U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

ORDER
JO 6191.3A

Effective Date:
07/07/2009

SUBJ: STANDARD TERMINAL AUTOMATION REPLACEMENT SYSTEM (STARS) MAINTENANCE TECHNICAL HANDBOOK

1. PURPOSE.

This handbook provides guidance and prescribes technical standards, tolerances, and procedures applicable to the maintenance and inspection of the Standard Terminal Automation Replacement System (STARS). It also provides information on special methods and techniques that will enable Tech OPS 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.

2. DISTRIBUTION.

This directive is distributed to offices and services within Washington headquarters, the William J. Hughes Technical Center, the Mike Monroney Aeronautical Center, regional Air Traffic Organization (ATO) divisions, Department of Defense (DoD) facilities, and ATO field offices having the following facilities/equipment: STARS. An electronic version of this handbook is available on a Federal Aviation Administration (FAA) Intranet site located at **http://nasdoc.faa.gov** and a DoD accessible website at **http://www.dod.tc.faa.gov.**

3. CANCELLATION. Not Applicable.

4. EXPLANATION OF CHANGES.

This revision incorporates changes resulting from STARS physical and functional changes as well as field, service area, and headquarters comments. These changes are recorded on the Detailed Change History page.

5. MAINTENANCE AND MODIFICATION PROCEDURE.

a. Order 6000.15, this handbook, the applicable equipment TI Manuals, Interactive Electronic Technical Manual (IETM), and other applicable handbooks shall be consulted and used together by the maintenance technician in all duties and activities for the maintenance of STARS. These documents shall be considered collectively as the single official source of maintenance policy and direction authorized by the Terminal Operations (ATO-T). References located in the appropriate paragraphs of this handbook titled 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 or IETM shall be consulted for a particular standard, key inspection element, performance parameter, performance check,

maintenance task, or maintenance procedure. It should be noted that references to hardcopy TI manuals only apply until they are replaced with IETM.

b. The latest edition of Order 6032.1b, National Airspace System Modification Program, contains comprehensive direction concerning the development, authorization, implementation, and recording of modification to facilities, systems, and equipment in commissioned status. It supersedes all instructions published in earlier editions of maintenance technical handbooks and related directives.

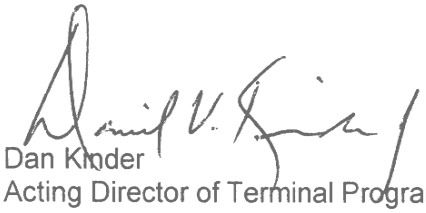
6. FORMS LISTING.

In addition to the forms required by Order 6000.15, FAA Form 6000-8, Technical Performance Records (TPRs) are required for numeric values. STARS delivers reproducible TPRs as MS Word files with this handbook as identified below:

- Figure 5 – 1. STARS Updated Software Chart - Revision A
- Figure 5 – 2a. STARS Daily Technical Performance Record
- Figure 5 – 2b. STARS Weekly Technical Performance Record – Revision B
- Figure 5 – 2c. STARS Monthly Technical Performance Record
- Figure 5 – 2d. STARS Quarterly Technical Performance Record – Revision A
- Figure 5 – 2e. STARS Semiannual Technical Performance Record
- Figure 5 – 2f. STARS As Required Technical Performance Record – Revision A
- FMA Figure 1 - STARS FMA Daily/Weekly Technical Performance Record – Revision B
- FMA Figure 2 - STARS FMA Quarterly/Annual Technical Performance Record

7. RECOMMENDATIONS FOR IMPROVEMENT.

This handbook is under configuration management control as defined in the latest edition of Order 1800.8, NAS Configuration Management, and NAS-MD-001, National Airspace System Configuration Management Document. Any changes to the baseline document or requests for deviation from national standards shall be processed through the NAS Change Proposal (NCP) process.



Dan Kinder
Acting Director of Terminal Program Operations

DETAILED CHANGE HISTORY

Revision Number	Date	Purpose or Associated Software Release	FAA Change Mechanism PTR/HDR/DDR/CCD	Affected Pages/Sections
FINAL	11/16/2006	First Release of Final STARS MHBK • Change 6191.XX to JO 6191.3	CCD N25779	All Pages
Revision A	07/07/2009	FS-2+ Baseline Update to Include ECP-025	CCD N31156	Multiple pages
		FS-2+ Baseline Update to Include ECP-026	CCD N31672	Multiple pages
		Initial Interface for Interface Requirement Document between ASDE-X and STARS for PRM-A functionality and performance.	CCD N31938	Attachment 2
		Implementing Policy for Event Based Certification of Terminal Systems and Sub Systems in paragraph 503 per updates for FAA Order 6000.15E	CCD N32021	Multiple pages
		Replaced Cover Page to conform with FAA Branding	DDR 06103	Cover Page
		Moved “Foreword” material to cover page	DDR 06103	Cover Page
		Foreword paragraph 6 – Inserted hyperlinks for all forms to facilitate removal of the forms from the Handbook	DDR 06103	Cover Page
		Removed old style change page	DDR 06103	i
		Inserted appropriate references to IETMs	DDR 05098 DDR 05322	Multiple pages
		Inserted inter-document hyperlinks as appropriate	DDR 06111	Multiple pages
		Removal of all AIA / EASL / LDDT / EDCM references	DDR 06092	Multiple pages
		Removal of Jumpstars, Jumpstart, Easy spare references	DDR 06112	Multiple pages
		Rephrase “Maintenance personnel” to say “Tech OPS” – not all of the field organizations use system specialists to maintain their inventory.	DDR 06107	Multiple pages
		202.b.7 Changed “Minimal” to “Partial” Data Block. Remove definitions and ref TI manuals.	DDR 06095	
		202.b.11 Removed “The FSL contains two independent LANs: online and standby.	DDR 06093	
		205 • Removed reference to Figure 1 • added hyperlinks	DDR 06092	
		323. • Removed checks that were redundant with para 322 • Remove PE Reliability from Para 323 references 1-5 • Changed Note 4 to “Reserved”. PE Reliability was removed • Fix all less than, greater than, equals, symbols for discrepancies • Changed all “01%” specs to “1%”	DDR 06114 DDR 06115 DDR 06116 DDR 06126 DDR 06127	
		323.a. Removed arrow designating as “Cert”	DDR 06098	

Revision Number	Date	Purpose or Associated Software Release	FAA Change Mechanism PTR/HDR/DDR/CCD	Affected Pages/Sections
		323.a.1 Change Search / Blip Scan for ASR-9 radar from “92%” to “88%”	DDR 06125	
		323.a. 2. Change Zero code standard to 1%	DDR 06099	
		323. a. Changed “Search/Beacon” to “FS”	DDR 06367	
		323. a. 4. Changed “ASR-8” to “ASR-8/7”	DDR 06368	
		323.b. Removed arrow designating as “Cert”	DDR 06098	
		329. a. Changed Operating Tolerance from “Same as standard” to “Set display to visual satisfaction.”	DDR 06370	
		330. instruct that Cmax and Cmin values be "set to visual satisfaction."	DDR 06096	
		347. Removed FSCK paragraph and designated “Reserved”	DDR 06119	
		465. QUARTERLY. Added: a. Included 6191.401 reference b. Included 6191.401 reference b. Changed “Visibly” to “Visible” f. TDM Fan Inspection and Cleaning g. TDW Articulating Arm Check.	 DDR 06064 DDR 06064 DDR 06121 DDR 06274	
		466. Semiannually. Added: a. Blower Fan and Filter Inspection and Cleaning b. Rack Cabinet Physical Inspection and Cleaning c. TCW Cabinet Physical Inspection and Cleaning d. Check Connector Mating	DDR 06371	
		469.a. Replace “STR-STARS-061” with reference to TI manual	DDR 06120	
		469. c. added to Standards and Tolerances: Do not verify firmware revision levels with revision levels in TI manual or IETM samples.	DDR 00000	
		469.d. Removed Jumpstars and designated “Reserved”	DDR 06112 DDR 06122	
		469.e. Removed Jumpstars and designated “Reserved”	DDR 06112 DDR 06122	
		469. f. Removed FSCK paragraph and designated “Reserved”	DDR 06119 DDR 06122	
		516.e.2.b. Modify keyboard entry to state "Enter the command, <F7 C (receiving keyboard)(sending keyboard) +><Enter>,”	DDR 06124	
		516.e.3 change first TCW / TDW to MCW.	DDR 06100	
		520.d. added: If this is not possible, it is permissible to utilize visual checks to determine range/azimuth integrity and reliability (see par. 537).	DDR 06271	

Revision Number	Date	Purpose or Associated Software Release	FAA Change Mechanism PTR/HDR/DDR/CCD	Affected Pages/Sections
		520 e.2.b.2, b.3 Removed “Add this to the standard deviation and …”	DDR 06110	
		521. Remove PE Reliability refs.	DDR 06272	
		530.e.3. changed: “ls –al /etc/.rootkey” To “ls –al /etc/.rootkey”	DDR 06273	
		530.e.5. changed: “/usr/lib/nis/nisping org_dir”. To “nisping org_dir”	DDR 06273	
		530.e.6. changed: “/usr/lib/nis/nisping groups_dir”. To “nisping groups_dir”	DDR 06273	
		535. Reversed order of Range/Azimuth Tables	DDR 06360	
		557.e.3. deleted “paragraph 7.2.15 in the…”		
		558 d. Change to “No special conditions required.” e.1. Removed step for “maintenance/Operate switch” e.2 Changed “Used” to “Refer to”	 DDR 06365 DDR 06372	
		559 modified paragraph to accommodate perforated doors	DDR06094	
		562.b. Edit spelling of second use of function	DDR 06102	
		562. added “Note any deficiencies”	DDR 06160	
		564. TDM FAN Inspection and Cleaning Inserted entire paragraph and NOTE	DDR 06108	
		570. Removed FSCK paragraph and designated “Reserved”	DDR 06119	
		Removed the following figures and replaced with hyperlinks to MS Word files for use by Site personnel. Figure 5-1, 5 – 2a, 5 – 2b, 5 – 2c, 5 – 2d, 5 – 2e, 5 – 2f, FMA Figure 1, FMA Figure 2	DDR 06113	
		Table A1-2. Addition of RTADS Certification (per 6000.15)	N6000.216 & 6000.15	
		Table A1-3. Changed Normal Certification Interval from Weekly to Event Based (per 6000.15).	6000.15	
		Table A1-3A. Removed Radar Reliability Check	DDR 06098	
		Table A1-3A. Changed Normal Certification Interval from Weekly to Event Based (per 6000.15).	6000.15	
		Table A1-3B. Removed Radar Reliability Check	DDR 06098	
		Table A1-3B. Changed Normal Certification Interval from Weekly to Event Based (per 6000.15).	6000.15	
		Removed Table A1-3C. STARS EXISTING ARTS SERVICE LEVEL (EASL) SUBSYSTEM	DDR 06092	
		Table A1-3D. Removed Radar Reliability Check	DDR 06098	
		Table A1-3D. Changed Normal Certification Interval from Weekly to Event Based (per 6000.15).	6000.15	

Revision Number	Date	Purpose or Associated Software Release	FAA Change Mechanism PTR/HDR/DDR/CCD	Affected Pages/Sections
		Table A1-4. Changed Normal Certification Interval from Weekly to Event Based (per 6000.15).	6000.15	
		Table A3-2 Removed Figure 5-1, 5-2a., 5-2b., 5-2c.	DDR 06092	
		FMA 319 Changed ”TSPAD RADAR RELIABILITY AND DISPLAY INTEGRITY” To ”TSPAD DISPLAY ENTRY AND DISPLAY PROCESSING” And removed b. and c. checks	DDR 06168	
		Added FMA 320 TSPAD Radar Reliability And Performance Parameters	DDR 06168	
		Updated FMA 410.c. to TSPAD Data Entry and Display Processing.	DDR 06168	
		Added FMA 410.d. TSPAD Radar Reliability and Performance Parameters	DDR 06168	
		FMA 513 Modify references to Appendix 1, Table 2 to Appendix 1, Table FMA - 1	DDR 06275	
		FMA 513 Changed ” TSPAD RADAR RELIABILITY AND DISPLAY INTEGRITY. “ To ”TSPAD Display ENTRY and DISPLAY Processing.”	DDR 06168	
		FMA 513. Removed NOTE and steps 8 & 9	DDR 02677	
		Added FMA 515. TSPAD Radar Reliability And Performance Parameters.	DDR 06168	
		FMA 527 • Enhanced FMA 527 b. Discussion • Enhanced FMA 527 e. to accommodate perforated door steps.	DDR 02677	
		Table FMA – 1 changed “Radar Reliability and Display Integrity.” To “Data Entry and Display Processing.”	DDR 06168	
		Table FMA-2. Changed Normal Certification Interval from Weekly to Event Based (per 6000.15).	6000.15	

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

ATTACHMENTS

CHAPTER 1. GENERAL INFORMATION AND REQUIREMENTS

100. OBJECTIVE.

This handbook provides the necessary guidance to be used in conjunction with information available in instruction books and other handbooks for the proper maintenance of Standard Terminal Automation Replacement System (STARS).

101. SAFETY.

Tech OPS shall observe all pertinent safety precautions when performing maintenance on the equipment covered in this manual. Refer to the latest edition of Order 6000.15, General Maintenance Handbook for Airway Facilities, for guidance.

In addition, Tech OPS shall comply with all federal and FAA safety regulatory requirements including, but not limited to 29 CFR 1910, OSHA General Industry Standards; 29 CFR 1926, OSHA Safety and Health Regulations for Construction; FAA Order 3900.19B, FAA Occupational Safety and Health Program; FAA-STD-G-2100g, FAA Specifications for Electronic Equipment, General Requirements; and DOT/FAA/CT-03/05 HF-STD-01, Human Factors Design Standard.

102. CERTIFICATION.

Refer to Order 6000.15 for general guidance on the certification of systems, subsystems, and equipment. Refer to Appendix 1, Certification Requirements for the specific certification requirements for STARS.

a. Certification Tables. Each table in Appendix 1 of this handbook lists the certification levels, associated certification parameters, reference paragraphs, maximum certification intervals, identification of recommended personnel responsible for certification, and the prescribed certification statements to be entered into the facility maintenance log.

b. Certification of Systems. Certification is required for the following service and systems.

1. Terminal Automated Radar Service (TARS).
2. Remote Tower Alphanumeric Display Service (RTADS).
3. STARS system.
   (a) Full Service Level (FSL)
   (b) Emergency Service Level (ESL)
4. Radar Terminal Display System (RTDS)
   (a) Direct Radar Feed (DRF)

c. Certification Accomplishment. Certification of the total automation service and the major subsystems shall be accomplished using the nationally approved procedures prescribed herein. These procedures provide the minimum maintenance tasks and performance checks required for certifying the system. Additional actions may be taken at the discretion of the system/service certified Airway Transportation System Specialist (ATSS). Before additional actions are taken, consideration should be given to the potential impact on ATC operations.

d. Certification Statement. The certifying ATSS shall document the certification by making the prescribed certification statement from Appendix 1 in the STARS maintenance log.

e. Levels of Certification. The two levels are the Service Level and the System Level certification.

1. Service Level. The service level certification encompasses all lower certification levels and indicates that overall service can be used by Air Traffic (AT) for the safe, efficient movement of aircraft within the area covered by the service. As part of the service certification, the certifying ATSS must ensure that certifiable systems and subsystems from the sensor to the display path are performing advertised functions.
2. System Level. The System Level certification verifies that system hardware and software are functioning properly. This level of certification does not include equipment that is not an integral part of the system, such as a sensor. This level of certification also ensures that the correct version of software/firmware is installed on each computer/Local Area Network (LAN) utilized in the system.

f. Certification Following Corrective Maintenance. After corrective maintenance on a Line Replaceable Unit (LRU), the LRU may be returned to the system after verifying that the element functions properly offline. Certification is required only if the failure of the LRU affected a certification parameter found in Appendix 1.

1. The Tech OP should determine if the unit is capable of performing its advertised functions.
2. Verify proper operation within the appropriate subsystem using the applicable diagnostics.
3. Return the LRU to the system.
4. Monitor and ensure that the LRU is operating properly in the system.
5. Log the returned element in the facility maintenance log.

g. Certification Responsibility. Certification responsibility is assigned to the appropriate Tech OPS who hold certification credentials granted under the provisions of the latest edition of Order 3400.3, Airway Facilities Tech OPS Certification Program.

103. AIRCRAFT ACCIDENT.

When aircraft accidents or incidents occur, Air Traffic Organization Technical Operations personnel are responsible, when requested by the Technical Operations Aircraft Accident Representative (AFAAR) 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.

104. COORDINATION.

Coordination requests shall be made in accordance with the latest edition of Order 6000.15. Those procedures require:

a. Requests for authority to remove equipment from service shall be directed to the appropriate Tech OPS Control Center and include the desired time of shutdown, probable duration, and reason.

b. The Tech OPS Control Center other appropriate entities, obtain approval or justification for refusal, and advise the requesting organization or the Tech OPS of the results.

c. The Tech OPS should confirm the approval for the interruption with AT or Tech OPS control center personnel immediately prior to the shutdown to ensure the approval status has not changed.

105. 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 8200.1, United States Standard Flight Inspection Manual. For additional information concerning flight inspections, see Chapter 6 of this order.

106. TECHNICAL INSPECTION.

Facility inspections, objectively conducted, are one of the most effective tools for assuring the reliability of the National Airspace System (NAS). See the latest edition of Order 6000.15 and the latest edition of Order 6040.6, Airway Facilities NAS Technical Evaluation Program, for the details on intervals and responsibilities for formal inspections.

107. PERIODIC MAINTENANCE.

a. Tasks. Chapter 4 of this handbook establishes the tasks and schedules that are required for the periodic maintenance of STARS. These tasks, as scheduled, are the minimum required for each of the systems to meet minimum performance standards.

b. Tech OPS. Related information useful to Tech OPS may be found in the Federal Aviation Administration (FAA) orders and handbooks, maintenance manuals, and diagnostic operating procedures listed in Appendix 3 of this handbook.

c. Configurations.

1. FSL
2. ESL

108. TEST EQUIPMENT AND TOOLS FOR PERIODIC MAINTENANCE.

Special tools are required for performing STARS routine maintenance. Tools that are delivered to the site with STARS equipment are listed in Technical Instruction (TI) 6191.400, STARS O & M Manual for the SOS (while available) or appropriate 6191.500 IETM.

109. MODIFICATION POLICY.

a. No modification shall be made to the standard equipment, facilities, software, or procedures without proper authorization. It is recognized that there will be occasions when certain temporary repairs will be necessary when approved parts are not readily available or a design deficiency is discovered. Under such circumstances, a complete report shall be submitted to the appropriate supervisor. The report shall explain the nature of the problem, describe the changes made, and provide an estimate of when the equipment will be restored to its original condition. The affected equipment shall be restored to its original condition as soon as possible.

b. Prior Washington headquarters approval is required before region wide or system-wide modifications are undertaken. Regional offices may grant approval for a temporary modification for testing purposes or for determining the feasibility of a proposed improvement. Refer to the latest edition of National Airspace System Configuration Management, and Order 6032.1, Modification to Ground Facilities, Systems, and Equipment in the National Airspace System, for further information

c. Proposed modifications to improve system performance, increase reliability, minimize safety hazards, or increase maintenance efficiency may be suggested by any field personnel. Such proposed modifications must be described in detail and submitted through the proper channels per NAS Change Proposal (NCP), FAA form 1800-2.

110. MAINTENANCE AND DIAGNOSTIC MANUALS.

A list of maintenance and diagnostic manuals are referenced in Appendix 3 of this handbook.

111. FAA FORMS.

Appendix 3 of this handbook lists the applicable FAA forms required by this handbook.

112. FAA ORDERS AND HANDBOOKS.

Appendix 3 of this handbook lists the latest edition of orders and handbooks referenced within this handbook. A listing of documents useful to NAS system personnel may be found in the catalog of documentation maintained by the National Airspace System Documentation Facility, found on a Federal Aviation Administration (FAA) Intranet site located at **http://nasdoc.faa.gov/** and a DoD accessible website at **http://www.dod.tc.faa.gov**.

113. SYSTEM SECURITY.

a. Tech OPS at facilities are expected to maintain user Identification (ID) and password protection for all workstations. The dissemination of the root or super-user password should be strictly controlled and shall be changed frequently. Personnel should log on as the root or super-user only when absolutely required to perform some action such as a diagnostic or a Remove and Replace (R&R). The root or super-user is not meant for use in everyday operations. Extreme caution should be used when logged in as root or super-user, because certain commands may take the system down.

b. All personnel who are responsible to operate the system shall be assigned a separate user ID and password. Separate user IDs and passwords for each operator allow the use of audit trails to determine who performed what action on the system. Personnel who leave or no longer require access to the system shall have their user IDs and passwords deleted.

114. RESERVED.

115. – 199. RESERVED.

Chapter 2. TECHNICAL CHARACTERISTICS

200. PURPOSE.

The paragraphs that follow describe the overall purpose of STARS and the purpose of each STARS site type.

201. SYSTEM INTRODUCTION.

a. System Purpose. STARS is an open architecture, distributed software-based air traffic control automation system that replaces the Automation Radar Terminal System (ARTS) for Federal Aviation Administration (FAA) Terminal Radar Approach Control (TRACON) facilities, Tower facilities and equivalent Department of Defense (DoD) air traffic control facilities.

b. STARS Site Types.

1. STARS consists of three basic site types:
   (a) STARS Central Support Complex (SCSC)
   (b) Operational Support Facility (OSF)
   (c) STARS Operational Site (SOS)
2. In addition to these basic sites, Local Towers (LT), Remote Towers (RT), and RTs with Direct Radar Feed (DRF) provide for local ATC operations at airport sites.

c. Site Purpose.

1. **SCSC Purpose.** The SCSC facility provides for centralized control of STARS field support and software development. Field support performs Program Technical Report (PTR) analysis and testing, hardware testing/analysis, and configuration management. The software development develops, modifies, and tests software to establish software baselines, resolve existing software problems, add new functionality (incremental upgrades) to the software baseline, and to perform system level adaptation. The SCSC is located at the William J. Hughes Technical Center (WJHTC). An FAA Wide Area Network (WAN) provides for data and software transfer between the SCSC and STARS OSFs.
2. **OSF Purpose.** Each OSF serves as a support facility for software maintenance to include both site adaptation data and site support for associated SOSs. The purpose of software maintenance is to receive operational site software releases from the SCSC, integrate site adaptation to complete the operational program, and test the entire operational program prior to implementation at an SOS.
3. **SOS Purpose.** Each SOS accepts and processes surveillance and flight data information providing ATC and system information to air traffic controllers and external systems. Typically the SOS includes a local tower for local airport traffic control, and may support one or more RTs. For more information, see the Maintenance and Diagnostic Manuals TI 6191.400, TI 6191.401 (while available) and TI 6191.500.
4. **RT Purpose.** RTs extend the SOS facilities role by supporting satellite airports that are usually several miles away and are physically separate. Functionally, the RTs are part of the SOS and as such, support their primary mission. In addition, some RTs may have direct radar feed used for standalone operations when the associated SOS communication links are not available.

202. FSL SYSTEM FUNCTIONAL DESCRIPTION.

a. FSL provides tracking for terminal and tower control areas. Automatic transfer of flight data via Inter-Facility between FSL and Air Route Traffic Control Centers (ARTCC) and/or TRACON facilities are also provided. FSL provides the following capabilities:

1. Search-only
2. Beacon-only
3. Radar-reinforced beacon target tracking
4. Beacon-radar correlation and tracking
5. Site registration
6. Collimation corrections
7. Conflict Alert (CA)/Mode-C Intruder (MCI) processing
8. Continuous Data Recording (CDR)
9. Automatic failure recovery and reconfiguration
10. Real-Time Quality Control (RTQC)
11. Minimum Safe Altitude Warning (MSAW)
12. Multi-sensor tracking
13. Sensor Mosaic display
14. Inter-Facility and intra-facility hand-offs
15. Remote displays
16. Traffic count
17. Up to 32 digital maps referenced on the DCB. Up to 400 system-wide (memory permitting).
18. Six levels of weather intensity display
19. Select up to 16 sensors
20. Workstation replay events

b. FSL is comprised of NUNIOs, Communication Gateway (CGW), Radar Data Processor (RDP), Global Positioning System (GPS), Continuous Data Recorder (CDR), Applications Interface Gateway (AIG), Terminal Control Workstation (TCW), Tower Display Workstation (TDW), Monitor Control Workstation (MCW), Control and Monitor Display (CMD), and a dual redundant LAN. Functions are described as follows.

1. **NUNIO CHASSIS**. Each NUNIO chassis enclosure has six NUNIO modules, each of which can support four serial data inputs. Each module converts radar serial data to networked packeted data. It is then sent out to CGWs via the LAN. The NUNIO also provides an interface between Inter-Facility and the CGW.
2. **CGW.** The CGW is capable of accepting digitized radar data from up to 16 terminal and/or long-range radar sensors. The radar data is distributed to the RDPs over the FSL LANs. Dual CGWs provide backup protection in the event that the online CGW fails. The CGW also provides Inter-Facility data transfer between STARS at the TRACON and ARTCC.

3. **RDP.** The RDP accepts raw radar data from the CGW and processes it into synthetic display images that are distributed to the TCW and TDW displays. The RDP performs all tracking, registration corrections, collimation corrections, CA, MSAW, radar performance monitor, auto hand-offs, auto-associations, auto-acquires, and auto-drops. Dual RDPs provide backup protection in the event that the online RDP fails.

4. **GPS.** The GPS provides the system time that is used in FSL via the RDP. The GPS interfaces with a GPS time code processor module installed in each RDP.

5. **CDR.** The CDR is used for ATC data recording. CDR consists of two Data Recording Facilities (DRF). The ATC data includes displayed targets, weather, maps, lists, filter limits, display control settings, system messages, change to flight plan data, and user actions. CDR also allows playback of recorded radar data and printout of operator actions. Dual CDR provides backup protection in the event the online CDR fails.

6. **AIG.** The AIG is the router that provides an interface between STARS and other NAS systems.

7. **AIG Switch.** This switch provides additional one-way interface ports for connection between the AIG router and external subsystems.

8. **TCW.** The TCW is the display located in the TRACON that the controllers use to provide service to aircraft in the terminal environment. The primary function of the TCW is to display radar data that has been collected by radar sensors and tracked by the RDP. The TCW functionality consists of the following: hand-offs, initiate tracking, terminate tracking, flight plan entry, flight plan edit, digital map display (up to 32), altitude filter limits, auto offset, select configuration, and quick look. The tracked radar data is combined with flight plan data allowing the TCW to present track characteristics with Full Data Blocks (FDB), Partial Data Blocks (PDB), Limited Data Blocks (LDB).

9. **TDW.** The TDW runs on the same architecture and has the same radar display characteristic as the TCW, but displays radar data on a high brightness color monitor. The TDWs are located in the local and remote tower cabs.

10. **MCW.** The MCW functions as the central point to monitor and control the system through the FSL LANs. All system status, health, and error messages are displayed at the MCW. The function of the MCW can be obtained at any TCW and TDW that are not assigned airspace by requesting a Monitor and Control Process (MCP) and taking system control via an authorized log-in. The levels of authorization in conjunction with a unique password limit access to MCW functions. The different levels of authorization are log out, monitor, and control.

    (a) Log out level indicates that the MCW is logged out. There is no operation or status available.

    (b) Monitor level has viewing only privileges.

    (c) Control level has access to functions that affect and operate on STARS equipment and links to external systems and to functions that affect ATC related operations and features. This level has unrestricted access.

11. **CMD** The CMD provides the capability to relinquish MCW function to the TCW and TDW and vice versa.

12. **Dual Redundant LANs** The LANs used throughout the various STARS configurations all employ the Ethernet/Fast Ethernet family of LAN technology. The 10-Megabits per second (Mbps) Ethernet and 100-Mbps Fast Ethernet both comply with the Institute of

Electrical & Electronic Engineers (IEEE) 802.3 standard. They share the same frame format and protocol and differ only at the physical layer. The LAN functions as a communication pathway between all processors in the system.

203. ESL SYSTEM FUNCTIONAL DESCRIPTION.

a. The ESL system provides a backup to the FSL. ESL provides ATC with surveillance position information, aircraft beacon code and beacon filters, altitude and altitude filters, maps, range marks, weather information, and sensor identification. ESL is made operational by controller selection at each display. Targets will continue to be displayed on the controller display in response to a controller's command to switch from FSL to ESL. ESL provides the following capabilities: search and beacon target display with no tracking capability, remote displays, display digital maps (up to 32), six levels of weather intensity display, automatic failure recovery, and reconfiguration.

b. ESL is comprised of two NUNIO chassis utilizing a crossover service to two CGWs; one services LAN A, and the other services LAN B independently. ESL also has one MCW for maintenance monitoring and control, one or more TCWs, and one or more TDWs.

1. **NUNIO CHASSIS.** Each NUNIO chassis enclosure has six NUNIO modules, each of which can support four serial data inputs. Each module converts radar serial data to networked packet data. It is then sent out to CGWs via the LAN.
2. **CGW.** The CGW in ESL operates independently from the CGWs in FSL. A CGW is capable of accepting up to 16 channels of digitized radar data from short-range (terminal) and/or long-range radar sensors. The CGW converts the input data into network format; it is then sent to the TCWs and TDWs via the ESL LAN. At remote towers with direct radar feed, redundant CGWs will be provided. A remote CGW is used to provide backup radar data to the remote tower in case of STARS failure at the TRACON.
3. **TCW.** The primary function of the TCW is to display radar data without tracking capability that has been collected by the ESL CGW through the ESL LANs. TCW presents radar data characteristics in LDBs.
4. **TDW.** The TDW runs on the same architecture and has the same radar display characteristic as the TCW, presenting radar data on a high brightness color monitor. The TDWs are located in the local and remote tower cabs
5. **MCW.** The MCW functions as the central point to monitor and control the system. All system error messages are displayed at the MCW. The function of the MCW can be obtained at any TCW and TDW, by configuring it to a MCP and taking system control. DoD sites having two MCWs may use the second MCW as backup for system control.
6. **LAN.** The ESL LANs operate independently from the FSL LANs; however, they have the same characteristics and functionality.

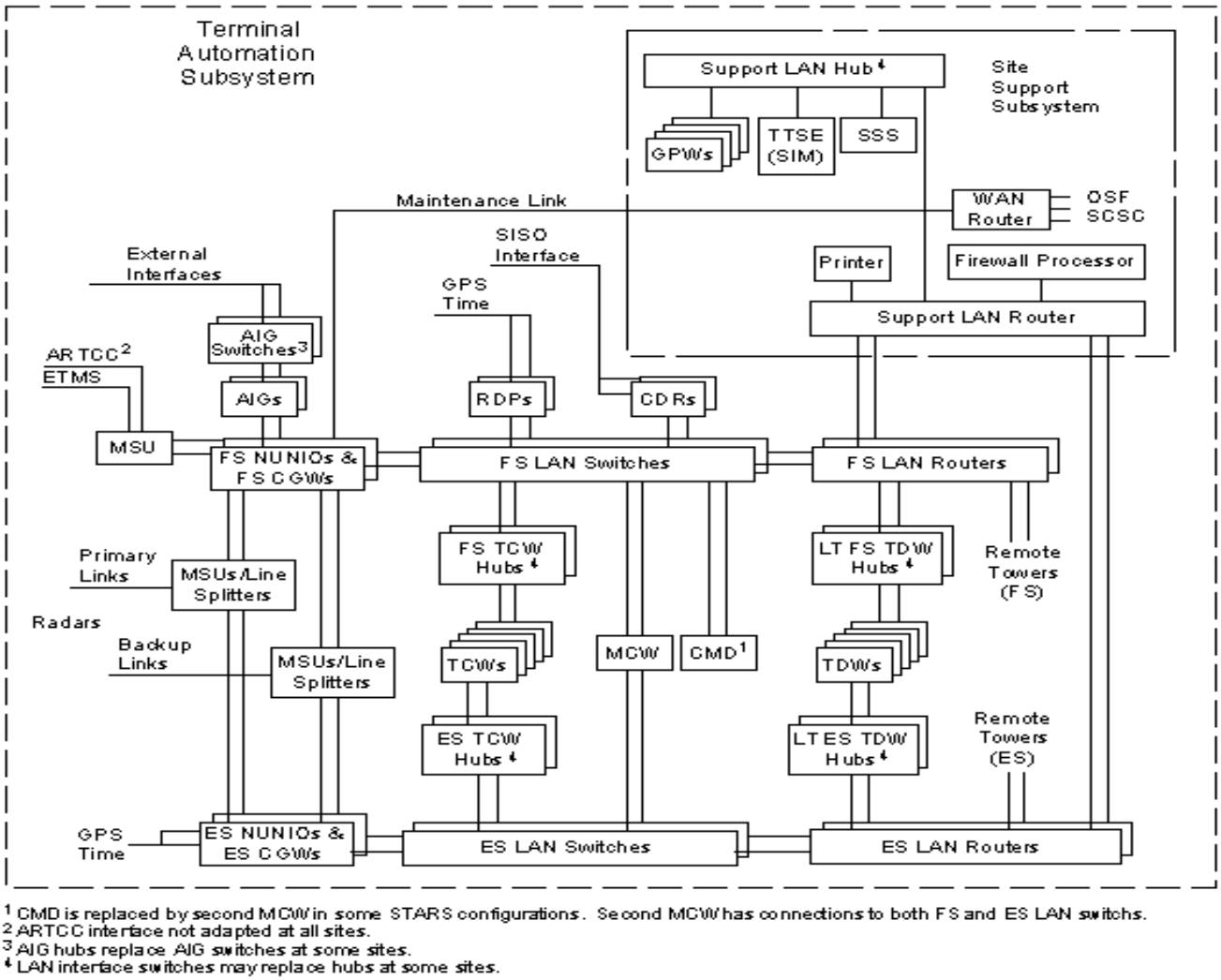
204. RESERVED

205. STARS BLOCK DIAGRAM.

Respectively, Figure 2-1 (Reserved); Figure 2-2, Typical SOS; Figure 2-3, Typical Remote Tower; and Figure 2-4, Remote Tower with Local Primary Radar in this handbook show typical configuration of SOS, remote tower configuration, and a stand-alone tower configuration.

