U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Air Traffic Organization Policy

ORDER
JO 6190.12D

Effective Date:
03/04/2011

SUBJ: Maintenance of the Automated Radar Terminal System Expansion (ARTS IIIE)

1. Purpose of This Change. This handbook provides updates as directed by Order 6000.15F, General Maintenance Handbook for NAS Facilities, guidance and prescribes technical standards, tolerances, and procedures applicable to the maintenance and inspection of the Automated Radar Terminal System Expansion (ARTS IIIE), Radar Terminal Display Sub-System (RTDS), ARTS Color Display (ACD) Sub-System and Radar Gateway (RGW) System. It also provides information on special methods and techniques that will enable maintenance personnel to achieve optimum performance from the equipment. This information augments information available in instruction books and other handbooks, and complements the latest edition of Order 6000.15, General Maintenance Handbook for NAS Facilities.

2. Audience. This directive is distributed to selected Technical Operations Services (TOS) offices having the following facilities/equipment: ARTS IIIE.

3. Where Can I Find This Change? This change is available on the MyFAA employee Web site at https://employees.faa.gov/tools_resources/orders_notices/**.**
An electronic version of this Order is available on the Intranet site located at **http://nasdoc.faa.gov/** under the System heading: ARTS; System A3E.

4. Explanation of Changes. This Change adds periodic Maintenance and Certification procedures for ADS-B Service and System Track Display Mode (STDM) operations.

5. Distribution. This directive is distributed to selected offices and services within Washington headquarters, regional Technical Operations divisions, William J. Hughes Technical Center, Mike Monroney Aeronautical Center, and Technical Operations Field Offices having the following facilities/equipment: ARTS IIIE.

6. Cancellation. This Order cancels Order 6190.12C CHG-2, Maintenance of the ARTS IIIE, dated 08/19/2009.

7. Maintenance and Modification Procedures.

a. Order 6000.15, General Maintenance Handbook for NAS Facilities, this handbook, and the applicable equipment instruction books shall be consulted and used together by the maintenance technician in all duties and activities for the maintenance of the ARTS IIIE system. Maintenance personnel must consider these documents collectively as the single official source of maintenance policy and direction authorized by Air Traffic Organization Terminal (AJT-0). References located in the chapters of this handbook entitled Chapter 3, Standards and Tolerances, Chapter 4, Periodic Maintenance, and Chapter 5, Maintenance Procedures shall indicate to the user whether this handbook and/or the equipment instruction book shall be consulted for a particular standard, key inspection element or performance parameter, performance check, maintenance task, or maintenance procedure.

b. The latest edition of Order 6032.1, Modifications to Ground Facilities, Systems, and Equipment in the National Airspace System (NAS), contains comprehensive policy and direction concerning the development, authorization, implementation, and recording of modifications to facilities, systems, and equipment in commissioned status. It supersedes all instructions published in earlier editions of maintenance technical handbooks and related directives.

8. Forms Listing.
Modifications to equipment that are listed in NAS-MD-001, NAS Configuration Management Document, as baselined under configuration management, shall be in accordance with the latest edition of Order 1800.8, National Airspace System Configuration Management.

9. Recommendations for Improvement.
This handbook is under configuration management control as defined in Order 1800.8 and NAS-MD-001. Any changes to the baseline documents or requests for deviation from national standards shall be processed through the NAS Change Proposal (NCP) process. Copies of FAA Form 1800-2, NAS Change Proposal, are provided in the back of this handbook for the convenience of handbook users.

10. Risk. A Safety Risk Management (SRM) analysis meeting was conducted on October 6, 2010, and the Subject Matter Experts (SME)'s and SRM specialist concur that all changes referenced in this handbook are categorized as having no safety impact and pose no risks to the National Airspace System (NAS).

Malcolm Andrews
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Air Traffic Organization

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF ILLUSTRATIONS

Figure *Page*

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LIST OF TABLES

Table *Page*

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CHAPTER 1. GENERAL INFORMATION AND REQUIREMENTS

100. OBJECTIVE.

This handbook provides guidance and prescribes technical standards, tolerances, and procedures applicable to the maintenance and inspection of the Automated Radar Terminal System Expansion (ARTS IIIE), TRACON Automation Display Systems (TADS), Radar Tower Display System (RTDS) and Radar Gateway (RGW) System. It does not cover plant, communications, or alternating current (ac) power equipment maintenance.

101. SAFETY.

Personnel shall observe all pertinent safety precautions when performing duties on the equipment. Refer to Order 6000.15, General Maintenance Handbook for NAS Facilities, for guidance.

102. COORDINATION.

Maintenance activities at each facility shall be closely coordinated at all times through the appropriate Control Center with Air Traffic (AT) operations personnel in accordance with Order 6000.15.

103. CERTIFICATION.

Refer to Order 6000.15 for general guidance on the certification of services, systems and subsystems. Refer to Appendix 1 of this handbook for TRACON Certification Requirements or Appendix 2 of this handbook for Tower Certification Requirements.

a. Certification Rationale.

The certification rationale is based on the criteria published in Order 6000.15, which specifies that systems and services providing moment-by-moment positional information will require certification.

(1) Certification of the automation systems and services shall be accomplished using one or any combination of methods as described in Order 6000.15. The nationally approved procedures in this order are intended to provide guidance in support of making certification determinations.

(2) Additional actions for certification may be taken at the discretion of the certifier and should consider potential impacts on Air Traffic Control (ATC) operations.

(3) In the vast complex NAS, the physical separation of the major systems impose a responsibility on the certifier to make determinations about the capability of multiple systems working together to provide an advertised service.

b. Terminal Air Traffic Control Environment.

(1) The terminal automation environment consists of primary radar sensors, secondary beacon sensors, transmission mediums, automated processing capabilities, and display systems. Together, they support the large number of flight plan processing and radar data processing required to accomplish the ATC function at the TRACON and Tower.

(2) The major service is Terminal Automated Radar Service (TARS).

(3) The major systems include ARTS as the primary automation system and the RGW as the backup automation system.

(4) The major display subsystem is TADS.

(5) The tower display subsystem is RTDS.

(6) The NAS must be viewed as more than a large hardware/software system. It also includes numerous controllers at their sector displays and operating positions, the live air traffic being controlled, and the personnel that monitor system operations and restore systems or equipment that fail.

c. Levels of Certification.

There are three levels of periodic certification in the automated terminal environment. The service

level is the highest level, a system level in the middle, and a subsystem level as the lowest.

(1) **Service Level.**

(a) Surveillance services provide a means for air traffic control personnel to determine aircraft position, course, and identification used to facilitate the safe and efficient movement of aircraft within the terminal area. This service is certified as Terminal Automation Radar Service (TARS) in accordance with tables published in this handbook. Automatic Dependent Surveillance (ADS) Automatic Dependent Surveillance Service (ADSS) is dependent on TARS and fused processing capability to allow the facility to perform ATC operations using Automatic Dependent Surveillance-Broadcast (ADS-B).

(b) Order 6000.15 established new naming conventions for NAS Infrastructure Services.TARS, ADSS, ARTS, RGW, and TADS apply to the Tracon. RTADS and RTDS apply to the Towers.

(c) Service level certification is the highest level in the certification hierarchy and is based on the system level of certification being current.

(2) **System Level.** System level certification provides the basis for the service level certification. System certification is based on the provision of advertised services. Advertised services are the functional capabilities of a system such as processing capability or interface capability. They are the primary focus of subjective certification judgments. Measurement of the certification parameters is one method used to determine the quality and scope of the advertised services. The following require system level certification:

a. ARTS.

b. RGW.

c. External Systems. Surveillance radar and beacon systems are certified in accordance with provisions of the applicable maintenance handbook.

(3) **Subsystem Level.** Subsystem level certification is similar to system level certification and includes the TADS and RTDS.

d. **Certification Responsibility.**
The certification entry to be made in the facility maintenance log is published in Appendices in this order.

(1) **General.** Certification.

Responsibility will be assigned to appropriate technical personnel in accordance with requirements in the latest edition of Order 3400.3, Airway Facilities Maintenance Personnel Certification Program.

(2) **Certification Responsibilities.** Certification responsibility designations included in the certification requirement tables are for general guidance only. It is recognized that circumstances will arise that will necessitate special designations by the manager for other personnel having sufficient and appropriate expertise to perform technical certification of service and system performance. Special designees must comply with the requirements in the latest edition or Order 3000.57.

e. **Certification Accomplishments.**

(1) **Certification Requirements.**
Certification shall be accomplished as follows:

(a) Periodic. Maintenance personnel must accomplish periodic service certification within the intervals specified in appendixes 1 and 2, and in accordance with Order 6000.15.

(b) Part of the Restoration Process. In the event of a failure, certification may be required prior to restoring a single item of equipment back into operation.

(2) **Certification Following Corrective Maintenance on ARTS IIIE Equipment.** After corrective maintenance on an element of the ARTS IIIE system affecting a certification parameter, the ARTS IIIE must be recertified. No attempt is made to provide related guidance for all possible restoration situations or the required certification actions involved therefore, the cognizant certifying Airway Transportation Systems Specialist (ATSS) must determine the extent of the recertification actions to be taken

since they will relate directly to the corrective maintenance that was performed.

(3) Certification Following Software Maintenance. Certification may be required in accordance with Appendix 1 or 2 following software changes pertaining to the ARTS IIIE as determined by the ARTS IIIE certifying official.

(4) Peripheral Device Failure Following Certification. Loss of a Redundant Chassis, Continuous Data Recording (CDR), Digital Altimeter Setting Indicator (DASI), Flight Data Entry PC (FDEPC) or interfacility functions, shall not result in decertification of the ARTS. A log entry will be made noting the loss and the cognizant AT operations personnel shall be advised.

(5) Certification Status Following a System Recovery.

(a). Following a system reconfiguration, the ARTS remains certified unless the system fails to recover properly or, in the opinion of the ARTS IIIE certifying official, there is reason to believe that a hardware failure occurred and was not properly isolated from the operational system.

(b). Any element that fails to recover properly should be physically isolated from the system, so that it cannot be activated during a future reconfiguration. Decertification may be required if the system or subsystem is judged to not meet the published certification requirements.

f. Certification Procedures.

(1) TARS Service. Certification of the TARS service can be accomplished using any combination of methods described in Order 6000.15 to determine the quality and scope of the provided service. If direct measurement of certification parameters is the chosen method, refer to Table A.1-1 and Appendices 1 in this order.

(2) ARTS or RGW System. Certification of the automation system can be accomplished using any combination of methods described in Order 6000.15 to determine the quality and scope of the advertised services. If direct measurement of certification parameters is the chosen method, refer to Appendix 1, Table A.1-2 or A.1-3 in this Order. Generally, completion of periodic maintenance at the appropriate interval may be used as a basis for certification determinations.

(3) TADS Subsystem. Certification of the subsystem can be accomplished using any combination of methods described in Order 6000.15 to determine the quality and scope of the advertised services. If direct measurement of certification parameters is the chosen method, refer to Appendix 1, Table A.1-4 in this order. Generally, completion of periodic maintenance at the appropriate interval may be used as a basis for certification determinations.

(4) ADSS Service. Certification of the ADSS Service can be accomplished using any combination of methods described in Order 6000.15 to determine the quality and scope of the provided service. If direct measurement of cert. parameters is the chosen method, refer to Table A.1-5 and Appendix 1 in this order. Notify AOCC of loss or reduction of service. Consult with local Air Traffic Operations personnel and if need be disable tracking for any affected service volume and / or Radio Station. 6000.15, chapter 4, Section 1 covers procedures for unscheduled System, Subsystem and Service interruptions.

104. RECORD KEEPING.

Station records, such as facility logs, meter reading forms, initial standards and tolerances, etc., must be maintained to satisfy all legal, maintenance and quality assurance requirements.

105. AIRCRAFT ACCIDENTS.

When aircraft accidents or incidents occur, Air Traffic Organization Technical Operations personnel are responsible, when requested by the Technical Operations Aircraft Accident Representative (TOAAR) through the appropriate control center, to evaluate and document the technical performance of the facilities which may have been involved (for some facilities, it may also be necessary to remove them from service, and to conduct flight inspections). This requires that facility operational data be obtained and recorded in the maintenance log and on technical

performance records. These records are official documents, and may be used by an aircraft accident investigation board in the determination of facility operational status at the time of the accident. See the latest edition of Order 8020.16, "Air Traffic Organization Aircraft Accident and Incident Notification, Investigation, and Reporting," for detailed guidance on requirements and activities following an aircraft accident/incident.

106. FLIGHT INSPECTION.

Normal instruction and guidance concerning flight inspection of the basic radar system and associated equipment are contained in the latest edition of Order A 8200.1, United States Standard Flight Inspection Manual.

107. TECHNICAL INSPECTION.

Formal inspections, objectively conducted, are an important part of the overall maintenance evaluation system. They are one of the more effective management tools for assuring the required quality level of maintenance work and of equipment and system performance. See Order 6000.15 and the latest edition of Order 6040.6, National Airspace System Technical Evaluation Program for further detail.

108. PERIODIC MAINTENANCE.

Maintenance personnel shall follow the tasks and schedules provided in chapter 4, which include the minimum essential periodic maintenance activities and the frequency with which they shall be performed to meet the minimum performance standards.

109. TEST EQUIPMENT AND TOOLS FOR PERIODIC MAINTENANCE.

Test equipment and tools required for performing routine maintenance and troubleshooting of the ARTS IIIE system is shown in the latest edition of Order 6200.4, Test Equipment Management Handbook.

110. INSTRUCTION BOOKS.

A list of maintenance and diagnostic manuals is referenced in Table 1-1 in this directive. These manuals shall be readily available for reference in the performance of periodic and corrective maintenance and certification of the system.

111. FAA FORMS.

Table 1-2 represents the applicable FAA forms required within the document.

112. FAA ORDERS AND HANDBOOKS.

The latest edition of the applicable directives represented in Table 1-3 shall be used within this document.

113-119. RESERVED.

Table 1-1. Maintenance and Diagnostic Manuals

Title	*Publication Number*
Time Code Generator/Synchronized-Generator	TrueTime, Inc (Model 814-149)
Antenna Down/Up Converter	TrueTime, Inc (Model 142-6150)
XL-AK Time and Frequency Receiver	TrueTime, Inc (Model 600-101)
WWVB RTC Slave	KINEMETRICS (Model SF-DC)
Computer System Operators Manual/Software User's Manual	(CSOM/SUM)
Common Arts IIIE Instruction Book for ARTS Gateway (AGW)	TI 6190.50
Common Arts IIIE Instruction Book for ARTS Radar Gateway (RGW)	TI 6190.52
Common Arts IIIE Instruction Book for Remote-Arts Color Display (R-ACD)	TI 6190.53
Common Arts IIIE Instruction Book for Remote Display Multiplexer (RDM)	TI 6190.54
Common Arts IIIE Instruction Book for PowerPC Chassis	TI 6190.55
Common Arts IIIE Instruction Book for ARTS Color Display (ACD)	TI 6190.56
Common Arts IIIE Instruction Book for System Configuration and Interface	TI 6190.57
Common Arts IIIE Instruction Book for Remote-ARTS Color Display (R-ACD3)	TI 6190.68
Common Arts IIIE Instruction Book for ARTS Color Display 2 (ACD2)	TI 6190.69
Common Arts IIIE Instruction Book for ARTS Processor (AP)	TI 6190.70
Common Arts IIIE Computer System Diagnostic Manual (CSDM)	TI 6190.62
Common Arts IIIE Interface Control Document (ICD)	TI 6190.63
Common Arts IIIE Interface Design Document (IDD) P1, P2 &P3	TI 6190.64
Common Arts IIIE Instruction Book for Remote ARTS Color Display (RACD2)	TI 6190.66
Technical Manual for Operation and Maintenance Instructions DBRITE System	TI 6410.18

Table 1-2. FAA Forms

Form Number	*Description*
FAA Form 1800-2	NAS Change Proposal
FAA Form 6000-8	Technical Performance Record
FAA Form 6030-1	Facility Maintenance Log
FAA Form 6030-3	Hardware Discrepancy Report
FAA Form 6030-16	Technical Reference Data Records Cover/Transmittal Sheet
FAA Form 6030-17	Technical Reference Data Records Cover
FAA Form 6032-2	Airway Facilities Modification Record
FAA Form 6040-3	Facility and Service Outage Report
FAA Form 6100-1	Program Technical Report
FAA Form 6310-8	Technical Performance Record - ASR/ASDE/PAR IFR Room

Table 1-3. FAA Orders and Handbooks

Order Number	*Description*
1100.134	Maintenance of National Airspace System Automation Subsystem
1320.58	Equipment and Facility Directives - Modification and Maintenance Technical Handbooks
1800.8	National Airspace System Configuration Management
3400.3	Airway Facilities Maintenance Personnel Certification Program
4630.2	Standard Allowance of Supplies and Working Equipment for National Airspace System Facilities
6000.15	General Maintenance Handbook for NAS Facilities
6000.22	Maintenance of Analog Lines
6032.1	Modifications to Ground Facilities, Systems, and Equipment in the National Airspace System (NAS)
6040.6	National Airspace System Technical Evaluation Program
6170.10	Maintenance of Data Multiplexing Network Equipment
6190.9	Electronic Equipment Modification Handbook Automated Radar Terminal System Expansion (ARTS IIIE)
6200.4	Test Equipment Management Handbook
6310.2	Maintenance of Airport Surveillance Radar (ASR) Facilities
6310.9	Maintenance of Airport Surveillance Radar (ASR-7, ASR-7E, ASR-7F, ASR-8)
6310.19	Maintenance of Airport Surveillance Radar-9 (ASR-9)

Order Number	*Description*
6310.30	Maintenance of Airport Surveillance Radar-11 (ASR-11)
6350.13	Maintenance of Radar Microwave Link Equipment (RML-1A, 2, 3, and 4)
6350.15	Maintenance of Radar Microwave Link Equipment (RML-6)
6360.1	Maintenance of Air Traffic Control Beacon Interrogator (ATCBI-4) Equipment
6360.14	Maintenance of Air Traffic Control Beacon Interrogator (ATCBI-5) Equipment
6365.3	Maintenance of the Mode Select (Mode-S) Beacon System
6410.18	Maintenance of the Digital Brite Radar Indicator Tower Equipment (DBRITE)
7210.3	Facility Operation and Administration
8020.11	Aircraft Accident and Incident Notification, Investigation, and Reporting
8260.25	Implementing Epoch Year Magnetic Variation Values
A 8200.1	United States Standard Flight Inspection Manual
6540.38	LDRCL

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CHAPTER 2. TECHNICAL CHARACTERISTICS

200. PURPOSE.

This chapter provides a general description of the automated air traffic control capabilities and the technical characteristics of the hardware and software that comprise the system.

201. AUTOMATED RADAR TERMINAL SYSTEM (ARTS) DESCRIPTION.

The ARTS IIIE system provides automated alphanumeric, beacon tracking level, and radar tracking level, with ARTCC/Terminal Radar Approach Control (TRACON) ARTS IIIE interfacility data transfer capability. The ARTS IIIE system function provides the following capabilities:

a. Radar target detection and processing.

b. Beacon–radar correlation and tracking.

c. Mosaic processing and display.

d. Improved aircraft tracking program.

e. MSAW/CA.

f. ADS-B Data Processing.

g. Online continuous data recording, i.e., CDR.

h. Failure recovery and reconfiguration.

i. Automatic overload sensing and protection.

j. Common processing.

k. Track processing.

l. Fused Display Processing

202. ARTS HARDWARE.

ARTS hardware is composed of Commercial-off-the-Shelf (COTS) components connected to a Versa Module Eurocard (VME) bus. The ARTS IIIE chassis contain the various subsystems that provide the ARTS IIIE functionality. Refer to Figure 2-1, Typical ARTS IIIE Hardware Configuration, for a diagram of the ARTS IIIE configuration. The hardware comprising the ARTS IIIE system can be broken down into the following major subsystems:

a. Track Processing Subsystem (TPS). The TPS subsystem performs tracking and surveillance functions. The TPS consists of (3) Track Processors (TP). The TP tracks and processes targets and provides a serial interface for all digital sensors.

b. Common Processing Subsystem (CPS). The CPS subsystem performs correlation between flight plans and target tracking information. CPS performs Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), interfacility message processing, and system wide keyboard processing.

c. System Monitor Console (SMC). The SMC Subsystem performs system monitoring and control functions and consists of microprocessor nodes residing on the network with a set of peripherals. The SMC also performs Continuous Data Recording (CDR).

d. Display Processing Subsystem (DPS). The DPS contains display subsystems and subsystems that drive the displays.

(1) The TADS Subsystem consists of ACD, TMU, LACD, RACD and Digital Bright Radar Indicator Tower Equipment (DBRITE). The primary purpose of the TADS Subsystem is to provide the human–computer interface (HCI) between the ATC sensors and processors, and the air traffic controller.

(2) The RDM provides an interface to drive multiple remote displays and process controller inputs.

e. Subsystem Interface (SSI). The SSI subsystem provides a common communication medium used between operational subsystems of the ARTS IIIE and external users.

(1) The SSI subsystem is the means by which the TPS, CPS, DPS, and SMC communicate. The SSI is characterized by efficient, reliable Local Area Network (LAN) technology and is configured with fail–safe, dual trunk redundancy.

(2) The ARTS Gateway (AGW) provides an interface for external users of ARTS data.

203. ARTS SOFTWARE.

The software comprising the ARTS IIIE system consists of two distinct types. They are operational and offline. A brief description of the two types follows:

a. Operational Software. The operational software consists of executive, tasks, and database elements and is distributed across multiple processors. The operational software is responsible for meeting the real–time requirements for displaying and tracking aircraft in the terminal environment.

b. Offline Software. Offline software is a collection of support, utility, and diagnostic software, which operates independently of the operational program.

204. MOSAIC PROCESSING AND DISPLAY CAPABILITY.

Mosaic capability uses track data from all adapted sensors to provide a display presentation of the entire ARTS IIIE system plane to the controller. Mosaic capability processes and display targets and tracks from multiple sensors based on a sensor hierarchy within a Radar Sort Box (RSB) grid. Individual RSBs are two miles by two miles. Mosaic capability provides improved coverage in the service volume area to overcome the limitations of a single sensor.

205. RADAR GATEWAY (RGW) SYSTEM.

The primary purpose of the RGW is to provide radar, beacon, and weather radar information to the Display Processing Subsystem (DPS) in the event that the ARTS IIIE operational network is unavailable. The RGW has all the capabilities of the ARTS with the exception of interfacility and DASI interfaces. Additionally, RGW has Mosaic and display capabilities.

a. **RGW Hardware.** The RGW combines the TPS, CPS, and SMC major subsystems of the ARTS IIIE into a single redundant chassis. Refer to Figure 2-1, Typical ARTS IIIE Hardware Configuration, for a diagram of the RGW configuration.

b. **RGW Software**. The software comprising the RGW system includes the software functionality of the TPS, CPS, and SMC.

