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RADAR TRAINING FACILITY PROGRAM IMPLEMENTATION PLAN

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U.S. DEPARTMENT OF TRANSPORTATION
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Systems Research & Development Service
Washington, D.C. 20590

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16. Abstract

This document presents information to be utilized for program guidance and management direction during the development and implementation phases of the Federal Aviation Administration's Radar Training Facility (RTF). The RTF is to be installed at the Aeronautical Center as an element of the FAA Academy for academy level radar training and effective evaluation of developmental terminal and en route Air Traffic Control Specialists.

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METRIC CONVERSION FACTORS

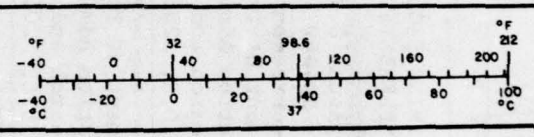
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.96	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



FOREWORD

1. PURPOSE. This Program Implementation Plan (PIP) presents information to be used for guidance and management direction for the development and implementation of the Radar Training Facility (RTF). The RTF is to be installed at the Aeronautical Center (AAC) for academy level training and objective evaluation of developmental terminal and en route air traffic control specialists.

2. COORDINATION. This document was developed with the assistance of AAC and Office of Personnel and Training (APT). Formal coordination on the final draft copy was received from the appropriate Washington Headquarters staff offices, AAC and NAFEC. The comments received during the coordination process have been incorporated. The publication of this PIP in FAA Order format has been approved by the Office of Management Systems (AMS-1).

3. DISTRIBUTION. This publication is distributed to the branch level in the Systems Research and Development Service and the Office of Personnel and Training and to the division level of Air Traffic Service, Airway Facilities Services, Office of Aviation Medicine, Office of Budget, Office of Labor Relations, Office of Investigations and Security, and Logistics Service in Washington headquarters; to branch level at AAC; to division level of the Regions and the National Aviation Facilities Experimental Center (NAFEC).

4. ACTION. The headquarters offices listed herein and AAC are responsible for the major roles for the RTF acquisiton and implementation, with the National Aviation Facilities Experimental Center (NAFEC) having a supporting role in specially defined areas where expertise exists. The Regions are to stay abreast of the program so as to plan and schedule their training requirements to take into consideration the improved training provided through the RTF. The schedules included in Appendix 1 are to be carefully followed and the RTF Program Manager is to be notified if a responsible organization cannot meet a scheduled date(s). While this PIP provides program guidance and management direction, it is not intended to provide the detailed information for many of the contract management and implementation activities. The more detailed planning and the day-to-day actions required by the headquarters staff and AAC are to be accomplished within the guidance framework and schedules contained herein.

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CHAPTER 1. GENERAL PROGRAM SUMMARY

1. PURPOSE. This Program Implementation Plan (PIP) provides guidance and management direction for the development and implementation of the Radar Training Facility (RTF) for the training and objective evaluation of developmental air traffic control specialists. It provides the program and planning information and management direction for the orderly development and incorporation of the RTF into the Federal Aviation Administration (FAA) National Airspace System (NAS) training programs. It identifies the many tasks to be accomplished, assigns responsibilities and provides schedule information for development and implementation. This document supplements contractual information in the area of program management which relates to both contractor and FAA activities. This information is available as guidance to the contractor supporting the RTF during the system development and implementation. The schedule information, included in Appendix 1, is organized so that it can be updated without making changes to the main body of this document.

2. BACKGROUND. During January 1975, the Institute for Defense Analysis (IDA) completed a study of Air Traffic Controller training. The study examined such things as location of training, duration of individual segments of training and use of consequence free training devices. The findings contained in the final report indicated that the most efficient and effective method of providing basic controller training would be the establishment of an Air Traffic Control (ATC) Radar Training Facility at the FAA Academy and the application of pass/fail criteria (screening) early in the developmental controller's career. These findings were based on hiring rate forecasts for new controllers over the next few years of between 1,400 and 2,000 personnel annually. In recent years, the attrition rate has been 23 percent of new controllers hired with the cost of training each controller estimated to be between $24,000 and $30,000. Most significantly, the IDA findings concluded that the RTF capability requirement will be clearly cost beneficial as a training device to thereby permit the most effective use of personnel.

3. APPROVAL FOR THE RTF. On July 10, 1976, the Administrator approved the procurement and implementation of the RTF for the FAA. The system is to be installed at the FAA Academy of the Aeronautical Center (AAC) located at Oklahoma City. The AAC will provide the building space and the system environmental requirements. The operational RTF will provide the Academy with a greatly improved capability for the training and evaluation of both en route and terminal ATC specialists as it will closely simulate actual air traffic conditions for the en route and terminal control of traffic.

4. PROCUREMENT PHASES OF THE RTF. The procurement of the RTF will be accomplished in two phases. Phase I will include the design, fabrication, test and installation of a baseline training facility consisting of the basic functions necessary to provide a serviceable system in the shortest time frame. Phase II will consist of enhancements (add-on) features to extend the training capabilities of the baseline system in the areas of controller performance measures, interactive scenario preparation and data reduction and analysis (DR&A). Efforts under Phase II will not commence until after completion of Phase I, i.e., the acceptance and operational use of the basic system for training at the AAC.

5. PROCUREMENT APPROACH. The functional and performance requirements for the RTF permit its design and production to stay well within the state-of-the-art. It is expected that largely off-the-shelf equipment will be used. In this connection, the FAA is providing government furnished equipment (GFE) to the contractor for the controller displays (en route and terminal), flight strip printers and associated hardware for system development at the factory and for system installation at the AAC. These equipments are identical to those used for actual en route and terminal ATC, thus it provides a high degree of likeness between the training and actual operational equipment. The contractor has the responsibility for the interfacing of the GFE and the other equipment through providing the necessary hardware, communications and software interfaces. The contractor is given full responsibility for the development, production, integration, installation and testing of the system.

6. PROGRAM MANAGEMENT ORGANIZATION AND AUTHORITY. This PIP is the principal authoritative document for the program management during the acquisition and implementation of the RTF. The following subparagraphs assign the principal program management authority and identify the organizations which are to provide program management assistance and other support. Chapter 2, Program Management, defines the detailed RTF program responsibilities of all participating organizations.

   a. Program Manager Assignment. The Systems Research and Development Service (ARD) is assigned overall RTF program management responsibility. On August 6, 1976, Associate Administrator for Engineering

and Development (AED-1) letter, subject: "Program Management Structure for Radar Training Facility Development", assigned program management responsibility to ARD for the development and implementation of the RTF and included the authority of the appointed Program Manager as follows:

> "The Program Manager is delegated the authority to: direct the development and implementation activities, coordinate all contractual actions with the Airway Facilities Service, the Aeronautical Center, and Logistics Service, convene and chair meetings of the Program Management Staff; and provide regular progress reports to management. An early initial task will be the preparation of a System Program Plan which will identify in one document the many different tasks required to implement the Radar Training Facility, and the functional responsibilities of the related organization elements."

FAA Order 1320.1B dated March 28, 1977 eliminates the System Program Plan from the directives system. This PIP fulfills the AED-1 requirement for an RTF System Program Plan.

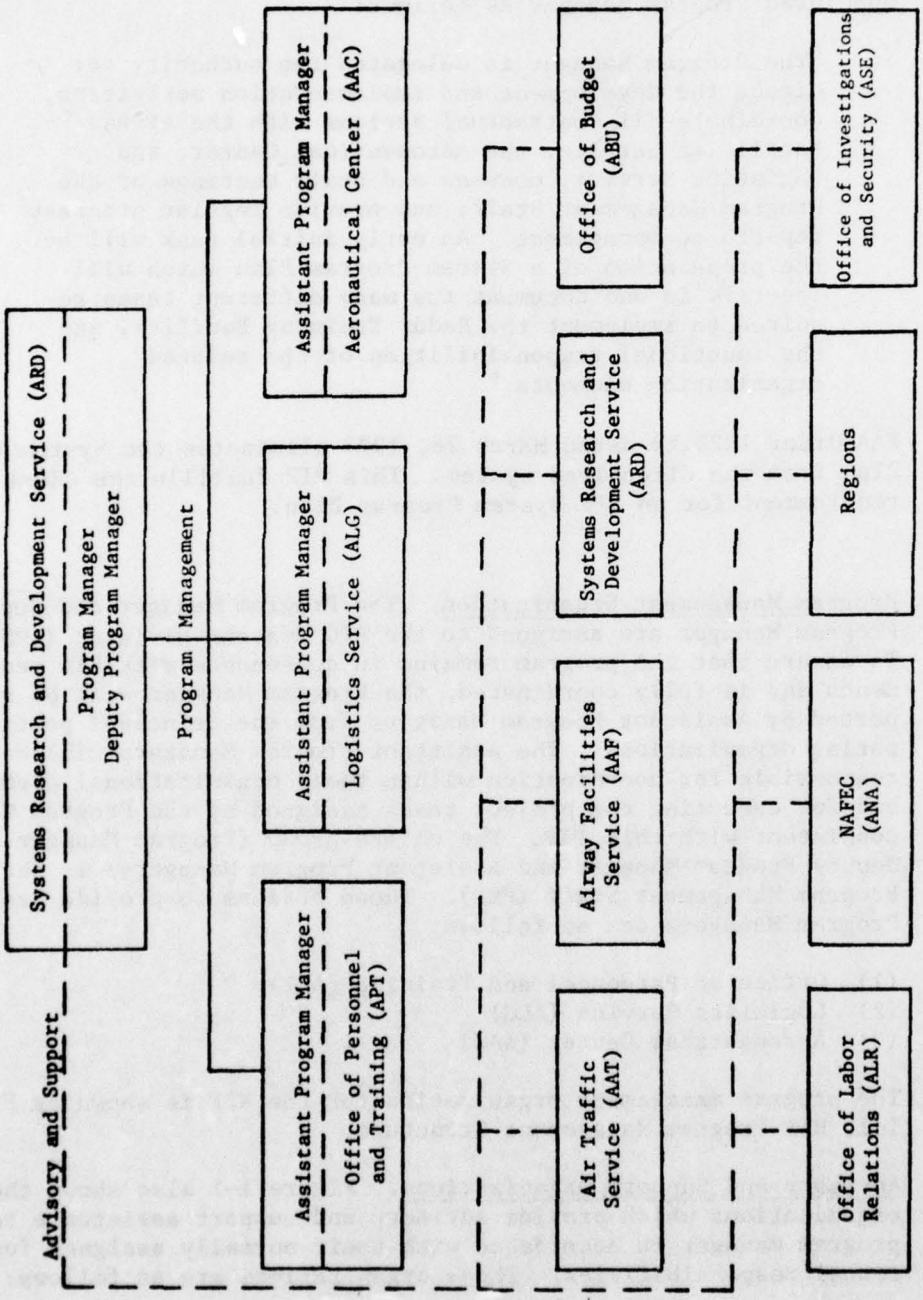
b. Program Management Organization. The Program Manager and Deputy Program Manager are assigned to the ATC Systems Division (ARD-100). To ensure that the program remains in consonance with FAA requirements and is fully coordinated, the Program Manager will be supported by Assistant Program Managers from the principal participating organizations. The Assistant Program Managers will be responsible for coordination within their organizational elements and for executing the project tasks assigned by the Program Manager, consistent with this PIP. The entire group (Program Manager, Deputy Program Manager and Assistant Program Managers) is the Program Management Staff (PMS). Those offices to provide Assistant Program Managers are as follows:

(1) Office of Personnel and Training (APT)
(2) Logistics Service (ALG)
(3) Aeronautical Center (AAC)

The program management organization for the RTF is shown as Figure 1-1, RTF Program Management Structure.

c. Advisory and Support Organizations. Figure 1-1 also shows those organizations which provide advisory and support assistance to the program manager in accordance with their normally assigned functional responsibilities. These organizations are as follows:

FIGURE 1-1. RTF PROGRAM MANAGEMENT STRUCTURE



(1) Air Traffic Service (AAT)
(2) Airway Facilities Service (AAF)
(3) Systems Research and Development Service (ARD)
(4) Office of Budget (ABU)
(5) Office of Labor Relations (ALR)
(6) Office of Investigations and Security (ASE)
(7) National Aviation Facilities Experimental Center (ANA)
(8) Regions

7. SYSTEM FUNDING. The funds for this procurement are included in the Facility and Equipment (F&E) FY-1977 Congressional Budget submission.

8. SECURITY REQUIREMENTS. The RTF is not a classified project. Its procurement does not require access to classified information by contractor employees. The contract is not to be considered a CLASSIFIED contract within the meaning of Handbook 1600.2A, Classification, Reclassification and Control of National Security Information, dated February 13, 1973. Physical security and computer security systems for the RTF will be provided to insure: protection against unauthorized persons having entry or access to any part of the RTF system, including access to student and other physical records as well as the processing system; protection against the elements of weather, electro-magnetic interferences and other phenomena.

9. PIP MAINTENANCE PROCEDURES. ARD has overall responsibility for maintaining and updating this PIP. ARD-100 has been delegated the responsibility for conducting and coordinating staff actions for updating this document. When organizations within the FAA have recommended changes, they are to advise ARD-100, attention RTF Program Manager, in writing through appropriate channels. Follow-on actions and coordination are to be completed by the Program Manager and if approved, the changes are to be reflected in the next update of the PIP. Where a change involves only Appendix information, e.g., schedules, only the appropriate appendix will be updated and distributed.

10. - 20. RESERVED.

CHAPTER 2. PROGRAM MANAGEMENT

21. PROGRAM DIRECTION. This chapter of the PIP defines the detailed responsibilities of the various FAA organizations and participants during all phases of the acquisition and implementation of the RTF. It defines the responsibilities of the principal program management organization, ARD, and the participating organizations at the FAA Headquarters, AAC, NAFEC/ANA, committees, boards and special groups, and contractors. The FAA documents (latest edition) which define management responsibilities are:

a. Handbook 1100.1, FAA Organization - Policies and Standards.

b. Handbook 1100.2, FAA Organization - FAA Headquarters.

c. Handbook 1100.5, FAA Organization - Field.

d. Order 1100.121, Management of Air Traffic Control Automation Systems.

e. Order 1100.127, Airway Facilities Sector Configuration.

f. Order 1100.134, Maintenance of National Airspace System Automation Subsystems.

g. Order 1100.139 Air Traffic and Airway Facilities Responsibilities at NAS Computer-Equipped Terminal Facilities.

h. Order 1350.22, Protecting Privacy of Information about Individuals.

i. Order 1600.1, Personnel Security Program.

j. Order 1600.6, Protection of Agency Property.

k. Order 1600.24, Use of Recording or Monitoring Equipment and Practices.

l. Order 1600.54, Security of FAA Automatic Data Processing Systems and Facilities.

m. Handbook 1800.1, National Airspace System Management.

n. Order SM 1800.8, System Maintenance Service Planning, Programming, and Budgeting Procedures.

o. Order 1800.8, National Airspace System Configuration Management.

p. Order 1800.30, Development of Logistic Support for FAA Facilities and Equipment.

q. Order 6000.10, Definition of the Terminal Automation Program.

22. PARTICIPATING ORGANIZATIONS. For the ARD to accomplish its assigned mission, coordination must be effected with all offices, services, AAC, NAFEC/ANA, regions and other organizations that have responsibilities in the acquisition and implementation of the RTF. The functions and responsibilities enumerated below must be accomplished (as a minimum) to ensure the timely completion of all actions that make up the complete program.

a. Systems Research and Development Service (ARD).

(1) Provides the Program Manager.

(2) Provides program guidance to all offices, services, AAC, NAFEC/ANA and regions for the development, acquisition and implementation activities.

(3) Organizes and acts as chairman for the proposal (technical) evaluation team, develops evaluation criteria to select the required contractor support and supports ALG in contract negotiations for the acquisition and implementation of the RTF.

(4) Convenes meetings and acts as chairman for the PMS and special working groups and boards established for supporting the RTF acquisition activities.

(5) Provides support during the preparation of functional specifications, conducts design reviews and provides consulting services.

(6) Maintains the currency of the PIP and prepares, analyzes and distributes planning and scheduling information to all interested organizations; establishes systems for feedback information for assisting in the management of the program.

(7) Ensures the baseline configuration for all hardware and software items that make up the RTF and provides suitable documentation to AAC and the NAS Documentation Facility upon transition and turnover of the system to the AAC. (The Program Manager approves all contractor developed documentation with the review assistance from ARD-140, AAF, AAT, APT, ALG, NAFEC/ANA and the AAC, as appropriate.)

(8) Provides site preparation standards and requirements (e.g., power, air conditioning and equipment space requirements) to the AAC for the installation of the RTF.

(9) Arranges for FAA staff and RTF contractor support to AAC for the architectural design engineering for the training facility.

(10) Responsible for system testing for factory acceptance and for site testing culminating in an operational readiness demonstration prior to final acceptance and turnover of the RTF to the AAC.

(11) Identifies requirements and resources necessary to support the testing efforts.

(12) Applies or reapplies, in conjunction with ABU, funds identified as direct costs in accordance with established budgetary procedures.

(13) Monitors and is responsible for the technical performance of contractors, with assistance from the AAC in the design, development, production, testing, installation and integration of hardware and software for the RTF.

(14) Provides the principal plant representation for the FAA (Technical Officers) on the RTF contract as outlined in the Contracting Officer's letter of designation.

(15) Approves the software maintenance concept developed by the AAC.

(16) Ensures that logistic support requirements, in coordination with AAF, ALG and the AAC, are planned, funded and delivered in time to permit effective operational use of the RTF.

(17) Provides guidance and assistance to AAC to establish personnel (positions and skills) and training requirements for the operation and maintenance of the RTF system.

(18) Develops RTF acceptance criteria, with support from ALG, AAC and NAFEC/ANA, in accordance with contractual requirements. This includes acceptance of the documentation associated with the RTF.

(19) Reviews and records recommendations for system changes and enhancements which may be made during production and implementation; determines the phasing for incorporating approved changes/enhancements into the RTF.

(20) Receives and evaluates advice from the research and development elements of ARD on future developments as they may impact the RTF development activities.

(21) Develops, with assistance from the AAC, the Joint Acceptance Inspection (JAI) procedures.

b. Office of Personnel and Training (APT).

(1) Provides an Assistant Program Manager for the PMS.

(2) Provides membership to special committees, groups and teams as may be necessary for support of the RTF program.

(3) Reviews and approves training plans which reflect the training requirement for the RTF.

(4) Establishes guidelines and standards for the classification of positions and selection of employees for staffing the RTF.

(5) Reviews and coordinates personnel requirements for the RTF positions.

(6) Advises and assists the AAC for the timely recruitment of RTF personnel.

(7) Defines and delimits identified personnel problems and provides guidance for their resolution.

(8) Analyzes training requirements and programs developed by the AAC for the training of RTF hardware and software maintenance personnel, system instructors and operators; makes recommendations for approval of contractor provided training programs to the RTF Program Manager.

(9) Assigns training responsibilities for implementation of approved training programs for the training use and operation of the RTF.

(10) Reviews and approves, in coordination with the Program Manager and AAT, the Academy developed RTF controller training curriculums and RTF training procedures.

(11) Instructs and advises the regions on the RTF training programs, schedules and assignments.

(12) Provides inputs to the PIP and responds to planning activities contained therein that apply to APT.

c. Logistics Service (ALG).

(1) Provides an Assistant Program Manager for procurement activities.

(2) Provides all necessary procurement actions and enters into contract(s) between FAA and contractor(s) for RTF and related items (this does not include items to be procured by AAC in accordance with FAA Order 4650.16A, which covers procurement responsibilities).

(3) Provides contract administration at FAA Headquarters and inplant.

(4) Provides assistance when requested for conducting factory acceptance testing.

(5) Provides industrial engineering support and production surveillance of program management and contract administration.

(6) Provides guidance as requested to the AAC for appropriate RTF property controls and records maintenance.

(7) Determines adequacy of contractor's quality and reliability programs and inspection systems; furnishes quality/reliability assistance for inplant quality and reliability assurance.

(8) Provides inputs to the PIP and acquisition paper; carries out assigned tasks.

(9) Provides membership, as required, to committees, groups and boards established in support of the RTF.

d. Airway Facilities Service (AAF).

(1) Procures and provides GFE to the AAC and the RTF contractor as required by the RTF requirements document.

(2) Provides membership to special committees, groups and teams as may be necessary.

(3) Provides appropriate inputs to the RTF PIP and responds to activities contained therein which pertain to logistical support.

(4) Supports RTF system design and hardware maintenance documentation reviews and acceptance testing activities.

e. Air Traffic Service (AAT).

(1) Provides technical and other support, as operational advisor to the Program Manager, to ensure the training requirements for air traffic controllers are met with the RTF system.

(2) Provides support to acceptance testing activities.

(3) Reviews and coordinates training plans, programs, curricula, procedures, standards and other training related material to insure the training requirements are met for air traffic controllers.

(4) Provides membership to special committees, groups and teams as may be necessary.

(5) Provides appropriate inputs for the RTF PIP and responds to activities contained therein which pertain to AAT areas of responsibility.

(6) Establishes interface ccordination procedures to insure that the RTF reflects similar functional processing as provided in the NAS automation.

(7) Supports software documentation reviews for assurance that functional training requirements are met.

f. Office of Budget (ABU).

(1) Provides for the actions to acquire funds for the acquisition and implementation of the RTF.

g. Office of Labor Relations (ALR).

(1) Reviews training standards and trainee performance requirements to insure they conform with FAA labor relations policies and agreements.

h. Office of Investigations and Security (ASE).

(1) Provides policy guidance and assistance to the Program Manager on matters pertaining to the security of the RTF and the computer system used to support RTF training activities.

(2) Reviews contractor design specifications to assure that adequate security controls are incorporated into RTF system software and hardware.

(3) Reviews the safeguard section of any Privacy Act notifications that may be prepared as a result of program implementation.

i. Aeronautical Center (AAC).

(1) Provides all logistic support services for the RTF operation.

(2) Develops staffing and training plans and insures support for the RTF implementation, operation and maintenance.

(3) Accomplishes cataloging and provisioning for the RTF.

(4) Provides supplies and working equipment not provided under the RTF contract or being procured by Washington Headquarters Procurement Office in accordance with FAA Order 4650.16A.

(5) Provides Assistant Technical Officer(s) to report to the ARD Technical Officer for technical inplant contractor monitoring for the RTF; responsibilities of the Technical Officer and Assistant Technical Officer(s) shall be as outlined in the Contracting Officer's letter of designation.

(6) Provides technical support for system tests conducted at the factory.

(7) Implements the RTF program at the AAC.

(8) Completes the RTF building annex architectural engineering and coordinates the construction and preparation of the facility to house the RTF system.

(9) Develops detailed RTF Transition and Utilization Plan, to be provided in accordance with the schedule in Appendix 1.

(10) Develops the RTF hardware and software maintenance policies and procedures.

(11) Conducts provisioning conferences for the RTF and provides recommendations to the Program Manager for provisioning.

(12) Accomplishes acceptance of items delivered to the AAC under the RTF contract.

(13) Provides for technical monitoring of onsite (AAC) activities performed under the RTF contract.

(14) Participates in reviews (e.g., design, progress, test) during the production and testing of the RTF and supports the Program Manager in the review of RTF documentation for its adequacy and correctness.

(15) Supports APT in the development of overall training plans for the RTF.

(16) Develops training curricula and procedures for the use of the RTF for the training of air traffic controllers; conducts the training.

(17) Develops RTF instructor, operator and equipment maintenance personnel requirements and submits them through budgetary channels for review and approval.

(18) Develops estimates for facility preparation and logistical support and submits them to the RTF Program Manager.

(19) Develops, in coordination with the Program Manager, the RTF System Shakedown Plan and Procedures.

(20) Supports the Program Manager in the development of the JAI procedures and criteria.

(21) Establishes financial and item management control and accountability for all FAA property received at the AAC.

(22) Provides an Assistant Program Manager for RTF program activities.

(23) Provides membership to special groups, committees and boards as may be required for the RTF.

(24) Provides an organizational interface with AAT and AAF to stay abreast of changes which may occur in the NAS automation.

(25) Provides inputs for the PIP and carries out assigned tasks defined within the PIP for the RTF.

(26) Acts as the principal staff to the Program Manager for conducting evaluations and design reviews to ensure that functional requirements (including controller performance measurements considerations) are met and for assessing the RTF maintainability and reliability.

(27) Identifies personnel requirements for and continues conducting ongoing research on the development of optimum measures of trainee performance and on optimum methods of using the RTF for training.

(28) Maintains the central library for software and hardware documentation; provides the NAS Documentation Facility with copies of the documentation and updates.

(29) Maintains the RTF hardware and software after acceptance.

(30) Develops and implements appropriate physical security controls for the protection of the RTF and its contents.

j. National Aviation Facilities Experimental Center (NAFEC/ANA).

(1) Provides technical support, as required, during the design and implementation phases of the program.

(2) Provides membership to groups, committees and boards, as may be required.

(3) Supports software documentation reviews and acceptance testing activities as requested.

(4) Maintains the library copy(ies) of the referenced applicable documentation in accordance with FAA Order 1750.6, NAS Documentation Facility.

(5) Provides controller performance measurement criteria as requested by the Program Manager.

(6) Provides any development testing and analysis specified in support of the development of the RTF on a task basis.

(7) Provides support as may be required on current software as used in the System Support Facility (SSF) and Terminal Automation Test Facility (TATF).

(8) Provides support, as requested, on Digital Simulation Facility (DSF) software and functions as may be applied to the RTF.

k. Regions.

(1) Stays abreast of RTF plans, programs and schedules to plan their overall training activities.

l. Contractors. Each contractual relationship is to specifically establish the responsibility of the contractor and is not to detract from or compromise the FAA overall management responsibilities.

m. Boards, Groups and Committees. The Program Manager may appoint boards, groups or committees to assist in the review of special areas and problems and to make recommendations for management actions. A board to become active early in the program is the Selection Evaluation Board (SEB) which will be established in accordance with DOT Order 4200.11, Source Selection. Although the ACC provides staff support to the Program Manager for developing contractor selection criteria and evaluating contractor proposals, the SEB will conduct reviews of the selection criteria and contractor proposals and provide the basis for contractor selection.

23. CONFIGURATION MANAGEMENT. The configuration management procedures for the RTF hardware and software will be implemented within the broad framework of the FAA procedures which exist for NAS En Route Stage A and Automated Radar Terminal System (ARTS) III. These procedures are identified in FAA Order 1800.8D, National Airspace System Configuration Management. However, variations from the existing procedures are anticipated because of the uniqueness of the RTF. It is a one-of-a-kind system at the AAC for the training of air traffic controllers. Although it simulates actual operational conditions for ATC, the RTF hardware and software differs from the NAS. Changes to NAS may or may not have substantial impacts on the RTF. Each NAS change proposal (NCP) will be evaluated to determine the impact on the RTF.

a. Configuration Control. The utilization of the configuration management process and functions for the RTF program management are required during the life cycle of the system. In accordance with FAA Order 1800.8D, the System Research and Development Service has primary responsibility for configuration management during production and testing of the system and this responsibility transitions to the Chief of the Aeronautical Center at the completion of Phase II and system acceptance at the AAC facility.

(1) Configuration Control During Production and Testing.

The Director of the Systems Research and Development Service is the Configuration Manager of the RTF system during its development, production and testing phases. The RTF Engineering Requirement (ER-D-150-004) serves as the principal document for baselining and configuration controlling the system during these phases. It is planned that the ER will be baselined at the time the FAA approves the contractor's RTF Design Data and his System Functional Specifications. This follows the completion of the FAA's critical design review. With the baselining of the ER, the procedures outlined by FAA Order 1800.8D will apply, i.e., the contractor as well as the FAA must use the 1800.8D procedures for recommending design and functional changes to the system. The processing of NAS Change Proposals (NCP) and the Configuration Control Decision (CCD) documents will follow 1800.8D procedures. It is recognized, however, that the contractor requires configuration control procedures for his internal configuration management. These procedures are reviewed and approved by the FAA and are useful to the FAA inplant team for the technical management and monitoring of the contractor's work.

(2) Configuration Control After System Acceptance. The Director of AAC is delegated Configuration Management responsibility at the completion of Phase II. He may redelegate (appoint) the Configuration Manager authority to a responsible individual within the AAC organization who has responsibility for the RTF system. The Director, however, reviews any controversial and/or major configuration control actions prior to their approval. The Director develops an AAC Order which defines the local authority for configuration management, assigns responsibilities and outlines the configuration management procedures to be used. The AAC procedures, however, operate within those defined in FAA Order 1800.8D, i.e., the FAA NCP and CCD forms are used locally, and the CCDs are coordinated in the FAA Washington Headquarters before implementation.

b. Impacts of NAS Changes on the RTF. Each NCP and CCD which apply to only the RTF will be processed within the FAA Order 1800.8D procedures during production and within AAC procedures after Phase II system implementation. The NCPs which are processed for NAS (En Route Stage A and ARTS III) will be routed to the RTF Program Manager for review and comments concerning impacts they may have on the RTF and for recommendations whether or not changes need to be made to the RTF. If changes are indicated, the Program Manager initiates the necessary NCP's which are processed within FAA Order 1800.8D for approval to make changes to the RTF system during its production. Changes should be avoided, however, after the RTF system is baselined and during its production and testing so as not to cause implementation delays and adversely impact quality assurance. The needed changes, however, should be recorded and they may then be implemented during Phase II of the RTF system. Similar procedures will be followed after the RTF acceptance at the AAC. The AAC reviews the En Route and ARTS III NCP's for RTF impact. If changes to the RTF are indicated from the CCD's which result for NAS, the AAC configuration management procedures are applied for system change approvals.

c. Hardware Configuration Management After System Acceptance. Site support for hardware problems is provided by AAF-600 for NAS equipment. The AAC submits hardware discrepancy reports (HDR) to AAF-640 for the RTF GFE where support is required. The HDR system will also be used by the AAC for locally correcting deficiencies to the equipment. All changes made to the RTF hardware (GFE and RTF peculiar) are accomplished through the AAC configuration management procedures. The AAC maintains hardware documentation for the RTF.

d. Software Configuration Management After System Acceptance. Software refers to the operational, nonoperational support and maintenance diagnostic computer programs delivered at system acceptance at the AAC. The AAC is assigned responsibility for the maintenance of the software after system acceptance. The submission of software program trouble reports (PTR) to AAT-500 and AAF-600 organizations is not required unless special support is needed. The PTR system will be used locally at the AAC for the logging and correction of software problems. All software changes (improvements, functional enhancements, etc.) will be accomplished through the AAC configuration management procedures. The AAC maintains the software documentation.

24. QUALITY ASSURANCE MANAGEMENT.

a. During Production. The contractor establishes a quality control (QC) program to insure that the required quality of the software, hardware and interfaces are met and that the RTF system meets functional, performance, design and maintainability requirements. The contractor QC program and procedures are reviewed by ALG, with support from the Program Manager, AAC and NAFEC to insure that the

program meets the requirements of FAA-STD-013 and Section 4 of FAA-ER-650-021. The contractor implementation of the QC program will periodically be reviewed by the Technical Officer/Assistant Technical Officer and ALG during development and production of the RTF to insure conformance to the FAA standards and the engineering requirements. In addition, QC considerations will be principal items of review during formal and informal reviews of the RTF development and during testing. Inspections may be made of equipment components and materials used in the production of the equipment to insure compliance with the specifications covering procurement.

b. During Operational Life. Quality control of the RTF continues during its operational life. The AAC assumes responsibility to apply established FAA QC standards and procedures for both hardware and software for the operational system.

25. - 30. RESERVED.

CHAPTER 3. SYSTEM FUNCTIONS

31. REQUIREMENT FOR THE RTF. The complexity and criticality of the operating functions of the air traffic controller indicate a requirement for the simulation RTF system to represent the functional and operational aspects of NAS En Route Stage A and the ARTS III. The RTF will provide the Academy with an improved capability for providing developmental (basic) training to both en route and terminal air traffic control specialists (ATCS). The system provides consequence-free ATC simulation training which is not available at the ATC facilities. It will also provide information about each student to assist in the early evaluation of proficiency, skill level and developmental progress. An overview of the system functions is presented in this chapter.

32. RTF POSITIONS AND STATIONS. There are several positions and stations provided by the RTF for the conduct and supervision of student training. These are described below under two main categories:

a. Trainee Positions
b. Supervisory and Support Positions/Stations

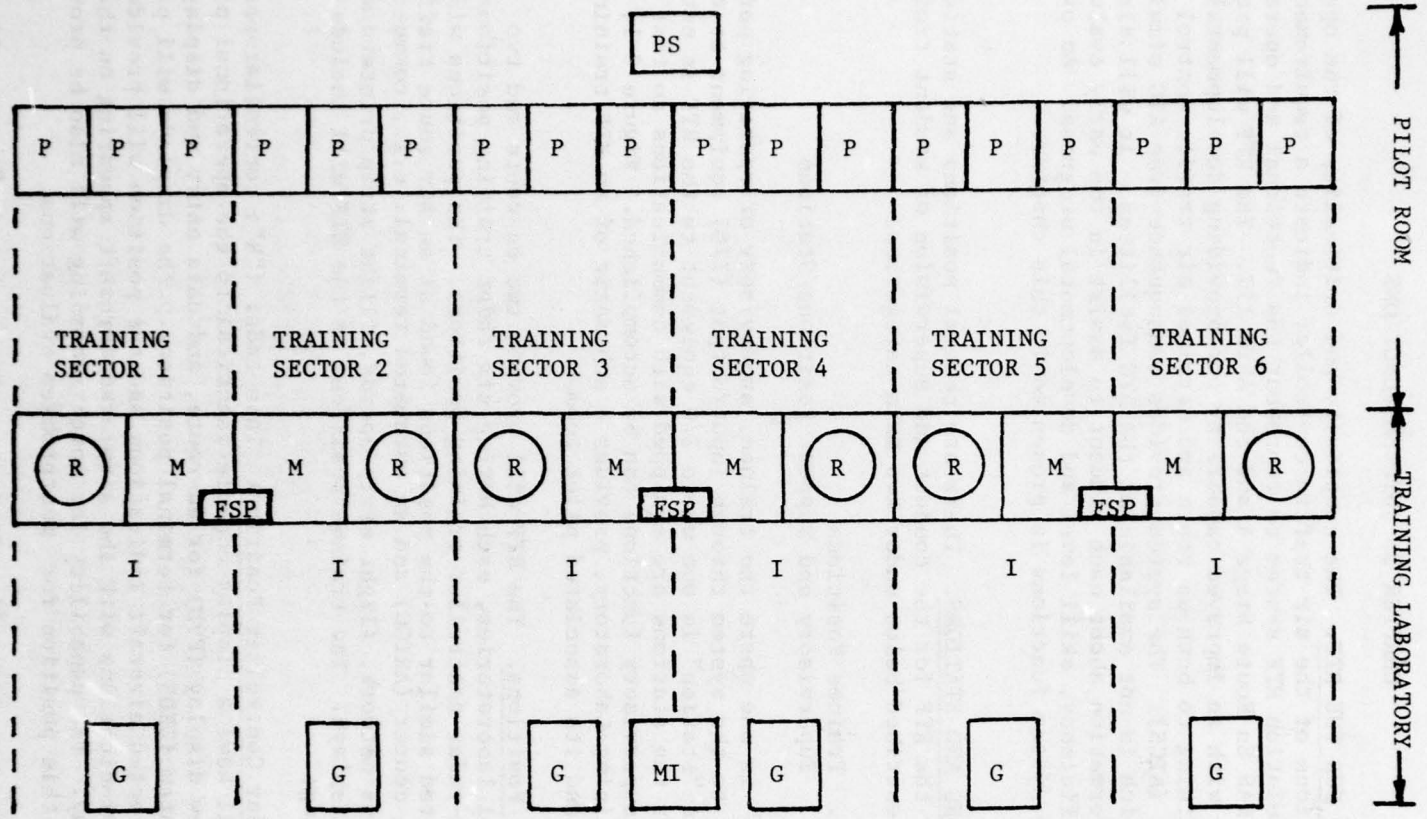
A "position" is one where the trainee, supervisory or operating personnel have access to the system through input/output (I/O) equipment at the position. A "station" is one where I/O equipment to the RTF is not provided but the stations are equipped with communications so that the instructor/supervisory functions can be accomplished. Figure 3-1, Typical Training Laboratory, provides a schematic of an RTF training laboratory and its associated pilot room.

a. Trainee Positions. The RTF will provide two en route and two terminal laboratories, each having six radar training positions and six non-radar controller training positions. The positions will be structured similar to the positions found at an air route traffic control center (ARTCC) and an automated terminal, e.g., communications network, flight strip boards, flight strip printers and radar displays. The trainee positions in the RTF will include the following:

(1) Radar Controller Position. This radar ("R") controller position will have a display console identical to the operational plan view display (PVD) for en route, and data entry and display subsystem (DEDS) for terminal positions. The displays will present selected aircraft indications and the position will provide communications with the simulated aircraft appearing on the display. The capability for voice recording will also be provided at this position for postproblem evaluations.