206. – 299. RESERVED.

Figure 2 – 1. Reserved



1 CMD is replaced by second MCW in some STARS configurations. Second MCW has connections to both FS and ES LAN switchs.
2 ARTCC interface not adapted at all sites.
3 AIG hubs replace AIG switches at some sites.
4 LAN interface switches may replace hubs at some sites.

Figure 2 – 2. Typical SOS

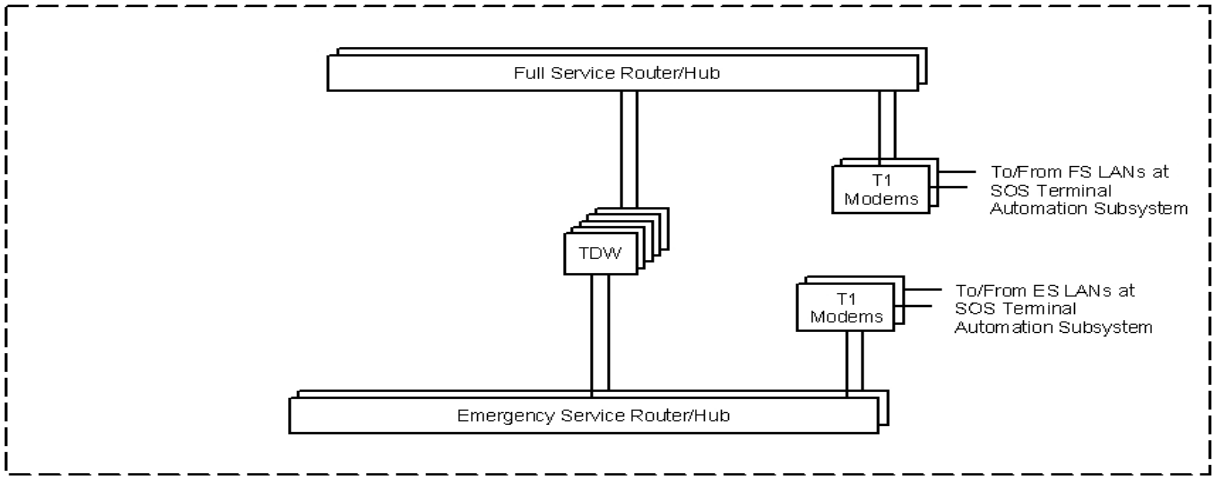


Figure 2 – 3. Typical Remote Tower

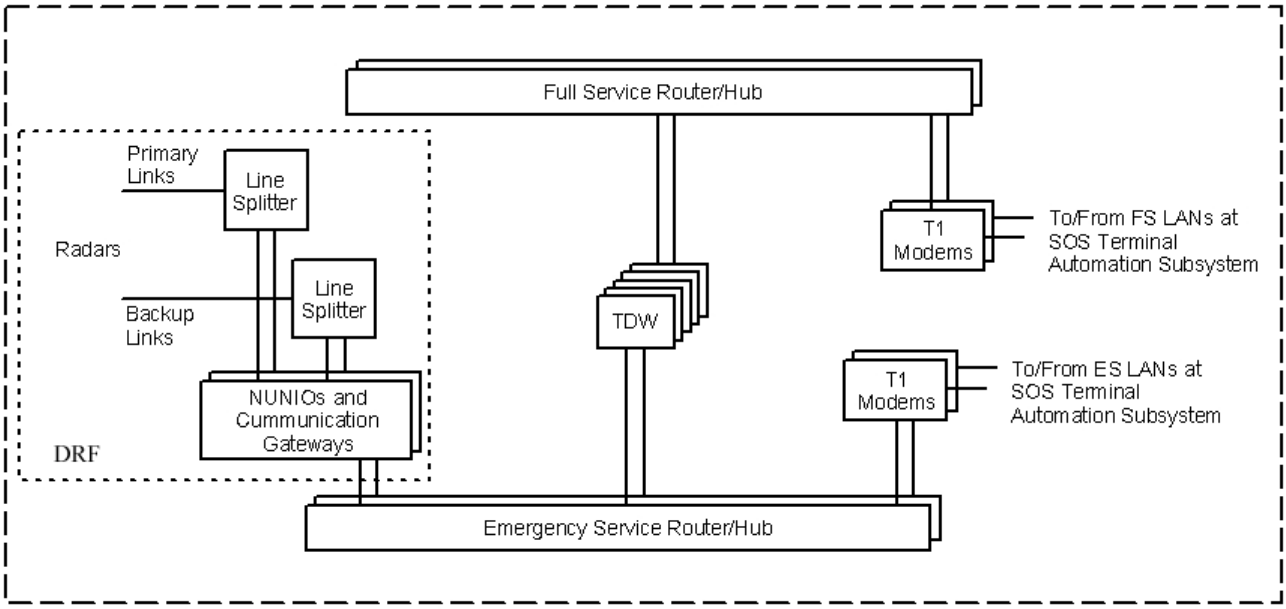


Figure 2 – 4. Remote Tower With Direct Radar Feed

Chapter 3. STANDARDS AND TOLERANCES

300. GENERAL.

a. This chapter prescribes the standards and tolerances for STARS, as defined and described in the latest edition of 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 to enhance the organization and make it easier to use.

b. Definitions of standard, initial, and operating tolerance as used in this handbook are defined as follows:

1. **Standard.** The optimum value assigned to an essential system parameter.
2. **Initial Tolerance.** The maximum deviation from the standard value of the parameter, or the range, which is permissible when the system or equipment is accepted at the time of initial commissioning or after any readjustment, modification, or modernization.
3. **Operating Tolerance.** The maximum deviation from the standard value of the parameter or the range within which a system or equipment may continue to operate on a commissioned basis without adjustment or corrective maintenance and beyond which remedial action is mandatory.

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
301. FSL NUNIO.				
a. Visually inspect FSL MCW status of the NUNIO icons**.**	TI 6191.500	No visual error indication.	Same as standard.	Same as standard.
b. Offline diagnostics**.**	TI 6191.500	Successful no fault execution.	Same as standard.	Same as standard.
c. Verify there are no active error or alarm messages reported at the FSL MCW**.**	TI 6191.500	Error free operation.	Same as standard.	Same as standard.
302. FSL CGW.				
a. Visually inspect FSL MCW status of the CGW icons.	TI 6191.500	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics for FSL Processor.	TI 6191.500	Successful no fault execution.	Same as standard.	Same as standard.
c. Verify there are no active error or alarm messages reported at the FSL MCW.	TI 6191.500	Error free operation.	Same as standard.	Same as standard.
d. Network Information System Plus (NIS+) check.	Par. 530	Successful no fault execution.	Same as standard.	Same as standard.
303. FSL RDP.				
a. Visually inspect FSL MCW status of the RDP icons.	TI 6191.500	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics for FSL Processor.	TI 6191.500	Successful no fault execution.	Same as standard.	Same as standard.
c. Verify there are no active error or alarm messages reported at the FSL MCW.	TI 6191.500	Error free operation.	Same as standard.	Same as standard.
d. Network Information System Plus (NIS+) check.	Par. 530	Successful no fault execution.	Same as standard.	Same as standard.
304. FSL TCW.				
a. Visually inspect FSL MCW status of the TCW icons.	TI 6191.500	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics for FSL Processor.	TI 6191.500	Successful no fault execution.	Same as standard.	Same as standard.
c. Verify there are no active error or alarm messages reported at the FSL MCW.	TI 6191.500	Error free operation.	Same as standard.	Same as standard.
d. Network Information System Plus (NIS+) check.	Par. 530	Successful no fault execution.	Same as standard.	Same as standard.

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
305. FSL TDW.				
a. Visually inspect FSL MCW status of the TDW icons.	TI 6191.500	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics for FSL Processor.	TI 6191.500	Successful no fault execution.	Same as standard.	Same as standard.
c. Verify there are no active error or alarm messages reported at the FSL MCW.	TI 6191.500	Error free operation.	Same as standard.	Same as standard.
d. Network Information System Plus (NIS+) check.	Par. 530	Successful no fault execution.	Same as standard.	Same as standard.
306. FSL MCW.				
a. Visually inspect FSL MCW status of the MCW icons.	TI 6191.500	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics for FSL Processor.	TI 6191.500	Successful no fault execution.	Same as standard.	Same as standard.
c. Verify there are no active error or alarm messages reported at the FSL MCW.	TI 6191.500	Error free operation.	Same as standard.	Same as standard.
d. Network Information System plus (NIS+) check.	Par. 530	Successful no fault execution.	Same as standard.	Same as standard.
307. FSL CDR.				
a. Visually inspect FSL MCW status of the CDR icons.	TI 6191.500	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics for FSL Processor.	TI 6191.500	Successful no fault execution.	Same as standard.	Same as standard.
c. Verify there are no active error or alarm messages reported at the FSL MCW.	TI 6191.500	None.	Same as standard.	Same as standard.
d. Network Information System plus (NIS+) check.	Par. 530	Successful no fault execution.	Same as standard.	Same as standard.
308. FSL STANDBY RESOURCES.				
a. Configure FSL to utilize the Standby Resources.	Par. 529	Successful no fault execution.	Same as standard.	Same as standard.
309. FSL SERVICE CERTIFICATION AND TARGET PARAMETERS.				
→ **a.** Check icons at the FSL MCW.	Par. 511	Minimum required resources that can sustain the	Same as standard.	Same as standard.

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
		facility AT operation.		
→ **b.** Check system messages reported at the FSL MCW.	Par. 511	Minimum required resources that can sustain the facility AT operation.	Same as standard.	Same as standard.
→ **c.** Test Target Display Check.	Par. 512	Applicable PEs/MTI reflectors, PARROT/ CPMEs and Beacon/Search RTQCs are displayed within or on appropriate geo-boxes or adapted map location symbols, or are displayed at expected positions.	Same as standard.	Same as standard.
Target Parameters 1. Beacon PARROT. ATCBI-5/6.				
(a) Azimuth.	Par. 512		Within ± 1° of standard.	Same as initial.
(b) Range.	Par. 512		Within ± ¼ nm of standard.	Same as initial.
2. Mode-S CPME.				
(a) Azimuth.	Par. 512		Within ± 1° of standard.	Same as initial.
(b) Range.	Par. 512		Within ± ¼ nm of standard.	Same as initial.
3. Search PE. Search PE/MTI reflector.				
(a) Azimuth.	Par. 512		Within ± 1° of standard.	Same as initial.
(b) Range.	Par. 512		Within ± ¼	Same as

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
			nm of standard.	initial.
4. Search/Beacon RTQC.				
(a) Azimuth.	Par. 512		Within ± 1° of standard.	Same as initial.
(b) Range.	Par. 512		Within ± ¼ nm of standard.	Same as initial.
310. STARS FSL SUBSYSTEM CERTIFICATION.				
a. Software Version Verification.	Software Status Report TI 6191.500	Latest software and adaptation versions are installed and running on all operational processors and modules.	Same as standard.	Same as standard.
b. Resource Verification Test.	Par. 510 And TI 6191.500	Minimum required resources that can sustain the facility AT operation pass.	Same as standard.	Same as standard.
c. Performance Verification of air traffic control visual and aural alarms.				
1. Using the TCW/TDW.	Par. 516 And TI 6191.500	Successful no fault execution.	Same as standard.	Same as standard.
d. Radar Data Processing and Display Capability.	Par. 518	Data is presented on the display for AT operation.	Same as standard.	Same as standard.
311. ESL NUNIO.				
a. Visually inspect ESL MCW status of the NUNIO icons.	TI 6191.500	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostic.	TI 6191.500	Successful no fault execution.	Same as standard.	Same as standard.
c. Verify there are no active error or alarm messages reported at the ESL MCW.	TI 6191.500	Error free operation.	Same as standard.	Same as standard.

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
312. ESL CGW.				
a. Visually inspect ESL MCW status of the CGW icons.	TI 6191.500	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics.	TI 6191.500	Successful no fault execution.	Same as standard.	Same as standard.
c. Verify there are no active error or alarm messages reported at the ESL MCW.	TI 6191.500	Error free operation.	Same as standard.	Same as standard.
d. Network Information System Plus (NIS+) check.	Par. 532	Successful no fault execution.	Same as standard.	Same as standard.
313. ESL TCW.				
a. Visually inspect ESL MCW status of the TCW icons.	TI 6191.500	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics for ESL Processor.	TI 6191.500	Successful no fault execution.	Same as standard.	Same as standard.
c. Verify there are no active error or alarm messages reported at the ESL MCW.	TI 6191.500	Error free operation.	Same as standard.	Same as standard.
d. Network Information System Plus (NIS+) check.	Par. 532	Successful no fault execution.	Same as standard.	Same as standard.
314. ESL TDW.				
a. Visually inspect ESL MCW status of the TDW icons.	TI 6191.500	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics for ESL Processor.	TI 6191.500	Successful no fault execution.	Same as standard.	Same as standard.
c. Verify there are no active error or alarm messages reported at the ESL MCW.	TI 6191.500	Error free operation.	Same as standard.	Same as standard.
d. Network Information System Plus (NIS+) check.	Par. 532	Successful no fault execution.	Same as standard.	Same as standard.
315. ESL MCW.				
a. Visually inspect ESL MCW status of the MCW icons.	TI 6191.500	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics for ESL Processor.	TI 6191.500	Successful no fault execution.	Same as standard.	Same as standard.
c. Verify there are no active error or alarm messages reported at the ESL MCW.	TI 6191.500	Error free operation.	Same as standard.	Same as standard.

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
d. Network Information System Plus (NIS+) check.	Par. 532	Successful no fault execution.	Same as standard.	Same as standard.
316. ESL STANDBY RESOURCES.				
a. Configure ESL to utilize the standby resources.	Par. 531	Successful no fault execution.	Same as standard.	Same as standard.
317. ESL SERVICE CERTIFICATION AND DRF SYSTEM CERTIFICATION. **NOTE:** The certifying official, using the same ESL checks specified in the following table, must determine that the Direct Radar Feed (DRF), if available, is capable of providing its advertised functions. For DRF checks, ensure that the DRF sensor is selected at the TDW. Then drill down into appropriate towers/radar GUI at ESL MCW for detailed indications.				
→ **a.** Check icons at the ESL MCW.	Par. 511	Minimum required resources that can sustain the facility AT operation.	Same as standard.	Same as standard.
→ **b.** Check system messages reported at the ESL MCW.	Par. 511 And TI 6191.500	Minimum required resources that can sustain the facility AT operation.	Same as standard.	Same as standard.
→ **c.** Test Target Display Check.	Par. 513	Applicable PEs/MTI reflectors, PARROT/ CPMEs and Beacon/Search RTQCs are displayed within or on appropriate geo-boxes or adapted map location symbols, or are displayed at expected positions.	Same as standard.	Same as standard.

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
Target Parameters 1. Beacon PARROT. ATCBI-5/6.				
(a) Azimuth.	Par. 513	Adapted position.	Within ± 1° (11 ACP) of standard.	Same as initial.
(b) Range.	Par. 513	Adapted position.	Within ±1/4 nm of standard.	Same as initial.
2. Mode-S CPMEs.				
(a) Azimuth.	Par. 513	Adapted position.	Within ± 1° (11 ACP) of standard.	Same as initial.
(b) Range.	Par. 513	Adapted position.	Within ±1/4 nm of standard	Same as initial.
3. Search PE. Search PE/MTI reflector.				
(a) Azimuth.	Par. 513	Adapted position.	Within ± 1° (11 ACP) of standard.	Same as initial.
(b) Range.	Par. 513	Adapted position.	Within ±1/4 nm of standard.	Same as initial.
4. Search/Beacon RTQC.				
(a) Azimuth.	Par. 513	Adapted position.	Within ± 1° (11 ACP) of standard.	Same as initial.
(b) Range.	Par. 513	Adapted position.	Within ±1/4 nm of standard	Same as initial.
318. STARS ESL SUBSYSTEM AND DRF CERTIFICATION. **NOTE:** The certifying official, using the same ESL checks specified in the following table, must determine that the Direct Radar Feed (DRF), if available, is capable of providing its advertised functions.				
a. Software Version Verification.	Software Status Report TI 6191.500	Latest software and adaptation versions are	Same as standard.	Same as standard.

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
		installed and running on all operational processors and modules.		
b. Resource Verification Test.	Par. 510 And TI 6191.500	Minimum required resources that can sustain the facility AT operation pass.	Same as standard.	Same as standard.
c. Performance Verification of air traffic control visual and aural alarms.	Par. 522 And TI 6191.500	Successful no fault execution.	Same as standard.	Same as standard.
d. Radar Data Processing and Display Capability.	Par. 524	Data is presented on the display for AT operation.	Same as standard.	Same as standard.
319. ESL SYSTEM STATUS ALERT COLOR CHECK	Par. 514	Inverted red delta is displayed.	Same as standard	Same as standard
320. ESL SYSTEM STATUS ALERT COLOR CHECK	Par. 517	Inverted red delta is displayed.	Same as standard	Same as standard
321. VERIFY SYSTEM DATE AND TIME		Month, day, year, hour, minute and seconds are current at FS and ES MCP.	Same as standard	Same as standard
322. STARS CERTIFICATION RANGE/AZIMUTH CHECK AND DRF CERTIFICATION.				

NOTE 1: All Moving Target Indicator (MTI) reflectors or adapted PEs or beacon Position Adjustable Range Reference Orientation Transponders (PARROT) or Mode-S Calibration Performance Monitoring Equipment (CPME) are used for a normal air traffic control operation and certification. However, it is recognized that there will be occasions when certain equipment will be temporarily degraded. Under these circumstances, use whatever equipment is available (see NOTE 2).

NOTE 2: For FS only: If all MTI reflectors and search PEs or beacon PARROTs/Mode S CPMEs are missing or are unreliable for a particular sensor due to known reasons external to STARS or the sensor itself, alternate methods of measuring range/azimuth integrity may be used. Such methods include meeting a registration tolerance of ±2 ACP for azimuth and ±1/8 nm range with a known good sensor (see par. 325, detailed procedure par. 536). If this is not possible, it is permissible to utilize visual checks

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
to determine range/azimuth integrity and reliability (see par. 537). **NOTE 3: For DRF:** Ensure that the DRF sensor is selected at the TDW. Then drill down into appropriate TOWERS/RADAR GUI at ESL MCW for detailed indications.				
a. PARROT, PE, CPME, MTI, and RTQC Monitoring at FSL MCW.				
1. Beacon PARROT Air Traffic Control Beacon Interrogator Model 5/6 (ATCBI-5/6).	Par. 520	Adapted value.	Within ± 4 ACP ± 1/8 nm ≥ 90% reliability of standard.	Same as initial.
2. Mode-S CPME.	Par. 520	Adapted value.	Within ± 4 ACP ± 1/8 nm ≥ 90% reliability of standard.	Same as initial.
3. Search PE/MTI Reflector.	Par. 520	Adapted value.	Short-range sensor within ± 6 ACP ± 1/8 nm ≥ 80% reliability of standard. Long-range sensor within ± 4 ACP ± 1/8 nm	Same as initial.
b. PARROT, PE, CPME and MTI Monitoring at ESL MCW.	For ESL and DRF, as long as targets are reported within adapted tolerance, there is no error indicated at the ESL MCW.	Error free operation.	Same as standard.	Same as standard.
323. STARS SYSTEM CERTIFICATION RADAR RELIABILITY CHECK AND SENSOR PERFORMANCE PARAMETERS. **NOTE:** For beacon-only systems the				

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
radar reinforcement rate, SRTQC reliability, and search blip scan measurements do not apply.				
a. FS RTQC Check Report at FSL MCW.	Par. 521 And TI 6191.500	See Sensor Performance Parameters.	Same as standard.	Same as standard.
Sensor Performance Parameters				
1. **ASR-9/11**				
Radar Reinforcement Rate (≥)	Note 2, 5	80%	Same as standard or baseline value.	Within 10% of initial.
Mode 3/A Validity (≥)	Note 1	98%	Same as standard or baseline value.	Within 10% of initial.
Mode C Validity (≥)	Note 1	97%	Same as standard or baseline value.	Within 10% of initial.
Search RTQC Reliability (≥)	Note 1, 3	98%	Same as standard or baseline value.	Within 10% of initial.
Beacon RTQC Reliability (≥)	Note 1, 3	98%	Same as standard or baseline value.	Within 10% of initial.
Zero Code (<)	Note 2	1%	Same as standard or baseline value.	Same as standard or baseline value.
Search Blip/Scan (≥)	Note 2	88%	Same as standard or baseline value.	Within 10% of initial.
Beacon Blip/Scan (≥)	Note 2	90%	Same as standard or baseline value.	Within 10% of initial.
Beacon Azimuth Split (<)	Note 2	1%	Same as	Same as

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
			standard or baseline value.	standard or baseline value.
Range Split (<)	Note 2	1%	Same as standard or baseline value.	Same as standard or baseline value.
2. **ARSR-4**				
Radar Reinforcement Rate (≥)	Note 2, 5	80%	Same as standard or baseline value.	Within 10% of initial.
Mode 3/A Validity (≥)	Note 1	98%	Same as standard or baseline value.	Within 10% of initial.
Mode C Validity (≥)	Note 1	97%	Same as standard or baseline value.	Within 10% of initial.
Search RTQC Reliability (≥)	Note 1, 3	98%	Same as standard or baseline value.	Within 10% of initial.
Beacon RTQC Reliability (≥)	Note 1, 3	98%	Same as standard or baseline value.	Within 10% of initial.
Zero Code (<)	Note 2	1%	Same as standard or baseline value.	Same as standard or baseline value.
Search Blip/Scan (≥)	Note 2	92%	Same as standard or baseline value.	Within 10% of initial.
Beacon Blip/Scan (≥)	Note 2	96%	Same as standard or baseline value.	Within 10% of initial.
Beacon Azimuth Split (<)	Note 2	1%	Same as standard or baseline	Same as standard or baseline

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
			value.	value.
Range Split (<)	Note 2	1%	Same as standard or baseline value.	Same as standard or baseline value.
3. **ARSR-1/2/3**				
Radar Reinforcement Rate (≥)	Note 2, 5	60%	Same as standard or baseline value.	Within 10% of initial.
Mode 3/A Validity (≥)	Note 1	98%	Same as standard or baseline value.	Within 10% of initial.
Mode C Validity (≥)	Note 1	97%	Same as standard or baseline value.	Within 10% of initial.
Search RTQC Reliability (≥)	Note 1, 3	98%	Same as standard or baseline value.	Within 10% of initial.
Beacon RTQC Reliability (≥)	Note 1, 3	98%	Same as standard or baseline value.	Within 10% of initial.
Zero Code (<)	Note 2	1%	Same as standard or baseline value.	Same as standard or baseline value.
Search Blip/Scan (≥)	Note 2	75%	Same as standard or baseline value.	Within 10% of initial.
Beacon Blip/Scan (≥)	Note 2	96%	Same as standard or baseline value.	Within 10% of initial.
Beacon Azimuth Split (<)	Note 2	1%	Same as standard or baseline value.	Same as standard or baseline value.
Range Split (<)	Note 2	1%	Same as	Same as

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
			standard or baseline value.	standard or baseline value.
4. **ASR-8/7**				
Radar Reinforcement Rate (≥)	Note 2, 5	80%	Same as standard or baseline value.	Within 10% of initial.
Mode 3/A Validity (≥)	Note 1	95%	Same as standard or baseline value.	Within 10% of initial.
Mode C Validity (≥)	Note 1	95%	Same as standard or baseline value.	Within 10% of initial.
Search RTQC Reliability (≥)	Note 1, 3	98%	Same as standard or baseline value.	Within 10% of initial.
Beacon RTQC Reliability (≥)	Note 1, 3	98%	Same as standard or baseline value.	Within 10% of initial.
Zero Code (<)	Note 2	1%	Same as standard or baseline value.	Same as standard or baseline value.
Search Blip/Scan (≥)	Note 2	80%	Same as standard or baseline value.	Within 10% of initial.
Beacon Blip/Scan (≥)	Note 2	90%	Same as standard or baseline value.	Within 10% of initial.
Beacon Azimuth Split (<)	Note 2	1%	Same as standard or baseline value.	Same as standard or baseline value.
Range Split (<)	Note 2	1%	Same as standard or baseline	Same as standard or baseline

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
			value.	value.
5. **Other (e.g., RYC-8405, FPS-67B)**				
Radar Reinforcement Rate (≥)	Note 2, 5	50%	Same as standard or baseline value.	Within 10% of initial.
Mode 3/A Validity (≥)	Note 1	95%	Same as standard or baseline value.	Within 10% of initial.
Mode C Validity (≥)	Note 1	95%	Same as standard or baseline value.	Within 10% of initial.
Search RTQC Reliability (≥)	Note 1, 3	98%	Same as standard or baseline value.	Within 10% of initial.
Beacon RTQC Reliability (≥)	Note 1, 3	98%	Same as standard or baseline value.	Within 10% of initial.
Zero Code (<)	Note 2	1%	Same as standard or baseline value.	Same as standard or baseline value.
Search Blip/Scan (≥)	Note 2	75%	Same as standard or baseline value.	Within 10% of initial.
Beacon Blip/Scan (≥)	Note 2	90%	Same as standard or baseline value.	Within 10% of initial.
Beacon Azimuth Split (<)	Note 2	1%	Same as standard or baseline value.	Same as standard or baseline value.
Range Split (<)	Note 2	1%	Same as standard or baseline value.	Same as standard or baseline value.

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
b. Search/Beacon RTQC at ESL MCW. **NOTE:** For DRF check, ensure that the DRF sensor is selected at the TDW. Then drill down into appropriate TOWERS/RADAR GUI at ESL MCW for detailed indications.	For ESL and DRF, as long as RTQC are reported within adapted tolerance, there is no error indicated at the ESL MCW.	Error free operation.	Same as standard.	Same as standard.
NOTE 1: Valid data can be expected when > 5 minutes of data is collected. Always select a 15 minute time period as the FSL MCW RTQC Check Report data collection interval whenever possible. **NOTE 2:** Valid data can be expected when > 1000 beacon reports/hour are recorded (4 targets for LRR, 2 targets for SRR). However, it is recommended to perform the sensor performance checks during peak traffic periods. For those sensors where the beacon maximum range is greater than the search maximum range, the radar-reinforced rate shall be calculated using only those beacon targets that are within maximum range of the search. **NOTE 3:** Reliability parameters may exceed 100%. **NOTE 4:** Reserved. **NOTE 5:** For those sensors where the beacon maximum range is greater than the search maximum range, the radar-reinforced rate shall be calculated using only those beacon targets that are within maximum range of the search. STARS uses the adapted PSR range for its calculations.				
324. FLIGHT DATA PROCESSING CERTIFICATION.				
a. FDP Input/Output Check.	Par. 515	IFDT connection is established.	Same as standard.	Same as standard.
325. REGISTRATION.				
a. Registration.	Par. 533 <FS Registration and Collimation… > Menu Option TI 6191.500	0 ACP 0 nm	Azimuth ± 2 ACP Range ±1/8 nm.	Same as initial.
NOTE 1: 1/8 nm = 64/512 nm. Therefore, Registration Recommended Value for Range is from –64 to +64 in the Registration Collimation Report. **NOTE 2:** 2 ACP = 32/16 ACP. Therefore, Registration Recommended Value for Azimuth is from –32 to +32 in the Registration Collimation Report.				
326. SSS.				

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
a. Visual inspection of SSS icon.	Visually inspect MCW status of the icons. Or TI 6191.500	No visual error indication.	Same as standard.	Same as standard.
b. Online Diagnostics for SSS Processor.	TI 6191.500	Successful no fault execution.	Same as standard.	Same as standard.
c. Verify there are no active error or alarm messages reported at the MCW.	Visually inspect FSL MCW system messages. Or TI 6191.500	Error free operation.	Same as standard.	Same as standard.
d. Network Information System Plus (NIS+) check.	Par. 530	Successful no fault execution.	Same as standard.	Same as standard.
327. SIM.				
a. Visual inspection of SIM icon.	Visually inspect MCW status of the icons. TI 6191.500	No visual error indication.	Same as standard.	Same as standard.
b. Online Diagnostics for SIM Processor.	TI 6191.500	Successful no fault execution.	Same as standard.	Same as standard.
c. Verify there are no active error or alarm messages reported at the MCW.	Visually inspect FSL MCW system messages. Or TI 6191.500	Error free operation.	Same as standard.	Same as standard.
d. Network Information System Plus (NIS+) check.	Par. 530	Successful no fault execution.	Same as standard.	Same as standard.
328. GPW.				
a. Visual inspection of GPW icon.	Visually inspect MCW status of the icons. TI 6191.500	No visual error indication.	Same as standard.	Same as standard.
b. Online Diagnostics for GPW Processor.	TI 6191.500	Successful no fault execution.	Same as standard.	Same as standard.
c. Verify there are no active error or alarm messages reported at the	Visually inspect FSL	Error free operation.	Same as standard.	Same as standard.

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
MCW.	MCW system messages. TI 6191.500			
d. Network Information System Plus (NIS+) check.	Par. 530	Successful no fault execution.	Same as standard.	Same as standard.
329. TDW MONITOR.				
a. Video Adjust.	Visually inspect for correct focus, color, & alignment. Or TI 6191.500	Correct focus, color, and alignment.	Same as standard.	Set display to visual satisfaction then perform FS and ES System Status Alert Color Check FS Par. 319, ES Par. 320.
330. SONY DATA DISPLAY MONITOR (DDM) CHECK.				
a. Video Alignment (white balance).	TI 6191.500			
1. Color and Brightness Contrast Maximum.		Manufacturer setting.	0.241 ≤ x ≤ 0.301 0.256 ≤ y ≤ 0.316 43.0≤Y≤47.0	Set display to visual satisfaction then perform FS and ES System Status Alert Color Check FS Par. 319, ES Par. 320.
2. Color and Brightness Contrast Minimum.		Manufacturer setting.	0.241 ≤ x ≤ 0.301 0.256 ≤ y ≤ 0.316 6.0 ≤ Y ≤ 7.0	Set display to visual satisfaction then perform FS and ES System Status Alert Color Check FS Par. 319, ES Par. 320.
b. Geometry Alignment in Millimeter (mm) Width x Height.	TI 6191.500	Manufacturer setting.	498x498 ± 5	Same as initial.
c. Convergence Alignment.	TI 6191.500			

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
1. Zone A: the area within the circle whose radius from the center of the CRT to the edge of the picture size.		≤ 0.330 mm.	Same as standard.	Same as standard.
2. Zone B: the area outside of zones A and C.		≤ 0.508 mm.	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.		≤ 0.700 mm.	Same as. standard.	Same as standard.
d. Geometric Distortion at all areas of the picture size.	TI 6191.500	Manufacturer setting.	Within 1% of picture height at all picture areas 1% of 498 ±5	Same as standard.
e. Focus. Minimum Recognizable Character Font.	TI 6191.500	The smallest known video map features are discernable on the display. Visually inspect for correct focus. Minimum recognizable character font. Character size 1.	Visual satisfaction Same as standard.	Set display to visual satisfaction. Same as initial
331. FIREWALL/WAN ROUTER PERFORMANCE CHECK.				
a. Verify that the firewall is properly configured and functional.	Par. 554	Successful no fault execution, i.e., read ClearText test message file downloaded from support facilities.	Same as standard.	Same as standard.
332. FSL SOFTWARE RELEASE MAINTENANCE.				
a. Managing multiple versions of software.	Par. 550	Successful no fault execution.	Same as standard.	Same as standard.
333. ESL SOFTWARE RELEASE				

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
MAINTENANCE.				
a. Managing multiple versions of software.	Par. 551	Successful no fault execution.	Same as standard.	Same as standard.
334. FSL SOFTWARE UPDATE.				
a. Verify new software is functioning properly.	Par. 552	Successful no fault execution.	Same as standard.	Same as standard.
335. ESL SOFTWARE UPDATE.				
a. Verify new software is functioning properly.	Par. 553	Successful no fault execution.	Same as standard.	Same as standard.
336. MAP ALIGNMENT.				
a. Verify map alignment.	Par. 555	Maps are adapted correctly.	Same as standard.	Same as standard.
337. FIXED TARGET MAP.				
a. Verify the fixed target map.	Par. 556	Maps are adapted correctly.	Same as standard.	Same as standard.
338. GPS SYSTEM CLOCK AND SYNCHRONIZATION.				
a. FSL MCW system time.	TI 6191.500	GPS displays and updates UTC on the FSL MCW.	Same as standard.	Same as standard.
b. ESL MCW system time.	TI 6191.500	GPS displays and updates UTC on the ESL MCW.	Same as standard.	Same as standard.
339. AURAL ALARM.				
a. Verify individual speakers at TCW/TDW.	TI 6191.409 Audible Alarm Test	Successful no fault execution.	Same as standard.	Same as standard.
340. RTDS TARGET DISPLAY CHECK. **NOTE:** Check each sensor used for coverage including backup(s).				
a. FS target display check.	Target reports updates and display as expected.	No error reported by qualified observer.	Same as standard.	Same as standard.
b. ES target display check.	Target reports updates and	No error reported by	Same as standard.	Same as standard.

