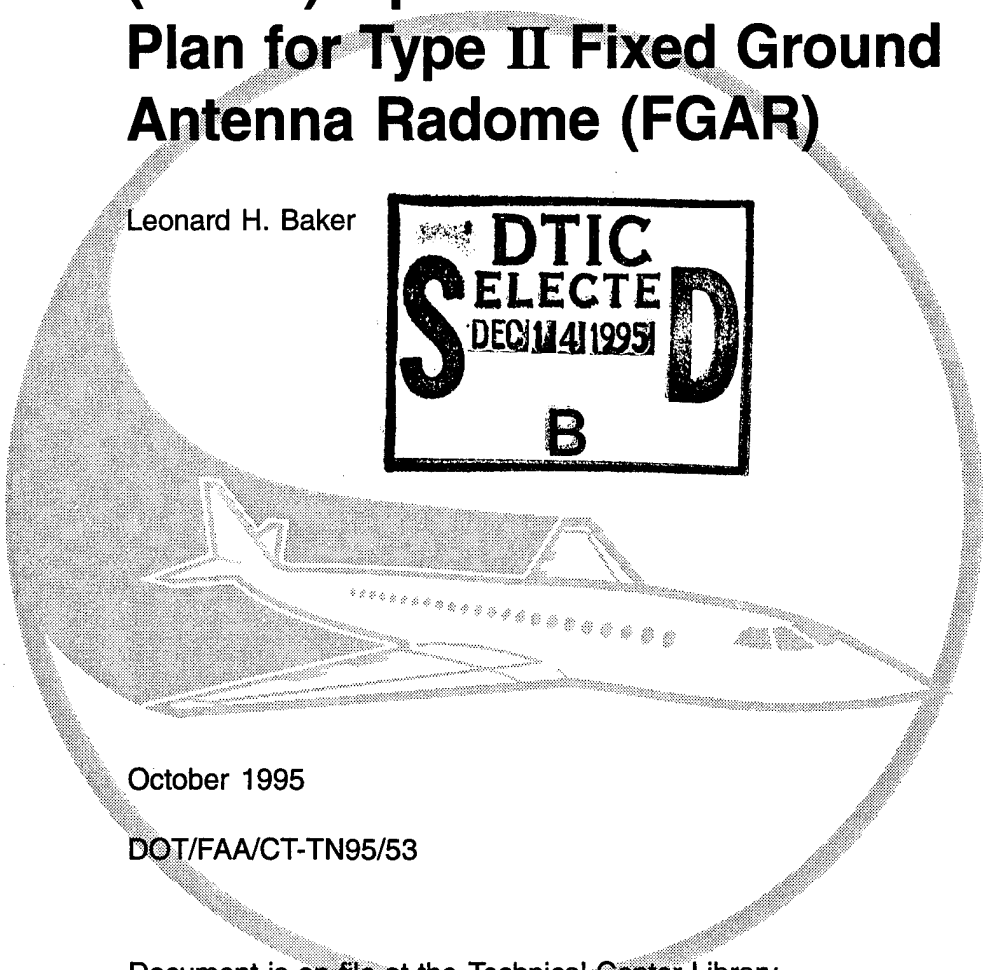
te technical note techn

Operational Test and Evaluation (OT&E) Operational Test Plan for Type II Fixed Ground Antenna Radome (FGAR)

Leonard H. Baker



October 1995

DOT/FAA/CT-TN95/53

Document is on file at the Technical Center Library,
Atlantic City International Airport, New Jersey 08405.

U.S. Department of Transportation
Federal Aviation Administration
Technical Center
Atlantic City Airport, NJ 08405

NOTICE

This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for the contents or use thereof.

The United States Government does not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the objective of this report.

AD NUMBER	DATE 12/1/95	DTIC ACCESSION NOTICE
1. REPORT IDENTIFYING INFORMATION 95 0308		
A. ORIGINATING AGENCY FAA Technical CEnter Atlantic City International Airport, NJ		
B. REPORT TITLE AND/OR NUMBER Operational test and evaluation (OT&E) operational...		
C. MONITOR REPORT NUMBER DOT/FAA/CT-TN95/53 Baker, L. et al.		
D. PREPARED UNDER CONTRACT NUMBER		
2. DISTRIBUTION STATEMENT UNLIMITED AVAILABILITY		

DTIC Form 50 DEC 91

PREVIOUS EDITIONS ARE OBSOLETE

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT/FAA/CT-TN95/53		

4. Title and Subtitle	5. Report Date
OPERATIONAL TEST AND EVALUATION (OT&E) OPERATIONAL TEST PLAN FOR TYPE II FIXED GROUND ANTENNA RADOME (FGAR)	October 1995
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
Leonard H. Baker,ACT-310B; Harold G. Sedgwick,Raytheon	DOT/FAA/CT-TN95/53
9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
U.S. Department of Transportation Federal Aviation Administration Technical Center Atlantic City International Airport, NJ 08405	11. Contract or Grant No.
	13. Type of Report and Period Covered
12. Sponsoring Agency Name and Address	Technical Note
U.S. Department of Transportation Federal Aviation Administration Technical Center Atlantic City International Airport, NJ 08405	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

The Federal Aviation Administration (FAA) Operational Test and Evaluation (OT&E) Operational Test Plan for Type II Fixed Ground Antenna Radome (FGAR) is prepared by the Associate Program Manager for Test (APMT). It defines the overall planning, test activities, and coordination associated with OT&E Operational testing required to ensure the project meets the requirements of the project specification, and the system and subsystem requirements allocated to the project.

The purpose of the FGAR project is to provide new, larger radomes for en route surveillance radars and for Beacon Only Sites (BOS) that require Mode Select Beacon System (Mode S) installations. The FGARs will provide an environmental enclosure for a variety of single or dual-face monopulse beacon phased array and en route surveillance radars.

The Type II FGAR is specially designed to be mounted on a standard BOS (Airport Surveillance Radar [ASR-8]) antenna tower. The Type II FGARs will be installed principally at facilities which will receive the Mode S. In addition, they will be installed at some Air Traffic Control Radar Beacon System (ATCRBS) sites which require environmental protection due to local conditions. A Type II FGAR will also be installed at the Lihue, Hawaii (HI), Terminal Radar Facility.

17. Key Words	18. Distribution Statement
Fixed Ground Antenna Radome (FGAR) Test and Evaluation (T&E) Operational Test and Evaluation (OT&E)	Document is on file at the Technical Center Library, Atlantic City International Airport, NJ 08405

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	56	

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

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

EXECUTIVE SUMMARY

This test plan describes the Type II Fixed Ground Antenna Radome (FGAR) Operational Test and Evaluation (OT&E) Operational testing required by Order 1810.4B, FAA National Airspace System (NAS) Policy. This plan provides the details not identified in the Federal Aviation Administration (FAA) Test and Evaluation Master Plan (TEMP) for Fixed Ground Antenna Radome (FGAR), report DOT/FAA/CT-TN93/17. There are no NAS requirements for the FGAR defined in either the NAS-SS-1000 or the NAS-DD-1000E. The plan is designed to determine the effect, if any, on the Air Traffic Control Radar Beacon System (ATCRBS)/Mode Select Beacon System (Mode S) secondary radar and the Airport Surveillance Radar (ASR)-8 antenna patterns.

There are three distinct types of FGARs being procured: they are Types I, II, and V, which vary principally in size. Extensive OT&E Integration and OT&E Operational testing has been performed at the first two Type I/III FGAR First Article sites. This test plan covers follow-on testing of the Type II FGAR, with three different antenna configurations.

The first Type II radome will be installed at the Rockville, Nebraska (NE) Beacon Only Site (BOS) [QJM] in October 1995. Prior to the installation of the FGAR, the ATCRBS antenna will be replaced with a Mode S back-to-back antenna. Electromagnetic performance test data will be collected at the Minneapolis (ZMP), Denver (ZDV), and Kansas City (ZKC) Air Route Traffic Control Center's (ARTCC) by their HOST Computer Systems (HCS). They will use the Quick Analysis of Radar Sites (QARS), Beacon False Target Analysis (BFTA), and Common Digitizer Data Reduction (COMDIG) programs to analyze the data.

The second Type II radome to be tested will be at the Lihue, Hawaii (HI) Terminal Radar Facility (LIH) in May 1996. Electromagnetic performance test data will be collected at the site and sent to the FAA Technical Center to be analyzed. Air Traffic Control Specialists (ATCS) at the Honolulu Combined Center/Radar Approach Control (CERAP) [ZHN] and Lihue Airport Traffic Control Tower (ATCT) [LIH] will evaluate the video data presented on their displays.

The third Type II radome to be tested will be at the Samburg, Tennessee (TN) BOS (QPB) in November 1996. This facility will retain its ATCRBS antenna. Electromagnetic performance test data will be collected at the Memphis (ZME) and Kansas City (ZKC) ARTCCs by their HCS. They will use the QARS, BFTA, and COMDIG programs to analyze the data.

Baseline data will be collected prior to the installation of each FGAR. Similar data will be collected after the FGARs are installed. The data will be analyzed to determine if the antenna patterns have changed.

Follow-on testing of the Rockville BOS (QJM) may be performed after the Mode S system is installed and operational. The decision to perform this follow-on testing will be based upon the results of the testing performed with the ATCRBS and when the Mode S is installed and operational.

1. INTRODUCTION.

1.1 BACKGROUND.

The Federal Aviation Administration's (FAA) program to implement the En Route Mode Select Beacon System (Mode S) project resulted in a requirement to replace existing radomes and to install them at sites without a radome. The existing radomes are not physically large enough to accommodate the new Mode S monopulse back-to-back antennas. Facilities that will receive the Fixed Ground Antenna Radomes (FGAR) include: FAA Air Route Surveillance Radar (ARSR) sites, military type long-range surveillance (AN/FPS) radar sites, and Beacon Only Sites (BOS). FGARs will also be procured for Mode S en route facilities presently without radomes. There are three distinct types of FGARs being procured: they are Types I, II, and V.

The FAA awarded the FGAR contract to the Electronic Space Systems Corporation (ESSCO) September 30, 1993. FAA-E-2773b, Specification for Fixed Ground Antenna Radome (Mode S Compatible), establishes the requirements for performance, design, production, and acceptance of a state-of-the-art radome which provides environmental protection for sophisticated L-band antenna systems. The contract provides for a turnkey installation. There are no FGAR National Airspace System (NAS) requirements defined in NAS-SS-1000, NAS System Specification, or NAS-DD-1000E, National Air Space Level I Design Document.

The contractor shall conduct a Test and Evaluation (T&E) program in accordance with FAA-E-2773b and the Statement Of Work (SOW). First Article testing will be conducted by the contractor and witnessed by the FAA. The contractor shall conduct factory acceptance testing. The contractor will deliver and install the first three Type I/III, and the first Type II and Type V/VI production FGARs as First Articles. The contractor shall complete First Article testing at the site to verify those contract requirements not verifiable at the factory. The contractor shall conduct Site Acceptance Tests (SAT). The Contract Acceptance Inspection (CAI) shall occur after the contractor successfully completes the SAT. The CAI is the final acceptance of the turnkey installation by the Government from the contractor.

The FAA Technical Center's Communications/Navigation/Surveillance Engineering and Test Division, ACT-300, has conducted extensive Operational Test and Evaluation (OT&E) Integration and Operational testing on the first two Type I FGARs: at the FAA Technical Center's Elwood, New Jersey (NJ) En Route Beacon Test Facility (ERBTF) and the Northwest Mountain Region's Trinidad En Route Radar Facility (TAD), Colorado (CO). OT&E Integration and Operational testing is designed to ensure the FGAR meets the design requirements. The purpose of the OT&E program is to ensure the operational effectiveness and suitability of the FGAR will meet the user's requirements.

