

<b>SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEMS OFFEROR TO COMPLETE BLOCKS 12, 17, 23, 24, &amp; 30</b>				1. REQUISITION NUMBER <b>57-4218-99</b>	PAGE 1 OF <b>9</b>
2. CONTRACT NO.	3. AWARD/EFFECTIVE DATE	4. ORDER NUMBER	5. SOLICITATION NUMBER <b>N00173-99-R-CB06</b>	6. SOLICITATION ISSUE DATE <b>26 JUL 1999</b>	
7. FOR SOLICITATION INFORMATION CALL:	a. NAME <b>Cheri R. Burkhardt</b>		b. TELEPHONE NUMBER (No collect calls) <b>(202)767-6542</b>	8. OFFER DUE DATE/ LOCAL TIME <b>Blk 20</b>	
9. ISSUED BY <b>CONTRACTING OFFICER NAVAL RESEARCH LABORATORY ATTN: CODE WASHINGTON DC 20375-5326</b>			CODE <b>N00173</b>	10. THIS ACQUISITION IS <input checked="" type="checkbox"/> UNRESTRICTED <input type="checkbox"/> SET ASIDE: % FOR <input type="checkbox"/> SMALL BUSINESS <input type="checkbox"/> SMALL DISAV. BUSINESS <input type="checkbox"/> 8(A) SIC: <b>5049</b> SIZE STANDARD: <b>100</b>	11. DELIVERY FOR FOB DESTINATION UNLESS BLOCK IS MARKED <input type="checkbox"/> SEE SCHEDULE <input checked="" type="checkbox"/> 13a. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700) 13b. RATING <b>DO-C9</b> 14. METHOD OF SOLICITATION <input type="checkbox"/> RFO <input type="checkbox"/> IFB <input checked="" type="checkbox"/> RFP
15. DELIVER TO <b>NAVAL RESEARCH LABORATORY, BLDG. 49 4555 OVERLOOK AVE. SW, WASHINGTON, DC 20375-5326</b>			CODE <b>N00173</b>	12. DISCOUNT TERMS	
17a. CONTRACTOR/OFFEROR CODE <input type="text"/> FACILITY CODE <input type="text"/>			18a. PAYMENT WILL BE MADE BY <b>TBD</b> CODE <input type="text"/>		
TELEPHONE NO. <input type="checkbox"/> 17b. CHECK IF REMITTANCE IS DIFFERENT AND PUT SUCH ADDRESS IN OFFER			18b. SUBMIT INVOICES TO ADDRESS SHOWN IN BLOCK 18a UNLESS BLOCK BELOW IS CHECKED <input type="checkbox"/> SEE ADDENDUM		
19. ITEM NO.	20. SCHEDULE OF SUPPLIES/SERVICES	21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
	<b>Offer Due: 4:00 P.M. - 26 AUG 1999 See Continuation of Blocks 19 - 24</b>				
<i>(Attach Additional Sheets as Necessary)</i>					
25. ACCOUNTING AND APPROPRIATION DATA				26. TOTAL AWARD AMOUNT (For Govt. Use Only)	
<input checked="" type="checkbox"/> 27a. SOLICITATION INCORPORATES BY REFERENCE FAR 52.212-1, FAR 52.212-4, FAR 52.212-3 AND 52.212-5 ARE ATTACHED.			<input checked="" type="checkbox"/> ARE <input type="checkbox"/> ARE NOT ATTACHED		
<input type="checkbox"/> 27b. CONTRACT/PURCHASE ORDER INCORPORATES BY REFERENCE FAR 52.212-4, FAR 52.212-5 IS ATTACHED. ADDENDA			<input type="checkbox"/> ARE <input type="checkbox"/> ARE NOT ATTACHED		
28. CONTRACTOR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN <input type="checkbox"/> TO ISSUING OFFICE. CONTRACTOR AGREES TO FURNISH AND DELIVER ALL ITEMS SET FORTH OR OTHERWISE IDENTIFIED ABOVE AND ON ANY ADDITIONAL SHEETS SUBJECT TO THE TERMS AND CONDITIONS SPECIFIED HEREIN.			29. AWARD OF CONTRACT: REFERENCE _____ OFFER <input type="checkbox"/> DATED _____ YOUR OFFER ON SOLICITATION (BLOCK 5), INCLUDING ANY ADDITIONS OR CHANGES WHICH ARE SET FORTH		
30a. SIGNATURE OF OFFEROR/CONTRACTOR			31a. UNITED STATES OF AMERICA (SIGNATURE OF CONTRACTING OFFICER)		
30b. NAME AND TITLE OF SIGNER		30c. DATE SIGNED	31b. NAME OF CONTRACTING OFFICER		31c. DATE SIGNED
32a. QUANTITY IN COLUMN 21 HAS BEEN <input type="checkbox"/> RECEIVED <input type="checkbox"/> INSPECTED <input type="checkbox"/> ACCEPTED, AND CONFORMS TO THE CONTRACT, EXCEPT AS NOTED			33. SHIP NUMBER <input type="checkbox"/> PARTIAL <input type="checkbox"/> FINAL	34. VOUCHER NUMBER	35. AMOUNT VERIFIED CORRECT FOR
32b. SIGNATURE OF AUTHORIZED GOVT. REPRESENTATIVE		32c. DATE	36. PAYMENT <input type="checkbox"/> COMPLETE <input type="checkbox"/> PARTIAL <input type="checkbox"/> FINAL		37. CHECK NUMBER
41a. I CERTIFY THIS ACCOUNT IS CORRECT AND PROPER FOR PAYMENT		38. S/R ACCOUNT NUMBER		39. S/R VOUCHER NUMBER	40. PAID BY
41b. SIGNATURE AND TITLE OF CERTIFYING OFFICER		41c. DATE	42a. RECEIVED BY (Print)		
			42b. RECEIVED AT (Location)		
			42c. DATE REC'D (YY/MM/DD)	42b. TOTAL CONTAINERS	

