ORDER **JO 6191.3**

STANDARD TERMINAL AUTOMATION REPLACEMENT SYSTEM (STARS)

MAINTENANCE TECHNICAL HANDBOOK

FINAL

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U.S. DEPARTMENT OF TRANSPORTATION
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INITIATED BY: Terminal Field Operational Support, STARS

RECORD OF CHANGES

DIRECTIVE NO. JO 6191.3

CHANGE TO BASIC	SUPPLEMENT			OPTIONAL	CHANGE TO BASIC	SUPPLEMENT			OPTIONAL

FAA Form 1320-5 (6-80) USE PREVIOUS EDITION

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 # 25779	All Pages

FOREWORD

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 maintenance personnel to achieve optimum performance from the equipment. This information augments information available in instruction books and other handbooks, and complements the latest edition of Order 6000.15.

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 an 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. Not Applicable.

5. MAINTENANCE AND MODIFICATION PROCEDURE.

a. Order 6000.15, this handbook, the applicable equipment TI Manuals, 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 shall be consulted for a particular standard, key inspection element, performance parameter, performance check, maintenance task, or maintenance procedure.

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. The TPRs include non-numeric checks for convenience as a checklist tool for PM tracking. STARS provides a reproducible Updated Software Chart and reproducible TPRs in this handbook as identified below:

- Figure 5 – 1. STARS Updated Software Chart
- Figure 5 – 2a. STARS Daily Technical Performance Record
- Figure 5 – 2b. STARS Weekly Technical Performance Record
- Figure 5 – 2c. STARS Monthly Technical Performance Record
- Figure 5 – 2d. STARS Quarterly Technical Performance Record
- Figure 5 – 2e. STARS Semiannual Technical Performance Record

- Figure 5 – 2f. STARS As Required Technical Performance Record
- FMA Figure 1 - STARS FMA Daily/Weekly Technical Performance Record
- 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.

Teri L. Bristol

Director of Terminal Program Operations

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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.

Maintenance personnel 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, maintenance personnel 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, 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 Airborne Target Display (TSATD) service.
   2. General Information Automated Flight Plan (GIAFP) service.
   3. STARS system.
      (a) Full Service Level (FSL)
      (b) Emergency Service Level (ESL)
      (c) Existing Automation Service Level (EASL) where EASL is part of the configuration

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 ATSS 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 technical personnel who hold certification credentials granted under the provisions of the latest edition of Order 3400.3, Airway Facilities Maintenance Personnel Certification Program.

103. 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.

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 AF Control Center and include the desired time of shutdown, probable duration, and reason.

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

c. The System Specialist should confirm the approval for the interruption with AT or AF 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 requirements 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. **Maintenance Personnel.** Related information useful to maintenance personnel 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
3. EASL where EASL is part of the configuration

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.

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. Sites 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 required 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. JUMPSTARS POLICY.

a. **General.** This paragraph provides policy guidance on when to execute JumpSTARS procedures. JumpSTARS is a tool that is used to load the Unix operating system on a STARS LRU, and to initialize that LRU in preparation for operational use. The JumpSTARS procedures are contained in TI 6191.484, STARS JumpSTARS Operator's Manual for the SOS.

b. **Background.** There are two ways to run JumpSTARS. Easy Spare is run on an isolated STARS LRU on a test bench, and JumpSTARS is run on all STARS LRUs connected in its operational configuration.

c. **Policy.** Airway Facilities policy is that JumpSTARS should be used only as a last resort, i.e., when all attempts to restore a system-wide failure by first level maintenance and second level engineering support have failed. All coordination and approvals shall be obtained as delineated below.

d. **JumpSTARS Procedure.** JumpSTARS could interrupt normal operation of the STARS LRUs for 12 to 48 hours, depending on the number of displays, towers, and LRUs. The following steps shall be completed before running JumpSTARS other than during STARS initial installation:

1. **Justification.** In the event of a system-wide failure of STARS, and all attempts to restore STARS by first level maintenance and second level engineering support have failed, JUMPSTARS may be used as a last resort.

2. **Approval and Coordination.**

   (a) Notify the System Support Center (SSC) Manager and get approval to run JumpSTARS.

   (b) Notify the associated AT Operations Manager and get approval to run JumpSTARS.

   (c) The Specialist running JumpSTARS shall notify the appropriate AF control center to begin the coordination for running the JumpSTARS procedures. The Specialist should provide information such as who, what, when, and where to the AF control center.

   (d) The AF control center is responsible for coordination with the affected System Management Office (SMO) and Regional Operations Branch Manager.

3. **Execution.** Refer to the JumpSTARS Procedures Manual for detailed procedures on configuration and execution of JumpSTARS. The second level engineering support organization should be included in the execution of JumpSTARS.

4. **Documentation.** Document the coordination activities, approvals, start of JumpSTARS, and completion of JumpSTARS in the maintenance log.

e. **Easy Spare Procedure.** Easy Spare is performed isolated on a test bench and has no impact to STARS operation. Easy Spare should be run as part of a replacement or modification to STARS components. There are no approval or coordination requirements to run Easy Spare.

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 provides automation to support Air Traffic Control (ATC) within the FAA TRACON and DoD air traffic control facilities. STARS ultimately replaces all terminal automation systems previously deployed at these facilities, including the following:

1. Automated Radar Terminal System (ARTS) IIA, ARTS IIE, ARTS IIIA, and ARTS IIIE.
2. En route Automated Radar Terminal System (EARTS), the Navy Radar Air Traffic Control Facility-Direct Altitude and Identification Readout (RATCF-DAIR).
3. Programmable Indicator Display Processor (PIDP) systems and Military Beacon Decoder (TPX-42) systems at DoD air traffic control facilities.
4. Micro-EARTS (DoD only).
5. Digital Bright Radar Indicator Tower Equipment (DBRITE).

b. **Site Types.**

1. STARS is designed around three basic site types. STARS site types are:
   (a) STARS Central Support Complex (SCSC)
   (b) Operational Support Facility (OSF)
   (c) STARS Operational Site (SOS)
2. In addition to these basic sites, SOS Local Towers (LT), Remote Towers (RT), and standalone towers provide for local ATC operations at airport sites. The system/site roles are established through the design of the STARS system hierarchy structure.

c. **Site Purpose.**

1. **SCSC Purpose.** The SCSC facility provides for centralized control of STARS field support and software development. The 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.** The SOS facilities provide the automation of air traffic data to support ATC within FAA and DoD terminal control areas. Each SOS provides automation to

support control of air traffic within a designated FAA TRACON or DoD air traffic control facility. The SOS accepts and processes surveillance and other data to provide ATC and system information to air traffic controllers and external systems. Typically, the SOS includes a local tower for local airport traffic control. An SOS site may support one or more RTs as part of the configuration. The SOS may also use RTs to support its facility role. Stand-alone towers provide automation for local airport/air station ATC similar to the RT capabilities but without the need for direct SOS support.

(a) **Independent Support.** The SOS operates in an independent fashion. The primary STARS mission can be accomplished without any connection to any of the STARS support facilities. For support purposes, the SOS includes two dial-up circuits for interfacing to the external support sites. The dial-up links are typically used to connect the operational site to the associated OSF site. The dial-up circuits can also be used to establish a connection with the SCSC or any other STARS site subject to security criteria established at each site.

(b) **SOS Security.** The SOS consists of operational and support subsystems. The SOS also includes equipment to ensure that computer security is maintained in the FAA networking environment. Router and firewall equipment are provided to authenticate any users who attempt to dial into or out of the SOS and to report any detected breaches.

(c) **Operational Support Subsystem.** The STARS Support Subsystem (SS) provides the offline support functions needed to maintain the operational site. The SS typically communicates with the OSF and SCSC. The SS also provides site support such as simulation for testing, training, and the ability to transfer data to OSF or SCSC for analysis, etc.

(d) **Data Processing and Display.** STARS is a digital radar processing automation and display system. It is comprised of numerous computers linked with dual redundant LANs that together accomplish the task of accepting radar and Inter-Facility (IFDT) data and displaying ATC related information on the displays for AT personnel. Radar data can be received from both short-range (terminal) and long-range radars. STARS has three service levels: FSL, ESL, and EASL (transition level).

(e) **Modem Sharing Unit (MSU).** STARS utilizes the MSU as radar data and Inter-Facility data splitter devices for the automation systems (FSL and ESL). The MSU consists of either a 4-port or 2-port RS-232 line sharing device. Long-range radar data is connected to the input of the 4-port line sharing device. Outputs of the MSUs are fed to primary and alternate FSL Networked Universal Input/Output (NUNIO) and primary and alternate ESL NUNIOs. Inter-Facility data is connected to the input of the 2-port line sharing device. Outputs of the line sharing devices are fed to the primary and alternate FSL NUNIOs.

(f) **Line Splitter.** Short range radar data is connected to the input of RS-530 line splitter devices. Outputs from the line splitter are fed to primary and alternate FSL NUNIO devices and primary and alternate ESL NUNIOs.

(g) **Site Support Subsystem.** The site support subsystem is common to both FSL and ESL. The components of the site support subsystem are General Purpose Workstations (GPW), Test and Training Simulator Equipment (TTSE), a Site Support Server (SSS), laser printer, and firewall. The GPWs are used for general processing support at the site. The TTSE provides simulation and training to AT

operation. The Commercially Available Software (CAS) that supports the training task is ATCoach software. The SSS is the central point storage for the operational, utility, and diagnostic software. The firewall provides site access security processing for all transfers over the dial-up lines and WAN router.

202. FSL SYSTEM FUNCTIONAL DESCRIPTION.

a. The operational software that is used in FSL is AutoTrac. The FSL provides beacon tracking for terminal and tower control areas. Automatic transfer of flight data via Inter-Facility between the FSL and Air Route Traffic Control Centers (ARTCC) and/or TRACON facilities are provided. The 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), a 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. **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), Minimal Data Blocks (MDB), Limited Data Blocks (LDB), and alternate FDBs to the controllers.

   (a) **The FDB contains:** Present Position Symbol (PPS), Controller Jurisdiction Indicator (CJI), leader line, Predicted Track Line (PTL), Aircraft Identification (ACID) or Secondary Surveillance Radar (SSR) code, aircraft category, Mode-C flight level/altitude, vertical movement indicator, computed ground speed, destination terminal, assigned flight level/altitude, vertical speed, assigned heading, and a comments field. All FDB tracks have a flight plan. FDBs are represented for any tracks that are: “owned” but not in the hold list, quick looked, in hand-off mode for which a TCW is either the initiator or the receiver, special condition (e.g., general emergency, hi-jack, or radio communications failure), and tracks with unsuppressed MSAW or CA.

   (b) **The MDB contains:** a PPS with a CJI, and a PTL. All MDB tracks have an associated flight plan. MDBs are represented for any tracks that are “owned” by another controller.

   (c) **The LDB contains:** a leader line, a PTL, an SSR code, a Mode-C flight level/altitude, and a vertical movement indicator. LDBs are presented for all tracks that do not have an associated flight plan.

(d) **The alternate FDB** has a similar characteristic and presentation as the FDB, except the aircraft type will be displayed in place of the Mode-C flight level/altitude, and the vertical movement indicator.

8. **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 tower cab, remote tower cab, and stand-alone tower cab.

9. **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.

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

11. **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 FSL contains two independent LANs: online and standby. The LAN functions as a communication pathway between all processors in the system.

203. ESL SYSTEM FUNCTIONAL DESCRIPTION.

a. The operational software used in ESL is TracView. The ESL system provides a backup to the FSL and EASL during transition. ESL provides the 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/EASL 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 tower cab, remote tower cab, and stand-alone tower cab.
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. EASL SYSTEM FUNCTIONAL DESCRIPTION.

EASL uses the ARTS IIIA system inputs, via the Automation Interface Adapter (AIA), in conjunction with the STARS hardware to provide ATC operational capabilities, with the added feature of color displays. EASL is used only during the transition phase of deployment. The AIA provides processing to convert the existing automation alphanumeric data into networking package format for transmission to the TCW, and performs the inverse function for data entries emanating from the TCW keyboard. The AIA will be removed after a complete cutover to STARS.

205. STARS BLOCK DIAGRAM.

Respectively, Figure 2-1, Transition Phase; Figure 2-2, Typical SOS; Figure 2-3, Typical Remote Tower; Figure 2-4, Remote Tower with Local Primary Radar; and Figure 2-5, Typical Stand-Alone Tower, in this handbook show the transition states of STARS, typical configuration of SOS, remote tower configuration, and a stand-alone tower configuration.

206. – 299. RESERVED.