206. DIRECT RADAR FEED (DRF) CAPABILITY.

The primary purpose of DRF is to provide radar, beacon and weather information to the RACD in the event the interface is interrupted between the Tower and TRACON. DRF capability provides digital extents, trails, weather and limited data blocks.

207. COMMON ARTS IIIE TAMR SYSTEM OVERVIEW.

The Common ARTS (IIIE) Terminal Automation Modernization/Replacement (TAMR) system architecture is based on rack-mounted X86 server architecture PCs. These server PCs are called ARTS Processor (AP) chassis. The Common ARTS (IIIE) TAMR system replaces Motorola MVME177 and MVME2700 (PowerPC) VME-based TPs, CPs, SMCs, RDMs, as well as FDADs, LBPs and DBRITEs. The IIIE TAMR system architecture replaces the TP, CP, and SMC with an SP chassis and depending on the number of serial RADAR interfaces required, one or two additional SIFS chassis per SP and RGW to accommodate the additional serial ports. The RGW is identical to the SP and both the RGW and SP contain additional hard drives to accommodate the CDR storage requirements, refer to figure 2-2 for AP configuration of ARTS IIIE. Each AP chassis in the IIIE TAMR system is fully populated with the following H/W: PCI Express X16 graphics cards, IDE DVD burner, 4x20 LCD marquee keypad, 3 8-port serial cards, 6-port Ethernet card, two redundant hot-swap power supplies, and two 250GB or larger SATA hard drives. The SP and RGW chassis have 6 additional SATA hard drives for CDR.

The operating system that resides in all ARTS Processor (AP) configurations is Linux OS. It is a UNIX-like operating system and is conformant with IEEE POSIX (Portable Operating System Interface for Computer Environments) 1003.1. For additional information, refer to Linux OS reference manuals.

The TAMR ARTS IIIE system is a functionally distributed system consisting of the following five physical subsystems (see Figure 2-1):

1. System Processing (SP)
2. Subsystem Interface (SSI)
3. Legacy PPC Common ARTS Gateway (AGW)
4. Radar Gateway (RGW)
5. ACD Subsystem

   ARTS Color Display (ACD2)

   Remote Display Multiplexer (RDM)

   Remote- ARTS Color Display (R-ACD3)

208. FUSED DISPLAY MODE (STDM).

The Fused mode uses track data from all adapted sensors as well as ADS-B data provided via a service delivery point for the ARTS-IIIE System. It Processes and displays targets and tracks from the sensors and the ADS-B service (ADSS) in a fused display mode. The fused mode provides updates on the display at a site adapted interval as frequently as once per second and is supported by an improved tracker using the KALMAN IMM filter for enhanced accuracy.

209. RESERVED.

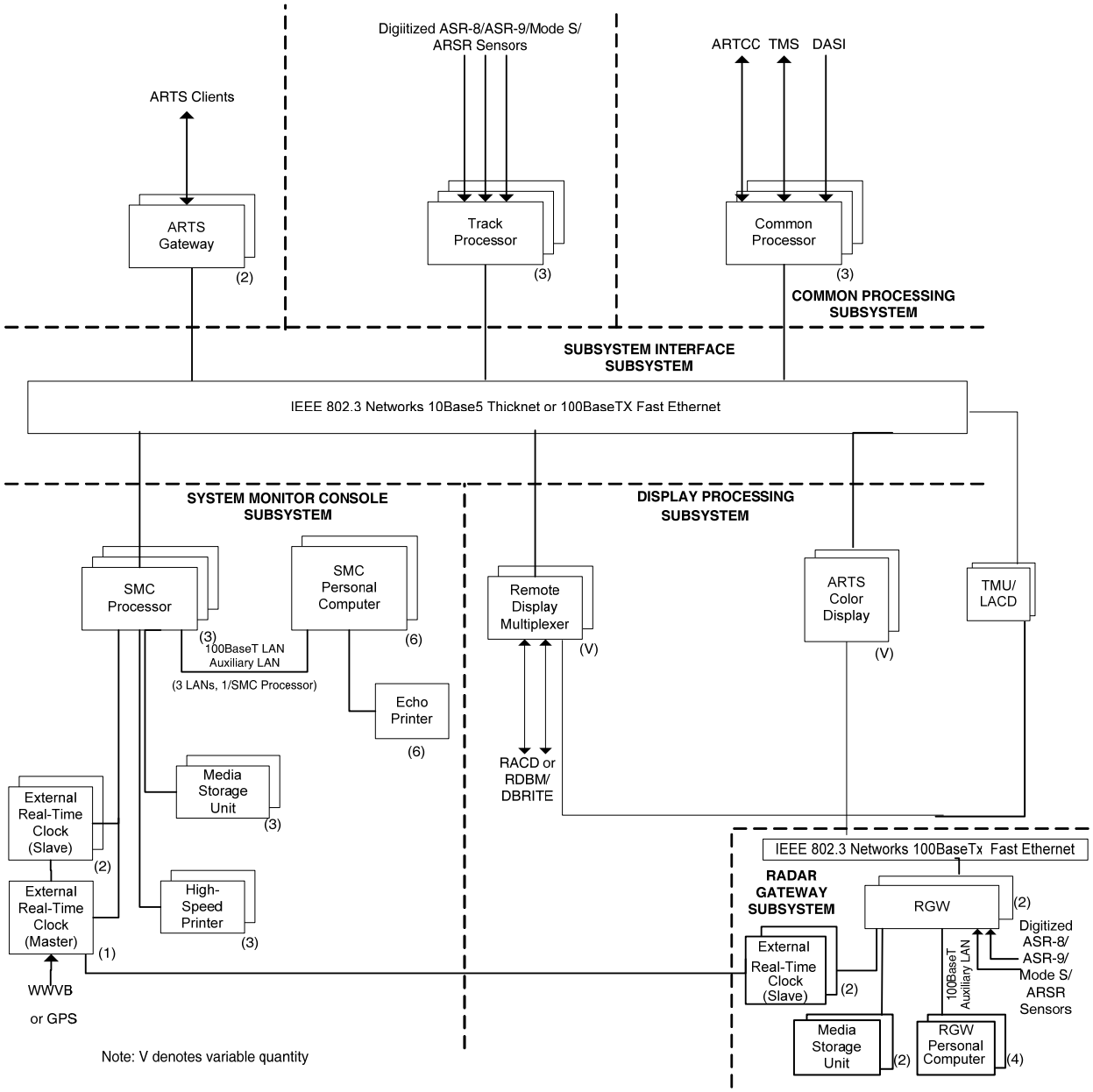

Figure 2-1. Typical ARTS IIIE Hardware Configuration

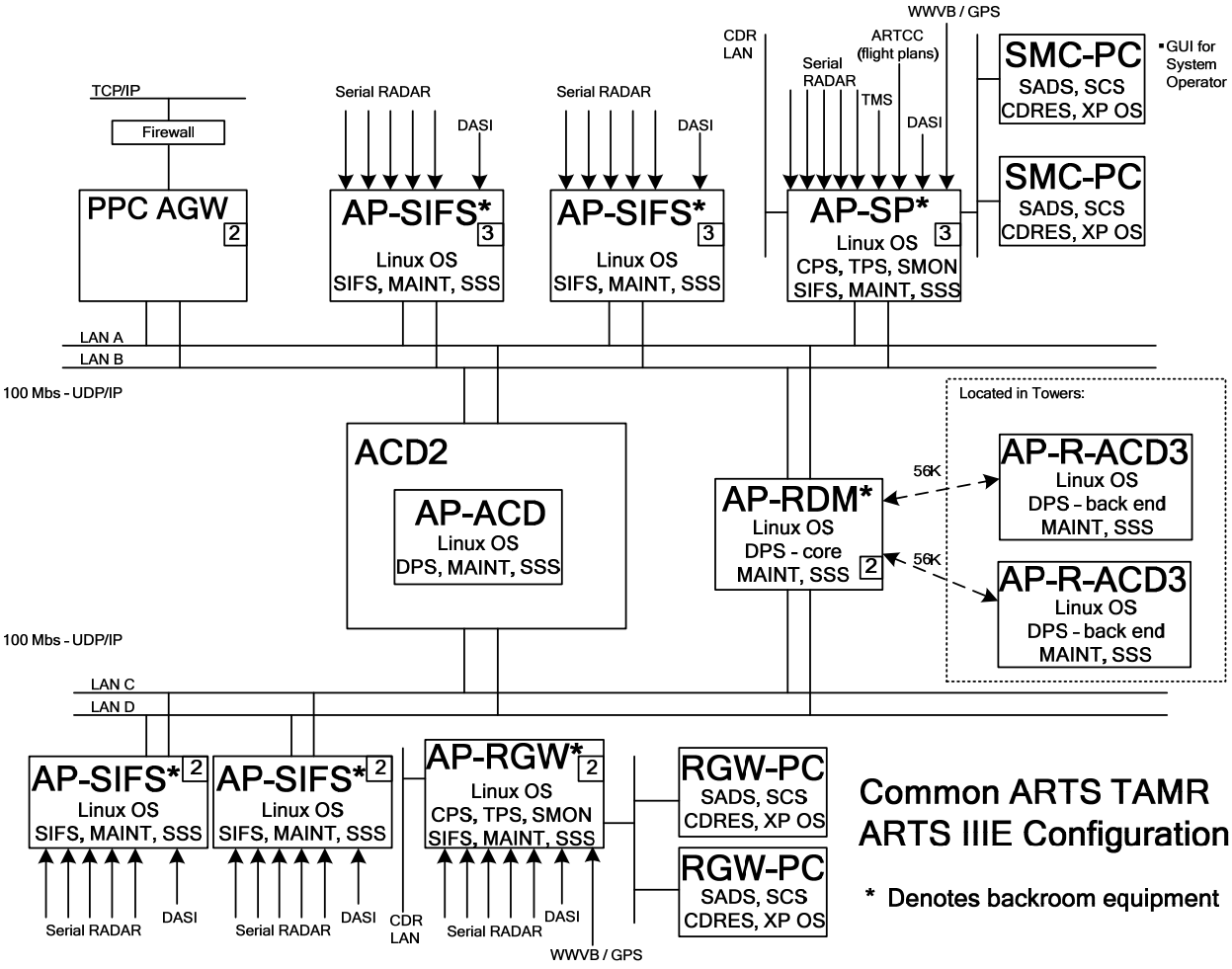

Figure 2-2. ARTS IIIE AP System Configuration

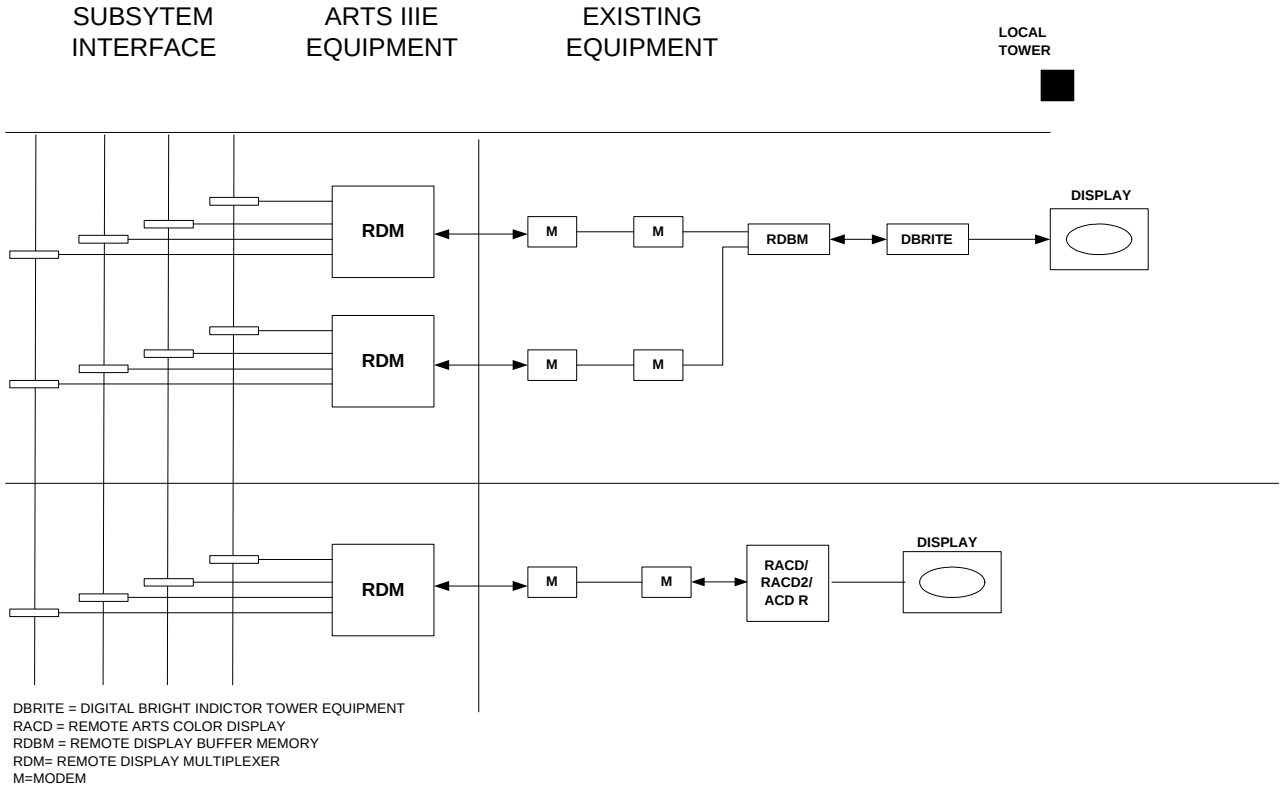

Figure 2-3. Tower DP Subsystem Reference Diagram

CHAPTER 3. STANDARDS AND TOLERANCES

300. GENERAL.

This chapter prescribes the standards and tolerances for the ARTS IIIE and RGW Systems as defined and described in Order 6000.15. All key performance parameters and/or key inspection elements are clearly identified by an arrow placed to the left of the applicable item. The paragraphs in this chapter are numbered so as to enhance the organization and make it easier to use. Table 3-1 summarizes the paragraph numbering system.

NOTE: All reference paragraphs apply to this handbook unless otherwise indicated.

Table 3-1. Paragraph Numbering System

Paragraph Numbers	*Standards and Tolerances Apply to the Following*
301-309	Overall System (ARTS)
310-319	TPS
320-329	CPS
330-339	SMC
340-349	DPS
350-359	SSI
360-369	RGW
370-379	ARTS Processor
380-389	Radar/ ARTS/ Interface Subsystem

NOTE: Reference FAA Forms 6030-16/6030-17 values are equivalent to commissioning criteria.

STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
301. OVERALL SYSTEM.				
→ **302. PERMANENT RETURN RANGE AND AZIMUTH.**				
Accuracy				
a. Single Sensor Permanent Return Accuracy	Para 509	FAA Form 6030-17		
(1) ASR Beacon				
(a) Azimuth		FAA Form 6030-17 Value	+/- 2 ACPs	+/- 5 ACPs
(b) Range		FAA Form 6030-17 Value	+/- 0.0625nmi	Same as Initial
(2) ASR Search				
(a) Azimuth		FAA Form 6030-17 Value	+/- 2 ACPs	+/- 5 ACPs
(b) Range		FAA Form 6030-17 Value	+/- 0.0625nmi	Same as Initial
(3) Air Route Surveillance Radar (ARSR) Beacon				
(a) Azimuth		FAA Form 6030-17 Value	+/- 2 ACPs	Same as Initial
(b) Range		FAA Form 6030-17 Value	+/- 0.125nmi	Same as Initial
(4) ARSR Search				
(a) Azimuth		FAA Form 6030-17 Value	+/- 4 ACPs	Same as Initial
(b) Range		FAA Form 6030-17 Value	+/- 0.125nmi	Same as Initial
b. Mosaic Permanent Return Accuracy /Common Arts Quick Radar Sensors (CQARS)	Para 506	FAA Form 6030-17		
(1) ASR Beacon				
(a) Azimuth		FAA Form 6030-17 Value	+/- 2 ACPs	Same as Initial
(b) Range		FAA Form 6030-17 Value	+/- 0.0625nmi	Same as Initial
(2) ASR Search				
(a) Azimuth		FAA Form 6030-17 Value	+/- 4 ACPs	Same as Initial
(b) Range		FAA Form 6030-17 Value	+/- 0.0625 nmi	Same as Initial

STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(3) ARSR Beacon				
(a) Azimuth		FAA Form 6030-17 Value	+/- 2 ACPs	Same as Initial
(b) Range		FAA Form 6030-17 Value	+/- 0.125 nmi	Same as Initial
(4) ARSR Search				
(a) Azimuth		FAA Form 6030-17 Value	+/- 4 ACPs	Same as Initial
(b) Range		FAA Form 6030-17 Value	+/- 0.125 nmi	Same as Initial
→ **303. CQARS DATA ANALYSIS.**	Para 506			
a. PR Reliability	Para 508			
(1) Beacon		Verify reliability for each adapted Beacon Permanent Return is greater than or equal to 90%	Same as standard	Same as standard
(2) Search		Verify reliability for each adapted Search Permanent Return is greater than or equal to 80%	Same as standard	Same as standard
b. Radar to Radar Inter-Sensor Linking for Single Sensor And Mosaic mode	Para 506			
(1) Inter-Sensor Linking valid for sensor center to sensor center distance less than or equal to 80nmi				
(a) ASR-ASR		0nmi	+/- 0.2nmi	+/- 0.2nmi
(b) ASR-ARSR		0nmi	+/- 0.4nmi	+/- 0.4nmi
(c) ARSR-ARSR		0nmi	+/- 0.4nmi	+/- 0.4nmi
(2) Inter-Sensor Linking valid for sensor center to sensor center distance greater than 80nmi				
(a) ASR-ASR		0nmi	+/- 0.4nmi	+/- 0.4nmi
(b) ASR-ARSR		0nmi	+/- 0.6nmi	+/- 0.6nmi

STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(c) ARSR-ARSR		0nmi	+/- 0.6nmi	+/- 0.6nmi
c. Radar Reinforcement Rate[i]	Para 506			
(1) ARSR 1/2/3		Greater than or equal to 60%	Same as standard	Same as standard
(2) All Others		Greater than or equal to 80%	Same as standard	Same as standard
304 ADS-B PERFORMANCE PARAMETERS.				
a. Fixed Test Target Accuracy	Par. 527e(4) Par 530	LAT/LONG ±3 sec	Same as standard	Same as standard
b. ADS-B Subsystem Status Report				
(1) Invalid MSGs RCVD	CSOM/SUM Para 6.2.8	Max <5% of total TRK MSGs RCVD	Same as standard	Same as standard
(2) LGTH Errors	CSOM/SUM Para 6.2.8	Max <5% of total TRK MSGs RCVD	Same as standard	Same as standard
(3) CRC Errors	CSOM/SUM Para 6.2.8	Max <5% of total TRK MSGs RCVD	Same as standard	Same as standard
c. CQARS Inter-Sensor Linking for Fused Mode using Radar to Radar or Radar to ADS-B correction.	Para 528			
(1) SRR dist nmi		+/- 0.1 nmi	Same as standard	Same as standard
(2) LRR dist nmi		+/- 0.2 nmi	Same as standard	Same as standard
305-309. RESERVED.				
310. TPS.				
311. TRACK PROCESSING.				
a. TP				
(1) Power Supplies	TI 6190.61 Para 6.5.1.3			
(a) +5.0 V dc		+ 5.0 Volts direct current (V dc)	+.25, -.125	Same as initial
(b) +12.0 V dc		+12.0 V dc	+.6, -.30	Same as initial
(c) -12.0 V dc		-12.0 V dc	-.6, +.30	Same as initial
(d) Ripple for 5.0 V dc, +12 V dc, -12 V dc		200 Mv peak-to-peak maximum		
(1) Floppy Confidence Test	TI 6190.62 Para 5.6	Successful no fault execution	Same as standard	Same as standard

STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	*Operating*
(2) Hard Disk Internal Diagnostic Test	TI 6190.62 Para 5.6	Successful no fault execution	Same as standard	Same as standard
(3) VCOM-54 Channel To Different Channel Synchronous Loop-Back Test	TI 6190.62 Para 5.2	Successful no fault execution of 50 cycles, Channel 7 to any other Channel	Same as standard	Same as standard
→ (4) Diagnostic Test	TI 6190.62 Para 5.3	Successful no fault execution (except for SCSI devices other than the HDD)	Same as standard	Same as standard
(5) Extended Diagnostics Test (Non Operator Intervention)	TI 6190.62 Para 4.1.2	Successful no fault execution	Same as standard	Same as initial
b. PPC TP				
(1) Power Supply	TI 6190.55 Para 5.1.3			
(a) +5.0 V dc		+5.0 V dc	+.25, -.125	Same as initial
(b) +12.0 V dc		+12.0 V dc	+.6, -.30	Same as initial
(c) -12.0 V dc		-12 V dc	-.6, +.30	Same as initial
(d) Ripple for +5.0 V dc, +12.0 V dc, -12.0 V dc		200 mv peak-to-peak maximum	Same as standard	Same as initial
(e) CDROM Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as standard
(f) Floppy Confidence Test		Successful no fault execution	Same as standard	Same as standard
(g) PC card reader 1 Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as initial
312-319. RESERVED.				
320. CPS.				
321. COMMON PROCESSING.				
a. CP				
(1) Power Supplies	TI 6190.60 Para 6.5.1.3			
(a) +5.0 V dc		+5.0 V dc	+.25, -.125	Same as initial
(b) +12.0 V dc		+12.0 V dc	+.6, -.30	Same as initial

