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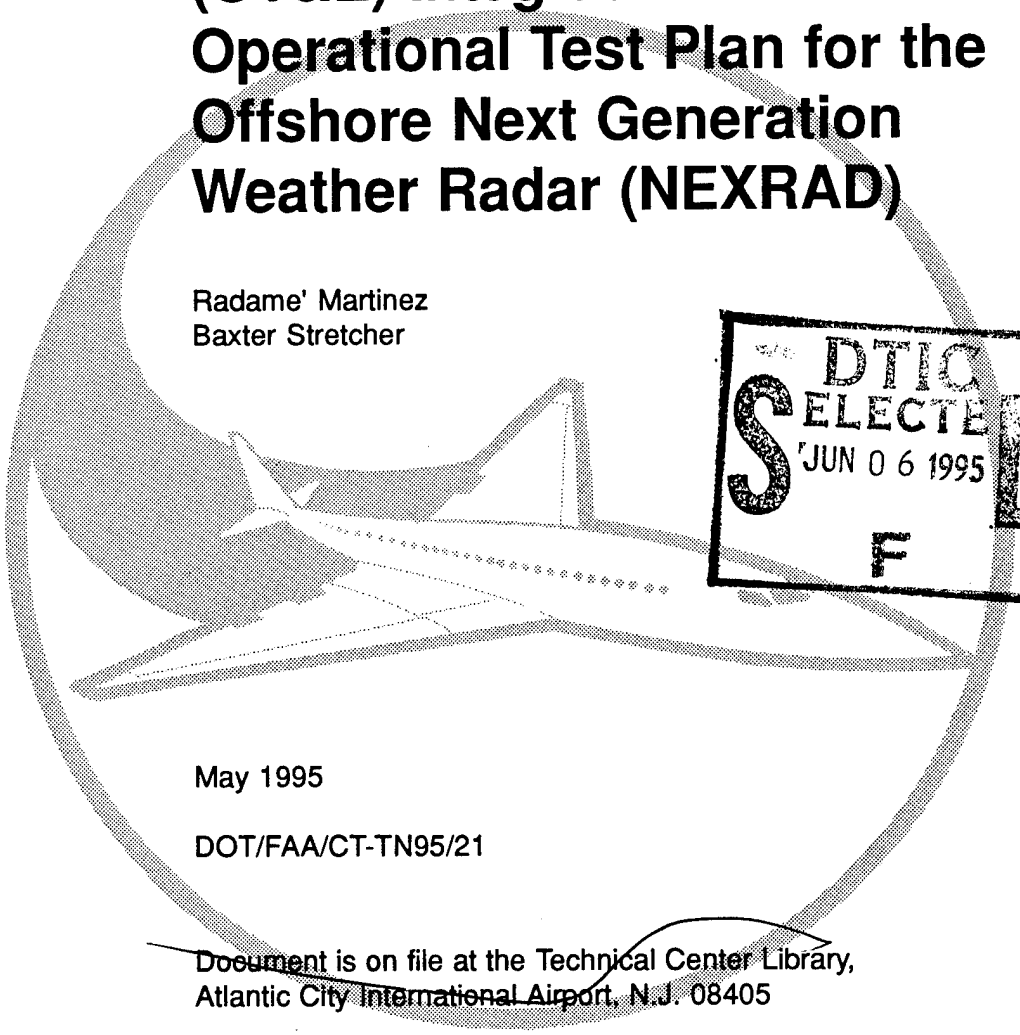
Operational Test and Evaluation (OT&E) Integration and OT&E Operational Test Plan for the Offshore Next Generation Weather Radar (NEXRAD)

Radame' Martinez
Baxter Stretcher



May 1995

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16. Abstract

This document provides the overall philosophy and approach for the National Airspace (NAS) Phase I Operational Test and Evaluation (OT&E) Integration and OT&E Operational Testing of the Offshore Next Generation Weather Radar (NEXRAD).

A total of 14 Offshore NEXRADs will be procured under this acquisition: 3 in the Caribbean, 4 in Hawaii, and seven 7 in Alaska. OT&E testing will be performed in two phases. Phase I testing will be performed on the redundant configuration in November 1994, in Kauai, Hawaii, and is described herein. Phase II testing will be performed on the Remote Monitoring Subsystem (RMS) at a later date and is not described in this document. A separate test plan and test procedures will be developed for Phase II OT&E Integration and OT&E Operational Testing.

The focus of this document is on Phase I limited OT&E Integration and OT&E Operational testing of the Offshore NEXRAD. The testing is limited in nature due to the extensive testing already performed on the single-channel NEXRAD system by the Joint System Program Office (JSPO) and funding constraints placed upon the Federal Aviation Administration (FAA).

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EXECUTIVE SUMMARY

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1. INTRODUCTION.

1.1 BACKGROUND.

The Next Generation Weather Radar (NEXRAD) system, developed by the Unisys Corporation, is an "S" band Doppler weather radar capable of detecting the location, severity, and movement of both routine and hazardous weather phenomena. It uses wideband and narrowband communication equipment, data processing hardware and software, color graphic displays, and both console and graphic tablet data entry equipment. Since 1987, Unisys Corporation has been the prime contractor on the project.

The principal users of the NEXRAD system are operationally oriented agencies within the participating departments of the Department Of Defense (DOD), Department of Commerce (DOC), and the Department of Transportation (DOT). These agencies established the NEXRAD Joint System Program Office (JSPO) to implement the national network of NEXRAD radars.

The JSPO, through the Air Force Operational Test and Evaluation Center (AFOTEC) completed operational testing of the single-channel NEXRAD in 1989, although Development Test and Evaluation (DT&E) continued through 1990. This single-channel NEXRAD system is currently being deployed in the Continental United States (CONUS) for use by the National Weather Service (NWS), the Federal Aviation Administration (FAA), and DOD.

The NWS is the principal civilian agency that uses the NEXRAD products because of its need to acquire and interpret weather information. The weather radar information is also disseminated to FAA facilities such as Air Route Traffic Control Centers (ARTCC), Combined Center/Radar Approach Control (CERAP), and the FAA's System Command Center (SCC).

The test and evaluation concept for the Offshore NEXRAD is unique in many ways to other FAA systems. The main difference is that the Offshore NEXRAD is a modified version of the WSR-88D which has previously been procured, developed, tested, and installed by JSPO. However, the JSPO single-channel NEXRAD systems do not comply with the FAA requirements for a redundant configuration (dual radar channels) with Remote Monitoring Subsystem (RMS) capabilities. In order to comply with these requirements, the FAA has procured, through JSPO, single-channel NEXRADs in a redundant configuration. The FAA will then add RMS capability at a later date.

The test and evaluation philosophy reflects this situation. Operational Test and Evaluation (OT&E) testing will be performed in two phases. Phase I testing will be performed on the first FAA redundant configuration which is scheduled for deployment to Kauai, Hawaii, in June of 1994. Phase II testing for the RMS will be performed at a site to be determined later.

This document describes the Phase I limited OT&E Integration and OT&E Operational testing for the first FAA redundant configuration. The primary focus of the testing at the first site will be the redundant configuration.

The FAA redundant configuration NEXRADs will be deployed to non-CONUS locations and hence are referred to as Offshore NEXRADs. A total of 14 Offshore NEXRADs have been procured under this acquisition as follows: 3 in the Caribbean, 4 in Hawaii, and 7 in Alaska. First site testing will be performed in Kauai, Hawaii.

1.2 PURPOSE.

The purpose of this FAA Offshore NEXRAD OT&E Integration and OT&E Operational Plan is to describe the testing requirements, general methodology and responsibilities for OT&E Integration and OT&E Operational Test of the Offshore NEXRAD in accordance with FAA Order 1810.4B (FAA National Airspace System (NAS) Test and Evaluation Policy, October 22, 1992), and FAA-STD-024B (Preparation of Test and Evaluation Documentation, Draft, December 15, 1993).

1.3 SCOPE.

This document focus is on Phase I limited OT&E Integration and OT&E Operational testing of the Offshore NEXRAD Weather Radar. The testing is limited in nature due to the extensive testing already performed on the single-channel NEXRAD system by JSPO and FAA funding shortfalls. This limited OT&E testing will focus primarily on the redundant configuration and will be conducted with the intent of verifying the effectiveness and suitability of the Offshore NEXRAD system. The aspects of this testing are further defined as follows:

a. Reliability, Maintainability, and Availability (RMA),

b. Degraded Operations and operational utilization scenarios,

c. Safety and Security, and,

d. Site Adaptation Data.

OT&E testing employs system users (such as the NWS) and system maintainers (FAA) to assess suitability and effectiveness of the subsystem in the NAS environment. Testing will be conducted in accordance with established OT&E requirements. The testing will address the evaluation of system functions, systems maintenance, and support operations.

2. REFERENCE DOCUMENTS.

2.1 FAA DOCUMENTS.

2.1.1 FAA Specifications.

NAS-SS-1000	NAS System Specification Volume I, Functional and Performance Requirements for the National Airspace System General, October 1992.
NAS-SS-1000	NAS System Specification Volume III, Functional and Performance Requirements for the Ground-to-Air Element, February 1993.
NAS-SS-1000	NAS System Specification Volume V, Functional and Performance Requirements for the National Airspace System Maintenance and Operations Support Element, October 1992.

2.1.2 FAA Standards.

FAA-STD-024B	Content and Format Requirements for the Preparation of Test and Evaluation Documentation, August 1994.
CT 1710.2B	Preparation and Issuance of Formal Reports, Technical Notes and other Documentation, February 13, 1990.

2.1.3 Other FAA Publications.

FAA ORDER 1810.1F	FAA Acquisition Process, March 19, 1993.
FAA ORDER 1810.1B	FAA NAS Test and Evaluation Policy, October 22,1992.
DOT/FAA/ CT-TN93/36	NEXRAD PUP OT&E Operational Test Final Report, October 1993.

2.2 OTHER DOCUMENTS.

JSPO R400-TP301	Next Generation Weather Radar Test and Evaluation Master Plan, May 31, 1990.
R400-SP401A	NEXRAD Technical Requirements (NTR), November 1, 1991.

AFOTEC PROJECT 86-0167	NEXRAD Initial Operational Test and Evaluation, Phase II Final Report, December 1989.
CDRL 505	CI Level Test Procedures for Redundancy, May 20, 1993.
1310035A	Build 7 Test Plan, October 15, 1993.
CDRL 245	Build 7 Test Procedures, November 1, 1993.
DV1208251F	Critical Item Development Spec. for Tower Utilities (B4, CI-01).
DV1208252G	Critical Item Development Spec. for Antenna Pedestal (B2, CI-02).
DV1208253F	Critical Item Development Spec. for Transmitter (B2, CI-03).
DV1208254E	Critical Item Development Spec. for Receiver/Signal Processor (B2, CI-04).
DV1208255F	Critical Item Development Spec. for RDA Control (B2, CI-05).
DV1208256E	Critical Item Development Spec. for Wideband Communications Link (B2, CI-06).
DV1208257F	Critical Item Development Spec. for RPG Equipment (B1, CI-07).
DV1208258F	Critical Item Development Spec. for PUP/RPGOP Equipment (B1, CI-08).
DV1208250E	Critical Item Development Spec. for RDA Equipment (B1, CI-09).
CDRL 246	Production Acceptance Tests For CLIN 0001AD Bloomfield, CT.

3. SYSTEM DESCRIPTION.

3.1 SYSTEM OVERVIEW.

The Offshore NEXRADs will acquire, process, distribute, and display weather radar information to support the NWS, FAA, and DOD. Figure 3.1-1 is a simplified block diagram of the single-channel NEXRAD configuration. This is a block diagram of the CONUS systems currently being deployed by JSPO. As indicated, the Radar Data Acquisition (RDA) unit primarily generates the three weather base products which are reflectivity, mean radial velocity, and velocity spectrum width. Also indicated in figure 3.1-1 are the tasks performed by the Radar Product Generator (RPG) which primarily involve processing the base data into weather products. The products are then sent to the various users.