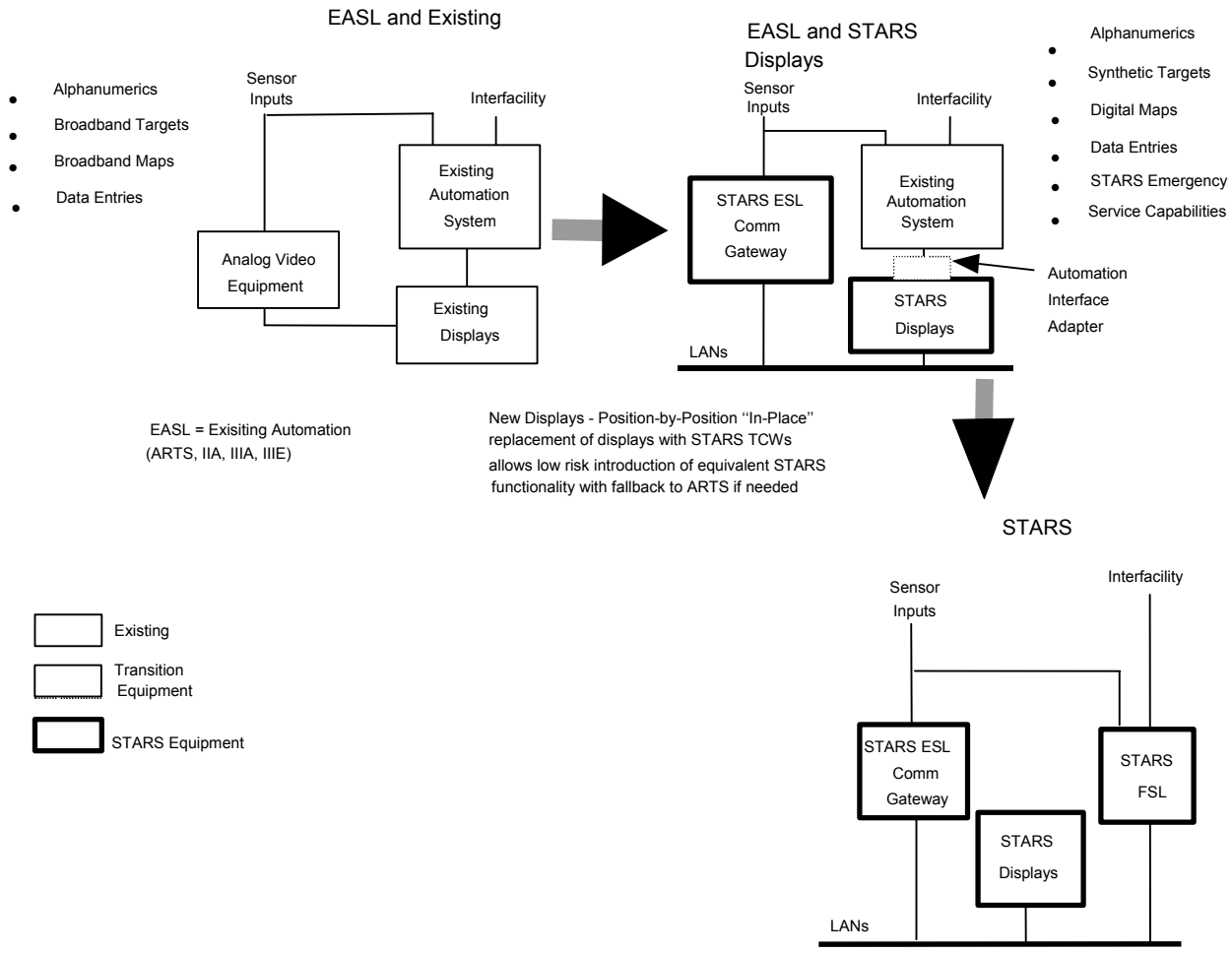

Figure 2 – 1. Transition Phase

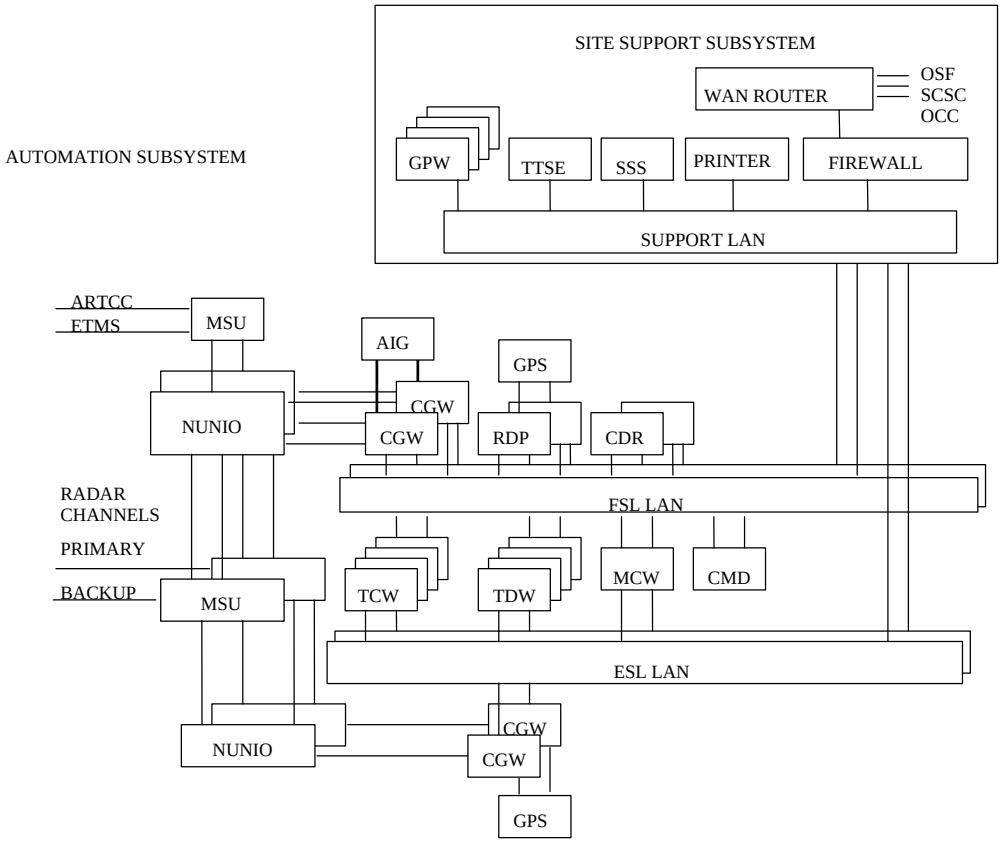

Figure 2 – 2. Typical SOS

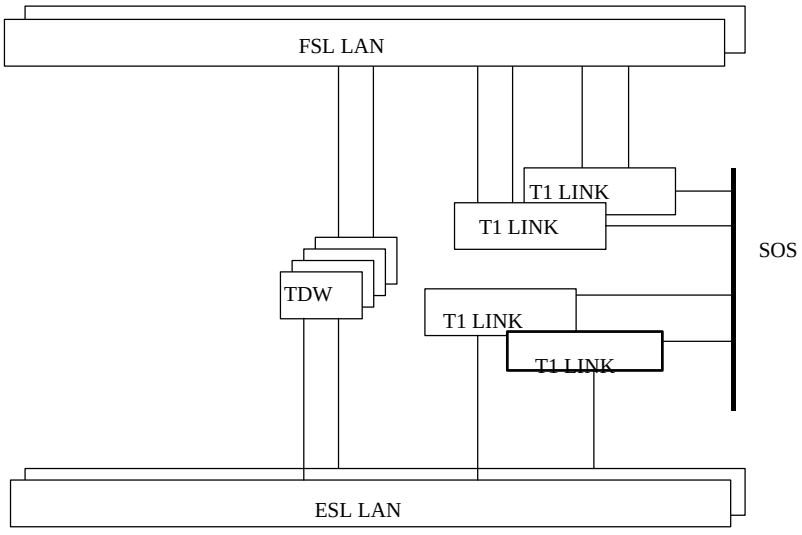

Figure 2 – 3. Typical Remote Tower

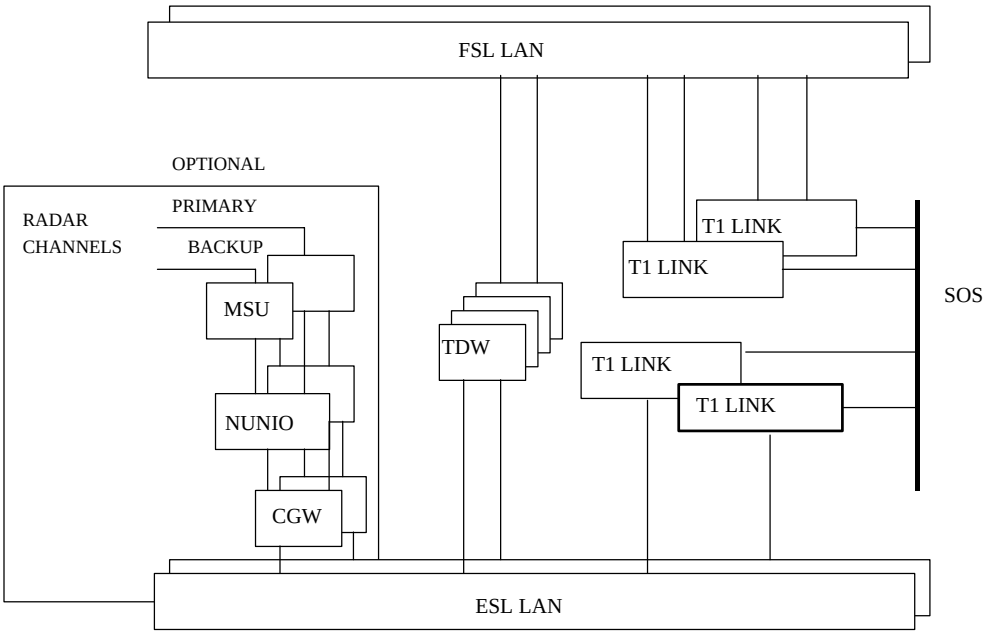

Figure 2 – 4. Remote Tower With Local Primary Radar

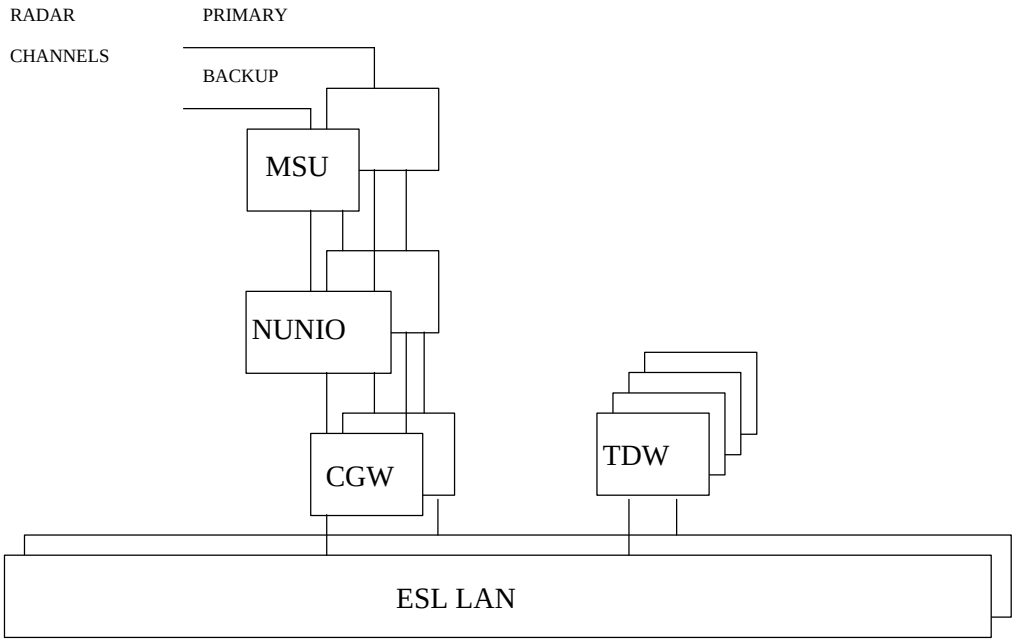

Figure 2 – 5. Typical Stand-Alone Tower

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.

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Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
301. FSL NUNIO.				
a. Visually inspect FSL MCW status of the NUNIO icons**.**	TI 6191.402	No visual error indication.	Same as standard.	Same as standard.
b. Offline diagnostics**.**	TI 6191.402	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 6191.402	Error free operation.	Same as standard.	Same as standard.
302. FSL CGW.				
a. Visually inspect FSL MCW status of the CGW icons.	TI 6191.402	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics for FSL Processor.	TI 6191.402	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 6191.402	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 6191.402	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics for FSL Processor.	TI 6191.402	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 6191.402	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 6191.402	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics for FSL Processor.	TI 6191.402	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 6191.402	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.

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Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
305. FSL TDW.				
a. Visually inspect FSL MCW status of the TDW icons.	TI 6191.402	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics for FSL Processor.	TI 6191.402	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 6191.402	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 6191.402	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics for FSL Processor.	TI 6191.402	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 6191.402	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 6191.402	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics for FSL Processor.	TI 6191.402	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 6191.402	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. TSATD FSL SERVICE CERTIFICATION AND TARGET PARAMETERS.				
a. Check icons at the FSL MCW.	Par. 511	Minimum required resources that	Same as standard.	Same as standard.

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Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
		can sustain the 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

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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.	TI 6191.402, Software Status Report	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	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 6191.402	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 6191.403	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostic.	TI 6191.403	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 6191.403	Error free operation.	Same as standard.	Same as standard.

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Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
312. ESL CGW.				
a. Visually inspect ESL MCW status of the CGW icons.	TI 6191.403	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics.	TI 6191.403	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 6191.403	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.
313. ESL TCW.				
a. Visually inspect ESL MCW status of the TCW icons.	TI 6191.403	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics for ESL Processor.	TI 6191.403	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 6191.403	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.
314. ESL TDW.				
a. Visually inspect ESL MCW status of the TDW icons.	TI 6191.403	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics for ESL Processor.	TI 6191.403	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 6191.403	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.
315. ESL MCW.				
a. Visually inspect ESL MCW status of the MCW icons.	TI 6191.403	No visual error indication.	Same as standard.	Same as standard.
b. Offline Diagnostics for ESL Processor.	TI 6191.403	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 6191.403	Error free operation.	Same as standard.	Same as standard.

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Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
d. Network Information System Plus (NIS+) check.	Par. 530	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. TSATD ESL SERVICE 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 6191.404	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.

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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-CPME.				
(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 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.	TI 6191.403	Latest software and adaptation versions are	Same as standard.	Same as standard.

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Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
		installed and running on all operational processors and modules.		
b. Resource Verification Test.	Par. 510	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	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. AIA.				
a. Visually inspect ESL MCW status of the AIA icons.	TI 6191.403	No visual error indication.	Same as standard.	Same as standard.
b. Verify there are no active error or alarm messages reported at the ESL MCW.	TI 6191.403	Error free operation.	Same as standard.	Same as standard.
c. Network Information System Plus (NIS+) check.	Par. 530	Successful no fault execution.	Same as standard.	Same as standard.
d. Execute Early Display Configuration Multiplexed Display Buffer Memory (EDCM) Diagnostic Program.	TI 6190.44	Successful no fault execution.	Same as standard.	Same as standard.
e. Execute Online Limited Data Display Test (LDDT) Program.	Par. 528	Successful no fault execution.	Same as standard.	Same as standard.
320. TSATD EASL SERVICE CERTIFICATION.				
a. Test Target Display Check.	Par. 514	The display responds and updates according to the input action. PE/MTI reflectors, PARROT/CPMEs and Beacon/Search	Same as standard.	Same as standard.