STANDARDS AND TOLERANCES

	Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
				Initial	*Operating*
	(c) -12.0 V dc		-12.0 V dc	-.6, +.30	Same as initial
	(d) Ripple for +5.0 V dc+12.0 V dc, -12.0 V dc		200 mv peak-to-peak maximum	Same as standard	Same as standard
	(2) CP Floppy Confidence Test	TI 6190.62 Para 5.6	Successful no fault execution	Same as standard	Same as standard
	(3) CP Hard Disk Internal Diagnostic Test	TI 6190.62 Para 5.6			
→	(4) VCOM-54 Test	TI 6190.62 Para 5.2			
	a. Channel To Different Channel Synchronous Loop-Back Test		Successful no fault execution of 50 cycles, Channel 7 to any other Channel	Same as standard	Same as standard
	b. Channel To Same Channel Asynchronous Loop-Back Test		Successful no fault execution	Same as standard	Same as standard
	c. Remote Display Connectivity	Para 522	Successful no fault execution	Same as standard	Same as standard
→	(5) Diagnostic Test	TI 6190.62 Para 5.3	Successful no fault execution	Same as standard	Same as standard
	(6) Extended Diagnostic Test (Non Operator Intervention)	TI 6190.62 Para 4.3.2	Successful no fault execution	Same as standard	Same as standard
	b. PPC CP				
	(1) Power Supplies	TI 6190.55 Para 5.1.3			
	(a) +5.0 V dc		+5.0 V dc	+.25, -.125	Same as initial
	(b) +12.0 V dc		+12.0 V dc	+.6, -.30	Same as initial
	(c) -12.0 V dc		-12.0 V dc	-.6, +.30	Same as initial
	(d) Ripple for +5.0 V dc, +12.0 V dc, -12.0 V dc		200 mv peak-to-peak maximum	Same as standard	Same as standard
	(2) Disk Tests	TI 6190.62 Para 5.6			
	(a) Floppy Confidence Test		Successful no fault execution	Same as standard	Same as standard
	(b) Hard Disk Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as standard

STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	*Operating*
(c) CDROM Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as standard
(d) PC card reader 1 SCSI Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as standard
(3) VCOM-54 Test	TI 6190.62 Para 5.2			
(a) Channel To Different Channel Synchronous Loop-Back Test		Successful no fault execution of 50 cycles, Channel 7 to any other Channel	Same as standard	Same as standard
(b) Channel To Same Channel Asynchronous Loop-Back Test		Successful no fault execution	Same as standard	Same as standard
→ (4) Diagnostics Test	TI 6190.62 Para 5.3	Successful no fault execution (except for SCSI devices other than the HDD)	Same as standard	Same as standard
(5) Extended Diagnostics Test (Non Operator Intervention)	TI 6190.62 Para 4.14.2	Successful no fault execution (except Flash 2)	Same as standard	Same as standard
→ **322. MSAW/CA ALARM.**				
Test MSAW Alarm under Program Control using referenced paragraph or with targets of opportunity.	Para 503	Successful no fault execution	Same as standard	Same as standard
323–329. RESERVED.				
330. SMC.				
331. SYSTEM MONITOR.				
a. SMC				
(1) Power Supplies	TI 6190.58 Para 6.5.1.3	Successful no fault execution	Same as standard	Same as standard
(a) +5.0 V dc		+5.0 V dc	+.25, -.125	Same as initial
(b) +12.0 V dc		+12.0 V dc	+.6, -.30	Same as initial
(c) -12.0 V dc		-12.0 V dc	-.6, +.30	Same as initial
(d) Ripple for +5.0 V dc +12.0 V dc, -12.0 V dc		200 mv peak-to-peak maximum	Same as standard	Same as standard
(2) Floppy Confidence Test	TI 6190.62 Para 5.6	Successful no fault execution	Same as standard	Same as standard

STANDARDS AND TOLERANCES

	Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
				Initial	*Operating*
	(3) Hard Disk Internal Diagnostic Test	TI 6190.62 Para 5.6	Successful no fault execution	Same as standard	Same as standard
	(4) CDR Internal Disk Diagnostic Test	TI 6190.62 Para 5.6	Successful no fault execution	Same as standard	Same as standard
→	(5) Diagnostics Test	TI 6190.62 Para 5.3	Successful no fault execution (except for SCSI devices other than the HDD)	Same as standard	Same as initial
	(6) Extended Diagnostics Test (Non Operator Intervention)	TI 6190.62 Para 4.8.2	Successful No Fault Execution	Same as standard	Same as standard
	b. PPC SMC				
	(1) CDR Internal Disk Diagnostic Test		Successful No Fault Execution	Same as standard	Same as standard
	(2) Extended Diagnostic Test (Non Operator Intervention)	TI 6190.62 Para 4.13.2	Successful No Fault Execution	Same as standard	Same as standard
	332–339. RESERVED.				
	340. DPS				
	341. DISPLAY PROCESSORS.				
	a. PPC RDM				
	(1) Power Supplies	TI 6190.54 Para 5.1.3			
	(a) +5.0 V dc		+5.0 V dc	+.25, -.125	Same as initial
	(b) +12.0 V dc		+12.0 V dc	+.6, -.30	Same as initial
	(c) -12.0 V dc		-12.0 V dc	-.6, +.30	Same as initial
	(d) Ripple for +5.0 V dc, +12.0 V dc, -12.0 V dc		200 mv peak-to-peak maximum	Same as standard	Same as standard
	(2) Disk Tests	TI 6190.62 Para 5.6			

STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(a) Floppy Confidence Test		Successful no fault execution	Same as standard	Same as standard
(b) Hard Disk Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as standard
(c) CDROM Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as standard
(d) PC Card Reader 1 SCSI Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as standard
(3) VCOM-54 Test	TI 6190.62 Para 5.2			
(a) Channel To Different Channel Synchronous Loop-Back Test		Successful no fault execution of 50 cycles, Channel 7 to any other Channel	Same as standard	Same as standard
(b) Channel To Same Channel Asynchronous Loop-Back Test		Successful no fault execution	Same as standard	Same as standard
(4) Diagnostics Test	TI 6190.62 Para 5.3	Successful no fault execution (except for SCSI devices other than the HDD)	Same as standard	Same as standard
(5) Extended Diagnostics Test (Non Operator Intervention)	TI 6190.62 Para 4.14.2	Successful no fault execution	Same as standard	Same as standard
(6) Remote Display Connectivity Check	Para 522	450 ms max ping response time	Same as standard	Same as standard
b. ACD/TMU				
(1) Power Supplies	TI 6190.56 TI 6190.53 Para 5.1.3			
(a) +5.0 V dc		+5.0 V dc	+.25, -.125	Same as initial
(b) +12.0 V dc		+12.0 V dc	+.6, -.30	Same as initial
(c) -12.0 V dc		-12.0 V dc	-.6, +.30	Same as initial
(d) Ripple for +5.0 V dc, +12.0 V dc, -12.0 V dc		200 mv peak-to-peak maximum	Same as standard	Same as standard
(e) Kybd/Trkball +5 V dc		+5.0 V dc	+/- .25	Same as initial

STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(f) Kybd/Trkball + 12 V dc		+12.0 V dc	+/- .6	Same as initial
(2) Disk Tests	TI 6190.62 Para 5.6			
(a) Floppy Confidence Test		Successful no fault execution	Same as standard	Same as standard
(b) Hard Disk Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as standard
(c) CDROM Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as standard
(d) PC Card Reader 1 SCSI Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as standard
(3) Diagnostics Test	TI 6190.62 Para 5.3	Successful no fault execution (except for SCSI devices other than the HDD)	Same as standard	Same as standard
(4) Extended Diagnostics Test (Non Operator Intervention)	TI 6190.62 Para 4.10.2 Para 4.16.2	Successful no fault execution (except Flash 2)	Same as standard	Same as standard
c. RACD/RACD2	TI 6190.66			
(1) Power Supplies	TI 6190.53 Para 5.1.3			
(a) +5.0 V dc		+5.0 V dc	+.25, -.125	Same as initial
(b) +12.0 V dc		+12.0 V dc	+.6, -.30	Same as initial
(c) -12.0 V dc		-12.0 V dc	-.6, +.30	Same as initial
(d) Ripple for +5.0 V dc, +12.0 V dc, -12.0 V dc		200 mv peak-to-peak maximum	Same as standard	Same as initial
(e) Kybd/Trkball +5 V dc		+5.0 V dc	+/- .25	Same as initial
(f) Kybd/Trkball + 12 V dc		+12.0 V dc	+/- .6	Same as initial
(2) Disk Tests	TI 6190.62 Para 5.6			
(a) Floppy Confidence Test[ii]		Successful no fault execution	Same as standard	Same as standard
(b) Hard Disk Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as standard
(c) CDROM Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as standard

STANDARDS AND TOLERANCES

	Parameter	Reference Paragraph	Standard	Tolerance/Limit	
				Initial	*Operating*
	(d) PC Card Reader 1 SCSI Internal Diagnostic Test[2]		Successful no fault execution	Same as standard	Same as standard
→	(3) Diagnostics Test	TI 6190.62 Para 5.3	Successful no fault execution (except for SCSI devices other than the HDD)	Same as standard	Same as standard
	(4) Extended Diagnostics Test (Non Operator Intervention)	TI 6190.62 Para 4.10.2 Para 4.16.2 Para 4.18.3	Successful no fault execution (except Flash 2)	Same as standard	Same as standard
	d. RDBM				
	(1) RDBM Power Supply	PX 12102 Para 5.5.c.1			
	(a) + 5.0 V dc (PS-1 +5V)		+ 5.0 V dc	+/- 0.25 V dc	Same as initial
	(b) + 5 V Ripple		100mv pk – pk maximum	Same as standard	Same as standard
	(c) + 12.0 V dc (PS1- +12V)		+ 12.0 V dc	+/- 0.8 V dc	Same as initial
	(d) + 12 V Ripple		200mv pk – pk maximum	Same as standard	Same as standard
	(e) -12.0 V dc (PS1- -12V)		- 12.0 V dc	+/- 0.6 V dc	Same as initial
	(f) -12 V Ripple		200mv pk – pk maximum	Same as standard	Same as standard
	(2) RDBM RTDT	TI 6190.62 Para 5.8	Successful no fault execution	Same as standard	Same as standard
→	(3) RDBM Firmware Diagnostic and BITE Test	PX 12102 Para 5	Successful no fault execution	Same as standard	Same as standard
	(4) Maintenance Panel Test		Successful no fault execution	Same as standard	Same as standard
→	(5) Test Clock	PX 12102 Para 5.5.c.3	19.2 kHz	+/- 0.10 kHz	Same as initial
	342. DISPLAY PRESENTATION.				
→	a. Single Sensor Display Registration	Para 513, Para 514 or Para 523			

STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(1) Radar/Beacon Permanent Returns				
(a) Azimuth		FAA form 6030-17 value	Same as standard	+/- 1 deg.
(b) SRR Search/BCN		FAA form 6030-17 value	Same as standard	+/- 0.07 nmi
(c) LRR Search/BCN		FAA form 6030-17 value	Same as standard	+/- 0.13 nmi
(2) Target/Alphanumeric Registration		Alphanumeric symbology coincident with target extent	Same as standard	Same as standard
→ b. Mosaic Display Registration	Para 515			
(1) ASR Beacon				
(a) Azimuth **NOTE:** Box drawn at +/- 4 ACPs		Center of Extent/Track symbol in Box or 6030-17 value	Same as standard	Same as standard
(b) Range **NOTE:** Box drawn at +/- 0.125 nmi		Center of Extent/Track symbol in Box or 6030-17 value	Same as standard	Same as standard
(2) ASR Search				
(a) Azimuth NOTE: Box drawn at +/-6 ACPs		Center of Extent/Track symbol in Box or 6030-17 value	Same as standard	Same as standard
(b) Range NOTE: Box drawn at +/- 0.250 nmi		Center of Extent/Track symbol in Box or 6030-17 value	Same as standard	Same as standard
(3) ARSR Beacon				

STANDARDS AND TOLERANCES

	Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
				Initial	*Operating*
	(a) Azimuth **NOTE:** Box drawn at +/- 3 ACPs		Center of Extent/Track symbol in Box or 6030-17 value	Same as standard	Same as standard
	(b) Range **NOTE**: Box drawn at +/- 0.125 nmi		Center of Extent/Track symbol in Box or 6030-17 value	Same as standard	Same as standard
	(4) ARSR Search				
	(a) Azimuth **NOTE:** Box drawn at +/- 4 ACPs		Center of Extent/Track symbol in Box or 6030-17 value	Same as standard	Same as standard
	(b) Range **NOTE**: Box drawn at +/- 0.250 nmi		Center of Extent/Track symbol in Box or 6030-17 value	Same as standard	Same as standard
→	(c) ARSR Target Registration	Para 512	Less than or equal to 2 nmi separation	Same as standard	Same as standard
→	(d) MSAW/CA Aural Alarm	Para 502	Successful no fault execution	Same as standard	Same as standard
→	(e) Map Magnetic North Mark	Para 520	0 degrees	+/- 1 degree	Same as initial
	c. LDDT	Para 517			
	(1) ACD/TMU	TI 6190.69 Para 5.1.7 TI 6190.53 Para. 5.1.4	Successful no fault execution	Same as standard	Same as standard
	(2) RACD/RACD2/RACD3	TI 6190.66 TI 6190.68 Para 5.1.4 TI 6190.53 Para 5.1.4	Successful no fault execution	Same as standard	Same as standard
	(3) DBRITE	TI 6190.62 Para 5.7	Successful no fault execution	Same as standard	Same as standard
	d. RTDT (DBRITE Only)	TI 6190.62 Para 5.8	Successful no fault execution	Same as standard	Same as standard
	e. Lamp Checks		All Lamps properly lit	Same as standard	Same as standard
	f. SONY Monitor	TI 6190.56 Para 6.5			
	(1) Video Adjustment				
→	(a) Color and brightness.				

STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(1) Contrast Maximum		Manufacturer Setting	0.241≤x≤0.301 0.256≤y≤0.316 43.0≤Y≤47.0	Same as initial
(2) Contrast Minimum			0.241≤x≤0.301 0.256≤y≤0.316 6.0≤Y≤7.0	Same as initial
(b) Picture size in Millimeters (mm) Width x Height		Manufacturer Setting	498 x 498 +/-5	Same as initial
(c) Convergence				
(1) Zone A: The area within the circle whose radius from the center of the CRT to the edge of the picture size		≤ 0.333mm	Same as standard	Same as standard
(2) Zone B: The area outside of zones A and C		≤ 0.508mm	Same as standard	Same as standard
(3) Zone C: The areas within the four right isosceles triangles at the corners of the picture size whose sides are 1 inch		≤ 0.700mm	Same as standard	Same as standard
(d) Geometric Distortion of all areas of the picture		Manufacturer Setting	Within 1% of Picture height at areas of the picture 1% of 498 +/-	Same as standard
→ (e) Focus Minimum recognizable character font		Manufacturer Setting	Character size 1	Same as initial
g. BARCO ISIS Monitor	TI 6190.53 Para 6.10			
→ (1) 100% White		Y = 150cd/m*m	135< <165	Same as initial
		x = 0.304	0.274< <0.334	Same as initial
		y = 0.330	0.300< <0.360	Same as initial

STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	*Operating*
→ (2) Check For Bad Pixels. A dot is one third of a pixel. It takes 3 dots or sub-pixes, a red, a blue, and a green to make one white pixel. Bright dots are luminous dots seen with a black screen. Dark dots are dots seen while the screen is illuminated with red, blue, or green.		# of total bright dots ≤ 15	Same as standard	Same as standard
		# of total dark dots ≤ 15	Same as standard	Same as standard
		# of bright dots of any one color ≤ 7	Same as standard	Same as standard
		# of dark dots of any one color ≤ 8	Same as standard	Same as standard
h. High Brightness Tower Monitor	TI 6190.66 TI 6190.53 Para 6.10			
→ (1) 100% White	TI 6190.68 Para 6.10	Y = 600cd/m*m	500< Y[iii]	300< Y
		x = .318	.290< .366<	Same as Initial
		y = 0.336	.319< <.385	Same as Initial
(2) Check For Bad Pixels. A dot is one third of a pixel. It takes 3 dots or sub-pixels, a red, a blue, and a green to make one white pixel. Bright dots are luminous dots seen with a black screen. Dark dots are dots seen while the screen is illuminated with red, blue, or green.		# of total bright dots ≤ 15	Same as standard	Same as standard
		# of total dark dots ≤ 15	Same as standard	Same as standard
		# of bright dots of any one color ≤ 7	Same as standard	Same as standard
		# of dark dots of any one color ≤ 8	Same as standard	Same as standard
343-349. RESERVED.				
350. SSI.				
351. ARTS GATEWAY.				
a. AGW				
(1) Power Supplies	TI 6190.50 Para 5.1.3			
(a) +5.0 V dc		+5.0 V dc	+.25, -.125	Same as initial
(b) +12.0 V dc		+12.0 V dc	+.6, -.30	Same as initial
(c) -12.0 V dc		-12.0 V dc	-.6, +.30	Same as initial

STANDARDS AND TOLERANCES

	Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
				Initial	*Operating*
	(d) Ripple for +5.0 V dc+12.0 V dc, -12.0 V dc		200 mv peak-to-peak maximum	Same as standard	Same as standard
	(2) Disk Test	TI 6190.62 Para 5.6			
	(a) Floppy Confidence Test		Successful no fault execution	Same as standard	Same as standard
	(b) Hard Disk Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as standard
	(c) CDROM Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as standard
	(d) PC Card Reader 1 Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as standard
→	(3) Diagnostics Test	TI 6190.62 Para 5.3	Successful no fault execution (except for SCSI devices other than HDD)	Same as standard	Same as standard
	(4) Extended Diagnostics Test (Non Operator Intervention)	TI 6190.62 Para 4.13.2	Successful no fault execution (except Flash 2)	Same as standard	Same as standard
	352. ROUTERS AND SWITCHES.				
	353. LANS.				
	a. ARTS LANs	TI 6190.62 Para 5.4			
	(1) LAN1 (Operational)		Successful no fault execution	Same as standard	Same as standard
	(2) LAN2 (Maintenance)		Successful no fault execution	Same as standard	Same as standard
	(a) LAN Test		Successful no fault execution	Same as standard	Same as standard
	b. RGW LANs	TI 6190.62 Para 5.4	Successful no fault execution	Same as standard	Same as standard
	(a) LAN Test		Successful no fault execution	Same as standard	Same as standard
	(1) LAN1 (Operational)				
	(a) LAN Test		Successful no fault execution	Same as standard	Same as standard
	(2) LAN2 (Maintenance)				
	(a) LAN Test		Successful no fault execution	Same as standard	Same as standard
	c. Tower LANs	TI 6190.62 Para 5.4	Successful no fault execution	Same as standard	Same as standard

STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(1) LAN1 (Operational)				
(a) Tower LAN Test		Successful no fault execution	Same as standard	Same as standard
d. CDR LAN	CSOM/SUM Para 4.6.4			
(1) CDR LAN Test		Successful no fault execution	Same as standard	Same as standard
e. ADS-B LAN				
(1) ADS-B Lan Test		Successful no fault execution	Same as standard	Same as standard
354–359. RESERVED.				
360. RGW.				
361. RADAR GATEWAY.				
a. RGW				
(1) Power Supply	TI 6190.52 Para 6.5.3			
(a) +5.0 V dc		+5.0 V dc	+.25, -.125	Same as initial
(b) +12.0 V dc		+12.0 V dc	+.6, -.30	Same as initial
(c)-12.0 V dc		-12 V dc	-.6, +.30	Same as initial
(d) Ripple for +5.0 V dc, +12.0 V dc, -12.0 V dc		200 mv peak-to-peak maximum	Same as standard	Same as standard
(2) Disk Tests	TI 6190.62 Para 5.6			
(a) Floppy Confidence Test		Successful no fault execution	Same as standard	Same as standard
(b) Hard Disk Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as standard
(c) CDROM Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as standard
(d) PC Card Reader 1 SCSI Internal Diagnostic Test		Successful no fault execution	Same as standard	Same as standard
(e) CDR Internal Disk Diagnostic Test		Successful no fault execution	Same as standard	Same as standard
(3) VCOM-54 Test	TI 6190.62 Para 5.2			

STANDARDS AND TOLERANCES

	Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
				Initial	*Operating*
	(a) Channel To Different Channel Synchronous Loop-Back Test		Successful no fault execution of 50 cycles, Channel 7 to any other Channel	Same as standard	Same as standard
→	(4) Diagnostics Test	TI 6190.62 Para 5.3	Successful no fault execution (except for SCSI devices other than HDD)	Same as standard	Same as standard
	(5) Extended Diagnostics Test (Non Operator Intervention)	TI 6190.62 Para 4.12.2	Successful no fault execution (except Flash 2)	Same as standard	Same as standard
	362–369. RESERVED.				
	370. ARTS PROCESSOR				
	a. AP Chassis	TI 6190.70 Para 525			
	(1) Power Supplies	Para 2.4.2.2 and Para 5.1.3	Successful no fault execution	Same as standard	Same as standard
	(a) +5.0 Vdc		+5.0 Vdc	+.25, -.20	Same as initial
	(b) +12.0 Vdc		+12.0 Vdc	+.6, -.48	Same as initial
	(c) +3.3 Vdc		+3.3 Vdc	+.165, -.1	Same as initial
	(d) Kybd/Trkball +5 V		+5.0 V dc	+/- .25	Same as initial
	(e) Kybd/Trkball +12 V dc		+12.0 V dc	+/-.6	Same as initial
→	(2) Diagnostics Test	TI 6190.62 Para 5.3	Successful no fault execution	Same as standard	Same as standard
	(3) Extended Diagnostics (Non Operator Intervention)	TI 6190.62 Para 4.19.3	Successful no fault execution	Same as standard	Same as standard
	371–389 RESERVED.				

CHAPTER 4. PERIODIC MAINTENANCE

400. GENERAL.

a. This chapter establishes all the maintenance activities that are required for the ARTS IIIE and RGW equipment systems on a periodic, recurring basis, and the schedules for their accomplishment. The chapter is divided into two sections. The first section identifies the performance checks (i.e., tests, measurements, and observations) of normal operating controls and functions that are necessary to determine whether operation is within established tolerances/limits. The second section identifies other tasks that are necessary to prevent deterioration and/or ensure reliable operation. Refer to Order 6000.15 for additional general guidance.

b. In addition to the periodic, recurring activities specified in this chapter, Order 6000.15 establishes requirements for routine maintenance and other specific maintenance activities that are to be performed for all AF equipment.

c. The following tables of performance checks and maintenance tasks are not to be taken as the minimum work required for proper maintenance, rather as the maximum interval permitted between tasks. Refer to Order 6000.15 for guidance.

d. It is understood that the frequency of accomplishment for the tasks listed are to be performed at a given period. For instance, on an anniversary, the annual, semiannual, quarterly, monthly, weekly, and daily tasks shall all be performed.

e. The content of the following two sections follows the latest edition of Order 1320.58, Equipment and Facility Directives - Modification and Maintenance Technical Handbooks, paragraph 216f(b) and (c). The activities listed include some, but not all, activities listed in instruction books, as well as some activities not listed in instruction books.

NOTE: All reference paragraphs apply to this handbook unless otherwise indicated.