The Principle User Processor (PUP) has undergone OT&E testing and is not under test. The results of PUP testing are documented in DOT/FAA/CT-TN93/36, dated October 1993. The Unit Control Position (UCP) is a console to input system commands and monitor system status.

Figure 3.1-2 is a simplified block diagram of the Offshore NEXRAD system. The configuration gives the Offshore NEXRAD the unique flexibility to switch between either channel, where each channel has a dedicated RDA and RPG. This configuration shown in figure 3.1-2 is the Offshore NEXRAD system that will undergo Phase I OT&E Integration and OT&E Operational Phase I testing as defined in this plan.

Note that for Offshore NEXRAD systems in Hawaii and the Caribbean, the ARTCC equivalent is the CERAP. The CERAP does not have a Central Weather Service Unit (CWSU) composed of trained meteorologists who interpret weather data. NEXRAD weather data at these locations will be interpreted by meteorologists at the National Weather Service Weather Forecast Office.

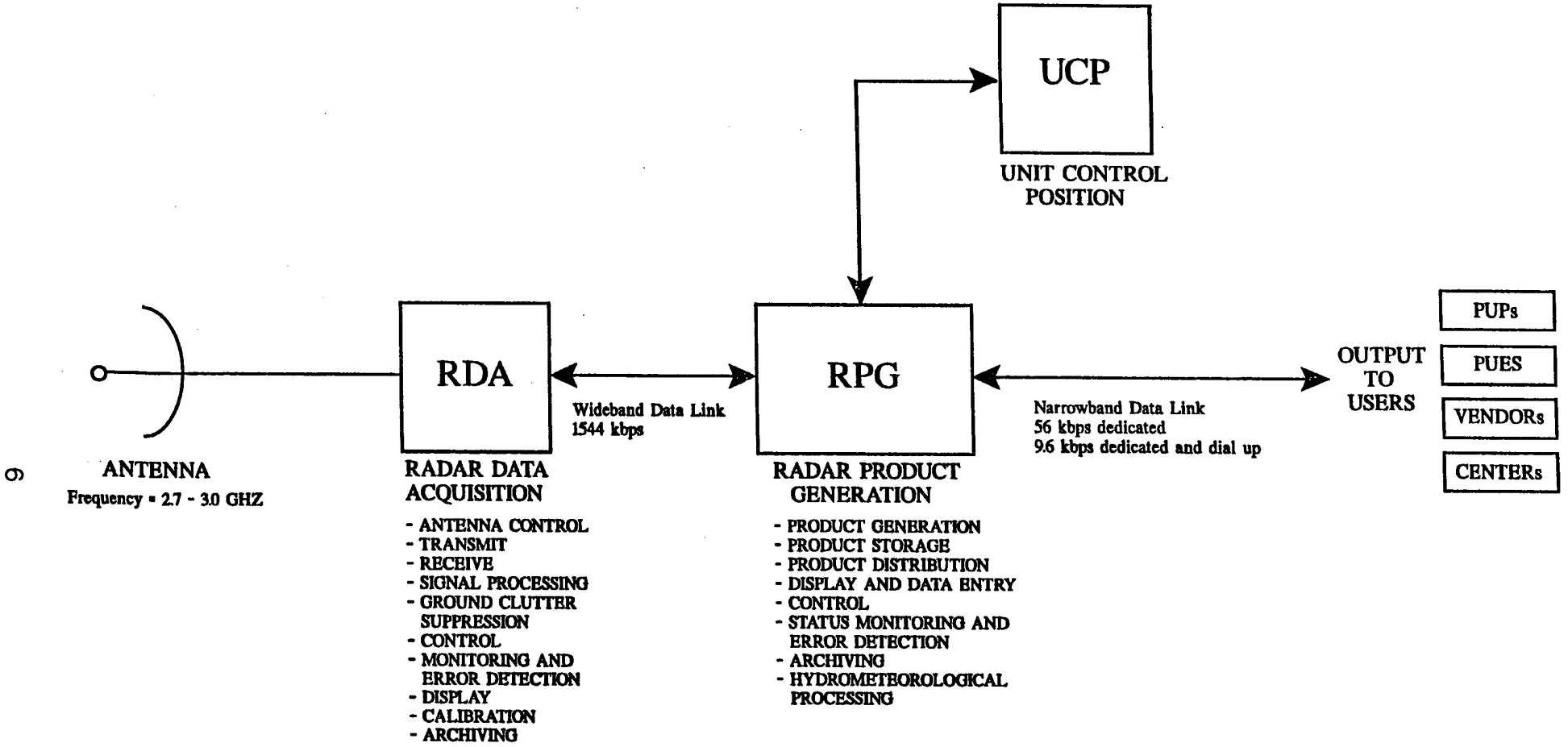

FIGURE 3.1-1. BLOCK DIAGRAM OF THE SINGLE-CHANNEL NEXRAD

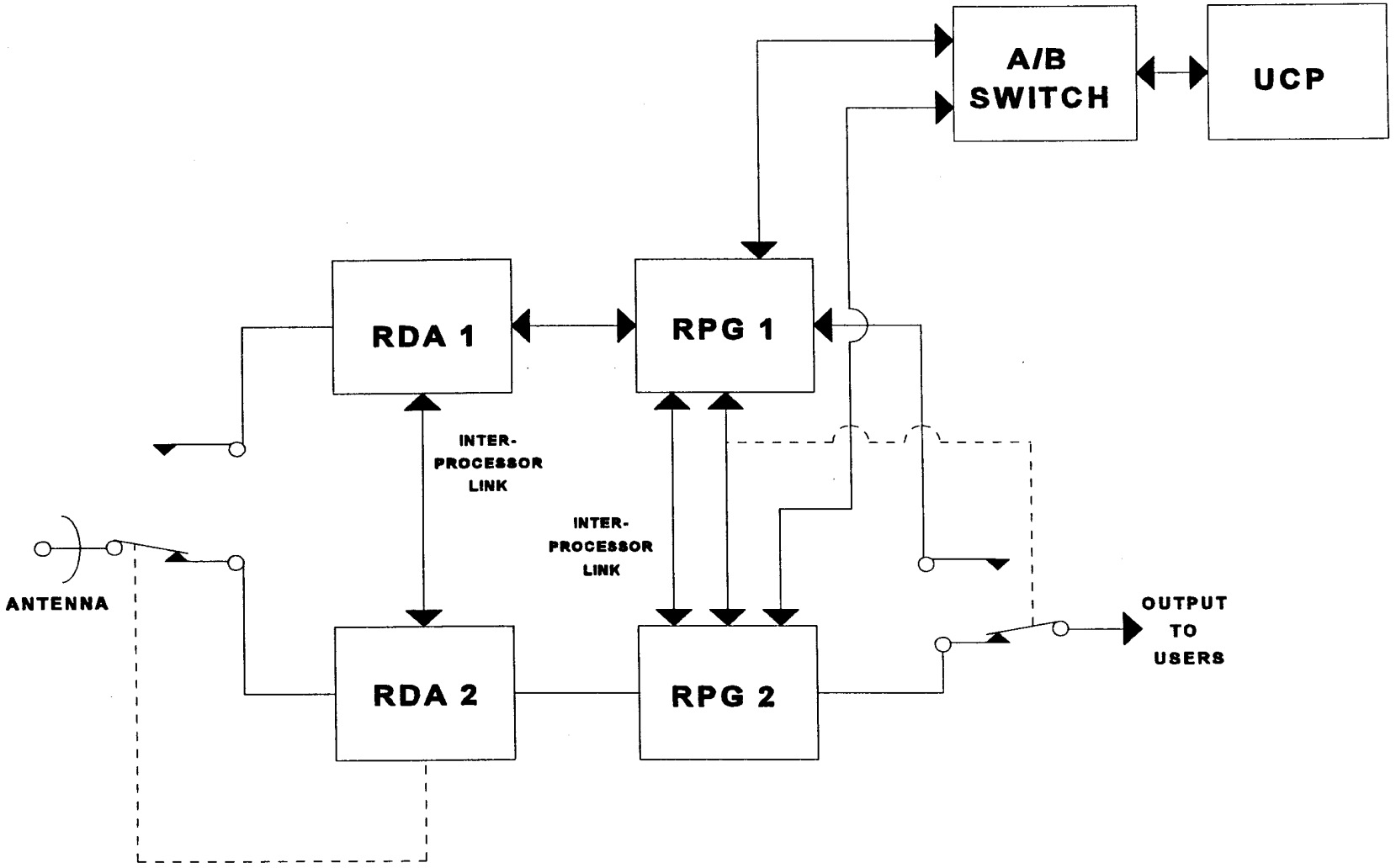

FIGURE 3.1-2. BLOCK DIAGRAM OF THE FAA REDUNDANT CONFIGURATION

3.2 INTERFACES.

The Offshore NEXRAD is being initially deployed as a stand-alone system. It does have the capability to work with various interfaces as they become available.

As shown in figure 3.2-1, the Offshore NEXRAD system will interface with the Weather And Radar Processor (WARP), the Maintenance Processor Subsystem (MPS) and when required, non-FAA users.

NEXRAD/WARP. Digitized base products and selected derived products will be forwarded to the WARP, routinely and upon request, for analysis and annotation by the NWS meteorologist at the CWSU. The WARP will automatically mosaic and contour NEXRAD data in image format for distribution.

NEXRAD/Non-FAA Users. The digitized data base will be made available to the National Oceanic and Atmospheric Administration (NOAA) and DOD, as required.

NEXRAD/Maintenance Processor Subsystem (MPS). The NEXRAD/MPS interface provides the transfer of requests for, and reports of, status data, performance data, diagnostics data, and maintenance control commands between the MPS and the NEXRAD via a standard interface.

NEXRAD/Maintenance Data Terminal (MDT). The NEXRAD will have a communication port to interface with an MDT. The NEXRAD will process maintenance control commands from the MDT and will provide status, performance data, and diagnostics data to the MDT when requested by an operator at the MDT. The NEXRAD will route terminal messages exchanged between the MPS and the MDT.

NEXRAD/Vendor. The digitized data base will be made available to selected commercial vendors which provide weather services to the FAA.

