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NOV 66 A M BARLOW, D F MILESON
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A PROCUREMENT SPECIFICATION
FOR TACTICAL DATA SYSTEM
COMPUTER PROGRAMS

November 1966

Prepared for
FLEET COMPUTER PROGRAMMING CENTER, PACIFIC
San Diego, California

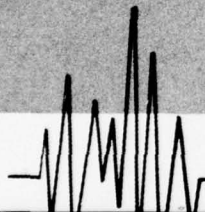
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FOREWORD

This document was prepared in close coordination with the Fleet Computer Programming Center, Pacific, as part of a complete set of documentation for the procurement and management of computer programs. As such it can be considered an integrated part of a total system approach to computer program development and procurement. In the development of this approach, it was necessary to prepare each package incrementally. Then the increments were integrated into the whole through an iterative process.

At the time of publication, several iterations have been completed, with coordinated inputs from all known sources. However, the process of updating and refining this document should be a continuous one so that it will be a viable document incorporating all advances and evolutionary changes in computer programming.

The following documents, of which this is one, comprise the system documentation package:

<u>Title</u>	<u>Publication No.</u>
A Preparation Guide for Request for Quotation for Tactical Data System Computer Programs	414-04-1-689
A Procurement Specification for Tactical Data System Computer Programs	414-04-2-690
A Guide for Preparation of Tactical Data System Operational Specifications	414-04-3-691
Tactical Data System Computer Programming Specification	414-04-4-692
A Specification for Tactical Data System Computer Program Documentation	414-04-5-693
A Management Manual for Tactical Data System Computer Programs	414-04-6-694

1. SCOPE

1.1 GENERAL

1.1.1 This specification defines the requirements for a digital computer program and related program documentation for a tactical data system (TDS) of the U. S. Navy. The computer program covered by this specification is to operate in the _____ computer, or in a computer of compatible concept. The computer program is to be prepared in _____ source language and reduced to appropriate object code.

1.2 BACKGROUND

1.2.1 It is the intent of this specification to define a clearly and precisely documented digital computer program that will perform in conformance with the requirements of the operational specifications for the TDS, utilizing a general-purpose computer.

1.2.2 Since the computer program must interface with the ancillary equipment with which the TDS operates, program documentation must be simultaneously developed which is in consonance with the source data available for the ancillary equipment. This documentation will provide the program visibility required to assure program conformity to future change requirements.

1.3 BASIC DESIGN PHILOSOPHY

1.3.1 The computer program to be developed to this specification will be compatible with the hardware configuration of the system within which the general-purpose computer is to operate.

1.3.2 It is expected that state-of-the-art logic construction and programming techniques will be utilized to develop the program in a manner that will maximize hardware performance, and wherever possible, reduce the complexity of the manually operated functions of the TDS.

1.3.3 It is imperative that the various routines outlined in Section 3 be programmed in a modular fashion insofar as possible within the equipment constraints. To do so will allow, within a routine, distinct and rapid program modifications responsive to changes in tactics, message standards or peripheral equipment; and having a minimum effect on other routines.

2. APPLICABLE DOCUMENTS

2.1 The following listed documents, of the issue in effect on the date of invitation for bids or requests for proposal, form a part of this specification to the extent specified herein.

General

U. S. Navy Book of Standards for Tactical Data Systems, OPNAV INST P05711.91, dated 7 January 1963 (with Changes No. 1 through No. 9, 14 January 1966).

Tactical Data System Computer Programming Specification.

Tactical Data System Computer Program Operational Specifications for the computer program routines described in 3.1.

Automatic Data Processing Glossary, Bureau of the Budget, 1962.

Specification for Tactical Data System Computer Program Documentation.

Equipment Specifications

Tactical Data System Equipment Description

System Manuals

The following appendices to the Specification for Tactical Data System Computer Program Documentation apply to manuals as indicated.

Appendix 1 - Command and Staff Manual

Appendix 2 - System Plan Manual

Appendix 3 - System Operational Manual

Appendix 4 - System Program Design Manual

Appendix 5 - System Program Assembly Listing Manual

Appendix 6 - System Program Maintenance Manual

Appendix 7 - System Programmer's Reference Manual

Weapons Information

This section should reference the specific publications that provide employment and performance data and/or equations for the vehicles, weapons, targets, etc., required as guidance in structuring the mathematical operatives in programs and routines.

Programming Guides

This section should reference all documents that provide guidance as to the limitations (language, structure, etc.) imposed by the data processing equipment.

Miscellaneous

This section should reference all documents that provide evaluation of equipment performance which serve to circumscribe the utilization of the data processing equipment.

8. REQUIREMENTS

3.1 PROJECT ORGANIZATION

3.1.1 The project for the development and delivery of the digital computer program and related documentation will be divided into two phases.

3.1.2 Phase I Content

3.1.2.1 This phase will consist of the following:

(1) Development and submittal of a project plan for both phases.

(2) Development of program flow diagrams for each of the operational program routines specified.

(3) Development of functional descriptions of logic flow for each program flow diagram.

(4) Conduct of project reviews.

(5) Preparation and submittal of a program design synthesis plan.

(6) Conduct of design reviews.

(7) Receipt of design approval.

3.1.3 Phase II Content

3.1.3.1 This phase will consist of the following:

(1) Development from the program flow diagrams, and from the functional descriptions of logic flow, of functional flow charts and deliverable source and object programs.

(2) Development and delivery of program flow diagrams, functional flow charts, and source and object programs for the test routines for each of the operational program routines specified.

(3) Preparation and delivery of source and object program card decks and program assembly listings for the final program and test routines.

(4) Preparation and delivery of the final program and test routines on magnetic tape in object code.

(5) Preparation and delivery of the program system documentation.

(6) Conduct of project reviews.

(7) Preparation of a program test plan.

(8) Conduct of preliminary acceptance testing.

(9) Conduct of final acceptance testing.

3.2 PHASE I TASKS

3.2.1 Project Plan

3.2.1.1 The contractor shall develop and deliver a project plan covering both phases of this procurement, in accordance with 3.4.1.

3.2.2 Program Flow Diagrams

3.2.2.1 The contractor shall develop program flow diagrams in accordance with the TDS Computer Programming Specification. These diagrams shall define the operational program routines necessary for the computer in the TDS to meet the functional requirements of its associated equipment and intrasystem interface, as well as the requirements contained in the operational specifications for the computer program routines listed below:

<u>Routine</u>	<u>Attachment</u>
Tracking	A
Intercept Control	B
Threat Evaluation	C
Weapon Assignment	D
Link 11 (Data Link Communications)	E
Navigation	F
Display (Symbol and Alphanumeric)	G
Executive Control	H
Data Extraction	I
Diagnostic Test	J
Others, As Applicable	K--

3.2.3 Functional Descriptions of Logic Flow

3.2.3.1 The contractor shall prepare and submit functional descriptions of logic flow to accompany each program flow diagram. These descriptions shall be prepared in accordance with the TDS Computer Programming Specification.

3.2.4 Project Reviews

3.2.4.1 The contractor shall conduct project reviews in accordance with 3.4.6.

3.2.5 Program Design Synthesis Demonstration Plan

3.2.5.1 The contractor shall prepare and submit a program design synthesis demonstration plan in accordance with 3.4.3.

3.2.6 Preliminary Design Reviews

3.2.6.1 The contractor shall conduct preliminary design reviews in accordance with 3.4.4.

3.2.7 Final Design Review

3.2.7.1 The contractor shall conduct a final design review in accordance with 3.4.5.

3.2.8 Design Approval

3.2.8.1 Design approval will be given by the designated representative of FCPC upon successful completion by the contractor of the final design review.

