Limited Production (LP) Precision Runway Monitor (PRM) Operational Test and Evaluation (OT&E) Integration and OT&E Operational Test Procedures

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16. Abstract

This document defines the Test Procedures that will be used to conduct the Limited Production (LP) Precision Runway Monitor (PRM) Operational Test and Evaluation (OT&E) Integration and OT&E Operational tests. These tests will be conducted at the Minneapolis-St. Paul International Airport following the Contractor Site Acceptance Test. The LP PRM OT&E test effort will concentrate on Operational Effectiveness and Operational Suitability.

The Operational Effectiveness Test consists of a review of the contractor performed Development Test and Evaluation (DT&E) and Site Acceptance Tests. This review will evaluate whether each of the Measures of Effectiveness had been satisfactorily tested and whether the results meet the Minimum Acceptable Operational Requirements (MAORs). This review will be conducted solely by test engineers and does not require the PRM system.

The Operational Suitability Tests will expose the test participants (air traffic controllers and Airway Facilities (AF) Technicians) to the PRM system in an operational environment while they perform specified operational procedures. These tests will be conducted in two separate phases: AT Suitability and AF Suitability. Each of these phases is focused on the specific test participants.

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1. INTRODUCTION.

The Precision Runway Monitor (PRM) Program is part of the Federal Aviation Administration (FAA) approach to improve airport capacity. The implementation of the PRM system will achieve significant capacity gains at airports with closely spaced parallel runways. The use of the PRM will allow simultaneous, independent Instrument Flight Rules (IFR) approaches at these airports. The Limited Production (LP) PRM is designed to provide faster and more accurate surveillance of aircraft in instrument landing approaches.

These test procedures contain steps to collect and analyze the data required to determine the operational suitability and effectiveness of the PRM/National Airspace System (NAS) configuration at Minneapolis, Minnesota.

The OT&E Integration tests will consist of an analysis of the results of the Development Test and Evaluation (DT&E) as well as tests of the PRM interfaces.

The Operational Test and Evaluation (OT&E) Operational tests will be conducted as a multistep strategy starting with simple tests using targets of opportunity, progressing through tests dealing with PRM target alert and system alarm resolution, leading to full flight tests. All flight tests will be conducted in visual flight rules (VFR) conditions.

2. REFERENCE DOCUMENTS.

a. Limited Production Precision Runway Monitor (PRM) Master Test Plan, November 1992, DOT/FAA/CT-TN92/23.

b. Limited Production (LP) Precision Runway Monitor (PRM) Operational Test and Evaluation (OT&E) Integration and OT&E Operational Test Plan, DOT/FAA/CT-TN95/2, March 1995.

c. Air Traffic Operational Requirements for a PRM System, 1991.

d. Allied Signal, Master Test Plan, A001-01-002.

e. Allied Signal, Phase 1 Test Plan, A002-001-001.

f. Allied Signal, Phase 1 Test Report, A003-001-001.

g. Allied Signal, Phase 2 Test Plan, B005-001-001.

h. Electronic Scan Precision Runway Monitor (E-SCAN PRM), FAA-E-2887 Rev. A 5 November 1993.

i. FAA NAS Test and Evaluation Policy, 10/22/92, FAA-ORDER-1810.4B.

j. Content and Format Requirements for the Preparation of Test and Evaluation Documentation, FAA-STD-024B, August 22, 1994.

3. TEST DESCRIPTION.

The LP PRM system is a monopulse secondary surveillance radar system that detects, acquires, tracks, and displays beacon-equipped air traffic within a predefined coverage area. Aircraft data is presented to air traffic controllers to assist in monitoring and maintaining the required separation of aircraft on approaches to closely spaced parallel runways. The LP PRM system is comprised of five main subsystems:

a. Beacon Radar Subsystem (BRS)
b. Radar Display Subsystem (RDS)
c. Communication Subsystem (CS)
d. Confidence and Performance Monitoring Subsystem (CPMS)
e. Recording and Playback Subsystem (RPS)

The critical power is provided through Uninterruptible Power Supplies (UPS). The UPS conditions the power (removes line spikes, smooths power fluctuations) and provides battery backup power when commercial and other backup power is not available.

3.1 TEST OVERVIEW.

3.1.1 OT&E Integration Tests.

The OT&E Integration tests will consist of an analysis of the results of the DT&E as well as tests of the PRM interfaces.

3.1.2 OT&E Operational Tests.

3.1.2.1 Air Traffic Operational Concept.

The following tests shall be performed:

a. PRM Display Console Test
b. Flight Tests
c. System Failure Tests
d. Data Playback and Listing Test

3.1.3 OT&E Operational Tests.

3.1.3.1 Airway Facilities Maintenance Concept.

The following tests shall be performed:

a. Fault Detection and Isolation Test
b. LRU Removal and Replacement Test
c. Maintenance Procedures Test

3.1.4 Test Participant Training.

The test participants who take part in the OT&E test effort will be either qualified air traffic controllers or AF technicians. Both the air traffic controllers and AF technicians will be given formal training on the PRM system prior to their involvement in the PRM OT&E test effort. The test participants will be given contractor provided operator's manuals and documentation.

The operational positions affected by the units under test are the air traffic monitor controllers and AF field technicians. The field technicians interface with the PRM through the PRM Status Display (PSD) and the PRM display consoles.

3.2 INTERFACES.

The PRM system's only equipment interface consists of a passive, read-only interface with the Automated Radar Terminal System (ARTS). Redundancy is achieved by connecting each of the two PRM/ARTS interface units to separate Multiplexed Display Buffer Memory (MDBM) ports of the ARTS. The interface captures ARTS B and C words to correlate aircraft identification and type data to PRM tracks for display on the PRM display consoles.

4. TEST PROGRAM DESCRIPTION.

The concept of the LP PRM OT&E test effort is to ensure that the PRM system complies with the Critical Operational Issues (COI) imposed by the LP PRM Master Test Plan. The overall approach of the test effort is to separately evaluate the operational suitability and operational effectiveness of the PRM system for these COIs and for additional OT&E test components derived from FAA Order 1810.4B. "Operational Effectiveness" centers around the technical performance of the PRM system while "Operational Suitability" centers on the useability of the PRM system.

Separate Measures of Suitability (MOS) and Measures of Effectiveness (MOE) have been developed for each COI. Likewise, each MOE has been further factored into Measures of Performance (MOP) and finally to Minimum Acceptable Operational Requirements (MAORs). These resultant MOS and MAORs are the critical success criteria that the PRM system must meet to successfully pass the OT&E evaluation.

5. TEST MANAGEMENT.

5.1 TEST DIRECTOR.

ACT-310 has the primary responsibility for the direction of test planning, test conduct, and test reporting activities associated with the LP PRM OT&E program. The test conduct team shall consist of two Test Engineers and the Test Participants, i.e., air traffic controllers or AF technicians. The Test Director acts as the agent for the Program Manager to manage the Test and Evaluation (T&E) program; including establishing overall test schedules, coordinating tests, ensuring that all test requirements are satisfied, and that tests are performed in accordance with approved procedures.

5.2 COORDINATION.

The Test Director coordinates with:

a. AND-410 Program Office and other FAA organizations to fund and/or arrange for the organizations' participation in T&E activities.

b. Performing organizations, and monitors DT&E, Production Acceptance Test and Evaluation (PAT&E), and OT&E activities.

c. The Contractor, on prepared DT&E plans, procedures, and reports.

d. Field facilities and offices.

5.3 DEVIATIONS.

a. The effectiveness of the PRM/ARTS interface is being conducted as part of the DT&E Data Review. This can be done since the interface will be extensively tested on site as part of the contractor's Site Acceptance Tests.

b. As part of the Upgrade PRM's OT&E test, a test was conducted to ensure that the addition of the PRM into the Raleigh-Durham air traffic environment did not degrade the performance of the current beacon interrogator. This test is not being conducted as part of this OT&E effort since the LP PRM has the same output power and employs the same interrogation scheme and pattern as the Upgrade PRM.

5.4 DATA ELEMENTS.

a. PRM track capacity data sheets (collected in ATS-1).

b. Controller Questionnaires. These questionnaires investigate the measure of suitability of the commands and controls used, the contractor provided training documentation

and training, the measure of suitability of the PRM display console presentation, and the suitability of the system's tracking capacity.

c. The test coordinator's Test Data Log. This log is filled out after the controller questionnaires are collected.

d. PRM Data tapes. Collected after ATS-3 and ATS-4.

e. Test Mission Log. Used for pass/failure of COIs.

f. ARTS tapes.

g. A copy of air traffic's daily facility log (denotes daily runway closures, scheduled navaid outages and failures).

6. ACRONYMS AND GLOSSARY.

AF	Airway Facilities
ARTS	Automated Radar Terminal System
AT	Air Traffic
BRS	Beacon Radar Subsystem
COI	Critical Operational Issue
CPMS	Confidence and Performance Monitoring Subsystem
CS	Communication Subsystem
DT&E	Development Test and Evaluation
FAA	Federal Aviation Administration
LP	Limited Production
MAOR	Minimum Acceptable Operational Requirement
MDBM	Multiplexed Display Buffer Memory
MOE	Measures of Effectiveness
MOP	Measures of Performance
MOS	Measures of Suitability

OT&E	Operational Test and Evaluation
PAT&E	Production Acceptance Test and Evaluation
PRM	Precision Runway Monitor
PSD	PRM Status Display
RDS	Radar Display Subsystem
RPS	Recording and Playback Subsystem
T&E	Test and Evaluation
UPS	Uninterruptible Power Supply
VFR	Visual Flight Rules

APPENDIX A.

TEST DATA LOG

Test Data Log

Pretest Section.

1. Test #:_____ Date: / / Time: : .

2. Note any open items or test procedure discrepancies.

3. Enter the names of the assigned test conduct personnel:

Test Coordinator	Test Engineer
Test Participant	Test Participant
Test Participant	Test Participant

4. Enter the PRM System Configuration Number _____.

5. Note any discrepancies from the test configurations.

Test Data Log

Post Test Section.

1. Note any test procedure discrepancies encountered during the test conduct.

2. Enter a summary of the data collection.

3. Enter a preliminary assessment of the test results.

APPENDIX B.

INTEGRATION TEST PROCEDURES

E1 - DT&E DATA REVIEW

TEST OBJECTIVE.

The objective of this test is to ensure that the PRM system meets the Minimum Acceptable Operational Requirement (MAOR) for each of the Measures of Performance (MOP) and Measures of Effectiveness (MOE) associated with each of the PRM's Critical Operational Issues (COI) and the OT&E Test Components as listed below:

Critical Operational Issue	Measures of Effectiveness	Measures of Performance	Minimum Acceptable Operational Requirement
1. Coverage Area: The area that the system acquires, tracks and displays aircraft	Elevation Coverage.	Minimum Elevation Coverage.	-2deg for range 500ft-3nmi 1.5deg for range >3nmi
		Maximum Elevation Coverage.	Top of Approved Keyhole
	Range Coverage.	Minimum Range Coverage.	1000ft with accuracy 500 feet w/o accuracy
		Maximum Range Coverage.	Extent of Approved Keyhole
	Azimuth Coverage.	Minimum Azimuths Covered.	Extent of Approved Keyhole
2. Display Mapping: The map data presented on the PRM display consoles.	Map Accuracy.	Map Runway Accuracy.	+/- system rng & az accuracy
		Map Obstructions Accuracy.	+/- system rng & az accuracy
		Map NTZ Accuracy.	+/- system rng & az accuracy
		Map Final Approach Accuracy.	+/- system rng & az accuracy
3. Sensor Accuracy: The accuracy with which the system presents targets on the PRM display consoles as correlated to tracked aircraft position.	Range Accuracy.	Mean Range Bias.	+/- 30ft.
		Mean Range Jitter.	30ft std dev
	Azimuth Accuracy.	RMS Azimuth Accuracy.	+/- 2.0 mrad for elevations <10 deg
4. Display Resolution: The capability to resolve two closely spaced aircraft.	Tracked Target Resolution.	Azimuth Resolution.	.57 deg @98%
		Range Resolution.	600ft @ 98%
5. System Capacity: The number of aircraft the PRM system can acquire, track and display.	Maximum track capacity, for each applicable update rate.	Maximum displayed tracks.	25 @ 1 sec (dual) 35 @ 2.4 sec (triple)
		Maximum ground tracks.	15 (dual) 15 (triple)
6. ARTS Interface: The PRM/ARTS Interface must be a passive (read-only, one-way) interface.	PRM/ARTS Interface effects on the ARTS system.	Effects on ARTS system due to PRM/ARTS Interface operations.	No effect
7. System Reliability: An estimate of how frequently the PRM system will fail.	Reliability.	Mean Time Between Critical Failures.	2190 hours
	Availability.	Availability.	.999
		Mean Time To Repair.	30 min with approved exceptions

Critical Operational Issue	Measures of Effectiveness	Measures of Performance	Minimum Acceptable Operational Requirement
8. System Failures: The capability to detect system failures and provide visual and aural alarms.	Detection of System Faults.	Minimum Percent Fault Detection.	95%
	False Alarm Rate.	Maximum False Alarm Rate.	No false alarms
9. Tracked Target: Display of tracked targets, ARTS data correlation, and timeliness of data.	Probability of Detection.	Minimum Probability of Detection for discreet beacon targets.	99%
	Track History	All Displayed Tracks have a Track History.	100% moving targets
	Track Projection Vector	All Displayed Tracks have a Projection Vector.	100% moving targets
	System Throughput.	Maximum time from aircraft reply to target display.	0.5 sec
	Correlation of Data.	Probability of ARTS correlation.	100% for discreet targets with available ARTS data
	ARTS Data Integrity.	Maximum False Data Rate.	0%
10. Display Console: The PRM display console's quality and controls.	None.	None.	N/A
	PRM Display Console Keyboard Commands.	All PRM Display Console Keyboard Commands function accurately.	meets PRM spec and design
	Brightness and Contrast Controls.	Availability of Brightness and Contrast Controls.	Front of PRM Display Console
11. Recording, Playback and Listing: The capability to record, replay, and list target information	Data Recording Integrity.	Maximum False/Missing Data Rate.	0%
	Data Playback Integrity.	Maximum False/Missing Data Rate.	0%
	Data Listing Integrity.	Maximum False/Missing Data Rate.	0%
12. False Targets: The capability to inhibit the number of false targets presented on the PRM display consoles.	False Targets due to fixed reflectors.	Maximum Number of False Tracks.	<5% of false reports due to known stationary reflectors
	Split Tracks.	Maximum Time Until Removal.	5 updates
13. NTZ Alerts: The capability to provide alerts when targets are projected to enter the NTZ.	NTZ Projection Alerts Integrity.	Probability of Alert.	100%
		Maximum False Alert Rate.	0%

OT&E Test Component	Measures of Effectiveness	Measure of Performance	Minimum Acceptable Operational Requirement
14. Technical Performance	The capability of the PRM System to meet specified requirements.	PRM Specification	Meets specified requirement
15. Maintainability	The capability of the PRM system to be maintained at the LRU level	DT&E Fault Isolation Tests and Analysis	Passed fault isolation tests
16. Training	The contractor provided training for PRM operation	Maintenance Course Content	Received Contractual Approvals
	The contractor provided training for PRM maintenance	Operations Course Content	Received Contractual Approvals

DT&E Test Component	Measures of Effectiveness	Measure of Performance	Minimum Acceptable Operational Requirement
17. Operational Documentation	The contractor provided documentation for PRM operation and maintenance	Maintenance Instruction Book Content	Received Contractual Approvals
		Operator's Manual Content	Received Contractual Approvals
18. Safety	The contractor provided documentation for PRM operation and maintenance	Safety Related Specified Requirements	Passed DT&E Safety Inspections
		PRM System Design	Received Contractual Approvals
19. Supportability	The sparing program that supports the PRM system.	Quantity of Spares	Received Contractual Approvals
		Quality of Spare Testing Program	Each spares acceptance test ensures proper operation in the PRM system

EVALUATION CRITERIA.

