INFORMATION TO OFFERORS OR QUOTERS
SECTION A - COVER SHEET

1. SOLICITATION NUMBER	2. *(X one)*	
		a. SEALED BID
N00173-98-R-DB01	X	b. NEGOTIATED *(RFP)*
		c. NEGOTIATED *(RFQ)*

INSTRUCTIONS

NOTE THE AFFIRMATIVE ACTION REQUIREMENT OF THE EQUAL OPPORTUNITY CLAUSE WHICH MAY APPLY TO THE CONTRACT RESULTING FROM THIS SOLICITATION.

You are cautioned to note the "Certification of Non-Segregated Facilities" in the solicitation. Failure to agree to the certification will render your reply nonresponsive to the terms of solicitations involving awards of contracts exceeding $25,000 which are not exempt from the provisions of the Equal Opportunity clause.

"Fill-ins" are provided on the face and reverse of Standard Form 18 and Parts I and IV of Standard Form 33, or other solicitation documents and Sections of Table of Contents in this solicitation and should be examined for applicability.

See the provision of this solicitation entitled either "Late Bids, Modifications of Bids or Withdrawal of Bids" or "Late Proposals, Modifications of Proposals and Withdrawals of Proposals."

When submitting your reply, the envelope used must be plainly marked with the Solicitation Number, as shown above and the date and local time set forth for bid opening or receipt of proposals in the solicitation document.

If NO RESPONSE is to be submitted, detach this sheet from the solicitation, complete the information requested on reverse, fold, affix postage, and mail. NO ENVELOPE IS NECESSARY.

Replies must set forth full, accurate, and complete information as required by this solicitation ***(including attachments)***. The penalty for making false statements is prescribed in 18 U.S.C. 1001.

3. ISSUING OFFICE *(Complete mailing address, including ZIP Code)*

CONTRACTING OFFICER CODE 3230.DB
NAVAL RESEARCH LABORATORY
4555 OVERLOOK AVE., SW
WASHINGTON DC 20375-5326

4. ITEMS TO BE PURCHASED *(Brief description)*

SPACE QUALIFIED ATTITUDE REFERENCE UNITS

5. PROCUREMENT INFORMATION *(X and complete as applicable)*

X	a. THIS PROCUREMENT IS UNRESTRICTED				
	b. THIS PROCUREMENT IS A _____ % SET-ASIDE FOR ONE OF THE FOLLOWING *(X one). (See Section I of the Table of Contents in this solicitation for details of the set-aside.)*				
		(1) Small Business		(2) Labor Surplus Area Concerns	(3) Combined Small Business/Labor Area Concerns

6. ADDITIONAL INFORMATION

7. POINT OF CONTACT FOR INFORMATION

a. NAME *(Last, First, Middle Initial)*	b. ADDRESS *(Include Zip Code)*
Daniel Brinkworth	NAVAL RESEARCH LABORATORY
c. TELEPHONE NUMBER *(Include Area Code and Extension) (NO COLLECT CALLS)* (202) 767-6746	4555 OVERLOOK AVE., SW WASHINGTON, DC 20375-5326

DD FORM 1707, MAR 90 Previous editions are obsolete.

8. REASONS FOR NO RESPONSE *(X all that apply)*			
	a. CANNOT COMPLY WITH SPECIFICATIONS		b. CANNOT MEET DELIVERY REQUIREMENT
	c. UNABLE TO IDENTIFY THE ITEM(S)		d. DO NOT REGULARLY MANUFACTURE OR SELL THE TYPE OF ITEMS INVOLVED
	e. OTHER *(Specify)*		

9. MAILING LIST INFORMATION *(X one)*				
	YES		NO	WE DESIRE TO BE RETAINED ON THE MAILING LIST FOR FUTURE PROCUREMENT OF THE TYPE OF TIME(S) INVOLVED.

10. RESPONDING FIRM	
a. COMPANY NAME	b. ADDRESS *(Include Zip Code)*

c. ACTION OFFICER			
(1) Typed or Printed Name *(Last, First, Middle Initial)*	(2) Title	(3) Signature	(4) Date Signed *(YYMMDD)*

DD FORM 1707 REVERSE, MAR 90

FOLD FOLD

FOLD FOLD

FROM

AFFIX STAMP HERE

SOLICITATION NUMBER	
N00173-98-R-DB01	
DATE *(YYMMDD)*	LOCAL TIME
98 MAR 23	4:00 PM

TO

SOLICITATION, OFFER AND AWARD	1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 350) ▶	RATING	PAGE OF 1 | 43 PAGES

2. CONTRACT NO.	3. SOLICITATION NO.	4. TYPE OF SOLICITATION	5. DATE ISSUED	6. REQUISITION/PURCHASE NO.
	N00173-98-R-DB01	☐ SEALED BID (IFB) ☒ NEGOTIATED (RFP)	20 FEB 98	

7. ISSUED BY	CODE	8. ADDRESS OFFER TO *(If other than Item 7)*
Contracting Officer, Code 3230.DB Naval Research Laboratory 4555 Overlook Ave., SW Washington DC 20375-5326	N00173	

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder".

SOLICITATION

9. Sealed offers in original and 02 copies for furnishing the supplies or services in the Schedule will be received at the place specified in Item 8, or if handcarried, in the depository located in Bldg 222 Room 115 until 4:00 *(Hour)* local time 23 Mar 98 *(Date)*

CAUTION - LATE Submissions, Modifications, and Withdrawals: See Section L, Provision No. 52.214-7 or 52.215-10. All offers are subject to all terms and conditions contained in this solicitation.

10. FOR INFORMATION CALL: ▶	A. NAME	B. TELEPHONE NO. *(Include area code) (NO COLLECT CALLS)*
	Daniel Brinkworth	(202) 767-6746

11. TABLE OF CONTENTS

(✓)	SEC.	DESCRIPTION	PAGE(S)	(✓)	SEC.	DESCRIPTION	PAGE(S)
		PART I - THE SCHEDULE				PART II - CONTRACT CLAUSES	
X	A	SOLICITATION/CONTRACT FORM	1	X	I	CONTRACT CLAUSES	12-16
X	B	SUPPLIES OR SERVICES AND PRICES/COSTS	2			PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACH.	
X	C	DESCRIPTION/SPECS./WORK STATEMENT	3	X	J	LIST OF ATTACHMENTS	16
X	D	PACKAGING AND MARKING	3			PART IV - REPRESENTATIONS AND INSTRUCTIONS	
X	E	INSPECTION AND ACCEPTANCE	3	X	K	REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF OFFERORS	16-33
X	F	DELIVERIES OR PERFORMANCE	4-5				
X	G	CONTRACT ADMINISTRATION DATA	5-9	X	L	INSTRS., CONDS., AND NOTICES TO OFFERORS	33-41
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OFFER *(Must be fully completed by offeror)*

NOTE: Item 12 does not apply if the solicitation includes the provisions at 52.214-16, Minimum Bid Acceptance Period.

12. In compliance with the above, the undersigned agrees, if this offer is accepted within _____ calendar days *(60 calendar days unless a different period is inserted by the offeror)* from the date for receipt of offers specified above, to furnish any or all items upon which prices are offered at the price set opposite each item, delivered at the designated point(s), within the time specified in the schedule.

13. DISCOUNT FOR PROMPT PAYMENT *(See Section I, Clause No. 52-232-8)* ▶	10 CALENDAR DAYS %	20 CALENDAR DAYS %	30 CALENDAR DAYS %	CALENDAR DAYS %

14. ACKNOWLEDGMENT OF AMENDMENTS *(The offeror acknowledges receipt of amendments to the SOLICITATION for offerors and related documents numbered and dated:*	AMENDMENT NO.	DATE	AMENDMENT NO.	DATE

15A. NAME AND ADDRESS OF OFFEROR	CODE	FACILITY	16. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER *(Type or print)*

15B. TELEPHONE NO. *(Include area code)*	15C. ☐ CHECK IF REMITTANCE ADDRESS IS DIFFERENT FROM ABOVE - ENTER SUCH ADDRESS IN SCHEDULE.	17. SIGNATURE	18. OFFER DATE

AWARD *(To be completed by Government)*

19. ACCEPTED AS TO ITEMS NUMBERED	20. AMOUNT	21. ACCOUNTING AND APPROPRIATION

22. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION:

☐ 10 U.S.C. 2304(c) ( ) ☐ 41 U.S.C. 253(c) ( )

23. SUBMIT INVOICES TO ADDRESS SHOWN IN ▶ *(4 copies unless otherwise specified)* ITEM

24. ADMINISTERED BY *(If other than Item 7)*	CODE	25. PAYMENT WILL BE MADE BY	CODE

26. NAME OF CONTRACTING OFFICER *(Type or print)*	27. UNITED STATES OF AMERICA *(Signature of Contracting Officer)*	28. AWARD DATE

IMPORTANT - Award will be made on this Form, or on Standard Form 26, or by other authorized official written notice.

PART I - THE SCHEDULE

SECTION B

SUPPLIES OR SERVICES AND PRICES/COSTS

B-1 SUPPLIES/SERVICES AND COSTS

ITEM NUMBER	SUPPLIES OR SERVICES	ESTIMATED COST	FIXED FEE	TOTAL EST. COST PLUS FIXED FEE
0001	Attitude Reference Unit (ARU) Qualification /Flight Unit in Accordance with Attachment No. 1.	$	$	$
0001AA	The Contractor shall design, fabricate, test, and verify one (1) ARU Qualification unit	* NSP	* NSP	* NSP
0001AB	After verification the contractor shall refurbish the ARU Qualification unit into one (1) Flight unit, test and deliver.	* NSP	* NSP	* NSP
0002	The contractor shall deliver two (2) ARU Flight Units in Accordance with Attachment No. 1.	$	$	$
0003	Data in accordance with Exhibit A (DD 1423) and Enclosure (1)	* NSP	* NSP	* NSP
TOTAL ESTIMATED COST PLUS FIXED FEE			$	$

* Not Separately Priced

SECTION C

DESCRIPTION/SPECIFICATIONS/STATEMENT OF WORK

C-1 STATEMENT OF WORK

The work and services to be performed hereunder shall be subject to the requirements and standards contained in Attachment (1), Specifications, Exhibit A, Contract Data Requirements List, and all other Attachments cited in Section J, which are incorporated by reference into Section C.

SECTION D

PACKAGING AND MARKING

D-1 PACKAGING AND MARKING

Preservation, packaging, packing and marking of all deliverable contract line items must conform to normal commercial packing standards to assure safe delivery at destination.

SECTION E

INSPECTION AND ACCEPTANCE

E-1 INSPECTION AND ACCEPTANCE CLAUSES INCORPORATED BY REFERENCE:

FAR CLAUSE TITLE

52.246-3 - Inspection Of Supplies- Cost Reimbursement (APR 1984)

DFARS CLAUSE TITLE

252.246-7000 - Material Inspection And Receiving Report (DEC 1991)

E-2 INSPECTION AND ACCEPTANCE

Inspection and acceptance of the final delivery under this contract must be accomplished by the Contracting Officer's Representative (COR) designated in Section G of this contract within fourteen (14) days after delivery of each item. Inspection and acceptance will be performed at the Naval Research Laboratory, Washington DC 20375-5326.

SECTION F

DELIVERIES OR PERFORMANCE

F-1 DELIVERIES OR PERFORMANCE CLAUSES INCORPORATED BY REFERENCE:

REQUIRED TIME OF DELIVERY

(a) The Government requires delivery to be made according to the following schedule:

REQUIRED DELIVERY SCHEDULE

ITEM NO.	QUANTITY	WITHIN Months AFTER DATE OF CONTRACT AWARD
0001	ALL	14 Months
0002	ALL	12 Months

F-2 PLACE OF DELIVERY - FOB DESTINATION

The contractor shall deliver supplies, all transportation charges paid, to destination in accordance with the clause in Section F of the Schedule titled FAR 52.247-34 FOB Destination (NOV 1991).

Receiving Officer
Naval Research Laboratory
Contract Number
ATTN: *
CODE: *
LOCATION: *
Bldg. 49
4555 Overlook Avenue, SW
Washington DC 20375-5320

(* To be filled in at time of award.)

F-3 DELIVERIES OR PERFORMANCE CLAUSES INCORPORATED BY REFERENCE:

FAR CLAUSE		TITLE
52.242-15	-	Stop-Work Order (AUG 1989) - Alternate I (APR 1984)
52.247-34	-	F.O.B. Destination (NOV 1991)

F-4 PLACE OF PERFORMANCE

(a) The principal place of performance of this contract shall be at the contractor's facility *

SECTION G

CONTRACT ADMINISTRATION DATA

G-1 PROCURING OFFICE REPRESENTATIVE

In order to expedite administration of this contract, the Administrative Contracting Officer (ACO) will direct inquiries to the appropriate office listed below. Please do not direct routine inquiries to the person listed in Item 20A on Standard Form 26.

Contract Matters Dan Brinkworth , Code 3230, (202) 767-6746, DSN 297-6746, or Telecopier (202)767-6197

Security Matters -Mr. Charles Rogers, Code 1221, (202) 767-2240, DSN 297-2240

Safety Matters -Mr. Kirk J. King, Code 1240, (202) 767-2232, DSN 297 2232

Patent Matters - Mr. Thomas McDonnell, Code 3008.2, (202) 767-3427, DSN 297-3427

Release of Data - Mr. Richard H. Baturin, Code 1230 (202) 767-2541, DSN 297-2541

The ACO will forward invention disclosures and reports directly to the Associate Counsel for Patents, Code 3008.2, Naval Research Laboratory, Washington DC 20375-5320. The Associate Counsel for Patents will return the reports along with a recommendation to the Administrative Contracting Officer. The Associate Counsel for Patents will represent the Contracting Officer with regard to invention reporting matters arising under this contract.

G-2 CONTRACTING OFFICER'S REPRESENTATIVE (COR) - FUNCTIONS AND LIMITATIONS

* is hereby designated the cognizant COR who will represent the Contracting Officer in the administration of technical details within the scope of this contract and inspection and acceptance. The COR is not otherwise authorized to make any representations or commitments of any kind on behalf of the Contracting Officer or the Government. The COR may be personally liable for unauthorized acts. The COR does not have the authority to alter the Contractor's obligations or change the specifications in the contract. If, as a result of technical discussions, it is desirable to alter contract obligations or statements of work, a modification must be issued in writing and signed by the Contracting Officer. The COR is responsible for reviewing the bills and charges submitted by the Contractor and informing the ACO of areas where exceptions are to be taken. This COR appointment shall be effective through the life of this contract unless otherwise relieved in writing and is not redelegable.

(* To be filled in at time of award)

G-3 ONR 5252.242-9718 - TECHNICAL DIRECTION (DEC 88)

(a) Performance of the work hereunder is subject to the technical direction of the Scientific Officer/COR designated in this contract or his duly authorized representative. For the purposes of this clause, technical direction includes the following:

(1) Direction to the Contractor which shifts work emphasis between work areas or tasks, requires pursuit of certain lines of inquiry, fills in details or otherwise serves to accomplish the objectives described in theSpecification;
(2) Guidelines to the Contractor which assist in the interpretation of drawings, specifications or technical portions of work description.

(b) Technical direction must be within the general scope of work stated in the contract. Technical instructions may not be used to:

(1) Assign additional work under the contract
(2) Direct a change as defined in the contract clause entitled "Changes";
(3) Increase or decrease the estimated contract cost, the fixed fee, or the time required for contract performance; or
(4) Change any of the terms, conditions or specifications of the contract.

(c) The only individual authorized to in any way amend or modify any of the terms of this contract shall be the Contracting Officer. When, in the opinion of the Contractor, any technical instruction calls for effort outside the scope of the contract or inconsistent with this special provision, the Contractor shall notify the Contracting Officer in writing within ten working days after its receipt. The Contractor shall not proceed with the work affected by the technical direction until the Contractor is notified by the Contracting Officer that the technical direction is within the scope of the contract.

(d) Nothing in the foregoing paragraphs may be construed to excuse the Contractor from performing that portion of work statement which is not affected by the disputed technical instruction.

G-4 NAPS 5252.232-9001 - SUBMISSION OF INVOICES (COST-REIMBURSEMENT, TIME-AND-MATERIALS, LABOR-HOUR, OR FIXED PRICE INCENTIVE (JUL 1992)

(a) "Invoice" as used in this clause includes contractor requests for interim payments using public vouchers (SF 1034) but does not include contractor requests for progress payments under fixed price incentive contracts.

(b) The Contractor shall submit invoices and any necessary supporting documentation, in an original and 4 copies, to the contract auditor at the following address:

(To be filled in at time of award)

unless delivery orders are applicable, in which case invoices will be segregated by individual order and submitted to the address specified in the order. In addition, an information copy shall be submitted to [See Section G for designated COR]. Following verification, the contract auditor will forward the invoice to the designated payment office for payment in the amount determined to be owing, in accordance with the applicable payment (and fee) clause(s) of this contract.

(c) Invoices requesting interim payments shall be submitted no more than once every two weeks, unless another time period is specified in the Payments clause of this contract. For indefinite delivery type contracts, interim payment invoices shall be submitted no more than once every two weeks for each delivery orders. There shall be a lapse of no more than 30 calendar days between performance and submission of an interim payment invoice.

(d) In addition to the information identified in the Prompt Payment clause herein, each invoice shall contain the following information, as applicable:

(1) Contract line item number (CLIN)
(2) Subline item number (SLIN)
(3) Accounting Classification Reference Number(ACRN)
(4) Payment terms
(5) Procuring activity
(6) Date supplies provided or services performed
(7) Costs incurred and allowable under the contract
(8) Vessel (e.g., ship, submarine or other craft) or system for which supply/service is provided

(e) A DD Form 250, "Material Inspection and Receiving Report",

__** __ is required with each invoice submittal.
__**X__ is required only with the final invoice.
__** __ is not required.

(f) A Certificate of Performance

__** __ shall be provided with each invoice submittal.
__** X__ is not required.

(g) The Contractor's final invoice shall be identified as such, and shall list all other invoices (if any) previously tendered under this contract.

(h) Cost of performance shall be segregated, accumulated and invoiced to the appropriate ACRN categories to the extent possible. When such segregation of costs by ACRN is not possible for invoices submitted with CLIN/SLINS with more than one ACRN, an allocation ratio shall be established in the same ratio as the obligations cited in the accounting data so that costs are allocated on a proportional basis.

G-5 INCREMENTAL FUNDING

This contract is incrementally funded pursuant to the Limitation of Funds clause, FAR 52.232-22. Funds are allotted to the contract in the amount of $ * and it is estimated that they are sufficient for contract performance through *.

(* To be filled in at time of award)

G-6 PAYMENT INSTRUCTIONS FOR MULTIPLE ACCOUNTING CLASSIFICATION CITATIONS (COST-REIMBURSEMENT)

The purpose of these instructions is to permit the paying office to charge the accounting classification citations in the contract in a manner that reflects the performance of the contract. These instructions do not create any obligation on the part of the Government or the contractor nor do they in any way alter any obligation created by any other provision of the contract. Invoices should be paid from available ACRNs in the following order:

(a) ACRNs cited on the contractor's invoice.

(b) On a proportional basis from any ACRNs assigned to funds which will cancel at the end of the current fiscal year.

(c) The ACRN assigned to the following line of accounting:

97X4930.NH4A 000 77777 0 000173 2F 000000 N00173Z45000.

(d) If funds appropriated in more than one fiscal year are allotted to the contract, the ACRN assigned to the oldest allotment of funds.

(e) On a proportional basis from all ACRNs assigned to allotments of funds appropriated in a single fiscal year.

G-7 ACCOUNTING AND APPROPRIATION DATA

(To be filled in at time of award)

SECTION H

SPECIAL CONTRACT REQUIREMENTS

H-1 TYPE OF CONTRACT

(To be filled in at time of award)

H-2 ONR 5252.237-9705 - KEY PERSONNEL (DEC 88)

(a) The Contractor agrees to assign to the contract tasks those persons whose resumes where submitted with its proposal and who are necessary to fulfill the requirements of the contract as "key personnel". No substitutions may be made except in accordance with this clause.

(b) The Contractor understands that during the first ninety (90) days of the contract performance period, no personnel substitutions will be permitted unless these substitutions are unavoidable because of the incumbent's sudden illness, death or termination of employment. In any of these events, the Contractor shall promptly notify the Contracting Officer and provide the information described in paragraph (c) below. After the initial ninety (90) day period the Contractor must submit to the Contracting Officer all proposed substitutions, in writing, at least fifteen (15) days in advance (thirty (30) days if security clearance must be obtained) of any proposed substitution and provide the information required by paragraph (c) below.

(c) Any request for substitution must include a detailed explanation of the circumstances necessitating the proposed substitution, a resume for the proposed substitute, and any other information requested by the Contracting Officer. Any proposed substitute must have qualifications

equal to or superior to the qualifications of the incumbent. The Contracting Officer or his/her authorized representative will evaluate such requests and promptly notify the Contractor of his/her approval or disapproval thereof.

(d) In the event that any of the identified key personnel cease to perform under the contract and the substitute is disapproved, the contract may be immediately terminated in accordance with the Termination clause of the contract.

The following are identified as key personnel:

(To be filled in at time of award)

H-3 SUBCONTRACTORS/CONSULTANTS

(a) The following subcontractors/consultants have been identified in the Contractor's proposal as necessary for performance of this contract.

Subcontractor/Consultant Name	Time or Unit	Estimated Cost

(To be filled in at time of award)

(b) The Contracting Officer's consent required by Paragraph (c) of the contract clause entitled "Subcontracts (Cost-Reimbursement and Letter Contracts)" is hereby given for the listed subcontracts/consultants unless (i) they are of the cost-reimbursement, time-and-materials, or labor-hour type and are estimated to exceed $10,000, including any fee, (ii) are proposed to exceed $100,000, or (iii) are one of a number of subcontracts with a single subcontractor, under this contract, for the same or related supplies or services that, in the aggregate, are expected to exceed $100,000. In such cases consent shall be requested from the Administrative Contracting Officer.

(c) Any changes to the above list must be authorized by the Administrative Contracting Officer (ACO).

H-4 ONR 5252.235-9714 - REPORT PREPARATION (FEB 97)

Scientific or technical reports prepared by the Contractor and deliverable under the terms of this contract will be prepared in accordance with format requirements contained in ANSI/NISO Z39.18-1995, “Scientific and Technical Reports: Elements, Organization, and Design.”
[NOTE: ANSI Z39.18 may be obtained from NISO Press Fulfillment Center, P. O. Box 338, Oxon Hill, MD. 20750-0338. Telephone 1-800-282-6476]

H-5 { CONTRACTOR-ACQUIRED PROPERTY

(a) The contractor is authorized to acquire the following items of facilities which are needed to accomplish this contract.

Items to be Acquired	Estimated Cost

(To be filled in at time of award)

(b) The Contracting Officer's consent required by Paragraph (c) of the contract clause entitled, "Subcontracts (Cost-Reimbursement and Letter Contracts)" is hereby given for acquisition of the above items unless (i) they are to be acquired under a cost-reimbursement, time-and-materials, or labor-hour type subcontract estimated to exceed $10,000, including any fee, (ii) the acquisition cost of any item exceeds $100,000, or (iii) they are to be acquired under one or more of a number of subcontractors with a single subcontractor, under this contract, for the same or related items that, in the aggregate, are expected to exceed $100,000. In such cases consent shall be requested from the Administrative Contracting Officer.

(c) Pursuant to the contract clause entitled "Government Property (Cost-Reimbursement, Time-and-Material, or Labor-Hour Contracts)," title to the property shall vest in the Government.

(d) Prior to acquisition of any item of Industrial Plant Equipment, the Contractor must comply with the requirements of Department of Defense Federal Acquisition Regulation Supplement (DFARS 245.302-1(b)(1)(A). (See DFARS 245.301 for definition of "Industrial Plant Equipment.")

H-6 REPRESENTATIONS AND CERTIFICATIONS

The Contractor’s completed Representations, Certifications, and Other Statements of Offerors or Respondents is incorporated herein by reference in any resultant award.

PART II - CONTRACT CLAUSES

SECTION I

CONTRACT CLAUSES

I-1 52.252-2 - CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

http://www-far.npr.gov/References/References.html
http://www.heron.nrl.navy.mil/contracts/home/htm

a. FEDERAL ACQUISITION REGULATION CLAUSES

FAR CLAUSE		TITLE
52.202-1	-	Definitions (OCT 1995)
52.203-3	-	Gratuities (APR 1984)
52.203-5	-	Covenant Against Contingent Fees (APR 1984)
52.203-6	-	Restrictions On Subcontractor Sales To The Government (JUL 1995)
52.203-7	-	Anti-Kickback Procedures (JUL 1995)
52-203-8	-	Cancellation, Rescission, And Recovery Of Funds For Illegal Or Improper Activity (JAN 1997)
52.203-10	-	Price Or Fee Adjustment For Illegal Or Improper Activity (JAN 1997)
52.203-12	-	Limitation On Payments To Influence Certain Federal Transactions (JUN 1997)
52.204-4	-	Printing/Copying Double-Sided On Recycled Paper (JUN 1996)
52.209-6	-	Protecting The Government's Interest When Subcontracting With Contractors Debarred, Suspended, Or Proposed For Debarment (JUL 1995)
52.211-15	-	Defense Priority and Allocation Requirements (SEP 1990)
52.215-2	-	Audit And Records-Negotiation (AUG 1996)
52.215-8	-	Order of Precedence - Uniform Contract Format (OCT 1997)
52.215-11	-	Price Reduction for Defective Cost or Pricing Data - Modifications (OCT 1997)
52.215-13	-	Subcontractor Cost or Pricing Data Modifications (OCT 1997)
52.215-14	-	Integrity of Unit Prices (OCT 1997)
52.215-17	-	Waiver of Facilities Capital Cost of Money (OCT 1997)

52.215-21 - Requirements for Cost or Pricing Data or Information Other Than Cost or Pricing Data -Modifications (OCT 1997)
52.216-7 - Allowable Cost And Payment (FEB 1998)
52.216-8 - Fixed-Fee (MAR 1997)
52.219-8 - Utilization Of Small, Small Disadvantaged And Women-Owned Small Business Concerns (JUN 1997)
52.219-9 - Small, Small Disadvantaged and Women-Owned Small Business Subcontracting Plan (AUG 1996) - Alternate II (MAR 1996)
52.219-16 - Liquidated Damages-Subcontracting Plan (OCT 1995)
52.222-1 - Notice To The Government Of Labor Disputes (FEB 1997)
52.222-2 - Payment For Overtime Premiums (JUL 1990) -The Use Of Overtime Is Authorized Under This Contract If The Overtime Premium Does Not Exceed _"0"_
52.222-3 - Convict Labor (AUG 1996)
52.222-26 - Equal Opportunity (APR 1984)
52.222-35 - Affirmative Action For Special Disabled And Vietnam Era Veterans (APR 1984)
52.222-36 - Affirmative Action For Handicapped Workers (APR 1984)
52.222-37 - Employment Reports On Special Disabled Veterans And Veterans Of The Vietnam Era (JAN 1988)
52.223-2 - Clean Air And Water (APR 1984)
52.223-6 - Drug-Free Workplace (JAN 1997)
52.223-14 - Toxic Chemical Release Reporting (OCT 1996)
52.225-11 - Restrictions On Certain Foreign Purchases (OCT 1996)
52.226-1 - Utilization Of Indian Organizations And Indian-Owned Economic Enterprises (SEP 1996)
52.227-1 - Authorization And Consent (JUL 1995)
52.227-2 - Notice And Assistance Regarding Patent And Copyright Infringement (AUG 1996)
52.227-11 - Patent Rights - Retention By The Contractor (Short Form) (JUN 1997)
52.227-12 - Patent Rights - Retention By The Contractor (Long Form) (JAN 1997)
52.228-7 - Insurance - Liability To Third Persons (MAR 1996)
52.230-2 - Cost Accounting Standards (APR 1996)
52.230-3 - Disclosure And Consistency Of Cost Accounting Practices (APR 1996)
52.230-6 - Administration Of Cost Accounting Standards (APR 1996)
52.232-9 - Limitation On Withholding Of Payments (APR 1984)
52.232-17 - Interest (JUN 1996)
52.232-18 - Availability Of Funds (APR 1984)
52.232-20 - Limitation Of Cost (APR 1984) (Applicable when the contract or task order is fully funded)
52.232-22 - Limitation Of Funds (APR 1984) (Applicable when the contract or task order is not fully funded)
52.232-23 - Assignment Of Claims (JAN 1986) Alternate I (APR 1984)
52.232-25 - Prompt Payment (JUN 1997)
52.232-33 - Mandatory Information For Electronic Funds Transfer Payment (AUG 1996)
52.233-1 - Disputes (OCT 1995)
52.233-3 - Protest After Award (AUG 1996) - Alternate I (JUN 1985)
52.242-1 - Notice Of Intent To Disallow Costs (APR 1984)

