

PERFORMANCE BASED COMMUNICATION AND SURVEILANCE (PBCS)

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PERFORMANCE BASED COMMUNICATION AND SURVEILLANCE (PBCS) OPERATIONS /APPROVAL

Performance-based communication (PBC) and performance-based surveillance (PBS) constitute PBCS and are similar, and complementary, to performance-based navigation (PBN). PBC and PBS involve the establishment of required communication performance (RCP) and required surveillance performance (RSP) specifications and imposing them on aeronautical communication and surveillance systems respectively.

PBCS Framework

The PBCS concept provides a framework to apply RCP and RSP specifications to ensure acceptable levels of communication and surveillance capabilities and performance of an operational system. These specifications are applied using the following methods:

- (a) Prescription** of an RCP specification for a communication capability and/or an RSP specification for a surveillance capability, either of which is required for Air Traffic Services (ATS) provision in a particular airspace;
- (b) Operational authorization** to file a flight plan on RCP/RSP capabilities including installed aircraft equipment where RCP and/or RSP specifications are prescribed for the communications and/or surveillance capabilities supporting the ATS provision; and
- (c) Local and regional monitoring programmes** to assess actual communication and surveillance performance against RCP and RSP specifications, thereby determining corrective actions, as applicable, for the appropriate entity.

When RCP/RSP specifications are not prescribed, the ANSP may still apply appropriate RCP/RSP specifications to identify the continuing compliance criteria for PBCS monitoring programmes e.g. when employing new technology for communication and surveillance capabilities.

Some specific equipment and terms that are used during performance based communication and surveillance include:

(i) Automatic dependent surveillance – contract (ADS-C) is a means by which the terms of an ADS-C agreement will be exchanged between the ground system and the aircraft, via a data link, specifying under which conditions ADS-C reports would be initiated, and what data would be contained in the report.

(ii) Controller-pilot data link communications (CPDLC) is a means of communication between controller and pilot, using data link for ATC communications.

(iii) Data link equipment refers to FANS 1/A (Satellite, HF, VHF) and, if installed, Aeronautical Telecommunication Network- ATN (VDL 2)

(iv) Future air navigation system (FANS 1/A) is a common industry name for the communication/surveillance system that incorporates CPDLC, ADS-C and PBCS.

Equipment required in the current FANS 1/A-capable models are:

- a) VHF, SATCOM, or HF/DL1 radios, as appropriate;
- b) ACARS management unit (MU)/communications management unit (CMU);
- c) Flight management computer (FMC) integration; and
- d) Printer 2 (if company procedures require its use).

(v) Required Communication Performance (RCP) is a statement of the performance requirements for operational communication in support of specific ATM functions (e.g. use of CPDLC)

(vi) Required Surveillance Performance (RSP) is a means by which a specification defines performance requirements associated with the delivery of surveillance data (e.g. use of ADS-C)

At KCAA, approval evaluations are anchored on The Kenya Civil Aviation Kenya (Instruments and Equipment) Regulations 2018, Regulations 18 (4) and 89 (2) for guidance on the uptake and conduct of performance based communication and surveillance (PBCS) operations. AOC holders may not operate Kenyan registered aircraft in an airspace or on a route where RSP specification for PBS is specified unless approved by the Authority.

APPLICATION FOR APPROVAL

An operator is required to make an application in writing to the Authority 30 days before the commencement of the operation, and shall be accompanied with application package containing-

- Evidence of aircraft eligibility on communication equipment required to operate in accordance with the RCP and RSP specifications capability listed in the Flight Manual, TC and/or STC, as approved by the aircraft manufacturer;
- Evidence of the aircraft RCP Specification capability listed in MEL;
- Normal and abnormal procedures, including contingency procedures;
- Flight crew qualifications and proficiency requirements in accordance with appropriate RCP specification.
- A training program for relevant personnel consistent with intended operation;
- Appropriate maintenance procedures to ensure continued airworthiness, in accordance with RCP specification;
- Means of ensuring compliance of contracted services, such as those with CSPs with respect to PBCS operations; and
- Documentation and continuous airworthiness procedures for participation in PBCS monitoring programmes including problem reporting.