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Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
		RTQCs are displayed within or on appropriate geo-boxes or adapted map location symbols, or are displayed at expected positions.		
321. STARS EASL SUBSYSTEM CERTIFICATION.	EASL cannot be certified if ESL is not available.			
a. Knowledge that Constituent Automation System is certified. ARTS IIIA.	Latest Order 6000.15; Latest Order 6190.6.	Terminal Radar Data Processing (TRDP) ARTS IIIA overall service is certified. ARTS IIIA overall system (except the Data Entry and Display Subsystem (DEDS) display is certified. Remote Tower Alphanumeric Display System (RTADS) overall service is certified. Data is presented on the display for AT operation.	Same as standard.	Same as standard.
b. Data Entry and Display Functions.	Par. 525	The display responds and updates according to the input action.	Same as standard.	Same as standard.
c. Radar Data Processing and Display Capability.	Par. 526	Successful no fault execution.	Same as standard.	Same as standard.

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Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
322. STARS CERTIFICATION RANGE/AZIMUTH CHECK.				
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 to determine range/azimuth integrity and reliability (see par. 537). **NOTE 3:** 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. 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 ≥ 80% reliability of standard.	Same as initial.
b. PARROT, PE, CPME and MTI	For ESL and	Error free	Same as	Same as

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Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
Monitoring at ESL MCW.	DRF, as long as targets are reported within adapted tolerance, there is no error indicated at the ESL MCW.	operation.	standard.	standard.
323. STARS SYSTEM CERTIFICATION RADAR RELIABILITY CHECK AND SENSOR PERFORMANCE PARAMETERS. **NOTE:** For beacon-only systems the radar reinforcement rate, SRTQC reliability, and search blip scan measurements do not apply.				
a. Search/Beacon RTQC Check Report at FSL MCW.	Par. 521 TI 6191.402 FS RTQC Check Report.	See Sensor Performance Parameters.	Same as standard.	Same as standard.
Sensor Performance Parameters				
1. **ASR-9/11**				
Radar Reinforcement Rate (≥)	Note 2, 5	80%		
Mode 3/A Validity (≥)	Note 1	98%		
Mode C Validity (≥)	Note 1	97%		
Search RTQC Reliability (≥)	Note 1, 3	98%		
Beacon RTQC Reliability (≥)	Note 1, 3	98%		
PE Reliability (≥)	Note 1, 3, 4	80%		
Zero Code (≤<)	Note 2	01%		
Search Blip/Scan (≥)	Note 2	92%		
Beacon Blip/Scan (≥)	Note 2	90%		
Beacon Azimuth Split (≤<)	Note 2	01%		
Range Split (≤<)	Note 2	01%		
2. **ARSR-4**				
Radar Reinforcement Rate (≥)	Note 2, 5	80%		

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Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
Mode 3/A Validity (≥)	Note 1	98%		
Mode C Validity (≥)	Note 1	97%		
Search RTQC Reliability (≥)	Note 1, 3	98%		
Beacon RTQC Reliability (≥)	Note 1, 3	98%		
PE Reliability (≥)	Note 1, 3, 4	80%		
Zero Code (≤)	Note 2	0%		
Search Blip/Scan (≥)	Note 2	92%		
Beacon Blip/Scan (≥)	Note 2	96%		
Beacon Azimuth Split (≤<)	Note 2	01%		
Range Split (≤<)	Note 2	01%		
3. **ARSR-1/2/3**				
Radar Reinforcement Rate (≥)	Note 2, 5	60%		
Mode 3/A Validity (≥)	Note 1	98%		
Mode C Validity (≥)	Note 1	97%		
Search RTQC Reliability (≥)	Note 1, 3	98%		
Beacon RTQC Reliability (≥)	Note 1, 3	98%		
PE Reliability (≥)	Note 1, 3, 4	80%		
Zero Code (≤<)	Note 2	01%		
Search Blip/Scan (≥)	Note 2	75%		
Beacon Blip/Scan (≥)	Note 2	96%		
Beacon Azimuth Split (≤<)	Note 2	01%		
Range Split (≤<)	Note 2	01%		
4. **ASR-8**				
Radar Reinforcement Rate (≥)	Note 2, 5	80%		
Mode 3/A Validity (≥)	Note 1	95%		
Mode C Validity (≥)	Note 1	95%		
Search RTQC Reliability (≥)	Note 1, 3	98%		
Beacon RTQC Reliability (≥)	Note 1, 3	98%		
PE Reliability (≥)	Note 1, 3	90%		
Zero Code (≤<)	Note 2	01%		
Search Blip/Scan (≥)	Note 2	80%		
Beacon Blip/Scan (≥)	Note 2	90%		

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Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
Beacon Azimuth Split (≤<)	Note 2	01%		
Range Split (≤<)	Note 2	01%		
5. **Other (e.g., RYC-8405, FPS-67B)**				
Radar Reinforcement Rate (≥)	Note 2, 5	50%		
Mode 3/A Validity (≥)	Note 1	95%		
Mode C Validity (≥)	Note 1	95%		
Search RTQC Reliability (≥)	Note 1, 3	98%		
Beacon RTQC Reliability (≥)	Note 1, 3	98%		
PE Reliability (≥)	Note 1, 3	90%		
Zero Code (<)	Note 2	1%		
Search Blip/Scan (≥)	Note 2	75%		
Beacon Blip/Scan (≥)	Note 2	90%		
Beacon Azimuth Split (<)	Note 2	1%		
Range Split (<)	Note 2	1%		
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: Use PARROT/PE Report.

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.

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Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
324. GIAFP SERVICE CERTIFICATION.				
a. FDP Input/Output Check.	Par. 515	IFDT connection is established.	Same as standard.	Same as standard.
325. REGISTRATION.				
a. Registration.	Par. 533 TI 6191.402, <FS Registration and Collimation… > Menu Option	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.				
a. Visual inspection of SSS icon.	Visually inspect MCW status of the icons.	No visual error indication.	Same as standard.	Same as standard.
b. Online Diagnostics for SSS Processor.	TI 6191.403	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.	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.	No visual error indication.	Same as standard.	Same as standard.
b. Online Diagnostics for SIM Processor.	TI 6191.403	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.	Error free operation.	Same as standard.	Same as standard.

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Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
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.	No visual error indication.	Same as standard.	Same as standard.
b. Online Diagnostics for GPW Processor.	TI 6191.403	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.	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.
329. TDW MONITOR.				
a. Video Adjust.	TI 6191.400 TI 6191.401 Visually inspect for correct focus, color, & alignment.	Correct focus, color, and alignment.	Same as standard.	Same as standard.
330. SONY DATA DISPLAY MONITOR (DDM) CHECK.				
a. Video Alignment (white balance).	TI 6191.414			
1. Color and Brightness Contrast Maximum.		Manufacturer setting.	$0.241 \leq x \leq 0.301$ $0.256 \leq y \leq 0.316$ $43.0 \leq Y \leq 47.0$	Same as initial.
2. Color and Brightness Contrast Minimum.		Manufacturer setting.	$0.241 \leq x \leq 0.301$ $0.256 \leq y \leq 0.316$ $6.0 \leq Y \leq 7.0$	Same as initial.
b. Geometry Alignment in Millimeter (mm) Width x Height.	TI 6191.414	Manufacturer setting.	$498 \times 498 \pm 5$	Same as initial.

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Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
c. Convergence Alignment.	TI 6191.414			
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.
NOTE: Refer to TI 6191.414 Appendix A Chapter 3, Installation Adjustment, Periodic Readjustment and Adjustment, for parameter check after replacing the Cathode Ray Tube.				
d. Geometric Distortion at all areas of the picture size.	TI 6191.414	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 6191.414	Manufacturer setting.	Character size 1.	Same as standard.
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 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.

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
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 6191.402 FS Set Date and Time.	GPS displays and updates UTC on the FSL MCW.	Same as standard.	Same as standard.
b. ESL MCW system time.	TI 6191.403 ES Set Date and Time.	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.				
a. FS target display check.	Target reports update and display as expected.	No error reported by qualified observer.	Same as standard.	Same as standard.
b. ES target display check.	Target reports update and display as expected.	No error reported by qualified observer.	Same as standard.	Same as standard.
341. SERVICE LEVEL AVAILABILITY CHECK.				
a. Back-Up Data Processing System Check for FSL. **NOTE:** The certifying official, using	Par. 519	Successful no fault execution.	Same as standard.	Same as standard.

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Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
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.				
b. Back-Up Data Processing System Check for EASL.	Par. 527	Successful no fault execution.	Same as standard.	Same as standard.
342. ES ARTS SYNC FUNCTION.				
a. If EASL and ESL are utilized by AT personnel for operational use.	TI 6191.403	Enabled.	Same as standard.	Same as standard.
b. If EASL is released to AF personnel for maintenance.	TI 6191.403	Disabled.	Same as standard.	Same as standard.
343. FS PERIODIC CERTIFICATION TEST VARIABLE SITE PARAMETER (VSP).				
a. VSP interval.	TI 6191.402	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 6191.402	Set VSP interval to 0.	Same as standard.	Same as standard.
344. ES BACKGROUND VERIFICATION.				
a. Verification interval.	TI 6191.403	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 display as expected.	No error reported by qualified operator on minimum resources for AT operations.	Same as standard.	Same as standard.
b. ESL	Tower positions	No error reported by	Same as	Same as

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
	processes ES data entry and display as expected.	qualified operator on minimum resources required for AT operations.	standard.	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. FSCK FILE SYSTEM CHECKER.				
a. Check file format on individually affected LRU.	Par. 570	Successful no fault execution.	Same as standard.	Same as standard.
348. FSL/ESL SYNCHRONIZATION				
a. If FSL and ESL are utilized by AT personnel for operational use or in standby operational use.	TI6191.403	Enabled.	Same as standard.	Same as standard.
b. If FSL is released to AF or DoD radar maintenance for maintenance or in cases of FSL failure.	TI6191.403	Disabled.	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
402. WEEKLY.		
a. Resource Verification Test.	Par. 310b	Par. 510
b. Performance Verification of air traffic control visual and aural alarms.	Par. 310c	TI 6191.402, Par. 516
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 6191.402
f. Check range/azimuth integrity.	Par. 322a	Par. 520
g. Radar Reliability Check.	Par. 323a, FSL; Par. 323b, ESL	Par. 521, FSL
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.		
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 6191.402 FS Set Date and Time
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 6191.402
b. FSL CGW: Execute diagnostics and perform all checks.	Par. 302	TI 6191.402

Subsection 1. FSL Performance Checks

Performance Checks	***Reference Paragraph***	
	Standards & Tolerances	***Maintenance Procedures***
c. FSL RDP: Execute diagnostics and perform all checks.	Par. 303	TI 6191.402
d. FSL TCW: Execute diagnostics and perform all checks.	Par. 304	TI 6191.402
e. FSL TDW: Execute diagnostics and perform all checks.	Par. 305	TI 6191.402
f. FSL MCW: Execute diagnostics and perform all checks.	Par. 306	TI 6191.402
g. FSL CDR: Execute diagnostics and perform all checks.	Par. 307	TI 6191.402
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	TI 6191.402
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.	Par. 317a	Par. 511
b. At the ESL MCW, check System messages.	Par. 317b	Par. 511
c. Check ESL data entry and display functions.	Par. 317c	Par. 513
d. Check EASL data entry and display functions.	Par. 320	Par. 514
e. While EASL and ESL are utilized by AT personnel for operational use, verify that the Emergency Services (ES) ARTS Sync function is enabled.	Par. 342a	TI 6191.403
f. While ESL is utilized by AT personnel for operational use, and EASL is released to AF personnel for maintenance, verify that the ES ARTS Sync function is disabled.	Par. 342b	TI 6191.403
g. Check FSL/ESL synchronization.	Par. 348	TI 6191.403
416. WEEKLY.		
a. Complete Resource Verification Test.	Par. 318b	TI 6191.403 and Par. 510
b. Performance Verification of air traffic control visual and aural alarms.	Par. 318c	TI 6191.403 and Par. 522
c. Verify ESL radar data processing and display capability at least one TCW or TDW.	Par. 318d	Par. 524
d. Check EASL data entry and display functions.	Par. 321b	Par. 525
e. While EASL and ESL are utilized by AT personnel for operational use, verify that the Emergency Services (ES) ARTS Sync function is enabled.	Par. 321c	Par. 526
f. At the ESL MCW, verify that Background Verification is enabled.	Par. 344	TI 6191.403
g. While ESL is utilized by AT personnel for operational use, and EASL is released to AF personnel for maintenance, verify that the ES ARTS Sync function is disabled.	Par. 341b	Par. 527
h. Check range/azimuth integrity.	Par. 322b	TI 6191.403
i. RTDS target display check.	Par. 340b	
j. RTDS data entry processing and display check.	Par. 345b	
417. BIWEEKLY.		
a. Reserved.		
418. MONTHLY.		
a. Reserved.		

Subsection 2. ESL Performance Checks

Performance Checks	***Reference Paragraph***	
	Standards & Tolerances	***Maintenance Procedures***
419. QUARTERLY.		
a. Execute the EDCM diagnostic.	Par. 319b	TI 6190.44
b. Execute LDDT.	Par. 319c	Par. 528
c. Verify that system time is provided by the GPS. If it is not, verify that the ESL MCW system time is synchronized with the EASL system time if applicable. Correct ESL MCW system time as required.	Par. 338b	TI 6191.403
d. 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 6191.403
b. ESL CGW: Execute diagnostics and perform all checks.	Par. 312	
c. ESL TCW: Execute diagnostics and perform all checks.	Par. 313	
d. ESL TDW: Execute diagnostics and perform all checks.	Par. 314	
e. ESL MCW: Execute diagnostics and perform all checks.	Par. 315	
f. SSS: Execute diagnostics and perform all checks.	Par. 326	
g. Test Training and Simulation Equipment (TTSE/SIM): Execute diagnostics and perform all checks.	Par. 327	
h. GPW: Execute diagnostics and perform all checks.	Par. 328	
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	TI 6191.403
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 6191.402
b. Clean the DLT/DAT drives if the "Use Cleaning Tape" Light Emitting Diode (LED) is illuminated.	LED Extinguished.	TI 6191.400
461. Weekly.		
a. Switch to standby CDR processor.	Standby available.	TI 6191.402
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 6191.400
b. Check surface of TCW and TDW displays and clean as required.	Visibly dirt and smudge free surface.	TI 6191.400
c. Visually inspect DDM for correct focus, color and alignment.	Par. 330	TI 6191.414
d. Check TDW alignment and align as required.	Par. 329	TI 6191.400
e. TDM High Efficiency Particulate Air (HEPA) Filter Inspection and Cleaning (if applicable)	N/A	Par. 563, TI6191.400
466. Semiannually.		
a. General Equipment Maintenance		
1. Blower Fan and Filter Inspection and Cleaning.	N/A	558
2. Rack Cabinet Physical Inspection and Cleaning.	N/A	559
3. TCW Cabinet Physical Inspection and Cleaning.	N/A	560
4. Check Connector Mating.	N/A	561
5. TDW Articulating Arm Check.	N/A	562
467. ANNUALLY.		
a. Reserved.		