The Test Coordinator (TC) and the Test Engineer (TE) will review the PRM Phase 1 and Phase 2 test documentation and associated trouble report documentation to evaluate whether each of the PRM's MAORs was sufficiently tested and achieved.

TEST DESCRIPTION.

The DT&E Data Review consists of a review of the contractor performed DT&E and Site Acceptance Tests, the contractor Spares Test Program, as well as of other contract related activities, i.e., training course and document reviews and approvals. This review will evaluate whether each of the Measures of Effectiveness had been satisfactorily tested and whether the results meet the corresponding success criteria. This review will be conducted by two test engineers and does not require the PRM system. Before the DT&E Data Review can be conducted the contractor performed DT&E and Site Acceptance test must be completed. This review will require copies of the "as run" test procedures and the associated test reports (drafts may be used). The DT&E Data Review shall be complete when a determination has been made for each MAOR. This determination shall include whether the DT&E test conducted was sufficient and whether the results meet the MAORs.

TEST PERSONNEL REQUIREMENTS.

#	Personnel
1	Test Coordinator (TC)
1	Test Engineer (TE)

TEST SUPPORT HARDWARE , SOFTWARE AND DOCUMENTATION.

Test Equipment, Facilities & Documentation	# Req.
PRM Phase 1 Test Data/Report	2
PRM Phase 2 Final Test Data/Report	2
PRM Phase 1 Trouble Report Log	2
PRM Phase 2 Trouble Report Log	2
PRM Specification	2

E-1

TEST CONCLUSION.

COI #	PASS	FAIL	ISSUE	PROPOSED SOLUTION	PRIORITY
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					

APPENDIX C.

AT OPERATIONAL TEST PROCEDURES

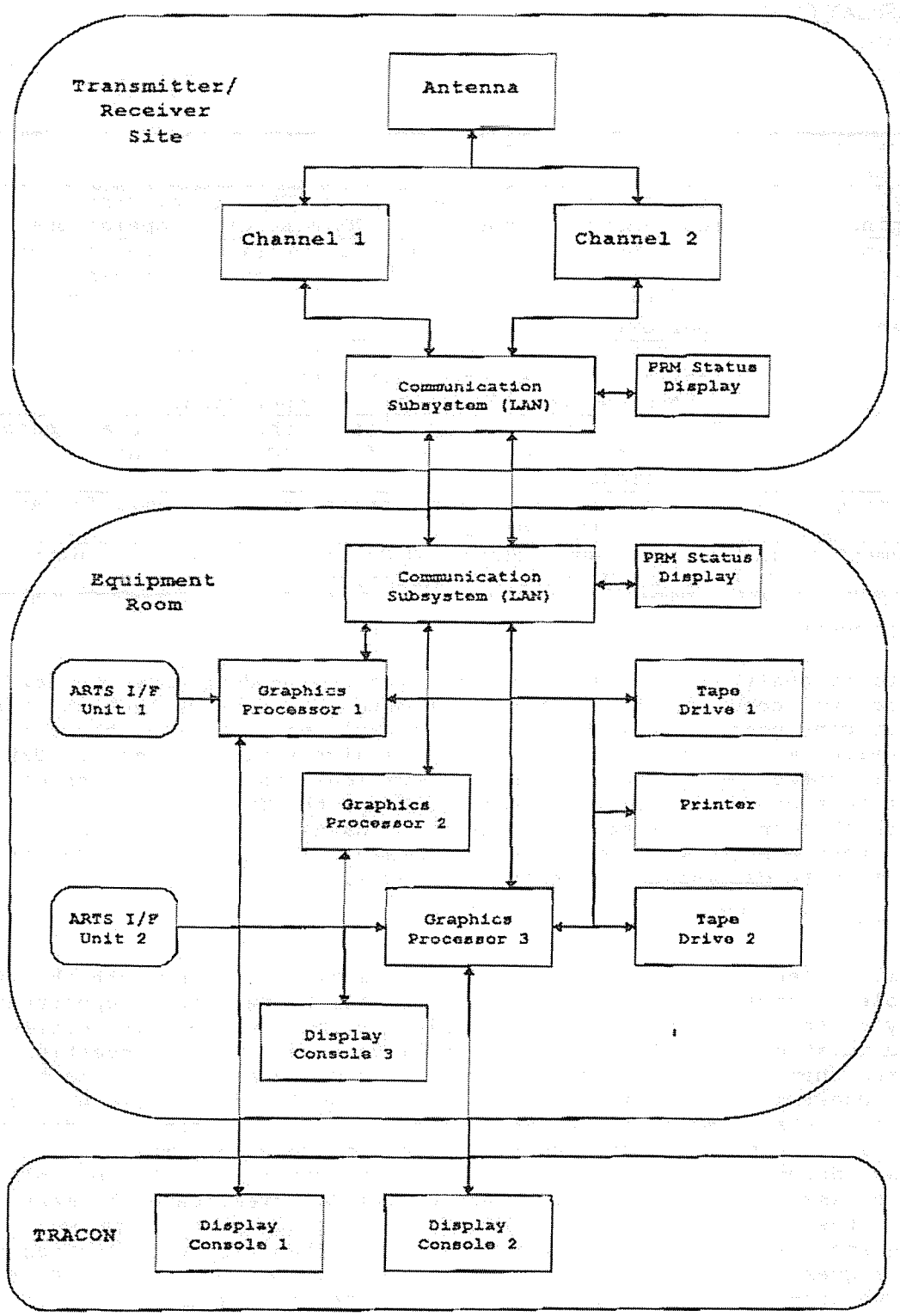

Figure 1: PRM System Block Diagram

ATS-1 - PRM DISPLAY CONSOLE TESTS

TEST OBJECTIVE.
The objective of this test is to collect the measures of suitability as listed below.

Issue Number	Operational Issues	Measure of Suitability
2	Display Mapping	The map data presented on the PRM display consoles is comprehensive enough for PRM monitoring operations.
5	System Capacity	The capacity of the system is sufficient to monitor all foreseeable aircraft in the coverage areas.
10a	Display Console	The PRM display is of sufficient quality for PRM monitoring operations.
10b		The PRM display console contains all controls (character size, intensity, data block offset, etc.) sufficient for PRM monitoring operations.
10c		The contrast and brightness of the PRM display console can be adjusted suitably for TRACON lighting conditions.
16	Training	The contractor provided training is suitable for Air Traffic PRM operation.
17	Documentation	The contractor provided Operator's Manual is suitable for Air Traffic PRM operation.

EVALUATION CRITERIA.

The TC will first analyze each test's test mission log to determine whether the data collection was conducted acceptably. The data from data collection phases which were not concluded acceptably will not be included in any further analysis. The questionnaires will then be analyzed. This analysis will attempt to determine a consensus of controller opinions for each operational issue. In cases where the answers point to a difference of controller opinions the TC may review the questions with the controllers to determine the consensus opinion. A consensus of the evaluated test controllers' opinions will measure the suitability for each operational issue to determine a pass/fail criteria.

TEST DESCRIPTION.

This test will collect opinions from AT controllers by having them use the PRM display console's commands and controls while monitoring targets of opportunity on a PRM display console. The AT controllers will also be supplied with copies of the PRM user documentation. The AT controllers will be given a set of questionnaires which will lead them through the test and collect their opinions. Using the directions in questionnaires atsl-1 through atsl-4 the AT controllers will use the PRM display console's commands and controls first while monitoring the display and answering the associated questions and second looking up each command and control in the PRM user documentation. For each command and control the AT controller will answer a set of associated questions. These questions investigate the measure of suitability of the commands and controls used, and the contractor provided documentation and training. The AT controllers will then fill out questionnaire atsl-5. These questions investigate the measure of suitability of the PRM display console presentation and the suitability of the system's tracking capacity.

ATS-1

TEST PERSONNEL REQUIREMENTS.

#	Personnel	Responsibility
1	Test Coordinator (TC)	Coordinate with AT Controllers
1	Test Engineer (TE)	Assist TC
sets of 2	AT Controllers	Use PRM displays, supply opinions
1	AT Supervisor/Staff	Use PRM Record/Playback functions, supply opinions

TEST SUPPORT HARDWARE , SOFTWARE AND DOCUMENTATION.

Test Equipment, Facilities & Documentation	Purpose	Duration/# Req.
PRM track capacity data sheets (collected in DTS1)	Data Collection	# of Controllers +2 copies
PRM System including Operational Displays	Data Collection	3 hours
PRM Operator's Manuals	Data Collection	# of Controllers +2 copies
PRM Operator's Reference Cards	Data Collection	# of Controllers +2 copies

INITIAL SET UP/CONFIGURATION.

The configuration used in this test consists of the full PRM system. Both channels should be operational. This test does not require the actual control of aircraft, but uses what ever traffic is available solely as a display feature. Note that questionnaire atsl-5 should evaluate a heavy traffic situation.

DATA COLLECTION SETUP, TERMINATION & RESTART.

The TE should start the PRM and insure it's proper operation. The TE should set the PRM displays to the normal default configuration. The TC should distribute the PRM operator's reference cards and the PRM operator's manuals to the AT controllers and brief the controllers on the test and their responsibilities. Data collection can be terminated following the completion of a data collection step i.e., a completed questionnaire.

DATA COLLECTION STEPS.

The TIC should distribute questionnaire-atsl-1 to the AT controllers and instruct them to use the listed commands to set the Intensities and Range Rings on the PRM Display features to their preference and answer the associated questions. Once the controllers have finished the TC should collect the questionnaires and fill out the appropriate sections of the test data log.

The TC should distribute questionnaire-atsl-2 to the controllers and instruct them to use the listed commands to **manipulate the target Data Blocks** on the PRM Display to their preference and answer the associated questions. Once the controllers have finished the TC should collect the questionnaires and fill out the appropriate sections of the test data log.

The TC should distribute questionnaire-atsl-3 to the controllers and instruct them to use the listed commands to **manipulate the Map and View and move the text areas** on the PRM display to their preference and answer the associated questions. Once the controllers have finished the TC should collect the questionnaires and fill out the appropriate sections of the test data log.

The TC should distribute questionnaire-atsl-4 to the controllers and instruct them to use the listed commands to **enter System controls** of the PRM and **recall display Setups** and answer the associated questions. Once the controllers have finished the TC should collect the questionnaires and fill out the appropriate sections of the test data log.

The TC should distribute questionnaire-atsl-5, 6 & 7 to the controllers and instruct them to use the **listed protected commands** and answer the associated questions. Once the controllers have finished the TC should collect the questionnaires and fill out the appropriate sections of the test data log.

The TC should distribute questionnaire-atsl-8 and the PRM track capacity data sheets (collected in DTS1) to the controllers and instruct them to **view the PRM display and adjust Control knobs** and answer the associated questions. Once the controllers have finished the TC should collect the questionnaires and fill out the appropriate sections of the test data log.

ATS-1

Questionnaire-1. Name: Date / /

Intensity/Range Ring Commands	Set Intensity of All Text	Set Intensity of All Maps	Set Intensity of All Data Blocks	Toggle Range Rings On/Off	Set Range Ring Interval	Toggle Parallel Lines On/Off
Q1-Found in Ref Card Was the command found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q2-Ref Card Entry Was the command's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q3-Found in Ops Manual Was the command found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q4-Ops Manual Entry Was the command's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q5-Keystrokes Are the command's keystrokes acceptable?	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable
Q6-Feedback Was the command's feedback acceptable?	OK Not Useful Not Needed	OK Not Useful Not Needed	OK Not Useful Not Needed	OK Not Useful Not Needed	OK Not Useful Not Needed	OK Not Useful Not Needed
Q7-Training Was the training provided for the command acceptable?	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered
Q8-CMD Selection Does the command allow you to set the intensity level you require or prefer?	Yes No:Level____ required /preferred	Yes No:Level____ required /preferred	Yes No:Level____ required /preferred	Yes No:Level____ required /preferred	Yes No:Level____ required /preferred	Yes No:Level____r equired /preferred
Q9-CMD needed Is this command required, nice to have or not needed at all?	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed
****** Comments ****** Place in the appropriate command column the Q# before each comment.						
Are there any items on the display that do not have an intensity adjustment command/control that you require/prefer one for?						