(2) Nonradar Controller Position. The sector ("D") controller position in en route or the hand off ("HO") controller position in the terminal will provide the capability for making and

FIGURE 3-1. TYPICAL TRAINING LABORATORY RADAR TRAINING FACILITY (RTF)



P - Pilot Console
G - Ghost Console
R - Radar Trainee Console
M - Manual Controller Trainee Position
Enroute "D" Controller or
Terminal "HO" Controller

MI - Master Instructor Position
PS - Pilot Supervisor Station
I - Instructor Station
FSP Flight Strip Printer

accepting handoffs. Additionally, this position provides training for manual or nonradar control through the use of flight progress strips. Voice calling to simulated adjacent ARTCCs, sectors, facilities, etc. will be a capability and monitoring the radio at the "R" position will be accomplished at this position. The capability for voice recording will also be provided at this position for postproblem evaluation.

(3) Pilot Operator Position. Pilot operator positions will be located apart from the training sectors. Three pilot consoles will be associated with each "R" position. The operators will function as simulated aircraft pilots during the training problems. A communications capability is provided with the pilot supervisor station, the sector's instructor station, and the sector's "R" and "D"/"HO" positions.

(4) Remote Facility (Ghost) Position. A remote facility position will provide the necessary realism at the training sector by performing the related functions of other ARTCCs, sectors, terminals, and Flight Service Stations (FSS). These functions will include initiating handoffs, accepting handoffs and generally "ghosting" all the interacting functions of the other sectors/facilities. Communications interfaces are provided with the sector's instructor station, "R" position and "D"/"HO" position in addition to the master instructor position.

b. Supervisory and Support Positions/Stations. To direct and coordinate the training and support activities within each training laboratory, control and monitoring devices in addition to communications will be provided at the supervisory and support positions or stations. These positions or stations include:

(1) Master Instructor Position. This position is a part of the simulator, with one position for each laboratory. It contains controls required to initiate and control the training problem for each laboratory. Communications interfaces are provided to enable this position to monitor the training problem progress as well as the instructor's activity. In addition to the monitoring functions required from the master instructor positions, it permits the operator to facilitate corrections to the problem, "freeze" the problem, and give verbal instructions to the instructor stations as well as the pilot supervisor stations and remote facility (ghost) positions. Responses by the trainees during a problem will be recorded for evaluation after the exercise. The control of this function will be from the master instructor position or transferred to the instructor station as required.

(2) Instructor Station. An instructor station will be required at each training sector. Facilities are provided to communicate

with the simulated pilot positions, remote facility position and the master instructor position via interphone.

(3) Pilot Supervisory Station. A pilot supervisory station will be required for each laboratory but will be located with the pilot operator positions associated with a common laboratory. Communications interfaces are provided to enable the pilot supervisor to monitor and instruct the pilot operators, coordinate activities with the master instructor position and communicate with the system monitor position.

(4) System Monitor Position. A system monitor position will be provided for each pair of laboratories. Each system monitor position will provide for computer operation in addition to operational and maintenance monitoring capabilities for either the en route or terminal laboratories. Communications interfaces are provided with four positions (two master instructor and two pilot supervisory positions) that are paired with either the en route or terminal laboratories for operational and maintenance coordination.

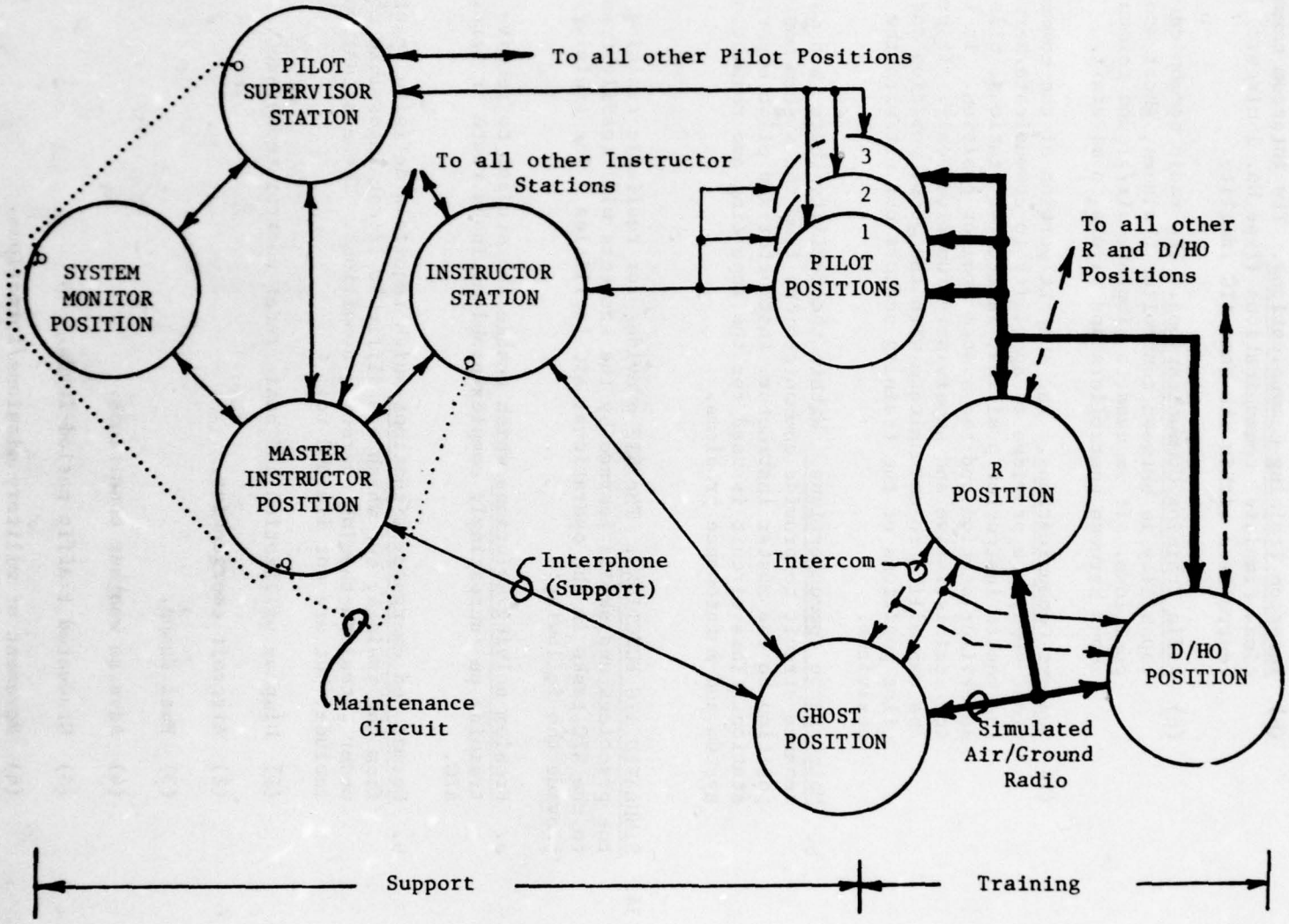
33. COMMUNICATIONS. The communications simulate the existing leased and FAA owned communications used in ARTCC and terminal facilities. The communications are divided into four sections or laboratories. Two laboratories simulate en route operations using communications equipment to simulate the Western Electric 300A System and the FAA owned radio channel control equipment. The other two laboratories simulate terminal operations using communications equipment to simulate the Western Electric 301A System and the FAA owned radio channel control equipment. There are no intercommunications between laboratories. Figure 3-2, Laboratory Communications, provides a simplified communications block diagram of the communications provided to a typical RTF laboratory and its associated pilot room.

a. Training and Support Communications. Within each laboratory, the communications are divided into the training communications and the support communications.

(1) Training Communications. The training communications provide a simulated interphone, intercom and radio capability which is typical of equipment in use in ARTCC and terminal facilities. Line selection and calling procedures functionally simulate the existing en route and terminal ATC facilities. The training communications include the training positions ("R" and "D"/"HO"), the associated ghost positions and pilot positions.

(a) Interphone Training Communication. The interphone communications simulate communications between controllers in adjacent (remote) ATC facilities.

FIGURE 3-2. LABORATORY COMMUNICATIONS



(b) Intercom Training Communications. The intercom communications simulate communications (Type No. 1 circuit) between controllers within the same ATC facility.

(c) Radio Training Communications. The radio communications capability is between controller trainees, ghost and pilot positions. It is used to simulate air/ground communications between controllers and pilots in aircraft.

(2) Support Communications. The support portion of the communications subsystem provides a capability to communicate between the master instructor position, instructor stations, pilot supervisor station and the system monitor position. It is used for administrative and supervisory functions only. It provides the capability to communicate with the ghost position and the pilot positions of the training sectors but not with the training positions.

b. Maintenance Communications. Within the facility there is a maintenance circuit to provide communications from the system monitor position to the master instructor, instructor and pilot supervisor station. This circuit is used for the reporting and resolution of system and maintenance problems.

34. SIMULATED ATC FUNCTIONS. The RTF provides for realistic training so that the practices and skills learned by the students will readily transfer to the ATC tasks in the operational ATC facilities. The training will provide the following:

a. Problem solving solutions which enable the student to receive training on increasingly complex problems in en route or terminal ATC.

b. Normal and emergency situations which require a definite reaction from the trainee, but which are difficult if not impossible to create under actual on-the-job operating conditions. These situations include, but are not limited to:

(1) Display utilization and basic radar control techniques.

(2) Aircraft emergencies.

(3) Fuel dumps.

(4) Adverse weather conditions.

(5) Graduated traffic period loads.

(6) Movement of military missions/formations.

(7) Failure of system components.

(8) Unusual increases in traffic which result from aircraft having been diverted to one airport due to closure of another airport.

(9) Route changes due to weather, traffic or other conditions.

(10) Area navigation.

(11) Failure of aircraft communications and navigational components.

(12) Inflight hijack and bomb threat.

c. Current procedures, as used operationally in terminal and en route facilities, so that the trainee will be better prepared for more advanced and environmentally oriented training at an assigned operational ATC facility.

d. Instructions and practice on equipment similar to that used by the operational ATC facilities.

35. TRAINING EXERCISES. The RTF will provide the relevant cues and tasks which will be practiced by the student to attain the desired skill level individually and on a team basis among the control positions of operation. Each sector/position is designed to operate as an independent unit as well as having the capability of interacting with one other sector within a common laboratory. This permits execution of training problems that require one operating sector or two operating sectors. Training exercises to be conducted on the radar simulation laboratory are as follows:

a. Identify radar/beacon aircraft targets.

b. Initiate and accept aircraft handoffs.

c. Maintain aircraft identification at all times or take appropriate actions in the event that identification cannot be maintained.

d. Provide radar advisory service.

e. Application of unique ATC procedures.

f. Effect interfacility and intrafacility coordination.

g. Effect appropriate route and altitude changes.

h. ATC voice phraseology.

36. DATA PROVIDED BY RTF DURING TRAINING EXERCISES. The RTF will provide the capabilities and data to accomplish the training exercises. This includes such things as: aircraft profiles (cruise speed, rate of climb and descent, standard and half standard rate turns); video map displayed on the DEDS; digital map on the en route "R" controller's

PVD; alphanumeric data blocks; display of weather situations; wind factors; flight progress strips printed for the appropriate sectors; nonbeacon targets; discrete and nondiscrete beacon codes; Mode C reports and communications simulating radio transmitting/receiving frequencies and landline communications. Figure 3-3, Information Flow, provides a block diagram that shows the information flow within a RTF laboratory.

37. TRAINEE PERFORMANCE MEASUREMENT AND EVALUATION. The RTF system provides a trainee performance measurement and evaluation capability through the operation of the data recording and analysis programs. Trainee performance information is recorded with the operation of the RTF software for each individual trainee during the training exercises. The recorded information is analyzed through the use of the DR&A programs and the appropriate performance measurement data are made available on the high speed printer after completion of the exercise.

a. Performance Measurement Summary. Upon completion of the exercise, a summary is prepared for each trainee. The form and content of the summary are subject to the criteria contained in the exercise. A high degree of objectivity is maintained. The RTF system security techniques insure that there are no provisions for modification of recorded records or measurement summary by operating personnel or other personnel who have RTF system access.

b. Permanent Record. A permanent record of the exercise performance measurement and evaluation is prepared for off-line output. This record consists of:

(1) Name of trainee.

(2) Class identification.

(3) Date.

(4) Scenario identification.

(5) List of constants (scenario air traffic samples).

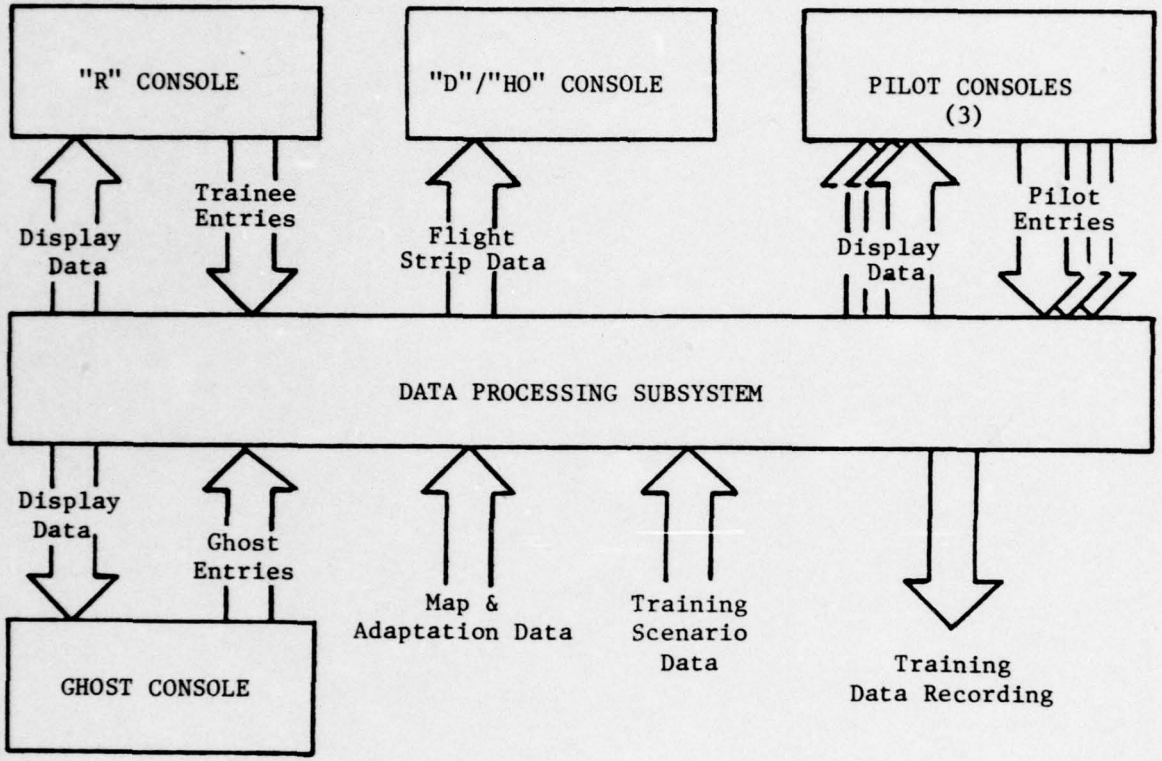
(6) List of data elements (trainee induced events and variables).

(7) List of performance measurement factors (raw scoring criteria).

(8) Performance measurement summary.

38. - 40. RESERVED.

FIGURE 3-3. INFORMATION FLOW



CHAPTER 4. STUDENT TRAINING OBJECTIVES AND CONCEPTS

41. TRAINING OBJECTIVES. The overall objective is to provide realistic basic radar training to students to become potential en route and terminal air traffic controllers through classroom and simulator training. An important activity during this training is evaluation of the students to determine their ability to operate a radar control position at a basic level and to proceed to advanced radar training provided at the ARTCCs and the terminal control facilities. The RTF laboratory is to provide a simulated dynamic radar air traffic environment. This dynamic air traffic simulation will provide a reference data base and a full range of control to establish a realistic simulation of aircraft traffic and radar phenomona under a variety of conditions. The RTF not only provides the training capabilities through realistic simulation but it provides information during training exercises which will be used for student performance evaluation.

42. STUDENT INPUT CAPACITY. The current student annual input load for Academy air traffic controller training is approaching 1800. It is projected that by the fiscal years 1978 and 1979 an annual input load of between 1,850 and 1,900 students will be required because of the expected increases in air traffic by that time. The resources reflected in this PIP provide a capability to train an annual input load of 2,880 students as an upper limit and 2,304 as a lower level over a four year period. The capacity input class size is 576 and there is a seven week overlap between classes. This represents one possible alternative as to input size and class intervals. Final determinations are made as the system becomes operational which are dependent upon FAA needs such as annual hiring targets, funding considerations, and mix of student inputs between the en route and terminal training needs. This scheduling could provide for maximum capacity input loads for the first 4 years of operation as follows:

First year student input	2,880
Second and third year student input	2,304
	2,304
Fourth year student input	2,880
Total 4 year student input capacity	10,368

The RTF operation is planned for two shifts per day, five days per week. The RTF requirements provide for a flexibility so that it may be expanded through system enhancements, if required. Resource requirements to operate the RTF will vary, depending upon the number of students to be trained.

43. TRAINING PHASES. The implementation of the RTF will necessitate some restructuring of the current terminal and the en route training programs. The following represents one possible approach to training with the RTF system:

a. Phase I, Indoctrination. This phase is conducted at the students' home facility. It is an 80-hour course. The course is an indoctrination to the FAA organization, air traffic services, and individual orientation to emergency readiness.

b. Phase II, Fundamentals of Air Traffic Control. This phase is conducted at the FAA Academy. The student receives 152 hours of classroom instruction. All students receive this training. This phase consists of classroom instruction in several courses as follows: Principles of Flight, Aircraft Types and Characteristics, Meteorology, Navigation, Federal Aviation Regulations, Air Traffic Control Communications, Air Traffic Services, Flight Assistance Service, Fundamentals of Radar and National Airspace System.

c. Phase III, Speciality Classroom Laboratory. The student starts to receive training in a speciality; i.e., terminal or en route, during this phase. A total of 120 hours of academic and classroom laboratory training is given to the students taking terminal control training and 240 hours to the en route control students.

(1) Terminal -- This training consists of the application of procedures for the control tower position's operation.

(2) En route -- This training consists of application of procedures for the manual "D" control position.

d. Phase IV, Non-Radar Approach Control. The students taking terminal control training will receive 120 hours of academic and classroom laboratory instructions during this phase.

e. Phase IV, En Route and Phase V, Terminal -- Speciality Basic Radar Training. This phase of basic radar training utilizes the RTF laboratory for simulating ATC conditions for both en route and terminal control. The student's time is divided equally between academic (classroom) and hands-on training in the RTF laboratory. While in the laboratory, a student's time is divided between operating support positions and receiving training at the operating positions. At the completion of training, each student has demonstrated the capability to perform radar controller positional duties within their specialty at a basic level and is qualified to receive advanced radar training within their specialty at an ARTCC or terminal facility.

During the first week, the student receives training in the operation of the various positions in the RTF laboratories. During this time, he receives 40 hours of academic and hands-on training in the RTF laboratories. The training will consist of such things as keyboard entries, use of the flight strip printer, manual position operation, pilot position operation, ghost position operation and exposure to the operations of the radar positions. The operation of these positions will include training in voice phraseology and operating the

interphone (300-301 systems) and radio voice techniques. During the remaining 8 weeks, the students will receive basic radar training in such fundamentals as follows:

(1) Interpret and react to radar returns (including radar phenomena), and other outputs on the displays.

(2) Operating the radar equipment (PVD's/DEDS's) including adjustment to the degree allowed.

(3) Effectively utilizing computer input devices and reacting to computer generated outputs.

(4) Using radar separation standards, coordination procedures and proper phraseology (as defined in Handbook 7110.65) to solve elementary radar control exercises.

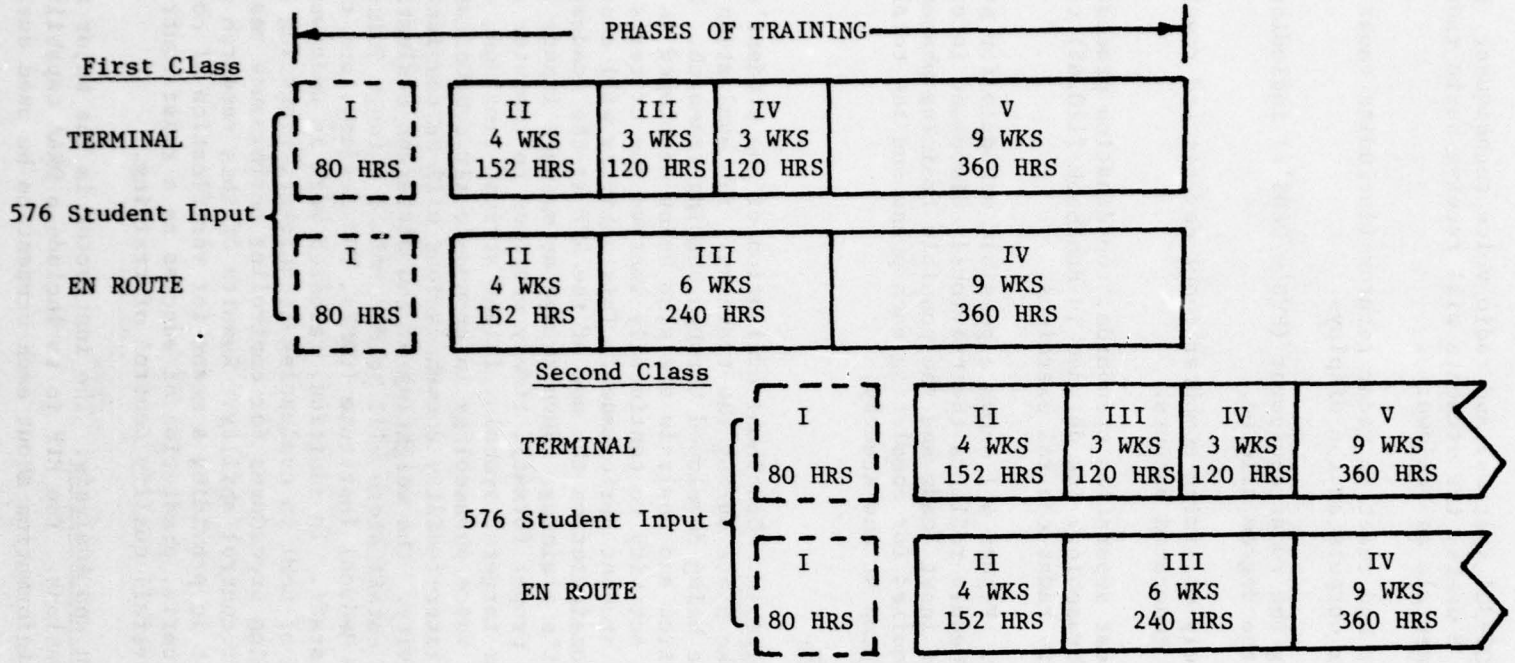
44. TRAINING SCHEDULE. Figure 4-1 shows a possible schedule for student training. The schedule reflects the previously discussed information concerning student input loads and the possible training phases. It shows the time required for completing each phase and the total time a student would spend at the Academy.

45. STUDENT EVALUATION.

a. Evaluation Criteria. Continual evaluation of the student's performance will take place during the training. The evaluation criteria to be used are being developed through ongoing research. Procedures of data reduction and analysis are also being developed as a part of this research activity to continually improve the criteria for the evaluation of student performance. This activity will continue, taking into consideration the use of the RTF at the Academy as part of the student's training. Such things as message inputs (manual dexterity and proper format), timely reaction to computer generated outputs (radar targets, symbols, flight strips, listings, etc.), use of proper voice phraseology in ground-to-air communications and in intra-and inter-facility communications will be considered in the research activity. The weighting of the different evaluation criteria and the cutoff score will be determined through joint efforts of civil Aero Medical Institute (CAMI), FAA Academy, and the FAA Headquarters staff. In addition, research work is underway under the direction of CAMI in evaluating techniques, preparing criteria, and establishing procedures for controller performance measurement tests of radar control ability. Results of this research will be used to assist in providing a means for verification of controller selection criteria, prediction of success as a radar controller, and methods for overall quality control of training.

b. Data Reduction and Analysis. The instructor is the major factor in student evaluations. The RTF is to include a DR&A capability which will provide information about each student to be used during the

FIGURE 4-1. PROPOSED RTF TRAINING SCHEDULE



KEY:

PHASES:
- I Indoctrination at the Facilities
- II Fundamentals of Air Traffic Control
- III Speciality Classroom Laboratory
- IV Terminal Non-Radar Approach Control
- V Terminal Basic Radar Training (RTF Laboratory)
- VI En Route Basic Radar Training (RTF Laboratory)

WKS = Number of weeks for the phase.
HRS = Number of hours of training within each phase.

Note: Schedule represents information discussed in paragraphs 42 and 43.

evaluation process. The RTF will log data for each student individually during the conduct of the training exercise. These data will be presented by the system in suitable form, e.g., summarized and applying statistical analysis to the recorded data, where it may be easily interpreted in the evaluation of the student's performance during an exercise. The results of the research efforts described in the foregoing paragraph will be used, as appropriate, for the development of the DR&A capability of the RTF system.

46. - 50. RESERVED.

CHAPTER 5. PERSONNEL RESOURCES

51. STAFFING STANDARDS. This chapter provides personnel planning guidance and estimates of staffing and workload requirements for the training operation and maintenance of the RTF system. Position grades and series designations shown are for planning purposes only. All positions are to be classified by the AAC on the basis of the current Civil Service Commission (CSC) classification standards and related FAA guidelines. It is recognized, however, that the RTF is for the conduct of controller training rather than for operational ATC, thus AAC local guidelines may need to be applied or used to supplement FAA guidelines.

52. PERSONNEL AND STAFFING GUIDANCE. Guidance contained in this chapter is to be used for planning purposes in determining the need for additional personnel positions or funds that may be required for the implementation of the RTF system. The staffing levels shown below reflect the skills and numbers of personnel needed to support the number of students, and Academy training phases and schedule discussed in Chapter 4, Student Training Objectives and Concepts. They do not represent absolute additional instructor requirements above resources currently allocated to the en route and terminal initial qualification training program at the Academy. The specific number of new staffing required will depend upon various factors such as the final configuration of the training program with the addition of the basic radar training phases, student workload in any given year, input scheduling and other considerations. The AAC utilizes normal budgetary processes to obtain any needed staffing and funding increases. Where manpower adjustments are necessary due to changes in positions and/or qualification requirements, lack of personnel mobility, failure to satisfactorily complete training, etc., the AAC is to take corrective action when this can be accomplished locally without an adverse impact on current employees and their programs. The provisions of the public law on equal opportunity shall be complied with in all personnel actions.

a. Personnel Selection Guides and Procedures. Both ingrade and promotion candidates are to be selected for assignment to the RTF project in accordance with the provisions of CSC Handbook X-118, the FAA merit promotion plans and Internal Placement Handbook PT P 3330.9. All positions shall be designated nonsensitive in accordance with paragraph 7., Chapter III, Appendix 1, FAA Order 1600.1B.

b. Position Timing and Training. To ensure meeting the implementation schedules, personnel selections must be made with sufficient lead-time to allow for completion of all prescribed training and staffing requirements. Additionally, plans are to be made well in advance and schedules developed accordingly to provide necessary replacement for employees selected for reassignment to the RTF and for positional backfill purposes during the periods of training that selected employees must undergo. For guidance on the policies and timing of promotions, reference should be made to Handbook 3330.1A, Merit Promotion Program.

53. HARDWARE MAINTENANCE STAFFING. The RTF hardware will be maintained with AAC personnel. Staffing requirements for hardware and diagnostic software maintenance are based on workload and maintenance coverage requirements. The RTF is scheduled for operational training for two 8-hour shifts per day. The maintenance support to provide the Academy with continuous and reliable system service requires hardware maintenance technicians to be present during system operation. The preventive maintenance and/or equipment modifications will be accomplished by the maintenance staff on the third shift and nonscheduled time. The maintenance concept is to "replace now, repair later" in order to provide responsive system services to the training mission. It is planned that the site maintenance staff will accomplish repairs on assemblies and subassemblies such as prewired plug-in modules (boards) and printed circuit cards where it is determined to be cost effective. FAA Handbook 1380.40 dated December 8, 1976, Airway Facilities Sector Level Staffing Standards System, was used as a guide for the development of staffing level requirements, adjusted to conform with AAC staffing formula.

a. Hardware Maintenance Position Requirements. The total hardware maintenance staffing is estimated at the following levels and grade structures for the maintenance of the RTF equipment. This includes maintenance of computers and associated peripherals; display and input/output equipment at the 24 training positions (12 en route, 12 terminal), ghost positions, pilot positions, master instructor positions; laboratory associated communications and voice recorders.

Number Required	Title	GS Grade
1	Supervisor	13
1	Systems Engineer	13
1	System Performance Specialist	12
3	System Shift Supervisors	12
6	Computer Technicians	11
3	Display and I/0 Technicians	11
3	Display and I/0 Technicians	09
3	Communications Technicians	11
3	Communications Technicians	09
24	Total Positions	

b. Hardware Maintenance Skill Levels. The following briefly describes the skill levels required for the RTF hardware and diagnostic software maintenance staff.

(1) RTF Supervisor/System Shift Supervisors, GS-13/12. The principal RTF hardware maintenance supervisor and the shift supervisors represent the top level of technical management. The encumbents of these positions are assigned the technical responsibility which encompasses analyzing, evaluating and certifying the total RTF system performance for the hardware. Additional responsibilities include:

(a) RTF Supervisor (GS-13) and Shift Supervisors (GS-12).

1 Directing and coordinating all maintenance activities on the large number of complex equipment assemblies, subassemblies, etc. assigned to the RTF.

2 Monitoring system performance status, directing system diagnosis, coordinating equipment shutdown and service restoration with RTF training supervisory personnel.

3 Isolating and correcting hardware errors and isolating and reporting software problems.

4 Coordinating with the designated training supervisor during system operations and providing assurance that the RTF performance is acceptable for conducting the training exercises.

5 Loading and startup of the operational programs when requested by the training supervisors.

6 Maintaining hardware technical documentation.

7 Maintaining inventory records of site spares, tools, test equipment, etc.

8 Maintaining and analyzing maintenance records.

(b) RTF Supervisor (GS-13). In addition to the above, the RTF Supervisor has the following responsibilities:

1 Coordinating the overall hardware maintenance activities with the RTF training management and supervisory personnel.

2 Coordinating the RTF supply and maintenance support requirements with the AAC depot and, as required, the FAA Headquarters staff.

3 Coordinating with the RTF system engineer and the engineers of AAF and NAFEC on technical problems relating to hardware maintenance.

4 Preparing budgetary and other cost estimates for maintenance, supply, personnel, modifications/upgrading, etc. for the RTF hardware.

5 Developing and maintaining documentation on hardware maintenance procedures.

(2) Systems Engineer, GS-13. This position is the senior systems engineer for the RTF hardware system. He is responsible for:

(a) Determining engineering requirements for all hardware interfaces and coordinating with the RTF software maintenance staff for hardware and software interface problems, hardware changes which impact software and interface testing.

(b) Maintaining RTF hardware configuration control and insuring that hardware documentation is maintained while retaining master copies of current hardware and diagnostic software documentation.

(c) Reviewing NCPs to determine impacts on RTF hardware.

(d) Conducting analyses and studies of system performance and making recommendations for improvements; maintaining records of system performance.

(e) Coordinating with systems engineers at NAFEC, AAF and other FAA organizations to insure that the RTF hardware system remains in consonance with en route and terminal systems.

(3) System Performance Specialist, GS-12. This position is responsible for the maintenance of the diagnostic software. Encumbent requires a combination of indepth technical knowledge of hardware and programming knowledge of operational, support and maintenance diagnostic software. Other requirements include:

(a) Maintaining the RTF maintenance diagnostic software; using and/or developing procedures for testing and debugging this software.

(b) Updating diagnostic software documentation.

(c) Analyzing RTF diagnostic software and hardware functional design to determine the need for improvements and/or additions to the contractor provided diagnostic software.

(4) Maintenance Technicians. The skill requirements are defined in terms of grade levels GS-11 and GS-09. Although the job titles under paragraph 53.2., Hardware Maintenance Position Requirements, show different titles, i.e., computer, display and I/O, and communications technicians, the skill levels are similar for each classification.

(a) Maintenance Technicians, GS-11. The incumbents of these positions (computer, display and I/O, and communications) are responsible for analyzing, evaluating and certifying full system performance of the highly complex electronic equipment of the RTF. Additional duties include:

1 Maintaining the RTF hardware; isolating and correcting hardware errors and malfunctions; identifying and reporting software problems.