NOTE

In the event that routines are available to satisfy certain of the computer program operational specifications, the following paragraphs should be incorporated, listing the applicable documents.

3.2.9 Government Furnished Routines

3.2.9.1 The contractor shall incorporate the following routines presently existing in government inventory as part of the total operational system program:

NOTE

The appropriate routines should be listed here.

Furthermore, the contractor shall develop program flow diagrams and functional descriptions of logic flow for these routines in accordance with this specification. Applicable program listings, card decks, and other available program documentation will be delivered to the contractor by the government at time of contract award.

3.3 PHASE II TASKS

3.3.1 Programs

3.3.1.1 Each of the operational program routines specified in 3.2 shall be incorporated into an overall program. Functional flow charts shall be developed from the program flow diagrams and functional descriptions of logic flow developed during Phase I. Source programs and object programs shall be provided and documented in accordance with the requirements of the TDS Computer Programming Specification. Source language shall be as specified in 3.3.10.

3.3.2 Test Routines

3.3.2.1 For each of the operational program routines required in 3.2, the contractor shall develop a test routine capable of testing the complete performance of each routine for which it was developed. Program flow diagrams, functional flow charts, source programs, and object programs shall be provided and documented in accordance with the requirements of the TDS Computer Programming Specification. Source language shall be as specified in 3.3.10.

3.3.3 Program Card Decks and Program Assembly Listings

3.3.3.1 Source and object program card decks (including comment cards for source programs) and assembly listings shall be provided for the final program and test routines in accordance with the requirements of the TDS Computer Programming Specification.

3.3.4 Magnetic Tape

3.3.4.1 Object programs for both the final program and the test routines shall be provided on a magnetic tape which meets the requirements of the equipment manuals and specifications.

NOTE

Add other information if available, such as:
"This tape shall be capable of being read directly into the memory of the L-304F computer via an IBM series 2400 magnetic tape unit or a tape unit of a compatible type."

3.3.5 Program System Documentation

3.3.5.1 Documentation shall be provided in accordance with the Specification for Tactical Data System Documentation as follows:

- (1) Command and Staff Manual - Appendix 1
- (2) System Plan Manual - Appendix 2
- (3) System Operational Manual - Appendix 3
- (4) System Program Design Manual - Appendix 4
- (5) System Program Assembly Listing Manual - Appendix 5
- (6) System Program Maintenance Manual - Appendix 6
- (7) System Programmer's Reference Manual - Appendix 7

3.3.6 Project Review

3.3.6.1 The contractor shall conduct project reviews in accordance with 3.4.6.

3.3.7 Program Test Plan and Procedures

3.3.7.1 The contractor shall prepare a program test plan in accordance with 3.4.7.2, and program test procedures in accordance with 3.4.7.3.

3.3.8 Preliminary Acceptance Test

3.3.8.1 The contractor shall conduct preliminary acceptance tests in accordance with 3.4.7.4.

3.3.9 Final Acceptance Tests

3.3.9.1 The contractor shall conduct final acceptance tasks in accordance with 3.4.7.5.

3.3.10 Source Program Language.

3.3.10.1 The contractor shall prepare all source programs in _____ language. Information relating to this source language is provided in the following documents:

NOTE

List all pertinent documents, such as those included under "Programming Guides", in 2.1.

3.4 GENERAL REQUIREMENTS

3.4.1 Project Plan

3.4.1.1 The contractor shall prepare a project plan which, within 30 days following contract award, shall be submitted to FCPC for approval.

3.4.1.2 The project plan shall be organized in a manner that will reflect full responsiveness to all the requirements of both phases of the contract. Hence, the elements of the project plan shall be the same as the elements of this specification, as amended by the contract or any detailed specification incorporated therein.

3.4.1.3 The project plan shall include:

(1) A brief description of the end items covered by the procurement specification.

(2) Details of the contractor's intended procedures, research activity and quality assurance program necessary to implement the requirements of the procurement specifications.

(3) A master schedule, showing proposed or estimated design review and project review dates, project milestones, end-item delivery dates, and report submission dates within the time frames established by the procurement contract.

(4) A PERT network and activity description chart consistent with the project plan.

3.4.1.4 The approved project plan shall be updated or reissued as necessary to reflect the current status of the project.

3.4.1.5 Revisions to the project plan which result from agreements at a project review shall be submitted to FCPC for approval within 30 days following the review.

3.4.1.6 Project plan revisions within the scope of the contract shall be implemented within the time periods agreed upon at the review meetings; revisions that are outside the scope of the contract will be made the subject of renegotiation.

3.4.2 Program Design Approach

3.4.2.1 The contractor shall prepare a formal document describing his program design approach which shall be submitted within 60 days following contract award. The presentation of this design approach shall be made at a design review within 15 working days of submittal of the report.

3.4.2.2 The program design approach shall present the contractor's approach for achieving the objectives of each operational program routine and test routine required by this specification and its

associated documents. This description shall be of sufficient detail to establish the feasibility of the selected approach.

3.4.2.3 The contractor's description of his program design approach shall utilize the program flow diagrams and functional descriptions of logic flow, and shall identify:

- (1) All inputs and outputs.
- (2) Computer constraints.
- (3) Associated equipment constraints.

3.4.3 Program Design Synthesis Demonstration Plan

3.4.3.1 The contractor shall develop a program design synthesis demonstration plan and submit it at least 30 days prior to the date of the final design review. This plan shall be developed to demonstrate that all of the individual program routines have been successfully integrated into a cohesive operational program.

3.4.3.2 FCPC will indicate approval or disapproval of the submitted plan at least 15 days in advance of the scheduled review.

3.4.4 Preliminary Design Reviews

3.4.4.1 Preliminary design reviews shall be conducted during Phase I to accomplish the following:

- (1) Review of the contractor's program design approach by FCPC representatives.
- (2) Definition of problem areas.
- (3) Assessment of progress relative to schedules.
- (4) Assignment of responsibility for changes, corrections, revisions, etc.

3.4.4.2 The contractor shall establish and conduct a formal program of planned, scheduled, and documented preliminary design reviews for the computer program routines called for in this specification. Such reviews shall be comprehensive, critical audits of all the pertinent aspects of the design.

3.4.4.3 The contractor shall conduct the preliminary design reviews at his facility except when otherwise indicated by FCPC. These reviews will be attended by cognizant FCPC representatives.

3.4.4.4 The contractor shall submit to FCPC a design review notice at least 15 days in advance of a preliminary design review. This notice shall contain the following information:

- (1) A list of the design aspects to be covered.
- (2) A schedule of individual presentation.
- (3) Date, time, and location of the proceedings.

3.4.4.5 Preliminary design review reports shall be submitted to FCPC within 15 days after the review and will include the following information:

- (1) A resume of the review meeting.
- (2) A statement of the revisions, if any, required as a result of the review.
- (3) Time periods agreed upon for revisions to be accomplished.
- (4) List of attendees.
- (5) Pertinent comments.
- (6) Items agreed upon at the review.

