AD-A052 362 FEDERAL AVIATION ADMINISTRATION WASHINGTON D C SYSTE--ETC F/G 1/5
AIRPORT SURFACE DETECTION EQUIPMENT (ASDE-3) PROJECT PLAN.(U)
JAN 78 M E PERIE

UNCLASSIFIED FAA/RD-78/12 NL

| OF |
AD
A052 362

END
DATE
FILMED
5-78
DDC

Report No. FAA-RD-78-12

AIRPORT SURFACE DETECTION EQUIPMENT (ASDE) -3 PROJECT PLAN

M.E. Perie
Federal Aviation Administration
Systems Research and Development Service
Washington, D.C. 20590

January 1978

Project Plan

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

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
(14) FAA-RD-78-12		(11)

4. Title and Subtitle	5. Report Date
(6) Airport Surface Detection Equipment (ASDE-3) Project Plan.	Jan[illegible]978
	6. Performing Organization Code ARD-102 (12) 49p.
7. Author(s) (10) M. E. Perie	8. Performing Organization Report No. FAA-RD-78-12
9. Performing Organization Name and Address U.S. Department of Transportation Federal Aviation Administration Systems Research & Development Service Washington, D. C. 20591	10. Work Unit No. (TRAIS) 11. Contract or Grant No.
12. Sponsoring Agency Name and Address U.S. Department of Transportation Federal Aviation Administration Systems Research and Development Service Washington, D.C. 20590	13. Type of Report and Period Covered Project Plan Fiscal Years 1978 and 1979 14. Sponsoring Agency Code ARD-102

15. Supplementary Notes

(9) Rept for FY 1978-1979

16. Abstract

The Airport Surface Detection Equipment (ASDE) is a primary radar and display system used to provide the airport surface traffic situation to the air traffic controller. An ASDE-3 engineering model is being procured by the Transportation Systems Center (TSC) for testing at NAFEC. The product of this development will be a complete and comprehensive technical data package presented to the Airways Facilities Service (AAF) for procurement of production ASDE-3 units.

The purpose of this Project Plan is to describe the program for development, test, evaluation, maintenance, and configuration control of the ASDE-3 engineering model, and to delineate the responsibilities of each of the participating organizations.

17. Key Words	18. Distribution Statement
Airport Surface Traffic Control, ASTC, Airport Surface Detection Equipment, ASDE, Radar	Document is available to the U.S. public through the National Technical Information Service, Springfield, Virginia 22161.

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED	43	

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

340 170 JOB

METRIC CONVERSION FACTORS

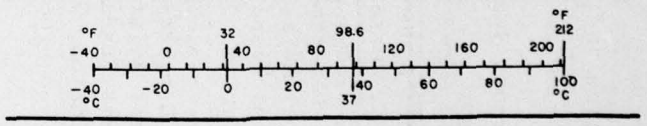
Approximate Conversions to Metric Measures

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	0.95	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



ASDE-3 PROJECT PLAN

1.0 INTRODUCTION

The Airport Surface Detection Equipment (ASDE) is a primary radar and display system used to provide the airport surface traffic situation to the air traffic controller. An ASDE-3 engineering model is being procured by the Transportation Systems Center (TSC) for testing at NAFEC. The product of this development will be a complete and comprehensive technical data package presented to the Airways Facilities Service (AAF) for procurement of production ASDE-3 units.

1.1 Background

The ASDE-2 radar, of a vacuum tube design, has had a number of maintenance problems which reduced the mean time between failures (MTBF) to less than 200 hours. In addition to its poor reliability, the performance of this radar is seriously degraded during periods of rainfall.

These deficiencies have prompted the development of an ASDE-3 which has been specified to be of solid-state design, increasing the MTBF, and which incorporates frequency agile operation at a lower frequency band for better rainfall penetration. In addition to these features, an improved design of antenna-radome assembly will be incorporated to reduce weight and wind loading, thus, easing installation problems.

1.2 Objective

The objective of the ASDE-3 project is to develop an improved radar and display system. The improved system features better performance to aid tower controllers during periods of degraded visibility due primarily to adverse weather conditions, and superior technical design to ease the installation and maintenance burden. The results of this development project, including the test data taken during the evaluation at NAFEC, will be used in preparing a technical data package to be provided AAF for production procurement of ASDE-3 systems.

The purpose of this Project Plan is to describe the program for development, test, evaluation,

maintenance, and configuration control of the ASDE-3 engineering model, and to delineate the responsibilities of each of the participating organizations.

1.3 ASDE-3 Establishment Criteria

The FAA has approved the following establishment criteria for installation of an ASDE-3*

- The candidate airport has a Category III runway; or
- The candidate airport has 180,000 or more annual itinerant operations, of which 100,000 or more are annual certificated route air carrier operations.

1.4 Scope

The engineering model of the ASDE-3 will be developed and tested according to the plans detailed herein. These plans include the fabrication of one ASDE-3 radar in the control tower configuration, that is, with no radar remoting features. Installation of the radar system will be made at NAFEC using the former ASDE-2 tower, as the antenna-radome mounting base. Operational testing and evaluation will be conducted for a six-month period using air traffic controllers with ASDE-2 experience as test participants. At the same time an engineering evaluation will be conducted which will include a technical assessment of fixed frequency versus frequency agile operation, and tests to confirm that system parameters meet operational requirements.

2.0 ASDE-3 DEVELOPMENT: TECHNICAL PLAN

2.1 Overview

The ASDE-3 development project consists of two phases: Basic ASDE-3 and Enhanced ASDE-3. Each of these is discussed in more detail below.

---

* "Establishment Criteria for ASDE-3 (Airport Surface Detection Equipment)", FAA Report No. ASP-75-3, December 1975.

2.1.1 Basic ASDE-3

The Basic ASDE-3 project consists of the procurement, test, and evaluation of the engineering model ASDE-3 radar and display enhancement unit (DEU). A contract was awarded to the Cardion Electronics Division of General Signal Corporation on May 31, 1977 (Contract No. DOT-TSC-1373). The "design to" specifications for the ASDE-3 were approved at the Preliminary Design Review in July 1977. The Critical Design Review, November and December 1977, is to result in the approval of the "build to" specifications. The ASDE-3 will then be fabricated and factory tests completed prior to installation of the system at NAFEC in October 1978. Acceptance testing and technical and operational evaluations will be conducted. The results of these tests will be used in preparing the Technical Data Package for ASDE-3 as well as for securing the frequency allocation for the production ASDE-3 systems. The ASDE-3 engineering model will remain at NAFEC to be used as a T&E facility for both ASDE-3 enhancements (see 2.1.2 below) and future ASTC systems. The ASDE-3 contract schedule is shown in Figure 2-1.

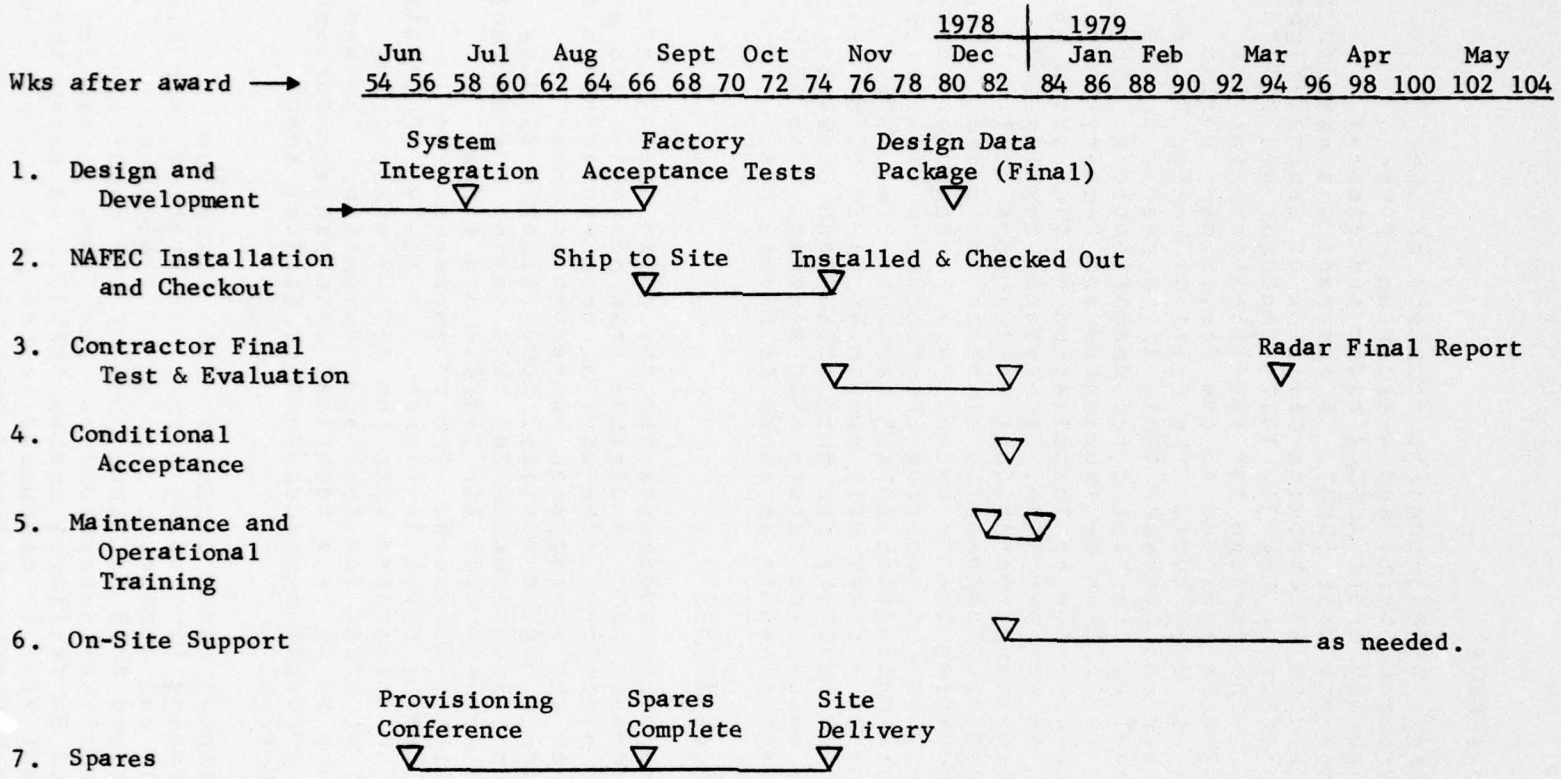
2.1.2 Enhanced ASDE-3

Two major enhancements for the basic ASDE-3 have been considered: a digital scan converter and a radar digitizer. The digital scan converter is to replace the analog scan converter in order to provide a higher quality, more reliable display system. Requirements for this device are currently being derived with Air Traffic and Airway Facilities Services. The procurement of a development model is planned for FY-79. This will then be integrated with the ASDE-3 engineering model at NAFEC for test and evaluation. The end product is to be a technical data package for use in a production procurement of digital scan converters.