52.242-3 - Penalties For Unallowable Costs (OCT 1995)
52.242-4 - Certification of Final Indirect Costs (JAN 1997)
52.242-13 - Bankruptcy (JUL 1995)
52.243-2 - Changes - Cost-Reimbursement (AUG 1987)
52.244-2 - Subcontracts (Cost-Reimbursement And Letter Contracts) (OCT 1997) - Alternate I (AUG 1996)
52.244-5 - Competition In Subcontracting (DEC 1996)
52.244-6 - Subcontracts for Commercial Items and Commercial Components (OCT 1995)
52.245-5 - Government Property (Cost-Reimbursement, Time-And-Material, Or Labor-Hour Contracts) (JUL 1995) (DEVIATION)
52.245-9 - Use And Charges (APR 1984) (DEVIATION)
52.245-18 - Special Test Equipment (FEB 1993)
52.246-23 - Limitation Of Liability (FEB 1997)
52.246-24 - Limitation Of Liability - High-Value Items (FEB 1997)
52.247-1 - Commercial Bill Of Lading Notations (APR 1984)
52.247-63 - Preference For U. S. Flag Carriers (JAN 1997)
52.249-6 - Termination (Cost-Reimbursement) (SEP 1996)
52.249-14 - Excusable Delays (APR 1984)
52.251-1 - Government Supply Sources (APR 1984)
52.252-6 - Authorized Deviations in Clauses (APR 1984) fill in 52.245-9 and 52.245-5
52.253-1 - Computer Generated Forms (JAN 1991)

b. DEPARTMENT OF DEFENSE FEDERAL ACQUISITION REGULATION CLAUSES

DFARS CLAUSE		TITLE
252.201-7000	-	Contracting Officer's Representative (DEC 1991)
252.203-7001	-	Special Prohibition On Employment (JUN 1997)
252.204-7003	-	Control Of Government Personnel Work Product (APR 1992)
252.205-7000	-	Provision Of Information To Cooperative Agreement Holders (DEC 1991)
252.209-7000	-	Acquisition From Subcontractors Subject To On-Site Inspection Under The Intermediate-Range Nuclear Forces (INF) Treaty (NOV 1995)
252.219-7003	-	Small Business And Small Disadvantaged Business Subcontracting Plan (DoD Contracts) (APR 1996)
252.219-7005	-	Incentive For Subcontracting With Small Businesses, Small Disadvantaged Businesses, Historically Black Colleges And Universities And Minority Institutions (NOV 1995) If the Contractor exceeds the small disadvantaged business, historically black college and university, minority institution goal of its subcontracting plan, at completion of contract performance, the Contractor will receive 1 percent of the excess.
252.225-7001	-	Buy American Act And Balance Of Payments Program (JAN 1994)
252.225-7002	-	Qualifying Country Sources As Subcontractors (DEC 1991)
252.225-7009	-	Duty Free Entry- Qualifying Country End Products And Supplies (JAN 1997)
252.225-7010	-	Duty Free Entry - Additional Provisions (JAN 1997)

252.225-7012 - Preference For Certain Domestic Commodities (FEB 1997)
252.225-7026 - Reporting Of Contract Performance Outside The United States (NOV 1995)
252.225-7031 - Secondary Arab Boycott Of Israel (JUN 1992)
252.227-7000 - Non Estoppel (OCT 1966)
252.227-7001 - Release Of Past Infringement (AUG 1984)
252.227-7013 - Rights In Technical Data -- Noncommercial Items (NOV 1995)
252.227-7014 - Rights In Noncommercial Computer Software And Noncommercial Computer Software Documentation (JUN 1995)
252.227-7016 - Rights In Bids or Proposal Information (JUN 1995)
252.227-7019 - Validation Of Asserted Restrictions--Computer Software (JUN 1995)
252.227-7030 - Technical Data--Withholding Of Payment (OCT 1988)
252.227-7034 - Patents--Subcontracts (APR 1984)
252.227-7036 - Declaration Of Technical Data Conformity (JAN 1997)
252.227-7037 - Validation Of Restrictive Markings On Technical Data (NOV 1995)
252.227-7039 - Patents--Reporting of Subject Inventions (APR 1990)
252.231-7000 - Supplemental Cost Principles (DEC 1991)
252.232-7006 - Reduction Or Suspension Of Contract Payments Upon Finding Of Fraud (AUG 1992)
252.242-7000 - Post Award Conference (DEC 1991)
252.242-7004 - Material Management And Accounting System (SEP 1996)
252.243-7002 Certification of Requests for Equitable Adjustment (JUL 1997)
252.245-7001 - Reports of Government Property (MAY 1994)
252.246-7001 - Warranty Of Data (DEC 1991)
252.247-7023 - Transportation Of Supplies By Sea (NOV 1995)
252.247-7024 - Notification Of Transportation Of Supplies By Sea (NOV 1995)
252.251-7000 - Ordering From Government Supply Sources (MAY 1995)

I-2 FAR 52.223-11 - OZONE-DEPLETING SUBSTANCES (JUN 1996)

(a) Definitions.
“Ozone-depleting substance”, as used in this clause, means any substance designated as Class I by the Environmental Protection Agency (EPA) (40 CFR Part 82), including but not limited to chlorofluorocarbons, halons, carbon tetrachloride, and methyl chloroform; or any substance designated as Class II by EPA (40 CFR Part 82), including but not limited to hydrochlorofluorocarbons.

(b) The Contractor shall label products which contain or are manufactured with ozone-depleting substances in the manner and to the extent required by 42 U.S.C. 7671j (b), (c), and (d) and 40 CFR Part 82, Subpart E, as follows:
"WARNING: Contains (or manufactured with, if applicable)_____*_____, a substance(s) which harm(s) public health and environment by destroying ozone in the upper atmosphere."

* The Contractor shall insert the name of the substance(s).

I-3 DFARS 252.225-7008 - SUPPLIES TO BE ACCORDED DUTY- FREE ENTRY (DEC 1991)

In accordance with paragraph (a) of the Duty-Free Entry clause and/or paragraph (b) of the Duty-Free Entry--Qualifying Country End Products and Supplies clause of this contract, the following supplies are accorded duty-free entry:

_____

_____

_____

PART III - LIST OF DOCUMENTS, EXHIBITS, AND OTHER ATTACHMENTS

SECTION J

LIST OF ATTACHMENTS

J-1 Attachment (1) - Specifications – 66 pages, With Exhibit A - DD Form 1423, Contract Data Requirements And Enclosure (1) - Instructions For Distribution-5 pages

PART IV - REPRESENTATIONS AND INSTRUCTIONS

SECTION - K

REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF OFFERORS OR RESPONDENTS

K-1 The following Representations, Certifications, and Other Statements Of Offerors or Respondents are incorporated by reference with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available.

FAR CLAUSE		**TITLE**
52.203-11	-	Certification And Disclosure Regarding Payments To Influence Certain Federal Transactions (APR 1991)

DFARS CLAUSE		**TITLE**
252.209-7001	-	Disclosure Of Ownership Or Control By The Government Of A Terrorist Country (SEP 1994)

K-2 FAR 52.204-3 - TAXPAYER IDENTIFICATION (JUN 1997)

(a) *Definitions.*

"Common parent," as used in the solicitation provision, means that corporate entity that owns or controls an affiliated group of corporations that files its Federal income tax returns on a consolidated basis, and of which the offeror is a member.

"Corporate status," as used in this solicitation provision, means a designation as to whether the offeror is a corporate entity, an unincorporated entity, (e.g., sole proprietorship or partnership), or corporation providing medical and health care services.

"Taxpayer Identification Number (TIN)," as used in this solicitation provision, means the number required by the IRS to be used by the offeror in reporting income tax and other returns.

(b) All offerors are required to submit the information required in paragraphs (c) through (e) of this solicitation provision in order to comply with reporting requirements of 26 U.S.C. 6041, 6041A, and 6050M and implementing regulations issued by the Internal Revenue Service (IRS). If the resulting contract is subject to reporting requirements described in FAR 4.903, the failure or refusal by the offeror to furnish the information may result in a 31 percent reduction of payments otherwise due under the contract.

(c) *Taxpayer Identification Number (TIN)*.

☐ TIN:_____.
☐ TIN has been applied for.
☐ TIN is not required because:
☐ Offeror is a nonresident alien, foreign corporation, or foreign partnership that does not have income effectively connected with the conduct of a trade or business in the U.S. and does not have an office or place of business or a fiscal paying agent in the U.S.;
☐ Offeror is an agency or instrumentality of a foreign government;
☐ Offeror is an agency or instrumentality of a Federal, state, or local government;
☐ Other. State basis. _____

(d) *Corporate Status.*

☐ Corporation providing medical and health care services, or engaged in the billing and collecting of payments for such services;
☐ Other corporate entity;
☐ Not a corporate entity;
☐ Sole proprietorship
☐ Partnership
☐ Hospital or extended care facility described in 26 CFR 501(c)(3) that is exempt from taxation under 26 CFR 501(a).

(e) *Common Parent*.

☐ Offeror is not owned or controlled by a common parent as defined in paragraph (a) of this clause.
☐ Name and TIN of common parent:

Name _____
TIN _____

K-3 FAR 52.204-5 -WOMAN-OWNED BUSINESS (OCT 1995)

(a) *Representation*. The offeror represents that it ☐ is, ☐ is not a women-owned business concern.

(b) *Definition*. "Women-owned business concern," as used in this provision, means a concern which is at least 51 percent owned by one or more women; or in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and whose management and daily business operations are controlled by one or more women.

K-4 FAR 52.209-5 - CERTIFICATION REGARDING DEBARMENT, SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY MATTERS (MAR 1996)

(a)(1) The Offeror certifies, to the best of its knowledge and belief, that-

(i) The Offeror and/or any of its Principals-

(A) Are ☐ are not ☐ presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;

(B) Have ☐ have not ☐, within a 3-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; and

(C) Are ☐ are not ☐ presently indicted for, or otherwise criminally or civilly charged by a governmental entity with commission of any of the offenses enumerated in subdivision (a)(1)(i)(B) of this provision.

(ii) The Offeror has ☐ has not ☐, within a 3-year period preceding this offer, had one or more contracts terminated for default by any Federal agency.

(2) "Principals," for the purposes of this certification, means officers; directors; owners; partners; and persons having primary management or supervisory responsibilities within a business entity (e.g., general manager; plant manager; head of a subsidiary, division, or business segment, and similar positions).

THIS CERTIFICATION CONCERNS A MATTER WITHIN THE JURISDICTION OF AN AGENCY OF THE UNITED STATES AND THE MAKING OF A FALSE, FICTITIOUS, OR FRAUDULENT CERTIFICATION MAY RENDER THE MAKER SUBJECT TO PROSECUTION UNDER SECTION 1001, TITLE 18, UNITED STATES CODE.

(b) The Offeror shall provide immediate written notice to the Contracting Officer if, at any time prior to contract award, the Offeror learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

(c) A certification that any of the items in paragraph (a) of this provision exists will not necessarily result in withholding of an award under this solicitation. However, the certification will be considered in connection with a determination of the Offeror's responsibility. Failure of the Offeror to furnish a certification or provide such additional information as requested by the Contracting Officer may render the Offeror non-responsible.

(d) Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by paragraph (a) of this provision. The knowledge and information of an Offeror is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

(e) The certification in paragraph (a) of this provision is a material representation of fact upon which reliance was placed when making award. If it is later determined that the Offeror knowingly rendered an erroneous certification, in addition to other remedies available to the Government, the Contracting Officer may terminate the contract resulting from this solicitation for default.

K-5 FAR 52.215-4 -TYPE OF BUSINESS ORGANIZATION (OCT 1997)

The offeror or respondent, by checking the applicable box, represents that -

(a) It operates as ☐ an individual, ☐ a partnership, ☐ a nonprofit organization, ☐ a joint venture, or ☐ a corporation incorporated under the laws of the State of _____.

(b) If the offeror or respondent is a foreign entity, it operates as ☐ an individual, ☐ a partnership, ☐ a nonprofit organization, ☐ a joint venture, or ☐ a corporation, registered for business in _____.
(country)

K-6 FAR 52.215-6 -PLACE OF PERFORMANCE (OCT 1997)

(a) The offeror or respondent, in the performance of any contract resulting from this solicitation, ☐ intends, ☐ does not intend [check applicable block] to use one or more plants or facilities located at a different address from the address of the offeror or respondent as indicated in this proposal or response to request for information.

(b) If the offeror or respondent checks "intends" in paragraph (a) of this provision, it shall insert in the following spaces the required information:

PLACE OF PERFORMANCE (STREET ADDRESS, CITY, STATE, COUNTY, ZIP CODE)	NAME AND ADDRESS OF OWNER AND OPERATOR OF THE PLANT OR FACILITY IF OTHER THAN OFFEROR OR RESPONDENT
_____	_____
_____	_____

K-7 FAR 52.219-1 - SMALL BUSINESS PROGRAM REPRESENTATIONS (JAN 1997)

(a) (1) The standard industrial classification (SIC) code for this acquisition is__3812_____.

(2) The small business size standard is __750_____.

(3) The small business size standard for a concern which submits an offer in its own name, other than on a construction or service contract, but which proposes to furnish a product which it did not itself manufacture, is 500 employees.

(b) *Representation*.

(1) The offeror represents as part of its offer that it ☐ is , ☐ is not a small business concern.

(2) (Complete only if offeror represented itself as a small business concern in block (b)(1) of this section.) The offeror represents as part of its offer that it ☐ is, ☐ is not a small disadvantaged business concern.

(3) (Complete only if offeror represented itself as a small business concern in block (b)(1) of this section.) The offeror represents as part of its offer that it ☐ is, ☐ is not a women-owned small business concern.

(c) *Definitions.* ”Small business concern”, as used in this provision, means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria in CFR Part 121 and the size standard in paragraph (a) of this provision.

“Small disadvantaged business concern”, as used in this provision, means a small business concern that (1) is at least 51 percent unconditionally owned by one or more individuals who are both socially and economically disadvantaged, or a publicly owned business having at least 51 percent of its stock unconditionally owned by one or more socially and economically disadvantaged individuals, and (2) has it management and daily business controlled by one or more such individuals. This term also means a small business concern that is at least 51 percent unconditionally owned by an economically disadvantaged Indian tribe or Native Hawaiian Organization, or a publicly owned business having at least 51 percent of its stock unconditionally owned by one or more of these entities, which has it management and daily business controlled by members of an economically disadvantaged Indian tribe or Native Hawaiian Organization, and which meets requirements of 13 CFR Part 124.

“Women-owned small business concern”, as used in this provision, means a small business concern -

(1) Which is at least 51 percent owned by one or more women or, in the case of any publicly owned business , at least 51 percent of the stock of which is owned by one ore more women; and

(2) Whose management and daily business operations are controlled by one ore more women.

(d) *Notice.*

(1) If this solicitation is for supplies and has been set aside, in whole or in part, for small business concerns, then the clause in this solicitation providing notice of the set-aside contains restrictions on the source of the end items to be furnished.

(2) Under 15 U.S.C. 645(d), any person who misrepresents a firm's status as a small or small disadvantaged business concern in order to obtain a contract to be awarded under the preference programs established pursuant to sections 8(a), 8(d), 9, or 15 of the Small Business Act or any other provision of Federal law that specifically references section 8(d) for a definition of program eligibility, shall --

(i) Be punished by imposition of fine, imprisonment, or both;

(ii) Be subject to administrative remedies, including suspension and debarment; and

(iii) Be ineligible for participation in programs conducted under the authority of the Act.

K-8 FAR 52.222-22 - PREVIOUS CONTRACTS AND COMPLIANCE REPORTS (APR 1984)

The offeror represents that--

(a) It ☐ has, ☐ has not participated in a previous contract or subcontract subject either to the Equal Opportunity clause of this solicitation, the clause originally contained in Section 310 of Executive Order No. 10925, or the clause contained in Section 201 of Executive Order No. 11114;

(b) It ☐ has, ☐ has not, filed all required compliance reports; and

(c) Representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained before subcontract awards.

K-9 FAR 52.222-25 - AFFIRMATIVE ACTION COMPLIANCE (APR 1984)

The offeror represents that--

(a) It ☐ has developed and has on file, ☐ has not developed and does not have on file, at each establishment, affirmative action programs required by the rules and regulations of the Secretary of Labor (41 CFR 60-1 and 60-2), or

(b) It ☐ has not previously had contracts subject to the written affirmative action programs requirement of the rules and regulations of the Secretary of Labor.

K-10 FAR 52.223-1 - CLEAN AIR AND WATER CERTIFICATION (APR 1984)

The Offeror certifies that--

(a) Any facility to be used in the performance of this proposed contract is ☐, is not ☐ listed on the Environmental Protection Agency List of Violating Facilities;

(b) The Offeror will immediately notify the Contracting Officer, before award, of the receipt of any communication from the Administrator, or a designee, of the Environmental Protection Agency, indicating that any facility that the Offeror proposes to use for the performance of the contract is under consideration to be listed on the EPA List of Violating Facilities; and

(c) The Offeror will include a certification substantially the same as this certification, including this paragraph (c), in every nonexempt subcontract.

K-11 FAR 52.223-13 - CERTIFICATION OF TOXIC CHEMICAL RELEASE REPORTING (OCT 1996)

(a) Submission of this certification is a prerequisite for making or entering into this contract imposed by Executive Order 12969, August 8, 1995.

(b) By signing this offer, the offeror certifies that --

(1) As the owner or operator of facilities that will be used in the performance of this contract that are subject to the filing and reporting requirements described in section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) (42 U.S.C. 11023) and section 6607 of the Pollution Prevention Act of 1990 (PPA) (42 U.S.C. 13106), the offeror will file and continue to file for such facilities for the life of the contract the Toxic Chemical Release Inventory Form (Form R) as described in sections 313(a) and (g) of EPCRA and section 6607 of PPA; or

(2) None of its owned or operated facilities to be used in the performance of this contract is subject to the Form R filing and reporting requirements because each such facility is exempt for at least one of the following reasons: (*Check each block that is applicable*)

☐ (I) The facility does not manufacture, process, or otherwise use any toxic chemicals listed under section 313(c) of EPCRA, 42 U.S.C. 11023(c);
☐ (ii) The facility does not have 10 or more full-time employees as specified in section 313(b)(1)(A) of EPCRA, 42 U.S.C. 11023(b)(1)(A);

☐ (iii) The facility does not meet the reporting thresholds of toxic chemicals established under section 313(f) of EPCRA, 42 U.S.C. 11023(f) (including the alternate thresholds at 40 CFR 372.27, provided an appropriate certification form has been filed with EPA);

☐ (iv)The facility does not fall within Standard Industrial Classification Code (SIC) designations 20 through 39 as set forth in section 19.102 of the Federal Acquisition Regulation; or

☐ (v) The facility is not located within any State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, the Northern Mariana Islands, or any other territory or possession over which the United States has jurisdiction.

K-12 FAR 52.226-2 - HISTORICALLY BLACK COLLEGE OR UNIVERSITY AND MINORITY INSTITUTION REPRESENTATION (MAY 1997)

(a) *Definitions*. As used in this provision--

"Historically Black College or University" means an institution determined by the Secretary of Education to meet the requirements of 34 CFR 608.2. For the Department of Defense, the National Aeronautics and Space Administration, and the Coast Guard, the term also includes any nonprofit research institution that was an integral part of such a college or university before November 14, 1986.

"Minority Institution" means an institution of higher education meeting the requirements of Section 1046(3) of the Higher Education Act of 1965 (20 U.S.C. 1135d-5(3)) which, for the purpose of this provision, includes a Hispanic-serving institution of higher education as defined in Section 316(b)(1) of the Act (20 U.S.C. 1059c(b)(1)).

(b) *Representation*. The offeror represents that it--

☐ is ☐ is not a Historically Black College or University;

☐ is ☐ is not a Minority Institution.

K-13 FAR 52.227-6 - ROYALTY INFORMATION (APR 1984)

(a) *Cost or charges for royalties*. When the response to this solicitation contains costs or charges for royalties totaling more than $250, the following information shall be included in the response relating to each separate item of royalty or license fee:

(1) Name and address of licenser.
(2) Date of license agreement.

(3) Patent numbers, patent application serial numbers, or other basis on which the royalty is payable.
(4) Brief description, including any part or model numbers of each contract item or component on which the royalty is payable.
(5) Percentage or dollar rate of royalty per unit.
(6) Unit price of contract item.
(7) Number of units.
(8) Total dollar amount of royalties.

(b) *Copies of current licenses.* In addition, if specifically requested by the Contracting Officer before execution of the contract, the offeror shall furnish a copy of the current license agreement and an identification of applicable claims of specific patents.

K-14 FAR 52.230-1 - COST ACCOUNTING STANDARDS NOTICES AND CERTIFICATION (APR 1996) ALTERNATE I (APR 1996)

Note: This notice does not apply to small businesses or foreign governments. This notice is in three parts, identified by Roman numerals I through III.

Offerors shall examine each part and provide the requested information in order to determine Cost Accounting Standards (CAS) requirements applicable to any resultant contract.
If the offeror is an educational institution, Part II does not apply unless the contemplated contract will be subject to full or modified CAS coverage pursuant to 48 CFR 9903.201-2(c)(5) or 9903.201-2(c)(6), respectively.

I. DISCLOSURE STATEMENT--COST ACCOUNTING PRACTICES AND CERTIFICATION

(a) Any contract in excess of $500,000 resulting from this solicitation, except contracts in which the price negotiated is based on (1) established catalog or market prices of commercial items sold in substantial quantities to the general public, or (2) prices set by law or regulation, will be subject to the requirements of the Cost Accounting Standards Board (48CFR Chapter 99), except for those contracts which are exempt as specified in 48 CFR 9903.201-1.
(b) Any offeror submitting a proposal which, if accepted, will result in a contract subject to the requirements of 48 CFR Chapter 99 must, as a condition of contracting, submit a Disclosure Statement as required by 48 CFR 9903.202. When required, the Disclosure Statement must be submitted as a part of the offeror's proposal under this solicitation unless the offeror has already submitted a Disclosure Statement disclosing the practices used in connection with the pricing of this proposal. If an applicable Disclosure Statement has already been submitted, the offeror may satisfy the requirement for submission by providing the information requested in paragraph (c) of Part I of this provision.

CAUTION: In the absence of specific regulations or agreement, a practice disclosed in a Disclosure Statement shall not, by virtue of such disclosure, be deemed to be a proper, approved, or

agreed-to practice for pricing proposals or accumulating and reporting contract performance cost data.

(c) Check the appropriate box below:

☐ (1) Certificate of Concurrent Submission of Disclosure Statement.

The offeror hereby certifies that, as a part of the offer, copies of the Disclosure Statement have been submitted as follows:

(i) original and one copy to the cognizant Administrative Contracting Officer (ACO) or cognizant Federal agency official authorized to act in that capacity (Federal Official), as applicable, and (ii) one copy to the cognizant Federal auditor.

(Disclosure must be on Form No. CASB DS-1 or CASB DS-2, as applicable. Forms may be obtained from the cognizant ACO or Federal official and/or from the loose-leaf version of the Federal Acquisition Regulation.)

Date of Disclosure Statement:_____

Name and Address of Cognizant ACO where filed:_____

The offeror further certifies that practices used in estimating costs in pricing this proposal are consistent with the cost accounting practices disclosed in the Disclosure Statement.

☐ (2) Certificate of Previously Submitted Disclosure Statement

The offeror hereby certifies that Disclosure Statement was filed as follows:

Date of Disclosure Statement:_____

Name and Address of Cognizant ACO or Federal Official Where Filed:_____

The offeror further certifies that the practices used in estimating costs in pricing this proposal are consistent with the cost accounting practices disclosed in the applicable Disclosure Statement.

☐ (3) Certificate of Monetary Exemption

The offeror hereby certifies that the offeror, together with all divisions, subsidiaries, and affiliates under common control, did not receive net awards of negotiated national defense prime contracts and subcontracts subject to CAS totaling more than $25 million (of which at least one award exceeded $1 million) in the cost accounting period immediately preceding the period in which this proposal was submitted. The offeror further certifies that if such status changes before an award resulting from this proposal, the offeror will advise the Contracting Office immediately.

☐ (4) Certificate of Interim Exemption

The offeror hereby certifies that (i) the offeror first exceeded the monetary exemption for

disclosure, as defined in (3) of this subsection, in the cost accounting period immediately preceding the period in which this offer was submitted and (ii) in accordance with 48 CFR 9903.202-1, the offeror is not yet required to submit a Disclosure Statement. The offeror further certifies that if an award resulting from this proposal has not been made within 90 days after the end of that period, the offeror will immediately submit revised a certificate to the Contracting Officer, in the form specified under subparagraphs (c)(1) or (c)(2) of Part I of this provision, as appropriate, to verify submission of completed Disclosure Statement.

CAUTION: Offerors currently required to disclose because they were awarded a CAS-covered prime contract or subcontract of $25 million or more in the current cost accounting period may not claim this exemption (4). Further, the exemption applies only in connection with proposals submitted before expiration of the 90-day period following the cost accounting period in which the monetary exemption was exceeded.

II. COST ACCOUNTING STANDARDS - ELIGIBILITY FOR MODIFIED CONTRACT COVERAGE

If the offeror is eligible to use the modified provisions of 48 CFR 9903.201-2(b) and elects to do so, the offeror shall indicate by checking the box below. Checking the box below shall mean that the resultant contract is subject to the Disclosure and Consistency of Cost Accounting Practices clause in lieu of the Cost Accounting Standards clause.

☐ The offeror hereby claims an exemption from the Cost Accounting Standards clause under the provisions of 48 CFR 9903.201-2(b) and certifies that the offeror is eligible for use of the Disclosure and Consistency of Cost Accounting Practices clause because during the cost accounting period immediately preceding the period in which this proposal was submitted, the offeror received less than $25 million in awards of CAS-covered prime contracts and subcontracts, or the offeror did not receive a single CAS-covered award exceeding $1 million. The offeror further certifies that if such status changes before an award resulting from this proposal, the offeror will advise the Contracting Officer immediately.

CAUTION: An offeror may not claim the above eligibility for modified contract coverage if this proposal is expected to result in the award of a CAS-covered contract of $25 million or more or if, during its current cost accounting period, the offeror has been awarded a single CAS-covered prime contract or subcontract of $25 million or more.

III. ADDITIONAL COST ACCOUNTING STANDARDS APPLICABLE TO EXISTING CONTRACTS.

The offeror shall indicate below whether award of the contemplated contract would, in accordance with paragraph (a)(3) of the Cost Accounting Standards clause, require a change in established cost accounting practices affecting existing contracts and subcontracts.

☐ YES ☐ NO

☐ (5) Certificate of Disclosure Statement Due Date by Educational Institution. If the offeror is an educational institution that, under the transition provisions of 48 CFR 9903.202-1(f), is or will be required to submit a Disclosure Statement after receipt of this award, the offeror hereby certifies that (check one and complete):

☐ (i) A disclosure Statement Filing Due Date of _____has been established with the cognizant Federal agency.

☐ (ii) The Disclosure Statement will be submitted within the 6-month period ending _____months after receipt of this award.

Name and Address of Cognizant ACO or Federal Official Where Disclosure Statement is to be Filed:_____
_____
.

K-15 DFARS 252.209-7002 DISCLOSURE OF OWNERSHIP OR CONTROL BY A FOREIGN GOVERNMENT (SEP 1994)

(a) *Definitions.*

As used in this provision --

(1) "Effectively owned or controlled" means that a foreign government or any entity controlled by a foreign government has the power, either directly or indirectly, whether exercised or exercisable, to control or influence the election, appointment, or tenure of the Offeror's board of directors by any means, e.g., ownership, contract, or operation of law (or equivalent power for unincorporated organizations).

(2) "Entity controlled by a foreign government" --

(i) Means --

(A) Any domestic or foreign organization or corporation that is effectively owned or controlled by a foreign government; or

(B) Any individual acting on behalf of a foreign government.

(ii) Does not include an organization or corporation that is owned, but is not controlled, either directly or indirectly, by a foreign government of the ownership of that organization or corporation by that foreign government was effective before October 23, 1992.

(3) "Foreign government" includes the state and the government of any country (other than the United States and its possessions and trust territories) as well as any political subdivision, agency, or instrumentality thereof.

(4) "Proscribed information" means --

(i) Top Secret information;

(ii) Communications Security (COMSEC) information, except classified keys used to operate secure telephone units (STU IIIs);

(iii) Restricted Data as defined in the U.S. Atomic Energy Act of 1954, as amended;

(iv) Special Access Program (SAP) information; or

(v) Sensitive Compartmented Information (SCI).

(b) *Prohibited on award.*
No contract under a national security program may be awarded to an entity controlled by a foreign government if that company requires access to proscribed information to perform the contract, unless the Secretary of Defense or a designee has waived application of 10 U.S.C. 2536(a).