ATS-1

Questionnaire-2. Name: Date / /

Data Block Commands	Modify Character Size for All Data Blocks	Modify Leader Line Length for All Data Blocks	Set Leader Line Default Angle for New Targets	Modify Leader Line Angle of Selected Data Block	Set History Trail Length for All Data Blocks	Toggle History Trails On/Off for All Targets
Q1-Found in Ref Card Was the command found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q2-Ref Card Entry Was the command's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q3-Found in Ops Manual Was the command found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q4-Ops Manual Entry Was the command's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q5-Keystrokes Are the command's keystrokes acceptable?	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable
Q6-Feedback Was the command's feedback acceptable?	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed
Q7-Training Was the training provided for the command acceptable?	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered
Q8-CMD Selection Does the command allow you to set the sizes you require or prefer?	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred
Q9-CMD needed Is this command required, nice to have or not needed at all?	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed
****** Comments ****** Place in the appropriate command column the Q# before each comment.						
Are there any items on the display that do not have a data block adjustment command/control that you require/prefer one for?						

ATS-1

Questionnaire-3. Name: Date / /

Move/View Commands	Set Size of All Text	Toggle System Status Area On/Off	Move System Status Area	Move Coast List	Move Preview Area	Move System Data Area
Q1-Found in Ref Card Was the command found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q2-Ref Card Entry Was the command's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q3-Found in Ops Manual Was the command found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q4-Ops Manual Entry Was the command's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q5-Keystrokes Are the command's keystrokes acceptable?	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptabl e
Q6-Feedback Was the command's feedback acceptable?	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed
Q7-Training Was the training provided for the command acceptable	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered
Q8-CMD Selection Does the command work as you require/prefer	Yes No see comments	Yes No see comments	Yes No see comments	Yes No see comments	Yes No see comments	Yes No see comments
Q9-CMD needed Is this command required, nice to have or not needed at all	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed
****** Comments ****** Place in the appropriate command column the Q# before each comment.						
Are there any additional commands or controls that you require/prefer to set the move/view you need?						

ATS-1

Questionnaire-4. Name: Date / /

System/Setup Commands	Silence system Alarm	Set Barometric Pressure	Enter Protected Mode	Restore Controller Default	List Display Setups	Configure Display Setups
Q1-Found in Ref Card Was the command found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q2-Ref Card Entry Was the command's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q3-Found in Ops Manual Was the command found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q4-Ops Manual Entry Was the command's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q5-Keystrokes Are the command's keystrokes acceptable?	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Gobd Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable
Q6-Feedback Was the command's feedback acceptable?	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed
Q7-Training Was the training provided for the command acceptable?	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered
Q8-CMD Selection Does the command allow you to set the sizes you require or prefer?	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred
Q9-CMD needed Is this command required, nice to have or not needed at all?	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed
****** Comments ****** Place in the appropriate command column the Q# before each comment.						
Are there any items on the display that do not have a system/setup adjustment command/control that you require/prefer one for?						

ATS-1

Questionnaire-5. Name: Date / /

Protected Commands	Start System	Stop System	Stop Recording	Start Recording	Select Tape Drive
Q1-Found in Ref Card Was the command found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not found	OK Too Hard Not Found	OK Too Hard Not Found
Q2-Ref Card Entry Was the command's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q3-Found in Ops Manual Was the command found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q4-Ops Manual Entry Was the command's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q5-Keystrokes Are the command's keystrokes acceptable?	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable
Q6-Feedback Was the command's feedback acceptable?	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed
Q7-Training Was the training provided for the command acceptable?	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered
Q8-CMD Selection Does the command allow you to set the sizes you require or prefer?	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred
Q9-Protected CMD needed Should this command be a protected command , a controller command , or is it not needed at all?	Protected Controller Not Needed	Protected Controller Not Needed	Protected Controller Not Needed	Protected Controller Not Needed	Protected Controller Not Needed
****** Comments ****** Place in the appropriate command column the Q# before each comment.					
Are there any items on the display that do not have a system/setup adjustment command/control that you require/prefer one for?					

ATS-1

Questionnaire-6. Name: Date / /

Protected Commands	Change Radar Channels	Change Runways	Set Date	Set Time	Test Voice Alert
Q1-Found in Ref Card Was the command found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q2-Ref Card Entry Was the command's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q3-Found in Ops Manual Was the command found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q4-Ops Manual Entry Was the command's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q5-Keystrokes Are the command's keystrokes acceptable?	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable
Q6-Feedback Was the command's feedback acceptable?	OK Not Useful Not Needed	OK Not Useful Not Needed	OK Not Useful Not Needed	OK Not Useful Not Needed	OK Not Useful Not Needed
Q7-Training Was the training provided for the command acceptable?	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered
Q8-CMD Selection Does the command allow you to set the sizes you require or prefer?	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred
Q9-Protected CMD needed Should this command be a protected command , a controller command , or is it not needed at all?	Protected Controller Not Needed	Protected Controller Not Needed	Protected Controller Not Needed	Protected Controller Not Needed	Protected Controller Not Needed
****** Comments ****** Place in the appropriate command column the Q# before each comment.					
Are there any items on the display that do not have a system/setup adjustment command/control that you require/prefer one for?					

ATS-1

Questionnaire-7. Name: Date / /

Protected Commands	Grant Maintenance Request	Deny Maintenance Request	Save Display Setup	Delete Display Setup	Log out of Protected Mode
Q1-Found in Ref Card Was the command found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q2-Ref Card Entry Was the command's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q3-Found in Ops Manual Was the command found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q4-Ops Manual Entry Was the command's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q5-Keystrokes Are the command's keystrokes acceptable?	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable
Q6-Feedback Was the command's feedback acceptable?	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed
Q7-Training Was the training provided for the command acceptable?	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered
Q8-CMD Selection Does the command allow you to set the sizes you require or prefer?	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred	Yes No:size_____ required /preferred
Q9-Protected CMD needed Should this command be a protected command , a controller command , or is it not needed at all?	Protected Controller Not Needed	Protected Controller Not Needed	Protected Controller Not Needed	Protected Controller Not Needed	Protected Controller Not Needed
****** Comments ****** Place in the appropriate command column the Q# before each comment.					
Are there any items on the display that do not have a system/setup adjustment command/control that you require/prefer one for?					

ATS-1

Questionnaire-8. Name: Date / /

Display Presentation Quality and Display Control Capabilities	YES	NO	The problem is....
Is the display presentation suitably free of reflections and glare?			
Is the display presentation suitably consistent?			
Is the display presentation suitably clear of clutter?			
Is the display presentation suitably flicker free?			
Does the display presentation provide sufficient contrast and brightness?			
Is the display presentation of uniform brightness?			
Is the display presentation suitably well defined with no blooming?			
Does the display presentation quality suitably recover after a view command (with 1 sec)?			
Are the display map lines and alphanumerics small enough but not too small?			
Is the presentation of the Map complete and suitable?			
Are the display control knobs easily accessible?			
Do the display control knobs make quality adjustments?			
Is the default display setup generally suitable for each approach?			
Is the PRM's tracking capacity suitable for all traffic patterns?			

TEST DATA REDUCTION AND ANALYSIS.

The TL will first analyze each test's Test Mission Log to determine whether the data collection was conducted acceptably. The data from data collection phases which were not concluded acceptably will not be included in any further analysis. The Questionnaires will then be analyzed. This analysis will attempt to determine a consensus of controller opinions for each question. In cases where the answers point to a difference of controller opinions the TL may review the questions with the controllers to determine the consensus opinion.

TEST CONCLUSION.

The test will be complete when the post test section of the test mission log has been completed and when a final consensus has been determined for each Measure of Suitability.
For each failure the issue will be entered along with a proposed solution and an assessment of the issues priority.

COI Number	PASS	FAIL	ISSUE	PROPOSED SOLUTION	PRIORITY
2					
5					
10a					
10b					
10c					
16					
17					

ATS2 - PRM FLIGHT TEST

TEST OBJECTIVE.

The objective of this test is to collect the measures of suitability as listed below.

Issue Number	Operational Issues	Measure of Suitability
1	Coverage Area	The coverage area presented on the PRM display consoles is sufficient for PRM monitoring operations for all applicable approaches.
4	Display Resolution	Closely spaced targets can be resolved on the PRM display consoles sufficiently enough for PRM monitoring operations.
9a	Tracked Targets	The tracking and display of aircraft is sufficient for PRM monitoring operations for all applicable approaches.
9b		The timeliness of the displayed targets is sufficient for PRM monitoring operations.
9c		The correlation and display of ARTS data is comprehensive enough for PRM monitoring operations.
12	False Targets	The number of false targets displayed on the PRM Display Console is few enough for PRM monitoring operations.
13	NTZ Alerts	The Aural NTZ projection is suitable for PRM monitoring operations.
16	Training	The contractor provided training is suitable for Air Traffic PRM operation.
17	Documentation	The contractor provided Operator's Manual is suitable for Air Traffic PRM operation.

EVALUATION CRITERIA.

The TC will first analyze each test's test mission log to determine whether the data collection was conducted acceptably. The data from data collection phases which were not concluded acceptably will not be included in any further analysis. The questionnaires will then be analyzed. This analysis will attempt to determine a consensus of controller opinions for each operational issue. In cases where the answers point to a difference of controller opinions the TC may review the questions with the controllers to determine the consensus opinion. A consensus of the evaluated test controllers' opinions will measure the suitability for each operational issue to determine a pass/fail criteria.

TEST DESCRIPTION.

This test uses two FAA test aircraft to supply targets for AT controllers (two at a time) to monitor and control at the PRM Display Consoles. The FAA test aircraft will be flown by FAA test pilots. The flight profiles will include: NTZ blunders along the approach path (including a missed approach) as well as transponder failures and emergencies. A full list of flight profiles is given in table 1. Additional approaches may be selected by the Test Participants (AT controllers) as time permits. All flights tests will be conducted under visual flight rules (VFR). The AT controllers will be given a set of questionnaires which will collect their opinions following each set of flight tests.

APP#	Left Approach	Right Approach
1	Missed Approach	Missed Approach
2	Simultaneous Approach (fast AC)	30 NTZ Blunder @ 5MRE (slow AC)
3	30 NTZ Blunder @ 12MRE	Simultaneous Approach
4	No Initial Frequency Changeover	30 NTZ Blunder @ 1MRE
5	Transponder Failure @ 5 MRE	Overshoot Turn On, Then Simultaneous Approach
6	Simultaneous Approach	Transponder Emergency @ 12MRE
7	30 NTZ Blunder @ 2MRE (slow AC)	Simultaneous Approach, 250' Inside Center Line (fast AC)
8	Simultaneous Approach, 250' Inside Runway Center Line	Radio Failure @ 10MRE
9	30 NTZ Blunder @ 5MRE	Simulate Poor Transponder Beginning on Downleg
10	Poor (Weaving) Simultaneous Approach	Transponder Failure @ 5 MRE
11	Overshoot Turn On, Then Simultaneous Approach	15 NTZ Blunder @ 8MRE
12	Radio Failure @ 10MRE	Poor (Weaving) Simultaneous Approach
13	15 NTZ Blunder @ 8MRE	No Initial Frequency Changeover

TABLE 1 FLIGHT PROFILES

TEST PERSONNEL REQUIREMENTS.

#	Personnel	Responsibility
1	Test Coordinator (TC)	Coordinate with AT Controllers
1	Test Engineer (TE)	Assist TC
4	Test Pilots	Fly Test Aircraft
sets of 2	AT Controllers	Use PRM displays, supply opinions

TEST SUPPORT HARDWARE , SOFTWARE AND DOCUMENTATION.

Test Equipment, Facilities & Documentation	Purpose	Duration/# Req.
PRM System including Operational Displays	Data Collection	3days
Test Aircraft	Data Collection	3days
Data Tapes	Data Collection	2 tapes
PRM Operator's Manuals	Data Collection	# of AT Controllers +2
PRM Operator's Reference Cards	Data Collection	# of AT Controllers +2

INITIAL SET UP/CONFIGURATION.

The configuration used in this test consists of the PRM system and it's operational displays as shown in **Figure 1**. This test requires a set of PRM displays in their normal operational environment including operational communications. The test will be complete when a final consensus has been determined for each Measure of Suitability. To obtain this consensus portions of the test may be rerun using targets of opportunity.

ATS-2

DATA COLLECTION SETUP, TERMINATION & RESTART.

The following are the steps to be completed before beginning the data collection:

1. The TC should coordinate with the AT Supervisor for the appropriate time of the day to conduct the live test flights as a safety consideration. The AT Supervisor should be informed that the flight test requires simultaneous ILS approaches. All flights must be conducted in VFR conditions. These tests will affect other controllers than the monitor "Test" controllers. The TC should coordinate with the AT Supervisor so that all affected controllers are aware of the test. The TC should ensure that the test pilots have been fully briefed on the flight profiles and the objectives of the test.

2. The TE should start the PRM, insure it's proper operation and set PRM Displays 1 and 2 to the normal default configuration.

3. The TC should distribute the PRM Operators Reference Cards to the Test Controllers.

4. The Test Controllers should set the PRM display to their preferences and perform any MSP procedural required set ups, i.e. a communications test.

Data Collection Steps.

1. The TC should inform the test pilots, TE2, and TE3 to follow procedures with the AT Supervisor and Airport Planning and Management for readiness of actual flight test.

2. The TC should instruct the Test Controllers to monitor the displays as they would for normal PRM monitored simultaneous ILS approaches and to respond to the tests as they would to a real world event.

3. The TE should observe and note on the Test Data Log any abnormal events.

4. At the conclusion of the flight test the TC should distribute the Operator's Manuals and associated Questionnaires ATS2-1 through ATS2-4 and instruct the Test Controllers to fill them out.

5. The TC should then collect all of the Questionnaires.

ATS-2

Questionnaire-1. Name: Date / /

Target Presentation	YES	NO	The Problem is...
Q1-Monitor Coverage Area Does the PRM effectively display the areas that you are responsible for (including altitude)?			
Q2-Missed Approach Coverage Does the PRM effectively display the missed approach region to support your monitor responsibilities?			
Q3-No-Coverage Areas Do the no-coverage areas (i.e. tower wedge) not effect your capability to perform your monitor responsibilities?			
Q4-False Targets Is the display presentation suitably free of false targets or spurious returns?			
Q5-Ground Speed Is the ground speed of the aircraft displayed by the PRM suitable for your monitor responsibilities?			
Q6-Coasts Presentation Is the presentation of track coasts and track drops suitable for your monitor responsibilities?			
Q7-Coast Frequency Is the frequency of track coasts suitable?			
Q8-Alert Inhibit Does the manual/automatic alert inhibit suitably allow you to minimize nuisance aural alerts?			
Q9-PRM/NAS System Suitability? Do you feel that the PRM/NAS system suitably and effectively supports your monitor responsibilities for resolving each of the alert events tested?			
Q10-PRM/NAS System Suitability? Do you feel that the PRM/NAS system suitably and effectively supports the monitoring of simultaneous ILS approaches?			