Section 2. OTHER MAINTENANCE TASKS

Performance Checks	***Reference Paragraph***	
	Standards & Tolerances	***Maintenance Procedures***
468. TRIANNUALLY.		
a. Reserved.		
469. AS REQUIRED.		
a. Backup router configuration file(s) from the Flashcard.	N/A	STR-STARS-061 Spare Flashcard Configuration
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://aftechnet.faa.gov
c. At receipt of a Spare, check firmware version and update as necessary.	Update firmware in accordance with latest STARS SSD release.	TI 6191.400
d. At receipt of a Spare, check JumpSTARS version and level, i.e., FSL or ESL	Confirm version and level in accordance with latest STARS SSD release.	TI 691.484
e. At receipt of spare, label firmware version and JumpSTARS version and level, i.e., FSL or ESL.	All spares are accurately labeled.	
f. Run File System Check (FSCK) after interruption of power that results in an FSL processor shutdown.	Par. 347	Par. 570
g. 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.	Par. 530
470. – 499. RESERVED.		
a. 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. 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 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 TSATD service certification requirements are listed in Appendix 1, table 1, 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. TSATD 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 TSATD service certification requirements are listed in Appendix 1, table 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. TSATD ESL/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 TSATD service certification requirements are listed in Appendix 1, table 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: If there is an 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.

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. TSATD EASL TEST TARGET DISPLAY CHECK.

a. **Objective.** Verify the ability of STARS to display test targets at correct display positions in support of terminal ATC operations.

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

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

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

e. **Detailed Procedures for EASL.**

1. Verify proper indications at all required TCWs. Ensure that selected display is in EASL mode:
   (a) Verify that primary and/or beacon targets are available at the display.
   (b) Select a geographic map associated with the selected sensor. Verify that correct map is displayed.
   (c) Verify that PE/MTI reflectors, PARROTs/CPMEs, primary and beacon RTQC are displayed over the appropriate geographic map symbols and/or expected locations.
   (d) Utilize targets of opportunity that are landing to verify that targets and map are presented correctly on the display.
2. Repeat this procedure for each available sensor.

515. GENERAL INFORMATION AUTOMATED FLIGHT PLAN (GIAFP) 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 GIAFP certification requirements are listed in Appendix 1, table 2 of this handbook. Reference IFDT error messages and alarms in TI6191.404 STARS System Message Dictionary.

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 NAS status icon into the IFDT. 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. The 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 two 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 (sending keyboard) (receiving keyboard) +><Enter>, where the sending keyboard position is the one selected for PVER.
3. From the TCW/TDW, 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. RESERVED.

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.
2. Select single sensor display mode and verify that tracks are updating as expected.
3. If possible, utilize targets of opportunity that are landing, at airports to verify that targets and map are presented correctly on the display.
4. Verify data display capability and presentation by checking that the following types of display data are present:
   (a) Primary Extent symbols
   (b) Beacon Extent 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 518e of this handbook for each remaining sensor. Towers may limit check to sensors that have coverage of assigned airspace.
6. 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.
7. 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. However, as a minimum, one TCW or local TDW shall be checked and at least one TDW at

each remote tower. 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. The TSATD service certification requirements are listed in Appendix 1, table 1, of this handbook.

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 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).

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. Add this to the standard deviation and 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. Add this to the standard deviation and 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 CERTIFICATION 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) 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 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.

2. Some of the threshold parameters (i.e., SEARCH RTQC, BEACON RTQC, and PE 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, per TI 6191.402, 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 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 report, per TI 6191.402, at the FSL MCW, to perform a certification 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 two 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. RESERVED.

524. STARS ESL 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: 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. 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. STARS EASL SUBSYSTEM CERTIFICATION PROCEDURE FOR DATA ENTRY AND DISPLAY FUNCTIONS.

a. **Objective.** Ensure STARS data entry and display function are operating properly.

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 STARS system certification requirements are listed in Appendix 1, table 3, of this handbook.

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

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

e. **Detailed Procedures for EASL.**

1. ARTS IIIA Sites. EASL is operating during the transition phase. All the track processing is done by the existing automation system. Alphanumeric data then will be displayed on the TCW. Therefore, the following existing automation service and system certifications are required per Order 6000.15 and 6190.6.

   (a) The TRDP ARTS IIIA Overall Service.

   (b) The ARTS IIIA Overall System (except the DEDS displays).

   (c) The remote RTADS Overall Service.

2. Verify a data entry and display capability by performing the following at all the required TCWs within the maximum certification interval. Ensure that the selected display is in EASL mode:

   (a) Enter several operational entries using knobs, buttons, keyboard(s) and trackball(s). Check for satisfactory system operation.

   (b) Change the display range. Verify that the display is updated and reflected to the selected range.

   (c) Offset the display. Verify that the display is updated and reflected to the selected position.

   (d) Change the history and leader length settings. Ensure that the display reflects the correct setting.

   (e) Verify that the display is being updated (time incrementing, targets moving, etc.).

526. STARS EASL SUBSYSTEM CERTIFICATION PROCEDURE - RADAR DATA PROCESSING / 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. However, as a minimum, one TCW or TDW shall be checked. This check should be made on a different position than last executed. The STARS system certification requirements are listed in Appendix 1, table 3, of this handbook.

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

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

e. **Detailed Procedures for EASL.**

1. Verify data entry and display capability by performing the following at all required TCWs and TDWs within the maximum certification interval.
2. Ensure that selected display is in EASL mode. Utilize targets of opportunity to verify radar data processing and tracking using the following guidelines and conditions:
   (a) Guidelines:
      (1) If more than one target is used, each target should be in a different sector.
      (2) If more than one target is used, the selected targets should not be traveling on the same relative heading. This will ensure a variety of tracking conditions.
   (b) Conditions:
      (1) No significant or unexplained loss of system updates or data blocks.
      (2) Data blocks track the correct targets.
      (3) Data blocks do not swap between targets.
      (4) Altitude and airspeed changes are reasonable.
3. Leaders and data blocks should automatically switch on targets that pass over or near each other. Ensure that this happens so that overlapping does not occur.
4. Verify a data display and presentation capability by checking that the following types of display data are present and operationally acceptable at an EASL mode display.
   (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 526e of this handbook for each remaining sensor.

527. STARS SYSTEM CERTIFICATION PROCEDURE FOR FSL BACK-UP DATA PROCESSING SYSTEM (EASL).

a. **Objective.** Ensure that STARS FSL Back-Up Data Processing System (EASL) works properly.

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 STARS system certification requirements are listed in Appendix 1, table 3 of this handbook.

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

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

e. **Detailed Procedures for EASL.**

1. Verify that the selection of backup level (ESL) is working at all required TCWs. Perform this check at all required TCWs within the maximum certification interval.

2. At a TCW that has EASL capability, switch to ESL. Verify that the display switches to ESL and targets update normally.
3. At the same TCW, switch to EASL. Verify the display switches to EASL and targets update normally.
4. Return display to normal operations.

528. PROCEDURE TO RUN LDDT.

a. **Objective.** Verify that the AIA is functioning properly.

b. **Discussion.** The LDDT is resident in ARTS IIIA and is available for online test and certification of the display processing. The LDDT consists of several patterns, which can be displayed.

1. One of the patterns in this test is the site adapted PEs. The site adapted PEs are displayed with overlaying squares. PE locations are adapted in ARTS IIIA site adaptation by the OSF. Sites are responsible for having the National ATB Adaptation Request (NAR) form submitted to the associated OSF so the OSF can update the site adaptation to reflect the location of PEs, MTI reflectors, beacon PARROTs, and CPME. The NAR form should provide the location of the PEs, MTI reflectors, beacon PARROTs, and CPME.
2. All keyboards associated with the selected display (henceforth known as the “tested” display) must be configured as a maintenance display before the LDDT can be performed. The tracks, handoffs, and flight plans on the display under test must be consolidated to another operational display position. This is accomplished by means of the Full Consolidation (FCON) keyboard entry. In addition, the LDDT will provide the ability to verify that magnetic north is adapted to the correct site magnetic variation.

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

d. **Conditions.** Obtain the release of the display prior to performing this procedure.

e. **Detailed Procedures.** In this procedure, the commas represented in all input keyboard sequences are used as delimiters, and are not entered in the sequence. Verify that the display selected for this test is in EASL mode.

1. Request the Teletype Emulator (TTYE) printout of the current keyboards configuration with the following entry at a control keyboard. Refer to the latest edition of the ARTS IIIA System Operator’s Manual, NASP-2501 for the detailed discussion of the configuration printout. Notice the display number and keyboard status that is associated with the tested display on the printout:

   F7,C,P,1,Enter

2. Perform full consolidation. This is accomplished by the following keyboard entry for each keyboard position on the tested display. It does not require consolidation of a paired keyboard. For example, if keyboard 1H is paired with keyboard 1J, only 1J is required for full consolidation:

   F7,C,xE,yA,+,Enter

   where:

   - xE is the subset number and keyboard symbol for position that will accept live data for the desired offline position.

- yA is the subset number and keyboard symbol for the desired offline position.

3. Configure the tested display into the maintenance display with the following entry at each keyboard including any paired keyboard. Configure the subset number and position symbol that is associated with the entering keyboard last:

   F7,C,yA,*,M,Enter

   where:

   yA is the subset number and position symbol of each associated tested display keyboard.

4. At the ARTS IIIA TTYE, load and verify that the on-call LDDT program is successfully loaded. Then, go to the selected display. The LDDT program can be loaded by using the menu or command line at the TTYE:

   TK IA LD n (EOT)

   where:

   - n is the decimal logical display number that was obtained from the TTYE printout from paragraph 525e(1) of this handbook.
   - (EOT) is pressing Ctrl and D characters on the keyboard simultaneously.

5. Site PE symbols. Press the Enter key on the keyboard until the site PE symbols are displayed on the CRT. Verify that PEs, MTI reflectors, beacon PARROTs, and CPME are within tolerance. If they are out of tolerance, and there is no error reporting at the MCW, the AIA and/or display processing are suspected as failure components.

6. Tabular list test. Press the Enter key on the keyboard until the following pattern is observed on the CRT. The pattern should consist of a tabular list of six lines with seven characters in each line containing the keyboard repertoire. Verify that all of the characters are readable. Otherwise, the AIA and/or display are suspected as failure components.

7. Blink test. Press the Enter key on the keyboard until the following pattern is observed on the CRT. The pattern should consist of three data blocks, one each in quadrants 1, 2, and 3, and a tabular list in quadrant 4. All the data blocks should contain the words BLINK TEST. In the first quadrant, the target symbol should blink. In the second quadrant, the entire data block should blink. In the third quadrant, the character N should blink. In the fourth quadrant, there should be four A characters. Verify that the blink function works properly. Otherwise, the AIA and/or display processing are suspected as failure components.

   NOTE: Turn off primary and beacon brightness levels for better observation.

8. Radar coordination and magnetic variation tests. Press Enter key on the keyboard until the following pattern is observed on the CRT. Four leaders, presented in display coordinates, should extend in four different directions from the center of the CRT. Extending from the sweep origin in the north, south, east, and west directions are single symbols (asterisks). These symbols are displayed in radar coordinates and are at ranges of 2, 4, 6, 8, 10, 15, 20, 25, 30, 40, and 50 Nautical Mile (NM). Displayed in radar coordinates in north, south, east, and west directions are asterisks labeled 42 NM and 55 NM. Verify that the vertical asterisks pattern displays on 0 (zero) and 180 degree marks of the compass rose, and horizontal asterisks pattern displays on 90 and

270 degree marks of the compass rose. Otherwise, the AIA, display processing, and site magnetic variation adaptation are suspected as failure components.

9. Leader direction test. Press the Enter key on the keyboard until the following pattern is observed on the CRT. A target symbol should be displayed in each quadrant consisting of a plus surrounded by four leaders, each extending in a different direction. The leaders surrounding each target symbol should be the same length and should be at an angle of 90 degrees to each other. The leaders should be oriented on a north or northeast line, depending on the LEADER DIRECTION control. Change the leader direction and verify that it responds properly. Otherwise, the AIA, display processing, and display control panel are suspected as failure components.

10. At the ARTS IIIA TTYE, terminate the on-call LDDT program. The LDDT program is terminated with the menu or command line at the TTYE:

    TK TA (EOT)

    where:

    (EOT) is pressing Ctrl and D characters on the keyboard simultaneously.

11. Configure the tested display back to a controller display with the following entry at a controller display associated with all of the keyboards of the tested display:

    F7,C,yA,*,C,Enter

    where:

    yA is subset number and position symbol of each associated tested display keyboard.

12. Return the operating configuration to what it was originally before the consolidation with the following deconsolidation entry at each keyboard:

    F7,C,Enter

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 per TI 6191.402. Verify that radar data is available at the FSL TCW, and there is no interruption of AT service.
2. Reconfigure FSL CGW1 offline per TI 6191.402 to ensure that all resources on LAN B and the alternate NUNIO are online with no interruption of AT service.
3. Reconfigure FSL RDP1 offline per TI 6191.402 to ensure that all resources on LAN B are online with no interruption of AT service.
4. Reconfigure FSL CGW1 online.
5. Reconfigure FSL CGW2 offline per TI 6191.402 to ensure all resources on LAN A and the alternate NUNIO are online with no interruption of AT service.
6. Reconfigure FSL RDP1 online.
7. Reconfigure FSL RDP2 offline per TI 6191.402 to ensure all resources on LAN A 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 per TI 6191.402. Verify that radar data is available at FSL TCW, and there is no interruption of AT service.
10. Reconfigure FSL CGW2 online.
11. Reconfigure FSL CGW1 to offline per TI 6191.402 to ensure that all resources on LAN B and the primary NUNIO are online with no interruption of AT service.
12. Reconfigure FSL RDP2 online.
13. Reconfigure FSL RDP1 to offline per TI 6191.402 to ensure that all resources on LAN B and the primary NUNIO are online with no interruption of AT service.
14. Reconfigure the alternate NUNIO modules online.
15. Reconfigure FSL CGW1 online.
16. Reconfigure FSL RDP1 online.

