Hardness test results.
 - 3.1.6.3.3 Cable Separation. Separate System A and System B cables shall exit from different banding porches.
- 3.1.7 Load Limiting Device. The size 2, rotary actuator shall contain a load limiting device.
 - 3.1.7.1 Minimum Setting. The load limiter shall have a minimum setting to provide the required torque per requirement 3.1.9 to the output.
 - 3.1.7.2 Maximum Setting. The load limiter's maximum setting shall not be more than 1.25 times the minimum setting.
- 3.1.8 Stopping Distance. The size 2, rotary actuator's output drive shall stop, when power is removed, within ¼ turn after driving full speed with an externally applied torque load of 4 inch-lbs in an accelerating direction.
- 3.1.9 Output Torque. The minimum output torque of the size 2, rotary actuator shall be determined from the Table and Figure in Appendix C.2, Attachment 2 with