SECTION 1. PERFORMANCE CHECKS

Subsection 1. ARTS IIIE PERFORMANCE CHECKS

Table 4-1. ARTS IIIE Performance Checks

ARTS IIIE Performance Checks	*Reference*	
	Standards & Tolerances	*Maintenance Procedures*
410. DAILY.		
a. CPS		
(1) Force Reconfiguration To An Alternate CP By Resetting Active CP. Verify That Critical Data Is Retained, and Reconfiguration Alarm Sounds		CSOM/SUM Para 4.2.3
(2) Indication That Operational Program Is Cycling Properly		
b. TPS		
(1) Force Reconfiguration To An Alternate TP By Resetting The Active TP. Verify That Critical Data Is Retained and Reconfiguration Alarm Sounds		CSOM/SUM Para 4.2.3
(2) Indication That Operational Program Is Cycling Properly		
c. SMC		
(1) Screen/Review System Monitor (SMON) Messages For Any Anomalies (i.e., Aural Alarm Failure, No Response From Disk, No Keyboard Function Response, Unexplained RDM Switching Of Remote Network Ids (NIDS, Etc)		CSOM/SUM Para 4.5.5
(2) Review System/Subsystem Status Reports		CSOM/SUM Para 4.7.7
(3) Call and Review Suicide Notes		CSOM/SUM Para 4.5.4
(4) Verify Proper Timing and Operation of Real Time Clock		CSOM/SUM Para 2.1.4.3
(5) Review SW Revision Level		CSOM/SUM Para 4.2.4
(6) Verify CDR Recording is Active		CSOM/SUM Para 4.7.8
(7) Run Beacon Radar Online Performance Monitor (BROPM /CQARS)	Para 303	Para 506
d. Mosaic		
(1) CQARS Data Analysis		
(a) PR Reliability Check	Para 303.a	Para 506
(b) Inter-Sensor Linking Check	Para 303.b	Para 506
(c) PR Accuracy Check	Para 302.b	Para 506

ARTS IIIE Performance Checks	*Reference*	
	Standards & Tolerances	*Maintenance Procedures*
(2) Generate Registration Analysis Summary Report		Para 505
(3) Activate System Tolerance Alarm		Para 504
e. Remote Tower Connectivity		
(1) Verify Remote Tower Connectivity On Both Communication Channels	Para 341.b.6	Para 522
f. SP/SIFS		
(1) Force reconfiguration to an alternate SP/SIFS by resetting active SP/SIFS. Verify that critical data is retained and reconfiguration alarm sounds. Indication that operational program is cycling properly.		CSOM//SUM Para 4.2.3
g. SP/ SMC PC		
(1) Screen/Review System Monitor (SMON) message for any anomalies (i.e., aural alarm failure, no response from disk, no keyboard function response, unexplained RDM switching of remote NIDs) etc.		CSOM//SUM Para 4.5.5
(2) Review system/subsystem status reports.		CSOM/SUM Para 4.7.7
(3) Call and review suicide notes.		CSOM/SUM Para 4.8.4
(4) Verify proper timing and operation of real time clock.		CSOM/SUM Para 4.5.11 Para 4.75 Para 2.1.4.3
(5) Review S/W revision level.		CSOM/SUM Para 4.2.4
(6) Verify CDR recording is active.		CSOM/SUM Para 4.7.8
(7) Run BROPM/CQARS.	Para 303	
h. ADS-B		
(1) Check external source status report		
(a) Verify external source LAN status, Service Volumes, and Radio Stations are operational.		Para 527.e.1 Para 527.e.3
(2) Check CQARS source ADB.		
(a) Inter-Sensor Linking Error. Note: This is only required if there are live ADS-B targets available and the sample size is at least 10.	Para 304c	Para 528
(3) Check ADS-B Subsystem Status Report.	Para 304b	CSOM/SUM Para. 6.2.8
(4) Check CQARS sensor XXX		
(a) Inter-Sensor Linking Error.	Para 303b	Para 506.e.2

ARTS IIIE Performance Checks	*Reference*	
	Standards & Tolerances	*Maintenance Procedures*
411. WEEKLY.		
a. System Checks		
(1) System Cold Start – Reset All Chassis		CSOM/SUM Para 4.2.1
b. Mosaic		
(1) Review Registration Analysis Summary Reports		Para 505
c. SMC/RGW/SP/PD PC		
(1) Power up reset TRACON SMC, RGW and Performance Data Personal Computers (PD-PC)		
(2) Review TRACON PC Event Viewer Logs		
d. CDR-E		
(1) Check RAID and LAN Status Via System Config Status Reports		CSOM/SUM Para 4.7.1
e. Run CDR Permanent Return Data Analysis	Para 302.a	Para 509
f. Run CDR Test Target Data Analysis	Para 304	Para 530
412. MONTHLY.		
a. CPS		
(1) Run CP Diagnostic	Para 321.a.5 or Para 321.b.4	TI 6190.62 Sec 5
b. TPS		
(1) Run TP Diagnostic	Para 311.a.5 or Para 311.b.4	TI 6190.62 Sec 5
c. AGW		
(1) Run AGW Diagnostic	Para 351.a.3	TI 6190.62 Sec 5
(2) Run Disk Fix Utility		Para 511
d. SMC		
(1) Run SMC Diagnostic	Para 331.a.5 or Para 331.b.3	TI 6190.62 Sec 5
(2) Check NEXSAN RAID Status Using PC Web Browser. Check System Information Event Log – Show Warnings and Errors		ATAboy 2X Product Manual

ARTS IIIE Performance Checks	*Reference*	
	Standards & Tolerances	*Maintenance Procedures*
e. System Check		
(1) Run CDR Permanent Return Data Analysis For ASR-9/Mode-S Sensors in Air Traffic Control Beacon Interrogator (ATC-BI) Mode	Para 302.a	Para 509
(2) Verify MSAW/CA Functionality Under Program Control	Para 322	Para 503
f. SP		
(1) Run SP Diagnostic.	Para 370..a.2	TI 6190.62
(2) Verify MSAW/CA functionality under program control.	Para 322	Para 5.3 Para 503
f. SIFS		
Run SIFS Diagnostic.	Para 370.a.2	TI 6190.62 Para 5.3
413. QUARTERLY.		
NOTE: When performing extended diagnostics, populate removable media devices with media (except for lower flash)		
a. CPS		
(1) Run CP Extended Diagnostic	Para 321.a.6 or Para 321.b.5	TI 6190.62 Sec 4
(2) Run Disk Fix Utility		Para 511
b. TPS		
(1) Run TP Extended Diagnostic	Para 311.a.6 or Para 311.b.5	TI 6190.62 Sec 4
(2) Run Disk Fix Utility		Para 511
c. AGW		
(1) Run AGW Extended Diagnostic	Para 351.a.4	TI 6190.62 Sec 4
(2) Run Disk Fix Utility		Para 511
d. SMC		

ARTS IIIE Performance Checks	*Reference*	
	Standards & Tolerances	*Maintenance Procedures*
(1) Run SMC Extended Diagnostic	Para 331.a.6 or Para 331.b.5	TI 6190.62 Sec 4
(2) Run Disk Fix Utility		Para 511
e. SP/SIFS		
(1) Run extended diagnostic (non-operator intervention)	Para 370.a.3	TI 6190.62 Para 4.19.3
414. SEMI-ANNUALLY.		
a. CPS		
(1) Check Power Supply Voltages and Ripple and Adjust As Required	Para 321.a.1 or Para 321.b.1	TI 6190.60 Sec 6 TI 6190.55 Sec.5
b. TPS		
(1) Check Power Supply Voltages and Ripple and Adjust As Required	Para 311.a.1 or Para 311.b.1	TI 6190.61 Sec 6 TI 6190.55 Sec 5
c. AGW		
(1) Check Power Supply Voltages and Ripple and Adjust As Required	Para 351.a.1	TI 6190.50 Sec 5
d. SMC		
(1) Check Power Supply Voltages and Ripple and Adjust As Required	Para 331.a.1 or Para 331.b.1	TI 6190.58 Sec 6 TI 6190.55 Sec 5
e. Mosaic		
(1) Run Sensor Coverage Analysis Program (SCAP)		Para 507
f. SP/SIFS		
(1) Check operation of each power supply.	Para 370.a.1	Para 525 TI 6190.70 Sec. 5
415-419. RESERVED		

SECTION 1. PERFORMANCE CHECKS CON'T

Subsection 2. TRACON AUTOMATION DISPLAY SYSTEM

Table 4-2. TADS Performance Checks

TADS Performance Checks	*Reference*	
	Standards & Tolerances	*Maintenance Procedures*
420. DAILY.		
a. Display Registration Checks		
(1) Single Sensor Mode Display Registration Check in ARTS and RGW mode.	Para 342.a	Para 513 a or b or 514 a or b
(2) STDM Display Registration Check.		
(a) ADS-B Test Target Accuracy in STDM mode.	Para 304.a	Para 527e4
(b) Permanent Returns accuracy in STDM mode.		Para 529
(3) Mosaic Displays (ACD/ACD2/TMU/LACD)		
(a) Mosaic Mode Display Registration Check in ARTS and RGW mode.	Para 342.b	Para 515
b. Activate MSAW/CA Aural Alarm.	Para 342.d	Para 502
421. WEEKLY.		
a. Data Entry and Display		Para 521
422. MONTHLY.		
423. QUARTERLY.		
NOTE: When performing extended diagnostics, populate removable media devices with media (except for lower flash)		
a. RDM		
(1) Run RDM Extended Diagnostic (non-operator intervention)	Para 341.a.6 or Para 341.b.5 or Para 370.a.3	TI 6190.62 Sec 4
(2) Run Disk Fix Utility (Not applicable to AP Chassis)		Para 511
b. ARTS Displays[iv]		
(1) Run Extended Diagnostic (non-operator intervention)	Para 341.c.4 or Para 341.d.4	TI 6190.62 Sec 4
(2) Run Disk Fix Utility (Not applicable to AP Chassis)		Para 511

TADS Performance Checks	*Reference*	
	Standards & Tolerances	*Maintenance Procedures*
(3) Run LDDT	Para 342.f.	TI 6190.56 Sec 5 TI 6190.53 Sec 5 TI 6190.69 Sec 5 TI 6190.68 Sec 5
424. SEMI ANNUALLY.		
a. RDM		
(1) Check Power Supply Voltages/Ripple and Adjust As Required	Para 341.b.1	TI 6190.54 Sec 5 TI 6190.55 Sec 5
b. ARTS Displays[v]		
(1) Check Power Supply Voltages/Ripple and Adjust As Required	Para 341.c.1	TI 6190.58 Sec 5 TI 6190.56 Sec 5 TI 6190.57 Sec 5 TI 6190.69 Sec 5
(2) Check TMU/LACD Keyboard Power Supply Voltages	Para 341.c.1	TI 6190.53 Sec 5 TI 6190.68 Sec 5 TI 6190.66 Sec 5
(3) Back Up Pref Sets		Para 510
c. Monitors/Displays		
(1) Check Sony Monitor Alignment	Para 342.i	TI 6190.56 Para 6.5 TI 6190.69 Para 6.5
(2) Check ISIS Monitor Alignment	Para 342.j	TI 6190.53 Para 6.10
(3) Check High Brightness Tower Monitor Alignment	Para 342.k	TI 6190.53 Para 6.10 TI 6190.66 Para 6.10 TI 6190.68 Para 6.10
d. AP RDM		
(1) Check operation of each power supply.	Para 370.a.1	TI 6190.70 Para 5.13 Para 525
e. AP ACD2	Para 370.a.1	TI 6190.70 Para 5.13 Para 525
(1) Check operation of each power supply		TI 6190.70 Para 5.25
(2) Check keyboard power supply voltages	Para 370.a.1	TI 6190.68 Para 5.1.6
(3) Back Up Pref Sets		Para 510
425. RESERVED.		
426. AS REQUIRED.		
a. Map Verification Check	Para 342.e	Para 520
427–429. RESERVED.		

SECTION 1. PERFORMANCE CHECKS CON'T

Subsection 3. RTDS PERFORMANCE CHECKS

Table 4-3. RTDS Performance Checks

RTDS Performance Checks	*Reference*	
	Standards & Tolerances	*Maintenance Procedures*
430. DAILY.		
431. WEEKLY.		
a. RACD/RACD2/RACD3/LACD Chassis		
(1) Check Front Panel 2x20/4x20, LEDs, FSS, Circuit Card Assemblies (CCA) for Normal Indications		TI 6190.53 TI 6190.66 TI 6190.68 Chap 3
(2) Check Interfacing Equipment (Direct Digital Connect (DDC) pnl., Verilink, Newbridge, etc.) for Normal Front Panel Indications		Applicable user's manual
(3) Check Uninterruptible Power Supply (UPS) Front Panel Indicators for Normal Operation		Applicable UPS user's manual
b. RACD/RACD2/RACD3/LACD/DBRITE Display		
(1) Data Entry and Display		Para 521
(2) Activate MSAW/CA Aural Alarm	Para 342.d	Para 502
(3) Check High Brightness Tower Monitor for Proper Focus, Brightness, Color, Pixels[vi]		TI 6190.53 TI 6190.66 TI 6190.68 Para 6.10
(4) Check High Brightness Tower Monitor Cooling Fans [Vi]		Local Procedures
(5) Single Sensor Mode Display Registration Check	Para 342.a	Para 513a or Para 513b
(6) ARSR Target Registration Check	Para 342.c	Para 512
(7) Verify Display Data From All Sensors Adapted For Tower		Para 521
(8) Verify RGW Mode Operation and Ability to switch between ARTS/RGW.		TI 6190.53 Para 4.2.2.2 TI 6190.66 Para 4.2.2.2 TI 6190.68 Para 3.3.1
c. DRF Capable RACDs Only		
(1) DRF Mode Display Registration Check	Para 342.a	Para 523
(2) PR Reliability	Para 303.a	Para 508

RTDS Performance Checks	*Reference*	
	Standards & Tolerances	*Maintenance Procedures*
432. MONTHLY.		
a. RACD2/RACD3		
(1) Check Health Status Reports. Check Both HDs In RAID		TI 6190.66 Para 5.1.4
433. QUARTERLY.		
NOTE: When performing extended diagnostics, populate removable media devices with media (except for lower flash)		
a. RACD/RACD2/LACD/RACD3		
(1) Run Extended Diagnostic (non-operator intervention)	Para 341.d.4	TI 6190.62 Sec 4
(2) Run Disk Fix Utility		Para 511 (RACD/RACD2) TI 6190.62 TI 6190.62 Para 4.18.2 (RACD3) Para 4.18.2 (RACD3)
(3) Run LDDT	Para 342.f.2	TI 6190.53 TI 6190.66 Sec 5 TI 6190.68
b. RDBM/DBRITE		
(1) Run RTDT	Para 342.f Para 341.e.2	
434. SEMI ANNUALLY.		
a. RACD/LACD/RACD2		
(1) Check Power Supply Voltages/Ripple and adjust as required	Para 341.d.1	TI 6190.53 TI 6190.66 Sec 5
(2) Check RACD Keyboard Power Supply Voltages	Para 341.d.1	TI 6190.53 TI 6190.66 Sec 5
(3) Back Up Pref Sets		Para 510
(4) Load Test UPS (If Installed)		Para 524
b. RACD/LACD/RACD2/ RACD3 Monitors/Displays (Tower)		
(1) Check Sony Monitor Alignment	Para 342.i	TI 6190.56
(2) Check High Brightness Tower Monitor Alignment	Para 342.k	TI 6190.53 TI 6190.66 TI 6190.68 Para 6.10

RTDS Performance Checks	*Reference*	
	Standards & Tolerances	*Maintenance Procedures*
c. RDBM		
(1) Check Power Supply Voltages/Ripple and Adjust As Required.		
(2) Check RDBM Internal and Modem Clock and Adjust As Required		
d. RACD3		
(1) Check operation of each power supply.	Para 370.a.1	TI 6190.68 Para 5.1.3 Para 525
(2) Check RACD Keyboard Power Supply Voltages	Para 370.a.1	TI 6190.68 Sec 5
(3) Back Up Pref Sets		Para 510
(4) Load Test UPS (If Installed)		Para 524
435. RESERVED.		
436. AS REQUIRED.		
a. Map Verification Check	Para 342.e	Para 520
437–439. RESERVED.		

SECTION 1. PERFORMANCE CHECKS CON'T

Subsection 4. RGW PERFORMANCE CHECKS

Table 4-4. RGW Performance Checks

RGW Performance Checks	*Reference*	
	Standards & Tolerances	*Maintenance Procedures*
440 DAILY.		
a. Indication that the Operational Program Is Cycling Properly		
b. SIFS/RGW		
(1) Force reconfiguration to an alternate SIFS/RGW by resetting active SIFS/RGW.		
(2) Verify that critical data is retained and reconfiguration alarm sounds		
(3) Indication that Operational program is cycling properly.		
c. RGW PC		
(1) Screen/review system monitor (SMON) message for any anomalies (i.e., aural alarm failure, no response from disk, no keyboard function response, unexplained RDM switching of remote NIDs) etc.		CSOM/SUM Para 4.5.5
(2) Review system/subsystem status reports.		Para 4.7.7
(3) Call and review suicide notes.		Para 4.5.4
(4) Verify proper timing and operation of real time clock.		Para 4.5.11, 4.7.5, 2.1.4.3
(5) Review S/W revision level		Para 4.2.4
(6) Verify CDR recording is available.		Para 4.7.8
(7) Run BROPM/CQARS	Para 303	Para 506
441. WEEKLY.		
a. Run Permanent Return CDR Data Analysis	Para 302	Para 509
b. Cold Start RGW System		CSOM/SUM Para 4.5.1
442. MONTHLY.		
a. Verify MSAW/CA functionality under program control.	Para 322	Para 503
443. QUARTERLY.		
NOTE: When performing extended diagnostics, populate removable media devices with media (except for lower flash)		

RGW Performance Checks	*Reference*	
	Standards & Tolerances	*Maintenance Procedures*
a. Run RGW/SIFS Extended Diagnostic (non-operator intervention)	Para 361.a.5	TI 6190.62 Sec 4
b. Run Disk Fix Utility	Para 370.a.3	Para 511 (PPC) TI 6190.62 Para 4.1.8.2 (AP)
444. SEMI ANNUALLY.		
a. Check PPC RGW Power Supply Voltages/Ripple and Adjust As Required	Para 361.a.1	TI 6190.52 Para 6.5.3
b. AP/RGW/SIFS		
Check operation for each power supply.	Para 370..a.1	TI 6190.70 Sec5 Pars 525
445–449. RESERVED.		

SECTION 1. PERFORMANCE CHECKS CON'T

Subsection 5. SSI PERFORMANCE CHECKS

Table 4-5. SSI Performance Checks

SSI Performance Checks	*Reference*	
	Standards & Tolerances	*Maintenance Procedures*
450–452. RESERVED		
453. QUARTERLY.		
a. LAN Tests		TI 6190.62 Para 5.4
(1) ARTS LAN Test		
(a) Test All Nodes Using LAN 1 (Operational)	Para 353.a	
(b) Test All Nodes Using LAN 2 (Maintenance)	Para 353.a	
(2) RGW LAN Test		
(a) Test All Nodes Using LAN 1 (Operational)	Para 353.b	
(b) Test All Nodes Using LAN 2 (Maintenance)	Para 353.b	
(3) Tower LAN Test		
(a) Test All Nodes Using LAN 1 (operational)	Para 353.c	
(b) Test All Nodes Using LAN2 (Maintenance)		
(4) CDR LAN Test	Para 353.d	CSOM/SUM Para 4.6.4
(5) ADS-B LAN Test	Para 353.e	
b. Routers and Switches		Manufacturer Handbook
(1) Verify Front Panel Indicators For Proper Operation		
c. Clean and Inspect Routers and Switches.		
454–459 RESERVED.		

SECTION 1. PERFORMANCE CHECKS CON'T

Subsection 6. MISCELLANEOUS PERFORMANCE CHECKS

Table 4-6. Miscellaneous Performance Checks

Miscellaneous Performance Checks	*Reference*	
	Standards & Tolerances	*Maintenance Procedures*
460. RESERVED.		
461. WEEKLY.		
a. Check Lamps On All Units and Adjust/Replace As Required		
462. MONTHLY.		
a. Check and Clean or Replace Filters On All Units		
b. Check Ventilation Louvers/Ports for Obstructions On All Units		
c. Clean Display Surface		
463. QUARTERLY.		
a. Check Blowers and Fans for Proper Operation		
b. Clean PCs		
464. SEMI ANNUALLY.		
a. Clean Surfaces Of All Cabinets		
b. Clean Interior Of All Cabinets		
c. Inspect Cables and Connectors		
465. RESERVED.		
466. AS REQUIRED.		
a. High Speed Printers (HSP)		Manufacturer Handbook
(1) Clean HSP Units.		
(a) Clean Top Cover Viewing Window		
(b) Vacuum Band Mechanism Area		
(c) Clean Paper Motion Sensors and Band Brushes		
(d) Clear Ribbon Shorting Bars		
(e) Clean Print Bands an Pulleys		
(f) Clean Ribbon Shafts		

Miscellaneous Performance Checks	*Reference*	
	Standards & Tolerances	*Maintenance Procedures*
(2) Inspect for Inoperative/Damaged Items and Loose Hardware		
(3) Check Operator Controls and Status Display		
b. Echo Printers		Manufacturer Handbook
(1) Clean and Vacuum Printers		
(2) Clean Platten and Paper Bail Rollers		
(3) Check Operator Controls and Status Display		
a. PD-PC, SMC-PC and RGW-PC		Manufacturer Handbook
(1) Virus Protect		
c. Update S/W and virus definitions		
467-499. RESERVED.		

NOTE: Virus protection software shall be FAA approved and distributed.

CHAPTER 5. MAINTENANCE PROCEDURES

500. GENERAL.

This chapter establishes the procedures for accomplishing the various essential maintenance activities required for the ARTS IIIE and RGW Systems, either on a periodic or incidental basis. The procedures contained herein are those that cannot be found in the equipment handbooks.

NOTE: In this chapter, the character "^" signifies a space. With the exception of Table 5-2, in which the character "^" signifies the mathematical exponential factor, otherwise known as "to the power of".

501. TECHNICAL PERFORMANCE RECORDS ENTRIES.

Order 6000.15 contains maintenance concept guidance and detailed instructions for field utilization of Technical Performance Record forms as applicable to the ARTS IIIE and RGW. Entries shall be made in accordance with the instructions published in Order 6000.15 (except as otherwise instructed in the subparagraphs to follow). Figures 5-1 through 5-8 are samples of FAA Form 6000-8.

a. The ARTS IIIE and RGW system performance shall be recorded on the approved forms posted on http://tpr.faa.gov.

b. Records of certifications shall be made in the Facility Maintenance Log, FAA Form 6030-1, or by electronic means.