530. 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. The recommended procedure is to contact the Helpdesk at 1-800-475-2667 and report the problem.

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.
   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:

   “/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.
   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. ESL “nisping” will not communicate with FS processors; therefore, a response from the FS CDR replicas should not be expected.

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 per TI 6191.403. Verify that radar data is available at the ESL TCW and there is no interruption of AT service.
   2. Reconfigure ESL CGW1 offline per TI 6191.403 to ensure all resources on LAN B and the alternate NUNIO are online with no interruption of AT service.
   3. Reconfigure ESL CGW1 online.
   4. Reconfigure ESL CGW2 offline per TI 6191.403 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.
   6. Reconfigure the alternate NUNIO modules offline per TI 6191.403. Verify that radar data is available at ESL TCW with no interruption of AT service.
   7. Reconfigure ESL CGW2 online.
   8. Reconfigure ESL CGW1 to offline per TI 6191.403 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.
   10. Reconfigure ESL CGW1 online.

532. RESERVED.

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 ATBdeployment 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 Helpdesk at 1-800-475-2667.

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.

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. Users should reference TI 6191.402, FS Monitoring and Control Workstation (MCW) Manual, for additional instructions for opening a Registration and Collimation Report and implementing registration functions.

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 “COUNT” 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 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

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

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

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

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. Follow the procedures for generating a Registration and Collimation Report as specified in TI 6191.402 FSL Monitoring and Control Operator’s Manual, Procedure to Generate Registration and Collimation Control Correction Factors. 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 but particularly to single sensor sites 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 the fixed target map selected or 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.

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 (i.e., RTQC are reporting, targets are displayed and are updating normally, approaches are lined up on runway center lines, both primary and secondary returns are displayed (slant range mode only). This procedure applies to FSL and ESL.

e. **Detailed Procedure**

1. Select a sensor for display.
2. Select the fixed target map.
3. Adjust the display to view a PE/MTI or CPME/PARROT test target.
4. Verify that PE/MTI reflectors and/or PARROTs/CPMEs are displayed over the appropriate geographic map symbols and/or expected locations. Typically, boxes are used to mark PARROT/CPMEs while carats are used for PE/MTIs.
5. Move the System Status Area to a location where it is easy to view both the test target and the system clock.

   NOTE: The scan rates are minimum values. They may be exceeded at the discretion of the certifying official. The times used for the examples are typical for short-range sensors. Long-range sensor scan rates are typically equivalent to 10 or 12 seconds.

   (a) For PARROT/CPMEs: Determine that the return is inside the box, for a minimum time period equivalent to 18 out of 20 scans. For example, if the scan rate is 4.6 seconds, the test target should be visible inside of box for approximately 83 seconds out of 92.

   (b) For MTI/PEs: Determine that the return is touching the carat tip for a minimum time period equivalent to 16 out of 20 scans. For example, if the scan rate is 4.6 seconds, the test target should be touching the carat tip for approximately 74 seconds out of 92.

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 specified in the TI.6191.419 Software Toolsmenu manual. 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 specified in the TI.6191.419, STARS Software Tools Menu for the SOS. 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. 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.

3. 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.

4. At the FSL MCW, reset any VSPs previously set for local operations (e.g., disable long-range sensor weather, registration corrections, etc.)

5. If maps were modified, refer to paragraph 555 in this handbook to verify that geographic maps are adapted correctly.

6. Service and system certifications are required per Appendix 1 of this handbook.

7. 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 in this handbook is a usable STARS updated software chart.

8. 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.

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

"FSL software updated checks completed for SSM YYY"

where:

YYY is the SSM number.

10. 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. 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.
3. At the ESL MCW, reconfigure to standby resources.
4. 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.
5. At the ESL MCW, reset any VSPs previously set for local operations.
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. If using EASL, at the SSS, verify the AIA(s) software version.
9. If using EASL, perform the following procedures at a TCW in EASL mode:

   (a) Use the on-call LDDT to verify that site true north is adapted correctly and refer to paragraph 528 of this handbook to load the LDDT.

   NOTE: Turn off primary and beacon brightness levels for better observation.

(b) At the selected TCW, press the Enter key on the keyboard until the following pattern is observed on the CRT. Four leaders, displayed in display coordinates, extending in four different directions from the center of the display. Extending from the sweep origin in the north, south, east, and west directions are single symbols (asterisks). These symbols are displayed in radar coordinates and are at ranges of 2, 4, 6, 8, 10, 15, 20, 25, 30, 40, and 50 nm. Displayed in radar coordinates in north, south, east, and west directions are asterisks labeled 42 nm and 55 nm. Verify that the vertical asterisks pattern displays on the 0 (zero) and 180 degree marks of the compass rose, and horizontal asterisks pattern displays on the 90 and 270 degree marks of the compass rose. Otherwise, the site true north is adapted incorrectly.

10. 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, of this handbook is the STARS Updated Software Chart.

11. 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.

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

    "ESL software updated checks completed for SSM YYY"

    where:

    YYY is the SSM number.

13. 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 output:

   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.

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.** It is recommended that if the DAC value on the GPS Time Unit reaches 5000 or 60,000 a replacement GPS Time Unit should be requested and an R&R performed.

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 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 per paragraph 7.2.15 in the 6191.400 O & M Manual for the SOS.

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.** 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. Use the TI 6191.400 manual to 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.

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.

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 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.

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 articulation 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 funciton 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.
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 TDW HEPA filter is clean and free of foreign matter.

b. **Discussion.** A dirty HEPA filter may not function properly and cause the TDW 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 TDW. TI6191.400 contains an illustration of the location of the filter as well as a procedure to remove it.
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. – 569. RESERVED.

Section 3. Special Maintenance Procedures

570. FSCK AFTER INTERRUPTION OF POWER.

a. **Objective**. Verify that the UNIX file system is correct in order to restore operational processors after a power outage or interruption.

b. **Discussion.** After an unexpected power shutdown, interruption of power, or power surge the UNIX filesystem may become corrupt. This will prevent processors from successful bootup after power restoration. FSCK can be run on all affected STARS processors after such an incident to repair file systems.

NOTE: For Solaris 8 systems, do not run fsck on affected processors. Perform a remove and replace.

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

d. **Conditions.** FSL processors do not recover after a power interruption or surge.

e. **Detailed Procedures**. The following procedure provides direction for FSL processors that do not recover from a HARD restart. The following procedure should be performed prior to attempting an R&R activity.

1. Determine which FSL resources were affected by the power interruption.
2. Using the maintenance laptop, establish a Hyper Terminal session as described in TI 6191.400.
3. Connect the laptop com Port to the processor serial port A using a DB25 (Male) to DB9 (Female) null modem cable (or equivalent)

   NOTE: Steps 4 through 8 are performed at the maintenance laptop connected to the affected processor.
4. Establish the “OK” prompt by hitting <function> <break> simultaneously.
5. Boot that processor in single user mode by entering “boot -s”.
6. When prompted, enter the root password for that processor.
7. Once at the “#” prompt, enter “fsck -y”.
8. Once the fsck command completes, enter “reboot”.

571. – 598. RESERVED.

STARS UPDATED SOFTWARE CHART

Release by Documentation	National Baseline Version (FSL, ESL, AIA)	Adaptation Baseline Version (FSL, ESL, AIA)	Installed on (mm/dd/yy)	Tested on (mm/dd/yy)	Operational on (mm/dd/yy)	Remarks

6191 - STARS MHBK - Figure 5-1

Figure 5 – 1. STARS Updated Software Chart

NOTE: Figure can be printed locally. Also, the soft copy of the handbook contains a hyperlink to an MS WORD file that can be saved and used locally.

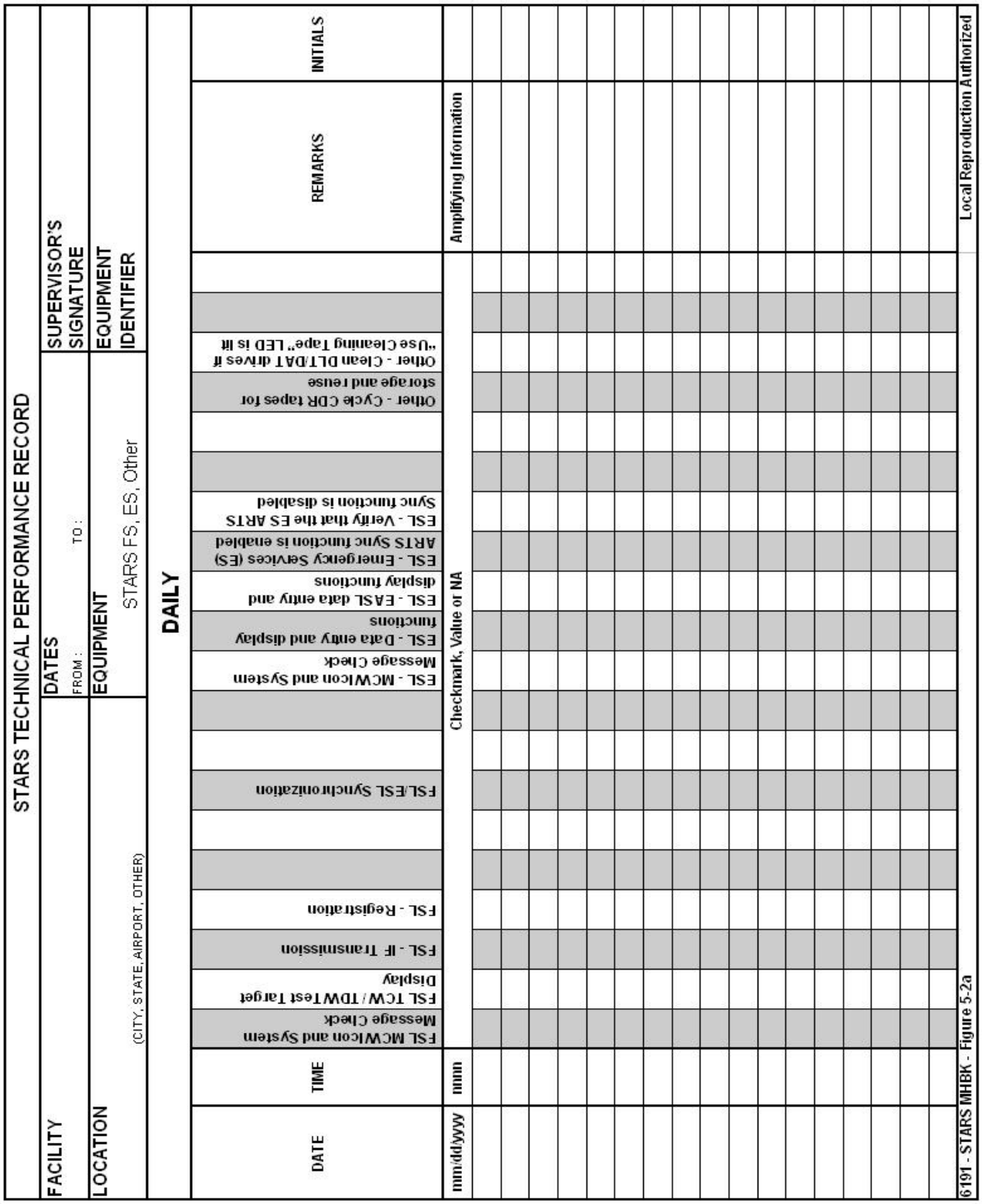

Figure 5 – 2A. STARS Daily Technical Performance Record

NOTE: Figure can be printed locally. Also, the soft copy of the handbook contains a hyperlink to an MS WORD file that can be saved and used locally.

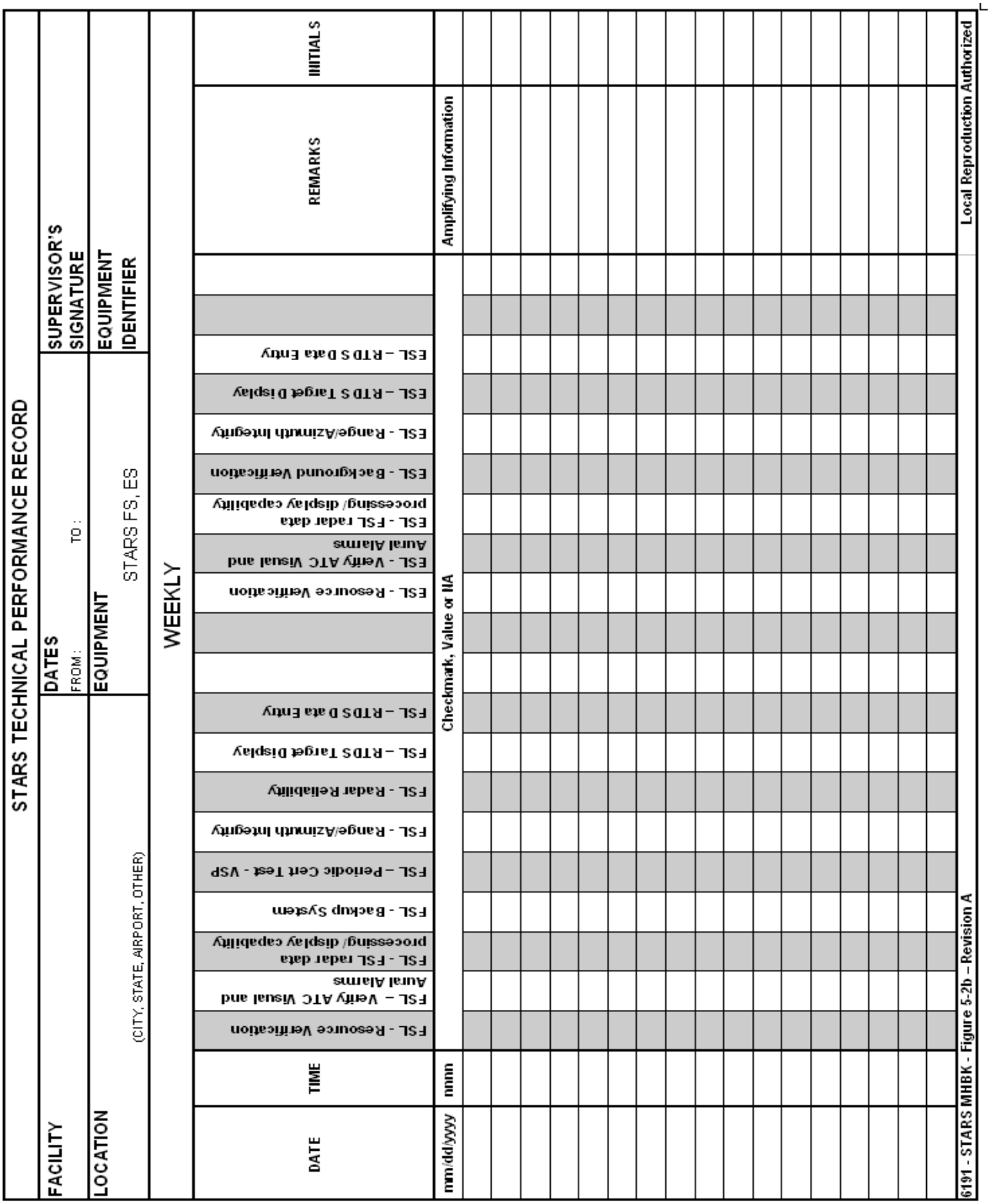

Figure 5 – 2B. STARS Weekly Technical Performance Record

NOTE: Figure can be printed locally. Also, the soft copy of the handbook contains a hyperlink to an MS WORD file that can be saved and used locally.