# 1. CONTINUATION OF THE SF 1449 - SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEMS

A. Blocks 19 - 24 are completed as follows:

Item No.	Schedule of Supplies/Services	Quantity	Unit	Unit Price	Amount
0001	The contractor shall provide a RF Susceptibility Test System that includes both a Low Band Amplifier System with a test equipment system and a High Band Amplifier System				
0001AA	Low Band Amplifier System (80MHz – 1000MHz) with a test equipment system that includes the Power Measurement System, Field Measurement System, Optical Linked Data Monitoring System, and Shielded Video Monitoring System, and training in accordance with the Specification, Attachment No. 1	1	EA	\$	\$
0001AB	High Band Amplifier System (1000MHz – 2500MHz) and training in accordance with the Specification, Attachment No. 1	1	EA	\$	\$
0002	The Contractor shall provide technical telephone/fax support in accordance with the Specification, Attachment No. 1	1	LO	\$	\$
0003	Data in accordance with Exhibit A ,DD1423	*NSP	*NSP	*NSP	*NSP

\* NOT SEPARATELY PRICED.

B. Block 25 Accounting and Appropriation Data will be inserted at time of award.

**2. ADDENDA TO FAR 52.212-4 CONTRACT TERMS AND CONDITIONS--COMMERCIAL ITEMS (MAY 1999)**

**A. REQUIRED DELIVERY OR PERIOD OF PERFORMANCE**

The required delivery is as follows:

ITEM NO.	QUANTITY	WITHIN DAYS AFTER DATE OF CONTRACT AWARD
0001AA	1	180 Days
0001AB	1	365 Days

B. The period of performance for CLIN 0002 will begin with delivery of CLIN 0001AA and continue (6) six months past final delivery and training for CLIN 0001AB in accordance with 4.0 Technical Support of the Specification , Attachment 1.

**C. AUTHORIZED GOVERNMENT REPRESENTATIVE**

\*,Code \*,Telephone number \*, is hereby designated the Authorized Government Representative for inspection and acceptance purposes.

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

**D. YEAR 2000 COMPLIANT INFORMATION TECHNOLOGY**

This requirement applies to information technology (IT) that processes date-related information. All such IT delivered under this contract shall be Year 2000 compliant as defined at FAR 39.002.

**E. Remittance Address:**

**F. INSPECTION AND ACCEPTANCE**

Inspection and acceptance of the Low Band Amplifier System and the High Band Amplifier System will be accomplished by the Technical Manager in 30 days from setup time and training on the amplifier systems.

### 3. FAR 52.212-5 CONTRACT TERMS AND CONDITIONS REQUIRED TO IMPLEMENT STATUTES OR EXECUTIVE ORDERS--COMMERCIAL ITEMS (MAY 1999)

(a) The Contractor agrees to comply with the following FAR clauses, which are incorporated in this contract by reference, to implement provisions of law or executive orders applicable to acquisitions of commercial items:

- (1) 52.222-3, Convict Labor (E.O.11755); and
- (2) 52.233-3, Protest after Award (31 U.S.C 3553).