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
	display as expected.	qualified observer.		
c. DRF target display check.	Target reports update and display as expected.	No error reported by qualified observer.	Same as standard.	Same as standard.
341. ESL SERVICE LEVEL AND DRF AVAILABILITY CHECK.				
a. Back-Up Data Processing System Check for FSL. **NOTE:** The certifying official, using the same ESL checks specified in this table, must determine that the Direct Radar Feed (DRF), if available, is capable of providing its advertised functions.	Par. 519	Successful no fault execution.	Same as standard.	Same as standard.
342. RESERVED				
343. FS PERIODIC CERTIFICATION TEST VARIABLE SITE PARAMETER (VSP).				
a. VSP interval.	TI 6191.500	Up to maximum value.	Same as standard.	Same as standard.
b. If FS Periodic Certification is providing false errors. **NOTE:** It is necessary to keep abreast of known or reported periodic certification issues. It may be necessary to contact 2nd level engineering support for further instructions.	TI 6191.500	Set VSP interval to 0.	Same as standard.	Same as standard.
344. ES BACKGROUND VERIFICATION.				
a. Verification interval.	TI 6191.500	Optionally set to enabled. If enabled, Maximum value may be used.	Same as standard.	Same as standard.
345. RTDS DATA ENTRY PROCESSING AND DISPLAY CHECK.				
a. FSL	Tower positions processes FS data entry and	No error reported by qualified operator on	Same as standard.	Same as standard.

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
	display as expected.	minimum resources for AT operations.		
b. ESL	Tower positions processes ES data entry and display as expected.	No error reported by qualified operator on minimum resources required for AT operations.	Same as standard.	Same as standard.
c. DRF	Tower positions processes ES data entry and display in DRF mode as expected.	No error reported by qualified observer.	Same as standard.	Same as standard.
346. TEST TARGET DEVIATION.				
a. Check the range/azimuth deviation of radar/interrogator test targets.	Par. 535	Successful no fault execution.	Same as standard.	Same as standard.
347. RESERVED				
348. FSL/ESL SYNCHRONIZATION.				
a. If FSL and ESL are utilized by AT personnel for operational use or in standby operational use.	TI 6191.500 FS: Par. 523 ES: Par. 525	Enabled and indicating OK/OK.	Same as standard.	Same as standard.
b. If FSL is released to Tech OPS or DoD Radar Maintenance for maintenance, positions in test partition, or in cases of FSL failure.	TI 6191.500 FS: Par. 523 ES: Par. 525	Disabled and indicating OK/NA for FS or NA/OK for ES.	Same as standard.	Same as standard.
349. GPS DAC VALUE.				
a. Verify that the DAC value on the GPS Time Unit	Par. 557	60000 ≥ x ≥ 5000 where ‘x’ is the DAC value from the GPS unit.	Approx. 32000.	Same as standard.
350 - 399. RESERVED.				
a. Reserved.				

Chapter 4. PERIODIC MAINTENANCE

400. GENERAL.

a. This chapter establishes all maintenance activities that are required for STARS equipment 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 for STARS, which are necessary to determine whether operation is within established tolerances/limits. The second section identifies other tasks which are necessary to prevent deterioration and/or ensure reliable operation of STARS.

b. Order 6000.15 requires that certain routine and general maintenance tasks be completed on all NAS hardware. Refer to Order 6000.15 for a list of routine maintenance requirements and other maintenance requirements.

c. All test equipment must be maintained in proper operating condition. Refer to paragraph 108 of this handbook for special tools. Refer to the latest edition of Order 6200.4, Test Equipment Management Handbook for further information on test equipment.

d. Refer to Order 6000.15 for the periodic maintenance intervals and their tolerances.

e. Refer to Order 6191.2, STARS Security Handbook, for STARS security periodic intervals and tolerances.

Section 1. PERFORMANCE CHECKS

Subsection 1. FSL Performance Checks

Performance Checks	*Reference Paragraph*	
	Standards & Tolerances	***Maintenance Procedures***
401. DAILY.		
a. At the FSL MCW, check icons for proper indications.	Par. 309a	Par. 511
b. At the FSL MCW, check System messages.	Par. 309b	Par. 511
c. Verify proper test target display on at least one TCW or TDW.	Par. 309c	Par. 512
d. Check Inter-Facility data transmission.	Par. 324	Par. 515
e. Check and optimize registration.	Par. 325	Par. 533
f. FSL system status alert color check	Par.319	Par. 514
g. Check FSL/ESL synchronization.	Par. 348	TI 6191.500 FS: Par. 523
h. Verify system date and time	Par. 321	Check system date and time at FS MCP
402. WEEKLY.		
a. Resource Verification Test.	Par. 310b	Par. 510
b. Performance Verification of air traffic control visual and aural alarms.	Par. 310c	Par. 516 And TI 6191.500
c. Verify FSL radar data processing and display capability at least one TCW or TDW.	Par. 310d	Par. 518
d. Successful selection of backup data processing system.	Par. 341a	Par. 519
e. At the FSL MCW, check the Periodic Certification Test Variable Site Parameter (VSP) interval.	Par. 343	TI 6191.500
f. Check range/azimuth integrity.	Par. 322a	Par. 520
g. Radar Reliability Check.	Par. 323a	Par. 521
h. RTDS target display check	Par. 340a	
i. RTDS data entry processing and display check.	Par. 345a	
403. BIWEEKLY.		
a. Reserved.		
404. MONTHLY.		
a. GPS DAC Value Check.	Par. 349	Par. 557
405. QUARTERLY.		

Subsection 1. FSL Performance Checks

Performance Checks	*Reference Paragraph*	
	Standards & Tolerances	***Maintenance Procedures***
a. Verify that system time provided by the GPS is the time displayed at the FSL MCW. If necessary, synchronize FSL MCW system time with GPS.	Par. 338a	TI 6191.500
b. Configure FSL to utilize the standby resources.	Par. 308	Par. 529
406. SEMIANNUALLY.		
a. FSL NUNIO: Execute diagnostics and perform checks on all resources.	Par. 301	TI 6191.500
b. FSL CGW: Execute diagnostics and perform all checks.	Par. 302	TI 6191.500
c. FSL RDP: Execute diagnostics and perform all checks.	Par. 303	TI 6191.500
d. FSL TCW: Execute diagnostics and perform all checks.	Par. 304	TI 6191.500
e. FSL TDW: Execute diagnostics and perform all checks.	Par. 305	TI 6191.500
f. FSL MCW: Execute diagnostics and perform all checks.	Par. 306	TI 6191.500
g. FSL CDR: Execute diagnostics and perform all checks.	Par. 307	TI 6191.500
407. ANNUALLY.		
a. Reserved.		
408. BIANNUALLY.		
a. Reserved.		
409. TRIANNUALLY.		
a. Reserved.		
410. AS REQUIRED.		
a. FSL software release maintenance.	Par. 332	Par. 550
b. FSL software update.	Par. 334	Par. 552
c. Map accuracy.	Par. 336	Par. 555
d. Fixed target map.	Par. 337	Par. 556
e. Verify individual speakers on each of the TCWs and TDWs.	Par. 339	TI 6191.409 Audible Alarm Test
f. Software Version Verification.	Par. 310a	FSL Software Status Report TI 6191.500
g. Firewall/WAN Router Connectivity Performance Check	Par. 331	Par. 554
411. – 414. RESERVED.		
a. Reserved.		

Subsection 2. ESL Performance Checks

Performance Checks	*Reference Paragraph*	
	Standards & Tolerances	***Maintenance Procedures***
415. DAILY.		
a. At the ESL MCW, check icons for proper indications.	ESL and DRF Par. 317a	Par. 511
b. At the ESL MCW, check System messages.	ESL and DRF Par. 317b	Par. 511
c. Check ESL data entry and display functions.	Par. 317c	Par. 513
d. Check FSL/ESL synchronization.	Par. 348	TI 6191.500 ES: Par. 525
e. ESL system status alert color check	Par. 320	Par. 517
f. Verify system date and time	Par. 321	Check system date and time at ES MCP
416. WEEKLY.		
a. Complete Resource Verification Test.	ESL and DRF Par. 318b	Par. 510 And TI 6191.500
b. Performance Verification of air traffic control visual and aural alarms.	ESL and DRF Par. 318c	Par. 522 And TI 6191.500
c. Verify ESL radar data processing and display capability at least one TCW or TDW.	ESL and DRF Par. 318d	Par. 524
d. Check ESL data entry and display functions for DRF.	DRF Par. 317c	Par. 513
e. At the ESL MCW, verify that Background Verification is enabled.	Par. 344	TI 6191.500
f. Check range/azimuth integrity.	ESL Par. 322b DRF Par. 322b	TI 6191.500
g. RTDS target display check.	ESL Par. 340b DRF Par. 340c	
h. RTDS data entry processing and display check.	ESL Par. 345b DRF Par. 345c	
i. Radar Reliability Check.	ESL and DRF Par. 323b	
417. BIWEEKLY.		
a. Reserved.		
418. MONTHLY.		

Subsection 2. ESL Performance Checks

Performance Checks	*Reference Paragraph*	
	Standards & Tolerances	***Maintenance Procedures***
a. Reserved.		
419. QUARTERLY.		
a. Verify that system time is provided by the GPS.	Par. 338b	TI 6191.500
b. Configure ESL to utilize the standby resources.	Par. 316	Par. 531
420. SEMIANNUALLY.		
a. ESL NUNIO: Execute diagnostics and perform all checks.	Par. 311	TI 6191.500
b. ESL CGW: Execute diagnostics and perform all checks.	Par. 312	TI 6191.500
c. ESL TCW: Execute diagnostics and perform all checks.	Par. 313	TI 6191.500
d. ESL TDW: Execute diagnostics and perform all checks.	Par. 314	TI 6191.500
e. ESL MCW: Execute diagnostics and perform all checks.	Par. 315	TI 6191.500
f. SSS: Execute diagnostics and perform all checks.	Par. 326	TI 6191.500
g. Test Training and Simulation Equipment (TTSE/SIM): Execute diagnostics and perform all checks.	Par. 327	TI 6191.500
h. GPW: Execute diagnostics and perform all checks.	Par. 328	TI 6191.500
421. ANNUALLY.		
a. Reserved.		
422. TRIANNUALLY.		
a. Reserved.		
423. AS REQUIRED.		
a. ESL software release maintenance.	Par. 333	Par. 551
b. ESL software update.	Par. 335	Par. 553
c. Map accuracy.	Par. 336	Par. 555
d. Fixed target map.	Par. 337	Par. 556
e. Software Version Verification.	Par. 318a	ESL Software Status Report TI 6191.500
424. – 459. RESERVED.		
a. Reserved.		

Section 2. OTHER MAINTENANCE TASKS

Performance Checks	*Reference Paragraph*	
	Standards & Tolerances	***Maintenance Procedures***
460. Daily.		
a. Cycle CDR tapes for storage and reuse. Remove and store currently recording CDR tape for minimum specified time period. Use standby tape drive at each CDR cycle.	Tape stored before reuse for a minimum of 45 days from date removed.	TI 6191.500
b. Clean the DLT/DAT drives if the “Use Cleaning Tape” Light Emitting Diode (LED) is illuminated.	LED Extinguished.	TI 6191.500
461. Weekly.		
a. Switch to standby CDR processor.	Standby available.	TI 6191.500
462. Biweekly.		
a. Reserved.		
463. Monthly.		
a. Reserved.		
464. Bimonthly.		
a. Reserved.		
465. Quarterly.		
a. Clean all TCW and TDW trackballs and keyboards.	Manufacturer specifications.	TI 6191.500
b. Check surface of TCW and TDW displays and clean as required.	Visible dirt and smudge free surface.	TI 6191.500
c. Visually inspect DDM for correct focus, color and alignment.	Par. 330	TI 6191.500
d. Check TDW alignment and align as required.	Par. 329	TI 6191.500
e. TDM High Efficiency Particulate Air (HEPA) Filter Inspection and Cleaning (if applicable).	N/A	Par. 563 TI 6191.500
f. TDM Fan Inspection and Cleaning.	N/A	Par 564
g. TDW Articulating Arm Check.	N/A	Par 562
466. Semiannually.		
a. Blower Fan and Filter Inspection and Cleaning.	N/A	Par 558
b. Rack Cabinet Physical Inspection and Cleaning.	N/A	Par 559
c. TCW Cabinet Physical Inspection and Cleaning.	N/A	Par 560

Section 2. OTHER MAINTENANCE TASKS

Performance Checks	*Reference Paragraph*	
	Standards & Tolerances	***Maintenance Procedures***
d. Check Connector Mating.	N/A	Par 561
467. ANNUALLY.		
a. Check splitter power supply and replace any that are six years from CAI or six years from last replacement. Log replacement date in facility reference.	N/A	TI 6191.500 IETM Splitter Power Supply
468. TRIANNUALLY.		
a. Reserved.		
469. AS REQUIRED.		
a. Backup router configuration file(s) from the Flashcard.	N/A	TI 6191.500
b. Check the Airway Facilities Technical Network for ATS Maintenance Alerts applicable to STARS. **NOTE:** For those without FAA Intranet access, the STARS program screens all Maintenance Alerts for applicability to STARS and E-Mails those affecting STARS to the STARS Operational E-Mail List. Facilities may ensure inclusion on this list by sending E-Mail addresses to 9-ACT-STARSDOC@faa.gov.		The user must be on the FAA Intranet to access this site: http://technet.faa.gov/
c. At receipt of a Spare, check firmware version and update as necessary.	Verify the latest firmware using the latest STARS SSD release. Update using latest STARS SSD release, if applicable.	TI 6191.500
d. Verify that the NIS+ service is functioning properly NOTE: This check should be performed under the following circumstances: 1. Root password change (rpassmass). 2. Remove and Replace (R & R) (Only necessary on the spared box unless the R&R was performed on the SSS, then perform on all processors). 3. After an event or incident that site deems may impact NIS+ functionality or integrity.	Successful no fault execution.	FSL and Support: Par. 530 ESL: Par. 532
470. – 499. RESERVED.		

Chapter 5. MAINTENANCE PROCEDURES

500. GENERAL.

The first section of this chapter contains the procedures for making the performance checks listed in chapter 4, section 1. Section 2 of this chapter contains the procedures or methods for performing the tasks listed in chapter 4, section 2 of this handbook.

501. TECHNICAL PERFORMANCE RECORD ENTRIES.

Order 6000.15 contains guidance and detailed instructions for Field Utilization of FAA Form 6000 series as applicable to the STARS. Printed Reports or entries shall be made in accordance with the instructions published in Order 6000.15.

502. – 509. RESERVED.

Section 1. Performance Check Procedures

510. STARS FSL/ESL/DRF SUBSYSTEM PROCEDURE FOR RESOURCE VERIFICATION TEST.

a. Objective. Verify that the minimum required resources that can sustain ATC operations are present and working properly.

b. Discussion. The STARS system certification requirements are listed in Appendix 1, table A1-3 of this handbook.

c. Test Equipment Required. Not applicable.

d. Conditions. The certifying official must ensure that the correct versions of software and adaptation are installed and running on each processor utilized in the system. Refer to paragraph 550 or 551 of this handbook for a suggestion to manage multiple versions of software in the system. A chart should be prepared to show the latest version of each program. This chart should be readily available to the certifying official. Ensure that the checks in paragraph 552 or 553 have been completed for FSL and ESL since the last software update.

e. Detailed Procedures. Perform the Resource Verification test from the FSL or ESL MCW. Verify that the minimum required resources that can sustain the facility AT operation pass. For DRF checks it is necessary to verify that the minimum required resources that can sustain direct radar feed AT operation pass.

511. MCW ICON AND SYSTEM MESSAGE CHECK.

a. Objective. Verify that the minimum required resources that can sustain ATC operations are present and working properly.

NOTE: The certifying official, using the ESL checks specified in this paragraph, must determine that the Direct Radar Feed (DRF), if available, is capable of providing its advertised functions. It is necessary to have proper coordination between the certifying official at the TRACON or RAPCON, and the remote tower. If necessary, local and/or regional procedures should be developed to coordinate activities between distant facilities and to convey certification information.

b. Discussion. The STARS service certification requirements are listed in Appendix 1, table A1-3, of this handbook. This check applies to FS, ES, and DRF.

c. Test Equipment Required. Not applicable.

d. Conditions. These checks must be made while operational programs are being executed.

e. Detailed Procedure. Check for proper indications at the appropriate FSL and/or ESL MCW:

1. For DRF checks, ensure that the DRF sensor is selected at the TDW. Then drill down into appropriate TOWERS/RADAR GUI at ESL MCW for detailed indications.
2. Check that the minimum required resources (e.g., NUNIO, CGW/RCGW, RDP, TCW, TDW, and LAN equipment) that can retain air traffic operation are available.

3. Check for current failure/alarm report messages on the minimum required resources (e.g., NUNIO, CGW/RCGW, RDP, TCW, TDW, and LAN equipment) that can retain air traffic operation.

512. FSL TEST TARGET DISPLAY CHECK.

a. Objective. Verify the ability of constituent facilities to provide test target reports at correct display positions in support of ATC operations.

b. Discussion. The required number of displays to be checked will be determined locally. However, as a minimum, one TCW or TDW shall be checked. This check should be made on a different position than last executed. The TARS service certification requirements are listed in Appendix 1, Table A1-1, of this handbook.

c. Test Equipment Required. Fixed target map with test target geo-boxes or symbols appropriate for all applicable sensors.

d. Conditions. These checks must be made while the FSL operational program is being executed.

e. Detailed Procedures for FSL.

1. Verify proper data entry and display functions of PE/MTI, PARROT/CPME, and RTQC test targets at required TCW(s) and/or TDW(s). The certifying ATSS may check with AT or may choose to perform the following:
   (a) Select single sensor display mode.
   (b) Verify primary and/or beacon targets are available at the display.
   (c) Select a geographic map that contains fixed target geo-boxes for the selected sensor. Verify that the correct map is displayed.
   (d) Enable RTQC display from the DCB.
   (e) Verify that the beacon and search RTQCs are displayed on or within the appropriate geo-boxes or adapted map location symbols, or not more than 1 degree and 1/4 nm from expected position.
   (f) Verify that the PARROT/CPME(s) is displayed on or within the appropriate geo-boxes or adapted map location symbols, or not more than 1 degree and 1/4 nm from expected position.
   (g) Verify that the PE/MTI reflector(s) is displayed on or within the appropriate geo-boxes or adapted map location symbols, or not more than 1 degree and 1/4 nm from expected position.
2. Repeat this procedure for each available sensor.
3. If accessible, switch the display to multi-radar mode. Verify that the display operates in multi-radar mode.
4. After checking all available sensors, return to normal operations.

513. ESL AND DRF TEST TARGET DISPLAY CHECK.

a. Objective. Verify the ability of constituent facilities to provide test target reports at correct display positions in support of ATC operations.

b. Discussion. The required number of displays to be checked will be determined locally. However, as a minimum, one TCW or TDW shall be checked. The TARS service certification requirements are listed in Appendix 1, Table A1-1, of this handbook.

c. Test Equipment Required. Fixed target map with test target geo-boxes or symbols appropriate for all applicable sensors.

d. Conditions. These checks must be made while the ESL operational program is being executed.

NOTE: In addition to the ESL check**,** if there is a RT connected to the SOS, and the RT has a direct Local Radar Feed, then this check must also be made on the RT using the direct Radar Feed. This is done by selecting the DRF sensor on the DCB at the TDW.

e. Detailed Procedures for ESL.

1. Verify proper data entry and display functions of PE/MTI, PARROT/CPME, RTQC test targets at all required TCW(s) and/or TDW(s). The certifying ATSS may check with AT or may choose to perform the following:
   (a) Select sensor.
   (b) Verify that primary and/or beacon targets are available at the display.
   (c) Select a geographic map associated with the selected sensor that contains fixed target geo-boxes or symbols for the selected sensor. Verify the correct map is displayed.
   (d) Enable RTQC display from the DCB.
   (e) Verify that the beacon and search RTQC(s) is displayed on or within the appropriate geo-box or not more than 1 degree and 1/4 nm from expected position.
   (f) Verify that the PARROT/CPME(s) is displayed on or within the appropriate geo-box or not more than 1 degree and 1/4 nm from expected position.
   (g) Verify that the PE/MTI reflector(s) is displayed on or touching the appropriate map symbol or not more than 1 degree and 1/4 nm from expected position.
2. Repeat this procedure for each available sensor.
3. After checking all available sensors, return to normal operations.

514. FSL SYSTEM STATUS ALERT COLOR CHECK

a. Objective. Verify that the red color is properly displayed in the system status alert icon on selected TCW and/or TDW positions.

b. Discussion. The Red Check symbol (solid inverted red delta centered in a green outlined box) is always displayed to verify color red is OK. Following the check symbol is either an empty field which means there are no unavailable or failing radars, or it shows one or more 3–character radar names (in red) of unavailable or failing radars.

The certifying official may corroborate with ATC to verify the red check symbol at each position. In addition, the official should inspect displays first-hand. Perform this check on all displays where possible.

c. Test Equipment Required. Not applicable.

d. Conditions. These checks must be made while operational programs are being executed.

e. Detailed Procedures. The following procedure provides direction for checking the system status area.

1. On selected FSL TCW/TDW locate the system status area.
2. Verify that in the upper left hand corner of the system status area there is a red check symbol.

515. FLIGHT DATA PROCESSING INPUT/OUTPUT CHECK.

a. Objective. Verify ability of STARS to communicate with other facilities in support of terminal air traffic operations.

b. Discussion. The Flight Data Processing requirements for STARS are listed in Appendix 1, table A1-1 STARS certification of this handbook. Reference IFDT error messages and alarms in TI6191.404 STARS System Message Dictionary or appropriate IETM TI 6191.500.

c. Test Equipment Required. Not applicable.

d. Conditions. These checks must be made while in FSL.

e. Detailed Procedures.

1. At the FSL MCW, drill down into the NUNIO A and B Module 6 status and check the icon associated with the inter-facility line. Verify the module is online. Investigate any red icon indications.
2. At the FSL MCW, drill down from the IFDT status icon into the NAS icon. Verify the heartbeat is present and check the icons associated with the main and alternate inter-facility data transfer lines. Investigate any red icon indications.
3. Verify that Inter-Facility is working properly by checking for absence of IFDT failure messages:
   (a) #102 Module 6 Heartbeat: Failed
   (b) #277 IFDT Test Failure

516. STARS FSL PROCEDURE FOR PERFORMANCE VERIFICATION OF ATC VISUAL AND AURAL ALARMS.

a. Objective. Verify the ability of FS STARS to process and display aural and visual alarms in support of terminal air traffic control operations, and verify RTQC recieve status. The alarms include special condition codes and safety alert alarms i.e., MSAW and CA. This check is performed at the MCW and/or display positions with the exception of the RDP safety alert processing, and RTQC receive status. Both of these checks are performed internally in the RDP and is verified only from the MCW.

b. Discussion. The required number of displays to be checked will be determined locally. However, as a minimum, one TCW/TDW shall be checked. This check should be made on a different position than last executed. There are various methods that can be used to verify special condition codes and the safety alert alarms. The full PVER, abbreviated PVER, and targets of opportunity, are described here. Any one of these methods will satisfy the certification requirement. However, RDP safety alert processing, and RTQC receive status are only accomplished using the full PVER method so it is necessary to run

one full PVER each certification period. Running the full PVER on any one TCW or TDW, remote or local, will suffice for this portion of the check.

1. Full FS PVER: There are three basic processing functions that are tested by the FS PVER. They are special condition codes, safety alert, and RTQC threshold monitoring. The special condition codes and the safety alerts implement aural and visual alarms that are observable at the display position within the first four minutes of the PVER. The RTQC monitoring tests have no display. Once the PVER is requested, the following items provide guidelines on the execution and results analysis of the Full FS PVER;

   (a) A successful execution of the PVER is indicated on the PVER test report by an end of test notification specifying the duration of the test as well as confirmation that the proper indications are displayed. The specialist should inspect the "Test Case Summary" at the bottom of the Performance Verification Test Report to ensure all expected test cases were processed. A discrepancy between these numbers may indicate a problem with the PVER scenario, the execution of the scenario, or the system data processing and display. If this occurs print the report, and retry the scenario. If the discrepancy reoccurs, print the second report and contact the assigned OSF.

   (b) If the failures pertain to RTQC receive status (Beacon/Search RTQC, PARROT or PE), perform the checks specified in paragraphs 401a, 401b, 401c, 402f, and 402g, at minimum, to verify if the RTQC monitoring threshold is performing within standards.

   (c) If the failures pertain to special condition codes or safety alert processing it is acceptable to rerun the PVER scenario and make visual confirmation that the situation displayed is performing as expected. It is permissible to corroborate with AT to determine if system is performing as expected using targets of opportunity. See paragraph 516 b3 for further information.

   (d) If the discrepancy reoccurs, print the second report and contact the assigned OSF.

   (e) The following definitions are useful to determine pass/fail criteria of the system performance verification:

      (1) ASSERTIONS – Boolean test cases scripted into the scenario that report as PASS, FAIL and both the expected and actual results of the test case.

      (2) ACTUAL – The column that reports the result condition of an assertion.

      (3) STATUS – This column only lists the Boolean result of an assertion. The values are only PASS or FAIL.

      (4) EXPECTED – Number of assertions scripted into the PVER scenario and also the column that specifies the pass condition of an assertion.

      (5) PROCESSED – Actual number of assertions processed in the PVER scenario

      (6) REJECTED – This indicates assertions that are rejected due to logic errors, undefined fixes, aircraft type, timing, etc. Rejections are typically errors with the PVER scenario.

      (7) MISSING – The difference between the expected assertions and the actual number of processed assertion statements.

(8) EXTRA – Any additional assertion statements processed but are not listed in the scenario.

(9) NOTP – Not present, is used to test or report the absence of special condition codes.

(10) MISS – Similar to NOTP but used with RTQC assertions.

(11) EXEC – Excessive is used to test or report excessive RTQC.

(12) CURR – Current is used with CA and MSAW assertions and defines the aircraft situation as being in present violation of separation rules or low altitude parameters, respectively, as opposed to PRED.

(13) PRED – Prediction indicates future CA or MSAW violations unless course, speed, or altitude is changed to mitigate safety transgressions.

2. Abbreviated FS PVER: The abbreviated FS PVER uses the same scenario as the full FS PVER. It is initiated the same way as the full PVER but is canceled after the special condition code and safety alert processing checks are complete. A full PVER scenario may take up to 20 minutes to complete. However, the special condition code and safety alert processing checks are performed within the first 4 minutes. Premature cancellation of a PVER is performed at the MCW by selecting the CANCEL button on the PVER report window. The report will display the results of the portion of the check conducted up to that point. Once the CANCEL button is selected all other buttons, including the CLOSE button, is temporarily grayed-out. When the CLOSE button returns from the grayed-out state, it is selected for final termination of the PVER. Coordination may be required by the observer and the MCW operator especially if this method is used to check aural and visual alarms at remote tower locations.

3. Targets of opportunity may be used to verify processing and display of special condition codes and safety alert alarms. It is permissible to corroborate with AT to perform this check. Lack of user complaints is an acceptable method of coordination provided that AT is advised to report any issues with visual and aural alarms.

c. Test Equipment Required. ATCoach PVER scenario provided by first-level support. The TTSE must be online and available and ATCoach must be in ready state on the TTSE.

d. Conditions. The display selected for PVER may not have airspace and only one PVER may execute at a time including ES PVER. The PVER check includes visual and aural confirmation that the alarms perform as expected. For single display radar towers only, if release of the display impacts AT, then results noted from the report and/or lack of error reports from qualified operators are acceptable. Checks for remote or distant positions may require assistance. If assistance is not available, or if the site is unable to release positions, then targets of opportunity with lack of user complaints is an acceptable method of performing this check.

e. Detailed Procedures for FSL.

1. FSL PVER is performed on display positions that do not have airspace. Checking if a display has airspace or no airspace can be done in the following ways:

   (a) At the MCW, drill down into the display detailed status window and verify that the “Equipment State” is in STANDBY.

   (b) Use the “FS View Consolidation” report on the MCW. If all the keyboard identifiers assigned to a TCW/TDW are blank under the TCP column, the position has no airspace.

(c) Observe the System Status Area (SSA) on the TCW/TDW. If consolidation information on line S is blank, the position has no airspace. "1R CON: 1R" is an example of consolidation information on line S in the SSA.

2. If the chosen position has airspace, the airspace is reassigned using the following commands at a TCW/TDW.

   (a) Login any display position if not already logged-in.

   (b) Enter the command, <F7 C (receiving keyboard) (sending keyboard) +><Enter>, where the sending keyboard position is the one selected for PVER.

3. From the MCW, execute the Performance Verification on the TCW/TDW.

4. The display position will blank momentarily as it transitions into the PVER mode.

5. As the scenario runs, ensure that the following codes are properly identified and displayed.

   (a) EM (Emergency) 7700

   (b) RF (Radio Failure) 7600

   (c) SA (Suspect Aircraft) 1236

   (d) HJ (High-jack) 7500

   (e) CA (Conflict Alert)

   (f) LA/MSAW (Low Altitude)

6. If using the abbreviated method for this check, the specialist may cancel the scenario now by selecting <CANCEL> on the PVER window, then selecting <CLOSE> when that option changes from a grayed-out state.

7. After the test is completed, verify that all beacon and search RTQC test cases have a "PASS" status, all PARROT and PE test cases have a "PASS" status, all Special Code (SPC) test cases have a "PASS" status, and Test Report Summary indicates all test cases "PASS."

8. At the satisfactory completion of the PVER, return the display to normal operational capability.

517. ESL SYSTEM STATUS ALERT COLOR CHECK

a. **Objective**. Verify that the red color is properly displayed in the system status alert icon on selected TCW and/or TDW positions.

b. **Discussion.** The Red Check symbol (solid inverted red delta centered in a green outlined box) is always displayed to verify color red is OK. Following the check symbol is either an empty field which means there are no unavailable or failing radars, or it shows one or more 3–character radar names (in red) of unavailable or failing radars.

The certifying official may corroborate with ATC to verify the red check symbol at each position. In addition, the official should inspect displays first-hand. Perform this check on all displays where possible.

c. **Test Equipment Required**. Not applicable.

d. **Conditions.** These checks must be made while operational programs are being executed.

e. Detailed Procedures. The following procedure provides direction for checking the system status area.

1. On selected ESL TCW/TDW locate the system status area.
2. Verify that in the upper left hand corner of the system status area there is a red check symbol.

518. STARS FSL SUBSYSTEM CERTIFICATION PROCEDURE RADAR DATA PROCESSING AND DISPLAY CAPABILITY.

a. Objective. Ensure that STARS data processing and display system are functioning properly.

b. Discussion. The required number of displays to be checked will be determined locally. As a minimum, one TCW or TDW should be checked. Emphasis should be placed on positions that are manned by AT less frequently. It is permissable to coordinate with field personnel to perform this check at remote towers. In addition, the certifying official should corroborate with ATC to verify data entry and display functions are performing normally on a system level. This check should be made on a different position than last executed if possible.

c. Test Equipment Required. Not applicable.

d. Conditions. These checks must be made while operational programs are being executed.

e. Detailed Procedures for FSL.

1. Verify data entry and display capability by performing the following at a TCW or TDW position.
   (a) Select single sensor display mode and verify that tracks are updating as expected.
   (b) If possible, utilize targets of opportunity that are landing, at airports to verify that targets and map are presented correctly on the display.
   (c) Verify data display capability and presentation by checking that the following types of display data are present:
      (1) Primary Extent symbols including size and color.
      (2) Beacon Extent symbols including size and color.
      (3) Geographic map (e.g., airways, sector boundaries, and special areas)
      (4) Data blocks
      (5) Weather data (high, medium, and low), including color and pattern, if available
   (d) Repeat paragraph 518e of this handbook for each remaining sensor. Towers may limit check to sensors that have coverage of assigned airspace.
   (e) If accessible, select multi-radar mode and perform paragraph 518e with the exception of inspecting for primary and beacon extent symbols.

      NOTE: In multi-radar mode all target symbols appear as same-sized primary extent symbols. Hollow symbols indicate targets presented for display by sensors that are 40nm or more from aircraft.

   (f) Return display to normal operational service.

519. STARS SYSTEM CERTIFICATION PROCEDURE FOR FSL BACK-UP DATA PROCESSING SYSTEM (ESL / DRF).

NOTE: The certifying official, using the same ESL checks specified in this paragraph, must determine that the Direct Radar Feed (DRF), if available, is capable of providing its advertised functions. 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.

a. Objective. Ensure that STARS FSL Back-Up Data Processing System (ESL/DRF) works properly.

b. Discussion. The required number of displays to be checked will be determined locally. It is permissable to coordinate with AT personnel to perform this check. The STARS service certification requirements are listed in Appendix 1, table A1-1 for TARS and Appendix 1, table A1-2 for RTADS of this handbook. The TARS check should include local TDWs if applicable.

c. Test Equipment Required. Not applicable.

d. Conditions. These checks must be made on positions that have ESL, including remote towers with Direct Radar Feed (DRF), capability and FSL while FSL operational programs are being executed.

e. Detailed Procedures for FSL.

1. Verify that the selection of backup level ESL including DRF, if available, is working at all required TCW and TDW positions. Perform this check at all required positions within the maximum certification interval.
2. At a TCW that is operating in FSL, switch to ESL. Verify that the display switches to ESL and targets update normally.

   NOTE 1: Due to Magnetic Variance and the differences between FSL and ESL adaptation (including DRF) and the Magnetic Variance Tile Set, a shift of the display may be noticed when selecting between FSL and ESL. If more information is needed, or if a listing of the Magnetic Variance Tile Set is needed, refer to the listing of the Magnetic Variance Tile Set provided with the site adaptation.

