

SOLICITATION, OFFER AND AWARD		1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 350)		RATING DO-C9	PAGE OF 1 24 PAGES
2. CONTRACT NO.	3. SOLICITATION NO. N00173-02-R-JR02	4. TYPE OF SOLICITATION <input type="checkbox"/> SEALED BID (IFB) <input checked="" type="checkbox"/> NEGOTIATED (RFP)		5. DATE ISSUED 27 DEC 2001	6. REQUISITION/PURCHASE NO. 56-9253-01
7. ISSUED BY CONTRACTING OFFICER NAVAL RESEARCH LABORATORY-SSC ATTN: CODE 3235 STENNIS SPACE CENTER, MS 39529-5004		CODE N00173	8. ADDRESS OFFER TO (If other than Item 7)		

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

SOLICITATION

9. Sealed offers in original and 3 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 1007, RM 47 until 4:00 P local time 29 JAN 2002
(Hour) (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 JERRY RILES, Contract Specialist	B. TELEPHONE NO. (Include area code) (NO COLLECT CALLS) (228) 688-4259
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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: <input type="checkbox"/> 10 U.S.C. 2304(c) () <input type="checkbox"/> 41 U.S.C. 253(c) ()		23. SUBMIT INVOICES TO ADDRESS SHOWN IN (4 copies unless otherwise specified)	
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/SERVICES	ESTIMATED COST	FIXED FEE	ESTIMATED COST PLUS FIXED FEE
BASE:				
0001	The Contractor shall provide all personnel and facilities for performance of the work as described in Section C.	\$	\$	\$
0002	Data in accordance with Exhibit A (DD 1423)	* NSP	* NSP	* NSP
OPTION				
0003	The Contractor shall provide all personnel and facilities for performance of the work as described in Section C. The following shall be provided in accordance with the SOW:	\$	\$	\$
0003AA	Test Lens	*NSP	*NSP	*NSP
0003AB	3 Final Lenses and Windows	*NSP	*NSP	*NSP
0004	Data in accordance with Exhibit A (DD 1423)	* NSP	* NSP	* NSP
TOTAL ESTIMATED COST PLUS FIXED FEE INCLUDING ALL OPTIONS			\$	\$

* 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), Statement of Work, with Exhibit A, Contract Data Requirements List, and all other Attachments cited in Section J, which are incorporated by reference into Section C.

C-2 SUBCONTRACTING PLAN

Subcontracting Plan dated is hereby incorporated by reference and made a material part of this contract.

*(*this provision will be included and completed at time of award, if applicable)*

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 (MAR 2001)
52.246-5 - Inspection Of Services - 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 will be accomplished by the Technical Manager (TM) or Contracting Officer Representative (COR) designated in Section G of this contract. Inspection and acceptance will be performed at the Naval Research Laboratory, Washington DC 20375-5320.

**SECTION F
DELIVERIES OR PERFORMANCE**

F-1 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-2 PERIOD AND PLACE OF PERFORMANCE

- (a) The work under this contract is from date of award through three(3) months. Each option, if exercised, shall extend the period an additional twelve (12) months.
- (b) The principal place of performance of this contract shall be the contractor's facility

F-3 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.)

SECTION G
CONTRACT ADMINISTRATION DATA

G-1 PROCURING OFFICE REPRESENTATIVE

In order to expedite administration of the 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- Mr. Jerry Riles, Code 3235, (228) 688-4259, DSN 488-4259, or FAX (228)688-6055, email: jriles@nrlssc.navy.mil

Security Matters- Ms. Tina Smallwood, Code 1221, (202) 767-2240, DSN 297-2240, email tina@code1200.nrl.navy.mil

Safety Matters- Mr. Stuart Burns, Code 1240, (202) 767-2232, DSN 297-2232, email burns@code1200.nrl.navy.mil

Patent Matters- Mr. John J. Karasek, Code 1008.2, (202) 404-1552, DSN 297-1552, email Karasek@nrl.navy.mil

Release of Data- Mr. Richard L. Thompson, Code 1030 (202) 767-2541, DSN 297-2541, email rthomps@ccf.nrl.navy.mil

The ACO will forward invention disclosures and reports directly to the Associate Counsel for Patents, Code 1008.2, 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 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.

(* To be completed at time of award)

G-3 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

*

*(*this provision will be included and completed at time of award, if applicable)*

(b) This authorization does not constitute any consent required pursuant to the contract clause entitled "Subcontracts" (FAR 52.244-2). Advance notification or requests for consent pursuant to that clause shall be directed to the administrative contracting officer (ACO).

(c) Pursuant to the contract clause entitled "Government Property (Cost-Reimbursement, Time-and-Material, or Labor-Hour Contracts)" (FAR 52.245-5), 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.")

G-4 SUBCONTRACTORS/CONSULTANTS

(a) Advance notification or requests for consent pursuant to the contract clause entitled "Subcontracts" (FAR 52.244-2) shall be directed to the cognizant administrative contracting officer (ACO).

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

Subcontractor/Consultant Name

Estimated Cost

(Paragraph (b) will be included and filled in at time of award if subcontractor/consultants are proposed by the successful offeror)

G-5 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 completed 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.
- is required only with the final invoice.
- is not required.

(f) A Certificate of Performance

- shall be provided with each invoice submittal.
- 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-6 PAYMENT OF FIXED FEE (COMPLETION FORM)

The fixed fee set forth in Section B of this contract shall be payable on completion of the work and services required under each CLIN of this contract and their acceptance on behalf of the Government. However, the contractor may bill on each voucher the amount of the fixed fee bearing the same percentage to the amount of cost billed as the total fixed fee bears to the total estimated cost set forth in Section B, subject to the contract clause entitled "Fixed Fee" (FAR 52.216-8). If the fixed fee is reduced pursuant to any clause or requirement of this contract and the reduced fee is less than the sum of all fee payments made to the contractor under this contract, the contractor shall repay the difference to the Government. The total fee paid the contractor shall not exceed the fixed fee set forth in Section B.