3.4.5 Final Design Review

3.4.5.1 A final design review shall be initiated when the program flow diagrams and functional descriptions of logic flow for all of the program routines required by 3.2 have been completed and all have passed design reviews. At such time, the contractor shall present, for FCPC approval, all of the program routines indicated by the program flow diagrams.

3.4.5.2 The scheduling, notification, and conduct of the final design review shall be governed by the requirements of the preliminary design reviews.

3.4.5.3 The final design review shall include a demonstration of successful program design synthesis in accordance with the plan described in 3.4.3.

3.4.5.4 The final design review report shall constitute the final report of Phase I, and shall be submitted to FCPC within 15 working days after the review. In addition to the information required in the preliminary design review report, the final program flow diagrams and functional descriptions of logic flow shall be included in a bound volume together with appropriate narrative material.

3.4.6 Project Review

3.4.6.1 The contractor and cognizant FCPC representatives, will jointly conduct reviews of the project, including preparation of the required documentation, to assess its progress and to determine the need for adjustments or changes. These reviews shall normally be scheduled by the contractor at major milestones in the program--at least quarterly, but no more frequently than monthly.

3.4.6.2 During Phase I, the project reviews may be held coincident with or satisfied by the design reviews.

3.4.6.3 FCPC reserves the right to request a project review whenever deemed necessary by its cognizant representatives.

3.4.6.4 Project review shall be documented by the contractor and the report submitted to FCPC within 15 working days following the review.

3.4.7 Program Test Requirements

3.4.7.1 The programs developed by the contractor shall be tested during Phase II to demonstrate to FCPC that the operational program routines under contract fully satisfy the requirements of their associated operational specifications. A program test plan shall be prepared, describing the conduct of the tests in two categories: preliminary acceptance tests and final acceptance tests. These tests will serve as a basis for acceptance or rejection of the program, in whole or in part.

3.4.7.2 Program Test Plan. A program test plan defining the overall conduct of preliminary acceptance and final acceptance tests shall be prepared by the contractor during Phase II. This test plan shall include a description of the method to be used in accomplishing the integration of program modules, a listing of the equipment necessary, input data, time required, and general criteria for determining the success of each portion of the test. Submission of this plan to FCPC in report form is required at least 90 days in advance of the scheduled tests. Approval or disapproval of the submitted plan will be indicated by FCPC within 30 days of receipt of the plan.

3.4.7.3 Program Test Procedures. Specific program test procedures shall be prepared to implement the plan described in 3.4.7.2. These test procedures shall include a detailed description of each step necessary for the conduct of the test. Specific operator actions and detailed success criteria shall be included. Submission to FCPC of a report including these procedures is required at least 60 days in advance of scheduled test. Approval or disapproval of the submitted procedures will be indicated by FCPC within 30 days of receipt of the procedures.

3.4.7.4 Preliminary Acceptance Tests. The contractor shall conduct preliminary acceptance tests to establish satisfactory performance of modular elements (1.3.3) of the final program, and the successful integration of these elements. These tests shall be shown as milestones in the project plan (3.4.1) and shall be incorporated into project reviews (3.4.6). Results of preliminary acceptance tests shall be included in project review reports.

3.4.7.5 Final Acceptance Tests. Final acceptance tests shall be conducted on the final computer program after all modular elements of the program have been successfully integrated. This test shall be scheduled in the project plan (3.4.1). Final acceptance tests shall be conducted in two stages:

- Stage 1 - Laboratory Simulation Demonstration, and
- Stage 2 - Operational Demonstration.

3.4.7.5.1 Stage 1 of the final acceptance tests will include a demonstration of the satisfactory performance of the program in an operational environment simulated in FCPC laboratory, or in another appropriately equipped laboratory designated by FCPC. A Stage 1 final acceptance test report shall be submitted within 15 working days after completion of Stage 1 testing. It shall contain documentation sufficiently comprehensive to establish that the tests were conducted in accordance with the test plan and procedures, and that the prescribed success criteria had been met. Approval or disapproval of the test report will be indicated by FCPC within 15 days of receipt of the test report.

3.4.7.5.2 Stage 2 of the final acceptance tests will include a demonstration of the satisfactory performance of the program in an actual operational environment under controlled test conditions approved by FCPC. These controlled conditions will be within the established operation capabilities of the system and will be executed by qualified personnel in a fully operational equipment installation. The Stage 2 final acceptance test report shall be submitted within 15 working days after the completion of Stage 2 testing. It shall contain documentation sufficiently comprehensive to establish that the tests were conducted in accordance with the test plan and procedures and that the prescribed success criteria had been met.

3.4.8 Project Status Reports

3.4.8.1 The contractor shall submit a monthly report of project status which shall include the following types of information:

- (1) Statement of project progress.
- (2) Specific achievements during the reporting period.
- (3) Description of problem areas, together with a statement of the corrective action being taken, or intended.
- (4) A summary of program documentation submittals for the reporting period.

(5) A summary of significant events and activities scheduled for the next reporting period.

(6) An accounting of manhour and dollar expenditures.

3.5 SUMMARY OF REPORT REQUIREMENTS

3.5.1 All of the tasks listed in 3.4 require the submission of reports as described therein. For convenience, all required reports are summarized in this section.

3.5.2 Project Plan Report

3.5.2.1 The project plan is to be submitted by a report within 30 days following contract award.

3.5.3 Program Design Approach Report

3.5.3.1 The contractor's program design approach is to be submitted by a report within 60 days following contract award.

3.5.4 Program Design Synthesis Demonstration Plan Report

3.5.4.1 The program design synthesis demonstration plan is to be submitted by a report at least 30 days prior to the date of the final design review.

3.5.5 Preliminary Design Review Notice and Report

3.5.5.1 The preliminary design review notice is to be submitted at least 15 days in advance of the design review.

3.5.5.2 The preliminary design review report is to be submitted within 15 working days after the design review.

3.5.6 Final Design Review Notice and Report

3.5.6.1 The final design review notice is to be submitted at least 15 days in advance of the final design review.

3.5.6.2 The final design review report is to be submitted within 15 working days after the final design review.

3.5.7 Project Review Report

3.5.7.1 Project review reports are to be submitted within 15 working days after the project review.

3.5.8 Program Test Reports

3.5.8.1 Program Test Plan Report. The program test plan is to be submitted by a report at least 90 days in advance of the scheduled tests.

3.5.8.2 Program Test Procedures Report. The Program test procedures are to be submitted by a report at least 60 days in advance of the scheduled tests.

3.5.8.3 Preliminary Acceptance Test Report. The reports of preliminary acceptance tests are to be included in project review reports.

3.5.8.4 Final Acceptance Test Reports

3.5.8.4.1 Stage 1 Final Acceptance Test Reports. The Stage 1 final acceptance test report is to be submitted within 15 working days after completion of Stage 2 testing.

3.5.8.4.2 Stage 2 Final Acceptance Test Reports. The Stage 2 report is to be submitted within 15 working days after completion of Stage 2 testing.

4. QUALITY ASSURANCE PROVISIONS

4.1 QUALITY ASSURANCE SYSTEM

4.1.1 Contractor Responsibility

4.1.1.1 The contractor shall provide and maintain an effective quality assurance system for all computer programs and documentation items under contract. The contractor shall maintain, at his site, adequate facilities and the trained staff necessary to implement the quality assurance system. This system will be subject to periodic verification by FCPC.