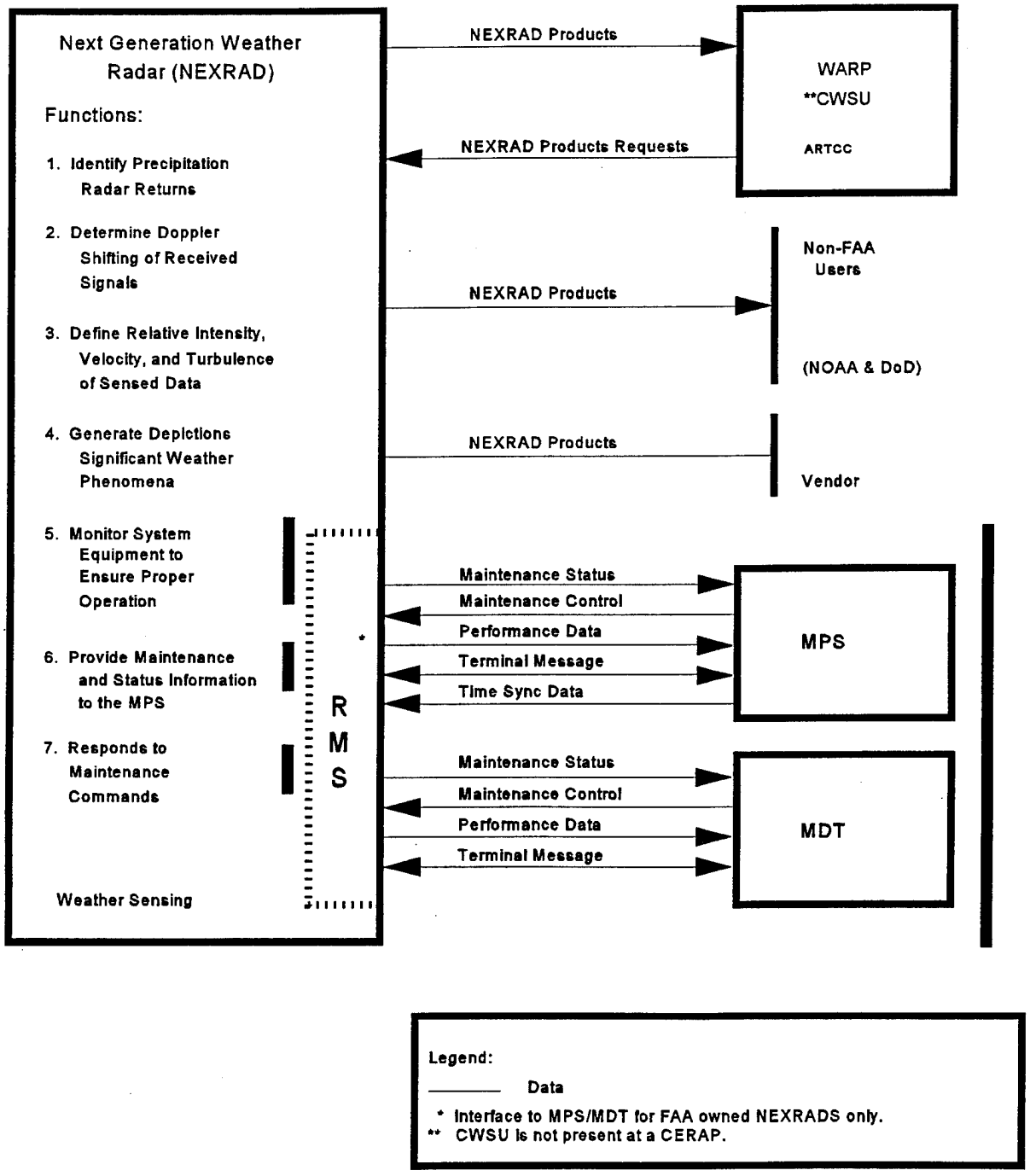

FIGURE 3.2-1. BLOCK DIAGRAM OF NEXRAD AND INTERFACES

4. TEST PROGRAM DESCRIPTION.

4.1 APPROACH AND CONCEPT.

4.1.1 Evaluation Approach.

Performance of the single-channel NEXRAD weather radars is well documented. Figure 3.1-1 shows a simplified block diagram of the single-channel NEXRAD system. Figure 3.1-2 shows a simplified block diagram of the FAA redundant configuration. These are oversimplified diagrams and specific control circuitry is not shown. However, the diagrams loosely illustrate the concept of NEXRAD redundancy. Notice the difference between the two configurations. At the RDAs, the microwave section of the "switch" connects the on-line channel to the antenna. At the RPGs, the narrowband section of the "switch" connects the on-line RPG to the users. The approach and concept for OT&E Integration and OT&E Operational testing is to verify that the FAA redundant configuration conforms to single-channel NEXRADs and test NAS-SS-1000 requirements per 1810.4B. NAS-SS-1000 requirements for weather have been extensively tested during the initial development phase for the single-channel NEXRAD system. The purpose here is not to duplicate the testing already performed on the single-channel NEXRADs, merely to check that the redundant system conforms to requirements.

In addition, to better evaluate system maintainability, a questionnaire was developed by ACW-200, and will be administered to Airway Facilities (AF) personnel. The questionnaire addresses such issues as accuracy and completeness of maintenance procedures, diagnostics, built in self-tests, and technical documentation. Questions to determine ease of maintenance and effective use of external test equipment are also included in the questionnaire.

At the pretest briefing and prior to administering the questionnaire, AF personnel will be briefed by an ACW-200 test team member, on the scope and purpose of the questionnaire. Results will be evaluated and included in both the Quick Look and final reports. A copy of the questionnaire is in appendix C of this document.

4.1.2 Critical Operational Issues (COI).

The following COI is related to the Offshore NEXRAD system and must be addressed during Phase I OT&E testing:

a. Is the Reliability, Maintainability, and Availability of the Offshore NEXRAD system suitable for incorporation into the NAS when used in an operational environment with the available FAA resources, logistics plan, personnel, and system maintenance procedures?

1. MOS A-1. Will the FAA redundant configuration NEXRAD perform at the level of Reliability and Availability required by the

NAS? The Availability requirement is 0.99987616 and the Mean Time Between Failure (MTBF) requirement is 4037 hours.

2. MOS A-2. Have FAA maintenance personnel received a system capable of performing at the level of Maintainability required by the NAS, and have they received the resources necessary to maintain it to this requirement? The Mean Time To Repair (MTTR) requirement is 0.5 hours.

3. MOS A-3. Operationally will there be sufficient FAA personnel assigned to maintain the Offshore NEXRAD system? The Availability requirement is 0.99987616.

The following COIs are related to the Offshore NEXRAD system and must be addressed once the WARP and RMS are available for testing:

b. Does the Offshore NEXRAD system provide the required interoperability with the RMS?

c. Does the Offshore NEXRAD system provide the required interoperability with the WARP?

The first COI will be addressed by specific testing performed during Phase I OT&E Integration and OT&E Operational testing as well as Phase I OT&E Shakedown testing. The second and third COIs will be addressed by performing OT&E testing after the above interfaces are developed.

The NAS-SS-1000 requirements that are applicable to the Offshore NEXRAD system are defined in appendix A. Specific requirements applicable to the above issues are marked with an **X** in the COI column in appendix A.

4.1.3 Minimum Acceptable Operational Requirements.

The minimum acceptable operational performance criteria for the Offshore NEXRAD can be divided into two categories; technical and functional. Minimum technical performance criteria is defined quantitatively in the Verification Requirements Traceability Matrix (VRTM) and defines physical operating performance required from the Offshore NEXRAD system. This type of data is typically associated with minimum and/or maximum performance parameters. Minimum functional performance criteria is defined qualitatively in FAA Order 1810.4B and NAS-SS-1000 and is a measure of the effectiveness of the system at performing the required tasks. Phase I OT&E Integration and OT&E Operational testing will address both categories of minimum operational performance and identify any deficiencies in either category.

4.1.4 Activities Leading to Test.

Prior to OT&E Integration and OT&E Operational testing, ACW-200 will prepare Offshore NEXRAD OT&E Integration and OT&E Operational Test Procedures. In addition, the Offshore NEXRAD at Kauai, HI, will have successfully undergone an INstallation and CheckOut (INCO) test and Acceptance testing, performed by JSPO acceptance personnel.

4.2 TEST ENVIRONMENT.

OT&E Operational testing of any NAS subsystem requires an environment that is equivalent to that of the NAS operational environment, or one that closely resembles that environment. In the case of Phase I OT&E Integration and OT&E Operational testing, the Offshore NEXRAD analysis of related NAS-SS-1000 requirements indicate that most of these requirements, with the exception of those related to the Remote Maintenance Monitoring Subsystem (RMMS) and dual UCP configuration, can be fully verified at the first site.

4.2.1 TEST LOCATION.

The first Offshore NEXRAD site is scheduled for deployment to the island of Kauai, HI. The UCP and Associated PUP will most likely be located at the Weather Forecast Office (WFO) in Honolulu, on the island of Oahu, HI. The NWS will operate the Kauai NEXRAD from the Associated PUP. The CERAP in Honolulu will have an end-state UCP and a PUP associated with the Molokai site and a dial-up capability for the Kauai site. NWS to FAA coordination of maintenance actions will be tested in the absence of the modification for a dual UCP configuration. It is recognized that response time for coordination will improve with the dual configuration.

4.3 TEST AND ANALYSIS TOOLS.

Along with the standard NEXRAD equipment list for operation and maintenance, electronic equipment will be required to perform Phase I OT&E Integration and OT&E Operational testing. The following electronic equipment, or its equivalent should be available for Phase I OT&E testing:

a. Oscilloscope	
b. Power Meter	HP 438
c. Power Sensors	HP 8481A and 8481D
d. Connectors (RF and Data)	HP-IB, Type N, BNC, TNC, Triax
e. Spectrum Analyzer	HP 8569B
f. High Voltage Probe	
g. Variable Attenuators	
h. Frequency Counters	HP 5361B (Microwave Pulse)
i. Synthesizer	HP 8673E-B
j. Coaxial Detector	HP 423B

k.	Color Plotter	HP 7090
l.	Pulse Generator	
m.	Personal Computer	ACW-200 will provide

Other equipment will be utilized or substituted from the Offshore NEXRAD System Common Support Equipment List and the Offshore NEXRAD System Peculiar Support Equipment List as applicable.

ACW-200 will use software to analyze test data in order to determine the NEXRAD Inherent Availability (Ai), Mean Time Between Failures (MTBF), Mean Time Between Critical Failure (MTBCF) and Mean Time To Repair (MTTR) during the Phase I test interval.

4.4 TEST OBJECTIVES.

Phase I testing at Kauai, HI, addresses the following:

a. Verify conformance to single-channel NEXRAD systems, including weather product verification compared to an operational single-channel system.

b. Verify performance of the redundant configuration features such as, switching of channels, performance of redundant configuration specific items, and simultaneous operation of channels.

c. Test the FAA redundant configuration per 1810.4B and NAS-SS-1000 requirements (interpolated from 1-month test period).

1. Reliability, Maintainability, and Availability,

2. Degraded Operations and operational utilization scenarios,

3. Safety, Security and Site Adaptation Data,

4. Other criteria defined in the VRTM in appendix A.

In the area of "Degraded Operations and operational utilization scenarios," our test objective is to measure the performance of the Offshore NEXRAD system using normal operational stimuli, such as channel changes or simulated equipment failures, to introduce degraded operations.

For Safety, our test objective is to ensure that the Offshore NEXRAD system is in compliance with FAA Order 3900.19A and any applicable Region or local standards.

Security testing objective is to ensure that the Offshore NEXRAD system meets physical and electronic security requirements in accordance with FAA Orders 1600.46, 1600.54B, 1650.7B, and any applicable Region or local standards.

Figure 4.4-1 is a block diagram of the Test and Evaluation Program Flow Diagram. This diagram outlines the events necessary to perform Phase I OT&E Integration and OT&E Operational testing at Kauai, HI.