Type II OT&E Operational testing will be performed at three separate facilities, conforming to the different system/antenna configurations to be used with the Type II FGAR.

a. The First Article site will be the Rockville, Nebraska (NE) BOS (QJM) in October 1995. Prior to installation of the FGAR, the Air Traffic Control Radar Beacon System (ATCRBS) antenna will be replaced with a Mode S back-to-back antenna. Testing will involve collecting electromagnetic performance data at the Minneapolis (ZMP), Denver (ZDV), and Kansas City (ZKC) Air Route Traffic Control Centers (ARTCC).

b. The second site to be tested will be the Lihue, Hawaii (HI) Terminal Radar Facility (LIH) in May 1996. Testing will involve collecting Common Digitizer (CD)-1 data at the facility. Air Traffic Control Specialists (ATCS) at the Honolulu Combined Center/Radar Approach Control (CERAP) [ZHN] and Lihue Airport Traffic Control Tower (ATCT) [LIH] will evaluated the video data.

c. The third site to be tested will be the Samburg, Tennessee (TN) BOS (QPB) in November 1996. This site is not scheduled to receive a Mode S system and will retain its original ATCRBS antenna. Testing will involve collecting electromagnetic performance data at the Memphis (ZME) and Kansas City (ZKC) ARTCCs.

1.2 PURPOSE.

The purpose of this document is to define the overall planning, testing activities, and coordination associated with OT&E Operational testing of the Type II FGAR. The testing will be performed in accordance with Order 1810.4B, FAA NAS Test and Evaluation Policy, and NAS-MD-110, Test and Evaluation (T&E) Terms and Definitions for the National Airspace System.

OT&E Operational testing will ensure the Type II FGAR meets the requirements defined in Order 1810.4B. It will focus on determining to what degree the FGAR meets, exceeds, or degrades the operational characteristics of the enclosed ATCRBS/Mode S system and Airport Surveillance Radar (ASR)-8 primary radar.

1.3 SCOPE.

This test plan defines the:

a. Requirements to be verified.

b. Test objectives.

c. Criteria for the successful completion of each test.

d. Configuration(s) to be used during testing.

e. Scope of the testing to be accomplished.

f. Resources and activities to be coordinated in preparation for, and in support of the testing.

g. Development of detailed test procedures to perform the testing.

2. REFERENCE DOCUMENTS.

A list of applicable documentation and reference materials that relate to the contents of this plan are provided in the following paragraphs. The hierarchical dependency of the documents used in developing this test plan are shown in figure 2-1.

2.1 FAA ORDERS.

Order 1810.4B	FAA NAS Test and Evaluation Policy
Order 6100.1C	Maintenance of NAS En Route Stage A Air Traffic Control System

Order 6190.10	Maintenance of En Route Automated Radar Tracking System
Order 6300.12	Project Implementation Plan (PIP) Fixed Ground Antenna Radome (FGAR) Including Tower Retrofit Modification

2.2 FAA STANDARDS.

FAA-STD-024b	Content and Format Requirements for the Preparation of Test and Evaluation Documentation

2.3 FAA SPECIFICATIONS.

FAA-E-2773b	Specification for Fixed Ground Antenna Radome (Mode S Compatible)

2.4 NAS DOCUMENTS.

NAS-MD-110	Test and Evaluation (T&E) Terms and Definitions for the National Airspace System
NAS-MD-691	On-Line Certification and Diagnostics

2.5 OTHER FAA DOCUMENTS.

DTFA01-93-C-00075	Fixed Ground Antenna Radome (FGAR) Contract
DOT/FAA/CT-TN93/17	Fixed Ground Antenna Radome (FGAR) Master Test and Evaluation Plan (TEMP)
DOT/FAA/CT-TN95/23	Fixed Ground Antenna Radome (FGAR) Type I/III OT&E Integration and OT&E Operational Final Test Report
FAA-4306B-8H	User's Manual - Common Digitizer Data Reduction (COMDIG) Program
FAA-4306N-6H	User's Manual - Quick Analysis of Radar Sites (QARS) Program
FAA-4306P-9H	User's Manual - Beacon False Target Analysis (BFTA) Program
SPB-TRA-009	New Radar Analysis Software for Transportable Radar Analysis Computer System

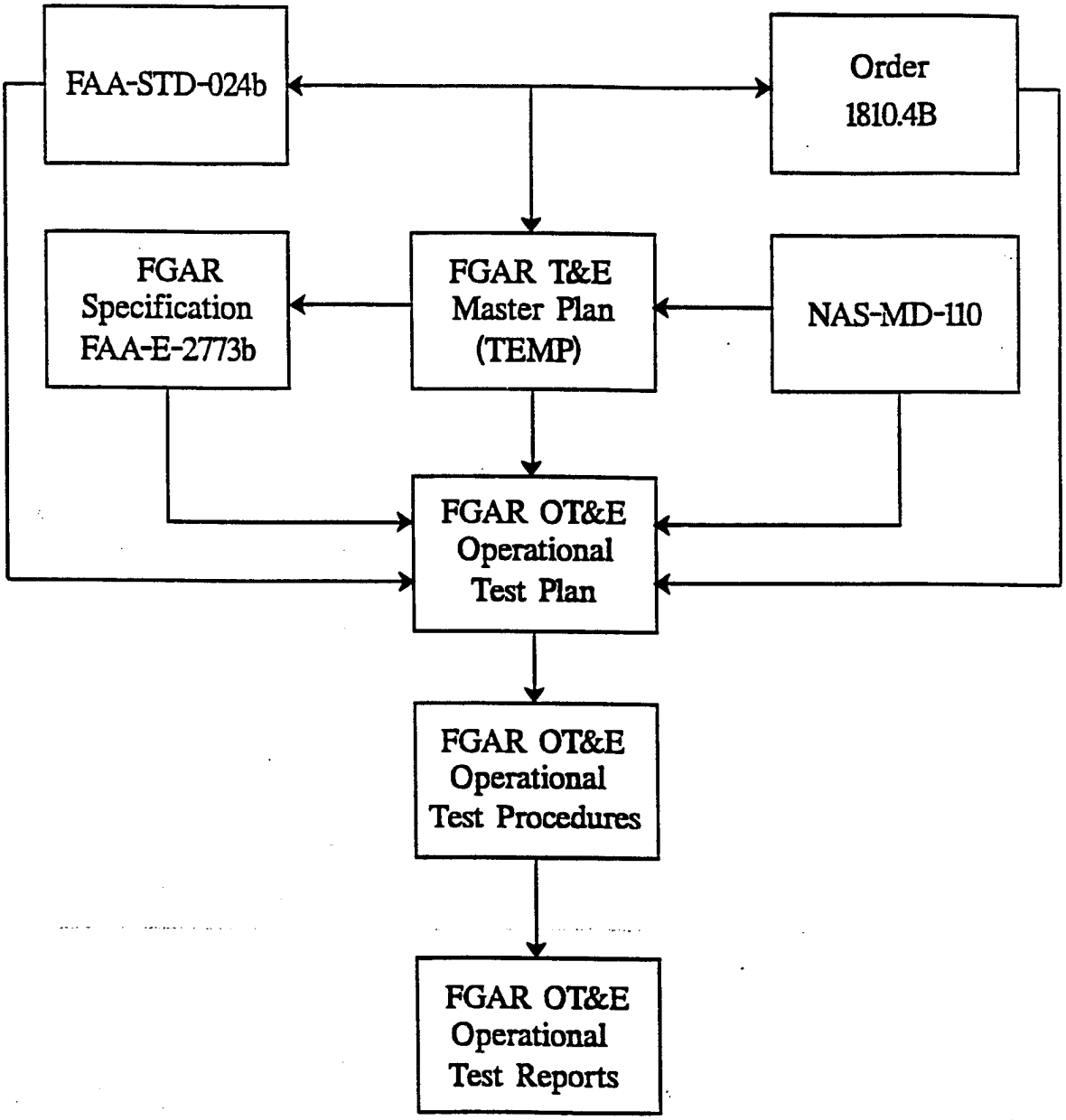


FIGURE 2-1. REFERENCE DOCUMENTS

3. SYSTEM DESCRIPTION.

3.1 SYSTEM OVERVIEW.

The FGAR supplies optimal protection of the antenna(s) from the outside environment while providing minimal degradation to the electromagnetic performance characteristics of the enclosed antenna(s). The hardware required for installation, i.e., cables, wiring, support equipment, radome mounted/supported equipment, radome base ring (Type II only), and spare parts are part of the FGAR procurement. There are five types of radomes (no Type IV radomes are being procured). They are the following:

a. Type I Radome.

This type of radome will provide an environmental enclosure for a collocated L-band surveillance radar reflector and top-mounted dual-faced L-band beacon phased array antenna. The radome will be capable of withstanding wind velocities of 150 miles per hour (MPH). They will have an inside diameter of 59 feet at their widest point, and will fit a base-ring diameter equal to the present CW-396A radome. The enclosed antennas will rotate at a speed of either 5 or 6 revolutions per minute (RPM).

b. Type II Radome.

This type of radome will provide an environmental enclosure for a dual-faced L-band beacon phased array antenna consisting of two identical rectangular back-to-back antennas approximately 6 feet high by 27 feet wide, rotating at speeds up to 5 RPM. The radome will be capable of withstanding wind velocities of 150 MPH and have an inside diameter of 35 feet at its widest point. It will fit the standard beacon-only antenna platform.

c. Type III Radome.

This type of radome will be identical to the Type I in all respects, except that it will be capable of withstanding wind velocities of 100 MPH maximum.

d. Type V Radome.

This type of radome will provide an environmental enclosure for a collocated L-band surveillance radar reflector and top-mounted dual-faced L-band beacon phased array antenna. The radome will be capable of withstanding wind velocities of 150 MPH. They will have an inside diameter of 57.5 feet at their widest point, and will fit a base-ring diameter equal to the present ARSR-3 radome.

e. Type VI Radome.

This type of radome will be identical to the Type V in all respects, except that it will be capable of withstanding wind velocities of 100 MPH maximum.

3.2 INTERFACES OVERVIEW.

3.2.1 Mechanical Interface.

a. The Type I/III and V/VI FGARs interface mechanically with the existing antenna tower radome base ring.

b. The Type II FGAR radome base ring is part of the procurement and interfaces with the antenna tower.

3.2.2 Electrical Interface.

The FGAR interfaces electrically with the following facility systems:

a. Electrical system.

b. Lightning protection system.

c. Remote Maintenance Monitoring System (RMMS)/Environmental Remote Monitoring Subsystem (ERMS).

d. Transient protection.

These interfaces will be verified during the contractor's SAT and will not be repeated during the FAA's OT&E.

A block diagram of the Type II interfaces are shown in figure 3.2.2-1.