G-7 INCREMENTAL FUNDING

Pursuant to the Limitation of Funds clause (FAR 52.232-22), the total amount allotted to this contract is \$* and it is estimated that this amount is sufficient for contract performance through * .

*(*this provision will be included and completed at time of award, if applicable)*

G-8 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.

SECTION H SPECIAL CONTRACT REQUIREMENTS

H-1 TYPE OF CONTRACT

This is a *

*(*To be completed 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 were 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 completed at time of award)*

H-3 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-4 ELECTRONIC AND INFORMATION TECHNOLOGY (EIT)

In accordance with Section 508 of the Rehabilitation Act of 1973 (29 U.S.C. 794d), all EIT supplies and services provided under this contract must comply with the applicable accessibility standards issued by the Architectural and Transportation Barriers Compliance Board at 36 CFR part 1194 (see FAR Subpart 39.2). Electronic and information technology (EIT) is defined at FAR 2.101.

H-5 OPTION(S)

The Government may require performance of the numbered line items identified in the Schedule as optional items at the price stated in the Schedule. The Contracting Officer may unilaterally exercise the option by written notice to the Contractor anytime prior to the current completion date of the contract. . The Government may elect to exercise its option by issuing a new contract for the option. Except as provided in the schedule, the new contract will have the same terms and conditions as this contract including any unexercised options.

H-6 GOVERNMENT-FURNISHED PROPERTY

The following Government property will be furnished to the contractor on a rent-free basis for use in performing the contract:

(To be completed at time of award)

H-7 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.

H-8 SUBCONTRACTING PLAN

The contractor's Comprehensive Small Business Subcontracting Plan is incorporated into this contract in accordance with DFARS SUBPART 219.7 *Test Program for Negotiation of Comprehensive Small Business Subcontracting Plans*.

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.arnet.gov/far>
<http://heron.nrl.navy.mil/contracts/home.htm>

a. FEDERAL ACQUISITION REGULATION CLAUSES

FAR CLAUSE	TITLE
52.202-1	- Definitions (MAY 2001)
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	- Printed Or Copied Double-Sided On Recycled Paper (AUG 2000)
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 (JUN 1999)
52.215-8	- Order Of Precedence - Uniform Contract Format (OCT 1997)
52.215-14	- Integrity Of Unit Prices (OCT 1997)
52.215-17	- Waiver Of Facilities Capital Cost Of Money (OCT 1997) (will be included if the successful offeror does not propose facilities capital cost of money)
52.216-7	- Allowable Cost And Payment (MAR 2000) <i>(If the contract is with an educational institution, modify the clause by deleting from paragraph (a) "Subpart 31.2" and substitute "Subpart 31.3". If the contract is with a state or local government, delete from paragraph (a) "Subpart 31.2" and substitute "Subpart 31.6". If the contract is with a nonprofit other than an educational institution, a state or local government, or a nonprofit organization exempted under OMB Circular A-122, modify the clause by deleting from paragraph (a) "Subpart 31.2" and substituting "Subpart 31.7".)</i>
52.216-8	- Fixed-Fee (MAR 1997)
52.219-4	- Notice Of Price Evaluation Preference For HUBZone Small Business Concerns (JAN 1999) <input type="checkbox"/> Offeror elects to waive the evaluation preference.
52.219-8	- Utilization Of Small Business Concerns (OCT 2000)
52.219-9	- Small Business Subcontracting Plan (OCT 2001) - Alternate II (OCT 2001)

- 52.219-16 - Liquidated Damages-Subcontracting Plan (JAN 1999)
- 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)
- 52.222-19 - Child Labor – Cooperation With Authorities And Remedies (FEB 2001)
- 52.222-21 - Prohibition of Segregated Facilities (FEB 1999)
- 52.222-26 - Equal Opportunity (FEB 1999)
- 52.222-35 - Affirmative Action For Disabled Veterans And Veterans Of The Vietnam Era (APR 1998)
- 52.222-36 - Affirmative Action For Workers With Disabilities (JUN 1998)
- 52.222-37 - Employment Reports On Disabled Veterans And Veterans Of The Vietnam Era (JAN 1999)
- 52.223-6 - Drug-Free Workplace (MAY 2001)
- 52.223-14 - Toxic Chemical Release Reporting (OCT 2000)
- 52.225-13 - Restrictions On Certain Foreign Purchases (JUL 2000)
- 52.227-1 - Authorization And Consent (JUL 1995)- Alternate I (APR 1984)
- 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)
(will be included if the successful offeror is a small business or a non-profit organization)
- 52.227-12 - Patent Rights - Retention By The Contractor (Long Form) (JAN 1997)
(will be included if the successful offeror is not a small business or a non-profit organization)
- 52.228-7 - Insurance - Liability To Third Persons (MAR 1996)
- 52.230-2 - Cost Accounting Standards (APR 1998)
- 52.230-3 - Disclosure And Consistency Of Cost Accounting Practices (APR 1998)
- 52.230-6 - Administration Of Cost Accounting Standards (NOV 1999)
- 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 (MAY 2001)
- 52.232-33 - Payment By Electronic Funds Transfer-Central Contractor Registration (MAY 1999)
- 52.233-1 - Disputes (DEC 1998) - Alternate I (DEC 1991)
- 52.233-3 - Protest After Award (AUG 1996) - Alternate I (JUN 1985)
- 52.237-3 - Continuity Of Services (JAN 1991)
- 52.242-1 - Notice Of Intent To Disallow Costs (APR 1984)
- 52.242-3 - Penalties For Unallowable Costs (MAY 2001)
- 52.242-4 - Certification of Final Indirect Costs (JAN 1997)
- 52.242-13 - Bankruptcy (JUL 1995)
- 52.243-2 - Changes - Cost-Reimbursement (AUG 1987) - Alternate V (APR 1984)
- 52.243-6 - Change Order Accounting (APR 1984)