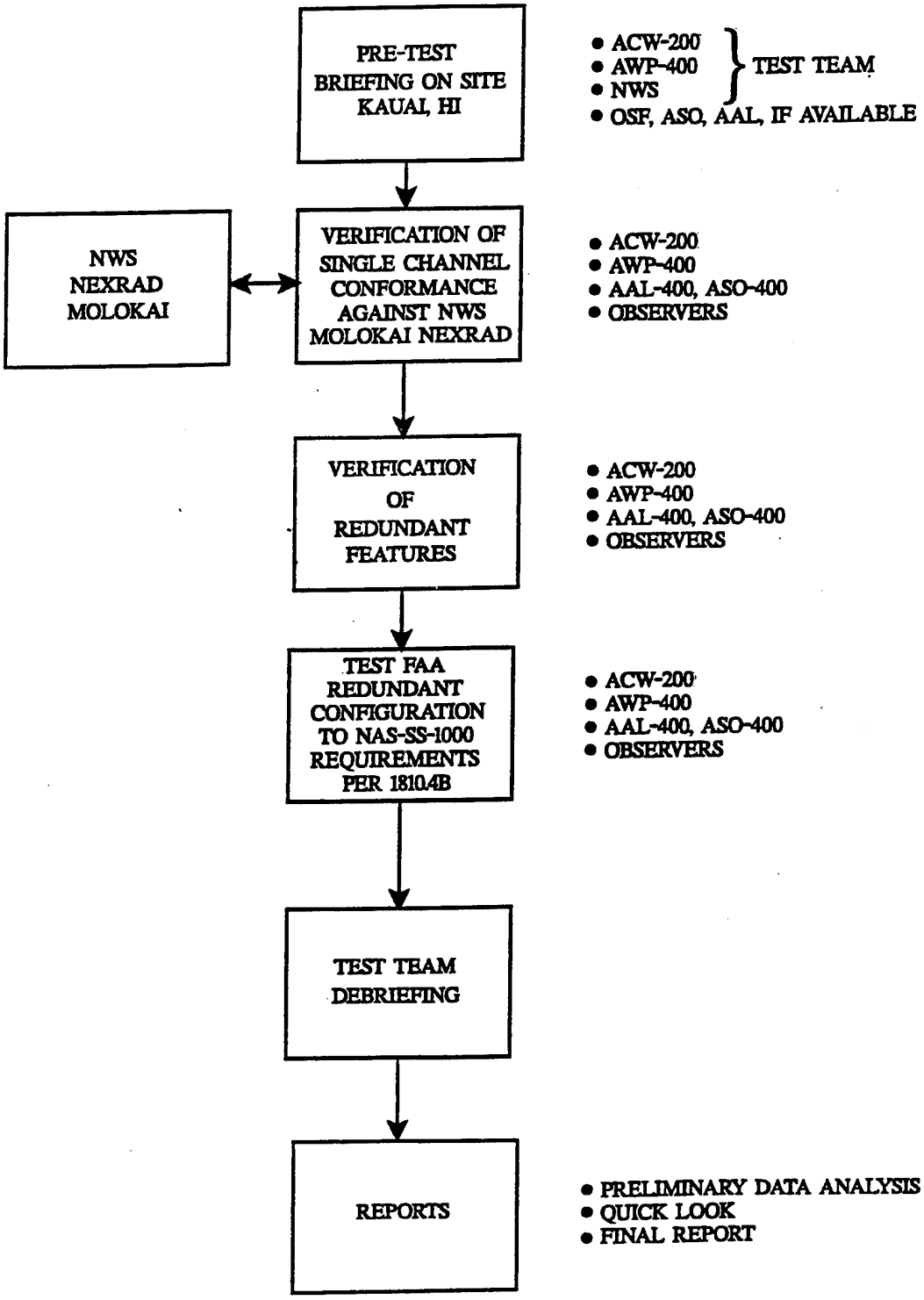

FIGURE 4.4-1. TEST AND EVALUATION PROGRAM FLOW DIAGRAM

5. TEST MANAGEMENT.

5.1 ORGANIZATION ROLES AND RESPONSIBILITIES.

5.1.1 Program Manager for Weather Radar

The Program Manager (PM) for Weather Radar (ANR-500) is responsible for the overall management of the Offshore NEXRAD program from acquisition and implementation through the Operational Readiness Demonstration (ORD).

The Program Office is supported by the following Associate Program Managers (APM):

1. APM for Engineering (APME)
2. APM for Logistics (APML)
3. APM for Maintenance (APMM)
4. APM for Requirements (APMR)
5. APM for System Engineering (APMSE)
6. APM for Test (APMT)

5.1.2 Weather Radar Division Manager.

The NEXRAD JSPO is responsible to the Weather Division Manager, ANR-900, with regard to requirements for design, production testing, and delivery. ANR-900 will also act as the Agency Test and Acceptance Coordinator.

5.1.3 Test Policy Review Committee (TPRC).

The Chairperson of the TPRC will support Test and Evaluation (T&E) policy, test standards, and definitions. The TPRC is responsible for approving the Test and Evaluation Master Plan (TEMP) and revisions to the TEMP, as well as approving test policy waivers, and resolving disagreements on T&E issues when agreements cannot be reached at lower levels of FAA Management.

5.1.4 Associate Program Manager for Test (APMT).

The APMT is from the Weather Branch, ACW-200, located at the FAA Technical Center. It is the PM's and APMT's responsibility to develop a TPRC approved Offshore NEXRAD TEMP.

Additionally, the APMT will be responsible for conducting overall OT&E activities and specifically the OT&E Test Plans which are a subset of OT&E testing. For these tests, ACW-200 will prepare test plans, test procedures, and test reports in accordance with FAA Order 1810.4B.

The APMT will also be responsible for tracking and ensuring the resolution of program trouble reports resulting from the test efforts.

5.1.5 Other Participating Organizations.

5.1.5.1 Joint System Program Office (JSPO).

JSPO has been responsible for the overall Developmental Test & Evaluation (DT&E) and Production Acceptance Test & Evaluation (PAT&E) of the Offshore NEXRAD system. JSPO Acceptance will be responsible to perform acceptance testing of Offshore NEXRAD system for each FAA site.

5.1.5.2 UNISYS Corporation Testing Role.

The contractor will be responsible for the planning, conduct, and analysis of all contractually required testing in accordance with the Statement Of Work (SOW) and the Contract. UNISYS Corporation is the contractor for the redundant configuration feature.

5.1.6 Test Plan Working Group (TPWG).

The APMT has formed a Test Plan Working Group (TPWG) consisting of all participating agencies. The TPWG members will commit resources and participate in the overall testing. The TPWG will also review and discuss the Offshore NEXRAD test issues and activities in order to insure proper integration, function, and suitability of the system into the NAS.

5.1.7 Test Conduct Team.

The test conduct team will consist of personnel from the TPWG. Trained meteorologists from the NWS are also required to interpret NEXRAD weather data. Also, participation from the Operational Support Facility (OSF) and other applicable agencies is encouraged, to familiarize users and support personnel with the Offshore NEXRAD system.

5.2 TRAINING.

Currently, DOD, NWS, and FAA personnel are trained in the operation of single-channel NEXRAD systems at the Keesler Air Force Base, Mississippi. The training manuals which explain operation and maintenance of the redundant configuration are not formalized and are currently not available. Operators and technicians therefore, will be inexperienced in the operation and maintenance of an FAA redundant configuration.

Training prior to the test will be required. Before the start of OT&E testing, redundancy system familiarization training will be conducted by Unisys Corp. Personnel to receive training include

OT&E Integration and Operational and OT&E Shakedown test team members, HIP Sector Systems Specialists supporting OT&E testing as well as test monitors and observers from the Southern and Alaskan Regions.

In addition, training of FAA Technical Center OT&E Integration and Operational test personnel will also encompass various self learning processes in preparation for testing the Offshore NEXRAD.

Reading of technically related NEXRAD literature will be the basic and chief medium of gaining additional familiarization with the system. The various forms of informational reading will include: NAS publications related to NEXRAD, single-channel NEXRAD operation and maintenance instructions, NEXRAD Technical Requirements (NTR), JSPO NEXRAD Test Plans and Reports, FAA Headquarters generated documents and other FAA orders.

The meteorologist required from the NWS must be familiar with interpreting NEXRAD weather data. This will require the interpretation of two sets of NEXRAD base products from sites that are not collocated.

5.3 SYSTEM CONFIGURATION MANAGEMENT.

JSPO is responsible for Configuration Management (CM) of the Offshore NEXRAD as delivered. OSF will assume CM responsibility of fielded systems. A Physical Configuration Audit (PCA) and Functional Configuration Audit (FCA) have been performed on the FAA redundant configuration.

5.3.1 Testbed Configuration.

A testbed was used for DT&E testing of both the FAA and NWS redundant configurations at the UNISYS facility in Bloomfield, CT. Phase I OT&E testing will be performed at the actual test site at Kauai, HI.

5.4 TEST READINESS CRITERIA.

The organizations defined in sections 5.1.1 to 5.1.5 must fulfill their respective responsibilities in order to provide an operational site which can be tested. The TPWG and the test team must coordinate the sequence of test events, in advance, so that all participants understand their roles. Upon completing a successful acceptance test by JSPO Acceptance, the Kauai site will be ready for Phase I OT&E Integration and OT&E Operational testing.

5.5 TEST EXECUTION.

Figure 4.4-1 defines the Test and Evaluation Program Flow Diagram including pretest and post-test briefings. The test types are listed in section 4.4 and specific details of each test will be

defined in the Offshore NEXRAD Phase I OT&E Integration and OT&E Operational Test Procedures. During OT&E testing, criteria for proceeding with a test will depend on the extent to which the test will simulate the actual operation in the NAS environment. At the time of this writing, some technical information specific to the FAA redundant configuration has not been finalized.

5.6 TEST COMPLETION CRITERIA.

Test completion criteria will vary and contain quantitative and qualitative information in nature depending on the specific test. For example, verifying conformance to a single-channel NEXRAD may contain pass/fail data while other tests contain minimum and/or maximum values for the test result. Also, some tests such as the access time to products upon channel switching will contain only a numerical value. The intent of the test in this case will be to establish a baseline to inform the users of limitations to the system that occur under various conditions. Details of each test and the performance parameters that indicate a successful or unsuccessful result are defined in the Offshore NEXRAD Phase I OT&E Integration and OT&E Operational Test Procedures.

5.7 TEST REPORTS.

Fifteen days after the conclusion of testing a Quick Look Report will be published by the APMT which will summarize the test results. A Final Report with more detailed information will be published 60 days after the completion of testing. Reports will be distributed according to FAA Order 1810.4B guidelines.

5.8 SYSTEM/OPERATIONAL DEFICIENCY REPORTS.

A NEXRAD Service Report shall be generated for each system/ operational deficiency that is encountered during test. The service report shall provide necessary information to sufficiently document the problem. An example trouble report will be contained in the Offshore NEXRAD Phase I OT&E Integration and OT&E Operational Test Procedures.

5.9 TEST SCHEDULE.

An Offshore NEXRAD Integrated Test Schedule is contained in appendix B. The schedule details all information known at the time regarding deployment and test activity. Test information will be defined upon further availability.

5.9.1 Planning Considerations and Limitations.

Several factors affect the overall accuracy and effectiveness of the testing. Inadequate test time to evaluate system Reliability, Maintainability and Availability reduces the confidence level in the generated MTBF, MTBCF, and MTTR. The proximity of testing,

scheduling, and coordination will affect system testing. Adequate logistics and technical support is necessary for a successful test. Test waivers will have to be obtained, if required. Any items requiring retest will have to be rescheduled for test. The test site is in Kauai, HI, and may not reveal environmental system deficiencies or operational problems that occur in the Alaskan or Caribbean regions.

5.10 PERSONNEL RESOURCE REQUIREMENTS.

Due to limited information at this time, only an estimate of test personnel requirements can be presented. Personnel requirements are as follows:

Position	No. of Personnel*	Location*
APMT ACW-200	1	PUP/UCP/ radar site** FAA Technical Center
Test Director (ACW-200)	1	PUP/UCP/ radar site**
NEXRAD Meteorologist (NWS)	1-2	PUP
NEXRAD Technicians	2-4	PUP radar site**
Other Support Personnel such as Test Monitors/Operators, PUP/UCP Operators, etc.	4-8	PUP/UCP/ radar site**

*Personnel requirements will vary depending on the specific test, which PUP is used for the test (associated or dial-up) and if the UCP is required for the test.