(b) The Contractor agrees to comply with the FAR clauses in this paragraph (b) which the contracting officer has indicated as being incorporated in this contract by reference to implement provisions of law or executive orders applicable to acquisitions of commercial items or components:

*(Contracting Officer shall check as appropriate.)*

- (1) 52.203-6, Restrictions on Subcontractor Sales to the Government, with Alternate I (41 U.S.C.253g and 10 U.S.C.2402).
- (2) 52.219-3, Notice of HUBZone Small Business Set-Aside (Jan 1999)
- (3) 52.219-4, Notice of Price Evaluation Preference for HUBZone Small Business Concerns (Jan 1999) *(if the offeror elects to waive the preference, it shall so indicate in its offer)*
- (4) (i) 52.219-5, Very Small Business Set-Aside (Pub. L. 103-403, section 304, Small Business Reauthorization and Amendments Act of 1994)
- (ii) Alternate I to 52.219-5
- (iii) Alternate II to 52.219-5
- (5) 52.219-8, Utilization of Small Business Concerns (15 U.S.C.637 (d)(2) and (3)).
- (6) 52.219-9, Small Business Subcontracting Plan (15 U.S.C.637 (d)(4)).
- (7) 52.219-14, Limitations on Subcontracting (15 U.S.C.637(a)(14)).
- (8) (i) 52.219-23, Notice of Price Evaluation Adjustment for Small Disadvantaged Business Concerns (Pub. L. 103-355, section 7102, and 10 U.S.C. 2323) *(if the offeror elects to waive the adjustment, it shall so indicate in its offer)*
- (ii) Alternate I of 52.219-23.
- (9) 52.219-25, Small Disadvantaged Business Participation Program - Disadvantaged Status and Reporting (Pub L. 103-355, section 7102, and 10 U.S.C. 2323).
- (10) 52.219-26, Small Disadvantaged Business Participation Program - Incentive Subcontracting (Pub. L. 103-355, section 7102, and 10 U.S.C. 2323).

- (11) 52.222-21, Prohibition of Segregated Facilities (Feb 1999)
- (12) 52.222-26, Equal Opportunity (E.O.11246).
- (13) 52.222-35, Affirmative Action for Disabled Veterans and Veterans of the Vietnam Era (38 U.S.C.4212).
- (14) 52.222-36, Affirmative Action for Workers with Disabilities (29 U.S.C.793).
- (15) 52.222-37, Employment Reports on Disabled Veterans and Veterans of the Vietnam Era (38 U.S.C.4212).
- (16) 52.225-3, Buy American Act -- Supplies (41 U.S.C.10).
- (17) 52.225-9, Buy American Act -- Trade Agreements Act -- Balance of Payments Program (41 U.S.C.10, 19 U.S.C.2501-2582).
- (18) [Reserved]
- (19) 52.225-18, European Union Sanction for End Products (E.O.12849).
- (20) 52.225-19, European Union Sanction for Services (E.O.12849).
- (21) (i) 52.225-21, Buy American Act -- North American Free Trade Agreement Implementation Act -- Balance of Payments Program (41 U.S.C 10, Pub.L.103-187).
- (ii) Alternate I of 52.225-21.
- (22) 52.232-33, Payment by Electronic Funds Transfer -- Central Contractor Registration (31 U.S.C. 3332).
- (23) 52.232-34, Payment by Electronic Funds Transfer --Other than Central Contractor Registration (31 U.S.C. 3332).
- (24) 52.232-36, Payment by Third Party (31 U.S.C. 3332).
- (25) 52.239-1, Privacy or Security Safeguards (5 U.S.C.552a).
- (26) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (46 U.S.C.1241).

(c) The Contractor agrees to comply with the FAR clauses in this paragraph (c), applicable to commercial services, which the Contracting Officer has indicated as being incorporated in this contract by reference to implement provisions of law or executive orders applicable to acquisitions of commercial items or components:

*(Contracting Officer check as appropriate.)*

- (1) 52.222-41, Service Contract Act of 1965, As Amended (41 U.S.C.351, *et seq.*).
- (2) 52.222-42, Statement of Equivalent Rates for Federal Hires (29 U.S.C.206 and 41 U.S.C.351, *et seq.*).

- (3) 52.222-43, Fair Labor Standards Act and Service Contract Act -- Price Adjustment (Multiple Year and Option Contracts) (29 U.S.C.206 and 41 U.S.C.351, *et seq.*).
- (4) 52.222-44, Fair Labor Standards Act and Service Contract Act - Price Adjustment (29 U.S.C.206 and 41 U.S.C.351, *et seq.*).
- (5) 52.222-47, SCA Minimum Wages and Fringe Benefits Applicable to Successor Contract Pursuant to Predecessor Contractor Collective Bargaining Agreement (CBA) (41 U.S.C.351, *et seq.*).