   NOTE 2: Magnetic offset variations change over time, but the siting information in the FRDF changes only when a change of more than 2 degrees has occurred. Because STARS uses more current and accurate offset information, the location of the PEs, MTI Reflectors, CPMEs, and RTQC could be displayed at a location different than the location recorded in the FRDF.
3. At the same TCW, switch to FSL. Verify that the display switches to FSL and targets update normally.
4. At a TDW that is operating in FSL, switch to ESL. Verify that the display switches to ESL and targets update normally.
5. At the same TDW with DRF capability, switch to DRF. Verify that the display switches to DRF and targets update normally.
6. At the same TDW, switch to FSL. Verify that the display switches to FSL and targets update normally.

f. Perform this check at all required TCWs and TDWs within the maximum certification interval.

520. STARS SYSTEM CERTIFICATION RANGE/AZIMUTH INTEGRITY.

a. Objective. Ensure STARS Real-Time Quality Control (RTQC) Functional Monitoring at FSL MCW.

b. Discussion. The STARS system certification requirements are listed in Appendix 1, table A1-3 of this handbook.

c. Test Equipment Required. Not applicable.

d. Conditions.

1. At least one PE/MTI reflector and/or one PARROT/CPME per sensor is reported properly.
2. If all MTI reflectors/search PEs or beacon PARROTs/Mode S CPMEs are missing or are unreliable for a particular sensor due to known reasons external to STARS or the sensor itself, alternate methods of measuring range/azimuth integrity may be used. Such methods include meeting a registration tolerance of 2 ACP for azimuth and 1/8 nm range with a known good sensor (see paragraph 325).
3. If this is not possible, it is permissible to utilize visual checks to determine range/azimuth integrity and reliability (see par. 537).

e. Detailed Procedures.

1. Verify proper indications at the FSL MCW. Check for failure/alarm system messages related to Primary Surveillance Radar (PSR) and/or Secondary Surveillance Radar (SSR) Test Targets (RTQC) at the FSL MCW.
2. Verify Functional Monitoring at FSL MCW. Verify the accuracy and reliability of PARROTs, CPME(s), PEs and MTI reflectors.

   (a) At the FSL MCW, verify that error reporting is enabled for each qualified PE and/or PARROT for each sensor by checking the ENABLED column of the PARROT/PE Report for “YES”.

   NOTE: STARS FSL notation references MTIs as PEs and CPMEs as PARROTs. This convention will be used in this section.

   (b) Inspect the FSL MCW, display a PARROT/PE Report and conduct the following checks and analysis based on this report:

   (1) Ensure that the value in the RELIABILITY column is equal to or greater than the minimum reliability percentage required for each particular type of test target. Check that the value complies with Standard and Tolerances specified in paragraph 322. If the values are not within specification, the data may be used for performance trouble-shooting but not as certification criteria. Check section e2(c) of this paragraph for additional guidance. A ‘0’ in this column indicates that data is not reporting within the capture box boundaries.

   (2) For each target item, calculate the absolute difference between the ADAPTED RANGE and the range MEAN. Check to see if this value is within the Standard and Tolerance specified in paragraph 322. If the values are not

within specification, the data may be used for performance trouble-shooting, but utilization as certification criteria is at risk. Check section e2(c) of this paragraph for additional guidance and reference paragraph 535 for a more precise analysis of data.

(3) For each target item, calculate the absolute difference between the ADAPTED AZIMUTH and the azimuth MEAN. Check to see if this value is within the Standard and Tolerance specified in paragraph 322. If the values are not within specification, the data may be used for performance trouble-shooting, but utilization as certification criteria is at risk. Check section e2(c) of this paragraph for additional guidance and reference paragraph 535 for a more precise analysis of data.

(c) General Report Analysis Guidelines

(1) When analyzing the PARROT/PE report it is important to check other indicators before making a decision to decertify the service of a sensor. There is always the possibility that the test target(s) is defective and not the sensor. If all of the test targets monitoring a particular sensor are out of tolerance, it may be an indication that the sensor is at fault or that a general radar adaptation parameter is inaccurate (e.g., north correction angle). On the contrary, if a single test target indicates a fail, that is often an indication that the test target device, site survey, or test target adaptation is the problem. On a general point, any discrepancies should be verified by corroborating with AT, visual inspection at the display, and/or using any alternate method available, e.g., registration analysis, RTQC Check Report, etc. If all reliable test targets, including RTQCs, assigned to a sensor are out of alignment and targets do not line up on runway centerlines, then the certification of the service provided by that sensor is at risk. Given this situation the specialist should continue to press for an explanation by contacting radar technicians at remote radars or check radar indicators locally.

(2) The reliability of PARROT/PE test targets must be satisfactory before making conclusions concerning accuracy. The lower the reliability the less confidence there is in the measured mean values. Poor reliability issues should be resolved before accuracy measurements can be confident.

(3) Standard deviation is typically an indication of the “wobble” or “jitter” of a device.

(4) Discrepancies between adapted values and measured mean values may be indications of inaccurate site survey, magnetic declination calculations or adaptation.

521. STARS FSL SUBSYSTEM RADAR RELIABILITY CHECK USING THE RTQC CHECK REPORT.

a. Objective. Verify that radar data input into STARS meets the performance parameters listed in paragraph 323a.

b. Discussion. The performance parameters in paragraph 323a should be reasonable for a properly aligned radar and digitizer system. However, situations unique to each site (e.g., obstructions, large bodies of water, antenna tilt, anomalous propagation) may prevent some radar sites from meeting the established criteria. For this reason each site should

establish a baseline for each sensor utilized by the SOS. The baseline values should be utilized to determine if sensor is performing normally.

1. When a parameter does not meet the criteria established in paragraph 323a, the FSL subsystem may still be certified provided the sensor is performing to recorded mean values. However, the reason for not meeting performance parameters in paragraph 323ashould be identified and documented. Every effort should be made to bring the radar and digitizer up to specifications.

2. Some of the threshold parameters (i.e., SEARCH RTQC, BEACON RTQC RELIABILITYs) are adaptable. It is possible, for example, that results greater than 100 percent are obtainable. The site should confer with the OSFs to verify what the normal limits are for each adaptable parameter for each sensor and ensure that these are set accordingly. Every effort should be made to make the radar or digitizer meet specifications. In the event that this is not possible for site specific reasons, the site should determine and document the specific reasons.

c. Test Equipment Required. Not applicable.

d. Conditions. This procedure should be performed on working sensors only.

e. Detailed Procedures. The detailed procedures are in two parts: The first part provides procedures for establishing a baseline; the second part for requesting a report and comparing values to the established baseline.

1. Utilize the FS RTQC report at the FSL MCW over a period of seven days to provide data for a performance baseline for each sensor. The collection days do not need to be consecutive, but they should be done within a two or three week period. A 15-minute Data Collection Interval is recommended for each collection. Do not collect data immediately following an installation, a system shutdown or some other event that causes a break in the system data collection cycle. Allow enough time for the system to collect a sufficient amount of data to provide a valid report. After seven days of data has been collected, average the results by totaling each column and dividing the sum by the total number of samples collected (normally seven). Record the average value and file the average and the collected reports in the FRDF. The baseline should be updated every three months. It is not necessary to complete this procedure before declaring IOC and/or ORD on a STARS or sensor installation.

2. Utilize the FS RTQC report at the FSL MCW, to perform a performance check that verifies radar input data. This is a weekly check and should be done within the maximum certification interval. Compare the performance parameter values with the recorded baseline values. When a parameter does not meet the criteria established in paragraph 323, the FSL subsystem may still be certified provided the sensor is performing to recorded mean values. However, the reason for not meeting performance parameters in paragraph 323 should be identified and documented. Every effort should be made to bring the radar and digitizer up to specifications.

522. STARS ESL PROCEDURE FOR PERFORMANCE VERIFICATION OF ATC VISUAL AND AURAL ALARMS.

a. Objective. Verify the ability of ES STARS to process and display aural and visual alarms in support of terminal air traffic control operations, and verify RTQC receive status. The alarms only include special condition codes for ES.

b. Discussion. The required number of displays to check will be determined locally. However, as a minimum, one TCW/TDW shall be checked. This check should be made on

a different position than last executed. There are various methods that can be used to verify special condition codes and the safety alert alarms. The full PVER, abbreviated PVER, and targets of opportunity, are described here. Any one of these methods will satisfy the certification requirement. However, RTQC receive status is only accomplished using the full PVER method so it is necessary to run one full PVER each certification period. Running the full PVER on any one TCW or TDW, remote or local, will suffice for this portion of the check.

1. Full ES PVER: There are two basic processing functions that are tested by the ES PVER. They are special condition codes, and RTQC receive status. The special condition codes implement aural and visual alarms that are observable at the display position within the first four minutes of the PVER. The RTQC monitoring tests have no display. Once the PVER is requested, the following items provide guidelines on the execution and results analysis of the Full ES PVER;

   (a) A successful execution of the PVER is indicated on the PVER test report by an end of test notification specifying the duration of the test as well as confirmation that the proper indications are displayed. The specialist should inspect the "Test Case Summary" at the bottom of the Performance Verification Test Report to ensure all expected test cases were processed. A discrepancy between these numbers may indicate a problem with the PVER scenario, the execution of the scenario, or the system data processing and display. If this occurs print the report and retry the scenario. If the discrepancy reoccurs, print the second report and contact the assigned OSF.

   (b) If the failures pertain to RTQC receive status (Beacon/Search RTQC, PARROT or PE), perform the checks specified in paragraphs 415a, 415b, 415c, and 402g, at minimum, to verify if the RTQC monitoring threshold is performing within standards.

   (c) If the failures pertain to special condition codes it is acceptable to rerun the PVER scenario and make visual confirmation that the situation displayed is performing as expected. It is permissible to corroborate with AT to determine if system is performing as expected using targets of opportunity. See paragraph 522 b3 for further information.

   (d) If the discrepancy reoccurs, print the second report and contact the assigned OSF.

   (e) The following definitions are useful to determine pass/fail criteria of the system performance verification:

      (1) ASSERTIONS – Boolean test cases scripted into the scenario that report as PASS, FAIL and both the expected and actual results of the test case.

      (2) ACTUAL – The column that reports the result condition of an assertion.

      (3) STATUS – This column only lists the Boolean result of an assertion. The values are only PASS or FAIL.

      (4) EXPECTED – Number of assertions scripted into the PVER scenario and also the column that specifies the pass condition of an assertion.

      (5) APPLICABLE – Actual number of assertions processed in the PVER scenario

      (6) REJECTED – This indicates assertions that are rejected due to logic errors, undefined fixes, aircraft type, timing, etc. Rejections are typically errors with the PVER scenario.

(7) MISSING – The difference between the expected assertions and the actual number of processed assertion statements.

(8) EXTRA – Any additional assertion statements processed but are not listed in the scenario.

(9) NOT PRESENT – Not present, is used to test or report the absence of special condition codes.

(10) MISSING – Similar to NOTP but used with RTQC assertions.

(11) EXECESSIVE – Excessive is used to test or report excessive RTQC.

2. Abbreviated ES PVER: The abbreviated ES PVER is initiated the same way as the full ES PVER but is canceled after the special condition codes are complete. A full PVER scenario may take up to 20 minutes to complete. However, the special condition code checks are performed within the first 2 minutes. Premature cancellation of a PVER is performed at the MCW by selecting the CANCEL button on the PVER report window. The report will display the results of the portion of the check conducted up to that point. Once the CANCEL button is selected all other buttons, including the CLOSE button, is temporarily grayed-out. When the CLOSE button returns from the grayed-out state, it is selected for final termination of the PVER. The observer and the MCW operator may require coordination especially if this method is used to check aural and visual alarms at remote tower locations.

3. Targets of opportunity may be used to verify processing and display of special condition codes and safety alert alarms. It is permissible to corroborate with AT to perform this check. Lack of user complaints is an acceptable method of coordination provided that AT is advised to report any issues with visual and aural alarms.

c. Test Equipment Required. ATCoach PVER scenario provided by first-level support. The TTSE must be online and available, and ATCoach in a ready state.

d. Conditions. Only one PVER may execute at a time including FS PVER. The PVER check includes visual and aural confirmation that the alarms perform as expected. For single display radar towers only, if release of the display impacts AT, then results noted from the report and/or lack of error reports from qualified operators are acceptable. Only one PVER may execute at a time including the FS PVER. Checks for remote or distant positions may require assistance. If assistance is not available, or if the site is unable to release positions, then targets of opportunity with lack of user complaints is an acceptable method of performing this check.

e. Detailed Procedures for ESL.

NOTE: If there is a remote tower (RT) connected to the SOS, and the RT has a direct Local Radar Feed, then this check shall be made on the RT using the direct Radar Feed. This is done by selecting the DRF sensor on the DCB at the TDW.

1. Execute the Performance Verification on each required TCW or TDW within the maximum certification interval from the ESL MCW.

2. Verify that the test pattern is displayed and the system is capable of detecting emergency codes.

3. As the scenario runs, ensure that the following codes are properly identified and displayed.

   (a) EM (Emergency) 7700

(b) RF (Radio Failure) 7600

(c) SA (Suspect Aircraft) 1236

(d) HJ (High-jack) 7500

4. If using the abbreviated method for this check, the specialist may cancel the scenario now by selecting <CANCEL> on the PVER window, then selecting <CLOSE> when that option changes from a grayed-out state.

5. After the test is completed, verify that all beacon and search RTQC test cases have a "Pass" status, all PARROT and PE test cases have a "Pass" status, all SPC test cases have a "Pass" status, and Test Report Summary indicates all test cases "Pass."

6. At the satisfactory completion of the PVER, return the display to normal operational capability.

523. FSL SYSTEM FS/ES SYNCHRONIZATION CHECK

a. Objective. Verify comunication between ESL and FSL processors for display synchronization.

b. Discussion. FSL / ESL synchronization and availabilty status can be one of the following states: OK = fully functioning and operational, NA =not available, NR = the system is OK but no radar is being received from the selected sensor (or "sensors" if in multi–radar mode). The first character pair indicates FS status followed by ES. The FSL status indicator for ESL can be manually toggled between OK and NA using the ESL MCW FSL Sync option under the System Control option on the main title bar.

The certifying official may corroborate with ATC to verify the red check symbol and ESL status are displayed normally at each position. In addition, the official should inspect displays first-hand. Perform this check on all displays where possible.

c. Test Equipment Required. Not applicable.

d. Conditions. These checks must be made while operational programs are being executed. FSL sync is enabled at the ESL MCW

e. Detailed Procedures. The following procedure provides direction for checking the system status area.

1. On selected FSL TCW/TDW locate the system status area.

2. Note synchronization indicator for each display.

3. If NR is indicated it may be necessary to select a different radar to achieve OK status.

524. STARS ESL AND DRF SUBSYSTEM CERTIFICATION PROCEDURE - RADAR DATA PROCESSING AND DISPLAY CAPABILITY.

a. Objective. Ensure STARS data processing and display system are functioning properly.

b. Discussion. The required number of displays to be checked will be determined locally. As a minimum, one TCW or TDW should be checked. Emphasis should be placed on positions that are manned by AT less frequently. It is permissable to coordinate with field personnel to perform this check at remote towers. In addition, the certifying official should corroborate with ATC to verify data entry and display functions are performing normally on a system level. This check should be made on a different position than last executed if possible.

c. Test Equipment Required. Not applicable.

d. Conditions. These checks must be made on ESL while ESL operational programs are being executed.

e. Detailed Procedures for ESL.

NOTE: In addition to the ESL check**,** if there is a remote tower (RT) connected to the SOS, and the RT has a direct Local Radar Feed, then this check must also be made on the RT using the direct Radar Feed. This is done by selecting the DRF sensor on the DCB at the TDW.

1. Verify data entry and display capability by performing the following at a TCW or TDW position.
2. Ensure that the selected display is in ESL mode. Select a sensor and verify that tracks are updating as expected.
3. If possible, utilize targets of opportunity to verify that targets and map are presented correctly on the display.
4. Verify data display capability and presentation by confirming that the following types of display data are present.
   (a) Primary symbols
   (b) Beacon symbols
   (c) Geographic map (e.g., airways, sector boundaries, and special areas)
   (d) Data blocks
   (e) Weather data (high, medium, and low) if available
5. Repeat paragraph 524e of this handbook for each remaining sensor. Towers may limit check to sensors that have coverage of assigned airspace.

525. ESL SYSTEM FS/ES SYNCHRONIZATION CHECK

a. Objective. Verify comunication between ESL and FSL processors for display synchronization.

b. Discussion. FSL / ESL synchronization and availabilty status can be one of the following states: OK = fully functioning and operational, NA =not available, NR = the system is OK but no radar is being received from the selected sensor (or “sensors” if in multi–radar mode). The first character pair indicates FS status followed by ES. The FSL status indicator for ESL can be manually toggled between OK and NA using the ESL MCW FSL Sync option under the System Control option on the main title bar.

The certifying official may corroborate with ATC to verify the red check symbol and ESL status are displayed normally at each position. In addition, the official should inspect displays first-hand. The number of displays to be inspected will be determined locally. Positions that are manned by AT less frequently and standby positions must be included.

c. Test Equipment Required. Not applicable.

d. Conditions. These checks must be made while operational programs are being executed. FSL sync is enabled at the ESL MCW

e. Detailed Procedures. The following procedure provides direction for checking the system status area.

1. On selected FSL TCW/TDW locate the system status area.
2. Note synchronization indicator for each display.
3. If NR is indicated It may be necessary to select a different radar to achieve OK status.

526. RESERVED

527. RESERVED

528. RESERVED

529. PROCEDURE TO CONFIGURE FSL TO UTILIZE THE STANDBY RESOURCES.

a. Objective. Verify that all standby resources are available and utilized in FSL. This procedure is designed to isolate and test individual data paths.

b. Discussion. The detailed procedure was written with the assumption that CGW1 and RDP1 are online and active. Typically, CGW1 and RDP1 are online after the system has been restarted e.g., when new adaptation is executed. The detailed procedure is an example only. In cases where CGW2 and/or RDP2 are online, it may be necessary for the specialist to draw up notes to assist in properly testing all data paths and switch to redundant resources.

c. Test Equipment Required. Not applicable.

d. Conditions.

1. Prior to performing this procedure, the ATSS must ensure that the standby resource is available for switching purpose. Do not run the procedure to switch to the standby resource that was reported as a failure by the system. Verify that the minimum required modules in both primary and alternate NUNIOs that can sustain the facility AT operation are available. Verify that both RDPs and CGWs are online and working properly.
2. Coordinate with AT and perform this procedure during scheduled maintenance time.

e. Detailed Procedure. Perform the procedure at the FSL MCW.

1. Reconfigure the primary NUNIO modules offline from the MCW. Verify that radar data is available at the FSL TCW, and there is no interruption of AT service.
2. Reconfigure FSL CGW1 offline from the MCW to ensure that all remaining online/standby resources and the alternate NUNIO are available with no interruption of AT service.
3. Reconfigure FSL RDP1 offline from the MCW to ensure that all remaining online/standby resources are online with no interruption of AT service.
4. Reconfigure FSL CGW1 online from the MCW.
5. Reconfigure FSL CGW2 offline from the MCW to ensure remaining online/standby resources and the alternate NUNIO are online with no interruption of AT service.
6. Reconfigure FSL RDP1 online from the MCW.
7. Reconfigure FSL RDP2 offline from the MCW to ensure remaining online/standby resources and the alternate NUNIO are online with no interruption of AT service.
8. Reconfigure the primary NUNIO modules online.

9. Reconfigure the alternate NUNIO modules offline from the MCW. Verify that radar data is available at FSL TCW, and there is no interruption of AT service.
10. Reconfigure FSL CGW2 online from the MCW.
11. Reconfigure FSL CGW1 to offline from the MCW to ensure that remaining online/standby resources and the primary NUNIO are online with no interruption of AT service.
12. Reconfigure FSL RDP2 online from the MCW.
13. Reconfigure FSL RDP1 to offline from the MCW to ensure that remaining online/standby resources and the primary NUNIO are online with no interruption of AT service.
14. Reconfigure the alternate NUNIO modules online.
15. Reconfigure FSL CGW1 online from the MCW.
16. Reconfigure FSL RDP1 online from the MCW.

530. FSL AND SUPPORT NETWORK INFORMATION SYSTEM PLUS (NIS+) CHECK.

a. Objective. Verify that the NIS+ service is functioning properly.

b. Discussion. NIS+ defines a security model to control access to information managed by the service. The service defines access rights that are selectively granted to individual clients or groups of clients. STARS utilizes NIS+ to control access to resources by system accounts (including root), system administration accounts, and user accounts. Failure or degradation of NIS+ will compromise the ability to manage user accounts, gain access to system resources and possibly degrade system services. Any NIS+ failures or anomalies observed on STARS should be documented and reported to the ISSO.

c. Test Equipment Required. Not applicable.

d. Conditions. This check should be conducted as required under the following circumstances:

1. Root password change (rpassmass).
2. Remove and Replace (R & R) (Only necessary on the spared box unless the R&R was performed on the SSS, then perform on all redundant processors, and on a locally determined number of TCWs/TDWs).
3. After an event or incident that site deems may impact NIS+ functionality or integrity.

e. Detailed Procedures. Executing the NIS+ check verifies that the local processor is properly connected to the NIS server system. The results from the check of each resource should be the same when compared with results from resources on the same service level.

NOTE: The following examples are provided for clarification. Specific details may not match exactly. Contact the helpdesk for additional explanation or concerns.

1. If you have not already done so, use your user account to login into the SSS.
2. Rlogin to a remote processor.
3. Enter "**ls –al /etc/.rootkey**". The correct response lists information for the rootkey file:

   "–rw------- 1root other 50 Mar 7 21:37 etc/.rootkey"

4. Enter "**rsh sss ls /etc/secure_host**". The correct response is "**/etc/secure_host**".
5. Enter "**nisping org_dir**". The correct response is similar to the response shown:

   "Pinging replicas serving directory <domain name, e.g., as4.gov>. :
   Master server is as4s040.as4.gov.
   Last update occurred at Thu Jul 29 22:24:56 2002
   Replica server is as4s041.as4.gov.
   Last update seen was Thu Jul 29 22:24:56 2002
   Replica server is as4f080.as4.gov.
   Last update seen was Thu Jul 29 22:24:56 2002
   Replica server is as4f081.as4.gov.
   Last update seen was Thu Jul 29 22:24:56 2002"
6. Enter "**nisping groups_dir**".

   "Pinging replicas serving directory <domain name, e.g., as4.gov>. :
   Master server is as4s040.as4.gov.
   Last update occurred at Thu May 7 22:24:56 2002
   Replica server is as4s041.as4.gov.
   Last update seen was Thu May 7 22:24:56 2002
   Replica server is as4f080.as4.gov.
   Last update seen was Thu May 7 22:24:56 2002
   Replica server is as4f081.as4.gov.
   Last update seen was Thu May 7 22:24:56 2002"
7. Repeat for each processor in the STARS system as required per the conditions in 530d.

   NOTE: The "nisping" response for FS and Support boxes should match.

531. PROCEDURE TO CONFIGURE ESL/DRF TO UTILIZE STANDBY RESOURCES.

a. Objective. Verify that all standby resources are available and utilized in ESL.

b. Discussion. ESL will utilize primary NUNIO modules, ESL CGW1, and LAN A by default on the power-up. Configure primary NUNIO modules offline to verify both primary and alternate NUNIOs feed. Configure ESL CGW1 offline to switch from LAN A to LAN B.

c. Test Equipment Required. Not applicable.

d. Conditions.

1. Prior to performing this procedure, the ATSS must ensure that the standby resource is available for switching. Do not run the procedure to switch to the standby resource that was reported as a failure by the system. Verify that the minimum required modules in both primary and alternate NUNIOs that can sustain the facility AT operation are available. Reconfigure the primary and alternate NUNIO, one at a time, to the offline mode, and then perform offline diagnostics on all NUNIO modules. Verify that both CGWs are online and available.
2. Perform this procedure during scheduled maintenance time.

e. Detailed Procedure. Perform the procedure at the ESL MCW.

NOTE: Perform this check on DRF resources by substituting primary and alternate DRF resources for ESL primary and alternate resources in this procedure.

1. Reconfigure the primary NUNIO modules offline at the MCW. Verify that radar data is available at the ESL TCW and there is no interruption of AT service.
2. Reconfigure ESL CGW1 offline at the MCW to ensure all resources on LAN B and the alternate NUNIO are online with no interruption of AT service.
3. Reconfigure ESL CGW1 online at the MCW.
4. Reconfigure ESL CGW2 offline at the MCW to ensure that all resources on LAN A and the alternate NUNIO are online with no interruption of AT service.
5. Reconfigure the primary NUNIO modules online at the MCW.
6. Reconfigure the alternate NUNIO modules offline at the MCW Verify that radar data is available at ESL TCW with no interruption of AT service.
7. Reconfigure ESL CGW2 online at the MCW.
8. Reconfigure ESL CGW1 to offline at the MCW to ensure that all resources on LAN B and the primary NUNIO are online with no interruption of AT service.
9. Reconfigure the alternate NUNIO modules online at the MCW.
10. Reconfigure ESL CGW1 online at the MCW.

532. ESL NETWORK INFORMATION SYSTEM PLUS (NIS+) CHECK.

a. Objective. Verify that the NIS+ service is functioning properly.

b. Discussion. NIS+ defines a security model to control access to information managed by the service. The service defines access rights that are selectively granted to individual clients or groups of clients. STARS utilizes NIS+ to control access to resources by system accounts (including root), system administration accounts, and user accounts. Failure or degradation of NIS+ will compromise the ability to manage user accounts, gain access to system resources and possibly degrade system services. Any NIS+ failures or anomalies observed on STARS should be documented and reported to the ISSO.

c. Test Equipment Required. Not applicable.

d. Conditions. This check should be conducted as required under the following circumstances:

1. Root password change (rpassmass).
2. Remove and Replace (R & R) (Only necessary on the spared box unless the R&R was performed on the SSS, then perform on all redundant processors, and on a locally determined number of TCWs/TDWs).
3. After an event or incident that site deems may impact NIS+ functionality or integrity.

e. Detailed Procedures. Executing the NIS+ check verifies that the local processor is properly connected to the NIS server system. The results from the check of each resource should be the same when compared with results from resources on the same service level. ESL does not communicate with FSL resources and, therefore, will return a message indicating that it can not communicate with FSL NIS+ servers. The following procedure will clarify this point by example.

NOTE: The following examples are provided for clarification. Specific details may not match exactly. Contact the helpdesk for additional explanation or concerns.

1. If you have not already done so, use your user account to login into the SSS.
2. Rlogin to a remote processor.
3. Enter "**ls –al /etc/.rootkey**". The correct response lists information for the rootkey file:

   "–rw------- 1root other 50 Mar 7 21:37 etc/.rootkey"
4. Enter "**rsh sss ls /etc/secure_host**". The correct response is "**/etc/secure_host**".
5. Enter "**/usr/lib/nis/nisping org_dir**". The correct response is similar to the response shown:

   "Pinging replicas serving directory <domain name, e.g., as4.gov>. :
   Master server is as4s040.as4.gov.
   Last update occurred at Thu Jul 29 22:24:56 2002
   Replica server is as4s041.as4.gov.
   Last update seen was Thu Jul 29 22:24:56 2002
   Replica server is as4f080.as4.gov.
   Unavailable
   Replica server is as4f081.as4.gov.
   Unavailable"
6. Enter "**/usr/lib/nis/nisping groups_dir**".

   "Pinging replicas serving directory <domain name, e.g., as4.gov>. :
   Master server is as4s040.as4.gov.
   Last update occurred at Thu May 7 22:24:56 2002
   Replica server is as4s041.as4.gov.
   Last update seen was Thu May 7 22:24:56 2002
   Replica server is as4f080.as4.gov.
   Unavailable
   Replica server is as4f081.as4.gov.
   Unavailable"
7. Repeat for each processor in the STARS system as required per the conditions in 532d.

   NOTE: ESL "/usr/lib/nis/nisping" will not communicate with FS processors; therefore, a response from the FS CDR replicas should not be expected.

533. REGISTRATION.

a. Objective. Ensure that registration bias for adapted radar pairs is within the operating tolerance and is as close as possible to the standard tolerance specified in paragraph 325. This applies to FSL and multi-radar sites only.

b. Discussion. Registration bias that exceeds the operational tolerance in paragraph 325 may contribute to track anomalies such as track drops, track suppression, and duplicate

beacons. In addition, the STARS tracker performs optimally when registration bias is as close as possible to standard values. Therefore, it is critical to maintain registration bias within operating tolerance and it is recommended to keep biases as close as possible to standard values. During initial setup (pre-IOC), it may be necessary to apply corrections that exceed threshold values cited later in this paragraph as part of a baseline process. It is best to report initial setup registration issues to the ATO deployment team, assigned OSF, and/or Regional Field Office. The FAA Technical Center may provide support during this time as well. If there is uncertainty to whom to report, contact the Field Support Helpdesk.

NOTE: Prior to registration analysis, it is necessary to have all sensors that contribute to the STARS multi-tracker adapted correctly to site survey information, or to the best available local and/or regional information. The critical components are positional (i.e., latitude/longitude, range/azimuth, altitude, etc.) of sensors, PARROTS/CPMES, and RTQCs. North correction angles are also critical. The values in STARS adaptation should be consistent with adaptation used by regional and co-regional (if applicable) facilities constituent to the STARS multi-radar complex. The registration report should be run during high traffic periods.

c. Test Equipment Required. Surveyed data, FRDF, radar data worksheets, regional adaptation, and/or STARS radar adaptation.

d. Conditions. Registration is possible on radar pairings only. Radar pairings used for radar registration are defined in adaptation using the DMS. Only adapted radar pairings qualify for analysis using the registration report at the MCW position. In some cases, it is useful to determine which sensor is the “primary” or “standard” sensor in a multi-radar environment. Typically, it is the radar the terminal site maintains and is usually the closest or “local” radar. To effectively implement the functions provided by the Registration Collimation Report, sensors must be within the certification window per the procedures specified in Appendix 1 of this handbook.

e. Detailed Procedure. Perform this procedure on a daily basis.

1. Open the Registration/Collimation Report.
2. From the report window, select the Generate button.
3. On the FS Registration and Collimation Control window, select the Registration button.
4. On the FS Registration and Collimation Control window, select every certified, online, available sensor.
5. Select the OK button.
6. On the FS Warning Window, in response to the “TERMINATE PREVIOUS ANALYSIS?” question, select YES and note the time.
7. On the FS Registration and Collimation Control window, select CANCEL .
8. If the specialist chooses to watch the Sample size “CURRENT” field increment, he/she may select the REFRESH button to update the report. The report updates each time the REFRESH button is selected. Otherwise, the FS Registration and Collimation report window can be closed by selecting CANCEL. The latter action will not affect the registration analysis.

   NOTE: Message #318, REGISTRATION ANALYSIS COMPLETED FOR RADAR PAIR: <xxxyyy> is displayed as each adapted pair completes. Do not confuse this with the #317 final completion message display.

9. The registration analysis is complete when message #317, REGISTRATION ANALYSIS COMPLETED FOR FINAL RADAR PAIR: <xxxyyy> (where xxx and yyy are 3-letter sensor designators) appears in the FS system message area on the MCW. Verify that the word “FINAL” appears in the message. Alternatively, the specialists may recall the report (or REFRESH if it was not CANCELED in the previous step) until the date and time field for each radar selected for analysis displays a date and time after the analysis was requested.

10. After the registration analysis is complete, print a copy of the Registration and Collimation report.

    NOTE: Do not expect recommended values of a radar pair to match when comparing them from each radar section. For example, the radar pair A to B will have different results than the converse radar pair B to A.

11. With the printed report, begin the data analysis to determine corrective action. First examine the range registration. Do this for each radar that was selected for registration analysis.

    (a) Subtract any values that may be in the CURRENT (1/512 NM) column from any values under the corresponding RECOMMENDED (1/512 NM) column. Ignore the PARROT, PE and COLL values. Remember that subtraction of a negative number becomes addition of a positive number.

    (b) Write the result at the right of the appropriate RECOMMENDED value.

    (c) Circle all results that exceed ±64 (64/512 or 1/8NM).

12. Perform the azimuth registration analysis. Again, do this for each radar that was selected for registration analysis.

    (a) Subtract any values that may be in the CURRENT (1/16 ACP) column from any values under the corresponding RECOMMENDED (1/16 ACP) column. Ignore the PARROT, PE and COLL values. Remember that subtraction of negative number becomes addition of a positive number.

    (b) Write the result at the right of the appropriate RECOMMENDED value.

    (c) Circle all results that exceed ±32 (32/16 or 2ACPs).

13. If no results are circled, then sensors are within the operating tolerance for registration. The specialist may CANCEL any windows and quit this procedure.

14. If any of the results are circled, the specialist must take one of the next two actions to correct this bias depending on the size of the bias.

    (a) If any circled range results are greater than ±128 (128/512 or 1/4NM) or any circled azimuth results are greater than ±64 (64/16 or 4ACPs), quit this procedure and contact the Helpdesk at 1-800-475-2667.

    (b) If any circled range results are less than or equal to ±128/512 (128/512 or 1/4NM) or any circled azimuth results are less than or equal to ±64 (64/16 or 4ACPs), proceed to the next step.

15. Coordinate with AT, then begin the apply registration process by bringing up the Registration and Collimation Report and selecting the APPLY button.

16. On the FS Registration and Collimation Control window, select the Registration button.

17. On the FS Registration and Collimation Control window, select every certified, online, available sensor that was previously selected for analysis. If there are additional sensors available at this time, restart this entire procedure.