The ASDE-3 radar digitizer will allow the processing (including target declaration, tracking, etc.) and synthetic display of ASDE data. Digitized ASDE is, thus, one of the candidate surveillance subsystems for the Tower Automation Ground Surveillance system (TAGS). As such, this project will be discussed in the project plan for the Tower Automated Ground Surveillance System (FAA-RD-

FIG. 2-1

ASDE-3 Contract Schedule



78-4) and the Engineering and Development Program Plan for Airport Surface Traffic Control (to be published).

The remainder of this section of the ASDE-3 Technical Plan will discuss the major portions of the Basic ASDE-3 project: test and evaluation, electromagnetic compatibility, maintenance, and configuration management.

2.2 ASDE-3 Test and Evaluation

The test and evaluation segments will be conducted in three phases:

1. Contractor Factory and Field Tests;
2. Government engineering tests;
3. Government operational tests.

2.2.1 Contractor Tests

The contractor's test program consists of three major phases, each contributing toward the objective of satisfying the Government that the ASDE-3 meets the contract specification requirements, and that the engineering model will be a viable system for the conduct of Government engineering and operational tests. In addition, the system and subsystem characteristics measured in this phase are necessary inputs to field performance analytical predictions and field test planning by the Government. The contractor test phases are:

1. Factory Test

   . Engineering Test and Evaluation -- included are component, module, unit, subsystem and system integration testing. No formal procedures or reports will be submitted, but data will be available for Government review.

   . Formal Acceptance Tests - Government witnessed, with formal test plan draft submittal two months prior to the first test. Test results report will be submitted within 15 days after test completion. The contract provides detailed requirements for inspection, radar parameter, EMI, burn-in, and maintainability

testing which must be satisfactorily completed prior to shipment to the field test site.

2. Field Installation and Checkout Tests

. The objective of installation and checkout tests is to insure the system has survived shipment and installation, and is ready for field site testing at NAFEC. Site survey, installation/ checkout plan, and GFE interface requirements are detailed in the contract. A test report is required upon satisfactory completion of installation and checkout.

3. Field Tests and Evaluation

. Successful completion of the contractor field site performance tests at NAFEC will formally qualify the ASDE-3. The contractor is responsible for conducting tests which will demonstrate contract specification compliance. Tests will be conducted in accordance with Government approved plans, and a formal test report will be submitted. The major testing will involve those system level performance tests not feasible for factory conduct.

- . Resolution, dynamic range, target image and display quality for real targets
- . DEU operability and registration
- . Rainfall/Clutter performance
- . Rooftop equipment tower loading, vibration and noise
- . Electromagnetic Compatibility/ Radio Spectrum Engineering Criteria (EMC/RSEC)
- . Second Time Around Target Returns
- . Frequency Agile Performance

2.2.2 Government Engineering Test

Government engineering evaluation tests will begin after the completion of the contractor site tests. The Government tests are intended primarily to

determine system performance limitations and finalize radar performance characteristics prior to submittal of the final technical data package to AAF and request for frequency allocation (see section 2.3). To accomplish this, the following types of tasks are required:

- Evaluate fixed frequency versus frequency agile operation for performance and cost tradeoff comparison.
- Measure the radar signal characteristics of fixed and moving targets in rainfall/clutter/clear environments.
- Investigate resolution and target dynamic range capabilities.
- Assess ground multipath effect on rain clutter backscatter volume.
- Validate rainfall penetration analytical model with empirical data.

2.2.3 Government Operational Test

The government operational tests will be conducted to determine the operational utility of ASDE-3 to tower controllers. Appendix A is an Air Traffic Service (AAT-100) submittal outlining operational requirements for the testing and evaluation of the ASDE-3. These will be used to establish the test plan and evaluation criteria. Controllers with ASDE-2 experience will be used to assess how well ASDE-3 meets the stated requirements.

2.3 EMC (Electromagnetic Compatibility) Plan

2.3.1 Background

The Office of Telecommunications Policy (OTP) Manual of Regulations and Procedures, Section 8.3, Procedure for the Review of Telecommunication Systems for Frequency Availability and Electromagnetic Compatibility, sets forth specific requirements which all federal agencies are obliged to follow in order to obtain authorization to use the radio frequency spectrum. These regulations, which are supported by the Office of Management and Budget (OMB), require four successive stages of

applications to the OTP/IRAC (Interdepartment Radio Advisory Committee). Each application is reviewed by all other federal agencies concerned and must receive the concurrence of the other agencies prior to OTP approval and FAA expenditure of federal funds for each successive level of program effort (i.e., planning/conceptual, experimental, engineering model/development, and implementation for operational use.). The ASDE-3 Stage 3 (development) application was approved by OTP letter dated November 12, 1976. A number of factors and conditions were delineated by the IRAC Spectrum Planning Subcommittee (SPS) and were included in the OTP Stage 3 approval letter. This letter is incorporated in this project plan as Appendix B.

2.3.2 Objective

The objective of the EMC portion of the ASDE-3 Development Project is to obtain Stage 4 (production) frequency approval for ASDE-3. This must be accomplished in compliance with the provisions, both explicit and implied, of the OTP Stage 3 approval, while maintaining the best interest of the FAA in the areas of performance and cost.

2.3.3 Discussion

A review of the objective and the conditions contained in the SPS recommendation reveals some potential problem areas. One major area of concern is the SPS condition that the production models be capable of single frequency operation. The primary advantage of the frequency agile approach is its superior performance in rainfall. This conclusion is based on analytical studies and experience from radar developments by DOD. In order to achieve this performance with the conventional single frequency technique, a much higher power transmitter must be used. Therefore, it would appear that two different ASDE-3 radars would have to be implemented in order for the FAA to both comply with the SPS condition and obtain the best rainfall pentration. This is an unacceptable position for the agency from the standpoint of cost and maintenance. The ASDE-3 development project will therefore devote a significant effort to proving the advantages of frequency agility over single frequency on both a cost and performance

basis. If, during the course of the test program, the frequency agile technique does not prove advantageous, a conventional single frequency radar will be specified for production.

With respect to ASDE frequency agile operation, the SPS will need to know the following in order to recommend Stage 4 approval.

1. The number of discrete frequencies used and tested in each agility scheme and the rationale and results for each scheme.

2. The provisions incorporated for changing each of the discrete frequencies in the agility scheme, and information on how quickly such a frequency change can be made in the field.

3. The peak and average power delivered to the antenna at each frequency in the agile scheme.

4. The maximum gain and pattern of the antenna at each frequency of the frequency agile scheme.

5. Details on the PRF used, whether staggered or single PRF.

6. Pulse characteristics and emission spectra at each frequency used in the agile scheme.

7. For the alternative single-frequency ASDE (for Stage 4), the pulse characteristics (shape), PRF mode(s), peak and average pulse power to the antenna, and the antenna gain and pattern.

8. The measure(s) by which the proposed (for Stage 4) frequency agile ASDE is better (or worse) than a single frequency ASDE.

9. The cost-vs-benefit calculations and results for comparing an implementation of frequency-agile ASDE versus a mixture of single-frequency and frequency-agile sites.

10. The estimated added cost for sector blanking for -

    a. A frequency-agile ASDE.

    b. A single-frequency ASDE.

In addition, the ASDE-3 development project will endeavor to satisfy all of the areas of concern set forth in the IRAC/SPS letter of November 12, 1976 (Appendix B).

The product of the EMC portion of the ASDE-3 project is the application for Stage 4 (production) frequency approval. The following steps are necessary in preparation for the Stage 4 application.

1. Coordinate all EMC related test plans for the ASDE-3 engineering model with all concerned government organizations (including ECAC, DOD, and OTP) through ARD-60.

2. Provide documents containing technical information and ASDE-3 engineering model data which convincingly supports the preferred frequency agile approach, rather than a single-frequency ASDE-3, within the band 15.7 to 17.7 GHz. These documents should be suitable for attachment to FAA's ASDE-3, Stage 4 application to the IRAC/SPS.

3. Provide document(s) to demonstrate ASDE-3 electromagnetic compatibility (for the Stage 4 application) with other system equipment in all applicable, anticipated ASDE-3 environments, e.g.:

    - Simultaneous, non-interfering use of two ASDE-3's spaced at least 6000 ft., at the same airport.

    - ASDE-3 EMC with various military radars (i.e., in band 15.7 - 17.7 GHz), whether the ASDE-3 operates in a single-frequency or a frequency-agile mode.

4. Provide documents containing technical information and ASDE-3 measured data to insure that the production ASDE-3 can be and will be in conformance with the provisions of Section 5.3.2, Radar Spectrum Engineering Criteria (RSEC) of the OTP Manual of Regulations and Procedures for Radio Frequency Management. (It is noted that a revision of the RSEC was approved by the IRAC on November 8, 1977).

5. Provide documents or statements to support the Stage 4 application, assuring that the production ASDE-3 can be and will be continuously tunable over the 15.7 - 16.2 GHz band (and over as much of the 16.2 - 17.7 GHz band as is economically feasible).

6. Provide evidence or statement to support the Stage 4 application to assure that the production ASDE-3 specification can and will require a capability to change operating frequencies in the field.

7. Provide support to ARD-60 in preparing the ASDE-3 Stage 4 application to OTP/IRAC and in pursuing appropriate actions to obtain Stage 4 approval for production systems.

2.4 Maintenance Plan

2.4.1 Introduction

This ASDE-3 Maintenance Plan identifies the means of developing the input requirements and procedures for NAFEC personnel to assume the responsibility to maintain the ASDE-3 equipment during the test program to be conducted at NAFEC with limited contractor support. NAFEC will assume maintenance responsibility following Government acceptance of the ASDE-3 from the contractor, and will continue maintaining the ASDE-3 as a Test and Evaluation Facility as long as it is needed.

2.4.2 Organization

The Maintenance Plan will be executed by the NAFEC Project Team associated with the ASDE-3 Test and Evaluation Program. A senior technican will be designated as the Site Manager and will have the responsibility of accomplishing the maintenance plan. The Site Manager will report to the NAFEC Program Manager who, in turn, will report as necessary to the Airport Surface Traffic Control (ASTC) Program Manager in SRDS.

As the project progresses towards the installation and test phase, an additional line technician (or technicians) will be assigned to effect the maintenance requirements. The on-site support contract will be utilized to resolve any problems or malfunctions that may not have been covered during the training program or other phases of the program prior to the field tests at NAFEC.

2.4.3 Maintenance Capability Development

The ASDE-3 maintenance capability will be developed during the following designated phases:

a. Contract monitoring

b. Acceptance tests

c. Field installation and checkout tests

d. Contractor training program

e. Field test and evaluation.

2.4.3.1 Contract Monitoring

The contract monitoring phase will enable the NAFEC personnel to develop an early understanding of the equipment and its design. Monitoring will be done on a non-interference basis to the contractor and the technical progress will be determined from the monthly progress reports, quarterly status reviews, and phone contact.

This procedure will provide the means for NAFEC to develop an early understanding of the magnitude of the maintenance requirements to ascertain the type and level of person(s) to support the ASDE-3 field

tests and evaluation. It is also expected that the maintenance technician will provide an input to the Configuration Management team (Section 2.5) in reference to equipment changes of concern.

2.4.3.2 Acceptance Tests

Participation in the acceptance tests will consist of observing (on a non-interfering basis) the system performance and the techniques used during the tests. This will provide background information concerning of the component test equipment used.