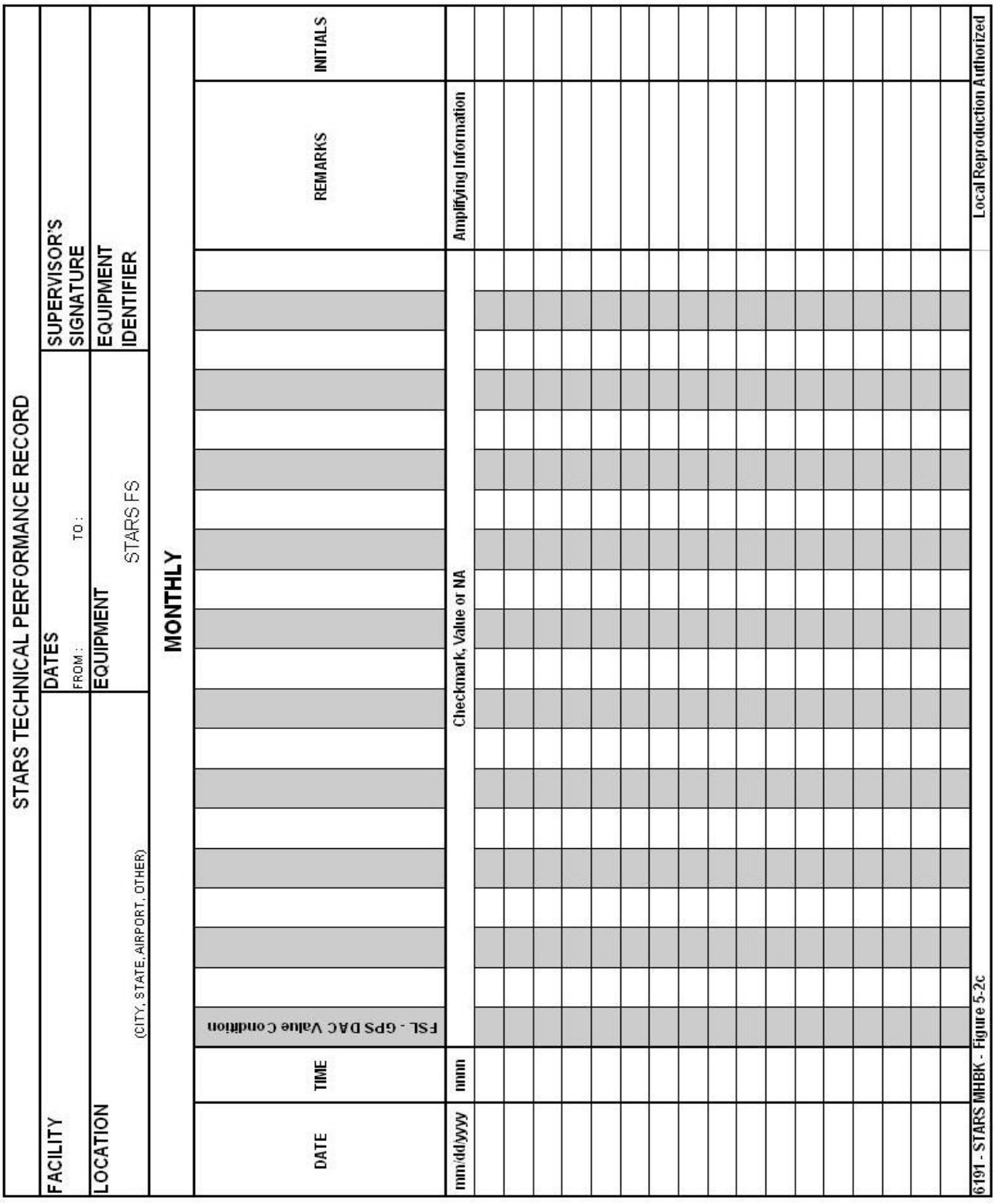

Figure 5 – 2C. STARS Monthly Technical Performance Record

NOTE: Figure can be printed locally. Also, the soft copy of the handbook contains a hyperlink to an MS WORD file that can be saved and used locally.

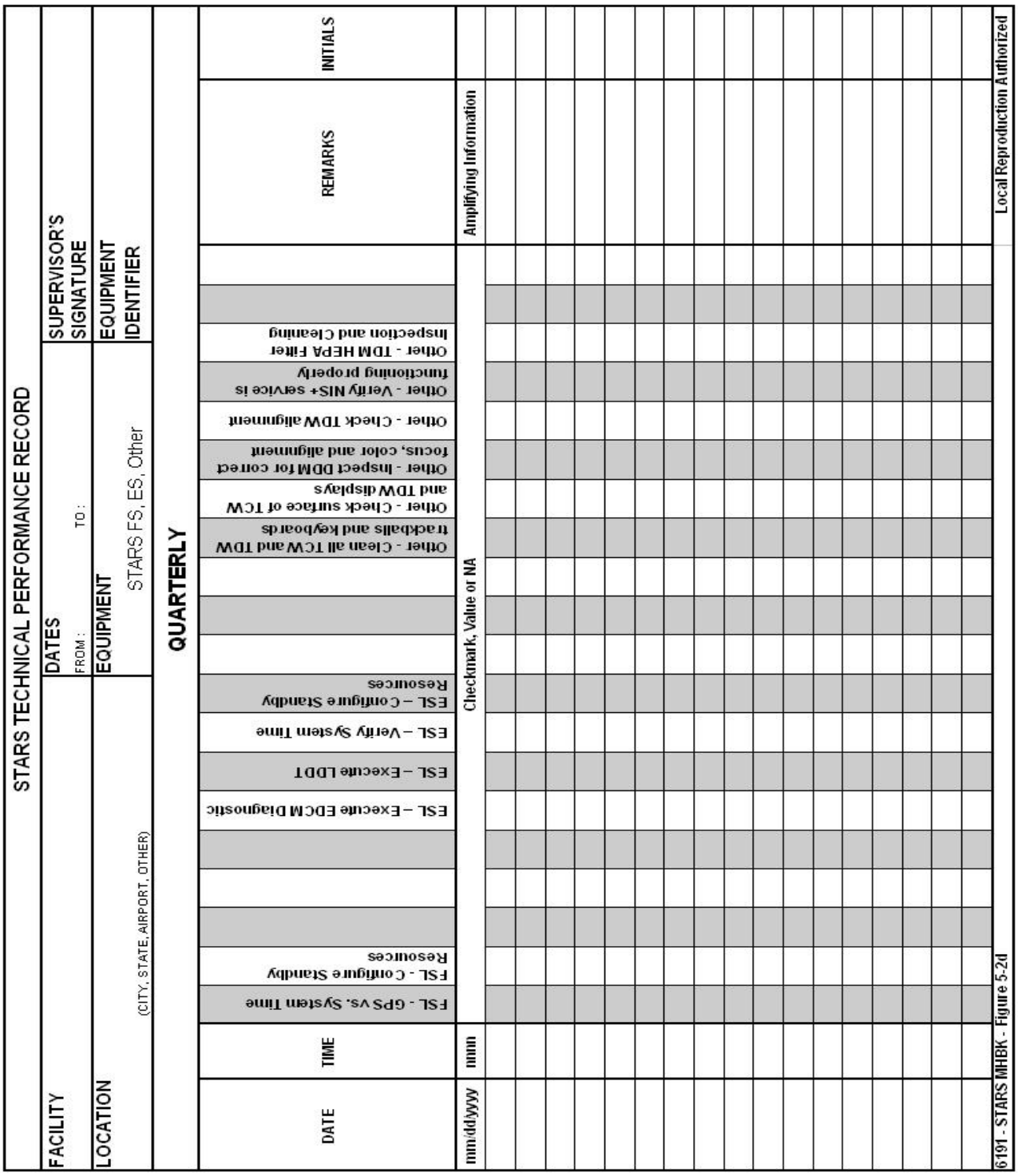

Figure 5 – 2D. STARS Quarterly Technical Performance Record

NOTE: Figure can be printed locally. Also, the soft copy of the handbook contains a hyperlink to an MS WORD file that can be saved and used locally.

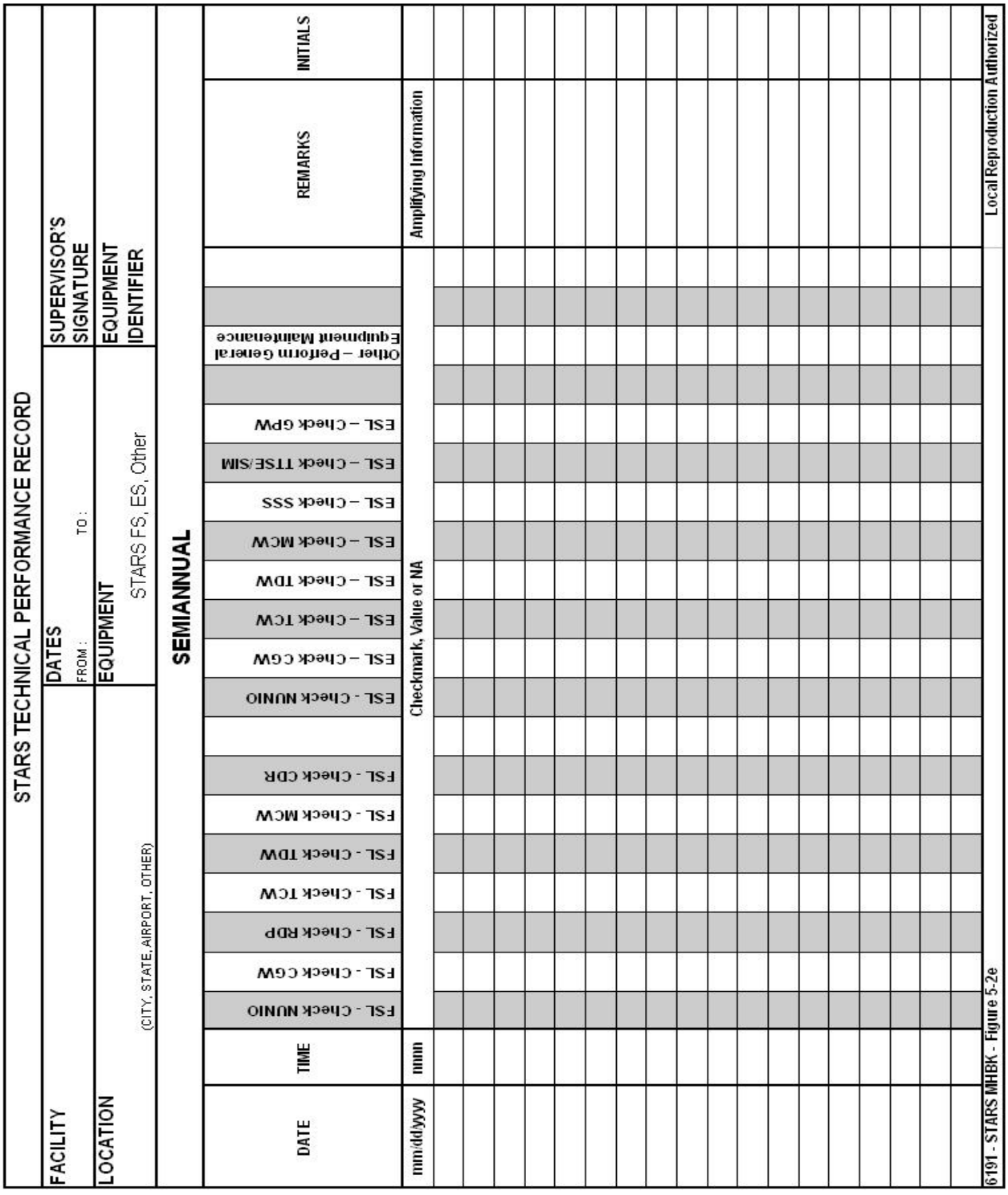

Figure 5 – 2E. STARS Semiannual Technical Performance Record

NOTE: Figure can be printed locally. Also, the soft copy of the handbook contains a hyperlink to an MS WORD file that can be saved and used locally.