- 52.244-2 - Subcontracts (AUG 1998) - Alternate I (AUG 1998)
- 52.244-5 - Competition In Subcontracting (DEC 1996)
- 52.244-6 - Subcontracts For Commercial Items (MAY 2001)
- 52.245-5 - Government Property (Cost-Reimbursement, Time-And-Material, Or Labor-Hour Contracts) (JAN 1986) (DEVIATION)
- 52.245-19 - Government Property Furnished "As-Is" (APR 1984)
- 52.246-23 - Limitation Of Liability (FEB 1997)
- 52.246-25 - Limitation Of Liability - Services (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)
- 52.252-6 - Authorized Deviations in Clauses (APR 1984)(fill in Defense Federal Acquisition Regulation Supplement (48 CFR Chapter 2))
- 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 - Prohibition On Persons Convicted Of Fraud Or Other Defense Contract Related Felonies (MAR 1999)
- 252.204-7003 - Control Of Government Personnel Work Product (APR 1992)
- 252.204-7004 - Required Central Contractor Registration (MAR 2000)
- 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)
- 252.209-7004 - Subcontracting With Firms That Are Owned Or Controlled By The Government Of A Terrorist Country (MAR 1998)
- 252.219-7003 - Small Business And Small Disadvantaged Business Subcontracting Plan (DoD Contracts) (APR 1996)
- 252.219-7004 - Small, Small Disadvantaged And Women-Owned Small Business Subcontracting Plan (Test Program) (JUN 1997)
- 252.225-7001 - Buy American Act And Balance Of Payments Program (MAR 1998)
- 252.225-7002 - Qualifying Country Sources As Subcontractors (DEC 1991)
- 252.225-7007 - Buy American Act--Trade Agreements—Balance Of Payments Program (SEP 2001)
- 252.225-7012 - Preference For Certain Domestic Commodities (AUG 2000)
- 252.225-7026 - Reporting Of Contract Performance Outside The United States (JUN 2000)
- 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) - Alternate I (JUN 1995)
- 252.227-7014 - Rights In Noncommercial Computer Software And Noncommercial Computer Software Documentation (JUN 1995) - Alternate I (JUN 1995)

- 252.227-7016 - Rights In Bid Or Proposal Information (JUN 1995)
- 252.227-7019 - Validation Of Asserted Restrictions--Computer Software (JUN 1995)
- 252.227-7025 - Limitations On The Use Or Disclosure Of Government-Furnished Information Marked With Restrictive Legends (JUN 1995)
- 252.227-7026 - Deferred Delivery Of Technical Data Or Computer Software (APR 1988)
- 252.227-7027 - Deferred Ordering Of Technical Data Or Computer Software (APR 1988)
- 252.227-7030 - Technical Data--Withholding Of Payment (MAR 2000)
- 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 (SEP 1999)
- 252.227-7039 - Patents--Reporting Of Subject Inventions (APR 1990)
- 252.231-7000 - Supplemental Cost Principles (DEC 1991)
- 252.232-7005 - Reimbursement Of Subcontractor Advance Payment—DoD Pilot Mentor-Protégé Program (SEP 2001)
- 252.235-7010 - Acknowledgment Of Support And Disclaimer (MAY 1995)
- 252.235-7011 - Final Scientific Or Technical Report (SEP 1999)
- 252.242-7000 - Post Award Conference (DEC 1991)
- 252.242-7004 - Material Management And Accounting System (DEC 2000)
- 252.243-7002 - Requests For Equitable Adjustment (MAR 1998)
- 252.244-7000 - Subcontracts For Commercial Items And Commercial Components (DOD Contracts) (MAR 2000)
- 252.245-7001 - Reports Of Government Property (MAY 1994)
- 252.247-7023 - Transportation Of Supplies By Sea (MAR 2000)
- 252.247-7024 - Notification Of Transportation Of Supplies By Sea (MAR 2000)
(will be included if the successful offeror made a negative response to the inquiry at DFARS 252.247-7022)
- 252.251-7000 - Ordering From Government Supply Sources (MAY 1995)

I-2 FAR 52.223-11 - OZONE-DEPLETING SUBSTANCES (MAY 2001)

- (a) *Definitions.* "Ozone-depleting substance", as used in this clause, means any substance the Environmental Protection Agency designates in 40 CFR Part 82 as –
- (1) Class I, including, but not limited to, chlorofluorocarbons, halons, carbon tetrachloride, and methyl chloroform; or
 - (2) Class II, 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 (MAR 1998)

In accordance with paragraph (b) of the Duty-Free Entry clause of this contract, in addition to duty-free entry for all qualifying country supplies (end products and components) and all eligible end products subject to applicable trade agreements (if this contract contains the Buy American Act - Trade Agreements - Balance of Payments Program clause or the Buy American Act - North American Free Trade Agreement Implementation Act - Balance of Payments Program clause), the following foreign end products that are neither qualifying country end products nor eligible end products under a trade agreement, and the following nonqualifying country components, are accorded duty free entry.

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

- J-1** Attachment (1) - Statement Of Work - 8 Pages, With Exhibit A - DD Form 1423, Contract Data Requirements List, 2 Pages.
- J-2** Attachment () – Accounting and Appropriation Data- 1 page. *
(To be included at time of award)*

**PART IV - REPRESENTATIONS AND INSTRUCTIONS
SECTION - K
REPRESENTATIONS, CERTIFICATIONS
AND OTHER STATEMENTS OF OFFERORS OR RESPONDENTS**

K-1 Representations, Certifications, and Other Statements of Offerors or Respondents

Each Offeror must submit a completed Representations, Certifications, and Other Statements Of Offerors or Respondents with its proposal which is available electronically in full text at <http://heron.nrl.navy.mil/contracts/rep&certs.htm>

K-2 FILL IN FOR FAR 52.219-1 - SMALL BUSINESS PROGRAM REPRESENTATIONS (MAR 2001)

The fill in information is as follows:

The NAICS code for this acquisition is: **333314**

The small business size standard is: **500 empl**

**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.arnet.gov/far>
<http://heron.nrl.navy.mil/contracts/home.htm>

FAR CLAUSE TITLE

52.204-6	-	Data Universal Numbering System (DUNS) Number (JUNE 1999)
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 (MAY 2001)
52.215-5	-	Facsimile Proposals (OCT 1997)
52.215-16	-	Facilities Capital Cost Of Money (OCT 1997)
52.237-10	-	Identification of Uncompensated Overtime (OCT 1997)

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

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

The Government contemplates award of a Cost Plus Fixed Fee completion type 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 252.227-7017 - 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 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-7 GOVERNMENT-FURNISHED PROPERTY

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

L-8 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-9 INSTRUCTIONS FOR SUBMISSION AND INFORMATION REQUIRED TO EVALUATE PROPOSALS

(1) Information for the technical/management proposal shall be placed in Volume I and be completely separate from the business 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. N00173-02-R-JR02

Closing Date:

(As specified in Block 9, RFP face page)

Attn: Code 3235:JR

Stennis Space Center, MS 39529-5004

(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 :

L-10 VOLUME I - TECHNICAL/MANAGEMENT PROPOSAL

REQUIRED COPIES: 1 ORIGINAL AND 3 COPIES .

1. QUALITY AND RESPONSIVENESS:

The proposal should demonstrate its completeness and responsiveness to the Statement of Work and soundness and clarity in technical explanations.

The proposal should indicate the justification given for wide anamorphic field of view and the basis for blur size, focus stability and good F-number.

If references to technical journal publications are cited, the proposal should indicate their direct relationship to issues being described in the proposal. References to non published reports, such as from prior contractual efforts or results of IR&D or proprietary efforts, must be backed up by three copies of such supporting documents for government use with the proposal submission.

The proposal should demonstrate the completeness, readability, and practical realism of modeling used to predict performance.

2. LENS DESIGN AND FABRICATION EXPERIENCE :

The proposal should provide a complete description of prior and current endeavors for designing along with either producing or working closely with producers of similar optics, and integrating them with cryogenic dewar and stabilization systems. No weighting will be given to prior contacts of personnel or to previous endeavors not described in the offer's proposal. The proposal should provide Points of contacts at the agencies or corporations that have tested and used these previous optical systems, as well as references to any open-literature publications summarizing their technology and performance.

The proposal should demonstrate the offerors record of manufacture, assembly and testing of infrared lenses, familiarity with cryogenic systems and experience with packaging for military deployment. The proposal should provide evidence of this experience along with appropriate points of contacts.

3. PAST PERFORMANCE INFORMATION

(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 three(3) contracts or subcontracts completed by the offeror or predecessor companies during the past three (3) years for services similar in nature to this requirement. Include in the three (3), 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 electronically in full text at <http://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.

L-11 VOLUME II - BUSINESS PROPOSAL

REQUIRED COPIES: 1 ORIGINAL AND 3 COPIES

(1) COST PROPOSAL

The offeror shall submit a business proposal that includes 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 each cost element. 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. However, offerors are advised to use actual labor rates of proposed personnel as the basis for estimating labor costs when practicable.

L-12 MULTIPLE AWARDS

The Contracting Officer may make multiple awards resulting from this solicitation.

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 the cost factor, the closer the technical scores of the various proposals are to one another, the more important the business 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.

M-2-1. TECHNICAL/MANAGEMENT

(1) QUALITY AND RESPONSIVENESS:

The proposal will be evaluated on its completeness and responsiveness to the Statement of Work and according to its soundness and clarity in technical explanations.

The proposal will be evaluated on the justification given for wide anamorphic field of view and the basis for blur size, focus stability and good F-number.

If cited, references to technical journal publications must be directly related to issues being described in the proposal. References to non published reports, such as from prior contractual efforts or results of IR&D or proprietary efforts, must be backed up by three copies of such supporting documents for government use with the proposal submission.

Modeling to predict performance will be rated according to its completeness, readability and practical realism.

(2) LENS DESIGN AND FABRICATION EXPERIENCE :

The proposal will be evaluated on the description provided of prior and current endeavors for designing and then either producing or working closely with producers of similar optics and integrating them with cryogenic dewar and stabilization systems. No weighting will be given to prior contacts of personnel or to previous endeavors not described in the offer's proposal. Points of contact at the agencies or corporations that have tested and used these previous optical systems must be included in the proposal as well as references to any open-literature publications summarizing their technology and performance.

The proposal will be evaluated on the offerors record of manufacture, assembly and testing of infrared lenses, familiarity with cryogenic systems and experience with packaging for military deployment. Evidence of this experience must be included with the proposal with appropriate points of contacts.

(3) PAST PERFORMANCE

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 and other sources if available. The evaluation will take into account past performance information regarding predecessor companies, subcontractors that will perform major or critical aspects of the requirement, or the proposed project manager or key personnel responsible for major or critical aspects of the requirement. 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)(iv).

M-2-2 COST TO THE GOVERNMENT

Proposed estimated cost to the Government. The Government may adjust the proposed cost for purposes of evaluation based upon an evaluation of cost realism. 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 cost realism evaluation 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 as well as the proposed labor and indirect rates. It also includes evaluation of the likelihood that the risks inherent in the offeror's technical approach will result in higher actual costs than anticipated.

M-3 FAR 52.217-5 - EVALUATION OF OPTIONS (JUL 1990)

Except when it is determined in accordance with FAR 17.206(b) not to be in the Government's best interests, the Government will evaluate offers for award purposes by adding the total price for all options to the total price for the basic requirement. Evaluation of options will not obligate the Government to exercise the option(s).

STATEMENT OF WORK

Wide FOV, MWIR Anamorphic Optics

1. OVERVIEW:

The navy is initiating a program to demonstrate a new kind of prototype system for ship-based infrared search and track (IRST). It will use a set of staring array cameras to view the horizon surround. This Request for Proposals concerns the lens systems to be used in these cameras. The contract will have two phases, an initial dual award equally funded for three-month of design, and an optional follow-on for fabrication.