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Refer to http://tpr.faa.gov

Figure 5-1. RACD Daily Maintenance

Refer to http://tpr.faa.gov

Figure 5-2. RACD Weekly Maintenance

Refer to http://tpr.faa.gov

Figure 5-3. RACD Semi-Annual (SA-1) Maintenance

Refer to http://tpr.faa.gov

Figure 5-4. RACD Semi-Annual (SA-2) Maintenance

Refer to http://tpr.faa.gov

Figure 5-5. ACD Semi-Annual Maintenance

Refer to http://tpr.faa.gov

Figure 5-6. ARTS Daily Maintenance

Refer to http://tpr.faa.gov

Figure 5-7. AGW Semi-Annual Maintenance

Refer to http://tpr.faa.gov

Figure 5-8. TMU ISIS Monitor Semi-Annual Maintenance

502. MSAW/CA AURAL ALARM CHECK.

a. Objective. Verify proper operation of MSAW/CA Aural Alarm.

b. Discussion. This check verifies the display hardware is capable of properly providing both an aural and visual indication of the MSAW/CA alarm.

Several methods are provided below to perform this check. The keyboard entry method is preferred, as this method exercises DPS MSAW/CA software subroutines. Performance of one of the available methods is required for each operational display.

c. Test Equipment Required. None.

d. Conditions. Checks must be made on operational displays while the operational program is being executed. Coordination with the appropriate control center is necessary.

e. Detailed Procedures.

(1) Keyboard Entry Method (ACD/TMU/RACD).

(a) Use the trackball to minimize the alarm indicator view, at the keyboard enter: **F7,2,ALARM^M<Enter>** where ^ = space. Verify the alarm indicator view maximizes, the LA alarm area is flashing green, and the aural alarm sounds.

(b) Use the trackball to minimize the alarm indicator view, at the keyboard enter: **F7,2,ALARM^C<Enter>** where ^ = space. Verify the alarm indicator view maximizes, the CA alarm area is flashing red, and the aural alarm sounds.

(2) Trackball Selection Method (ACD/TMU/RACD).

(c) Use the trackball to select the LA button in the alarm indicator view area. Verify the LA alarm area is flashing green and the aural alarm sounds. Reselect the LA button to terminate the alarm test.

(d) Use the trackball to select the CA button in the alarm indicator view area. Verify the CA alarm area is flashing red and the aural alarm sounds. Reselect the CA button to terminate the alarm test.

(3) Keyboard Entry Method (DBRITE).

(e) At the keyboard enter: **F7,2,ALARM^M<Enter>**
Verify the LA aural alarm sounds.

(f) At the keyboard enter: **F7,2,ALARM^C<Enter>**
Verify the CA aural alarm sounds.

503. MSAW/CA ALARM CHECK UNDER PROGRAM CONTROL.

a. Objective. Verify the capability of the operational program to detect MSAW/CA conditions and to visually/aurally alert controllers regarding these conditions.

b. Discussion. This test will verify that the operational program can detect an MSAW condition in the following areas: arrival monitor at a primary and a satellite airport, departure monitor at a primary and a satellite airport, and general terrain monitor. Conflict alert conditions in the following areas: Type 1 runway, Type 2 arrival/departure corridor, and Type 3 general airspace. Mode-C Intruder (MCI) is tested. For facilities that operate in STDM the scenario must also check CA and MSAW performance in STDM.

c. Test Equipment Required. None.

d. Conditions. This test is conducted from a display in training mode. This test will activate the MSAW/CA aural alarms at the display the scenario is running on. Full coordination with the appropriate control center is required.

e. Detailed Procedures.

(1) Select a keyboard to execute the scenario. Change display to the appropriate sensor that is being tested. F7, X, sensor number.

(2) Verify a scenario for the selected keyboard is available in the /d0/SCEN directory of the active CP hard drive or on a floppy disk.

NOTE: Each scenario is written for execution from a specific keyboard and will normally have the following naming convention:

XXXYZ.## **XXX =** Facility identifier

Y = Keyboard subset number

Z = Keyboard position symbol

= Version number of the file or blank for initial release

(3) Configure display to run scenario.

(a) Unpair paired keyboard(s). **F7,C,(paired kybd),*,C<enter>**

(b) Consolidate keyboards(s) to another display. **F7,C,(kybd to),(kybd from),+<enter>**

(c) Place display in training status. **F15,X,M<enter>**

(d) Enable Aural Alarm. **F15,X,A<enter>**

(e) Enable ETG. **F15,X,T<enter>**

(4) Activate the appropriate scenario. **F15,X,I,$,xxxyz.## <enter>**

NOTE: $=C if scenario is on hard drive. **$=F** if scenario is on a floppy disk.

(5) Observe that the scenario starts and that flight plan information begins to appear in the tabular list. The scenario normally takes approximately 10 minutes to run. Verify that the test targets produce the following alerts:

(a) **APM1MSW** should display and sound **LA** (arrival at primary airport).

(b) **APM2MSW** should display and sound **LA** (arrival at satellite airport).

(c) **DEP1MSW** should display and sound **LA** (departure at primary airport).

(d) **DEP2MSW** should display and sound **LA** (departure at satellite airport).

(e) **GTM1MSW** should display and sound **LA** (general terrain monitor).

(f) **GTM2MSW** should display and sound **LA** (general terrain monitor).

(g) **CA1TYP1** and **CA2TYP1** should display and sound **CA** (Type 1 area).

(h) **CA3TYP2** and **CA4TYP2** should display and sound **CA** (Type 2 area).

(i) **CA5TYP3** and **CA6TYP3** should display and sound **CA** (Type 3 area).

(j) **MCICA1** should display and sound **MCI CA.**

(k) **SCENARIO OFF** should display when the scenario is completed.

(6) Disable ETG. **F15,Z,T<enter>**

(7) Return the display to live mode. **F15,Z,M<enter>**

(8) Deconsolidate the keyboards. **F7,C<enter>**

(9) Return keyboards to paired status. **F7,C,(paired kybd),*,P,(kybd paired to) <enter>**

(10) Verify all alarms were processed by reviewing the SMR file.

504. ENABLE SENSOR TOLERANCE ALARM.

a. Objective. Ensure the sensor tolerance alarm is active.

b. Discussion. The sensor tolerance alarm is an aural alarm indicating a serious sensor alignment or registration problem. Currently no utility or indicator exists to alert the systems specialist that the sensor tolerance alarm has been inhibited since the last cold start. The only way to ensure the alarm is active is to enter the sensor tolerance alarm enable command and review SMON printouts.

c. Test Equipment Required. None.

d. Conditions. This procedure must be performed from either the SMS SMC-PC or a display keyboard with supervisory privileges.

e. Detailed Procedures.

(1) Make a note of the approximate time for use in searching the SMON printouts.

(2) At the display keyboard enter: **F7,2^SENT^E<enter>**
or in the SMON window of the SMS SMC-PC enter: **F,2^SENT^E<enter>**

(3) Review the SMON printouts at the time noted in step (1) above and verify the command entered in step (2) above was processed by the system.

505. REGISTRATION ANALYSIS.

a. **Objective.** Generate and review daily registration summary printouts and perform weekly sensor registration trend analysis.

b. **Discussion.** This analysis uses daily-generated registration printouts output to the SMR file. This procedure can be performed in either ARTS or Radar Gateway mode. ARTS mode is preferable.

c. **Test Equipment Required.** None.

d. **Condition.** Normal operating conditions.

e. **Detailed Procedures**.

(2) At the SMS SMC-PC, type **CA^R<enter>** in the SMON keyboard entry area, or at an ACD keyboard, type: **F11,R<enter>**.
The registration summary report is output in the SMR file. Review the summary report or the "RTQC Config" window for abnormal values.

(3) Review SMR files for instances of registration RTQC Bound printouts and Sample Complete printouts. If an RTQC Bound printout or Sample Complete printout is encountered, assess sensor performance and correct sensors as appropriate.

(4) Review the week's registration summary reports for abnormal values and trends. If abnormal values or trends are encountered analyze alignment and correct sensors as appropriate.

(5) Review SMR files for high instances of RTQC TIMEOUT printouts. Consider modifying sensor pairing in adaptation if the condition persists.

NOTE: RTQC TIMEOUT printouts on some sensors are not unusual during low traffic periods.

506. CQARS DATA ANALYSIS.

a. Objective. Verify PR Performance, Inter-sensor linking, and overall sensor performance using CQARS.

b. Discussion. The Common Arts Quick Analysis of Radar Sites (CQARS) status reporting function provides for the monitoring and confirmation of the radar subsystem interfaces. It provides sensor performance data for evaluating operational suitability of sensors for Mosaic and STDM operation.

c. Test Equipment Required. None.

d. Condition. No impact to AT operations will result from CQARS. CQARS is an online performance monitor program that runs continuously in the background. The minimum collection time interval is selectable. The default collection time interval should be adapted to 10 minutes. For Inter-sensor linking verification, the minimum time interval should be 30 minutes. This check should be performed on both the ARTS and RGW systems.

e. Detailed Procedures.

(1) Permanent Return Verification and Sensor Performance Verification.

(a) On the SMC-PC or RGW-PC, select Sensor Config status report.

(b) Select a Sensor.

(c) Verify collection time interval is 10 minutes minimum, as shown on top bar of CQARS status report.

(d) Verify PR reliabilities are within standards and tolerances as per table 5-1..

(e) Verify mean range and azimuth for each adapted PR is within the standards and tolerances of the expected range and azimuth.

(f) If a sensor has no search PR available with known accurately surveyed position, or if search PR reliability does not meet or exceed the standards and tolerances in step (d) above, verify the sensor has a Beacon PR that is within standards and tolerance for reliability and accuracy and the radar reinforcement rate is within the standard and tolerances.

(g) Verify remaining Radar/Beacon performance parameters meet threshold limits as evidenced by green indication in "Current" column.

(h) Perform steps (b) through (g) for each adapted sensor.

(2) Inter-Sensor Linking Verification.

NOTE: This check must be done during normal to heavy traffic periods.

(a) On the SMC-PC or RGW-PC, select Start, Programs, function config, performance monitor config.

(b) Select CQARS online performance monitor.

(c) Click on the ">". Observe "CQARS on-line performance monitor" appears in the right hand box.

(d) Enter "60" (default) in the collection time interval box.

(e) Click the Apply or OK button.

(f) Note time. Wait 60 minutes, then select Sensor Config status report.

(g) Select a Sensor.

(h) Verify collection time interval is 60 minute minimum.

(i) Verify Inter-Sensor Link standards and tolerances are not exceeded as evidenced by the values in the "AVG-Dist" column.

(j) Repeat steps (g) through (i) for each adapted sensor.

(k) Return CQARS collection time interval to site adapted default value.

.

Table 5-1. Sensor Performance Parameters

SENSOR PERFORMANCE PARAMETERS	ASR-7/8/ TDX-2000	BCN ONLY	ASR-9/11	ARSR-4	ARSR-1/2/3
a. BEACON					
(1) Radar Reinforcement	80%	N/A	80%	80%	60%
(2) Mode 3/A Validity	97%	97%	97%	97%	97%
(3) Mode C Validity	96%	96%	96%	96%	96%
(4) SRTQC Reliability	98%	98%	98%	98%	98%
(5) BRTQC Reliability	98%	98%	98%	98%	98%
(6) Permanent Return Reliability.	90%	90%	90%	90%	90%
(7) Zero Code	1%	1%	1%	1%	1%
(8) Blip/Scan	90%	90%	90%	96%	96%
(9) Splits	1%	1%	1%	1%	1%
b. SEARCH					
(1) Splits	5%	N/A	3%	2%	2%
(2) Permanent Return Reliability.	80%	N/A	80%	80%	80%

NOTE 1: At least one adapted Beacon PE is required to be in tolerance for each sensor.

NOTE 2: Search PEs may not be applicable to some sensors.

NOTE 3: The search range and azimuth accuracy may be verified without search PEs or MTI reflectors, provided the system has at least one beacon permanent return that is within range and azimuth accuracy standard and tolerance, the limits stated herein, and the radar reinforced rate for that sensor is greater than or equal to 80%.

NOTE 4: Valid data can be expected when >10 minutes of data is collected.

NOTE 5: Valid data can be expected when >1000 beacon reports/per hour are recorded.

NOTE 6: Reliability parameters may exceed 100%. CQARS begins collecting data as soon as the start entry is made rather than waiting for the start of the next scan. Therefore a partial scan of data may be included in the calculation. The number of extra hits should never be greater than the number of scans in the calculation plus one. The shorter the calculation period the more the percentage may exceed 100%. The error can be kept to less than 1% if the collection period is 100 scans or more. The maximum error can be calculated from 100 – ((SCANS * 100)/(SCANS + 1)).

507. SENSOR COVERAGE ANALYSIS PROGRAM (SCAP).

a. Objective. To check sensor coverage and investigate why sensor coverage has degraded or recommend Mosaic adaptation changes based on changes in sensor coverage.

b. Discussion. Mosaic adaptation that contains the Radar Sort Boxes (RSBs) ranking by sensor, needs to be optimized initially, and reviewed periodically thereafter and/or when sensor coverage improves or degrades. Changes may occur that will result in reduced or increased sensor coverage due to any number of factors. Some examples are: shift in sensor alignment; change in power output of the transmitter; construction of a building or Tower or other obstruction that may cause a gap in coverage or reflections; or interference from other transmitters, etc. SCAP is a program used to evaluate sensor coverage. SCAP uses CDR data as input and produces a text file that is then imported into the Site Adaptation Editor (SA Editor) for viewing. The SA Editor provides comparison by RSB of Site Adaptation derived RSB ranking versus SCAP analysis RSB ranking. SCAP analysis RSB ranking is based on the sensor seeing the largest number of targets having the highest ranking, the sensor with the next highest number ranked 2nd, and so on. The SCAP program should be run using CDR data to check whether there is a problem with the sensor, or to check whether the Mosaic adaptation should be changed to shift sensor ranking for RSBs where the preferred sensor or a high ranking sensor has coverage problems. SCAP can be re-run and results appended to a previous analysis. This facilitates using CDR data from multiple time periods to get a more realistic analysis using data from a longer time period than may be contained in a single CDR data file. If it looks like there may be a problem with the sensor operation itself, further investigation may be required to determine the cause of the problem and whether there is a possible remedy.

c. Test Equipment Required. None.

d. Condition. SCAP analysis requires a standby or off-line SMC to run.

e. Detailed Procedures.

(1) Obtain CDR data that has all the sensors operating. Multiple files can be combined for analysis by SCAP. Care should be taken to ensure that good representative data is contained in the CDR file(s). The SCAP analysis RSB ranking can be skewed by improperly operating sensors.

(2) Select appropriate filters that will maximize the number of targets meeting the criteria when optimizing the entire system plane and during the periodic checks. Select more restrictive filters when doing analysis as a result of reported problems, or suspected improvement, or degradation of coverage in a particular sensor.

(3) Run SCAP analysis.

(4) Run the SA Editor.

(5) Select “File, Open”. Select “Current Site Adaptation” file.

(6) Select “File, Import Sensor Analysis”.

(7) Select “Sensor & Altimeter Data”.

(8) Select “RSB Ranking”.

(9) Coordinate with appropriate Air Traffic Personnel to review the SCAP analysis RSB ranking against the Site Adaptation derived RSB ranking, and submit recommended changes to the Mosaic adaptation if it is judged to be necessary.

508. PERMANENT RETURN RELIABILITY.

a. Objective. Determine the usability of the PR as a reference for display registration checks.

b. Discussion. This check is used for locations that do not have access to CQARS. This check ensures the target/scan ratio of the PR is within standards and tolerances and is suitable for use in display registration checks.

This procedure shall be performed for each adapted sensor that would normally be used operationally as either a primary or backup sensor.

NOTE: The scan rate for the sensor can be determined by using a target of opportunity and counting the time (in seconds) between the track updates. Typically the scan rate for an ASR is approximately 4.6 seconds and the scan rate for the ARSR is approximately 12 seconds.

c. Test Equipment Required. None.

d. Conditions. This procedure should be conducted on one operational display per sensor. Full coordination with the appropriate control center is necessary.

e. Detailed Procedures.

(1) Observe a minimum of 20 antenna scans on the display and count the number of scans a particular PR is displayed as a usable target.

(2) Record the usable target/scan ratio as:

$$\frac{\text{Number of scans PR is displayed}}{\text{Number of scans observed}}$$

(3) The decimal fraction should be 0.8 or greater for radar PRs and 0.9 or greater for beacon PRs.

(4) Repeat for each PR for the sensor.

509. PERMANENT RETURN ACCURACY CDR DATA ANALYSIS.

a. Objective. To verify average reported range and azimuth accuracy of Permanent Returns.

b. Discussion. This procedure will extract data from CDR for use in analysis of average PR range and azimuth accuracy.

c. Test Equipment Required. None.

d. Conditions. A minimum of 10 minutes of CDR data is required for this procedure.

e. Detailed Procedures.

(1) Reduce the stored radar or beacon target data by running the CDR reduction program. Select RT for Radar Target Reports or BT for Beacon Target Reports in the Classes tab. Select applicable filters (e.g. Sensor, Beacon Code, Range, and Azimuth) in the Filter tab to extract the desired data.

(2) Review the CDR printout to ensure the average reported range and azimuth position values for the PR are within standards and tolerances.

(3) Repeat steps (1) and (2) above for the remaining PRs for the sensor.

(4) Repeat steps (1) through (3) above for the remaining sensors.

510. BACKUP AND RESTORE PREF SETS.

A. Backup And Restore Using Floppy/LS120 disk.

a. Objective. To backup and restore ACD/TMU/RACD/LACD Pref Sets.

b. Discussion. User preference data is saved in a directory on the CRIT partition of the display chassis hard drive. User data does not cross display/chassis types. This procedure provides instructions to backup and restore user data. User data is periodically updated (broadcast) for all displays sharing a common local network and of the same display type. User data is also updated on the hard drive whenever a user makes changes and saves them, and will be broadcast (on that devices next broadcast cycle) to other displays of the same type on the same network. For sites that have a single display chassis or that do not have a local network, should the hard drive crash, all preference data will have to be restored using this procedure or will need to be manually reentered by each user.

c. Test Equipment Required. None.

d. Condition. Full coordination with the appropriate control center is necessary.

e. Detailed Procedures. Perform the following procedure on an ARTS display.[vii]

(1) Connect a null modem cable from the maintenance PC to the Maintenance Port of the desired chassis.

(2) Execute "HyperTerminal" configured to the following settings:

Baud Rate	9600
Data Bits	8
Stop Bits	1
Parity	None
Flow Control	Xon/Xoff

(3) Depress the Enter key on the maintenance PC.

(4) Enter **root** when prompted for the username.

(5) Enter the root-level password when prompted for the password.

NOTE: Steps (6) through (15) are used to back up Pref Sets. Proceed to step (16) when restoring Pref Sets. Enter the commands for either Lynx Operating System (OS) or Linux OS depending on which OS the display is running.

(6) Insert a blank floppy disk into the desired chassis floppy drive.

NOTE: The following steps are entered at the maintenance PC and are followed by the Enter key.

(7) Make a file system on the floppy.
(Lynx OS) **mkfs /dev/sdncr.5**
(Linux OS) mke2fs /dev/floppy.

(8) Mount the floppy disk.
(Lynx OS) **mount /dev/sdncr.5 /fd0**
(Linux OS) mount /dev/floppy /mnt/floppy

(9) cd /p2

(10) Compress the contents of the /crit/newuser directories into prefs.tar.
tar –czPf prefs.tar /crit/newuser

(11) Copy the prefs.tar file to the floppy disk.
(Lynx OS) **cp prefs.tar /fd0**
(Linux OS) cp prefs.tar /mnt/floppy

(12) Delete the compressed file from the hard drive.
rm prefs.tar

(13) Unmount the floppy disk.
(Lynx OS) **umount /fd0**
(Linux OS) umount /mnt/floppy

(14) Eject the floppy disk and label the floppy as a Pref Set backup diskette with the date and chassis type. Write protect the diskette using the floppy write protect switch.

(15) Store the floppy for future use.

(16) Insert the Pref Set backup diskette into the desired chassis floppy drive.

NOTE: The following steps are entered at the maintenance PC and are followed by the Enter key.

(17) Mount the floppy disk.
(Lynx OS) **mount –o ro dev/sdncr.5 /fd0**
(Linux OS) mount /dev/floppy /mnt/floppy

(18) Copy the compressed file to partition p2 on the hard drive.
(Lynx OS) **cp /fd0/prefs.tar /p2**
(Linux OS cp /mnt/floppy/prefs.tar /p2

(19) Change directory to partition p2.
cd /p2

(20) Extract the backed-up user data to the /crit/newuser directories.
tar –xzPf prefs.tar

(21) Change directory.
cd /

(22) Delete the compressed file from p2 partition.
rm /p2/prefs.tar

(23) Unmount the floppy disk.
(Lynx OS) **umount /fd0**
(Linux OS umount /mnt/floppy

(24) Eject the floppy disk and store for future use.

B. Backup And Restore Using FTP.

a. Objective. To backup and restore RACD/RACD2/RACD3 Pref Sets.

b. Discussion. User preference data is saved in a directory on the CRIT partition of the display chassis hard drive. User data does not cross display/chassis types or the tower boundary. User data is periodically updated (broadcast) for all displays sharing a common

local network (Tower LAN) and of the same display type. User data is also updated on the hard drive whenever a user makes changes and saves them, and will be broadcast to other displays of the same type on the same network. For sites that have a single display chassis or that do not have a local network, should the hard drive(s) crash, all preference data will have to be restored using this procedure or will need to be manually reentered by each user. The RACD2 does not have removable media capability for backup and restoration of user data, thus this function and instructions are performed at the TRACON.

c. **Test Equipment Required.** None.

d. **Condition.** Full coordination with the appropriate control center is necessary.

e. **Detailed Procedures.** Perform the following procedure on an ARTS IIIE SMC PC.or SP-PC

C. Backup Prefs Using Putty/PSFTP

(1) Enable the Putty program on SMC_PC or SP-PC.

Go to Start ->Programs ->Putty -> click Putty.

(2) Under Host Name or IP Address=196.1.XXX.YYY (where XXX is the NID of the RDM and YYY is the NID of the RACD2 chassis.)

(3) Click 'Open'

(4) Click 'Yes' to confirm the security popup window (the security popup window should only happen once for each chassis) – the login window should appear.

(a) Enter "atc" when prompted for the user name.