4.1.2 Quality Assurance Plan

4.1.2.1 The contractor's plan for quality assurance of all computer programs and documentation shall be submitted to FCPC for approval as part of the project plan (3.4.1). Any changes to the approved quality assurance system must be approved in writing by FCPC prior to implementation by the contractor.

4.2 GOVERNMENT VERIFICATION

4.2.1 Sampling

4.2.1.1 To verify the adequacy of the contractor's quality assurance system, cognizant representatives of FCPC will make, during preliminary acceptance testing, a complete and detailed inspection of or random sample of each item deliverable under this procurement. Results of this random sample inspection will be used to determine whether significant errors can be presumed to exist in the remainder of the deliverable items. If significant errors are presumed to exist, all items may be returned to the contractor for recheck. Another random sample inspection will be performed on resubmittal.

4.2.2 Correction of Deficiencies

4.2.2.1 Failure of the contractor to promptly correct deficiencies discovered by him, or of which he is notified, shall be cause for suspension of product acceptance until corrective action has been taken or until conformance of the product to the applicable criteria of the attached Operational Specifications has been demonstrated.

5. PREPARATION FOR DELIVERY

5.1 GENERAL REQUIREMENTS

5.1.1 Quantity

5.1.1.1 The number of copies of the programs and documentation (including changes, revisions, and supplements thereto) shall be as specified in the contract or order. Unless otherwise specified, the contractor shall be responsible for the distribution of all copies of the program and documentation procured on the contract. Distribution of changes, revisions, and supplements shall be made to all activities receiving the original documentation and in the same quantity for each, or as directed by FCPC.

5.1.2 Distribution

5.1.2.1 At least 30 days prior to anticipated shipping dates, the contractor shall request instructions from FCPC regarding the required distribution of copies of the programs and documentation.

5.1.3 Packaging and Marking

5.1.3.1 Classified Material. All classified material, including bulk shipments, shall be packaged and marked in accordance with the requirements of Form DD-441.

5.1.3.2 Packaging. All material shall be packed to preclude the possibility of damage in transit. Containers shall comply with the Uniform Freight Classification Rules or other carrier regulations as applicable to the mode of transportation.

5.1.3.3 Marking. Identification or publication numbers shall be indicated on the shipping papers accompanying each shipment. In addition, interior packages and exterior shipping containers shall be marked with the following information for each item enclosed:

(1) Box (number) of (number of boxes, on multiple container shipments).

- (2) Identification number.
- (3) Quantity contained within the package.
- (4) Contract or order number.

The words "FOR STOCK" shall be marked on those packages destined for stock.

5.2 DETAILED REQUIREMENTS

5.2.1 Individual Copies of Manuals

5.2.1.1 Individual copies of multivolume manuals shall be packed and shipped as complete sets.

5.2.2 Bulk Shipments of Manuals

5.2.2.1 Manuals shipped in bulk shall not be individually wrapped. Stock copies of identical volumes of multivolume manuals shall be packed and bulk-shipped in common containers. Stock copies of all manuals having different publication numbers shall be packed separately.

5.2.3 Review Documents

5.2.3.1 Manuscript copies and other documents for review (including changes, revisions, and supplements thereto) shall be prepared for shipment in the same manner as for final documentation. In addition, a self-addressed (to the contractor) postal card containing information similar to the following notice shall be enclosed with each document attached to the title page:

"IMPORTANT NOTICE: This is a review document for (insert nomenclature of system or equipment), publication (insert number). Return this card immediately indicating ship or shore activity and mailing address."

5.2.4 Artwork and Reproducible Copy

5.2.4.1 Test pages and artwork shall be arranged in groups according to size and shall be so packaged that all reproducible copy and artwork will lie flat and withstand rough handling.

5.2.5 Submittals for Record

5.2.5.1 When negatives are contractually required as submittals for record, they shall be furnished as individual page negatives and shall be collated in numerical sequence by page number (except for foldouts). The page number and publication number shall be prominently marked on each negative in a consistent location. A slip sheet of manifold, tissue, or other suitable paper shall be inserted between negatives. Foldout negatives also shall be arranged in numerical sequence but packaged separately from the page-size negatives. Negatives shall be packed flat; rolled negatives are not acceptable. Prints shall be packaged so that the material will lie flat and withstand rough handling.

5.2.6 Program Card Decks

5.2.6.1 Individual copies of program card decks shall be packaged separately with appropriate identifying markings included in each package.

5.2.7 Program Tapes

5.2.7.1 Individual copies of program magnetic tapes shall be packaged separately in individual metal containers. Appropriate identifying markings shall be included in each package.

o. NOTES

o.1 INTENDED USE

o.1.1 Examples of items in this section are:

- (1) System Environment.
- (2) Primary System Functions.
- (3) Expected Operational Employment.
- (4) System Capabilities.

o.2 PROGRAM SCOPE

o.2.1 Examples of items in this section are:

- (1) Computer Functions.
- (2) Operation Functions.

o.3 SPECIAL REQUIREMENTS

o.3.1 Examples of items in this section are:

- (1) Notification of flight test requirements.
- (2) Required availability of government furnished equipment.

APPENDIX A
SAMPLE PROCUREMENT SPECIFICATION
FOR AN ATDS COMPUTER PROGRAM

APPENDIX A
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1. SCOPE

1.1 GENERAL

1.1.1 This Specification defines the requirements for a digital computer program and related program documentation for the Airborne Tactical Data System (ATDS) of the U. S. Navy. The computer program covered by this specification is to operate in the Litton L-304 computer, or in a computer of compatible concept. The computer program is to be prepared in L-304 source language and reduced to appropriate object code.

1.2 BACKGROUND

1.2.1 It is the intent of this specification to define a clearly and precisely documented digital computer program that will perform in conformance with the requirements of the operational specifications for the ATDS, utilizing a general-purpose computer.

1.2.2 Since the computer program must interface with the ancillary equipment with which the ATDS operates, program documentation must be simultaneously developed which is in consonance with the source data available for the ancillary equipment. This documentation will provide the program visibility required to assure program conformity to future change requirements.

1.3 BASIC DESIGN PHILOSOPHY

1.3.1 The computer program to be developed to this specification will be compatible with the hardware configuration of the system within which the general-purpose computer is to operate.

1.3.2 It is expected that state-of-the-art logic construction and programming techniques will be utilized to develop the program in a manner that will maximize hardware performance, and wherever possible, reduce the complexity of the manually operated functions of the ATDS.

Appendix A

1.3.3 It is imperative that the various routines outlined in Section 3 be programmed in a modular fashion insofar as possible within the equipment constraints. To do so will allow, within a routine, distinct and rapid program modifications responsive to changes in tactics, message standards or peripheral equipment, and with a minimum of effect on other routines.

1.3.4 It is anticipated that the contractor will make maximum use of the current knowledge available at the Fleet Computer Programming Center, Pacific, (FCPCP).

2. APPLICABLE DOCUMENTS

2.1 The following listed documents, of the issue in effect on the date of invitation for bids or requests for proposal, form a part of this specification to the extent specified herein.

General

U. S. Navy Book of Standards for Tactical Data Systems, OPNAV INST P05711.91, dated 7 January 1963 (with Changes NO. 1 through No. 9, 14 January 1966).

Tactical Data System Computer Programming Specification.

Tactical Data System Computer Program Operational Specifications for the computer program routines described in 3.1.

Automatic Data Processing Glossary, Bureau of the Budget, 1962.