2.4.3.3 Field Installation and Check-out Tests

While the contractor is installing the equipment, the NAFEC maintenance team will have on-the-job training on a non-interfering basis. The installation effort will point out the possible problem areas of the equipment and therefore will be a major input to determine the maintenance requirements. This phase will also enable the maintenance team to determine the adequacy of the ASDE-3 instruction book. Observation of the installation effort will also give the background for making recommendations regarding the field installation of the production equipment.

2.4.3.4 Contractor Two-Week Training Program

This training program will provide a formal course for maintenance and operational personnel. It will be given immediately upon completion of the field installation and check-out testing by the contractor.

2.4.3.5 Field Test and Evaluation

After acceptance of the system from the contractor, maintenance will be initially conducted under the guidance of the contractor on-site support technician to determine the effectiveness of the contractual instructional material and the adequacy of NAFEC maintenance capability.

These tests will also furnish an input to the Configuration Management Plan documentation (Section 2.5). The NAFEC maintenance technician will report on the correctness of the drawings and technical material provided by the contractor. It will also be the technician's responsibility to provide proposed circuit changes or modification to the Configuration Manager (CM).

During this phase, the adequacy of the spare parts provided will be determined. Recommendations will be made in reference to the type and quantity.

2.4.4 Records

Records will be maintained by the Site Manager on all aspects of the maintenance effort. Records to be maintained will include daily log of meter readings, and quality of scope presentation, failures, time to fix failure, down time and parts used. Notation will be made if the repair required that the contractor on-site technician be used or that the contractor was contacted if the contractor on-site technician was not available.

The record forms will be developed by the NAFEC Program Manager (with cooperation from TSC and the contractor) when the equipment is ready for acceptance tests. This will allow the Site Manager to become familiar with the equipment and the data to be recorded on the forms. Modifications to the forms will be made based as experience is gained during the test phases.

2.4.5 Staffing

The Site Manager, a senior technician, will be the only maintenance technician assigned until the equipment is ready for installation. At that point, it will be determined whether a second technician would be required for maintenance purposes.

It is planned to have an engineer and a technician assigned to the program for monitoring purposes and to help develop the various plans required, until the equipment is ready for acceptance tests. At that time an additional engineer and technician will be assigned for equipment familiarization in order to conduct the field and operational tests.

2.5 Configuration Management Plan

2.5.1 Introduction

This plan applies to the major components of the ASDE-3 system which are grouped in the following categories:

a. Tower Roof Equipment

b. Van Equipment

c. Cab Equipment

d. Test Equipment.

The individual components and items are identified in Paragraph 2.5.3.2.

2.5.1.2 Objectives

The objectives of the ASDE-3 configuration management plan are to establish procedures and a recording system to:

a. Provide a means to update the documentation provided by the contractor.

b. Detail the tower installation.

c. Make appropriate changes or additions to the specification.

d. Provide recommendations for enhancement or improvements.

e. Record utilization of the provided spares and any other parts used for maintenance or repairs.

2.5.1.3 Applicable Documents

ASDE-3 Engineering Model Radar Specifications (Appendix I of Contract DOT-TSC-1373 dtd May 31, 1977).

MIL-STD-480, Configuration Control Engineering Changes, Deviations and Waivers, October 30, 1968.

2.5.1.4 Definitions

The definitions of configuration management terms used herein are contained in MIL-STD-480, APPENDIX E.

2.5.2 Organization

The configuration management will be a part of the functions performed by the NAFEC Project Team responsible for the ASDE-3 Test and Evaluation Program. A senior engineer will be designated by NAFEC as configuration manager (CM) and will be responsible to ensure compliance with the Plan. The designated senior engineer is directly responsible to the NAFEC Program Manager who, in turn, will report as necessary to the Airport Surface Traffic Control (ASTC) Program Manager in SRDS.

2.5.2.1 Responsibilities

The CM will report problems, prepare procedures, maintain a status report and be the responsible individual for implementing the configuration management plan after the ASDE-3 acceptance tests at NAFEC and during the engineering tests and controller operational tests.

The CM will also be responsible for minitoring and controlling Government Furnished Equipment (GFE).

Assignment of additional personnel will be made based on the recommendations of the CM through NAFEC management.

The CM will establish a reporting procedure to be used by the Site Manager who is responsible for the conduct ofthe Maintenance Plan. This input will be the source of modifications made during the various tests.

2.5.3 Configuration Identification

2.5.3.1 Baseline

The baseline documentation will be that referenced in the ASDE-3 contract (Contract DOT-TSC-1373 dated May 31, 1977), and subsequently updated, delivered, and accepted as a contract deliverable item. The baseline documents include the design specification, engineering drawings and the instruction books.

2.5.3.2 Equipment

This plan applies to the following grouped components of the ASDE-3 system:

a. Tower roof equipment
   - Radome
   - Antenna
   - Safety Devices
   - Waveguide and cables

b. Van equipment
   - Transmitter/receiver
   - Maintenance Radar Control Rack
   - Analog Scan Converter Rack
   - Radar Switching Unit
   - Dehydrator-Compressor
   - Power Distribution Box
   - Test Equipment
   - Cables

c. Cab Equipment
   - TV Display
   - Display Control Unit
   - Radar Cables Control Unit

d. Government Furnished Equipment
   - PPI and the mechanical assembly for the PPI Camera
   - Analog scan converter
   - Vidicon camera
   - Bright TV Displays (2)
   - Van (equipment trailer)
   - Drawings of the NAFEC ASDE Tower

e. Test Equipment
Signal Generator
Sweep Generator
Spectrum Analyzer

2.5.3.3 Nomenclature

Nomenclature assignment will be requested from the FAA in conjunction with submittal of the nameplate drawings for FAA approval by FAA-G-2100/1. Since equipment titles that are specified in the equipment specifications are still subject to FAA approval prior to use on nameplates, the nameplate drawings will not include the type designation or equipment title assigned by the FAA.

2.5.3.4 Identification Markings

Identification markings, including nameplates, reference designations and serialization, will be in accordance with FAA-G-2100/1. Manufacturing sequence numbers will be sequentially assigned to sub-assemblies and assemblies. Units/Assemblies which receive a nameplate will be assigned a sequential serial number, starting with 001. Computer program decks and tapes will be identified by header cards and labels, respectively, which will include mnemonic, manufacturer's code identification, part number, revision letter and date, contract number, system identity, and serial number.

2.5.4 Configuration Control Board

Each engineering change which is initiated against the configuration identification will be evaluated by the ASDE-3 Configuration Control Board (ACCB) to determine the necessity and impact, check the change classification, and assign them effectively. The ACCB Chairman (ACCBC) will approve or disapprove all changes. The ACCB will be comprised of one member each from SRDS, NAFEC, TSC, AAF, and AAT. During the course of the ASDE-3 development contract, the TSC member will act as chairman. After acceptance of the ASDE-3 at NAFEC, the chairmanship will transition to the NAFEC member. ACCB members will review change documents and provide a signed copy of their recommendations to the ACCBC. The ACCBC will maintain status accounting of changes. At the option of the ACCBC

the ACCB may conduct formal meetings or changes may be routed to each member individually.

After acceptance testing, the resultant changes to baseline documents will be maintained and updated by the NAFEC Test Team for the NAFEC CM during the field and operational tests.

2.5.5 Status Accounting and Reporting

2.5.5.1 Records

Status records will be maintained by the ACCBC for the configuration identification, engineering changes, deviations, and waivers which affect the final configuration. Records will be maintained manually or by Automatic Data Processing (ADP) where justified by volume of data. The records will be in contractor format. When the equipment goes into the test phases at NAFEC, the CM will exercise the control of the above items.

2.5.5.2 As-Built List

An as-built list will be compiled for each new and modified configuration item. The list will include all serialized assemblies/subassemblies, wire lists, harnesses and cables. Approved deviations and waivers will be noted on the as-built list for the applicable serialized item. The as-built data will be verified by quality assurance and a copy of the list will be forwarded to the ACCBC for manual status accounting.

3.0 ASDE-3 DEVELOPMENT: MANAGEMENT PLAN

3.1 Organization Roles and Responsibilities

The ASDE-3 project has three significant products: (1) a Technical Data Package for production procurement of ASDE-3; (2) necessary data to support a request for frequency allocation for ASDE-3; and (3) an ASDE-3 test and evaluation facility. The effort which is central to achieving these products is the development of the ASDE-3 engineering model. The activities necessary to complete these products are the Master Test Activity, EMC Activity, Site Preparation and Maintenance Activity, and Contract and GFE Display Activity. (Figures 3-1, 2, 3, and 4 respectively).

The ASTC Program Manager (ARD-102) is responsible for the overall conduct of the ASDE-3 project. The primary product area of responsibility is the production of a Technical Data Package through the Master Test Activity (Fig. 3-1). Overall supervision of the Master Test Activity is the responsibility of the ASTC Program Manager. However, the test and evaluation will be carried out by the ASDE-3 Test Team (Fig. 3-5).

ARD-60 is responsible for the EMC Activity (Fig. 3-2), NAFEC is responsible for the Site Preparation and Maintenance Activity (Fig. 3-3) and TSC is responsible for the Contract and GFE Display Activity (Fig. 3-4). Functions and responsibilities for each organization are detailed below.

3.1.1 SRDS (ARD-102)

(1) Provides the Program Manager.

(2) Provides program guidance to all offices, services, NAFEC, and TSC for the development, test, and evaluation functions.

(3) Acts as chairman and convenes meetings of the ASDE-3 Coordination Team.

