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CIVIL AVIATION SAFETY PUBLICATION

North Atlantic Flight

NAT Implementation of PBCS/PBN Based Separation Minima



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1.0 INTRODUCTION

(1) Advancements in aircraft avionics and air traffic management flight data processing systems resulted in an initiative to analyse whether the lateral separation standard in the current North Atlantic High Level Airspace (NAT HLA) could be reduced from 60 nm to 25 nm thereby increasing the number of route options available and capacity at optimum flight levels. An ongoing trial implementation of 25 nm lateral separation, referred to as Reduced Lateral Separation Minimum (RLatSM), has established tracks that are spaced by one-half degree of latitude with the inclusion of an extra track between the core tracks of the NAT Organised Track System (OTS) from Flight Level (FL) 350 to FL 390 inclusive. Phase 2 will extend the trial to the whole of the OTS and is affect since the end of 2017. A similar trial has been ongoing in the Shanwick Oceanic Control Area (OCA) to reduce longitudinal separation between aircraft following the same track to 5 minutes. This initiative is referred to as Reduced Longitudinal Separation Minimum (RLongSM). These trials have been terminated on 29 March 2018. However, the application of both reduced lateral and longitudinal separation will still be possible after this date with the introduction of Performance Based Communication and Surveillance (PBCS). This CASP sets out the criteria for PBCS and the requirements for operators to continue using airspace where PBCS separations (i.e. reduced separations) are being applied. .

2 APPLICABILITY

(1) This CASP applies to Kuwaiti Registered operators holding an Air Operator Certificate (AOC) issued under Kuwait DGCA

3 REFERENCES AND REQUIREMENTS

3.1 Reference Documents

(1) It is intended that the following reference materials (latest edition) be used in conjunction with this document:

(a) KCASR 6,

(b) KCASR 8,

(c) International Civil Aviation Organization (ICAO) DOC 9689 — *Performance-based Communication and Surveillance (PBCS) Manual;*

(d) ICAO DOC 10037 — *Global Operational Data Link (GOLD) Manual;*

(e) Federal Aviation Administration (FAA) Advisory Circular (AC) *120-70C — Operational Authorization Process for use of Data Link Communication Systems;*

(f) FAA AC 20-140B — *Guidelines for Design Approval of Aircraft Data Link Communication Systems Supporting Air Traffic Services (ATS);*

(g) FAA AC 20-160 — *On-board Recording of Controller Pilot Data Link Communication in Crash Survivable Memory;*

(h) *Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace* (Oceanic SPR Standard, RTCA DO-306/EUROCAE ED-122);

(i) *Safety and Performance Standard for Air Traffic Data Link Services in Continental Airspace* (Continental SPR Standard, RTCA DO-290/EUROCAE ED-120, Change 1 and Change 2);

(j) *Interoperability Requirements for ATS Applications Using ARINC 622 Data Communications* (FANS 1/A INTEROP Standard, RTCA DO-258A/EUROCAE ED-100A);

(k) *Interoperability Requirements Standard for Aeronautical Telecommunication Network Baseline 1* (ATN B1 INTEROP Standard, RTCA DO-280B/EUROCAE ED-110B); and

(l) *Future Air Navigation System 1/A — Aeronautical Telecommunication Network Interoperability Standard* (FANS 1/A — ATN B1 INTEROP Standard, RTCA DO 305A/EUROCAE ED 154A);

(m) *PBCS Charter* - http://www.fans-cra.com/user/login/?next=/charter/charter.

3.2 Definitions and Abbreviations

(1) The following definitions are used for the purposes of this document:

(a) **Actual Communications Performance (ACP)**: The portion of communication transaction time that is monitored against the Required Communication Monitored Performance (RCMP) values provided by the Required Communications Performance (RCP) specification.

(b) **Actual Surveillance Performance (ASP)**: The portion of surveillance data delivery time that is monitored against the RSMP values provided by the Required Surveillance Performance (RSP) specification.

(c) **Aeronautical Telecommunication Network Baseline 1 (ATN B1):** ATN B1 generally means that the data link system on an aircraft, the Air Traffic Services Unit (ATSU) ground system, and communication service provision comply with the standard as adapted by Euro control Specification on Data Link Services (EUROCONTROL-SPEC0116). ATN B1 consists of the following data link applications:

(i) Context Management (CM) for data link initiation capability (DLIC); and

(ii) Limited Controller Pilot Data Link Communications (CPDLC) for Air Traffic Service (ATS) Communications Management (ACM), ATS clearance (ACL), and ATC Microphone Check (AMC).

(d) **Automatic Dependent Surveillance – Contract (ADS-C)**: 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 what conditions ADS-C reports would be initiated and what data would be contained in the reports.

(e) **Communication Service Provider (CSP)**: Any public or private entity providing communication services for general air traffic. This would include services provided by a satellite service provider (SSP) through a contract or agreement.