Specification for Tactical Data System Computer Program Documentation.

Equipment Specifications

GAEC, Computer Indicator Group AN/ASA-27 Design Control Specification, AV 123-CS-12.5; dated 19 May 1965.

GAEC, Computer Indicator Group AN/ASA-27 Design Control Specification, AV 123-CS227-A-ECP 410, dated 10 February 1966.

System Manuals

The following appendices to the Specification for Tactical Data System Computer Program Documentation apply to manuals as indicated:

Appendix 1 - Command and Staff Manual

Appendix 2 - System Plan Manual

Appendix 3 - System Operation Manual

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- Appendix 4 - System Program Design Manual
- Appendix 5 - System Program Assembly Listing Manual
- Appendix 6 - System Program Maintenance Manual
- Appendix 7 - System Programmer's Reference Manual

Weapons Information

Time, Distance and Fuel Equations for the F-8D/E and F-4B Interceptors, FCPC Report FR-3006, dated 2 August 1965; and Addendum No. 1, dated 22 September 1965.

Naval Weapons Publications NWP-41 (Naval Air Operating Procedures) and Supplements:

F-4B Weapons Systems Tactical Handbook

F-8F Weapons Systems Tactical Handbook

NATOPS Flight Manuals:

F-4B NW-01-245FDB-1 and -1A

F-8E NW-01-45HHD-1 and -1A

NWIP 1-4, Experimental Tactics for U. S. Navy Ships and Aircraft

Programming Guides

Software Documentation for E-2A/L-304 Retrofit Computer (MS 1125), dated 3 May 1966 (Litton Industries).

Programmers Reference Manual for Litton L-340 Micro-electronic Computer (MS 1140), dated 16 May 1966.

Litton L-304F Programming Manual (MS 996).

Litton L-304F Assembly Manual (MS 997).

Procedures Manual for the L-304F/IBM 360 Simulator Program (MS 998).

L-304F Continuity and Functional Test Program (MS 1007).

L-304F General Machine Test Program (MS 1008).

L-304F Service Routine Manual (MS 1012).

Miscellaneous

Coordinate Conversion Equation Evaluation, Report No. AV-123-OIP-2, dated 15 October 1965 (GAEC).

3. REQUIREMENTS

3.1 PROJECT ORGANIZATION

3.1.1 The project for the development and delivery of the digital computer program and related documentation will be divided into two phases.

3.1.2 Phase I Content

3.1.2.1 This phase will consist of the following:

(1) Development and submittal of a project plan for both phases.

(2) Development of program flow diagrams for each of the operational program routines specified.

(3) Development of functional descriptions of logic flow for each program flow diagram.

(4) Conduct of project reviews.

(5) Preparation and submittal of a program design synthesis plan.

(6) Conduct of design reviews.

(7) Receipt of design approval.

3.1.3 Phase II Content

3.1.3.1 This phase will consist of the following:

(1) Development from the program flow diagrams, and from the functional descriptions of logic flow, of functional flow charts and deliverable source and object programs.

(2) Development and delivery of program flow diagrams, functional flow charts, and source and object programs for the test routines for each of the operational program routines specified.

(3) Preparation and delivery of source and object program card decks and program assembly listings for the final program and test routines.

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(4) Preparation and delivery of the final program and test routines on magnetic tape in object code.

(5) Preparation and delivery of the program system documentation.

(6) Conduct of project reviews.

(7) Preparation of a program test plan.

(8) Conduct of preliminary acceptance testing.

(9) Conduct of final acceptance testing.

3.2 PHASE I TASKS

3.2.1 Project Plan

3.2.1.1 The contractor shall develop and deliver a project plan covering both phases of this procurement, in accordance with 3.4.1.

3.2.2 Program Flow Diagrams

3.2.2.1 The contractor shall develop program flow diagrams in accordance with the TDS Computer Programming Specification. These diagrams shall define the operational program routines necessary for the computer in the ATDS to meet the functional requirements of its associated equipment and intrasystem interface, as well as the requirements contained in the operational specifications for the computer program routines listed below:

<u>Routine</u>	<u>Attachment</u>
Tracking	A
Intercept Control	B
Threat Evaluation	C
Weapon Assignment	D
Link 11 (Data Link Communications)	E
Navigation	F
Display (Symbol and Alphanumeric)	G
Executive Control	H
Data Extraction	I
Diagnostic Test	J

3.2.3 Functional Descriptions of Logic Flow

3.2.3.1 The contract shall prepare and submit functional descriptions of logic flow to accompany each program flow diagram. These descriptions shall be prepared in accordance with the TDS Computer Programming Specification.

3.2.4 Project Reviews

3.2.4.1 The contractor shall conduct project reviews in accordance with 3.4.6.

3.2.5 Program Design Synthesis Demonstration Plan

3.2.5.1 The contractor shall prepare and submit a program design synthesis demonstration plan in accordance with 3.4.3.

3.2.6 Preliminary Design Reviews

3.2.6.1 The contractor shall conduct preliminary design reviews in accordance with 3.4.4.

3.2.7 Final Design Review

3.2.7.1 The contractor shall conduct a final design review in accordance with 3.4.5.

3.2.8 Design Approval

3.2.8.1 Design approval will be given by the designated representative of FCPC upon successful completion of the final design review.

NOTE

In the event that routines are available to satisfy certain of the computer program operational specifications, the following paragraph shall apply.

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3.2.9 Government Furnished Routines

3.2.9.1 The contractor shall incorporate the following routines presently existing in government inventory as part of the total operational system program:

3.2.9.2 The contractor shall develop program flow diagrams and functional descriptions of logic flow for these routines in accordance with this specification. Applicable program listings, card decks, and other available program documentation will be delivered to the contractor by the government at time of contract award.

3.3 PHASE II TASKS

3.3.1 Programs

3.3.1.1 Each of the operational program routines specified in 3.2 shall be incorporated into an overall program. Functional flow charts shall be developed from the program flow diagrams and functional descriptions of logic flow developed during Phase I. Source programs and object programs shall be provided and documented in accordance with the requirements of the TDS Computer Programming Specification. Source language shall be as specified in 3.3.10.

3.3.2 Test Routines

3.3.2.1 For each of the operational program routines required in 3.2, the contractor shall develop a test routine capable of testing the complete performance of each routine for which it was developed. Program flow diagrams, functional flow charts, source programs, and object programs shall be provided and documented in accordance with the requirements of the TDS Computer Programming Specification. Source language shall be as specified in 3.3.10.

3.3.3 Program Card Decks and Program Assembly Listings

3.3.3.1 Source and object program card decks (including comment cards for source programs) and assembly listings shall be provided for the final program and test routines in accordance with the requirements of the TDS Computer Programming Specification.

3.3.4 Magnetic Tape

3.3.4.1 Object programs for both the final program and the test routines shall be provided on a magnetic tape which meets the requirements of the equipment manuals and specifications. This tape shall be capable of being read directly into the memory of the L-304F computer via an IBM series 2400 magnetic tape unit or a tape unit of compatible type, as specified in the equipment manuals.