Layout designs are to be provided in the Base Phase 1 part of the contract. These designs are to be for the lenses listed in Table 1 and optimized subject to the performance criterion of Equations 1-4.

The Phase 2 fabrication option of this contract is anticipated to require four steps: (1) critical design review, CDR, followed by (2) a preliminary build to be evaluated for producibility, packaging and optical performance, (3) final refined design, and then (4) a final build of three units complete with athermalization and including mechanical and optical integration with government-provided focal plane arrays.

2. BACKGROUND:

Shipboard infrared search systems (IRST's) have, in the past, used scanning technology with a long linear or TDI array oriented vertically. This is a way to look up to tens of degrees, but today's sea skimming threats appear in only the first 0.2 degrees above the horizon, and surface imaging and tracking can be accomplished with only a few degrees of elevation coverage. Use of staring technology can speed refresh rate, lengthen dwell time and improve sensitivity, but will require use of several small camera units to simultaneously view the 360° horizon surround. Mounted with separate windows and stabilization, this set of cameras can be compatible with modern low radar cross section (RCS) ship structures. This set of low RCS cameras will be referred to as a distributed aperture system or DAS.

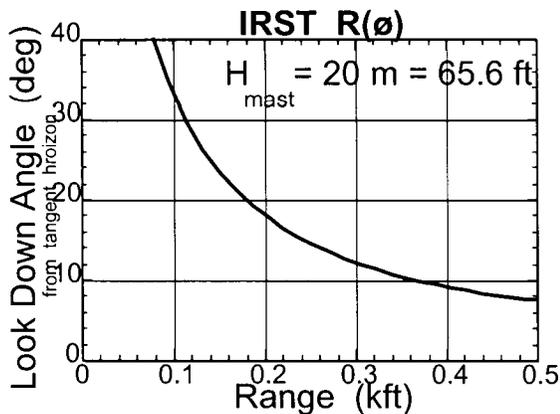
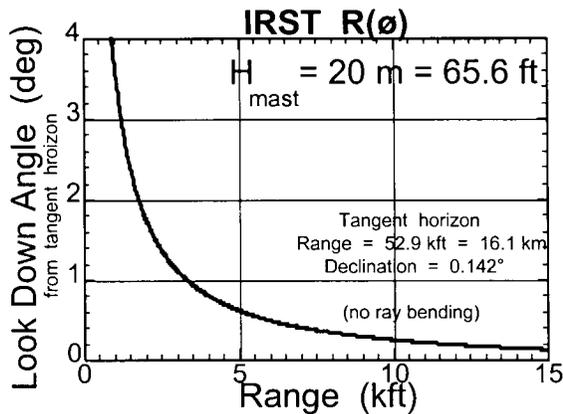
A six unit step-stare implementation has been considered. This approach, intermediate between scanning and full staring, could use 1024x1024 arrays but must rely on a fairly sizable line-of-sight stepping mirror and torquer to achieve wide azimuthal coverage. The approach chosen for this requirement is full staring with eight 48° wide cameras. The desired optical design is to achieve 2560 resolution elements across the 48° azimuthal field of view (FOV). That's an azimuthal resolution or IFOV of 327 μRad that needs to be matched closely to a detector pitch of 25 μm.

The lens must be anamorphic to shrink unneeded elevation coverage and improve sensitivity. Arrays of size 2560x512 are being developed separately. These have an aspect ratio of 5:1, so for a symmetric wide-angle lens the field of view would be 48°x9.6°. The missile detection problem requires very little elevation coverage but require good sensitivity and hence small solid angle IFOV. The baseline design is for an anamorphic ratio of 4:1 to achieve FOV and IFOV of 48°x2.4° and 327x82 μRad.

The surface imaging problem, requires some 45° of elevation coverage with azimuthal resolution better than the human eye, and this can be achieved only with some form of panning mechanism. A steady staring view can be provided from the horizon in to only 600 yd by the lower two degrees elevation coverage of the 2.4 deg DAS system. The additional 0.4 deg above the horizon can then take in missiles flying as high as 180 ft at 8 km range.

In port, ships do not require missile detection capability, but instead, there is concern about swimmers and small boats from a distance of from two miles in to some 50'. From high on the mast the required look-down angles for these surface ranges are approximately 0.3 to 50 deg, a spread that can be achieved only by nod panning the line-of-sight of the DAS using the inner gimbal of its yoke stabilization system. With registration and processing, the scene and object display can be similar to a radar refresh screen. Look-down angle will be limited by window size to about 45 deg. These are gimbal pointing or image registration and processing tasks.

There is a possible feature of the optical design that could help the situation awareness task with no mechanical nodding - dual elevation field of view. If the cylindrical elements could be switched out of the lens, it may be beneficial to have a lens starting with a better resolution (4.8:1 anamorphic ratio, 48°x2° FOV and 327x68 μRad IFOV), switchable to low resolution (1:1, 48°x9.6° and 327x327 μRad). This would provide full-staring coverage of approximately 500' with no mechanical elevation scan. A dual-FOV design is, however, only of secondary interest compared to the basic horizon search missile detection problem.



3. PHASE 1

A. Candidate Lens Systems:

The unusually asymmetric horizon viewing requirement is being addressed here by utilizing wide aspect ratio in both the detector array and in the optics, but both are difficult to achieve. Optical design achievability is to be evaluated and compared starting with the two lenses listed as bold type in Table 1. It appears, for instance, that a six camera system with 63 deg FOV would probably be aberration limited to unacceptably poor F-3.0 and some 40 μm blur size, so this possibility is not even listed in the table. But what about the 8 FS baseline lens listed in the first row? Show whether F-number and blur can be as good as or better than the estimated F-2.4 and 32 μm. And clarify achievability of the dual field-of-view lens discussed above and listed as 8 FS-d in Table 1.