(d) *Comptroller General Examination of Record.* The Contractor agrees to comply with the provisions of this paragraph (d) if this contract was awarded using other than sealed bid, is in excess of the simplified acquisition threshold, and does not contain the clause at 52.215-2, Audit and Records -- Negotiation.

(1) The Comptroller General of the United States, or an authorized representative of the Comptroller General, shall have access to and right to examine any of the Contractor's directly pertinent records involving transactions related to this contract.

(2) The Contractor shall make available at its offices at all reasonable times the records, materials, and other evidence for examination, audit, or reproduction, until 3 years after final payment under this contract or for any shorter period specified in FAR Subpart 4.7, Contractor Records Retention, of the other clauses of this contract. If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for 3 years after any resulting final termination settlement. Records relating to appeals under the disputes clause or to litigation or the settlement of claims arising under or relating to this contract shall be made available until such appeals, litigation, or claims are finally resolved.

(3) As used in this clause, records include books, documents, accounting procedures and practices, and other data, regardless of type and regardless of form. This does not require the Contractor to create or maintain any record that the Contractor does not maintain in the ordinary course of business or pursuant to a provision of law.

(e) Notwithstanding the requirements of the clauses in paragraphs (a), (b), (c) or (d) of this clause, the Contractor is not required to include any FAR clause, other than those listed below (and as may be required by an addenda to this paragraph to establish the reasonableness of prices under Part 15), in a subcontract for commercial items or commercial components --

- (1) 52.222-26, Equal Opportunity (E.O.11246);
- (2) 52.222-35, Affirmative Action for Special Disabled and Vietnam Era Veterans (38 U.S.C.2012(a));
- (3) 52.222-36, Affirmative Action for Workers with Disabilities (29 U.S.C.793); and
- (4) 52.247-64, Preference for Privately-Owned U.S.- Flag Commercial Vessels (46 U.S.C.1241) (flow down not required for subcontracts awarded beginning May 1, 1996).

**4. 252.212-7001 -- CONTRACT TERMS AND CONDITIONS REQUIRED TO IMPLEMENT STATUTES OR EXECUTIVE ORDERS APPLICABLE TO DEFENSE ACQUISITIONS OF COMMERCIAL ITEMS. (JAN 1999)**

- (a) The Contractor agrees to comply with the Defense Federal Acquisition Regulation Supplement (DFARS) clause 252.247-7023, Transportation of Supplies by Sea, which is included in this contract by reference to implement 10 U.S.C.2631.
- (b) The Contractor agrees to comply with any clause that is checked on the following list of DFARS clauses which, if checked, is included in this contract by reference to implement provisions of law or Executive Orders applicable to acquisitions of commercial items or components.

- 252.205-7000 Provision of Information to Cooperative Agreement Holders (10 U.S.C.2416).
- 252.206-7000 Domestic Source Restriction (10 U.S.C.2304).
- 252.219-7003 Small Business and Small Disadvantaged Business Subcontracting Plan (DOD Contracts) (15 U.S.C.637).
- 252.225-7001 Buy American Act and Balance of Payment Program (41 U.S.C.10 a-10d, E.O. 10582).
- 252.225-7007 Buy American Act -Trade Agreements - Balance of Payments Program  
 Alternate I) (41 U.S.C. 10a-10d, 19 U.S.C.2501-2518, and 19 U.S.C. 3301 note).
- 252.225-7012 Preference for Certain Domestic Commodities.
- 252.225-7014 Preference for Domestic Specialty Metals (10 U.S.C.2241 note).
- 252.225-7015 Preference for Domestic Hand or Measuring Tools (10 U.S.C.2241 note).
- 252.225-7021 Trade Agreements (Alternate I) (19 U.S.C. 2501-2518 and 19 U.S.C. 3301 note).
- 252.225-7027 Restriction on Contingent Fees for Foreign Military Sales (22 U.S.C.2779).
- 252.225-7028 Exclusionary Policies and Practices of Foreign Governments (22 U.S.C.2755).
- 252.225-7029 Restriction on Acquisition of Air Circuit Breakers (10 U.S.C.2534(a)(3)).

- 252.225-7036 Buy American Act -- North American Free Trade Agreement Implementation Act.-- Balance of Payment Program (Alternate I) (41 U.S.C. 10a-10d and 19 U.S.C. 3301 note).
- 252.227-7015 Technical Data -- Commercial Items (10 U.S.C.2320).
- 252.227-7037 Validation of Restrictive Markings on Technical Data (10 U.S.C.2321).
- 252.243-7002 Certification of Requests for Equitable Adjustment (10 U.S.C. 2410).
- 252.247-7024 Notification of Transportation of Supplies by Sea (10 U.S.C.2631).