2 Resolving data transfer problems within a training laboratory.

3 Loading and startup of the operational program when requested by the training supervisory personnel.

4 Maintaining the RTF hardware technical documentation.

(b) Maintenance Technician, GS-9. Incumbents of these positions (display and I/O, and communication technicians) have attained an experience level where they may be assigned the analysis, repair and evaluation of a subsystem or equivalent level work in a complex electronic system. These technicians normally work independently with a minimum of supervision. Completed work is reviewed for technical accuracy and conformance with maintenance policies, standards and procedures.

54. RTF AUTOMATION STAFFING. The AAC will be responsible for maintenance and update of the RTF software, data base maintenance, scenario generation and automated student performance measurements. This will also include the day-to-day physical operation of the RTF System; i.e., computer operators and pilot instructors/supervisors. The personnel requirements and skill levels for computer program maintenance and system operation are based on the size and complexity of the software; the operational shift coverage required by programmers/operators i.e., two 8-hour shifts per day with one operator for each laboratory (en route and terminal); the need for improvements and enhancements to the RTF system after it becomes operational; exercising software configuration management and performing the maintenance of documentation. It is planned that contractor assistance will be provided for approximately one year following system acceptance to assist the AAC in software maintenance, in developing an interactive scenario capability and providing on-the-job software training.

a. Automation Staffing Tenure. The automation staff should consist of some personnel under employment agreements with return rights to the regions to provide current field experience as well as permanent personnel with the required training and experience in the unique RTF system to provide continuity. The mix of personnel with return rights in the 2152 occupational series and permanent computer personnel in the 334 occupational series is to be determined by the Aeronautical Center in coordination with APT-1 of the Washington Headquarters.

b. Automation/Staff Position Requirements. The total automation staff is estimated at the following levels and grade structures for the software maintenance and operation of the RTF.

Number Required	Position/Title	Series/Grade
1	Supervisory Air Traffic Control Specialists (SATCS)	GS-2152-14
4	Air Traffic Control Specialists (ATCS) (Computer Programmer/ Analyst)	GS-2152-13
3	Computer System Analyst	GS-334-13
8	Computer Programmer	GS-334-11/12
5	Computer Programmer	GS-334-7/9
5 1/	Computer Operator	GS-332-5/7
1	Education Specialist	GS-1710-12
10	Pilot Instructor/Supervisor	GS-301-5/7
37	Total	

1/ Hardware configuration dependent.

c. Automation Staff Position Skill Requirements.

(1) SATCS, GS-14. The incumbent of this position is the overall manager of the RTF Automation Staff and is responsible for all operational and nonoperational software (excludes hardware maintenance diagnostic software) for the RTF. In addition to the management responsibilities, the supervisor performs the following functions:

(a) Coordinates with RTF training personnel concerning new air traffic control operational and training functional requirements, system changes and system improvements.

(b) Monitors RTF system performance and testing activities.

(c) Coordinates all software activities with the RTF hardware maintenance and training organizations.

(d) Coordinates software activities with outside organizations; e.g., NAFEC's ANA and AAT software groups, to stay abreast of other FAA systems and developments for possible impact on the RTF and industry for state-of-the-art reasons.

(e) Maintains software configuration management, reviews NCPs which may impact RTF software and provides impact information.

(f) Develops personnel, budgetary and other requirements information.

(g) Insures security of the RTF system including assurance against unauthorized access to software, data and hardware elements.

(h) Maintains security of the RTF system to insure conformance with FAA Orders 1600.54 and 1350.22.

(i) Schedules the RTF computer system time according to established priorities.

(2) ATCS (Computer Programmer/Analyst), GS-13.

(a) Reviews and evaluates all NAS change documents (CCD's, NCP's and Case Files) for RTF system impact.

(b) Analyzes new field requirements for RTF system impacts and makes recommendations. This includes both functional requirements and/or hardware requirements. Evaluation information includes such things as impacts on processing times, storage capacity, procedures, costs and schedules.

(c) Provides terminal/en route automation expertise and assistance to other RTF automation personnel and instructors.

(d) Develops functional requirements documentation for approved RTF system changes.

(e) Develops student air traffic exercise scenarios.

(f) Assists in preparing automated student performance measurement criteria.

(g) Acts as the principal staff for RTF data base maintenance.

(h) Maintains system and functional documentation which has been placed under configuration management.

(i) Provides technical monitoring and coordination over the computer programmers to insure that the software meets user functional requirements.

(j) Provides technical assistance and instruction to the RTF instructor personnel in the development and use of scenarios for conducting the training exercises.

(k) Develops functional testing requirements for testing system changes and monitors testing activities.

(l) Measures system performance and conducts special studies through simulation modeling and/or by other means.

(3) Computer Systems Analyst, GS-13.

(a) Translates functional requirements into design logic; e.g., develops algorithms, procedures, data design and data flow. Performs analyst duties which define the system at a level where the computer programmers can interpret the design information and write computer programs.

(b) Evaluates new requirements for RTF system impacts. This includes both functional requirements and/or hardware requirements. Evaluation information includes such things as impacts on processing times, storage capacity, procedures, costs and schedules.

(c) Maintains software security of the RTF system including assurance against unauthorized access to software and data.

(d) Develops student air traffic exercise scenario generation software and assists in preparing automated student performance measurement criteria.

(e) Maintains system and software documentation which has been placed under configuration management.

(f) Provides technical monitoring and coordination over the computer programmers to insure that the software meets user and RTF system performance requirements.

(g) Provides technical assistance to the RTF personnel in the development of scenarios for conducting the training exercises.

(h) Develops testing criteria for testing changes and monitors testing activities to insure system performance requirements are met.

(i) Measures system performance and conducts special studies through simulation, modeling and/or by other means.

(j) Assists in the review of NAS change documents which may impact RTF software.

(4) Computer Programmers, GS-7/12.

(a) Designs the detailed flow charts for the computer programs and writes, documents and tests the computer programs.

(b) Analyzes software problems and corrects errors, as required.

(c) Performs software testing activities.

(d) Develops and maintains the software for system initialization.

(e) Monitors and updates the RTF operating systems, utility, system support software and data base.

(f) Maintains the software library including utility and other support software.

(g) Assists the system analyst in the maintenance of software documentation and in system performance evaluation.

(h) Assists RTF personnel for the development of scenarios for conducting training exercises.

(5) Computer Operators, GS-5/7.

(a) Operates all RTF equipment in the computer room; i.e., monitors the consoles, manipulates the computer controls, places information media into the input devices, removes the output and performs other related functions.

(b) Receives and records messages from RTF laboratory positions and stations concerning RTF operations and problems; takes action for the resolution of problems.

(c) Reports problems and error conditions in sufficient detail so that diagnosis and maintenance (hardware or software) can be performed.

(d) Assists in system generation (initial start) and accomplishes new starts and restarts.

(e) Maintains operating logs and other records concerning the operation and maintenance of the system.

(f) Maintains the tape and disc library.

(6) Education Specialists, GS-12.

(a) Develops and coordinates RTF policies and procedures for:

1 Curriculum planning and development.

2 Training validation.

3 Student evaluation.

4 Training procedures.

5 Analysis of test results.

6 Selection, use and evaluation of audio/visual aids and training devices.

7 Effective use of current educational and psychological technology.

8 Overall course administration.

(b) Maintains a system of accountability for RTF student evaluations which includes security, documentation and necessary reports on examinations utilization.

(c) Conducts educational research and maintains currency on new/improved methods of course design, training techniques, multimedia approaches, training aids and devices and evaluation techniques.

(d) Proposes, guides and evaluates RTF training research projects.

(e) Functions as an advisor in analyzing RTF training results and effectiveness of the teaching/learning process in the RTF training environment.

(f) Coordinates student testing activities with instructors, FAA Academy, and CAMI personnel.

(g) Assists in measuring student performance and assists CAMI personnel in special studies and psychological projects.

(7) Pilot Instructors, GS-5/7.

(a) Instructs and monitors student pilots in pilot console operations and pilot laboratory procedures.

(b) Assists RTF instructors and student pilots during exercise operations.

(c) Assists RTF Automation Staff personnel in pilot console operations for possible improvements and/or updates.

(d) Operates RTF pilot consoles, monitors consoles, manipulates pilot console keyboards and associated I/O devices.

(e) Identifies and assesses pilot console laboratory problems and alerts necessary personnel.

(f) Conducts pilot console classroom training.

55. RTF INSTRUCTOR STAFFING. Additions to current air traffic instructor personnel levels will be required to insure adequate instructor-to-student ratios for RTF training and operations.

a. RTF Instructor Recruitment and Availability. The RTF instructor personnel will be required to perform onsite RTF testing and scenario building activities, receive instructor training and accomplish RTF familiarization. Some of these activities are esti-

mated to begin approximately 6 months before the RTF system acceptance. The requirement exists for trained RTF instructors to staff all positions (training, pilot, ghost and master instructor) in one en route and one terminal RTF laboratory during onsite testing. A total of 74 RTF instructors/pilot supervisors are required to staff these positions in the two laboratories. Since RTF instructor personnel may be recruited from FAA regional organizations, the AAC is responsible to insure adequate recruitment and selection lead times which will provide RTF instructor availability 6 months prior to the RTF system acceptance date.

b. RTF Instructor Requirements. The RTF instructor personnel levels which are described below apply only to the RTF laboratories or Phase IV for en route training and Phase V for terminal training. These levels are based on the maximum student input loading as described in Chapter 4, Student Training Objectives and Concepts. The actual instructor requirements for conducting RTF laboratory training will be based on the expected phased student loading at the time the RTF becomes operational. The actual instructor requirements will be reflected in the AAC budgetary submissions for supporting the RTF. Other FAA Academy air traffic instructor requirements for other phases of training, class lead instructor, and supervisory personnel positions are not included in the RTF instructor personnel levels shown below.

Instructor positions required for each RTF laboratory	7
Number of RTF laboratories (2 en route, 2 terminal)	4
Number of shifts of operation for the RTF laboratories	2
Sub Total (7 x 4 x 2 = 56)	56
FAA staffing standard positional factor (allows for annual and sick leaves and training)	x 1.65
Sub Total	92.4

The FAA Academy academic preparation factor is .0669. This is for time allowed an instructor to prepare lesson plans, course materials, etc., for laboratory instruction. therefore:

1.0669 x 92.4 = 98.58 or:

Total RTF laboratory instructors required = 99

c. RTF Instructor Skill Level Requirements, ATCS (Instructor), GS-13.

RTF instructor personnel must be fully qualified radar air traffic control specialists in either en route or terminal ATC. They must be familiar with the latest ATC rules, regulations, procedures and the use of automation equipment for the control of air traffic. The rotation of instructors from the Regions will facilitate the currency of the Academy instructors. Other requirements include:

(1) Conducting classroom instructions.

(2) Conducting RTF laboratory instructions.

(3) Evaluating the performance of students.

(4) Assisting in the development of scenarios for RTF laboratory training exercises.

56. CLERICAL PERSONNEL. The foregoing personnel estimates do not include the requirement for clerical support personnel for the RTF system. These requirements will be developed by the AAC, using the AAC established standards for determining clerical personnel skills and levels. The requirements will be reflected within the AAC manpower and budgetary submissions for the appropriate fiscal years in consonance with the scheduled time these personnel resources are needed.

57. - 60. RESERVED.

CHAPTER 6. AERONAUTICAL CENTER PERSONNEL TRAINING

61. TRAINING REQUIREMENTS. This chapter provides guidance for the development of detailed training plans and for the conduct of training for the AAC personnel who will operate, maintain and conduct training with the RTF. This includes training for hardware and software maintenance, system operator and instructor personnel.

62. TRAINING OBJECTIVES. The objective is to develop training plans and programs which will permit the AAC to integrate the RTF into the NAS training programs and to conduct the highest quality of ATC training, utilizing FAA resources. This includes the more detailed Personnel and Training Requirements Plan to be developed by AAC for hardware and software maintenance, instructor and operator training so that it can assume full responsibility for all aspects of the RTF activity without contractor assistance as soon as possible after system acceptance. For the total program, plans are to consider: manpower resources and utilization factors; the schedule for system implementation; system operating and maintenance concepts; training resources and other factors which may affect the RTF program.

63. HARDWARE MAINTENANCE TRAINING. Hardware maintenance training will consist of Academy provided formalized training and on-the-job training (OJT) for the maintenance of GFE and contractor provided formalized training and OJT for contractor provided RTF equipment. The following information, to be included in the AAC developed Personnel Training and Requirements Plan, is to be used for broad planning and policy guidance: detailed requirements, numbers to be trained, training schedules, etc.

a. Maintenance Training for GFE. Personnel requiring training for the maintenance of GFE will be scheduled into currently existing Academy training courses which are conducted for the training of regional personnel for the en route and terminal automation equipment maintenance. It is planned that some of these trainees will be used for the backfill, i.e., trained personnel from the current AAC hardware maintenance organization will be transferred to the RTF program and newly trained personnel will be used for the backfill. This will provide an early nucleus of experienced personnel for the maintenance of the GFE used as a part of the RTF. The formalized training will be completed well in advance of RTF delivery to the AAC. The type of training will be classroom system theory training and hands-on-equipment training in the maintenance training laboratory. It will emphasize preventive maintenance and analytical approaches to malfunction diagnosis. It will include the use of test equipment and computer diagnostics for performing onsite maintenance.

For those maintenance personnel requiring refresher training or upgrading, OJT for the maintenance of GFE will be provided by the RTF maintenance staff. This training may start, however, prior to RTF equipment delivery by the trainees being temporarily assigned

to the existing hardware maintenance organizations of the AAC. The GFE maintenance staff should be sufficiently trained and skilled so as to provide responsive GFE maintenance support at system delivery and during contractor checkout and acceptance testing activities. The qualification requirements for receiving maintenance training will be in accordance with existing FAA standards.

b. Maintenance Training for Contractor Provided Equipment. The hardware maintenance training for contractor provided equipment (non-GFE) will be provided by the RTF contractor. He will conduct both formalized classroom and OJT. The formalized training will be completed prior to the delivery of the system to the AAC and it is expected to be conducted at the contractor's facility. The OJT will be conducted as part of the contract maintenance support contract, following equipment delivery to the AAC and continuing for an estimated period of six months to one year after system acceptance.

(1) Formalized Hardware Maintenance Training. This contractor provided classroom training for the contractor provided equipment will emphasize preventive maintenance and analytical approaches to malfunction diagnosis. It will include the use of test equipment and computer software diagnostics for performing field maintenance. The training is expected to require 10-14 weeks at the contractor facility, to be completed during the latter stages of system development and prior to equipment delivery to the AAC. The trainees will be qualified in the maintenance of complex electronic equipment and/or will have completed Academy maintenance training courses for the maintenance of electronic equipment. The numbers of personnel to be trained, length of the training period and the training schedule will be described in more detail in the AAC developed Personnel and Training Requirements Plan.

(2) On-The-Job Training for Hardware Maintenance. The RTF contractor will provide OJT for contractor furnished RTF equipment (non-GFE) as part of a hardware maintenance support contract. It is expected to cover a six-month to one-year period following system acceptance at the AAC. It is expected there will be an option to extend the maintenance support contract, depending upon the ability of AAC to acquire and train hardware maintenance personnel for the RTF.

(a) Hardware OJT. The objective of the OJT is for the development of full AAC personnel competence in performing maintenance operations on all elements of the contractor furnished equipment. However, maintenance of the interfaces between GFE and other equipment will be major considerations. The OJT is the follow-on training at the RTF after trainees have completed the formal training received at the contractor facility. Some practical OJT, with the student

performing actual maintenance tasks, will be exercised to permit the trainee to duplicate and practice the techniques demonstrated.

(b) Diagnostic Software Training. As a part of the OJT activity at the AAC, there will be training in the maintenance and use of the hardware diagnostics software. The prerequisite for this OJT is that the software analysts/programmer will have completed the contractor provided training in the use of the RTF computer automation assembly language (or higher order language) which is used in the development and maintenance of RTF software.

64. SOFTWARE TRAINING. The RTF contractor will provide classroom, self-study and OJT instructions for the software system analysts and programmers. It is expected that some formalized training will be conducted at a contractor training facility. With the contractor furnished hardware planned to be off-the-shelf equipment, it is expected that the contractor will make available a variety of courses for training personnel at various skill levels, e.g., at the beginner's level and through the higher skill levels. Training offered for beginners will be more generalized in the field of data processing; training for skilled software personnel with experience will be more oriented toward the specific needs of the RTF software maintenance. The AAC will match the training requirements to their personnel skill levels and will develop and schedule the training requirements as part of its Personnel and Training Requirements Plan.

a. Operational Support Software Training. As indicated later in paragraph 78, Software Maintenance, of Chapter 7, the objective is to develop an early FAA capability for the maintenance of the RTF software. Initial emphasis will be placed on training in the operational support software as it is expected that the contractor will have available and provide standard training courses for this software, e.g., training in the assembly language, higher order languages and other support software described in Chapter 7. In addition, it is expected that the RTF program monitor will represent software which the contractor makes available with the computer hardware. Early training in this software will also be accomplished for AAC personnel. All RTF system analysts and computer programmers (including those to be responsible for hardware maintenance diagnostic software) who have software backgrounds should receive training in the support software and the program monitor. More basic training may be accomplished through individuals attending introductory electronic data processing courses for those who have no experience in data processing. Self-study course material should also be provided by the RTF contractor. Additionally, the contractor should have available a service center computer for the support of AAC software training.

b. Operational Software Training. The training for maintaining the operational software will be scheduled to occur later in the training program because this involves the project software which must be designed, produced and tested to meet the specific requirements of the RTF. This software consists of the computer programs described in Chapter 7. It is expected that both formalized and OJT will be provided by the RTF contractor.

(1) Formalized Training. The system analysts and programmers will have completed the standard course training in the support software and program monitor before starting formalized training for the operational software. Generally, contractor developed training courses for the operational software will be non-standard and will be specifically oriented toward the software maintenance needs of the RTF operational real time system. The RTF program manager and the AAC will coordinate the contractor efforts for developing and providing the proper training for the RTF operational software. Some formalized training may be accomplished before system delivery, followed with a larger amount accomplished after system acceptance at the AAC.

(2) OJT. As indicated in Chapter 7, the RTF contractor will provide software maintenance support for approximately one year after system acceptance. During this period of time, the contractor will provide OJT for software maintenance personnel. This includes the AAC personnel who will accomplish the actual software maintenance and software enhancements under the guidance and assistance of the contractor software personnel. Classroom problems, however, may also be given to the students and the RTF system may be used by the programmers on a noninterfering basis for the OJT.

65. COMPUTER OPERATOR TRAINING. The objective of the FAA is to develop the capability to assume equipment operating responsibilities by final acceptance of the RTF system. The RTF contractor will provide an onsite operator training course. The training may be both formalized and OJT. The OJT will be provided by the contractor until the computer operators become proficient in system operation. It is expected that the operator training will be accomplished during site installation, testing and system acceptance activities.

66. INSTRUCTOR TRAINING. Instructor training principally involves the RTF instructor personnel, however, supervisory, management and pilot instructor personnel will also require training. The contractor will provide training to a nucleus instructor group at his facility. The contractor will also provide RTF instructor, pilot and supervisory/management training at the AAC following system delivery. This training will be both classroom and OJT. The instructor training will cover but will not be limited to the following areas:

a. Overall system logic, including a comprehensive study of all the functions performed by the RTF.

b. All I/O requirements for all positions (radar and nonradar, pilot, ghost, master instructor) and the actions required at these positions for controlling the training exercise.

c. Configure the laboratory, initialize-start, stop-terminate, suspend-freeze, restart-continue problems during a training exercise.

d. Procedures, methods, restrictions, etc. for developing and maintaining training scenarios.

e. Use of the DR&A capabilities to be provided with the RTF so that instructor personnel may properly interpret and use the DR&A computer outputs for evaluating students.

The OJT will be an important part of the instructor training program to qualify for an RTF instructor. Because of the relatively small amount of time the contractor has for system development, only limited OJT can be expected at the contractor facility. Therefore, most of the OJT must be accomplished at the Academy after system delivery. It is expected that some OJT can be accomplished during testing and system evaluation. Additional OJT may also be required after system acceptance and during the system shakedown period to qualify RTF instructor personnel. The instructor training requirements and methods for accomplishment will be defined in more detail in the AAC developed Personnel and Training Requirements Plan.

67. - 70. RESERVED.

CHAPTER 7. SYSTEM IMPLEMENTATION

71. AERONAUTICAL CENTER ESTABLISHMENT RESPONSIBILITIES. The responsibilities of the AAC include four major activities: (1) site engineering, (2) site preparation work, (3) contractor related work, including contractor activities monitoring and providing assistance to the contractor at the site to efficiently accomplish the contractor RTF implementation activities and (4) implementation and operation of the RTF.

a. Site Engineering. The AAC has the responsibility for acquiring additional building space, accomplishing the engineering and managing the construction work required for the installation and operation of the RTF equipment. This includes providing classroom and administration space, fixtures and training aids for trainees and instructors and for work and storage space required by maintenance and support personnel. The additional space is to be provided by the City of Oklahoma City by building an annex to existing facilities. Site engineering includes the normal activities such as the architectural design; the preparation of drawings and work orders; the coordination of the annex construction and site preparation work, including the installation of cable ladders, ducts, AC power wiring, and air conditioning. The AAC prepares the building design documents and cost estimates for engineering and annex construction and provides copies to the RTF Program Manager.

b. Site Preparation Work. The AAC will manage all site construction and preparation work through use of its internal resources and/or by contract. This includes annex construction, computer flooring, power, air conditioning and filtering, cable ladders and raceways and other environmental requirements. The contractor provides an Installation Plan and Report (see Appendix 1 for scheduled delivery of plan) to be used by AAC for site engineering and annex construction. In order to permit the RTF contractor to develop the Installation Plan and Report, the AAC provides him environmental information concerning the annex to house the RTF. This includes such things as planned location for the equipment, floor plan layout, proposed cable routing, location of power, information on access restrictions, if any, and floor loading restrictions. This information is to be provided to the Program Manager for review and delivery to the contractor as shown in the Appendix 1 schedule. The contractor developed plan/report will contain, as a minimum, the following general and typical information for the AAC for site preparation:

(1) System block diagram with a short narrative general description of the functional capabilities and hardware subsystems.

(2) Floor plan layouts for the computer room and laboratories, including information on equipment placement limitations, e.g., maximum distances between equipment comprising the system.

(3) Detailed physical description of the equipment, including physical size, weight, clearance factors, ventilation or air conditioning requirements, cable entry, exit features, etc.

(4) Cable and duct/overhead ladder requirements, including such items as information on subsystem cable interconnection requirements, system cable connections to signal junction box, quantity of cables to be used, etc.

(5) Power requirements, including information on the size and type of power cabling to be used and the type and size of required government furnished power panels.

(6) System and equipment grounding requirements.

(7) Any other technical or general information that will be required in order to properly prepare a site for installation activities that should be considered for proper installation, operation and maintenance of the equipment.

The site preparation activities are further described in Chapter 9, Environment.

c. Contractor Monitoring and Support.

(1) At Contractor's Facility. The FAA Program Manager is delegated responsibility by the FAA Contracting Officer (ALG-300) for contractor management during system development and factory acceptance testing. The AAC provides support during this period by providing representation at the contractor facility as Assistant Technical Officer(s) to the ARD Technical Officer appointed by the FAA Contracting Officer. The AAC also provides spare parts for GFE at the contractor facility on a reimbursable basis and special GFE tools and test equipment for GFE maintenance by the contractor to be returned at the completion of the procurement contract.

(2) At RTF Site. With the installation of the RTF at the Academy, contractor management and support responsibilities gradually transition to AAC. The AAC will support the contractor by providing working space, utilities, site modifications, spare parts storage for contractor provided hardware and other support that may be required for the timely installation and testing of the RTF system. The AAC also provides all maintenance and supply support of GFE starting with system delivery.

d. Implementation and Operation of the RTF. The organization structure required for operation and maintenance of the RTF and conducting training after acceptance will be planned and established by the AAC in accordance with normal FAA administration procedures. Existing organizations will support the implementation activities in accordance with their assigned functional responsibilities. This includes the functions of budgeting, recruitment, selection of personnel, scheduling of personnel, training AAC personnel, management, logistical and other support for the RTF activities. The AAC develops an RTF Transition and Utilization Plan and a Personnel and Training Requirements Plan to identify and to assign responsibility for the many actions that are required by AAC for the implementation of the RTF system.

72. WASHINGTON OFFICE SUPPORTING ACTIVITY RESPONSIBILITIES. The FAA Headquarters staff provides technical and management support to the AAC during system implementation and acceptance testing. The technical support will provide for the solution of special problems by NAFEC as well as from the FAA staff located in Washington, D. C. This support may be in areas such as human factors study, system performance analyses, interface engineering and acceptance testing. Other responsibilities include:

a. The Program Manager and LG-300 insures that the contractor provides the AAC with the equipment layout plans and environmental requirements in a timely fashion to permit facility preparation to be completed on schedule.

b. The ALG-300 office provides a contracting service for GFE acquisition and manages the contract(s) to insure GFE is available at the AAC for completing modifications/EEM's and for installation and integration into the RTF system according to scheduled requirements.

c. The Program Manager provides for the development of final system acceptance criteria. This is accomplished with support from the AAC, NAFEC and the Washington Staff.

d. Assistance is provided to AAC as may be required for the development of the RTF System Shakedown Plan. The RTF Program Manager may call on other offices and organizations for support.

e. The Program Manager provides for JAI procedures and organizes the JAI team.

f. Funds are provided to the AAC through the FAA established budget and fiscal procedures for implementation and operations of the RTF at the AAC.

g. Guidance and support are provided to the AAC for planning the RTF support and training organizations, for determining the numbers and skills of personnel required for the maintenance, training and operation of the RTF and for planning ATCS training programs to be conducted with the RTF.

h. General engineering support will be provided either through use of the Washington staff and NAFEC/ANA and/or by contract.

73. PROGRAM MANAGEMENT ROLES. As indicated above, the Program Manager assigned to ARD has primary responsibility for planning, coordinating and the day-to-day direction for the acquisition and implementation of the RTF. During system implementation, e.g., facility preparation, equipment installation and checkout, the Program Manager relies heavily upon the AAC for the planning and the accomplishment of these activities. The Program Manager responds to AAC needs by arranging for technical

and staff support from NAFEC, Regions, and the Washington, D.C. staff which may be needed for timely and efficient system implementation, including testing, system acceptance and JAI activities.

a. AAC RTF Program Coordinator. In order to coordinate and follow daily progress of the efforts required by the RTF Program Manager, AAC and the contractor, an AAC RTF Program Coordinator will be appointed to serve as the AAC principal point of contact for the RTF implementation activities. The Program Coordinator is to provide the AAC site coordination, direction and guidance necessary for effective and timely accomplishment of site preparation, installation, testing, evaluation and system certification during the RTF implementation at the AAC. The Program Coordinator reports site progress, problems and other matters to the AAC and to the RTF Program Manager.

b. Implementation Support from FAA Organizations. In addition to the above, all FAA organizations respond to RTF implementation requirements in accordance with the functions and responsibilities defined in Chapter 2, Program Management. Organizations also provide RTF implementation support in carrying out their functional responsibilities as assigned in official FAA Handbooks, Orders or other FAA publications.

74. CONTRACTOR RESPONSIBILITIES. The contractor is responsible for all activities relating to packing, shipping, receiving, installing, integrating and testing the RTF system at the AAC.

a. Equipment Delivery. All items, including GFE at the contractor's facility, are to be delivered to the AAC by the contractor to permit testing and acceptance according to the schedules shown in Appendix 1. This not only includes the hardware components of the RTF system, but it includes special test equipment, site spare parts, computer program tapes, (including operational, maintenance diagnostics and other computer support program tapes), manuals and other documentation. Inspection of the items shipped is accomplished at the AAC by the contractor, who is responsible for all damage to equipment which may occur during shipment, uncrating, movement within the site and installation. Damaged equipment will be repaired or replaced, depending upon its condition, by the contractor. The AAC should insure that the Contracting Officer has the specific site shipping address and other instructions (e.g., marking instruction for shipping containers) that can be provided to the contractor for packing and shipping the equipment and other items to the AAC.

b. Equipment Installation. The contractor is contractually responsible for the equipment installation. The AAC, however, will provide coordination and assistance to the contractor for the orderly and timely installation and checkout of the RTF system. The AAC is responsible for providing the name and address of the site installation coordinator to the FAA contracting officer 10 weeks prior to

site delivery. It is expected that site work, RTF installation and testing can be accomplished without undue disruption of the training activities conducted by the Academy. The RTF installation work and testing must be accomplished in accordance with a mutually agreed upon schedule between the contractor and cognizant AAC personnel. The installation and testing of the RTF must be in accordance with contractual requirements and also accomplished within the schedules shown in Appendix 1 of this PIP.

c. Site Acceptance Testing. The contractor conducts all on-site acceptance testing and demonstrates system performance for FAA acceptance. The testing activities will be conducted as defined in the contractor developed and approved Test Plans. The contractor will notify in writing the FAA Contracting Officer, who will notify the Program Manager and the AAC RTF Program Coordinator of the starting date of onsite testing. This notification will be given by the contractor as early as possible, but no later than 10 calendar days before the date for starting onsite testing. The contractor provides all RTF support during the onsite testing activities, except maintenance of GFE which is provided by AAC. The AAC and, as may be required, the FAA Washington Staff and NAFEC/ANA will provide console/position manning during acceptance testing.

75. RECEIVING RTF EQUIPMENT AT THE AAC. The equipment to be shipped to the AAC includes GFE, contractor provided (non-GFE), special tools, test equipment and spare parts.

a. Equipment From RTF Contractor. The AAC provides support to the RTF contractor for receiving and movement of equipment by providing suitable access to the equipment room, materials handling equipment, trash removal, working areas and storage space. The AAC is to notify the contractor with suggested routes to the RTF building; restrictions or limitations for equipment unloading, uncrating and movement to the equipment room and laboratories in addition to any other information which will be useful to the contractor in planning for the delivery of the RTF equipment and support items.

b. Government Furnished Equipment. The AAC has the responsibility for receiving, movement and storage of the GFE for the RTF other than that which was furnished the contractor for system development. This includes coordination with the FAA contracting officer to arrange for delivery, inspection and acceptance of the equipment which is procured as GFE for the RTF. This equipment list is included in Chapter 9, Logistics, of this PIP. The AAC completes the necessary actions to provide GFE from current FAA stocks, e.g., PVDs. The AAC has the responsibility for movement of the GFE to the equipment room and sets it in place for contractor cabling and integration into the RTF system.

c. Special Tools, Test Equipment and Spare Parts. The RTF contractor delivers the RTF special tools, special test equipment and spare

parts to the AAC by the time the RTF equipment delivery is ready. This also includes FAA provided special tools and test equipment on loan at the contractor facility. The AAC is responsible for inventorying and inspecting these RTF support items to insure receipt in good condition in accordance with the terms of the contract. Storage space will be provided for these items by the AAC.

76. FACILITY PREPARATION. The AAC is responsible for the preparation of the new facility for the RTF system. This is accomplished through close coordination with the RTF contractor, the FAA staff and other offices which may be designated by the RTF Program Manager to insure optimum RTF laboratory layout design and space utilization.

a. Power Requirements Responsibilities. The AAC is responsible for providing the primary power, including power required for air conditioning. The AAC will provide two 225 AMP power three phase 208/120 volt panels in the computer room. The contractor furnishes all circuit breakers, conduits (including special insulations that may be required), connectors, conductors and all other items required for equipment installation, including floor cutouts. For the laboratories, the AAC furnishes power panels complete with circuit breakers. The primary power installation should be supplied from the RTF annex distribution center by a separate cable to which no other users are attached, e.g., air conditioning or elevator operations. The contractor will specify and AAC will approve the cable and circuit breaker sizes required as well as power load requirements. The RTF contractor is responsible for making all power connections to equipment, including the internal cables and connecting of all internal cabling from the power supply to equipment components. This includes GFE as well as RTF contractor provided equipment. All electrical installations must comply with applicable standards, regulations and local requirements for making power connections. Other considerations for planning by the RTF contractor include:

(1) Need for shielding and network filtering.

(2) Power distribution line protection switches and main power switches other than those shown in the building plans provided to the contractor.

(3) Power measuring sets and switch-off installations.

(4) Protective grounding.

(5) Signal grounding.

(6) Safety provisions, e.g., emergency switch-off capabilities other than those shown in the building plans provided to the contractor.

b. Air Conditioning. The air conditioning is provided for equipment operation, supporting activities and personnel housed in the new facility. Power requirements are provided to operate the air conditioning system. The RTF contractor provides the air conditioning and air filtration requirements for his equipment, including desirable temperature and humidity ranges in addition to upper and lower limits for satisfactory equipment operations. The environmental requirements for the GFE are available to the AAC.

c. Equipment Layout/Floor Space. The RTF contractor in the Installation Plan/Report, provides an equipment layout plan for use in planning the floor space and environmental requirements. The AAC provides the RTF contractor the plans for the optimum layout for the training laboratories. In planning equipment floor area, front and rear access spaces are to be provided for good accessibility for maintenance and repair of units, components and circuits with minimum inconvenience. Illumination levels, including emergency systems, are planned for and provided by the AAC. The specifications for computer flooring will be provided by AAC to the RTF contractor with the type of floor covering, floor vibration tolerances, loading, static electricity prevention, etc. Computer flooring will be provided as part of annex construction for the computer (backroom) area, not to exceed 3,000 square feet.

d. Cable Support Facilities. All cable trays, ladders, under floor ducts, etc. and associated hardware support facilities will be provided by the AAC.

All power and data signal cables and cable support hardware, including conduit (not including cable trays, ladders, etc.) needed for equipment interfacing, e.g., between equipment provided by RTF contractor and GFE consoles, will be the responsibility of the RTF contractor. The RTF contractor also provides connectors, technical information, etc. for power and communications interfacing.

e. Equipment Grounding. The contractor will be responsible for establishing the gounding requirements which must be approved by the AAC. The AAC provides one central grounding point (as shown

on the building plans provided the contractor) for equipment and signal grounds. The AAC will provide isolated grounding lugs on panels in the computer room and laboratories for power systems grounding. The RTF contractor furnishes and installs all grounding plates and conductors, and connects all equipment power and signal grounding cables to the plates. A determination will be made by the contractor whether separate equipment/signal grounding is required.

f. Equipment Interfacing and Checkout. The RTF contractor is responsible for accomplishing the equipment, communications and power interfacing as part of the hardware installation responsibilities. The RTF contractor also is responsible for testing the interfaces to insure that all equipment components and communications function as a system in accordance with specification and performance requirements.

g. Physical and Environmental Security. The AAC is responsible for providing the physical and environmental security for the RTF building and system. This includes such things as protection against the elements, unauthorized access and intrusion into areas within the building and the computer system, and providing physical safeguards to secure the RTF building area and computer system during non-duty hours, weekends and holidays.