(c) *Disclosure.*
The Offeror shall disclose any interest a foreign government has in the Offeror when that interest constitutes control by a foreign government as defined in this provision. If the Offeror is a subsidiary, it shall also disclose any reportable interest a foreign government has in any entity that owns or controls the subsidiary, including reportable interest concerning the Offeror's immediate parent, intermediate parents, and the ultimate parent. Use separate paper as needed, and provide the information in the following format:

Offeror's Point of Contact for Questions about Disclosure (Name and Phone Number with Country Code, City Code and Area Code, as applicable)

Name and Address of Offeror

_____

_____

_____

Name and Address of Entity Controlled by a Foreign Government	Description of Interest, Ownership Percentage, and Identification of Foreign Government
_____	_____
_____	_____
_____	_____
_____	_____

K-16 DFARS 252.219-7000 - SMALL DISADVANTAGED BUSINESS CONCERN REPRESENTATION (DOD CONTRACTS) (JUN 1997)

(a) *Definition.*

Small disadvantaged business concern, as used in this provision, means a small business concern, owned and controlled by individuals who are both socially and economically disadvantaged, as defined by the Small Business Administration at 13 CFR Part 124, the majority of earnings of which directly accrue to such individuals. This term also means a small business concern owned and controlled by an economically disadvantaged Indian tribe or Native Hawaiian organization which meets the requirements of 13 CFR Part 124.112 or 124.113, respectively. In general, 13 CFR Part 124 describes a small disadvantaged business concern as a small business concern--

(1) Which is at least 51 percent unconditionally owned by one or more socially and economically disadvantaged individuals; or

(2) In the case of any publicly owned business, at least 51 percent of the voting stock of which is unconditionally owned by one or more socially and economically disadvantaged individuals; and

(3) Whose management and daily business operations are controlled by one or more such individuals.

(b) *Representations.*
Check the category in which your ownership falls--

_____Subcontinent Asian (Asian-Indian) American (U.S. citizen with origins from India, Pakistan, Bangladesh, Sri Lanka, Bhutan, the Maldives Islands, or Nepal)

_____Asian-Pacific American (U.S. Citizen with origins from Japan, China, the Philippines, Vietnam, Korea, Samoa, Guam, U.S. Trust Territory of the Pacific Islands (Republic of Palau), the Northern Mariana Islands, Laos, Kampuchea (Cambodia), Taiwan, Burma, Thailand, Malaysia, Indonesia, Singapore, Brunei, Republic of the Marshall Islands, the Federated States of Micronesia, Macao, Hong Kong, Fiji, Tonga, Kiribati, Tuvalu, or Nauru)

_____Black American (U.S. Citizen)

_____Hispanic American (U.S. Citizen with origins from South America, Central America, Mexico, Cuba, the Dominican Republic, Puerto Rico, Spain, or Portugal)

_____Native American (American Indians, Eskimos, Aleuts, or Native Hawaiians including Indian tribes or Native Hawaiian organizations)

_____Individual/concern, other than one of the preceding, currently certified for participation in the Minority Small Business and Capital Ownership Development Program under Section 8(a) of the Small Business Act

_____Other

(c) *Certifications.*
Complete the following--

(1) The Offeror is___ is not___a small disadvantaged business concern.

(2) The Small Business Administration (SBA) has ___ has not___made a determination concerning the offeror's status as a small disadvantaged business concern. If the SBA has made a determination, the date of the determination was_____ and the Offeror--

____ Was found by SBA to be socially and economically disadvantaged and no circumstances have changed to vary that determination.

____ Was found by SBA not to be socially and economically disadvantaged but circumstances which caused the determination have changed.

(d) *Penalties and Remedies.*
Anyone who misrepresents the status of a concern as a small disadvantaged business for the purpose of securing a contract or subcontract shall--

(1) Be punished by imposition of a fine, imprisonment, or both;

(2) Be subject to administrative remedies, including suspension and debarment; and

(3) Be ineligible for participation in programs conducted under authority of the Small Business Act.

K-17 DFARS 252.226-7001 - HISTORICALLY BLACK COLLEGE OR UNIVERSITY AND MINORITY INSTITUTION STATUS(JAN 1997)

(a) *Definitions.*

"Historically black colleges and universities," as used in this provision, means institutions determined by the Secretary of Education to meet the requirements of 34 CFR 608.2.

"Minority institutions," as used in this provision, means institutions meeting the requirements of paragraphs (3), (4), and (5) of Section 321(b) of the Higher Education Act of 1965 (20 U.S.C. 1058). The term also means any nonprofit research institution that was an integral part of a historically black college or university before November 14, 1986.

(b) *Certification.*
The Offeror certifies that it is--

_____A historically black college or university

_____A minority institution

(c) *Notification.*
Notify the Contracting Officer before award if your status as a historically black college or university or minority institution changes.

K-18 DFARS 252.247-7022 - REPRESENTATION OF EXTENT OF TRANSPORTATION BY SEA (AUG 1992)

(a) The Offeror shall indicate by checking the appropriate blank in paragraph(b) of this provision whether transportation of supplies by sea is anticipated under the resultant contract. The term "supplies" is defined in the Transportation of Supplies by Sea clause of this solicitation.

(b) *Representation.*
The Offeror represents that it--

_____Does anticipate that supplies will be transported by sea in the performance of any contract or subcontract resulting from this solicitation.

_____Does not anticipate that supplies will be transported by sea in the performance of any contract or subcontract resulting from this solicitation.

(c) Any contract resulting from this solicitation will include the Transportation of Supplies by Sea clause. If the Offeror represents that it will not use ocean transportation, the resulting contract will also include the Defense FAR Supplement clause at 252.247-7024, Notice of Transportation of Supplies by Sea.

K-19 COMMERCIAL AND GOVERNMENT ENTITY (CAGE) CODE REPORTING

The Offeror's CAGE Code is_____.

See DFARS 252.204-7001 in Section L for procedures on requesting a CAGE Code.

SECTION L

INSTRUCTIONS CONDITIONS AND NOTICES TO OFFERORS OR RESPONDENTS

L-1 52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998)

This solicitation incorporates one or more solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph identifier and provide the appropriate information with its quotation or offer. Also, the full text of a solicitation provision may be

accessed electronically at this/these address(es):

http://www-far.npr.gov/References/References.html
http://www.heron.nrl.navy.mil/contracts/home/htm

FAR CLAUSE		**TITLE**
52.204-6	-	Contractor Identification Number - Data Universal Numbering System (DUNS) Number (DEC 1996)
52.211-2	-	Availability of Specifications Listed in the DOD Index of Specifications and Standards (DODISS) (JUN 1997)
52.214-34	-	Submission Of Offers In The English Language (APR 1991)
52.214-35	-	Submission Of Offers In U.S. Currency (APR 1991)
52.215-1	-	Instructions to Offerors- Competitive Acquisition (OCT 1997)
52.215-1	-	Instructions to Offerors- Competitive Acquisition (OCT 1997) Alternate II (OCT 1997)
52.215-16	-	Facilities Capital Cost Of Money (OCT 1997)
52.252-5	-	Authorized Deviations in Provisions (APR 1984)

L-2 FAR 52.211-14 - NOTICE OF PRIORITY RATING FOR NATIONAL DEFENSE USE (SEP 1990)

Any contract awarded as a result of this solicitation will be a ☐ DX rated order; ☒ DO rated order certified for national use under the Defense Priorities and Allocations system (DPAS) (15 CFR 700), and the Contractor will be required to follow all of the requirements of this regulation.

L-3 FAR 52.215-20 REQUIREMENTS FOR COST OR PRICING DATA OR INFORMATION OTHER THAN COST OR PRICING DATA (OCT 1997)ALTERNATE IV (OCT 1997)

(a) Submission of cost or pricing data is not required.

(b) Provide information described below Labor hours and rates, all other direct cost to include travel and material with supporting documentation, and all indirect cost and their respective rates

L-4 FAR 52.216-1 - TYPE OF CONTRACT (APR 1984)

The Government contemplates award of a Cost Plus Fixed Fee Completion contract resulting from this solicitation.

L-5 FAR 52.233-2 - SERVICE OF PROTEST (AUG 1996)

(a) Protests, as defined in Section 33.101 of the Federal Acquisition Regulation, that are filed directly with an agency, and copies of any protests that are filed with the General Accounting Office (GAO) shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgment of receipt from the Control Desk, Code 3200, Bldg. 222, Rm. 115, Naval Research Laboratory, 4555 Overlook Ave., S.W., Washington DC 20375-5326.

(b) The copy of any protest shall be received in the office designated above within one day of filing a protest with the GAO.

L-6 DFARS 252.204-7001 - COMMERCIAL AND GOVERNMENT ENTITY (CAGE) CODE REPORTING (DEC 1991)

(a) The Offeror is requested to enter its CAGE code on its offer in the block with its name and address. The CAGE code entered must be for that name and address. Enter CAGE Before the number.

(b) If the Offeror does not have a CAGE code, it may ask the Contracting Officer to request one

from the Defense Logistics Services Center (DLSC). The Contracting Officer will--

(1) Ask the Contractor to complete section B of a DD Form 2051, Request for Assignment of the Commercial and Government Entity (CAGE) Code;

(2) Complete section A and forward the form to DLSC; and

(3) Notify the Contractor of its assigned CAGE code.

(c) Do not delay submission of the offer pending receipt of a CAGE code.

L-7 DFARS 252.227-7017 - IDENTIFICATION AND ASSERTION OF USE, RELEASE, OR DISCLOSURE RESTRICTIONS (JUN 1995)

(a) The terms used in this provision are defined in following clause or clauses contained in this solicitation--

(1) If a successful offeror will be required to deliver technical data, the Rights in Technical Data--Noncommercial Items clause, or, if this solicitation contemplates a contract under the Small Business Innovative Research Program, the Rights in Noncommercial Technical Data and Computer Software--Small Business Innovative Research (SBIR) Program clause.

(2) If a successful offeror will not be required to deliver technical data, the Rights in Noncommercial Computer Software and Noncommercial Computer Software Documentation clause, or, if this solicitation contemplates a contract under the Small Business Innovative Research Program, the Rights in Noncommercial Technical Data and Computer Software--Small Business Innovative Research (SBIR) Program clause.

(b) The identification and assertion requirements in this provision apply only to technical data, including computer software documents, or computer software to be delivered with other than unlimited rights. For contracts to be awarded under the Small Business Innovative Research Program, the notification requirements do not apply to technical data or computer software that will be generated under the resulting contract. Notification and identification is not required for restrictions based solely on copyright.

(c) Offers submitted in response to this solicitation shall identify, to the extent known at the time an offer is submitted to the Government, the technical data or computer software that the Offeror, its subcontractors or suppliers, or potential subcontractors or suppliers, assert should be furnished to the Government with restrictions on use, release, or disclosure.

(d) The Offeror's assertions, including the assertions of its subcontractors or suppliers or potential subcontractors or suppliers shall be submitted as an attachment to its offer in the following format, dated and signed by an official authorized to contractually obligate the Offeror:

Identification and Assertion of Restrictions on the Government's Use, Release, or Disclosure of Technical Data or Computer Software.

The Offeror asserts for itself, or the persons identified below, that the Government's rights to use, release, or disclose the following technical data or computer software should be restricted:

Technical Data or Computer Software to be Furnished With Restrictions*	Basis for Assertion**	Asserted Rights Category***	Name of Person Asserting Restrictions****
(LIST)*****.	(LIST)	(LIST)	(LIST)

* For technical data (other than computer software documentation) pertaining to items, components, or processes developed at private expense, identify both the deliverable technical data and each such items, component, or process. For computer software or computer software documentation identify the software or documentation.

** Generally, development at private expense, either exclusively or partially, is the only basis for asserting restrictions. For technical data, other than computer software documentation, development refers to development of the item, component, or process to which the data pertain. The Government's rights in computer software documentation generally may not be restricted. For computer software, development refers to the software. Indicate whether development was accomplished exclusively or partially at private expense. If development was not accomplished at private expense, or for computer software documentation, enter the specific basis for asserting restrictions.

*** Enter asserted rights category (e.g., government purpose license rights from a prior contract, rights in SBIR data generated under another contract, limited, restricted, or government purpose rights under this or a prior contract, or specially negotiated licenses).

**** Corporation, individual, or other person, as appropriate.

***** Enter "none" when all data or software will be submitted without restrictions.

Date _____

Printed Name and Title _____

_____

Signature _____

(End of identification and assertion)

(e) An offeror's failure to submit, complete, or sign the notification and identification required by paragraph (d) of this provision with its offer may render the offer ineligible for award.

(f) If the Offeror is awarded a contract, the assertions identified in paragraph (d) of this provision shall be listed in an attachment to that contract. Upon request by the Contracting Officer, the Offeror shall provide sufficient information to enable the Contracting Officer to evaluate any listed assertion.

L-8 DFARS 252.227-7028 - TECHNICAL DATA OR COMPUTER SOFTWARE PREVIOUSLY DELIVERED TO THE GOVERNMENT (JUN 1995)

The Offeror shall attach to its offer an identification of all documents or other media incorporating technical data or computer software it intends to deliver under this contract with other than unlimited rights that are identical or substantially similar to documents or other media that the Offeror has produced for, delivered to, or is obligated to deliver to the Government under any contract or subcontract. The attachment shall identify - -

(a) The contract number under which the data or software were produced;

(b) The contract number under which, and the name and address of the organization to whom, the data or software were most recently delivered or will be delivered; and

(c) Any limitations on the Government's rights to use or disclose the data or software, including, when applicable, identification of the earliest date the limitations expire.

L-9 GOVERNMENT-FURNISHED PROPERTY

No material, labor, or facilities will be furnished by the Government unless provided for in the solicitation.

L-10 INQUIRIES CONCERNING THE RFP

Any questions concerning the RFP must be submitted in writing to the Contracting Officer at the location noted in blocks 7 and 9 of the Standard Form 33, "Solicitation, Offer and Award," no less than fifteen (15) days before closing. The Government will not consider questions received after this date. Offerors are cautioned against directing any questions concerning this RFP to technical personnel at the Naval Research Laboratory.

L-11 INSTRUCTIONS FOR SUBMISSION AND INFORMATION REQUIRED TO EVALUATE PROPOSALS

(1) Information for the technical and management proposal shall be placed in Volume I and be completely separate from the cost proposal (Volume II).

(2) Proposal Identification/Mailing - The proposal should be packaged for delivery so as to permit safe and timely arrival at destination. The proposal package should be sent to the address shown in Block 7 of the RFP face page and marked:

Solicitation No. N00173-98-R-DB01
Closing Date:
(As specified in Block 9, RFP face page)
Attn: Code 3230:DB

(3) Proposal Format and Length - No attempt is made to restrict the proposal format and style. However, the proposal should be written and organized so as to be compatible with the RFP, the Statement of Work, company's organization and accounting structure, and proposed cost estimate. Offerors are encouraged to use recycled paper and maximize the use of double sided copying when preparing responses to solicitations.

(4) Include a matrix indicating proposed labor hours by skill category required to perform the statement of work. This matrix shall not contain labor rates or any other indication of price.

(5) The following information is required for evaluation of your technical/management and cost proposal. Any additional information may be provided.

VOLUME I - TECHNICAL/MANAGEMENT PROPOSAL

REQUIRED COPIES: 1 ORIGINAL AND 3 COPIES

Technical Factor (1)-- Technical Description:
The proposal should provide appropriate descriptive materials, including drawings, schematics, and parts list, which proves that the offeror's hardware is capable of meeting the performance requirements. In addition, the materials should show that the design will be based on an existing inertial measurement unit or inertial reference unit. The proposal should include a description of design modifications to the previously built unit that will be required to meet the specification requirements. The proposal should provide a specific statement whether or not the technical proposal complies with the Specification, and a full description of any and all exceptions that the offeror takes with the Specification.

Technical Factor (2)-- Capabilities and Experience

The proposal should provide a brief history of the offeror's firm including technology and manufacturing experience with emphasis on a description of the company's experience in producing hardware for projects similar to this requirement. The proposal should provide the years of experience in designing and developing similar products or technology. The proposal should provide a full description of the offeror's capabilities to support the proposed task, including information on available facilities and equipment and previous performance with any subcontractors or suppliers that will be used. The proposal should specify personnel qualifications to establish realism of proposal.

Technical Factor (3)-- Program Plan

The proposal should provide a program/management plan sufficiently detailed to clearly demonstrate consideration of all the details of the specification in the areas of schedule and risk. This plan should address detailed information regarding the proposed (1) schedule, (2) manufacturing plan, and (3) quality assurance plan.

Technical Factor (4)-- Past Performance

(a) Offerors shall submit the following information as part of their proposal. (Offerors are encouraged to submit the information prior to other parts of the proposal to assist the government in reducing the length of the evaluation period.) List the last five contracts or subcontracts completed during the past three years for services similar in nature to this requirement. Include in the five any current contracts or subcontracts for similar services that were awarded at least one year prior to the date of this solicitation. Offerors that have no similar previous or current contracts should provide the requested information for proposed subcontractors that will perform major or critical aspects of the requirement or for the proposed project manager or key personnel responsible for major or critical aspects of the requirement.

1. Name of contracting organization.
2. Contract number
3. Contract type
4. Total contract value
5. Description of the contract work
6. Contracting officer and telephone number
7. Contracting officer's representative, program manager, or similar official and telephone number

(b) Offerors shall contact the contracting organizations identified pursuant to paragraph (a) as soon as possible and request them to send past performance information on the identified contracts to the address in Block 7 of the face page of this solicitation. The past performance report which is available at http://www.heron.nrl.navy.mil/contracts/home/htm is to be provided to the contracting organization for this purpose. If the contracting organization has already collected past performance information on the contract pursuant to FAR Subpart 42.15, the format used to collect the information may be used instead of the past performance report.

(c) Offerors may include in their proposals specific information relating to problems encountered in performing the identified contracts and any corrective actions by the offeror. Offerors should not provide general information on their performance on the identified contracts as this will be obtained from the contracting organizations.

VOLUME II - COST PROPOSAL

REQUIRED COPIES: 1 ORIGINAL AND 2 COPIES

The offeror shall submit a cost proposal with supporting information for each cost element consistent with offeror's cost accounting system. The supporting breakdown should include such elements as materials, direct labor, indirect cost, and other costs such as travel. The offeror shall provide exhibits as necessary to substantiate the cost elements. Should rates be used in the proposal which are not DCAA approved, the offeror shall provide complete documentation and the rationale for their use at time of proposal submission. Offerors are requested to submit a soft copy of their cost proposal readable by the PC version of Excel.

L-12 CRITERIA FOR ALTERNATE PROPOSALS

Proposals submitted in response to this solicitation are not limited to the suggested approaches of the acquisition data furnished. In order to be evaluated, alternate proposals must offer technical improvements or modifications which are to the overall benefit of the Government. Offerors are encouraged to submit alternate proposals containing new ideas, unique approaches or other significant beneficial program improvements. The alternate proposal will be evaluated in accordance with the evaluation criteria. If the alternate proposal is considered most advantageous to the Government but involves a substantive or material departure from the stated basic proposal requirements or the stated evaluation criteria, all offerors shall be given an opportunity to submit new or amended proposals on the basis of the revised requirements provided this can be done without revealing to the other offerors innovative solutions or techniques or other information entitled to protection from disclosure. **Specifically, the Government is interested in items that offer increased reliability and safety that may be achieved through redundancy whereby the number of units may be reduced and Sections B and F would be revised accordingly**.The Government reserves the right to award a contract based upon an alternate proposal which meets the government's technical requirements and is otherwise awardable in accordance with the evaluation and award criteria.

SECTION M

EVALUATION FACTORS FOR AWARD

M-1 EVALUATION

Award will be made to that offeror whose proposal is determined to be the best value to the Government, proposed cost and other factors considered. The Government reserves the right to make award to other than the low offeror. Although technical considerations are more important than cost, the closer the technical scores of the various proposals are to one another, the more important cost considerations become.

M-2 EVALUATION FACTORS FOR AWARD

Proposals will be evaluated in accordance with the following criteria. The technical factor is more important than the cost factor. The technical subfactors are listed in descending order of importance. The cost subfactors are listed in descending order of importance.

Technical Factor (1)-- The proposal will be evaluated on the offeror's demonstrated ability to meet the requirements of the specification with a minimum amount of modification, as shown by (1) the development/qualification status of the hardware, (2) technical compliance (3) technical risk, (4) supporting analysis, (5) drawings, (6) understanding of the requirement, (7) maturity of the design, and (8) parts list. Preference will be given to proposed designs based on an existing inertial measurement unit or inertial reference unit.

Technical Factor (2)-- The proposal will be evaluated on the offeror’s demonstrated: (1) company experience in successfully manufacturing and assembling closely similar systems, (2) ability to produce the units for this procurement, as surmised by information they provide on (1) facilities and equipment available, (2) major suppliers developed, and (3) personnel qualifications

Technical Factor (3)-- The proposal will be evaluated on the adequacy of the offeror's program/management plan in the areas of schedule and risk.

Technical Factor (4)-- Past performance will be evaluated on the basis of the quality of the work performed, timeliness of performance, cost control, and business relations. The evaluation will be based on the information provided pursuant to Section L.-11 and other sources if available. Offerors that have no relevant performance history or for which past performance information is not available will not be evaluated favorably or unfavorably on past performance. The government may begin proposal evaluation prior to receipt of past performance information. If, after completion of proposal evaluation except evaluation of past performance, the contracting officer determines that evaluation of past performance will not affect the outcome of competitive selection, the contracting officer may waive its evaluation in accordance with FAR 15.304(c)(3)(iii).

II. COST

(1) PROPOSED OVERALL COST

Proposed estimated cost and fixed-fee.

(2) THE REALISM OF THE PROPOSED COST

Cost Realism means that the costs in an offeror's proposal are realistic for the work to be performed; reflect a clear understanding of the requirements; and are consistent with the various elements of the offeror's technical proposal.

The Government may adjust the proposed cost for purposes of evaluation based upon the results of the cost realism evaluation.

Cost Realism includes an analysis of the adequacy of the hours, labor mix, and other direct costs to perform the work as proposed in the technical proposal. The proposed labor and indirect rates will be considered.

NAVAL RESEARCH LABORATORY

NAVAL CENTER FOR SPACE TECHNOLOGY

Attitude Reference Unit (ARU) Critical Item Product Specification

SSD-S-IM058 **11 February 1998**

4555 Overlook Avenue, S.W.
Washington, D.C. 20375-5000

RECORD OF CHANGES

REVISION LETTER	DATE	TITLE OR BRIEF DESCRIPTION	ENTERED BY
—	11 February 1998	Final RFP Changes	A. Posselt

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1.0 SCOPE

1.1 General. This Critical Item Product Specification (CIPS) establishes the design, performance, fabrication, testing, verification, and delivery requirements for the Attitude Reference Unit (ARU).

1.2 Classification. The critical item described by this specification shall be designated as specified in Table 1-1. The Engineering Development Model (EDM), or Brassboard Unit, replicates the form, fit, and function of the Flight Unit and is used to verify mechanical and electrical compatibility. The EDM undergoes functional testing to verify functionality but is not exposed to environmental testing. The Flight Unit meets specified requirements and is tested to acceptance test levels. The Qualification Unit meets specified requirements and is tested to qualification test levels where qualification levels are identified, and tested to acceptance test levels where no qualification level is cited.

Table 1-1. Critical Item Classification

Part Number	Nomenclature	Basic Difference
IM023-01	Attitude Reference Unit	Engineering Development Model (Brassboard)
IM023-02	Attitude Reference Unit	Flight Unit
IM023-03	Attitude Reference Unit	Qualification Unit

1.3 Document Overview. This specification addresses the ARU definition, characteristics, design, construction, documentation, logistics, personnel, training, subordinate elements, and qualification requirements. The document is organized as follows:

- Section 1.0, Scope, identifies the item and explains the purpose and contents of this document.
- Section 2.0, Referenced Documents, lists all documents referenced in or required for use with this specification.
- Section 3.0, Requirements, specifies the mechanical, electrical, data, and interface requirements for the ARU. In Section 3.0, requirement numbers (shown as RQMT XXX), appear along the left margins. These requirement numbers are used to clearly mark and number each of the requirements set forth in this Critical Item Product Specification for the ARU. Each requirement number is listed in the Verification Requirements Checklist (Table 4-1), along with the method for verifying the requirement.
- Section 4.0, Quality Assurance Provisions, details the tests to be conducted on the item and the methods of test verification that will be employed.
- Section 5.0, Preparation for Delivery, specifies methods of containing and storing item components.
- Section 6.0, Deliverables and Tasks, specifies tasks to be performed and items to be prepared and delivered as part of this effort.

2.0 REFERENCED DOCUMENTS

2.1 Government Documents. The following documents of the exact issue shown form a part of this specification to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement. Copies of specifications, standards, drawings, and publications required by suppliers in connection with specified procurement functions should be obtained from the contracting agency or as directed by the contracting officer. Documents beginning with the control number "SSD" or "SSP" are program documents controlled by the NRL or NASA and should be obtained from the contracting officer.

2.1.1 Specifications.

Number	Title	Cited in Paragraph
DOD-D-1000	Drawings, Engineering and Associated Lists	3.4.2
DOD-E-8983	General Specification for Extended Space Environment Aerospace Electronic Equipment	3.3.1.1
DOD-W-83575	Wiring Harness, Space Vehicle, Design and Testing, General Specification for	3.3.1.1.5
MIL-B-5087	Bonding, Electrical and Lightning Protection for Aerospace Systems	3.3.2.5.1
MIL-C-17	Cable, Radio Frequency	3.3.1.1.6
MIL-C-24308	Connectors, Electrical, Rectangular Miniature Polarized Shell, Rack and Panel, General Specification for	3.2.2.4 3.3.1.1.5
MIL-C-38999	Connector, Electrical, Circular, Miniature, High Density, Quick Disconnect	3.3.1.1.5
MIL-C-39012	Coaxial Connectors	3.3.1.1.5
MIL-C-55302	Connector, Printed Circuit Subassembly and Accessories	3.3.1.1.5
MIL-F-7179	Finishes, Coatings, and Sealants for the Protection of Aerospace Weapon Systems	3.3.1.2.4
MIL-M-38510H	General Specification For Microcircuits	3.3.1.1.2
MIL-P-50884	Printed Wiring, Flexible and Rigid-Flex	3.3.1.3.4
MIL-P-55110	Printed Wiring Boards, General Specifications	3.3.1.3.4
MIL-S-45743	Soldering, Manual Type, High Reliability, Electrical and Electronic Equipment	3.3.1.3.4
MIL-S-46844	Solder Bath Soldering of Printed Wiring Assemblies	3.3.1.1, 3.3.1.3.4
MIL-T-31000	Technical Data Packages, General Specification for	3.4, 3.4.2
MIL-W-22759	Wire, Electrical, Insulated	3.3.1.1.6

2.1.2 Standards.

2.1.3 Other Publications.

Number	Title	Cited in Paragraph
MIL-STD-198	Military Standard Capacitors, Selection and Use of	3.3.1.1.3
MIL-STD-275	Printed Wiring For Electronic Equipment	3.3.1.3.4
MIL-STD-199	Selection and Use of Resistors	3.3.1.1.3
MIL-STD-454	Standard General Requirements For Electronic Equipment	3.3.4.1
MIL-STD-461	Electromagnetic Interference Characteristics, Requirements for Equipment	4.4.4.5
MIL-STD-462	Electromagnetic Interference Characteristics, Measure of	4.4.4.5
MIL-STD-490	Specification Practices	3.4.1
MIL-STD-498	Software Development and Documentation	3.4.1
MIL-STD-1246	Product Cleanliness Levels and Contamination Control Program	3.3.4.2
MIL-STD-2118	Flexible and Rigid-Flex Printed-Wiring for Electronics Equipment, Design Requirements for	3.3.1.3.4
MIL-STD-756	Reliability Modeling and Prediction	3.2.3.4 4.4.2
MIL-STD-810	Environmental Test Methods and Engineering Guidelines	3.2.7.2.5, 3.2.7.2.6
MIL-STD-889	Dissimilar Metals	3.3.1.2.2
MIL-STD-975M(2)	NASA Standard Electrical, Electronic, and Electromechanical (EEE) Parts List	3.3.1.1.2
MIL-STD-1541	Electromagnetic Compatibility Requirements for Space Systems	3.3.2
MIL-STD-1542	Electromagnetic Requirements and Ground Requirements for Space System Facilities	3.3.2
MIL-STD-1546	Materials and Processes Control Program for Space and Launch Vehicles	3.3.1
MIL-STD-1547	Electronic Parts, Materials, and Processes for Space and Launch Vehicles	3.3.1
MIL-STD-1553B	Military Standard Digital Time Division Command/Response Multiplex Data Bus	3.2.1.2.1 3.3.1.1.5.3
MIL-STD-1568	Materials and Processes for Corrosion Prevention and Control in Aerospace Weapons Systems	3.3.1.2.2 3.3.1.2.4

Number	Title	Cited in Paragraph
MIL-HDBK-5	Metallic Materials and Elements for Space Vehicle Structures	3.3.1.2.2
MIL-HDBK-17	Polymer Matrix Composites, Guidelines	3.3.1.2.2
MIL-HDBK-23	Composites	3.3.1.2.2
MIL-HDBK-217	Reliability Prediction of Electronic Equipment	3.2.3.4, 4.2.2
MSFC Spec 522	Design Criteria for Controlling Stress Corrosion Cracking	3.3.1.2.1

NASA NHB5300.4A	Requirements for Soldered Electrical Connections	3.3.1.3.4
NASA S-311-P-4/9	Connectors, Electrical, Polarized Shell, For Spaceflight Use, Detailed Specification For	3.2.2.4
SP-R-0022	General Specification, Vacuum Stability Requirements of Polymeric Material for Spacecraft Application	3.2.2.9
SSD-D-IM003	ICM EMI/EMC Plan	3.3.2
SSD-D-IM006	Failure Reporting Analysis and Corrective Action Procedure	3.3.1.3.2 4.1.3
SSD-D-IM007	Worst Case Analysis, Guidelines and Criteria	3.2.3.6, 3.3.1.3.3, 4.2.1, 4.2.2
SSD-D-IM008	Spacecraft Product Assurance Program Plan	3.2.3.2, 3.2.3.3, 3.2.3.4, 3.3.1, 3.3.1.1.2, 3.3.1.3.7, 4.1, 4.2.2
SSD-D-IM009	Flight Hardware Fabrication, Test, and Repair	3.3.9
SSD-D-IM012	Destructive Physical Analysis	3.3.1.1.4
SSP 30312	Electrical, Electronic, and Electromechanical (EEE), and Mechanical Parts Management and Implementation Plan for International Space Station Program	3.3.1.1.1
SSP 30420	Space Station Grounding Requirements	3.2.7.5.3
SSP 30423	Space Station Requirements for Electromagnetic Compatibility	3.3.1.1.2
SSP 30425	Space Station Program Natural Environment Definition for Design	3.2.7.5.3
SSP 30512	Space Station Ionizing Radiation Design Environment	3.2.2.6, 3.2.7.5.3

2.2 Non-Government Documents. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on the date of the invitation of bids or request for proposal shall apply. In the event of conflict between the documents referenced herein and the contents of this specification, this specification shall take precedence.