(c) In addition to the clauses listed in paragraph (e) of the Contract Terms and Conditions Required to Implement Statutes or Executive Orders-Commercial Items clause of this contract, the Contractor shall include the terms of the following clause, if applicable, in subcontracts for commercial items or commercial components, awarded at any tier under this contract:

252.225-7014 Preference for Domestic Specialty Metals, Alternate I (10 U.S.C.2241 note).

#### DFARS:

252.204-7004 Required Central Contractor Registration (MAR 1998)

#### 5. CONTRACT DOCUMENTS, EXHIBITS OR ATTACHMENTS:

1. Exhibit A - Contract Data Requirements List, DD 1423 – 1 Page
2. Attachment 1 - Statement of Work/Specifications - 7 Pages
3. Attachment 2 – Accounting and Appropriation Data – 1 page (use at time of award and is always the last attachment)

#### 6. FAR 52.212-2 - EVALUATION - COMMERCIAL ITEMS (JAN 1999)

(a) The Government will award a contract resulting from this solicitation to the responsible offeror whose offer conforming to the solicitation will be most advantageous to the Government, price and other factors considered. The following factors shall be used to evaluate offers:

- (1) Price
- (2) Technical capability of the item offered to meet the Government requirement.
- (3) Past Performance

Technical and past performance, when combined, are of equal importance when compared to price.

(b) Options. The Government will evaluate offers for award purposes by adding the total price for all options to the total price for the basic requirement. The Government may determine

that an offer is unacceptable if the option prices are significantly unbalanced. Evaluation of options shall not obligate the Government to exercise the option(s).

- (c) A written notice of award or acceptance of an offer, mailed or otherwise furnished to the successful offeror within the time for acceptance specified in the offer, shall result in a binding contract without further action by either party. Before the offer's specified expiration time, the Government may accept an offer (or part of an offer), whether or not there are negotiations after its receipt, unless a written notice of withdrawal is received before award.

## **7. OFFEROR REPRESENTATIONS AND CERTIFICATIONS**

Offeror must complete and submit with its proposal, FAR 52.212-3 (MAY 1999) *Offeror Representations and Certifications--Commercial Items* and DFARS 252.212-7000 *Offeror Representations and Certifications--Commercial Items.*, which are available electronically in full text at : <http://heron.nrl.navy.mil/contracts/rep&certs.htm>

**CONTRACT DATA REQUIREMENTS LIST**  
(2 Data Items)

Form Approved  
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 220 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503. Please DO NOT RETURN your form to either of these addresses. Send completed form to the Government Issuing Contracting Officer for the Contract/PR No. listed in Block E.

<b>A. CONTRACT LINE ITEM NO.</b> 0003		<b>B. EXHIBIT</b> A		<b>C. CATEGORY:</b> TDP _____ TM _____ OTHER _____								
<b>D. SYSTEM / ITEM</b> 0001AA and 0001AB			<b>E. CONTRACT / PR NO.</b>		<b>F. CONTRACTOR</b>							
<b>1. DATA ITEM NO.</b> A001	<b>2. TITLE OF DATA ITEM</b> Operators Manual			<b>3. SUBTITLE</b>								
<b>4. AUTHORITY (Data Acquisition Document No.)</b> N/A			<b>5. CONTRACT REFERENCE</b>		<b>6. REQUIRING OFFICE</b> NRL Cod 2814							
<b>7. DD 250 REQ</b> No	<b>8. DIST STATEMENT REQUIRED</b>	<b>10. FREQUENCY</b> 1 Time	<b>12. DATE OF FIRST SUBMISSION</b> See Block 16		<b>14. DISTRIBUTION</b>							
<b>8. APP CODE</b> N/A	N/A	<b>11. AS OF DATE</b> See Block 16	<b>13. DATE OF SUBSEQUENT SUBMISSION</b>									
<b>16. REMARKS</b> Blocks 11-12 The manuals are due at the time of dlivery of the item so stated below. The manuals shall contain instructions for operation and maintenace of the following items:  High Power Amplifiers Power Meter Field Meter Field Probe Optical Volt Meter Optical Transceivers Optical Bus Extender Video Monitoring System					<b>a. ADDRESSEE</b> COR	<b>b. COPIES</b>						
						Draft	Reg	Repro				
						0	3	0				
					<b>15. TOTAL</b> →					0	3	0
<b>1. DATA ITEM NO.</b> A002	<b>2. TITLE OF DATA ITEM</b> Test Data			<b>3. SUBTITLE</b>								
<b>4. AUTHORITY (Data Acquisition Document No.)</b> N/A			<b>5. CONTRACT REFERENCE</b> SOW PARAGRAPH 5.0		<b>6. REQUIRING OFFICE</b> NRL Code 2814							
<b>7. DD 250 REQ</b> No	<b>8. DIST STATEMENT REQUIRED</b>	<b>10. FREQUENCY</b> 1 Time	<b>12. DATE OF FIRST SUBMISSION</b> See Block 16		<b>14. DISTRIBUTION</b>							
<b>8. APP CODE</b> N/A	N/A	<b>11. AS OF DATE</b>	<b>13. DATE OF SUBSEQUENT SUBMISSION</b>									
<b>16. REMARKS</b> The Contractor shall provide test data verifying that all system performance parameters are met for the low band amplifier system along with the dual directional couplers that are a part of the Power Measurement System and and the Field Probes that are a part of the Field Measurement System in the specification. The contractor shall also provide test dat for the high band amplifier system. Delivery will take place with the delivery of the system.					<b>a. ADDRESSEE</b> COR	<b>b. COPIES</b>						
						Draft	Reg	Repro				
						0	3	0				
					<b>15. TOTAL</b> →					0	3	0
					<b>G. PREPARED BY</b> NRL Code 2814		<b>H. DATE</b> 6/10/99		<b>I. APPROVED BY</b>		<b>J. DATE</b>	