    NOTE: The next action will apply corrections (or an average of the corrections) from the RECOMMENDED column for both range and azimuth for any sensor selected on the Control window. Corrections are not cumulative. They are applied to uncorrected data and are not added to previous corrections.

18. On the FS Warning Window, at the "PROCEED WITH VSP CHANGE?", select YES. On the FS Registration and Collimation Control window, select CANCEL.

19. Select the REFRESH button to update the report and verify the corrections are applied by examining the CURRENT column

    NOTE: When corrections are applied, the RECOMMENDED values are added together for the radars listed in each radar section. This is done for range and for azimuth. That result is divided by the number of radars listed. This is the value applied. When a registration correction is applied, it adds (or subtracts) two single values, one range and one azimuth, to the positional data reported from a sensor. The corrected positions are not used for MCW azimuth integrity checks, but they will change target positions on the display. Therefore, when a correction is applied, perform the procedure for the data entry and display function certification parameter found in Appendix 1, Table 1 of this handbook. In addition, coordinate with AT to check that approaches are aligning on runway centerlines at primary and/or secondary airports. Also check for ghosting of targets. If the displayed target positions are not positioned satisfactorily, different values may need to be entered. Contact the Helpdesk at 1-800-475-2667 for clarification of this point.

20. If the system passes the data entry and display check, repeat steps 1 to 14 of this procedure to verify acceptable registration using the Registration and Collimation report.

    NOTE: Registration corrections can be undone by changing registration correction VSPs at the MCW to zero.

534. RESERVED.

535. TEST TARGET RANGE/AZIMUTH DEVIATION CHECK.

a. Objective. Check the range/azimuth deviation of radar/interrogator test targets.

b. Discussion. Coordination with the OSF for correct adaptation may be necessary (see paragraph 337).

c. Test Equipment Required. Not applicable.

d. Conditions. Not applicable.

e. Detailed Procedures.

1. Verify proper indications at the FSL MCW. Check for failure/alarm system messages related to Primary Surveillance Radar (PSR) and/or Secondary Surveillance Radar (SSR) Test Targets (RTQC) at the FSL MCW.

2. Functional Monitoring at FSL MCW. Verify the accuracy and reliability of PARROTs, CPME(s), PEs and MTI reflectors.

(a) At the FSL MCW, verify that error reporting is enabled for each qualified PE and/or PARROT for each sensor. Viewing the PARROT/PE Report does this.

NOTE: STARS FSL notation references MTIs as PEs and CPMEs as PARROTs. This convention will be used in this section.

(b) At the FSL MCW, display a PARROT/PE Report and conduct the following checks and analysis based on this report:

(1) Ensure that the value in the COUNT column is “100” for all the qualified targets. A ‘0’ in this column indicates that data is not reporting within the capture box boundaries adapted for this fixed target and therefore, cannot be used for verification purposes.

(2) For each target item with a proper COUNT value, calculate the absolute difference between the ADAPTED RANGE and the range MEAN. Note the standard deviation of the PE or PARROT in the STD DEV column for the range values.

(3) For each item with a proper COUNT value, calculate the absolute difference between the ADAPTED AZIMUTH and the azimuth MEAN. Note the standard deviation of the PE or PARROT in the STD DEV column for the azimuth values.

(4) Ensure that the standard deviations noted above are less than or equal to the values in the maximum standard deviation (Max Std Deviation) column for the previously calculated mean difference. These values are listed in the following tables:

(a) For example, if a PARROT adapted for a short-range sensor has a difference between the adapted range and mean range of ‘8’, the maximum allowable standard deviation would be ‘32’ (1/512 nm).

(b) If the same PARROT has a difference between the adapted azimuth and mean azimuth of ‘0’, the maximum allowable standard deviation for azimuth would be ‘10’ (1/4 ACP).

PARROT /CPME RANGE TABLE (1/512 nm units) (1/8 nm tolerance @ 90%) Short & long-range sensors	
Difference between Mean & Adapted	Max Std Deviation
0	40
1 — 8	32
9 — 16	32
17 — 24	24
25 — 32	24
33 — 40	16
41 — 48	16
49 — 56	8
57 — 64	0

PARROT/CPME AZIMUTH TABLE (1/4 ACP units) (4 ACP tolerance @ 90%) Short & long-range sensors	
Difference between Mean & Adapted	Max Std Deviation
0	10
1	9
2	9
3	8
4	8
5	7
6	7
7	6
8	5
9	5
10	4
11	4
12	3
13	2
14	2
15	1
16	0

PE/MTI RANGE TABLE (1/512 nm units) (1/8 nm tolerance @ 80%) Short-range sensors only	
Difference between Mean & Adapted	Max Std Deviation
0	48
1 — 8	48
9 — 16	48
17 — 24	40
25 — 32	40
33 — 40	32
41 — 48	16
49 — 56	8
57 — 64	0

PE/MTI AZIMUTH TABLE (1/4 ACP units) (6 ACP tolerance @ 80%) Short-range sensors only	
Difference between Mean & Adapted	Max Std Deviation
0	19
1	18
2	18
3	17
4	17
5	15
6	15
7	15
8	14
9	13
10	13
11	12
12	11
13	10
14	10
15	9
16	8
17	7
18	6
19	5
20	4
21	3
22	2
23	1
24	0

536. ALTERNATIVE CERTIFICATION METHOD USING REGISTRATION ANALYSIS.

a. Objective. Certify radar service in the event all PE/MTI or PARROT/CPME are missing, unreliable, or unavailable for a particular sensor. This applies to FSL and multi-radar sites only.

b. Discussion. Certification of range/azimuth integrity may be accomplished using the registration report function provided by FSL. This may be an alternative certification procedure if a sensor does not have real-time quality control test targets (PARROT/CPME, PE/MTI) reporting or is not available at the MCW. In order to implement this procedure, the sensor must be reporting RTQC reliably.

c. Test Equipment Required. Not applicable.

d. Conditions. Registration is only possible on radar pairings. Radar pairings used for radar registration are defined in adaptation using the DMS. Only adapted radar pairings qualify for analysis using the registration report at the MCW position. It is important to determine which sensor is the "primary" or "standard" sensor in a multi-radar environment. Typically, it is the radar the terminal site maintains and is usually the closest or "local" radar. This radar must be within the certification parameters specified in Appendix 1 of this order. For the purpose of radar service through registration, this radar is considered the standard to which other radars paired to it are measured. If the primary sensor is not available, the next closest radar may be used as the standard. If a radar pair is adapted that does not involve the primary sensor then the ATSS or Radar Maintenance must make their best judgement as to which radar should be used as the standard. To implement the Registration Report as an alternative certification procedure the sensor used as the standard must be within the certification window per the procedures specified in Appendix 1 of this handbook.

e. Detailed Procedure.

1. Generate a Registration and Collimation Report at the MCW. Observe the system message area at the MCW to determine when registration analysis is complete on all radar pairings.
2. When registration analysis is complete print a copy of the registration and collimation report. Notice the report is organized into sections. Each section is subtitled by the word "RADAR" followed by the 3-letter radar designator. Identify the section that has data for the radar designated as the standard. Data in this section will not be used for registration because this is the standard all other radars paired to it are measured.
3. Identify the section that has data for radar paired to the designated standard radar. Under the "SITE" column find the standard radar row. Note the values under the "RECOMMENDED" column for range (1/512 NM) and azimuth (1/16 ACP) and check them against the standard and tolerances specified in paragraph 325a.
4. If values are outside the operating tolerances, then certification of this radar service is not possible using this method. In this case, the certifying official should make an entry in the log and every effort should be made to report this condition to the responsible organization and to correct it. A certification entry with an exception statement shall be made.

537. ALTERNATIVE CERTIFICATION METHOD USING VISUAL CHECKS.

a. Objective. Certify radar service in the event PE/MTI or PARROT/CPME devices are missing, unreliable, or unavailable for a particular sensor. This may apply to any site that can not use the alternative method specified in paragraph 536.

b. Discussion. Certification of range/azimuth integrity may be accomplished using visual display checks with targets of opportunity reporting positions to ground based controllers to verify displayed locations. This may be an alternative certification procedure if a sensor does not have specific real-time quality control test targets (PARROT/CPME and/or PE/MTI) reporting or is not available at the MCW. It is recommended that the site configure all sensors off-line from the TCW except one. Seperation rules apply for sensor selected.

c. Test Equipment Required. Not applicable.

d. Conditions. In order to implement this procedure, the sensor must be reporting RTQC reliably and pass the RTQC Check Report check specified in paragraph 521. These alternate procedures may be used in the event that preferred procedures are not possible due to an explainable circumstance where the certifying official is assured that the sensor is operating in a reasonable fashion. This procedure applies to FSL and ESL.

e. Detailed Procedure

1. Select a sensor for display.
2. Verify RTQC are reporting.
3. Select a map(s) that provide runway centerline for approaches.
4. Adjust display so that approaches on runway centerline are observed.
5. Coordinate with AT and verify that targets of opportunity are located as expected and the updates are reasonable for a properly functioning system.

538. – 549. RESERVED.

Section 2. Other Maintenance Tasks Procedures

550. FSL SOFTWARE RELEASE MAINTENANCE.

a. Objective. Provide guidelines for managing multiple versions of software in the system.

b. Discussion. STARS operational resources can store three versions (previous, current, and new) of operational software and/or adaptation. When a determination is made to replace the previous version, it may be purged from the SSS using the purge software capability from the Software Toolsmenu. However, this procedure should not be performed until a determination is made that the current software/adaptation is stable. Potential playback of stored CDR should also be considered before purging. Playback of CDR can only be accomplished with matching software and adaptation. It is recommended that versions are purged only after there is no longer any possibility of incident investigation of stored CDR.

NOTE: Do not purge a version from the SSS if that version remains in an operational directory. This will cause remove and replace failures of operational equipment.

c. Test Equipment Required. Not applicable.

d. Condition. Perform this test during maintenance time or during operational time after coordination with AT service.

e. Detail Procedure for FSL.

1. FSL can store up to three versions of operational software and adaptation files. The operational software will be stored in a software directory, and the adaptation files will be stored in an adaptation directory. During the Download Buildlists process, the operator will be asked to select a target directory, dir*_sw, or target environment, ENV00*_ad, where * is a 1, 2, or 3, to transfer the software to. First, Download Buildlists will remove all files from the selected target; then it will transfer selected files from the SSS to the selected target. If the selected target is being used operationally, Download Buildlists will remove and transfer files to the next available target without informing the operator. For example, if all three software directories (dir1_sw, dir2_sw and dir3_sw) have versions installed, and software directory dir1_sw is currently selected for operation, Download Buildlists will remove all files in software directory dir3_sw, and transfer selected files from the SSS to software directory dir3_sw although the operator selected software target directory dir1_sw.
2. At the initial delivery of STARS FSL, site will have initial operational software version installed in software directory dir1_sw, and initial site adaptation installed in the adaptation directory. This information can be viewed at an FSL MCW [System Control][FS Switch Software/Adaptation] window.
3. When a new operational software version is released to the site, site authorized personnel will perform Download Buildlists. This process will transfer the new operational software to software directory dir2_sw (assume that there is no change to adaptation files). After successfully testing the new software per release document (i.e., SSM and paragraph 552 of this handbook), the new release will then be used for operation.
4. When the third operational software version is released to the site, site authorized personnel will perform Download Buildlists. This process will transfer the new operational software-to-software directory dir3_sw (assume that there is no change to

adaptation files). Again, after successfully testing the new software per release document and paragraph 552 of this handbook, the new release will then be used for operation.

5. It is recommended that the adaptation update be maintained in a same manner as the operational software update.

551. ESL SOFTWARE RELEASE MAINTENANCE.

a. Objective. Provide guidelines for managing multiple versions of software in the system.

b. Discussion. STARS operational resources can store three versions (previous, current, and new) of operational software and/or adaptation. When a determination is made to replace the previous version, it may be purged from the SSS using the purge software capability from the STARS Software Tools Menu. However, this procedure should not be performed until a determination is made that the current software/adaptation is stable.

NOTE: Do not purge a version from the SSS if that version remains in an operational directory. This will cause remove and replace failures of operational equipment.

c. Test Equipment Required. Not applicable.

d. Condition. Perform this test during maintenance time or during operational time after coordination with AT service.

e. Detail Procedure for ESL.

1. ESL can store up to three versions of operational software and adaptation files. The operational software will be stored in a software directory, and the adaptation files will be stored in an adaptation directory. During the Download Buildlists process, the operator will be asked to select a target directory, dir*_sw, or target environment, ENV00*_ad, where * is a 1, 2, or 3, to transfer the software to. First, Download Buildlists will remove all files from the selected target; then it will transfer selected files from the SSS to the selected target. If the selected target is being used operationally, Download Buildlists will remove and transfer files to the next available target without informing the operator. For example, if all three software directories (dir1_sw, dir2_sw and dir3_sw) have versions installed, and software directory dir1_sw is currently selected for operation, Download Buildlists will remove all files in software directory dir3_sw, and transfer selected files from the SSS to software directory dir3_sw although the operator selected software target directory dir1_sw.

2. At the initial delivery of STARS FSL, the site will have initial operational software version installed in software directory dir1_sw, and initial site adaptation installed in the adaptation directory. This information can be viewed at an FSL MCW [System Control][FS Switch Software/Adaptation] window.

3. When a new operational software version is released to the site, site authorized personnel will perform Download Buildlists. This process will transfer the new operational software to software directory dir2_sw (assume that there is no change to adaptation files). After successfully testing the new software per release document (i.e., SSM and paragraph 553 of this handbook), the new release will be used for operation.

4. When the third operational software version is released to the site, site authorized personnel will perform Download Buildlists. This process will transfer the new operational software-to-software directory dir3_sw (assume that there is no change to

adaptation files). After successfully testing the new software per release document and paragraph 553 of this handbook, the new release will be used for operation.

5. It is recommended that the adaptation update be maintained in a same manner as the operational software update.

552. FSL SOFTWARE UPDATE CHECKS.

a. Objective. Verify that a new FSL software release, new CAS upgrade, and/or new adaptation meet certification criteria.

b. Discussion. The certifying official must document the completion of this procedure. That documentation will be utilized as the basis for completing the necessary certifications until the next software update or reinstallation.

c. Test Equipment Required. Not applicable.

d. Conditions.

1. Verify that the minimum required resources that can sustain the facility AT operation are available.
2. If STARS was partitioned to install software, the ATSS should use certification with exception for the unused redundant components.

e. Detailed Procedure for FSL.

1. Before downloading software or adaptation determine which directory to download so that the desired software and/or adaptation will be available for fallback.
2. Download software and/or adaptation per procedures in the delivered SSM, authorizing delivery document or 6191.500.
3. After downloading but before switching, verify the software and/or adaptation versions agree with the version number shown in the authorizing delivery document. Perform this check at the MCW. If the versions are correct, perform the switch.
4. At the FSL MCW, verify that status of each device installed in the system is indicated on the screen. Any device that is physically installed, but not shown on the MCW screen, may be an indication the system is adapted incorrectly.
5. At the FSL MCW, reset any VSPs previously set for local operations (e.g., disable long-range sensor weather, registration corrections, etc.)
6. If maps were modified, refer to paragraph 555 in this handbook to verify that geographic maps are adapted correctly.
7. Service and system certifications are required per Appendix 1 of this handbook.
8. Prepare a chart showing the document number for the latest software release, the software version numbers, the date the release was installed, and the date this test was completed. Figure 5-1, STARS Updated Software Chart is an MS Word file delivered with this handbook as a usable STARS updated software chart.
9. File the chart in the STARS Facility Reference Data File (FRDF). A copy may be posted near the STARS computer system for system certification purposes.
10. Make the following entry in the facility maintenance log:

    “FSL software updated checks completed for SSM YYY”

    where:

YYY is the SSM number.

11. For adaptation releases submitted with a delivery memorandum and not an SSM, make the following entry in the facility maintenance log:

"FSL adaptation updated checks completed for ZZZ"

where:

ZZZ is the adaptation buildlist version(s).

553. ESL SOFTWARE UPDATE CHECKS.

a. Objective. Verify that new ESL software release, new CAS upgrade, and/or new adaptation meet certification criteria.

b. Discussion. The completion of this procedure must be documented. That documentation will be utilized as the basis for completing the necessary certifications until the next software update or reinstallation.

c. Test Equipment Required. Not applicable.

d. Conditions.

1. Verify that the minimum required resources that can sustain the facility AT operation are available.

   NOTE: If an RT is connected to the SOS, and the RT has a direct Local Radar Feed, then this check must be made on DRF remote NUNIOs and CGWs.

2. The procedure in this paragraph must be run every time a change is made to the ESL software and/or adaptation.

e. Detailed Procedure for ESL.

1. Before downloading software or adaptation, determine which directory to download so that the desired software and/or adaptation will be available for fallback.
2. Download software and/or adaptation per procedures in the delivered SSM, authorizing delivery document or 6191.500.
3. After downloading but before switching, verify the software and/or adaptation versions agree with the version number shown in the authorizing delivery document. Perform this check at the MCW. If the versions are correct, perform the switch.
4. At the ESL MCW, reconfigure to standby resources.
5. At the ESL MCW, verify that the status of each device installed in the system is indicated on the screen. Any device that is physically installed, but not shown on the tested MCW screen, may be an indication the new system is adapted incorrectly.
6. At the ESL MCW, reset any VSPs previously set for local operations.
7. If maps were modified, refer to paragraph 555 in this handbook to verify that geographic maps are adapted correctly.
8. Service and system certifications are required per Appendix 1 of this handbook.
9. Prepare a chart showing the document number for the latest software release, the software version numbers, the date the release was installed, and the date this test was completed. Figure 5-1, STARS Updated Software Chart is a usable MS Word file delivered with this handbook.

10. File the chart in the STARS Facility Reference Data File (FRDF). A copy may be posted near the STARS computer system for system certification purposes.

11. Make the following entry in the facility maintenance log:

    "ESL software updated checks completed for SSM YYY"

    where:

    YYY is the SSM number.

12. For adaptation releases submitted with a delivery memorandum and not an SSM, make the following entry in the facility maintenance log:

    "ESL adaptation updated checks completed for ZZZ"

    where:

    ZZZ is the adaptation buildlist version(s).

554. FIREWALL/WAN ROUTER CONNECTIVITY PERFORMANCE CHECK.

a. Objective. Verify that the Firewall is properly configured and functional.

b. Discussion. The Firewall processor should provide secure access for external dial-up connections between the WAN router and support facilities in the STARS hierarchy, i.e., the regional OSF and the SCSC. STARS implements a standard, system-wide firewall rule-set maintained under centralized configuration management by the STARS Information System Security Officer (ISSO) at the SCSC.

c. Test Equipment Required. Not applicable.

d. Conditions. The detailed procedure should be conducted, at minimum, following the events listed below:

1. Root password change
2. Firewall R & R
3. After an event or incident that site deems may impact firewall functionality or integrity.

e. Detailed Procedures.

1. Some IP addresses are required for this procedure. Using the host file, determine the IP address for the Site Server (SS) of the support facility.
2. The ATSS will be asked to contact the OSF/SCSC. Once this is done, the ATSS may either maintain communication throughout the firewall performance check or disconnect with the support facility and then contact facility to report the completion of the check.
   (a) Configure the Support Site Interface online at the ES MCW.
   (b) Inform support facility (OSF or SCSC) of pending connection and ensure that their modems are on.
3. At the SSS, issue a continuous ping command to the SS by typing: "ping –s [SS IP address] then press enter. (The connection may take up to a minute to establish.)
4. Verify that ping generates response message.
5. Stop continuous ping by typing, <Ctrl><C> simultaneously.
6. From the SSS, download the file:

/fsstars/install/W/wan_connectivity_test_file.bl_al

(a) Start tool menu.

(b) Press the “Distribute Buildlists” button.

(c) Select the SCSC and press the “Compile Retrieve List” button.

(d) After the list of available buildlists is compiled, locate the buildlist called “wan_connectivity_test_file.bl_al” and select it.

(e) Press the “Get file(s) From SCSC” button.

(f) After the file transfer is complete, a screen message should indicate that the process has succeeded.

(g) Exit out of tool menu.

(h) Open an xterm window.

(i) Enter the following commands:

cd /usr/bin/cksum/fsstars/install/W

./wan_connectivity_test_file.bl_al

(j) Verify that the output matches the example:

“2394113417 134 /fsstars/install/W/wan_connectivity_test_file.bl_al”

(k) Enter the command:

cat /fsstars/install/W/wan_connectivity_test_file.bl_al

(l) Verify that the output matches the text of the message:

“This is a test file from the SCSC to be used when testing WAN connectivity.
Delete once test is completed.
(609) 485-4639 SCSC Lab”

(m) As “root”, delete the file by entering the following commands:

cd /fsstars/install/W

rm –f wan_connectivity_test_file.bl_al

7. Report to support facility that check is complete.

8. Configure the Support Site Interface offline at the ES MCW.

9. Repeat steps 1-8 to test OSF connectivity.

555. MAP ALIGNMENT CHECK.

a. Objective. Ensure that map adaptation is aligned with the fixed target map at the TCWs.

b. Discussion. This check is performed to new maps when new maps are added to the system. Utilize the targets of opportunity to verify runway centerline alignment and/or navigation aid alignment. All maps are built to true North. If applicable, utilize the cardinal marks on the fixed target map to ensure they coincide with the cardinal marks of the maps being checked. A request to have cardinal marks added to maps should follow local policy. The required number of maps and displays to be checked will be determined locally. It is the responsibility of AT to ensure map accuracy. (See the latest edition of Order 7110.65, Air Traffic Control.) It is permissible to corroborate with ATC to verify map accuracy.

NOTE 1: Due to Magnetic Variance and the differences between FSL and ESL adaptation and the Magnetic Variance Tile Set, a shift of the display may be noticed when selecting between FSL and ESL. If more information is needed, or if a listing of the Magnetic Variance Tile Set is needed, a listing of the Magnetic Variance Tile Set is provided with the site adaptation.

NOTE 2: Magnetic offset variations change over time, but the site survey information in the FRDF changes only when a change of more than 2 degrees has occurred. Because STARS uses more current and accurate offset information, the location of the PEs, MTI Reflectors, CPMEs, and RTQC could be displayed at a location different than the location recorded in the FRDF.

c. Test Equipment Required. Not applicable.

d. Conditions. Checks made for the Fixed Target Map (paragraph 556) must be made before the checks in this paragraph can be made.

e. Detailed Procedures.

1. Clear all maps from the TCW.
2. Display the Fixed Target Map.
3. Center the TCW display.
4. Select the map to be checked and ensure that the user map and the Fixed Target Map Cardinal Marks overlay.
5. For the appropriate maps, utilize a target of opportunity that is landing to verify that the runway centerline is adapted correctly.

556. FIXED TARGET MAP.

a. Objective. Verify that PEs, MTI reflectors, beacon PARROTs, CPME, and RTQC on the geographic map are adapted correctly.

b. Discussion. The fixed target map is a set of overlaying polygons and Cardinal Marks. These overlaying polygons represent the location of the PEs, MTI reflectors, beacon PARROTs, CPMEs, and RTQCs of a particular sensor. The areas of the fixed target map polygons are adapted as specified in paragraph 322 of this handbook. The Cardinal marks, which include the True North Mark, should be adapted according to the Magnetic Variance Tile Set. Each site is responsible for having a National Automation Request (NAR) form submitted to the associated OSF so the OSF can update the site adaptation to reflect the location of the PEs, MTI reflectors, beacon PARROTs, CPMEs, and RTQCs. The NAR forms should provide the location of said test target locations. Request to have the fixed target map generated should follow local policy.

NOTE 1: Due to Magnetic Variance and the differences between FSL and ESL adaptation and the Magnetic Variance Tile Set, a shift of the display may be noticed when selecting between FSL and ESL. If more information is needed, or if a listing of the Magnetic Variance Tile Set is needed, a listing of the Magnetic Variance Tile Set is provided with the site adaptation.

NOTE 2: Magnetic offset variations change over time, but the site survey information in the FRDF changes only when a change of more than 2 degrees has occurred. Because STARS uses more current and accurate offset information, the location of the PEs, MTI Reflectors, CPMEs, and RTQC could be displayed at a location different than the location recorded in the FRDF.

c. Test Equipment Required. Not applicable.

d. Conditions. Not applicable.

e. Detailed Procedures.

1. At a TCW, select the sensor to be checked and set the sensor reference at the center of the display.
2. Clear all maps from the TCW.
3. Select the Fixed Target map that is associated to the sensor.
4. Verify that all working PE, MTI reflector, beacon PARROTS, CPME, and RTQC symbols on the map are aligned and positioned with radar returns.
5. If applicable, check the Cardinal Marks on the Fixed Target Map.
6. Center the TCW display.
7. Verify that the True North Cardinal Mark is in the correct position using the value of the TCW display center Magnetic Variation Tile provided by the OSF.
8. Verify the remaining Cardinal Marks.

557. GPS DAC VALUE CHECK

a. Objective. Verify that the DAC value on the GPS Time Unit meets the performance parameters listen in paragraph 3.

b. Discussion. The GPS receiver includes DAC (Digital to Analog Converter) which is used to adjust the internal time base. If the DAC value drifts below 5000 or above 60000, recalibration is needed to ensure GPS accuracy.

c. Test Equipment Required. Not applicable.

d. Conditions. This check should be conducted on a GPS Time Unit that is receiving UTC messages from the connected antenna.

e. Detailed Procedures. The following procedure provides direction for checking the DAC value on the GPS Time Unit.

1. On the Front panel of the GPS Time Unit, ensure the first menu screen is displayed.
2. Press the menu button once to toggle to the Second menu screen. The DAC value is displayed on this menu screen.
3. Verify that DAC value is between 5000 and 60,000. If DAC value is less than or equal to 5000 or greater than or equal to 60,000, a replacement GPS Time Unit should be requested. Ensure that a note is included with the returned GPS that a DAC calibration is required. An R&R of the GPS Time Unit should be performed.

558. BLOWER FAN AND FILTER INSPECTION AND CLEANING.

a. Object. This procedure determines that the blower fans and any filters in the equipment cabinets are clean and functioning properly.

b. Discussion. The equipment cabinet blower fans are visually inspected to determine if they are moving air as intended. The air filters are inspected to determine if they require cleaning or replacement.

c. Test Equipment Required. No test equipment required.

d. Conditions. No special conditions required..

e. Detailed Procedure.

1. Identify the location of the blower, fans, and filters for each subsystem under inspection.
2. Access the required equipment cabinet or drawer of the subsystem under inspection.
3. Locate the blower fans for the equipment under inspection.
4. Visually determine if the blower fan is functioning.
5. Locate and inspect any air filters.
6. If the filter is dirty, clean the filter if possible; replace the filter if necessary.
7. Return the system to operational status.

559. RACK CABINET PHYSICAL INSPECTION AND CLEANING.

a. Object. This procedure determines that assemblies and sub-assemblies in the rack cabinets are free from foreign matter.

Discussion. Foreign matter such as dust, dirt, grease, or water may cause improper operation or damage to electronic components. For racks with non-perforated front doors, airflow is obtained through forced airflow from beneath the floor and/or from the blower fan assemblies. For racks with perforated front doors and/or rear doors, airflow is obtained by individual assembly fans drawing air in through the front door and exhausting air through rear door. More attention for dust accumulation is needed for racks with perforated front doors. Attention should be paid to the AS1 and AS2 racks because they have additional door fans added to assist cooling of equipment mounted behind them.

b. Test Equipment Required. No test equipment required.

c. Conditions. No special conditions required.

d. Detailed Procedure.

For racks with non-perforated front doors:

1. Inspect cabinet for accumulation of dirt, dust, grease, water, or any foreign matter.
2. Remove all dust with a soft brush. Brush as far away from processors as possible, and then vacuum clean.
3. Remove dirt and grime with a damp cloth.
4. Clean all exterior surfaces with a mild detergent.
5. Remove excess water with a dry cloth or sponge.

For racks with perforated front and/or rear doors:

1. Inspect cabinet for accumulation of dirt, dust, or any foreign matter.
2. Remove dust using a vacuum cleaner
3. Remove dirt and grime with a damp cloth.
4. Clean all exterior surfaces with a mild detergent.

560. TCW CABINET PHYSICAL INSPECTION AND CLEANING.

a. Object. This procedure determines that assemblies and sub-assemblies in the TCW display cabinets are free from foreign matter.

b. Discussion. Foreign matter such as dirt, grease, or water may cause improper operation or damage to electronic components.

c. Test Equipment Required. No test equipment required.

d. Conditions. No special conditions required.

e. Detailed Procedure.

1. Inspect unit for accumulation of dirt, dust, grease, water, or any foreign matter.
2. Remove all dust with a soft brush. Brush as far away from processors as possible, and then vacuum clean.
3. Remove dirt and grime with a damp cloth.
4. Clean all exterior surfaces with a mild detergent.
5. Remove excess water with a dry cloth or sponge.

561. CHECK CONNECTOR MATING.

a. Object. This procedure determines that connectors for assemblies an sub-assemblies in the STARS system are properly installed.

b. Discussion. Loose or damaged connectors may cause improper operation or damage to electronic equipment.

c. Test Equipment Required. No test equipment required.

d. Conditions. No special conditions required.

e. Detailed Procedure.

1. Inspect unit for loose or damaged connectors.
2. Gently push down on all connectors, making sure they seat properly.
3. Tighten any loose connectors.
4. Replace damaged cables.

562. TDW ARTICULATING ARM CHECK.

a. Object. This procedure determines that the TDW articulating arm assembly and components are properly installed and in satisfactory condition.

b. Discussion. Leaky gas spring pistons may not function properly and may cause additional damage to tower equipment. Frayed or worn brake cables may not function properly. Loose or damaged connectors may cause improper operation or damage to electronic equipment.

c. Test Equipment Required. No test equipment required.

d. Conditions. No special conditions required.

e. Detailed Procedure.

1. Check articulating arm joints and components for cracks, fatigue, or wear. Note any deficiencies.

2. Test range of movement and adjustment of articulating arm. Note any deficiencies.
3. Check gas spring piston and the area underneath the arm mounted TDW for signs of leaks. Test operation of piston. Replace leaky piston.
4. Check brake cable for frayed or damaged wire or fittings. Test operation of articulating arm brake. Replace damaged cable.

563. TDM HEPA FILTER INSPECTION AND CLEANING

a. Object. This procedure determines that the TDM HEPA filter is clean and free of foreign matter.

b. Discussion. A dirty HEPA filter may not function properly and cause the TDM to operate at higher temperatures.

c. Test Equipment Required. No test equipment required.

d. Conditions. No special conditions required.

e. Detailed Procedure.

1. Remove the HEPA filter from the TDM.
2. Inspect the filter against a bright source of light.
3. Remove dirt by slapping filter against the edge of a desk, vacuuming, or brushing with fingers.
4. Re-inspect the filter against a bright source of light.
5. Replace filters that do not clean.

564. TDM FAN INSPECTION AND CLEANING

a. Object. This procedure determines that the TDM rear fans and area behind fans are free of foreign matter and are clean.

b. Discussion. Proper cleaning of the TDM fans and area behind the fans is necessary to prevent TDM from overheat conditions. Dirt or grime build up on fan assembly or perforated hole behind intake fan could cause the TDM to operate at higher temperatures and cause harm to the monitor.

c. Test Equipment Required. No test equipment required.

d. Conditions. No special conditions required.

e. Detailed Procedure.

NOTE: It is imperative that all connectors and plugs are marked for proper replacement/connection of all cabling. COTS equipment is not marked with system-unique identifiers for the proper replacement of cabling and or position of parts. Never disconnect any cabling or parts from COTS equipment without first ensuring that all cables, connectors, and parts are properly marked for replacement.

1. Remove each fan assembly.
2. Inspect and clean fan blades using compressed air, vacuum, brush, and or damp cloth.

3. Inspect and clean perforated area behind the intake fan using a vacuum or damp cloth.
4. Inspect and clean access areas behind top exhaust fans fan using a vacuum.

565. – 569. RESERVED.

Section 3. Special Maintenance Procedures

570. – 598. RESERVED.

Chapter 6. FLIGHT INSPECTION

600. GENERAL.

a. Flight inspections are made to verify the overall performance of radar, navigation aids, and air/ground communications systems. Direction for flight inspections are contained in the latest edition of Order 8200.1, United States Standard Flight Inspection Manual.

b. Direction for flight inspections following an aircraft accident are contained in the latest edition of Order 8020.16, Air Traffic Organization Aircraft Accident And Incident Notification, Investigation, And Reporting

601. – 699. RESERVED.

APPENDIX 1. CERTIFICATION REQUIREMENTS

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 combinations 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.

3. SYSTEMS.

Centralized, distributed, or backup surveillance processing systems, TCW or TDW are used to provide these services. The system is certified STARS 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 level (ESL) is taken out of service, yet another level (FSL) 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.

APPENDIX 1. CERTIFICATION REQUIREMENTS

5. TRANSITION PHASE.

As surveillance processing systems are replaced, it is necessary to run dual processing operations. To accommodate different configurations that are subject to change, the reference paragraphs in this appendix are provided in separate columns for each of the applicable configurations. All procedures for each configuration currently in operation shall be accomplished.

6. FUTURE SYSTEMS.

For future planning purposes, systems that provide the above services or are used for testing or prototyping shall be certified in accordance with Order 6000.15.