Copies of specifications, standards, drawings, and publications required by Suppliers in connection with specified procurement functions should be obtained from the contracting agency or as directed by the contracting officer.

2.2.1 Specifications. Not applicable.

2.2.2 Standards.

Number	Title	Cited in Paragraph
ANSI Y14.5	Dimensioning and Tolerancing	3.2.2.2
ANSI Y32.2	Graphic Symbols for Electrical and Electronic Diagrams	3.3.3.2
ANSI Y32.16	Reference Designations for Electrical and Electronic Parts and Equipments	3.3.3.2
ANSI/J-STD-001	Requirements for Soldering	3.3.1.3.4

2.2.3 Other Publications.

Number	Title	Cited in Paragraph
IPC-A-600D	Acceptability of Printed Wiring Boards	3.3.1.3.4
IPC-D-275	Standard for PCB Design and Assembly	3.3.1.3.4
IPC-FC-250	Performance Specification for Single and Double-Sided Flexible Printed Boards	3.3.1.3.4
IPC-FC-250A-86	Specification for Single and Double-Sided Flexible Wiring	3.3.1.3.4

3.0 REQUIREMENTS

3.1 Item Definition. The item specified herein is the Attitude Reference Unit. It will be used on the International Space Station (ISS) that is under development by the National Aeronautics and Space Administration (NASA). The equipment described by the requirements of this section shall satisfy the requirements for examination, analysis, and tests as specified in section 4.0. The Attitude Reference Unit (referred to herein as the ARU) shall perform the functions of inertial angular rate measurement (or incremental angular measurement) in three mutually orthogonal axes. The ARU provides meaurement and communicates to the flight computer. The ARU will be used to determine vehicle attitude between star tracker updates. Any calibration and compensation required to meet performance requirements shall reside in the ARU. The ARU shall include any required internal power conditioning from the spacecraft power and will interface with the flight computer with the electrical interface as described in this specification.

3.1.1 Interface Definition. The ARU will have the interfaces defined in the subsections below. Signal definitions are as follows:

- Input and output signals will be active high unless otherwise specified. Active high signals are asserted at the higher (more positive) of two logic voltage levels (high-true). Active low signals are asserted at the lower (less positive) of two logic voltage levels (low-true). Active low signals will be identified by an asterisk (*) after the signal name.

3.2 Characteristics.

3.2.1 Performance Requirements. The ARU shall meet the performance requirements and shall provide the capabilities as specified within this document.

3.2.1.1 Gyroscope Performance.

3.2.1.1.1 General. The ARU shall provide inertial angular rate indication about three mutually perpendicular axes.

3.2.1.1.2 Maximum Continuous Input Rates. The unit shall be capable of maximum continuous input rates for each axis of 10 degrees/second.

3.2.1.1.3 Output Scale Factors. The output scale factors for each axis shall be as defined below:

3.2.1.1.3.1 Scale Factor Linearity. Scale factor linearity (after compensation) shall be less than 100 ppm (one sigma) per axis.

3.2.1.1.3.2 Scale Factor Stability. Scale factor stability (after compensation) shall be less than 100 ppm (one sigma) per axis.

3.2.1.1.4 Bias Repeatability. Bias repeatability shall not exceed 0.1 degree/hour (one sigma).

3.2.1.1.5 Angular Random Walk. Angular random walk shall not exceed 0.015 degrees/root-hour (one sigma) per axis.

3.2.1.1.6 Bandwidth. The minimum bandwidth for each of the three gyroscope outputs shall be 20 Hz.

RQMT-100 **3.2.1.1.7 Axis Alignment.** The three gyroscope reference axes shall be mutually orthogonal.

RQMT-110 The physical misalignment of the gyroscope input axes relative to a set of optically derived axes shall not exceed two milliradians.

RQMT-120 The uncertainty in the alignment of the input axes relative to the optical reference axes shall be no greater than 100 microradians.

3.2.1.1.8 Sensitivity. Each incremental angle measurement output shall have a maximum threshold of 10 deg/hour.

3.2.1.1.9 Warm-up Time. The warm-up time for the unit shall not exceed one minute.

3.2.1.2 Output Data Interfaces.

3.2.1.2.1 Output Data. The Command, Telemetry, and Data Handling (CT&DH) System interfaces between the ARU and the flight computer shall be MIL-STD-1553.

RQMT-100 **3.2.1.2.2 ARU Output Sampling Period.** The sample period of the ARU output shall be ≤100 milliseconds.

RQMT-110 Requirements of section 3.2.1 shall be met using this sample period.

RQMT-100 **3.2.1.3 Primary Power.** The ARU may be designed to accept unregulated input power from the Spacecraft's Electrical Power System (EPS) and provide preregulation for use within the subsystem. Switching of input power (i.e., power-on and power-off) shall be accomplished in the EPS, which shall also provide control of inrush current.

RQMT-110 The equipment shall operate as specified herein when supplied with input power having the characteristics specified below, and shall not impose emissions on the power bus in excess of those specified herein.

3.2.1.3.1 Input Voltage. The steady state voltage at the input connector of the equipment will be 30 ± 6 V dc, excluding noise, ripple and transients.

3.2.1.3.2 Source Impedance. The input power will have an equivalent source impedance as depicted in Figure 3-1.

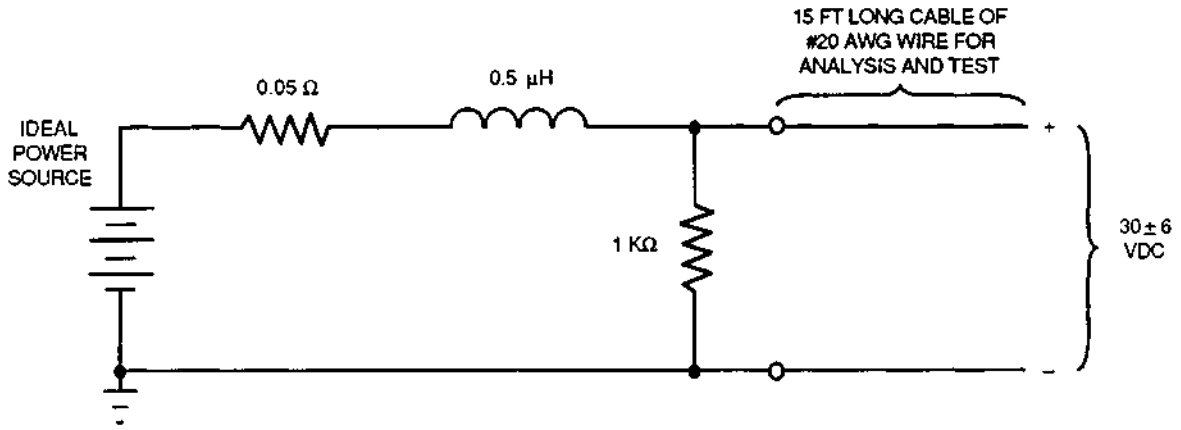


Figure 3-1. Primary Power Input Equivalent Circuit

RQMT-100 **3.2.1.3.3 Isolation.** The equipment shall be compatible with a single-point ground for primary power with separate positive and return wires brought out to the power input connector.

RQMT-110 Primary input power and returns to the equipment shall be isolated from the case (chassis) and secondary power circuitry by a minimum dc resistance of one megohm.

RQMT-120 The case (chassis) or mounting structure shall not be used to conduct power currents.

3.2.1.3.4 Power Consumption. The power consumption of the equipment shall not exceed 25 watts.

RQMT-100 **3.2.1.3.5 Inrush Current.** The inrush current to the equipment when switching from power-off to power-on in any mode shall not exceed twice the average operating input current, and the input current shall settle to within 10% of the nominal operating value within 200 milliseconds after the application of power.

RQMT-110 The input power equivalent circuit shall be as shown in Figure 3-1.

3.2.2 Physical Characteristics. This paragraph specifies the physical characteristics of the ARU.

RQMT-100 **3.2.2.1 Mass Properties.** The ARU shall be designed for minimum weight consistent with the requirements specified herein and shall not exceed the values listed in Table 3-1. The Contracting Officer's Representative (COR) has established a system of mass properties management to ensure fulfillment of the spacecraft mass properties objectives.

RQMT-110 The Contractor shall periodically provide the COR with mass properties data.

RQMT-120 The data shall include current weight traceability and estimates of its uncertainty, current weight, and the related center of gravity.

RQMT-130 Final mass properties data shall be provided at delivery.

Table 3-1. Weight Limits

Item	Weight (lb)	Mass (kg)
Attitude Reference Unit (ARU)	15	6.8

RQMT-100 **3.2.2.2 Mechanical Size, Configuration and Interface.** The item shall be capable of meeting the following requirements.

RQMT-110 a. Dimensions and tolerancing shall be according to ANSI Y14.5, *Dimensioning and Tolerancing* guidelines.

RQMT-120 b. The ARU shall operate as specified herein when mounted in any orientation.

RQMT-130 c. The Contractor shall furnish to the COR an envelope drawing providing the center of gravity (CG) for the flight article.

RQMT-140 d. The unit, including interior walls and gaskets, shall be either hermetically sealed or have provisions for positive (non-casual) venting according to the environments specified in section 3.2.7.

RQMT-150 e. Sufficient venting shall be provided to allow internal pressure stabilization within 15 minutes of achieving an external pressure of 1×10^{-4} torr.

RQMT-160 f. The unit shall be capable of withstanding repressurization from 1×10^{-4} torr to 775 torr at one torr per second without performance degradation.

RQMT-100 **3.2.2.3 Mounting.** The ARU shall be hard mounted and shall operate as specified when mounted in any orientation.

RQMT-110 The enclosure mounting surfaces shall have a flatness within 0.001 inch per inch or 0.01 inch over the entire mounting surface, whichever is greater, and the footprint surface shall have a smoothness of 63 microns or better. Incidental scratches are allowable if not more than one percent of the mounting surface is disturbed.

RQMT-120 No scratch shall exceed 0.005 inch in depth.

RQMT-100 **3.2.2.4 Connectors.** External connectors shall be provided for power and signals in accordance with MIL-C-24308 or NASA S-311-P-4/9.

RQMT-110 Connector pin assignments shall be defined jointly by the COR and the Contractor.

RQMT-120 The Contractor shall furnish to the COR a fabrication drawing for the cables. Connector pins carrying the same function for redundancy may be located in the same connector.

RQMT-130 The signal and signal return wires for each function shall be located in the same connector and assigned to adjacent pins to allow wire twisting and shielding.

RQMT-140 Keying, polarization or other mechanical means, or combinations thereof, shall be incorporated in connectors to prevent mismating, or incorrect mating, with cable connectors.

RQMT-150 The power bus positive and return shall be on nonadjacent pins.

RQMT-160 Intervening pins shall be kept open.

RQMT-170 The location of connectors and spacing of connectors shall permit access for mate and demate while the ARU is mounted on the vehicle. A minimum edge-to-edge spacing of 0.25 inch is recommended for adjacent connectors.

RQMT-100 **3.2.2.5 Thermal Design.** The thermal design shall be consistent with the maximum, minimum, and differential allowable operating temperatures specified herein, using the following guidelines.

RQMT-110 a. The derating criteria specified herein shall be reflected in the establishment of piece part temperature limits and allowable temperature differences between piece parts, circuit boards, and equipment cases.

RQMT-120 b. Except for mounting surfaces, electrical connectors, exposed fastener hardware, and the areas immediately adjacent to mounting holes, all external surfaces shall be painted black with an emissivity of 0.8 or greater.

RQMT-130 Unpainted areas (excluding the mounting surface) shall not exceed five percent of the total area and no contiguous unpainted areas shall exceed one percent of the total area. Exposed fastener hardware may be painted black.

RQMT-140 c. The thermal interface shall provide for dissipating heat by conduction through the ARU's baseplate to the spacecraft's support structure.

RQMT-150 The ARU's thermal design shall be based on being bolted to a deck surface that is maintained within the temperature specified in Table 3-2.

Table 3-2. Mounting Surface Temperature Requirements

Performance and Calibration Temperature (C°)	On-Orbit Non-Operating Survival Temperatures (C°)	Acceptance Thermal Vacuum and Thermal Cycling Temperatures (C°)	Qualification Thermal Vacuum and Thermal Cycling Temperatures (C°)
-10/+50	-20/+60	-10/+50	-20/+60

RQMT-160 d. Items having greater than 10 watts internal heat dissipation (on an orbital average basis) shall have an actual footprint density greater than 0.5 watts/in^2.

RQMT-170 e. Cutouts or recesses in the item's baseplate are permitted, but the area of these cutouts shall not be counted as contact area.

RQMT-180 f. For thermal analysis purposes, the Contractor shall assume that the unit is wet-mounted using RTV. Thermal conductance between the unit's mounting surface and the deck surface conductance is defined by the item's baseplate area.

RQMT-190 The Contractor shall assume 75 BTU/Hr-F° (40W/C°) per square foot of the unit's baseplate.

RQMT-200 g. The item shall have solar absorptivity and emissivity values as follows:

Emissivity	≥0.85
Absorptivity	Not Applicable

3.2.2.6 Radiation Effects. The Total Dose Hardening of the item shall be accomplished through a combination of piece part selection and control, radiation shielding, and piece part parameter derating. The natural on-orbit radiation environment is defined within NASA's SSP 30512, Figure 3.2.2-2, for Maximum Solar Flare Orbit Averaged Integral Heavy Ion Fluxes.

RQMT-100 **3.2.2.6.1 Radiation Protection.** As a goal, the ARU enclosure shall have a minimum unit wall area density (Material Density x Thickness) at any point of ≥0.411 g/cm2 (0.06 inch aluminum) to limit radiation dosage. Necessary apertures, such as pin and vent holes, may be baffled to meet this requirement.

RQMT-110 For purposes of item shielding analysis, the Contractor shall assume that an additional 0.040 inch of aluminum shielding will be provided by the spacecraft.

RQMT-100 **3.2.2.6.2 Radiation Hardness and Dosage.** The design of the ARU shall be such that all electrical, electronic, and electromechanical (EEE) parts shall be operational after a total radiation dose of 10 kRAD (Si) at the part level over the three-year mission duration without degrading the performance of the item or exceeding the manufacturer's specified limits.

RQMT-110 a. Radiation effects on the item shall in no way impact operation of the spacecraft.

RQMT-120 b. Radiation dosage is specified at the part level. Parts with a total dose tolerance between 3 and 10 kRAD (Si) may be individually approved for usage by the COR. Metal Oxide Semiconductor (MOS) integrated circuits and other radiation susceptible parts shall be acceptable only after process verification has been obtained that all parts meet the total radiation dose requirement. Due to lot-to-lot variations and the different failure mechanisms of MOS parts, the definition of part failure after the specified dose level is:

(1) The part is no longer functional.

(2) Standby device current increases to more than 100% of the pre-radiation specification.

(3) A device noise margin decreases by more than 25% of the pre-radiation level.

(4) Individual device input leakage currents increase by more than 200% of the pre-radiation levels.

RQMT-100 **3.2.2.6.3 Single Event Effects.** Single Event Effects (SEE) hardening shall be accomplished through a combination of piece part selection and control, and circuit/system design such that component performance and effectiveness are not degraded.

RQMT-110 a. For the purposes of analysis, the integral flux versus Linear Event Transfer (LET) environment shall be ≤40 MeV-cm^2/mg.

RQMT-120 b. The ARU shall be resistant to Single Event Upsets (SEU).

RQMT-130 The design of the item shall limit the mean time between SEUs resulting in temporary loss of telemetry or command capability to ≤4.5 x 10^{-3} events per year. The use of high SEU risk device types and technologies listed below requires the approval of the COR for each application:

(1) Semiconductor Memory Devices

(2) Microprocessors and Peripheral Devices

(3) Gate Arrays and other VLSI Devices

(4) Logic Devices or technologies with a heavy ion SEU threshold ≤40 MeV-cm^2/mg.

RQMT-140 c. In the SEU vulnerability assessment, consideration shall be given to:

(1) The device application, mission criticality, and impact of a SEU on mission performance.

(2) The corrective action required.

(3) The anticipated frequency and corrective action for nominal and peak SEU rates.

(4) The mission impact of a corrective action.

RQMT-150 d. The design of the item shall eliminate the possibility of an SEU resulting in a non-recoverable adverse condition or mode.

RQMT-100 **3.2.2.6.4 Single Event Latchup (SEL).** Destructive Single Event Latchups shall not occur.

RQMT-110 Non-destructive SEL shall be cleared through power cycling of the unit.

Note that SEL is caused by penetration of cosmic ray particles into a solid state device, creating a parasitic transistor pair between =Vdd / -Vss. SEL is the result of a single energetic particle injecting a current sufficient to trigger the potential parasitic pn-pn silicon controlled rectifier function into the substrate. This effect is inherent in Complementary-MOS (CMOS) technology. When this effect occurs, a stable low-impedance path is generated, drawing high current through the chip that can cause the device to burn out within 500 μSeconds unless appropriate protection is implemented. In general, the protection against permanent damage requires that the supply current to all susceptible devices be limited such that no single CMOS device can draw excessive current (e.g., greater than 100 ma).

3.2.2.7 Corona Suppression. Proper performance of the ARU shall not be impaired by corona discharge in normal operating environments, and the ARU shall not be a source of corona discharge at atmospheric or hard vacuum.

RQMT-100 **3.2.2.8 Venting.** All enclosures shall be vented to the external environment.

RQMT-110 Any pressure differential encountered during vacuum system pump-down or launch shall cause no damage to any ARU component.

RQMT-100 **3.2.2.9 Outgassing.** Materials shall be selected for low out-gassing characteristics in accordance with SP-R-0022, *General Specification, Vacuum Stability Requirements of Polymeric Material for Spacecraft Application*.

RQMT-110 Deviations from this requirement shall be reported to the COR.

3.2.3 Reliability. The ARU reliability shall be greater than 0.98 based on a three year mission duration with an operating duty cycle of 100% and a host spacecraft temperature of 30˚C.

3.2.3.1 Reserved.

3.2.3.2 Failure Mode, Effects and Criticality Analysis (FMECA). As a part of the design process, a FMECA shall be performed on the ARU in accordance with Section 3 of the SSD-D-IM008, *Spacecraft Product Assurance Program Plan*.

3.2.3.3 Electrical Stress Analysis. As a part of the design process, an electrical stress analysis shall be performed in accordance with Section 3 of the SSD-D-IM008, *Spacecraft Product Assurance Program Plan,* to ensure that the derating criteria of Table 3-1 of that document are not exceeded.

RQMT-100 **3.2.3.4 Reliability Analysis.** As a part of the design process, a reliability analysis shall be performed in accordance with Section 3 of the SSD-D-IM008, *Spacecraft Product Assurance Program Plan*.

RQMT-110 Reliability predictions shall be performed according to Task 202 of MIL-STD-756 or equivalent.

RQMT-120 The specific technique to be used shall be Method 2005 parts stress analysis of MIL-STD-756 or equivalent.

RQMT-130 Electronics part failure rates from MIL-HDBK-217 (or equivalent) shall be used.

RQMT-140 All other sources of part failure data shall require the concurrence of the COR prior to use.

RQMT-150 A space environmental factor, nominal operating conditions (e.g., nominal electrical stresses), and nominal estimated duty cycle shall be used as a baseline for developing part failure rates.

3.2.3.5 Single Point Failure (SPF). Not applicable.

3.2.3.6 Worst Case Analysis. As a part of the design process, a Worst Case Analysis (WCA) shall be performed at the component level in accordance with SSD-D-IM007, *Worst Case Analysis Guidelines and Criteria*, or equivalent.

RQMT-100 **3.2.4 Maintainability.** No scheduled or preventive maintenance shall be required to meet the performance and reliability requirements specified herein.

RQMT-110 Part failures during ground test, checkout, and storage shall be repaired without degrading the performance or reliability characteristics.

RQMT-120 Provisions for fault detection, isolation, and checkout, using multipurpose test equipment, shall be incorporated in the ARU design.

RQMT-130 Testing shall be at the replacement (“black box”) level with the ARU in its installed configuration.

RQMT-100 **3.2.4.1 Access and Mounting.** Access and mounting provisions shall be provided such that checkout, maintenance, adjustment, servicing, and replacement of the space segment and its subassemblies and components can be accomplished with a minimum amount of disassembly and without the excessive use of special tools or equipment.

RQMT-110 Positive positioning and alignment features shall be provided to ensure repeated correct assembly and installation.

RQMT-100 **3.2.4.2 Modular Construction.** Modular construction shall be employed in design of the space segment.

RQMT-110 Whenever possible, modules shall be designed as functionally complete subassemblies that can be tested, adjusted, calibrated, and maintained as single independent units.

3.2.4.3 Fault Detection Capability. As a goal, fault detection, isolation, and checkout capability shall be provided to the subassembly or component level at which replacement will be performed when the space segment is in its installed configuration.

3.2.4.4 Maintenance Provisions. No scheduled or preventive maintenance shall be performed to meet the performance requirements specified herein.

3.2.5 Availability.

3.2.5.1 Space Segment.

3.2.5.1.1 Non-Operating Environment. The ARU shall meet the requirements of this specification without refurbishment or adjustment after exposure to any combination of the conditions specified herein while the equipment is not operating.

3.2.5.1.2 Operating Environment. The ARU shall perform as specified after exposure to the operating environments as applicable for prelaunch, launch, ascent, and on-orbit.

3.2.5.2 Ground Segment - NRL Engineering Node (NEN). Not applicable.

3.2.6 Systems Effectiveness Models. Not applicable.

3.2.7 Environmental Conditions. The ARU shall meet the requirements of this document after exposure to the environments as specified in the following paragraphs.

3.2.7.1 Storage. The ARU in an unpackaged state with protective dust wrapping about the unit(s) shall meet the following requirements after exposure to any combination of the following storage environments defined herein for the two-year storage period.

3.2.7.1.1 Ambient Air Temperature. The ambient air temperature shall be controlled to 24˚C ± 10˚C.

3.2.7.1.2 Ambient Pressure. The ambient pressure will vary between that naturally occurring at sea level and at 5,000 feet.

3.2.7.1.3 Humidity. As a goal, at no time will condensation be allowed to form on the ARU, its test equipment, or protective covers. The relative humidity shall be maintained above 30%.

3.2.7.1.4 Cleanliness. The storage facility will be controlled to meet a controlled environment typical of the NRL's Payload Processing facility.

3.2.7.2 Ground Handling and Transportation. The ARU in its approved container and/or packaging shall meet the requirements of this document after exposure to any combination of the following ground handling and transportation environments.

3.2.7.2.1 Ambient Air Temperature. The ambient temperature of the air external to the shipping container ranges from -10˚C to +50˚C.

3.2.7.2.2 Ambient Pressure. The ambient pressure will vary between 31.3 in. Hg (sea level) and 3.5 in. Hg (50,000 feet).

3.2.7.2.3 Humidity. The relative humidity will range from zero to 100% with condensation in the form of water or ice external to the shipping container. Humidity within the shipping container shall be controlled such that no condensation of moisture or frost occurs on the hardware.

3.2.7.2.4 Acceleration. The maximum steady state acceleration shall not exceed that specified in section 3.2.7.4.3.

3.2.7.2.5 Vibration. When packaged or otherwise prepared for shipment, the ARU shall withstand the vibration environments specified in MIL-STD-810, Method 514.2.

RQMT-100 **3.2.7.2.6 Shock.** The shock levels to the structure subsystem shall be controlled by design of the handling and shipping container.

RQMT-110 The packaged structure subsystem shall be designed to withstand the shock environment of MIL-STD-810, Method 516.2, Procedure II.

RQMT-100 **3.2.7.2.7 Cleanliness.** The package shall maintain the hardware at the cleanliness level specified in paragraph 3.2.7.1.4.

RQMT-110 The ARU shall meet the requirements of this specification during continuous exposure to any combination of the conditions specified herein while the equipment is operating.

3.2.7.3 Prelaunch. The prelaunch phase covers those environments that occur before launch. The ARU shall meet the requirements of this document during and after exposure to the prelaunch environments defined herein.

3.2.7.3.1 Ambient Air Temperature. The ambient air temperature shall be maintained at 23˚C ± 10˚C.

3.2.7.3.2 Ambient Pressure. The ambient pressure will vary between that naturally occurring at sea level and at 6,000 feet.

3.2.7.3.3 Humidity. The relative humidity shall be maintained above 30%. At no time shall condensation be allowed to form on the ARU.

3.2.7.3.4 Acceleration. The maximum steady state acceleration shall not exceed that specified in section 3.2.7.4.3.

3.2.7.3.5 Cleanliness. The assembly, test, and preparation area will be maintained at a normal high bay environment at the NRL's Payload Processing Facility or the NASA Launch Site.

3.2.7.4 Launch and Ascent. The launch and ascent phase covers those environments that occur between terminal countdown and opening of the Shuttle Transportation System (STS) payload bay doors, including environments associated with a one-orbit abort or emergency landing. The space segment need not meet the requirements of this document after exposure to emergency descent environment without refurbishment.

RQMT-100 **3.2.7.4.1 Temperature and Humidity.** The ARU shall operate properly when the temperature of the surroundings and the surface on which it is mounted is maintained at any temperature between -10°C to +50°C for on-orbit operations.

RQMT-110 The ARU shall operate properly during ground testing while exposed to relative humidity ranging from 20 to 90 percent at atmospheric pressure.

RQMT-100 **3.2.7.4.2 Pressure.** The pressure decay curve in the STS payload bay is defined in Figure 3-2. The ARU shall operate properly when the range of ambient pressure is between 13 and 16 psi (atmospheric) and less than 1×10^{-5} torr.

RQMT-110 The ARU shall not be required to operate at partial pressures between these extremes.

3.2.7.4.3 Acceleration. The maximum steady state acceleration shall be as specified on the mass-acceleration curve shown in Figure 3-3.

3.2.7.4.4 Emergency Landing (Launch Abort) Loads. The maximum steady-state load shall be 7 g's (limit) in any direction acting separately.

3.2.7.4.5 Acoustics and Random Vibration.

3.2.7.4.5.1 Acoustic Vibration. Not applicable.

3.2.7.4.5.2 Random Vibration. The ARU shall withstand the vibration environment of Figure 3-4 and Figure 3-5 in three orthogonal axes.

3.2.7.5 Orbital Operations. The orbital operations phase covers those environments that occur between opening of the STS payload bay doors for vehicle deployment, moving from the STS parking orbit to the vehicle docked position, and subsequent operations. The ARU shall meet the requirements of this document during exposure to any combination of the following environments defined herein.

3.2.7.5.1 Natural Thermal Radiation. Not applicable.

3.2.7.5.2 Pressure. The pressure environment during orbital operation shall be a hard vacuum of less that 1×10^{-5} torr.