**Location and/or number of these personnel will vary depending on the specific test being executed.

6. ACRONYMS AND ABBREVIATIONS.

ACW-200	Weather/Primary Radar Division
AF	Airway Facilities
AFOTEC	Air Force Operational Test and Evaluation Center
Ai	Inherent Availability
ANR-500	Weather Radar Program Office
ANR-900	Weather Radar Division
APM	Associate Program Manager
APME	Associate Program Manager for Engineering
APML	Associate Program Manager for Logistics
APMM	Associate Program Manager for Maintenance
APMR	Associate Program Manager for Requirements
APMSE	Associate Program Manager for System Engineering
APMT	Associate Program Manager for Test
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCT	Air Traffic Control Tower
AWP	Western Pacific Region
CERAP	Combined Center/Radar Approach Control
CM	Configuration Management
COI	Critical Operational Issue
CONUS	Continental United States
CWSU	Central Weather Service Unit
DOC	Department of Commerce
DOD	Department Of Defense
DOT	Department of Transportation
DRR	Deployment Readiness Review
DT&E	Development Test and Evaluation
FAA	Federal Aviation Administration
FAATC	FAA Technical Center
FCA	Functional Configuration Audit
INCO	INstallation and CheckOut
JSPO	Joint System Program Office
LRU	Line Replaceable Unit

MDT	Maintenance Data Terminal
MPS	Maintenance Processor Subsystem
MTBF	Mean Time Between Failures
MTBCF	Mean Time Between Critical Failures
MTTR	Mean Time To Repair
NAS	National Airspace System
NEXRAD	Next Generation Weather Radar
NOAA	National Oceanic and Atmospheric Administration
NTR	NEXRAD Technical Requirements
NWS	National Weather Service
ORD	Operational Readiness Demonstration
OSF	Operational Support Facility
OT&E	Operational Test and Evaluation
PAT&E	Production Acceptance Test and Evaluation
PCA	Physical Configuration Audit
PM	Program Manager
PUP	Principal User Processor
RDA	Radar Data Acquisition
RADASOT	Radar Data Acquisition Software Operational Test
RMMS	Remote Maintenance Monitor Subsystem
RMS	Remote Monitoring Subsystem
RPG	Radar Product Generator
SAT	Site Acceptance Testing
SCC	System Command Center
SOW	Statement Of Work
T&E	Test and Evaluation
TBD	To Be Determined
TEMP	Test and Evaluation Master Plan
TPRC	Test Policy Review Committee
TPWG	Test Plan Working Group
TRACON	Terminal Radar Control
TRR	Test Readiness Review

UCP	Unit Control Position
UTC	Universal Time Coordinated
VRTM	Verification Requirements Traceability Matrix
WARP	Weather And Radar Processor

APPENDIX A

OFFSHORE NEXRAD TEST AND EVALUATION MASTER PLAN (TEMP)

VERIFICATION REQUIREMENTS TRACEABILITY MATRIX PLAN (VRTM)

OFFSHORE NEXRAD TEST AND EVALUATION MASTER PLAN (TEMP)
VERIFICATION REQUIREMENTS TRACEABILITY MATRIX (VRTM)

NEXRAD NAS-SS-1000 REQUIREMENTS							
COI	REQ.#	VOL.III PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL			REMARKS
				OT&E(I)	OT&E(O)	OT&E(S)	
	3001a	3.2.1.2.4.1.1.a	Identify the presence of Wind and Wind Shear	X	X	X	NOTE 1
	3001b	3.2.1.2.4.1.1.b	Identify the presence of Turbulence	X	X	X	NOTE 1
	3001c	3.2.1.2.4.1.1.c	Identify the presence of Mesocyclones	X	X	X	NOTE 1
	3001d	3.2.1.2.4.1.1.d	Identify the presence of Precipitation	X	X	X	NOTE 1
	3001e	3.2.1.2.4.1.1.e	Identify the presence of Hail	X	X	X	NOTE 1
	3001f	3.2.1.2.4.1.1.f	Identify the presence of Tornadoes	X	X	X	NOTE 1
	3002a	3.2.1.2.4.1.2.a	Measure wind velocities and portray estimates of turbulence intensity	X	X	X	NOTE 1
	3002b	3.2.1.2.4.1.2.b	Measure wind velocities and portray estimates of precipitation intensity	X	X	X	NOTE 1
	3003a	3.2.1.2.4.1.3.a	Analyze return radar signals to determine type of weather phenomena	X	X	X	NOTE 1
	3003b	3.2.1.2.4.1.3.b	Analyze return radar signals to determine location of weather phenomena	X	X	X	NOTE 1
	3003c	3.2.1.2.4.1.3.c	Analyze return radar signals to determine velocity of weather phenomena	X	X	X	NOTE 1

COI = Critical Operational IssueVerification Methods: T=Test D=Demonstration A=Analysis I=Inspection X=Not Applicable Q=Deferred

NEXRAD NAS-SS-1000 REQUIREMENTS							
COI	REQ.#	VOL.III PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL			REMARKS
				OT&E(I)	OT&E(O)	OT&E(S)	
	3003d	3.2.1.2.4.1.3.d	Analyze return radar signals to determine severity of weather phenomena	X	X	X	NOTE 1
	3003e	3.2.1.2.4.1.3.e	Analyze return radar signals to determine forecast movement of weather phenomena	X	X	X	NOTE 1
	3004a	3.2.1.2.4.1.4.a	Generate reflectivity maps providing echo-intensity data	X	X	X	NOTE 1
	3004b	3.2.1.2.4.1.4.b	Generate maps providing mean radial velocity data	X	X	X	NOTE 1
	3004c	3.2.1.2.4.1.4.c	Generate maps providing radial velocity spectrum width data	X	X	X	NOTE 1
	3004d	3.2.1.2.4.1.4.d	Generate maps providing turbulence intensity data	X	X	X	NOTE 1
	3004e	3.2.1.2.4.1.4.e	Generate maps providing storm structure and tracking information	X	X	X	NOTE 1
	3004f	3.2.1.2.4.1.4.f	Generate data providing precipitation rate and accumulation products	X	X	X	NOTE 1
	3004g	3.2.1.2.4.1.4.g	Generate maps providing combined shear data	X	X	X	NOTE 1
	3004h	3.2.1.2.4.1.4.h	Generate maps and messages providing severe weather data	X	X	X	NOTE 1
X	3005a	3.2.1.2.4.1.5a	Disseminate weather products to the WARP routinely and upon request	Q	Q	X	NOTE 3

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NEXRAD NAS-SS-1000 REQUIREMENTS							
COI	REQ.#	VOL.III PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL			REMARKS
				OT&E(I)	OT&E(O)	OT&E(S)	
	3005b	3.2.1.2.4.1.5b	Disseminate weather products to NOAA, DOD, and vendors	Q	Q	X	NOTE 3
X	3005c	3.2.1.2.4.1.5c	Disseminate maintenance data to the MPS	Q	Q	Q	NOTE 5
	3006	3.2.1.2.4.1.6	Supply operational status	X	D	D	
	3007a	3.2.1.2.4.1.7a	Accept operational control commands from the unit controller	X	D	D	
	3007b	3.2.1.2.4.1.7b	Accept operational control commands from the RMS	Q	Q	Q	NOTE 5
	3007c	3.2.1.2.4.1.7c	Process operational control commands from the unit controller	X	D	D	
	3007d	3.2.1.2.4.1.7d	Process operational control commands from RMS	Q	Q	Q	NOTE 5
X	3008	3.2.1.2.4.1.8	Implement the RMS functional characteristics	Q	Q	Q	NOTE 5
	3009a	3.2.1.2.4.1.9a	Receive timing synchronized to Universal Time Coordinated (UTC) to support system recording	D	D	D	
	3009b	3.2.1.2.4.1.9b	Receive timing synchronized to (UTC) to support system distribution of products	D	D	D	
	3009c	3.2.1.2.4.1.9c	Maintain timing synchronized to UTC to support system recording	D	D	D	
	3009d	3.2.1.2.4.1.9d	Receive and maintain timing synchronized to UTC to support system maintenance	D	D	D	

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COI	REQ.#	VOL.III PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL			REMARKS
				OT&E(I)	OT&E(O)	OT&E(S)	
	3009e	3.2.1.2.4.1.9e	Maintain timing synchronized to UTC to support system distribution of products	D	D	D	
	3010	3.2.1.2.4.2.1	Detect weather phenomena between zero and 360° in azimuth, from -1 to 45° in elevation, and over an unambiguous range of 1 to 460 kilometers	X	T,A	X	NOTE 2
	3011	3.2.1.2.4.2.2	Provide a minimum detection capability of at least 0 dB signal to noise ratio for a -8 dBz target at 50 km	X	T,A	X	NOTE 2
	3012	3.2.1.2.4.2.3	Provide ground clutter suppression capability of 50dB for a mean radial velocity and spectrum width of 4 meters per second or greater	X	T,A	X	NOTE 2
	3013a	3.2.1.2.4.2.4.a	Provide weather data continuously while operating under 14 elevation scans from 0 to 20° scan time of 5 minutes (storm mode)	X	T,A	I	
	3013b	3.2.1.2.4.2.4.b	Provide weather data continuously while operating under 9 elevation scans from 0 to 20° in a volume scan time of 6 minutes (computer sizing mode)	X	T,A	I	
	3013c	3.2.1.2.4.2.4.c	Provide weather data continuously while operating under 5 elevation scans from 0 to 5° in a volume scan time of 10 minutes (clear air mode)	X	T	I	
	3014	3.2.1.2.4.2.5	Achieve a maximum throughput time of TBD minutes for any product	Q	Q	Q	
	3015	3.2.1.2.4.2.6	Operates within the 2.7 gigahertz (GHz) to 3.0 GHz frequency bandwidth	X	I	I	

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NEXRAD NAS-SS-1000 REQUIREMENTS							
COI	REQ.#	VOL.III PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL			REMARKS
				OT&E(I)	OT&E(O)	OT&E(S)	
	3016a	3.2.1.2.4.2.7a	Accept a maximum of 3 requests per second for weather products	X	T	T	
	3016b	3.2.1.2.4.2.7b	Respond within 3.0 seconds after receipt of the request for weather products	X	T	T	
	3017	3.2.1.2.4.2.8	Generate an alarm/alert within 5.0 seconds from detection of an alarm condition	X	T	T	
X	3018	3.2.1.2.4.2.9	Disseminate data to (maximum); 6 WARPs, 1 MPS, 3 NWS/DOD, and 3 vendors	Q	Q	Q	NOTE 3
X	3019	3.2.1.2.4.2.10	Meets maintenance monitoring performance characteristics	Q	Q	Q	NOTE 5
	3020a	3.2.2.1.4.2.11a	Categorize weather data into 6 levels of intensity: Level 1: 18=< dBz< 30 Level 2: 30=< dBz< 41 Level 3: 41=< dBz< 46 Level 4: 46=< dBz< 50 Level 5: 50=< dBz< 57 Level 6: dBz=> 57	X	T,A	X	NOTE 2
	3020b	3.1.2.1.4.2.11b	Data shall not be displayed for dBz values less than 18	X	T,A	X	NOTE 2
	3021	3.2.1.2.4.3-1.A	Interface functionally and physically as shown in figure 3.2.1.2.4.3-1 NEXRAD DOD	Q	Q	Q	Figure shown on NAS-SS-1000 Vol III Page 101, NOTE 3

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NEXRAD NAS-SS-1000 REQUIREMENTS							
COI	REQ.#	VOL.III PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL			REMARKS
				OT&E(I)	OT&E(O)	OT&E(S)	
X	3022b	3.2.1.2.4.3-1.B	Interface functionally and physically as shown in figure 3.2.1.2.4.3-1 MPS NEXRAD	Q	Q	Q	NOTE 3
X	3022c	3.2.1.2.4.3-1.C	Interface functionally and physically as shown in figure 3.2.1.2.4.3-1 NEXRAD MPS	Q	Q	Q	NOTE 3
	3022d	3.2.1.2.4.3-1.D	Interface functionally and physically as shown in figure 3.2.1.2.4.3-1 NEXRAD NOAA	Q	Q	Q	NOTE 3
X	3022e	3.2.1.2.4.3-1.E	Interface functionally and physically as shown in figure 3.2.1.2.4.3-1 NEXRAD WARP	Q	Q	Q	NOTE 3
X	3022f	3.2.1.2.4.3-1.F	Interface functionally and physically as shown in figure 3.2.1.2.4.3-1 WARP NEXRAD	Q	Q	Q	NOTE 3
	3022g	3.2.1.2.4.3-1.G	Interface functionally and physically as shown in figure 3.2.1.2.4.3-1 NEXRAD VENDOR	Q	Q	Q	NOTE 3
X	3023a	3.2.2.1-1a	NEXRAD Ai Requirement 0.99987616	X	T	T	NOTE 4
X	3023b	3.2.2.1-1b	NEXRAD MTBF Requirement 4037 hours	X	T	T	NOTE 4
X	3023c	3.2.2.1-1c	NEXRAD MTTR Requirement 0.5 hours	X	T	T	NOTE 4