3.3.5 Program System Documentation

3.3.5.1 Documentation shall be provided in accordance with the Specification for Tactical Data System Computer Program Documentation as follows:

- (1) Command and Staff Manual - Appendix 1
- (2) System Plan Manual - Appendix 2
- (3) System Operational Manual - Appendix 3
- (4) System Program Design Manual - Appendix 4
- (5) System Program Assembly Listing Manual - Appendix 5
- (6) System Program Maintenance Manual - Appendix 6
- (7) System Programmer's Reference Manual - Appendix 7

3.3.6 Project Review

3.3.6.1 The contractor shall conduct project reviews in accordance with 3.4.6.

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3.3.7 Program Test Plan and Procedures

3.3.7.1 The contractor shall prepare a program test plan in accordance with 3.4.7.2, and program test procedures in accordance with 3.4.7.3.

3.3.8 Preliminary Acceptance Test

3.3.8.1 The contractor shall conduct preliminary acceptance tests in accordance with 3.4.7.4.

3.3.9 Final Acceptance Tests

3.3.9.1 The contractor shall conduct final acceptance tasks in accordance with 3.4.7.5.

3.3.10 Source Program Language.

3.3.10.1 The contractor shall prepare all source programs in L-304 assembly language.

3.4 GENERAL REQUIREMENTS

3.4.1 Project Plan

3.4.1.1 The contractor shall prepare a project plan which, within 30 days following contract award, shall be submitted to FCPC for approval.

3.4.1.2 The project plan shall be organized in a manner that will reflect full responsiveness to all the requirements of both phases of the contract. Hence, the elements of the project plan shall be the same as the elements of this specification, as amended by the contract or any detailed specification incorporated therein.

3.4.1.3 The project plan shall include:

(1) A brief description of the end items covered by the procurement specification.

(2) Details of the contractor's intended procedures, research activity and quality assurance program necessary to implement the requirements of the procurement specifications.

(3) A master schedule, showing proposed or estimated design review and project review dates, project milestones, end-item delivery dates, and report submission dates within the time frames established by the procurement contract.

(4) A PERT network and activity description chart consistent with the project plan.

3.4.1.4 The approved project plan shall be updated or reissued as necessary to reflect the current status of the project.

3.4.1.5 Revisions to the project plan which result from agreements at a project review shall be submitted to FCPC for approval within 30 days following the review.

3.4.1.6 Project plan revisions within the scope of the contract shall be implemented within the time periods agreed upon at the review meetings; revisions that are outside the scope of the contract will be made the subject of renegotiation.

3.4.2 Program Design Approach

3.4.2.1 The contractor shall prepare a formal document describing his program design approach which shall be submitted within 60 days following contract award. The presentation of this design approach shall be made at a design review within 15 working days of submittal of the report.

3.4.2.2 The program design approach shall present the contractor's approach for achieving the objectives of each operational program routine and test routine required by this specification and its

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associated documents. This description shall be of sufficient detail to establish the feasibility of the selected approach.

3.4.2.3 The contractor's description of his program design approach shall utilize the program flow diagrams and functional descriptions of logic flow and shall identify:

- (1) All inputs and outputs.
- (2) Computer constraints.
- (3) Associated equipment constraints.

3.4.3 Program Design Synthesis Demonstration Plan

3.4.3.1 The contractor shall develop a program design synthesis demonstration plan and submit it at least 30 days prior to the date of the final design review. This plan shall be developed to demonstrate that all of the individual program routines have been successfully integrated into a cohesive operational program.

3.4.3.2 FCPC will indicate approval or disapproval of the submitted plan at least 15 days in advance of the scheduled review.

3.4.4 Preliminary Design Reviews

3.4.4.1 Preliminary design reviews shall be conducted during Phase I to accomplish the following:

- (1) Review of the contractor's program design approach by FCPC representatives.
- (2) Definition of problem areas.
- (3) Assessment of progress relative to schedules.
- (4) Assignment of responsibility for changes, corrections, revisions, etc.

3.4.4.2 The contractor shall establish and conduct a formal program of planned, scheduled, and documented preliminary design reviews for the computer program routines called for in this specification. Such reviews shall be comprehensive, critical audits of all the pertinent aspects of the design.

3.4.4.3 The contractor shall conduct the preliminary design reviews at his facility except when otherwise indicated by FCPC. These reviews will be attended by cognizant FCPC representatives.

3.4.4.4 The contractor shall submit to FCPC a design review notice at least 15 days in advance of a preliminary design review. This notice shall contain the following information:

- (1) A list of the design aspects to be covered.
- (2) A schedule of individual presentation.
- (3) Date, time, and location of the proceedings.

3.4.4.5 Preliminary design review reports shall be submitted to FCPC within 15 working days after the review and will include the following information:

- (1) A resume of the review meeting.
- (2) A statement of the revisions, if any, required as a result of the review.
- (3) Time periods agreed upon for revisions to be accomplished.
- (4) List of attendees.
- (5) Pertinent comments.
- (6) Items agreed upon at the review.

3.4.5 Final Design Review

3.4.5.1 A final design review shall be initiated when the program flow diagrams and functional descriptions of logic flow for all of the program routines required by 3.2 have been completed and all have passed design reviews. At such time, the contractor shall present, for FCPC approval, all of the program routines indicated by the program flow diagrams.

3.4.5.2 The scheduling, notification, and conduct of the final design review shall be governed by the requirements of the preliminary design reviews.

3.4.5.3 The final design review shall include a demonstration of successful program design synthesis in accordance with the plan described in 3.4.3.

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3.4.5.4 The final design review report shall constitute the final report of Phase I, and shall be submitted to FCPC within 15 working days after the review. In addition to the information required in the preliminary design review report, the final program flow diagrams and functional descriptions of logic flow shall be included in a bound volume together with appropriate narrative material.

3.4.6 Project Review

3.4.6.1 The contractor and cognizant FCPC representatives, will jointly conduct reviews of the project, including preparation of the required documentation, to assess its progress and to determine the need for adjustments or changes. These reviews shall normally be scheduled by the contractor at major milestones in the program, at least quarterly, but no more frequently than monthly.

3.4.6.2 During Phase I, the project reviews may be held coincident with or satisfied by the design reviews.

3.4.6.3 FCPC reserves the right to request a project review whenever deemed necessary by its cognizant representatives.

3.4.6.4 Project review shall be documented by the contractor and the report submitted to FCPC within 15 working days following the review.

3.4.7 Program Test Requirements

3.4.7.1 The programs developed by the contractor shall be tested during Phase II to demonstrate to FCPC that the operational program routines under contract fully satisfy the requirements of their associated operational specifications. A program test plan shall be prepared, describing the conduct of the tests in two categories: preliminary acceptance tests and final acceptance tests. These tests will serve as a basis for acceptance or rejection of the program, in whole or in part.

3.4.7.2 Program Test Plan. A program test plan defining the overall conduct of preliminary acceptance and final acceptance tests shall be prepared by the contractor during Phase II. This test plan shall include a description of the method to be used in accomplishing the integration of program modules, a listing of the equipment necessary, input data, time required, and general criteria for determining the success of each portion of the test. Submission of this plan to FCPC in report form is required at least 90 days in advance of the scheduled tests. Approval or disapproval of the submitted plan will be indicated by FCPC within 30 days of receipt of the plan.

3.4.7.3 Program Test Procedures. Specific program test procedures shall be prepared to implement the plan described in 3.4.7.2. These test procedures shall include a detailed description of each step necessary for the conduct of the test. Specific operator actions and detailed success criteria shall be included. Submission to FCPC of a report including these procedures is required at least 60 days in advance of scheduled test. Approval or disapproval of the submitted procedures will be indicated by FCPC within 30 days of receipt of the procedures.