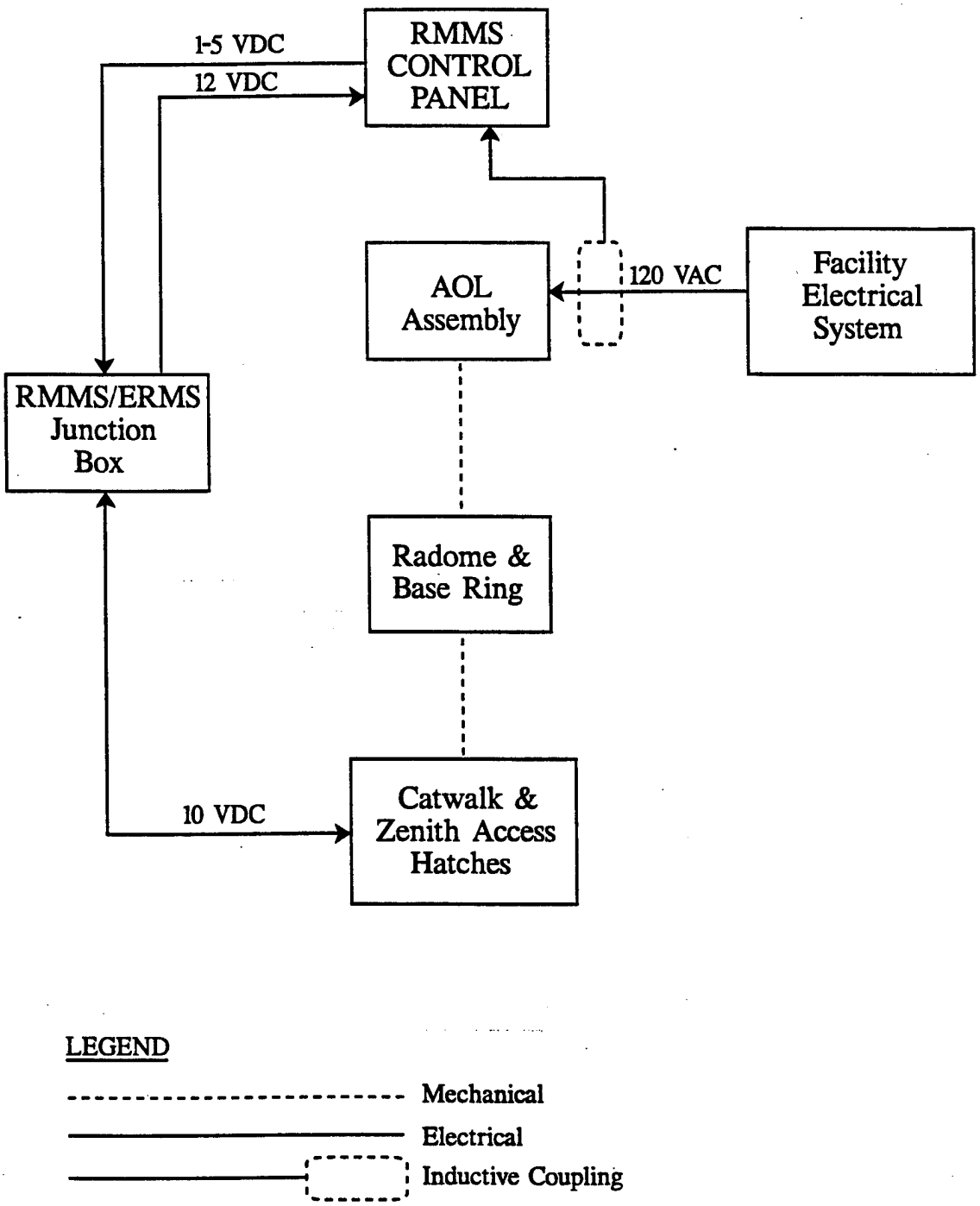


FIGURE 3.2.2-1. TYPE II FGAR INTERFACES BLOCK DIAGRAM

4. TEST PROGRAM DESCRIPTION.

4.1 APPROACH AND CONCEPT.

OT&E Operational testing will be accomplished at three separate facilities, corresponding to the three different system/antenna configurations to be used with the Type II FGAR.

a. Lihue Terminal Radar Facility (LIH).

OT&E Operational testing will include electromagnetic performance and human engineering testing.

1. Electromagnetic performance testing will use "live" aircraft (targets of opportunity) ASR-8 and ATCRBS reply data. The data will be recorded at the output of the Lihue Terminal Radar Facility (LIH) CD-1. The recorded data will be analyzed at the FAA Technical Center by ACT-300 engineers.

2. Human engineering will test the ability of technicians to maintain the aircraft obstruction lights (AOL) and other Zenith Hatch Assembly mounted equipment.

b. Rockville BOS (QJM).

OT&E Operational testing will be limited to electromagnetic performance testing using "live" aircraft (targets of opportunity) reply data collected at the Minneapolis (ZMP), Denver (ZDV), and Kansas City (ZKC) ARTCCs. The ARTCCs will collect and analyze ATCRBS/Mode S data received from the Rockville BOS (QJM) using their HOST Computer System (HCS) and QARS, BFTA, and COMDIG programs.

c. Samburg BOS (QPB).

OT&E Operational testing will be limited to electromagnetic performance testing using "live" aircraft (targets of opportunity) reply data collected at the Memphis (ZME) and Kansas City (ZKC) ARTCCs. The ARTCCs will collect and analyze ATCRBS data received from the Samburg BOS (QPB) using their HCS and QARS, BFTA, and COMDIG programs.

4.1.1 Evaluation Approach.

The OT&E Operational testing approach is to verify the FGAR's Measures of Effectiveness (MOE) and Measures of Suitability (MOS) separately.

a. Primary (ASR-8) and ATCRBS data will be collected using "live" aircraft (targets of opportunity) to determine the electromagnetic performance MOEs and MOSs.

b. Human engineering MOEs and MOSs at the Lihue Terminal Radar Facility (LIH) will be evaluated using Airways Facilities (AF) technicians.

The TEMPs Test Verification Requirements Traceability Matrix (TVRTM) defines the verification methods.

4.1.2 Critical Operational Issues (COI)/Test Requirements Summary.

The COI is: there is no degradation to the ATCRBS/Mode S or ASR-8 aircraft positional accuracy.

4.1.3 Minimum Acceptable Operational Requirements (MAOR).

The MAOR are:

a. There is no degradation in the electromagnetic performance of the ATCRBS/Mode S and ASR-8 antenna patterns.

b. There is no degradation in the azimuth pointing accuracy.

4.1.4 Activities Leading to Test.

The electromagnetic performance tests are divided into two phases. Phase 1 will be completed prior to the installation of the FGAR, while the facility is in a normal operational mode. Phase 2 will be completed after:

a. The contractor has:

1. Completed the installation of the FGAR.

2. Removed any scaffolding, cranes, etc., required for its installation.

3. Completed the First Article Design Qualification Test (DQT), if applicable.

4. Completed the SAT.

5. Completed the CAI.

b. The FAA has:

1. Lihue Terminal Radar Facility (LIH).

(a) Completed alignment of the ASR-8 and ATCRBS antennas.

(b) Optimized the operation of the ASR-8, Air Traffic Control Beacon Interrogator (ATCBI)-4, and CD-1.

(c) Performed the commissioning flight check.

2. Rockville BOS (QJM).

(a) Completed alignment of the Mode S back-to-back antenna.

(b) Completed the recommissioning flight check.

4.2 TEST ENVIRONMENT.

OT&E Operational testing will be accomplished at three sites, each with a different system/antenna configuration.

a. Rockville BOS (QJM) and Samburg BOS (QPB).

The Rockville BOS (QJM) and Samburg BOS (QPB) are existing, commissioned facilities. They are associated with ARTCCs, to which their data are supplied.

b. Lihue Terminal Radar Facility (LIH).

The Lihue Terminal Radar Facility (LIH) is a new facility, which is not yet commissioned. The ASR-8 and ATCRBS data will be used for terminal air traffic control (ATC), e.g., arrival, departure, etc. Their data will be sent to the Honolulu CERAP (ZHN) and Lihue ATCT (LIH).

4.2.1 Test Locations.

OT&E Operational testing will be accomplished at the following facilities:

a. Denver ARTCC (ZDV), Rocky Mountain Systems Management Office (SMO).

Electromagnetic performance testing using the Denver ARTCC (ZDV) HCS and QARS, BFTA, and COMDIG programs to analyze ATCRBS/Mode S data received from the Rockville BOS (QJM).

b. Honolulu CERAP (ZHN).

Journeymen ATCSs will evaluate the Lihue Terminal Radar Facility (LIH) video data on their displays.

c. Kansas City ARTCC (ZKC), Great Plains SMO.

Electromagnetic performance testing using the Kansas City ARTCC (ZKC) HCS and QARS, BFTA, and COMDIG programs to analyze ATCRBS/ Mode S data received from the Rockville BOS (QJM) and ATCRBS data from the Samburg BOS (QPB).

d. Lihue ATCT (LIH).

Journeymen ATCSs will evaluate the Lihue Terminal Radar Facility (LIH) video data on their displays.

e. Lihue Terminal Radar Facility (LIH).

Primary (ASR-8) and secondary (ATCRBS) radar electromagnetic performance data will be recorded at the output of the CD-1. The data will be analyzed at the Technical Center. In addition, journeymen environmental technicians will demonstrate the ability to maintain the FGAR Zenith Hatch Assembly mounted equipment.

f. Memphis ARTCC (ZME) Airway Facilities Sector (AFS).

Electromagnetic performance testing using the Memphis ARTCC (ZME) HCS and QARS, BFTA, and COMDIG programs to analyze ATCRBS data received from the Samburg BOS (QPB).

g. Minneapolis ARTCC (ZMP) AFS.

Electromagnetic performance testing using the Minneapolis ARTCC (ZMP) HCS and QARS, BFTA, and COMDIG programs to analyze ATCRBS/Mode S data received from the Rockville BOS (QJM).

4.3 TEST AND ANALYSIS TOOLS.

4.3.1 Data Collection.

a. Lihue Terminal Radar Facility (LIH).

1. Visual evaluation of the video data by ATCSs at the Honolulu CERAP (ZHN) and Lihue ATCT (LIH).

2. Primary (ASR-8) and secondary (ATCRBS) radar data will be recorded at the output of the CD-1.

3. Human engineering data will be recorded on data sheets while observing the test.

b. Rockville BOS (QJM).

Data will be collected by the Denver (ZDV), Kansas City (ZKC), and Minneapolis (ZMP) ARTCCs using their HCS and the QARS program.

c. Samburg BOS (QPB).

Data will be collected by the Kansas City (ZKC) and Memphis (ZME) ARTCCs using their HCS and the QARS program.

4.3.2 Data Analysis.

a. Lihue Terminal Radar Facility (LIH).

1. Visual evaluation of the video data, by journeymen ATCSs, will provide an "end user" evaluation.

2. The primary (ASR-8) and secondary (ATCRBS) data recorded during the test will be analyzed using the Transportable Radar Analysis Computer System (TRACS) Data Reduction (TDR) and PLOTASR programs. The output data from these programs will provide the information required to determine if the FGAR caused any degradation.

3. Observation of the human engineering task(s) will provide the required evaluation data.

b. Rockville BOS (QJM).

The QARS program will provide statistical "live" aircraft tracking data that will be analyzed to determine if any degradation of NAS has occurred due to the installation of the FGAR.

The BFTA and COMDIG programs will provide detailed information about the "live" aircraft tracking data.

c. Samburg BOS (QPB).

The QARS program will provide statistical "live" aircraft tracking data that will be analyzed to determine if any degradation of NAS has occurred due to the installation of the FGAR.

The BFTA and COMDIG programs will provide detailed information about the "live" aircraft tracking data.

4.4 TEST AND/OR EVALUATION DESCRIPTIONS.

The tests to be conducted are contained in appendix A. Each test is uniquely identified by a test number and contains sufficient information to plan for the test activity.

5. TEST MANAGEMENT.

5.1 TEST MANAGEMENT ORGANIZATION.

The FGAR test management team is responsible for ensuring all requirements are verified during OT&E Operational testing. The test management team is composed of representatives from AND-440 and ACT-310.

The FGAR test management team has the responsibility to direct, control, and monitor all activities relative to FGAR OT&E Operational testing. Specifically these responsibilities include:

a. Implementing a test program that is consistent with the requirements of Order 1810.4B.

b. Reviewing and providing concurrence/nonconcurrence with all test plans, procedures, and related T&E documentation.

c. Distribution of T&E activity related documents to all participating organizations for review.

d. Assigning roles and responsibilities to the OT&E Operational test support group.

e. Directing and conducting OT&E Operational testing.

5.1.1 Roles and Responsibilities.

The FGAR test management team consists of personnel who are knowledgeable in the specific technical areas. The role of this team is to develop test requirements, plans, procedures, and other support tools. The composition and duties of the team are listed below.

Organization	Primary Roles/Functions
AND-440	Program Manager (PM) Provides ultimate authority and direction for test operations.
AND-440	Associate Program Manager for Engineering (APME) Provides engineering support to the PM.
ACT-310B	Associate Program Manager for Test (APMT) Appointed by the Technical Center. Manages test program for the PM, prepares the OT&E Operational Test Plan and Procedures, conducts OT&E Operational testing, prepares test reports, coordinates all test activities, determines test requirements, and provides coordination and direction for implementing the OT&E Operational Test Plan.