77. TESTING. The objective of RTF testing is to achieve a reliable and secure operating basic radar training system that will enhance the present training and evaluation capabilities for training potential air traffic controllers at the FAA Academy. In addition, a thorough testing program will ensure that the RTF system meets its stated functional performance requirements and is capable of long term operation with or without future modifications. This section describes the testing required for the validation of the RTF system at the contractor's facility prior to delivery and at the AAC during system integration and acceptance.

a. Overall Test Philosophy. The overall test philosophy calls for complete hardware and software subsystem testing and system testing at the factory, followed by the system integration and testing of the hardware, software, procedures, etc. at the AAC. Because of the heavy reliance on communications during testing at the AAC, the RTF communications subsystem will be installed and tested by the time testing is to begin on the other RTF subsystems. Hardware subsystem testing is expected to precede software subsystem testing. Hardware testing of the RTF processor(s) and related peripheral devices will take into consideration the fact that identical hardware has been delivered to and accepted by a variety of customers and has, therefore, undergone extensive testing and field usage experience. In addition, the GFE portion of the system has also undergone extensive testing and operational usage. Any special hardware or interfaces which must be developed for the RTF system will undergo extensive testing. The hardware configuration available to the contractor is tested at the system development facility.

b. Testing Sequence. Software functions will be system tested at the contractor's facilities on the equipment that is used for system development. It must be recognized that the system configuration at the contractor's facility is smaller than the operational system will be at the Academy, i.e., fewer training consoles and other hardware. Factory system testing is completed prior to shipment of the hardware, software and support items. Following installation of the hardware, it is site tested at the AAC. Software installation, system integration and formal system testing for acceptance at the AAC occurs next followed by operational system shakedown testing.

c. Measuring Contractor Performance. Hardware and software tests are used as the principal basis for gauging the contractor's performance, determining the state of readiness for shipment and determining the completion of specified milestone events set forth in the contract. However, final acceptance for all items required by the contract occurs as the result of successful completion of operational (system) testing for RTF acceptance at the AAC.

d. Test Documentation. Each test will have associated with it the following documentation:

(1) Test Plans. The contractor provides the test plans for all testing through operational acceptance testing. This includes test specifications and test procedures.

(a) Test Specifications. The test plans and specifications are prepared during the production contract and are based on functional and performance requirements. They define the major tests which must be performed by the contractor and witnessed by the FAA, or their representatives, in order to gauge progress and for determining if and when the related terms of the contract are fulfilled. The test specifications emphasize the scope and the criteria for satisfactory completion of the required tests. The test plans, based upon the test specifications, describe how the contractor intends to satisfy the requirements of the test specifications.

(b) Test Procedures. The test procedures are based on the test specifications and test plans that have been mutually agreed upon by the FAA and the contractor. The test procedures provide a test script and step-by-step methodology for conducting each test and subtest, e.g., identifies all specific inputs and the expected output or other results.

(2) Test Data Sheets. During the conduct of testing, the test data sheets are used for recording the results of each test and subtest defined in the test procedures. A single test procedure might apply to all identical input/output terminals, with multiple copies of test records for the terminals. Test results may be verified automatically by special test/maintenance programs or may be verified by visual observation of data and/or graphic patterns displayed on a cathode ray tube or printed on other output devices. These expected results are defined in the test procedures and included as part of the test data sheets. The observed results are recorded on the test data sheets and are compared with the required results.

(3) Test Reports. Test reports include raw test results (data sheets, test logs, automatic data extraction and analysis outputs, etc.) and summarized (evaluated) test results. The test reports are prepared by the contractor and approved by the Program Manager or his duly authorized representative.

e. Combined Test Team. A Combined Test Team (CTT) will be responsible for observing and evaluating most of the RTF testing. Test Team membership will include contractor personnel and FAA representatives. The FAA representatives include ARD-100 personnel with support, as required, from AAC, APT, AAT, ALG, ASE, NAFEC/ANA, and others who may be under contract to represent the FAA. The conduct of all testing, however, is the responsibility of the contractor until final system acceptance at the AAC. Assistance from FAA may be required, however, in some testing, such as the operation of consoles during integration and system testing.

f. Scope of Testing. All items and services, e.g., hardware, software, documentation, system procedures, and system security controls provided by the contractor are to be tested and/or verified. Testing and verification will be accomplished for both on-line and off-line processing functions that include operational, maintenance, support and test capabilities. In addition, production unit tests will be performed on each unit procured. (Ongoing production unit testing may be acceptable for off-the-shelf equipment.)

g. Controls During Testing. Quality and configuration controls of all hardware, software and documentation will be maintained by the contractor throughout the testing activity.

h. Test Conduct. Tests conducted at the AAC will, whenever practical, be previously performed at the factory. The performance of these simulated site tests in the factory will include hardware, software, test procedures and test devices. The FAA may witness all tests or may designate a representative to witness specific tests. The FAA

may choose to accept written proof of satisfactory completion of certain factory tests in lieu of being present to witness the tests. If the FAA chooses not to witness a test, that test will still be formally conducted, evaluated and reported by the contractor.

The FAA requires reasonable testing of any system requirement in the contract documentation and the test requirements are expressly stated. New and changed requirements coordinated during RTF system development must be included in the test requirements and in the contractor prepared test documentation. The FAA and contractor may mutually require reruns of prior completed tests where it is judged that correction of a test deficiency may impact the results of prior tests.

i. Sequence and Description of Testing. Seven testing activities are defined and described below:

(1) Hardware factory testing.

(2) Software factory testing.

(3) System factory testing.

(4) Hardware installation testing.

(5) Software installation and system testing.

(6) Site acceptance.

(7) Operational system shakedown.

In addition to these tests, an FAA JAI is conducted.

(1) Hardware Factory Testing. Hardware factory testing is a comprehensive verification that all contractor delivered hardware meets stated requirements. Where possible, all hardware related requirements will be initially verified at the factory. Where a complete test of a requirement is not possible or practical at the factory, a partial test of the design will be conducted to reduce the risk of encountering problems at the AAC by verifying as much of the design as possible. Where existing production tests are adequate, they may be used in this testing activity. A major objective of factory testing is to deliver equipment that can be integrated at the AAC with minimal impact to site activities and complete onsite testing according to schedules.

(a) Hardware Unit Testing. Unit testing is the first level of hardware production testing. All hardware units (on-line, off-line, and spares) are tested individually. In addition, all test devices must be unit tested prior to their use. Unit tests are to be conducted on hardware units both before and after they are integrated with other units. Unit testing also includes testing each of a unit's interfaces with other hardware units against the interface specifications defined in the documentation. Recorded or simulated test inputs may be used. Hardware and software test devices (e.g., input data or stimulus, interface simulators, etc.) may be used as part of the test configuration.

(b) Hardware Subsystem Testing. Hardware subsystem testing is an intermediate level of production testing. In subsystem testing, two or more hardware units are combined into a subsystem or subsystems are combined into higher order subsystems. Subsystem testing includes hardware interchangeability tests including the testing of combined contractor provided and GFE subsystem testing. Recorded, simulated or manual test inputs may be used. Both hardware and software test devices may be used as part of the test configuration.

(c) Hardware System Testing. System testing involves contractor supplied hardware in deliverable form integrated with the GFE. Testing may include visual/mechanical inspection, electrical, functional and performance testing in addition to other design verification tests. Recorded, simulated and manual inputs may be used. The test configuration may include hardware and software test devices. The acceptability of the hardware documentation is also verified.

(2) Software Factory Testing. Software factory testing is a comprehensive verification that all contractor delivered software satisfies system requirements. These requirements include functional and performance requirements for both on-line and off-line functions whether operational, maintenance or support in nature. Software documentation and system procedures are also verified. Where possible, all functional and performance requirements will be initially verified at the factory. Where a complete test of a requirement is not possible or practical at the factory, a partial test of the design will be conducted to reduce the risk of encountering problems at the AAC by verifying as much of the design as possible. A major objective of factory testing is to deliver a system that can be integrated at the AAC and become operational at the earliest possible time.

(a) Software Module Testing. Module testing (sometimes called unit testing) is the first level of software production testing. All operational, maintenance and support modules (on-line and off-line) are tested individually. In addition, all hardware and software test devices must be module or unit tested prior to their use. Module tests are to be conducted on software modules both before and after they are integrated with other modules. Module testing also includes testing each of a software module's interfaces with other modules against the interface specifications defined in the documentation. Recorded or simulated test inputs may be used. Hardware and software test devices may be used as part of the test configuration.

(b) Software Subsystem Testing. Subsystem testing is an intermediate level of production testing. In subsystem testing, two or more software modules are combined into a subsystem, or subsystems are combined into higher order subsystems. Recorded or simulated test inputs may be used. Both hardware and software test devices may be used as part of the test configuration.

(c) Software System Testing. Software system testing involves all contractor supplied software in deliverable form. The testing is conducted at the contractor's software production facility on the computer configuration that is to be installed at the AAC and with the GFE provided the contractor for system development. Training data similar to that to be used for training students at the Academy, e.g., problem scenarios and entries at the consoles, will be used. Recorded and simulated data may also be used. The test configuration may include hardware and software test devices. The acceptability of system procedures and documentation is also verified.

(3) Factory System Testing. Factory system testing begins after successful completion of hardware and software testing. All hardware, software, system functions, system performance, operating procedures, etc. will be verified during factory system testing. A 72-hour stability test and mean downtime test will be accomplished during this testing. The RTF (including contractor and GFE) hardware and software will be used during testing and training data similar to that to be used for training students at the Academy, e.g., problem scenarios and entries at the consoles, will be used. Recorded, simulated and manual inputs may also be used. The test configuration may include hardware and software test devices. In addition, a subset of the communications subsystem will be available during testing to make the factory system acceptance testing as realistic as possible. This communications subset will

be mutually agreed upon by the RTF Program Manager and the contractor. The acceptability of all documentation is also verified as a part of factory system testing. The hardware, software, documentation, maintenance/test tools and spare parts will be shipped to the AAC following successful testing of the RTF system at the factory.

(4) Hardware Installation Testing. The purpose of hardware installation testing is to verify that the hardware operates in the final site environment (power, air conditioning, etc.) as it did in the factory. This activity is a test of the installation effort as well as a test of equipment operation in the operational equipment room environment. The communications subsystem is installed and tested in time for its use during hardware checkout and testing. Hardware installation testing includes such areas as follows:

(a) Inventory of all equipment, test support items, spare parts, special tools, test equipment and documentation.

(b) Verification of installation (hardware and communications) including checks of such items as mechanical installation, electrical continuity, grounding and compliance with specified standards.

(c) Hardware unit tests.

(d) Hardware subsystem tests.

(e) Hardware system testing including the integration of the subsystems and the testing of the communications subsystem.

(f) Electromagnetic interference testing as required to insure system operation within the AAC environment without interference.

All contractor supplied and government furnished equipment is integrated and tested. This testing may exclude operational software but does allow test software. Use of hardware and/or software test devices is also allowed. Final testing will include operation of the total RTF hardware configuration. Recorded or manual inputs may be used. This testing establishes a sound hardware baseline for proceeding to the next level of testing.

(5) Software Installation and System Testing. This testing combines the software tested at the factory with the hardware configuration at the AAC. The test configuration includes the contractor delivered hardware, software and the full complement of GFE for the RTF laboratories. Following a period of software installa-

tion and testing by the contractor, formal testing will commence. This testing demonstrates operation with all software, hardware and the RTF data base. (The communications subsystem is used extensively during this testing.) Both functional and performance tests will be conducted and verified. A specific performance test to be conducted is a 72-hour stability test of the system hardware and software. The configuration for this test will include all RTF contractor supplied equipment, GFE and communications. The data base, problem scenarios and inputs will be the same as that which will be used for student training. This, however, does not eliminate the use of test and simulated data for some aspects of the testing. The AAC will provide support during this testing, e.g., developing problem scenarios and providing console operators during periods of testing. This will be carefully coordinated with the contractor.

(6) Site Acceptance. When sufficient confidence is gained in the functional operation, stability, performance and integration of the RTF system, the final test of readiness to begin operational testing is conducted. This testing is a maximum system functional and performance test with all I/O devices connected and in operation. This testing will require the use of the actual data base, training problem scenarios, actual inputs and the communications subsystem. The AAC and the Combined Test Team will provide assistance during testing by operating the consoles and conducting training exercises. Completion of this and all previous tests represents acceptance of the RTF system and the beginning of the system shakedown period and operational use.

(7) Operational System Shakedown Testing. During operational system shakedown testing, the RTF system is integrated with the personnel and procedures involved in training, maintenance and support functions. During the early part of system shakedown testing, it is expected that the system will be used for some instructor and hardware maintenance training. It is expected that the student training capability will be phased in during system shakedown and as confidence and proficiency increase, this period of operation will extend to a full capability in using the system for training. Specific items to be addressed include:

(a) Validation of RTF functions.

(b) Validation of system procedures.

(c) Proficiency development of support personnel (software maintenance, utility functions, logistics support, etc.).

(d) Proficiency development of instructor personnel.

(e) Proficiency development of hardware operators and maintenance personnel.

(8) Joint Acceptance Inspection. The JAI occurs toward the end of the system shakedown period. It is a joint activity which is organized by the RTF Program Manager with representation from the FAA staff for maintenance and supply, training, software and ATC policy and support activities. The purpose of the JAI is to provide a joint review of the progress being made at the AAC in the use of the RTF for training and includes a review of maintenance and operating procedures, manning and skill levels of software and hardware maintenance personnel and the RTF instructor training and qualification levels. Other aspects of the program may also be reviewed, e.g., system security and student evaluation criteria development and application. In addition, the JAI ensures that previously encountered problems have been resolved.

j. Prerequisites for Conducting Tests. Each formal test activity has associated with it certain requirements that must be satisfied prior to the beginning of that test activity. The following prerequisites are generally common to all test activities.

(1) All test documentation for the test has been prepared, reviewed, approved and the final approved copy(s) delivered.

(2) The test has been successfully performed by the contractor prior to the formal test.

(3) Prior notification of the beginning of the test has been issued.

(4) All previous tests have been completed successfully and any outstanding problems are adequately resolved.

(5) Configuration control and quality control of the test configuration, including any hardware or software test devices, are current and any outstanding problems have been resolved.

(6) The communications subsystem is available for realistic communications during testing.

(7) Proper test personnel are available for the conduct of the test.

(8) A formal pretest inspection has been conducted to verify that all prerequisites have been satisfied.

(9) The software, hardware, communications and procedures documentation is at the proper level and is available for testing. This is most applicable starting with factory system testing.

(10) The AAC personnel (instructors and operators) are trained to the level required to operate the system. This is most applicable with the start of system shakedown.

(11) The AAC and/or contractor maintenance support for software, hardware and communications have completed the required training and have achieved adequate proficiency in system maintenance procedures. This is most applicable for start of testing at the AAC.

k. Organizational Responsibilities. Most of the responsibilities for managing, observing and approving the testing are assumed by the Combined Test Team. Within this test team, however, some responsibilities are associated with the FAA and their representatives while other responsibilities are associated with the contractor. The responsibilities are defined below as contractor, joint (contractor and FAA) and FAA.

(1) Contractor Testing Responsibilities. The following are contractor testing responsibilities:

(a) Preparing and delivering draft and final acceptance test specifications, test plans, test procedures, test data sheets and test reports for all testing except system shakedown testing and JAI.

(b) Conducting all testing except system shakedown and JAI.

(c) Providing notification prior to the start of each test for all testing except system shakedown and JAI.

(d) Solving RTF test problems.

(e) Providing for configuration and quality controls through all testing except system shakedown and JAI.

(f) Providing all hardware, communications and software test devices used in testing.

(g) Maintaining hardware, communications and software and providing spares for non GFE during all testing except system shakedown and JAI.

(h) Providing all hardware, communications and software test support items and all supporting documentation.

(i) Providing equipment areas and test areas for all factory tests.

(j) Providing office space near the test activity for FAA personnel and FAA respresentatives during all factory testing.

(k) Identifying property proposed to be furnished by FAA for factory testing and site testing.

(l) Providing technical support to the FAA during system shakedown testing.

(2) Joint Contractor/FAA Testing Responsibilities. The following are joint contractor/FAA testing responsibilities:

(a) Completing pretest inspection to verify prerequisites.

(b) Planning all testing activities.

(c) Coordinating system implementation at the AAC.

(d) Providing test management.

(e) Providing ongoing assessment of testing activities.

(3) FAA Testing Responsibilities. The following are FAA testing responsibilities:

(a) Providing acceptance test guidelines.

(b) Reviewing and approving all contractor prepared test documentation.

(c) Providing test observers for all tests. In addition, provides GFE maintenance, system operations and console operators when testing starts at the AAC.

(d) Determining whether or not testing has been successfully completed; if test failures occur, specifying the corrective actions required to complete successful testing.

(e) Providing FAA furnished property to the factory and to the AAC.

(f) Providing test documentation for system shakedown testing and JAI. This includes test specifications, test plans, test procedures, test data sheets, expected test results and test reports.

(g) Conducting system shakedown and JAI testing.

78. SOFTWARE MAINTENANCE. It is the objective of the FAA to develop an in-house capability at the AAC to perform all RTF software maintenance. It has been determined that contractor software maintenance support will be required beyond system acceptance because of the size and complexity of the computer programs. Furthermore, complete documentation for the operational programs, program lists, etc. for the real time training system will not be available from the contractor until system acceptance. There will, therefore, be insufficient time and training resources to acquire an AAC personnel proficiency to accept total software maintenance responsibility by system acceptance. Contractor software maintenance and training support will, therefore, be provided for a period of time (estimated up to 1 year) after system acceptance. The software maintenance approach and planning is discussed in the following paragraphs.

a. Contractor Provided Software. The contractor provided software will consist of operational and support program packages.

(1) Operational Software. This software includes the real time operatinal programs which provide the simulation of a dynamic air traffic environment for the training and evaluation of potential air traffic controllers. Included under operational software are:

(a) Control Programs. This software will operate in a real-time environment and it controls the parameters necessary to provide realistic simulated ATC system interactions. It provides for controlling the training exercise by supervisory personnel through executing the functions of loading the training scenario, set date and time of day, start processing, freeze processing, restart processing and replay processing. The control programs also provide security measures to prohibit unauthorized persons from entering the system through consoles and peripheral equipment, and to prevent legitimate system users from accessing protected files (e.g., premature callup of student problems and making changes to student performance information recorded by the system), or modifying the control programs.

(b) Scenario Generation Programs. This software translates and processes defined training exercises into a form suitable for execution. This may be accomplished off-line and as a nonreal time operation.

(c) Flight Data Processing. This software provides the flight planning data processing, including the calculation of fix arrival times, determination of fix positions, flight plan extrapolation of aircraft positions and data transfer.

(d) Display Processing. This software maintains the display system data base and transfers information to the display subsystem in a form and at the time needed for displaying information during the training exercise. The display processing task obtains, filters (where required) and organizes data from various records and tables to provide the appropriate information to the displays. Information displayed include such things as simulated primary radar and beacon targets, tabular lists of aircraft being controlled, trackball symbol, en route geographical map data and system preview area for keyboard entry. The display processing software also accepts and processes the data entry messages from the consoles.

(e) Program Monitor. This software provides control resources management over the hardware system configuration, monitors processing performance and provides a real time executive monitoring and control service for the applications programs.

(2) Operational Support Software. This software provides all the support tools necessary for the production, testing, maintenance and analysis of the RTF. Included under operational support software are:

(a) Assembler and Compiler. This software provides the means for program development and for program maintenance.

(b) Builder. This software provides for linking separately assembled or compiled tasks and data bases with the program monitor (executive).

(c) Editors. This software enables the user to generate and edit symbols (source) programs in either assembler or compiler language.

(d) Interpreters. This software provides an on-line interpretative execution feature to facilitate on-line program debugging.

(e) Utility Programs. This set of software packages include a system loader and source program updates. It also includes programs to perform the common functions of sort/merge, copy, compare, etc.

(f) Data Recording and Analysis. This software provides the capability to establish a stored record of events, to allow output of the stored data on a selective basis, to provide a summary of the selected events and to permit the addition of statistical data analysis at a later time.

(g) Debugging Aids. This software provides the capability to verify, change and dump memory as an aid in tracing and diagnosing software and hardware problems.

(h) Diagnostics. This software provides a set of equipment oriented programs which include the necessary diagnostic programs to meet the maintainability requirements with fault location to the board level.

(i) Test Software. This software provides a capability for testing both software and hardware. It includes the software developed by the RTF contractor for performing tests during development and testing activities and off-the-shelf and proprietary software which is needed for testing.

b. Maintenance of Operational Software. The maintenance of the operational software is an important and complext task which requires a significant amount of attention from the contractor during the period of installation and early operation, and from the AAC beginning during acceptance testing and early RTF operation. The activity level of software maintenance can be expected to be high during the early use of the system and diminish as software discrepancies are uncovered through testing and operational use of the system over an extended period of time. Early software maintenance may also include refinement and optimization of the design through minor changes in the software due to revised operating procedures and requirements not anticipated or defined by the system requirements. The AAC organizes a software maintenance activity to assume maintenance responsibility from the contractor. The personnel resources and training requirements are defined in Chapters 5, Personnel Resources and 6, Aeronautical Center Personnel Training. Contractor maintenance support will be provided on the operational software estimated up to one year following system acceptance. During this period of time, the contractor will provide both classroom instructions and OJT in the operational software; software documentation will be reviewed and used for familiarization and training and to insure its adequacy for continuing software maintenance. In addition, software maintenance procedures will be developed and/or refined during the contractor to AAC transitional period.

c. Maintenance of Operational Support Software. The AAC maintains the operational support software. It is expected that much of the operational support software will be standard off-the-shelf computer program packages and that standard customer training programs exist for the use and maintenance of this software. It is expected, therefore, that the AAC software staff will acquire an early capability in the operation and maintenance of the operational support software. Further, it is expected that updates and improvements to the support software will be provided on a continuing basis from the contractor to the AAC as a regular customer service.

79. - 80. RESERVED.

81. RADAR TRAINING FACILITY ANNEX.

The Administration Review Board (ARB) on November 29, 1976, approved a new lease constructed annex for the RTF. The DOT approved the annex on March 16, 1977. This annex will provide approximately 46,000 gross square feet which will give no less than 30,000 square feet of assignable space to conduct basic radar training in the RTF. The annex is to be two floors above ground and a full size basement below ground level. It is to be constructed and funded by the Oklahoma City Airport Trust of Oklahoma City, and leased to the AAC for its use as the RTF. The annex is to be built to FAA specifications. The initial functions which will be housed in the annex are as follows:

(1) Four RTF Laboratories

(2) RTF Pilot Rooms

(3) RTF Computer Equipment Room

(4) Classrooms for Phase II Training, i.e., Fundamentals of Air Traffic Control

(5) Software Maintenance

(6) Scenario Development

(7) Test Workroom

(8) Conference Room

(9) Storage

(10) Shop and Maintenance Support

(11) Student Lounge

It is estimated that some reserve capacity will be available (approximately 4,200 square feet) at the time the RTF is first implemented. This may be used for program expansion or to help meet the needs of future training programs.

82. SPACE PLANNING AND ARCHITECTURAL ENGINEERING.

a. Space Planning. The AAC has primary responsibility for developing the detailed plans for the utilization of the RTF annex. This includes detailed floor plans showing: Proposed location of functions; position of equipment in the laboratories and in the equipment room(s); partitions; hallways; stairways; elevators, etc. These will be drawn to scale and will depict the location of

equipment and furnishings. The RTF Program Manager provides support, guidance and coordination during this planning activity and arranges for consulting support as may be needed from one or two selected Regions and NAFEC/ANA to assist in the layout of the RTF laboratories and in other areas as may be required. The Program Manager is provided copies of the building plans.

b. Architectural Engineering. Following Office, Secretary of Transportation (OST) approval of the project, the AAC provides the Oklahoma City Airport Trust organization with building specifications for accomplishing the architectural engineering. During this phase, the AAC provides the day-to-day interface, guidance and coordination with the Trust. The RTF Program Manager is kept informed by AAC during this phase and is provided copies of appropriate material as requested.

83. GENERAL PLANNING CONSIDERATIONS

a. Space Planning for Students and Academy Staff. The capacity for each training cycle is 576 students (288 en route and 288 terminal). For space planning purposes, the assumption is that the annex will provide classroom space for these en route and terminal students during Phase II of their training, i.e., 4 weeks of instructions in the Fundamentals of Air Traffic Control. The class size will be 48 to 50 students during Phase II training. Following completion of Phase II training, the class is arranged into groups of 18 students each during their classroom work. In order to accomodate the increase in the number of classes and the 7-week overlap between student input and graduation, available training facilities located in other buildings will be utilized for classroom training. So as to make the most effective use of the RTF, training will be conducted two shifts each day. Therefore, the maximum number of personnel involved in the training process to occupy space in the RTF annex is expected to be as follows:

(1) First shift time -- 0600 to 1430 hours

288	Phase II students
288	RTF Students
112	Instructors and AT support
2	Computer operators
16	Special program students
5	Special program instructors
10	Equipment maintenance
4	Software maintenance
725	Total

(2) Second shift -- 1530 to 0000 hours.

288	Phase II students
288	RTF students
98	Instructors and AT support
7	Equipment maintenance
4	Software maintenance
2	Computer operators
687	Total

(3) Third shift -- This shift will be utilized for software and hardware maintenance, scenario development and other training support activities.

b. Net Space Summary. The following represents a preliminary estimate of space requirements, to be used for planning purposes. It is expected that some change will occur during the detailed planning of the space.

Radar Laboratories	5,000 square feet
Pilot Rooms	3,500
Equipment Area	3,000
Classrooms	9,600
Program Maintenance	300
Scenario Development	600
Test Workroom	400
Conference Room	200
Storage	500
Shop and Maintenance Support	1,700
Student Lounge	1,000
Program Expansion	4,200
Total Net Assignable Space	30,000 square feet

c. Future Expansion. The location of functional activities should be planned so that future expansion of training equipment can be accomplished without a major disruption of training activities and incurring unreasonable costs.

84. SPACE PLANNING GUIDANCE.

a. Laboratories, Pilot Facilities and Support.

(1) Four laboratories: 2 terminal and 2 en route. For planning purposes, each laboratory should have a minimum uncolumned area of 23.5 feet wide by 50 feet long. This minimum area does not reflect space which may be required for future expansion resulting from additional training requirements or the installation of newly developed operational equipment required to keep the RTF current with field facilities. Space planning should include an area immediately adjacent to each laboratory to permit expansion to a minimum length of 65 feet. Each laboratory has the following sectors, positions and stations:

(a) Six training sectors are located in each laboratory. Each sector has a "D" (en route) or "HO" (terminal) manual controller position and an "R" position with space for each student to work, i.e., chairs, space for movement and space for the instructor to observe and conduct training assistance. Figures 8-1 and 8-2 are drawings of the RTF laboratories. The equipment at each training position is as follows:

1 Radar Training Position - En Route Laboratories. Each en route radar training position includes a PVD, a computer readout device (CRD), data entry and control devices, simulated radio and interphone communications. This equipment is the same as currently used in ARTCCs. In addition, voice recording equipment is located at this position. The training equipment is arranged along a single line for the six sectors.

2 Radar Training Position - Terminal Laboratories. Each terminal radar training position includes the ARTS III DEDS Type I console, simulated radio and interphone communications. In addition, voice recording equipment is located at this position. The training equipment is arranged along a single line for the six sectors.

3 Manual Controller Training Position - Terminal and En Route Laboratories. Each terminal and en route manual control training position includes simulated radio and interphone communications and standard M-1 flight data board assemblies. One flight strip printer is shared by two adjacent manual control training positions. This equipment is the same as currently used in operational ATC facilities. In addition, voice recording equipment is located at each manual controller training position. Within each laboratory, training equipment

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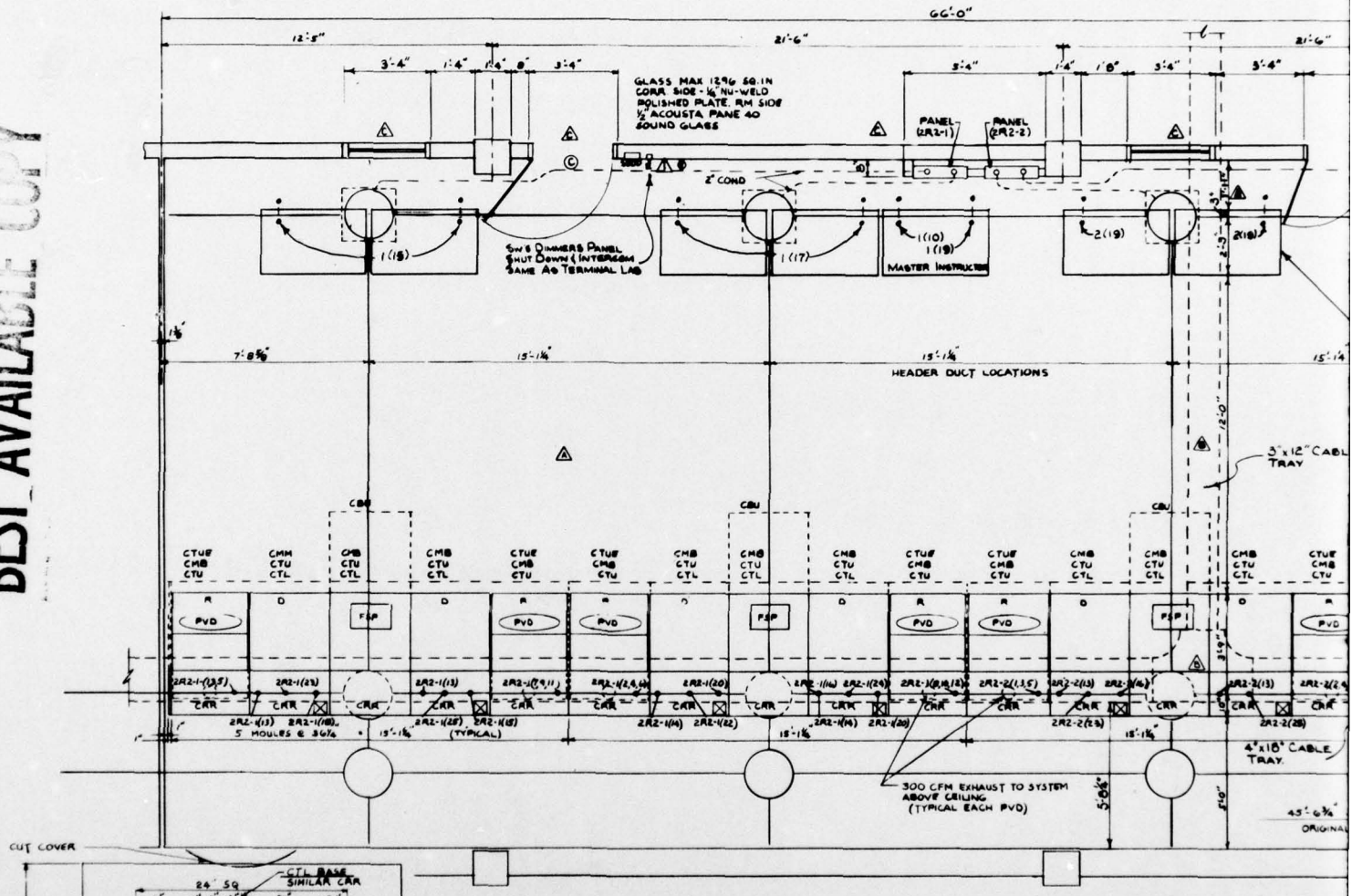
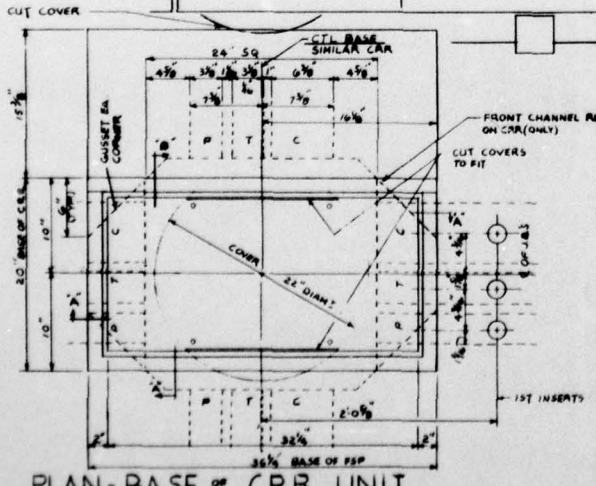
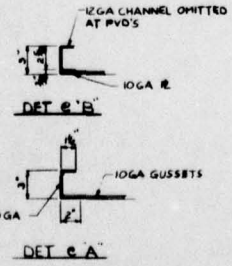
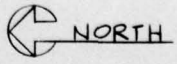








FLOOR PLAN

ENROUTE LABORATORY NO.