3.4.7.4 Preliminary Acceptance Tests. The contractor shall conduct preliminary acceptance tests to establish satisfactory performance of modular elements of the final program, and the successful integration of these elements. These tests shall be shown as milestones in the project plan (3.4.1) and shall be incorporated into project reviews (3.4.6). Results of preliminary acceptance tests shall be included in project review reports.

3.4.7.5 Final Acceptance Tests. Final acceptance tests shall be conducted on the final computer program after all modular elements of the program have been successfully integrated. This test shall be scheduled in the project plan (3.4.1). Final acceptance tests shall be conducted in two stages:

- Stage 1 - Laboratory Simulation Demonstration
- Stage 2 - Operational Demonstration.

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3.4.7.5.1 Stage 1 of the final acceptance tests will include a demonstration of the satisfactory performance of the program in an operational environment simulated in FCPC laboratory, or in another appropriately equipped laboratory designated by FCPC. A Stage 1 final acceptance test report shall be submitted within 15 working days after completion of Stage 1 testing. It shall contain documentation sufficiently comprehensive to establish that the tests were conducted in accordance with the test plan and procedures, and that the prescribed success criteria had been met. Approval or disapproval of the test report will be indicated by FCPC within 15 days of receipt of the test report.

3.4.7.5.2 Stage 2 of the final acceptance tests will include a demonstration of the satisfactory performance of the program in an actual operational environment under controlled test conditions approved by FCPC. These controlled conditions will be within the established operation capabilities of the system and will be executed by qualified personnel in a fully operational equipment installation. The Stage 2 final acceptance test report shall be submitted within 15 working days after the completion of Stage 2 testing. It shall contain documentation sufficiently comprehensive to establish that the tests were conducted in accordance with the test plan and procedures and that the prescribed success criteria had been met.

3.4.8 Project Status Reports

3.4.8.1 The contractor shall submit a monthly report of project status which shall include the following types of information:

- (1) Statement of project progress.
- (2) Specific achievements during the reporting period.
- (3) Description of problem areas, together with a statement of the corrective action being taken, or intended.
- (4) A summary of program documentation submittals for the reporting period.

(5) A summary of significant events and activities scheduled for the next reporting period.

(6) An accounting of manhour and dollar expenditures.

3.5 SUMMARY OF REPORT REQUIREMENTS

3.5.1 All of the tasks listed in 3.4 require the submission of reports as described therein. For convenience, all required reports are summarized in this section.

3.5.2 Project Plan Report

3.5.2.1 The project plan is to be submitted by a report within 30 days following contract award.

3.5.3 Program Design Approach Report

3.5.3.1 The contractor's program design approach is to be submitted by a report within 60 days following contract award.

3.5.4 Program Design Synthesis Demonstration Plan Report

3.5.4.1 The program design synthesis demonstration plan is to be submitted by a report at least 30 days prior to the date of the final design review.

3.5.5 Preliminary Design Review Notice and Report

3.5.5.1 The preliminary design review notice is to be submitted at least 15 days in advance of the design review.

3.5.5.2 The preliminary design review report is to be submitted within 15 working days after the design review.

3.5.6 Final Design Review Notice and Report

3.5.6.1 The final design review notice is to be submitted at least 15 days in advance of the final design review.

3.5.6.2 The final design review report is to be submitted within 15 working days after the final design review.

Appendix A

3.5.7 Project Review Report

3.5.7.1 Project review reports are to be submitted within 15 working days after the project review.

3.5.8 Program Test Reports

3.5.8.1 Program Test Plan Report. The program test plan is to be submitted by a report at least 90 days in advance of the scheduled tests.

3.5.8.2 Program Test Procedures Report. The Program test procedures are to be submitted by a report at least 60 days in advance of the scheduled tests.

3.5.8.3 Preliminary Acceptance Test Report. The reports of preliminary acceptance tests are to be included in project review reports.

3.5.8.4 Final Acceptance Test Reports

3.5.8.4.1 Stage 1 Final Acceptance Test Reports. The Stage 1 final acceptance test report is to be submitted within 15 working days after completion of Stage 2 testing.

3.5.8.4.2 Stage 2 Final Acceptance Test Report. The Stage 2 final acceptance test report is to be submitted within 15 working days after completion of Stage 2 testing.

4. QUALITY ASSURANCE PROVISIONS

4.1 QUALITY ASSURANCE SYSTEM

4.1.1 Contractor Responsibility

4.1.1.1 The contractor shall provide and maintain an effective quality assurance system for all computer programs and documentation items under contract. The contractor shall maintain, at his site, adequate facilities and the trained staff necessary to implement the quality assurance system. This system will be subject to periodic verification by FCPC.

4.1.2 Quality Assurance Plan

4.1.2.1 The contractor's plan for quality assurance of all computer programs and documentation shall be submitted to FCPC for approval as part of the project plan (3.4.1). Any changes to the approved quality assurance system must be approved in writing by FCPC prior to implementation by the contractor.

4.2 GOVERNMENT VERIFICATION

4.2.1 Sampling

4.2.1.1 To verify the adequacy of the contractor's quality assurance system, cognizant representatives of FCPC will make, during preliminary acceptance testing, a complete and detailed inspection of, or random sample of, each item deliverable under this procurement. Results of this random sample inspection will be used to determine whether significant errors can be presumed to exist in the remainder of the deliverable items. If significant errors are presumed to exist, all items may be returned to the contractor for recheck. Another random sample inspection will be performed on resubmittal.

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4.2.2 Correction of Deficiencies

4.2.2.1 Failure of the contractor to promptly correct deficiencies discovered by him, or of which he is notified, shall be cause for suspension of product acceptance until corrective action has been taken or until conformance of the product to the applicable criteria of the attached Operational Specifications has been demonstrated.

5. PREPARATION FOR DELIVERY

5.1 GENERAL REQUIREMENTS

5.1.1 Quantity

5.1.1.1 The number of copies of the programs and documentation (including changes, revisions, and supplements thereto) shall be as specified in the contract or order. Unless otherwise specified, the contractor shall be responsible for the distribution of all copies of the program and documentation procured on the contract. Distribution of changes, revisions, and supplements shall be made to all activities receiving the original documentation and in the same quantity for each, or as directed by FCPC.

5.1.2 Distribution

5.1.2.1 At least 30 days prior to anticipated shipping dates, the contractor shall request instructions from FCPC regarding the required distribution of copies of the programs and documentation.

5.1.3 Packaging and Marking

5.1.3.1 Classified Material. All classified material, including bulk shipments, shall be packaged and marked in accordance with the requirements of Form DD-441.

5.1.3.2 Packaging. All material shall be packed to preclude the possibility of damage in transit. Containers shall comply with the Uniform Freight Classification Rules or other carrier regulations as applicable to the mode of transportation.

5.1.3.3 Marking. Identification or publication numbers shall be indicated on the shipping papers accompanying each shipment. In addition, interior packages and exterior shipping containers shall be marked with the following information for each item enclosed:

(1) Box (number) or (number of boxes, on multiple container shipments).

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- (2) Identification number.
- (3) Quantity contained within the package.
- (4) Contract or order number.

The words "FOR STOCK" shall be marked on those packages destined for stock.