5.1.2 Other Participating Organizations.

The FGAR test support team will be supplemented by members of the following organizations:

Organization	Primary Roles/Functions
ACT-300	Provides engineers to collect and analyze the Lihue Terminal Radar Facility (LIH) ASR-8/ATCRBS data.
Denver ARTCC (ZDV), Rocky Mountain SMO	Provides the computers, software, and trained personnel to run the QARS, BFTA, and COMDIG programs, on data received from the Rockville BOS (QJM), and to analyze the results.
Honolulu CERAP (ZHN)	Provides journeymen ATCSs to evaluate Lihue Terminal Radar Facility (LIH) ASR-8/ATCRBS video data on their displays.
Kansas City ARTCC (ZKC), Great Plains SMO	Provides the computers, software, and trained personnel to run the QARS, BFTA, and COMDIG programs, on data received from the Rockville BOS (QJM) and Samburg BOS (QPB) facilities, and to analyze the results.
Lihue ATCT (LIH)	Provides journeymen ATCSs to evaluate Lihue Terminal Radar Facility (LIH) ASR-8/ATCRBS video data on their displays.
Lihue Terminal Radar Facility (LIH)	Provides trained technicians to: (1) perform certification tests and measurements on the ASR-8 and ATCBI-4 systems, (2) to record CD-1, Real-Time Aircraft Display System (RTADS) data, and (3) environmental technicians to perform the human engineering tests.
Memphis ARTCC (ZME) AFS	Provides the computers, software, and trained personnel to run the QARS, BFTA, and COMDIG programs, on data received from the Samburg BOS (QPB), and to analyze the results.
Minneapolis ARTCC (ZMP) AFS	Provides the computers, software, and trained personnel to run the QARS, BFTA, and COMDIG programs, on data received from the Rockville BOS (QJM), and to analyze the results.

5.1.3 Test Conduct Team.

A Test Director (TD) will be assigned for the Type II FGAR OT&E Operational test program.

5.2 TRAINING.

The test team members do not require any special training to conduct the tests. Personnel who are fully qualified in their present positions, e.g., electronic engineers and technicians, computer operators, ATCSs, etc., will be used for conducting the tests. The analysis of data recorded at the ARTCCs will be performed by Technical Support Staff (TSS)/Service Management Operations Center (SMOC) personnel at the ARTCCs, who are familiar with the interpretation of the statistical outputs provided by the software analysis

programs. The analysis of data recorded at the Lihue Terminal Radar Facility (LIH) will be performed by ACT-300 engineers.

5.3 SYSTEM CONFIGURATION MANAGEMENT.

System Configuration Management (SCM) is the responsibility of the facility managers, i.e., Rockville BOS (QJM), Lihue Terminal Radar Facility (LIH), and Samburg BOS (QPB).

5.3.1 Testbed Configuration.

The testbeds to be used for Type II FGAR OT&E Operational testing have the following systems installed:

a. Lihue Terminal Radar Facility (LIH).

1. ASR-8 radar.

2. ATCBI-4 beacon, with a 5-foot planar array antenna.

b. Rockville BOS (QJM).

1. ATCBI-5 beacon.

2. A Mode S back-to-back antenna will be installed while the facility is shutdown for the FGAR installation.

3. A Mode S is scheduled to be installed.

c. Samburg BOS (QPB).

ATCBI-5 beacon, with a 5-foot planar array antenna.

5.4 TEST READINESS CRITERIA.

The electromagnetic performance testing is divided into two phases and will be performed in conjunction with the FGAR installation. This testing will ensure the FGAR does not degrade the electromagnetic performance of the ATCRBS/Mode S or ASR-8 radar systems. The phases are:

a. Phase 1.

Before the FGAR is installed (no radome installed) and the FAA has:

1. Lihue Terminal Radar Facility (LIH).

(a) Completed alignment of the ASR-8 and ATCRBS antennas.

(b) Optimized the operation of the ASR-8, ATCBI-4, and CD-1.

(c) Performed the commissioning flight check.

b. Phase 2.

After the installation of the FGAR is completed and:

1. The contractor has:

(a) Removed any scaffolding, cranes, etc., required for its installation.

(b) Completed First Article DQT. (Rockville BOS [QJM] only)

(c) Completed the SAT.

(d) Completed the CAI.

2. The FAA has:

(a) Rockville BOS (QJM).

(1) Completed alignment of the Mode S back-to-back antenna.

(2) Completed the recommissioning flight check.

5.5 TEST EXECUTION.

The testing will be performed at the Denver (ZDV), Kansas City (ZKC), Memphis (ZME), and Minneapolis (ZMP) ARTCCs, Honolulu CERAP (ZHN), Lihue Terminal Radar Facility (LIH), Lihue ATCT (LIH), and the Technical Center. The following sections describe the pretest and post-test reviews.

5.5.1 Pretest Review.

The test will be performed at a time determined by the individual facilities. Therefore, no formal pretest review will be conducted.

5.5.2 Post-Test Review.

The test will be performed at a time determined by the individual facilities. Therefore, no formal post-test review will be conducted.

5.6 TEST COMPLETION CRITERIA.

The individual test completion criteria are contained in the test descriptions (see appendix A).

5.7 TEST REPORTS.

A description of the reports required for reporting the OT&E Operational test activities are presented in the following paragraphs. Figure 5.7-1 illustrates the sequence in which the test documents and reports are prepared. A description of the reports and when they are prepared is shown in table 5.7-1.

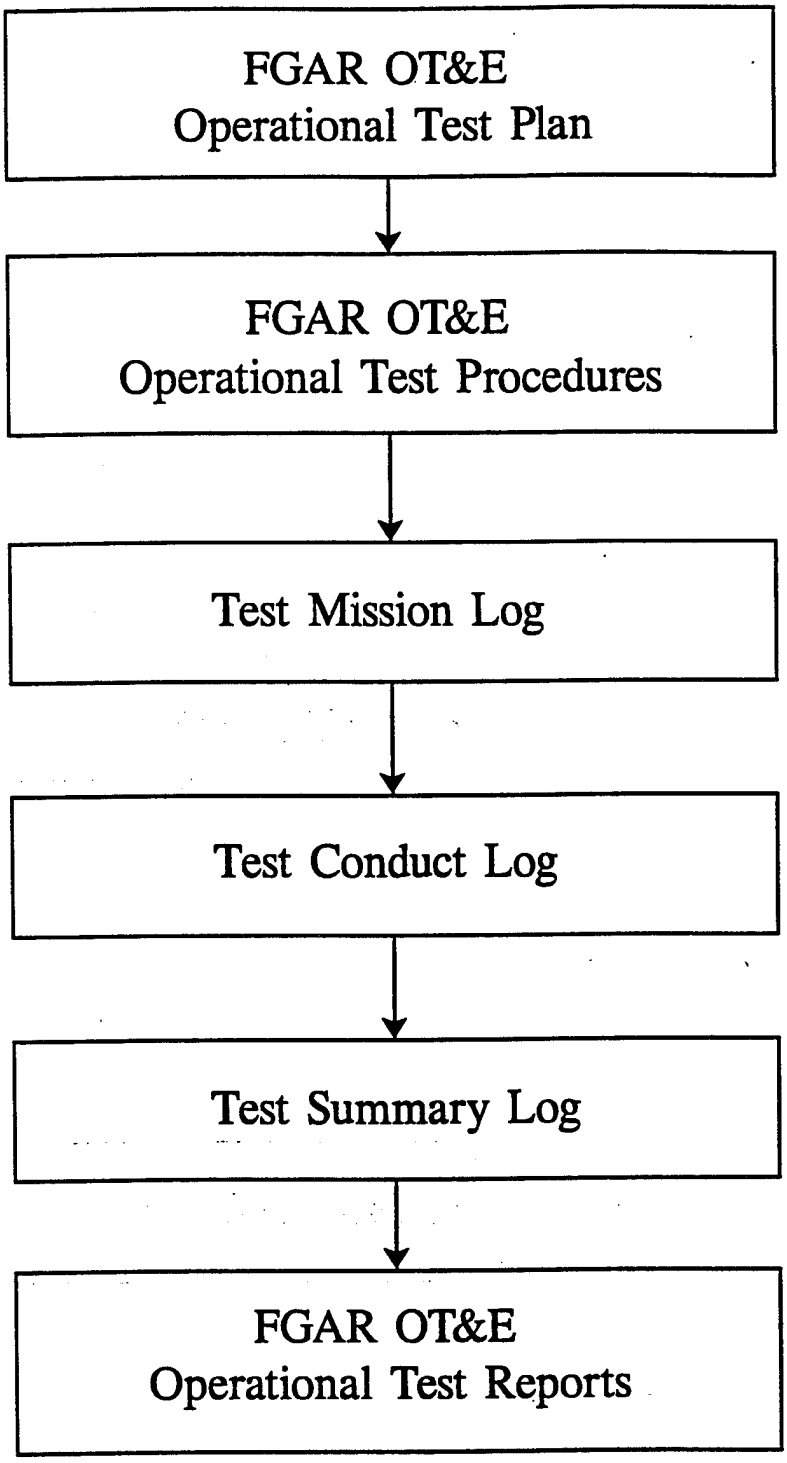


FIGURE 5.7-1. TEST DOCUMENT AND REPORT FLOW

TABLE 5.7-1 TEST REPORT MATRIX

Report	Required Completion
Test Mission Log	Prepared by TD
Test Conduct Log	Prepared by TD
Test Summary Log	Prepared by TD
Test Discrepancy Report (TDR)	Prepared by the TD, if required
OT&E Operational Test Reports:	
1. Quick Look Report	Fifteen calendar days after completion of OT&E Operational testing
2. Preliminary OT&E Operational Test Report	Thirty calendar days after the Quick Look Report
3. Final OT&E Operational Test Report	Thirty calendar days after the Preliminary OT&E Operational Test Report is submitted

5.7.1 Test Mission Log.

The Test Mission Log is completed by the TD, based on information received from the facility personnel. The log will contain any open items, e.g., deviations from the test procedures, required regression testing, etc.; test objectives; hardware configuration(s); and a list of the test team members and their assignments.

5.7.2 Test Conduct Log.

The Test Conduct Log is completed by the TD, based on information received from the facility personnel. The log contains a record of specific events, measurements, etc., problems encountered, anomalies, etc.

5.7.3 Test Summary Log.

The Test Summary Log is completed by the TD, based on information received from the facility personnel. The log contains a summary of the test conduct and a preliminary assessment of the results.

5.7.4 Test Reports.

The test reports trace the test results to relevant issues, and the operational test requirements. The reports describe anomalous test results, highlight any outstanding or unresolved problems, and identify options for their resolution. There are three test reports.

a. Quick Look Report

b. Preliminary OT&E Operational Test Report

c. Final OT&E Operational Test Report

5.8 TEST DISCREPANCY REPORTS (TDR).

TDR's are prepared, if required, by the TD. These reports document any analogies or deficiencies encountered during the conduct of a test. They describe in detail problems, failures, etc., encountered during the test.

5.9 TEST SCHEDULE.

The FGAR OT&E test schedule flows from the FGAR contract and TEMP requirements. The operational testing time frames are based on the delivery and acceptance dates. The Type II FGAR schedules are shown in figures 5.9-1 through 5.9-3.

5.9.1 Planning Considerations and Limitations.

If there is a slippage in the Type II FGAR schedule, the test dates will be adjusted accordingly.

5.10 PERSONNEL RESOURCE REQUIREMENTS.

The personnel required for testing are described below.

a. Lihue Terminal Radar Facility (LIH).

1. Honolulu CERAP (ZHN) ATCSs.

2. Lihue ATCT (LIH) ATCSs.

3. Lihue Terminal Radar Facility (LIH) radar and environmental technicians.

b. Rockville BOS (QJM).