(b) Enter the atc level password when prompted for the password. NOTE: default directory is /home/atc

(5) Compress the contents of the /crit/newuser directory into /home/atc/prefs.tar file.

~$ tar –czPf prefs.tar /crit/newuser <enter>

(6) Verify that the prefs.tar file is on the hard drive.

~$ ls –al <enter>

(7) Start a psftp session.

Go to Start-> Programs-> Putty-> click PSFTP

(8) Open a session for the desired RACD2 (where XXX is the NID of the RDM and YYY is the NID of the RACD2 chassis.)

psftp>open 196.1.XXX.YYY

(a) Enter "atc" when prompted for the user name.

(b) Enter the atc level password when prompted for the password. NOTE: default directory is /home/atc.

(9) Change the local directory to c:\temp.

psftp>lcd c:\temp

(10) At the psftp prompt, transfer the compressed prefs.tar file to the SMC PC.

psftp>get prefs.tar

(11) At the psftp prompt, exit the psftp session.

psftp>exit

(12) Exit the putty session.

D. Restore Prefs Using Putty/PSFTP

(1) Start a psftp session.

(2) **Go to Start->Programs->Putty-> click PSFTP**Open a session for the desired RACD2 (where XXX is the NID of the RDM and YYY is the NID of the RACD2 chassis.)

psftp>open 196.1.XXX.YYY

(c) Enter "atc" when prompted for the user name.

(d) Enter the atc level password when prompted for the password. NOTE: default directory is /home/atc.

(3) Change the local directory to c:\temp.

psftp>lcd c:\temp

(4) At the psftp prompt, transfer the compressed prefs.tar file from the SMC PC to the RACD2

psftp> put prefs.tar

(5) At the psftp prompt, exit the psftp session.

psftp>exit

(6) Enable the Putty program

Go to Start ->Programs ->Putty -> click Putty.

(7) Under Host Name or IP Address=196.1.XXX.YYY (where XXX is the NID of the RDM and YYY is the NID of the RACD2 chassis.)

(8) Click 'Open'

(9) Click 'Yes' to confirm the security popup window (the security popup window should only happen once for each chassis) – the login window should appear.

(a) Enter "atc" when prompted for the user name.

(b) Enter the atc level password when prompted for the password. NOTE: default directory is /home/atc

(c) Switch user to 'root' to obtain proper Permissions to extract prefs.tar

(d) Enter "su root"

(e) Enter the root level password when prompted for the password.

(10) Extract the contents of the /home/atc/prefs.tar file to the /crit/newuser directory.

#tar –xzPf prefs.tar <enter>

(11) Verify that the prefs.tar file is on the hard drive.

#ls –al /crit/newuser <enter>

(12) Exit the root putty session

#exit<enter>

(13) Exit the putty session

#exit<enter>

511. DISK FIX UTILITY.

a. Objective. Defragment the hard drive of the ARTS chassis.

b. Discussion. During normal operation of software updates (i.e., OS, application, and adaptation), the files on the hard drives may become fragmented. This procedure is used to defragment the hard drives.

c. Test Equipment Required. None.

d. Conditions. This procedure will remove the chassis from operational use. Full coordination with the appropriate control center is necessary. PPC chassis must have a flash card installed with an OS installed to boot from during this procedure.

e. Detailed Procedures.

NOTE: A maintenance PC can be connected to the serial port during the execution of the following test to provide more detailed information.

(1) Note the current setting of the Function Select Switch (FSS), then set it to position D.

(2) Depress the Chassis Reset pushbutton.

(3) Observe the following on the 2X20 display:

(a) Power up test completes and passes

(b) Blank for a brief period while the chassis resets to update the environment and boot from flash.

(c) Doing disk checks

(d) Finished disk checks

(e) Chassis ID, Lynx/Linux ready

(4) Return the FSS to the original setting. Power the chassis Off; then power it On or depress Chassis reset.

(5) Observe 2X20 display for successful power-up test and load to current operational program and adaptation.

512. ARSR BACKUP MODE TARGET REGISTRATION CHECK.

a. Objective. Verify the difference in range and azimuth between ARSR digital target position and ASR broadband/digital extent video is within a maximum range value of 2 nautical miles (nmi) for all range settings. This only applies to DBRITE.

b. Discussion. The digital target position on the ARTS display in the ARSR Back-up configuration could appear to lag the broadband/digital extent video target position by up to 2 nmi because of antenna scan rate differences between the ARSR and ASR. This apparent difference is accommodated by procedures developed by AT Operations. This check should be performed on one operational display position per ARSR that is capable of operating in the applicable ARSR Back-up configuration. (This check does not apply to Single Sensor Long Range configuration.)

c. Test Equipment Required. None.

d. Conditions. This check must be conducted while the operational program is being executed. Coordination with the appropriate control center is necessary.

e. Detailed Procedures.

(1) Setup a display position capable of overlaying ARSR digital position data with ASR broadband/digital extent video.

(a) Software Adaptation to Beacon Subsystem (SWAB) to the appropriate ASR sensor and verify proper presentation/registration of permanent return data (i.e., MTI Reflectors, PE, Beacon Parrot, Remote Sensor Monitor (RSM), Calibration Performance Monitor Equipment (CPME), Mono-pulse Remote Sensor Monitor (MRSM).

(b) SWABs to the appropriate ARSR sensor and use targets of opportunity to verify digital target position data provided by the ARSR does not appear to be displaced from the ASR broadband/digital extent video in excess of 2 nmi for any range scale.

(2) Return display to operational /original settings.

513. SINGLE SENSOR MODE DISPLAY REGISTRATION CHECKS FOR MOSAIC CAPABLE SITES.

NOTE: Permanent returns may consist of any of the following: Permanent Echoes, Beacon Parrots, MTI Reflectors, CPMEs. Use paragraph A or B below to perform registration checks on ARTS displays in Single Sensor Mode. Paragraph A procedure will not work when the 2nd slew enter coordinates are within 1 nautical mile of an adapted airport. In this situation Paragraph B must to be used.

A. Verify Location Of PR Using * enter slew enter.

a. Objective. To verify range and azimuth accuracy of Permanent Returns (PRs) when in Single Sensor Mode.

b. Discussion. This procedure will verify proper display of PRs on ARTS IIIE display in Single Sensor Mode. This procedure shall be performed on one display for each adapted sensor and should be performed on a display within the area that would normally operate on that sensor (either as a primary or backup sensor).

c. Test Equipment Required. None.

d. Condition. Full coordination with the appropriate control center is necessary.

e. Detailed Procedures. Perform the following procedure on an ACD or TMU display.

(1) Verify PRs meet or exceed CQARS reliability check in paragraph 508.-

(2) Ensure that "Dwell" is set to On via the keyboard (N/A for DBRITE).

(3) Center cursor on Sensor, type: **F7, K, <enter>**

(4) Enable display of all Beacon Parrots. **F7, D, PAR, ^E <enter>**

(5) Start and maintain tracks on each search PR for this sensor. Assign unique identification of TESTPR## where ##

designates the PR number (i.e., TESTPR01, TESTPR02, etc.).

FI,TESTPR##,slew to PR, <slew enter>

NOTE: This step is not necessary for Beacon PRs.

NOTE: It may be necessary to restart tracks if they go into coast.

NOTE: Some Radar-Only PRs may be in areas or regions that are adapted to inhibit their tracking. If this is the case slew to the center of the target rather than the data block in step (6) below. If there is no search PR or if the search PR is unreliable, verify the sensor has a Beacon PR that is within standards and tolerance for reliability and accuracy and the sensor's radar reinforcement rate is within standard and tolerance.

(6) Perform the following keyboard entry:
Clear, *, <slew enter>, slew to the PR,
when the data block intensifies,
<slew enter>

For DBRITEs perform the following keyboard entry:

Clear, *, <slew enter>,slew to the PR, <slew enter>

NOTE: If the slew enter does not return a range and azimuth for at least one search return for this sensor because of an adapted geographic region, or if the Search PR is unreliable, then verify that at least one Beacon PR is reliable, and within range and azimuth accuracy standards and tolerance, and verify that the sensor's radar reinforcement rate is within standard and tolerance; or perform Paragraph 513B.

(7) Verify range and azimuth reported on the display is within the tolerance limits stated in Chapter 3 Standards and Tolerances.

(8) If necessary, to terminate the track started in step (5) above, type:
F4,TESTPR##<enter>

(9) Repeat for all PRs on this sensor.

(10) Inhibit display of Beacon Parrot.
F7,D,PAR,^I<enter>

B. Verify Location Of PR Using Digital Map Symbol

a. **Objective.** To verify range and azimuth accuracy of permanent returns in single sensor mode and digital maps are available with caret or other symbol denoting the location of each Permanent Return.

b. **Discussion.** This procedure can be used provided the appropriate maps are available with symbols denoting the location of the Permanent Return. This procedure shall be performed for each adapted sensor that would normally be used in the TRACON or Tower, either as a primary or backup sensor.

c. **Test Equipment Required.** None.

d. **Condition.** Full coordination with the appropriate control center is necessary prior to removal of display from operation.

e. **Detailed Procedures**. Perform the following on the display.

(1) Perform Verify PRs meet or exceed reliability in paragraph 508.

(2) Enable the display of all Beacon Parrots.
F7,D,PAR,^, E <enter>

(3) Manipulate the display to view permanent returns.

(4) Verify map symbol/caret is coincident with Permanent Return.

(5) Repeat for all PRs for the sensor.

(6) Inhibit the display of all Beacon Parrots.
F7,D,PAR,^, I <enter>

514. SINGLE SENSOR MODE DISPLAY REGISTRATION CHECKS FOR MOSAIC CAPAB

NOTE: Permanent returns may consist of any of the following: Permanent Echoes, Beacon Parrots, MTI Reflectors, CPMEs. Use paragraph A or B below to perform

registration checks on ARTS displays[1] in Single Sensor Mode.

A. Verify Location Of PR Using * enter slew enter.

a. Objective. To verify range and azimuth accuracy of Permanent Returns (PRs) when in Single Sensor Mode.

b. Discussion. This procedure will verify proper display of PRs on ARTS IIIE display in Single Sensor Mode. This procedure shall be performed on one display for each adapted sensor and should be performed on a display within the area that would normally operate on that sensor (either as a primary or backup sensor).

c. Test Equipment Required. None.

d. Condition. Full coordination with the appropriate control center is necessary.

e. Detailed Procedures. Perform the following procedure on an ACD or TMU display.

(1) Verify PRs meet or exceed CQARS reliability check in paragraph 506-e(1)(a) – (d) and (f) – (h).

(2) Place the display in ARTS mode.

(3) Center cursor on Sensor, type: **F7, K, <enter>**

(4) Ensure that "Dwell" is set to On via the TRK menu on the ACD/TMU Keyboard.

(5) Toggle keyboard supervisory privileges to On.
F7,P,*k*<enter>
Where ***k*** is the desired keyboard position designator.

(6) Enable display of all Beacon Parrots.
F7,D,PAR,^E<enter>

(7) Start and maintain tracks on each search PR for this sensor. Assign unique identification of TESTPR## where ## designates the PR number (i.e., TESTPR01, TESTPR02, etc). **FI,TESTPR##,slew to PR, <slew enter>**

NOTE: This step is not necessary for Beacon PRs.

NOTE: It may be necessary to restart tracks if they go into coast.

NOTE: Some Radar-Only PRs may be in areas or regions that are adapted to inhibit their tracking. If this is the case slew to the center of the target rather than the data block in step (8) below. If there is no search PR or if the search PR is unreliable, verify the sensor has a Beacon PR that is within standards and tolerance for reliability and accuracy and the sensor's radar reinforcement rate is within standard and tolerance.

(8) Perform the following keyboard entry: **Clear, *, <slew enter>, slew to the PR, when the data block intensifies, <slew enter>**

NOTE: If the slew enter does not return a range and azimuth for at least one search return for this sensor because of an adapted geographic region then verify the sensor's radar reinforcement rate is within standard and tolerance or perform Paragraph 514.B below.

(9) Verify range and azimuth reported on ARTS IIIE display is within tolerance limits stated in standards and tolerances.

(10) Repeat for all PRs on this sensor.

(11) Inhibit Display of Beacon Parrot.
F7,D,PAR,^I<enter>

B. Verify Location Of PR Using Digital Map Symbol.

[1] **NOTE:** ARTS displays are defined as ACD, LACD, RACD and TMU.

a. Objective. To verify range and azimuth accuracy of permanent returns in single sensor mode and digital maps are available with caret or other symbol denoting the location of each Permanent Return.

b. Discussion. This procedure can be used provided the appropriate maps are available with symbols denoting the location of the Permanent Return.

c. Test Equipment Required. None.

d. Condition. Full coordination with the appropriate control center is necessary prior to removal of ACD/TMU from service.

e. Detailed Procedures. Perform the following on an ACD/TMU display.

(1) Verify PRs meet or exceed CQARS reliability check in paragraph 506e(1).

(2) Enable display of all Beacon Parrots.
F7, D, PAR,^, E <enter>

(3) Manipulate the display to view Permanent Returns.

(4) Verify map symbol/caret is coincident with Permanent Returns.

(5) Inhibit display of Beacon Parrot.
F7, D,PAR,^, I <enter>

515. MOSAIC MODE REGISTRATION CHECKS.

NOTE: PRs may consist of any of the following: Permanent Echoes, Beacon Parrots, MTI reflectors, CPMEs. Use paragraph A or B below to perform display registration checks on ACDs or TMUs in Mosaic mode.

NOTE: Where "^" equals space.

A. Automated Registration Checks (Keyboard Macro Available).

a. Objective. To verify range and azimuth accuracy of PRs when in Mosaic mode.

b. Discussion. This procedure uses RSM boxes drawn on an ACD or TMU corresponding to allowable system range and azimuth accuracy tolerances of permanent returns for Mosaic mode operation. Creating and using ACD and TMU PREFSETS for manipulating the display settings (i.e., Range, Offset, etc.) to view the desired PR can reduce time required to perform this check. This procedure shall be performed on each Mosaic display adapted.

c. Test Equipment Required. None.

d. Conditions. Full coordination with the appropriate control center is necessary prior to removal of ACD/TMU from normal AT operations.

e. Detailed Procedures. Perform the following procedure on a Mosaic capable ACD/TMU display.

(1) Verify PRs meet or exceed CQARS reliability check in paragraph 506e(1).

(2) Ensure display is in Mosaic mode if necessary, type:
F7, X,MOS <enter>

(3) Toggle keyboard supervisory privileges to On.
F7,P,*k* <enter>
Where ***"k"*** is the desired keyboard position designat*or*.

(4) Enable display of all Permanent Return boxes using an adaptation keyboard macro provided by local OSF.
F7,K,macroname1<enter>

(5) After receiving the message "MACRO COMPLETE" on the display, enable the display of all beacon parrots.
F7, D, PAR,^, E <enter>

(6) Manipulate the display to view the PR at Minimum range (6nmi). (Recommend creating and using ACD/TMU PREFSETS for the location of each PR.)

(7) For Radar-Only PRs, start and maintain a track on the PR, assigning a unique identification for the PR (i.e., TESTPR01, TESTPR02, etc.).

NOTE: It may be necessary to restart tracks if they go into coast.

NOTE: Some Radar-Only PRs may be in areas or regions that are adapted to inhibit their tracking. If this is the case, verify the center of the target is within the respective box in step (8) below. If there is no search PR or if the search PR is unreliable, verify the sensor has a Beacon PR that is within standards and tolerance for reliability and accuracy and the sensor's radar reinforcement rate is within standard and tolerance.

(8) Verify that the track symbology of the PR is coincident with the target extent and is within the respective box.

(9) Repeat steps (6) through (8) above for each adapted PR.

(10) Change the display to Single Sensor mode or to another sensor to inhibit display of RSM boxes.

(11) Inhibit the display of all Beacon Parrots.
F7, D, PAR,^, I <enter>

B. Manual Registration Checks (Keyboard Macro Not Available).

(a) **Objective.** To verify range and azimuth accuracy of Permanent Returns when in Mosaic mode.

(b) **Discussion.** The procedure uses RSM boxes drawn on an ACD or TMU corresponding to allowable system range and azimuth accuracy tolerances of permanent returns for Mosaic mode operation. Creating and using ACD and TMU PREFSETS for manipulating the display settings (i.e., Range, Offset, etc.) to view the desired PR can reduce time required to perform this check.

(c) **Test Equipment Required.** None.

(d) **Condition.** Full coordination with the appropriate control center is necessary prior to removal of ACD/TMU from normal AT operations.

(e) **Detailed Procedures**. Perform the following on a Mosaic capable ACD/TMU display.

(1) Verify PRs meet or exceed CQARS reliability check in paragraph 506e.

(2) **Ensure** display is in Mosaic mode if necessary.
F7, X, MOS <enter>

(3) **Toggle** keyboard supervisory privileges to On.
F7,P,*k* <enter>
Where "***k***" is the desired keyboard position designator.

(4) Enable display of all beacon parrots.
F7, D, PAR,^, E <enter>

(5) Display RSM box for Permanent Return.
F10, EE,^, RSM*0*,^, E <enter>
Where "**RSM*0***" is ID of PR

(6) Manipulate display to view PR at Minimum range (6nmi). (Recommend creating and using ACD/TMU PREFSETS for the location of each PR.)

(7) For Radar-Only PRs, start and maintain a track on the PR, assigning a unique identification for the PR (i.e., TESTPR01, TESTPR02, etc.).

NOTE: It may be necessary to restart tracks if they go into coast.

NOTE: Some Radar-Only PRs may be in areas or regions that are adapted to inhibit their tracking. If this is the case, verify the center of the target is within the respective box in step (8) below. If there is no search PR or if the search PR is unreliable, verify the sensor has a Beacon PR that is within standards and tolerance for reliability and accuracy and the sensor's radar reinforcement rate is within standard and tolerance.

(8) Verify the track symbology of the PR is coincident with the target extent and is within the respective box.

(9) Repeat steps 5 through 8 for each PR.

(10) Inhibit display of all Beacon Parrots.
F7, D, PAR,^, I <enter>

(11) Change display to Single Sensor mode or to another Sensor to inhibit display of RSM boxes.

C. Verify Location Of PR Using *L.

a. Objective. To verify range and azimuth accuracy of PRs when in Mosaic mode.

b. Discussion. This procedure will verify proper display of PRs on ARTS IIIE display in Mosaic mode.

c. Test Equipment Required. None.

d. Condition. Full coordination with the appropriate control center is necessary.

e. Detailed Procedures. Perform the following on the ARTS IIIE display.

(1) Verify PRs meet or exceed CQARS reliability check in paragraph 506 e (1).

(2) Ensure that "Dwell" is set to On via the TRK menu on the ACD/TMU keyboard.

(3) Ensure display is in Mosaic mode if necessary.
F7,X,MOS,<enter>

(4) Enable display of all Beacon Parrots.
F7,D,PAR,^,E<enter>

(5) Start and maintain tracks on each search PR for this sensor. Assign unique identification of TESTPRxx where xx designates the PR number (i.e., TESTPR01, TESTPR02, etc). This step is not necessary for beacon PRs.

NOTE: It maybe necessary to restart tracks if they go into coast.

NOTE: Some Radar-Only PRs may be in areas or regions that are adapted to inhibit their tracking. If this is the case slew to the center of the target rather than the data block in step (7) below. If there is no search PR or if the search PR is unreliable, verify the sensor has a Beacon PR that is within standards and tolerance for reliability and accuracy and the sensor's radar reinforcement rate is within standard and tolerance.

(6) Perform the following keyboard entry: **Clear, *L, slew to the PR when the data block intensifies, <slew enter>**

NOTE: If the slew enter does not return a latitude and longitude for at least one search return for this sensor because of an adapted geographic region, then verify the sensor has a Beacon PR that is within standards and tolerance for reliability and accuracy and the sensor's radar reinforcement rate is within standard and tolerance.

(7) Observe the location of PR Latitude and Longitude.

(8) Verify coordinates are within tolerance limits by verifying the location is within the Latitude and Longitude bounds obtained from paragraph 516, Deriving LAT/LON Tolerances For Permanent Returns In Mosaic mode.

(9) Inhibit the display of all Beacon Parrots.
F7,D,PAR,^,I <enter>

516. DERIVING LAT/LON TOLERANCES FOR PERMANENT RETURNS IN MOSAIC MODE.

a. Objective. To derive Lat/Lon tolerances for Permanent Returns from the sensor-based range and azimuth coordinates.

b. Discussion. These tolerances shall be computed prior to the facilities initial Mosaic certification. Additionally these tolerances shall be computed if any of the following conditions occur.

(1) The installation of a new PR.

(2) A PR range delay value is changed.

(3) Any other change resulting in the realignment or relocation of a PR.

The tolerances pertaining to this procedure are in Paragraph 342B. The location information must be derived from an accurate NAD 83 survey and is available in adaptation. A Mosaic Mode Permanent Return Lat/Lon Tolerance Worksheet (Table 5-2) is provided for performing this procedure.

c. **Test Equipment Required**. None.

d. **Condition.** No impact to AT operations will result from this procedure. This procedure uses the Lat/Lon calculator available on the SMC-PC.

e. **Detailed Procedures**.

(1) Record information from adaptation for worksheet items 1 to 14.

(2) On any available SMC-PC, select Start, Programs, ARTS tools, LAT_LON X_Y Calculator.

(3) Select "Polar" for the coordinate type.

(4) Enter the RSM Latitude and RSM Longitude (worksheet items 11 and 12) in the "Point to be Converted" fields.

(5) Enter the Sens Latitude and Sens Longitude (worksheet items 3 and 4) in the "Tangency Point Geodetic Latitude and Longitude" fields.

(6) Ensure AUTO box is checked for "Radius of Projection".

(7) Ensure "Stereo Origin Offset XT and YT" fields are set to 0.

(8) Enter the Sens Mag Var and Sens Mag Dir (worksheet items 5 and 6) in the "Magnetic Variation" fields.

NOTE: This only applies to Short Range Sensors that are aligned to magnetic North.

(9) Select "<" to obtain range and azimuth values for the RSM. Record the Range and Azimuth values for worksheet items 15 and 16.

(g) Using a scientific calculator, square the results of item 15 and record this value as item 17.

(h) Subtract item 7 from item 10 and record this value as item 18.

(i) Divide item 18 by 6076.115 and record this value as item 19.

(j) Square the results of item 19 and record this value as item 20.(e) Add item 17 and item 20 and record this value as item 21.

(k) Calculate the SQRT of item 21 and record this value as item 22.

(l) Divide item 13 by 12.36 and record this value as item 23.

(m) Add item 23 and item 22 and record this value as item 24.

(n) Divide item 19 by item 15 and record this value as item 25.