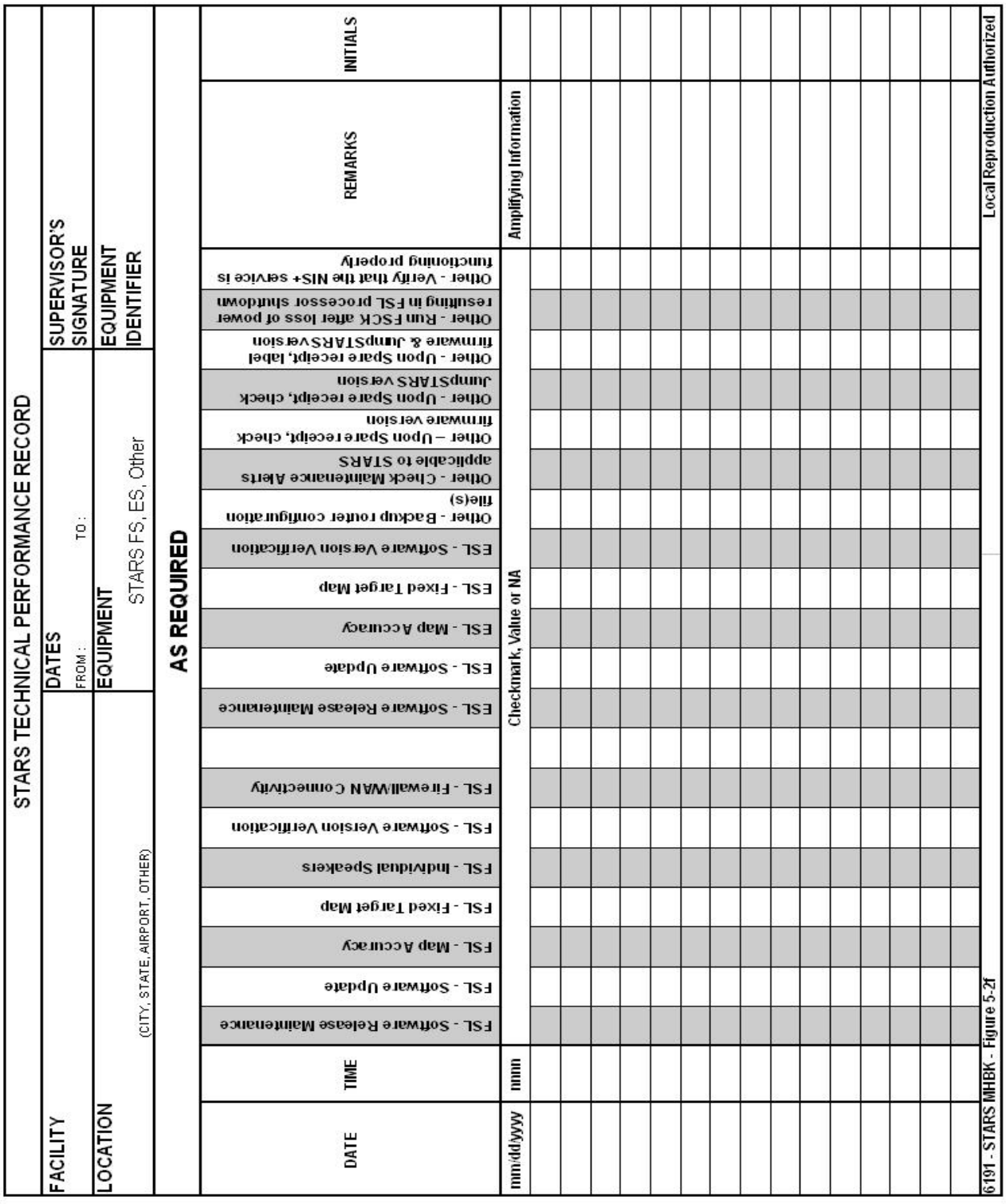

Figure 5 – 2F. STARS As Required Technical Performance Record

NOTE: Figure can be printed locally. Also, the soft copy of the handbook contains a hyperlink to an MS WORD file that can be saved and used locally.

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. This service is certified as TSATD, and GIAFP in accordance with tables included in this appendix.

a. TSATD is a mutually dependent surveillance display service, relying on a combination of ATC and airborne systems. TSATD 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. TSATD enhances surveillance capabilities by displaying real-time aircraft transponder data, e.g., pressure altitude, indicated airspeed, squawk codes, etc.

b. GIAFP provides terminal radar data processing with the surveillance processing system. It provides enhanced ATC capabilities by linking real-time flight data with flight plan data, and automating the handling of surveillance data to appropriate ATC sectors. It depends on systems that file, route, update, and terminate flight plans.

3. SYSTEMS.

Centralized, distributed, or backup surveillance processing systems, TCW or TDW are used to provide these services. The system is certified as a STARS in accordance with this appendix. Surveillance Flight Plan Systems (SFS), Surveillance Radar Systems (SRS), and Surveillance Interrogator Systems (SIS) are certified in accordance with the applicable maintenance handbook.

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 SURVEILLANCE AIRBORNE TARGET DISPLAY (TSATD) SERVICE

Advertised Service	*Certification Parameter*	*Reference Paragraph*
SRS Certification of constituent facilities.	Knowledge that the constituent Surveillance Radar System (SRS) 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 is certified. Sites can reference FAAO 6000.6 for an explanation of DOD certification guidelines and responsibilities.
SIS certification of constituent facilities.	Knowledge that the constituent Surveillance Interrogator System (SIS) 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 Interrogator System is certified. Sites can reference FAAO 6000.6 for an explanation of DOD certification guidelines and responsibilities.
STARS certification.	Knowledge that STARS is certified.	APPENDIX 1, Table A1-3
Sensor update and display capability.	Proper indications at monitor and control position.	**FSL:** Par. 309a and Par. 309b; Par. 511 **ESL/DRF:** Par. 317a and Par. 317b; Par. 511 **EASL:** Par. 320
	Test target check at the required number of display positions.	**FSL:** Par. 309c; Par. 512 **ESL/DRF:** Par. 317c; Par. 513

Normal Certification Interval: Daily.

Maximum Certification Interval: 7 Days.

Allowable Exceptions: FSL, ESL, DRF or EASL. Associated surveillance radar, associated surveillance interrogator, individual TCW(s), TDW(s).

Person Responsible for Certification: ATSS with certification authority.

Certification Entries in the STARS Maintenance Log:

Without Exception:

TSATD certified.

With Exception:

TSATD certified except (appropriate service level) subsystem.

TSATD certified except (display designation).

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

Removing Exception:

TSATD (appropriate service level) subsystem certified.

TSATD (display designation) certified.

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

APPENDIX 1. CERTIFICATION REQUIREMENTS

Table A1-2. GENERAL INFORMATION AIRCRAFT FLIGHT PLANNING (GIAFP) SERVICE

Advertised Service	*Certification Parameter*	*Reference Paragraph*
SFS certification of constituent facilities.	Knowledge that the constituent Surveillance Flight Planning System (SFS, e.g., associated CCCH) is certified.	FAA sites should log onto the Maintenance Management System (MMS) or use any means available to determine if a Surveillance Flight Planning System is certified.
	Knowledge that the constituent STARS is certified.	APPENDIX 1, Table A1-3
Connectivity capability.	Flight Data Processing (FDP) Input/Output check.	Par. 324; Par. 515

Normal Certification Interval: Daily.

Maximum Certification Interval: 7 Days.

Allowable Exceptions: None

Person Responsible for Certification: ATSS with certification authority.

Certification Entries in the STARS Maintenance Log:

Without Exception:

GIAFP certified.

With Exception:

None.

Removing Exception:

None.

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
	EASL	APPENDIX 1, Table A1-3c
	DRF	APPENDIX 1, Table A1-3d
Service Level Availability Check.	Back-Up Data Processing.	
	FSL (ESL)	Par. 341a; Par. 519
	FSL (EASL)	Par. 341b; Par. 527

Normal Certification Interval: Weekly.

Maximum Certification Interval: 14 Days.

Allowable Exceptions: Individual service level subsystems, i.e., FSL, ESL, DRF or EASL.

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.

Removing Exception:

STARS (service level) 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 tests are included in the PVER. This test is executed on a TCW or TDW).	Par. 310c; Par. 516
	Radar Data Processing and Display Capability. **NOTE:** Corroborate with ATC to verify that data entry and display functions are performing normally.	Par. 310d; Par. 518
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
Radar Reliability	Radar Reliability Check. **Note 1:** Interim FMA facilities do not need to perform this check. It is performed under FMA TSPAD.	Par. 323a and Par. 521

Normal Certification Interval: Weekly.

Maximum Certification Interval: 14 Days.

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
	Radar Data Processing and Display Capability. **NOTE:** Corroborate with ATC to verify that data entry and display functions are performing normally.	Par. 318d; Par. 524
Range/Azimuth Integrity	Radar and Interrogator positions reliability of PEs/MTI reflectors and PARROTs/CPME.	Par. 322b
Radar Reliability	Radar Reliability Check.	Par. 323b

Normal Certification Interval: Weekly.

Maximum Certification Interval: 14 Days.

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 EXISTING ARTS SERVICE LEVEL (EASL) SUBSYSTEM

Advertised Service	*Certification Parameter*	*Reference Paragraph*
Processing and Display System (PDS) capability. NOTE: It is permissible to corroborate with ATC to verify that data entry and display functions are performing normally.	Knowledge that the ESL Subsystem is certified.	Appendix 1, Table 3b
	Knowledge that the constituent automation system is certified.	Par. 321a
	Proper data entry and display functions.	Par. 321b
	Radar Data .Processing and Display Capability	Par. 321c

Normal Certification Interval: Weekly.

Maximum Certification Interval: 14 Days.

Allowable Exceptions: Individual EASL TDW/TCW(s).

Person Responsible for Certification: ATSS with certification authority.

Certification Entries in the STARS Maintenance Log:

Without Exception:

EASL subsystem certified.

With Exception:

EASL subsystem certified except (designated display).

Removing Exception:

EASL subsystem (designated display) certified.

APPENDIX 1. CERTIFICATION REQUIREMENTS

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

Advertised Service	*Certification Parameter*	*Reference Paragraph*
Processing and Display System (PDS) capability.	Resource verification test	Par. 318b, Par. 510
	Performance verification (PVER) test.	Par. 318c, Par. 522
	Proper data entry and display functions at display position. **NOTE:** Corroborate with ATC to verify that data entry and display functions are performing normally.	Par. 318d, Par. 524
Range/Azimuth Integrity	Radar and Interrogator positions reliability of PEs/MTI reflectors and PARROTs/CPME.	Par. 322b
Radar Reliability	Radar Reliability Check.	Par. 323b

Normal Certification Interval: Weekly.

Maximum Certification Interval: 14 Days.

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

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

Certification Entries in the STARS Maintenance Log:

Without Exception:

DRF ESL subsystem certified.

With Exception:

DRF ESL subsystem certified except ESL (LRU or designated display).

Removing Exception:

DRF ESL subsystem ESL (LRU or designated display) certified.

APPENDIX 1. CERTIFICATION REQUIREMENTS

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

Advertised Service	*Certification Parameter* NOTE: The RTDS parameters are for remote TDWs.	*Reference Paragraph*
Radar Tower Display Capability.	Performance Verification of air traffic control visual and aural alarms. NOTE: Corroboration between remote tower and TRACON/RAPCON personnel is required to perform this test.	**FSL:** Par 310c; Par. 516 **ESL:** Par. 318c; Par. 522
	Targets update and display as expected.	**FSL:** Par. 340a **ESL:** Par. 340b
Data Entry and Display capability.	Proper data entry processing and display functions at display positions.	**FSL:** Par. 345a **ESL:** Par. 345b

Normal Certification Interval: Weekly.

Maximum Certification Interval: 14 Days.

Allowable Exceptions: Individual TDW(s).

Person Responsible for Certification: ATSS 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
AIA	Automation Interface Adapter
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

APPENDIX 2. GLOSSARY OF ACRONYMS AND TERMS

Table A2-1. ACRONYMS

DDS	Digital Data System
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
EDCM	Early Display Configuration Multiplexed Display Buffer Memory
EARTS	En route Automated Radar Terminal System
EASL	Existing Automated Service Level
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
GIAFP	General Information Automated Flight Planning
GPS	Global Positioning System
GPW	General Purpose Workstation
ID	Identification
IFDT	Inter-Facility
IP	Internet Protocol
IEEE	Institute of Electrical and Electronic Engineers
LAN	Local Area Network
LDB	Limited Data Block
LDDT	Limited Data Display Test
LED	Light Emitting Diode
LRU	Line Replaceable Unit
Mbps	Megabit Per Second
MCI	Mode C Intruder

APPENDIX 2. GLOSSARY OF ACRONYMS AND TERMS

Table A2-1. ACRONYMS

MCP	Monitor and Control Process
MCW	Monitor Control Workstation
MDB	Minimal Data Blocks
MM	Millimeter
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
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-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

APPENDIX 2. GLOSSARY OF ACRONYMS AND TERMS

Table A2-1. ACRONYMS

RTDS	Radar Terminal Display System
RTQC	RealTime Quality Control
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
TRACON	Terminal Radar Approach Control
TRDP	Terminal Radar Data Processing
TSATD	Terminal Surveillance Airborne Target Display
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.
Easy Spare	A tool used to load the Unix operating system on an individual STARS LRU and to initialize the LRU in preparation for operational use.
Jump STARS	A tool used to load the Unix operating system on system-wide STARS LRUs and to initialize the LRUs in preparation for operational use.
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.

APPENDIX 2. GLOSSARY OF ACRONYMS AND TERMS

Table A2-2. TERMS.

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 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
TI 6191.401	STARS O & M Manual for the RT
TI 6191.402	STARS FSL MCW Operator's Manual
TI 6191.403	STARS ESL MCW Operator's Manual
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
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
TI 6191.419	STARS Software Tools Menu for the SOS
TI 6191.484	STARS JumpSTARS Operator's Manual for the SOS

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
Figure 5 – 1.	STARS Updated Software Chart
Figure 5 – 2a.	STARS Daily / Weekly Technical Performance Record
Figure 5 – 2b.	STARS Monthly / Quarterly Technical Performance Record
Figure 5 – 2c.	STARS Semi-Annual / As Required Technical Performance 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 ON STARS MAINTENANCE HANDBOOK

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 maintenance personnel to achieve optimum performance from the equipment. This information augments information available in instruction books and other handbooks, and complements the latest edition of order 6000.15, General Maintenance Handbook For Airway Facilities.

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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 1A 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. FMA on STARS

   2. Terminal Surveillance Parallel Approach Display (TSPAD) Service

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.

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

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

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	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	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 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 certification geo-box.	Same as standard.	Target falls inside or on certification geo-box ≥ 70 % reliability of standard.

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
311. LINEARITY/GEOMETRIC DISTORTION.				
a. Linearity/Geometric Distortion Check	517 TI6191.414, Sony Tube Alignment Procedure	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	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.	$0.241 \leq x \leq 0.301$	Set display to visual satisfaction.
c. Brightness		Manufacturer setting.	$0.256 \leq y \leq 0.316$	Set display to visual satisfaction.
d. Contrast		Manufacturer setting.	$43.0 \leq Y \leq 47.0$	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.

CHAPTER 3. STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
→ 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	525	The STARS aircraft identification (ACID) in the data tag of chosen target on the STARS display correlates to the ACID in the data log of the target on a TRACON FMA display.	Same as standard.	Same as standard.
→ 316. MONOPULSE BEACON (MODE S) OPERATIONAL STATUS	512	The Mode S operating in monopulse 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.