1. Minneapolis ARTCC (ZMP) AFS TSS personnel and HCS operators.

2. Denver ARTCC (ZDV), Rocky Mountain SMO, SMOC personnel, and HCS operators.

3. Kansas City ARTCC (ZKC), Great Plains SMO, TSS personnel, and HCS operators.

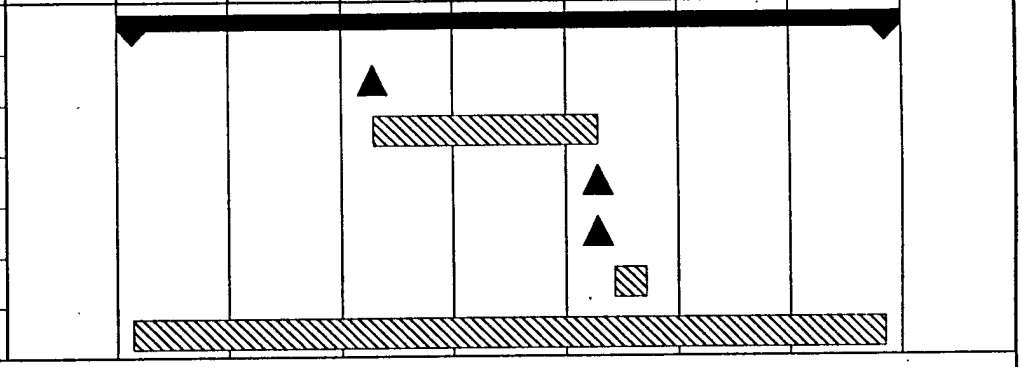
c. Samburg BOS (QPB).

1. Memphis ARTCC (ZME) AFS TSS personnel and HCS operators.

2. Kansas City ARTCC (ZKC), Great Plains, SMO TSS personnel, and HCS operators.

Rockville BOS (QJM) Type II FGAR OT&E Operational Test Schedule

ID	Task Name	Duration	Start	Finish
1	**Rockville BOS (QJM)**	**47d**	**10/2/95**	**11/17/95**
2	Delivery	0d	10/17/95	10/17/95
3	Contractor ICO	14d	10/17/95	10/30/95
4	Water Test	0d	10/31/95	10/31/95
5	CAI	0d	10/31/95	10/31/95
6	On-Site Testing	2d	11/1/95	11/2/95
7	OT&E/O Testing	47d	10/2/95	11/17/95



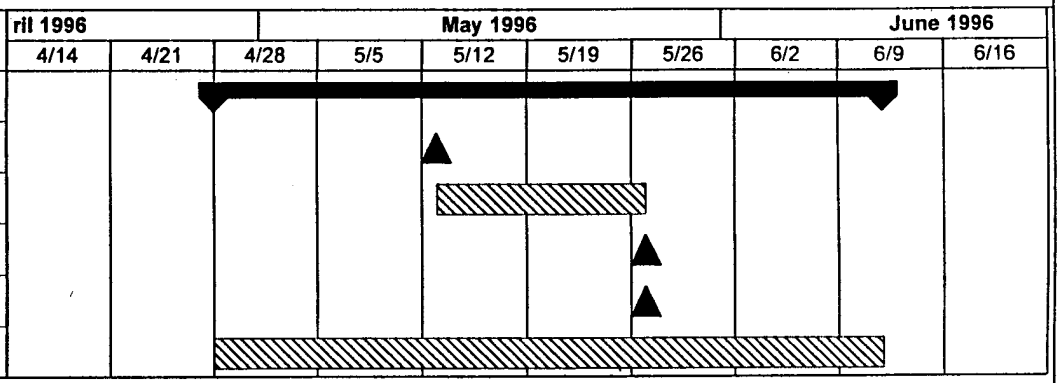
Project: : Type II FGAR OT&E/O Test
Date: 9/8/95

Task Milestone Summary

FIGURE 5.9-1. ROCKVILLE BOS (QJM) OT&E OPERATIONAL TEST SCHEDULE

Lihue Terminal Radar Facility (LIH) Type II FGAR OT&E Operational Test Schedule

ID	Task Name	Duration	Start	Finish
1	Lihue Radar (LIH)	45d	4/28/96	6/11/96
2	Delivery	0d	5/13/96	5/13/96
3	Contractor ICO	14d	5/13/96	5/26/96
4	Water Test	0d	5/27/96	5/27/96
5	CAI	0d	5/27/96	5/27/96
6	OT&E/O Testing	45d	4/28/96	6/11/96



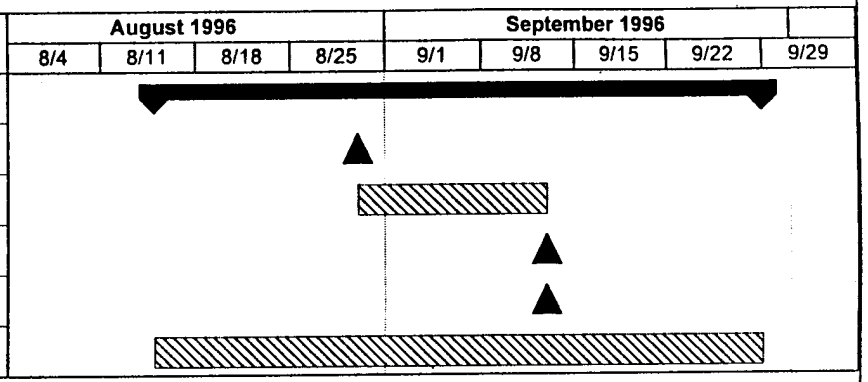
Project: Type II FGAR OT&E/O Test
Date: 9/8/95

Task Milestone Summary

FIGURE 5.9-2. LIHUE TERMINAL RADAR FACILITY (LIH) OT&E OPERATIONAL TEST SCHEDULE

Samburg BOS (QPB) Type II FGAR OT&E Operational Test Schedule

ID	Task Name	Duration	Start	Finish
1	**Samburg BOS (QPB)**	**45d**	**8/15/96**	**9/28/96**
2	Delivery	0d	8/30/96	8/30/96
3	Contractor ICO	14d	8/30/96	9/12/96
4	Water Test	0d	9/13/96	9/13/96
5	CAI	0d	9/13/96	9/13/96
6	OT&E/O Testing	45d	8/15/96	9/28/96



Project: : Type II FGAR OT&E/O Test
Date: 9/8/95

Task Milestone Summary

FIGURE 5.9-3. SAMBURG BOS (QPB) OT&E OPERATIONAL TEST SCHEDULE

6. ACRONYMS.

ACP	Azimuth Change Pulse (QARS program)
AF	Airway Facilities
AFS	Airway Facilities Sector
AFSFO	Airway Facilities Sector Field Office
ALT	Altitude (QARS program)
AN/FPS	Army-Navy/Fixed Ground Radar Search (military designation)
AOL	Aircraft Obstruction Light(s)
APME	Associate Program Manager for Engineering
APMT	Associate Program Manager for Test
ARSR	Air Route Surveillance Radar
ARTCC	Air Route Traffic Control Center
ASPLT	Azimuth Split (QARS program)
ASR	Airport Surveillance Radar
ATC	Air Traffic Control
ATCBI	Air Traffic Control Beacon Interrogator
ATCRBS	Air Traffic Control Radar Beacon System
ATCS	Air Traffic Control Specialist
ATCT	Airport Traffic Control Tower
AZ	Azimuth (QARS program)
BCN	Beacon (QARS program)
BFTA	Beacon False Target Analysis (computer program)
BFTS	Beacon False Target Summary (TRACS TDR computer program)
BOS	Beacon Only Site
C	Critical
CAI	Contract Acceptance Inspection
CD	Common Digitizer
CDRECORD	Common Digitizer Record (computer program)
CERAP	Combined Center/Radar Approach Control
CO	Colorado
COI	Critical Operational Issues

COLL	Collimation (QARS program)
COMDIG	Common Digitizer Data Reduction (computer program)
CPME	Calibration Performance Monitoring Equipment
CW	Radomes (military designation)
DEV	Deviation (QARS program)
DQT	Design Qualification Test
EARTS	En Route Automated Radar Tracking System
EQARS	EARTS QARS (computer program)
ERMS	Environmental Remote Monitoring Subsystem
ERBTF	En Route Beacon Test Facility
ESSCO	Electronic Space Systems Corporation (company name)
FAA	Federal Aviation Administration
FALSE-BCN	False Beacon (QARS program)
FGAR	Fixed Ground Antenna Radome
HCS	HOST Computer System
HI	Hawaii
HOST	Air Traffic Control HOST Computer System (not an acronym)
I	Integration
IBM	International Business Machines (company name)
ICO	Installation and Checkout
LIH	Lihue Airport Traffic Control Tower (identifier)
LIH	Lihue Terminal Radar Facility (identifier)
M3REL	Mode 3/A Reliability (QARS program)
M3VAL	Mode 3/A Validity (QARS program)
MAOR	Minimum Acceptable Operational Requirements
MCREL	Mode C Reliability (QARS program)
MCVAL	Mode C Validity (QARS program)
Mode S	Mode Select Beacon System
MOE	Measures Of Effectiveness
MOS	Measurers Of Suitability
MPH	Miles Per Hour

MTI	Moving Target Indicator (QARS program)
NAS	National Airspace System
NC	Noncritical
NE	Nebraska
NJ	New Jersey
NML	Normal (QARS program)
NO.	Number
O	Operational
OT&E	Operational Test and Evaluation
OT&E/O	Operational Test and Evaluation/Operational
PC	Personal Computer
PE	Permanent Echo (QARS and TRACS TDR programs)
PIP	Project Implementation Plan
PLOTASR	PLOTASR (TRACS program, not an acronym)
PM	Program Manager
QARS	Quick Analysis of Radar Sites (computer program)
QJM	Rockville Beacon Only Site (identifier)
QPB	Samburg Beacon Only Site (identifier)
R/R	Radar Reinforced (QARS program)
RAR	Ring-A-Round (QARS program)
REF	Reference
REF	Reflection (QARS program)
RMMS	Remote Maintenance Monitoring System
RPM	Revolutions Per Minute
RSPLT	Range Split (QARS program)
RTADS	Real-Time Aircraft Display System (TRACS program)
SAT	Site Acceptance Test
SCH	Combined MTI and Normal Video (QARS program)
SCM	System Configuration Management
SMO	Systems Management Office
SMOC	Service Management Operations Office

SOW	Statement of Work
T&E	Test and Evaluation
TAD	Trinidad En Route Radar Facility (identifier)
TD	Test Director
TDR	Test Discrepancy Report
TDR	TRACS Data Reduction (TRACS program)
TEMP	Test and Evaluation Master Plan
TN	Tennessee
TRACS	Transportable Radar Analysis Computer System (computer program)
TSS	Technical Support Staff
TVRTM	Test Verification Requirements Traceability Matrix
VAC	Volts Alternating Current
VDC	Volts Direct Current
ZER	Code Zero Percentage (QARS program)
ZDV	Denver Air Route Traffic Control Center (identifier)
ZHN	Honolulu Combined Center/Radar Approach Control (identifier)
ZKC	Kansas City Air Route Traffic Control Center (identifier)
ZME	Memphis Air Route Traffic Control Center (identifier)
ZMP	Minneapolis Air Route Traffic Control Center (identifier)

APPENDIX A

TEST DESCRIPTIONS

TEST DESCRIPTIONS

1. TEST TITLE.

LHAT-1 Lihue ATCT (LIH) Air Traffic Control Specialist (ATCS) Evaluation Test

1.1 TEST OBJECTIVES.

The objective is to determine if there are any differences in the primary (ASR-8) and secondary (ATCRBS) video data presented on the ATCS displays, e.g., apparent strength of targets, loss of targets, or other anomalies, after the FGAR is installed.

1.2 TEST CRITERIA.

The primary (ASR-8) and secondary (ATCRBS) video data strength appear the same to the ATCSs. The number of lost/coasting targets does not increase. There are no other apparent anomalies.

1.3 TEST APPROACH.

The Lihue ATCT (LIH) ATCSs will observe the Lihue Terminal Radar Facility (LIH) primary (ASR-8) and secondary (ATCRBS) video data on their displays. They will visually compare the presentation, using targets of opportunity.

Test LHAT-1 will be accomplished by test and analysis.