(o) Calculate ATAN of item 25 and record this value as item 26.

(p) Calculate COS of item 26 and record this value as item 27.

(q) Multiply item 24 and item 27 and record this value as item 28.

(r) Multiply item 22 by 0.67101 and record this value as item 29.

(s) Subtract item 7 from 10606 and record this value as item 30.

(t) Divide item 30 by 6076.115 and record this value as item 31.

(u) Square item 31 and record this value as item 32.

(v) Subtract item 32 from item 22 and record this value as item 33.

(w) Calculate the SQRT of item 33 and record this value as item 34.

(x) Subtract range tolerance from either item 28, 29, or 34 and record this value as item 35.

(y) Add range tolerance to either item 28, 29, or 34, and record this value as item 36.

(z) Divide item 16 by 0.087890625 and record this value as item 37.

(aa) Subtract azimuth tolerance from item 37 and record this value as item 38.

(bb) Add azimuth tolerance to item 37 and record this value as item 39.

(10) Enter item 35 in the "Range" field and item 38 in the "Azimuth" field of the LAT_LON X_Y Calculator.

(a) Select the ">" to obtain the coordinates for the first point in LAT/LON.

(b) Record the first point values as item 40.

(11) Enter item 35 in the "Range" field and item 39 in the "Azimuth" field of the LAT_LON X_Y Calculator.

(a) Select the ">" to obtain the coordinates for the second point in LAT/LON.

(b) Record the second point values as item 40.

(12) Enter item 35 in the "Range" field and item 38 in the "Azimuth" field of the LAT_LON X_Y Calculator.

(a) Select the ">" to obtain the coordinates for the first point in LAT/LON.

(b) Record the third point values as item 41.

(13) Enter item 36 in the "Range" field and item 39 in the "Azimuth" field of the LAT_LON X_Y Calculator.

(a) Select the ">" to obtain the coordinates for the second point in LAT/LON.

(b) Record the fourth point values as item 43.

(14) File a copy of the worksheet in the FRDF.

(15) Repeat steps 1 through 13 for all other Permanent Returns seen by this sensor.

(16) Repeat this procedure for all adapted sensors.

Table 5-2. Mosaic Mode Permanent Return Tolerance Worksheet

1) ADAPTATION VERSION: _____

SEN_LOCATIONS

2) SENS NAME: _____

3) SENS LATITUDE: _____º _____' _____" (N / S)

4) SENS LONGITUDE: _____º _____' _____" (E / W)

5) SENS MAG VAR: _____ 6) SENS MAG DIR: _____ 7) SENS ALT: _____

TGT_RSM_DEFINES

8) RSM NUM: _____ 9) RSM BCN CODE: _____ 10) RSM MSL ALT: _____

11) RSM LATITUDE: _____º _____' _____" (N / S)

12) RSM LONGITUDE: _____º _____' _____" (E / W)

13) RANGE DELAY: _____ 14) RSM SENS SELECT: _____

RSM RANGE AND AZIMUTH

15) RSM RANGE: _____ 16) RSM AZIMUTH: _____

PE_SLANT RANGE CALCULATION
SQRT{RSM_RANGE^2 + [(RSM_MSL_ALT – SENS_ALT) ÷6076.115]^2}

17) RSM_RANGE^2 = _____^2 = _____
ITEM 15 ***ITEM 17***

18) RSM_MSL_ALT – SENSOR_MSL = _____ - _____ = _____
ITEM 10 *ITEM 7* ***ITEM 18***

19) [(RSM_MSL_ALT – SENSOR_MSL) ÷6076.115] = _____ ÷ 6076.115 = _____
ITEM 18 ***ITEM 19***

20) [(RSM_MSL_ALT – SENSOR_MSL) ÷6076.115]^2 = _____ ^2 = _____
ITEM 19 ***ITEM 20***

21) RSM_RANGE^2 + [RSM_MSL_ALT – SENS_ALT) ÷6076.115] = _____ + _____ = _____
ITEM 17 *ITEM 20* ***ITEM 21***

22) SQRT{ RSM_RANGE^2 + [RSM_MSL_ALT – SENS_ALT) ÷6076.115]^2} = SQRT_____ =_____
ITEM 21 ***ITEM 22***

DELAYED_SLANT_RANGE (BEACON PARROTS AND CPMEs ONLY)
[RSM_DELAY ÷12.36] + PE_SLANT RANGE

23) [RSM_DELAY ÷ 12.36] = _____ ÷ 12.36 = _____
ITEM 13 ***ITEM 23***

24) [RSM_DELAY ÷ 12.36] + PE_SLANT RANGE = _____ + _____ = _____
ITEM 23 *ITEM 22* ***ITEM 24***

DERIVED GROUND RANGE (BEACON PARROTS AND CPMEs ONLY)
DELAYED_SLANT_RANGE*COS{ATAN[({RSM_MSL_ALT – SEN_ALT} ÷ 6076.115) ÷ RSM_RANGE]

25) [({RSM_MSL_ALT – SEN_ALT} ÷ 6076.115) ÷ RSM_RANGE] = _____ ÷ _____ = _____
ITEM 19 *ITEM 15* ***ITEM 25***

26) {ATAN[({RSM_MSL_ALT – SEN_ALT} ÷ 6076.115) ÷ RSM_RANGE]} = ATAN_____ = _____
ITEM 25 ***ITEM 26***

27) COS{ATAN[({RSM_MSL_ALT – SEN_ALT} ÷ 6076.115) ÷ RSM_RANGE]} = COS_____ = _____
ITEM 26 ***ITEM 27***

28) DELAYED_SLANT_RANGE * COS{ATAN[({RSM_MSL_ALT – SEN_ALT} ÷ 6076.115) ÷ RSM_RANGE]} = _____ * _____ = _____
ITEM 24 *ITEM 27* ***ITEM 28***

DERIVED GROUND RANGE for SEARCH PRs < 1.857657nmi
0.67101 * PE_SLANT_RANGE

29) 0.67101 * _____ = _____
ITEM 22 ***ITEM 29***

DERIVED GROUND RANGE for SEARCH PRs > 1.857657nmi
SQRT{PE_SLANT_RANGE^2 – [(10606 – SENS_ALT) ÷ 6076.115]^2}

30) (10606 – SENS_ALT) = 10606 - _____ = _____
ITEM 7 ***ITEM 30***

31) [(10606 – SENS_ALT) ÷ 6076.115] = _____ ÷ 6076.115 = _____
ITEM 30 ***ITEM 31***

32) [(10606 – SENS_ALT) ÷ 6076.115]^2 = _____^2 = _____
ITEM 31 ***ITEM 32***

33) {PE_SLANT_RANGE^2 – [(10606 – SENS_ALT) ÷ 6076.115]^2 = _____ - _____ = _____
ITEM 21 *ITEM 32* ***ITEM 33***

34) SQRT{PE_SLANT_RANGE^2 – [(10606 – SENS_ALT) ÷ 6076.115]^2} = SQRT_____ = _____
ITEM 33 ***ITEM 34***

35) DERIVED GROUND RANGE – RANGE TOLERANCE = _____ - _____ = _____
ITEM 28, 29, or 34 *RNG TOL* ***ITEM 35***

36) DERIVED GROUND RANGE + RANGE TOLERANCE = _____ + _____ = _____
ITEM 28, 29, or 34 *RNG TOL* ***ITEM 36***

37) RSM_AZIMUTH / 0.087890625 = _____ / 0.087890625 = _____
ITEM 16 ***ITEM 37***

38) (RSM_AZIMUTH/ 0.087890625) – AZIMUTH TOLERANCE = _____ - _____ = _____
ITEM 37 *AZ TOL* ***ITEM 38***

39) (RSM_AZIMUTH/ 0.087890625) + AZIMUTH TOLERANCE = _____ + _____ = _____
ITEM 37 *AZ TOL* ***ITEM 39***

LAT/LON TOLERANCES

40) LAT _____º _____’ _____” (N / S) LON _____º _____’ _____” (E / W)

41) LAT _____º _____’ _____” (N / S) LON _____º _____’ _____” (E / W)

42) LAT _____º _____’ _____” (N / S) LON _____º _____’ _____” (E / W)

43) LAT _____º _____’ _____” (N / S) LON _____º _____’ _____” (E / W)

517. LDDT.

a. Objective. To perform LDDT on a DBRITE display.

b. Discussion. This test will verify proper operation of the DBRITE Subsystems when interfaced with the common processing subsystem.

c. Test Equipment Required. None.

d. Conditions. Full coordination with the appropriate control center is necessary.

e. Detailed Procedures. Perform the following test to run the LDDT on a display.

ACD and DBRITE LDDT	
Procedure	**Keyboard**
Consolidate keyboard of display under test with supervisory display keyboard.	(F7) C [Supervisor keyboard #] [Test keyboard#] +, Enter
Make all keyboards of the test display maintenance positions from the supervisory display keyboard.	(F7) C [Test keyboard#] * M, Enter
Initiate LDDT at test display keyboard.	(F7) 2 LDDT, Enter
Run all LDDT tests.	
Terminate LDDT at test Display from supervisory display.	(F7) 2 D [Test Display#] E, Enter
Make keyboards of display under test controller positions from supervisory display keyboard.	(F7) C [Test keyboard#] * C, Enter
Deconsolidate test display keyboard with supervisory display keyboard.	(F7) C [Test keyboard#] [Test keyboard#), Enter

518-519. RESERVED.

520. MAP VERIFICATION CHECK.

a. Objective. Verify appropriate maps are available at the display.

(4) Verify all displayed characters are the proper size, shape, and are focused.

b. Discussion. This procedure provides instructions for verifying correct maps following the download of new or changed maps.

Per the latest edition of FAA Order 7210.3T, it is the facility AT manager's responsibility to "ensure the adequacy of common reference points on radar maps where such points are used in providing air traffic control services."

FAA Order 8260.25 provides guidelines for implementing, maintaining, and updating Epoch Year Magnetic Variation Values.

c. Conditions. Personnel responsible for maintenance of remote Towers must be notified of any change to maps for their facilities. Remote Towers and TRACONS must perform steps (1) and (2) below.

d. Detailed procedures.

(1) Verify correct North Mark is displayed on a changed or new map.

(2) Verify proper name and date is displayed on a new or changed map.

521. DATA ENTRY AND DISPLAY.

a. Objective. To verify data entry and display capability and display presentations are correct and of operational quality.

b. Discussion. This procedure provides instructions for verifying data entry and display functionality.

c. Conditions. These checks must be made while the operational program is executing. These checks shall be performed on all operational displays.

d. Detailed Procedures.

(1) Verify maps and targets are displayed on all operational displays.

(2) Verify system time is correct and updating.

(3) Verify proper operation of keyboard and trackball.

Verify primary extents, secondary extents, alphanumerics are present and of acceptable quality.

(5) Verify alphanumerics are coincident with targets.

(6) Switch between ARTS and RGW and verify display updates properly.

(7) Select each Sensor adapted for this display and verify targets and maps update properly.

(8) For Mosaic capable displays switch between Single Sensor mode and Mosaic, verify display updates properly.

(9) Verify weather data (if known to exist).

(10) Verify the keyboard lights, illuminate all keys.

(11) For STDM capable displays, switch to STDM, verify display updates properly.

522. RDM TO REMOTE DISPLAY CONNECTIVITY CHECK.

a. Objective. To verify connectivity of Primary and Secondary communications path between TRACON RDMs and Remote RACDs.

b. Discussion. This procedure provides instructions for checking the RDM - RACD path connectivity.

c. Conditions. These checks can be performed by manually pinging each remote RACD communication path or utilizing a script file to ping each remote through both paths.

d. Detailed Procedure.

(1) Bring up Command Prompt window on a Standby or Offline SMC-PC connected to operational LAN.

(2) Ping each Remote RACD via both RDMs providing connectivity utilizing assigned Primary and Secondary IP addresses. (ping 196.1.160.128 for RDM0, or ping 196.1.161.128 for RDM1.) Refer to Site data for IP address assignments.

523. DRF MODE DISPLAY REGISTRATION CHECK.

NOTE: Permanent Returns (PRs) consist of any of the following: Permanent Echos, Beacon Parrots, MTI Reflectors, CPMEs, and MRSMs.

a. Objective. To verify range and azimuth accuracy of PRs when in DRF Mode.

b. Discussion. This procedure will verify proper display of PRs on Tower displays when in DRF Mode. This procedure shall be performed on each DRF capable display.

c. Test Equipment Required. None.

d. Condition. Full coordination with the appropriate control center is necessary.

e. Detailed Procedures. Perform the following procedure on the DRF capable display.

(1) Ensure DRF Mode is selected on the applicable display.

(2) Perform the following keyboard entry: **Clear, *, <slew enter>, slew to the center of the PR, <slew enter>**

(3) Verify range and azimuth reported on the display is within tolerance limits stated in Chapter 3 Standards and Tolerances.

(4) Repeat for all PRs on this sensor.

(5) Return display to operational settings (i.e., ARTS mode).

524. UPS LOAD TEST.

a. Objective. To test UPS capability to supply AC power in the event of a normal AC power interruption.

b. Discussion. This procedure will disconnect AC power to the UPS to test the capability of the UPS to switch correctly and to provide uninterrupted power to the ARTS tower display.

c. Test Equipment Required. None.

d. Condition. Full coordination with the appropriate control center is necessary. If the UPS fails this test, it will result in a reset or failure of the ARTS tower display.

e. Detailed Procedures. Perform the following on the UPS.

(1) Unplug the AC input cord of the UPS.

(2) Observe the VME chassis 2x20 display and/or the maintenance display.

(3) Verify that the display continues to update normally.

(4) Reconnect the AC input plug to facility power.

525 AP PROCESSOR POWER SUPPLY CHECK

a. At rear of chassis, shut off power switch for PS2.
b. At 4x20 Marquee, select screen #2 and scroll down to verify/record voltages for PS1.
c. Power on PS2 and power off PS1.
d. Repeat step b for PS2.
e. Power on PS1.

526 AP PROCESSOR BATTERY

a. After replacement of Bios battery, verify the following Bios settings in Figure 5-9.

527 ADSS Service Level Certification Procedure

a. Objective. To verify the ability of ARTS-3E to perform ADS-B data processing in support of Terminal ATC operations

b. Discussion.

1. Certification Techniques available. There are no automatic certification techniques available for the ADSS service. Manual Procedure must be used to certify the ADSS.

2. Certification Requirements. The ADSS Certification requirements are listed in Appendix 1, Table A.1-5 of this order.

c. Test Equipment required. None.

d. Condition. Full coordination with the appropriate control center is necessary.

e. Detailed procedures.

(1) At the SMC Verify that the external source LAN is UP.

(2) At the SMC verify that no ADS-B performance related problems are indicated.

NOTE: During periods of low ADS-B traffic blip interval and valid altitude may be red but does not indicate improper operation of ADS-B service.

(3) Check the external source status report to verify that the Service volume(s) and radio station(s) are UP.

(4) Verify that the ADS-B test targets meet the accuracy criteria established in Para 304 using one of the procedures below:

(a) Using map symbols.

1. Perform the following keyboard entries at a display to enable the display of ADS-B test targets:

(a) **F7,X,STDM<Enter>** enable system track display mode.

(b) Verify display updates properly.

(c) **F7,D,ADSB,^E<Enter>** enable display of all ADS-B test targets.

(d) Press the appropriate Mxx button on the map menu to display the map that contains the test target symbols.

(e) Verify that the test targets are coincident with the map symbols within the standards and tolerances of Para 304.

(f) **F7,D,ADSB,^,I <Enter>** inhibit display of all ADS-B test targets.

(b) Using *L slew enter.

1. Perform the following keyboard entries at a display to enable the display of ADS-B targets:

(a) **F7,X,STDM<Enter>** enable system track display mode.

(b) Verify display updates properly.

(c) **F7,D,ADSB,^E<Enter>** enable display of all ADS-B test targets.

(d) *L,slew enter,slew to the test target, slew enter.

(e) Verify that the test target is accurate within the standards and tolerances of Para. 304.

(f) **F7,D,ADSB,^,I<Enter>** inhibit display of all ADS-B test targets.

(c) Using test target geo regions.

1. Perform the following keyboard entries at a display to enable the display of ADS-B test targets:

(a) **F7,X,STDM<Enter>** enable system track display mode.

(b) Verify display updates properly.

(c) **F7,D,ADSB,^,E <Enter>** enable display of all ADS-B test targets.

(d) **F10,AH,^,S<Enter>** enable display of test target geo regions.

(e) Verify that the center of all test targets are displayed within the geo regions on the display.

(f) **F7,D,ADSB,^,I<Enter>** inhibit display of all ADS-B test targets

(g) **F10,AH,^,I<Enter>** inhibit display of test target geo regions

528. ADS-B and Radar Inter-Sensor Linking Error.

a. **Objective:** To verify Inter-Sensor Linking errors for ADS-B are within Standards and Tolerances of Paragraph 304.

b. **Discusson:** Inter-Sensor Linking errors must be within Standards and Tolerances to ensure adequate accuracy to support STDM operations.

c. **Test Equipment Required**: None.

d. **Condition:** No impact to AT operations will result from CQARS. CQARS is an online performance monitor program that runs continuously in the background. The minimum collection time interval is selectable. The default collection time interval should be adapted to 10 minutes. For Inter-sensor linking verification, the minimum time interval should be 30 minutes. This check should be performed on both the ARTS and RGW systems.

e. **Detailed Procedure**.

(1) If the sample size of live ADS-B targets is less than 10, perform radar to radar CQARS data analysis as outlined in paragraph 506. Verifty Inter-Sensor Linking Errors, for each sensor and within Standard and Tolerance of Paragraph 304

(2) If sample size of live ADS-B targets is 10 or greater perform the following for each sensor.

(a). At an SMC-PC, select external source status report.

(b). Select CQARS status.

(c). Verify Inter-Sensor Linking Errors, for each sensor are within Standard and Tolerance of Paragraph 304.

529. Permanent Return Accuracy in STDM.

Note: Use paragraph A or B below to perform registration checks in STDM.

A. Verify location of P.R. using *L slew enter.

1. Perform the following entries at a TRACON display to enable the display of P.R.s and verify their accuracy in Lat/Long coordinates:

(a) Place the display in ARTS mode.

(b) **F7,X,STDM<Enter>** Enable system track display mode.

(c) **F7,D,Par,^,E<Enter>** Enable display of all beacon parrots.

(d) *L,slew enter<slew to the Beacon Parrot, slew enter.

(e) Verify the Parrot is within standards and tolerances of the adapted Lat./Long postion.

(f) Repeat steps (d) and (e) for each adapted Parrot.

(g) *L,slew enter<slew to the Permanent Return.

(h) Verify the Permanent Return is within Standards and Tolerances of the adapted Lat./Long position.

(i) Repeat steps (g) and (h) for each Permanent Return

(j) **F7,D,Par,^,I<Enter>** Inhibit display of Beacon Parrots.

B. Verify location of P.R. using Map Symbols.

1. Perform the following entries at a TRACON display to enable the display of P.R.s and verify their accuracy Using Map Symbols.

(a) Place the display in ARTS mode.

(b) **F7,X,STDM<Enter>** Enable system track display mode.

(c) **F7,D,PAR,^,E<Enter>** Enable display of all beacon parrots.

(d) Press the appropriate Mxx button on the map menu to display the map that contains the Permanent Return Symbols.

(e) Verify that the P.R.s are coincident with the map symbol within the Standard and Tolerances.

(f) **F7,D,PAR,^,I<Enter>** Inhibit display of Beacon Parrots.

530. CDR Test Target Data Analysis.

(a) Objective To verify the accuracy of ADS-B test targets.

(b) Discussion. This procedure will extract data from CDR for use in analysis of Test Target Accuracy.

(c) Test Equipment required. None.

(d) Conditions: A minimum of 10 minutes of CDR data is required for this procedure.

(e) Detailed Procedures.

(1) Start CDR editor at SMC-PC.

(2) Select imput of RAID.

(3) Select classes tab. Select EX data class (external sources).

(4) Select filter tab. Select start/end time. Select 10 minutes minimum.

(5) Select ICAO address filter. Enter ICAO addresses of test targets.

(6) Select Output tab and select output file options.

(7) Select Control tab and start edit.

(8) Review the CDR editor output file. Verify the test target position values are within Standards and Tolerances.

531. Residual Bias of Beacon RSMs

a. Objective: To verify the residual bias of the Beacon RSMs are within the Standards and Tolerances of Paragraph 304.

b. Discussion: The residual bias is the error remaining after the RTQC correction algorithm applies corrections to minimize the errors in Range and Azimuth between adapted pairs of sensors. This is normally done using targets of opportunity seen by both sensors that meet the criteria for RTQC correction. The residual bias is the difference between the expected range/Azimuth of the Beacon RSMs and the corrected Mean (Average) Range/Azimuth. These values are reported on the Sensor CQARS report.

c. Test Equipment Required: None.

d. Condition: Coordination is not necessary since this is done by viewing reports on the SMC-PC.

e. Detailed Procedure:

1. At the SMC-PC select Sensor Config Status report.

2. Select the Sensor status for each sensor to see the CQARS report.

3. Compare the expected Range and Azimuth of each Beacon RSM with the Corrected Mean range and azimuth of that RSM.

4. Verify that the residual bias errors are within the Standards and Tolerances of Paragraph 304

532--599. RESERVED

BIOS Path(F2 at Pwr-up to Enter)	Selection (Bold = changed)
Advanced/Floppy Configuration/ Legacy Diskette A:	**Disabled**
Diskette B:	**Disabled**
Advanced/Console Redirection/ Com Port Address:	**On Board Com A**
Baud Rate:	**115.2k**
Console type:	PC ANSI
Flow Control:	CTS/RTS
Continue CR after POST:	ON
Boot/Boot Device Priority:	**CDROM**
	Removable Device
	+ Hard Drive
Power/Post Errors	Disabled

Figure 5-9. AP PROCESSOR BIOS SETTINGS

CHAPTER 6. FLIGHT INSPECTION

600-609. RESERVED.

