

	TANZANIA CIVIL AVIATION AUTHORITY DIRECTORATE OF SAFETY REGULATIONS AIR NAVIGATION INSPECTORATE	Revision: 0 Advisory Circular
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1.0 Purpose

- 1.1 Implementing a Quality Management System (QMS) in Communication, Navigation, and Surveillance (CNS) services is essential to ensuring that these critical aviation systems meet high standards of safety, reliability, and performance. QMS will help CNS systematically manage and improve their services, ensuring compliance with regulatory requirements, reducing operational risks, and enhancing overall efficiency.

2.0 References

- 2.1 The Civil Aviation (Certification of Air Navigation Services Provider), Regulations.

3.0 Process for implementation of QMS for CNS services

3.1 Define the Scope and Objectives of the QMS

The first step in implementing a QMS is to clearly define the scope of the system, ensuring it covers all relevant CNS services, including:

- i. **Communication Systems:** VHF and UHF radios, satellite communication, voice recording systems, voice communication control system and data links.
- ii. **Navigation Systems:** VORs, ILS, DME, GNSS, and other precision navigation aids.
- iii. **Surveillance Systems:** Radar, ADS-B, and other surveillance technologies used for tracking and monitoring aircraft.

The main objectives of the QMS should be to:

- i. Ensure the safety and reliability of CNS systems.
- ii. Meet regulatory requirements.
- iii. Optimize the efficiency and performance of CNS operations.
- iv. Ensure continual improvement through feedback and audits.

3.2 Establish Leadership and Commitment

Successful implementation of a QMS requires strong leadership and commitment at all levels of the organization:

Top Management Involvement: Senior leadership must commit to the QMS by providing necessary resources, setting clear quality objectives, and fostering a quality-oriented culture.

Quality Manager/Coordinator: Appoint a dedicated Quality Manager or Coordinator to oversee the implementation and ongoing management of the QMS.

Cross-functional Collaboration: Involve key personnel from different departments (e.g., operations, engineering, maintenance, safety) to ensure a holistic approach to quality.

3.3 Document of the Quality Management System

A robust QMS for CNS services should include comprehensive documentation to standardize processes and ensure consistency. Key documents may include:

Quality Manual: Describes the overall approach to quality, including the quality policy, objectives, and structure of the QMS.

Standard Operating Procedures (SOPs): Detailed procedures for operating, maintaining, and inspecting CNS systems, ensuring compliance with regulatory and internal standards.

Work Instructions: Specific instructions for carrying out tasks within the organization, including calibration, system performance testing, and troubleshooting.

Forms and Templates: Standardized forms for reporting issues, conducting inspections, logging maintenance activities, etc.

Regulatory Compliance Documents: Documentation demonstrating compliance with relevant regulations (TCARs).

3.4 Developing Key Processes and Procedures

A QMS should clearly define and standardize key processes for managing CNS services, ensuring that they are effective, efficient, and aligned with safety standards. Some of the critical processes include:

Design and Development of CNS Services:

- i. Establish procedures for the design, installation, and commissioning of new CNS facilities and systems.
- ii. Ensure that systems are designed to meet safety, regulatory, and operational requirements.

Operation and Maintenance of CNS Services:

- i. Define procedures for the daily operation and routine maintenance of CNS systems, ensuring their proper functioning and minimizing downtime.
- ii. Develop preventive maintenance schedules and emergency maintenance protocols.

Monitoring and Performance Evaluation:

- i. Implement regular monitoring of CNS systems' performance (e.g., signal strength, coverage, accuracy, reliability) through performance indicators.
- ii. Develop processes for testing and calibrating CNS systems to ensure accuracy and reliability.
- iii. Use automated monitoring tools to track the operational status of the systems in real-time.

Incident and Non-conformance Management:

- i. Establish a system for reporting, investigating, and resolving non-conformities or incidents related to CNS services, such as signal degradation or equipment failure.
- ii. Implement root cause analysis techniques (e.g., Fishbone Diagram, 5 Whys) to understand underlying issues and prevent recurrence.

3.5 Staff Training and Competence

To ensure the effective implementation of the QMS, personnel must be adequately trained in quality management principles and the specific procedures for CNS services. Key training components should include:

- i. **CNS System Training:** Comprehensive training for staff on the operation, maintenance, and testing of communication, navigation, and surveillance systems.
- ii. **Quality Management Awareness:** Ensure that employees understand the principles of QMS, the importance of meeting quality standards, and their role in the system.
- iii. **Safety and Regulatory Compliance:** Ensure that all personnel are familiar with the relevant safety and regulatory requirements for CNS systems.
- iv. **Continuous Professional Development:** Promote continuous learning and certification for staff, particularly in new technologies and emerging standards.

3.6 Internal Audits and Inspections

Regular internal audits and inspections are essential to evaluate the effectiveness of the QMS and ensure compliance with procedures. These audits should focus on:

- i. **System Performance:** Assess the performance of CNS systems and ensure they meet defined quality standards.
- ii. **Compliance Checks:** Ensure that all CNS operations are in compliance with relevant standards, regulations, and procedures.
- iii. **Corrective and Preventive Actions:** Identify areas for improvement and implement corrective and preventive actions (CAPAs) based on audit findings.

Audits should be scheduled at regular intervals, with a detailed report generated after each audit. Non-conformities should be tracked, and actions should be taken to resolve them.

3.7 Continuous Improvement and Feedback Mechanism

A QMS is not a one-time effort but a continuous process of improvement. To achieve continuous improvement:

- i. **Performance Data Analysis:** Regularly analyze data from system performance monitoring, audits, and incident reports to identify trends and areas for improvement.
- ii. **Feedback Loops:** Create mechanisms for feedback from all stakeholders (e.g., operators, maintenance teams, safety officers, and air traffic controllers) to highlight issues or suggestions for improvement.
- iii. **Management Review:** Senior management should periodically review the performance of the QMS, assess the effectiveness of implemented actions, and approve plans for future improvements.

Key Methods for Continuous Improvement:

- i. **Root Cause Analysis:** When issues arise, perform root cause analysis to prevent recurrence and improve processes.
- ii. **Risk Management:** Conduct regular risk assessments to identify and mitigate risks associated with CNS operations.
- iii. **Benchmarking:** Compare your CNS systems' performance against industry best practices to identify opportunities for enhancement.

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3.8 Regulatory Compliance

A QMS for CNS services must ensure compliance with local and international regulatory frameworks. The organization should strive to meet or exceed the relevant certification standards.

Achieving and maintaining certifications demonstrates that the organization's QMS is aligned with regulatory requirements and best practices in the industry.

3.9 Management Review and Reporting

Periodic reviews by management ensure that the QMS is working effectively and that it aligns with the organization's goals. Key activities during management reviews include:

- i. **Review of Key Performance Indicators (KPIs):** Management should review KPIs related to CNS system performance, operational efficiency, and customer satisfaction.
- ii. **Review of Audit and Inspection Results:** Evaluate findings from internal audits and inspections to assess whether corrective actions have been effective.
- iii. **Strategic Planning:** Use the review process to inform future plans for system upgrades, technological advancements, and potential service improvements.



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