APPENDIX 1. CERTIFICATION REQUIREMENTS

TABLE A1-1. TERMINAL AUTOMATED RADAR SERVICE (TARS)

Advertised Service	*Certification Parameter*	*Reference Paragraph*
Certification of constituent facilities.	Knowledge that the constituent Surveillance Radar System (SRS), Surveillance Interrogator System (SIS), and Surveillance Flight Planning System (SFS) is certified (FAA) or suitable for NAS (DOD).	FAA sites should log onto the Maintenance Management System (MMS) or use any means available to determine if a Surveillance Radar System, Surveillance Interrogator System, and Surveillance Flight Planning System is certified. Sites can reference FAAO 6000.6 for an explanation of DOD certification guidelines and responsibilities.
Flight Data Processing (FDP)	Flight Data Processing Input/Output and connectivity check	Par. 324; Par. 515
STARS certification.	Knowledge that STARS is certified.	APPENDIX 1, Table A1-3
Sensors update and display capability.	Test target check at the required number of display positions.	**FSL:** Par. 309c; Par. 512 **ESL:** Par. 317c; Par. 513
	Radar Data Processing and Display Capability. **NOTE:** Corroboration with ATC to verify that data entry and display functions are performing normally is permitted.	**FSL:** Par. 310d; Par. 518 **ESL:** Par. 318d; Par. 524
FSL system status alert color check	Verify red color in red check symbol.	**FSL**: Par. 319; Par. 514
ESL system status alert color check	Verify red color in red check symbol.	**ESL**: Par. 320; Par. 517
Service Level Availability Check.	Back-Up Data Processing.	
	FSL (ESL)	Par. 341a; Par. 519

Normal Certification Interval: Weekly.

Allowable Exceptions: FSL, ESL, associated surveillance radar, associated surveillance interrogator, flight planning (Inter-facility).

Person Responsible for Certification: ATSS with certification authority.

Certification Entries in the TARS Maintenance Log:

Without Exception:

TARS certified.

With Exception:

TARS certified except (appropriate service level) subsystem.

TARS certified except (location identifier) (associated surveillance system).

Removing Exception:

TARS (appropriate service level) subsystem certified.

TARS (location identifier) (associated surveillance system) certified.

APPENDIX 1. CERTIFICATION REQUIREMENTS

Table A1-2. REMOTE TOWER ALPHANUMERIC DISPLAY SERVICE (RTADS)

Advertised Service	*Certification Parameter*	*Reference Paragraph*
Provide terminal processing to remote tower	Knowledge that the constituent STARS is certified	APPENDIX 1 Table A1-3
	Knowledge that the RTDS is certified	APPENDIX 1 Table A1-4
NOTE: Check each applicable sensor.	Targets update and display as expected. **NOTE:** Corroboration with ATC to verify that targets are updating as expected at each applicable sensor is permitted.	**FSL:** Par. 340a **ESL:** Par. 340b **DRF:** Par. 340c
Data Entry and Display capability.	Proper data entry processing and display functions at display positions.	**FSL:** Par. 345a; **ESL:** Par. 345b **DRF:** Par. 345c; Par. 318d, Par. 524
Sensors update and display capability.	Test target check at the required number of display positions.	**DRF:** Par. 317c; Par. 513
FSL system status alert color check	Verify red color in red check symbol.	**FSL:** Par. 319; Par. 514
ESL system status alert color check	Verify red color in red check symbol.	**ESL:** Par. 320; Par. 517
Audible Alarm Test	Verify the MSAW alarm sound	**FSL:** Par.339
Service Level Availability Check.	Back-Up Data Processing.	
	FSL (ESL, DRF)	Par. 341a; Par. 519

Normal Certification Interval: Weekly.

Allowable Exceptions: FSL, ESL, DRF, and associated radar system.

Person Responsible for Certification: ATSS with certification authority.

Certification Entries in the RTADS Maintenance Log:

Without Exception:

RTADS certified.

With Exception:

RTADS certified except (appropriate service level) subsystem.

RTADS certified except (location identifier) radar system.

Removing Exception:

RTADS (appropriate service level) certified.

RTADS (location identifier) radar system certified.

APPENDIX 1. CERTIFICATION REQUIREMENTS

Table A1-3. STANDARD TERMINAL AUTOMATION REPLACEMENT SYSTEM (STARS)

Advertised Service	*Certification Parameter*	*Reference Paragraph*
Processing and Display System (PDS) capability.	Knowledge that the STARS subsystem(s) is certified.	
	FSL	APPENDIX 1, Table A1-3a
	ESL	APPENDIX 1, Table A1-3b
	DRF	APPENDIX 1, Table A1-3c

Normal Certification Interval: Event Based (per 6000.15).

Allowable Exceptions: FDP Service and Individual service level subsystems, i.e., FSL, ESL, DRF

Person Responsible for Certification: ATSS with certification authority.

Certification Entries in the STARS Maintenance Log:

Without Exception:

STARS certified.

With Exception:

STARS certified except (service level) subsystem.

STARS certified except Flight Data Processing.

Removing Exception:

STARS (service level) certified.

STARS Flight Data Processing certified.

APPENDIX 1. CERTIFICATION REQUIREMENTS

Table A1-3A. STARS FULL SERVICE LEVEL (FSL) SUBSYSTEM

Advertised Service	*Certification Parameter*	*Reference Paragraph*
Processing and Display System (PDS) capability.	Resources verification test.	Par. 310b; Par. 510
	Performance Verification of air traffic control visual and aural alarms. (The MSAW and CA alarm tests are included in the PVER. This test is executed on a TCW or TDW).	Par. 310c; Par. 516
Sensor update and display capability.	Proper indications at monitor and control position.	Par. 309a and Par. 309b; Par. 511
Range/Azimuth Integrity.	Radar and Interrogator positions reliability of PEs/MTI reflectors and PARROTs/CPME. **Note 1:** Interim FMA facilities do not need to perform this check. It is performed under FMA TSPAD.	Par. 322a and Par. 520

Normal Certification Interval: Event Based (per 6000.15).

Allowable Exceptions: Individual FSL LRUs, redundant resources, e.g., NUNIO, CGW, RDP, LAN equipment, and individual TDW/TCW(s).

Person Responsible for Certification: ATSS with certification authority.

Certification Entries in the STARS Maintenance Log:

Without Exception:

FSL subsystem certified.

With Exception:

FSL subsystem certified except FSL (LRU or designated display).

Removing Exception:

FSL subsystem FSL (LRU or designated display) certified.

APPENDIX 1. CERTIFICATION REQUIREMENTS

Table A1-3B. STARS EMERGENCY SERVICE LEVEL (ESL) SUBSYSTEM

Advertised Service	*Certification Parameter*	*Reference Paragraph*
Processing and Display System (PDS) capability.	Resources verification test.	Par. 318b, Par. 510
	Performance Verification of air traffic control visual and aural alarms. (Executed on a TCW or TDW).	Par. 318c, Par. 522
Sensor update and display capability.	Proper indications at monitor and control position.	Par. 317a and Par. 317b; Par. 511
Range/Azimuth Integrity.	Radar and Interrogator positions reliability of PEs/MTI reflectors and PARROTs/CPME.	Par. 322b

Normal Certification Interval: Event Based (per 6000.15).

Allowable Exceptions: Individual ESL LRUs, redundant resources, e.g., NUNIO, CGW, RCGW, network equipment, and individual TDW/TCW(s).

Person Responsible for Certification: ATSS with certification authority.

Certification Entries in the STARS Maintenance Log:

Without Exception:

ESL subsystem certified.

With Exception:

ESL subsystem certified except (LRU or designated display).

Removing Exception:

ESL subsystem (LRU or designated display) certified.

APPENDIX 1. CERTIFICATION REQUIREMENTS

Table A1-3C. STARS DIRECT RADAR FEED (DRF) SUBSYSTEM

Advertised Service	*Certification Parameter*	*Reference Paragraph*
Sensor update and display capability.	Proper indications at monitor and control position.	Par. 317a and Par. 317b; Par. 511
Processing and Display System (PDS) capability.	Resource verification test	Par. 318b, Par. 510
Range/Azimuth Integrity	Radar and Interrogator positions reliability of PEs/MTI reflectors and PARROTs/CPME at ESL MCW.	Par. 322b

Normal Certification Interval: Event Based (per 6000.15).

Allowable Exceptions: Individual DRF LRUs, redundant resources, e.g., NUNIO, CGW, RCGW, network equipment, and individual TDW/TCW(s).

Person Responsible for Certification: ATSS with certification authority.

Certification Entries in the STARS Maintenance Log:

Without Exception:

DRF subsystem certified.

With Exception:

DRF subsystem certified except (LRU or designated display).

Removing Exception:

DRF subsystem (LRU or designated display) certified.

APPENDIX 1. CERTIFICATION REQUIREMENTS

Table A1-4. RADAR TERMINAL DISPLAY SYSTEM (RTDS)

Advertised Service	*Certification Parameter*	*Reference Paragraph*
Radar Tower Display Capability.	Performance Verification of air traffic control visual and aural alarms. **NOTE:** Performed at TRACON and observed at Remote Tower. Corroboration between remote tower and TRACON/RAPCON personnel may be required to perform this test.	**FSL:** Par 310c; Par. 516 **ESL:** Par. 318c; Par. 522 **DRF:** Par. 318c; Par. 522

Normal Certification Interval: Event Based (per 6000.15).

Allowable Exceptions: Individual TDW(s) and subsystem level.

Person Responsible for Certification: ATSS at the ATCT with certification authority.

Certification Entries in the RTDS Maintenance Log:

Without Exception:

RTDS certified.

With Exception:

RTDS certified except (designated display).

Removing Exception:

RTDS (designated display) certified.

APPENDIX 2. GLOSSARY OF ACRONYMS AND TERMS

Table A2-1. ACRONYMS

ACID	Aircraft Identification
ACP	Azimuth Change Pulse
AF	Airway Facility
AFAAR	Technical Operations Aircraft Accident Representative
AIG	Applications Interface Gateway
AOS	Operational Support Service
ARSR	Air Route Surveillance Radar
ARTCC	Air Route Traffic Control Center
ARTS	Automated Radar Terminal System
ASR	Airport Surveillance Radar
AT	Air Traffic
ATB	Terminal Business Service
ATC	Air Traffic Control
ATCBI-5	Air Traffic Control Beacon Interrogator, Model 5
ATCBI-6	Air Traffic Control Beacon Interrogator, Model 6
ATO	Air Traffic Operation
ATS	Air Traffic Service
ATSS	Airway Transportation System Specialist
CA	Conflict Alert
CAS	Commercially Available Software
CDR	Continuous Data Recording
CGW	Communication Gateway Workstation
CJI	Controller Jurisdiction Indicator
CMD	Control and Monitor Display
COTS	Commercial Off–The–Shelf
CPME	Calibration Performance Monitoring Equipment
CRT	Cathode Ray Tube
DAT	Digital Audio Tape
DBRITE	Digital Bright Radar Indicator Tower Equipment
DDM	Data Display Monitor
DDS	Digital Data System

APPENDIX 2. GLOSSARY OF ACRONYMS AND TERMS

Table A2-1. ACRONYMS

DEDS	Data Entry and Display Subsystem
DLT	Digital Linear Tape
DoD	Department of Defense
DRF	Direct Radar Feed, also Data Recording Facility
EDC	Early Display Configuration
EARTS	En route Automated Radar Terminal System
ES	Emergency Service
ESL	Emergency Service Level
FAA	Federal Aviation Administration
FCON	Full Consolidation
FDB	Full Data Block
FRDF	Facility Reference Data File
FS–1	Full STARS phase 1
FS–2	Full STARS phase 2
FSL	Full Service Level
GPS	Global Positioning System
GPW	General Purpose Workstation
ID	Identification
IFDT	Inter-Facility
IP	Internet Protocol
IEEE	Institute of Electrical and Electronic Engineers
IETM	Interactive Electronic Technical Manual
LAN	Local Area Network
LDB	Limited Data Block
LED	Light Emitting Diode
LRU	Line Replaceable Unit
Mbps	Megabit Per Second
MCI	Mode C Intruder
MCP	Monitor and Control Process
MCW	Monitor Control Workstation
MDB	Minimal Data Blocks
MM	Millimeter

APPENDIX 2. GLOSSARY OF ACRONYMS AND TERMS

Table A2-1. ACRONYMS

Modem	Modulator/Demodulator
MSAW	Minimum Safe Altitude Warning
MSU	Modem Sharing Unit
MTI	Moving Target Indicator
NAR	National AOS Request
NAS	National Airspace System
NCP	NAS Change Proposal
NIS+	Network Information System Plus
NM	Nautical Mile
NUNIO	Networked Universal Input/Output
OCC	Operational Control Center
OSF	Operational Support Facility
PARROT	Position Adjustable Range Reference Orientation Transponder
PC	Personal Computer
PE	Permanent Echo
PIDP	Programmable Indicator Display Processor
PPS	Present Position Symbol
PRM	Precision Runway Monitor
PRM-A	Precision Runway Monitor - Alternate
PSR	Primary Surveillance Radar
PTL	Predicted Track Line
PTR	Program Technical Report
PVER	Performance Verification
R & R	Remove and Replace
RAPCON	Radar Approach Control
RATCF	Radar Air Traffic Control Facility
DAIR	Navy Radar Air Traffic Control Facility–Direct Altitude and Identification Readout
RDP	Radar Data Processor
RT	Remote Tower
RTADS	Remote Tower Alphanumeric Display System
RTDS	Radar Terminal Display System
RTQC	RealTime Quality Control

APPENDIX 2. GLOSSARY OF ACRONYMS AND TERMS

Table A2-1. ACRONYMS

SCSC	STARS Central Support Complex
SFS	Surveillance Flight Plan Systems
SIS	Surveillance Interrogator Systems
SMO	System Management Office
SOS	STARS Operational Site
SPC	Special Code
SR	Search Radar
SRS	Surveillance Radar Systems
SS	STARS Support Subsystem
SSM	System Support Modification
SSPP	STARS Security Process and Procedures
SSR	Secondary Surveillance Radar
SSS	Site Support Server
STARS	Standard Terminal Automation Replacement System
Std	Standard
TCW	Terminal Control Workstation
TDW	Tower Display Workstation
TI	Technical Instruction
TSPAD	Terminal Surveillance Parallel Approach Display
TRACON	Terminal Radar Approach Control
TRDP	Terminal Radar Data Processing
TARS	Terminal Automated Radar Service
TTSE	Test and Training Simulator Equipment
TTYE	Teletype Emulator
TWX	Teletypewriter Exchange Service
UTC	Coordinated Universal Time (ZULU)
VSP	Variable Site Parameter
WAN	Wide Area Network
WJHTC	William J. Hughes Technical Center

APPENDIX 2. GLOSSARY OF ACRONYMS AND TERMS

Table A2-2. TERMS.

Terms used in this handbook are as follows:

Beacon Azimuth Split	Two beacon reports from a single target. Both reports contain the same beacon code, occur within the same scan, are in the same range cell, and are separated in azimuth by no more than 45 ACPs.
Beacon Range Split	Two beacon reports from a single target. Both reports contain the same beacon code, occur within the same scan, are in adjacent range cells, and are separated in azimuth by no more than 30 ACPs.
Beacon Blip/Scan	The ratio between the number of times a target is detected over the number of times it should have been detected (Blip Scan = #Hits/#Scans). A low blip scan increases the probability that a track will coast more frequently.
Common Digitizer	A device that converts analog radar and beacon returns into a digitized form that is transmitted via landlines to the indicator site for use by a tracking computer.
Correlation	The relative association of two sets of data; e.g., positional agreement between radar data and the computer predicted track position.
Data Block	The item displayed adjacent to a tracked aircraft target, containing aircraft position symbols, leader, and the alphanumeric data associated with the aircraft i.e., aircraft identification, assigned altitude, Mode C altitude, beacon code, and special condition indicators.
Leader	A straight line connecting the track symbol and the alphanumeric data.
Lists	Aircraft data presented in tabular form on the display.
Matched Track	A track that is paired to its proper flight plan segment.
Mode 2	A reply from an airborne beacon transponder at 1090 megahertz used by the military.
Mode 4	A reply from an airborne beacon transponder at 1090 megahertz used by the military.
Mode 3/A	A reply from an airborne beacon transponder at 1090 megahertz with a P1 to P3 spacing of 8 seconds utilize; that is used for identification and tracking. The reply utilizes a pulse train of 12 pulses. Each pulse has 0.45 seconds wide and space 1.45 seconds apart. There are 4096 possible transponder codes (0000 to 7777 octal).
Mode 3/A Reliability	The ratio of the number of beacon returns with the Mode 3/A validity bit set to the total number of beacon returns.
Mode 3/A Validity	The mode 3/A validity bit is set by the digitizer when two successive replies in a response from the same aircraft are identical. If two successive code matches are not found before target trail edge then the validation bit is set to zero.
Mode C	A reply from an airborne beacon transponder at 1090 megahertz with a

APPENDIX 2. GLOSSARY OF ACRONYMS AND TERMS

Table A2-2. TERMS.

	P1 to P3 spacing of 21 microseconds utilize to automatically report uncorrected pressure altitude to the nearest 100 feet.
Mode C Reliability	The ratio of the number of beacon returns with the Mode C validity bit set to the total number of beacon returns.
Mode C Validity	The mode C validity bit is set by the digitizer when two successive replies in a response from the same aircraft are identical. If two successive code matches are not found before target trail edge then the validation bit is set to zero.
National Airspace System	The common system of facilities, equipment, regulations, procedures, and personnel required for the safe and efficient movement of civil and military aircraft through the airspace of the United States.
Preferred Coverage	The radar-designated preferential coverage over a particular geographical area where coverage is available from two or more radars.
Radar Reinforced Rate	A ratio of the number of times a beacon target was detected in the same range cell as a search target with overlapping azimuths over the total number beacon targets (total = reinforced + beacon only) (RR Rate = #RR/(#RR + #BO)).
Search Range Split	A search report detected in an adjacent range cell as a reinforced beacon target that has an azimuth separation of no more than one digitizer sliding window size. A search split also occurs when a beacon only target is detected and two search reports are detected in adjacent range cells and the azimuth separation is no more than one digitizer sliding window size.
Sort Box	An area around a radar return used to eliminate from correlation consideration all tracks whose positions are outside the sort box limits.
Supplemental Coverage	Radar having overlapping coverage over a particular area, but not classified as preferred coverage.
Target History	A display of stored past and present positions of an aircraft target.
Tracking	Positional agreement of a radar target and the computer predicted position. Computation of the difference between the predicted position and the actual position of the target.

APPENDIX 3. DOCUMENTATION AND FORMS

Table A3-1. MAINTENANCE AND DIAGNOSTIC MANUALS

PUBLICATION NUMBER	*TITLE*
TI 6191.400	STARS O & M Manual for the SOS (while available)
TI 6191.401	STARS O & M Manual for the RT (while available)
TI 6191.402	STARS FSL MCW Operator's Manual (while available)
TI 6191.403	STARS ESL MCW Operator's Manual (while available)
TI 6191.404	STARS System Message Dictionary (SSMD)
TI 6191.406	STARS System Administration and Security for the SOS
TI 6191.407	STARS ATCoach User's Manual
TI 6191.408	STARS DMS Software User's Manual (while available)
TI 6191.409	STARS FSL TCW/TDW Operator's Manual
TI 6191.410	STARS FSL TCW/TDW Quick Reference Cards
TI 6191.411	STARS ESL TCW/TDW Operator's Manual
TI 6191.412	STARS ESL TCW/TDW Quick Reference Cards
TI 6191.414	STARS SONY Tube Alignment Procedure (while available)
TI 6191.419	STARS Software Tools Menu for the SOS (while available)
TI6191.500	STARS Interactive Electronic Technical Manual (IETM)

Table A3-2. 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 6032-1	Airway Facilities Modification Record

APPENDIX 3. DOCUMENTATION AND FORMS

Table A3-3. FAA ORDERS AND HANDBOOKS

LATEST REVISION ORDER NUMBER	*DESCRIPTION*
1370.82	Information Systems Security Program
3400.3	Airway Facilities Maintenance Personnel Certification Program
3900.6	Occupational Safety Program for Airway Facilities Personnel
3900.14	Safety Climbing
4630.2	Standard Allowance of Supplies and Working Equipment for National Airspace System Facilities
6000.6A	Interagency Ground Inspection Guidance
6000.15	General Maintenance Handbook for Airway Facilities
6000.30	Policy for Maintenance of the NAS Through the Year 2000
6000.40	Monitoring Policy for the Maintenance Control Center (MCC) of the National Airspace (NAS)
6000.48	General Maintenance Handbook for Automated Logging
6000.50	Airway Facilities National Airspace System Operations Handbook
6000.5	Facility, Service, and Equipment Profile
6030.31	Restoration of Operational Facilities
6030.45	Facility Reference Data File
6032.1	Modification to Ground Facilities, Systems, and Equipment in the National Airspace System
6040.6	Airway Facilities NAS Technical Evaluation Program
6040.15	National Airspace Performance Reporting System
6190.6	Maintenance of Automated Radar Terminal Systems and Remote Tower Alphanumeric Display System
6190.12	Maintenance of Automated Radar Terminal Systems Expansion (ARTS IIIE)
6191.2	STARS System Administration Security Handbook
6200.4	Test Equipment Management Handbook
6310.2	Maintenance of Airport Surveillance Radar (ASR) Indicator Site Equipment
6310.19	Maintenance of the Airport Surveillance Radar
6170.10	Maintenance of Data Multiplexing Network Equipment
6190.5	Maintenance of Automated Radar Terminal System (ARTS IIA)

APPENDIX 3. DOCUMENTATION AND FORMS

Table A3-3. FAA ORDERS AND HANDBOOKS

LATEST REVISION ORDER NUMBER	*DESCRIPTION*
6340.13	Maintenance of Air Route Surveillance Radar (ARSR-3) Facilities
6340.26	Maintenance of Air Route Surveillance Radar (ARSR-4) Facilities
6350.8	Maintenance of Common Digitizer Equipment
6350.12	CD Subsystem Integration Test Procedures Manual
6350.21	Maintenance of Common Digitizer-2 Equipment
6360.1	Maintenance of Air Traffic Control Beacon Interrogator (ATCBI) Equipment (Except ATCBI-5)
6360.14	Maintenance of Air Traffic Control Beacon Interrogator (ATCBI-5) Equipment and Mode-S Collocated with Solid-State Radar Beacon Decoder (SSRBD)
6365.3	Maintenance of the Mode Select (Mode-) Beacon System
6410.18	Maintenance of the Digital Bright Radar Indicator Tower Equipment (DBRITE)
7110.65	Air Traffic Control
7210.3	Facility Operation and Administration
8020.16	Air Traffic Organization Aircraft Accident and Incident Notification, Investigation, and Reporting
8200.1	United States Standard Flight Inspection Manual
8200.39	Flight Inspections of Precision Runway Monitors / Final Monitor Aid
8260.19	Flight Procedures and Air Space
NASP-2501-07	ARTS IIIA System Operator’s Manual
OAP 8200.1	United States Standard Flight Inspection Manual

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

FOREWORD

This attachment provides guidance and prescribes technical standards, tolerances, and procedures applicable to the maintenance and inspection of Final Monitor Aid (FMA) on Standard Terminal Automation Replacement System (STARS) facilities. It also provides information on special methods and techniques, which will enable Tech OPS 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 Airway Facilities.

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

CHAPTER 1. GENERAL INFORMATION AND REQUIREMENTS

100. OBJECTIVE.

This attachment provides the necessary guidance, to be used in conjunction with information available in instruction books and other handbooks, for the proper maintenance of the Final Monitor Aid (FMA) on Standard Terminal Automation Replacement System (STARS) facilities

101. CERTIFICATION.

Refer to the latest edition of Order 6000.15 for general guidance on the certification of systems, subsystems, and equipment. Refer to Appendix 1, of this attachment for the specific requirements for the FMA.

a. Certification Tables. The tables provided in Appendix 1 of this attachment lists the certification levels, associated certification parameters, reference paragraphs, maximum certification intervals, identity of recommended personnel responsible for certification, and the prescribed certification statements to be entered into the facility maintenance log.

b. Certification of Systems. Certification is required for the following service and systems.

1. Terminal Surveillance Parallel Airborne Display (TSPAD).
2. Final Monitoring Aid (FMA)

102. AIRCRAFT ACCIDENT.

When aircraft accidents or incidents occur, Air Traffic Organization Technical Operations personnel are required, when requested by the Technical Operations Aircraft Accident Representative (AFAAR) 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.

103. 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 8200.1, United States Standard Flight Inspection Manual. For additional information concerning flight inspections, see Chapter 6 of this attachment.

104 - 110. RESERVED.

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

CHAPTER 2. TECHNICAL CHARACTERISTICS

200. PURPOSE

The following paragraphs describe the overall purpose of FMA and explain STARS FMA types.

201. FINAL MONITOR AID (FMA) FUNCTIONAL DESCRIPTION

The Final Monitor Aid (FMA) is a collection of software and display functions, integrated into the overall STARS system, that support monitoring and control of air traffic arriving on sets of parallel runways. FMA provides a display that gives controllers the capability to monitor simultaneous approaches on a set of parallel runways with particular sensitivity to lateral deviations from the expected approach course.

In addition to allowing the controller to observe that adequate separation exists, FMA will automatically notify the controller with visual and spoken aural alerts if an aircraft deviation is detected, if an aircraft is not assigned to the runway to which it is aligned or if radar surveillance data is interrupted.

For a given set of parallel runways, an FMA application makes use of special adapted airspace that includes an Active Monitored Zone (AMZ), which is used to filter out traffic that is not of interest to the FMA application.

a. **FMA Integration With STARS** - FMA may be made available for any FSL STARS site by means of suitable adaptation. For sites that do not yet have FSL STARS deployment, a specially adapted version of FMA may be configured to work in conjunction with the existing ARTS system and is called Interim FMA.

b. **Interim FMA -** A special hybrid installation of FMA is available for sites that are not scheduled to be transitioned to full STARS capability prior to installation of the STARS based FMA function. In this configuration a STARS display and processing equipment is interfaced with ARTS data via the ARTS Gateway utilizing the Precision Runway Monitor (PRM) data interface (a dedicated point-to-point Transmission Control Protocol / Internet Protocol (TCP/ IP) sessions that provides two-way communications). The interface is a fully redundant, dedicated physical link between the STARS AIG equipment (host processors and routers) and the FMA interface. The ARTS/AGW, configured for a PRM interface, provides selected Operational Live Flight Plan data (including runway assignment and Low-Altitude Alert), Track data, Conflict Alert, Adaptation, and Status messages through the Applications Interface Gateway (AIG) host processor to the STARS/FMA subsystem. Only heartbeat messages are transmitted from the STARS/FMA subsystem to the ARTS/AGW. Data transmission frequencies, timeouts and other time-related values associated with this interface may be set on a site by site basis by means of Adaptation Parameters (AP).

STARS employs the ARTS flight plan and track data to create an internal (to STARS) database consistent with the ARTS data. STARS displays track data derived from its own interface to the main airport radar and as supported by ARTS operational data, e.g., scratch pad contents, ACID and fix data, etc. The FMA interface from the AGW is supported only if adapted and only in the STARS Full Service Level at TCWs in FMA mode. In all exercise contexts (including Performance Verification), no messages from ARTS will be processed.

202. – 298. RESERVED

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

CHAPTER 3. STANDARDS AND TOLERANCES

300. GENERAL.

a. This chapter prescribes the standards and tolerances for the FMA equipment, 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.

b. Entries in the reference paragraph column refer to this attachment to the handbook.

c. Definitions of standard, initial, and operating tolerance as used in this handbook are defined as follows:

1. **Standard.** The optimum value assigned to an essential system parameter.
2. **Initial Tolerance.** The maximum deviation from the standard value of the parameter, or the range, which is permissible when the system or equipment is accepted at the time of initial commissioning or after any readjustment, modification, or modernization.
3. **Operating Tolerance.** The maximum deviation from the standard value of the parameter or the range within which a system or equipment may continue to operate on a commissioned basis without adjustment or corrective maintenance and beyond which remedial action is mandatory.

NOTE: Certification of all corresponding subsystems is required before completing any maintenance and/or certification checks.

301. - 308. RESERVED

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
309. MCW ICON AND SYSTEM MESSAGE CHECK.				
a. Check icons at the FSL MCW.	510 And TI 6191.500	Minimum required resources that can sustain the facility AT operation.	Same as standard.	Same as standard.
b. Check system messages reported at the FSL MCW.	510 And TI 6191.500	Minimum required resources that can sustain the facility AT operation.	Same as standard.	Same as standard.
310. Range and Azimuth Accuracy.				
a. MCW.				
1. Range	516	Adapted range value.	Same as standard.	Within ± 12/512 nm.
2. Azimuth	516	Adapted azimuth value.	Same as standard.	Within ± 10/4 ACPs. CPME(s) ≥ 70% reliability of standard.
b. TCW.				
1. Range	520	CPME target falls within FMA certification geo-box.	Same as standard.	Target falls inside or on certification geo-box ≥ 70 % reliability of standard.
2. Azimuth	520	CPME target falls within FMA certification geo-box.	Same as standard.	Target falls inside or on certification geo-box ≥ 70 % reliability of standard.
311. LINEARITY/GEOMETRIC DISTORTION.				

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
a. Linearity/Geometric Distortion Check	517 And TI6191.414, Sony Tube Alignment Procedure Or 517 And TI 6191.500	The display lines will match the lines on a mylar display overlay of the digital map.	Subjective determination of linearity based on mylar display overlay.	Same as Initial.
b. Magnification Stretch Factor Accuracy Check	518	NTZ width measured at 4-to-1 magnification is 4 times wider than at 1-to-1 magnification.	Same as standard.	Same as initial.
312. SONY DATA DISPLAY MONITOR (DDM) CHECK				
a. Focus.	521 And TI 6191.500	The smallest known video map features are discernable on the display. Visually inspect for correct focus. Minimum recognizable character font. Character size 1.	Visual satisfaction Same as standard.	Same as initial Set display to visual satisfaction.
b. Color		Manufacturer setting.	0.241≤ x ≤ 0.301	Set display to visual satisfaction then perform FS System Status Alert Color Check Par. 321.
c. Brightness		Manufacturer setting.	0.256 ≤ y ≤ 0.316	Set display to visual satisfaction.
d. Contrast		Manufacturer setting.	43.0 ≤ Y ≤ 47.0	Set display to visual satisfaction.

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
313. FMA ALERTS CHECK	514	Alert warning activates when the test target deviates toward or enters the NTZ	Same as standard.	Same as standard.
314. TARGET UPDATE RATE CHECK	519	The target update rate shall be equal to or less than 4.8 seconds in track mode.	Same as standard.	Same as standard.
315. STARS INTERFACE (Performed at non-STARS to STARS FMA sites)	525	Data tag information and target location and behavior correlates between non-STARS and STARS FMA.	Same as standard.	Same as standard.
316. MONOPULSE BEACON (MODE S) OPERATIONAL Status	512	The Mode S operating in mono-pulse mode is required for full FMA service certification. The Mode S operating in interim beacon interrogator (IBI) mode is required for partial FMA service certification.	Same as standard.	Same as standard.
317. MAP ACCURACY				
a. Runway Centerline	522	Maximum error left or right of runway edges shall not exceed 100 ft. (30.5m)	Same as standard.	Same as initial.
b. Map Alignment Check	523	The maps are adapted correctly.	Same as standard.	Same as initial.

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
c. Fixed Target Map	524	Fixed targets are adapted correctly.	Same as standard.	Same as initial.
318. RADAR DATA PROCESSING AND DISPLAY CAPABILITY	511	Data is presented on the display for AT operation.	Same as standard.	Same as standard.
319. TSPAD DISPLAY ENTRY AND DISPLAY PROCESSING				
a. Data Entry and Display Processing	513	Display responds to entered commands and displays test target at expected location.	Beacon test target displayed within or on map geo-box or at expected location.	Same as initial
320. TSPAD RADAR RELIABILITY AND PERFORMANCE PARAMETERS				
a. FS RTQC Check Report	515 And TI.6191.402 FS RTQC Check Report. Or 515 And TI 6191.500	See Sensor Performance Parameters.	Same as standard.	Same as standard.
b. ASR-9/11Sensor Performance Parameters Mode 3/A Validity (≥) Mode C Validity (≥) Beacon RTQC Reliability (≥) Zero Code (<) Beacon/Blip Scan (≥) Beacon Azimuth Split (<) Range Split (<)		 98% 97% 98% 1% 90% 1% 1%	Same as standard.	Same as standard.
321. FMA FSL SYSTEM STATUS ALERT COLOR CHECK	Check red check symbol in SSA on all available displays.	Inverted red delta is displayed.	Same as standard	Same as standard
322 - 399. RESERVED.				

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

CHAPTER 4. PERIODIC MAINTENANCE

400. GENERAL.

a. This chapter establishes maintenance activities that are required for the FMA Equipment on a periodic basis, and the schedules for their accomplishment. System maintenance activities are contained herein and additional maintenance activities are contained in the FMA user's manual. The chapter is divided into two sections. Section 1 identifies the performance checks (i.e., tests, measurements, observations, and adjustments) of normal operating controls and functions, which are necessary to determine whether operation is within established tolerances/limits. Section 2 identifies other tasks that are necessary to ensure reliable system operation and prevent deterioration. Refer to the latest edition of Order 6000.15 for additional guidance.

NOTE: Similar Periodic Maintenance performed on a corresponding subsystem, for example, STARS, does not need to be repeated. Certification of all corresponding subsystems is required before completing any maintenance and/or certification checks.

b. The following table of performance checks and maintenance tasks are not to be taken as the minimum work required for proper maintenance, but rather as the maximum interval permitted between tasks.

c. Completion of all performance checks and maintenance tasks within the prescribed intervals in sections 1 and 2 is mandatory.

d. References to specific paragraphs (for example 310 or 525) refer to paragraphs of this order. The indicated reference for a procedure is a recommendation. Other methods, using equivalent equipment and procedures that will establish operation within the allowable operating tolerance/limit, are permitted. Test/field data supplied with each system by the manufacturer is not referenced; however, it may prove to be beneficial in some instances.