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 RADAR RELIABILITY AND DISPLAY INTEGRITY				
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
b. Search Beacon RTQC Check Report	TI.6191.402 FS RTQC Check Report.	See Sensor Performance Parameters.	Same as standard.	Same as standard.
c. 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%		
320 - 399. RESERVED.				

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.

Subsection 1. FMA Performance Checks

Performance Checks	***Reference Paragraph***	
	Standards & Tolerances	***Maintenance Procedures***
410. DAILY. **C**omplete FAA Form 6000-8 or Figure 1.		
a. MCW Icon and System Message Check.	309	510
b. Monopulse Beacon (Mode S) Operational Status.	316	512
c. TSPAD Radar Reliability and Display Integrity.	319	513
d. Range and Azimuth Accuracy.	310	516, 520
e. STARS Interface.	315	525
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
d. Map Accuracy.	317	522
412. QUARTERLY. Complete FAA Form 6000-8 or Figure 2.		
a. Linearity/geometric distortion.	311a	517
b. Magnification Stretch Factor Accuracy Check.	311b	518
c. Target Update Rate Check.	314	519
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.		

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.

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.

2. 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.

3. 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:

   (a) FMA Position symbols

   (b) Geographic map (e.g., airways, sector boundaries, and special areas)

   (c) Data blocks

   (d) Weather data (high, medium, and low) if available

4. Return display to normal operational service

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 RADAR RELIABILITY AND DISPLAY INTEGRITY.

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 2, 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.

NOTE: The performance parameters in paragraph 319b 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.

8. Utilize the FS RTQC report, per TI 6191.402, 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.

9. Utilize the FS RTQC check report, per TI 6191.402, at the FS MCW, to perform a certification check that verifies radar data entry input. Compare the performance parameter values with the criteria established in paragraph 319b of this attachment.

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, follow instructions for executing an FS PVER and be alert for the FMA check portion described in below in step e. 16.

e. **Detailed Procedures.**

1. At the FSL MCW, ensure that the SIM Icon is Green.

2. Verify and record the current environment and adaptation directory. From the main menu bar, select <System Control, FS Switch Software/Adaptation>.

3. When the FS Switch Software/Adaptation window appears, record the current environment and directory, which is highlighted (e.g., ENV001.ad).

4. Login to TCW. <sign on>, enter name, <enter>, enter password (if required), <enter>.

5. Switch the TCW to FMA mode.

6. Logon if necessary.

7. If position has airspace, consolidate airspace to another display position by entering <F7><C><Winning position><Losing position><+><enter>. Refer to the consolidation procedure in TI 6191.409 for additional assistance.
8. On DCB select <Mode>. Select <TRNG2> Select slew <Enter>. Select <Accept>.
9. When the display returns in Training Mode, select keyboard key <TgtGen> button. Select keyboard key <Enter>. The ATCoach Simulation Control Window will appear.
10. On the Site File line, use the track ball to press the [Select] button.
11. When the Site File window appears, choose the current <Site File ENV> (Select current environment recorded in step 2, e.g., xxx_ENV001_ad.st (where xxx is the three letter site identifier)) and select <OK>.
12. On the Scenario File line, use the trackball to press the [Select] button.
13. When the Scenario File window appears, choose scenario XXX_FMA_ALERTS (where XXX is the three character site identifier) and select <OK>.
14. Leave the Pseudo Pilot and Offset Time lines blank.
15. 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.
16. As the scenario runs, ensure that the following warnings are properly displayed with appropriate voice alert.
    (a) NTZ caution (yellow DB as A/C prediction vector touches the NTZ, Voice announces “CAUTION”)
    (b) NTZ warning (red DB as A/C enters the NTZ, Voice announces “WARNING”)
    (c) Wrong RWY alarm (flashing red DB. Voice announces “WRONG RUNWAY”.)
    (d) Coast alert (red DB, “CST” appears and Voice announces “COAST”.)
17. After all the alerts listed above have been identified, end the scenario by selecting keyboard key <TgtGen> button. Select keyboard key <Enter>.
18. The ATCoach Simulation Control Window will appear.
19. Use the trackball to select the <End Scenario> button.
20. Select <Cancel> to close ATCoach Simulation Control Window.
21. Switch from Training mode to FS mode and return display to ATC service.
22. Return to normal operation.

515. RESERVED.

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.**

1. Linearity/Geometric Distortion Check.

(a) Follow procedures detailed in TI.6191.414, Sony Tube Alignment Procedure to perform this check.

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.
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 chapter 3.

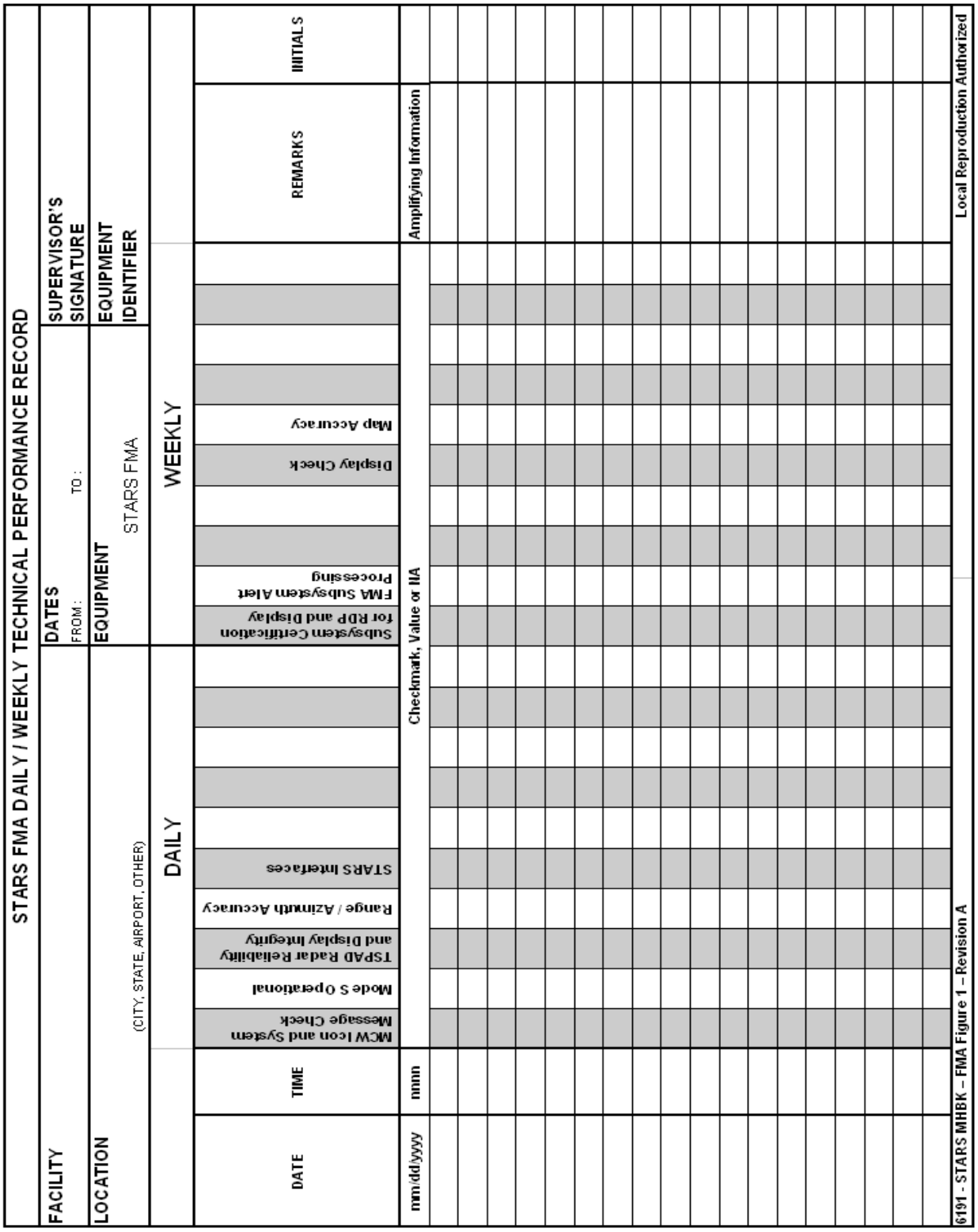
b. **Discussion**. The target update rate is determined by dividing by 10, the elapsed time required for a displayed target to visually update 10 times.

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.



FMA FIGURE 1 – STARS FMA DAILY / WEEKLY TECHNICAL PERFORMANCE RECORD

NOTE: Figure can be printed locally. Also, the soft copy of the handbook contains a hyperlink to an MS WORD file that can be saved and used locally.

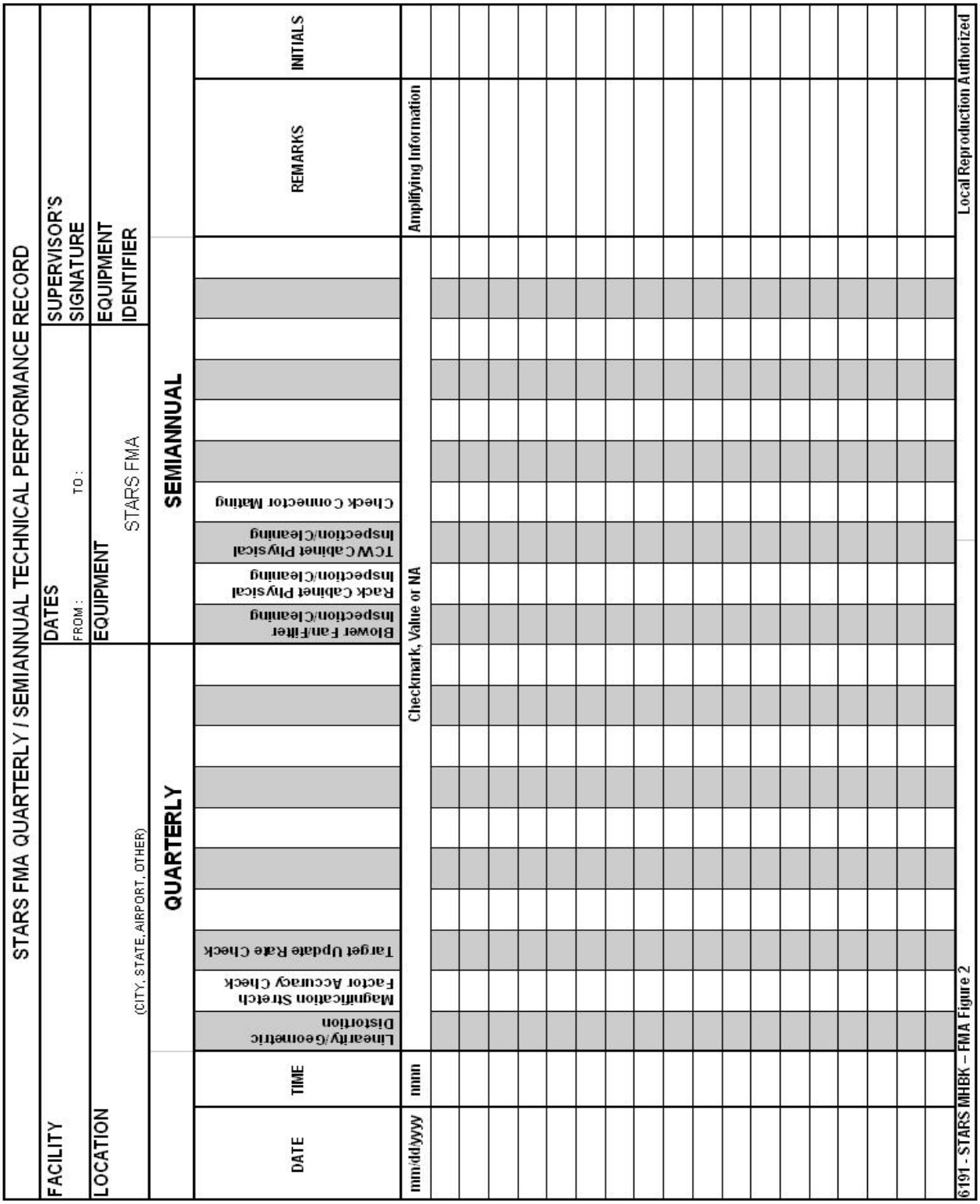


FIGURE 2 – STARS FMA QUARTERLY / SEMIANNUAL TECHNICAL PERFORMANCE RECORD

NOTE: Figure can be printed locally. Also, the soft copy of the handbook contains a hyperlink to an MS WORD file that can be saved and used locally.

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 310.

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 a rectangular CPME geo-box.

c. **Test Equipment.** Fixed target map or map that displays fixed targets.

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 rectangular CPME geo-box used to gauge the accuracy of the FMA.
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.

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 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 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 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.

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 310 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 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 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.

a. **Object.** This procedure determines that the STARS Interface is within the tolerances specified in chapter 3.

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

c. **Test Equipment Required.** Not used.

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

e. **Detailed Procedure.**

1. Select a target of opportunity on the STARS display and record the STARS data tag information for the target.
2. Find the target on the FMA display and verify the existence and accuracy of the STARS data tag information displayed by the 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. Use the TI 6191.400 manual to 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 subassemblies in the rack 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 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.

528. FMA 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.

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.

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.

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. This service is certified as TSPAD in accordance with the table included in this appendix.

3. Systems.

Centralized, distributed, or backup surveillance processing systems, TCW or TDW are used to provide these services. The system is certified as a STARS in accordance with this appendix. Surveillance Flight Plan Systems (SFS), Surveillance Radar Systems (SRS), and Surveillance Interrogator Systems (SIS) are certified in accordance with the applicable maintenance handbook.

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.

Table FMA - 1. Terminal Surveillance Parallel Approach Display (TSPAD) Service		
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. 310
	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
	Radar Reliability and Display Integrity.	Par. 319
Normal Certification Interval: Daily. Maximum Certification Interval: 7 Days. Allowable Exceptions: Associated surveillance interrogator system, individual runway approach, individual TCW(s), TDW(s), triple independent approaches. Person Responsible for Certification: ATSS with certification authority. Certification Entries in the STARS Maintenance Log: Without Exception: TSPAD certified. With Exception: TSPAD service certified except (individual runway approach). TSPAD service certified except (location identifier) (associated surveillance interrogator 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 surveillance system) service certified. TSPAD triple independent approach certified.		

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. 313
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: Weekly. Maximum Certification Interval: 14 Days. Allowable Exceptions: Individual TDW/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.		