ATS-2

Questionnaire 2. Name: Date / /

Alert Presentation	NTZ Projection	Projection Voice Alert	NTZ Penetration	NTZ Voice Alert	ARTS CA Alert	ARTS LA Alert
Q1-Ops Manual Entry. Was the Alert found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q2-Ops Manual Entry Suitability. Was the Alert's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q3-Training. Was the training provided for the alert presentation acceptable? i.e., did it cover what the Alert means?	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered
Q4-Alert Placement. Is the placement of the Alert in the data block suitable?	Yes No: See Comments	Yes No: See Comments	Yes No: See Comments	Yes No: See Comments	Yes No: See Comments	Yes No: See Comments
****** Comments ****** Place in the appropriate command column the Q# before each comment.						

ATS-2

Questionnaire-3. Name: Date / /

Alert Presentation	Emergency Code	Radio Failure	Hijack	Transponder Coast	Transponder Failure	Time Alert
Q1-Ops Manual Entry. Was the Alert found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q2-Ops Manual Entry Suitability. Was the Alert's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q3-Training. Was the training provided for the alert presentation acceptable? i.e., did it cover what the Alert means?	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered
Q4-Alert Placement. Is the placement of the Alert in the data block suitable?	Yes No See Comments	Yes No See Comments	Yes No See Comments	Yes No See Comments	Yes No See Comments	Yes No See Comments
****** Comments ****** Place in the appropriate command column the Q# before each comment.						

Questionnaire-4. Name: Date / /

General	YES	NO	The Problem is...
Q1-PRM/NAS System Suitability? Do you feel that the PRM/NAS system suitably and effectively supports your monitor responsibilities for resolving each of the alert events tested?			
Q2-Data Block Locations? Do you feel that the default Data Block Locations assigned by the PRM are suitable and effective?			
Q3-Map Features? Do you feel that the Map features displayed by the PRM are suitable and effective?			
Q4-Map Features Training? Was the training provided to you on the map features suitable and comprehensive?			
Q5-Aspect Ratio Training? Was the training provided to you on the effects that the 4:1 aspect ratio have on the displayed targets suitable and comprehensive?			
Q6-Other Training Concerns? Was the training provided to you suitable and comprehensive so that you can use the PRM/NAS system to effectively support your monitoring responsibilities?			

TEST DATA REDUCTION AND ANALYSIS.

The TL will first analyze each test's Test Mission Log to determine whether the data collection was conducted acceptably. The data from data collection phases which were not concluded acceptably will not be included in any further analysis. The Questionnaires will then be analyzed. This analysis will attempt to determine a consensus of controller opinions for each question. In cases where the answers point to a difference of controller opinions the TL may review the questions with the controllers to determine the consensus opinion.

TEST CONCLUSION.

The test will be complete when the post test section of the test mission log has been completed and when a final consensus has been determined for each Measure of Suitability. For each failure the issue will be entered along with a proposed solution and an assessment of the issues priority.

COI Number	PASS	FAIL	ISSUE	PROPOSED SOLUTION	PRIORITY
1					
4					
9a					
9b					
9c					
12					
13					
16					
17					

ATS3 - SYSTEM FAILURES TEST

TEST OBJECTIVE.

The objective of this test is to collect the measures of suitability as listed below.

Issue Number	Operational Issues	Measure of Suitability
8a	System Failures	The visual and aural alarms provided on the PRM Display Console for system failures are suitable for notifying appropriate personnel.
8b		The visual and aural alarms provided on the PRM Status Display for system failures are suitable for notifying appropriate personnel.
16	Training	The contractor provided training is suitable for Air Traffic PRM operation.
17	Documentation	The contractor provided Operator's Manual is suitable for Air Traffic PRM operation.

EVALUATION CRITERIA.

The TC will first analyze each test's test mission log to determine whether the data collection was conducted acceptably. The data from data collection phases which were not concluded acceptably will not be included in any further analysis. The questionnaires will then be analyzed. This analysis will attempt to determine a consensus of controller opinions for each operational issue. In cases where the answers point to a difference of controller opinions the TC may review the questions with the controllers to determine the consensus opinion. A consensus of the evaluated test controllers' opinions will measure the suitability for each operational issue to determine a pass/fail criteria.

TEST DESCRIPTION.

This test does not require the actual control of aircraft, but uses targets of opportunity simply as a display feature. This test will collect opinions from AT controllers by having them monitor the PRM displays as PRM system failures are demonstrated. These system failures will include as a minimum:

Channel switches/failures
LAN switches/failures
Tape recorder status/failures
Keyboard failures
Dectalker failures
ARTS Interface failures
Display failures
Tracking overload and overflow
Antenna failures
Critical system failures

Additional system failures will be selected by the Test Participants (AT controllers). Questionnaires will be collected from the AT controllers to obtain their opinions on the Measures of Suitability for each Operational Issue. An analysis of the Questionnaires will be conducted by the test director along with the AT Controllers to obtain a consensus of opinion for each Measure of Suitability

TEST PERSONNEL REQUIREMENTS.

#	Personnel	Responsibility
1	Test Coordinator (TC)	Coordinate with AT Controllers
1	Test Engineer (TE)	Assist TC
sets of 2	AT Controllers	Use PRM displays, supply opinions

TEST SUPPORT HARDWARE, SOFTWARE AND DOCUMENTATION.

Test Equipment, Facilities & Documentation	Purpose	Duration/# Req.
Pre-shortened 9 track data tapes	Full tape test	2 tapes
PRM System including Operational Displays	Data Collection	3 hours
PRM Operator's Manuals	Data Collection	# of AT Controllers +2 copies
PRM Operator's Reference Cards	Data Collection	# of AT Controllers +2 copies

INITIAL SET UP/CONFIGURATION.

The configuration used in this test consists of the PRM system and it's operational displays as shown in **Figure 1**. This test requires a set of PRM displays in their normal operational environment including operational communications. The test will be complete when a final consensus has been determined for each Measure of Suitability.

DATA COLLECTION SETUP, TERMINATION & RESTART.

The TE should start the PRM and insure it's proper operation on channel 1. The TE should set the PRM displays to the normal default configuration. The TC should distribute the PRM operator's reference cards and the PRM operator's manuals to the AT controllers and brief the controllers on the test and their responsibilities. Data collection can be terminated and restarted following the completion of any sub-failure test.

Data Collection Steps.

1. **Controlled Channel Change.**

a. TC- Instruct the Test Controllers to change the system to Channel 2, to notice the status changes/alarms, continue to monitor the targets of opportunity. Have them change channels as many times as they want to, so that they get a good feeling for the channel change effects. Enter notes in the test data log as appropriate.

b. TC- Distribute Questionnaire-ATS3-1 to the Test Controllers and have them fill it out and collect the Questionnaires when the Test Controllers have filled them out.

2. **Automatic Channel Change.**

a. TE- Ensure that the complete PRM is operating correctly and that Channel 1 is in use.

b. TC- Have the Test Controllers monitor the PRM displays.

c. TE- Fault Channel 1 by turning the IPA to "off". Then reset Channel 1.

d. TE- After Channel 1 is back in Go/STBY fault Channel 2 by depressing the data processor reset. Then reset Channel 2.

e. TE- After Channel 2 is back in Go/STBY fault Channel 1 by depressing the data processor reset. Then reset Channel 1.

f. TC- Enter notes in the test data log as appropriate.

g. TC- Distribute Questionnaire-ATS3-2 to the Test Controllers and have them fill it out. Collect the Questionnaires when the Test Controllers have filled them out.

3. **Standby Channel Failure.**

a. TE- Insure that the complete PRM is operating correctly and that Channel 1 is in use.

b. TC- Have the Test Controllers monitor the PRM displays.

c. TE- 1st fault Channel 2 by depressing the data processor reset. Then reset the Channel.

d. TC- Enter notes in the test data log as appropriate.

e. TC- Distribute Questionnaire-ATS3-3 to the Test Controllers and have them fill it out. Collect the Questionnaires when the Test Controllers have filled them out.

4. **Single LAN Failure.**

a. TE- Insure that the complete PRM is operating correctly and that LAN 1 is in use.

b. TC- Have the Test Controllers monitor the PRM displays.

c. TE- Insert fault into LAN 1 by turning the power off at the LAN1 driver unit located in the ops auxiliary equipment cabinet.

d. TE- Turn power back on at the LAN 1 driver.

e. TC- Enter notes in the test data log as appropriate.

f. TC- Distribute Questionnaire-ATS3-4 to the Test Controllers and have them fill it out. Collect the Questionnaires when the Test Controllers have filled them out.

5. **Tape Failures.**

a. TE- Insure that the complete PRM is operating correctly using tape drive 1.

b. TC- Have the Test Controllers monitor the PRM displays.

c. TE- Place tape drive 1 off-line.

d. TE- Wait 5 minutes and put tape drive 2 off-line.

e. TE- Load tape drives 1 and 2 with pre-shortened tapes

f. TC- Start recording on tape drive 1. Have the Test Controllers monitor the PRM displays.

g. TC- Wait until first tape 1 is full and then until tape 2 is full.

h. TC- Enter notes in the test data log as appropriate.

i. TC- Distribute Questionnaire-ATS3-5 to the Test Controllers and have them fill it out. Collect the Questionnaires when the Test Controllers have filled them out.

6. **Keyboard Failures.**

a. TE- Insure that the complete PRM is operating correctly.

b. TC- Have the Test Controllers monitor the PRM displays.

c. TC- Unplug the keyboard on display 1.

d. TC- Unplug the keyboard on display 2.

e. TC- Enter notes in the test data log as appropriate.

f. TC- Distribute Questionnaire-ATS3-6 to the Test Controllers and have them fill it out. Reconnect the keyboards. Collect the Questionnaires when the Test Controllers have filled them out.

7. **Dectalker Failures.**

a. TE- Insure that the complete PRM is operating correctly.

b. TC- Have the Test Controllers monitor the PRM displays.

c. TC- Unplug or turn off the dectalker unit on display 1.

d. TC- Unplug or turn off the dectalker unit on display 2.

e. TC- Enter notes in the test data log as appropriate.

f. TC- Distribute Questionnaire-ATS3-7 to the Test Controllers and have them fill it out. Reconnect the dectalker units. Collect the Questionnaires when the Test Controllers have filled them out.

8. **PRM/ARTSIIIA Interface failures.**

a. TE- Insure that the complete PRM is operating correctly, that both PRM/ARTS Interface (I/F) Units are available, and that I/f unit 1 is active.

b. TC- Instruct the Test Controllers to monitor the targets of opportunity. Instruct the TE to turn off I/F Unit 1. Wait 2 minutes then, instruct the TE to turn off I/F Unit 2. Instruct the Test Controllers to monitor the target as they would in real life following the AT procedures.

c. TC- Enter notes in the test data log as appropriate.

d. TC- Distribute Questionnaire-ATS3-8 to the Test Controllers and have them fill it out. Collect the Questionnaires when the Test Controllers have filled them out.

9. **Single Display Failure.**

a. TE- Insure that the complete PRM is operating correctly.

b. TE- Turn off the power to display 1.

c. TE- After 5 minutes turn on display 1, reboot if required.

d. TE- Turn off the power to display 2.

e. TE- After 5 minutes turn on display 2, reboot if required.

f. TC- Distribute Questionnaires-ATS3-9 to the Test Controllers and have them fill it out. Collect the Questionnaires when the Test Controllers have completed them.

10. **Overload/Overflow Conditions.**

a. TE- Insure that the complete PRM is operating correctly.

b. TE- Open the geographic filters on the PRM to the full 32 mile filter.

c. TE- Have the Test Controllers note the system update rate, status and alarms as the system acquires tracks and moves into Overload and then into overflow.

d. TC- Distribute Questionnaire ATS3-10 to the Test Controllers and have them fill them out. Restore the system to the keyhole filter. Repeat steps a and b if necessary.

11. **Antenna Fault.**

a. TE- Reset the PRM filters to the keyhole and insure it's proper operation, set the PRM Displays to the normal default configuration and the system using channel 1.

b. TC- Instruct the Test Controllers to monitor the PRM displays as they would during simultaneous ILS approaches.

c. TE- After 5 minutes simulate an antenna fault.

d. TC- After the Test Controllers have observed the system status and performance distribute Questionnaires ATS3-11 to the Test Controllers and have them fill them out. Collect the questionnaires after they have been completed.

12. **Critical System Failure.**

a. TE- Insure that the complete PRM is operating correctly and channel 1 is on-line.

b. TC- Instruct the Test Controllers to monitor the PRM displays as they would during simultaneous ILS approaches.

c. TC- After 5 minutes power off channel 1. After another 5 minutes power off channel 2.

d. TE- Distribute Questionnaires ATS3-12 to the Test Controllers and have them fill them out. Collect the questionnaires after they have been completed.

ATS-3

Questionnaire-1. Name: Date / /

Controlled Channel Changes	YES	NO	The problem is....
Q1-Lost Data? Is the channel change quick enough?			
Q2-Data Integrity? Is the display presentation suitable following the channel change?			
Q3-Feedback? Is the command feedback from the channel change suitable?			
Q4-Status Screen? Is the status screen suitable for knowing channel status?			
Q5-Channel Status Training? Was the training provided to you sufficient to understand the channel status screen information to the level you require to fulfill your monitor responsibilities?			
Q6-Aural Alarm? Is the aural alarm for "controlled" channel changes suitable?			
Q7-Training? Was the training provided to you for changing PRM channels comprehensive enough?			

ATS-3

Questionnaire-2. Name: Date / /

Automatic Channel Changes	YES	NO	The problem is....
Q1-Lost Data? Is the channel change quick enough?			
Q2-Data Integrity? Is the display presentation suitable following the channel change?			
Q3-Status Screen? Is the status screen suitable for knowing the channel status?			
Q4-Subsystem Status Training? Was the training provided to you sufficient to understand the subsystem status screen information to the level you require to fulfill your monitor responsibilities?			
Q5-Aural Alarm? Is the aural alarm for "automatic" channel changes suitable?			
Q6-Reset Channel? Is the status suitable for when the channel is brought back on-line?			
Q7-Alarm Shutoff? Is there a suitable way to turn off the alarms?			
Q8-Training? Was the training provided to you on the effects that an auto channel change (single channel failure) means to the capability of the PRM to support your monitoring responsibilities suitable?			