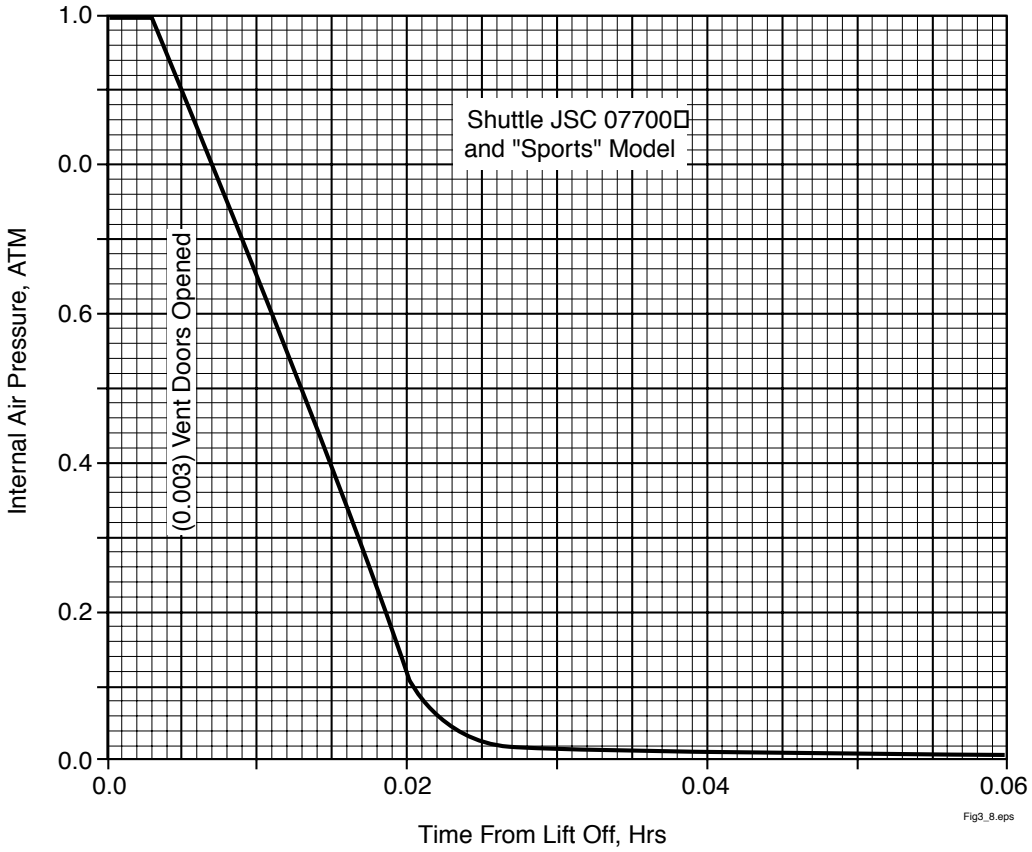
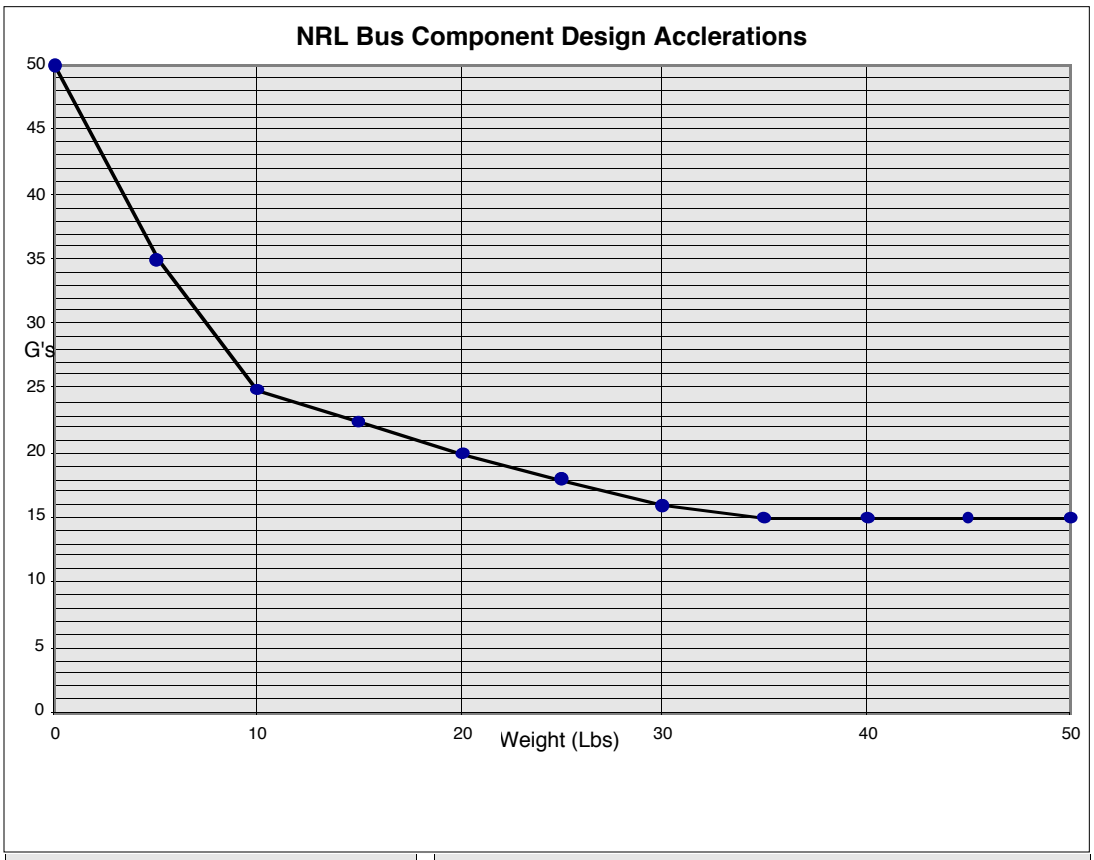


Figure 3-2. STS Ascent Payload Bay Pressure/Time History



Design Accelerations

Component Wt. (Lbs)	G's
0	50
5	35
10	25
15	22.5
20	20
25	18
30	16
35	15
40	15
45	15
50	15

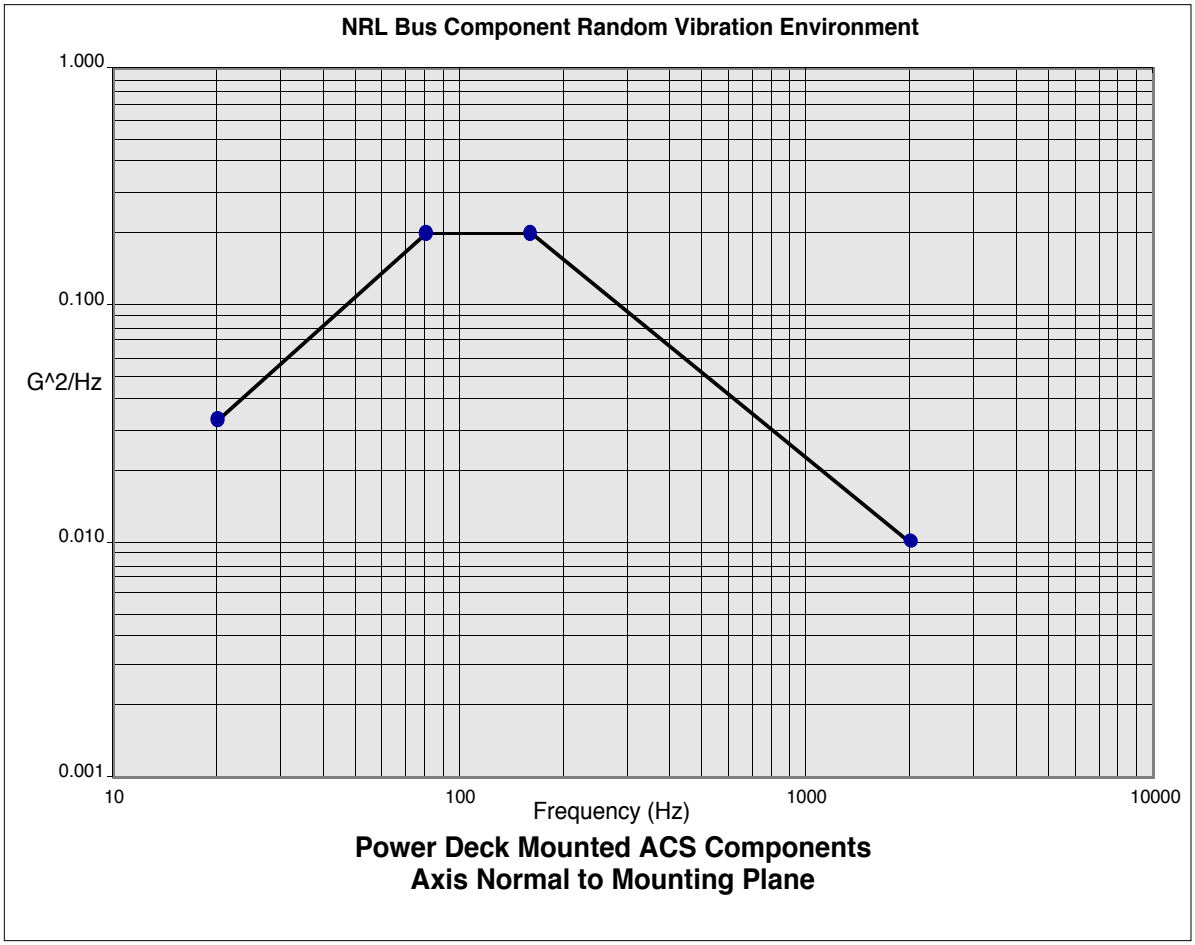
Design Acceleration Philosophy

* These accelerations are to be used for evaluating component Mounting Configurations and Hardware

* Some specialized components such as thrusters may require specialized levels.

TEMP1.pict

Figure 3-3. Acceleration



Flight Environment

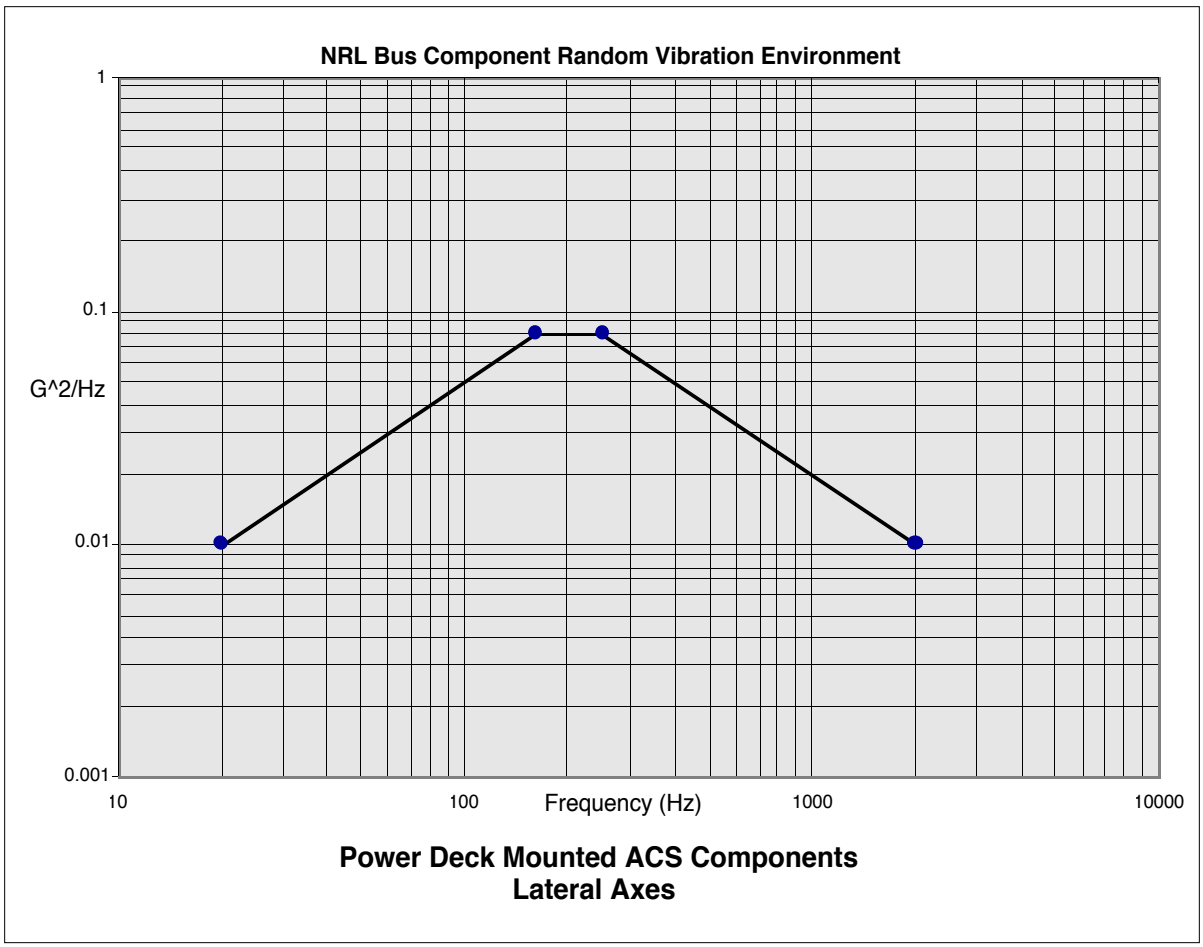
9.3 Grms

Frequency (Hz)	G^2/Hz
20	0.033
80	0.200
160	0.200
2000	0.010

Test Levels

	Margin Above Flight Level (dB)	Duration (Minutes)
Non-Flight Prototypes (Design & Qualification Level)	6	2
Flight Units (Flight Acceptance Level)	0	1
Prototype Flight Unit (Protoflight Acceptance Level)	3	2

Figure 3-4. Random Vibration-Axis Normal to Mounting Plane



Flight Environment

7.4 Grms

Frequency (Hz)	G^2/Hz
20	0.01
160	0.08
250	0.08
2000	0.01

Test Levels

	Margin Above Flight Level (dB)	Duration (Minutes)
Non-Flight Prototypes (Design & Qualification Level)	6	2
Flight Units (Flight Acceptance Level)	0	1
Prototype Flight Unit (Protoflight Acceptance Level)	3	2

Figure 3-5. Random Vibration-Lateral Axes

RQMT-100 **3.2.7.5.3 Particle Radiation.** The ARU will be subjected to galactic cosmic radiation, geomagnetically trapped radiation, and solar flare particles. The spherical geomagnetically trapped dosage for parts as a function of aluminum shielding thickness, for a one-year period including a solar maximum, is shown in Figure 3-6.

RQMT-110 A factor of two shall be added as a minimum margin for part application.

RQMT-120 Any part used shall meet the requirements of this document with a minimum total radiation dose of 1 x 10^4 Rads (Si) consistent with SSP 30512, SSP 30420, and SSP 30425.

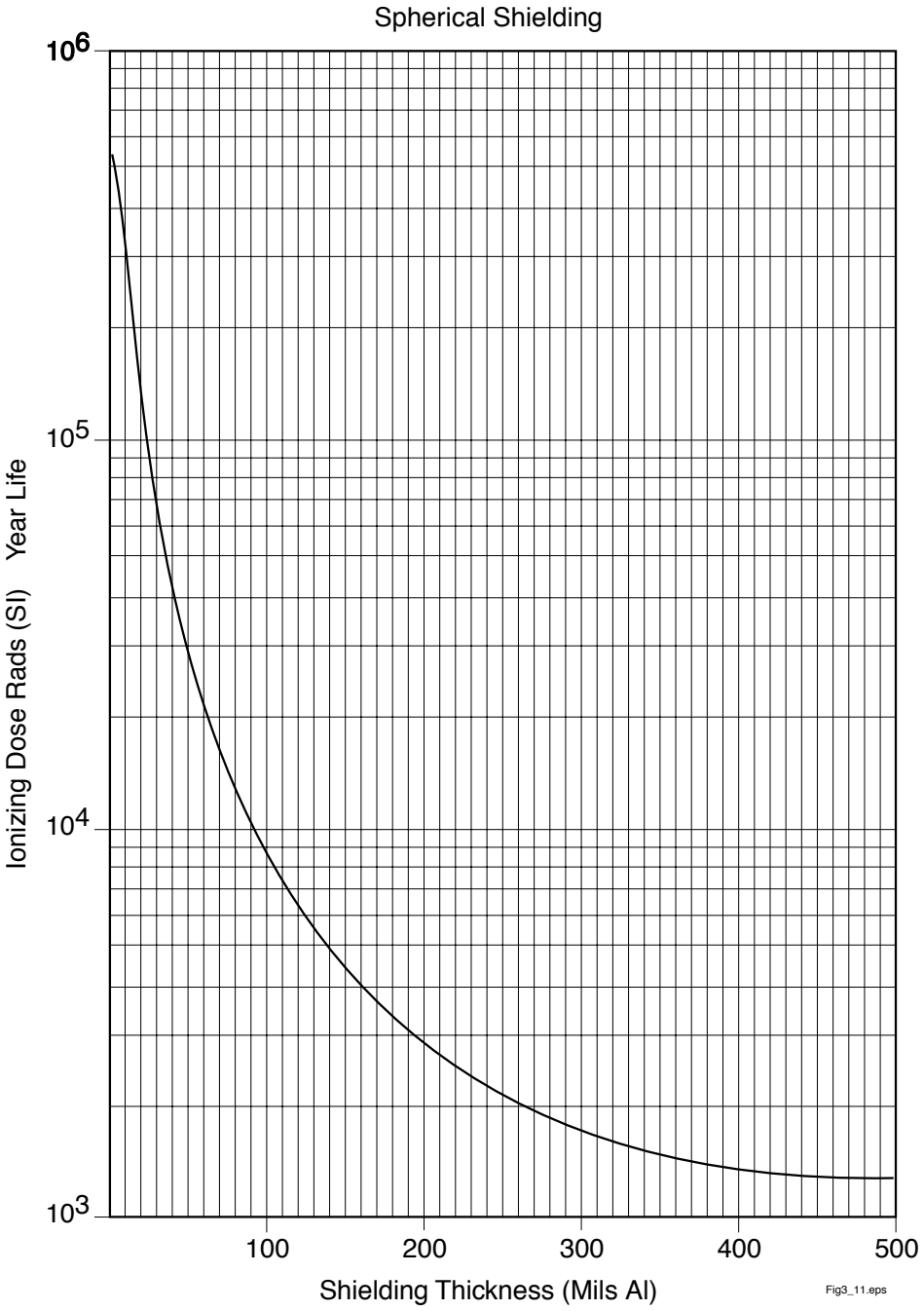
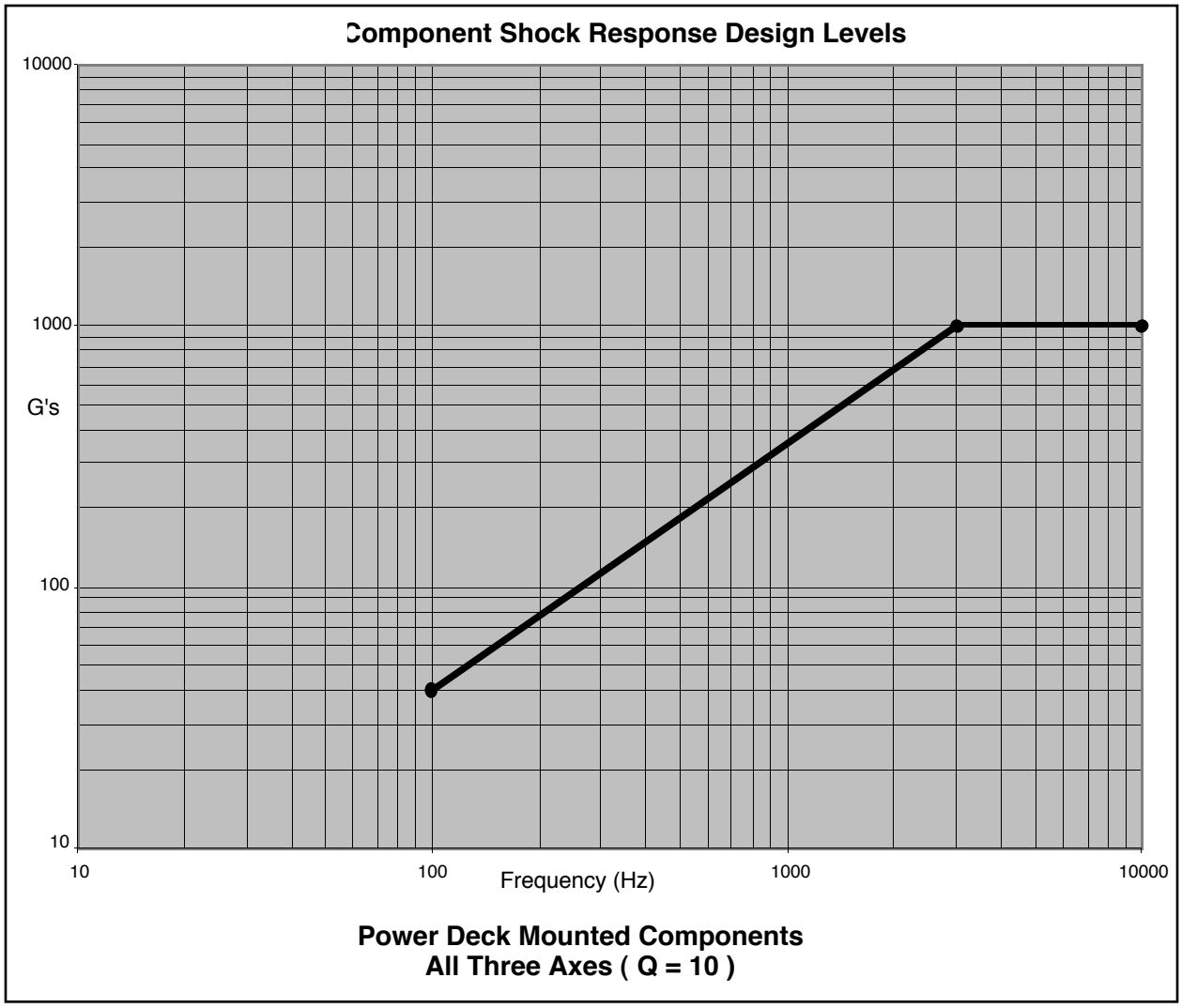


Figure 3-6. Radiation Dose as a Function of Shielding Thickness

3.2.7.5.4 Acceleration. The accelerations experienced by the ARU during operating periods of orbital transfer shall not exceed launch loads in any direction.

3.2.7.5.5 Pyrotechnic Shock. The ARU shall withstand ordnance-induced (pyrotechnic) shock in each of three orthogonal axes as shown in Figure 3-7. The orientation of the axes is optional. The response levels shown in Figure 3-7 apply to the equipment mounting surface.



Design Environment
Shock Response Spectrum Levels

Frequency (Hz)	G's
100	40
3000	1000
10000	1000

Figure 3-7. Pyrotechnic Shock

3.2.7.5.6 Meteoroids. Not applicable.

3.2.7.6 Reserved.

3.2.8 Nuclear Control Requirements. Not applicable.

RQMT-100 **3.2.9 Transportability.** The ARU shall be capable of meeting the requirements of this specification after shipment by air or surface carrier.

RQMT-110 Protective packing and packaging shall be provided to withstand environmental conditions associated with shipping, storage, and handling that are expected to exceed the conditions specified in section 3.2.7.

RQMT-120 Special packaging shall be used as necessary to assure that transportation methods do not impose design penalties.

3.3 Design and Construction. The following subparagraphs describe the general requirements for design and construction that are applicable to the ARU.

RQMT-100 **3.3.1 Materials, Processes, and Parts.** Parts, materials, and processes (PMP) implementation shall meet the general guidelines specified within MIL-STD-1546 and MIL-STD-1547 (or equivalent).

RQMT-110 PMP shall be selected and controlled according to the requirements of SSD-D-IM008, *Spacecraft Product Assurance Program Plan*.

RQMT-100 **3.3.1.1 Electronic Piece Parts.** Design and fabrication of electronic components shall meet the general guidelines specified within DOD-E-8983 and MIL-S-46844 (or equivalent).

RQMT-110 The selection and control procedures shall emphasize quality and reliability to meet the mission requirements, including all environmental degradation effects, and to minimize total life cycle cost for the system.

RQMT-120 The materials employed in the design shall be selected to assure maximized reliability and performance in the specified environment within the volume and weight constraints.

RQMT-130 The selection of parts, materials, and processes shall maximize commonality and thereby minimize the variety of parts, related tools, and test equipment required in fabrication, installation, and maintenance.

RQMT-140 No identical parts (e.g., electrical connectors, fittings) shall be used where inadvertent interchange of items or interconnections could cause a malfunction.

RQMT-100 **3.3.1.1.1 Parts Selection and Use.** The ARU shall use NASA's SSP 30312 as a guide.

RQMT-110 Otherwise, electronic parts shall be designed and selected for high reliability and long life in storage, test, and in operational use in the launch environment and during on-orbit operations in the space environment.

RQMT-120 All parts shall be hermetically sealed.

RQMT-130 Parts and materials which have been installed in an assembly and which are then removed from an assembly for any reason shall not be used in any item of spaceflight hardware.

RQMT-140 Justification for the use of nonstandard or non-approved parts shall be provided to the COR by a Non-Standard Parts Approval Request (NSPAR).

RQMT-100 **3.3.1.1.2 EEE Parts Program.** The intent of the EEE Parts Program is to provide the highest reliability level available within the program and schedule limitations. The radiation hardness characteristics of all parts will be established, implemented and maintained. Standard parts will be selected according to the following order of preference:

a. MIL-STD-975 Grade 1 and 2 or NASA SSP 30423

b. JANS and JANB microcircuits per MIL-M-38510 not listed in MIL-STD-975

c. JANTXV, JANTX and JANS semiconductor devices

d. Passive devices procured under established reliability for level of "S" and "R"

e. Industrial grade parts, specified for -40˚ C to +85˚C operation, and

f. All other parts selection shall be considered nonstandard and shall be submitted to the COR via the use of NSPARs.

RQMT-110 The Contractor shall procure EEE parts and perform the necessary specified screening requirements as delineated in SSD-D-IM008, *Spacecraft Product Assurance Program Plan*.

RQMT-120 This document shall also be used for establishment of the Contractor's parts program.

3.3.1.1.3 Capacitors and Resistors. MIL-STD-198 and MIL-STD-199 (or equivalent) shall be used as guidance for the selection of capacitors and resistors.

3.3.1.1.4 Other Devices. Relays, crystals, and Radio Frequency (RF) filters shall be procured to a Specification Control Drawing (SCD) that shall delineate the applicable qualification, screening, Destructive Physical Analysis (DPA) (refer to SSD-D-IM012), and receiving inspection requirements.

RQMT-100 **3.3.1.1.5 Electrical Connectors.** External connectors shall conform to the requirements of DOD-W-83575 (or equivalent) and as specified herein.

RQMT-110 Receptacle connectors for external connectors carrying wires to be shielded in external cabling shall be capable of being fitted with Electromagnetic Interference (EMI) backshells on the mating plug connector unless filtering is provided within the ARU assembly.

RQMT-120 Receptacle connectors for external connections, carrying wires to be unshielded in external cabling, shall be fitted with COR-approved EMI filter pins for all conductors carried by the connector. Connectors should conform to the requirements of MIL-C-24308, MIL-C-38999, MIL-C-39012, or MIL-C-55302 (or equivalent).

RQMT-130 The signal and signal return wires for each function shall be located in the same connector and shall be assigned adjacent pins to allow wire twisting and shielding. Keying, polarization, or other mechanical means, or combinations thereof, should be incorporated in connectors to prevent mismating, or incorrect mating, with cable connectors.

RQMT-140 One set of connector mates shall be supplied with each ARU.

RQMT-100 **3.3.1.1.5.1 Connector Savers.** Connector savers and ESD dust covers for all external connectors shall be provided on each connector from the time that it is installed in the ARU assembly until the item is packaged for delivery to the NRL.

RQMT-110 The connector saver shall be secured to the item and shall not be removed until shipment, except when absolutely necessary for the assembly or disassembly of the unit.

RQMT-120 In the latter case, the removal shall be entered in the item logbook.

RQMT-130 One set of connector savers shall be supplied with each ARU.

RQMT-100 **3.3.1.1.5.2 Coaxial Connectors.** All coaxial connectors, if used, shall be of the SMA type and the pin connectors shall be compatible with the Cannon D*MA type using #20 contacts (male on the power connector).

RQMT-110 One set of connector mates shall be supplied with each ARU.

RQMT-100 **3.3.1.1.5.3 MIL-STD-1553 Bus Connectors.** Connectors for the 1553 bus, if used, shall be twinax, screw attachment keyed coax connectors: TROMPETER BJ 3159 AC-201 for the primary bus and TROMPTER BJ 3159 ACFL-201 for the redundant bus or equivalent.