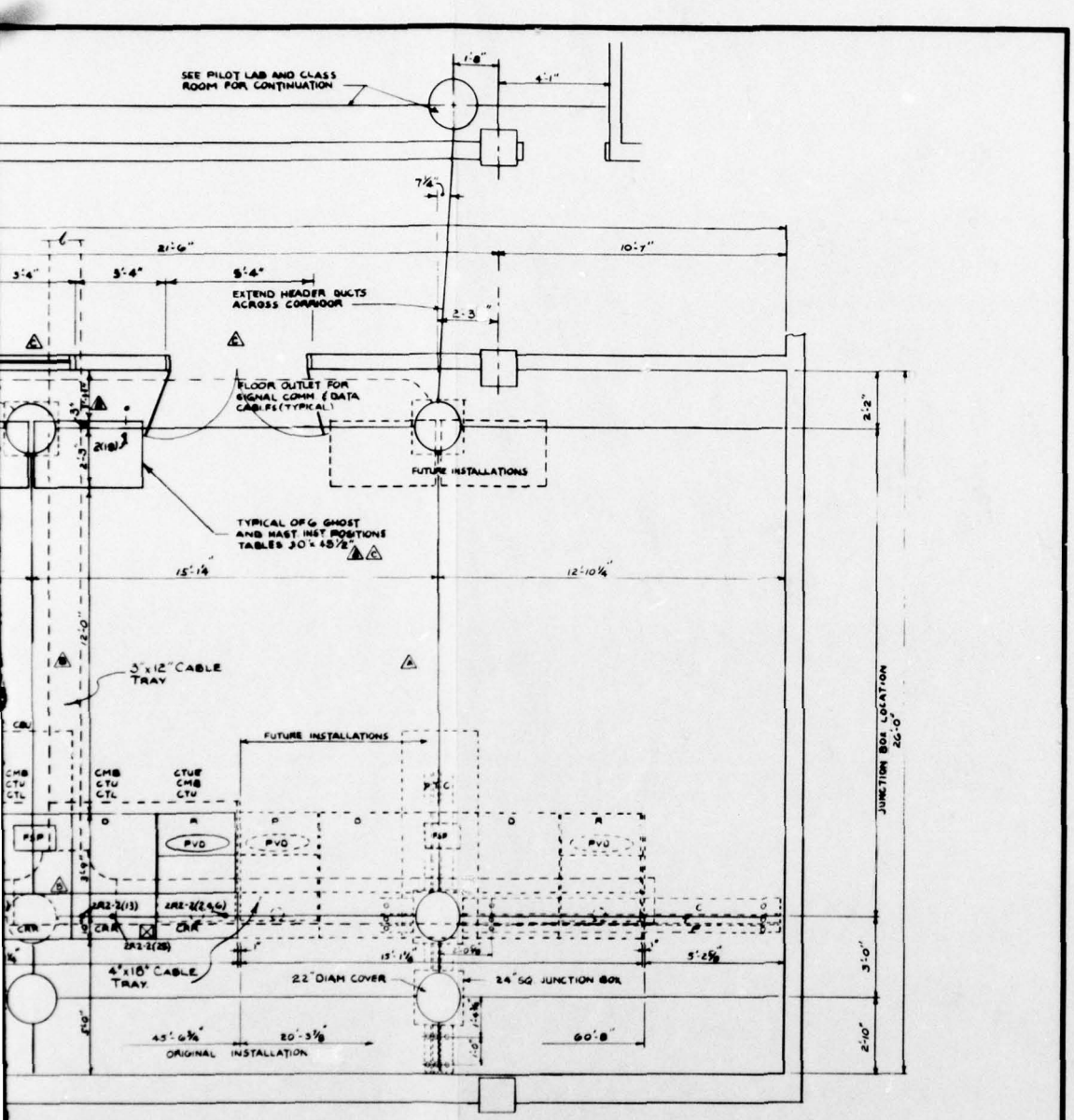
(LAB. NO. 2 SIMILAR OPPOSITE)

MODULAR CONSOLE TYPE M

SCALE ⅜"=1'-0"

NOTE:

EXACT LOCATION OF FLOOR POWER OUTLETS FOR PV UNITS WILL BE CRITICAL & WILL BE DETERMINED FROM "MOCK-UP" INSTALLATION. INSERTS WILL BE INSTAL WHERE NEEDED



RECAP OF MODULAR EQUIPMENT

15 EA.	CRR	
9 EA.	CTL	
15 EA.	CTU	
15 EA.	CMB	
6 EA.	CTUE	
3 EA.	CBU	
1 EA.	LH	PANEL FOR CRR
1 EA.	RH	PANEL FOR CRR
1 EA.	LH	PANEL FOR CMB
1 EA.	RH	PANEL FOR CMB
1 EA.	LH	PANEL FOR CTU
1 EA.	RH	PANEL FOR CTU

OR PLAN
LABORATORY NO. 1
2 SIMLAR OPPOSITE)
CONSOLE TYPE M 1-A
3/8" = 1'-0"
F FLOOR POWER OUTLETS FOR PVD
CAL (WILL BE DETERMINED FROM
ON. INSERTS WILL BE INSTALLED

REV LTR	DATE	DESCRIPTION	CHK'D	APP'D
1	8-21-77	RELOCATE GHOSTED DOORS	HD	BK
2	9-8-77	ADDED CABLE TRAY	HC	HD
3	8-31-77	OMIT FLOOR DUCTS	HC D	BK D

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
AERONAUTICAL CENTER OKLAHOMA CITY, OKLAHOMA

RADAR TRAINING FACILITY
DETAIL OF
ENROUTE LABORATORY

DESIGNED BY HCD	SUBMITTED BY	APPROVED BY
DRAWN BY CDA		
CHECKED BY	ISSUED BY FACILITY SUPPORT DIVISION AAC-50	DATE 8/15/77
WORK ORDER 77-770		DRAWING NO AAC-34-D-917 SHT 5 OF 19

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FIGURE 8-1
RTF EN ROUTE LABORATORY

2

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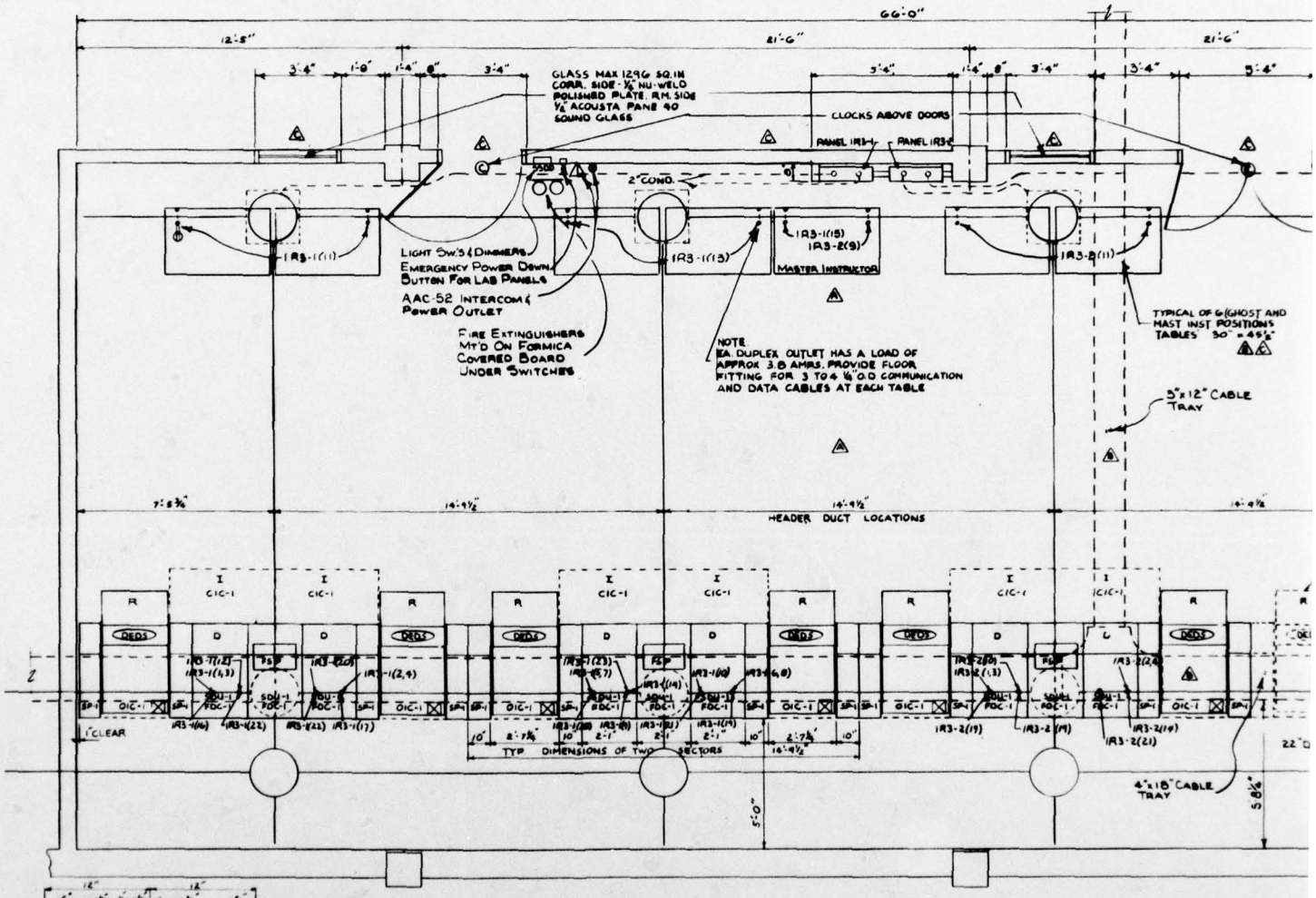
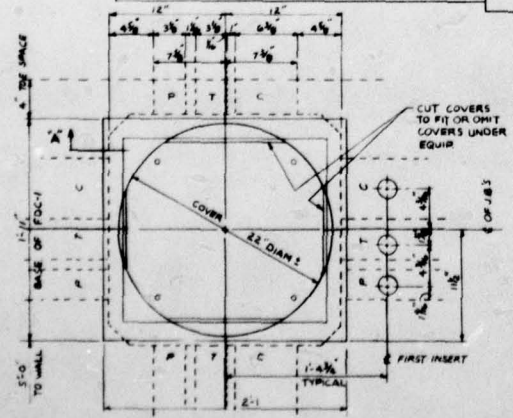


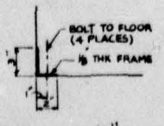


PLAN AT BASE OF FDC-1

SCALE 1½" = 1'-0"

RECAP OF MODULAR EQUIPMENT

- 12 EA. SP-1 & SP3-2
- 1 EA. SPP-1 RH
- 1 EA. SPP-1 LH
- 9 EA. FDC-1 & FDCS-2
- 6 EA. SDU-1
- 6 EA. CIC-1
- 6 EA. OIC-1
- 6 EA. DEDS



DETAIL AT "A"

NORTH

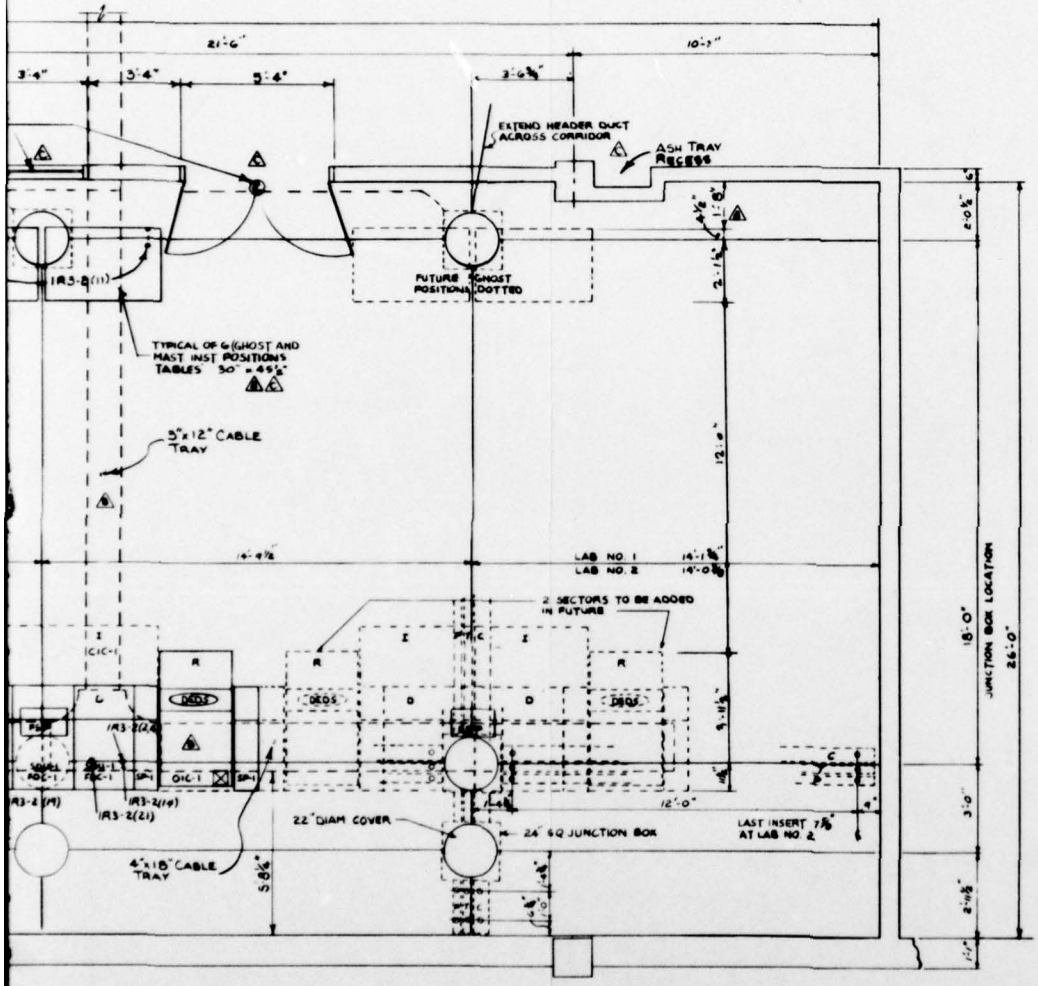
FLOOR PLAN

TERMINAL LABORATORY NO 1

(LAB NO. 2 SIMILAR OPPOSITE)

TRACON / RAPCON MODULAR CONSOLE (DEDS)

SCALE ⅜" = 1'-0"



OOR PLAN

AL LABORATORY NO 1

NO 2 SIMILAR OPPOSITE)

RAPCON MODULAR CONSOLE (DEDS)

3/8" = 1'-0"

REV LTR	DATE	DESCRIPTION	CHK'D	APP'D
A	9-8-77	RELOCATE GHOSTS (DOORS		
B	9-8-77	ADDED CABLE TRAY		
C	9-14-77	OMIT FLOOR DUCT		

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
AERONAUTICAL CENTER OKLAHOMA CITY, OKLAHOMA

RADAR TRAINING FACILITY
DETAIL OF
TERMINAL LABORATORY

DESIGNED BY M.C.D.	SUBMITTED BY	APPROVED BY
DRAWN BY GDA		
CHECKED BY	ISSUED BY FACILITY SUPPORT DIVISION AAC-60	DATE 8/16/77
WORK ORDER 77-770		DRAWING NO. AAC-29-D-917

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2

FIGURE 8-2
RTF TERMINAL LABORATORY

is arranged along a single line. Each pair of manual controller training position equipment is placed between the first and second; third and fourth; fifth and sixth "R" Consoles.

(b) Six instructor stations are provided in each laboratory located behind the ATC trainee positions. Each instructor station will have communications equipment consisting of a dual telephone jack, two six-button line access modules and a telephone instrument.

(c) Six ghost positions are provided in each laboratory. Each position has a console containing a tabular display, data entry keyboard and communications equipment. The work area consists of a console and chair. The communications equipment consists of a dual telephone jack, an interphone speaker, an indirect access dialer module, two six-button common control modules, three six-button direct access modules and a telephone instrument.

(d) One master instructor position is provided for each laboratory. Equipment of this position includes the master instructor position console containing a tabular display and data entry set (including function keys); interphone connection with each of the training sectors, the ghost positions, the pilot supervisors, the instructor positions in the laboratory and communications to the computer room. The communications equipment at this position includes a dual telephone jack, three six-button line access modules, a handset and a telephone instrument. The work area consists of the console and chair.

(2) Four pilot subsystems: two terminal and two en route. A minimum of 3,500 square feet should be planned for the pilot positions in rooms separate from the training laboratories. Each pilot subsystem has the following positions and station:

(a) Eighteen pilot positions associated with each laboratory (three positions for each radar training position) are preferably located in a separate room for each laboratory. Each pilot position consists of a console containing a tabular display, keyboard and communications equipment that consists of a dual telephone jack. A console and chair are provided at each pilot position.

(b) One pilot supervisor for each pilot subsystem is located with the 18 associated pilot positions. This position has a desk, chair and communications equipment that consists of a dual telephone jack, two six-button line access module, a handset and a telephone instrument.

(3) Support for the laboratories' operations is provided by the following:

(a) Some space should be planned for locating spare backup equipment within the annex convenient to each laboratory and the pilot rooms, e.g., spare PVD, tabular display/ keyboard and flight strip printer.

(b) A viewing area should be considered for a terminal laboratory and for an en route laboratory.

b. Equipment Area. The following will be located in the equipment area. It is estimated that 3,000 square feet of computer floor area will be required for the following items.

(1) Computers, peripherals and operator consoles.

(2) Digital character vector generators for PVDs.

(3) Data communications control units for flight strip printers.

(4) Video mappers for DEDS.

(5) Airport Surveillance Radar (ASR) common equipment rack -- 1 each.

(6) Digital Sweep Generator (dual) -- 1 each.

(7) Magnetic tape, disc, punch card, printer paper, etc. storage space.

(8) System monitor station.

(9) Communication subsystem equipment.

c. Classrooms. Approximately 9,600 square feet of classroom space is needed in the RTF annex as noted in paragraph 83.a.

d. Program (Software) Maintenance and Scenario Development. A total of 900 square feet of floor space is required for these activities, 300 square feet for software maintenance and 600 square feet for scenario development activities.

e. Test Workroom. A total of 400 square feet is estimated as needed for the student testing workroom.

f. Shop and Maintenance Support. Approximately 1,700 square feet of floor space will be required. This includes maintenance working space, space for maintenance consoles, spare parts storage, tools, test equipment and administrative space for maintenance management.

g. Other Space. In addition to the above space estimates, floor space is required for the following:

(1) Conference Room. A total of 200 square feet for the general use by the activities of the RTF.

(2) Storage. A total of 500 square feet for storage of training forms, training materials and general storage for other training support items.

(3) Student Lounge. A total of 1,000 square feet is planned for the general use by the students during training breaks.

(4) Program Expansion. A total of 4,200 square feet will be available for program expansion to meet future training needs.

85. FACILITY SUPPORT CONSIDERATIONS. Facility support includes, but not limited to, the following areas:

a. Hallways and Stairways. The width of the hallways and stairways should be sufficient to permit the free movement of personnel going in both directions; heavy student traffic volumes should be considered during the change of classes. In addition, the hallway widths, ceiling heights and floor texture should permit easy movement of RTF training equipment, e.g., PVD consoles, test carts, furnishings and other items. Hallway lighting should meet existing standards.

b. Freight/Personnel Elevator. A freight/personnel elevator is required to service the basement and the two floors above ground. It should be of sufficient size and loading capacity for the lifting of PVD with its transport and other training equipment, test carts, furnishings and other items to and from floors of the laboratories, equipment area, maintenance and other areas.

c. Loading/Unloading Facility and Entrance Ways. A loading and unloading facility should be provided for the receiving and shipping of training equipment, test carts, supplies, furnishings, spare parts and other support items needed for the RTF. The access doorways into the building and within the building to the laboratories, maintenance and other areas where the large size equipment must be moved should be large enough (width and height) to accommodate the equipment and transports used to move the equipment.

d. Utilities. The facility will include the necessary space, ducts, cable raceways, conduits, plumbing, etc. for the normal utilities of heating, air conditioning, toilets, telephone communications, lighting, power for equipment operation, custodial and other services. The air conditioning should be sufficient to carry the loads for equipment operations and personnel. The primary power for equipment

operations should be supplied from the annex distribution center by separate cables to which no other users are attached, e.g., air conditioning or elevator operation. Backup power systems need not be planned.

86. ENVIRONMENTAL CONSIDERATIONS

a. Laboratories.

(1) Cooling and Air Handling. The facility should include the air conditioning capacity, duct work and other air movement means for maintaining the required temperature and humidity controls in the laboratories. To avoid the need for raised flooring, a plenum in each laboratory for air exhausting from the training position equipment, e.g., PVD's and DEDS, should be provided. The temperature and humidity requirements for contractor furnished equipment (non-GFE) will be made available when the equipment is selected. A total of 30 persons including students, instructors, ghost position operators and maintenance personnel within a laboratory should be used for planning cooling requirements. A total of 20 persons in each pilot room should be used.

(2) Lighting. The lighting should be overhead and "soft", the brightness controllable, and it should not cause glare and/or reflections to occur at the consoles. Outlets for trouble lighting and work lighting should be provided for equipment maintenance and for extra lighting which may be needed at the various positions within the laboratories. Safety lighting should be provided in the event of power failure.

(3) Acoustics. Acoustical materials should be used for ceilings, floors and walls to absorb noises (voice communications). In addition, acoustical partial partitioning between groups of three pilot positions should be considered for noise suppression of voice communications.

(4) False Ceiling. The ceiling heights should be sufficient for the use of false ceilings in the laboratories. In order to avoid raised flooring, cable conduits and raceways, air ducts, electrical wiring, etc. may be installed between the false and permanent ceilings.

b. Equipment Area. There is a need for 3000 square feet of computer flooring for air handling and cabling for the contractor provided data processing equipment. There may also be a need for a false ceiling for cabling and duct work for air handling. The ceiling height should, therefore, be sufficient to accommodate this. The lighting should be overhead and meet illumination standards for equipment room operations. Emergency lighting should be provided in the event of power failure. Acoustical considerations should be taken

in areas where noise is generated such as printer and punch card equipment operation.

c. Shop and Maintenance Area. The environmental conditions for the maintenance area should be similar to those for the equipment area. The maintenance area should be adjacent to the equipment area for the convenience of communications, running diagnostics and testing. Easy access between the two areas should be provided to permit the movement of equipment, test carts, etc. for the performance of testing and maintenance.

d. Classrooms. Environmental conditions should meet standards for classrooms for such things as temperature, humidity, lighting and space.

87. CABLE SUPPORT. The design of the RTF annex should take into consideration the cable support facilities required. This includes cable trays, ladders, conduits, etc. for the RTF equipment operations and communications subsystem. This includes cabling (power, data channels, voice) required within each laboratory and between the laboratories and the equipment area and the maintenance area. The distances between the laboratories, including pilot positions, and the central data processing equipment located in the equipment area should be such that interconnecting cable lengths will be no greater than 300 feet.

88. EQUIPMENT PHYSICAL DESCRIPTION.

a. Physical Dimensions and Weights.

(1) Government Furnished Equipment. The dimensions and weights of the GFE are known to AAC. Space planned for GFE should provide for maintenance access, and ease of replacing units, e.g., replacing a complete PVD unit. Floor construction should take into consideration equipment weights for their operation and movement within the facility.

(2) Contractor Provided Equipment.

(a) Data Processing. The dimensions and weights of the data processing equipment to be located in the equipment area will not be known until a contractor is selected. It is estimated, however, that the 3,000 square feet planned for the equipment area will be sufficient to accommodate the equipment, with sufficient spacing to permit access for maintenance. Floor loading should be no greater than that required for GFE.

(b) Display Consoles. Exact dimensions of display consoles will not be known until a contractor is selected. It is estimated, however, that each console should not require more space than a size desk of 30" by 45 1/2" and 29" high at the pilot, ghost and master instructor positions.

b. Power and Air Conditioning.

(1) Government Furnished Equipment. The power (volts, amperes, kv.-a. and air conditioning (heat dissipation, B.t.u./hr.) are known to the AAC for GFE.

(2) Contractor Provided Equipment. The final power and air conditioning requirements for contractor provided equipment will not be known until the contractor has been selected.

89. SECURITY. Physical security is to be provided to prevent unauthorized entry into the laboratories and equipment areas. Physical security will also be provided to protect student records from unauthorized acquisition and use. This includes records which are in hard copy form and also records stored on magnetic tape, disc packs, cards or other media. In this connection, consideration should be given for providing a vault in the equipment room for the storing of tapes, disc packs and cards. The vault should have the same environmental characteristics as the equipment area.

90. CONSTRUCTION MANAGEMENT. The AAC is the FAA interface with Oklahoma City Airport Trust during the construction of the annex. The AAC provides the necessary day-to-day management and coordination activities during the construction. The Program Manager is kept advised of progress and problems during the construction period. The Program Manager also keeps the AAC advised of the latest delivery dates of the RTF system so that construction scheduling can remain consistant with the RTF system development and factory acceptance schedules. Appendix 3, RTF Annex, contains a copy of the floor plans for the RTF and the construction activities schedule.

CHAPTER 9. LOGISTICS

91. POLICY AND RESPONSIBILITY. This chapter provides the broad policy and planning considerations for the logistical support of the RTF during development at the contractor facility, delivery and site testing at the AAC and support following system acceptance. Responsive logistics support is paramount for the successful operation of the RTF for the AAC to meet the requirements of its ATC training mission.

a. Logistics Support Responsibility. The AAC has full responsibility for property management and accountability for all assets acquired in the program and for providing all logistical support (provisioning, spare parts, maintenance and repair, tools and test equipment, supply and maintenance management and equipment modifications) during the life cycle of the RTF system as defined herein. In doing this, the AAC follows established FAA-wide and, as appropriate, local procedures in providing logistical support.

b. Applicable FAA Publications. Policy guidance for logistics operations are provided in the following FAA publications:

(1)	Order 1800.30	Development of Logistic Support for FAA Facilities and Equipment
(2)	Order 2700.3	Accounting Principles, Concepts and Procedures
(3)	Order 4560.1	Initial Provisioning for Support of Facilities
(4)	Order 4620.1	Scheduled Overhaul of Ground Facilities Equipment
(5)	Order 4620.3C	Initial Support for New or Modified Equipment
(6)	Order 4630.2	Standard Allowances of Supplies and Working Equipment for National Airspace Facilities
(7)	Order 4650.17B	Guide for Non-FAA Activities Which Receive Supply Support and Service from the FAA Aeronautical Center (FAA Depot)
(8)	Order 6200.4B	Test Equipment Management
(9)	Handbook 4250.9	Field Inventory Management and Replenishment

(10) Handbook 4250.2A	Facility Equipment Records
(11) Handbook 4660.1	Real Property
(12) Order 4650.7-.30	FAA Depot Material Management
(13) Order 1800.8D	National Airspace Configuration Management
(14) Handbook 4650.7	Management of Project Material
(15) Handbook 4800.2	Utilization and Disposal of Excess and Surplus Personal Property

92. GOVERNMENT FURNISHED EQUIPMENT AND SERVICES. The government furnishes the following GFE and services to the RTF contractor for his use during system development and additional GFE to the AAC RTF site by the time the contractor delivers the equipment. The GFE provided to the RTF contractor for system development is shipped to the AAC RTF site by the contractor after factory system acceptance. The GFE requirements are listed as follows.

a. GFE for the AAC RTF Site. The GFE at the AAC site represents the total required for the RTF.

(1) NAS En Route Display, FAA Type 7912, with associated data entry and controls, and digital character vector generator (DCVG) for the operation of the en route laboratories -- 14 each. Two each of these units are for backup and off-line maintenance.

(2) ASR Common Equipment Rack -- one each.

(3) ARTS III Terminal Display, FAA Type 8320, with associated dual (28 sets) data entry and controls -- 14 each. Two of these sets are for backup and off-line maintenance.

(4) Digital Sweep Generator (dual) -- one each.

(5) Flight Strip Printer, International Business Machines (IBM) Type 1980 -- 14 each.

(6) Data Communications Control Unit, IBM Type 1051-02 (Teletype writer interface and control unit for IBM Type 1980 Printers) -- four each.

(7) Radar and Manual Posting Consoles, FAA Type M-1A, for en route laboratories for 12 "R" positions, 12 "D" positions, and overhead consoles for 12 instructor stations.

(8) Modular Consoles for terminal laboratories for 12 "R" positions, 12 "HO" positions and overhead consoles for 12 instructor stations.

(9) Type M-1A consoles to accomodate 12 Flight Strip Printers, i.e., six for en route and six for terminal laboratories.

(10) Video Mapper, 5-Channel, Type FA-8970 -- two each.

(11) Headset, Pacific Plantronics Starset, Model MS-80 (6 wire) -- 200 each for laboratory and support operations plus 20 percent spares or a total of 240.

(12) Recording and Playback Tape Cassettes. The type, quantity, etc. will be determined after evaluating contractor proposals and the selection of the contractor has been made.

(13) Office Furniture and Technical Supplies. These will be determined and acquired by AAC, using General Services Administration (GSA) standards where applicable. Office furniture includes such items as desks, chairs, tables, office equipment, etc. Technical supplies include such items as magnetic computer tapes, disc packs, punch cards, printer ribbons and paper.

b. Funding for GFE. The above listed items (paragraph 92.a) of equipment will be funded and acquired as indicated:

Item (1)	-- from current FAA inventory.
Items (2),(4),(7), (8),(9),(10)	-- procure with RTF project funds.
Item (3)	-- procure with RTF project funds; extended contract with Texas Instruments Corp.
Items (5),(6)	-- procure with RTF project funds; ordered under current IBM order contract.
Items (11),(12), (13)	-- provided by AAC through AAC budgeting.

c. GFE for the RTF Contractor Development Facility. The following items will be provided to the RTF contractor for his use at his facility for system development and testing. The items are listed from the listing in paragraph 92.a.

AD-A050 319 MITRE CORP MCLEAN VA METREK DIV F/G 17/9
RADAR TRAINING FACILITY PROGRAM IMPLEMENTATION PLAN, (U)
SEP 77 A ASCH, G BEEKER , L WUEBKER DOT-FA-69NS-162
UNCLASSIFIED FAA-ED-21-5 NL

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Item (1) -- two each.

Item (2) -- one each.

Item (3) -- two each.

Item (4) -- one each.

Item (5) -- two each.

Item (6) -- two each.

Item (7) -- units for two sectors.

Item (8) -- units for two sectors.

Item (9) -- two each.

Item (10) -- one each.

Item (11) -- 10 each.

d. *Shipping GFE to Contractor Facility.* The AAC is responsible, through coordination with the RTF Program Manager, for shipping the GFE to the RTF contractor facility. These shipping costs will be financed through RTF project funds. Shipments will be made direct from procurement sources to the RTF contractor wherever this becomes possible and where it is more cost effective to do so. All GFE will have accomplished any outstanding modifications and/or electronic equipment modifications(EEM) before shipment to the RTF contractor and/or before installation at the RTF. The AAC is responsible for completing all EEMs.

93. LOGISTICS SUPPORT. Logistics support is a continuing phase of operations beginning with development of the maintenance/support concept for the RTF. This includes the preparation of a procurement request which indicates a requirement for the contractor to provide certain provisioning documentation. It is essentially completed when the initial provisioning requirements have been determined and the documentation and material have been delivered to the AAC, stored and entered into the property accountability system. The individual item quantity requirements are to be predicated on a maintenance/support concept based on operational considerations, equipment redundancy and reliability factors derived from the approved system design.

a. Logistical Support for GFE.

(1) Support to the Contractor. The AAC provides spare parts support, special tools and special test equipment for GFE provided to the contractor for use during system development. The spare parts

will be provided on a reimbursable basis. The RTF contractor will be given a supply transaction code for usage accounting and billing. The inventory of spare parts remaining at the time of RTF shipment will be returned to AAC. The special GFE tools and test equipment will also be returned to AAC at the time of shipment of the RTF system. These will be inventoried and inspected by AAC for accountability and condition. Cost for any lost items will be reimbursed by the contractor. Damaged items will be repaired by the contractor before AAC acceptance. All GFE items returned by the contractor will be in operating condition in accordance with FAA standards.

(2) Documentation for GFE. The NAS Documentation Facility, ANA-64A, will provide the contractor with instruction manuals, drawings, maintenance procedures documentation, etc., to permit the contractor to perform normal maintenance on the GFE to be used during system development. The level of documentation will be the same as that provided to ARTCC and ARTS III facilities for field maintenance of equipment. The AAC will coordinate the delivery of the documentation with ANA-64A to insure it is delivered to the RTF contractor at the time the GFE is shipped. This documentation will be sent to AAC by the contractor when the RTF system is shipped following factory acceptance.

(3) Support to the AAC RTF Site. The logistical support for GFE, inventory control, usage accounting, etc., for the AAC RTF site will follow the normal FAA and AAC supply management procedures. The required quantity of onsite spares, tools and test equipment will be provided so that FAA maintenance on GFE can be accomplished at the time the RTF is delivered. The AAC will include the need for the RTF GFE spare parts and other support items in their requirements computations and procurement activities for both initial and follow-on support.

b. Logistical Support for Contractor Furnished Equipment. The contractor provides all logistical support for the non-GFE provided under the RTF system contract until system acceptance at the AAC. This includes the development and testing phases at the contractor facility and the time required at the AAC site for installation, test and evaluation and acceptance testing. Following system acceptance, the AAC provides all spare parts, supplies, tools and test equipment for the maintenance of all RTF equipment. Spare parts peculiar for the non-GFE will be located onsite.

94. SPARE PARTS PROVISIONING. Plans for initial spare parts provisioning and follow-on supply support are based on the maintenance concept and the operational characteristics of the RTF system. The basic maintenance concept, discussed later in this chapter, embodies the "replace-now-repair-later" principal. The onsite and depot level spare parts

provisioning will take into consideration the reliability and maintainability requirements of the RTF.

a. GFE Spare Parts Support. The AAC provides spare parts support for the GFE from current inventories and through the normal resupply procedures. The RTF site spares for the day-to-day maintenance will be determined through spare parts usage information for maintaining like equipment at the ARTCC and ARTS III facilities. This information may be adjusted to consider the requirements and features of the RTF which differ from the operational equipment in the Regions.

b. Contractor Furnished Equipment Spare Parts Support. As indicated above, the AAC spare parts support for the contractor furnished equipment (non-GFE) starts at system acceptance at the RTF site. The FAA RTF Program Manager coordinates with AAC for determining site spare parts peculiar. The AAC has the responsibility for determining depot stocks. The AAC will coordinate with the contractor through the FAA Contracting Officer in developing provisioning technical documentation in accordance with specification FAA-G-1210c, and for conducting provisioning conferences. The following criteria will be used for determining spare parts support.

(1) Site Spare Circuit Card Assemblies and Modules. The contractor provides as site spares a number of circuit card assemblies and modules equal to 10 percent of the total quantity of each type installed in the equipment, but not less than one, nor more than 10 of each type.

(2) Depot Spare Parts Peculiar. The contractor provides spare parts peculiar for depot stock in accordance with specification FAA-G-1375a. This specification will be modified in the solicitation to change paragraph 3.3.1 to show a minimum quantity of two each in lieu of three each as shown therein.

Note: Specification FAA-G-1210c details procedures for producing provisioning technical documentation as required by a line item in the contract. Specification FAA-G-1375a identifies the range and quantities of spare parts peculiar that the contractor must furnish for depot stock.

95. TEST EQUIPMENT. Test equipment is required for both GFE and non-GFE. The AAC provides all test equipment for the GFE. The RTF contractor coordinates with the FAA Contracting Officer, RTF Program Manager and AAC to provide test equipment for the contractor provided equipment.

a. Special Tools and Test Equipment. The special tools and test equipment are those not carried as a standard line by the contractor or another manufacturer. All special tools and test equipment for test and maintenance of the system not readily available on the open

market such as alignment wrenches, testing devices, jigs, special purpose test cables, printed circuit board (PCB) tester, circuit card extenders, etc., will be supplied with the equipment. The contractor submits for government approval a complete list of special tools and test equipment, the application of each and unit and/or component for which it is required. This will be submitted prior to fabrication or procurement of any specialized tools and test equipment for use at the RTF site. It is expected that the design of the equipment be such as to permit the use of standard tools and test equipment insofar as practicable. Instruction manuals or booklets will be provided to cover all special test equipment.

b. Printed Circuit Board Tester. The contractor provides PCB tester for equipment supplied under the RTF contract. The PCB tester package will include a complete set of test programs for all PCB's (contractor furnished). A spare parts kit will also be provided for the tester.

c. Standard Test Equipment. The contractor provides a list of standard test equipment which will be required, as a minimum, to maintain the system. The FAA Handbook 6200.4B, Test Equipment Management Handbook, will be used as guidance for providing the RTF test equipment. Normally, the contractor will not be required to provide the standard test equipment. The information in the contractor list will include, but not be limited to, the following for each item of test equipment.

(1) Intended use: e.g., measure volts, count pulses, etc.

(2) Ranges required.

(3) Accuracy requirements.

(4) Special parameters, e.g., short term drift, long term stability, temperature requirements, etc.

(5) At least three suggested sources of supply.

(6) Estimated cost (catalog prices) for single units and quantities.

(7) Estimated frequency of use.