<b>17. PRICE GROUP</b>
<b>18. ESTIMATED TOTAL PRICE</b>

<b>17. PRICE GROUP</b>
<b>18. ESTIMATED TOTAL PRICE</b>

# Specification for an RF Susceptibility Test System

## 1. Introduction

The Naval Research Laboratory is involved in the Electromagnetic Interference and Electromagnetic Compatibility (EMI/EMC) testing of various electronic components. This work is vital to establishing that these electronic systems will work as expected in the presence of electromagnetic fields that may be found in actual use environments. This SOW specifies the requirements for a test system to enable the required EMI/EMC testing to be performed.

The RF Susceptibility Test system will be used to examine the susceptibility of electronic circuits and systems in the presence of electromagnetic radiation as a function of RF power level and modulation waveform. The total system must be capable of operating from 80 MHz to 2.5 GHz, with a minimum output power of 1000 watts. The system will be set-up in an anechoic chamber, by NRL personnel.

## 2. Scope

The contractor shall furnish a total RF Susceptibility Test System that includes first a low band amplifier system with a test equipment system that includes the following systems: a Power Measurement System, Field Measurement System, Optically Linked Data Monitoring System, and a Shielded Video Monitoring System and to complete the system a high band amplifier system. The contractor shall provide technical assistance during installation of equipment.

## 3. Technical Requirements

The contractor shall provide a total system in which the individual systems must meet or exceed the following specifications as described below:

### **TASK I**

Task I consists of the following systems:

#### **3.1 Low band Amplifier (80 to 1000MHz):**

*Solid State Class "A" RF Amplifier*

**Power Output, cw:** nominal: 1300 watts  
minimum: 1000 watts

**Power Output, cw linear (less than 1dB compression into 50 ohms):** 700 watts minimum

**Flatness:** +/-2.0 dB maximum, +/-1.0 dB with internal leveling

**Frequency Response (instantaneous):** 80 to 1000 MHz

**Input for Rated Output:** 1.0 mW maximum

**Power Gain (at maximum setting):** 60 dB minimum

**Gain Control Range:** 20 dB minimum

**Input Impedance:** 50 ohms, VSWR 2.0:1 maximum

**Output Impedance:** 50 ohms, VSWR 2.0:1 typical

**Mismatch Tolerance:** ability to operate without damage, foldback, or oscillation with any magnitude and phase of source and load impedance

**Class of Operation:** A

**Modulation Capability:** Will faithfully reproduce AM, FM, or pulse modulation appearing on the input signal. AM peak envelope power limited to specified power.

**Harmonic Distortion:** -20 dBc maximum

**Primary Power:** 208 Vac  
50/60 Hz, 3-phase, 12 kVA maximum

**RF Connectors:** Input, Type N female; output, Type C female

**Cooling:** Forced air (self-contained fans)

**Other Features:** Front-panel power meter for monitoring forward and reflected power. Internal/external automatic level control (ALC) with front-panel threshold control. RF-pulse capability, RF output level protection. Front-panel digital control panel. Built-in fault detection circuits. IEEE-488 remote control. Upgradeable to 2000 watts (min).