RQMT-110 One set of connector mates shall be supplied with the ARU.

3.3.1.1.6 Wires and Cable. Wiring and cable shall conform to the requirements of MIL-W-22759 or MIL-C-17 (or equivalent).

3.3.1.2 Materials. Materials shall be able to withstand the environments of the following subparagraphs.

RQMT-100 **3.3.1.2.1 Materials Selection.** Materials shall be selected to minimize flammability and toxicity hazards.

RQMT-110 Use of combustible materials shall be kept to a minimum, with particular emphasis on those which generate toxic products of combustion.

RQMT-120 Materials shall be selected which have demonstrated their suitability for the intended application and shall be consistent with MIL-STD-1568 (or equivalent).

RQMT-130 MSFC Spec 522, Table I, will be used for material selection where possible or practical. Where practical, fungus inert materials shall be used.

RQMT-100 **3.3.1.2.2 Metallic Materials.** Metallic materials shall be corrosion resistant by nature or shall be corrosion inhibited by means of protective coating.

RQMT-110 Protection of dissimilar metal combinations shall be in accordance with MIL-STD-889 (or equivalent).

RQMT-120 Structural properties of materials for use in the Space Segment shall be taken from MIL-HDBK-5 for metals, MIL-HDBK-17 for plastics, and MIL-HDBK-23 for sandwich composites (or their equivalents).

RQMT-130 Use of dissimilar metals shall be avoided.

RQMT-140 Base metals intended for inter-metallic contact that form galvanic couples shall be plated with those metals that reduce the potential difference or shall be suitably insulated by a nonconducting finish.

RQMT-150 Electrical bonding methods shall include provisions for corrosion protection of mating surfaces. With the exception of solder, the use of tin is prohibited. Note that semiconductors containing tin which have been subjected to stabilization bake at 190°C to 215°C for four or more hours under a protective inert gas atmosphere are acceptable for use.

3.3.1.2.3 Magnetic Materials. Magnetic cleanliness is important. The use of magnetic materials should be avoided whenever possible. Magnetic materials shall be used only if necessary for equipment operation. The materials used should minimize permanently induced and transient magnetic fields.

RQMT-100 **3.3.1.2.4 Finishes.** Protective methods and materials for cleaning, surface treatment, and applications of finishes and protective coatings shall conform to MIL-F-7179 and MIL-STD-1568 (or equivalent).

RQMT-110 Neither cadmium nor zinc coatings shall be used.

3.3.1.2.5 Outgassing. Materials shall be selected for low out-gassing characteristics. Materials exhibiting TML of 1.0% or less and Collected Volatile Condensable Material (CVCM) values of 0.1% or less as per SP-R-0022 should be used. Any materials that fail to meet these criteria will be identified to the COR.

3.3.1.3 Processes. Selected processes shall meet the requirements of the following subparagraphs.

RQMT-100 **3.3.1.3.1 Traceability.** A system for categorizing electronic parts into sets of homogeneous groups and tracing those parts through the fabrication, assembly, test, and delivery cycles shall be maintained.

RQMT-110 a. The item's parts and material shall be traceable from the initial source of material through the completed hardware.

b. Parts will be traced by part number, serial number (when available), and lot number.

RQMT-120 (1) Fabrication records (i.e., travellers), capable of providing two-way traceability from the first stages of assembly through final acceptance testing, shall be maintained.

RQMT-130 Specific entries shall be made, recording this information as parts are installed.

RQMT-140 The Contractor shall provide traceability records as shown in Table 3-3.

Table 3-3. Traceability and Lot Control

Part	Relevant Information
Electronic Piece Parts	Mfg/Date/Lot Code
Printed Circuit Boards	Serial Number
Potting/Adhesives/Coatings	Batch Number
Plating of Electronic Housings	Production/Manufacturer Lot Number
Modules and Assemblies	Serial Number
Connectors	Manufacturer Lot Number and Date Code
Chassis Case/Structures	Lot/Heat Treat Number

c. All electronics piece parts installed will be identified and documented in order to be traceable to a specific manufacturer, lot number, or data lot code. A record will be prepared for each flight unit that provides the following information for each EEE part that is installed:

(1) Part Number and Location

(2) Manufacturer

(3) Lot Number or Data Code

(4) Serial Number (when necessary).

d. The records will include the traceability of critical materials (including sampling test records), processes, pre-acceptance testing records, and sources of supply to the greatest extent practical. The records will be identifiable to the item's serial number.

3.3.1.3.2 Failure Reporting and Corrective Action System. A closed-loop Failure Reporting, Analysis, and Corrective Action (FRACA) system for reporting, analysis, and corrective action shall be in effect for failures occurring during the acceptance testing phases. The FRACA system will determine whether failures are caused by design deficiencies, human error, defective parts, infant mortality, test equipment, environmental exposure, or software. NRL's FRACAS practices are defined in SSD-D-IM006, *Failure Reporting Analysis and Corrective Action Procedure* (or equivalent).

3.3.1.3.3 Part Stress Derating. The application of all EEE parts in the design shall be derated such that the applied stresses do not exceed the derating criteria contained in SSD-D-IM007, *Worst Case Analysis Guidelines and Criteria* (or equivalent).

RQMT-100 **3.3.1.3.4 Soldering and Other Processes.** Soldering and other processes shall be consistent with the requirements of NASA NHB 5300.4A.

RQMT-110 a. Soldering and other processes shall be specified in Contractor-approved process specifications that employ the guidelines of NASA NHB 5300.4A; ANSI/J-STD-001; MIL-S-46844, *Solder Bath Soldering of Printed Wiring Assemblies*; or MIL-S-45743, *Soldering, Manual Type, High Reliability, Electrical and Electronic Equipment*, or their equivalents.

RQMT-120 b. Other special processes (e.g., adhesive bonding, plating, etc.) shall be fabricated according to the Contractor's approved process specifications.

RQMT-130 c. Printed Circuit Boards (PCBs) used in the fabrication of the equipment shall conform to the requirements of the following documents or their equivalents:

- MIL-P-55110, *Printed Wiring Boards, General Specifications*
- IPC-D-275, *Standard for PCB Design and Assembly*
- MIL-STD-275, *Printed Wiring for Electronic Equipment*
- IPC-FC-250, *Performance Specification for Single and Double-Sided Flexible Printed Boards*
- MIL-P-50884, *Printed Wiring, Flexible and Rigid-Flex*
- IPC-A-600D, *Acceptability of Printed Wiring Boards*
- MIL-STD-2118, *Flexible and Rigid-Flex Printed-Wiring for Electronic Equipment, Design Requirements for*
- IPC-FC-250A-86*, Specification for Single and Double-Sided Flexible Wiring*

3.3.1.3.5 Mechanical Piece Parts. Not applicable.

3.3.1.3.6 Surface Finishes. The exposed surfaces of the ARU shall have an emissivity greater than or equal to 0.85.

RQMT-100 **3.3.1.3.7 High Reliability Parts Processing.** Each lot of parts used in the ARU shall be subjected to high reliability parts processing in order to gain confidence that parts to be used are free from incipient failures and to precipitate failure in any marginal devices.

RQMT-110 The processing shall be as defined in SSD-D-IM008, *Spacecraft Product Assurance Program Plan*.

RQMT-100 **3.3.1.3.8 Control of Electro-Static Sensitive Parts.** Integrated circuits, discrete semiconductors, and thin film resistors of 10,000 ohm or greater resistance shall be protected from electrostatic discharge (ESD).

RQMT-110 These items shall be handled according to ESD control disciplines such that throughout the receiving, fabrication, assembly, and handling process they are not exposed to an ESD exceeding 100 volts.

RQMT-120 Part packages, shipping containers, and storage and handling container shall be plainly marked with the CAUTION note of "ELECTROSTATIC SENSITIVE" or equivalent.

RQMT-100 **3.3.2 Electromagnetic (EMC) Environment.** The ARU and its Ground Support Equipment (GSE) shall be designed and constructed such that each item is compatible with itself and with its known operational environments.

RQMT-110 The electromagnetic compatibility requirements shall be in accordance with MIL-STD-1541 and SSD-D-IM003 (or equivalent) .

RQMT-120 All support facilities, including test facilities and launch base facilities, shall comply with the grounding requirements of MIL-STD-1542 and SSD-D-IM003 (or equivalent).

3.3.2.1 Conducted Emission. The ARU shall meet the conducted emissions levels defined within Figure 3-8.

3.3.2.2 Conducted Susceptibility. The ARU shall not exhibit malfunctions, degradation of performance, or deviation from specifications when subjected to the levels defined in Figure 3-9.

3.3.2.3 Radiated Susceptibility. The ARU shall be designed to operate without malfunction, undesirable response, or deviation from specified performance tolerances when subjected to the radiated emissions specified herein.

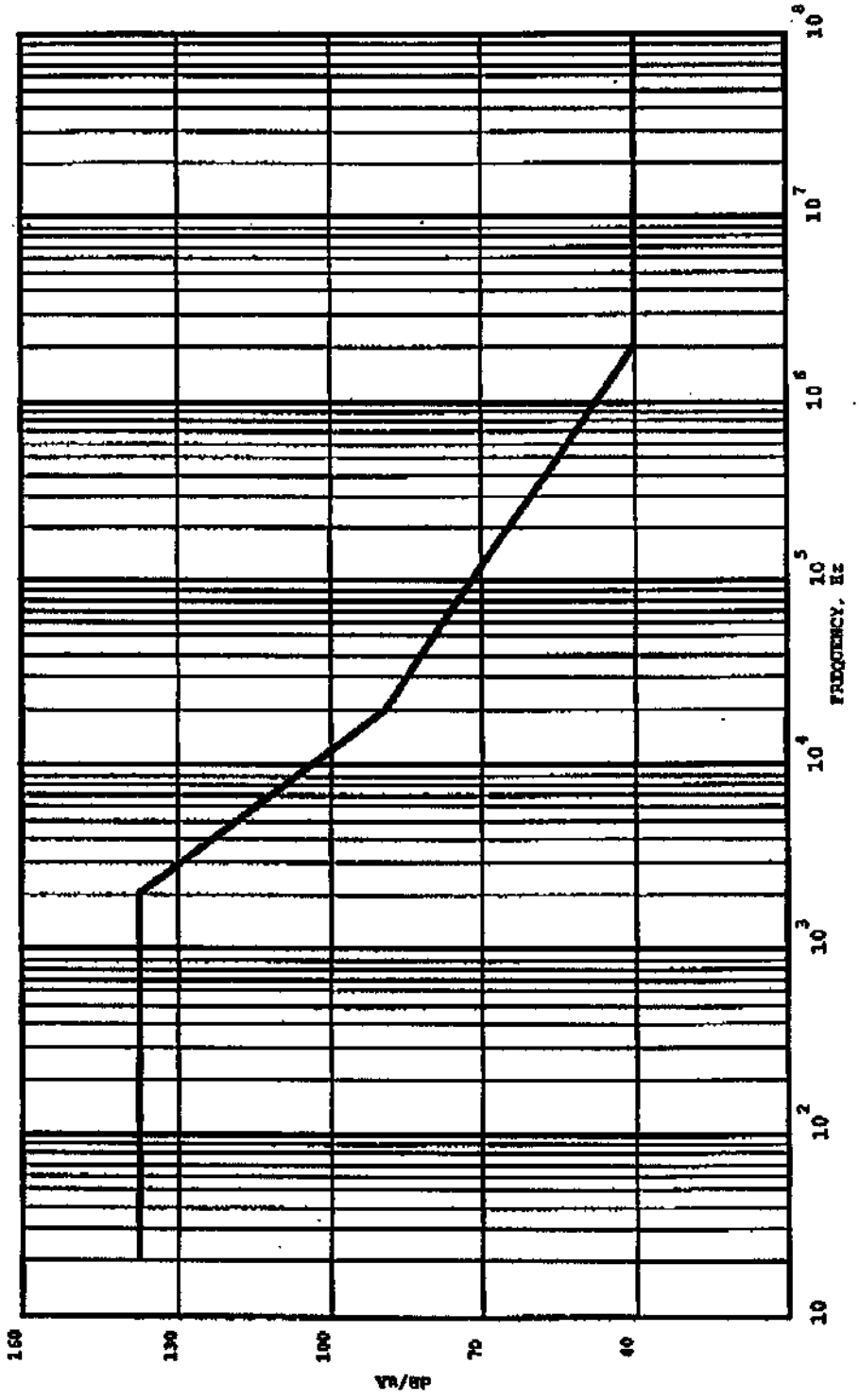


Figure 3-8. Allowable Conducted Emissions, Narrowband, on 28 V dc Bus

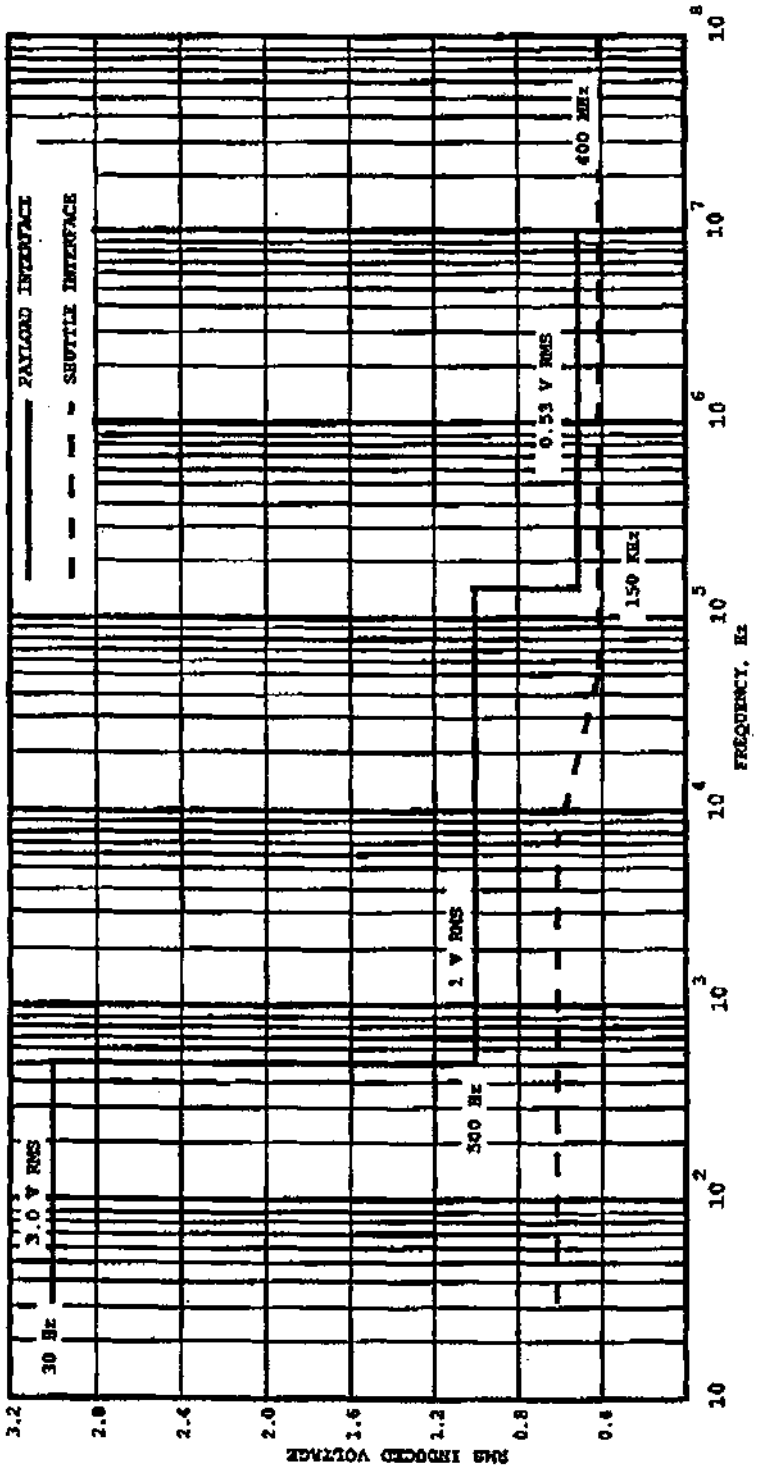


Figure 3-9. Limits for Conducted Susceptibility on 28 V dc Bus

RQMT-100 **3.3.2.3.1 Narrowband Susceptibility.** The ARU shall withstand the modulated continuous wave (MCW) apparent field strength of Table 3-4.

RQMT-110 Modulation of a carrier frequency up to 400 MHz shall be 30% and at a frequency which is critical to the subsystem.

RQMT-120 If a critical frequency is not apparent, 400 or 1000 Hz shall be used.

RQMT-130 Modulation of carrier frequencies higher than 400 MHz shall simulate the modulation used in the equipment, but at a reduced level sufficient to produce an indication.

Table 3-4. Radiated Susceptibility Limits

Frequency/Range	Radiated Electric Field Level
14 kHz to 200 MHz	5 V/m
200 MHz to 8 GHz	60 V/m
8 GHz to 10 GHz	20 V/m
2.2 GHz	161 V/m
8.5 GHz	79 V/m
13.7 GHz to 15.2 GHz	250 V/m

3.3.2.3.2 Broadband Susceptibility. Not applicable.

3.3.2.4 Radiated Emissions. The subsystem shall be designed to limit radiated emissions to the levels specified herein.

3.3.2.4.1 Narrowband Emissions. The apparent field strength of narrowband emissions at one meter from the subsystem shall be limited to the values shown in Table 3-5 and Figure 3-10.

Table 3-5. Narrowband Electrical Field Emissions

Frequency	Emissions
14 kHz to 10 MHz	56 dBμV/m
10 MHz to 259 MHz	Increasing log-linearly with increasing frequency from 56 to 86 dBμV/m (16 dB per decade)
259 MHz to 10 GHz	Increasing log-linearly with increasing frequency from 46 to 72 dBμV/m (16 dB per decade)
13.5 to 15.5 GHz	76 dBμV/m

3.3.2.4.2 Broadband Emissions. Not applicable.

3.3.2.5 Design Requirements. As a minimum the following design requirements shall apply relative to the electromagnetic radiation requirements specified herein.

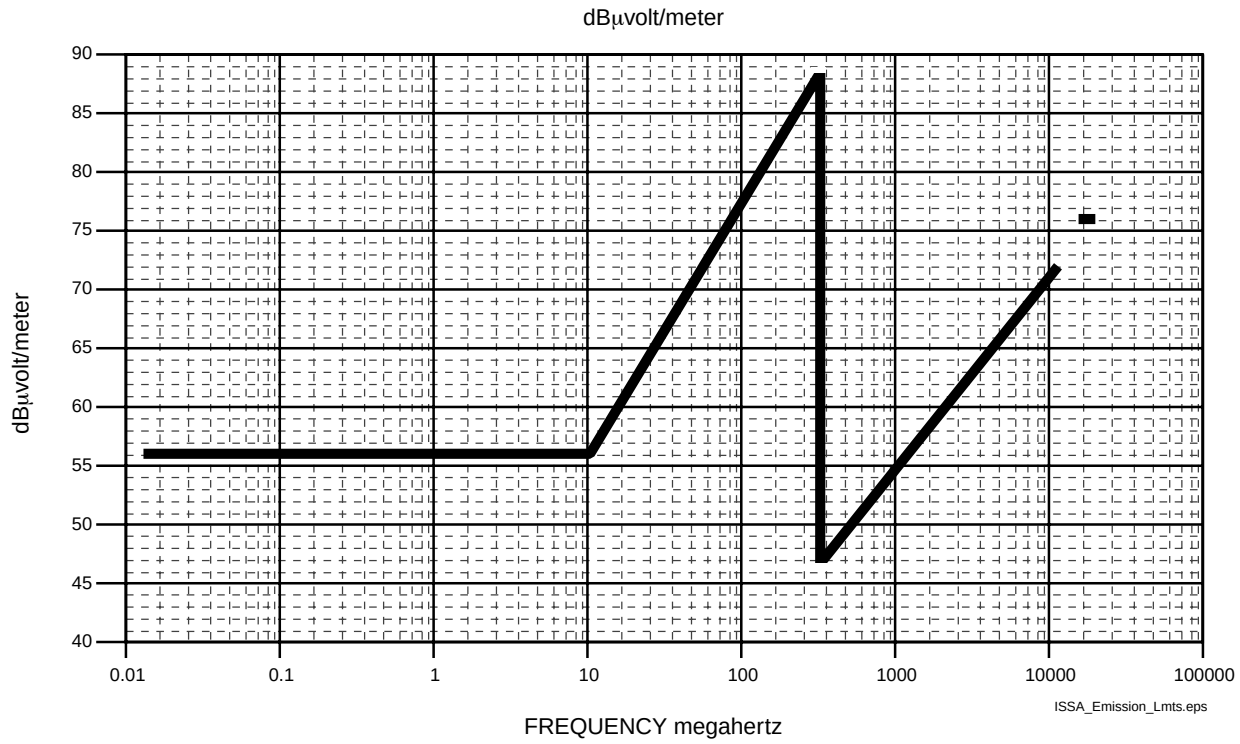


Figure 3-10. Narrowband Radiated Emission Limits

RQMT-100 **3.3.2.5.1 Electrical Bonding.** Electrical bonding shall be in accordance with MIL-B-5087, Class R (or equivalent).

RQMT-110 The electrical bonding of the equipment and structure shall:

a. Prevent the accumulation of static charge on any structure, equipment case, metal part, conductor or semi-conducting material and prevent damage of equipment due to lightning discharge or electrostatic discharge.

b. Provide a low impedance path to the electrical reference point for the conduction of fault current, instrumentation currents, and electro-magnetic currents.

c. Prevent electromagnetic wave or current nonlinear rectification.

d. Reduce to a minimum any shock hazard to personnel.

e. Provide a unipotential mass that can be used as a reference point for electrical measurements.

RQMT-120 The subsystem shall be designed such that the direct current (DC) resistance between any two points on the enclosure does not exceed 0.025 ohm total or 0.0025 ohm per joint.

RQMT-100 **3.3.2.5.2 Finishes for Bonding.** The surface finish for electrical bonding shall be bare metal or a qualified conductive finish such as Iridite l4 or Alodine l000.

RQMT-110 Nonconducting coatings such as anodized aluminum shall not be used.

RQMT-120 If abrasives or scrapers are used to remove any protective finish, they shall be the kind that produce a clean, smooth surface without removing excessive materials under the finish.

RQMT-130 Abrasives that would cause corrosion if embedded in the metal shall not be used.

RQMT-100 **3.3.2.5.3 Equipment Enclosure.** The equipment enclosure shall be electrically conductive and shall be designed to minimize electromagnetic propagation and pickup from external sources.

RQMT-110 The enclosure shall be designed to provide a shielding effectiveness of 65 dB to the predominant interference sources within. (Shielding effectiveness need not include leakage at connectors.)

RQMT-120 Provisions for installation shall be such that there shall be a continuous, low impedance path from the equipment enclosure to the basic structure of the platform to permit bonding of the equipment.

RQMT-130 The direct current resistance from enclosure to structure shall not exceed 2.5 milliohms.

RQMT-140 Mechanical discontinuities in the enclosure, such as covers, inspection plates, and joints, shall be kept to a minimum.

RQMT-150 Covers shall be secured by methods that prevent conductive metal particles generated from screw threads or EMI gaskets becoming mobile within the enclosure.

RQMT-160 A low impedance current path shall be provided across the interface of each discontinuity so as not to degrade the electromagnetic shielding effectiveness of the enclosure.

3.3.2.5.4 Signal Categories. Signals carried on internal interconnecting wiring shall be categorized as follows:

- Category 1 - Power, bi-level status signals, non-time critical control signals, relay control signals, and low-speed analog signals with noncritical circuit loop impedance requirements.
- Category 2 - Digital signals, including data, strobes and clocks, with speeds less than 15 Mbps; other signals, including clocks and timing pulses, with frequencies of less than 15 MHz; and low-speed analog signals with critical loop impedance requirements.
- Category 3 - Digital signals, including data, strobes and clocks, with speeds of 15 Mbps or greater; video signals; and other signals, including clocks and timing pulses, with frequencies of 15 MHz or higher.

RQMT-100 **3.3.2.5.4.1 Signal Shielding.** Internal interconnecting wiring carrying Category 3 signals, as specified herein, shall be coax, shall be routed in the most direct manner possible, and shall be terminated with connectors designed for the application as specified herein.

RQMT-110 Category 2 signals shall be carried on shielded wires or twisted, shielded pairs. Category 1 signals need not be shielded.

RQMT-100 **3.3.2.5.4.2 Signal Segregation.** Internal interconnecting wiring shall be segregated by signal category as specified herein.

RQMT-110 Wiring carrying Category 1 signals shall be segregated from wiring carrying Category 2 and 3 signals with a parallel spacing of at least five centimeters between segregated groups. Category 2 and 3 signals need not be segregated from each other.

RQMT-120 Segregated wire groups shall cross at right angles when crossing is necessary.

RQMT-100 **3.3.2.5.4.3 External Connectors.** External connectors for Category 3 signals shall be a coax type, either single or multiple, as specified herein.

RQMT-110 External connectors for Category 2 signals and their returns shall be dedicated to that category only and shall be of the EMI type with backshell as specified herein. Backshells need not be fitted internally in the unit.

RQMT-120 External connectors for Category 1 signals shall be fitted with EMI filter pins and shall contain only Category 1 signals and their returns.

RQMT-130 Returns for Category 1 and 2 signals shall terminate on pins adjacent to the signal to facilitate twisting of external wiring.

RQMT-140 Shields for internal wiring shall not be terminated on connector pins.

RQMT-100 **3.3.2.5.4.4 Connector Mounting.** Connectors shall be mounted in a manner to provide a ground path through the enclosure to the structure of the platform.

RQMT-110 The dc resistance measured from the connector shell to the equipment enclosure structure shall not exceed 2.5 milliohms.

RQMT-100 **3.3.2.5.4.5 Power Connectors.** Separate, dedicated receptacle connectors shall be provided for primary power inputs.

RQMT-110 EMI filters shall be provided for primary power inputs and shall be housed in a separate EMI shield enclosure contained within the overall envelope of the unit enclosure.

RQMT-120 As a goal, redundant connector pins shall be provided for all primary power and return paths.

RQMT-100 **3.3.2.5.4.6 Test Connectors.** Separate, dedicated receptacle connectors shall be provided if required to support unit testing.

RQMT-110 Test connections shall be terminated only in a test connector.

RQMT-120 If used, test receptacle connectors shall be provided with dummy mating plugs to be fitted when the test connector is not in use.

RQMT-130 The dummy plugs shall provide effective EMI shielding for the receptacle connectors.

RQMT-100 **3.3.2.5.4.7 Special Connectors.** Separate, dedicated receptacle connectors shall be provided as required for functions such as data bus terminations and unit personality coding as appicable.

RQMT-110 The connector type shall be selected, as specified herein, based on the signal category terminated in the connector.

RQMT-120 Mating plugs for special receptacle connectors shall be fabricated to provide the necessary coding jumpers or terminating loads, and to provide effective EMI shielding for the receptacle connector and the circuit elements contained in the plug assembly.

RQMT-100 **3.3.2.6 Corona Suppression.** The ARU's design shall be such that corona shall not exist.

RQMT-110 The effects of outgassing and residual pressure shall not cause arcing or breakdown of insulation.

RQMT-100 **3.3.3 Nameplates and Product Marking.** The ARU and its subassemblies shall be identified with a part number and a serial number.

RQMT-110 The same part number shall be used to identify like materials, processes, and details.

RQMT-120 The Contractor shall assign a new part number to a superseded part that is not interchangeable with respect to interface, reliability, safety, logistics, traceability, or performance.

3.3.3.1 Identification. The ARU shall display the following information.

- ARU
- Part Number and Dash Number
- Serial Number
- Contractor's Part Number and Change Letter
- Contractor Name or Trademark
- Contract Number

3.3.3.2 Electrical and Electronic Reference Designation Symbols. Electrical and electronic reference designations and symbols for external electrical connectors shall be affixed to the equipment in accordance with the requirements of ANSI Y32.16, *Reference Designations for Electrical and Electronic Parts and Equipments*, and ANSI Y32.2, *Graphic Symbols for Electrical and Electronic Diagrams*.

3.3.3.3 Test Articles. All development units (engineering models) shall be permanently marked "NOT FOR FLIGHT USE - DEVELOPMENT ONLY."

3.3.4 Workmanship.

RQMT-100 **3.3.4.1 General.** The ARU shall be manufactured, processed, tested, and handled such that finished items are of sufficient quality to ensure reliable operation, safety, and service life in the operational environments.

RQMT-110 All parts and assemblies shall be designed, constructed, and finished in a quality manner intended to produce defect-free equipment.

RQMT-120 Particular attention shall be given to critical operations such as soldering, plating, painting, riveting, machine screw assembly, welding, brazing, deburring, cleaning, and marking of parts and assemblies.