96. WORKING EQUIPMENT. Working equipment other than the test equipment is to be acquired in accordance with the provisions set forth in FAA Handbook 4630.2, Standard Allowance of Supplies and Working Equipment for National Airspace Facilities. Deviation from this guidance may be necessary to meet special requirements of the RTF system. Any deviations will be coordinated with the RTF Program Manager.

97. EQUIPMENT MAINTENANCE. The general maintenance objectives for the RTF system are to ensure that the facility, equipment and communications can function continuously at an acceptable level of performance and that the maintenance of the system and associated environmental facilities is efficient, economical and responsive to the operational needs and requirements of the AAC training mission. The specific RTF reliability and maintainability requirements are defined in the RTF Engineering Requirements, ER-D-150-004. It is the specific objective to develop the capability to maintain the RTF system equipment with AAC assigned personnel. The AAC will be responsible for achieving these maintenance objectives.

a. Maintenance Concept. The equipment maintenance coverage must be such as to ensure RTF system reliability and availability two shifts per day, five days per week during training classes. This will require a qualified maintenance staff on site during RTF training exercises. Dynamic maintenance diagnostic aids must be provided to rapidly isolate malfunctions and the design must permit quick replacement of defective components to provide prompt service restoration (replace now -- repair later) in the event of failures. The system must also be available during nontraining periods for supporting training functions such as scenario development and maintenance, DR&A and software maintenance. The preventive maintenance, equipment modifications, etc., are to be accomplished during nontraining periods. The contractor provided equipment units which can be economically repaired will be determined through contractor recommendations, cost considerations and reviews by AAC. Repair factors are available for GFE. Unit repairs will be accomplished, to the extent possible, at the RTF site.

b. Maintenance Resources. The AAC assumes responsibility for maintenance of all GFE at the time of equipment delivery to the AAC. The contractor maintains all non-GFE until system acceptance as part of the procurement contract. Because of the long lead times anticipated to satisfy the personnel recruitment, selection and training requirements, it is planned to acquire contractor maintenance support for non-GFE following system acceptance at the AAC.

c. Contractor Maintenance. It is planned to acquire contractor maintenance for a six-month to one-year period for the non-GFE equipment following system acceptance. Contractor maintenance personnel will be onsite during RTF training exercises during the first six months and on call for the next six months to provide any maintenance support. The level of support required will be determined by the Program Manager in coordination with AAF and AAC after more information becomes available concerning the equipment to be provided by the RTF contractor.

(1) Contractor Provided Maintenance Training. During the first six months, emphasis will be placed upon developing an AAC

maintenance capability. This will be accomplished through formalized and OJT provided by the contractor (see Chapter 6, Aeronautical Center Personnel Training, for more detail). The contractor emphasizes OJT during the first six months as part of the maintenance contract. It is expected that the OJT will enable the maintenance technicians to become proficient in the maintenance procedures, use of diagnostic software and system concepts by the time the maintenance contract is terminated. The maintenance technicians are to work closely with the contractor personnel during equipment installation and all phases of testing to obtain experience early on the individual hardware components and the entire system.

(2) Oncall Maintenance Support. The contractor provided maintenance support which may be required beyond the first six months will be an oncall basis to provide assistance in the solution of maintenance problems which the AAC maintenance personnel cannot readily resolve. In addition, engineering support services may be required from the contractor beyond the six-month period following system acceptance.

d. Maintenance Reporting Records. Management systems of the maintenance activity require selected statistical data on component failures and on the resources required to perform preventive maintennace and corrective maintenance. This statistical information will assist maintenance management to assure continued adequate system performance in accordance with established standards. The initial maintenance standards and tolerances will be provided by the RTF contractor; FAA standards are available for GFE. The statistical data will be collected on the maintenance resource input and the system performance output.

(1) Input/Output Data. Input/output data permits updating preliminary estimates of systems maintenance manpower requirements, establishing operation and maintenance standards and developing maintenance routines.

(2) Initial Data. The effect of implementing a new system is of prime interest. Data gathering is to commence at the start of testing and system integration and checkout during the RTF site acceptance time period. Current report forms should be utilized.

(3) Record of Maintenance. To provide a complete record of maintenance activities in the RTF, the Facility Maintenance Log (6030-1) currently in use at the AAC is essential for new equipment in the automated categories. As RTF equipment becomes installed and accepted, the 6030-1 log is to be used by any party responsible for the maintenance function, including contractor personnel. AAC maintenance personnel are to assist the contractor in preparation of the 6030-1 log.

The maintenance manager or designee is to certify that the log is chronologically complete, legible and properly filled out by affixing his signature in the lower left corner of the log sheet.

e. System/Equipment Standards and Tolerances. Form 198 or equivalent is to be used to record all pertinent data regarding the technical operation of the RTF. Initial standards and tolerances are to be determined during the acceptance testing and system shakedown period. All required joint acceptance data are to be recorded by site test personnel on appropriate form(s) (FAA Form 198, etc.). The AAC is to utilize this listing as the basis for establishing RTF standards and tolerances.

98. SYSTEM/EQUIPMENT INSTRUCTION MANUALS. The contractor provides all instruction manuals for the maintenance and operation of the RTF system. These manuals are approved by the RTF Program Manager prior to the time the system is shipped to the AAC. The AAC provides staff support to the Program Manager by reviewing and commenting on all RTF instruction manuals. The review and approval schedule is shown in Appendix 1. The following are general characteristics and requirements for the instruction manuals.

a. General Description. Briefly describes the equipment as a whole, including the general mechanical construction and the basic principles upon which it operates. Characteristics of power requirement, list of equipment units or major assemblies, list of detachable accessories furnished, weight and overall dimensions of each unit of equipment are also defined.

b. Theory of Operation. Describes the circuits of the equipment and their operation and explains unusual or new circuit arrangements and special circuits. Functional block diagrams, simplified logic flow diagrams and simplified or partial schematics may be employed where they will clarify text.

c. Installation. Includes instructions for installing and interconnecting the various units. Power source requirements, connections, recommended size of circuit breakers and initial adjustments to place equipment in operation are also included.

d. Operations. Describes the functional operating procedures, including step-by-step instructions for starting and operating the equipment.

e. Preventive Maintenance. Includes all maintenance procedures and adjustments which should be performed periodically by technicians for the purpose of preventing failure or impairment of the equipment.

f. Corrective Maintenance. Includes all information necessary to permit a technician to locate trouble and to replace/repair or to make necessary adjustments to the equipment.

g. Parts List. Identifies all parts in order to make possible procurement of replacements without the necessity of contacting the equipment manufacturer.

h. Circuit Diagrams. Includes cabling diagrams, wiring diagrams, logic diagrams, integrated circuit diagrams and schematic diagrams as specified in the RTF Engineering Requirements, ER-D-150-004.

Note: Existing commercial manuals will be acceptable provided the above items, as a minimum, are included.

99. DISPOSITION OF EXCESS EQUIPMENT. Disposition of excess equipment resulting from the operational use of the RTF is to be accomplished by AAC in accordance with the provisions of Handbook 4800.2.

100. RESERVED.

CHAPTER 10. DOCUMENTATION

101. DOCUMENTATION REQUIREMENTS. This chapter contains information concerning the documentation for the acquisition, implementation, operation and maintenance of the RTF. This includes documentation which is to be developed by both the RTF contractor and by the FAA. The documentation listings are identified and discussed for general reference and planning purposes in figure 10-1. More detailed information is included in the RTF Engineering Requirements, ER-D-150-004, for the contractor furnished documentation. Some of this documentation listed, e.g., reliability and maintainability, may not be required, depending upon the terms of the contract. The information shown in figure 10-1 includes:

a. Title and brief description for each document.

b. Organization responsible for producing the document.

c. Organizations to receive the documents.

d. Number of copies to be distributed.

e. Whether or not the document will be placed under FAA configuration management after system acceptance.

102. DOCUMENTATION DISTRIBUTION. The documentation from the contractor is distributed within the FAA by the RTF Program Manager until system acceptance at the AAC. The FAA produced documentation is distributed within FAA through use of established procedures. Following system acceptance, the AAC will be responsible for RTF documentation maintenance. Established FAA documentation maintenance and control procedures will be followed. The NAS Documentation Facility will provide a library service in accordance with FAA Order 1750.6. The schedule for documentation and specific responsibilities are included in Appendix 1, Major Milestones and Schedules.

103. - 110. RESERVED.

FIGURE 10-1
DOCUMENTATION REQUIREMENTS

DOCUMENT DESCRIPTION	RECIPIENT	COPIES	CONFIGURATION MANAGED
1. DEVELOPED BY CONTRACTOR.			
a. RTF Design Data.	ARD-100	5	No
	ALG-300	2	
Includes block diagrams, information logic flow diagrams, input/output details and interfaces for the RTF equipment; this documentation for the RTF hardware will reflect the design approach to the total RTF design.	AAC	2	
	AAF-600	1	
	APT-300	1	
	AAT-500	1	
	ALG-400	2	
b. Computer Program Design Data.	ARD-100	5	No
	ALG-300	2	
Includes the computer program organization and design specifications, subprogram descriptions and both external and internal data formats. Specific documents are as follows:	AAC	2	
	AAF-600	1	
	APT-300	1	
	AAT-500	1	
	ALG-400	2	
(1) System Functional Specifications.			
Provides a general system description of the applications programs; detailed functional description of each function to be performed; system checks and protection features to insure system operational integrity; system data base requirements; system acceptance criteria and provisions for expansion of the software system.			

FIGURE 10-1
DOCUMENTATION REQUIREMENTS

DOCUMENT DESCRIPTION	RECIPIENT	COPIES	CONFIGURATION MANAGED
(2) Software Design Specifications. Provides a description of the software design philosophy and requirements including: the software system overview; data base formats; storage locations; module definitions; memory management; nucleus system defining minimum number of software modules to achieve meaningful interactions; integration plan and acceptance test criteria.			
(3) System Module Documentation. Describes each software module in terms of purpose and functions to be performed including: internal logic; internal data structure; operating instructions and compiler/assemble and loading requirements.			
c. Instruction Manuals (Hardware).	ARD-100	3	Yes (1)
	ALG-300	1	
Provides instructions for operating and maintaining	AAC	10	
the system hardware including: a general description	AAF-200	2	
of the system; theory of operation, e.g., description	AAF-600	2	
of the circuits of the equipment and their operation;	APT-300	1	
instructions for installing and interconnecting the	AAT-500	1	
various units; environmental requirements; instructions	ALG-400	2	

(1) That documentation which describes the design of the hardware.

FIGURE 10-1
DOCUMENTATION REQUIREMENTS

DOCUMENT DESCRIPTION	RECIPIENT	COPIES	CONFIGURATION MANAGED
c. Instruction Manuals (Hardware). (Continued) for starting and operating the equipment; description of preventive maintenance to be performed; diagnostic data; procedures for corrective maintenance and the spare parts list.			
d. Computer Programs and Operator Manuals. Includes all documentation needed by the FAA to maintain and make modifications to the computer programs; includes the following documents:	ARD-100 ALG-300 AAC APT-300 AAF-600 AAT-500 ALG-400 ASE-1	3 1 10 2 2 2 2 1	Yes
(1) Program Reference Manual.			
(a) Basic Reference. Includes the basic information to allow FAA personnel to maintain and make modifications to computer programs including: procedures for manual updating; description of conventions used in flow charts, table names, data names, etc.; explanations of hardware related programming factors such as input/output format and codes used; description of techniques used in modifying adaptation parameters for individual training exercises;			

FIGURE 10-1
DOCUMENTATION REQUIREMENTS

DOCUMENT DESCRIPTION	RECIPIENT	COPIES	CONFIGURATION MANAGED
(a) Basic Reference. (Continued) description of each subprogram, table definitions, storage allocation and subprogram flow charts and program listings.			
(b) Computer Program Functional Specifications. Defines functions to be performed, timing, accuracy and control requirements, interfaces, storage requirements, etc.			Yes
(2) Operator Manuals. Provides an operator with an understanding of the system configuration and with all of the information needed to operate the operational software programs, the input/output equipment and communications; includes all detailed procedures needed during operations to conduct and manage the RTF training exercises. Separate volumes for each of the following positions or stations will be provided. (a) Radar Controller Position (b) Nonradar Controller Position (c) Pilot Operator Position (d) Remote Facility Position			Yes

FIGURE 10-1
DOCUMENTATION REQUIREMENTS

DOCUMENT DESCRIPTION	RECIPIENT	COPIES	CONFIGURATION MANAGED
(e) Master Instructor Position (f) Instructor Station (g) Pilot Supervisory Station (h) System Monitor Position			
(3) Utility Program Reference Manual. Indicates all actions required to prepare, initiate and run programs for assembly; provides information for analyzing outputs from assembly; includes procedures for use of utilities such as dumps and loaders.			Yes
(4) Maintenance Program Reference Manual. Includes documentation and instructions in the use of software diagnostics and maintenance programs required by the operator and maintenance personnel.			Yes
(5) Programmer's Reference Manual. Describes computer instructions, commands and orders used in the operational machine programs; includes information on instruction timing, input/output operations and other data needed for the use and control of programs.			Yes

FIGURE 10-1
DOCUMENTATION REQUIREMENTS

DOCUMENT DESCRIPTION	RECIPIENT	COPIES	CONFIGURATION MANAGED
e. Reliability and Maintainability Documentation. Provides descriptions of contractor plans, procedures and controls to achieve the required reliability and maintainability of the RTF; documentation to be provided is as follows: (1) Reliability Program Plan. Includes a description of the contractor organizations, plans and procedures to insure the development and delivery of a reliable product. (2) Maintainability Program Plan. Includes a contractor maintainability program plan in accordance MIL-STD-470; describes contractor organizational, methods and procedural approaches to develop and deliver a system which meets maintainability requirements. (3) Reliability and Maintainability Progress Reports. Reports are submitted quarterly reporting on the status of all program elements; identifies problems and approach for problem solutions.	ARD-100 ALG-300 AAC AAF-200 AAF-600 APT-300 AAT-500 ALG-400	3 1 3 2 2 1 2 3	No

FIGURE 10-1
DOCUMENTATION REQUIREMENTS

DOCUMENT DESCRIPTION	RECIPIENT	COPIES	CONFIGURATION MANAGED
f. Progress Reports.	ARD-100	4	No
	ALG-300	1	
Includes monthly progress information on all aspects	AAC	3	
of the RTF project; reports problems, provides fore-	APT-300	3	
casts and other types of management information.	ALG-400	2	
g. RTF Implementation Documentation.			No
(1) Installation Plan and Report.	ARD-100	2	
	ALG-300	1	
Provides information for the preparation of the	AAC	5	
RTF area for installation of the equipment,	APT-300	1	
communications, maintenance and other facility	ALG-400	2	
requirements; includes, as an example, floor	ASE-1.	1	
plan layouts; physical description of equipment			
and requirements for power, cooling and ground-			
ing. The plan is updated following system in-			
stallation to reflect the "as built" record and			
the resultant installation report is submitted to			
the AAC after system delivery.			
(2) Test Plan.	ARD-100	3	
	ALG-300	2	
Provides plans and procedures for system testing	AAC	3	
at both the contractor facility and at the AAC	APT-300	1	
to demonstrate compliance with all functional,	AAF-200	1	
operational, electrical, mechanical and relia-	AAF-600	2	
bility requirements.	AAT-500	2	
	ALG-400	2	
	ASE-1	1	

FIGURE 10-1
DOCUMENTATION REQUIREMENTS

DOCUMENT DESCRIPTION	RECIPIENT	COPIES	CONFIGURATION MANAGED
(3) Test Reports. Provides results of testing for both factory and site testing.	ARD-100 ALG-300 AAC APT-300 AAF-600 AAT-500 ALG-400 ASE-1	2 2 3 1 1 1 2 1	
(4) Special Tools and Test Equipment Lists. Includes a complete listing of special tools and test equipment required for equipment maintenance; instruction manuals and booklets will also be provided to cover the use of special test equipment.	ARD-100 ALG-300 AAC AAF-200 AAF-600 ALG-400	2 2 5 1 1 2	
(5) Standard Test Equipment List. Provide a list of the standard test equipment required for equipment testing and maintenance.	ARD-100 ALG-300 AAC AAF-200 AAF-600 ALG-400	2 2 5 1 1 2	
2. DEVELOPED BY THE FAA.			
a. RTF Contract Documents. Provides engineering requirements for design, fabrication, test and installation of the RTF; includes contracted terms for the development, installation,	ARD-100 ALG-300 AAC APT-300 AAF ALG-400	5 5 5 1 1 2	No

FIGURE 10-1
DOCUMENTATION REQUIREMENTS

DOCUMENT DESCRIPTION	RECIPIENT	COPIES	CONFIGURATION MANAGED
a. RTF Contract Documents. (Continued)	AAT	1	
	NAFEC/ANA	1	
testing, reliability, acceptance and support by the contractor. (ARD-100 and ALG-300 have primary responsibility for preparation of documentation.)			
	AED-1	1	No
b. Program Implementation Plan	AOA-1	1	
	ADA-1	1	
Provides management guidance and direction for the acquisition and implementation of the RTF. (ARD-100 has primary responsibility for preparation of the SPP.)	ATF-1	1	
	ARD-1	1	
	ARD-100	5	
	ALG-300	2	
	AAC	5	
	AAT-1	1	
	AAT-300	1	
	AAT-400	1	
	AAT-500	3	
	AAF-1	1	
	AAF-200	1	
	AAF-600	2	
	ABU-1	1	
	ALR-1	1	
	ALG-1	1	
	ALG-300	2	
	ALG-400	2	
	APT-1	1	
	APT-300	3	
	ASE-1	1	
	NAFEC	5	
	Regions	2 ea	

FIGURE 10-1
DOCUMENTATION REQUIREMENTS

DOCUMENT DESCRIPTION	RECIPIENT	COPIES	CONFIGURATION MANAGED
c. Facility Plan. Includes architectural drawings and schematics; defines the structural, electrical wiring, air conditioning and other work required at the AAC for the installation and operation of the RTF training activities. (AAC has primary responsibility for preparation of the facility plan.)	ARD-100 ALG-300 AAC APT-300 ASE-1	2 1 5 1 1	No
d. AAC RTF Transition and Utilization Plan. Includes detailed guidance and direction, responsibilities and schedules for the AAC to achieve an orderly operational transition into the RTF. It defines activities and leadtimes for such things as personnel recruitment, facility preparation, instructor and maintenance training. It supplements the program information included within this PIP. (AAC has primary responsibility for preparation of the transition and utilization plan.)	ARD-100 ALG-300 AAC APT-300 AAT-500 AAF-600	5 1 20 2 2 2	No
e. System Shakedown Plan. Defines the system shakedown activities to be conducted at the AAC following system acceptance from the contractor. (AAC has primary responsibility for preparation of the system shakedown plan.)	ARD-100 ALG-300 AAC APT-300 AAT-500 AAF-600 ALG-400	2 1 5 1 1 1 1	No

FIGURE 10-1
DOCUMENTATION REQUIREMENTS

DOCUMENT DESCRIPTION	RECIPIENT	COPIES	CONFIGURATION MANAGED
f. Joint Acceptance Inspection. Defines parameter and data requirements necessary to complete the JAI; identifies organizations to participate in the JAI. (ARD-100 has primary responsibility for this documentation.)	ARD-100 AAC AAF-600 APT-300 AAT-500 ALG-400	2 5 1 1 1 1	No
g. FAA Form 198. Provides guidance, requires tests and criteria for recording pertinent data regarding the technical operation of the RTF for establishing standards and tolerances. (AAC has primary responsibility for the completion of this form.)	AAC	5	No
h. Logistics Support Plan. Includes detailed planning information for supply and maintenance support for the RTF equipment. Covers such things as supply and maintenance support provided onsite and depot level support; support provided to the RTF contractor for GFE and maintenance support expected from the contractor. (AAC has primary responsibility for the preparation of the logistics support plan.)	ARD-100 ALG-300 AAC AAF-200 AAF-600	2 2 10 2 1	No

FIGURE 10-1
DOCUMENTATION REQUIREMENTS

DOCUMENT DESCRIPTION	RECIPIENT	COPIES	CONFIGURATION MANAGED
i. Personnel and Training Requirements Plan. Includes training requirements and plans for training instructor, operator, software and hardware maintenance personnel required for the operation and maintenance of the RTF; identifies possible source for personnel and leadtime considerations; describes training requirements, source of training, training schedules, etc. for AAC personnel. (AAC has primary responsibility for the preparation of the personnel and training requirements plan.)	ARD-100 AAC APT-300 AAT-500	2 10 5 5	No
j. Laboratory Operation Procedures. Describes the laboratory operating procedures that are to be used during RTF student training exercises. This includes procedures for all laboratory positions and stations. Also includes procedures required of the equipment operators and hardware maintenance personnel during training exercises. (AAC has primary responsibility for the preparation of the laboratory operating procedures.)	ARD-100 AAC APT-300 AAT-500 AAF-200	2 20 5 5 2	Yes

FIGURE 10-1
DOCUMENTATION REQUIREMENTS

DOCUMENT DESCRIPTION	RECIPIENT	COPIES	CONFIGURATION MANAGED
k. **RTF Training Curricula and Procedures.** **Includes the development of the curricula for classroom and laboratory training, procedures for development of training scenarios and procedures to be used by students during RTF training exercises. (AAC has primary responsibility for the preparation of the RTF training curricula and procedures.)**	ARD-100 AAC APT-300 AAT-500	2 20 5 5	Yes

APPENDIX 1

MAJOR MILESTONES AND SCHEDULES

1. PURPOSE. This Appendix includes major milestone and schedule information for the RTF system development and its integration into the FAA Academy training functions. The information is presented in four parts: (1) a tabulation, figure 1, of the major events and activities, (2) a chart, figure 2, which graphically displays the schedule information for the principal activities of contract management and testing, (3) a chart, figure 3, which displays the schedule for the implementation and supporting activities of personnel planning, training, facility preparation, logistical support, system shakedown testing and (4) a chart, figure 4, which provides a summary schedule showing the major events and activities.

2. FIGURE 1, RTF MAJOR EVENTS AND ACTIVITIES. This table includes a listing of the major events and activities which must be completed for the RTF system development and implementation; the organizations (both primary and supporting) responsible for completing the activities; the date on which work should start for each event; the date on which completion is to occur in order to meet overall schedule requirements and remarks which further explain each activity. Each event is given an identification number in figure 1. The first digit of the event number corresponds to the chapter number within the body of the PIP, e.g., program management activities are discussed in Chapter 2. In addition, some cross referencing to ER-D-150-004 is done by showing the paragraph numbers of the ER in the remarks column of figure 1. This was principally done for documentation events for easy cross referencing in obtaining more information concerning the content requirements of the documents to be delivered by the RTF contractor. The events and activities are listed under main headings which correspond to chapters discussing these subjects within the body of the PIP as follows:

   a. General Program Summary (Chapter 1)

   b. Program Management (Chapter 2)

   c. Personnel Resources (Chapter 5)

   d. Aeronautical Center Personnel Training (Chapter 6)

   e. System Implementation (Chapter 7)

   f. Environment (Chapter 8)

   g. Logistics (Chapter 9)

   h. Documentation (Chapter 10)

3. FIGURE 2, CONTRACT MANAGEMENT AND TESTING SCHEDULE. This figure shows the schedule, in chart form, of the principal management and contracting activities and the major testing efforts that are required for the RTF system during its development and implementation. Both beginning and ending times are shown for the activities through the use of triangular symbols with connecting lines. The solid symbols emphasize the importance of certain activities, e.g., if slippage should occur in meeting the schedule for such an activity, the result would in all probability be a slippage in meeting the target date for system operation. The key to other symbols used are shown on figure 2. The time scale is shown across the top of the chart.

4. FIGURE 3, IMPLEMENTATION AND SUPPORTING ACTIVITIES SCHEDULE. This chart shows the schedule information for the supporting activities for system implementation, e.g., personnel planning and training, facility preparation and logistical support. As in figure 2, the starting and ending times for the activities are shown by the use of triangular symbols which are connected with lines. These supporting activities can be correlated with significant events from figure 2. As an example, certain manpower recruitment and training activities must be started during RTF system development in order to have qualified personnel by the time the system is delivered to the AAC.

5. FIGURE 4, SUMMARY SCHEDULE. This chart graphically shows the most significant events and activities for the acquisition and implementation of the RTF system. It includes the major events and activities shown on figure 2 and 3 to provide an easy reference to the most important schedule information. It presents the time interrelationships between the contract management, supporting, factory testing and acceptance testing activities. The events and activities numbers shown in figures 2, 3, and 4 are the same as those shown in figure 1. The beginning and ending times represented by triangle symbols in these figures are also the same as the dates shown in figure 1.

FIGURE 1
RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
1. GENERAL PROGRAM SUMMARY			
1.1 Complete add on functions.	(P) ARD-100 (S) AAC (S) AAT (S) APT (S) Contractor (S) NAFEC/ANA	(S) Feb. 15,1980 (C) Feb. 15,1981	Includes RTF development Phase II features of improved controller performance measures, interactive scenario preparation and improved data reduction and analysis.

FIGURE 1

RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
2. PROGRAM MANAGEMENT			
2.1 Prepare and submit RFP to prospective contractors.	(P) ALG-300 (S) ARD-100	(C) Mar. 15,1977	
2.2 Develop contractor selection criteria for use by Selection Evaluation Board (SEB).	(P) ARD-100 (S) PMS 1/	(C) Mar. 15,1977	Subgroups will support the SEB during the evaluation of the contractor proposals.
2.3 Hold preproposal conferences.	(P) ALG-300 (S) ARD-100 (S) AAC (S) APT (S) NAFEC/ANA (S) Prospective Contractors	(C) Apr. 1,1977	Includes answering questions prospective contractors may have and holding discussions concerning the RFP to insure prospective contractors' understanding.
2.4 Receive and evaluate prospective contractor proposals.	(P) SEB (S) Contractor Candidates	(S) June 1,1977 (C) Oct. 1,1977	Competitive range is determined during this evaluation.
2.5 Conduct candidate contractor audits.	(P) ALG-300	(S) Oct. 1,1977 (C) Dec. 15,1977	Candidate contractors which fall within the competitive range are audited for qualification.

1/ PMS = Program Management Staff, defined in Chapter 2.

FIGURE 1

RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
2. PROGRAM MANAGEMENT (Continued)			
2.6 Negotiate terms and prepare draft contract.	(P) ALG-300 (S) ARD-100	(S) Oct. 1,1977 (C) Dec. 15,1977	Final SEB report is also completed during this time period.
2.7 Make final source selection by Source Selection Officer (SSO).	(P) SSO (S) ALG-300 (S) ARD-100	(S) Dec. 15,1977 (C) Feb. 15,1978	Recommendations from SEB and ALG-300 are used by the Source Selection Officer.
2.8 Review and clear contract and make final award.	(P) ALG-300 (S) ARD-100	(S) Jan. 15,1978 (C) Feb. 15,1978	Includes final review and coordination of contract and making the award.
2.9 Appoint Technical Officer, Assistant Technical Officer(s) and Quality Reliability Officer for technical contract mgmt.	(P) ALG-300 (S) ARD-100 (S) AAC (S) ALG-400	(C) Feb. 15,1978	Includes appointing a representative of ARD-100 as the Technical Officer, representative(s) from AAC as Asst. Technical Officer(s), and representative from ALG-400 as QRO.
2.10 Establish functional interfaces between AAC, AAT and AAF	(P) AAC,AAT, AAF (S) ARD-100	(S) Mar. 15,1978 (C) May 15,1978	Establishes functional interfaces between AAC, AAT and AAF to insure that RTF properly reflects functional changes in the en route and terminal operational systems.
2.11 Assume configuration control responsibility.	(P) AAC (S) ARD-100 (S) AAF-40	(C) Feb. 15,1981	The AAC develops configuration mgmt. procedures and assumes config. control over hardware and software with the ending of Phase II.

FIGURE 1
RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
5. PERSONNEL RESOURCES			
5.1 Establish software maintenance organization.	(P) AAC	(C) May 15,1978	Develops a software organization for assuming software maintenance responsibility; includes organization and personnel classification positions to permit the selection and training of personnel. Also includes organization and personnel position requirements for computer equipment operators; staffing will be in accordance with approved personnel and training plans.
5.2 Establish hardware maintenance organization.	(P) AAC	(C) May 15,1978	Establishes a hardware maintenance organization for the RTF and integrates it into ongoing AAC maintenance responsibilities; includes organization and personnel classification positions for the selection and training of personnel; staffing will be in accordance with approved personnel and training plans.

FIGURE 1

RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
5. PERSONNEL RESOURCES (Continued)			
5.3 Develop and approve personnel requirements for RTF.	(P) AAC (S) ARD-100 (S) APT	(S) Feb. 15,1978 (C) July 15,1978	For computer equipment operators, maintenance technicians, system analysts, computer programmers, supply technicians, instructors, administrative and clerical. This activity conforms with the FAA requirements for personnel authorization and budgetary procedures.

FIGURE 1

RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
6. AAC PERSONNEL TRAINING			
6.1 Develop and approve AAC personnel and training requirements plan.	(P) AAC (S) ARD-100 (S) APT (S) Contractor	(S) July 15,1978 (C) Oct. 15,1978	Defines personnel and training requirements, source(s) of training, training schedules, etc. for instructors, operators, software and hardware maintenance personnel required for the RTF.
6.2 Conduct formalized hardware maintenance training.	(P) AAC and Contractor	(S) Nov. 1,1978 (C) June 15,1979	Includes training for GFE maintenance at the AAC and contractor provided training on non-GFE; training is accomplished in accordance with approved personnel and training requirements plan.
6.3 Conduct formalized software maintenance training.	(P) AAC and Contractor	(S) Nov. 1,1978 (C) June 15,1979	The contractor provides the formalized training; training is accomplished in accordance with approved personnel and training requirements plan.
6.4 Conduct formalized instructor training.	(P) AAC and Contractor (S) ANA	(S) Apr. 15,1979 (C) June 15,1979	Contractor provides formalized training, ANA may provide some instructor training.

FIGURE 1
RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
6. AAC PERSONNEL TRAINING (Continued)			
6.5 Conduct RTF operator training.	(P) Contractor (S) AAC	(S) Dec. 1,1979 (C) Feb. 15,1980	Contractor provides formalized and OJT at the RTF.
6.6 Conduct OJT for RTF instructors.	(P) AAC and Contractor	(S) Oct. 1,1979 (C) Apr. 15,1980	Conducted at the RTF site by contractor and Academy trained instructors; conducted during system testing and during system shakedown testing.
6.7 Conduct OJT for hardware maintenance.	(P) Contractor (S) AAC	(S) Feb. 15,1980 (C) Aug. 15,1980	Contractor provided OJT as part of a maintenance contract on non-GFE equipment; the Academy provides training on GFE maintenance.
6.8 Conduct OJT for software maintenance.	(P) Contractor (S) AAC	(S) Feb. 15,1980 (C) Feb. 15,1981	Contractor provided OJT as part of a software maintenance support contract.

FIGURE 1

RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
7. SYSTEM IMPLEMENTATION			
7.1 Provide RTF annex planning information to RTF contractor.	(P) AAC (S) ARD-100	(S) Oct. 1,1977 (C) Feb. 15,1978	Developed by AAC and includes preliminary information on proposed site including assignments of equipment locations, floor plan layouts, proposed cable routing, location of power, etc. see (3.9.7); coordinates with contractor during this period.
7.2 Prepare installation plan and report by contractor and submit to FAA.	(P) Contractor (S) ARD-100 (S) AAC	(S) Feb. 15,1978 (C) Apr. 15,1978	Provided by RTF contractor; includes all information necessary to permit system delivery and installation at designated location. The information to include all topics identified within (3.9.7).
7.3 Organize the combined test team (CTT).	(P) ARD-100 (S) PMS (S) AAT (S) AAF (S) ALG-400 (S) ANA (S) Contractor	(C) May 15,1978	Establishes a combined FAA test team to monitor and evaluate RTF testing activities at the factory and at the AAC.

Fig 1

FIGURE 1

RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
7. SYSTEM IMPLEMENTATION (Continued)			
7.4 Review and approve factory hardware integration test plan.	(P) ARD-100 (S) CTT	(S) May 15,1978 (C) June 15,1978	Provided by RTF contractor; includes test planning, procedures, criteria for the testing and integration of the RTF hardware at the contractor's development facility.
7.5 Conduct and approve factory hardware integration testing.	(P) Contractor (P) CTT	(S) July 1,1978 (C) July 15,1978	To insure an adequate hardware system for the factory development and testing of the RTF system.
7.6 Develop RTF transition and utilization plan.	(P) AAC (S) ARD-100	(S) Feb. 15,1978 (C) July 15,1978	Includes detailed guidance and direction, responsibilities and schedules for operational transition into the RTF. Defines activities and leadtimes for personnel recruitment, instructor and maintenance training and facility preparation.
7.7 Develop software maintenance procedures.	(P) AAC (S) ARD-100 (S) Contractor	(S) July 15 ,1978 (C) May 15 ,1979	Includes procedures for AAC assumption of software maintenance responsibility.