1.4 TEST CONDUCT.

The evaluation will be conducted after the installation of the FGAR is complete and the contractor has removed any scaffolding, cranes, etc., required for its installation. The ATCSs will evaluate the video presentation on their displays and complete a questionnaire. The completed questionnaires will be forwarded to the TD for analysis.

1.5 EXECUTION TIME.

The test will take approximately 1 hour.

2. TEST TITLE.

LHAT-2 Honolulu CERAP (ZHN) Air Traffic Control Specialist (ATCS) Evaluation Test

2.1 TEST OBJECTIVES.

The objective is to determine if there are any differences in the primary (ASR-8) and secondary (ATCRBS) video data presented on the ATCS displays, e.g., apparent strength of targets, loss of targets, or other anomalies, after the FGAR is installed.

2.2 TEST CRITERIA.

The primary (ASR-8) and secondary (ATCRBS) video data strength appear the same to the ATCSs. The number of lost/coasting targets does not increase. There are no other apparent anomalies.

2.3 TEST APPROACH.

The Honolulu CERAP (ZHN) ATCSs will observe the Lihue Terminal Radar Facility (LIH) primary (ASR-8) and secondary (ATCRBS) video data on their displays. They will visually compare the presentation, using targets of opportunity.

Test LHAT-1 will be accomplished by test and analysis.

2.4 TEST CONDUCT.

The evaluation will be conducted after the installation of the FGAR is complete and the contractor has removed any scaffolding, cranes, etc., required for its installation. The ATCSs will evaluate the video presentation on their displays and complete a questionnaire. The completed questionnaires will be forwarded to the TD for analysis.

2.5 EXECUTION TIME.

The test will take approximately 1 hour.

3.0 TEST TITLE.

LHEP-1 Lihue Terminal Radar Facility (LIH) Electromagnetic Performance Tests (3.2.1.1)

3.1 TEST OBJECTIVES.

The objective is to determine if there are any differences in the performance characteristics of the ASR-8 and ATCRBS radar data, at the output of the CD-1, after the FGAR is installed.

3.2 TEST CRITERIA.

The performance characteristics of the ASR-8 and ATCRBS radar data, at the output of the CD-1, are not degraded by the FGAR. The performance characteristics are those described in the En Route Automated Radar Tracking System (EARTS) QARS (EQARS) program (see appendix B) and Order 6190.10.

3.3 TEST APPROACH.

Primary (ASR-8) and secondary (ATCRBS) data will be recorded at the output of the Lihue Terminal Radar Facility (LIH) CD-1. The data will then be analyzed at the Technical Center.

Test LHEP-1 will be accomplished by testing.

3.4 TEST CONDUCT.

The test will be divided into two phases.

a. Phase 1.

This phase will be performed prior to the installation of the FGAR and after the FAA has:

1. Completed alignment of the ASR-8 and ATCRBS antennas.

2. Optimized the operation of the ASR-8, ATCBI-4, and CD-1.

3. Performed the commissioning flight check.

b. Phase 2.

This phase will be performed after the contractor has:

1. Removed any scaffolding, cranes, etc., required for the installation of the FGAR.

2. Completed the SAT.

3. Completed the CAI.

3.5 EXECUTION TIME.

The test will take approximately 6 hours for each phase.

4. TEST TITLE.

LHHE-1 Lihue Terminal Radar Facility (LIH) Human Engineering Test (3.3.7)

4.1 TEST OBJECTIVES.

The objectives are to verify environmental technicians can replace lamps in the AOL assembly and perform other required maintenance on Zenith Hatch Assembly mounted equipment.

4.2 TEST CRITERIA.

Zenith Hatch Assembly mounted equipment, e.g., AOL lamps, etc., can be replaced, serviced, repaired, and/or removed by environmental technicians.

4.3 TEST APPROACH.

Environmental technicians will be observed performing maintenance tasks on the Zenith Hatch Assembly mount equipment.

The testing will be accomplished by demonstration.

4.4 TEST CONDUCT.

The ASR-8/ATCRBS radars must be shutdown and the antennas stopped during the testing.

An individual will climb to the Zenith Service Hatch and simulate replacing of the AOL lamps.

4.5 EXECUTION TIME.

The test will take approximately 2 hours.

5. TEST TITLE.

RKDV-1 Denver ARTCC (ZDV)/Rockville BOS (QJM) Quick Analysis of Radar Sites (QARS) Program Test (3.2.1.1)

5.1 TEST OBJECTIVES.

The objective is to determine if there are any differences in the performance characteristics of the Rockville BOS (QJM) ATCRBS/Mode S beacon data being received by the ARTCC, after the FGAR is installed.

5.2 TEST CRITERIA.

The performance characteristics of the Rockville BOS (QJM) ATCRBS/Mode S beacon data being received by the ARTCC are not degraded by the FGAR. The performance characteristics are those described in appendix B.

5.3 TEST APPROACH.

The Denver ARTCC (ZDV) will run the QARS program on their HCS using ATCRBS/Mode S data from the Rockville BOS (QJM). The ARTCCs AF SMOC personnel will analyze the data.

Test RKDV-1 will be accomplished by test and analysis.

5.4 TEST CONDUCT.

The test will be divided into two phases.

a. Phase 1 - Before the FGAR is installed.

b. Phase 2 - After installation of the FGAR is complete and:

(1) The contractor has completed the:

(a) First Article DQT.

(b) SAT.

(c) CAI.

(2) The FAA has:

(a) Completed alignment of the Mode S back-to-back antenna.

(b) Completed the recommissioning flight check.

During both phases, the HCS operators will run the QARS program using the Rockville BOS (QJM) ATCRBS/Mode S beacon data and provide a printout of the results to the AF SMOC personnel. The SMOC personnel will analyze the data and prepare a report.

5.5 EXECUTION TIME.

The test will take approximately 2 hours each time it is run.

6. TEST TITLE.

RKDV-2 Denver ARTCC (ZDV)/Rockville BOS (QJM) Beacon False Target Analysis (BFTA) Program Test (3.2.1.1)

6.1 TEST OBJECTIVES.

The objective is to determine if there are any differences in the number and/or types of beacon false targets, i.e., splits, ring-around, reflections, etc., in the Rockville BOS (QJM) beacon data being received by the ARTCC, after the FGAR is installed.

6.2 TEST CRITERIA.

The number and/or types of beacon false targets contained in the Rockville BOS (QJM) data received by the ARTCC did not increase, after installation of the FGAR.

6.3 TEST APPROACH.

The Denver ARTCC (ZDV) will run the BFTA program on their HCS using beacon data from the Rockville BOS (QJM). The ARTCC's AF SMOC personnel will analyze the data.

Test RKDV-2 will be accomplished by test and analysis.

6.4 TEST CONDUCT.

The test will be divided into two phases.

a. Phase 1 - Before the FGAR is installed.

b. Phase 2 - After installation of the FGAR is complete and:

(1) The contractor has completed the:

(a) First Article DQT.

(b) SAT.

(c) CAI.

(2) The FAA has:

(a) Completed alignment of the Mode S back-to-back antenna.

(b) Completed the recommissioning flight check.

During both phases, the HCS operators will run the BFTA program using the Rockville BOS (QJM) ATCRBS/Mode S beacon data. The SMOC personnel will analyze the data and prepare a report.

6.5 EXECUTION TIME.

The test will take approximately 2 hours each time it is run.

7. TEST TITLE.

RKDV-3 Denver ARTCC (ZDV)/Rockville BOS (QJM) Common Digitizer Data Reduction (COMDIG) Program Test (3.2.1.1)

7.1 TEST OBJECTIVES.

The objective is to determine if there are any changes in the position of the beacon "parrot(s)"/Mode S Calibration Performance Monitoring Equipment (CPME), in the Rockville BOS (QJM) beacon data being received by the ARTCC, after the FGAR is installed.

7.2 TEST CRITERIA.

There is no change in the position of the beacon "parrot(s)"/Mode S CPMEs in the Rockville BOS (QJM) data being received by the ARTCC, after the FGAR is installed.

7.3 TEST APPROACH.

The Denver ARTCC (ZDV) will run the COMDIG program on their HCS using data from the Rockville BOS (QJM). The ARTCC's AF SMOC personnel will analyze the data.

Test RKDV-2 will be accomplished by test and analysis.

7.4 TEST CONDUCT.

The test will be divided into two phases.

a. Phase 1 - Before the FGAR is installed.

b. Phase 2 - After installation of the FGAR is complete and:

(1) The contractor has completed the:

(a) First Article DQT.

(b) SAT.

(c) CAI.

(2) The FAA has:

(a) Completed alignment of the Mode S back-to-back antenna.

(b) Completed the recommissioning flight check.

During both phases, the HCS operators will run the BFTA program using the Rockville BOS (QJM) ATCRBS/Mode S beacon data. The SMOC personnel will analyze the data and prepare a report.

7.5 EXECUTION TIME.

The test will take approximately 2 hours each time it is run.

8. TEST TITLE.

RKKC-1 Kansas City ARTCC (ZKC)/Rockville BOS (QJM) Quick Analysis of Radar Sites (QARS) Program Test (3.2.1.1)

8.1 TEST OBJECTIVES.

The objective is to determine if there are any differences in the performance characteristics of the Rockville BOS (QJM) ATCRBS/Mode S beacon data being received by the ARTCC, after the FGAR is installed.

8.2 TEST CRITERIA.

The performance characteristics of the Rockville BOS (QJM) ATCRBS/Mode S beacon data being received by the ARTCC are not degraded by the FGAR. The performance characteristics are those described in appendix B.

8.3 TEST APPROACH.

The Kansas City ARTCC (ZKC) will run the QARS program on their HCS using ATCRBS/Mode S data from the Rockville BOS (QJM). The ARTCCs AF TSS personnel will analyze the data.

Test RKKC-1 will be accomplished by test and analysis.

8.4 TEST CONDUCT.

The test will be divided into two phases.

a. Phase 1 - Before the FGAR is installed.

b. Phase 2 - After installation of the FGAR is complete and:

(1) The contractor has completed the:

(a) First Article DQT.

(b) SAT.

(c) CAI.

(2) The FAA has:

(a) Completed alignment of the Mode S back-to-back antenna.

(b) Completed the recommissioning flight check.

During both phases, the HCS operators will run the QARS program using the Rockville BOS (QJM) ATCRBS/Mode S beacon data and provide a printout of the results to the AF TSS personnel. The TSS personnel will analyze the data and prepare a report.

8.5 EXECUTION TIME.

The test will take approximately 2 hours each time it is run.

9. TEST TITLE.

RKKC-2 Kansas City ARTCC (ZKC)/Rockville BOS (QJM) Beacon False Target Analysis (BFTA) Program Test (3.2.1.1)

9.1 TEST OBJECTIVES.

The objective is to determine if there are any differences in the number and/or types of beacon false targets, i.e., splits, ring-around, reflections, etc., in the Rockville BOS (QJM) beacon data being received by the ARTCC, after the FGAR is installed.

9.2 TEST CRITERIA.

The number and/or types of beacon false targets contained in the Rockville BOS (QJM) beacon data received by the ARTCC did not increase, after installation of the FGAR.

9.3 TEST APPROACH.

The Kansas City ARTCC (ZKC) will run the BFTA program on their HCS using data from the Rockville BOS (QJM). The ARTCC's AF TSS personnel will analyze the data.

Test RKKC-2 will be accomplished by test and analysis.

9.4 TEST CONDUCT.

The test will be divided into two phases.

a. Phase 1 - Before the FGAR is installed.

b. Phase 2 - After installation of the FGAR is complete and:

(1) The contractor has completed the:

(a) First Article DQT.

(b) SAT.

(c) CAI.

(2) The FAA has:

(a) Completed alignment of the Mode S back-to-back antenna.

(b) Completed the recommissioning flight check.

During both phases, the HCS operators will run the BFTA program using the Rockville BOS (QJM) ATCRBS/Mode S beacon data. The TSS personnel will analyze the data and prepare a report.