RQMT-130 The items shall be free of defects that would interfere with operational use, such as excessive scratches, nicks, burrs, loose material, fluxes, contamination, and corrosion.

RQMT-140 Workmanship shall meet the guidelines of MIL-STD-454, *Standard General Requirements For Electronic Equipment, Requirement 9* (or equivalent).

RQMT-100 **3.3.4.2 Contamination Control.** Contamination control and cleaning of the unit shall follow the guidelines of MIL-STD-1246, *Product Cleanliness Levels and Contamination Control Program* (or equivalent).

RQMT-110 The unit shall be free from all visible contamination, such as fingerprints, particles, corrosion products, metal chips, scale, oil, grease, preservatives, adhesives, and any foreign material.

RQMT-120 Motors and bearings shall be assembled in a Class 1,000 (or better) clean room. Labyrinth seals may be used to provide this level of protection.

RQMT-130 Motors shall be capable of being operated in a commercial shop environment without degradation.

RQMT-140 Units with contacts or parts in close proximity to conductive surfaces that cannot be cleaned and inspected after assembly shall be controlled during fabrication to assure a cleanliness level of 200D, in accordance with the guidelines of MIL-STD-1246 (or equivalent).

3.3.5 Interchangeability. Assemblies, components, and parts having identical part numbers shall, where practicable, be interchangeable.

RQMT-100 **3.3.6 Safety.** The unit shall be designed so that when stored, transported, or operated in accordance with applicable procedures, it will not cause damage to itself or to other equipment or cause injury to personnel.

RQMT-110 Precautionary markings shall be provided, as necessary, to warn personnel of the presence of hazardous conditions and the precautions to be observed to ensure the safety of personnel and equipment.

RQMT-120 The Contractor shall provide industrial safety activities that include implementation of accident prevention measures to protect all personnel and equipment under contract while in or on Contractor-controlled facilities.

RQMT-130 These activities shall be in accordance with applicable local, state and federal safety requirements and regulations.

3.3.7 Human Performance/Human Engineering. Not applicable.

RQMT-100 **3.3.8 Computer Resources.** Computer resources include all computer programs and associated computational equipment included within the ARU. Computational equipment includes both the equipment which executes symbolically expressed instructions and the associated peripheral devices. These computer resources shall be designed and developed in accordance with an integrated plan that minimizes the system life cycle cost.

RQMT-110 The system design shall provide ample memory and processing margins to accommodate contingencies and growth.

RQMT-100 **3.3.9 Standards of Manufacture.** General production requirements for the Space Segment shall be in accordance with SSD-D-IM009, *Flight Hardware Fabrication, Test and Repair* (or equivalent).

RQMT-110 Manufacturing standards and processes not covered by this specification that are critical to achieving the performance of the module specified herein shall require prior approval of the COR.

RQMT-100 **3.3.9.1 Processes and Controls.** The manufacturing processes and controls shall provide a Contractor-controlled baseline that ensures subsequent production items can be manufactured which are identical to, or better in performance, quality, and reliability than, initial production items used for qualification or flight demonstrations.

RQMT-110 These process controls shall be documented to give visibility to the procedures and specifications by which all processes, operations, inspections, and tests are to be accomplished by the Contractor.

RQMT-120 This internal Contractor documentation shall include the name of each component or part, each material required, the point it enters the manufacturing flow, and the controlling specification or drawing.

RQMT-130 The documentation shall indicate required tooling, facilities and test equipment, the manufacturing check points, the quality assurance verification points, and the verification procedures corresponding to each applicable process or material listed.

RQMT-140 The specifications, procedures, drawings, and supporting documentation shall reflect the specific revisions in effect at the time the item(s) used for qualification were produced.

RQMT-150 When approved by the COR, these flowcharts and referenced specifications, procedures, drawings, and supporting documentation shall become the manufacturing process control baseline and shall be retained by the Contractor for reference.

RQMT-160 Any changes to the baseline processes used, or the baseline documents used, when approved by the COR, shall be recorded by the Contractor following the production of the first item.

RQMT-100 **3.3.9.2 Production Lots.** Parts shall be grouped together in individual production lots during the various stages of their manufacture to ensure that all devices in a production lot are assembled during the same time period, using the same production materials, tools, methods, and controls.

RQMT-110 Items which cannot be adequately tested after assembly without destruction of the item, such as explosive ordnance devices, propulsion components, and complex electronics, shall have production lot controls implemented during manufacturing to ensure a uniform quality and reliability level of the entire lot.

RQMT-120 Each production lot shall be manufactured, tested, and stored as a single batch.

RQMT-130 Lot numbers shall be assigned to each production lot.

RQMT-100 **3.3.9.3 Contamination Control and Cleanliness.** Cleanliness requirements for each subsystem shall be determined and controlled on an individual basis.

RQMT-110 The ARU flight elements shall be protected from contamination during fabrication, integration, testing, storage, handling, transportation, and at the launch base.

RQMT-120 Satisfaction of the contamination requirements during prelaunch, launch, ascent, on-orbit, and abort operations shall be demonstrated by analysis.

RQMT-130 The item shall be monitored and periodically examined for cleanliness and cleaned as required, including before preparation for shipment from Contractor's facility to the NRL's facility and again before integration with the launch vehicle.

RQMT-100 **3.3.9.4 Connectors.** Connector keying or equivalent means shall be used to prevent mismating.

RQMT-110 All connectors shall be clearly labeled in addition to having the physical means to prevent improper connection.

3.3.9.5 Positive Locking Devices. If used, screw-type hardware on the ARU shall employ positive locking. Lockwashers shall not be used.

RQMT-100 **3.4 Documentation.** Documentation shall be consistent with the Contractor's established operation practices.

RQMT-110 Documentation shall be prepared according to the tailored guidelines of MIL-T-31000 (Developmental Design) or its equivalent.

RQMT-120 The results of trade studies, analyses, and development efforts shall be documented to support critical design decisions and milestone technical reviews during the course of the system development.

RQMT-100 **3.4.1 Specifications.** Specifications shall include all planning, design, responsibilities, and procedures. This text shall include, in detail, the specifics needed to accomplish any function within the documents themselves.

RQMT-110 Specifications shall be prepared according to the guidelines of MIL-STD-490, MIL-STD-498, and the appropriate Data Item Descriptions (DID), or their equivalents.

RQMT-120 These documents shall be subject to change control procedures and every proposed engineering change shall consider the effect of that change on these documents so that compatibility is maintained.

RQMT-100 **3.4.2 Drawings.** Specifications and hardware shall be supported by drawings according to the tailored guidelines of MIL-T-31000 (Developmental Design) and DOD-D-1000 or their equivalents.

RQMT-110 The final ARU documentation shall be such that subsequent production items can be produced or procured that are essentially equivalent in all respects to those initially tested or delivered.

RQMT-120 This final documentation shall also be adequate to allow the rapid incorporation of changes and modifications that have been approved by the COR.

RQMT-130 Documentation describing ARU operational procedures shall include contingency procedures to minimize the impact of possible on-orbit anomalies.

3.4.3 Software Support Documentation. All software support documentation shall be prepared according to the contractor's standard practices.

3.4.4 Test Plans and Procedures. All test plans and procedures shall be documented so that testing of the ARU can be accomplished by skilled engineering personnel.

3.4.5 Reserved.

3.5 Logistics.

RQMT-100 **3.5.1 Support Concept.** No scheduled or preventive maintenance shall be required to meet the performance and reliability requirements specified herein.

RQMT-110 Fault detection, isolation, and checkout shall be conducted at the module level, at which point replacement shall occur.

3.5.2 Support Facilities. Not applicable.

3.5.3 Hardware Support. Not applicable.

3.5.4 Computer Software Support. Not applicable.

3.6 Personnel. Not applicable.

3.7 Training. Not applicable.

3.8 Precedence. The order of precedence of the requirements specified herein is:

a. Safety

b. Missions

c. Space Vehicle Functions

d. Configuration Allocations

e. Quality Factors

f. All other requirements are considered equal in order of precedence.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 General. This section describes the analyses, tests, and inspections required for the Attitude Reference Unit (ARU) verification process. A quality assurance (QA) program shall be implemented according to the requirements of SSD-D-IM008, *Spacecraft Program Requirements and Guideline*s. The analyses, tests, and inspections specified in Table 4-1 (included at the end of this section) shall be conducted to verify that all requirements specified in section 3.0 have been achieved.

4.1.1 Responsibility for Tests. The Contractor shall perform all or any part of the verification requirements of this specification required by the COR. In the event the COR elects to perform any part or all of the tests or have them performed by others, the Contractor shall either write the test procedures for approval by the COR, or comment and mutually agree upon the test procedures provided by the COR.

4.1.2 Notification of Tests. The COR will be notified five days before the start of testing. In addition, the COR reserves the right to have either government or Industrial representatives from the COR and/or NASA witness selected tests.

4.1.3 Nonconformance Reporting. When a nonconformance occurs during testing, the Contractor shall discontinue testing and report the nonconformance to the COR using the guidelines of SSD-D-IM006, *Failure Reporting Analysis and Corrective Action Procedure* (or equivalent). The Contractor shall document all troubleshooting steps to be accomplished and obtain approval from the COR before undertaking troubleshooting and/or repair actions.

4.2 Analysis. Analyses shall be performed as specified in Table 4-1 to verify the requirements of section 3.0. The analytical methods that may be used include engineering analyses in the specified technical discipline, similarity to a previously verified requirement, review of Contractor drawings and data, use of experience, or prior testing. Formal submittal of analysis data and documentation shall be as specified in section 3.0 unless otherwise specified by the COR.

4.2.1 Worst-Case Analysis. The Contractor shall perform a worst-case analysis in accordance with SSD-D-IM007, *Worst Case Analysis, Guidelines, and Criteria (*or equivalent) to verify that the equipment will meet the performance requirements of paragraph 3.2.1 over the line voltage, external system loads, part parameters, and temperature variations anticipated during its operating life. The effects of part parameter variations shall be determined by setting the parts that have a measurable impact on the equipment performance parameter being evaluated at the value that results in the greatest variation in equipment performance. Those parts whose parameter variations do not have measurable impact on the equipment performance parameter of interest may be set at nominal values. Line voltage, external system loads, and temperature shall be set at worst-case conditions.

4.2.2 Reliability Analysis. The Contractor shall perform a reliability analysis on the equipment to verify attainment of the reliability requirements specified in paragraph 3.2.3 and to identify any potential areas of equipment reliability improvement. The reliability analysis shall include the following:

a. The Contractor shall perform an electrical stress analysis to verify proper part application in compliance with the part derating criteria of SSD-D-IM007.

b. The Contractor shall perform a Failure Modes, Effects, and Criticality Analysis (FMECA) according to SSD-D-IM008, *Spacecraft Product Assurance Plan*, to consider equipment circuitry failure modes and their effects on adjacent circuits, equipment inputs, and equipment outputs. Special emphasis shall be placed on eliminating failure propagation and potential safety hazards. The FMECA shall produce a single-point failure summary.

c. The Contractor shall perform a reliability prediction to verify achievement of the reliability requirement specified in paragraph 3.2.3. This reliability prediction shall conform to the prediction requirements of MIL-STD-756, *Reliability Modeling and Prediction (*or equivalent), and shall utilize the part failure rate data of MIL-HDBK-217, *Reliability Prediction of Electronic Equipment (*or equivalent). A space flight environment, a mission time of three years with continuous operation, and a baseplate temperature of 30°C shall be utilized in this prediction.

4.3 Inspections. Inspections shall be performed as specified in Table 4-1 to verify the requirements of section 3.0. Visual and other techniques shall be used to satisfy this requirement. Visual inspections shall be accomplished without magnification and with vision corrected to not worse than 20/30 and under a white light having an intensity of 100 foot-candles minimum at the point of inspection. Wipe tests, water break tests, ultraviolet inspection, special

lights, and mirrors are considered aids to visual inspection. Inspections shall be conducted at the last point of assembly at which each detail can be cleaned, if necessary, and inspected.

4.4 Tests. The tests specified in Table 4-1 shall be conducted on the ARU to verify the requirements of section 3.0. The analyses, inspections and tests specified in Table 4-1 shall be conducted on the ARU for purposes of acceptance by the COR, design verification, and to demonstrate equipment capability. The Contractor shall prepare and submit all test plans and test procedures for COR approval. Approval of the test plans and test procedures shall not relieve the Contractor of responsibility to perform adequate design verification and demonstration of equipment capabilities.

4.4.1 Functional Tests. The Contractor shall develop functional test procedures to verify the requirements of section 3.0, as specified in Table 4-1, and shall submit them for approval to the COR.

4.4.2 Performance Tests. The Contractor shall develop performance test procedures to verify the requirements of section 3.0, as specified in Table 4-1, and shall submit them for approval to the COR. The performance tests shall verify requirements of section 3.0 and quantify the performance of each individual unit. Performance tests shall verify specified power supply fluctuations and various interface signal levels.

4.4.3 Special Parameter Monitoring. The Contractor shall develop criteria and procedures for critical parameter monitoring during environmental tests to verify the requirements of section 3.0, as specified in Table 4-1. The Contractor shall submit these for approval to the COR, prior to the Contractor's preparation of detailed test procedures. Critical parameters shall include, as appropriate, test chamber temperature, test article temperature, pressure, test voltages and currents, test acoustic spectrum and level, test vibration spectrum and level, illumination, particle or radiation flux, instrument response and telemetry, and contamination.

4.4.4 Environmental Tests. Environmental tests shall be conducted at acceptance and qualification levels. Responsibilities for environmental tests are listed below:

- Burn-In: Contractor
- Temperature Cycling: Contractor
- Thermal Vacuum: Contractor
- Random Vibration: Contractor
- System Level Random Vibration* COR
- EMI/EMC: Contractor
- Pyrotechnic Shock*: COR

*Conducted as part of spacecraft-level testing program.

4.4.4.1 Burn-In. The total burn-in requirement shall be 200 hours (i.e., for each redundant side or element). The following conditions shall apply (to each redundant side or element) during this time:

a. A minimum of 40 hours of burn-in shall be accomplished at other than ambient temperature. This requirement shall be satisfied during normal temperature cycling and thermal vacuum testing with the unit functionally operating at temperature extremes and during ramping activities.

b. The final 50 hours of burn-in shall be accomplished with the hardware being failure free. This requirement may be accomplished either during temperature cycling/thermal vacuum or ambient temperature or in combination, as dictated by the normal test sequence.

4.4.4.2 Temperature Cycling Test. Temperature cycling tests shall consist of seven (or 13) cycles with minimum two-hour dwell at each temperature extreme. Performance testing shall be accomplished prior to and during the two temperature extremes of the first cycle, during the temperature extremes of the last cycle, and following the last cycle. Functional testing shall be accomplished during all temperature extremes of cycles two through six. Critical parameter monitoring shall be accomplished during all ramps. Temperature cycles, tests, and monitoring requirements (acceptance and qualification) are shown in Figure 4-1. Test verification that the hottest region on the subsystem's external surface be less than 10°C above the mounting surface is not required.

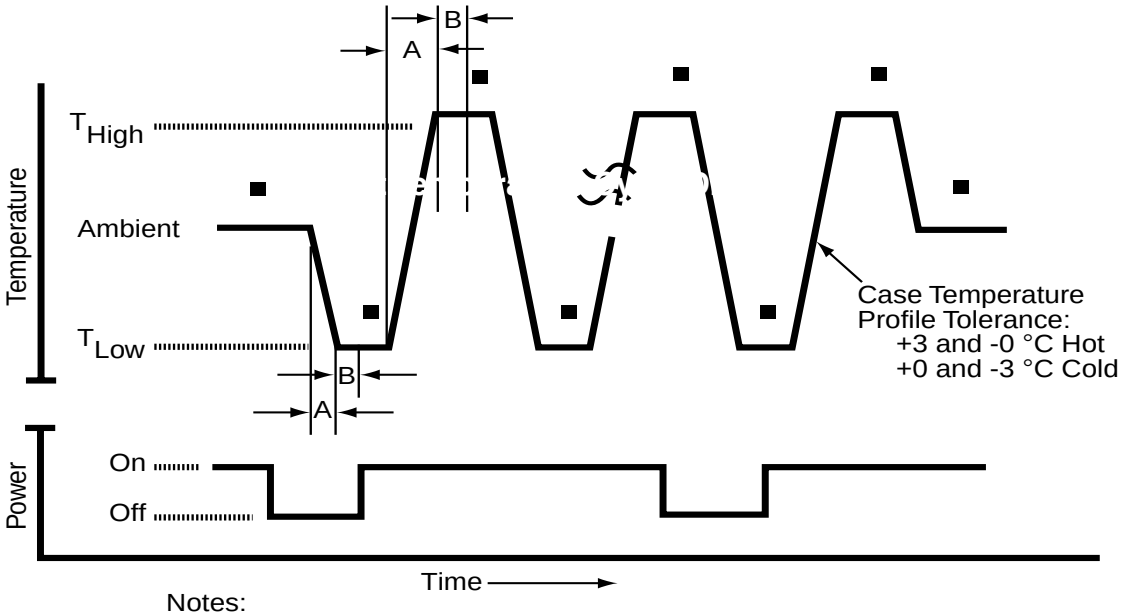
4.4.4.3 Thermal Vacuum Test. Thermal vacuum testing shall consist of one (or three) thermal cycle(s) at a pressure of 1×10^{-5} Torr or less with a minimum six-hour dwell at each of the temperature extremes. Performance test-

Procedure	No. of Cycles	T_{High}	T_{Low}
Qualification	13	60°C	-20°C
Acceptance	7	50°C	-10°C

■ Perform Functional Test

A Transition Rates as High as Practical, Not to Exceed 5°C/Min

B Two Hours Minimum for Temperature Stabilization



Notes:

1. Specimen Performance Will Be Monitored During Temperature Transients When Power is On.

2. At the End of Testing Day, Temperatures May Be Allowed to Return to Ambient Without Regard to Rate.

3. Functional Test at the First and Last Thermal Cycle Shall Be Run at 24, 30, and 36 Volts.

Figure 4-1. Temperature Cycle

ing shall be performed prior to the cycle, during each of the temperature extremes, and after the cycle. Critical parameter monitoring shall be accomplished during temperature transitions. Thermal vacuum requirements (acceptance and qualification) are shown in Figure 4-2. Test verification that the hottest region on the subsystem's external surface be less than 10° C above the mounting surface is not required.

4.4.4.4 Random Vibration. The random vibration test spectrum shall be equalized utilizing a control system with filters having a bandwidth of 10 Hz, or less, over the test frequency bandwidth of 20 to 2000 Hz. A true RMS or direct reading acceleration spectral density meter shall be used to monitor the vibration level. Random vibration data shall be presented as an acceleration spectral density versus frequency plot.

4.4.4.4.1 Test Method. A representative unit that is dynamically similar to the test unit shall be mounted on the rigid fixture and vibration exciter. The axis orientation shall be optional. The control and monitor accelerometers on the fixture shall be located as determined during fixture evaluation. The associated amplifiers and signal conditioning equipment for proper sensitivities and calibrations shall be adjusted, and an end-to-end check shall be conducted to verify proper control of the vibration system. Random vibration equalization to the specified spectrum and overall g rms level shall be accomplished. Tolerances are as follows:

Power Spectral Density:

20 Hz to 1000 Hz	±1.5 dB
1000 Hz to 2000 Hz	±3.0 dB

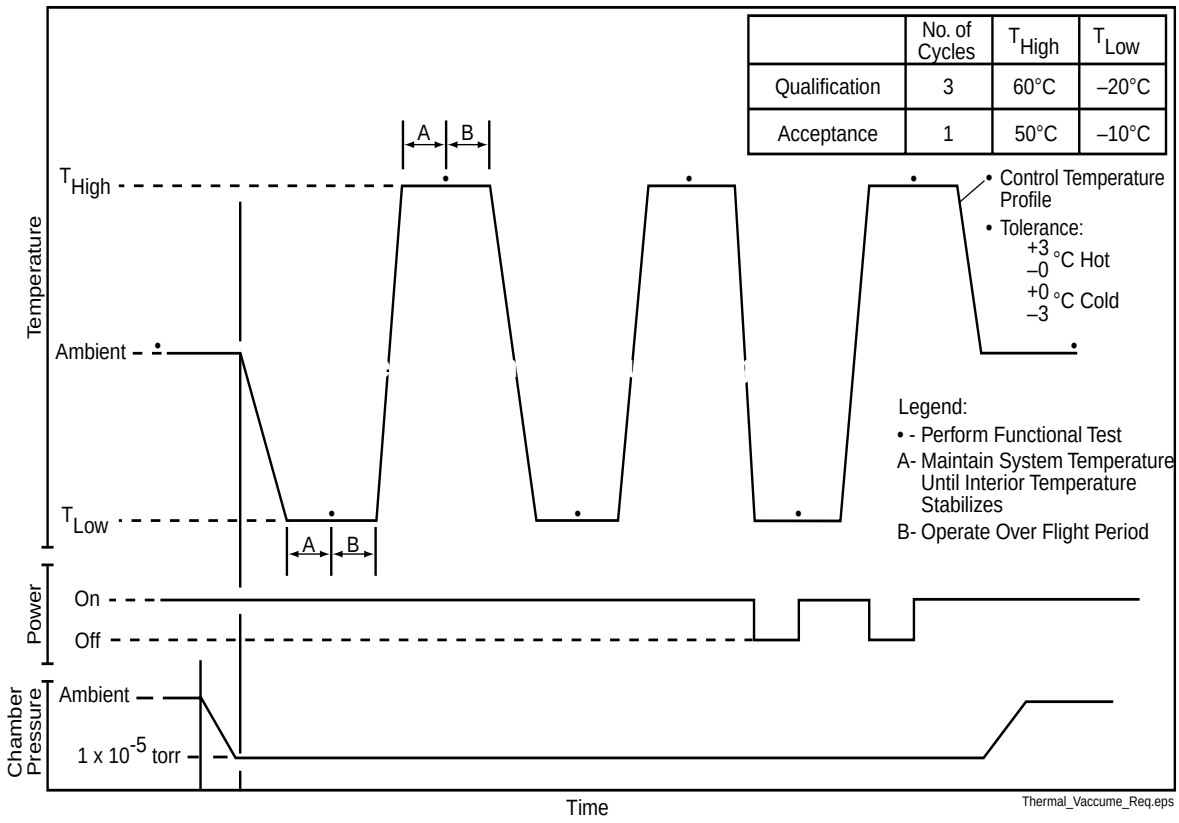


Figure 4-2. Thermal Vacuum Testing

Overall grms ±5%

If a representative unit is not available, the actual test item may be used with the approval of the COR. Where an actual test item must be used, the equalization level shall be reduced to approximately 20 percent of the specified overall g rms level and only after the vibration system protective devices have been demonstrated prior to mounting the test unit to the vibration fixture. Vibration system protective devices shall be set up and demonstrated to verify that they are set at the proper levels and functioning properly. The test unit shall be installed on the vibration fixture and shall be subjected to the random vibration test levels specified in section 3.0 in each of three orthogonal axes. A power spectral density plot shall be made to verify and record proper equalization for each of the three orthogonal axes.

4.4.4.5 Electromagnetic Compatibility Tests. The Contractor shall conduct EMC tests on the ARU qualification unit to verify compliance with section 3.0. EMC tests shall be based on MIL-STD-461 and MIL-STD-462 to meet the requirements of this specification. For existing products, this requirement may be met by analysis or by similarity.

4.4.4.6 Pyrotechnic Shock Tests. The COR will conduct pyrotechnic shock tests on the spacecraft to verify compliance with the test levels specified in section 3.0.

4.4.4.7 Acoustic Tests. Not applicable.

Table 4-1. Verification Requirements Checklist

Design Requirements		Verification Method					Test Requirements
Paragraph No.	Title	Not Applicable	Analysis	Inspection	Acceptance Test	Qualification Test	
3.0	REQUIREMENTS	X					
3.1	Item Definition	X					
3.1.1	Interface Definition			X			
3.2	Characteristics	X					
3.2.1	Performance Requirements	X					
3.2.1.1	Gyroscope Performance	X					
3.2.1.1.1	General	X					
3.2.1.1.2	Maximum Continuous Input Rates				X		
3.2.1.1.3	Output Scale Factors	X					
3.2.1.1.3.1	Scale Factor Linearity				X		
3.2.1.1.3.2	Scale Factor Stability				X		
3.2.1.1.4	Bias Repeatability				X		
3.2.1.1.5	Angular Random Walk				X		
3.2.1.1.6	Bandwidth				X		
3.2.1.1.7	Axis Alignment				X		
RQMT-100					X		
RQMT-110					X		
RQMT-120					X		
3.2.1.1.8	Sensitivity				X		
3.2.1.1.9	Warm-up Time				X		
3.2.1.2	Output Data Interfaces	X					
3.2.1.2.1	Output Data			X			
3.2.1.2.2	ARU Output Sampling Period			X			
RQMT-100				X			
RQMT-110				X			
3.2.1.3	Primary Power			X			
RQMT-100				X			

Table 4-1. Verification Requirements Checklist (Continued)

Design Requirements		Verification Method					Test Requirements
Paragraph No.	Title	Not Applicable	Analysis	Inspection	Acceptance Test	Qualification Test	
RQMT-110				X			
3.2.1.3.1	Input Voltage			X			
3.2.1.3.2	Source Impedance			X			
3.2.1.3.3	Isolation			X			
RQMT-100				X			
RQMT-110				X			
RQMT-120				X			
3.2.1.3.4	Power Consumption				X		
3.2.1.3.5	Inrush Current				X		
RQMT-100					X		
RQMT-110					X		
3.2.2	Physical Characteristics	X					
3.2.2.1	Mass Properties			X			
RQMT-100				X			
RQMT-110				X			
RQMT-120				X			
RQMT-130				X			
3.2.2.2	Mechanical Size, Configuration and Interface			X			
RQMT-100				X			
RQMT-110				X			
RQMT-120				X			
RQMT-130				X			
RQMT-140				X			
RQMT-150				X			
RQMT-160				X			
3.2.2.3	Mounting			X			
RQMT-100				X			

Table 4-1. Verification Requirements Checklist (Continued)

Design Requirements		Verification Method					Test Requirements
Paragraph No.	Title	Not Applicable	Analysis	Inspection	Acceptance Test	Qualification Test	
RQMT-110				X			
RQMT-120				X			
3.2.2.4	Connectors			X			
RQMT-100				X			
RQMT-110				X			
RQMT-120				X			
RQMT-130				X			
RQMT-140				X			
RQMT-150				X			
RQMT-160				X			
RQMT-170				X			
3.2.2.5	Thermal Design				X	X	
RQMT-100					X	X	
RQMT-110					X	X	
RQMT-120					X	X	
RQMT-130					X	X	
RQMT-140					X	X	
RQMT-150					X	X	
RQMT-160					X	X	
RQMT-170					X	X	
RQMT-180					X	X	
RQMT-190					X	X	
RQMT-200					X	X	
3.2.2.6	Radiation Effects		X				
3.2.2.6.1	Radiation Protection		X				
RQMT-100			X				
RQMT-110			X				

Table 4-1. Verification Requirements Checklist (Continued)

Design Requirements		Verification Method					Test Requirements
Paragraph No.	Title	Not Applicable	Analysis	Inspection	Acceptance Test	Qualification Test	
3.2.2.6.2	Radiation Hardness and Dosage		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
3.2.2.6.3	Single Event Effects		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
RQMT-130			X				
RQMT-140			X				
RQMT-150			X				
3.2.2.6.4	Single Event Latchup (SEL)		X				
RQMT-100			X				
RQMT-110			X				
3.2.2.7	Corona Suppression		X				
3.2.2.8	Venting		X				
RQMT-100			X				
RQMT-110			X				
3.2.2.9	Outgassing		X				
RQMT-100			X				
RQMT-110			X				
3.2.3	Reliability	X					
3.2.3.1	Reserved	X					
3.2.3.2	Failure Mode, Effects and Criticality Analysis (FMECA)		X				
3.2.3.3	Electrical Stress Analysis		X				
3.2.3.4	Reliability Analysis		X				

Table 4-1. Verification Requirements Checklist (Continued)

Design Requirements		Verification Method					Test Requirements
Paragraph No.	Title	Not Applicable	Analysis	Inspection	Acceptance Test	Qualification Test	
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
RQMT-130			X				
RQMT-140			X				
RQMT-150			X				
3.2.3.5	Single Point Failure (SPF)	X					
3.2.3.6	Worst Case Analysis		X				
3.2.4	Maintainability		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
RQMT-130			X				
3.2.4.1	Access and Mounting		X				
RQMT-100			X				
RQMT-110			X				
3.2.4.2	Modular Construction	X					
RQMT-100		X					
RQMT-110		X					
3.2.4.3	Fault Detection Capability			X			
3.2.4.4	Maintenance Provisions			X			
3.2.5	Availability	X					
3.2.5.1	Space Segment	X					
3.2.5.1.1	Non-Operating Environment		X				
3.2.5.1.2	Operating Environment				X	X	
3.2.5.2	Ground Segment - NRL Engineering Node (NEN)	X					
3.2.6	Systems Effectiveness Models	X					