Ten or twelve camera systems would be more costly to implement than an eight camera system, but they are to be evaluated as well because of their easier optics design and because of time delay and potential difficulty in acquiring full-length 2560x512 arrays. The initial preliminary lens to be made will be tested using a knife-edge technique and/or an existing 512x512 array at the center versus edge of the image plane. The final set of three lenses are to be integrated with the largest arrays that can now be procured, 2048x512. These arrays should be available as GFE at about the same time as fabrication of the final lenses. But 2560x512 arrays will not be available for another year or more and after additional NRE. So the baseline lens requested here is for 48 deg FOV ready for retrofit with 2560x512 arrays when they become available. A back-up design assuming availability of only 2048x512 arrays is also needed. The 6x2 FS designation indicates grouping of modest FOV cameras in pairs to form six stabilized units out of a twelve-camera system. The 10 FS and 6x2 FS configurations then cost about the same to implement, and they both can use 2048x512 arrays. The last row in Table 1 indicates a hybrid system using both step-stare and hybrid optics. This will probably not be pursued because of the required stepping mirror, but the optical performance should be relatively easy to achieve for this case and should be used as a basis of comparison in the initial design phase of this contract.

Table 1: Candidate Lenses to be Evaluated in the Initial Lens Design Study. The estimates listed for F-number and blur size are based on Equations 1-4, below, not actual lens design.

Number Of Sensors	Camera FOV	Lens FOV & Aspect	Array Az & Aspect	AR	IFOV (μRad)	F-no	Blur (μm 80%)
8 FS	48°x2.4°	48°x2.4°/16	2560/5	4.00	327x82	2.4	32
8 FS-d	48°x2°	48°x2°/24	2560/5	4.80	327x68	2.4	32
	48°x9.6°	48°x9.6°/5	2560/5	1.00	327x327	2.4	32
10 FS	39°x3°	39°x3°/13	2048/4	3.25	332x102	2.0	30
6x2 FS	33°x3°	33°x3°/11	2048/4	2.75	281x102	2.0	28
6 SS 6st	64°x3°	11.2°x3°/3.73	1024/2	1.87	191x102	2.0	24

AR = anamorphic ratio. FS = full stare. SS = step stare. 6st = six LOS steps.
 Blur is for 80 % of energy and to be compared to the 25 μm detector pitch.
 If AR = 4.8 too difficult, the dual FOV lens could use AR = 4.0.
 Arrays are all 512 high.

B. The Lens Quality Factor:

The requirements for high resolution and anamorphic optics are both driven by need for very good sensitivity, and as a guide for systems design the following background-limited formula for noise equivalent irradiance should be used:

$$NEI_{BLIP} \sim F Q_{blur} \phi_{det}^2 / (w_{det} \sqrt{t_{int}}), \quad (1)$$

ϕ = geometric mean of az & el detector IFOV's = w_{det}/f

Q_{blur} = blur quality factor = (RMS dif lim + aberration blur width) / 1.41 w_{det}

F = geometric mean of az & el F-numbers,

f = geometric mean of az & el focal lengths,

w_{det} = geometric mean of az & el detector pitch, = 25 μ m,

t_{int} = effective integration time including off-chip summation.

(t_{int} is not a not directly a lens parameter but suggests the possible need for elevation dither.)

This NEI formula indicates that detector IFOV is the single most important system design parameter for achieving good sensitivity. Performance modeling indicates that something on the order of 160 μ Rad square IFOV is sufficient for detection of the low-signatures anticipated from sub-mach anti-ship missiles at range. Azimuthal resolution is fixed by the number of cameras and the length of array that each uses. In the suggested designs of Table 1 the solid angle IFOV is improved by using anamorphic optics.

C. F-Number and Blur:

The formulas used for making the F-number and blur-size estimates of Table 1 are

$$\text{Aberration Blur Angle} > 2 \mu\text{Rad} * (\text{FOV in deg})^{1.5} / (F-.5) \quad (2)$$

$$80\% \text{ Energy Diffraction Blur Spot} = 1.8 \lambda F \approx 8.46 \mu\text{m} * F \quad (3)$$

$$\text{Blur Size} = \sqrt{(\text{Aber Spot})^2 + (\text{Dif Spot})^2} \quad (< 1.41 w_{det}) \quad (4)$$

Equation (2) is an empirical fit to many existing lens designs. A pin hole would be the easiest way to limit aberrations in a wide field of view lens, but that would cause diffraction blur and limit sensitivity. It is the RMS sum of diffraction plus aberration blur that is to be compared to detector size for defining Q_{blur} in the lens quality evaluation formula of Equation (1).

D. Integration Time and Elevation Stepping:

Long integration time is desirable but is the least important parameter in Equation 1 for improving sensitivity. The maximum usable integration is approximately 100 mSec due to the possibility of azimuthal motion and pixel blurring by the incoming missile. The detector well capacity limitation on integration time is, however, 4-20 mSec depending on background temperature, solar loading and spectral band. Consequently, the array readout electronics will include off-chip summation of as many as 16 sequential frames in order to achieve the longer effective integration time. In cold backgrounds the individual frame integration times will have to be longer, so the number of elevation steps will be reduced

The optical design is to evaluate whether it is practical to include a mechanism for elevation LOS mini-stepping between frames. Then the frame summations in the off-chip electronics could achieve detector averaging and bad detector correction as well

as long effective integration time. Though only one resolution element or detector spacing in size, these LOS steps would have to be quite rapid, much less than 4 mSec, so they must be accomplished with a small optical element.

One method that has been demonstrated for achieving fast pixel-sized stepping is the control of tilt angle of a dielectric flat. If near the image plane it can be similar in size to the focal plane array - some 3" long by about 0.5" in the dimension that has to be rotated to induce elevation steps in the image.

The optical design is to determine the position, size, motion, maximum number of reasonably achievable elevation pixel steps and in general the practical achievability of such a stepping dielectric flat. Give a recommendation as to whether it is or is not too costly or difficult to include.