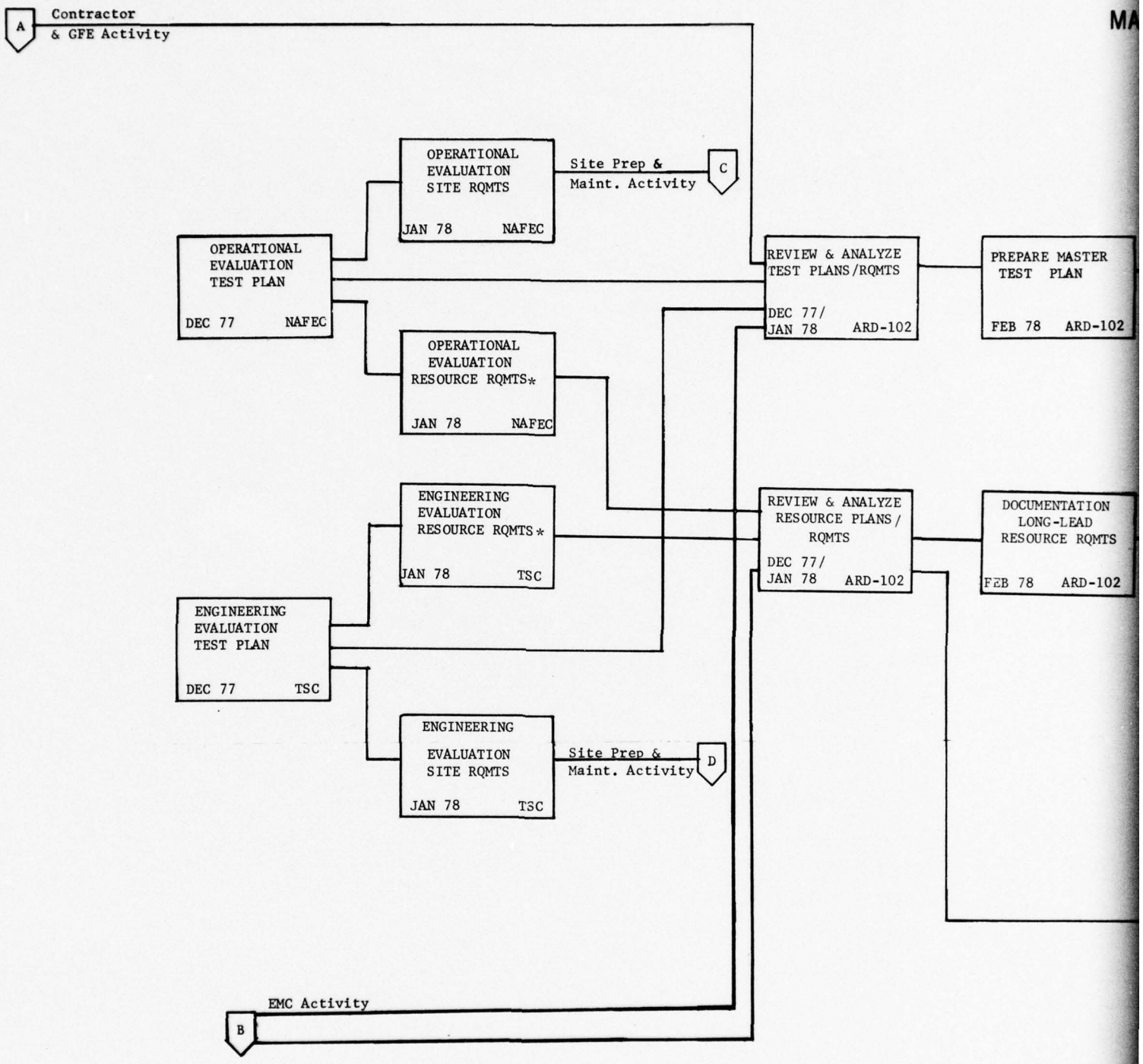
(4) Maintains the currency of the ASDE-3 Project Plan and prepares, analyzes, and distributes planning and scheduling information to all interested organizations.

(5) Compiles requirements and resources necessary to support the testing effort.

(6) Prepares Master Test Plan.

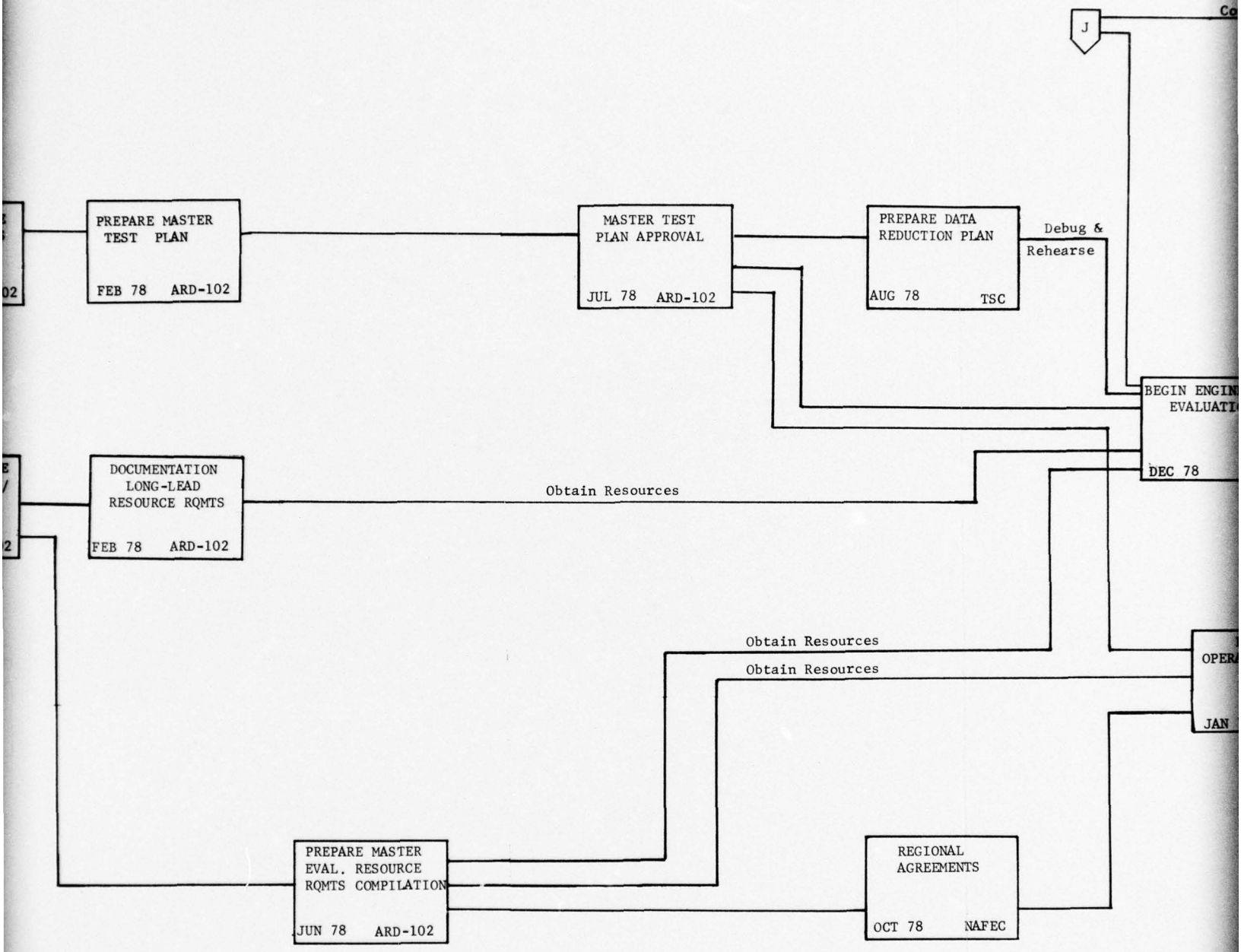
(7) Monitors project performance and conducts periodic, informal reviews.

(8) Provides progress reports to management.



* EVALUATION RESOURCE REQUIREMENTS INCLUDE: EVALUATORS, DR&A EQUIPMENT & PERSONNEL, AIRCRAFT

Fig. 3-1
ASDE PROJECT PLAN
MASTER TEST ACTIVITY CHART



& PERSONNEL, AIRCRAFT

2

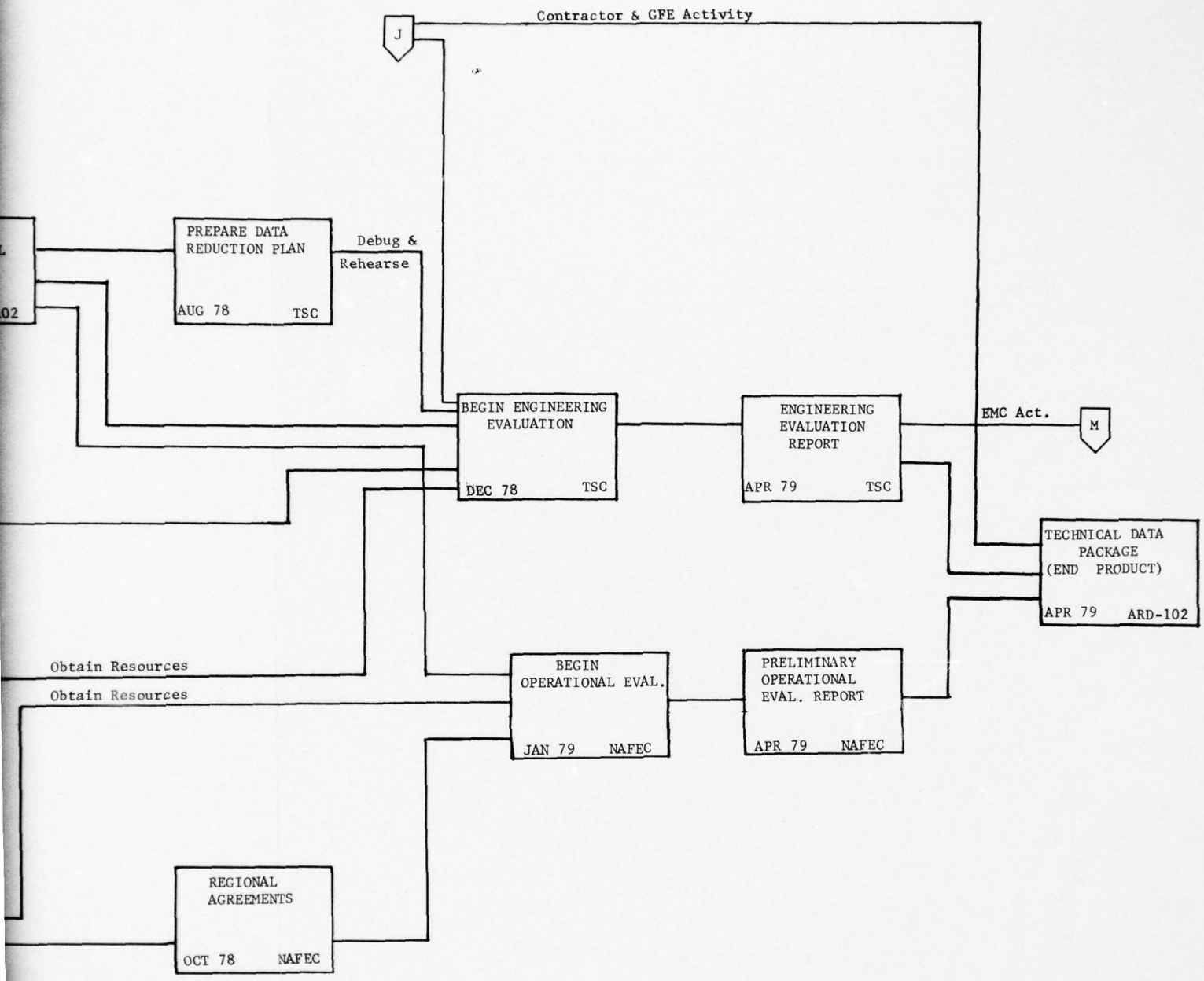
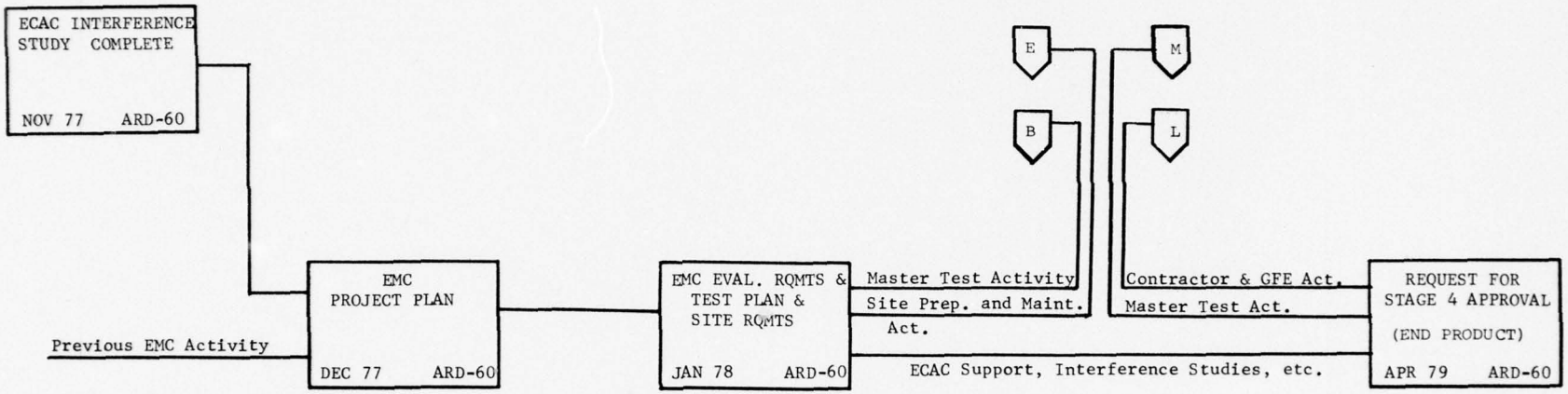
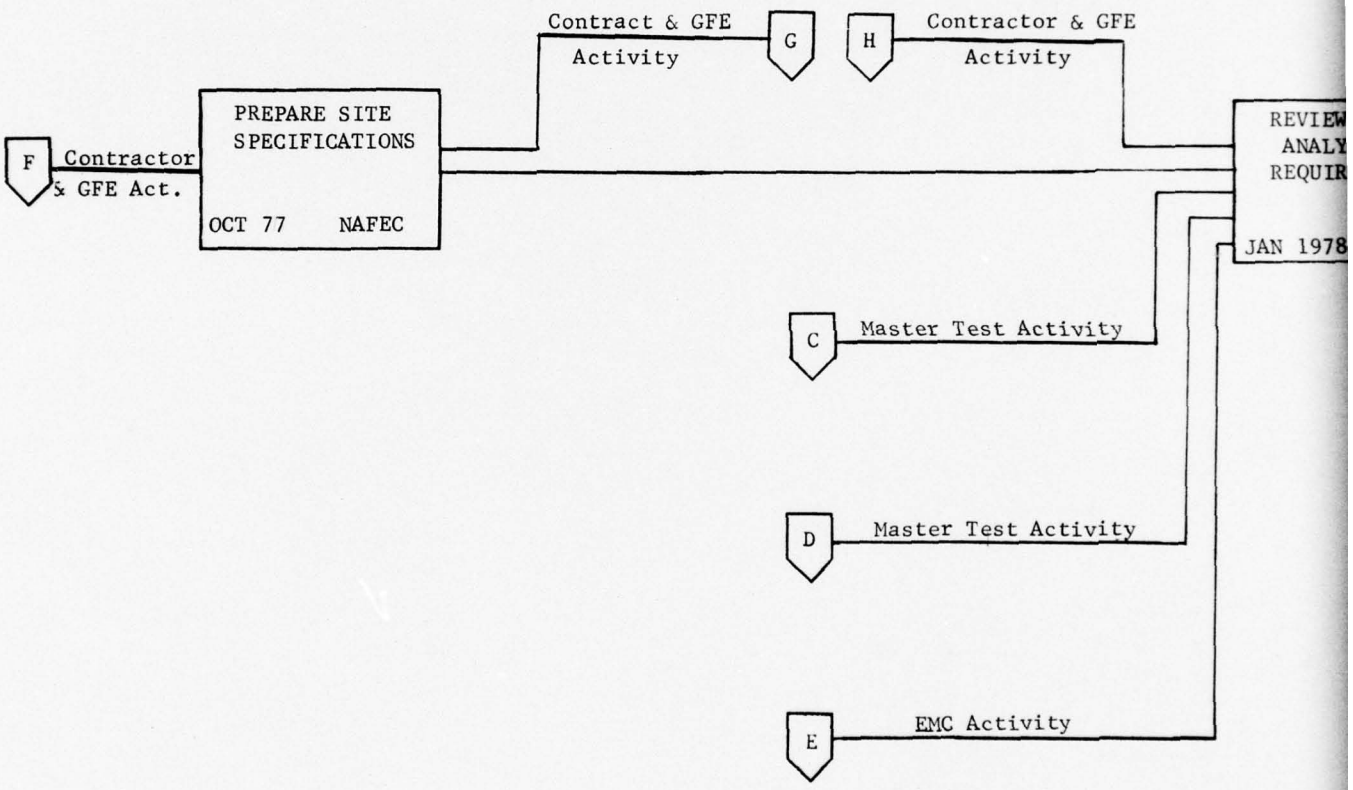