### 3.2 Power Measurement System:

#### 3.2.1 Dual Directional Couplers:

<b>Quantity:</b>	1 Each	1 Each	2 Each
<b>Frequency Range:</b>	80 -1000 MHz	80 -1 000 MHz	0.8 -2.8 GHz
<b>Power (min Watts):</b>	1500 cw 3000 peak	3000 cw 6000 peak	1500 cw 3000 peak
<b>Maximum Power deviation at output of coupler:</b>	+/- 0.5 dB	+/- 1.0 dB	+/- 0.8 dB
<b>Coupling Factor:</b>	Min 50 dB – Max 70 dB flat to +/-1 dB		
<b>Directivity minimum:</b>	20 dB	20 dB	20 dB
<b>Insertion Loss (max.)</b>	0.2 dB	0.2 dB	0.2 dB
<b>VSWR: (main line):</b>	1. 2: 1 max. (50 ohms)	1.5:1 max. (50 ohms)	1.2:1 max (50 ohms)
<b>Connectors main line:</b>	C male	EIA flange 1 5/8 in. male	7-16 DIN male
<b>coupled</b>	BNC female	BNC female	SMA female

**3.2.2 Power Meter:**

**Quantity:** 1 Each  
**Frequency Range:** 10 kHz to 100 GHz (min)  
**Power Range:** -70 dBm to +40 dBm (min)  
**Measurement.,** Speed: 100 readings/Sec (min)  
**Dynamic Range:** 90 dB  
**Inputs:** Two Sensor connectors. Rear panel IEEE-488.  
**Outputs:** Power Reference connector 0 dBm. 50 MHz.  
 RECORDER BNC connector to 10 V into 1 Mohm.  
**Standard IEEE-488 Bus:** Complies with IEEE-488.  
**Power Requirements:** 110 VAC, 50-60 Hz

**3.2.3 Power Head:**

**Quantity:** 2 Each  
**Dual diode:** 100 kHz to 18 GHz, -60 to +20 dBm.

**3.3 Field Measurement System:****3.3.1 Field Probe:**

**Quantity:** 1 Each  
**Sensor Type** Electric (E) field  
**Frequency Response:** 0.5 MHz – 5 GHz +/- 2 dB (min)  
**Response Time:** 100 ms (max)  
**Isotropy (on three orthogonal axes):** +/-0.5 dB  
**Sensitivity:** 15.0 - 3000 V/m  
**Overload Withstand.** At least two times full scale - each range  
**Sampling Rate:** 20 samples per second (min)  
**Power Requirements:** battery powered, rechargeable.  
 Charger provided with each probe. All batteries are replaceable.  
**Dimensions:** As small as possible to minimize perturbation of field  
**Connections:** Fiber optically connected to field meter

**3.3.2 Probe Stand:** Position field probes from 13 cm (5in) to 229 cm (90in.) [min]

**3.3.4 Field Meter:**

**Quantity:** 1 Each  
**Inputs:** Up to four independent probes  
  
**Outputs:** LCD digital display, 0.01 V/m or A/m resolution,  
 IEEE-488 interface, RS-232 interface,

Analog (BNC): 0-5 VDC proportional to % of selected range, Audio alarm

**Options:** 19 in. rack mountable

**Power Requirements:** 110 VAC, 50-60 Hz

### **3.4 Optically Linked Data Monitoring System:**

**3.4.1 Optical Voltmeter:** Measures voltage at device under test and transmits information back fiberoptically to receiving unit which converts to RS-232 data stream.

**Quantity:** 1 Each

**Shielding Level:** 200V/M CW from 10 KHz to 18 GHz

**Voltmeter to Measure:** (1) Balanced voltage between each input with respect to ground  
(2) The differential voltage between any two points

**Number of channels:** 8

**Full scale input:** +/- 40 VDC with respect to analog ground (min)  
+/- 80 VDC between any two points (min)

**Resolution:** 10mV

**Input Impedance:** 1M $\Omega$

**Amplitude accuracy:** +/- 0.5% +/- 20mV  
> 10 measurements/sec

**Optical connectors:** ST

**Electrical connectors:** Must be EMI filtered

**Communications standard**

**on receiving unit:** RS232

**Battery operating time**

**for field unit:** > 20 hours, rechargeable

### **3.4.2 Optical Cables:**

**Quantity:** 7 each

**Length:** 20 meters

**Connector:** ST

Bifiber Cable Pair, 10 M Graded index, Pair

**3.4.3 Optical Transceivers:** Takes data at device under test, digitizes it, sends data back fiberoptically to a mainframe unit for control and recording.