9.5 EXECUTION TIME.

The test will take approximately 2 hours each time it is run.

10. TEST TITLE.

RKKC-3 Kansas City ARTCC (ZKC)/Rockville BOS (QJM) Common Digitizer Data Reduction (COMDIG) Program Test (3.2.1.1)

10.1 TEST OBJECTIVES.

The objective is to determine if there are any changes in the position of the beacon "parrot(s)"/Mode S CPME, in the Rockville BOS (QJM) beacon data being received by the ARTCC, after the FGAR is installed.

10.2 TEST CRITERIA.

There is no change in the position of the Rockville BOS (QJM) beacon "parrot(s)"/Mode S CPMEs in the data being received by the ARTCC, after the FGAR is installed.

10.3 TEST APPROACH.

The Kansas City ARTCC (ZKC) will run the COMDIG program on their HCS using beacon data from the Rockville BOS (QJM). The ARTCC's AF TSS personnel will analyze the data.

Test RKKC-3 will be accomplished by test and analysis.

10.4 TEST CONDUCT.

The test will be divided into two phases.

a. Phase 1 - Before the FGAR is installed.

b. Phase 2 - After installation of the FGAR is complete and:

(1) The contractor has completed the:

(a) First Article DQT.

(b) SAT.

(c) CAI.

(2) The FAA has:

(a) Completed alignment of the Mode S back-to-back antenna.

(b) Completed the recommissioning flight check.

During both phases, the HCS operators will run the BFTA program using the Rockville BOS (QJM) ATCRBS/Mode S beacon data. The TSS personnel will analyze the data and prepare a report.

10.5 EXECUTION TIME.

The test will take approximately 2 hours each time it is run.

11. TEST TITLE.

RKMP-1 Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) Quick Analysis of Radar Sites (QARS) Program Test (3..2.1.1)

11.1 TEST OBJECTIVES.

The objective is to determine if there are any differences in the performance characteristics of the Rockville BOS (QJM) ATCRBS/Mode S beacon data being received by the ARTCC, after the FGAR is installed.

11.2 TEST CRITERIA.

The performance characteristics of the Rockville BOS (QJM) ATCRBS/Mode S beacon data being received by the ARTCC are not degraded by the FGAR. The performance characteristics are those described in appendix B.

11.3 TEST APPROACH.

The Minneapolis ARTCC (ZMP) will run the QARS program on their HCS using ATCRBS/Mode S data from the Rockville BOS (QJM). The ARTCCs AF TSS personnel will analyze the data.

Test RKMP-1 will be accomplished by test and analysis.

11.4 TEST CONDUCT.

The test will be divided into two phases.

a. Phase 1 - Before the FGAR is installed.

b. Phase 2 - After installation of the FGAR is complete and:

(1) The contractor has completed the:

(a) First Article DQT.

(b) SAT.

(c) CAI.

(2) The FAA has:

(a) Completed alignment of the Mode S back-to-back antenna.

(b) Completed the recommissioning flight check.

During both phases, the HCS operators will run the QARS program using the Rockville BOS (QJM) ATCRBS/Mode S beacon data and provide a printout of the results to the AF TSS personnel. The TSS personnel will analyze the data and prepare a report.

11.5 EXECUTION TIME.

The test will take approximately 2 hours each time it is run.

12. TEST TITLE.

RKMP-2 Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) Beacon False Target Analysis (BFTA) Program Test (3.2.1.1)

12.1 TEST OBJECTIVES.

The objective is to determine if there are any differences in the number and/or types of beacon false targets, i.e., splits, ring-around, reflections, etc., in the Rockville BOS (QJM) beacon data being received by the ARTCC, after the FGAR is installed.

12.2 TEST CRITERIA.

The number and/or types of beacon false targets contained in the Rockville BOS (QJM) data received by the ARTCC did not increase, after installation of the FGAR.

12.3 TEST APPROACH.

The Minneapolis ARTCC (ZMP) will run the BFTA program on their HCS using beacon data from the Rockville BOS (QJM). The ARTCC's AF TSS personnel will analyze the data.

Test RKMP-2 will be accomplished by test and analysis.

12.4 TEST CONDUCT.

The test will be divided into two phases.

a. Phase 1 - Before the FGAR is installed.

b. Phase 2 - After installation of the FGAR is complete and:

(1) The contractor has completed the:

(a) First Article DQT.

(b) SAT.

(c) CAI.

(2) The FAA has:

(a) Completed alignment of the Mode S back-to-back antenna.

(b) Completed the recommissioning flight check.

During both phases, the HCS operators will run the BFTA program using the Rockville BOS (QJM) ATCRBS/Mode S beacon data. The TSS personnel will analyze the data and prepare a report.

12.5 EXECUTION TIME.

The test will take approximately 2 hours each time it is run.

13. TEST TITLE.

RKMP-3 Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) Common Digitizer Data Reduction (COMDIG) Program Test (3.2.1.1)

13.1 TEST OBJECTIVES.

The objective is to determine if there are any changes in the position of the beacon "parrot(s)"/Mode S CPMEs, in the Rockville BOS (QJM) beacon data being received by the ARTCC, after the FGAR is installed.

13.2 TEST CRITERIA.

There is no change in the position of the beacon "parrot(s)"/Mode S CPMEs in the Rockville BOS (QJM) data being received by the ARTCC, after the FGAR is installed.

13.3 TEST APPROACH.

The Minneapolis ARTCC (ZMP) will run the COMDIG program on their HCS using beacon data from the Rockville BOS (QJM). The ARTCC's AF TSS personnel will analyze the data.

Test RKMP-3 will be accomplished by test and analysis.

13.4 TEST CONDUCT.

The test will be divided into two phases.

a. Phase 1 - Before the FGAR is installed.

b. Phase 2 - After installation of the FGAR is complete and:

(1) The contractor has completed the:

(a) First Article DQT.

(b) SAT.

(c) CAI.

(2) The FAA has:

(a) Completed alignment of the Mode S back-to-back antenna.

(b) Completed the recommissioning flight check.

During both phases, the HCS operators will run the BFTA program using the Rockville BOS (QJM) ATCRBS/Mode S beacon data. The TSS personnel will analyze the data and prepare a report.

13.5 EXECUTION TIME.

The test will take approximately 2 hours each time it is run.

14. TEST TITLE.

SMKC-1 Kansas City ARTCC (ZKC)/Samburg BOS (QPB) Quick Analysis of Radar Sites (QARS) Program Test (3.2.1.1)

14.1 TEST OBJECTIVES.

The objective is to determine if there are any differences in the performance characteristics of the Samburg BOS (QPB) ATCRBS beacon data being received by the ARTCC, after the FGAR is installed.

14.2 TEST CRITERIA.

The performance characteristics of the Samburg BOS (QPB) ATCRBS beacon data being received by the ARTCC are not degraded by the FGAR. The performance characteristics are those described in appendix B.

14.3 TEST APPROACH.

The Kansas City ARTCC (ZKC) will run the QARS program on their HCS using ATCRBS data from the Samburg BOS (QPB). The ARTCCs AF TSS personnel will analyze the data.

Test SMKC-1 will be accomplished by test and analysis.

14.4 TEST CONDUCT.

The test will be divided into two phases.

a. Phase 1 - Before the FGAR is installed.

b. Phase 2 - After installation of the FGAR is complete and the contractor has completed the SAT and CAI.

During both phases, the HCS operators will run the QARS program using the Samburg BOS (QPB) ATCRBS beacon data and provide a printout of the results to the AF TSS personnel. The TSS personnel will analyze the data and prepare a report.

14.5 EXECUTION TIME.

The test will take approximately 2 hours each time it is run.

15. TEST TITLE.

SMKC-2 Kansas City ARTCC (ZKC)/Samburg BOS (QPB) Beacon False Target Analysis (BFTA) Program Test (3.2.1.1)

15.1 TEST OBJECTIVES.

The objective is to determine if there are any differences in the number and/or types of beacon false targets, i.e., splits, ring-around, reflections, etc., in the Samburg BOS (QPB) beacon data being received by the ARTCC, after the FGAR is installed.

15.2 TEST CRITERIA.

The number and/or types of beacon false targets contained in the Samburg BOS (QPB) beacon data received by the ARTCC did not increase, after installation of the FGAR.

15.3 TEST APPROACH.

The Kansas City ARTCC (ZKC) will run the BFTA program on their HCS using data from the Samburg BOS (QPB). The ARTCC's AF TSS personnel will analyze the data.

Test SMKC-2 will be accomplished by test and analysis.

15.4 TEST CONDUCT.

The test will be divided into two phases.

a. Phase 1 - Before the FGAR is installed.

b. Phase 2 - After installation of the FGAR is complete and the contractor has completed the SAT and CAI.

During both phases, the HCS operators will run the BFTA program using the Samburg BOS (QPB) ATCRBS beacon data. The TSS personnel will analyze the data and prepare a report.

15.5 EXECUTION TIME.

The test will take approximately 2 hours each time it is run.

16. TEST TITLE.

SMKC-3 Kansas City ARTCC (ZKC)/Samburg BOS (QPB) Common Digitizer Data Reduction (COMDIG) Program Test (3.2.1.1)

16.1 TEST OBJECTIVES.

The objective is to determine if there are any changes in the position of the beacon "parrot(s)", in the Samburg BOS (QPB) beacon data being received by the ARTCC, after the FGAR is installed.

16.2 TEST CRITERIA.

There is no change in the position of the Samburg BOS (QPB) beacon "parrot(s)" in the data being received by the ARTCC, after the FGAR is installed.

16.3 TEST APPROACH.

The Kansas City ARTCC (ZKC) will run the COMDIG program on their HCS using beacon data from the Samburg BOS (QPB). The ARTCC's AF TSS personnel will analyze the data.

Test SMKC-3 will be accomplished by test and analysis.

16.4 TEST CONDUCT.

The test will be divided into two phases.

a. Phase 1 - Before the FGAR is installed.

b. Phase 2 - After installation of the FGAR is complete and the contractor has completed the SAT and CAI.

During both phases, the HCS operators will run the BFTA program using the Samburg BOS (QPB) ATCRBS beacon data. The TSS personnel will analyze the data and prepare a report.

16.5 EXECUTION TIME.

The test will take approximately 2 hours each time it is run.

17. TEST TITLE.

SMME-1 Memphis ARTCC (ZME)/Samburg BOS (QPB) Quick Analysis of Radar Sites (QARS) Program Test (3.2.1.1)

17.1 TEST OBJECTIVES.

The objective is to determine if there are any differences in the performance characteristics of the Samburg BOS (QPB) ATCRBS beacon data being received by the ARTCC, after the FGAR is installed.

17.2 TEST CRITERIA.

The performance characteristics of the Samburg BOS (QPB) ATCRBS beacon data being received by the ARTCC are not degraded by the FGAR. The performance characteristics are those described in appendix B.

17.3 TEST APPROACH.

The Memphis ARTCC (ZME) will run the QARS program on their HCS using ATCRBS data from the Samburg BOS (QPB). The ARTCCs AF TSS personnel will analyze the data.

Test SMME-1 will be accomplished by test and analysis.

17.4 TEST CONDUCT.

The test will be divided into two phases.

a. Phase 1 - Before the FGAR is installed.

b. Phase 2 - After installation of the FGAR is complete and the contractor has completed the SAT and CAI.

During both phases, the HCS operators will run the QARS program using the Samburg BOS (QPB) ATCRBS beacon data and provide a printout of the results to the AF TSS personnel. The TSS personnel will analyze the data and prepare a report.

17.5 EXECUTION TIME.

The test will take approximately 2 hours each time it is run.

18. TEST TITLE.

SMME-2 Memphis ARTCC (ZME)/Samburg BOS (QPB) Beacon False Target Analysis (BFTA) Program Test (3.2.1.1)

18.1 TEST OBJECTIVES.

The objective is to determine if there are any differences in the number and/or types of beacon false targets, i.e., splits, ring-around, reflections, etc., in the Samburg BOS (QPB) beacon data being received by the ARTCC, after the FGAR is installed.