Contractor & GFE Activity
J
PREPARE DATA REDUCTION PLAN
AUG 78 TSC
Debug & Rehearse
BEGIN ENGINEERING EVALUATION
DEC 78 TSC
ENGINEERING EVALUATION REPORT
APR 79 TSC
EMC Act.
M
TECHNICAL DATA PACKAGE (END PRODUCT)
APR 79 ARD-102
Obtain Resources
Obtain Resources
BEGIN OPERATIONAL EVAL.
JAN 79 NAFEC
PRELIMINARY OPERATIONAL EVAL. REPORT
APR 79 NAFEC
REGIONAL AGREEMENTS
OCT 78 NAFEC

Fig. 3-2

ASDE-3 PROJECT PLAN

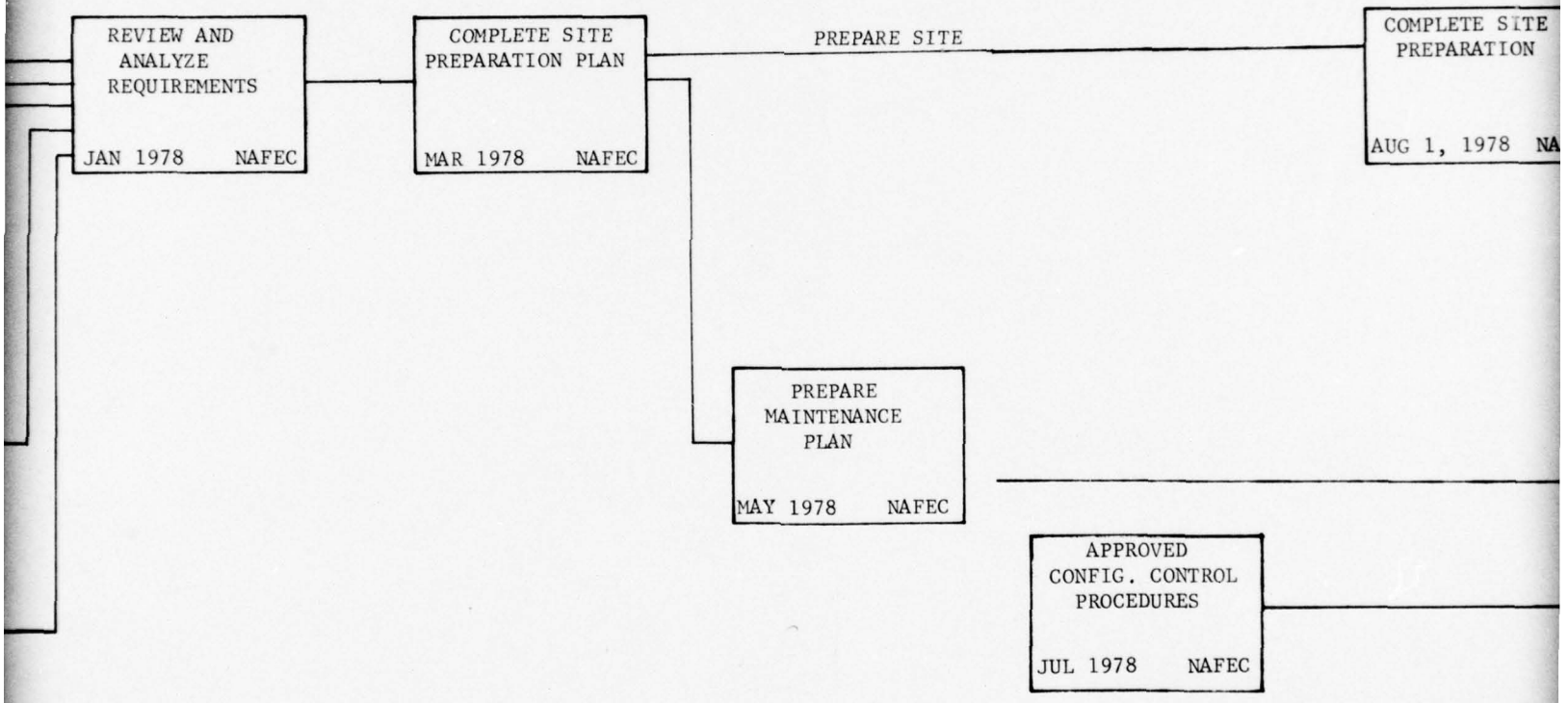
EMC ACTIVITY CHART




Contract & GFE
Activity
G
H
Contractor & GFE
Activity
PREPARE SITE
SPECIFICATIONS
OCT 77 NAFEC
F
Contractor
& GFE Act.
REVIEW
ANALY
REQUIR
JAN 1978
C
Master Test Activity
D
Master Test Activity
E
EMC Activity