FIGURE 1

RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
7. SYSTEM IMPLEMENTATION (Continued)			
7.8 Review and approve system acceptance procedures and criteria.	(P) Contractor (S) ARD-100 (S) CTT	(S) Oct. 15,1978 (C) Jan. 15,1979	Includes developing procedures and criteria for accepting the RTF system at the factory and at the AAC.
7.9 Review and approve draft test plans for factory and site testing.	(P) ARD-100 (S) CTT	(S) Apr. 15,1979 (C) May 1,1979	Includes all functional, operational, electrical, mechanical and reliability requirements testing at the factory and at the RTF. Contents of test plan to include items identified within (3.9.8.1.1).
7.9.1 Submit final plans.	(P) Contractor	(C) June 1,1979	
7.10 Conduct and approve final software factory testing.	(P) Contractor and CTT	(S) June 15,1979 (C) July 15,1979	Includes all software testing for verification of quality, functions and reliability prior to system testing.
7.10.1 Submit final report.	(P) Contractor	(C) Aug. 1,1979	

FIGURE 1
RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
7. SYSTEM IMPLEMENTATION (Continued)			
7.11 Conduct and approve system factory testing.	(P) Contractor and CTT	(S) July 15,1979 (C) Aug. 15,1979	Includes all acceptance tests identified within the final test plan that are to be conducted at the factory.
7.11.1 Submit final test report.	(P) Contractor	(C) Sep. 1,1979	Includes a complete description of the test results after each test is conducted in accordance with the final test plan. See (3.9.8.2).
7.12 Place GFE in RTF laboratories for contractor hook-up.	(P) AAC	(S) Mar. 15,1979 (C) Aug. 15,1979	The ACC locates the GFE in the RTF laboratories to make up the full system complement of equipment with the equipment shipped from the contractor facility.
7.13 Review and approve updated test plan for onsite testing.	(P) ARD-100 (S) CTT	(S) Aug. 15,1979 (C) Sep. 1,1979	Includes revisions to factory test plan that may be needed for onsite testing.
7.13.1 Submit final test plan.	(P) Contractor	(C) Oct. 1,1979	

FIGURE 1

RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
7. SYSTEM IMPLEMENTATION (Continued)			
7.14 Pack and ship RTF hardware, documentation and support items to AAC.	(P) Contractor	(S) Aug. 15,1979 (C) Sep. 1.1979	The completion date is the date the equipment is to arrive at the AAC. The AAC provides the FAA contracting officer with specific site shipping address and any desired markings and handling instructions 10 weeks prior to delivery.
7.15 Develop system shakedown plan and procedures.	(P) AAC (S) ARD-100 (S) ANA	(S) July 1,1979 (C) Nov. 1,1979	Defines the system shakedown activities to be conducted at the AAC following system acceptance.
7.16 Accomplish installation and integration of hardware and communications.	(P) Contractor (S) AAC	(S) Sep. 1,1979 (C) Oct. 1,1979	Equipment (contractor supplied and GFE) is installed. The contractor provides connectors to AAC for hookup of RTF equipment to power cables 60 days before system delivery.
7.17 Conduct and approve hardware integration testing.	(P) Contractor, AAC and CTT	(S) Oct. 1,1979 (C) Nov. 15,1979	To verify that hardware operates properly within the RTF annex.
7.17.1 Submit final test report.	(P) Contractor	(C) Dec. 1,1979	

FIGURE 1
RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
7. SYSTEM IMPLEMENTATION (Continued)			
7.18 Conduct and approve software installation	(P) Contractor, AAC and CTT	(S) Nov. 15,1979 (C) Jan. 1,1980	To verify software operates on AAC system configuration and is without errors and is reliable.
7.18.1 Submit final test report.	(P) Contractor	(C) Jan. 15,1980	
7.19 Conduct and approve system acceptance testing.	(P) Contractor, AAC and CCT	(S) Jan. 1,1980 (C) Feb. 15,1980	Includes all acceptance tests identified within the final test plan that are to be conducted at the AAC.
7.19.1 Submit final test report.	(P) Contractor	(C) Mar. 1,1980	Includes a complete description of the test results after each test is conducted in accordance with final test plan. See (3.9.8.2).
7.20 Assume operational responsibility for RTF system.	(P) AAC (S) Contractor	(C) Feb. 15,1980	Formally assumes operating responsibility for the RTF.
7.21 Assume software maintenance and documentation responsibility.	(P) AAC (S) Contractor	(C) Feb. 15,1980	Assumes software maintenance by AAC at the end of system testing and acceptance; contractor support, however, continues for a period of one year.

FIGURE 1

RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
7. SYSTEM IMPLEMENTATION (Continued)			
7.22 Develop JAI procedures and criteria.	(P) ARD-100 (S) CTT	(S)Nov. 1,1979 (C)Feb. 15,1980	Includes plans and procedures for conducting JAI following completion of system shakedown.
7.23 Revise and deliver installation plan and report to reflect "as built" record.	(P) Contractor (S) AAC	(C)Feb. 15,1980	Includes all information to record "as built" conditions. Report to include all information contained within (3.9.7).
7.24 Conduct system shakedown testing.	(P) AAC (S) Contractor	(S)Feb. 15,1980 (C)April 15,1980	Accomplishes total system integration, e.g., data processing, communications, operations, training, procedures, maintenance and other support.
7.25 Conduct JAI.	(P) AAC (S) CTT	(S)April 15,1980 (C)May 1,1980	Accomplishes a review by the Headquarters Staff that the objectives of the system operational shakedown testing have been met.
7.26 Acquire contractor software maintenance support.	(P) ARD-100 (S) ALG-300 (S) AAC (S) Contractor	(S)Feb. 15,1980 (C)Feb. 15,1981	Provides contractor software support to AAC for software maintenance, software OJT, and for system enhancements.

FIGURE 1

RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
8. ENVIRONMENT			
8.1 Complete RTF annex floor and preparation plans (facility plan).	(P) AAC (S) ARD-100	(C) July 28 ,1977	Includes information on RTF annex site including assignment of equipment locations, tentative floor plan layouts, proposed cable routing, locations of power, information on access restrictions and loading constraints, etc. See (3.9.7).
8.2 Accomplish RTF annex architectural engineering.	(P) AAC (S) ARD-100	(S) June 1,1977 (C) Oct. 20 ,1977	Architectural engineering is provided through the Oklahoma City Airport Trust organization.
8.3 Complete RTF annex construction.	(P) AAC (S) ARD-100	(S) Dec. 22 ,1977 (C) Mar. 18 ,1979	Construction is accomplished through the Oklahoma City Airport Trust organization.
8.4 Complete RTF site preparation wor'	(P) AAC (S) ARD-100 (S) Contractor	(S) Jan. 1,1979 (C) Aug. 1,1979	Site preparation is completed for start of installation and checkout of the RTF system at the AAC; this preparation work is in specific support for the installation and operation of the RTF equipment and communications.

FIGURE 1

RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
9. LOGISTICS			
9.1 Complete contracting for GFE.	(P) ALG-300 and ARD-100 (S) AAF	(C) Feb. 15,1978	Procurement of GFE which is not available within FAA inventories; initial completed May 15, 1977.
9.2 Receive and accumulate GFE for RTF contractor.	(P) AAC (S) AAF (S) ALG-300 (S) ARD-100	(S) May 15,1977 (C) Feb.15,1978	Includes GFE from contract and from FAA inventories required to support the RTF contractor at the development facility.
9.3 Accomplish all outstanding EEMs on GFE to be shipped to RTF contractor.	(P) AAC	(S) Aug. 15,1977 (C) Feb. 15,1978	GFE will have all outstanding EEMs accomplished before shipment to the RTF contractor.
9.4 Provide spare parts and usage accounting support to contractor.	(P) AAC	(C) Feb. 15,1978	Includes establishing a supply support code and a supply transaction code to be used for providing spare parts to the contractor on a reimbursable basis.
9.5 Provide GFE maintenance documentation to RTF contractor.	(P) ANA (S) AAC	(C) Feb. 15,1978	Provides necessary documentation to RTF contractor for maintaining GFE during system development.

FIGURE 1

RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
9. LOGISTICS (Continued)			
9.6 Ship GFE, test equipment and special tools to RTF contractor.	(P) AAC	(S) Feb. 15, 1978 (C) Apr. 15, 1978	Includes all GFE identified in the contract for the RTF contractor development facility. All outstanding EEMs if any have been completed prior to shipment.
9.7 Review and approve special tools and test equipment lists.	(P) ARD-100 (S) AAC (S) ALG-400	(S) June 15, 1978 (C) July 1, 1978	Provided by the RTF contractor; includes a list of all special and standard tools and equipment, the application of each and the unit and/or component on which it is to be used. See (3.10.1 and 3.10.2).
9.8 Conduct RTF provisioning conference.	(P) AAC (S) ARD-100 (S) ALG-400 (S) Contractor	(C) Aug. 15, 1978	To establish spare parts requirements for RTF equipment provided by the contractor.
9.9 Develop hardware maintenance policies and procedures (logistics support plan).	(P) AAC	(S) July 15, 1978 (C) May 15, 1979	Establishes RTF maintenance policies and requirements that include preventive and corrective maintenance, updating hardware through EEMs, personnel assignments, supply support provisions, etc.

FIGURE 1

RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
9. LOGISTICS (Continued)			
9.10 Refurbish and accomplish outstanding EEMs on GFE.	(P) AAC	(S) June 15,1977 (C) Mar. 15,1979	Refurbish and accomplish outstanding EEMs on GFE to be delivered to and installed in the RTF.
9.11 Assume GFE maintenance responsibility.	(P) AAC	(C) June 15,1979	Assumes hardware maintenance responsibility upon receipt of GFE at the RTF.
9.12 Assume hardware maintenance and documentation responsibility.	(P) AAC (S) Contractor	(C) Feb. 15,1980	AAC assumes maintenance and documentation responsibility with contractor assistance for onsite maintenance for first six months, and oncall for second six months.
9.13 Acquire contractor hardware maintenance support.	(P) ALG-300 (S) AAC (S) ARD-100 (S) AAF	(S) Feb. 15,1980 (C) Feb. 15,1981	Contract maintenance and OJT is provided for a one-year period; the first six months onsite maintenance, the second six months oncall.

FIGURE 1

RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
10. DOCUMENTATION			
10.1 Receive an index of drawings and technical memoranda.	(P) Contractor	(C) May 15,1978	Submitted by RTF contractor; includes index of all drawings and technical memoranda prepared in connection with design, fabrication, installation and testing of the RTF.
10.1.1 Deliver final index.	(P) Contractor	(C) Feb. 15,1980	
10.2 Review and approve preliminary reliability program plan.	(P) ARD-100 (S) PMS (S) AAF	(S) Apr. 15,1978 (C) June 15,1978	Submitted by RTF contractor; includes a description of the contractor's organization, plans and procedures to insure the development and delivery of a reliable RTF. Plan to be in accordance with MIL-STD-785, see (3.5.2).
10.2.1 Deliver final plan.	(P) Contractor	(C) Aug. 15,1978	
10.3 Review and approve preliminary maintainability program plan.	(P) ARD-100 (S) PMS (S) AAF (S) ALG-400	(S) Apr. 15,1978 (C) June 15,1978	Submitted by RTF contractor; includes a description of the contractor's organization, methods and procedures to ensure that the RTF meets the maintainability requirements of (3.5.3) and MIL-STD-470.
10.3.1 Deliver final plan.	(P) Contractor	(C) Aug. 15,1978	

FIGURE 1

RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
10. DOCUMENTATION (Continued)			
10.4 Review and agree upon RTF design data.	(P) ARD-100 (S) PMS (S) ANA (S) ALG-400	(S) May 15,1978 (C) July 15,1978	Includes block diagrams (3.9.1.1), information logic flow diagrams (3.9.1.2) and input/output details (3.9.1.3) for the total RTF design (3.9.1).
10.5 Review and agree upon RTF system functional specifications.	(P) ARD-100 (S) PMS (S) AAT (S) ANA (S) ALG-400	(S) May 15,1978 (C) July 15,1978	Includes general system description, detailed functional description and all elements listed in (3.9.2.1).
10.5.1 Conduct critical design review.	(P) ARD-100 (S) PMS (S) ANA (S) AAT (S) ALG-400 (S) Contractor	(C) Aug. 15,1978	Includes critical design review with the RTF contractor, based on all design and other documentation submitted by the contractor to date.
10.6 Review and agree upon software design specifications.	(P) ARD-100 (S) PMS (S) AAT (S) ANA (S) ALG-400	(S)June 15,1978 (C)Aug. 15,1978	Submitted by RTF contractor; includes system overview, system data base, module definition and all elements listed in (3.9.2.2) including a staging and implementation plan and system acceptance criteria.

FIGURE 1

RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
10. DOCUMENTATION (Continued)			
10.7 Review and approve draft computer program functional specifications (CPFS).	(P) ARD-100 (S) PMS (S) AAT (S) ANA (S) ALG-400	(S) Aug. 15,1978 (C) Oct. 15,1978	Submitted by RTF contractor; includes a computer program functional specification for each program within the software system, see topic (g) of (3.9.6.1.1).
10.7.1 Conduct critical design review.	(P) ARD-100 (S) PMS (S) ANA (S) AAT (S) ALG-400 (S) Contractor	(C) Nov. 15,1978	Conducting a critical design review with the RTF contractor from the software design specifications and the CPFS.
10.7.2 Submit final CPFS documentation.	(P) Contractor	(C) Feb. 15,1980	Final documentation of CPFS by contractor.
10.8 Review and agree upon system module documentation.	(P) ARD-100 (S) AAC (S) ALG-400	(S) Sep. 15,1978 (C) Nov. 15,1978	Provided by RTF contractor; includes all elements listed within (3.9.2.3) which represents the baseline software system used durirg factory testing.

FIGURE 1

RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
10. DOCUMENTATION (Continued)			
10.9 Develop laboratory operating procedures.	(P) AAC (S) ARD-100 (S) APT (S) ALG-400 (S) Contractor	(S) Oct. 1,1977 (C) Apr. 1,1979 (Validation occurs January, 1980.)	Describes the laboratory operating procedures that are to be used during RTF student training for the trainee and supervisory positions and stations and for equipment operators and hardware maintenance personnel.
10.10 Develop RTF training curricula and procedures.	(P) AAC (S) ARD-100 (S) APT (S) AAT (S) ALG-400 (S) Contractor	(S) Oct. 15,1977 (C) Apr. 1,1979 (Validation occurs January, 1980.)	Includes the development of the curricula for classroom and laboratory training; describes the laboratory training scenarios and objectives to be used by the students during RTF training exercises.
10.11 Review and approve preliminary instruction manuals (Hardware).	(P) ARD-100 (S) AAC (S) AAF (S) ALG-400	(S) Nov. 15,1978 (C) Jan. 15,1980	Provided by RTF contractor; includes instructions for operating and maintaining the system hardware and conforms to (3.9.5).
10.11.1 Submit final manuals.	(P) Contractor	(C) Feb. 15,1980	

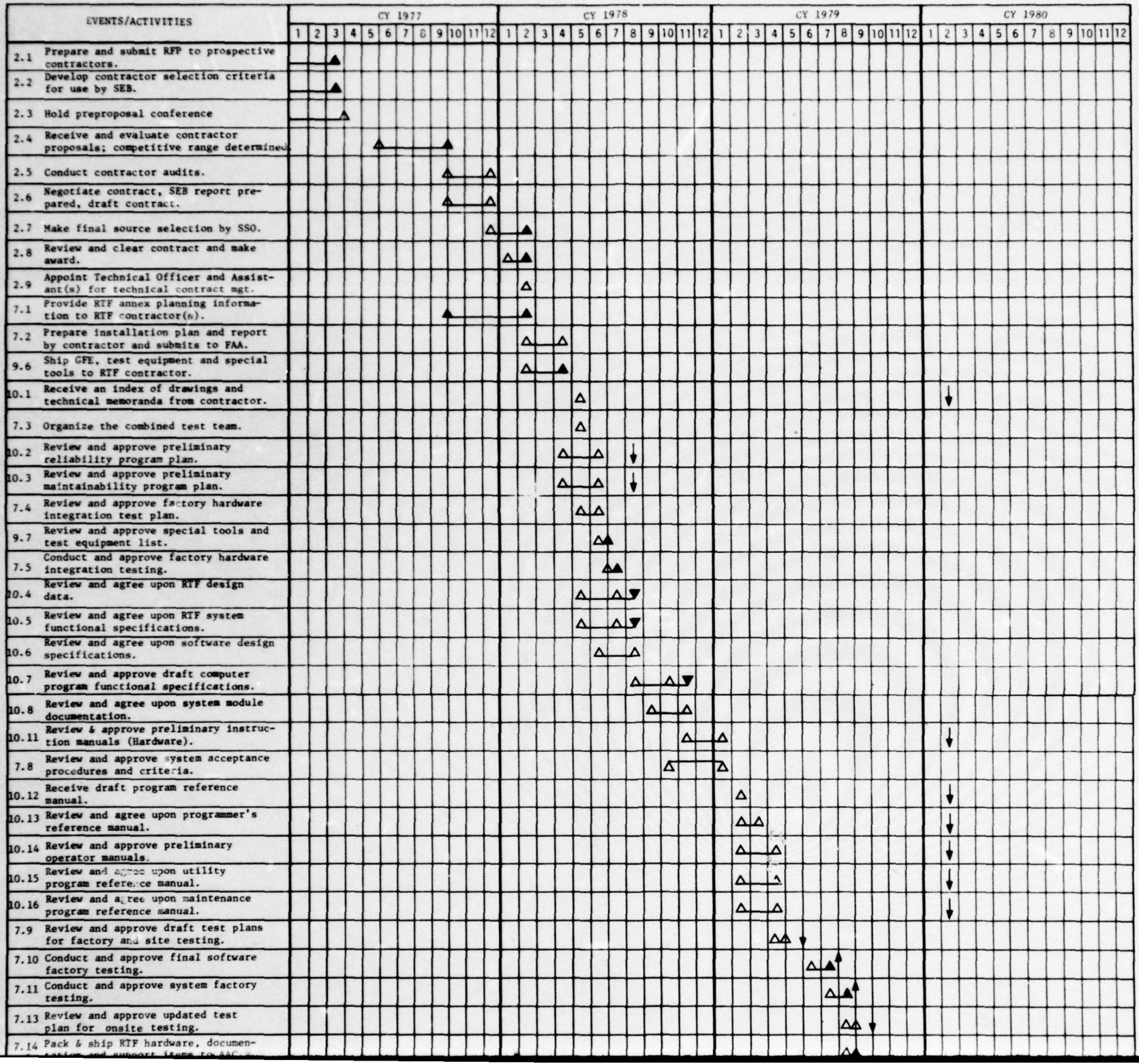
FIGURE 1

RTF MAJOR EVENTS AND ACTIVITIES

EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
10. DOCUMENTATION (Continued)			
10.12 Receive draft program reference manual.	(P) ARD-100 (S) AAC (S) ANA (S) ALG-400	(C) Feb. 15,1979	Provided by RTF contractor; includes an overview of all routines and their interrelationships to the hardware, detailed functional specs., interface details, flow charts and all elements identified within (3.9.6.1.1).
10.12.1 Submit final manual.	(P) Contractor	(C) Feb. 15,1980	
10.13 Review and agree upon programmer's reference manual.	(P) ARD-100 (S) AAC (S) ANA (S) ALG-400	(S) Feb. 15,1979 (C) Mar. 15,1979	Provided by RTF contractor; includes description of computer instructions, commands and orders noted within (3.9.6.2.3).
10.13.1 Submit final manual.	(P) Contractor	(C) Feb. 15,1980	
10.14 Review and approve preliminary operator manuals.	(P) ARD-100 (S) AAC (S) ANA (S) ALG-400	(S) Feb. 15,1979 (C) Apr. 15,1979	Provided by RTF contractor; includes all information needed to operate the system (pilot position, ghost positions, trainee positions, master instructor positions, system monitor position, etc.) as noted within (3.9.6.1.2).
10.14.1 Submit final manuals.	(P) Contractor	(C) Feb. 15,1980	

FIGURE 1
RTF MAJOR EVENTS AND ACTIVITIES

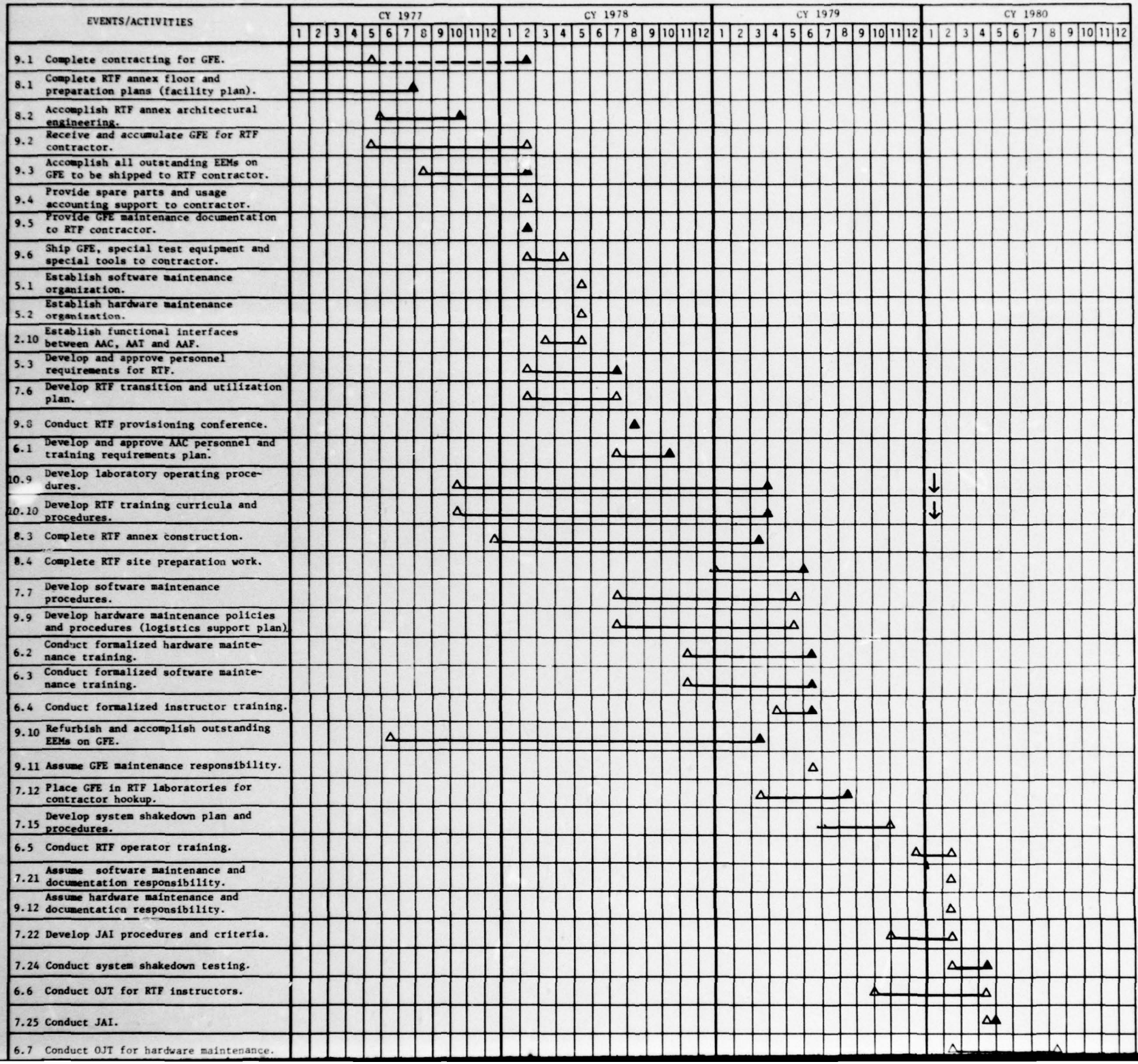
EVENTS AND ACTIVITIES	RESPONSIBILITY (P)-PRIMARY (S)-SUPPORT	COMPLETION DATES (S)-START (C)-COMPLETE	REMARKS
10. DOCUMENTATION			
10.15 Review and agree upon utility program reference manual.	(P) ARD-100 (S) AAC (S) ANA (S) ALG-400	(S) Feb. 15,1979 (C) Apr. 15,1979	Provided by RTF contractor; includes all utility programs (dumps, loaders, etc.) noted within (3.9.6.2.1).
10.15.1 Submit final manual.	(P) Contractor	(C) Feb. 15,1980	
10.16 Review and agree upon maintenance program reference manual.	(P) ARD-100 (S) AAC (S) AAF (S) ALG-400	(S) Feb. 15,1979 (C) Apr. 15,1979	Provided by RTF contractor; includes all diagnostic and maintenance programs noted within (3.9.6.2.2).
10.16.1 Submit final manual.	(P) Contractor	(C) Feb. 15,1980	

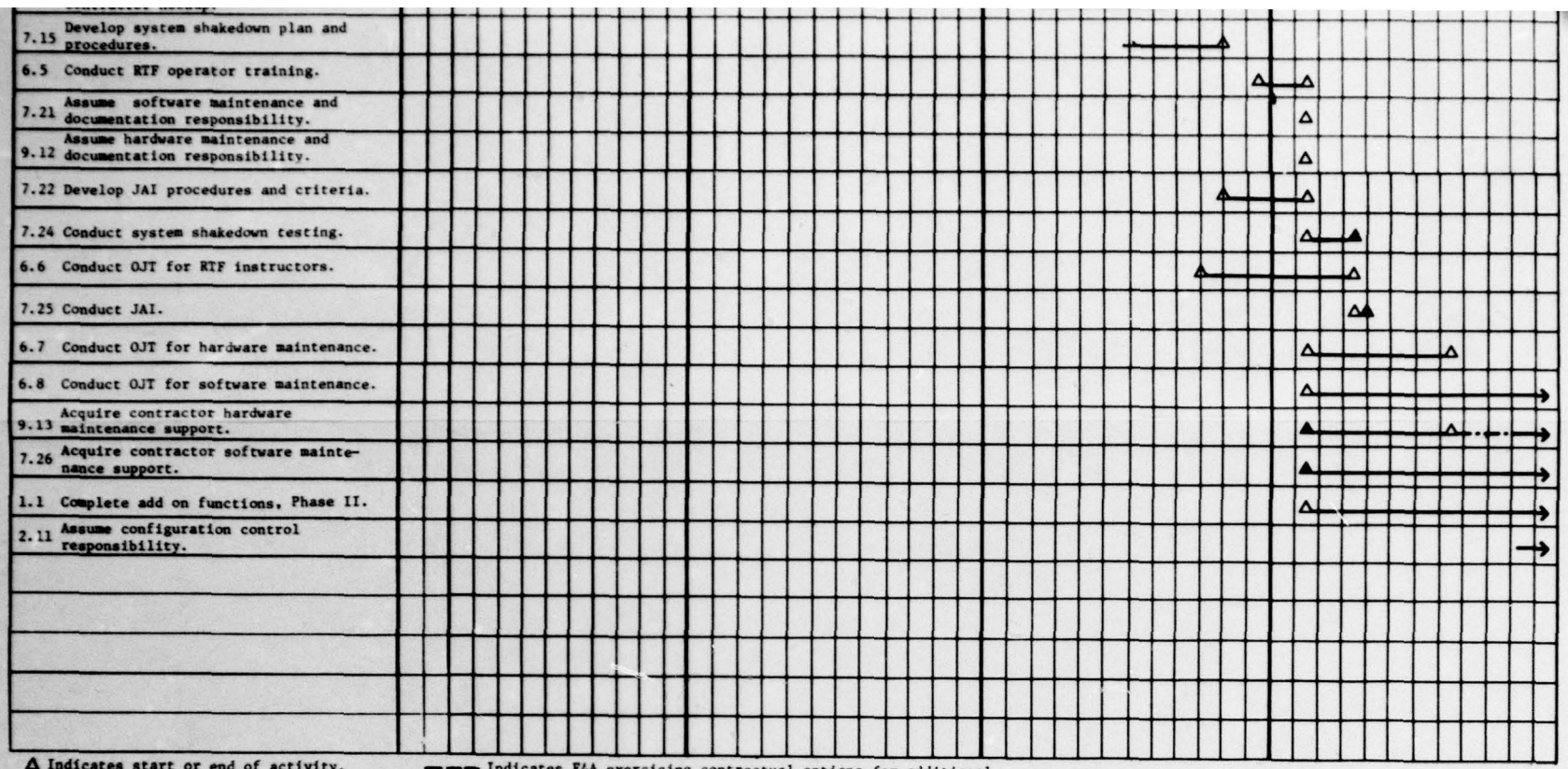

EVENTS/ACTIVITIES
CY 1977
CY 1978
CY 1979
CY 1980
1 2 3 4 5 6 7 8 9 10 11 12
2.1 Prepare and submit RFP to prospective contractors.
2.2 Develop contractor selection criteria for use by SEB.
2.3 Hold preproposal conference
2.4 Receive and evaluate contractor proposals; competitive range determined.
2.5 Conduct contractor audits.
2.6 Negotiate contract, SEB report prepared, draft contract.
2.7 Make final source selection by SSO.
2.8 Review and clear contract and make award.
2.9 Appoint Technical Officer and Assistant(s) for technical contract mgt.
7.1 Provide RTF annex planning information to RTF contractor(s).
7.2 Prepare installation plan and report by contractor and submits to FAA.
9.6 Ship GFE, test equipment and special tools to RTF contractor.
10.1 Receive an index of drawings and technical memoranda from contractor.
7.3 Organize the combined test team.
10.2 Review and approve preliminary reliability program plan.
10.3 Review and approve preliminary maintainability program plan.
7.4 Review and approve factory hardware integration test plan.
9.7 Review and approve special tools and test equipment list.
7.5 Conduct and approve factory hardware integration testing.
10.4 Review and agree upon RTF design data.
10.5 Review and agree upon RTF system functional specifications.
10.6 Review and agree upon software design specifications.
10.7 Review and approve draft computer program functional specifications.
10.8 Review and agree upon system module documentation.
10.11 Review & approve preliminary instruction manuals (Hardware).
7.8 Review and approve system acceptance procedures and criteria.
10.12 Receive draft program reference manual.
10.13 Review and agree upon programmer's reference manual.
10.14 Review and approve preliminary operator manuals.
10.15 Review and agree upon utility program reference manual.
10.16 Review and agree upon maintenance program reference manual.
7.9 Review and approve draft test plans for factory and site testing.
7.10 Conduct and approve final software factory testing.
7.11 Conduct and approve system factory testing.
7.13 Review and approve updated test plan for onsite testing.
7.14 Pack & ship RTF hardware, documen-

APPENDIX 1

FIGURE 2
CONTRACT MANAGEMENT AND TESTING SCHEDULE

Page 27 (and 28)


EVENTS/ACTIVITIES
CY 1977
CY 1978
CY 1979
CY 1980
1 2 3 4 5 6 7 8 9 10 11 12
9.1 Complete contracting for GFE.
8.1 Complete RTF annex floor and preparation plans (facility plan).
8.2 Accomplish RTF annex architectural engineering.
9.2 Receive and accumulate GFE for RTF contractor.
9.3 Accomplish all outstanding EEMs on GFE to be shipped to RTF contractor.
9.4 Provide spare parts and usage accounting support to contractor.
9.5 Provide GFE maintenance documentation to RTF contractor.
9.6 Ship GFE, special test equipment and special tools to contractor.
5.1 Establish software maintenance organization.
5.2 Establish hardware maintenance organization.
2.10 Establish functional interfaces between AAC, AAT and AAF.
5.3 Develop and approve personnel requirements for RTF.
7.6 Develop RTF transition and utilization plan.
9.8 Conduct RTF provisioning conference.
6.1 Develop and approve AAC personnel and training requirements plan.
10.9 Develop laboratory operating procedures.
10.10 Develop RTF training curricula and procedures.
8.3 Complete RTF annex construction.
8.4 Complete RTF site preparation work.
7.7 Develop software maintenance procedures.
9.9 Develop hardware maintenance policies and procedures (logistics support plan).
6.2 Conduct formalized hardware maintenance training.
6.3 Conduct formalized software maintenance training.
6.4 Conduct formalized instructor training.
9.10 Refurbish and accomplish outstanding EEMs on GFE.
9.11 Assume GFE maintenance responsibility.
7.12 Place GFE in RTF laboratories for contractor hookup.
7.15 Develop system shakedown plan and procedures.
6.5 Conduct RTF operator training.
7.21 Assume software maintenance and documentation responsibility.
9.12 Assume hardware maintenance and documentation responsibility.
7.22 Develop JAI procedures and criteria.
7.24 Conduct system shakedown testing.
6.6 Conduct OJT for RTF instructors.
7.25 Conduct JAI.
6.7 Conduct OJT for hardware maintenance.



△ Indicates start or end of activity.

▲ Indicates significant milestones.

↓ Indicates validation of procedures.

——— Indicates FAA exercising contractual options for additional GFE for completing laboratory equipment needs.

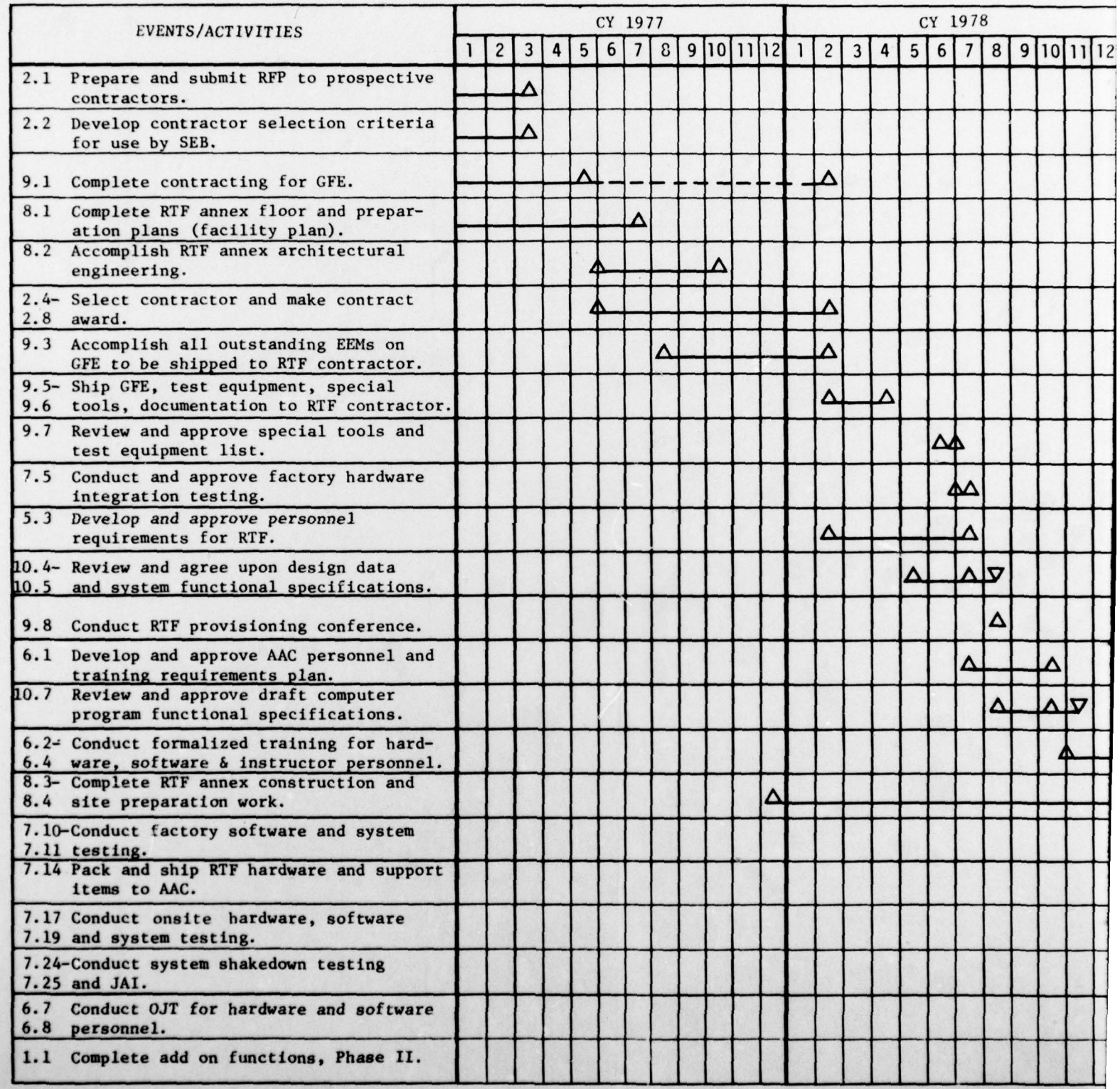
-·-·- Indicates exercising option, as required, for additional contractor support.

——→ Indicates extending two months into 1981.