ATS-3

Questionnaire-3. Name: Date / /

Standby Channel Failures	YES	NO	The problem is....
Q1-Display Presentation Is the display presentation suitable following the standby channel failure?			
Q2-Status Screen? Is the status screen suitable for knowing the standby channel status?			
Q3-Standby Channel Status Training? Was the training provided to you sufficient to understand the standby channel status screen information to the level you require to fulfill your monitor responsibilities?			
Q4-Aural Alarm? Is the aural alarm for "standby" channel changes suitable?			
Q5-Training? Was the training provided to you on the effects that a standby channel failure means to the capability of the PRM to support your monitoring responsibilities suitable?			

Questionnaire-4. Name: Date / /

Single LAN Failures	YES	NO	The problem is....
Q1-Lost Data? Is the LAN failure/change quick enough, is the amount of data loss acceptable?			
Q2-Display Presentation Is the display presentation suitable following the LAN failure/change?			
Q3-Status Screen? Is the status screen suitable for knowing the LAN status?			
Q4-LAN Status Screen Training? Was the training provided to you sufficient to understand the subsystem status screen information to the level you require to fulfill your monitor responsibilities?			
Q5-Aural Alarm? Is the aural alarm for LAN failures/changes suitable?			
Q6-Training? Was the training provided to you on the effects that a LAN change (single LAN failure) means to the capability of the PRM to support your monitoring responsibilities suitable?			

Questionnaire-5. Name: Date / /

Tape Failures	YES	NO	The problem is....
Q1-Tape Status? Is the status screen suitable for knowing the Tape drive status?			
Q2-Tape failures? Is the status screen suitable for displaying tape drive failure info?			
Q3-Tape Status Training? Was the training provided to you sufficient to understand the Tape status screen information to the level you require to fulfill your monitor responsibilities?			
Q4-Aural Alarm? Is the aural alarm for a tape drive failure suitable? Both tape drives?			
Q5-Training? Was the training provided to you on the effects that tape failures mean to the capability of the PRM to support your monitoring responsibilities suitable?			

ATS-3

Questionnaire-6. Name: Date / /

Keyboard Failures	YES	NO	The problem is....
Q1-Status Screen? Is the status screen suitable for knowing the Keyboard status?			
Q2-Keyboard Status Training? Was the training provided to you sufficient to understand the keyboard status screen information to the level you require to fulfill your monitor responsibilities?			
Q3-Aural Alarm? Is the an aural alarm for the keyboard failure suitable?			
Q4-Dectalk Test? Does the "TALK" command and the system monitoring give you enough confidence that the keyboard will work when it should?			
Q5-Training? Was the training provided to you on the effects that a keyboard failure means to the capability of the PRM to support your monitoring responsibilities suitable?			

Questionnaire-7. Name: Date / /

Dectalker Failures	YES	NO	The problem is....
Q1-Status Screen? Is the status screen suitable for knowing the Dectalker status?			
Q2-Dectalk Status Training? Was the training provided to you sufficient to understand the dectalker status screen information to the level you require to fulfill your monitor responsibilities?			
Q3-Aural Alarm? Is the an aural alarm for the dectalker failure suitable?			
Q4-Dectalk Test? Does the "TALK" command and the system monitoring give you enough confidence that the DecTalker will work when it should?			
Q5-Training? Was the training provided to you on the effects that a dectalker failure means to the capability of the PRM to support your monitoring responsibilities suitable?			

ATS-3

Questionnaire-8. Name: Date / /

PRM/ARTS Interface Unit Failures	YES	NO	The problem is....
Q1-Data Integrity? Is the PRM/ARTS Interface Unit change quick enough, is the amount of data loss acceptable?			
Q2-Display Presentation? Is the display presentation suitable following the PRM/ARTS Interface Unit change?			
Q3-Status Screen? Is the status screen suitable for knowing the PRM/ARTS Interface Unit(s) status?			
Q4-PRM/ARTS I/F Status Training? Was the training provided to you sufficient to understand the PRM/ARTS I/F status screen information to the level you require to fulfill your monitor responsibilities?			
Q5-Aural Alarm? Is the aural alarm for PRM/ARTS Interface Unit failure(s) suitable?			
Q6-Training? Was the training provided to you on the effects that a PRM/ARTS I/F failure(s) means to the capability of the PRM to support your monitoring responsibilities suitable?			

Questionnaire-9. Name: Date / /

Single Display Failure	YES	NO	The problem is....
Q1-Display Presentation? Is the display presentation suitable for sharing 1 display between two stations?			
Q2-Status Screen? Is the status screen suitable for knowing the Display status?			
Q3-Display Status Training? Was the training provided to you sufficient to understand the display status screen information to the level you require to fulfill your monitor responsibilities?			
Q4-Display Failure Training? Was the training provided to you sufficient to understand the consequences of a PRM display failure, the red border, etc?			
Q5-Aural Alarm? Is the aural alarm for Display Failures suitable?			
Q6-Display Resetting? Is the resetting of the failed display non-distracting enough to be done while you are monitoring active targets?			

ATS-3

Questionnaire-10. Name: Date / /

Overflow/Overload Condition. Monitor Controller	YES	NO	The problem is....
Q1- Status Screen? Is the status screen suitable for recognizing PRM overflow and overload events?			
Q2-Overflow/Overload Status Training? Was the training provided to you sufficient to understand the overflow and overload status screen information to the level you require to fulfill your monitor responsibilities?			
Q3- Aural Alarm? Is the implementation of the aural alarm for the overflow and overload events suitable?			
Q4-Modified Update Rate? Does the slower update rates during overload conditions allow you to fulfill your monitor responsibilities?			
Q5-PRM/NAS System Suitability? Do you feel that the PRM/NAS system (while in an overflow or overload state) suitably and effectively supports your responsibilities during the reversion to staggered approaches?			
Q6-Training? Was the training provided to you on the effects that an overflow or overload condition means to the capability of the PRM to support your monitoring responsibilities suitable?			

ATS-3

Questionnaire-11. Name: Date / /

Antenna Faults.	YES	NO	The problem is....
Q1- Status Screen? Is the status screen suitable for recognizing antenna faults?			
Q2-Antenna Fault Status Training? Was the training provided to you sufficient to understand the status screen information regarding antenna faults?			
Q3-PRM/NAS System Suitability? Do you feel that the PRM/NAS system suitably and effectively supports your responsibilities during the reversion to staggered approaches during an antenna fault?			
Q4- Aural Alarm? Is the aural alarm for an Antenna fault suitable?			
Q5-Training Was the training provided to you on the effects that an Antenna Fault have on the PRM System suitable?			

ATS-3

Questionnaire-12. Name: Date / /

Critical System Failure.	YES	NO	The problem is....
Q1- Status Screen? Is the status screen suitable for recognizing a critical system failure?			
Q2-System Failure Status Training? Was the training provided to you sufficient to understand the status screen information regarding critical system failures to the level you require to fulfill your monitor responsibilities?			
Q3-PRM/NAS System Suitability? Do you feel that the PRM/NAS system suitably and effectively supports your responsibilities during the reversion to staggered approaches during a critical system failure?			
Q4- Aural Alarm? Is the aural alarm for Critical System Failures suitable?			
Q5-Training Was the training provided to you on the effects that a Critical System Failure have on the PRM System suitable?			

TEST DATA REDUCTION AND ANALYSIS.

The TL will first analyze each test's Test Mission Log to determine whether the data collection was conducted acceptably. The data from data collection phases which were not concluded acceptably will not be included in any further analysis. The Questionnaires will then be analyzed. This analysis will attempt to determine a consensus of controller opinions for each question. In cases where the answers point to a difference of controller opinions the TL may review the questions with the controllers to determine the consensus opinion.

TEST CONCLUSION.

The test will be complete when the post test section of the test mission log has been completed and when a final consensus has been determined for each Measure of Suitability. For each failure the issue will be entered along with a proposed solution and an assessment of the issues priority.

COI Number	PASS	FAIL	ISSUE	PROPOSED SOLUTION	PRIO RITY
8a					
8b					
16					
17					

ATS4 - DATA PLAYBACK AND LISTING TEST

TEST OBJECTIVE.
The objective of this test is to collect the measures of suitability as listed below.

Issue Number	Operational Issues	Measure of Suitability
11a	Recording, Playback and Listing	The playback of recorded data suitably simulates actual PRM data and operations.
11b		The listing of PRM data supplies appropriate operational data.
16	Training	The contractor provided training is suitable for Air Traffic PRM operation.
17	Documentation	The contractor provided Operator's Manual is suitable for Air Traffic PRM operation.

EVALUATION CRITERIA.

The TC will first analyze each test's test mission log to determine whether the data collection was conducted acceptably. The data from data collection phases which were not concluded acceptably will not be included in any further analysis. The questionnaires will then be analyzed. This analysis will attempt to determine a consensus of test participant opinions for each operational issue. In cases where the answers point to a difference of opinion the TC may review the questions with the test participants to determine the consensus opinion. A consensus of the evaluated opinions will measure the suitability for each operational issue to determine a pass/fail criteria.

TEST DESCRIPTION.
This test will collect opinions from AT Staff Specialists by having them use the PRM Playback and Listing Programs. First the AT Staff Specialists will reconfigure the PRM system into a playback configuration and then use the PRM Playback program. Next the AT Staff Specialists will configure the PRM system into a listing configuration and use the PRM Listing program. The AT Staff Specialists will fill in questionnaires that investigate the suitability and effectiveness of the reconfiguration process, the Playback and Listing programs, the commands and controls used, and the documentation and training that was provided.

TEST PERSONNEL REQUIREMENTS.

#	Personnel	Responsibility
1	Test Coordinator (TC)	Coordinate with AT Staff Specialists
1	Test Engineer (TE)	Assist TC
2	AT Staff Specialist	Use PRM Playback and Listing Programs, supply opinions

TEST SUPPORT HARDWARE , SOFTWARE AND DOCUMENTATION.

Test Equipment, Facilities & Documentation	Purpose	Duration/# Req.
PRM System including Operational Displays	Data Collection	3 hours
PRM Data Tapes collected during ATS3	Supply Data	2 Tapes
PRM Operator's Manuals	Data Collection	2 copies
PRM Operator's Reference Cards	Data Collection	2 copies

INITIAL SET UP/CONFIGURATION.

This test requires the full PRM system. The test will be complete when a final consensus has been determined for each Measure of Suitability

DATA COLLECTION SETUP, TERMINATION & RESTART.

The TE should start the PRM and insure it's proper operation. The TE should set the PRM displays to the normal default configuration. The TC should distribute the PRM operator's reference cards and the PRM operator's manuals to the AT Staff Specialists and brief them on the test and their responsibilities.

Data Collection Steps.

1. **PRM Playback Program Setup.**

a. TC- Give the Staff Specialists the Data Tapes recorded form ATS-2 and have them configure the PRM system to a Playback configuration. Note the Staff Specialists should use the PRM documentation to assist them.

b. TE- Insure that the system has been successfully configured. Assist Staff Specialists if they were unsuccessful in configuring the system.

c. Repeat steps a and b reconfiguring the system to as many different Plackback configurations as the Staff Specialists think are viable.

d. TC- Distribute Questionnaire ATS4-1 to the Staff Specialists. Have them enter any problems onto out the questionnaire and hold onto it for later steps.

2. **PRM Playback Program.**

a. TC- Distribute Questionnaire ATS4-2 and ATS4-3 to the Staff Specialists. Have the Staff Specialists manipulate the tape and playback various files from both data tapes while reviewing the PRM documentation. Have them fill out questionnaire ATS4-2 and the playback questions on ATS4-3. The Staff Specialists should hold onto the questionnaires for later steps.

b. TC- Have the Staff Specialists re-configure the PRM system back to the normal operational configuration. Note the Staff Specialists should use the PRM documentation to assist them.

c. TE- Insure that the system has been successfully configured. Assist Staff Specialists if they were unsuccessful in configuring the system.

d. TC- Have the Staff Specialists fill out the questions on ATS4-1.

e. TC- Collect questionnaire ATS4-1.

3. **PRM Listing Program Setup.**

a. TC- Distribute questionnaire ATS4-4 and have the Staff Specialists configure the PRM system to list the data tapes. Note the Staff Specialists should use the PRM documentation to assist them.

b. TE- Insure that the system has been successfully configured. Assist Staff Specialists if they were unsuccessful in configuring the system.

c. TC- Have the Staff Specialists enter any problems onto ATS4-4 and hold onto the questionnaire for later steps.

4. **PRM Listing Program.**

a. TC- Have the Staff Specialists manipulate the tape and list various files and types of data from both data tapes while reviewing the PRM documentation. Have them fill out questionnaire ATS4-2 and the listing questions on ATS4-3.

b. TC- Have the Staff Specialists re-configure the PRM system back to the normal operational configuration. Note the Staff Specialists should use the PRM documentation to assist them.

c. TE- Insure that the system has been successfully configured. Assist Staff Specialists if they were unsuccessful in configuring the system.

d. TC- Have the Staff Specialists fill out the questions on ATS4-4.

e. TC- Collect questionnaires.

ATS-4

Questionnaire-1. Name: Date / /

Playback	YES	NO	The problem is....
Q1-PRM Playback Configuration Suitability? Does the PRM Playback Configuration suitably and effectively supports Air Traffic's requirements?			
Q2-Playback System Status? Is the alarm/status information provided effective and suitable for the Playback configuration?			
Q3-Playback Re-configuration Training? Was the training provided to you sufficient to understand the Playback Re-configuration process?			
Q4-Playback Configuration Training? Was the training provided to you sufficient to understand the Playback Configuration?			
Q5-Playback Configuration Documentation? Does the PRM documentation effectively and suitably cover the Playback configuration/reconfiguration processes?			
Q6-Playback? Does the PRM Playback program effectively and suitably support Air Traffic's Requirements?			
Q7-Playback Training? Was the training provided to you sufficient to understand the Playback program?			
Q8-Playback Documentation? Does the PRM documentation effectively and suitably cover the Playback program?			