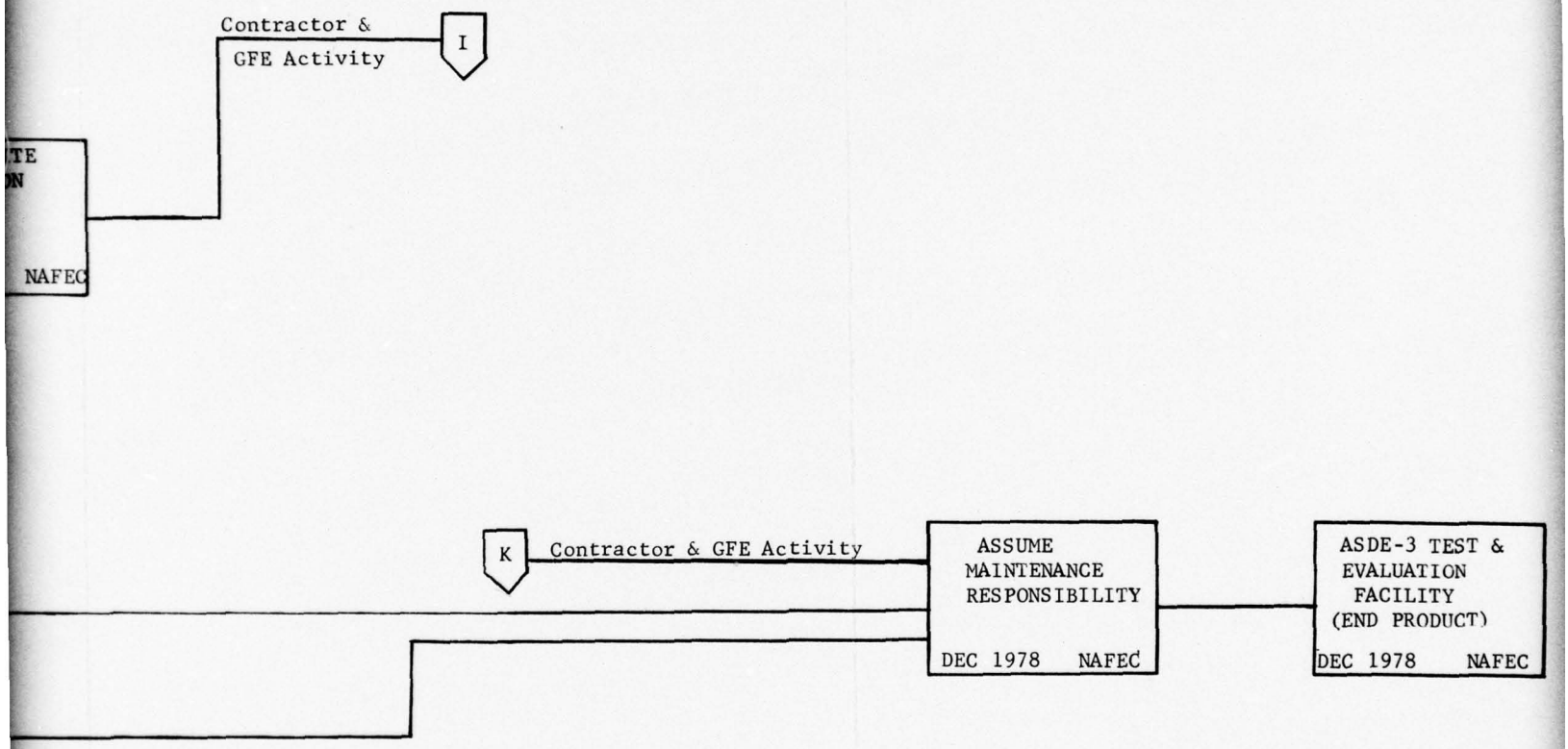
1

Fig. 3-3
ASDE-3 PROJECT PLAN
SITE PREPARATION AND MAINTENANCE ACTIVI



2

ITY CHART


Contractor &
GFE Activity
I
TE
N
NAFEC
K
Contractor & GFE Activity
ASSUME
MAINTENANCE
RESPONSIBILITY
DEC 1978 NAFEC
ASDE-3 TEST &
EVALUATION
FACILITY
(END PRODUCT)
DEC 1978 NAFEC

3

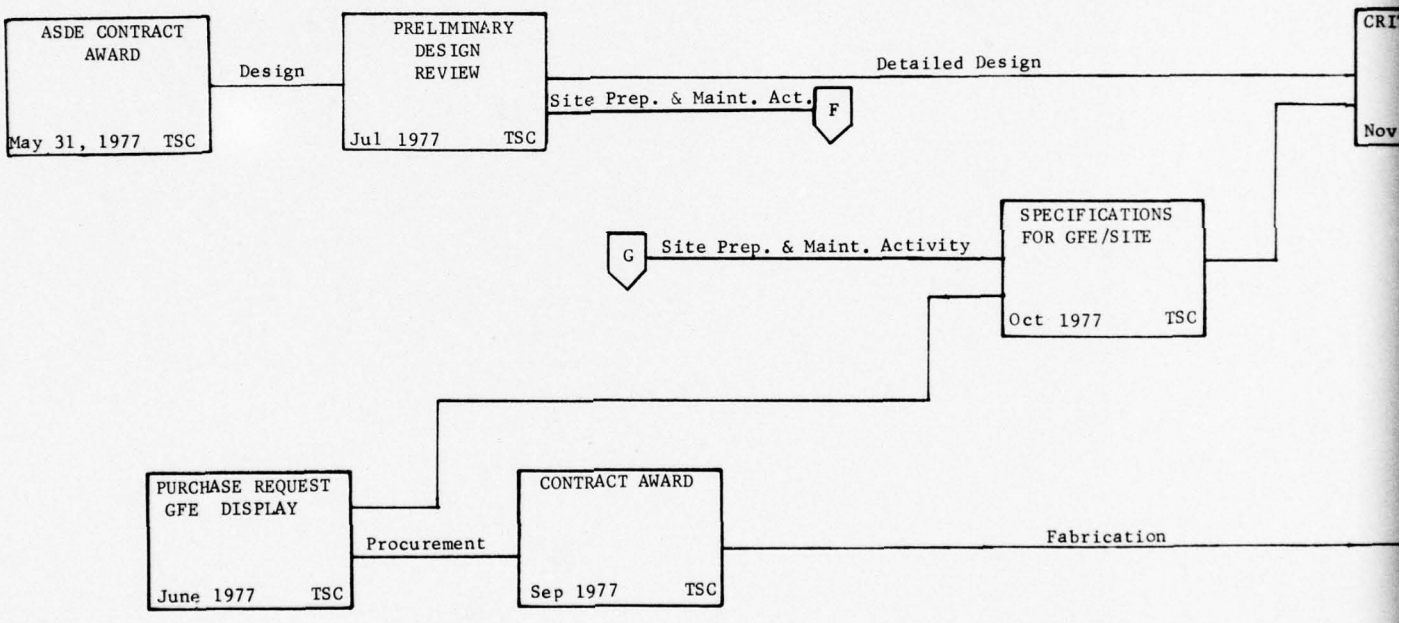
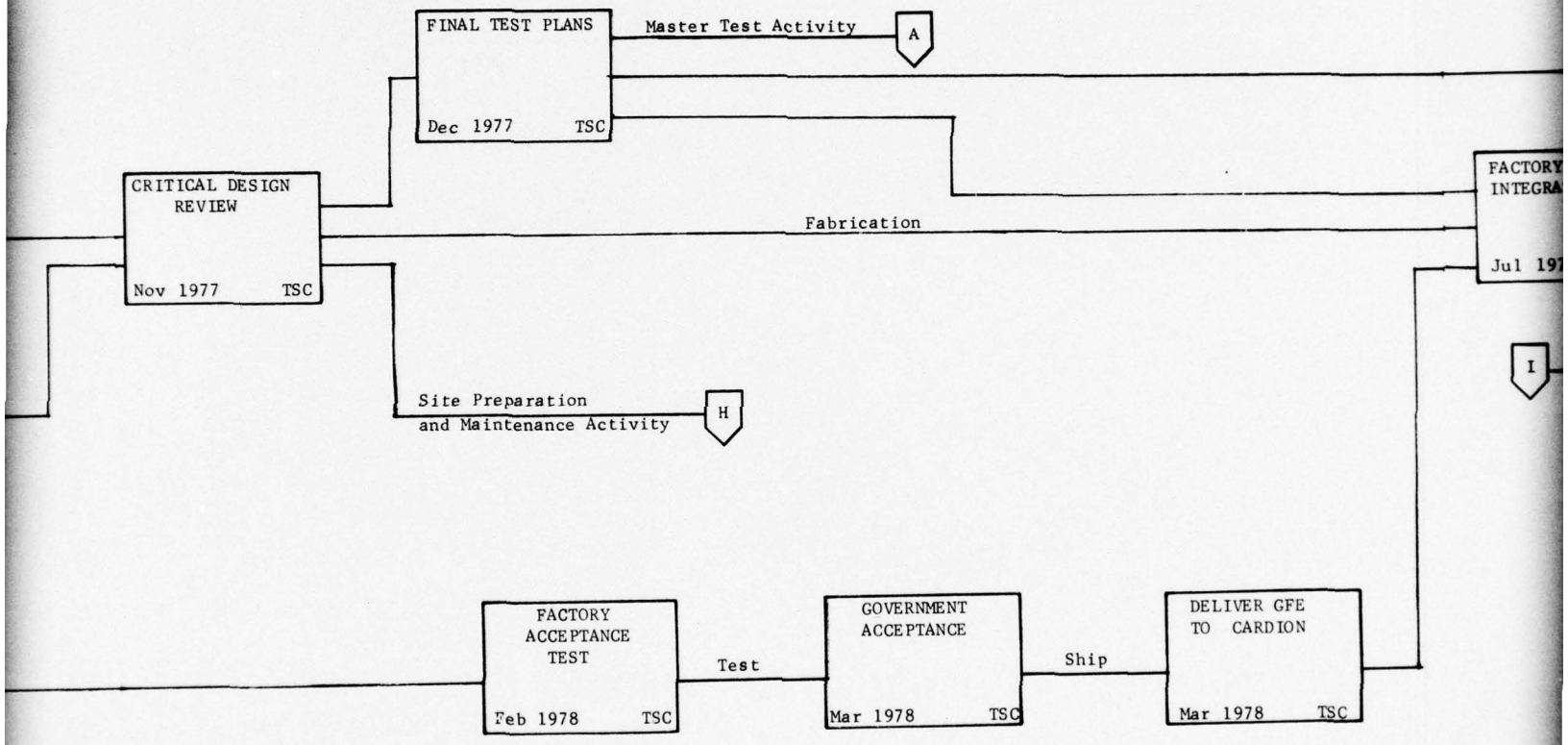
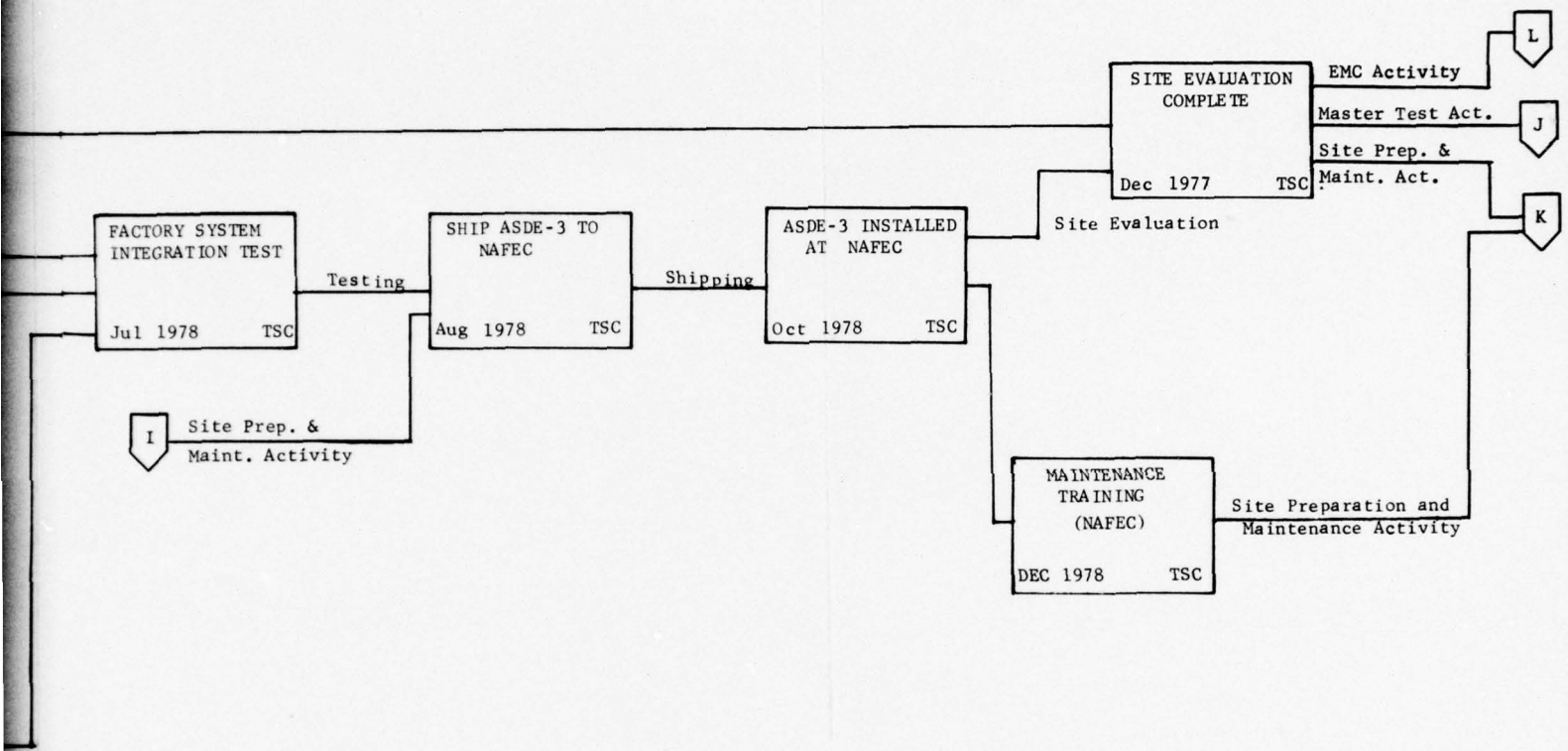