APPENDIX 1

FIGURE 3

IMPLEMENTATION OF SUPPORTING ACTIVITIES SCHEDULE

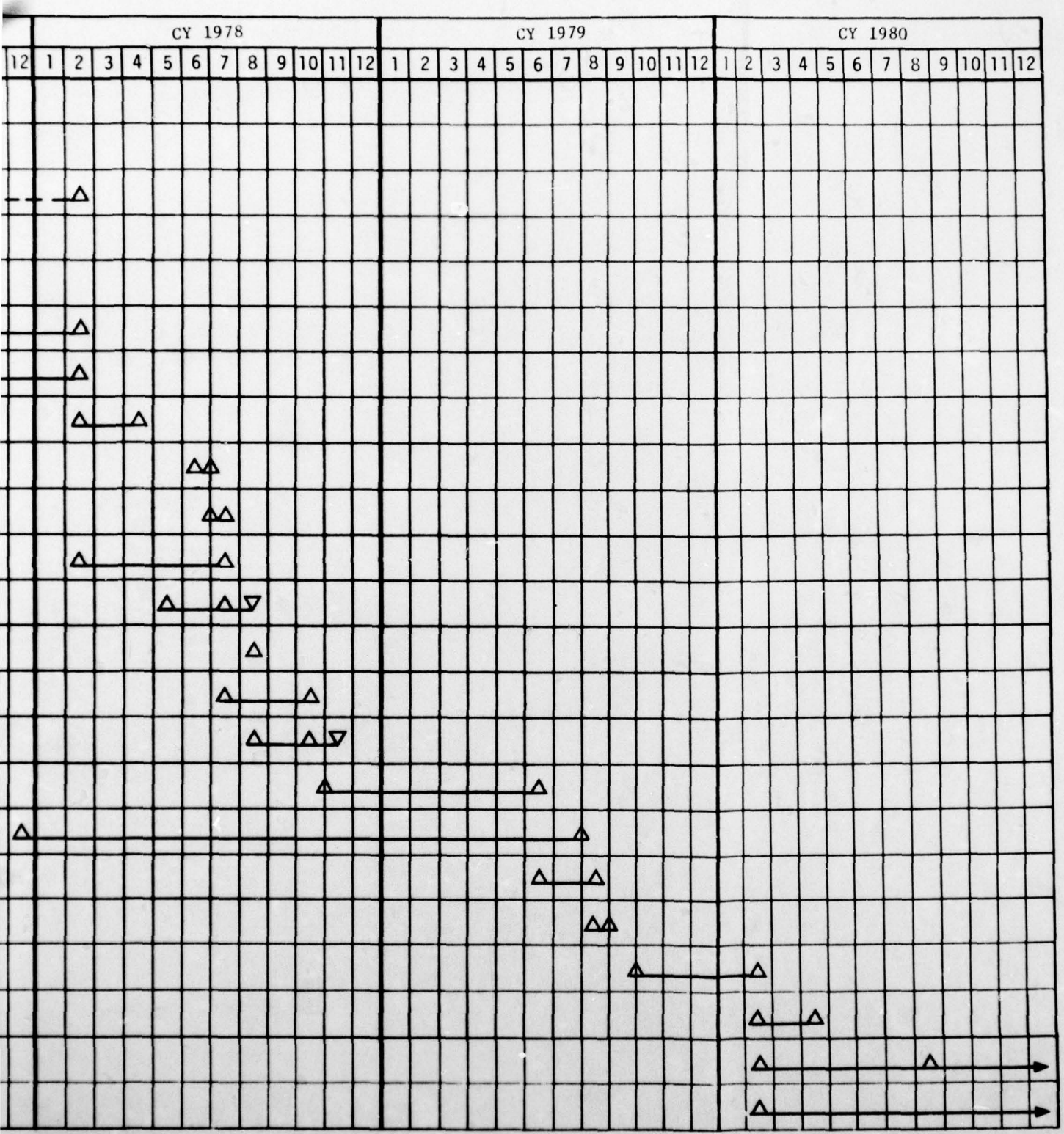


△ Indicates start or end of activity.

▽ Indicates critical design review completion.

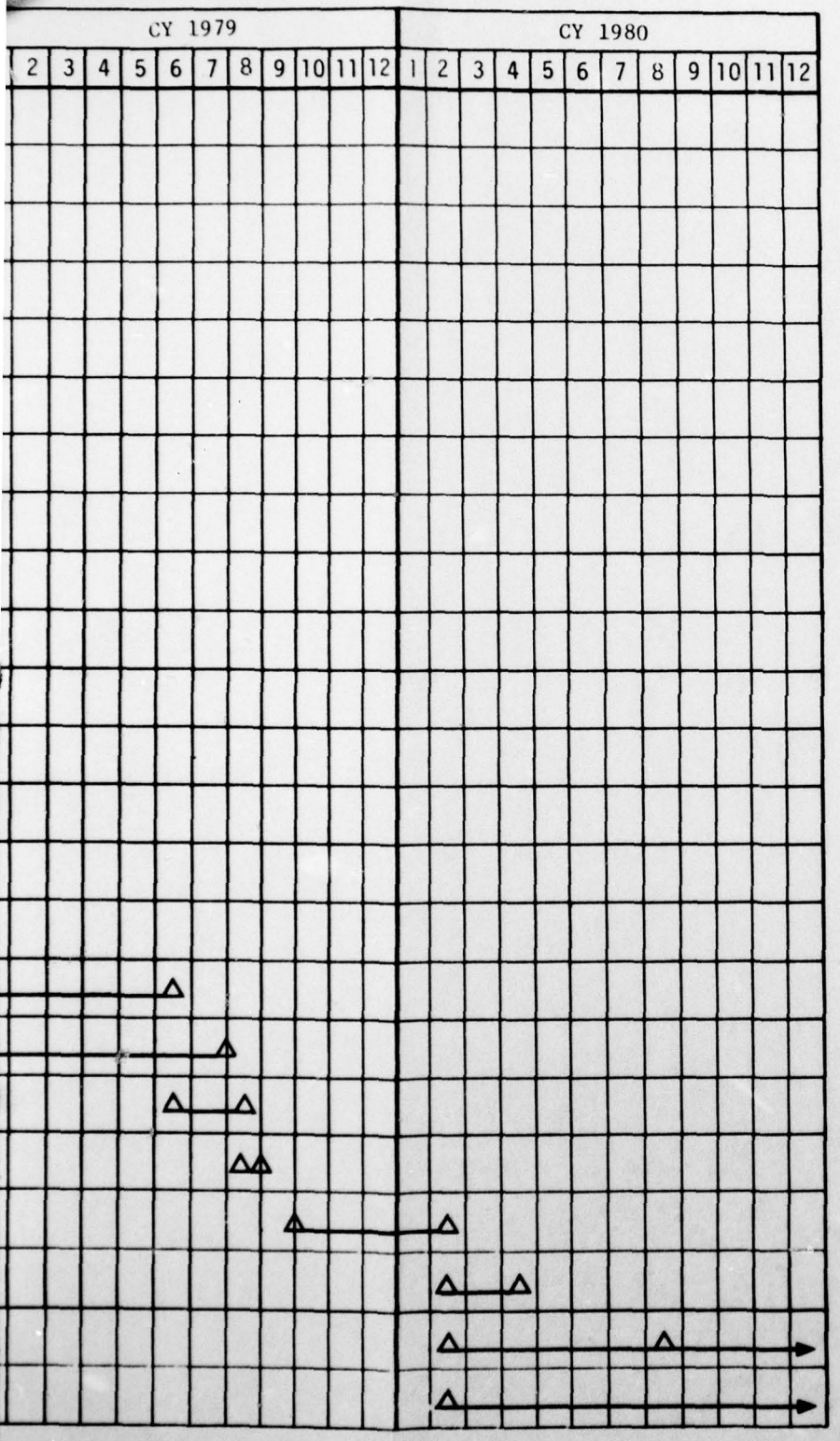
— — Indicates FAA exercising contractual options for additional GFE for completing laboratory equipment needs.

→ Indicates extending two months into 1981 software OJT, and two months into 1981 f Phase II add on functions.



cates extending two months into 1981 for
ware OJT, and two months into 1981 for
e II add on functions.

2



APPENDIX 1

FIGURE 4
SUMMARY SCHEDULE

Page 31 (and 32)

2

3

APPENDIX 2. RADAR TRAINING FACILITY ANNEX

1. Floor Plans. The floor plans for the RTF annex are included in this Appendix as follows:

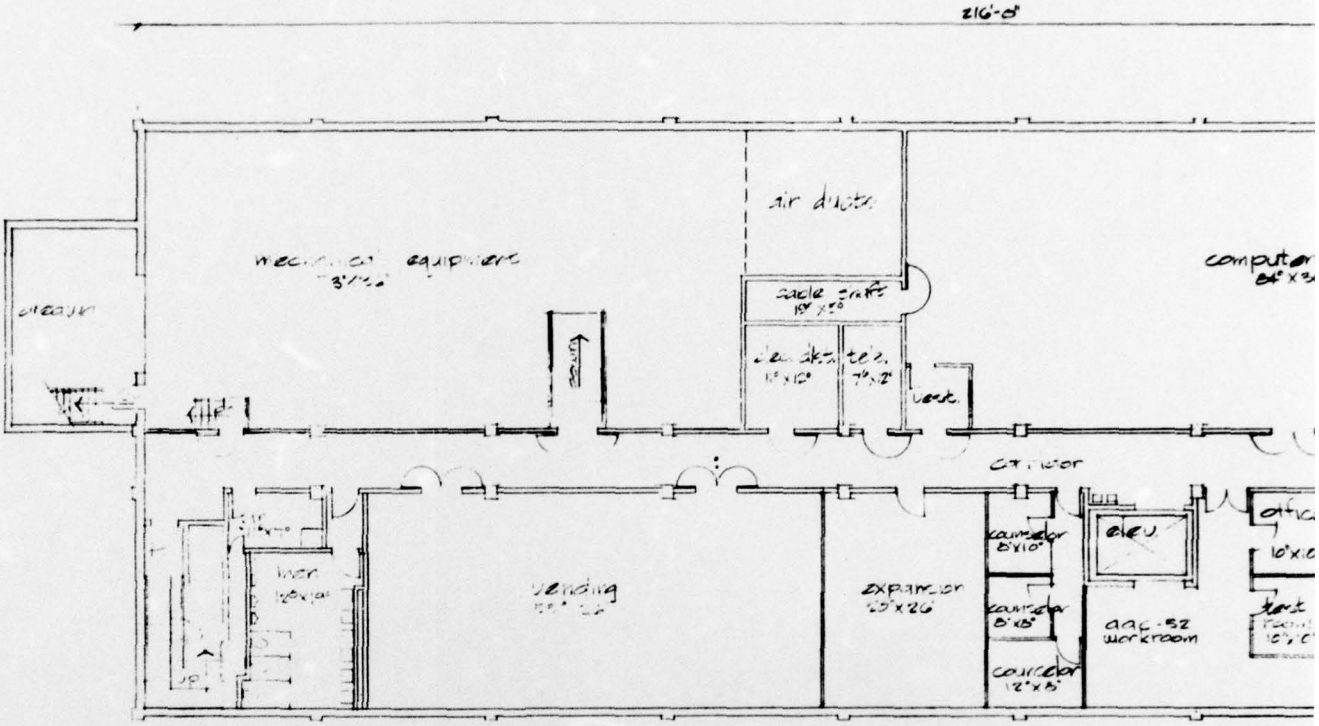
   a. Figure 1, RTF Basement Floor Plan

   b. Figure 2, RTF First Floor Plan

   c. Figure 3, RTF Second Floor Plan

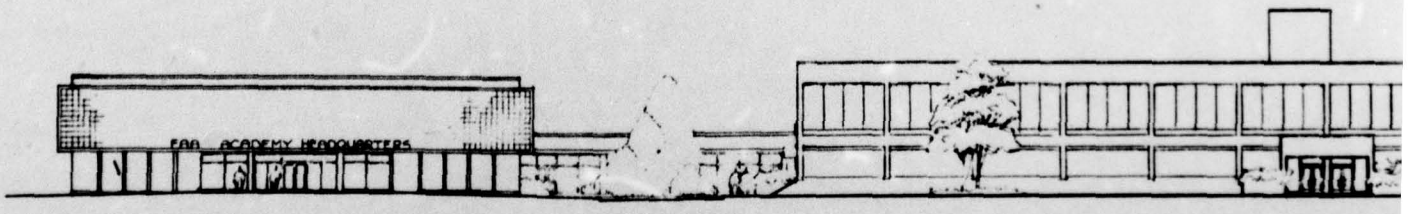
   The Aeronautical Center is developing the detailed RTF annex drawings and specifications for the construction work.

2. RTF Annex Construction Schedule. (This part of this Appendix will include the construction schedule for the RTF annex, to show the starting and completion dates for the significant events and activities (milestones) for the preconstruction time period and during construction. The schedule is being developed by AAC and will be included in this Appendix upon its completion.)



BASEMENT FLOOR PLAN

1/8"=1'-0"



WEST ELEVATION

1/16"=1'-0"

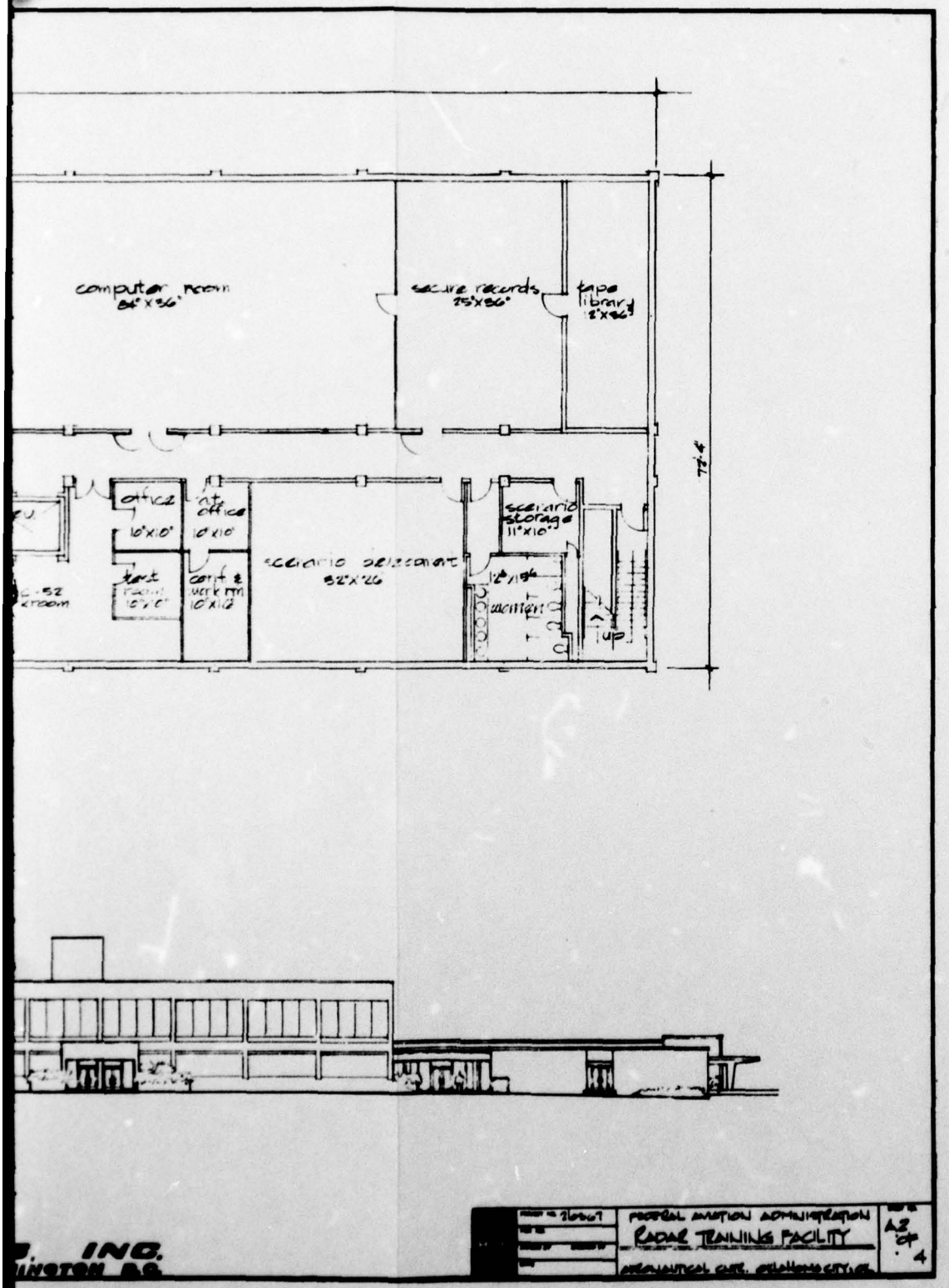
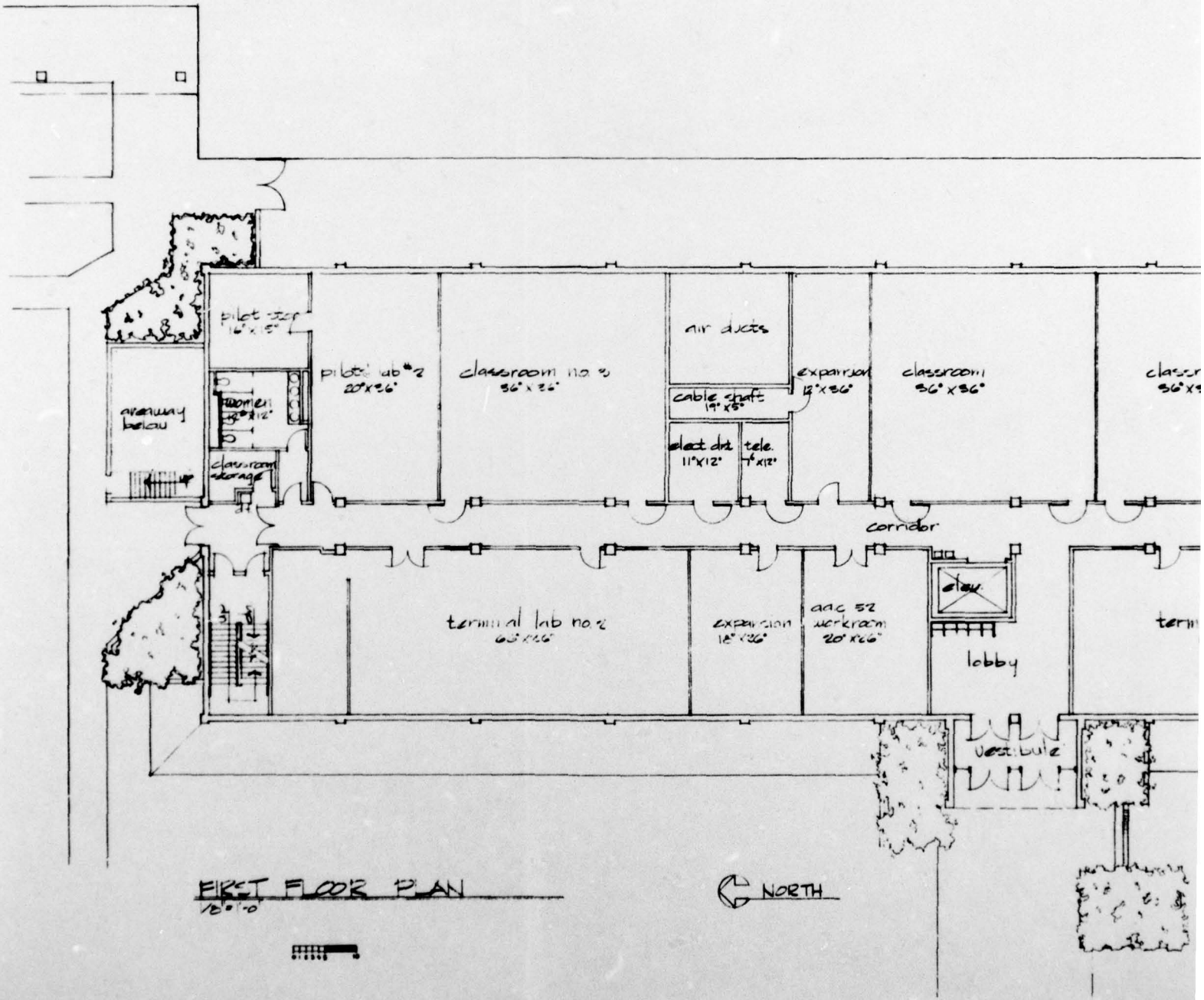


FIGURE 1
RTF BASEMENT FLOOR PLAN

Page 3 (and 4)

APPENDIX 2



FIRST FLOOR PLAN
1/8"=1'-0"

HUDGINS, THOMPSON, BALL AND ASSOCIATES, INC
ARCHITECTS · ENGINEERS · PLANNERS
OKLAHOMA CITY · TULSA · WASHINGTON D.C.

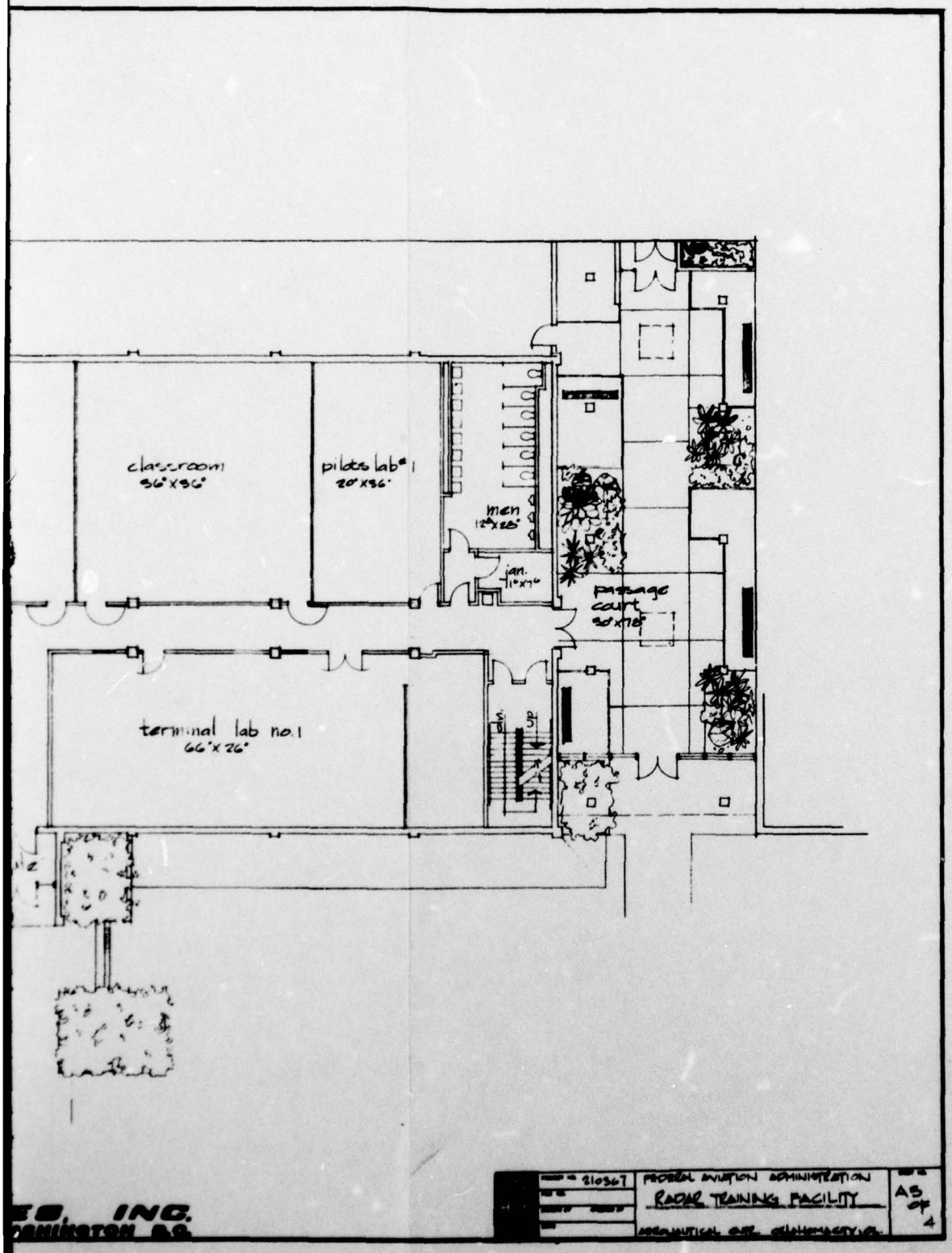
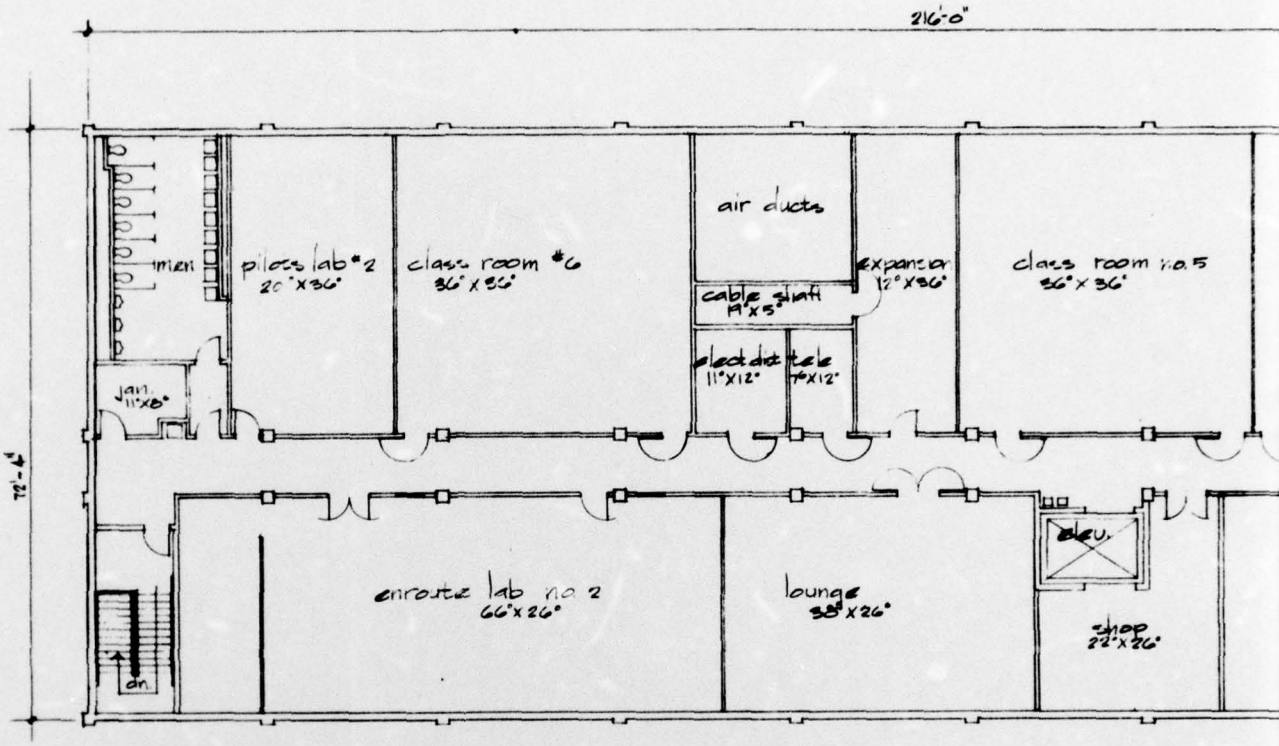
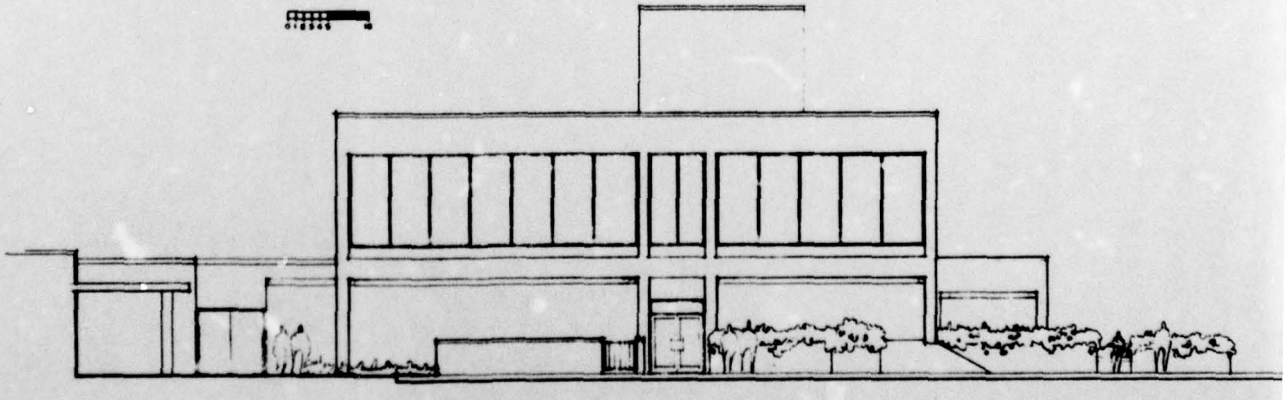


FIGURE 2
RTF FIRST FLOOR PLAN



SECOND FLOOR PLAN
1/8"-1'-0"

NORTH



NORTH ELEVATION
1/8"-1'-0"

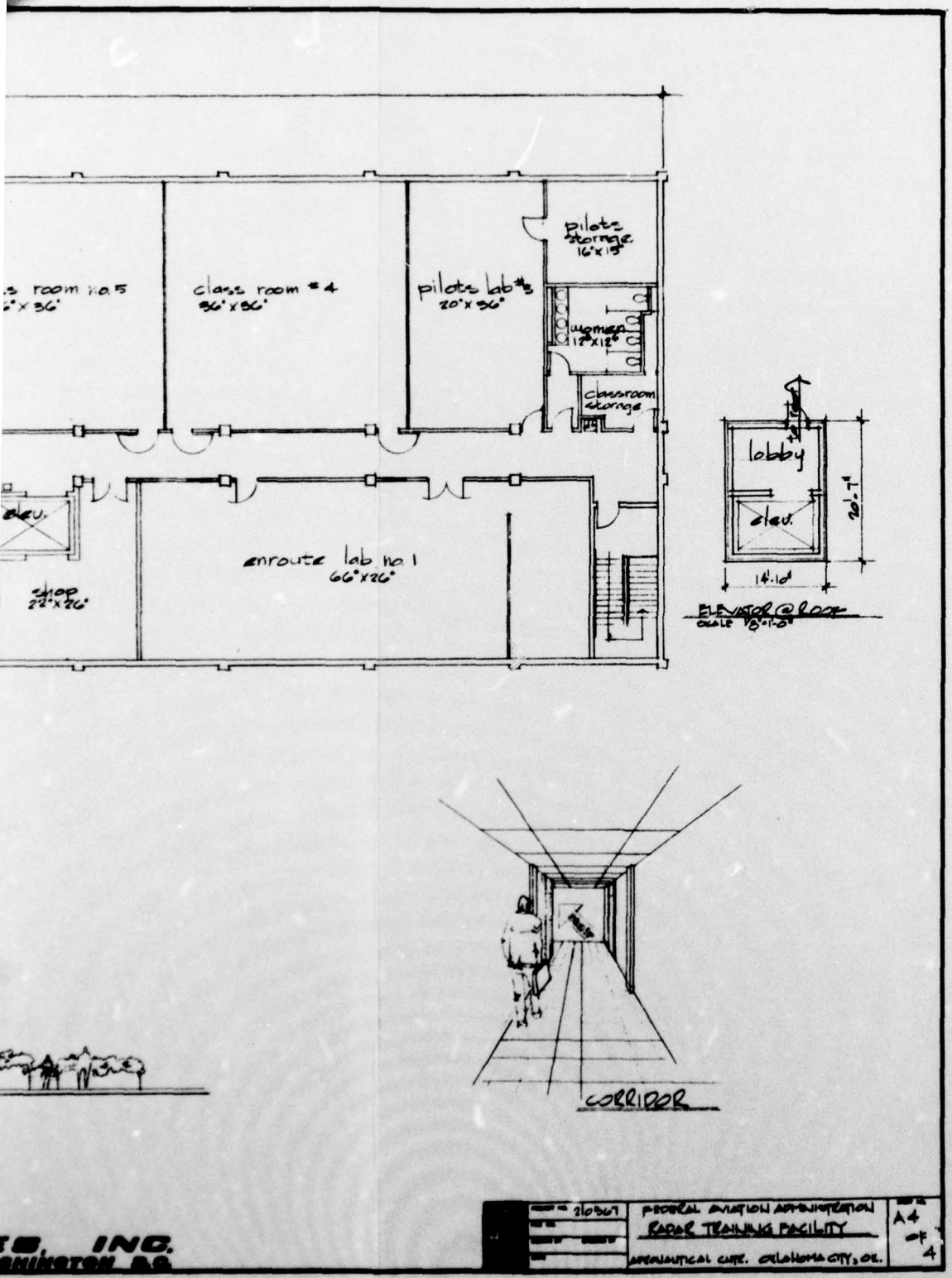


FIGURE 3
RTF SECOND FLOOR PLAN

APPENDIX 3. ACRONYMS AND DEFINITIONS

AAC	Aeronautical Center
AAF	Airway Facilities Service
AAT	Air Traffic Service
ABU	Office of Budget
AED	Associate Administrator for Engineering and Development
ALG	Logistics Service
ALR	Office of Labor Relations
ANA	National Aviation Facilities Experimental Center
APT	Office of Personnel and Training
ARB	Administration Review Board
ARD	Systems Research and Development Service
ARTCC	air route traffic control center
ARTS	Automated Radar Terminal System
ASR	Airport Surveillance Radar
ATC	Air Traffic Control
ATCS	air traffic control specialist
CAMI	Civil Aero Medical Institute
CCD	Configuration Control Decision
CPFS	computer program functional specification
CRD	computer readout device
CSC	Civil Service Commission
CTT	combined test team
D	sector controller
DCVG	digital character vector generator
DEDS	Data Entry and Display Subsystem
DR&A	data reduction and analysis
DSF	Digital Simulation Facility
EEM	electronic equipment modification
FAA	Federal Aviation Administration
F&E	Facility and Equipment
FSP	Flight Strip Printer
FSS	Flight Service Station
GFE	government furnished equipment
GSA	General Services Administration
HDR	hardware discrepancy report
HO	hand off controller
IBM	International Business Machines
IDA	Institute for Defense Analysis
I/O	input/output

Appendix 3

JAI	Joint Acceptance Inspection
NAS	National Airspace System
NCP	NAS change proposal
OJT	on-the-job training
OST	Office, Secretary of Transportation
PCB	printed circuit board
PIP	Program Implementation Plan
PMS	Program Management Staff
PTR	program trouble report
PVD	plan view display
QC	quality control
QRO	Quality Reliability Officer
R	Radar controller
RTF	Radar Training Facility
SATCS	Supervisory Air Traffic Control Specialist
SEB	Selection Evaluation Board
SSF	System Support Facility
SSO	Source Selection Officer
TATF	Terminal Automation Test Facility