ATS-4

Questionnaire-2. Name: Date / /

Tape Control Commands	Select Tape Drive	Rewind Tape	Advance to End of Tape	Select Tape Time	Go to Start of Current File	Go to Start of Previous File	Go to Start of Next File
Q1-Found in Ref Card Was the command found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q2-Ref Card Entry Was the command's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q3-Found in Ops Manual Was the command found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q4-Ops Manual Entry Was the command's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q5-Keystrokes Are the command's keystrokes acceptable?	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable
Q6-Feedback Was the command's feedback acceptable?	OK Not Useful Not Needed	OK Not Useful Not Needed	OK Not Useful Not Needed	OK Not Useful Not Needed	OK Not Useful Not Needed	OK Not Useful Not Needed	OK Not Useful Not Needed
Q7-Training Was the training provided for the command acceptable?	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered
Q8-CMD Selection Does the command allow you to control the tape as you require/prefer?	Yes No See Comments	Yes No See Comments	Yes No See Comments	Yes No See Comments	Yes No See Comments	Yes No See Comments	Yes No See Comments
Q9-CMD needed Is this command required, nice to have or not needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed
***** Comments ***** Place in the appropriate command column the Q# before each comment.							
Are there any additional commands or controls that you require/prefer to control the tape?							

ATS-4

Questionnaire-3. Name: Date / /

Playback and Listing Commands	Start Playback	Pause Playback	Resume Playback	Stop Playback	Select Print Options	Print Data
Q1-Found in Ref Card Was the command found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q2-Ref Card Entry Was the command's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q3-Found in Ops Manual Was the command found easily enough?	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found	OK Too Hard Not Found
Q4-Ops Manual Entry Was the command's entry useful/complete enough?	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete	OK Too Cryptic Incomplete
Q5-Keystrokes Are the command's keystrokes acceptable?	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable	Good Usable Unacceptable
Q6-Feedback Was the command's feedback acceptable?	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed	Ok Not Useful Not Needed
Q7-Training Was the training provided for the command acceptable?	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered	OK Too Little Too Cryptic Not Covered
Q8-CMD Selection Does the command allow you to control the tape as you require or prefer?	Yes No See Comments	Yes No See Comments	Yes No See Comments	Yes No See Comments	Yes No See Comments	Yes No See Comments
Q9-CMD needed Is this command required, nice to have, or not needed?	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed	Required Nice Not Needed
***** Comments ***** Place in the appropriate command column the Q# before each comment.						
Are there any additional commands or controls that you require/prefer to control the tape data?						

ATS-4

Questionnaire-4. Name: Date / /

PRM Listing Program	YES	NO	The problem is....
Q1-PRM Listing Program Configuration Suitability? Does the PRM Listing Program Configuration suitably and effectively supports Air Traffic's requirements?			
Q2-PRM Listing Program System Status? Is the alarm/status information provided effective and suitable for the PRM Listing Program configuration?			
Q3-PRM Listing Program Re-configuration Training? Was the training provided to you sufficient to understand the PRM Listing Program Re-configuration process?			
Q4-PRM Listing Program Configuration Training? Was the training provided to you sufficient to understand the PRM Listing Program Configuration?			
Q5-PRM Listing Program Configuration Documentation? Does the PRM documentation effectively and suitably cover the Listing Program configuration/reconfiguration processes?			
Q6-PRM Listing Program? Does the PRM Listing program effectively and suitably support Air Traffic's Requirements?			
Q7-PRM Listing Program Training? Was the training provided to you sufficient to understand the PRM Listing program?			
Q8-PRM Listing Program Documentation? Does the PRM documentation effectively and suitably cover the PRM Listing program?			

TEST DATA REDUCTION AND ANALYSIS.

The TL will first analyze each test's Test Mission Log to determine whether the data collection was conducted acceptably. The data from data collection phases which were not concluded acceptably will not be included in any further analysis. The Questionnaires will then be analyzed. This analysis will attempt to determine a consensus of controller opinions for each question. In cases where the answers point to a difference of controller opinions the TL may review the questions with the controllers to determine the consensus opinion.

TEST CONCLUSION.

The test will be complete when the post test section of the test mission log has been completed and when a final consensus has been determined for each Measure of Suitability. For each failure the issue will be entered along with a proposed solution and an assessment of the issues priority.

COI Number	PASS	FAIL	ISSUE	PROPOSED SOLUTION	PRIO RITY
11a					
11b					
16					
17					

APPENDIX D.

AF OPERATIONAL TEST PROCEDURES

AFS1 - FAULT DETECTION AND ISOLATION TEST

TEST OBJECTIVE.
The objective of this test is to collect the measures of suitability as listed below.

Issue #	Operational Issues	Measure of Suitability
15	Maintainability	The PSD must be suitably usable by appropriate trained personnel to detect and isolate system faults to the Line Replaceable Unit (LRU) level.
16	Training	The contractor provided training is suitable for Air Traffic PRM operation.
17	Documentation	The contractor provided Operator's Manual is suitable for Air Traffic PRM operation.

EVALUATION CRITERIA.

The TC will first analyze each test's test mission log to determine whether the data collection was conducted acceptably. The data from data collection phases which were not concluded acceptably will not be included in any further analysis. The questionnaires will then be analyzed. This analysis will attempt to determine a consensus of test participant opinions for each operational issue. In cases where the answers point to a difference of opinion the TC may review the questions with the test participants to determine the consensus opinion. A consensus of the evaluated opinions will measure the suitability for each operational issue to determine a pass/fail criteria.

TEST DESCRIPTION.
This test will collect opinions from AF Technicians by having them respond to selected failures. In response to the failures, the AF Technicians will troubleshoot the system by using the PRM display, the PSD, and the PRM IB. The AF Technicians will then fill out a Questionnaire for each failure type. These questions investigate the suitability of the PRM PSD fault detection and isolation capabilities and the suitability and effectiveness of the associated sections of the contractor provided training and PRM IB. The selected failures that make up the PSD Fault Detection and Isolation Tests are:

1. Single LAN failure.

2. Tape Drive Failures (single and double).

3. Channel Failures (Failed PRM LRUs)
   a. IPA failure (on-line channel)
   b. DP failure (on-line channel)
   c. Interrogator power supply A or B (off-line channel)
   d. SP failure (off-line channel)

5. UPS Failure

6. Graphics Processor Failures
   a. Barco Graphics Engine
   b. GP Dectalker Unit
   c. Console Keyboard

7. ARTS Interface

8. Antenna dipole

9. RF Distribution (RFD)
   a. RFD power supply
   b. Phase Shifter

10. Indeterminate Failure (requiring field support)

TEST PERSONNEL REQUIREMENTS.

#	Personnel	Responsibility
1	Test Coordinator (TC)	Coordinate with AT Staff Specialists
1	Test Engineer (TE)	Assist TC
2	AF Test Technicians (TT)	Supply Opinions

TEST SUPPORT HARDWARE , SOFTWARE AND DOCUMENTATION.

Test Equipment, Facilities & Documentation	Purpose	Duration/# Req.
PRM System	Data Collection	3 hours
Pre-shortened 9 track data tapes		
PRM Maintenance Handbook	Data Collection	2 copies
PRM Maintenance Instruction Book	Data Collection	2 copies

INITIAL SET UP/CONFIGURATION.
The configuration used in this test consists of the PRM system and it's operational displays as shown in **Figure 1**. This test requires the full PRM system. The test will be complete when a final consensus has been determined for each Measure of Suitability

DATA COLLECTION SETUP, TERMINATION & RESTART.
The TE should start the PRM and insure it's proper operation. The TC should distribute the PRM Maintenance Handbooks and IBs to the TT and brief them on the test and their responsibilities. Data collection can be terminated and restarted following the completion of a data collection "Fault Detection and Isolation" step.

Data Collection Steps.

TC - Hand out the PRM IBs to the Test Technicians (TT) to be used as an aid in troubleshooting and understanding the PRM functions.

1. **Single LAN Failure - OPS Site** 1 hour.

a. TE - Insure that the complete PRM is operating correctly and that LAN 1 is in use.

b. TC - At the OPS site, have one TT monitor the PSD, the other TT monitor GP3.

c. TE - Turn the power off at the LAN1 Multiport Transceiver located in the OPS Comm cabinet.

d. TT - Use the PSD and the PRM IB to pinpoint the trouble source and location.

e. TE - Reset the Transceiver power to "on".

f. TT - Reset the system to normal using the PRM IB as required.

g. TC - Enter notes in the test data log as appropriate. After failure analysis, have the TT fill out Questionnaire 1 - LRU Failure.

2. **Tape Drive Failures - OPS Site .**

a. **Both tapes full** 1 hour

(1) TE - Insure that the complete PRM is operating correctly with the pre-shortened tapes loaded using tape drive 1.

(2) TC - Have the TT monitor the PSD and GP3.

(3) TE - Start data recording "REC", allow both tapes to fill to capacity and fault.

(4) TT - Use the PSD and the PRM IB to pinpoint the trouble source and location.

(5) TT - Correct the faulted subsystem using the PRM IB and reset system to normal operation.

(6) TC - Enter notes in the test data log as appropriate.

b. **Single Tape Failure** 1 hour

(1) TE - Replace the shortened tapes with normal tapes. Put tape 1 active with tape 2 standby.

(2) TC - Have the TT monitor the PSD and GP3.

(3) TE - Turn tape drive 1 to "off".

(4) TT - Use the PSD and the PRM IB to pinpoint the trouble source and location.

(5) TT - Correct the faulted subsystem using the PRM IB and reset system to normal operation.

(6) TC - Enter notes in the test data log as appropriate.

(7) TC - After failure analysis, have the TT fill out Questionnaire 1 - LRU Failures.

3. **Channel Failures - T/R Site.** 4 hours

TE - Insure that the complete PRM is operating correctly and that Channel is in use.

TC - Have the TT monitor the PSD Monitor at the T/R site. Perform one fault at a time. Allow time for fault analysis for each fault.

a. **IPA Failure (on-line channel).**1 hour

(1) TE - Fault Channel 1 by turning the IPA to "off".

(2) TT - Use the PSD and the PRM IB to pinpoint the trouble source and location.

(3) TE - Clear the fault by turning the IPA "on".

(4) TC - Enter notes in the test data log as appropriate.

(5) TT - Reset the faulted PRM system using the PRM IB.

b. **DP Failure (on-line channel)**.1 hour
(1) TE - Fault channel 2 by unseating the data processor board. Be sure to use the ESD strap.

(2) TT - Use the PSD and the PRM IB to pinpoint the trouble source and location.

(3) TE - Clear the fault by reseating the data processor board.

(4) TT - Reset the PRM system using the PRM IB.

(5) TC - After failure analysis, have the TT fill out Questionnaire 1 - LRU Failures.

c. **Interrogator Power Supply - (standby channel)**.1 hour
(1) TC - Have the TT monitor the PSD.

(2) TE - Fault Channel 2 by turning off SP power supply PSI 1.

(3) TT - Use the PSD and the PRM IB to pinpoint the trouble source and location.
(4) TC - Observe the TT, enter notes in the test data log as to their use of reference manuals and trained skills exhibited.

(5) TT - Correct the fault and reset the faulted channel using the PRM IB.

d. **Reply decoder - (standby channel)** 1 hour
(1) TE - Fault Channel 2 by unseating the A14 UPI board on the SP.

(2) TC - Have the TT monitor the PSD.

(3) TT - Use the PSD and the PRM IB to pinpoint the trouble source and location.

(4) TC - Observe the TT, enter notes in the test data log as to their use of reference manuals and trained skills exhibited.

(5) TT - Correct the fault and reset the faulted channel using the PRM IB.

(6) TC - Have the TT fill out Questionnaire 1 - LRU Failures.

5. **UPS Failures - T/R Site**. 3 hours
TE - Insure that the complete PRM is operating correctly and that Channel 1 is in use.

a. **Remove Input Commercial power** 2 hours
(1) TC - Have the TT monitor the PSD.

(2) TE - Create a UPS failure status alarm by turning off the commercial power to the UPS by momentarily placing the circuit breakers in power panel A to "off".

(3) TT - Use the PSD and the PRM IB to pinpoint the trouble source and location.

(4) TT - Perform procedures in the UPS reference manual prior to restoring power.

(5) TC - Enter notes in the test data log as appropriate.

b. **Manually Bypass UPS** 1 hour

(1) TC - Turn the manual By-pass switch located on the UPS to Bypass. This connects the PRM directly to the AC source at the power panel and will cause a failure alarm.

(2) TT - Perform procedures in the UPS reference manual to prepare the UPS prior to restoring power.

(3) TC - Enter notes in the test data log as appropriate.

(4) TC - After failure analysis, have the TT fill out Questionnaire 1 - LRU Failures.

6. **GP Failures - OPS Site.** 3 hours

a. **Barco Driver Failure.** 1 hour

(1) TE - Insure that the complete PRM is operating correctly and that Channel 1 is in use.

(2) TC - Have one TT monitor GP3 and the other TT monitor the PSD.

(3) TE - Turn the power off at the Barco driver unit located in rear of GP1 console located in the TRACON room.

(4) TT - Use the PSD and the PRM IB to pinpoint the trouble source and location.

(5) TT - Reset the faulted subsystem using the PRM IB.

(6) TC - Enter notes in the test data log as appropriate.

b. **GP Dectalker Failure.** 1 hour

(1) TE - Insure that the complete PRM is operating correctly and that Channel 1 is in use.

(2) TC - Have one TT monitor GP3 and the other TT monitor the PSD.

(3) TE - Disable the dectalker for GP1 (or active dectalker *) by turning the unit off.

(4) TT - Use the PSD and the PRM IB to pinpoint the trouble source and location.

(5) TT - Reset the faulted subsystem using the PRM IB.

(6) TC - Enter notes in the test data log as appropriate.

c. **Console Keyboard and Console speaker** - 1 hour

(1) TE - Insure that the complete PRM is operating correctly with Channel 1 is in use. GP4 is in supervisory mode.

(2) TT - Place GP1 in maintenance mode and power console down.

(3) TT - Return to equipment room and monitor GP4 and the PSD.