E. Two-Point NUC Thermal Reference:

The 2048x512 and eventually the 2560x512 arrays will be packaged in a cryogenic dewar containing an internal cold shield and spectral filter, a window and a three-position filter wheel immediately in front of the window. The three approximately .5"x3.5" elements in this filter wheel will be arranged in the form of an equilateral triangle to minimize size, and two of the elements will be band-pass filters. The third element will be a thermoelectric flat to provide references for two-point non-uniformity calibration. The optical packaging design shall include mounting of this dewar system possibly including the above described stepping dielectric flat just in front of the filter wheel.

F. One-Point NUC Defocus Mechanism:

A fast-acting defocus mechanism is required for momentarily increasing blur size by about a factor of eight. This will provide a scene-based local temperature reference for one-point refinement of the array nonuniformity correction. If feasible, the desired defocus mechanism for Navy horizon scenes should be asymmetric, increasing azimuthal blur by a factor of 20 or more with little effect on elevation blur.

G. Spectral Bands:

There are two different atmospheric windows of interest. The 3.8-4.2 μm spectral band has good transmission and will be used most of the time. The 4.6-4.8 μm band is often needed, however, to minimize solar effects. The system processor will use algorithms to detect the presence of degrading solar ocean glint and thereby determine which spectral bandpass the camera should be using. A cooled 3.8-4.8 μm filter will be included inside the dewar, and two uncooled filters for separating the 3.8-4.2 μm and 4.6-4.8 μm bands will be included in the filter wheel just in front of the dewar window. Delivery of these components will be the responsibility of array vendor, but the optical designer must specify whether there is or is not to be any difference in optical thickness of the uncooled filters. And optical ray trace and blur design must be for both band either separately or together.

H. Entrance and Exit Pupils and Cold Shield Design:

The entrance pupil must be positioned reasonably far forward, preferably at the window in front of the lens. This may make it difficult to achieve other optical design criterion, in which case the entrance aperture may be behind the system window and a tradeoff of window size should be shown. The exit pupil must be inside the dewar and positioned at the cold shield. The lens design should include cold shield design and an estimate of cold shield performance.

I. System Window:

The design phase must address all window size, cost and producibility issues including ship roll of 10 deg. In the fabrication follow-on phase the contractor is to deliver a window for each of the three lens systems.

J. Stabilization and Packaging:

Ship roll will be limited to ten degrees or less. This is done to control radar cross section, but it also means that the stabilization of IR cameras is much simplified. Each camera will be mounted in its own compact yoke stabilization system just behind its own window in the low RCS ship structure. The stabilization gimbals must be aligned on the camera center of mass, and it is desirable also to have this positioned on the optical axis. The packaging design must include folding of the optical path to place the camera center of mass as far forward as possible so that optical entrance aperture will have minimal motion relative to the window. The dewar and especially the cryo-compressor are heavy and must be positioned carefully with consideration given to the limitations from compressor line length and possible vibrating inertia of piston motions. Weight budgets and positioning for other system components such as electronics are to be included in the packaging design. The optics contractor is responsible for positioning the center of mass as far forward and as near the optical axis as possible and must also provide stabilization tie points aligned on the center of mass.

Athermalization must be well implemented to assure maintenance of focus. The temperature environment inside the low RCS mast-type housing is not yet known, but the preponderance of Navy outside operating environment falls within the range from freezing to 100°F. Additionally, ship equipment must be able to survive the stress of high shock. The main responsibility for shock mounting is with the stabilization system which is not a part of this contract, but the lens layout design and proposal for fabrication should indicate packaging features aimed at sustaining residual shock.

K. Manufacturability & Tolerance Analysis:

The lens design should include analysis of manufacturing errors. One suggestion, is that lens assembly becomes difficult and costly if elements have to be centered in their holders to an accuracy of better than 0.4 mil = 0.0004 in. The Contractor shall summarize error bounds needed for ease of manufacturing and must give an optical performance tolerance analysis including these factors.

L. Interfacing:

There are three interfacing issues with GFE equipment being procured on separate contracts.

1. Cryogenics: the supplier of optics will be responsible for optical characteristics of the cold shield, the cooled filter, the dewar window and the uncooled switch able filters; for design of the mechanical linkage between optics and dewar and for mechanical placement of the cryocompressor subject to government and array vendor recommendations. The array vendor will be responsible for the fabrication of these components.

2. Stabilization: the supplier of optics will be responsible for packaging, weight distribution and center of mass placement of all camera payload components (optics, athermalization, dewar, compressor and electronics), will be responsible for optical properties, fabrication and mounting of any dither stepping dielectric flat, and is to

supply gimbal mount points for the payload package again subject to government and stabilization contractor recommendations. The supplier of optics will be responsible for all aspects of the low radar cross section window. The stabilization contractor will be responsible for controlling the payload as a whole. Either contractor may be responsible for the axis drivers and servo open-loop drivers for the stepping dielectric flat, if it is implemented.

3. Electronics: the supplier of optics is to include all payload components in the weight distribution and center of mass design, including electronics for the array, the processor and for athermalization.

M. Proprietary Products:

The tentative designs to be developed and delivered during this contract should contain no proprietary information or other material not belonging to government. The plans to be offered for follow-on must not anticipate or make use of proprietary designs or information. Lens designs are to be provided in Z-MAX format.

N. Summary:

Number of cameras	8 or fewer highly desired
IFOV solid angle	$< \approx (160 \mu\text{Rad})^2$ to achieve good sensitivity
Anamorphicity	5 or 4 desired to reduce array length
Spectral bands	4.6-4.8 μm and 3.8-4.2 μm , switchable
F-number	$<< 2.5$ desired
Az blur size*	$< 1.4 \times 25 \mu\text{m}$ desired, $< 2 \times 25 \mu\text{m}$ acceptable
EI blur size*	$< 1.4 \times 25 \mu\text{m}$ desired, $\approx 18 \mu\text{m}$ of interest
Focus stability	Essential
Distortion	Acceptable
Entrance pupil	Preferably forward at window
Exit pupil	At cold shield inside dewar
Transmission	High for in-band radiation
Baffling	Limit solar scattering
Folding	Need compact packaging and center of mass forward

*80% of energy for all positions in the image plane

Phase 1- Document Deliverables:

The Contractor shall deliver the following as set forth below and in the Contract Data Requirements List:

1. Initial Approach: Provide a brief description or drawings of the lens systems being considered within one month of contract award. Verbal discription via telephone may be used for clarification. The Government will provide feedback and direction, which will be limited to written memoranda.