ASDE CONTRACT AWARD
May 31, 1977 TSC
Design
PRELIMINARY DESIGN REVIEW
Jul 1977 TSC
Detailed Design
Site Prep. & Maint. Act.
F
CRI
Nov
G
Site Prep. & Maint. Activity
SPECIFICATIONS FOR GFE/SITE
Oct 1977 TSC
PURCHASE REQUEST GFE DISPLAY
June 1977 TSC
Procurement
CONTRACT AWARD
Sep 1977 TSC
Fabrication

Fig. 3-4
ASDE-3 PROJECT PLAN
CONTRACT AND GFE DISPLAY ACTIVITY CHART




FACTORY SYSTEM INTEGRATION TEST
Jul 1978 TSC
Testing
SHIP ASDE-3 TO NAFEC
Aug 1978 TSC
Shipping
ASDE-3 INSTALLED AT NAFEC
Oct 1978 TSC
Site Evaluation
SITE EVALUATION COMPLETE
Dec 1977 TSC
EMC Activity
Master Test Act.
Site Prep. & Maint. Act.
L
J
K
I
Site Prep. & Maint. Activity
MAINTENANCE TRAINING (NAFEC)
DEC 1978 TSC
Site Preparation and Maintenance Activity

3

A S D E - 3 T E S T T E A M

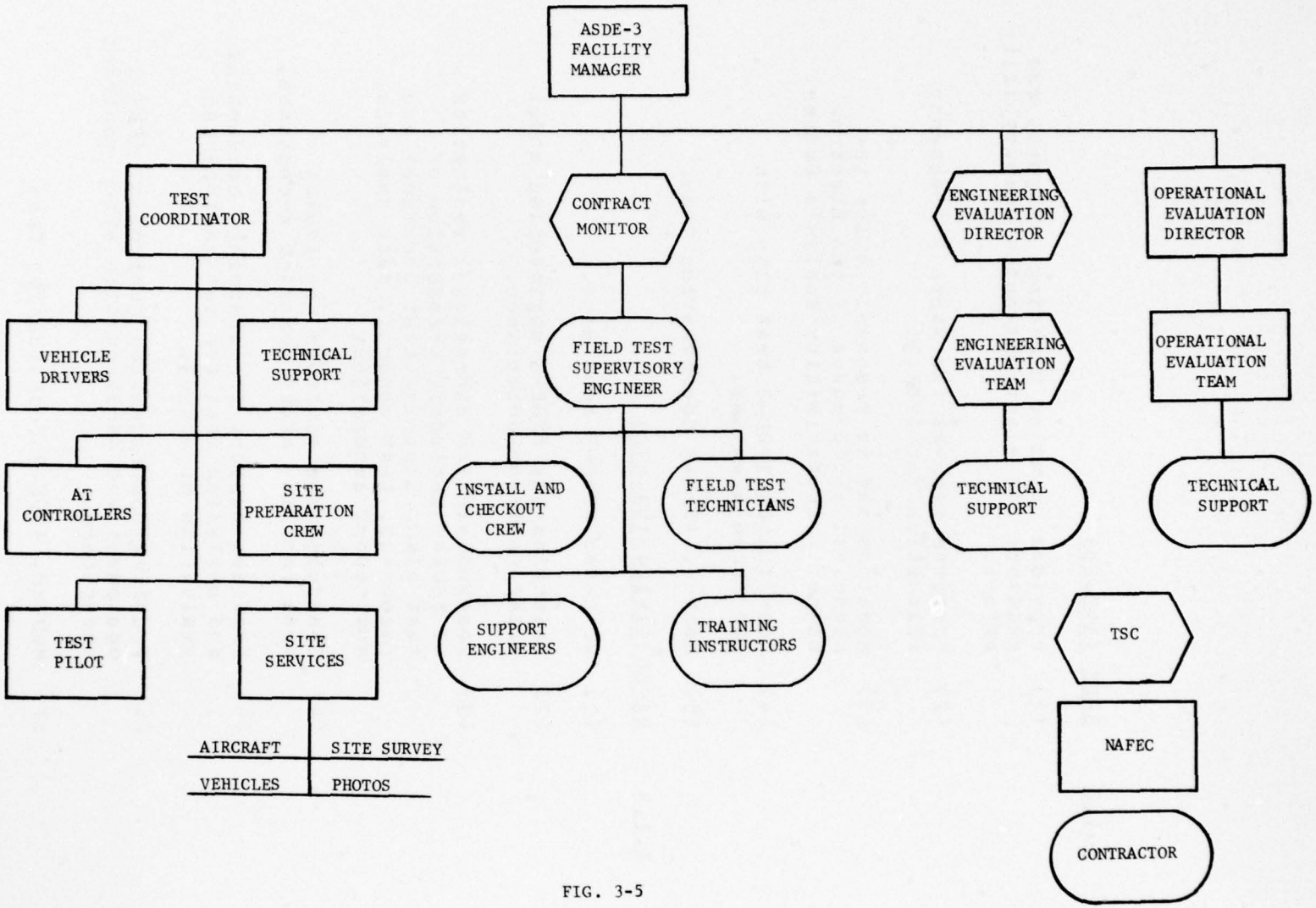


FIG. 3-5

3.1.2 SRDS (ARD-60)

(1) Provides detailed planning, support, and guidance for electromagnetic compatibility effort.

(2) Prepares request for State 4 frequency allocation for ASDE-3.

(3) Monitors and is responsible for the technical performance of the Electromagnetic Compatibility Analysis Center.

(4) Coordinates ASDE-3 test plan with concerned agencies.

(5) Member, ASDE-3 Coordination Team.

3.1.3 NAFEC (ANA-4/ANA-310)

(1) Prepares ASDE-3 test site.

(2) Maintains the ASDE-3 engineering model after contract acceptance.

(3) Responsible for operational evaluation of ASDE-3 including preparation of test plan, securing test personnel and resources, test conduct, data analysis, and report generation.

(4) Schedules and controls the ASDE-3 test facility after contract acceptance.

(5) Provides support for planning, conducting, and analyzing data for the engineering evaluation of ASDE-3.

(6) Provides configuration control of ASDE-3 equipment and documentation after contract acceptance.

(7) Member, ASDE-3 Coordination Team.

3.1.4 Airways Facilities Service (AAF-320)

(1) Provides technical requirements for ASDE-3.

(2) Provides technical consultation to TSC in monitoring the ASDE-3 development contract.

(3) Member, ASDE-3 Coordination Team.

(4) Provides expert advice and guidance with respect to technical issues impacting ASDE-3 implementation.

3.1.5 Air Traffic Service (AAT-120)

(1) Provides operational requirements for ASDE-3.

(2) Member, ASDE-3 Coordination Team.

(3) Provides expert advice and guidance with respect to operational issues impacting ASDE-3 implementation.

3.1.6 Transportation Systems Center (TSC-522)

(1) Monitors and is responsible for the ASDE-3 development contract.

(2) Monitors contract and is responsible for provision of Government furnished display equipment.

(3) Responsible for the engineering evaluation of ASDE-3 including the planning, test conduct, data reduction and analysis, and report generation.

(4) Provides support for planning, conducting, and analyzing data for the ASDE-3 operational evaluation.

(5) Member, ASDE-3 Coordination Team.

3.2 Management Documentation

This project plan will become the basic guidance document for ASDE-3 Project Management. All project documentation for management control, resource allocation, and budgeting will reference this document.

For FAA budgetary purposes, this project is part of the Airport Surface Traffic Control Program (program element 143). Airport Surface Detection Equipment is subprogram 143-102, which is further broken into two projects: Basic ASDE-3, 143-102-01; and Enhanced ASDE-3, 143-102-02.

The SRDS management control document for this project is the End-Item Resume, 143-103-01 and this program plan. The ASDE-3 Program Manager is responsible for keeping SRDS management apprised of progress via monthly status reports on the project.

The Program Manager officially tasks supporting organization (ARD-60, NAFEC, TSC) by a Request for End-Item Support. Responses are in the form of End-Item Resumes (ARD-60), NAFEC Program Documents (NPD), and TSC Program Plan Agreements (PPA). These and their status reports become management control documents for the ASDE-3 Program Manager. In addition to these formal lines of management communication, a means for working level discussion and decision making is necessary. This is satisfied by the ASDE-3 Coordination Team. This working group consists of representatives from SRDS (program office and spectrum management staff), NAFEC, OSEM, TSC, Air Traffic Service (ATC System Program Division), Airways Facilities Service (Radar Engineering Division), and the Program Management Staff of Air Traffic and Airway Facilities. The team provides critical review of both this plan itself and all test plans, resource requirements and the technical data package for ASDE-3. It keeps abreast of contractor performance through periodic briefings and provides the nucleus of technical and operational expertise for the Program Manager.

3.3 Schedules and Resources

The primary resource documents for the ASDE-3 project are the AED Budget Exhibits for FY-77, 78, and 79. These documents detail budget levels for in-house and contract dollars for SRDS, NAFEC, and TSC. The End-Item Resumes carry some budgetary information as well as major project milestones. While these documents are not a part of the body of this project plan, they are derived from this plan and are an integral part of the ASDE-3 project management.

The detailed schedules for ASDE-3 project activities are shown in figures 3-1, 2, 3, and 4. These activities will be closely monitored in order to meet the primary critical milestone for the ASDE-3 project: delivery of the Technical Data Package in April 1979. It is vital that this date be met in order to assure a production procurement of ASDE-3 in FY-1980. A narrative description of each of these activities follows.

3.3.1 Master Test Activity

This is the central activity in the ASDE-3 Project Plan. This activity results in the production of the Technical Data Package for ASDE-3. Figure 3-1 shows the events which make up this activity.