(4) TE - Disable the keyboard on GP1 by removing the keyboard and disconnecting J1. Disable the speaker by disconnecting one speaker wire. Reinstall the keyboard and speaker.

(5) TT - Power up GP1. There will be a PUB fault.

(6) TT - Use the PSD and the PRM IB to pinpoint the trouble source and location.

(7) TT - Make correction and reset the faulted subsystem using the PRM IB.

(8) TC - Enter notes in the test data log as appropriate.

(9) TC - After failure analysis, have the TT fill out Questionnaire 1 - LRU Failures.

7. **ARTS Interface Unit** 1 hour

a. TE - Insure that the complete PRM is operating correctly and that Channel 1 is in use.

b. TC - Have the TT place GP3 in Supervisory Protected mode if it is not already in this mode.

c. TE - Turn the power off at the ARTS IF unit 1 located in RDS 1.

d. TT - Use the PSD and the PRM IB to pinpoint the trouble source and location.

e. TT - Reset the faulted subsystem using the PRM IB.

f. TC - Enter notes in the test data log as appropriate.

g. TC - After failure analysis, have the TT fill out Questionnaire 1 - LRU Failures.

8. **Antenna Dipole - Antenna Deck and T/R Shelter** 2 hours

a. TE - Insure that the complete PRM is operating correctly and that Channel 1 is in use.

b. TC - Have the TT monitor the T/R PSD.

c. TE - Disconnect input RF rigid cable located at the bottom of the dipole. Choose a known dipole number if possible.

d. TT - Use the PSD and the PRM IB to pinpoint the trouble source and location.

e. TE - Reconnect the rigid coax to the dipole. Torque to correct inch pounds.

f. TT - Reset the faulted system using the PRM IB.

g. TC - Enter notes in the test data log as appropriate.

h. TC - After failure analysis, have the TT fill out Questionnaire 1 - LRU Failures.

9. **RF Distribution - RFD Shelter** 2 hours

a. **RFD Power Supply** 1 hour

(1) TE - Insure that the complete PRM is operating correctly and that Channel 1 is in use. Put GP3 in supervisory mode. Turn GP Alarms off.

(2) TC - Have one TT monitor GP3 and the other TT monitor the PSD.

(3) TE - In the RFD shelter, turn off the RFD 5 volt power supply.

(4) TT - Use the PSD and the PRM IB to pinpoint the trouble source and location. Because of the locations of the RFD and the OPS building ,it is not necessary for the TT to make the actual correction.

(5) TC - Enter notes in the test data log as appropriate and inform the TE that the test is complete and ready for restoration of the 5v power supply.

(6) TE - After the TT have successfully located the trouble, unseat a phase shifter in the RFD before restoring the 5v power supply. Restore power to the RFD power supply. This RFD fault will occur during PUB.

b. **RFD Phase Shifter.** 1 hour

(1) TE - Have the TT attempt to Reset the faulted system using the PRM IB. Of course, it appears to still have a fault.

(2) TC - observe how quickly the TT discover that another RFD fault is present. Enter notes in the test data log.

(3) TT - Use the PSD and the PRM IB to pinpoint the trouble source and location. Again, it is not necessary to make the actual correction.

(4) TE - Power down the RFD and reseat the phase shifter board. Restore power.

(5) TT - Reset the channel using the PRM IB.

(6) TC - After failure analysis, have the TT fill out Questionnaire 1 - LRU Failures.

10. **Indeterminate Failure - Requires Field Support**

a. TE - Instruct the TT that both PRM System LANs have failed and that the PSD Fault Isolation program does not indicate an appropriate LRU to replace.

b. TT - Follow the established procedure to obtain Field Support and determine when the actual support person would respond to MSP.

c. TT - Note the amount of time in order to contact the field support organization and obtain a response time:_____

d. TT - Note the amount of time before the field support person would respond at MSP: _____

e. TC - Have the TT fill out Questionnaire 2 - Indeterminate Failure.

11. **General Questions**

(1) TC - Have the TT fill out Questionnaire 3 - General Questions.

AFS-1

Questionnaire-1. Name: Date / /

LRU Failures: LRU_____	YES	NO	The problem is....
Q1- PSD Status Subscreens Suitable? Do the PSD's Status Subscreens suitably assist you in locating PRM faults and maintenance conditions?			
Q2- PSD Status Subscreens Training Effective? Was the training provided to you sufficient to understand the PSD status subscreens?			
Q3- PRM Instruction Book Suitable? Is the PRM Instruction Book detailed and comprehensive enough to assist you in using the PSD status subscreens?			
Q4- PSD Fault Isolation Suitable? Is the PSD Fault Isolation Program suitable to isolate this fault?			
Q5- Fault Isolation Training Effective? Was the training provided to you sufficient to understand and run the PSD fault isolation programs for this fault?			
Q6- PRM Instruction Book Suitable? Is the PRM Instruction Book detailed and comprehensive enough to assist you in running the PSD to isolate this fault?			
Q7- PRM Instruction Book Suitable? Is the PRM Instruction Book detailed and comprehensive enough to assist you in physically locating the failed LRU?			
Q8- Subsystem Reset Training Effective? Was the training provided to you sufficient to perform a reset on this subsystem?			
Q9- PRM Instruction Book Suitable? Is the PRM Instruction Book (and if applicable any referenced COTS manuals) detailed and comprehensive enough to assist you in resetting this subsystem?			
Q10- LRU Function Training? Was the training provided to you sufficient to understand the LRU's functions?			

AFS-1

Questionnaire-2. Name: Date / /

Indeterminate failure	YES	NO	The problem is....
Q1- Contacting Field Support (procedure)? Is the procedure for contacting the field support organization suitable and effective for AF's support responsibilities?			
Q2- Contacting Field Support (time)? Is the time required for contacting the field support organization suitable and effective for AF's support responsibilities?			
Q3- Contacting Field Support (response time)? Is the time required for the field support organization to respond suitable and effective for AF's support responsibilities?			
Q3- Contacting Field Support (response)? Is the response quality from the field support organization suitable and effective for AF's support responsibilities?			

AFS-1

Questionnaire-3. Name: Date / /

General Questions	YES	NO	The problem is....
Q1- PSD Status Subscreens Suitable? Do the PSD's Status Subscreens suitably assist you in locating PRM faults and maintenance conditions?			
Q2- PSD Status Subscreens Training Effective? Was the training provided to you sufficient to understand the PSD status subscreens?			
Q3- PRM Instruction Book Suitable? Is the PRM Instruction Book detailed and comprehensive enough to assist you in using the PSD status subscreens?			
Q4- PRM Fault Latching? Is the PRM Fault Latching scheme suitable for field maintenance requirement?			
Q5- Fault Latch Training? Was the training provided to you sufficient to understand why and when the PRM will latch faults?			
Q6- PRM Instruction Book Suitable? Is the PRM Instruction Book detailed and comprehensive enough to assist you in determining why and when the PRM system will latch faults?			
Q7- PRM Maintenance Mode Handshake Suitable? Is the Maintenance Mode Handshaking Scheme suitable and effective for field maintenance requirements?			
Q8- PRM Maintenance Mode Handshake Training Effective? Was the training provided to you sufficient to understand the PRM Maintenance Mode Handshake scheme?			
Q9- PRM Instruction Book Suitable? Is the PRM Instruction Book detailed and comprehensive enough to assist with the PRM Maintenance Mode Handshake?			
Q10- PRM Status Reporting Suitable? Are the PRM status messages and alarms suitable for field maintenance requirements?			
Q11- PRM Status Reporting Training Effective? Was the training provided to you sufficient to understand the PRM status messages and alarms for field maintenance requirements?			
Q12- PRM Instruction Book Suitable? Is the PRM Instruction Book detailed and comprehensive enough to assist with understanding the PRM status messages and alarms for field maintenance requirements?			

TEST DATA REDUCTION AND ANALYSIS.

The TL will first analyze each test's Test Mission Log to determine whether the data collection was conducted acceptably. The data from data collection phases which were not concluded acceptably will not be included in any further analysis. The Questionnaires will then be analyzed. This analysis will attempt to determine a consensus of technician opinions for each question. In cases where the answers point to a difference of controller opinions the TL may review the questions with the technicians to determine the consensus opinion.

TEST CONCLUSION.

The test will be complete when the post test section of the test mission log has been completed and when a final consensus has been determined for each Measure of Suitability. For each failure the issue will be entered along with a proposed solution and an assessment of the issues priority.

COI Number	PASS	FAIL	ISSUE	PROPOSED SOLUTION	PRIO RITY
15					
16					
17					

AFS2 - LRU REMOVAL AND REPLACEMENT TEST

TEST OBJECTIVE.
The objective of this test is to collect the measures of suitability as listed below.

Issue #	Operational Issues	Measure of Suitability
15	Maintainability	The design of the PRM system must allow for the removal and replacement of all LRUs of the PRM system.
16	Training	The Training provided to the AF Technicians must suitably cover the removal and replacement of all the LRUs of the PRM system.
17	Documentation	The Instruction Book provided to the AF Technicians must suitably cover the removal and replacement of all LRUs of the PRM system.
18	Safety	The design of the PRM system must allow for the safe removal and replacement of all LRUs of the PRM system.
19	Supportability	The spares provided are of suitable quantity and quality to maintain the PRM system.

EVALUATION CRITERIA.

The TC will first analyze each test's test mission log to determine whether the data collection was conducted acceptably. The data from data collection phases which were not concluded acceptably will not be included in any further analysis. The questionnaires will then be analyzed. This analysis will attempt to determine a consensus of test participant opinions for each operational issue. In cases where the answers point to a difference of opinion the TC may review the questions with the test participants to determine the consensus opinion. A consensus of the evaluated opinions will measure the suitability for each operational issue to determine a pass/fail criteria.

TEST DESCRIPTION.

This test will collect opinions from AF Technicians by having them replace selected LRUs in the PRM system. The AF Technicians will then fill out a Questionnaire for each LRU replacement. These questions investigate the suitability of the PRM IB and the effectiveness of the associated contractor provided training.

A sample group of LRUs is selected for replacement; another group is selected for a "procedural walk-thru", but not to make an actual replacement. The Test Technician will refer to the PRM IB procedures to replace the designated LRUs. The Test Technician will refer to the theory of operation to gain an overall understanding of the LRU functionality. Note: LRUs to be reviewed by a Walk-Thru may be changed to an actual LRU and additional LRUs may be tested at the request of the Test Technicians as time allows. The selected LRUs that make up the LRU Replacement Tests are:

LRUs to be Replaced	LRUs to be reviewed for Walk-Thru.
1. Auxiliary Cabinet Blower Assembly.	1. Sony CRT.
2. Interrogator PA assembly.	2. Barco Graphics Engine.
3. Interrogator Power Supply A.	3. Antenna Dipole.
4. Test target Generator.	
5. RFD Phase Shifter.	

TEST PERSONNEL REQUIREMENTS.

#	Personnel	Responsibility
1	Test Coordinator (TC)	Coordinate with AT Staff Specialists
1	Test Engineer (TE)	Assist TC
2	AF Test Technicians (TT)	Supply Opinions

TEST SUPPORT HARDWARE , SOFTWARE AND DOCUMENTATION.

Test Equipment, Facilities & Documentation	Duration/# Req.
PRM System	3 hours
PRM Maintenance Handbook	2 copies
PRM Instruction Book (IB)	2 copies
Handtools, including screwdriver	1 set
Spare LRUs: (1) Auxiliary Cabinet Blower Assembly. (2) Interrogator PA assembly. (3) Interrogator Power Supply A. (4) Test target Generator (5) RFD Phase Shifter (6) Receiver	1 each

INITIAL SET UP/CONFIGURATION.

The configuration used in this test consists of the PRM system and it's operational displays as shown in **Figure 1**. This test requires the full PRM system. Configure equipment room display, GP4, as the supervisory display. Insure that the alarm switches on the GP1 and GP2 displays are in the "off" position. Insure that the directions in the PRM IB are followed carefully, i.e. remove power when necessary, use wrist straps where required, etc. The test will be complete when a final consensus has been determined for each Measure of Suitability.

DATA COLLECTION SETUP, TERMINATION & RESTART.

The TE should start the PRM and insure it's proper operation. The TC should distribute the PRM Maintenance Handbooks and IBs (IB) to the TT and brief them on the test and their responsibilities. Data collection can be terminated and restarted following the completion of a data collection "LRU Removal and Replacement" step.

Data Collection Steps.

1. **Auxiliary Cabinet Blower Assembly.** (Walk-thru Option) - 1/2 hour

a. TE - Insure that the complete PRM is operating correctly.

b. TC - Have the TT look up the Auxiliary Cabinet Blower Assembly in the PRM IB and follow the directions for it's replacement.

c. TC - Enter notes in the test data log as appropriate.

d. TC - After the TT have completed the LRU replacement and reset the system successfully, have the TT fill out Questionnaire 1 - LRU Removal and Replacement and enter any pertinent problems on Questionnaire 2.

2. **Interrogator PA Assembly.** - 2 hours (alignment required)

a. TE - Insure that the complete PRM is operating correctly.

b. TC - Have the TT look up the Interrogator PA Assembly in the PRM IB and follow the directions for it's replacement.

c. TC - Enter notes in the test data log as appropriate.

d. TC - After the TT have completed the LRU replacement and reset the system successfully, have the TT fill out Questionnaire 1 - LRU Removal and Replacement and enter any pertinent problems on Questionnaire 2.

3. **Interrogator Power Supply A.** - 2 hours (adjustment required)

a. TE - Insure that the complete PRM is operating correctly.

b. TE - Have the TT look up the Interrogator Power Supply A in the PRM IB and follow the directions for it's replacement.

c. TC - Enter notes in the test data log as appropriate.

d. TC - After the Test Technicians have completed the LRU replacement and reset the system successfully, have the TT fill out Questionnaire 1 - LRU Removal and Replacement and enter any pertinent problems on Questionnaire 2.

4. **Test Target Generator** - 3 hours (calibration required)

a. TE - Have the TT look up the TTG in the PRM IB and follow directions for it's replacement.

b. TC - Enter notes in the test data log as appropriate.

c. TC - After the Test Technicians have completed the LRU replacement and reset the system successfully, have the TT fill out Questionnaire 1 - LRU Removal and Replacement and enter any pertinent problems on Questionnaire 2.