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NEXRAD
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COI.	REQ. #	VOL. V PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL				REMARKS
				DT&E	OT&E(O)	OT&E(I)	OT&E(S)	
	5001a	3.2.1.1.1.1.1a	An RMS shall collect subsystem key performance parameters in real time by use of hardware sensors, software sensors, or both from the subsystem of which it is an inherent part	D	X	D	X	NOTE 5
	5001d	3.2.1.1.1.1.1d	The RMS shall collect self-test and monitoring information on the status, performance, and use of its own hardware and software for inclusion as part of the key performance or diagnostic performance parameters or both and make this data available to the MPS upon request	D	X	D	X	NOTE 5
	5001e	3.2.1.1.1.1.1e	The RMS shall collect operating status and performance data that includes configuration and mode of operation from each subsystem within the subsystem of which it is inherent part	D	X	D	X	NOTE 5
	5001f	3.2.1.1.1.1.1f	When directed by the MPS or MDT, the RMS shall initiate diagnostic routines, then collect the results for transfer to the location specified by the requestor	D	X	D	X	NOTE 5
	5002a	3.2.1.1.1.1.3a	The RMS shall receive and recognize valid commands from either the MPS or the MDT including those to activate the functions given in 3.2.1.1.1.1.2.3	X	X	D	D	NOTE 5
	5003a	3.2.1.1.1.1.4a	The RMS shall perform all collection functions including monitoring performance data, configuration data, and incoming requests at sampling rates which allow the system to detect changes commensurate with allocated RMS performance requirements	D	X	D	X	NOTE 5

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NEXRAD NAS-SS-1000 REQUIREMENTS								
COI.	REQ. #	VOL. V PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL				REMARKS
				DT&E	OT&E(O)	OT&E(I)	OT&E(S)	
	5003b	3.2.1.1.1.1.4b	The RMS shall accept general messages and requests for data from either an MPS or an MDT	D	X	D	X	NOTE 5
	5004a	3.2.1.1.1.2.1a	Compare the measured values of the performance parameters of the subsystem with up to two sets of stored thresholds-one set defining the ideal operating range representing the best possible conditions and one set defining the acceptable operating range representing the minimum permissible conditions-and determine within which range the parameters reside. Each range will be defined by up to two values to include an upper and a lower limit	D	X	D	X	NOTE 5
	5004b	3.2.1.1.1.2.1b	Filter or average the performance parameters to prevent the declaration of alarms due to transient conditions	D	X	D	X	NOTE 5
	5004c	3.2.1.1.1.2.1c	Generate an alarm when a key performance parameter value is outside the acceptable operating range	D	X	D	X	NOTE 5
	5004d	3.2.1.1.1.2.1d	Generate an alert when a key performance value is outside the ideal operating range but inside the acceptable range	D	X	D	X	NOTE 5
	5004e	3.2.1.1.1.2.1e	In the event of simultaneous multiple alarm conditions all alarms are stored in the RMS, and the RMS shall forward for transmission to the active interface all alarms on a first-in, first-out basis	D	X	D	X	NOTE 5

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NEXRAD NAS-SS-1000 REQUIREMENTS								
COI.	REQ. #	VOL. V PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL				REMARKS
				DT&E	OT&E(O)	OT&E(I)	OT&E(S)	
	5004f	3.2.1.1.1.1.2.1f	Monitor and check each and every key performance parameter value for an alarm or an alert condition at least once during each general status cycle. A general status cycle consists of collecting and evaluating all data necessary to determine the health of the system and reporting the results (e.g. alarms, alerts, or sys okay) to the RMS/MPS interface or the RMS/MDT interface or both as required by the communications mode in effect. The time period in which the general status cycle must be completed shall be programmable from five seconds to 60 seconds in increments of 5 seconds or less	D	I	D	D	NOTE 5
	5004g	3.2.1.1.1.1.2.1g	Monitor and check each and every key performance parameter value, detect any changes in value, and report the changed values to the RMS/MPS interface or the RMS/MDT interface or both as required by the communications mode in effect. The time period in which the general status cycle must be completed shall be programmable from 10 seconds to 2 minutes in increments of 10 seconds or less	D	I	D	D	NOTE 5
	5004h	3.2.1.1.1.1.2.1h	Generate a general status message and a key performance parameter message at times which depend on the individual cycle time defined above	D	X	D	X	NOTE 5
	5004i	3.2.1.1.1.1.2.1i	Generate a RTN message when a parameter causing an alarm or alert condition returns to its ideal operating range	D	X	D	X	NOTE 5
	5004j	3.2.1.1.1.1.2.1j	Determine if a monitored data point, status, or condition has changed between the sampling of parameter values and generate a state change message if the state has changed	D	X	D	X	NOTE 5
	5004k	3.2.1.1.1.1.2.1k	Initiate a diagnostic test of a subsystem, which includes fault isolation, in response to appropriate MPS or MDT command;bt	D	X	D	X	NOTE 5

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NEXRAD
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COI.	REQ. #	VOL. V PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL				REMARKS
				DT&E	OT&E(O)	OT&E(I)	OT&E(S)	
	5004l	3.2.1.1.1.1.2.1l	Initiate a fault recovery routine if an alarm or alert is generated.	D	X	D	X	NOTE 5
	5006a	3.2.1.1.1.1.2.3a	Upon receipt of a valid command from either the MPS or the MDT, the RMS shall execute the control command	X	I	D	D	NOTE 5
	5006b	3.2.1.1.1.1.2.3b	Upon receipt of a valid command from either an MDT or an MPS, the RMS shall change the current operating mode or configuration of a subsystem to the operating mode or configuration requested	X	I	D	D	NOTE 5
	5006c	3.2.1.1.1.1.2.3c	Upon receipt of a valid command from either an MDT or an MPS, the RMS shall adjust the subsystem parameter as requested	X	I	D	D	NOTE 5
	5006d	3.2.1.1.1.1.2.3d	Upon receipt of a valid command from either an MDT or an MPS, the RMS shall reset a subsystem or a part of a subsystem	X	I	D	D	NOTE 5
	5006f	3.2.1.1.1.1.2.3f	Upon receipt of a valid command from either an MDT or an MPS, the RMS shall change the requested threshold values of the parameters being monitored.	X	I	D	D	NOTE 5
	5006i	3.2.1.1.1.1.2.3i	Upon disconnect of an on-site MDT, the RMS shall automatically return to the remote communication mode with the MPS	X	I	D	D	NOTE 5
	5007b	3.2.1.1.1.1.2.4b	Compare filtered key performance parameter values with the two sets of threshold values as part of each General Status Cycle to determine if an alarm or alert condition has occurred. One set of threshold values is for alarm condition determination while the other set of thresholds is for alert condition determination	D	X	D	X	NOTE 5

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NEXRAD
NAS-SS-1000 REQUIREMENTS

COI.	REQ. #	VOL. V PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL				REMARKS
				DT&E	OT&E(O)	OT&E(I)	OT&E(S)	
	5007c	3.2.1.1.1.1.2.4c	Generate a report containing parameter values in response to a data request	D	X	D	X	NOTE 5
	5007d	3.2.1.1.1.1.2.4d	Generate a report containing alarm and alert condition in response to a subsystem status request	D	X	D	X	NOTE 5
	5007e	3.2.1.1.1.1.2.4e	Generate a maintenance data message containing information requested by either an MDT or an MPS	D	X	D	X	NOTE 5
	5007f	3.2.1.1.1.1.2.4f	Provide a date in the form of month/day/year and UTC in the form of hours/minutes/seconds on each message and report	D	X	D	X	NOTE 5
	5007h	3.2.1.1.1.1.2.4h	Generate the appropriate response to all commands	D	X	D	X	NOTE 5
	5007i	3.2.1.1.1.1.2.4i	The RMS shall make available all command responses to the MPS or the MDT or both depending upon the nature of the request	D	X	D	X	NOTE 5
	5007j	3.2.1.1.1.1.2.4j	The RMS shall prepare all messages for transmission in the appropriate protocol	D	X	D	X	NOTE 5
	5007k	3.2.1.1.1.1.2.4k	The RMS shall convert sensor input information into values directly related to engineering units such that no scaling other than decimal placement shall be required of the receiving MPS or MDT	D	X	D	X	NOTE 5
	5008a	3.2.1.1.1.1.3.1a	The RMS shall store all detected alarms and alerts until such alarm or alert condition no longer exists	D	X	D	X	NOTE 5

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NEXRAD
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COI.	REQ. #	VOL. V PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL				REMARKS
				DT&E	OT&E(O)	OT&E(I)	OT&E(S)	
	5008b	3.2.1.1.1.1.3.1b	The RMS shall be able to store key performance parameter values, diagnostic results, and operating mode data in temporary storage in preparation for transferring said information to the MPS	D	X	D	X	NOTE 5
	5008d	3.2.1.1.1.1.3.1d	The RMS shall store two sets of threshold values (each set to include: an upper limit, a lower limit, or both) with one set for alarm thresholds and one set for alert thresholds in nonvolatile storage	D	X	D	X	NOTE 5
	5008e	3.2.1.1.1.1.3.1e	The RMS shall store general programs needed for filtering data, formatting messages, encoding messages, converting data, and addressing messages in nonvolatile storage	D	X	D	X	NOTE 5
	5008f	3.2.1.1.1.1.3.1f	The RMS shall store cycle time intervals for each of the cycles required by 3.2.1.1.1.1.2.1f	D	X	D	X	NOTE 5
	5008g	3.2.1.1.1.1.3.1g	The RMS shall maintain records of the value of each monitored parameter, periodically updating each record	D	X	D	X	NOTE 5
	5009a	3.2.1.1.1.1.3.3a	The RMS shall store information needed to decode control and adjustment commands for that RMS	D	X	D	X	NOTE 5
	5009b	3.2.1.1.1.1.3.2b	The RMS shall store the initialization data needed to initialize the subsystem including all site dependent parameters in non-volatile memory.	D	X	D	X	NOTE 5
	5010a	3.2.1.1.1.1.3.4a	The RMS shall store only filtered key performance parameter values obtained through monitoring	D	X	D	X	NOTE 5
	5010b	3.2.1.1.1.1.3.4b	The RMS shall store alarm and alert threshold values, initialization tables, data required for interpreting addressing, and control and adjustment message function codes in non volatile storage	D	X	D	X	NOTE 5