5.2 DETAILED REQUIREMENTS

5.2.1 Individual Copies of Manuals

5.2.1.1 Individual copies of multivolume manuals shall be packed and shipped as complete sets.

5.2.2 Bulk Shipments of Manuals

5.2.2.1 Manuals shipped in bulk shall not be individually wrapped. Stock copies of identical volumes of multivolume manuals shall be packed and bulk-shipped in common containers. Stock copies of all manuals having different publication numbers shall be packed separately.

5.2.3 Review Documents

5.2.3.1 Manuscript copies and other documents for review (including changes, revisions, and supplements thereto) shall be prepared for shipment in the same manner as for final documentation. In addition a self-addressed (to the contractor) postal card containing information similar to the following notice shall be enclosed with each document attached to the title page:

"IMPORTANT NOTICE: This is a review document for (insert nomenclature of system or equipment), publication (insert number). Return this card immediately indicating ship or shore activity and mailing address."

5.2.4 Artwork and Reproducible Copy

5.2.4.1 Test pages and artwork shall be arranged in groups according to size and shall be so packaged that all reproducible copy and artwork will lie flat and withstand rough handling.

5.2.5 Submittals for Record

5.2.5.1 When negatives are contractually required as submittals for record they shall be furnished as individual page negatives and shall be collated in numerical sequence by page number (except for foldouts). The page number and publication number shall be prominently marked on each negative in a consistent location. A slip sheet of manifold, tissue, or other suitable paper shall be inserted between negatives. Foldout negatives also shall be arranged in numerical sequence but packaged separately from the page-size negatives. Negatives shall be packed flat; rolled negatives are not acceptable. Prints shall be packaged so that the material will lie flat and withstand rough handling.

5.2.6 Program Card Decks

5.2.6.1 Individual copies of program card decks shall be packaged separately with appropriate identifying markings included in each package.

5.2.7 Program Tapes

5.2.7.1 Individual copies of program magnetic tapes shall be packaged separately in individual metal containers. Appropriate identifying markings shall be included in each package.

6. NOTES

6.1 INTENDED USE

6.1.1 The computer programs to be obtained under this specification are to operate together in a microelectronic general-purpose computer that will be adapted to the AN/ASA-27 Airborne Tactical Data System (ATDS) which was originally designed utilizing a special-purpose computer system of predominately wired logic and a drum memory. The microelectronic general-purpose computer will replace the entire memory drum and its associated computer logic sections.

6.1.2 System Environment

6.1.2.1 The ATDS, which includes the AN/ASA-27 Computer Indicator Group, is installed in the Grumman E-2A "Hawkeye" early-warning and tactical-control aircraft designed for operation from a U. S. Navy aircraft carrier, and provides a significant capability for achieving air defense of Naval task forces.

6.1.3 Primary System Functions

6.1.3.1 The primary function of the ATDS is to aid in accomplishing area surveillance, threat recognition and evaluation, appropriate defensive action, and communication of information to and from a control center. To this end it must be capable of detecting, automatically tracking, and recognizing a target; and by data-link communication, exercising control over interceptors and reporting the targets to other fleet units.

6.1.4 Operational Employment

6.1.4.1 The E-2A ATDS is designed to be employed operationally with the Naval Tactical Data System (NTDS) installed in certain surface ships, and with the Marine Tactical Data System (MTDS) designed as a shore-based tactical command and control system, or as an autonomous tracking and control system.

6.1.5 System Capabilities

6.1.5.1 From three console display panels in the E-2A aircraft, three operators execute the manual operation of the AN/ASA-27 Computer Indicator Group. The present special-purpose digital computer supplements and facilitates the manual functions of the operators in accepting and processing data from a search radar, navigation equipment, and communication data links. The ATDS equipment can track, record the history of, and automatically control many simultaneous intercepts. The retrofit general-purpose computer will enhance the operation of the ATDS by increasing the memory capacity, flexibility, and reliability over that of the drum memory system.

6.2 PROGRAM SCOPE

6.2.1 While detailed requirements of the program will be found in the operational specifications attached, and in the applicable documents referenced in Section 2, the contractor's attention is invited to the following described functions which the computer programs, to be procured under this contract, will be required to provide, and to the operator functions which the computer program will be required to support.

6.2.2 Computer Functions

6.2.2.1 The Computer Indicator (CI) Group, as part of the ATDS, processes data in performing and supporting the following functions:

- (1) Tracking. Automatic target acquisition, tracking, and identification.
- (2) Intercept Control. Computation of intercept geometry and command data required to direct the manned interceptors into engagements with selected targets.
- (3) Threat Evaluation. Evaluation of the threat of each target classified as a "hostile" or "unknown" to an established point to be defended.

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(4) Weapon Assignment. Permit operator controlled assignment of an interceptor to a target or to a marshalling point for future assignment; or, if desired, the weapon assignment routine will automatically evaluate all available interceptors for assignment to a target and will engage the one computed to be the most likely to make to interception.

(5) Data Link Communications Processing.

(a) Reporting target position and status to other air and surface units in the defense network.

(b) Transmitting command and control data to friendly aircraft assigned as interceptors.

(6) Navigation. Make necessary computations from input data to maintain accurate data on own aircraft's position.

(7) Display. Enable visual symbolic and alpha-numeric display of tactical information.

(8) Executive Control. Provide the timing and sequencing of each routine and for the interaction between routines.

(9) Data Extraction. Provide a routine that will dump selected portions of the computer memory during run time and that will output these portions of memory to either a printer, magnetic tape unit, or to visual display equipment.

(10) System Diagnostic. Enable the computer to monitor and report its own operating condition.

6.2.3 Operator Functions

6.2.3.1 Operators are provided with visual displays which enable them to perform the following functions:

(1) Set up equipment in preparation for general or specific modes of operation.

(2) Monitor the automatic detection, acquisition and tracking of targets.

(3) Manual detection, acquisition, and tracking of targets in geographical regions or sectors for which the automatic computer computations have been intentionally inhibited.

(4) Target classification.

(5) Monitor automatic identification of targets.

(6) Manual identification of target.

(7) Manual designation of hostile targets.

(8) Monitor automatic threat evaluation.

(9) Manual threat evaluation.

(10) Monitor automatic interceptor control.

(11) Manual interceptor control.

(12) Manual entering of geographical positions:

(a) Barrier reference point

(b) Defended point

(c) Data-link reference point

(d) Interceptor waypoint

(13) Manual instructions to initiate or to discontinue automatic reporting on a given target.

(14) Manual assignment of target track numbers.

(15) Establishment of incoming or outgoing data-link reports.

(16) Correlation of targets reported over data line with targets tracked by own aircraft's sensor equipment.

(17) Initiation of a handover of control of an interceptor to another ATDS equipped aircraft, an NTDS ship, or an established MTDS.

(18) In-flight computer performance monitoring and fault isolation.

(19) Manual operation in degraded mode in the event of equipment failure.

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6.3 SPECIAL REQUIREMENTS

6.3.1 Modification of Flight Test Requirements

6.3.1.1 Requirements for aircraft and other Government facilities which are necessary to the fulfillment of final acceptance testing (3.4.7.5) shall be made the subject of a special letter requesting that these be provided. This letter shall be submitted at least 6 months prior to the start of final acceptance testing.

6.3.2 Required Availability of Government
Furnished Equipment

6.3.2.1 All Government-furnished equipment or facilities required (except that discussed in 6.3.1) shall be specified by a special letter request no later than 30 days after contract award.