The Master Test Activity begins with the test plans for each of the three evaluations: contractor site acceptance, engineering, and operational evaluations. From these are derived NAFEC site requirements, evaluation resource requirements and the master test plan.

The evaluation resource requirements should include the necessary personnel (test subjects, data reduction and analysis, technicians, engineers, etc.) and equipment (test equipment, aircraft, data processing, etc.) to conduct all of the test and evaluation. The Program Manager aided by NAFEC and TSC will then do whatever is necessary to obtain these resources. In the case of obtaining controllers with ASDE-2 experience as test subjects for the ASDE-3 operational evaluation, it is expected that Air Traffic Service will support NAFEC in writing and approving the necessary regional agreements. Also, TSC will prepare a data reduction plan including actual production and test

of the data reduction and analysis software in order to expedite the evaluation cycle. The master test plan will be prepared by the Program Manager and will contain a compendium of the individual test plans. It will then be coordinated among interested offices and services (Air Traffic and Airway Facilities). It will also be coordinated outside FAA through ARD-60 to all organizations interested from an electromagnetic compatibility viewpoint.

Test and evaluation will be conducted in accordance with the master test plan and will begin with the site acceptance tests by the contractor. When these have been successfully completed, the engineering evaluation will begin. The operational evaluation will begin thereafter as soon as is practical. The two evaluations must be run concurrently because of the criticality of meeting the April 1979 date for handoff of the Technical Data Package.

The government engineering and operational evaluations will be conducted under the overall guidance of the ASDE-3 Test Team. The organization and responsibilities of this team are shown in Figure 3-5.

The test team will be lead by the NAFEC ASDE-3 Facility Manager. He has overall responsibility for scheduling, operating, and maintaining the facility. He also acts to insure that the proper coordination has occurred among the Test Coordinator, the Engineering and the Operational Evaluation Directors.

The Test Coordinator is responsible for securing and utilizing all the NAFEC resources necessary for the tests. These include, aircraft, service vehicles, pilots, etc.

The two evaluation directors are responsible for the actual conduct, data recording, data analysis, and report generation in their areas. The Operational Evaluation Director will be from NAFEC, the Engineering Evaluation Director, from TSC.

3.3.2 EMC Activity

This activity (Figure 3-2) is of major importance to the FAA ASDE-3 program because of the necessity to obtain the proper frequency allocation for implementation. An EMC Program Plan will be developed by ARD-60. This plan will include the test, evaluation and site requirements necessary for frequency approval. It will also outline any remaining analyses and support requirements which ECAC may be able to provide to support FAA's Stage 4 spectrum use application.

The end product of this activity is the formal request for Stage 4 frequency spectrum use approval. The data in this report will be derived from the ASDE-3 evaluations at NAFEC. This request for frequency approval must be made at about the same time as the Technical Data Package handoff in order for the FAA to obtain the frequency allocation prior to the RFP issuance for the ASDE-3 production contract.

3.3.3 Site Preparation and Maintenance Activity

This activity (Figure 3-3) describes the events necessary to prepare the NAFEC site and personnel for the ASDE-3 installation and tests. The end product of this activity is the establishment of an ASDE-3 test and evaluation facility at NAFEC.

The site installation plan from the contractor together with the site requirements from each of the test areas comprise the input for the site preparation plan to be developed by NAFEC. The site will then be prepared in time for delivery of the ASDE-3 engineering model by the contractor.

Also a part of this activity is the preparation of maintenance and configuration control plans. These will be the basic guidance documents for use by NAFEC in managing the ASDE-3 test facility after government acceptance from the contractor.

3.3.4 Contract and GFE Display Activity

This activity consists of the management and contractual events necessary to actually develop the ASDE-3 engineering model. Major events in this activity are the responsibility of TSC and are shown in Figure 3-4. These events were discussed earlier (paragraph 2.1.1) in this document and need not be repeated here.

APPENDIX A

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591

D APR 25 1977

IN RE REFER AAT-120

SUBJ Outline of Operational Requirements for Airport Surface Detection Equipment (ASDE-3) Testing at NAFEC

FR Chief, ATC System Programs Division, AAT-100

ARD-100

Enclosed is an outline of operational requirements for the testing and evaluation of the ASDE-3 prototype.

As we agreed, we will continue to work closely with you.

Robert A. Ausrotas

CHARLES H. NEWPOL

Enclosure

1. Independent displays at local and ground control positions with individual offset, variable range, intensity and associated operational controls are required at each site.

2. The operational displays must be clear of clutter, flicker free, of uniform brightness and continuously usable in all light conditions. The outline of all runways, taxiways and ILS critical holding areas must be clearly discernible.

3. The operational displays must have a presentation with enough clarity to determine aircraft heading when standing, and to distinguish between small aircraft (Category I,II)/service vehicles, large and heavy aircraft (Category III) by size /shape of the target displayed. This display clarity must be present under all weather conditions including heavy rain, snow, fog, etc.

4. The actual position of the aircraft must be within 20 feet of the displayed target position. These targets must be well defined and blooming eliminated.

5. Provide complete coverage at airports with obstructing buildings such as large hangers. Eliminate shadowing on the movement area.

6. The radar must be a high resolution radar capable of detecting all aircraft and service vehicles operating on the runways and taxiways. This includes those taxiways immediately adjacent to the gate/ramp areas.

7. The operational displays must be of high resolution to permit high speed targets such as a F4 Fighter Jet (that has a landing speed of 165 knots) to be continuously discernible.

8. ASDE radar must have target resolution of 25 feet or less on the operational display of all targets at an altitude of at least 100 feet and below. This will provide ATC with arrival and departure assurance.

9. The antenna noise level must be nondistractive. Where the antenna is mounted on the tower, vibration in the cab must be eliminated when the antenna rotates.

APPENDIX B

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION / 1INISTRATION

WASHINGTON, D.C. 20591

DATE: NOV 22 1976

IN REPLY REFER TO: ARD-62D

SUBJECT: ASDE-3 Frequency Spectrum Planning

FROM: Acting Chief, Spectrum Management Staff, ARD-60

TO: ARD-100

Enclosed for your information and appropriate follow-on action is a letter dated November 12, from the Office of Telecommunications Policy (OTP) which responds to FAA's request for permission to include a frequency agility capability in our development model of ASDE-3. Your attention is called to the recommendations of the Spectrum Planning Subcommittee (SPS) on page 3, which have received the concurrence of the OTP.

Representatives of this office will arrange to meet soon with your ASDE-3 Program Manager and any others concerned to discuss the implications of the SPS recommendations for ASDE-3 development.

CHARLES D. INNES

Enclosure

OFFICE OF TELECOMMUNICATIONS POLICY
EXECUTIVE OFFICE OF THE PRESIDENT
WASHINGTON, D.C. 20504

November 12, 1976

ASSISTANT DIRECTOR

Mr. Charles Innes
Acting Chief
Spectrum Management Staff
Federal Aviation Administration
Washington, D.C. 20591

Dear Mr. Innes:

The Spectrum Planning Subcommittee has reviewed your agency's request for a Stage 3 (development) review of the ASDE-3 to include the testing of the possible use of frequency agility with systems. The results of that review are attached.

This Office concurs with recommendations of the SPS.

Sincerely,

S. E. Probst
Acting Assistant Director
for Frequency Management

cc: Mr. Jansky w/Incls
Dr. Thaler w/incls
IRAC w/Incls
FAS w/Incls
SPS w/Incls

FOR AGENDA SPS 1815/2-1.14.10

OFFICE OF TELECOMMUNICATIONS POLICY
INTERDEPARTMENT RADIO ADVISORY COMMITTEE

Washington, D.C. 20005

November 12, 1976

TO: Acting Assistant Director for Frequency Management

SUBJECT: Systems Review - FAA's Airport Surface Detection Equipment - Stage 3

The Spectrum Planning Subcommittee reviewed the FAA's request for system review of the proposed Airport Surface Detection Equipment (ASDE-3) under the provisions of OTP Circular No. 11.

The SPS noted that:

1. FAA is seeking Stage 3 approval for the procurement of one experimental unit and is looking toward follow-on operational equipment in the same band (15.7-17.7 GHz) for deployment at 33 airports in the U.S.;

2. Under footnotes G59 and US110, the ASDE-3 is permitted in the 15.7-16.2 GHz band on a coequal basis with military radiolocation subject to coordination with the military departments and is secondary in the 16.2-17.7 GHz band;

3. FAA is designing the ASDE-3 to be continuously tunable over the 15.7-16.2 GHz band and over as much of the 16.2-17.7 GHz band as is economically feasible, to permit ease of frequency selection if congestion becomes a problem;

4. ASDE-3 specifications require a capability to change operating frequencies in the field.

5. The frequency agility capability being built into the Stage 3 unit can be dropped during the tests of this unit in favor of a conventional pulse sysem if it is determined the agility is not sufficiently beneficial;

6. There will be a two year period from the delivery of the Stage 3 unit to the Stage 4 procurement, during which EMC tests could be made and the benefits of agility assessed;

7. ASDE-3 use is expected to be similar to the use of ASDE-2's (Current ASDE-2 models are used primarily during periods of low visibility, which averages to less than 6 hours per day);

8. Since the initial OT preliminary assessment (SPS-1241), about 3900 additional operational military radars which operate in the 15.7-17 GHz band have been identified by the military;

9. The DOD has recently identified the 15.7-17.7 GHz band for consideration in developing new systems; and

10. ECAC, at the request of FAA, made an EMC assessment* at the 33 proposed ASDE-3 locations with the following results:

    a. Frequency or operational coordination will be required at 6 airports due to potential ASDE interactions with ground-based equipments;

    b. ASDE radars are a potential source of interference to military attack/bomb/fire control radars in the 16-17 GHz band; and

    c. Results a. and b. are applicable whether ASDE operates in the single-frequency or frequency-agile mode.

Th SPS considered:

a. the documents concerning FAA's request for a lower operating frequency for ASDE-3, resulting in Stage 1 approval of spectrum support in the band 15.7-17.7 GHz (Doc. 18381/1-1.14.10);

b. supplemental requests for Stage 3 approval of the ASDE-3 system, for frequency agility as well a conventional pulse equipment (SPS-1444 and SPS-1678);

c. the OT preliminary assessment of the ASDE-3 (SPS-1736);

d. a briefing by personnel from the ASDE-3 project office of the Transportation System Center (SPS-1809/1-1.14.16); and

e. a briefing by personnel from ECAC on the EMC aspects of the ASDE-3 at all of the proposed locations (SPS-1812/1-1.14.16).

The SPS recommends approval of spectrum support (Stage 3) for the ASDE-3 subject to the following conditions:

- In support of any request for a frequency agility capability at a Stage 4 review (Procurement), FAA report on tests to justify the use of that technique in improving performance during conditions of reduced visibility;

- FAA perform and report on EMC tests between the Stage 3 unit and other typical equipments in the planned environment; and

- Stage 4 operational models have the capability of single frequency operations and sector blanking.

- That the ASDE-3 be in conformance with the provisions of Section 5.3.2 of the OTP Manual of Regulations and Procedures for Frequency Management.

The SPS further recommends that DOD and OT, Department of Commerce, be given the opportunity to participate in developing the Stage 3 test plans and in the conduct of the Stage 3 unit testing.