Table 4-1. Verification Requirements Checklist (Continued)

Design Requirements		Verification Method					Test Requirements
Paragraph No.	Title	Not Applicable	Analysis	Inspection	Acceptance Test	Qualification Test	
3.2.7	Environmental Conditions	X					
3.2.7.1	Storage	X					
3.2.7.1.1	Ambient Air Temperature		X				
3.2.7.1.2	Ambient Pressure		X				
3.2.7.1.3	Humidity		X				
3.2.7.1.4	Cleanliness		X				
3.2.7.2	Ground Handling and Transportation	X					
3.2.7.2.1	Ambient Air Temperature		X				
3.2.7.2.2	Ambient Pressure		X				
3.2.7.2.3	Humidity		X				
3.2.7.2.4	Acceleration		X				
3.2.7.2.5	Vibration		X				
3.2.7.2.6	Shock		X				
RQMT-100			X				
RQMT-110			X				
3.2.7.2.7	Cleanliness		X				
RQMT-100			X				
RQMT-110			X				
3.2.7.3	Prelaunch	X					
3.2.7.3.1	Ambient Air Temperature		X				
3.2.7.3.2	Ambient Pressure		X				
3.2.7.3.3	Humidity		X				
3.2.7.3.4	Acceleration		X				
3.2.7.3.5	Cleanliness		X				
3.2.7.4	Launch and Ascent	X					
3.2.7.4.1	Temperature and Humidity				X	X	
RQMT-100					X	X	

Table 4-1. Verification Requirements Checklist (Continued)

Design Requirements		Verification Method					Test Requirements
Paragraph No.	Title	Not Applicable	Analysis	Inspection	Acceptance Test	Qualification Test	
RQMT-110					X	X	
3.2.7.4.2	Pressure				X	X	
RQMT-100					X	X	
RQMT-110					X	X	
3.2.7.4.3	Acceleration		X				
3.2.7.4.4	Emergency Landing (Launch Abort) Loads		X				
3.2.7.4.5	Acoustics and Random Vibration	X					
3.2.7.4.5.1	Acoustic Vibration	X					
3.2.7.4.5.2	Random Vibration.				X	X	
3.2.7.5	Orbital Operations	X					
3.2.7.5.1	Natural Thermal Radiation	X					
3.2.7.5.2	Pressure				X	X	
3.2.7.5.3	Particle Radiation		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
3.2.7.5.4	Acceleration		X				
3.2.7.5.5	Pyrotechnic Shock		X				
3.2.7.5.6	Meteoroids	X					
3.2.7.6	Reserved	X					
3.2.8	Nuclear Control Requirements	X					
3.2.9	Transportability		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
3.3	Design and Construction	X					
3.3.1	Materials, Processes, and Parts		X				

Table 4-1. Verification Requirements Checklist (Continued)

Design Requirements		Verification Method					Test Requirements
Paragraph No.	Title	Not Applicable	Analysis	Inspection	Acceptance Test	Qualification Test	
RQMT-100			X				
RQMT-110			X				
3.3.1.1	Electronic Piece Parts		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
RQMT-130			X				
RQMT-140			X				
3.3.1.1.1	Parts Selection and Use		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
RQMT-130			X				
RQMT-140			X				
3.3.1.1.2	EEE Parts Program		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
3.3.1.1.3	Capacitors and Resistors		X				
3.3.1.1.4	Other Devices		X				
3.3.1.1.5	Electrical Connectors		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
RQMT-130			X				
RQMT-140			X				
3.3.1.1.5.1	Connector Savers		X				

Table 4-1. Verification Requirements Checklist (Continued)

Design Requirements		Verification Method					Test Requirements
Paragraph No.	Title	Not Applicable	Analysis	Inspection	Acceptance Test	Qualification Test	
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
RQMT-130			X				
3.3.1.1.5.2	Coaxial Connectors		X				
RQMT-100			X				
RQMT-110			X				
3.3.1.1.5.3	MIL-STD-1553 Bus Connectors.		X				
RQMT-100			X				
RQMT-110			X				
3.3.1.1.6	Wires and Cable		X				
3.3.1.2	Materials		X				
3.3.1.2.1	Materials Selection		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
RQMT-130			X				
3.3.1.2.2	Metallic Materials		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
RQMT-130			X				
RQMT-140			X				
RQMT-150			X				
3.3.1.2.3	Magnetic Materials		X				
3.3.1.2.4	Finishes		X				
RQMT-100			X				

Table 4-1. Verification Requirements Checklist (Continued)

Design Requirements		Verification Method					Test Requirements
Paragraph No.	Title	Not Applicable	Analysis	Inspection	Acceptance Test	Qualification Test	
RQMT-110			X				
3.3.1.2.5	Outgassing		X				
3.3.1.3	Processes		X				
3.3.1.3.1	Traceability		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
RQMT-130			X				
RQMT-140			X				
3.3.1.3.2	Failure Reporting and Corrective Action System		X				
3.3.1.3.3	Part Stress Derating		X				
3.3.1.3.4	Soldering and Other Processes		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
RQMT-130			X				
3.3.1.3.5	Mechanical Piece Parts	X					
3.3.1.3.6	Surface Finishes		X				
3.3.1.3.7	High Reliability Parts Processing		X				
RQMT-100			X				
RQMT-110			X				
3.3.1.3.8	Control of Electro-Static Sensitive Parts		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
3.3.2	Electromagnetic (EMC) Environment					X	
RQMT-100						X	

Table 4-1. Verification Requirements Checklist (Continued)

Design Requirements		Verification Method					Test Requirements
Paragraph No.	Title	Not Applicable	Analysis	Inspection	Acceptance Test	Qualification Test	
RQMT-110						X	
RQMT-120						X	
3.3.2.1	Conducted Emission					X	
3.3.2.2	Conducted Susceptibility					X	
3.3.2.3	Radiated Susceptibility					X	
3.3.2.3.1	Narrowband Susceptibility					X	
RQMT-100						X	
RQMT-110						X	
RQMT-120						X	
RQMT-130						X	
3.3.2.3.2	Broadband Susceptibility	X					
3.3.2.4	Radiated Emissions						
3.3.2.4.1	Narrowband Emissions					X	
3.3.2.4.2	Broadband Emissions	X					
3.3.2.5	Design Requirements	X					
3.3.2.5.1	Electrical Bonding		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
3.3.2.5.2	Finishes for Bonding		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
RQMT-130			X				
3.3.2.5.3	Equipment Enclosure		X				
RQMT-100			X				
RQMT-110			X				

Table 4-1. Verification Requirements Checklist (Continued)

Design Requirements		Verification Method					Test Requirements
Paragraph No.	Title	Not Applicable	Analysis	Inspection	Acceptance Test	Qualification Test	
RQMT-120			X				
RQMT-130			X				
RQMT-140			X				
RQMT-150			X				
RQMT-160			X				
3.3.2.5.4	Signal Categories		X				
3.3.2.5.4.1	Signal Shielding		X				
RQMT-100			X				
RQMT-110			X				
3.3.2.5.4.2	Signal Segregation		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
3.3.2.5.4.3	External Connectors		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
RQMT-130			X				
RQMT-140			X				
3.3.2.5.4.4	Connector Mounting		X				
RQMT-100			X				
RQMT-110			X				
3.3.2.5.4.5	Power Connectors		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
3.3.2.5.4.6	Test Connectors		X				

Table 4-1. Verification Requirements Checklist (Continued)

Design Requirements		Verification Method					Test Requirements
Paragraph No.	Title	Not Applicable	Analysis	Inspection	Acceptance Test	Qualification Test	
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
RQMT-130			X				
3.3.2.5.4.7	Special Connectors		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
3.3.2.6	Corona Suppression		X				
RQMT-100			X				
RQMT-110			X				
3.3.3	Nameplates and Product Marking			X			
RQMT-100				X			
RQMT-110				X			
RQMT-120				X			
3.3.3.1	Identification			X			
3.3.3.2	Electrical and Electronic Reference Designation Symbols			X			
3.3.3.3	Test Articles			X			
3.3.4	Workmanship	X					
3.3.4.1	General			X			
RQMT-100				X			
RQMT-110				X			
RQMT-120				X			
RQMT-130				X			
RQMT-140				X			
3.3.4.2	Contamination Control			X			

Table 4-1. Verification Requirements Checklist (Continued)

Design Requirements		Verification Method					Test Requirements
Paragraph No.	Title	Not Applicable	Analysis	Inspection	Acceptance Test	Qualification Test	
RQMT-100				X			
RQMT-110				X			
RQMT-120				X			
RQMT-130				X			
RQMT-140				X			
3.3.5	Interchangeability			X			
3.3.6	Safety		X				
RQMT-100			X				
RQMT-110			X				
RQMT-120			X				
RQMT-130			X				
3.3.7	Human Performance/Human Engineering	X					
3.3.8	Computer Resources		X				
RQMT-100			X				
RQMT-110			X				
3.3.9	Standards of Manufacture			X			
RQMT-100				X			
RQMT-110				X			
3.3.9.1	Processes and Controls			X			
RQMT-100				X			
RQMT-110				X			
RQMT-120				X			
RQMT-130				X			
RQMT-140				X			
RQMT-150				X			
RQMT-160				X			
3.3.9.2	Production Lots			X			

Table 4-1. Verification Requirements Checklist (Continued)

Design Requirements		Verification Method					Test Requirements
Paragraph No.	Title	Not Applicable	Analysis	Inspection	Acceptance Test	Qualification Test	
RQMT-100				X			
RQMT-110				X			
RQMT-120				X			
RQMT-130				X			
3.3.9.3	Contamination Control and Cleanliness			X			
RQMT-100				X			
RQMT-110				X			
RQMT-120				X			
RQMT-130				X			
3.3.9.4	Connectors			X			
RQMT-100				X			
RQMT-110				X			
3.3.9.5	Positive Locking Devices			X			
3.4	Documentation			X			
RQMT-100				X			
RQMT-110				X			
RQMT-120				X			
3.4.1	Specifications			X			
RQMT-100				X			
RQMT-110				X			
RQMT-120				X			
3.4.2	Drawings			X			
RQMT-100				X			
RQMT-110				X			
RQMT-120				X			
RQMT-130				X			
3.4.3	Software Support Documentation	X					

Table 4-1. Verification Requirements Checklist (Continued)

Design Requirements		Verification Method					Test Requirements
Paragraph No.	Title	Not Applicable	Analysis	Inspection	Acceptance Test	Qualification Test	
3.4.4	Test Plans and Procedures			X			
3.4.5	Reserved	X					
3.5	Logistics	X					
3.5.1	Support Concept			X			
RQMT-100				X			
RQMT-110				X			
3.5.2	Support Facilities	X					
3.5.3	Hardware Support	X					
3.5.4	Computer Software Support	X					
3.6	Personnel	X					
3.7	Training	X					
3.8	Precedence	X					

5.0 PREPARATION FOR DELIVERY

5.1 General. Preparation for delivery shall be in accordance with the terms specified in this Section.

5.2 Packaging and Packing.

5.2.1 Containers. Individual containers shall be utilized to allow removal of the item for inspection without destruction of the container or of the wrappers affixed to the item. If paper wrapping is used on the item, the wrapping paper shall be acid free. As an objective, the container shall provide equal protection, without use of special tools, to items repackaged following inspection.

5.2.2 Special Instructions. If the item requires special attention during receiving, inspection, installation, and operation, or if non-obvious characteristics require that special handling be used, the procuring activity shall be notified under separate cover, and a removable instruction tag shall be attached. Attachment shall be to the shipping container or the item, as appropriate.

5.3 Marking.

5.3.1 Marking for Shipment. Exterior shipping containers and non-carrier packages and separately shipped items shall be marked:

"FRAGILE SPACE ELECTRONICS EQUIPMENT.

DO NOT DROP.

CONTAINS ELECTROSTATIC SENSITIVE DEVICES.

WEIGHT = _____."

5.3.2 Reinspection. Articles requiring periodic reinspection shall be marked with the next inspection date.

6.0 DELIVERABLES AND TASKS

6.1 Monthly Status Reports. The Contractor shall provide a monthly status report via DD Form 1423, Contract Data Requirements List (CDRL) A001, identifying any progress to date, planned efforts for the next reporting period, and program issues and problems.

6.2 Program Support Documentation. The Contractor shall provide the necessary planning and schedule to meet the delivery requirements. The Contractor shall comment on any potential problems in the schedule and provide a detailed plan of attack for solving these problems. A detailed schedule must be prepared, maintained, and provided to the COR, with schedule changes and/or updates provided. The data shall be provided monthly starting 30 days after award of contract (DAC) via DD Form 1423, A001. The Contractor shall inform the COR within seven days of any and all events or delays at the Contractor's facility that may impact schedule, performance, quality, delivery, or cost. If any delays occur or are anticipated to occur, the Contractor shall notify the COR by phone, following up with a written notification to the Contract Negotiator (identified in Section G of the contract). The Contractor shall provide a copy of the written notification to the COR.

6.3 Interface Control Document. The ARU Interface Control Document (ICD), DD Form 1423, A009, shall provide all the electrical and mechanical interfaces for the ARU. This shall include schematics, timing diagrams, pinouts, and command and control requirements. The Contractor shall deliver a complete ICD 45 days after contract.

6.4 Design Packages.

6.4.1 Preliminary Design Review Package. A Preliminary Design Review (PDR) package, DD Form 1423, A002, consisting of engineering drawings, schematics, analyses, and schedule in accordance with this specification, shall be furnished to the COR seven days prior to the scheduled PDR. A summary of actions and action items resulting from the PDR shall be furnished to the COR within two weeks after the PDR.

6.4.2 Final Design Package. A Final Design Review (FDR) package, DD Form 1423, A003, consisting of engineering drawings, schematics, analyses, and schedule in accordance with this specification, shall be furnished to the COR seven days prior to the FDR. A summary of actions and action items resulting from the FDR shall be furnished to the COR within two weeks after the FDR.

6.4.3 Drawings.

6.4.3.1 Assembly. The Contractor shall deliver a complete set of all assembly drawings for the ARU, DD Form 1423, A004, at PDR. If changes to the drawings are required, revised drawings will be sent to the COR.

6.4.3.2 Schematics and Parts List. The Contractor shall deliver a complete parts list for the item, DD Form 1423, A005, along with annotated schematics at PDR. If any changes are required, a revised parts list and annotated schematics will be sent to the COR.

6.4.3.3 Engineering Changes. The ARU shall be fabricated and assembled in accordance with drawings, parts lists, processes, and other documents listed on Contractor drawings. These documents shall be submitted to and approved by the COR. Upon establishment of the baseline configuration between the Contractor and the COR, the Contractor shall make no changes to any of these items without written approval from the COR via a Change Control Notice (CCN). When changes need to be made to DD Form 1423, A006 will be provided.

6.5 Testing Packages.

6.5.1 Test Procedures. Test procedures, DD Form 1423, A007, shall be prepared by the Contractor and submitted for COR approval 30 days prior to testing.

6.5.2 Test Reports. Test reports, DD Form 1423, A008, shall be generated by the Contractor and submitted upon final delivery of the unit tested. Test reports shall document all test failures and anomalies. Test reports shall include assembly and test log books. A Certificate of Compliance with the specification shall be provided with the test reports.

6.6 System Effectiveness.

6.6.1 Worst Case Analysis and FMECA. The Contractor shall deliver a worst case analysis and FMECA180 days after contract via DD Form 1423, A010.

6.6.2 Stress Analysis. The Contractor shall deliver a stress analysis 180 days after contract via DD Form 1423, A011.

6.6.3 Worst Case Timing Analysis. The Contractor shall deliver a worst case timing analysis 180 days after contract via DD Form 1423, A012.

6.6.4 Reliability Analysis. The Contractor shall deliver a reliability analysis 180 days after contract via DD Form 1423, A013.

6.7 Tasks.

6.7.1 Preliminary Design Review. The Preliminary Design Review will be held at the Contractor's facility 30 days after contract.

6.7.2 Final Design Review. The Final Design Review will be held at the Contractor's facility 30 days prior to start of testing.

82-3028-98

CONTRACT DATA REQUIREMENTS LIST

Form Approved
OMB No. 0704-0188

A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY:
0003	A	TDP _____ TM – _____ OTHER _____

D. SYSTEM / ITEM	E. CONTRACT / PR NO.	F. CONTRACTOR

1. DATA ITEM NO. A001 | **2. TITLE OF DATA ITEM** MONTHLY STATUS REPORT | **3. SUBTITLE**

4. AUTHORITY *(Data Acquisition Document No.)* | **5. CONTRACT REFERENCE** SPEC PARA 6.1 | **6. REQUIRING OFFICE** NRL

7. DD 250 REQ LT | **8. APP CODE** | **9. DIST STATEMENT REQUIRED** | **10. FREQUENCY** MONTHLY | **11. AS OF DATE** 30 DAC | **12. DATE OF FIRST SUBMISSION** | **13. DATE OF SUBSEQUENT SUBMISSION**

16. REMARKS

14. DISTRIBUTION

a. ADDRESSEE	b. COPIES: Draft	Final: Reg	Final: Repro
COR		2	
15. TOTAL →		2	

17. PRICE GROUP

18. ESTIMATED TOTAL PRICE

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1. DATA ITEM NO. A002 | **2. TITLE OF DATA ITEM** PRELIMINARY DESIGN REVIEW PACKAGE | **3. SUBTITLE**

4. AUTHORITY *(Data Acquisition Document No.)* | **5. CONTRACT REFERENCE** SPEC PARA 6.4.1 | **6. REQUIRING OFFICE** NRL

7. DD 250 REQ LT | **8. APP CODE** | **9. DIST STATEMENT REQUIRED** | **10. FREQUENCY** O TIME | **11. AS OF DATE** 7days prior to PDR | **12. DATE OF FIRST SUBMISSION** | **13. DATE OF SUBSEQUENT SUBMISSION**

16. REMARKS

14. DISTRIBUTION

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COR		2	
15. TOTAL →		2	

17. PRICE GROUP

18. ESTIMATED TOTAL PRICE

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1. DATA ITEM NO. A003 | **2. TITLE OF DATA ITEM** FINAL DESIGN REVIEW PACKAGE | **3. SUBTITLE**

4. AUTHORITY *(Data Acquisition Document No.)* | **5. CONTRACT REFERENCE** SPEC PARA 6.4..2 | **6. REQUIRING OFFICE** NRL

7. DD 250 REQ DD | **8. APP CODE** | **9. DIST STATEMENT REQUIRED** | **10. FREQUENCY** O TIME | **11. AS OF DATE** 7days prior to FDR | **12. DATE OF FIRST SUBMISSION** | **13. DATE OF SUBSEQUENT SUBMISSION**

16. REMARKS

14. DISTRIBUTION

a. ADDRESSEE	b. COPIES: Draft	Final: Reg	Final: Repro
COR		2	
15. TOTAL →		2	

17. PRICE GROUP

18. ESTIMATED TOTAL PRICE

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1. DATA ITEM NO. A004 | **2. TITLE OF DATA ITEM** DRAWINGS (ASSEMBLY) | **3. SUBTITLE**

4. AUTHORITY *(Data Acquisition Document No.)* | **5. CONTRACT REFERENCE** SPEC PARA 6.4.3.1 | **6. REQUIRING OFFICE** NRL

7. DD 250 REQ DD | **8. APP CODE** | **9. DIST STATEMENT REQUIRED** | **10. FREQUENCY** ONE/R | **11. AS OF DATE** | **12. DATE OF FIRST SUBMISSION** 7days prior to PDR | **13. DATE OF SUBSEQUENT SUBMISSION**

16. REMARKS

14. DISTRIBUTION

a. ADDRESSEE	b. COPIES: Draft	Final: Reg	Final: Repro
COR		2	
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17. PRICE GROUP

18. ESTIMATED TOTAL PRICE

G. PREPARED BY	H. DATE	I. APPROVED BY	J. DATE
		Glen F Brinkworth	1/29/98

82-3028-98

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A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY:
0003	A	TDP _____ TM – _____ OTHER _____

D. SYSTEM / ITEM	E. CONTRACT / PR NO.	F. CONTRACTOR

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A005	DRAWINGS (SCHEMATICS & PARTS LIST)		18. ESTIMATED TOTAL PRICE

4. AUTHORITY (Data Acquisition Document No.)	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
	SPEC PARA 6.4.3.2	NRL

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION
DD		ONE/R	7days prior to PDR
8. APP CODE		**11. AS OF DATE**	**13. DATE OF SUBSEQUENT SUBMISSION**

14. DISTRIBUTION	b. COPIES		
a. ADDRESSEE	Draft	Final Reg	Final Repro
COR		2	
15. TOTAL →		2	

16. REMARKS

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A006	DRAWINGS (ENGINEERING CHANGES)		18. ESTIMATED TOTAL PRICE

4. AUTHORITY (Data Acquisition Document No.)	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
	SPEC PARA 6.4.3.3	NRL

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION
LT		AS REQ	
8. APP CODE		**11. AS OF DATE**	**13. DATE OF SUBSEQUENT SUBMISSION**

14. DISTRIBUTION	b. COPIES		
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COR		2	
15. TOTAL →		2	

16. REMARKS

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A007	TEST PROCEDURES		18. ESTIMATED TOTAL PRICE

4. AUTHORITY (Data Acquisition Document No.)	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
	SPEC PARA 6.5.1	NRL

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION
DD		O TIME	
8. APP CODE		**11. AS OF DATE**	**13. DATE OF SUBSEQUENT SUBMISSION**
		14 DPTT	

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COR		2	
15. TOTAL →		2	

16. REMARKS
DPTT=DAYS PRIOR TO TEST

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A008	TEST REPORTS		18. ESTIMATED TOTAL PRICE

4. AUTHORITY (Data Acquisition Document No.)	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
	SPEC PARA 6.5.2	NRL

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION
DD		O TIME	
8. APP CODE		**11. AS OF DATE**	**13. DATE OF SUBSEQUENT SUBMISSION**
		14 DATC	

14. DISTRIBUTION	b. COPIES		
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COR		2	
15. TOTAL →		2	

16. REMARKS
DATC=DAYS AFTER TEST COMPLETION

G. PREPARED BY	H. DATE	I. APPROVED BY	J. DATE
		Dan F Bankworth	1/28/98

82-3028-98

CONTRACT DATA REQUIREMENTS LIST

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A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY:
0003	A	TDP _____ TM – _____ OTHER _____

D. SYSTEM / ITEM	E. CONTRACT / PR NO.	F. CONTRACTOR

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A009	INTERFACE CONTROL DOCUMENT		18. ESTIMATED TOTAL PRICE

4. AUTHORITY (Data Acquisition Document No.)	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
	SPEC PARA 6.3	NRL

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION	b. COPIES		
DD		ONE/R		a. ADDRESSEE	Draft	Final Reg	Final Repro
8. APP CODE		11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION				
		45 days ARO		COR		2	
16. REMARKS							
				15. TOTAL →		2	

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A010	WORST CASE ANALYSIS		18. ESTIMATED TOTAL PRICE

4. AUTHORITY (Data Acquisition Document No.)	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
	SPEC PARA 6.6.1	NRL

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION	b. COPIES		
DD		O TIME		a. ADDRESSEE	Draft	Final Reg	Final Repro
8. APP CODE		11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION				
		6 MONTHS ARO		COR		2	
16. REMARKS							
				15. TOTAL →		2	

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A011	STRESS ANALYSIS		18. ESTIMATED TOTAL PRICE

4. AUTHORITY (Data Acquisition Document No.)	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
	SPEC PARA 6.6.2	NRL

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION	b. COPIES		
DD		O TIME		a. ADDRESSEE	Draft	Final Reg	Final Repro
8. APP CODE		11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION				
		6 MONTHS ARO		COR		2	
16. REMARKS							
				15. TOTAL →		2	

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A012	WORST CASE TIMING ANALYSIS		18. ESTIMATED TOTAL PRICE

4. AUTHORITY (Data Acquisition Document No.)	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
	SPEC PARA 6.6.3	NRL

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION	b. COPIES		
DD		O TIME		a. ADDRESSEE	Draft	Final Reg	Final Repro
8. APP CODE		11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION				
		6 MONTHS ARO		COR		2	
16. REMARKS							
				15. TOTAL →		2	

G. PREPARED BY	H. DATE	I. APPROVED BY	J. DATE
		Don F Bankworth	1/28/98

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A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY:
0003	A	TDP ____ TM – ____ OTHER ____

D. SYSTEM / ITEM	E. CONTRACT / PR NO.	F. CONTRACTOR

Data item 1

Field	Entry
1. DATA ITEM NO.	A013
2. TITLE OF DATA ITEM	RELIABILITY ANALYSIS
3. SUBTITLE	
4. AUTHORITY (*Data Acquisition Document No.*)	
5. CONTRACT REFERENCE	SPEC PARA 6.6.4
6. REQUIRING OFFICE	NRL
7. DD 250 REQ	DD
8. APP CODE	
9. DIST STATEMENT REQUIRED	
10. FREQUENCY	O TIME
11. AS OF DATE	6 MONTHS
12. DATE OF FIRST SUBMISSION	
13. DATE OF SUBSEQUENT SUBMISSION	
16. REMARKS	
17. PRICE GROUP	
18. ESTIMATED TOTAL PRICE	

14. DISTRIBUTION a. ADDRESSEE	b. COPIES Draft	Final Reg	Final Repro
COR		2	
15. TOTAL →		2	

Data item 2

Field	Entry
1. DATA ITEM NO.	
2. TITLE OF DATA ITEM	
3. SUBTITLE	
4. AUTHORITY (*Data Acquisition Document No.*)	
5. CONTRACT REFERENCE	
6. REQUIRING OFFICE	
7. DD 250 REQ	
8. APP CODE	
9. DIST STATEMENT REQUIRED	
10. FREQUENCY	
11. AS OF DATE	
12. DATE OF FIRST SUBMISSION	
13. DATE OF SUBSEQUENT SUBMISSION	
16. REMARKS	
17. PRICE GROUP	
18. ESTIMATED TOTAL PRICE	

14. DISTRIBUTION a. ADDRESSEE	b. COPIES Draft	Final Reg	Final Repro
15. TOTAL →			

Data item 3

Field	Entry
1. DATA ITEM NO.	
2. TITLE OF DATA ITEM	
3. SUBTITLE	
4. AUTHORITY (*Data Acquisition Document No.*)	
5. CONTRACT REFERENCE	
6. REQUIRING OFFICE	
7. DD 250 REQ	
8. APP CODE	
9. DIST STATEMENT REQUIRED	
10. FREQUENCY	
11. AS OF DATE	
12. DATE OF FIRST SUBMISSION	
13. DATE OF SUBSEQUENT SUBMISSION	
16. REMARKS	
17. PRICE GROUP	
18. ESTIMATED TOTAL PRICE	

14. DISTRIBUTION a. ADDRESSEE	b. COPIES Draft	Final Reg	Final Repro
15. TOTAL →			

Data item 4

Field	Entry
1. DATA ITEM NO.	
2. TITLE OF DATA ITEM	
3. SUBTITLE	
4. AUTHORITY (*Data Acquisition Document No.*)	
5. CONTRACT REFERENCE	
6. REQUIRING OFFICE	
7. DD 250 REQ	
8. APP CODE	
9. DIST STATEMENT REQUIRED	
10. FREQUENCY	
11. AS OF DATE	
12. DATE OF FIRST SUBMISSION	
13. DATE OF SUBSEQUENT SUBMISSION	
16. REMARKS	
17. PRICE GROUP	
18. ESTIMATED TOTAL PRICE	

14. DISTRIBUTION a. ADDRESSEE	b. COPIES Draft	Final Reg	Final Repro
15. TOTAL →			

G. PREPARED BY	H. DATE	I. APPROVED BY	J. DATE
		[signature]	1/28/98

ENCLOSURE (1) TO DD FORM 1423
INSTRUCTIONS FOR DISTRIBUTION

DISTRIBUTION OF TECHNICAL REPORTS

The minimum distribution of technical reports and the final report submitted in connection with this contract is as follows:

ADDRESSEE	DODAAD CODE	NUMBER OF COPIES UNCLASSIFIED/ UNLIMITED	NUMBER OF COPIES UNCLASSIFIED/LIMITED AND CLASSIFIED
COR Naval Research Laboratory Code: 4555 Overlook Ave., S.W. Washington, DC 20375-5320	N00173	1	1
Administrative Contracting Officer		1	1
Director Naval Research Laboratory ATTN: Code: 5227 4555 Overlook Ave., S.W. Washington, DC 20375-5326	N00173	1	1
Defense Technical Information Center (DTIC) 8725 John J. Kingman Rd. Suite #0944 Fort Belvoir, VA 22060-6218	S47031	4	2

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COR	N00173	1	1
Administrative Contracting Officer (DCMAO)		1	1