401 - 409. RESERVED.

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

Subsection 1. FMA Performance Checks

Performance Checks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
410. DAILY. Complete FAA Form 6000-8 or Figure 1.		
a. MCW Icon and System Message Check.	309	510 And TI 6191.500
b. Monopulse Beacon (Mode S) Operational Status.	316	512
c. TSPAD Data Entry and Display Processing.	319	513 And TI 6191.500
d. TSPAD Radar Reliability and Performance Parameters	320	515 And TI 6191.500
e. Range and Azimuth Accuracy.	310	516, 520
f. STARS Interface. **NOTE:** For non-STARS interfaced with STARS only.	315	525
g. FSL system status alert color check	321	Check red check symbol in SSA on all available displays.
h. Target Update Rate Check.	314	519
411. WEEKLY. Complete FAA Form 6000-8 or Figure 1.		
a. Subsystem Certification Procedure for Radar Data Processing and Display Capability.	318	511
b. FMA Alerts Check.	313	514
c. Display Check. 1. Focus 2. Color 3. Brightness 4. Contrast	312	521 And TI 6191.500
d. Map Accuracy.	317	522
412. QUARTERLY. Complete FAA Form 6000-8 or Figure 2.		
a. Linearity/geometric distortion.	311a	517 And TI 6191.500
b. Magnification Stretch Factor Accuracy Check.	311b	518

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

Subsection 1. FMA Performance Checks

Performance Checks	*Reference Paragraph*	
	Standards & Tolerances	***Maintenance Procedures***
413. SEMIANNUALLY. Complete FAA Form 6000-8 or Figure 2.		
a. FMA Blower Fan and Filter Inspection and Cleaning.	N/A	526
b. FMA Rack Cabinet Physical Inspection / Cleaning.	N/A	527
c. FMA TCW Cabinet Physical Inspection / Cleaning.	N/A	528
d. FMA Check Connector Mating.	N/A	529
414. – 499. RESERVED.		

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

CHAPTER 5. MAINTENANCE PROCEDURES

500. GENERAL.

This chapter establishes the procedure for accomplishing the various essential maintenance activities which are required for the FMA equipment on either a periodic or incidental basis. The chapter is divided into three sections. The first section describes the procedures to be used in making the performance checks listed in chapter 4, section 1. The second section describes the procedures for doing the tasks listed in chapter 4, section 2. The third section describes the procedures for doing special tasks, usually nonscheduled and not listed in chapter 4. Refer to the latest version of Order 6000.15 for additional guidance.

501. FORMS.

Order 6000.15 contains policy, guidance, and detailed instructions for field use of FAA Form 6000-8. Technical Performance Record, as applicable to the FAA facility. Entries shall be made in accordance with the instructions published in Order 6000.15. Figures 5-1 through 5-3 are sample FAA forms 6000-8 that show typical entries for normal and unsatisfactory conditions that may be encountered.

502. - 509. RESERVED.

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

510. MCW ICON AND SYSTEM MESSAGE CHECK.

a. Objective. Verify that the minimum required resources that can sustain ATC operations are present and working properly.

b. Test Equipment Required. Not applicable.

c. Conditions. These checks must be made while operational programs are being executed.

d. Detailed Procedures. Check for proper indications at the appropriate FSL MCW:

1. Check that the minimum required resources (e.g., NUNIO, CGW/RCGW, RDP, TCW, TDW, and LAN equipment) that can retain air traffic FMA operations are available.
2. Check for current failure/alarm report messages on the FSL MCW for the minimum required resources (e.g., NUNIO, CGW/RCGW, RDP, TCW, TDW, and LAN equipment) that can retain air traffic FMA operations are available.

511. SUBSYSTEM CERTIFICATION PROCEDURE FOR RADAR DATA PROCESSING AND DISPLAY CAPABILITY.

a. Objective. Ensure that STARS data processing and display system are functioning properly.

b. Discussion. The certifying official should corroborate with ATC to verify data entry and display functions are performing normally at each position. In addition, the official should inspect displays first-hand. The number of displays to be inspected will be determined locally. As a minimum, one position may be checked. This check should be made on a different position than last executed. For inspection, emphasis should be placed on positions that are manned by AT less frequently.

c. Test Equipment Required. Not applicable.

d. Conditions. These checks must be made while operational programs are being executed.

e. Detailed Procedures for FSL.

1. Verify data entry and display capability by performing the following at a TCW position.
   (a) Select single sensor mode and verify that tracks are updating as expected and there is no significant or unexplained loss of system updates or data blocks.
   (b) Check that arrivals are lining up on runway centerlines at primary and, if possible, secondary airports. It is recommended to corroborate with AT for this check. Verify data display capability and presentation by checking that the following types of display data are present:
      (1) FMA Position symbols including size and color.
      (2) Geographic map (e.g., airways, sector boundaries, and special areas)
      (3) Data blocks
      (4) Weather data (high, medium, and low) including size and color, if available
   (c) Return display to normal operational service

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

512. MONOPULSE BEACON (MODE S) OPERATIONAL STATUS.

a. Objective. Ensure that the automation system status for contributing FMA sensor indicates the monopulse beacon system.

b. Discussion. These checks must be made while operational programs are being executed. If the beacon interrogator system is not operating in monopulse mode, then FMA service is degraded from full certification to partial certification. Under partial certification, the FMA will not be certified for parallel approach on all runways, but will be certified for use with runway separation governed by Order 7110.65 Air Traffic Control rules and/or local procedures.

c. Test Equipment Required. Not applicable.

d. Conditions.

1. FMA full certification is possible only in monopulse mode.
2. The monopulse beacon interrogator system must be certified.

e. Detailed Procedures for FSL.

1. At the MCW select <Reports><FS Radar Status Report> and verify the FMA qualified sensor(s) is in monopulse mode, e.g. Mode S.
2. Verify that the STARS System Status Area (SSA) at the FMA TCW indicates the monopulse beacon system (e.g., for mode S systems “Mode S” appears in the SSA).

513. TSPAD DISPLAY ENTRY AND DISPLAY PROCESSING.

a. Objective. Verify the ability of constituent facilities to provide target reports at correct positions in support of ATC operations and display responds to entry commands.

b. Discussion. The required number of displays to be checked will be determined locally. As a minimum, one position must be checked. This check should be made on a different position than last executed. The TSPAD service certification requirements are listed in Appendix 1, Table FMA - 1, of this attachment.

c. Test Equipment Required. Not applicable.

d. Conditions. These checks must be made while the FSL operational program is being executed.

e. Detailed Procedures for FSL.

1. Verify proper data entry and display functions of monopulse beacon interrogator system test target(s) at required position.
   (a) Select single sensor mode.
   (b) Select FMA mode.
2. Select the FMA geographic map that contains beacon system fixed target geo-box(es) for the selected sensor. Verify that the correct map is displayed.
3. Re-center display on beacon test target.
4. Set FMA display to maximum magnify and minimum range. Re-center display on beacon test target as necessary.

5. Verify that the beacon system test target(s) is displayed within or touching the appropriate map symbol.
6. Repeat this procedure for each available test target.
7. After checking all appropriate sensors, return to normal operations.

514. FMA ALERTS CHECK.

a. Objective. To ensure FMA alert processing is operating within specifications listed in paragraph 313.

b. Discussion. The NTZ alert warning is checked by visual and aural demonstration of a STARS ATCoach scenario, which has targets that violate NTZ parameters. The required number of displays to be checked will be determined locally. However, as a minimum, one position must be checked. This check should be made on a different position than last executed.

c. Test Equipment Required. Not applicable.

d. Conditions. The FMA host system is operational. Optionally this check may be incorporated as part of the FS PVER by the OSF. Please coordinate with the OSF for details. If the FMA alert scenario is incorporated into the FS PVER, follow instructions for executing an abbreviated FS PVER Main Par 516 and be alert for the FMA check portion described in below in step e. 17. After the FMA alert conditions are observed, the FS PVER may be canceled.

e. Detailed Procedures.

1. This procedure assumes that the position chosen is not signed-on, is not in FMA mode, FMA sensor is not selected, and position has airspace.
2. At the FSL MCW, ensure that the SIM Icon is Green.
3. Verify and record the current environment and adaptation directory. From the main menu bar, select <System Control, FS Switch Software/Adaptation>.
4. When the FS Switch Software/Adaptation window appears, record the current environment and directory, which is highlighted (e.g., ENV001.ad).
5. Login to TCW. <sign on>, enter name, <enter>, enter password (if required), <enter>.
6. Switch the TCW to FMA mode.
7. If position has airspace, consolidate airspace to another display position by entering <F7><C><receiving position><sending position><+><enter>. Refer to the consolidation procedure in TI 6191.409 for additional assistance.
8. Sign-on if necessary.
9. On DCB select <Mode>. Select <TRNG#> Select slew <Enter>. Select <Accept>. (where '#' is a site specific training exercise number reserved for this check. It is coordinated with air traffic training to prevent scenario conflicts.)
10. When the display returns in Training Mode, select keyboard key <TgtGen> button. Select keyboard key <Enter>. The ATCoach Simulation Control Window will appear.
11. On the Site File line, use the track ball to press the [Select] button.

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

12. When the Site File window appears, choose the current <Site File ENV> (Select current environment recorded in step 4, e.g., xxx_ENV001_ad.st (where xxx is the three letter site identifier)) and select <OK>.
13. On the Scenario File line, use the trackball to press the [Select] button.
14. When the Scenario File window appears, choose scenario XXX_FMA_ALERTS (where XXX is the three character site identifier) and select <OK>.
15. Leave the Pseudo Pilot and Offset Time lines blank.
16. On the ATCoach Simulation Control Window, use the trackball to select the <Run Scenario> button to start the scenario.

    NOTE: If the <Run Scenario> button is not available (grayed out), select the <End Scenario> button first, then the <Run Scenario> button.
17. As the scenario runs, ensure that the following warnings are properly displayed with appropriate voice alert.
    (a) NTZ CAUTION (Non-blinking, yellow “NTZ” is displayed in the DB as A/C prediction vector touches the NTZ. Voice announces “CAUTION”. Violated NTZ turns yellow)
    (b) NTZ WARNING (Blinking, red “NTZ” is displayed in the DB as A/C enters the NTZ. Voice announces “WARNING”. Violated NTZ turns red)
    (c) WRONG RWY alarm (Blinking, red “RWY” is displayed in the DB. Voice announces “WRONG RUNWAY”.)
    (d) COAST alert (May see “NOM” time-shares in DB. Blinking red “CST” is displayed in DB. DB and position symbol freeze in position. Voice announces “COAST”.)
18. After all the alerts listed above have been identified, end the scenario by selecting keyboard key <TgtGen> button. Select keyboard key <Enter>.
19. The ATCoach Simulation Control Window will appear.
20. Use the trackball to select the <End Scenario> button.
21. Select <Cancel> to close ATCoach Simulation Control Window.
22. Sign-on if necessary
23. Switch from Training mode to FS mode and return display to ATC service.
24. Return to normal operation.

515. TSPAD RADAR RELIABILITY AND PERFORMANCE PARAMETERS.

a. **Objective.** Check radar performance values.

b. Discussion. The performance parameters in paragraph 320b should be reasonable for a properly aligned radar and digitizer system. However, situations unique to each site (e.g., obstructions, large bodies of water, antenna tilt) may prevent some radar sites from meeting the established criteria. For this reason each site should establish a baseline for each sensor utilized by the SOS. The baseline values should be utilized to determine if sensor is performing normally.

When a parameter does not meet the criteria established in paragraph 320b, the FSL subsystem may still be certified provided the sensor is performing to recorded mean values. However, the reason for not meeting performance parameters in paragraph 320b should be identified and documented. Every effort should be made to bring the radar and digitizer up to specifications.

c. Test Equipment Required. Not applicable.

d. Conditions. These checks must be made while the FSL operational program is being executed.

e. Detailed Procedures for FSL.

1. Utilize the FS RTQC report at the FSL MCW over a period of seven days to provide data for a performance baseline for each sensor. The collection days do not need to be consecutive, but they should be done within a reasonable amount of time. A 15-minute Data Collection Interval is recommended for each collection. Do not collect data immediately following an installation, a system shutdown or some other event that causes a break in the system data collection cycle. Allow enough time for the system to collect a sufficient amount of data to provide a valid report. After seven days of data has been collected, average the results by totaling each column and dividing the sum by the total number of samples collected (normally seven). Record the average value and file the average and the collected reports in the FRDF. The baseline should be updated every six months. It is not necessary to complete this procedure before declaring IOC and/or ORD on a STARS or sensor installation.
2. Utilize the FS RTQC check report at the FS MCW. Compare the performance parameter values with the report criteria established in paragraph 320b of this attachment.

516. FMA SUBSYSTEM RANGE/AZIMUTH INTEGRITY.

a. Objective. Ensure STARS Real-Time Quality Control (RTQC) Functional Monitoring at FSL MCW.

b. Discussion. Coordination with the OSF for correct adaptation values may be necessary.

c. Test Equipment Required. Not applicable.

d. Conditions. At least one monopulse beacon interrogator test target per sensor is reporting properly.

e. Detailed Procedures.

1. Verify proper indications at the FSL MCW. Check for failure/alarm system messages related to Secondary Surveillance Radar (SSR) Test Targets (RTQC) at the FSL MCW.
2. Verify the accuracy and reliability of monopulse beacon interrogator test target(s) by requesting a PARROT/PE report at the MCW.
3. Verify that error reporting is enabled for each qualified test target for each sensor by checking the ENABLED column of the PARROT/PE Report for “YES”.
4. Ensure that the value in the COUNT column is equal to adapted value for all qualified beacon test target(s). A ‘0’ in this column indicates that data is not reporting within the adapted capture box boundaries.

5. For each qualified target item, determine the difference between the ADAPTED RANGE and the range MEAN. This value should be plus or minus within the Standard and Tolerance specified in paragraph 310a.
6. For each qualified target item, determine the difference between the ADAPTED AZIMUTH and the azimuth MEAN. This value should be within the Standard and Tolerance specified in paragraph 310a.
7. Check that the value under the RELIABILITY for each qualified test target is within the Standard and Tolerances specified in paragraph 310a.

517. LINEARITY/GEOMETRIC DISTORTION CHECK.

a. Objective. This procedure determines that the linearity and geometric distortion associated with the FMA's display is within the tolerances specified in paragraph 311a.

b. Discussion. The Sony linearity/geometric distortion test grid will be activated. A mylar grid overlay will be placed over the FMA display to determine if the linearity/geometric distortion of the display is within tolerance.

c. Test Equipment Required.

1. Sony DDM-RM10 remote controller.
2. Mylar linearity/geometric distortion grid overlay.
3. Parallax corrector viewing tube

d. Conditions. The FMA system is in an operational configuration.

e. Detailed Procedures.

Perform the Linearity/Geometric Distortion Check in TI6191.414, Sony Tube Alignment Procedure or TI 6191.500 specified in 311a.

518. MAGNIFICATION STRETCH FACTOR ACCURACY CHECK

a. Objective. This procedure provides verification of magnification aspect ratio's with the FMA's display of map information and also determines that the 4-to-1 aspect ratio using the stretch factor command is within the tolerances specified in paragraph 311b.

b. Discussion. The 4:1 (MAG 4) aspect ratio of the display is checked against the 1:1 (MAG 1)aspect ratio to determine if the stretch factor is within tolerance.

c. Test Equipment Required.

1. Ruler

d. Conditions. The FMA system is in an operational configuration.

e. Detailed Procedures.

1. Select FMA Mode on TCW to be tested.
2. Select MAG from the DCB and set the magnification of the display to a 1:1 (MAG 1) ratio.
3. Select PLACE CENTER from the DCB and center the Active Monitoring Zone (AMZ) display on the middle of the display.

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

4. Select RANGE from the DCB and set the range of the display to minimum.
5. Measure and record the width of the NTZ.
6. Select MAG on the DCB and set the magnification of the display to a 4:1 (MAG 4) ratio.

   NOTE: THE STRETCH FACTOR COMMAND WILL CAUSE THE MAP INFORMATION TO STRETCH PERPENDICULARLY TO THE SELECTED NTZ.
7. Measure and record the width of the NTZ displayed on the screen. To do this, re-center the display if necessary.
8. The NTZ width measured at 4:1 (MAG 4) magnification should be 4 times wider than the NTZ width measured at 1:1 (MAG 1) magnification.

519. TARGET UPDATE RATE CHECK.

a. Objective. This procedure determines that the target update rate is within the tolerances specified in paragraph 314.

b. Discussion. The target update rate is determined by dividing by 10, the elapsed time required for a displayed target to visually update 10 times.

c. Test Equipment Required. Clock or watch.

d. Conditions. The FMA system is in operational configuration.

e. Detailed Procedure.

1. Observe a target on the FMA display.
2. Note a start time, then visually observe the target update (move) 10 times.
3. Note the stop time, and determine the elapsed time.
4. The update rate is determined by dividing the elapsed time by 10 (the number of target updates).
5. Verify that the update rate is within the tolerances specified in paragraph 314.

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

Section 1. PERFORMANCE CHECK PROCEDURES

520. RANGE AND AZIMUTH ACCURACY.

a. Object. This procedure determines that the range and azimuth accuracy of the display is within the tolerances specified in paragraph 310b.

b. Discussion. The range and azimuth accuracy is verified by visually checking the display to determine if the calibration performance monitor equipment (CPME) symbol is positioned inside the FMA CPME geo-box.

c. Test Equipment. Fixed target map or map that displays FMA geo-boxes.

d. Conditions. The FMA system is in an operational configuration.

e. Detailed Procedure.

1. Select FMA Mode on the TCW to be tested.
2. Select the map with fixed targets for display.
3. Select MAG from the DCB. Set the magnification of the display to 1:1 (MAG 1) ratio.
4. Select RANGE from the DCB. Adjust the display to its minimum range.
5. Locate the FMA CPME geo-box.
6. Select PLACE CENTER from the DCB, and center the display screen on the CPME geo-box.
7. With the RANGE option, zoom in on the CPME geo-box to the minimum range. Re-center if necessary.
8. Visually verify that the CPME symbol is positioned inside the CPME geo-box at least 7 out of 10 updates.

521. DISPLAY CHECK.

a. Object. This procedure evaluates the quality of the display presentation.

b. Discussion. A subjective evaluation of the display presentation will be made in a normal operational environment. The display focus, brightness, and contrast will be evaluated.

c. Test Equipment Required. None.

d. Conditions. The FMA system is in operational configuration.

e. Detailed Procedure.

1. Evaluate the display presentation focus. Check the overall focus for operational usability when the focus is adjusted to that the targets, range marks, map, and display lines are as clear and sharp as possible. Check the size and separation of the finest site coverage detail that is known to be resolvable.
2. Evaluate the display brightness and contrast for operational usability. Observe large blocks of peak video level in the FMA display versus background level, low–level range mark, and map video. Also, observe peak target video at the same approximate brilliance.

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

522. MAP ACCURACY

a. Object. This procedure ensures proper alignment of the map video with radar returns.

b. Discussion. This test shall verify correct map alignment with the radar returns. The test may be conducted with known fixes or targets–of–opportunity to verify runway centerline alignment and navigational aid alignment. This test shall also verify that the map is aligned to the correct site magnetic variation by a visual check of the position of the map magnetic north mark. The site digital map and digital terrain maps must be built using the same magnetic variation. Per Order 7210.3K, Facility Operation and Administration, it is the AT managers responsibility to ensure map alignment to magnetic north. However, the AF technician is responsible for ensuring that the overall FMA system is maintained to the proper magnetic variation. AT and AF shall ensure that they are using the magnetic variation. FAA Order 8260.25, Implementing Epoch Year Magnetic Variation Values, defines the method by which variations are assigned and maintained.

c. Test Equipment required. None.

d. Conditions. The FMA system is to be placed in an operational configuration.

e. Detailed Procedure. Use targets–of–opportunity or surveyed targets to verify map position. Check that arrivals are lining up on runway centerlines at primary airports. It is recommended to corroborate with AT for this check.

523. MAP ALIGNMENT CHECK.

a. Objective. Ensure that map adaptation is aligned with the fixed target map at the TCWs.

b. Discussion. This check is performed to new maps when new maps are added to the system. Utilize the targets of opportunity to verify runway centerline alignment and/or navigation aid alignment. All maps are built to true North. If applicable, utilize the cardinal marks on the fixed target map to ensure they coincide with the cardinal marks of the maps being checked. A request to have cardinal marks added to maps should follow local policy. The required number of maps and displays to be checked will be determined locally. It is the responsibility of AT to ensure map accuracy. (See the latest edition of Order 7110.65, Air Traffic Control.) It is permissible to corroborate with ATC to verify map accuracy.

NOTE: Magnetic offset variations change over time, but the site information in the FRDF changes only when a change of more than 2 degrees has occurred. Because STARS uses more current and accurate offset information, the location of the PEs, MTI Reflectors, CPMEs, and RTQC may be displayed at a location different than the location recorded in the FRDF.

c. Test Equipment Required. Not applicable.

d. Conditions. Checks made for the Fixed Target Map (paragraph 524) must be made before the checks in this paragraph can be made.

e. Detailed Procedures.

1. Clear all maps from the TCW.
2. Display the Fixed Target Map.
3. Center the TCW display.

4. Select the map to be checked and ensure that the user map and the Fixed Target Map Cardinal Marks overlay.
5. For the appropriate maps, utilize a target of opportunity that is landing to verify that the runway centerline is adapted correctly.

524. FIXED TARGET MAP.

a. Objective. Verify that PEs, MTI reflectors, beacon PARROTs, CPME, and RTQC on the geographic map are adapted correctly.

b. Discussion. The fixed target map is a set of overlaying polygons and Cardinal Marks. These overlaying polygons represent the location of the PEs, MTI reflectors, beacon PARROTs, CPMEs, and RTQCs of a particular sensor. The areas of the fixed target map polygons are adapted as specified in paragraph 310b of this handbook. The Cardinal marks, which include the True North Mark, should be adapted according to the Magnetic Variance Tile Set. Each site is responsible for having a National Automation Request (NAR) form submitted to the associated OSF so the OSF can update the site adaptation to reflect the location of the PEs, MTI reflectors, beacon PARROTs, CPMEs, and RTQCs. The NAR forms should provide the location of said test target locations. Request to have the fixed target map generated should follow local policy.

NOTE: Magnetic offset variations change over time, but the site information in the FRDF changes only when a change of more than 2 degrees has occurred. Because STARS uses more current and accurate offset information, the location of the PEs, MTI Reflectors, CPMEs, and RTQC may be displayed at a location different than the location recorded in the FRDF.

c. Test Equipment Required. Not applicable.

d. Conditions. Not applicable.

e. Detailed Procedures.

1. At a TCW, select the sensor to be checked and set the sensor reference at the center of the display.
2. Clear all maps from the TCW.
3. Select the Fixed Target map that is associated to the sensor.
4. Verify that all working PE, MTI reflector, beacon PARROTS, CPME, and RTQC symbols on the map are aligned and positioned with radar returns.
5. If applicable, check the Cardinal Marks on the Fixed Target Map.
6. Center the TCW display.
7. Verify that the True North Cardinal Mark is in the correct position using the value of the TCW display center Magnetic Variation Tile provided by the OSF.
8. Verify the remaining Cardinal Marks.

Section 2. FMA INTERFACE

525. STARS INTERFACE.

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

a. Object. This procedure determines that the STARS Interface is within the tolerances specified in paragraph 315.

b. Discussion. The operation of the STARS interface is verified by comparing the non-STARS data tag of a chosen target on the non-STARS display to the data tag of the target on the STARS FMA display.

c. Test Equipment Required. Not used.

d. Conditions. The STARS FMA system and the non-STARS system are in operational configuration.

e. Detailed Procedure.

1. Select a target of opportunity on the non-STARS display and record the non-STARS data tag information for the target.
2. Find the target on the STARS FMA display and verify the existence and accuracy of the data tag information displayed by the STARS FMA.

Section 3. OTHER MAINTENANCE TASK PROCEDURES

526. FMA BLOWER FAN AND FILTER INSPECTION AND CLEANING.

a. Object. This procedure determines that the blower fans and any filters in the equipment cabinets are clean and functioning properly.

b. Discussion. The equipment cabinet blower fans are visually inspected to determine if they are moving air as intended. The air filters are inspected to determine if they require cleaning or replacement.

c. Test Equipment Required. No test equipment required.

d. Conditions. The subsystem to be inspected on the maintenance LAN.

e. Detailed Procedure.

1. On the subsystem to be inspected, place the maintenance/operate switch into the maintenance position.
2. Identify the location of the blower fans and filters for each subsystem under inspection.
3. Access the required equipment cabinet or drawer of the subsystem under inspection.
4. Locate the blower fans for the equipment under inspection.
5. Visually determine if the blower fan is functioning.
6. Locate and inspect any air filters.
7. If the filter is dirty, clean the filter if possible; replace the filter if necessary.
8. Return the system to operational status.

527. FMA RACK CABINET PHYSICAL INSPECTION.

a. Object. This procedure determines that assemblies and sub-assemblies in the rack cabinets are free from foreign matter.

b. Discussion. Foreign matter such as dust, dirt, grease, or water may cause improper operation or damage to electronic components. For racks with non-perforated front doors, airflow is obtained through forced airflow from beneath the floor and/or from the blower fan assemblies. For racks with perforated front doors and/or rear doors, airflow is obtained by individual assembly fans drawing air in through the front door and exhausting air through rear door. More attention for dust accumulation is needed for racks with perforated front doors. Particular attention should be paid to the AS1 and AS2 racks because they have additional door fans added to assist cooling of equipment mounted behind them.

c. Test Equipment Required. No test equipment required.

d. Conditions. No special conditions required.

e. Detailed Procedure.

For racks with non-perforated front doors:

1. Inspect cabinet for accumulation of dirt, dust, grease, water, or any foreign matter.
2. Remove all dust with a soft brush. Brush as far away from processors as possible, and then vacuum clean.
3. Remove dirt and grime with a damp cloth.
4. Clean all exterior surfaces with a mild detergent.
5. Remove excess water with a dry cloth or sponge.

For racks with perforated front and/or rear doors:

1. Inspect cabinet for accumulation of dirt, dust, or any foreign matter.
2. Remove dust using a vacuum cleaner
3. Remove dirt and grime with a damp cloth.
4. Clean all exterior surfaces with a mild detergent.

528. FMA TCW CABINET PHYSICAL INSPECTION.

a. Object. This procedure determines that assemblies and subassemblies in the FMA display cabinets are free from foreign matter.

b. Discussion. Foreign matter such as dirt, grease, or water may cause improper operation or damage to electronic components.

c. Test Equipment Required. No test equipment required.

d. Conditions. No special conditions required.

e. Detailed Procedure.

1. Inspect unit for accumulation of dirt, dust, grease, water, or any foreign matter.
2. Remove all dust with a soft brush. Brush as far away from processors as possible, and then vacuum clean.
3. Remove dirt and grime with a damp cloth.
4. Clean all exterior surfaces with a mild detergent.
5. Remove excess water with a dry cloth or sponge.

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

529. FMA CHECK CONNECTOR MATING.

a. Object. This procedure determines that connectors for assemblies an subassemblies in the FMA system are properly installed.

b. Discussion. Loose or damaged connectors may cause improper operation or damage to electronic equipment.

c. Test Equipment Required. No test equipment required.

d. Conditions. No special conditions required.

e. Detailed Procedure.

1. Inspect unit for loose or damaged connectors.
2. Gently push down on all connectors, making sure they seat properly.
3. Tighten any loose connectors.
4. Replace damaged cables.

530. - 550. RESERVED.

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

CHAPTER 6. FLIGHT INSPECTION

600. GENERAL.

a. Flight inspections are made to verify the overall performance of radar, navigation aids, and air/ground communications systems. Direction for flight inspections are contained in the latest edition of FAA Order 8200.1, United States Standard Flight Inspection Manual.

b. Per FAA Order 8200.1, flight inspection requirements and procedures for FMA are prescribed in the latest FAA Order 8200.39, Flight Inspections of Precision Runway Monitors / Final Monitor Aid.

c. Note that FAA Order 8200.1 may change to include directions in FAA Order 8200.39 at a future date.

d. Direction for flight inspections following an aircraft accident are contained in the latest edition of Order 8020.16, Air Traffic Organization Aircraft Accident And Incident Notification, Investigation, And Reporting.

601. – 699. RESERVED.

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

APPENDIX FMA - 1 - CERTIFICATION REQUIREMENTS

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.

3. SYSTEMS.

Centralized, distributed, or backup surveillance processing systems, TCW or TDW are used to provide these services. The system is certified STARS 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. 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.

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

5. Transition Phase.

As surveillance processing systems are replaced, it is necessary to run dual processing operations. To accommodate different configurations that are subject to change, the reference paragraphs in this appendix are provided in separate columns for each of the applicable configurations. All procedures for each configuration currently in operation shall be accomplished.

6. Future Systems.

For future planning purposes, systems that provide the above services or are used for testing or prototyping shall be certified in accordance with Order 6000.15.

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

Table FMA / Radar - 1. TERMINAL SURVEILLANCE PARALLEL APPROACH DISPLAY (TSPAD)

Advertised Service	*Certification Parameter*	*Reference Paragraph*
Parallel Approach Capability	Knowledge that the constituent Surveillance Interrogator System (SIS) is certified in monopulse mode. NOTE: SIS must be certified and operating in mono-pulse mode (e.g., mode S) for triple independent approaches. If SIS is certified and operating in interim beacon mode (e.g., IBI), then parallel approaches are governed by Air Traffic and Flight Standard runway separation rules. Azimuth/Range Accuracy using CPME geo-map and one or more CPME(s). One short-range monopulse beacon interrogator test target is required to measure this parameter.	Par. 316; Par. 512 Par. 310; Par. 516 Par 310, Par 516, Par 520
	Knowledge that the constituent Air Traffic Control Automation System is certified. NOTE: Required at STARS FMA interim facilities.	FAA sites should log onto the Maintenance Management System (MMS) or use any means available to determine if the Air Traffic Control Automation System is certified.
	Knowledge that STARS FSL Subsystem is certified. NOTE: Required at STARS FMA sites.	Refer to JO 6191.3, Appendix 1, Table A1-3a
	Knowledge that STARS FMA Subsystem is certified.	Attachment 1, Appendix FMA-1, Table FMA-2
	Data Entry and Display Processing.	Par. 319; Par. 513
	FMA system status alert color check.	Par. 321

Normal Certification Interval: Weekly.

Allowable Exceptions: Associated PRM sensor system (primary, secondary, and/or non-radar), individual runway approach, individual TCW(s), sensor, and triple independent approaches.

Person Responsible for Certification: ATSS with certification authority.

Certification Entries in the TSPAD Maintenance Log:

Without Exception: TSPAD certified.

With Exception:

TSPAD service certified except (individual runway approach).

TSPAD service certified except (location identifier) (associated PRM sensor system).

TSPAD service certified except (display designation).

TSPAD service certified *except triple independent approaches.*

Removing Exception:

TSPAD (appropriate runway approach) service certified.

TSPAD (display designation) service certified.

TSPAD (location identifier) (associated PRM sensor system) service certified.

TSPAD triple *independent approach certified*.

ATTACHMENT 1 – FMA WITH RADAR ON STARS MAINTENANCE

TABLE FMA - 2. STARS Final Monitor AID (FMA) Subsystem		
Advertised Service	*Certification Parameter*	*Reference Paragraph*
Tracking Capability NOTE: It is permissible to corroborate with ATC to verify that data entry and display functions are performing normally at each position.	Radar data processing and display check. FMA Alerts Check	Par. 318; Par. 511 Par. 313; Par. 514
Display Capability	Alarm free data transmission for FMA display and local area network (LAN)	Proper indication at the MCW and tracks updating as expected on FMA displays.
Normal Certification Interval: Event Based (per 6000.15). Allowable Exceptions: Individual TCW(s) displays. Person Responsible for Certification: ATSS with certification authority. Certification Entries in the STARS Maintenance Log: Without Exception: FMA subsystem certified. With Exception: FMA subsystem certified except FSL (Designated display). Removing Exception: FMA subsystem FSL (Designated display) certified. **NOTE:** Only required at STARS FMA sites.		

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

FOREWORD

This attachment provides guidance and prescribes technical standards, tolerances, and procedures applicable to the maintenance and inspection of Final Monitor Aid (FMA) on Standard Terminal Automation Replacement System (STARS) facilities that interface with the Multi-Lateration (MLAT), also known as the Precision Runway Monitor – Alternate (PRM-A), survillance system. It also provides information on special methods and techniques, which will enable Tech OPS 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 Airway Facilities.

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

LIST OF TABLES

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

CHAPTER 1. GENERAL INFORMATION AND REQUIREMENTS

100. OBJECTIVE.

This attachment provides the necessary guidance, to be used in conjunction with information available in instruction books and other handbooks, for the proper maintenance of the Final Monitor Aid (FMA) using MLAT on Standard Terminal Automation Replacement System (STARS) facilities.

101. CERTIFICATION.

Refer to the latest edition of Order 6000.15 for general guidance on the certification of systems, subsystems, and equipment. Refer to Appendix 1, of this attachment for the specific requirements for the FMA.

a. Certification Tables. The tables provided in Appendix 1 of this attachment lists the certification levels, associated certification parameters, reference paragraphs, maximum certification intervals, identity of recommended personnel responsible for certification, and the prescribed certification statements to be entered into the facility maintenance log.

b. Certification of Systems. Certification is required for the following service and systems.