2. Summary of Approach: Provide tentative ray-trace drawings of the lens systems being considered within two months of contract performance. Verbal description via telephone may be used for clarification. The Government will provide feedback and direction, which will be limited to written memoranda.

3. Layout Design Drawings : Provide optical, packaging and integration drawings, description and tolerance analysis for all the candidate lenses of Table 1, showing:

- a. ray tracing and optical performance including blur spot distributions and size, registration and F-number across the field of view,

- b. integration with dewar cooled filter and cold shield, two-position spectral filter, and possible dither-stepping dielectric flat,
 - c. support for mating to mechanical stabilization and
 - d. athermalization, optical folding, packaging and center of mass placement.
4. The Contractor shall provide a cost, schedule and implementation plan for final design, fabrication and testing of three lens systems. Give an estimate of eventual production costs in units of hundreds. These drawings and descriptions must present the entire design effort performed under the Base Phase 1 part of this contract and may contain no information or material not purchased by government under this contract.

4. OPTION: PHASE 2

A. The Contractor shall perform the following as an optional task under this contract:

- (1) critical design review (CDR),
- (2) a preliminary build to be evaluated for producibility, packaging and optical performance,
- (3) refine design, and
- (4) a final build of three units complete with athermalization and including mechanical and optical integration with government-provided focal plane arrays.

B. Government Furnished Equipment and Data:

The Government will provide a modest-sized array for testing the first preliminary lens and three 2048x512 arrays with cryocoolers for integration into the final packaged optics. Information will be provided during contract performance concerning the weight and mechanical details of this array, the design 2560x512 array and other electronics to be included in the lens packaging and interface design.

Phase 2: Document Deliverables:

- 1. Critical Design Review (CDR): Provide design drawings and all details for critical design review including production schedule, cost review and lens test and integration plans. 6 months after contract award
- 2. Test Lens Report and Final Design: Provide written results from performance testing of initial test lens and provide the final lens design following refinement based on these test results. 15 months post award.
- 3. Final Lens Report: Provide written results from performance testing of the three final lenses. 18 months after contract award.

Phase 2: Other Deliverables:

- 1. Test Lens: Fabrication of the first test lens and initial testing at the contractor facility are expected to be completed by 15 months after contract award. This test lens is then to be delivered to NRL.
- 2. Final Lenses & Windows: Fabrication, test, integration and delivery of the final three lens systems with windows is expected 18 months post award. When tested and when delivered these final lenses are to be mechanically and optically integrating with the focal plane arrays being provided as government furnished equipment.

CONTRACT DATA REQUIREMENTS LIST

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OMB no. 0704-0188

The public reporting burden for this collection of information is estimated to average 110 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 (0701-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to the above address. Send completed form to the Government Issuing Contracting Officer for the Contract/PR No. listed in Block E.

A. CONTRACT LINE ITEM NO. 0004		B. EXHIBIT B		C. CATEGORY: TDP _____ TM _____ OTHER _____	
D. SYSTEM / ITEM Fast Anamorphic MWIR Optics			E. CONTRACT / PR NO. N00173-02-R-JR02		F. CONTRACTOR TBD
1. DATA ITEM NO. B001	2. TITLE OF DATA ITEM Critical Design Review			3. SUBTITLE	
4. AUTHORITY (Data Acquisition Document No.)			5. CONTRACT REFERENCE SOW-Phase 2		6. REQUIRING OFFICE NRL
7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY OTIME	12. DATE OF FIRST SUBMISSION See Blk 16		14. DISTRIBUTION
8. APP CODE	11. AS OF DATE See Blk 16		13. DATE OF SUBSEQUENT SUBMISSION		
16. REMARKS Shall include design drawings and all details for critical design review including production schedule, cost review and lens test and integration plans. Required three(3) months after exercise of Option 1.					a. ADDRESSEE Code 5622
					b. COPIES
					Draft
					Final
					Reg
					Repro
15. TOTAL →					2
1. DATA ITEM NO. B002	2. TITLE OF DATA ITEM Test Lens Report and Final Design			3. SUBTITLE	
4. AUTHORITY (Data Acquisition Document No.)			5. CONTRACT REFERENCE SOW-Phase 2		6. REQUIRING OFFICE NRL
7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY OTIME	12. DATE OF FIRST SUBMISSION See Blk 16		14. DISTRIBUTION
8. APP CODE	11. AS OF DATE See Blk 16		13. DATE OF SUBSEQUENT SUBMISSION		
16. REMARKS Shall include written results from performance testing of initial test lens and provide the final lens design following refinement based on these test results. Required within twelve(12) months after exercise of Option 1.					a. ADDRESSEE Code 5622
					b. COPIES
					Draft
					Final
					Reg
					Repro
15. TOTAL →					2
1. DATA ITEM NO. B003	2. TITLE OF DATA ITEM Final Lens Report			3. SUBTITLE	
4. AUTHORITY (Data Acquisition Document No.)			5. CONTRACT REFERENCE SOW-Phase 2		6. REQUIRING OFFICE NRL
7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY OTIME	12. DATE OF FIRST SUBMISSION See Blk 16		14. DISTRIBUTION
8. APP CODE	11. AS OF DATE See Blk 16		13. DATE OF SUBSEQUENT SUBMISSION		
16. REMARKS Shall include written results from performance testing of the three final lenses.					a. ADDRESSEE Code 5622
					b. COPIES
					Draft
					Final
					Reg
					Repro
15. TOTAL →					2
G. PREPARED BY			H. DATE	I. APPROVED BY	
J. DATE					

17. PRICE GROUP
18. ESTIMATED TOTAL PRICE

17. PRICE GROUP
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