AIRCRAFT ELIGIBILITY

Operators have to demonstrate that aircraft system is capable of meeting the applicable RCP/RSP specifications prescribed for intended operation and ensure that aircraft system is properly maintained to continue to meet the applicable RCP/RSP specifications, as contained in the PBCS Manual (Doc 9869).

The operator should ensure that the following are documented and managed appropriately:

- a) Configuration and equipment list detailing the pertinent hardware and software components for the aircraft applicable to the specific RCP/RSP operation;
- b) Configuration control for subnetwork, communication media and routing policies; and
- c) Description of systems including display and alerting functions (including message sets).

For a FANS 1/A CPDLC and ADS-C aircraft system, Safety and Performance Requirements Standard for Air Traffic Data Link Services in Oceanic and Remote airspace (RTCA DO-306/EUROCAE ED-122) is equivalent to RCP240, RCP400, RSP180 and RSP400 as contained in the PBCS Manual (Doc 9869, 2nd Edition).

The demonstration of compliance with the RCP and RSP specifications should be specific to each individual airframe or the combination of the aircraft type and configuration. The demonstration may be documented in one of the following documents;

- a) Type Certificate (TC);
 - b) Supplemental Type Certificate (STC);
 - c) Aircraft Flight Manual (AFM), AFM Supplement, or other acceptable document; or
 - d) A compliance statement from the manufacturer, which has been approved by the State of Design and accepted by the Authority, during the approval process.
- e) In addition, the aircraft manufacturer or equipment supplier should document associated operating limitations, information and procedures in AFM or other appropriate documents.

Similarly, the aircraft manufacturer or equipment supplier should identify any specific items related to PBCS capability in the master minimum equipment list (MMEL) and/or minimum equipment list (MEL). Operators will adopt provisions for certain specific systems to be operational at dispatch. The MEL should be amended to highlight the impact of losing an associated system/sub-system on data link operational capability.

Operational procedures

Operators are required to ensure that standard operating procedures (SOPs) are established for flight crew and other relevant personnel (flight dispatchers and maintenance engineers). The SOPs shall include both normal and non-normal (contingency) procedures for the data link systems used in the PBCS operations, addressing the following:

- a) Pre-flight planning requirements including MELs, eligible flight plan filing;
- b) Actions to be taken in the data link operation, to include specific RCP/RSP required cases;
- c) Actions to be taken for the loss of data link capability while in and prior to entering the airspace requiring specific RCP/RSP specifications;
- d) Problem reporting procedures to the local/regional PBCS monitoring agency (e.g. central reporting agency) specific regional requirements, if applicable.

Note: The performance monitoring has shown that High Frequency Data Link (HF DL) does not meet RCP240/RSP180 performance

Training

Operators should ensure that flight crew and other personnel (flight dispatchers and maintenance engineers) are proficient with the PBCS operations. The existing training programme should incorporate a basic PBCS concept and requirements for flight crew and other personnel that have direct impact on overall data link performance required for the provisions of air traffic services (e.g. reduced separation). Subject areas that should be addressed during the training are as follows:

Flight Crew Training

- a) Data link communications system theory (relevant to operational use)
- b) AFM and AFM Supplement limitations
- c) Normal pilot response to data link communication messages
- d) Message elements in the message set used in each environment
- e) Required Communication Performance (RCP)/Required Surveillance Performance (RSP) specifications and their performance requirements
- f) Implementation of performance-based reduced separation with associated RCP/RSP specifications or other possible performance requirements associated with their routes
- g) Other ATM operations involving data link communication services
- h) Both normal and non-normal (contingency) procedures
- i) Data link communication failure/problem and reporting

Dispatchers/Flight Operations Officers

- a) Proper use of data link and PBCS flight plan designators,
- b) Air traffic service provider's separation criteria and procedures relevant to RCP/RSP specifications,
- c) MEL remarks or exceptions based on data link communications,
- d) Procedures for transitioning to voice communication and other contingency procedures related to the operation in the event of abnormal behavior of the data link communication,
- e) Coordination with the ATS unit related to or following a special data link communication exceptional event (e.g. log-on or connection failures), and
- f) Contingency procedures to transition to a different separation standard when data link communication fails.