   1. Terminal Surveillance Parallel Airborne Display (TSPAD).

   2. Final Monitoring Aid (FMA).

102. AIRCRAFT ACCIDENT.

When aircraft accidents or incidents occur, Air Traffic Organization Technical Operations personnel are required, when requested by the Technical Operations Aircraft Accident Representative (AFAAR) 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.

103. 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 8200.1, United States Standard Flight Inspection Manual. For additional information concerning flight inspections, see Chapter 6 of this attachment.

104 - 110. RESERVED.

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

CHAPTER 2. TECHNICAL CHARACTERISTICS

200. PURPOSE

The following paragraphs describe the overall purpose of FMA and explain STARS FMA types.

201. FINAL MONITOR AID (FMA) FUNCTIONAL DESCRIPTION

The Final Monitor Aid (FMA) is a collection of software and display functions, integrated into the overall STARS system, that support monitoring and control of air traffic arriving on sets of parallel runways. FMA provides a display that gives controllers the capability to monitor simultaneous approaches on a set of parallel runways with particular sensitivity to lateral deviations from the expected approach course.

In addition to allowing the controller to observe that adequate separation exists, FMA will automatically notify the controller with visual and spoken aural alerts if an aircraft deviation is detected, if an aircraft is not assigned to the runway to which it is aligned or if radar surveillance data is interrupted.

For a given set of parallel runways, an FMA application makes use of special adapted airspace that includes an Active Monitored Zone (AMZ), which is used to filter out traffic that is not of interest to the FMA application.

a. **FMA Integration With STARS** - FMA may be made available for any FSL STARS site by means of suitable adaptation. For sites that do not yet have FSL STARS deployment, a specially adapted version of FMA may be configured to work in conjunction with the existing ARTS system and is called Interim FMA.

b. **MLAT –** Is a surviellance system that interfaces with STARS through the AIG routers.

202. – 298. RESERVED

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

CHAPTER 3. STANDARDS AND TOLERANCES

300. GENERAL.

a. This chapter prescribes the standards and tolerances for the FMA equipment, 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.

b. Entries in the reference paragraph column refer to this attachment to the handbook.

c. Definitions of standard, initial, and operating tolerance as used in this handbook are defined as follows:

1. **Standard.** The optimum value assigned to an essential system parameter.

2. **Initial Tolerance.** The maximum deviation from the standard value of the parameter, or the range, which is permissible when the system or equipment is accepted at the time of initial commissioning or after any readjustment, modification, or modernization.

3. **Operating Tolerance.** The maximum deviation from the standard value of the parameter or the range within which a system or equipment may continue to operate on a commissioned basis without adjustment or corrective maintenance and beyond which remedial action is mandatory.

NOTE: Certification of all corresponding subsystems is required before completing any maintenance and/or certification checks.

301. - 308. RESERVED

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
309. TSPAD MCW ICON AND SYSTEM MESSAGE CHECK.				
a. Check MLAT icons at the FSL MCW.	510 And TI 6191.500	Minimum required resources that can sustain MLAT operation.	Same as standard.	Same as standard.
b. Check system messages reported at the FSL MCW.	510 And TI 6191.500	Minimum required resources that can sustain MLAT operation.	Same as standard.	Same as standard.
310. TSPAD ACCURACY CHECK.	516	Reference transponder target is on, around or within FMA map geo-figure.	Same as standard.	Same as standard
311. LINEARITY/GEOMETRIC DISTORTION.				
a. Linearity/Geometric Distortion Check	517 and TI6191.414, Sony Tube Alignment Procedure or TI 6191.500	The display lines will match the lines on a Mylar display overlay of the digital map. If Mylar overlay is not available use best judgment.	Subjective determination of linearity based on Mylar display overlay.	Same as Initial.
b. Magnification Stretch Factor Accuracy Check	518	NTZ width measured at 4-to-1 magnification is 4 times wider than at 1-to-1 magnification.	Same as standard.	Same as initial.

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
312. SONY DATA DISPLAY MONITOR (DDM) CHECK				
a. Focus.	521 and TI6191.414, Sony Tube Alignment Procedure or TI 6191.500	The smallest known video map features are discernable on the display. Visually inspect for correct focus. Minimum recognizable character font. Character size 1.	Visual satisfaction Same as standard.	Same as initial Set display to visual satisfaction.
b. Color	521 and TI6191.414, Sony Tube Alignment Procedure or TI 6191.500	Manufacturer setting.	0.241≤ x ≤ 0.301	Set display to visual satisfaction then perform FS System Status Alert Color Check Par. 321.
c. Brightness	521 and TI6191.414, Sony Tube Alignment Procedure or TI 6191.500	Manufacturer setting.	0.256 ≤ y ≤ 0.316	Set display to visual satisfaction.
d. Contrast	521 and TI6191.414, Sony Tube Alignment Procedure or TI 6191.500	Manufacturer setting.	43.0 ≤ Y ≤ 47.0	Set display to visual satisfaction.
→ **313. FMA ALERTS CHECK.**	514	Alert warning activates when the test target deviates toward or enters the NTZ	Same as standard.	Same as standard.

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

314. TARGET UPDATE RATE CHECK.	519	# of MLAT RefTran msgs from Target Summary Report is within tolerance.	See 519	Same as standard.
315. RESERVED.				

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
316. MLAT AVAILABILITY	512	MLAT available.	Same as standard.	Same as standard.
317. MAP ACCURACY				
a. Runway Centerline	522	Maximum error left or right of runway edges shall not exceed 100 ft. (30.5m)	Same as standard.	Same as initial.
b. Map Alignment Check	523	The maps are adapted correctly.	Same as standard.	Same as initial.
c. Fixed Target Map	524	Fixed targets are adapted correctly.	Same as standard.	Same as initial.
318. RESERVED				
319. TSPAD DISPLAY ENTRY AND DISPLAY PROCESSING				
a. Data Entry and Display Processing	513	Display responds to entered commands.	Same as standard.	Same as standard.

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
320. TSPAD RADAR RELIABILITY AND PERFORMANCE PARAMETERS	515			
Probability of Detection (Pd) (≥) Out of Standard Deviation (SDOP) Invalid Mode 3/A (≤) Invalid Mode C (≤) Discarded MLAT Reports (≤)		97% 0 2% 3% 3%	Same as Standard	- 2% 0 + 2% + 2% + 2%
321. FMA FSL SYSTEM STATUS ALERT COLOR CHECK	Check red check symbol in SSA on all available displays.	Inverted red delta is displayed.	Same as standard	Same as standard
322 -- 399. RESERVED.				

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

CHAPTER 4. PERIODIC MAINTENANCE

400. GENERAL.

a. This chapter establishes maintenance activities that are required for the FMA Equipment on a periodic basis, and the schedules for their accomplishment. System maintenance activities are contained herein and additional maintenance activities are contained in the FMA user's manual. The chapter is divided into two sections. Section 1 identifies the performance checks (i.e., tests, measurements, observations, and adjustments) of normal operating controls and functions, which are necessary to determine whether operation is within established tolerances/limits. Section 2 identifies other tasks that are necessary to ensure reliable system operation and prevent deterioration. Refer to the latest edition of Order 6000.15 for additional guidance.

NOTE: Similar Periodic Maintenance performed on a corresponding subsystem, for example, STARS, does not need to be repeated. Certification of all corresponding subsystems is required before completing any maintenance and/or certification checks.

b. The following table of performance checks and maintenance tasks are not to be taken as the minimum work required for proper maintenance, but rather as the maximum interval permitted between tasks.

c. Completion of all performance checks and maintenance tasks within the prescribed intervals in sections 1 and 2 is mandatory.

d. References to specific paragraphs (for example 310 or 525) refer to paragraphs of this order. The indicated reference for a procedure is a recommendation. Other methods, using equivalent equipment and procedures that will establish operation within the allowable operating tolerance/limit, are permitted. Test/field data supplied with each system by the manufacturer is not referenced; however, it may prove to be beneficial in some instances.

401 - 409. RESERVED.

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

Subsection 1. MLAT / FMA Performance Checks

Performance Checks	*Reference Paragraph*	
	Standards & Tolerances	***Maintenance Procedures***
410. DAILY. Complete FAA Form 6000-8 or Figure 1.		
a. TSPAD MCW Icon and System Message Check.	309	510 And TI 6191.500
b. TSPAD Accuracy Check.	310	516
c. Target Update Rate Check.	314	519
d. MLAT Availability.	316	512
e. TSPAD Data Entry and Display Processing.	319	513 And TI 6191.500
f. TSPAD Radar Reliability and Performance Parameters.	320	515 And TI 6191.500
g. FSL system status alert color check.	321	Check red check symbol in SSA on all available displays.
411. WEEKLY. Complete FAA Form 6000-8 or Figure 1.		
a. Display Check. 1. Focus 2. Color 3. Brightness 4. Contrast	312	521 And TI 6191.500
b. FMA Alerts Check.	313	514
c. Map Accuracy.	317	522
412. QUARTERLY. Complete FAA Form 6000-8 or Figure 2.		
a. Linearity/geometric distortion.	311a	517 And TI 6191.500
b. Magnification Stretch Factor Accuracy Check.	311b	518

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

413. SEMIANNUALLY. Complete FAA Form 6000-8 or Figure 2.		
414. – 499. RESERVED.		

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

CHAPTER 5. MAINTENANCE PROCEDURES

500. GENERAL.

This chapter establishes the procedure for accomplishing the various essential maintenance activities which are required for the FMA equipment on either a periodic or incidental basis. The chapter is divided into three sections. The first section describes the procedures to be used in making the performance checks listed in chapter 4, section 1. The second section describes the procedures for doing the tasks listed in chapter 4, section 2. The third section describes the procedures for doing special tasks, usually nonscheduled and not listed in chapter 4. Refer to the latest version of Order 6000.15 for additional guidance.

501. FORMS.

Order 6000.15 contains policy, guidance, and detailed instructions for field use of FAA Form 6000-8. Technical Performance Record, as applicable to the FAA facility. Entries shall be made in accordance with the instructions published in Order 6000.15. Figures 5-1 through 5-3 are sample FAA forms 6000-8 that show typical entries for normal and unsatisfactory conditions that may be encountered.

502. - 509. RESERVED.

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

510. TSPAD MCW ICON AND SYSTEM MESSAGE CHECK.

a. Objective. Verify that the minimum required resources that can sustain TSPAD ATC operations are present and working properly.

b. Discussion. The AIG EXTERNAL INTERFACES MCW icon is sub-labeled AIG1, AIG2, AIG3, respectively, and represents a logical grouping based on AIG message classes and not physical equipment. The AIG ROUTER icon represents the physical, redundant AIG router equipment.

c. Test Equipment Required. Not applicable.

d. Conditions. STARS certified and operational programs are being executed.

e. Detailed Procedures. Check for proper TSPAD indications at the FSL MCW:

1. Check the MLAT icon under the AIG EXTERNAL INTERFACES and verify that the minimum required resources for MLAT ATC operations are online.
2. Check the MLT sensor detailed status under the SENSORS top level icon and verify that Coverage, Overall, Enabled and Monitor Enabled Status are PASS.
3. Check for current failure/alarm report messages on the FSL MCW to determine if the minimum required resources for MLAT ATC operations are available.

511. RESERVED.

512. MLAT AVAILABILITY.

a. Objective. Ensure that the automation system status for the MLAT surveillance indicates it is available.

b. Discussion. These checks must be made while operational programs are being executed. Each reference transponder has a redundant antenna. Pairings are sequential, i.e., 1 and 2 are paired, 3 and 4 are paired etc. Only one antenna is required for a RefTran position to obtain operational status.

c. Test Equipment Required. Not applicable.

d. Conditions. Not applicable

e. Detailed Procedures for FSL.

NOTE: The indication of “PRESENT” means the Reference Transponders are reporting and does not reflect accuracy or detection capability.

NOTE: The AMZ FAILURE banner and the MLT sensor failure indications in the SSA are only applicable to FMA adapted sensors, positions, and coverage zones.

1. At the MCW select <Reports><Sensor Status Report> and select MLT sensor. Verify that System Status is OPERATIONAL.
2. Note status of Reference Transponders as PRESENT. Note status of operational coverage zones as GO.
3. Note absence of red AMZ FAILURE banners on TCWs selected for FMA positions.
4. Note absence of red MLT sensor failure alert in SSA area on TCWs selected for FMA positions.

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

513. MLAT FMA DISPLAY ENTRY AND DISPLAY PROCESSING.

a. Objective. Verify the display entry and display processing capability of MLAT FMA data.

b. Discussion. The required number of displays to be checked will be determined locally. As a minimum, one position must be checked. If possible, this check should be made on a different position than last executed.

c. Test Equipment Required. Not applicable.

d. Conditions. These checks must be made while the MLAT FMA operational program is being executed.

e. Detailed Procedures for FSL.

1. Verify proper FMA MLAT data entry and display functions.
   (a) Select MLT sensor.
   (b) Select FMA mode.
   (c) Select proper AMZ
2. Adjust brightness and character size for preferred viewing.
3. Select an associated target and adjust PTL at the DCB and observe that the PTL line adjusts.
4. Select the FMA geographic map that contains MLAT FMA fixed target geo-figures. Verify that the correct map is displayed.
5. Re-center display on one of the MLAT FMA reference transponders.
6. Set FMA display to maximum magnify and minimum range. Re-center display on beacon test target as necessary.
7. Verify that the MLAT FMA fixed target is displayed on or touching the appropriate map symbol.

514. FMA ALERTS CHECK.

a. Objective. To ensure FMA alert processing is operating within specifications listed in paragraph 313.

b. Discussion. The NTZ alert warning is checked by visual and aural demonstration of a STARS ATCoach scenario, which has targets that violate NTZ parameters. The required number of displays to be checked will be determined locally. However, as a minimum, one position must be checked. This check should be made on a different position than last executed.

c. Test Equipment Required. Not applicable.

d. Conditions. The FMA host system is operational and the correct software voice build is loaded. Optionally this check may be incorporated as part of the FS PVER by the OSF. Please coordinate with the OSF for details. If the FMA alert scenario is incorporated into the FS PVER, follow instructions for executing an abbreviated FS PVER Par 516 of the main section of this book and be alert for the FMA check portion described below in step e. 17. After the FMA alert conditions are observed, the FS PVER may be canceled.

e. Detailed Procedures.

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

1. This procedure assumes that the position chosen is not signed-on, is not in FMA mode, FMA sensor is not selected, and position has airspace.
2. At the FSL MCW, ensure that the SIM Icon is Green.
3. Verify and record the current environment and adaptation directory. From the main menu bar, select <System Control, FS Switch Software/Adaptation>.
4. When the FS Switch Software/Adaptation window appears, record the current environment and directory, which is highlighted (e.g., ENV001.ad).
5. Login to TCW. <sign on>, enter name, <enter>, enter password (if required), <enter>.
6. Switch the TCW to FMA mode.
7. If position has airspace, consolidate airspace to another display position by entering <F7><C><receiving position><sending position><+><enter>. Refer to the consolidation procedure in TI 6191.409 for additional assistance.
8. Sign-on if necessary.
9. On DCB select <Mode>. Select <TRNG#> Select slew <Enter>. Select <Accept>. (Where '#' is a site specific training exercise number reserved for this check. It is coordinated with air traffic training to prevent scenario conflicts.)
10. When the display returns in Training Mode, select keyboard key <TgtGen> button. Select keyboard key <Enter>. The ATCoach Simulation Control Window will appear.
11. On the Site File line, use the track ball to press the [Select] button.
12. When the Site File window appears, choose the current <Site File ENV> (Select current environment recorded in step 4, e.g., xxx_ENV001_ad.st (where xxx is the three letter site identifier)) and select <OK>.
13. On the Scenario File line, use the trackball to press the [Select] button.
14. When the Scenario File window appears, choose scenario XXX_FMA_ALERTS (where XXX is the three character site identifier) and select <OK>.
15. Leave the Pseudo Pilot and Offset Time lines blank.
16. On the ATCoach Simulation Control Window, use the trackball to select the <Run Scenario> button to start the scenario.

    NOTE: If the <Run Scenario> button is not available (grayed out), select the <End Scenario> button first, then the <Run Scenario> button.
17. As the scenario runs, ensure that the following warnings are properly displayed with appropriate voice alert.
    (a) NTZ CAUTION (Non-blinking, yellow "NTZ" is displayed in the DB as A/C prediction vector touches the NTZ. Voice announces "CAUTION". Violated NTZ turns yellow.)
    (b) NTZ WARNING (Blinking, red "NTZ" is displayed in the DB as A/C enters the NTZ. Voice announces "WARNING". Violated NTZ turns red)
    (c) WRONG RWY alarm (Blinking, red "RWY" is displayed in the DB. Voice announces "WRONG RUNWAY".)

(d) COAST alert (May see “NOM” time-shares in DB. Blinking red “CST” is displayed in DB. DB and position symbol freeze in position. Voice announces “COAST”.)

18. After all the alerts listed above have been identified, end the scenario by selecting keyboard key <TgtGen> button. Select keyboard key <Enter>.
19. The ATCoach Simulation Control Window will appear.
20. Use the trackball to select the <End Scenario> button.
21. Select <Cancel> to close ATCoach Simulation Control Window.
22. Switch from Training mode to FS mode and return display to ATC service.
23. Position should return to non-FMA sensor and large, red AMZ FAILURE banner should be displayed. If FMA sensor is presented, select a non-FMA sensor and observe failure banner.
24. Sign-on if necessary
25. Select FMA sensor and ensure that banner toggles off the display.
26. Return to normal operation.

515. TSPAD SENSOR RELIABILITY AND PERFORMANCE PARAMETERS.

a. **Objective.** Check sensor performance values.

b. **Discussion.** TSPAD sensor reliability and performance parameters are not direct certification checks. However, they may be used in conjunction with other checks or on their own to assist a specialist in making a certification statement. Their specified value is to measure TSPAD service to trigger more in-depth analysis. Probability of detection (Pd) uses RefTran reports to measure service performance capability. It is recommended to perform this sub-check during non-peak traffic times. The other sub-checks should be made during peak traffic times. An MLAT discarded report may have an error message displayed on the MCW. A more than normal increase in this value may indicate a system problem and should be investigated. When a parameter does not meet the criteria established in attachment 2, paragraph 320, the FSL subsystem may still be certified provided the sensor is performing to recorded baseline values (see e.). However, the reason for not meeting performance parameters in attachment 2, paragraph 320 should be identified and documented. Every effort should be made to bring the sensor and digitizer up to specifications.

c. **Test Equipment Required.** Not applicable.

d. **Conditions.** These checks must be made while the FSL operational program is being executed.

e. Detailed Procedures for FSL.

1. A baseline value for the performance parameters should be updated every six months. If this step is within the six month cycle, skip to step 2. Utilize the Target Summary Report at the FSL MCW over a period of seven days to provide data for a performance baseline for the sensor. The collection days do not need to be consecutive, but they should be done within a reasonable amount of time. Do not collect data immediately following an installation, a system shutdown or some other event that causes a break in the system data collection cycle. Allow enough time for the system to collect a

sufficient amount of data to provide a valid report. After seven days of data has been collected, average the results by totaling each column and dividing the sum by the total number of samples collected (normally seven). Record the average value and file the average and the collected reports in the FRDF. It is not necessary to complete this procedure before declaring IOC and/or ORD on a STARS or sensor installation.

2. At the FSL MCW, refer to the Target Report Summary for MLT sensor.

3. For probability of detection (Pd) of RefTrans, use the number of PRESENT RefTranms from the Sensor Status Report for MLT sensor, the report period (SECONDS:) from the Target Report Summary for MLT sensor, and the number of MLAT REFTRANS REPORTS also from the Target Report Summary. Apply these to the lookup table below and which should comply with the tolerance specified in paragraph 320. The table assumes a one second update rate.

# RF PRESENT	95% (300 sec.)	97% (300 sec.)
12	3420	3492
11	3135	3201
10	2850	2910
9	2565	2619
8	2280	2328
7	1995	2037
6	1710	1746

If values are within 10% low, perform this check at a low traffic period.

4. Verify that the Out of Standard Deviation tolerance (SDOP) is within tolerances specified in paragraph 320.

5. Verify that the values for Invalid Mode 3/A and Invalid Mode C are within the tolerances specified in paragraph 320.

6. Verify that MLAT discarded reports is within the tolerance specified in paragraph 320. Discarded reports reflect any reports not used due to external designations and/or internal checks.

516. TSPAD ACCURACY CHECK.

a. Object. This procedure determines that the postional accuracy of the display is within the tolerances specified in paragraph 310.

b. Discussion. These checks must be made while operational programs are being executed. Each reference transponder has a redundant antenna. Pairings are sequential,

i.e., 1 and 2 are paired, 3 and 4 are paired etc. Only one antenna is required for a RefTran position to obtain operational status. The accuracy is verified by visually checking the display to determine if the reference transponder (RefTran) symbol is on, around or within the FMA reference target geo-figure. It is recommended to save preferred display settings into preference set files.

c. Test Equipment. Fixed target map or map that displays FMA reftran geo-figures.

d. Conditions. The FMA system is in an operational configuration.

e. Detailed Procedure.

1. Select site MLT.
2. Select FMA Mode on the TCW to be tested.
3. Select the map with fixed targets for display.
4. Select the RTQC button from the DCB.
5. Increase MPA (RefTran map geo-figures) and position symbol brightness.
6. Decrease AMZ, NTZ, RWY, and REF brightness.
7. Locate the FMA RefTran geo-figures.
8. As a suggestion, set MAG to 4 and range to the minimum value where all RefTrans are visible on display however it is permissible to use PLACE CENTER, RANGE, and/or MAG display options on the DCB or DCP, to adjust display for optimum observation.
9. Visually verify that the RefTran position symbols are on, around or within the FMA map geo-figures.
10. Verify that arrivals are correctly aligned on approach centerlines and runways. Increasing magnification assists in close inspection of targets of opportunity. Because magnification is proportionally greater east to west than north to south, targets moving east to west appear to cover more distance. This only applies to settings greater than one. It is recommended to corroborate with AT for this step.

517. LINEARITY/GEOMETRIC DISTORTION CHECK.

a. Objective. This procedure determines that the linearity and geometric distortion associated with the FMA's display is within the tolerances specified in paragraph 311a.

b. Discussion. The Sony linearity/geometric distortion test grid will be activated. A mylar grid overlay will be placed over the FMA display to determine if the linearity/geometric distortion of the display is within tolerance.

c. Test Equipment Required.

1. Sony DDM-RM10 remote controller.
2. Mylar linearity/geometric distortion grid overlay.
3. Parallax corrector viewing tube

d. Conditions. The FMA system is in an operational configuration.

e. Detailed Procedures. Perform the Linearity/Geometric Distortion Check in TI6191.414, Sony Tube Alignment Procedure or TI 6191.500 specified in 311a.

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

518. MAGNIFICATION STRETCH FACTOR ACCURACY CHECK

a. Objective. This procedure provides verification of magnification aspect ratio with the FMA's display of map information and also determines that the 4-to-1 aspect ratio using the stretch factor command is within the tolerances specified in paragraph 311b.

b. Discussion. The 4:1 (MAG 4) aspect ratio of the display is checked against the 1:1 (MAG 1)aspect ratio to determine if the stretch factor is within tolerance.

c. Test Equipment Required.

1. Ruler

d. Conditions. The FMA system is in an operational configuration.

e. Detailed Procedures.

1. Select FMA Mode on TCW to be tested.
2. Select MAG from the DCB and set the magnification of the display to a 1:1 (MAG 1) ratio.
3. Select PLACE CENTER from the DCB and center the Active Monitoring Zone (AMZ) display on the middle of the display.
4. Select RANGE from the DCB and set the range of the display to minimum.
5. Measure and record the width of the NTZ.
6. Select MAG on the DCB and set the magnification of the display to a 4:1 (MAG 4) ratio.

   NOTE: The Stretch Factor command will cause the map information to stretch perpendicularly to the selected NTZ.
7. Measure and record the width of the NTZ displayed on the screen. To do this, re-center the display if necessary.
8. The NTZ width measured at 4:1 (MAG 4) magnification should be 4 times wider than the NTZ width measured at 1:1 (MAG 1) magnification.

519. TARGET UPDATE RATE CHECK.

a. Objective. This procedure determines that the target update rate is within the tolerances specified in the lookup table in this section.

b. Discussion. The MLAT TSPAD target update rate specification is between 1 second plus or minus 0.2 seconds. This check uses the MLAT REFTRANS REPORTS from the FS Target Report Summary, MLT section, to determine if the target update rate is within tolerance.

c. Test Equipment Required. N/A.

d. Conditions. MLAT operational.

e. Detailed Procedure.

1. Count the number of RefTrans that report PRESENT from the MLT Sensor Status Report.
2. Note the number of MLAT REFTRANS REPORTS from the MLT section of the Target Report Summary.

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

3. Note the report period after the SECONDS: area from the same report.
4. Verify from the table below that the number of MLAT REFTRANS REPORTS is between the HI and LO for the correct number of PRESENT RefTrans under the noted SECONDS period.

	300 sec report period		**60 sec report period**	
# PRESENT RefTrans	**HI**	**LO**	**HI**	**LO**
12	4802	3201	960	637
11	4401	2922	880	584
10	4001	2656	800	531
9	3601	2391	720	478
8	3201	2125	640	425
7	2800	1859	560	371
6	2400	1594	480	318

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

Section 1. PERFORMANCE CHECK PROCEDURES

520. RESERVED.

521. DISPLAY CHECK.

a. Object. This procedure evaluates the quality of the display presentation.

b. Discussion. A subjective evaluation of the display presentation will be made in a normal operational environment. The display focus, brightness, and contrast will be evaluated.

c. Test Equipment Required. None.

d. Conditions. The FMA system is in operational configuration.

e. Detailed Procedure.

1. Evaluate the display presentation focus. Check the overall focus for operational usability when the focus is adjusted so that the targets, range marks, map, and display lines are as clear and sharp as possible. Check the size and separation of the finest site coverage detail that is known to be resolvable.
2. Evaluate the display brightness, color and contrast for operational usability.

522. MAP ACCURACY

a. Object. This procedure ensures proper alignment of the map video with sensor returns.

b. Discussion. This test shall verify correct map alignment with the sensor returns. The test may be conducted with known fixes or targets–of–opportunity to verify runway centerline alignment and navigational aid alignment. This test shall also verify that the map is aligned to the correct site magnetic variation by a visual check of the position of the map magnetic north mark. The site digital map and digital terrain maps must be built using the same magnetic variation. Per Order 7210.3K, Facility Operation and Administration, it is the AT managers responsibility to ensure map alignment to magnetic north. However, the AF technician is responsible for ensuring that the overall FMA system is maintained to the proper magnetic variation. AT and AF shall ensure that they are using the magnetic variation. FAA Order 8260.25, Implementing Epoch Year Magnetic Variation Values, defines the method by which variations are assigned and maintained.

c. Test Equipment required. None.

d. Conditions. The FMA system is to be placed in an operational configuration.

e. Detailed Procedure. Use targets–of–opportunity or surveyed targets to verify map position. Check that arrivals are lining up on runway centerlines at primary airports. It is recommended to corroborate with AT for this check.

523. MAP ALIGNMENT CHECK.

a. Objective. Ensure that map adaptation is aligned with the fixed target map at the TCWs.

b. Discussion. This check is performed to new maps when new maps are added to the system. Utilize the targets of opportunity to verify runway centerline alignment and/or navigation aid alignment. All maps are built to true North. If applicable, utilize the cardinal marks on the fixed target map to ensure they coincide with the cardinal marks of the maps being checked. A request to have cardinal marks added to maps should follow local policy. The required number of maps and displays to be checked will be determined locally. It is the responsibility of AT to ensure map accuracy. (See the latest edition of Order 7110.65, Air Traffic Control.) It is permissible to corroborate with ATC to verify map accuracy.

c. Test Equipment Required. Not applicable.

d. Conditions. N/A.

e. Detailed Procedures.

1. Clear all maps from the TCW.
2. Display the Fixed Target Map.
3. Center the TCW display.
4. Select the map to be checked and ensure that the user map and the Fixed Target Map Cardinal Marks overlay.
5. For the appropriate maps, utilize a target of opportunity that is landing to verify that the runway centerline is adapted correctly.

524. FMA/MLAT FIXED TARGET MAP.

a. Objective. Verify that Reference Transponders (RefTran) on the geographic map are postitioned correctly.

b. Discussion. The fixed target map is a set of MLAT Reftran and Reference Unit (RU) overlaying dots and map cardinal marks. These overlaying dots represent the location of transmittal and receiving equipment for the multi-lateration system. The RefTrans transmit a signal that is shown as a target on the display. The cardinal marks, which include the True North Mark, should be adapted according to the Magnetic Variance Tile Set. Each site is responsible for having a National Automation Request (NAR) form submitted to the associated OSF so the OSF can update the site adaptation to reflect the location of the RefTrans and RUs. The NAR forms should provide the location of said test target locations. Request to have the fixed target map generated should follow local policy.

c. Test Equipment Required. Not applicable.

d. Conditions. Not applicable.

e. Detailed Procedures.

1. At a TCW, select FMA mode, select the multi-lateration sensor to check, and set the display reference at the center of the display.
2. Clear all maps from the TCW.
3. Select the Fixed Target map that is associated to the sensor.
4. Verify that all working RefTran symbols on the map are aligned and positioned with transmitted signals.
5. If applicable, check the Cardinal Marks on the Fixed Target Map.

6. Center the TCW display.
7. Verify that the True North Cardinal Mark is in the correct position using the value of the TCW display center Magnetic Variation Tile provided by the OSF.
8. Verify the remaining Cardinal Marks.

Section 2. FMA INTERFACE

525. RESERVED.

Section 3. OTHER MAINTENANCE TASK PROCEDURES

526. - 550. RESERVED.

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

CHAPTER 6. FLIGHT INSPECTION

600. GENERAL.

a. Flight inspections are made to verify the overall performance of sensor, navigation aids, and air/ground communications systems. Direction for flight inspections are contained in the latest edition of FAA Order 8200.1, United States Standard Flight Inspection Manual.

b. Per FAA Order 8200.1, flight inspection requirements and procedures for FMA are prescribed in the latest FAA Order 8200.39, Flight Inspections of Precision Runway Monitors / Final Monitor Aid.

c. Note that FAA Order 8200.1 may change to include directions in FAA Order 8200.39 at a future date.

d. Direction for flight inspections following an aircraft accident are contained in the latest edition of Order 8020.16, Air Traffic Organization Aircraft Accident And Incident Notification, Investigation, And Reporting.

601. – 699. RESERVED.

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

APPENDIX FMA With MLAT - 1 - CERTIFICATION REQUIREMENTS

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 sensor data processing from the automation system to display targets and alphanumeric data on the display(s) at a remote tower.

3. SYSTEMS.

Centralized, distributed, or backup surveillance processing systems, TCW or TDW are used to provide these services. The system is certified STARS 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 sensor 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. 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.

5. TRANSITION PHASE.

As surveillance processing systems are replaced, it is necessary to run dual processing operations. To accommodate different configurations that are subject to change, the reference paragraphs in this appendix are provided in separate columns for each of the applicable configurations. All procedures for each configuration currently in operation shall be accomplished.

6. FUTURE SYSTEMS.

For future planning purposes, systems that provide the above services or are used for testing or prototyping shall be certified in accordance with Order 6000.15.

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

Table FMA / MLAT - 1. TERMINAL SURVEILLANCE PARALLEL APPROACH DISPLAY (TSPAD)

Advertised Service	*Certification Parameter*	*Reference Paragraph*
MLAT Parallel Approach Capability	Knowledge that the constituent Surveillance Interrogator System (SIS) is certified, e.g., ASDE-X PRM-A. TSPAD Accuracy Check. Target Update Rate Check MLAT Availability	 310; 516 314; 519 316; 512
	Knowledge that STARS FSL Subsystem is certified. NOTE: Required at STARS FMA sites.	Refer to JO 6191.3, Appendix 1, Table A1-3a
	Knowledge that STARS FMA Subsystem is certified.	Attachment 1, Appendix FMA-1, Table FMA-2
	FMA system status alert color check	Par. 321

Normal Certification Interval: Weekly.

Allowable Exceptions: Associated PRM sensor system (primary, secondary, and/or non-radar), individual runway approach, individual TCW(s), sensor, and triple independent approaches.

Person Responsible for Certification: ATSS with certification authority.

Certification Entries in the TSPAD Maintenance Log:

Without Exception: TSPAD certified.

With Exception:

TSPAD service certified except (individual runway approach).

TSPAD service certified except (location identifier) (associated PRM sensor system).

TSPAD service certified except (display designation).

TSPAD service certified *except triple independent approaches.*

Removing Exception:

TSPAD (appropriate runway approach) service certified.

TSPAD (display designation) service certified.

TSPAD (location identifier) (associated PRM sensor system) service certified.

TSPAD triple *independent approach certified*.

ATTACHMENT 2 – FMA WITH MLAT (PRM-A) ON STARS MAINTENANCE

TABLE FMA / MLAT - 2. STARS Final Monitor AID (FMA) Subsystem		
Advertised Service	*Certification Parameter*	*Reference Paragraph*
Display Capability	FMA Alerts Check	Par. 313; Par. 514
	TSPAD Data Entry and Display Processing.	Par. 319; Par. 513
Normal Certification Interval: Event Based (per 6000.15). Allowable Exceptions: Individual TCW(s) displays. Person Responsible for Certification: ATSS with certification authority. Certification Entries in the STARS Maintenance Log: Without Exception: FMA subsystem certified. With Exception: FMA subsystem certified except FSL (Designated display). Removing Exception: FMA subsystem FSL (Designated display) certified. **NOTE:** Only required at STARS FMA sites.		