**3.4.3.1 Mainframe:** 1 each

- mainframe for plug-in units
- IEEE 488 Interface
- max four plug-ins
- mountable in standard 19" rack

**3.4.3.2 Plug-ins: 2 each**

- managed by mainframe
- bandwidth: DC to 1 MHz
- flatness: better than  $\pm 1.5$ dB over bandwidth
- input for nominal output: voltage scaling required by factors up to 500
- nominal output: 1 volt (p-to-p)
- output connector: BNC 50 $\Omega$
- measures from two satellite units

**3.4.3.3 Satellite Data Acquisition Units: 4 each**

- shielding 200 V/M CW 10 KHz-18 GHz
- bandwidth DC to 1 MHz
- 1 Megohm input resistance
- flatness: better than  $\pm 1.5$ dB over bandwidth
- remotely controlled via plug-ins
- up to 8 hours of continuous operation before recharging batteries

**3.4.3.4 Optical Bus Extender****- Transceiver**

<b>Quantity</b>	2 Each (one transmit/one receive)
<b>Bus type</b>	ISO 11898
<b>Shielding Level</b>	200V/M cw from 10 kHz to 18 GHZ
<b>Power</b>	8 hours of continuous operation (Battery at transmit unit/prime power or battery at receive unit)

**3.5 Shielded Video Monitoring System:**

<b>Quantity</b>	1 Each
<b>Shielding.</b>	200V/M cw 10KHz –18 GHz
<b>Camera:</b>	Zoom Focus Controllable via a fiber-optical link
<b>Camera Mount:</b>	Pivotal Unit fiber-optic controlled for tilt and pan.
<b>Monitor:</b>	14" Color (min)
<b>Control Unit:</b>	Mainframe based on SLOTBUS system cable of powering up to three audio or video and control plug-ins, allowing mixed systems.

## **TASK II**

Task II consists of the following system.

### **3.6 High Band Amplifier (1000 to 2500 MHz)**

TWT Microwave Amplifier

**Power Output – Fundamental:** nominal: 1100 watts  
CW minimum: 1000 watts  
linear at 1 dB compression; 500 watts minimum

**Flatness:** +/-8 dB maximum, equalized for +/-2 dB maximum at rated power

**Frequency Response (instantaneous):** 1 to 2.5 GHz

**Input for Rated Output:** 1.0 mW maximum

**Power Gain (at maximum setting):** 60 dB minimum

**Gain Adjustment (continuous ranges):** 30dB minimum

**Input Impedance:** 50 ohms, VSWR 2.0:1 maximum

**Output Impedance:** 50 ohms, VSWR 2.5:1 typical

**Mismatch Tolerance:** Output power foldback protection at reflected power exceeding 200 watts (Will operate without damage or oscillation with any magnitude and phase of source and load impedance.)

**Modulation Capability:** Will faithfully reproduce AM, FM, or pulse modulation appearing on the input signal. AM peak envelope power limited to specified power.

**Noise Power Density:** -72dBm/Hz maximum; -77dBm/Hz typical

**Harmonic Distortion:** -30 dBc

**Primary Power:** 208VAC, 3-phase, 50/60Hz; 8.0 k VA maximum

**Connectors (on rear panel):** RF input: Type N female  
RF output: 7-16 DIN female  
RF output sample port: Type N female

**Cooling:** Forced air (self-contained fans), air entry and exit in rear

**Special Features:** Digital control panel  
IEEE-488 remote  
RF sample port  
Built-in pre-amp

## **4.0 Technical Support**

The contractor shall provide telephone/fax technical support for a period starting with delivery of the first items and extending for 6 months after the delivery and training is completed of the high band amplifier under TASK II paragraph 3.6.

## **5.0 Test Data**

The contractor shall provide test data verifying that all system performance parameters are met for the low band amplifier system along with the dual directional couplers that are part of the Power Measurement System and the Field Probes that are a part of the Field Measurement System in the specification. The contractor shall also provide test data for the high band amplifier system. Delivery of test data will take place with the delivery of the system.

## **6.0 Training**

The contractor shall provide training for Task I and Task II. The training for each task will take place at NRL for four NRL personnel for a period of four (4) hours for each task. The operators manuals shall be used for the training session.

## **7.0 Warranty**

The contractor shall provide a standard commercial warranty for the low band amplifier and the high band amplifier system. Also, a standard commercial warranty must be provided for both the tubes in the high band amplifier system described in paragraph 3.6 of the specification and the test system under Task 1.