Engineering and maintenance personnel

- a) Data link communication equipment including installation, maintenance and modification
- b) MEL relief and Procedures for return to service authorizations
- c) Correction of reported non-performance of data link system

Operators unsure of required maintenance procedures for data link communication-related equipment should contact field service representatives of their aircraft manufacturer.

CSP compliance

Participating operators should ensure that contracted CSPs comply with RCP/RSP specification allocations as well as monitoring, recording and notification requirements.

They should ensure that their contracted CSPs notify the ATS units of any failure condition that may have an impact on PBCS operations. Notification shall be made to all relevant ATS units regardless of whether or not the CSP has a contract with them.

Operators may demonstrate compliance of their contracted CSP through service level agreements (SLAs)/contractual arrangements for data link services or through a joint agreement among PBCS stakeholders (e.g. MOU or PBCS Charter).

Participation in the PBCS monitoring programmes

Operators should establish a process to participate in local or regional PBCS monitoring programmes and provide the following information, including any subsequent changes, to monitoring entities:

- a) Operator name;
- b) Operator contact details; and
- c) Other coordination information which include e-mail address for the CSP/SSP service fail notification.

The process should also address the actions to be taken with respect to problem reporting and resolution of deficiencies, such as:

- Reporting problems identified by the flight crew or other personnel to the PBCS monitoring entities associated with the route of flight on which the problem occurred;
- Disclosing operational data in a timely manner to the appropriate PBCS monitoring entities when requested for the purposes of investigating a reported problem; and
- Investigating and resolving the cause of the deficiencies reported by the PBCS monitoring entities.

FANS 1/A Central Reporting Website (www.fans-cra.com)

This is a website created and administered by Airways New Zealand to facilitate coordination and cooperation concerning global data link operation including PBCS.

The website provides a means for stakeholders to:

- a) Raise problem reports against FANS 1/A system;
- b) View de-identified problem reports and problem reports raised by stakeholders;
- c) View reports assigned to a specific stakeholder by the regional monitoring entities;
- d) View FANS 1/A monitored performance against RCP240/RSP180;
- e) View and sign up for PBCS Charter; and
- f) View and provide contact information for all stakeholders (ANSP, Operators and Communication Service Providers-CSPs).

Flight planning

When planning to operate in an airspace where RCP/RSP specifications are prescribed for certain services such as reduced separation, the operator shall ensure that the planned use of association communication and surveillance capabilities for the flight are in accordance with regulations, policies and procedures in controlled areas for the flight as published in the AIP or other State publications.

The operator shall ensure proper information indicating PBCS operational approval for RCP/RSP capabilities is included in the ICAO flight plan as per ICAO Doc 4444.

CHALLENGES AND POSSIBLE SOLUTIONS IN PBCS OPERATIONS

1. Personnel training and qualifications
2. Funding and resources to monitor PBCS operations
3. Submitting and accessing information on PBCS by users e.g. problem reports, data
4. Non compliance – operation system that does not meet the RCP/RSP specification (monitoring programme)
5. Correct filling of flight plan (e.g. P2 – for RCP240 in item 10, and RSP180 following SUR/ in item 18 of the flight plan. J codes for CPDLC and D1 or G1 for ADS-C in item 10)
6. Most operators in Kenya have small to medium range aircraft, and therefore do not operate remote and oceanic routes that require the uptake of PBCS,
7. Aircraft or ground equipment failures – documented procedures on reporting modalities have to be adhered to,
8. Occasional power outages that bear significant effect on ground based satellite equipment from time to time.