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NEXRAD NAS-SS-1000 REQUIREMENTS								
COI.	REQ. #	VOL. V PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL				REMARKS
				DT&E	OT&E(O)	OT&E(I)	OT&E(S)	
	5010c	3.2.1.1.1.1.3.4c	The RMS shall update stored performance parameter values and status data at least once during the general status cycle time interval, only keeping the most current equipment performance data	D	X	D	X	NOTE 5
	5010d	3.2.1.1.1.1.3.4d	The RMS shall store, in non-volatile memory, the data necessary for interpreting a message function code (the code within a message used by the RMS to determine the type of message)	D	X	D	X	NOTE 5
	5010e	3.2.1.1.1.1.3.4e	The RMS shall retrieve maintenance data stored in the RMS and deliver it to the requesting unit upon receipt of a valid command	D	X	D	X	NOTE 5
	5011a	3.2.1.1.1.1.4.1a	The RMS shall transfer collected subsystem performance data and status messages to the MDT and MPS upon request	D	X	D	D	NOTE 5
	5011b	3.2.1.1.1.1.4.1b	The RMS shall transfer performance parameter data as a data report to the MPS upon at a specified interval defined as the key performance parameter cycle time interval	D	X	D	D	NOTE 5
	5011c	3.2.1.1.1.1.4.1c	At a specified interval defined as the general status cycle time interval, the RMS shall transfer general status information consisting of a subsystem identifier, a date and time-stamp, and an indication that the subsystem is either 1) in an alarm condition (red status), 2) in an alert condition (yellow status), or 3) operating properly (green status)	D	X	D	D	NOTE 5
	5011d	3.2.1.1.1.1.4.1d	The RMS shall transfer a state change message when such a change is determined and requires MPS notification. If appropriate, this message includes information indicating a specialist has logged on or off the RMS via an MDT	D	X	D	D	NOTE 5

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NEXRAD
NAS-SS-1000 REQUIREMENTS

COI.	REQ. #	VOL. V PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL				REMARKS
				DT&E	OT&E(O)	OT&E(I)	OT&E(S)	
	5011e	3.2.1.1.1.1.4.1e	The RMS shall transfer the diagnostic performance parameter values to either the MDT or the MPS when requested. This request does not imply MPS control	D	X	D	D	NOTE 5
	5011f	3.2.1.1.1.1.4.1f	If an alarm or an alert condition is detected, the RMS shall transfer the appropriate alarm or alert message containing measured parameter values to the MPS once	D	X	D	D	NOTE 5
	5013a	3.2.1.1.1.1.4.3a	The RMS shall transfer a message indicating a state change whether the change is due to an automatic process or a command	D	X	D	D	NOTE 5
	5013b	3.2.1.1.1.1.4.3b	Upon receipt of an invalid command, the RMS shall transfer a message indicating that the received command is invalid to the source of the input	D	X	D	D	NOTE 5
	5014b	3.2.1.1.1.1.4.4b	The RMS shall transmit data in response to a valid request from the MPS and the MDT	D	X	D	D	NOTE 5
	5015b	3.2.1.1.1.3b	No RMS function shall interfere with other functions of the RMS or the subsystem of which it is a part	X	D	D	D	NOTE 5
	5016a	3.2.1.1.3.1.1.1a	The MDT shall collect key performance parameter values, diagnostic performance parameter values, status messages, alarm messages, and alert messages from the RMS either directly or through the MPS	D	X	D	X	NOTE 5
	5016b	3.2.1.1.3.1.1.1b	The MDT at an RMS location shall collect maintenance management information via the RMS for use by the maintenance specialist	D	X	D	X	NOTE 5

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COI.	REQ. #	VOL. V PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL				REMARKS
				DT&E	OT&E(O)	OT&E(I)	OT&E(S)	
	5016c	3.2.1.1.3.1.1.1c	The MDT shall collect the maintenance documents, including manuals and drawings, necessary for the technician to perform corrective and preventative maintenance on a NAS subsystem	D	X	D	X	NOTE 5
	5016d	3.2.1.1.3.1.1.1d	The MDT shall collect data from the MPS via modem	D	X	D	X	NOTE 5
	5017a	3.2.1.1.3.1.1.2a	The MDT shall collect subsystem security data including facility and data access security alarms from the RMS	D	X	D	X	NOTE 5
	5017b	3.2.1.1.3.1.1.2b	The MDT shall collect passwords and user identification codes to pass through the appropriate unit for either MPS or RMS log on from the specialist	X	X	X	X	NOTE 5
	5018	3.2.1.1.3.1.1.3	Control data collection. The MDT shall collect control commands listed in 3.2.1.1.3.1.2.3	D	X	D	X	NOTE 5
	5019	3.2.1.1.3.1.1.4	Automated functions for data collection. The MDT shall collect user messages	D	X	D	X	NOTE 5
	5020a	3.2.1.1.3.1.2.1a	The MDT shall format and display key performance parameter values, diagnostic performance parameter values, status messages, alarm messages, and alert messages from the RMS and the MPS	D	X	D	X	NOTE 5
	5020b	3.2.1.1.3.1.2.1b	The MDT shall display (visual and aural) indications of alarm and alerts to specialists	D	X	D	X	NOTE 5
	5021a	3.2.1.1.3.1.2.2a	The MDT shall interact with the RMS or the MPS eventually to verify a specialist's authorization and permitted access to the RMMS by passing the user entered user identification code and password to the RMS	D	X	D	X	NOTE 5

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COI.	REQ. #	VOL. V PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL				REMARKS
				DT&E	OT&E(O)	OT&E(I)	OT&E(S)	
	5021b	3.2.1.1.3.1.2.2b	The MDT shall initiate a message commanding the RMS to inhibit all alarms generated by a facility or subsystem when in the local control mode	D	X	D	X	NOTE 5
	5022	3.2.1.1.3.1.2.3	Control data processing. The MDT shall translate and encode the following type of requests from the user and prepare each for transfer to the RMS:	X	X	X	X	NOTE 5
	5022a	3.2.1.1.3.1.2.3a	On-off control	X	D	X	X	NOTE 5
	5022b	3.2.1.1.3.1.2.3b	Change mode	X	D	X	X	NOTE 5
	5022c	3.2.1.1.3.1.2.3c	Change configuration	D	X	X	X	NOTE 5
	5022d	3.2.1.1.3.1.2.3d	Adjust subsystem parameter	D	X	X	X	NOTE 5
	5022e	3.2.1.1.3.1.2.3e	Disable and enable alarm or alert reports	D	X	X	X	NOTE 5
	5022f	3.2.1.1.3.1.2.3f	Switch to local or dual mode	D	X	X	X	NOTE 5
	5022g	3.2.1.1.3.1.2.3g	Maintenance data residing in the MPS	X	D	X	X	NOTE 5
	5022h	3.2.1.1.3.1.2.3h	Maintenance documents residing in the MPS and the MDT	X	D	X	X	NOTE 5
	5023a	3.2.1.1.3.1.2.4a	The MDT shall accept alphanumeric data and free-form text, and syntax checks on selected entries for standard formats	D	X	D	X	NOTE 5
	5023b	3.2.1.1.3.1.2.4b	The MDT shall format and display alphanumeric text and graphics	D	X	D	X	NOTE 5

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NEXRAD NAS-SS-1000 REQUIREMENTS								
COI.	REQ. #	VOL. V PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL				REMARKS
				DT&E	OT&E(O)	OT&E(I)	OT&E(S)	
	5023c	3.2.1.1.3.1.2.4c	The MDT shall work with all RMS and MPS application software functions	D	X	D	X	NOTE 5
	5024	3.2.1.1.3.1.3.1	Subsystem performance data storage. The MDT shall retain log entries for later transfer to the MPS in the event that communication between an MDT and an MPS is lost or nonexistent	D	X	D	X	NOTE 5
	5025a	3.2.1.1.3.1.3.3a	The MDT shall retain all control actions taken by the specialist for later transfer to the MPS in the event that communication between an MDT and an MPS is lost or nonexistent	D	X	D	X	NOTE 5
	5025b	3.2.1.1.3.1.3.3b	The MDT shall store the information necessary to perform syntax checks, encode commands, and prepare messages.	D	X	D	X	NOTE 5
	5026a	3.2.1.1.3.1.3.4a	The MDT shall retain software applications which allow the specialist to initiate diagnostic routines, keep maintenance logs, and change parameters at the RMS	D	X	D	X	NOTE 5
	5026b	3.2.1.1.3.1.3.4b	The prepared MDT display (screens) described in software applications shall look and act like those screens contained in the MPS or the MCCP-MMC	D	X	D	X	NOTE 5
	5026c	3.2.1.1.3.1.3.4c	The MDT shall date and time-stamp all log entries in the format YYMMDD (YY - year, MM - month, and DD - day) if storing temporarily	D	X	D	X	NOTE 5
	5026d	3.2.1.1.3.1.3.4d	The MDT shall temporarily store necessary selected sections of maintenance documentation for display to the technician	X	D	X	D	NOTE 5

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NEXRAD
NAS-SS-1000 REQUIREMENTS

COI.	REQ. #	VOL. V PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL				REMARKS
				DT&E	OT&E(O)	OT&E(I)	OT&E(S)	
	5027	3.2.1.1.3.1.4.1	Subsystems performance data transfer. The MDT shall transfer log entries either from storage or directly when entered to the MPS for storage	D	X	D	X	NOTE 5
	5028	3.2.1.1.3.1.4.2	The MDT shall transfer user passwords and identification codes to both the RMS and the MPS.	D	X	D	X	NOTE 5
	5029	3.2.1.1.3.1.4.3	Control data transfer. The MDT shall transfer stored control actions to the MPS including:	X	X	X	X	NOTE 5
	5029a	3.2.1.1.3.1.4.3a	Control actions taken	D	X	D	X	NOTE 5
	5029b	3.2.1.1.3.1.4.3b	Parameter changes	D	X	D	X	NOTE 5
	5029c	3.2.1.1.3.1.4.3c	Configuration changes	D	X	D	X	NOTE 5
	5030	3.2.1.1.3.1.4.4	Automated functions for data transfer. When connected to either an MPS or an RMS, the MDT shall transfer electronic messages from the keyboard to the RMS for pass through to the MPS	X	X	X	X	LEAD-IN, NOTE 5
	5031a	3.2.1.1.3.2.1a	The MDT data storage capacity shall be based upon a maximum of 60 percent utilization under "normal" diagnostic circumstances. Normal circumstances means that communication with the MPS is available. Therefore, the storage of expected control actions, terminal messages, and log entries shall take up less than 60 percent of the available memory in the MDT	A,T	X	T	X	NOTE 5
	5031b	3.2.1.1.3.2.2b	Communication. The MDT shall provide for the transfer of specialists' messages up to 4000 characters within an average time of 60 seconds and a maximum time of 120 seconds. This time is measured from the time the message is output by the MDT to the message receipt at the MPS	AT	X	T	X	NOTE 5

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COI.	REQ. #	VOL. V PARAGRAPH #	DESCRIPTION	VERIFICATION LEVEL				REMARKS
				DT&E	OT&E(O)	OT&E(I)	OT&E(S)	
	5032a	3.2.1.1.3.3a	The MDT shall support peripheral devices including a plotter and a printer	D	X	D	X	NOTE 5
	5032b	3.2.1.1.3.3b	The MDT shall have the capability to interface with the commercial telephone network	D	X	D	X	NOTE 5
	5032c	3.2.1.1.3.3c	The MDT shall contain a standard port for interface with the RMS	D	X	D	X	NOTE 5
	5032d	3.2.1.1.3.3d	The MDT shall have the capability to physically interface with the MPS	D	X	D	X	NOTE 5

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NEXRAD VRTM NOTES

NOTE 1: The three organizations which constitute the JSPO have performed extensive testing on the single channel NEXRADs. The capability of the NEXRAD system to detect these weather events is well documented. Testing, therefore, will focus on the redundant configuration features and their effects on performance of the system. For a detailed description of NEXRAD weather products see:

Next Generation Weather Radar Product
Description Document, R400-PD-202, NEXRAD
Joint System Program Office (JSPO), December, 1986

NOTE 2: Verification may require testing and/or analysis to existing single channel NEXRAD test data.

NOTE 3: Test and Evaluation shall be performed after the RMS has been implemented. This includes the evaluation of weather data to users such as DOD, NOAA and VENDORS. Interfaces must conform to technical specifications defined in Table 3.2.1.2.4.3-1 on Page 102. Vol. III, NAS-SS-1000.

NOTE 4: Inherent Availability, MTBF and MTTR figures shall be generated from actual on-site test data.