18.2 TEST CRITERIA.

The number and/or types of beacon false targets contained in the Samburg BOS (QPB) data received by the ARTCC did not increase, after installation of the FGAR.

18.3 TEST APPROACH.

The Memphis ARTCC (ZME) will run the BFTA program on their HCS using beacon data from the Samburg BOS (QPB). The ARTCC's AF TSS personnel will analyze the data.

Test SMME-2 will be accomplished by test and analysis.

18.4 TEST CONDUCT.

The test will be divided into two phases.

a. Phase 1 - Before the FGAR is installed.

b. Phase 2 - After installation of the FGAR is complete and the contractor has completed the SAT and CAI.

During both phases, the HCS operators will run the BFTA program using the Samburg BOS (QPB) ATCRBS beacon data. The TSS personnel will analyze the data and prepare a report.

18.5 EXECUTION TIME.

The test will take approximately 2 hours each time it is run.

19. TEST TITLE.

SMME-3 Memphis ARTCC (ZME)/Samburg BOS (QPB) Common Digitizer Data Reduction (COMDIG) Program Test (3.2.1.1)

19.1 TEST OBJECTIVES.

The objective is to determine if there are any changes in the position of the beacon "parrot(s)", in the Samburg BOS (QPB) beacon data being received by the ARTCC, after the FGAR is installed.

19.2 TEST CRITERIA.

There is no change in the position of the beacon "parrot(s)" in the Samburg BOS (QPB) data being received by the ARTCC, after the FGAR is installed.

19.3 TEST APPROACH.

The Memphis ARTCC (ZME) will run the COMDIG program on their HCS using data from the Samburg BOS (QPB). The ARTCC's AF TSS personnel will analyze the data.

Test SMME-2 will be accomplished by test and analysis.

19.4 TEST CONDUCT.

The test will be divided into two phases.

a. Phase 1 - Before the FGAR is installed.

b. Phase 2 - After installation of the FGAR is complete and the contractor has completed the SAT and CAI.

During both phases, the HCS operators will run the BFTA program using the Samburg BOS (QPB) ATCRBS beacon data. The TSS personnel will analyze the data and prepare a report.

19.5 EXECUTION TIME.

The test will take approximately 2 hours each time it is run.

20. LIST OF TEST TITLES.

LHAT-1	Lihue ATCT (LIH) Air Traffic Control Specialist (ATCS) Evaluation Test
LHAT-2	Honolulu CERAP (ZHN) Air Traffic Control Specialist (ATCS) Evaluation Test
LHEP-1	Lihue Terminal Radar Facility (LIH) Electromagnetic Performance Test
LHHE-1	Lihue Terminal Radar Facility (LIH) Human Engineering Test
RKDV-1	Denver ARTCC (ZDV)/Rockville BOS (QJM) Quick Analysis of Radar Sites (QARS) Program Test
RKDV-2	Denver ARTCC (ZDV)/Rockville BOS (QJM) Beacon False Target Analysis (BFTA) Program Test
RKDV-3	Denver ARTCC (ZDV)/Rockville BOS (QJM) Common Digitizer Data Reduction (COMDIG) Program Test
RKKC-1	Kansas City ARTCC (ZKC)/Rockville BOS (QJM) Quick Analysis of Radar Sites (QARS) Program Test
RKKC-2	Kansas City ARTCC (ZKC)/Rockville BOS (QJM) Beacon False Target Analysis (BFTA) Program Test
RKKC-3	Kansas City ARTCC (ZKC)/Rockville BOS (QJM) Common Digitizer Data Reduction (COMDIG) Program Test
RKMP-1	Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) Quick Analysis of Radar Sites (QARS) Program Test
RKMP-2	Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) Beacon False Target Analysis (BFTA) Program Test
RKMP-3	Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) Common Digitizer Data Reduction (COMDIG) Program Test
SMKC-1	Kansas City ARTCC (ZKC)/Samburg BOS (QPB) Quick Analysis of Radar Sites (QARS) Program Test
SMKC-2	Kansas City ARTCC (ZKC)/Samburg BOS (QPB) Beacon False Target Analysis (BFTA) Program Test
SMKC-3	Kansas City ARTCC (ZKC)/Samburg BOS (QPB) Common Digitizer Data Reduction (COMDIG) Program Test
SMME-1	Memphis ARTCC (ZME)/Samburg BOS (QPB) Quick Analysis of Radar Sites (QARS) Program Test
SMME-2	Memphis ARTCC (ZME)/Samburg BOS (QPB) Beacon False Target Analysis (BFTA) Program Test
SMME-3	Memphis ARTCC (ZME)/Samburg BOS (QPB) Common Digitizer Data Reduction (COMDIG) Program Test

APPENDIX B

DATA ANALYSIS PROGRAMS

DATA ANALYSIS PROGRAMS

The programs that will be used to analyze the electromagnetic performance of the primary and beacon radars data are described below.

1. Beacon False Target Analysis (BFTA) Program.

   The BFTA program provides a tool to investigate and evaluate false target problems associated with the ATCRBS. The BFTA program retrieves and processes beacon target information relative to all Mode 3/A beacon equipped aircraft detected during one job cycle of the program.

2. Common Digitizer Data Reduction (COMDIG) Program.

   The COMDIG program extracts selected types of data from a Common Digitizer Record (CDRECORD) program tape containing various mixtures of six different CD message types received by the HCS and prints the data in prescribed formats.

3. Quick Analysis of Radar Sites (QARS) Program.

   The QARS programs is divided into two sections, (1) verification of the radar system interface, and (2) Radar Data Analysis Summary routine which analyzes the beacon tracks.

   a. Radar System Interface Verification.

      The following applicable parameters are supplied:

      (1) Site identification.

      (2) Beacon percentages.

         (a) Mode 3/A validation percentage

         (b) Mode C validation percentage

         (c) Mode 2 validation percentage

      (3) Status summary - provides the status of the secondary radar and the CD.

   b. Radar Data Analysis Summary.

      The following parameters are supplied:

      (1) Adapted radar site name.

      (2) Video - The beacon (BCN) receiver video used for the CD input.

         (a) Beacon (BCN)

         (b) Moving Target Indicator (MTI) [primary radar]

         (c) Normal (NML) [primary radar]

         (d) Combined MTI and Normal video (SCH) [primary radar]

(3) Scans -

(a) Beacon - total number of antenna revolutions for the period of time the beacon return was tracked.

(b) Surveillance - will vary according to a targets range and elevation (primary radar).

(4) Blip/Scan - The percentage ratio of the number of times a target was detected (BLIP) to the number of times a target could have been detected (SCAN).

(5) Radar Reinforced (R/R) - Ratio of number of beacon messages with the reinforced bit set to the total number of beacon messages received (primary radar).

(6) Collimation (COLL) - The collimation percentage for NML and MTI video (primary radar).

(7) Beacon split -

(a) Azimuth Split (ASPLT)

(b) Range Split (RSPLT)

(8) False Beacon (FALSE-BCN) -

(a) Ring-a-round (RAR)

(b) Reflections (REF)

(c) Code zero percentage (ZER)

(9) Code reliability -

(a) Mode 3/A reliability percentage (M3REL)

(b) Mode 3/A validity (M3VAL)

(c) Mode C reliability percentage (MCREL)

(d) Mode C validity (MCVAL)

(10) Range - Beacon track start and stop histories.

(11) Azimuth (AZ) - Beacon track start and stop histories.

(12) Altitude (ALT) - Beacon track start and stop histories.

(13) Deviation (DEV) - Mean difference of the predicted versus the actual position of a track.

(14) Collimation Distribution - Variations of the closest surveillance return relative to the beacon return that was being tracked (primary radar).

(15) Permanent Echo (PE) Verification - Range of the adapted PE in whole and eighths of a mile, together with the mean error in whole and tenths of Azimuth Change Pulses (ACP).

(16) The mean predicted versus actual position of all the tracks for the site.

4. En Route Automated Radar Tracking System (EARTS) Quick Analysis of Radar Sites (EQARS) Program.

The EQARS program monitors radar digitizer data and presents data information related to specific sensors.

5. Transportable Radar Analysis Computer System (TRACS).

a. PLOTASR.

The PLOTASR program provides the capability to plot and sort aircraft and weather data in a polar presentation on a International Business Machines (IBM) compatible personal computer (PC) graphics display. The target data is retrieved from a CDRECORD disk file.

b. Real-Time Aircraft Display System (RTADS).

The RTADS program is a real-time hardware/software package that can record disseminated target data on an IBM compatible PC. The RTADS can handle three different formats, including CD-En Route and CD-Terminal.

c. TRACS Data Reduction (TDR).

The TRACS TDR is a set of computer analysis programs. The following programs will be used:

1. Beacon False Target Summary (BFTS).

The BFTS program analyzes false beacon targets for azimuth split, ring-around, uplink and downlink reflections, and other categories. The uplink reflections are used to calculate the location and orientation of the reflectors. Range versus azimuth, range versus elevation, and azimuth versus elevation plots are provided for false targets. Beacon messages with ATCRBS code of 0000 are identified.

2. Permanent Echo (PE) Accuracy.

This program analyzes the range and azimuth accuracy of the beacon messages for a specified PE transponder. The reference range and azimuth positions are inputted by the user.

3. Permanent Echo (PE) Accuracy Merge.

This program merges range azimuth accuracy statistics and plots for permanent echo PE transponders and produces trend plots.

4. Surveillance Analysis.

This program analyzes beacon and search performance on all beacon tracks. Statistics are given individually for each track and combined into ATCRBS, Mode S, and total categories. Range versus altitude, and azimuth versus altitude plots are provided which contain track initiations, coasts, and drops.

APPENDIX C

TEST VERIFICATION REQUIREMENTS TRACEABILITY MATRIX (TVRTM)

FAA-2773b, Specification for Fixed Ground Antenna Radome (Mode S Compatible) Paragraph No.	Test Level 1 I	 O	Test Location	C/NC	Support Organizations	Test Designation	TEMP Ref
1) 3.2.1.1 Electrical Performance Requirements		X	ZDV ZHN ZKC ZME ZMP LIH	C	ACT-300 ZDV ZHN ZKC ZME ZMP QJM QPB LIH AFSFO LIH ATCT	LHAT LHEP RKDV RKKC RKMP SMKC SMME	7.5
2) 3.2.1.1.1 Antenna Main Lobe Beam Width Error		X	ZDV ZHN ZKC ZME ZMP LIH	C	ACT-300 ZDV ZHN ZKC ZME ZMP QJM QPB LIH AFSFO LIH ATCT	LHAT LHEP RKDV RKKC RKMP SMKC SMME	7.5
3) 3.2.1.1.2 Boresight Error		X	ZDV ZHN ZKC ZME ZMP LIH	C	ACT-300 ZDV ZHN ZKC ZME ZMP QJM QPB LIH AFSFO LIH ATCT	LHAT LHEP RKDV RKKC RKMP SMKC SMME	7.5

FAA-2773b, Specification for Fixed Ground Antenna Radome (Mode S Compatible) Paragraph No.	Test Level I	Test Level O	Test Location	C/NC	Support Organizations	Test Designation	TEMP Ref
4) 3.2.1.1.5 Sidelobe Level Error		X	ZDV ZHN ZKC ZME ZMP LIH	C	ACT-300 ZDV ZHN ZKC ZME ZMP QJM QPB LIH AFSFO LIH ATCT	LHAT LHEP RKDV RKKC RKMP SMKC SMME	7.5
5) 3.3.7 Human Engineering		X	LIH	C	ACT-300 LIH AFSFO	LHHE-1	7.4

LEGEND:

AFSFO	Airway Facilities Sector Field Office
ATCT	Air Traffic Control Tower
C	Critical
I	Integration
LIH	Lihue
NC	Noncritical
O	Operational
QJM	Rockville BOS
QPB	Samburg BOS
REF	Reference
ZDV	Denver ARTCC
ZHN	Honolulu CERAP
ZKC	Kansas City ARTCC
ZME	Memphis ARTCC
ZMP	Minneapolis ARTCC