5. **RFD Phase Shifter.** (Optional Walk-thru) - 1 hour

a. TE - Have the TT look up the RFD Phase Shifter in the PRM IB and follow directions for it's replacement.

b. TC - Enter notes in the test data log as appropriate.

c. TC - After the Test Technicians have completed the LRU replacement, have the TT fill out Questionnaire 1 - LRU Removal and Replacement and enter any pertinent problems on Questionnaire 2.

6.. **Receiver SUM or DIFF** - 1 hour - alignment check is required.

a. TE - Have the TT look up the Receiver in the PRM IB and follow directions for it's replacement.

b. TC - Enter notes in the test data log as appropriate.

c. TC - After the Test Technicians have completed the LRU replacement, have the TT fill out Questionnaire 1 - LRU Removal and Replacement and enter any pertinent problems on Questionnaire 2.

"Walk- Thru" LRU Replacements

7. **Sony CRT.** - 2 hours for walk-thru, 4 hours for replacement.

a. TE - Have the TT look up the Sony CRT in the PRM IB. Use GP3 Console in conjunction with the referenced COTS manual to walk-through the directions for replacement. Identify the bolts, cables, and etc.

b. TC - Enter notes in the test data log as appropriate.

c. TC - After the Test Technicians have completed the LRU replacement walk-through, have the TT fill out Questionnaire 1 - LRU Removal and Replacement and enter any pertinent problems on Questionnaire 2.

8. **BARCO Graphic Engine.** - 2 hours (software changes necessary at PSD)

a. TE - Have the TT look up the Barco Graphics Engine in the PRM IB. Use GP3 Console in conjunction with the referenced materials to walk-through the directions for replacement. Identify the connections, cables, and etc.; determine alignments required and walk through them also.

b. TC - Enter notes in the test data log as appropriate.

c. TC - After the TT have completed the LRU replacement walk-through, have the TT fill out Questionnaire 1 - LRU Removal and Replacement and enter any pertinent problems on Questionnaire 2.

9. **Antenna Dipole.** - 1:00 hour for walk-thru; 2:30 hours to replace the dipole.

a. TE - Have the TT look up the Antenna Dipole in the PRM IB and walk through directions for it's replacement.

b. TC - Enter notes in the test data log as appropriate.

c. TC - After the Test Technicians have completed the LRU replacement walk-thru, have the TT fill out Questionnaire 1 - LRU Removal and Replacement and enter any pertinent problems on Questionnaire 2.

10. **Other LRUs.** (Optional Walk-thru)

a. TE - Have the TT look up the LRU in the PRM IB and follow directions for it's replacement.

b. TC - Enter notes in the test data log as appropriate.

c. TC - After the Test Technicians have completed the LRU replacement, have the TT fill out Questionnaire 1 - LRU Removal and Replacement and enter any pertinent problems on Questionnaire 2.

AFS-2

Questionnaire-1. Name: Date / /

LRU: _____	YES	NO	No, the problem is....
Q1- LRU Replace-ability? Was the LRU replaceable in a suitable manner? (accessibility and time consumption)			
Q2- LRU Replacement Training Effective? Was the training provided to you sufficient to use the PRM IB and replace the LRU?			
Q3- PRM Instruction Book Suitable? Is the PRM Instruction Book detailed and comprehensive enough to assist you in replacing this LRU?			
Q4- PRM Instruction Book Suitable? Is the PRM Instruction Book detailed and comprehensive enough to assist you in physically locating the failed LRUs?			
Q5- Subsystem Reset Training Effective? Was the training provided to you sufficient to perform a reset, alignment, or calibration on this subsystem? N/A if not required.			
Q6- PRM Instruction Book Suitable? Is the PRM Instruction Book detailed and comprehensive enough to assist you in resetting, aligning, or calibrating this subsystem? N/A if not required.			
Q7- LRU Functional Training? Was the training provided to you sufficient to understand the LRU's functions?			
Q8- Overall System Safety ? Do the test tools, PRM documentation, PRM System or procedures allow you to perform this LRU removal and replacement in a safe manner?			

AFS--2

Questionnaire-2. Name: Date / /

General Questions	YES	NO	No, the problem is....
Q1- Signal Flow Documentation? Does the PRM Instruction Book suitably cover the signal flow of the PRM system?			
Q2- Signal Flow Training? Did the training provided to you suitably cover the signal flow of the PRM system?			
Q3-LAN Documentation? Does the PRM Instruction Book suitably cover the PRM system LAN (including system reconfiguration)?			
Q4-LAN Training? Did the training provided to you suitably cover the PRM system LAN (including system reconfiguration)?			

TEST DATA REDUCTION AND ANALYSIS.

The TL will first analyze each test's Test Mission Log to determine whether the data collection was conducted acceptably. The data from data collection phases which were not concluded acceptably will not be included in any further analysis. The Questionnaires will then be analyzed. This analysis will attempt to determine a consensus of technician opinions for each question. In cases where the answers point to a difference of controller opinions the TL may review the questions with the technicians to determine the consensus opinion.

TEST CONCLUSION.

The test will be complete when the post test section of the test mission log has been completed and when a final consensus has been determined for each Measure of Suitability. For each failure the issue will be entered along with a proposed solution and an assessment of the issues priority.

COI Number	PASS	FAIL	ISSUE	PROPOSED SOLUTION	PRIOR ITY
15					
16					
17					
18					
19					

AFS3 - MAINTENANCE PROCEDURES TEST

TEST OBJECTIVE.
The objective of this test is to collect the measures of suitability as listed below.

Issue #	Operational Issues	Measure of Suitability
15	Maintainability	Maintenance Procedures must be executable by appropriate trained personnel
16	Training	The Training provided to the AF technicians must suitably cover the maintenance procedures of the PRM system.
17	Documentation	The Instruction Book provided to the AF technicians must suitably cover the maintenance procedures of the PRM system.
18	Safety	The design of the PRM system must allow for the safe conduct of all maintenance procedures of the PRM system.

EVALUATION CRITERIA.

The TC will first analyze each test's test mission log to determine whether the data collection was conducted acceptably. The data from data collection phases which were not concluded acceptably will not be included in any further analysis. The questionnaires will then be analyzed. This analysis will attempt to determine a consensus of test participant opinions for each operational issue. In cases where the answers point to a difference of opinion the TC may review the questions with the test participants to determine the consensus opinion. A consensus of the evaluated opinions will measure the suitability for each operational issue to determine a pass/fail criteria.

TEST DESCRIPTION.
This test will collect opinions from Test Technicians by having them perform test procedures and alignments on the PRM system. The Test Technicians will then fill out a Questionnaire for each task. These questions investigate the suitability of the FAA PRM IB, COTS documentation, and the effectiveness of the associated contractor provided training. The selected PRM Test Procedures/Alignments are:

a. Overall System Sensitivity.
b. Receiver Sensitivity
c. Receiver Bandwidth.
d. Receiver STC.
e. Transmitter Pulse Spectrum
f. Transmitter Frequency.

TEST PERSONNEL REQUIREMENTS.

#	Personnel	Responsibility
1	Test Coordinator (TC)	Coordinate with AT Staff Specialists
1	Test Engineer (TE)	Assist TC
2	AF Test Technicians (TT)	Supply Opinions

TEST SUPPORT HARDWARE , SOFTWARE AND DOCUMENTATION.

Test Equipment, Facilities & Documentation	Duration/# Req.
PRM System	3 hours
PRM Maintenance Handbook	2 copies
PRM Instruction Book (IB)	2 copies
Handtools, including screwdriver	1 set
Oscilloscope	1
CW Generator	1
Spectrum Analyzer	1
HP Power Analyzer	1

INITIAL SET UP/CONFIGURATION.

This test requires the full PRM system. Log the equipment room display into protected mode. Insure that the alarm switches on the TRACON displays are in the "off" position. Insure that the directions in the PRM IB are followed carefully. The test will be complete when a final consensus has been determined for each MOS.

DATA COLLECTION SETUP, TERMINATION & RESTART.

The TE should start the PRM and insure it's proper operation. The TC should distribute the PRM Maintenance Handbooks and IBs to the TT and brief them on the test and their responsibilities. Data collection can be terminated and restarted following the completion of a data collection "Maintenance Procedure " step.

Data Collection Steps.

1. **Overall System Sensitivity (OSS)** - 1 hour - The OSS is performed at the Interrogator Signal Processor digital output port at the T/R site. In normal operation, the resultant digital word is transmitted on the LAN to the display. When in MBIT, the digital word terminates at the LAN.

a. TT - Refer to the FAA Maintenance Handbook to obtain minimum sensitivity values.

b. TT - Follow instructions in the PRM IB to perform an OSS. Internal backplane losses and TTG output power values must be measured, or taken from the Phase II OSS test results.

NOTE: Alternate Receiver Tangential Sensitivity : After you have recorded the OSS, connect the oscilloscope to the SUM receiver LOG TEST. There should be a .7v to .9v pulse present. At the MBIT keyboard, increase the MP TTG AMP in 1 or 2 db steps to obtain a tangential sensitivity for the receiver. Compare this reading with the Receiver Sensitivity results in the next test procedure.

c. TC - Have the TT fill out Questionnaire 1 - Maintenance Procedures.

2. **Receiver Sensitivity** - 1 hour - Requires a CW Generator and Oscilloscope

a. TT - Locate the receiver sensitivity requirements in the parameters section of the FAA Maintenance Handbook and turn to the referenced pages in the PRM IB.

b. TT - Perform the Receiver sensitivity procedure.

d. TC - Have the TT fill out Questionnaire 1 - Maintenance Procedures.

3. **Receiver Bandwidth.** - 1 hour This test requires a CW generator & oscilloscope.

a. TT - Locate the receiver bandwidth requirements in the parameters section of the FAA Maintenance Handbook and turn to the referenced pages in the PRM IB.

b. TT - Perform the bandwidth procedure.

d. TC - Have the TT fill out Questionnaire 1 - Maintenance Procedures.

4. **Receiver STC.** - 1 hour - This test will require using MBIT and the TTG.

a. TT - Locate the system parameters section in the FAA Maintenance Handbook

b. TT - Find Receiver STC and note the requirements. Turn to the paragraph in the PRM IB and follow instructions.

c. TT - Perform the receiver STC procedure.

d. TC - Have the TT fill out Questionnaire 1 - Maintenance Procedures.

5. **Transmitter Pulse Parameters.** - 2 hour - Perform the test procedure per the FAA PRM IB using MBIT and a Power Analyzer. Verify that readings on the PSD Interrogator screen agree with test results.

a. TT - Locate the transmitter pulse parameters in the FAA Maintenance Handbook and note the minimum pulse requirements width, spacing, and rise/fall times.

b. TT - Perform the test procedure in the PRM IB. As you proceed, compare results with the PSD readout.

c. TC - Have the TT fill out Questionnaire 1 - Maintenance Procedures.

6. **Transmitter Frequency.** - 1 hour - This test requires the use of MBIT and the spectrum analyzer. Verify the PSD readout.

a. TT - Locate transmitter frequency parameters section in the FAA Maintenance Handbook for minimum requirements.

b. TT - Record the local oscillator frequency from the PSD.

c. TT - Perform the transmitter frequency procedure in the PRM IB.

NOTE: A good check to assure there are no frequency shifts occurring in the IPA, the PA, or the backplane is to check the spectrum center frequency in relation to the local oscillator frequency as follows:

(1) Freeze the spectrum on the Spectrum Analyzer.

(2) Disconnect the input cable coming from the Bi-directional coupler.

(3) Connect a cable between the analyzer input and the 1030 MHZ LO output on the FREQ & LO GENERATOR.

(4) Press Delta on the analyzer and read the frequency difference between C.F. and LO freq.

d. TC - Have the TT fill out Questionnaire 1 -. Maintenance Procedures

7. **General Questions.**

a. TC - Have the TT fill out Questionnaire 2 -. General Questions

Questionnaire-1. Name: Date / /

Maintenance Procedure:	YES	NO	No, the problem is....
Q1- Maintainability ? Given the PRM Instruction Book and the supplied test equipment, were you able to perform this test on the PRM system?			
Q2- Training Effective? Was the training provided to you sufficient to use the PRM Instruction Book and the required test equipment to perform this test.			
Q3- PRM Instruction Book Suitable? Is the PRM Instruction Book detailed and comprehensive enough to assist you in performing these tests ?			
Q6- Overall System Safety ? Do the test tools, PRM documentation, PRM System or procedures allow you to perform this procedure in a safe manner?			
Q7- System Availability? Does the PRM system suitably and effectively allow you to maintain PRM service while performing this procedure?			
Q8- System Availability Training? Did the training provided to you suitably cover the PRM system availability while performing this procedure?			
Q9- System Availability Documentation? Does the PRM Instruction Book suitably cover the PRM system availability while performing this procedure?			
Q10- Overall PRM Functional Training? Was the training provided to you sufficient to understand the full PRM's functions so that you are comfortable in performing this test ?			

Questionnaire-2. Name: Date / /

General questions	YES	NO	No, the problem is....
Q1- MBIT Operation? Doe the MBIT program suitably and effectively support field maintenance requirements?			
Q2- MBIT Training Effective? Did the training provided to you suitably cover the MBIT program?			
Q3- PRM Instruction Book Suitable? Is the PRM Instruction Book or referenced material detailed and comprehensive enough to assist you in understanding and running the MBIT Program?			
Q4-PRM Theory of Operations Documentation? Does the PRM Instruction Book suitably cover the PRM Theory of Operations?			
Q5- PRM Theory of Operations Training? Did the training provided to you suitably cover the PRM Theory of Operations?			

TEST DATA REDUCTION AND ANALYSIS.

The TL will first analyze each test's Test Mission Log to determine whether the data collection was conducted acceptably. The data from data collection phases which were not concluded acceptably will not be included in any further analysis. The Questionnaires will then be analyzed. This analysis will attempt to determine a consensus of technician opinions for each question. In cases where the answers point to a difference of controller opinions the TL may review the questions with the technicians to determine the consensus opinion.

TEST CONCLUSION.

The test will be complete when the post test section of the test mission log has been completed and when a final consensus has been determined for each Measure of Suitability. For each failure the issue will be entered along with a proposed solution and an assessment of the issues priority.

COI Number	PASS	FAIL	ISSUE	PROPOSED SOLUTION	PRIO RITY
15					
16					
17					
18					