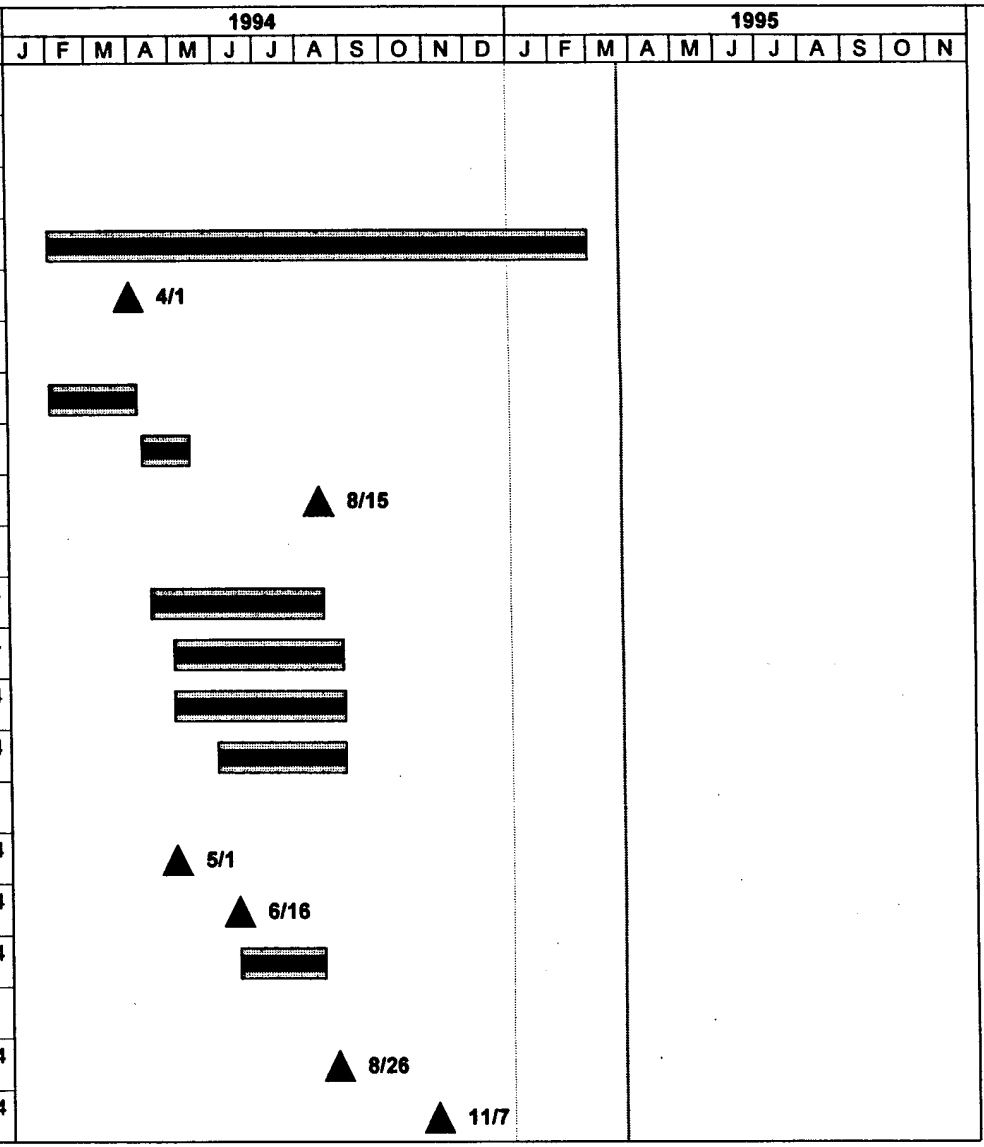
NOTE 5: RMS requirements will be tested after the RMS enhancement to the system has been developed.

APPENDIX B

OFFSHORE NEXRAD INTEGRATED SCHEDULE

Offshore NEXRAD Integrated Schedule

ID	Task Name	Start	Finish
1	Mission Need Statement	1/1/90	1/1/90
2	Specification (NTR 93)	11/1/91	11/1/91
3	Contract Award-Redundant Configuration	11/1/91	11/1/91
4	DT&E - Redundant Configuration	2/1/94	2/28/95
5	PCA	4/1/94	4/1/94
6			
7	TEMP (Draft) Completed	2/1/94	4/5/94
8	TEMP Review/Comments Period	4/9/94	5/13/94
9	TEMP TPRC Approval	8/15/94	8/15/94
10			
11	OT&E OPS/INT Plan	4/15/94	8/17/94
12	OT&E Shakedown Plan	5/1/94	8/31/94
13	OT&E OPS/INT Procedures	5/1/94	9/1/94
14	OT&E Shakedown Procedures	6/1/94	9/1/94
15			
16	FCA	5/1/94	5/1/94
17	Equipment Delivery Date (Hawaii)	6/16/94	6/16/94
18	Equipment Installation	6/16/94	8/16/94
19			
20	Test Readiness Review (TRR)	8/26/94	8/26/94
21	ACW-200 Pre-test Briefing (Kauai)	11/7/94	11/7/94



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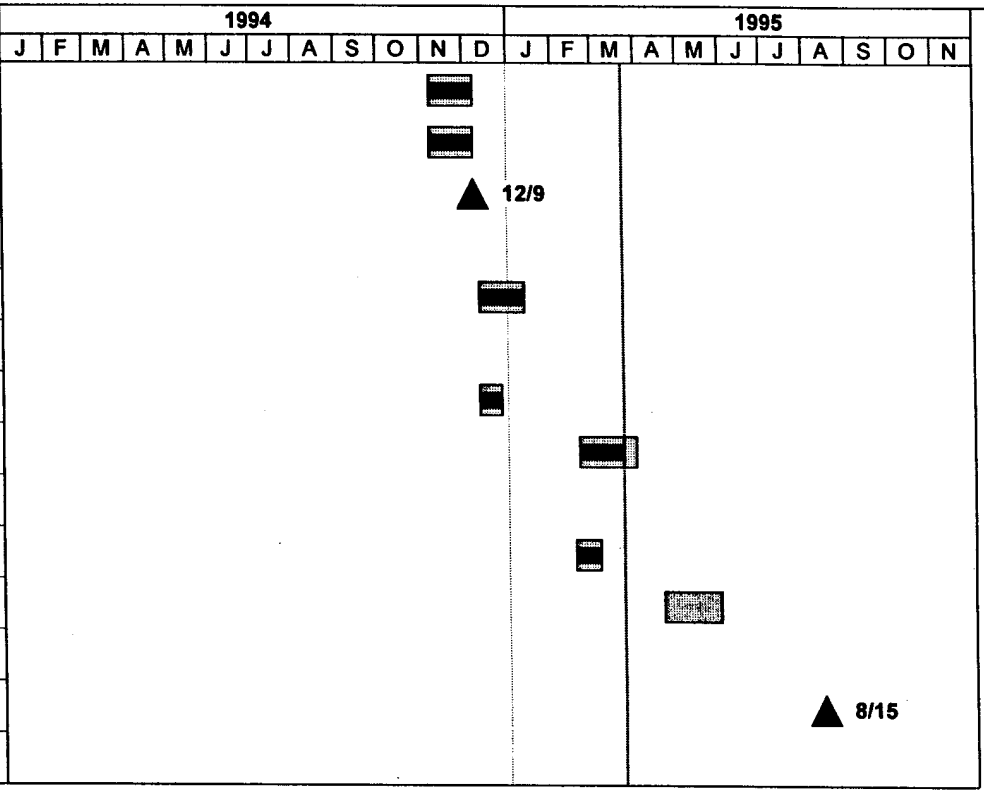
ACT-320 Offshore NEXRAD Integrated Schedule

Offshore NEXRAD Integrated Schedule

ID	Task Name	Start	Finish
22	OT&E Integration - Redundant Configuration	11/8/94	12/8/94
23	OT&E Operational -Redundant Configuration	11/8/94	12/8/94
24	ACW-200 Post-test Briefing (Kauai)	12/9/94	12/9/94
25			
26	OT&E Shakedown	12/12/94	1/12/95
27			
28	OT&E OPS/INT Quick Look Report	12/12/94	12/27/94
29	OT&E OPS/INT Final Test Report	2/20/95	4/1/95
30			
31	OT&E Shakedown Quick Look Report	2/17/95	3/6/95
32	OT&E Shakedown Final Report	4/21/95	6/1/95
33			
34	DRR EXCOM (Planned)	8/15/95	8/15/95
35			



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ACT-320 Offshore NEXRAD Integrated Schedule

APPENDIX C

AIRWAY FACILITIES (AF) MAINTAINABILITY QUESTIONNAIRE

AIRWAY FACILITIES (AF) MAINTAINABILITY QUESTIONNAIRE

PLEASE USE SEPARATE SHEET PROVIDED IF NECESSARY

SECTION I: OVERALL TEST OPERATIONS.

1. Is there sufficient communication between the system users (NWS) and the Systems Specialist (FAA) to provide timely notification of an outage or failure.

___ Yes. ___ No.

Please comment on your answer.

2. Is there sufficient communication between the CERAP Specialist and the Field Specialist? For example, diagnostic information from the Unit Control Position (UCP) and the Principal User Processor (PUP).

___ Yes. ___ No.

Please comment on your answer.

3. Was the training provided, sufficient enough to troubleshoot and repair an FAA NEXRAD redundant configuration system? Was sufficient training provided on the use of specific test equipment for the system?

___ Excellent.
___ Good.
___ Fair.
___ Poor.
___ Not enough data.

Please comment on your answer.

4. Was there a sufficient level of safety maintained throughout troubleshooting and repair of the system? Throughout corrective and preventive maintenance procedures?

___ Yes. ___ No.

Please comment on your answer.

SECTION II: TECHNICAL TEST OPERATIONS

1. Does the NEXRAD redundant configuration diagnostics (i.e., System Operability Test, Radar Data Acquisition Software Operational Test (RDASOT), RDA Maintenance terminals, etc.) provide sufficient information to localize and isolate the failures?

   Please comment on your answer.

_____

_____

_____

2. Does the NEXRAD redundant configuration require a reasonable time and effort for the interchange of the failed Line Replaceable Units (LRU) and/or components?

   ___ Yes. ___ No.

   If your answer is "No", please explain with an example.

_____

_____

_____

3. Is there a reasonable and efficient means of obtaining replacement parts for the system in a timely manner?

   ___ Yes. ___ No.

   Please give an example of a good or bad experience with this situation.

_____

_____

_____

4. Can the interchange or replacement of the LRUs be performed within a reasonable time and effort?

___ Yes. ___ No. ___ Not enough data.

Please comment.

5. Can required checkouts, alignment, and calibration procedures be performed within a reasonable time and effort after LRU replacement?

___ Yes. ___ No. ___ Not enough data.

Please comment on your answer.

6. Was the documentation provided, sufficient and accurate enough to provide guidance for you to perform corrective and preventive maintenance within a reasonable amount of time?

___ Yes. ___ No. ___ Not enough data.

Please comment:

7. Please identify any difficulties in performing repair and maintenance procedures.

8. Is the test equipment sufficient and readily available to support troubleshooting and repair of the NEXRAD redundant configuration system?

___ Yes. ___ No.

Please comment:

9. What is your estimation of the required staffing level needed to keep the system operational (i.e. , number of personnel and hours to repair)? Please explain your answer with examples if available.

YOUR INPUT IS VERY VALUABLE TO THE SUCCESS OF THIS TEST. WE APPRECIATE, AND THANK YOU, FOR YOUR TIME AND EFFORT IN COMPLETING THIS QUESTIONNAIRE.

EXTRA SHEETS FOR ANSWERS

PLEASE GIVE:

SECTION #---QUESTION #

EXTRA SHEETS FOR ANSWERS

PLEASE GIVE:
SECTION #---QUESTION #