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CHAPTER 7. GLOSSARY

700. GLOSSARY

A	Amperes
AACU	Aural Alarm Control Unit
ac	Alternating current
ACD	ARTS Color Display
ACID	Aircraft Identification
ACP	Azimuth Change Pulse
A/D	Analog to Digital
AF	Airway Facilities
AFAAR	Airway Facilities Aircraft Accident Representative
AGW	Arts Gateway
A/N	Alphanumeric
ANA	Analog
AP	ARTS Processor
APG	Azimuth Pulse Generator
ARP	Azimuth Reference Pulse
ARSR	Air Route Surveillance Radar
ARTCC	Air Route Traffic Control Center
ARTS	Automated Radar Terminal System
ARTS IIIE	Automated Radar Terminal System Expansion
ASCII	American National Standard Code for Information Interchange
ASR	Airport Surveillance Radar
AT	Air Traffic
ATC	Air Traffic Control
ATC-BI	Air Traffic Control Beacon Interrogator
ATCRBS	Air Traffic Control Radar Beacon System
ATCPS	Automated Terminal Common Processing System
ATO-T	Air Traffic Organization - Terminal
ATP	Acceptance Test Procedure
ATSS	Airway Transportation Systems Specialist
BANS	BRITE Alphanumeric Subsystem
BCN	Beacon
BITE	Built–In Test Equipment
BRG	Beacon Reply Group
BRITE	Bright Radar Indicator Tower Equipment
BROPM	Beacon Radar Online Performance Monitor
CA	Conflict Alert
CAG	Common ARTS Gateway
CCA	Circuit Card Assembly
CCW	Counter Clockwise
CDR	Continuous Data Recording
CLD	Card Level Diagnostic
COTS	Commercial-Off-The-Shelf
CP	Common Processor
CP	Common Processing Capability
CPME	Calibration Performance Monitor Equipment
CPS	Common Processing Subsystem
CPU	Central Processing Unit

CQARS	Common-Arts Quick Analysis Radar Sensors
CSDM	Computer System Diagnostic Manual
CRT	Cathode Ray Tube
CST	Coast
CTAS/ FAST	Center TRACON Automation System/ Final Approach Spacing Tool
DASI	Digital Altimeter Setting Indicator
dB	Decibels
DBRITE	Digital Bright Radar Indicator Tower Equipment
dc	direct current
DDC	Direct Digital Connect
DP	Display Processing Capability (TRACON)
DP	Tower Display Processing Capability
DPS	Display Processing Subsystem
DM	Display Module
DMAP	Digital Map
DRF	Direct Radar Feed
ERSD	External Removable Storage Device
ETG	Enhanced Target Generator
F/D	Full–Digital
FDAD	Full Digital ARTS Display
FDEPC	Flight Data Entry PC
FDP	FDAD Display Processor
FRDP	Facility Reference Data File
FSS	Function Select Switch
HCI	Human-Computer Interface
HDD	Hard Disk Drive
HSP	High–Speed Printer
Hz	Hertz
IC	Interfacility Communications
ICD	Interface Control Document
ID	Identification
IDD	Interface Design Document
IFR	Instrument Flight Rules
I/O	Input/Output
ISP	Interim Support Plan
k	kilobit
kHz	kilo-Hertz
kV	kilovolt
LACD	Local ARTS Color Display
LAN	Local Area Network
LBP	Local BANS Processor
LL	Landline
LDDT	Limited Display Diagnostic Test
LPM	Lines per Minute
LRR	Long Range Radar
MDD	Maintenance Display Diagnostic
MDS	Minimum Discernible Signal
MHz	Megahertz
MMS	Maintenance Management System
modem	modulator/demodulator
MRSM	Mono-pulse Remote Sensor Monitor
ms	microsecond
ms	millisecond
MSAW	Minimum Safe Altitude Warning
MTD	Moving Target Detected
MTI	Moving Target Indicator
MUX	Multiplexer
mV	millivolt
mV	microvolt

NAS	National Airspace System
NAS-MD	NAS Configuration Management Document
NCP	NAS Change Proposal
NID	Network ID
nmi	nautical mile
ns	nanosecond
ONSS	Overall Narrowband System Sensitivity
OSS	Overall System Sensitivity
PC	Personal Computer
PD-PC	Performance Data Personal Computer
PPC	Power PC
PE	Permanent Echo
PEM	Position Entry Module
PIM	Parallel Interface Module
p-p	peak–to–peak
PPI	Plan Position Indicator
PPS	Pulses per Second
PRF	Pulse Repetition Frequency
RAT	Ring–Around Threshold
R/B	Radar/Beacon
RACD	Remote ARTS Color Displays
RCU	Remote Control Unit
RDBM	Remote Display Buffer Memory
RDM	Remote Display Multiplexer
RF	Radio Frequency
RGW	Radar Gateway
RML	Radar Microwave Link
RPM	Antenna Revolutions Per Minute
RSB	Radar Sort Box
RSM	Remote Sensor Monitor
RSSS	Radar System Selector Switch
RTADS	Remote Tower Alphanumeric Display
RTDS	Remote Terminal Display System
RTDT	Remote Tower Display Test
RTQC	Real–Time Quality Control
SCAP	Sensor Coverage Analysis Program
SCIP	Surveillance Control and Interface Processor
SCSI	Small Computer Systems Interface
SIM	Serial Interface Module
SLD	System Level Diagnostic
SMC	Systems Maintenance Console
SMCC	System Maintenance Control Complex
SMO	System Management Office
SMON	System Monitor
S/N	Signal to Noise
SP	System Processor
SPI	Special Positions Indicator
SRR	Short Range Radar
SSI	Subsystem Interface
SSS	System Support Software
STB	Site Technical Bulletin
STC	Sensitivity Time Constant
STC	Sensitivity Time Curve
SWAB	Software Adaptation to Beacon Subsystem
TMU	Traffic Management Unit
TAMR	Terminal Automation Modernization and or Replacement
TP	Tracking Processor
TPS	Track Processing Subsystem

TRACON	Terminal Radar Approach Control
TRDP	Terminal Radar Data Processing
TSATD	Terminal Surveillance Airborne Target Display Service
TRVSS	Terminal Radar Video Switching System
T/S	Time–Share
TSG	Training Scenario Generator
UPS	Uninterruptible Power Supply
V	Volt
V dc	Volts Direct Current
VME	Versa Module Eurocard
Wx	Weather

APPENDIX 1. CERTIFICATION REQUIREMENTS AT TRACONS AND LOCAL AIR TRAFFIC CONTROL TOWERS

1. GENERAL.

This appendix contains certification requirements for surveillance services provided in the terminal ATC environment, and certification requirements for constituent systems used to provide these services. Refer to Order 6000.15 for general guidance on the certification of services and systems.

2. SERVICES.

A service is defined as a system or group of systems providing some functional benefit to a user. The terminal surveillance service provides a means for ATC personnel to determine aircraft position and course during aircraft operations. These services are certified as Terminal Automated Radar Service, (TARS), and Remote Tower Alphanumeric Display Service (RTADS) in accordance with tables included in this appendix.

a. TARS is a mutually dependent surveillance and automation display service, relying on a combination of ATC and airborne systems. TARS relies on surveillance data from short-range sensors, long-range sensors, or any combination of sensors to provide ATC personnel with a means to determine aircraft position and course. TARS enhances surveillance capabilities by displaying real-time aircraft transponder data, e.g., pressure altitude, indicated airspeed, squawk codes, and by linking real-time flight data with flight plan data, and automating the handling of surveillance tracking to appropriate ATC sectors.

b. RTADS provides terminal surveillance radar data processing from the automation system to display targets and alphanumeric data on the display(s) at a remote tower.

c. ADSS is a serveillance and automation display service relying on TARS and fused processing capability as well as serveillance data generated from ADS-B equipped aircraft that is delivered by the ADS-B Service Delivery Point to the Automation system. ADSS provides increased accuracy and faster update rates compared to RADAR/BEACON Surveillance Systems.

3. SYSTEMS.

Centralized, distributed, or backup surveillance processing systems, ACDs or RACDs are used to provide these services. The system is certified as an ARTS or TADS in accordance with this appendix.

a. Certification of systems and subsystems is now event based. Event based certification removes the periodic requirement for certification, and requires certification whenever maintenance or administrative activities affecting system or subsystem operations occur. Refer to Order 6000.15 for specific guidance on event based certification.

b. For facilities that have remote towers with direct radar feeds, it is necessary to have the assistance of personnel at the remote tower to conduct certification activities. It is necessary to have proper coordination between the certifying official at the TRACON or RAPCON and the remote tower. In these cases local and/or regional procedures should be developed, if necessary, in order to facilitate activities between distant facilities and convey certification information.

4. EXCEPTIONS.

Order 6000.15 permits certification with exceptions where a system provides somewhat less than its full functional benefit but is still useable, e.g., one processor is taken out of service, yet another processor is still is contributing to the terminal surveillance service. Outstanding exceptions may be certified in accordance with the tables included in this appendix. Additional guidance is given for the specific purpose of removing the exceptions.

Table A.1-1. Terminal Automated Radar Service (TARS)

Service	*Certification Parameter*	*Reference Paragraph Standards and Tolerance/Limits*
TARS Provide terminal processing to TRACON Air Traffic Controllers.	Verification that the Automated Radar Terminal System (ARTS) and the associated input and output equipment are processing virtually error free.	The latest editions of Orders 6310.2, 6310.9, 6310.19, 6360.10, 6360.14, 6365.3, 6410.18 and this handbook.
	Knowledge that constituent FAA Radar systems, Interrogator systems, Processing systems and TRACON Display systems are currently certified.	
	Proper indication at monitor and control positions.	SMC status screens indicating normal overall operation and printouts (if available).
Fused Processing Capability Provides processing of Radar/Beacon/ADS-B Data into a fused mode System Track Display (STDM)	CQARS data analysis. Inter Sensor Linking Error.	Para 528 Para 410.h.4
Mosaic Processing Capability Provides processing of radar/beacon data for Mosaic mode display.	CQARS Data Analysis.	Para 303

NORMAL CERTIFICATION INTERVAL: Daily.

ALLOWABLE EXCEPTIONS EXAMPLES: Any Advertised Service or Certification Parameter.

PERSONS RESPONSIBLE FOR CERTIFICATION: ATSS with certification authority.

CERTIFICATION ENTRIES IN FACILITY MAINTENANCE LOG:

Without Exception:	TARS certified.
With Exception (Example):	TARS certified except Mosaic Processing. TARS certified except Fused Processing.
Removing Exception (Example):	TARS Mosaic Processing certified TARS Fused Processing certified.

NOTE: This item only applies to Mosaic capable ARTS IIIE sites that have one or more displays adapted (enabled) for Mosaic mode.[2]

[2]

Table A.1-2. Automated Radar Terminal System (ARTS)

Advertised Service	*Certification Parameter*	*Reference Paragraph Standards and Tolerance/Limits*
Automation Capability		
Provides terminal processing to Air Traffic Controllers.	Normal operation of systems/subsystems with each other as evidenced by:	
	1. Normal indications of alphanumeric information on the display.	Para 521
	2. PC status screens indicating normal overall operations and printouts.	CSOM/SUM Para 4.7
Sensor Interface Capability		
Provides radar/beacon data to the ARTS and to the display.	Radar/beacon video levels to display are within required tolerance levels as evidenced by:	
	1. Proper presentation of beacon/radar data to the display.	Para 521
Track Processing Capability		
Provides for processing of data prior to display.	1. Radar Data Processing and Tracking.	Utilize targets of opportunity; verify the acceptability of radar data processing and tracking for each adapted sensor.
	2. Successful reconfiguration to alternate TP/SP/SIFS.	
	Error-free cycling of the operational program.	
Common Processing Capability		
Provides for processing of common data prior to display.	Error free processing of common data into display format as evidenced by:	
	1. Successful reconfiguration to alternate CP.	
	2. Error free cycling of the operational program.	
	Proper operation of MSAW/CA detection capability.	Para 322

NORMAL CERTIFICATION INTERVAL: Event Based.

ALLOWABLE EXCEPTIONS: Any Advertised Service or Certification Parameter.

PERSONS RESPONSIBLE FOR CERTIFICATION: ATSS with certification authority.

CERTIFICATION ENTRIES IN FACILITY MAINTENANCE LOG:

Without Exception:	ARTS certified.
With Exception (Example):	ARTS certified except for MSAW/CA detection capability.
Removing Exception (Example):	ARTS MSAW/CA detection capability certified.

Table A.1-3. Radar Gateway (RGW) System

Advertised Service	*Certification Parameter*	*Reference Paragraph Standards and Tolerance/Limits*
Back-up Processing Capability Provides digital processing of radar/beacon data acceptable for further processing by the display.	Accurate conversion of radar/beacon target reports as evidenced by:	
	1. Proper presentation of beacon/radar data to the display	Para 521
	2. Normal indications of alphanumeric information on the display.	Para 521
	Normal operation of systems/ subsystems with each other as evidenced by:	
	1. Successful reconfiguration to alternate RGW/SIFS.	CSOM/SUM Para 4.3.1
	2. RGW-PC status screens indicating normal overall operation and printouts (if applicable).	CSOM/SUM Para 4.7
	3. Error-free cycling of the operational program.	
	4. Proper operation of MSAW/CA detection capability [viii]	Para 322

NORMAL CERTIFICATION INTERVAL: Event Based.

ALLOWABLE EXCEPTIONS: Any Advertised Service or Certification Parameter.

PERSON RESPONSIBLE FOR CERTIFICATION: ATSS with certification authority.

CERTIFICATION ENTRIES IN FACILITY MAINTENANCE LOG:

Without Exception:	RGW certified.
With Exception (Example):	RGW certified except Mosaic mode.
Removing Exception (Example):	RGW Mosaic mode certified.

Table A.1-4. TADS Sub-System

Advertised Service	*Certification Parameter*	*Reference Paragraph*
Display Processing Capability	Data Display and Entry.	Para 521
	Display luminance and color characteristics verification.	Verification that the Color Display luminance and color characteristics are sufficient in the environment being used based on the judgment of the certifying official.
Provide alphanumeric, radar data and beacon data functional capabilities to the TRACON controller with related keyboard control.	Single Sensor Mode Display Registration Checks.	Para 342.A
	MSAW/CA Alarm.	Para 342.D
	Mosaic Mode Display.[ix]	Para 342.B
	Registration Check.	

NORMAL CERTIFICATION INTERVAL: Event Based.

ALLOWABLE EXCEPTIONS: Any Advertised Service or Certification Parameter.

PERSON RESPONSIBLE FOR CERTIFICATION: ATSS with certification authority.

CERTIFICATION ENTRIES IN FACILITY MAINTENANCE LOG:

Without Exception:	TADS certified.
With Exception (Example):	TADS certified except Mosaic mode.
Removing Exception (Example):	TADS Mosaic mode certified.

Table A.1-5. AUTOMATIC DEPENDENT SURVEILLANCE SERVICE (ADSS)

Service	*Certification Parameter*	*Reference Paragraph Standards and Tolerance/Limits*
ADSS	Knowledge that the ARTS and ACD subsystem are certified.	Table A1-2
NOTE: ADSS certification is only required if the facility performs ATC operations using ADS-B.	Proper indications at Monitor and Control Positions.	SMC status screens indicating normal overall operation and printouts for ADS-B data.
	Position accuracy.	Para 527e(4)
	Normal processing and tracking of ADS data.	
	ADS data transfer.	Para 527e(1)
CQARS Data Analysis	Inter-Sensor Linking Error	Para 528 Para 410.h.2
	Test Target Accuracy	Para 527

NORMAL CERTIFICATION INTERVAL: Daily.

ALLOWABLE EXCEPTIONS: Individual radio stations or Service Volumes in reduced service.

PERSON RESPONSIBLE FOR CERTIFICATION: ATSS with certification authority.

CERTIFICATION ENTRIES IN FACILITY MAINTENANCE LOG:

Without Exception	*ADSS certified.*
With Exception Example:	*ADSS certified except [individual radio station or service volume].*
Removing Exception Example:	*ADSS [individual radio station or service volume] certified.*

APPENDIX 2. CERTIFICATION REQUIREMENTS AT REMOTE AIR TRAFFIC CONTROL TOWERS

Table A.2-1. Remote Tower Alphanumeric Display Services (RTADS)

Service	*Certification Parameter*	*Reference Paragraph Standards and Tolerance/Limits*
RTADS Provide terminal processing to Tower Air Traffic Controllers.	Knowledge that the Automated Radar Terminal System (ARTS) is certified.	Table A.1-2
	Knowledge that the constituent FAA Radar and Interrogator systems are currently certified.	Appropriate Radar and Interrogator Maintenance Handbooks.
	Knowledge that the RTDS or DBRITE is certified.	Table A.2-2 Order 6410.18, Appendix Tables 1 and 2
	MSAW/CA Alarm.	Para 502 or Targets of Opportunity
Provide limited tracking capability (DRF mode) as a backup for TRACON feed to Tower. [x]	DRF mode display registration check.	Para 523

NORMAL CERTIFICATION INTERVAL: Weekly

ALLOWABLE EXCEPTIONS: Any Advertised Service or Certification Parameter.

PERSONS RESPONSIBLE FOR CERTIFICATION: ATSS with certification authority.

CERTIFICATION ENTRY IN FACILITY MAINTENANCE LOG:

Without Exception:	RTADS certified.
With Exception (Example):	RTADS certified except Sensor *xxx*.
Removing Exception (Example):	RTADS Sensor *xxx* certified.

Table A.2-2.Radar Terminal Display System (RTDS)

Advertised Service	*Certification Parameter*	*Reference Paragraph*
Display Processing Capability	Data Display and Entry.	Para 521
	Display luminance and color characteristics verification.	Verification that the Color Display luminance and color characteristics are sufficient in the environment being used based on the judgment of the certifying official.
Provide alphanumeric, radar data and beacon data functional capabilities to the Tower controller with related keyboard control.	Single Sensor mode display registration checks.	Para 342a

NORMAL CERTIFICATION INTERVAL: Event Based.

ALLOWABLE EXCEPTIONS: Any Advertised Service or Certification Parameter.

PERSONS RESPONSIBLE FOR CERTIFICATION: ATSS with certification authority.

CERTIFICATION ENTRY IN FACILITY MAINTENANCE LOG:

Without Exception:	RTDS certified.
With Exception (Example):	RTDS certified except Keyboard 2.
Removing Exception (Example):	RTDS Keyboard 2 certified.

APPENDIX 3. FAA FORM 1800-2 NAS CHANGE PROPOSAL

CASE FILE/NAS CHANGE PROPOSAL (PLEASE TYPE OR PRINT NEATLY)				Page 1 of
1. Case File Number - -	2. **FOR CM USE** Case File Received Date		NCP Issuance Date	NCP Number
3. Scope of Change □ Local □ National □ Test	4. Reason for Change □ Safety □ Technical Upgrade □ Systems Interface □ Requirements Change □ Design Error □ Parts Unavailability □ Baseline □ Other			
5. Priority □ Normal □ Time-Critical □ Urgent	6. Justification of Time Critical/Urgent Priority		7. Supplemental Change Form □ ECR/ECP □ TES □ N/A 7a. Supplemental Change No___ 7b. Supplemental Change Initiation Date ___	
8. Case File Originator	9. Originator's Organization	10. Telephone Number	11. Case File Initiation Date	
12. Type of Document Affected □ CPFS □ SPEC □ MTBK □ _____ □ TI □ DWG □ IRD/ICD			13. Baseline Document Number(s)	
14. CI Subsystem Designator	15. FA Type		16. CI Component Designer	
17. Facility Identifier (FACID)	18. Facility Code (FACCODE)	19. Cost Center Code	20. System Software Version	
21. Title				
22. Description: (a) Identification of problem, (b) proposed change, (c) interface impact, (d) cost estimate, (e) funding source, (f) benefits/risks, (g) schedule, (h) other (e.g., logistics, quality, etc.) IDENTIFICATION OF THE PROBLEM: PROPOSED CHANGE: (a) INTERFACE IMPACT: (d) COST ESTIMATE: (e) SOURCE OF FUNDING: (f) BENEFITS/RISKS: (g) SCHEDULE: (h) OTHER:				
Blocks 1 through 22 are to be completed by originator and/or the NCP coordinator. If a block is not applicable, write n/a. Attach additional sheets if necessary. See current revision of NAS-MD-001 for detailed completion instructions.				

FAA FORM 1800-2 (5-99) Supersedes Previous Edition NSN:0052-00-801-6005

Case File Number - -	NCP Number	Page 2 of

23. Name and Title of Originator's Immediate Supervisor (Type/Print Clearly)	Signature	Date

24. Facility/SMO Review (AT/AF)					25. Regional Review				
Name	Routing Symbol	Date	Concur	Non-Concur	Name	Routing Symbol	Date	Concur	Non-Concur
			☐	☐				☐	☐
			☐	☐				☐	☐
			☐	☐				☐	☐
			☐	☐				☐	☐
			☐	☐				☐	☐
			☐	☐	☐ Approve (Enter into CM/STAT. Forward to Prescreening)			☐ Disapprove (Return to Originator)	
			☐	☐					

Routing Symbol	Signature	Routing Symbol	Signature
Date		Date	
Routing Symbol	Signature	Routing Symbol	Signature
Date		Date	
24a. Comments		Routing Symbol	Signature/Configuration Mgr/NCP Coordinator/Reg Exec Sec
		Date	
		25a. Comments	
		(Attach additional sheets if necessary)	

26. **PRESCREENING**

Prescreening Office
Prescreening Comments

(Attach additional sheets if necessary)

Reviewers	Routing Symbol	Date	Concur	Non-Concur	☐ Recommend Approval ☐ Recommend Disapproval	
					☐ New Requirement	
					(Return original to originating office through the Regional NCP Coordinator)	
					Routing Symbol	Signature
Recommended Must Evaluators					Date	

27. **For Internal Configuration Management Use Only**

[i] For ASR-11 Sensors where Search coverage may not equal Beacon coverage, the following applies: Upon review and assurance in writing (from the Air Traffic Manager) that Air Traffic defined Beacon and Search sensor volumes are adequate for the Air Traffic service required, the following alternate procedure is allowed for the calculation of radar reinforcement rate. For a sensor where the Beacon volume is greater than the Search volume, the radar reinforcement rate shall be calculated using only those Beacon-only targets within the volume of the search. This procedure requires the use of Radar Rata Analysis Tool, RBAT, or the analysis of CDR data.

[ii] **NOTE:** This applies to RACD only.
[iii] **NOTE:** Initial applies only for new monitors with <50 hrs usage.
[iv] **NOTE:** ARTS displays are defined as ACD, ACD2, LACD, RACD, RACD2, RACD3 and TMU.
[v] **NOTE:** ARTS displays are defined as ACD, ACD2, LACD, RACD, RACD2, RACD3 and TMU.
[vi] **NOTE:** RACD/RACD2/LACD only
[vii] **NOTE:** ARTS displays are defined as ACD, LACD, RACD and TMU.
[viii] **NOTE:** This item only applies to a RGW running revision 32 or later.
[ix] **NOTE:** This item only applies to Mosaic capable ARTS IIIE sites that have one or more displays adapted (enabled) for Mosaic mode.
[x] **NOTE:** This only applies to displays that have DRF input.