(f) **Future Air Navigation System (FANS 1/A)**: FANS 1/A generally means that the data link system on an aircraft, the ATSU ground system, and communication service provision comply with the standard. In certain cases, specific reference is made to a particular type of FANS 1/A aircraft as follows:

(i) FANS 1/A+ means that the aircraft completely complies with Revision A of the standard, which includes message latency monitor; and

(ii) FANS 1/A ADS-C means that the aircraft complies with ATC Facilities Notification (AFN) and ADS-C applications, but does not include the CPDLC application.

(g) **Performance-Based Communications (PBC):** ATS communication services and capability based on performance requirements for air traffic service provision, aircraft and flight operations along an ATS route, on an instrument approach procedure or in a designated airspace.

Note: *Communication performance requirements are allocated to system components in an RCP specification in terms of communication transaction time, continuity, availability, integrity, safety and functionality needed for the proposed operation in the context of a particular airspace concept.*

(h) **Performance-Based Communications and Surveillance (PBCS) Operation**: Air Traffic Management (ATM) or aircraft operation to which an RCP and/or RSP specification has been prescribed.

(i) **Performance-Based Surveillance (PBS):** ATS surveillance services and capability based on performance requirements for air traffic service provision, aircraft and flight operations along an ATS route, on an instrument approach procedure or in a designated airspace.

Note: *Surveillance performance requirements are allocated to system components in an RSP specification in terms of surveillance data delivery time, continuity, availability, integrity, accuracy of the surveillance data, safety and functionality needed for the proposed operation in the context of a particular airspace concept.*

(j) **Required Communication Monitored Performance (RCMP):** An RCP allocation that specifies the maximum time against which ACP is assessed.

(k) **Required Communication Performance (RCP) specification:** A set of requirements for air traffic service provision, aircraft capability, and operations needed to support performance-based communication within a defined airspace.

Note 1: *See International Civil Aviation Organization (ICAO) Doc 9869 and Appendix B of Global Operational Data Link Document (GOLD) document for RCP specifications.*

Note 2: *The term RCP, defined by ICAO as "a statement of performance requirements for operational communication in support of specific ATM functions", is used to align the concept of PBC with the concept of PBN. The term RCP is now used in the context of a specification that is applicable to the prescription of airspace requirements, qualification of ATS provision, aircraft capability, and operational use, including post-implementation monitoring (e.g. RCP 240 refers to the criteria for various components of the operational system to ensure an acceptable intervention capability for the controller is maintained).*

(l) **Required Surveillance Performance (RSP) specification:** A set of requirements for air traffic service provision, aircraft capability, and operations needed to support performance based surveillance within a defined airspace.

Note 1: *See ICAO Doc 9869 and Appendix C of the GOLD document for RSP specifications.*

Note 2: *The term RSP is used in the context of a specification that is applicable to the prescription of airspace requirements, qualification of ATS provision, aircraft capability, and operational use, including post-implementation monitoring (e.g. RSP 180 refers to the criteria for various components of the operational system to ensure an acceptable surveillance capability for the controller is maintained).*

(m) **Required Surveillance Monitored Performance (RSMP):** An RSP allocation that specifies the maximum time against which ASP is assessed.

(n) **Satellite Service Provider (SSP**): An entity or group of entities that provide, via satellite, aeronautical fixed services and/or aeronautical mobile services at least from the signal in space to/from aircraft, to the attachment point of the ground earth station (GES) to the ground communication services network.

(o) **Special Authorization (SA):** The authorizations, conditions and limitations associated with the air operator certificate (AOC) and subject to the conditions in the operations manual.

(2) The following **abbreviations** are used in this document:

(a) **CASP:** Civil Aviation Safety Publication Advisory Circular;
(b) **ACM:** ATS Communications Management;
(c) **ACP:** Actual Communications Performance;
(d) **ADS-B:** Automatic Dependent Surveillance – Broadcast;
(e) **ADS-C:** Automatic Dependent Surveillance – Contract;
(f) **AFM:** Aircraft Flight Manual;
(g) **AFN:** ATC Facilities Notification;
(h) **AIP:** Aeronautical Information Publication;
(i) **AOC:** Air Operator Certificate;
(j) **ANSP:** Air Navigation Service Provider;
(k) **ASP:** Actual Surveillance Performance;
(l) **ATM:** Air Traffic Management;
(m) **ATN B1:** Aeronautical Telecommunication Network Baseline 1;
(n) **ATS:** Air Traffic Service;
(o) **ATSU:** Air Traffic Services Unit;
(p) **CARs:** Canadian Aviation Regulations;
(q) **CASS:** Commercial Air Services Standard;
(r) **CM:** Context Management;
(s) **CPDLC:** Controller-Pilot Data Link Communications;
(t) **CSP:** Communications Service Provider;
(u) **COM:** Company Operations Manual;
(v) **EUROCAE:** European Organization for Civil Aviation Equipment;
(w) **FANS 1/A:** Future Air Navigation System (1 = Boeing, A = Airbus);

(x) **GOLD:** Global Operational Data Link Document;

(y) **HLA:** High Level Airspace (NAT);

(z) **HMI:** Human-machine interface;

(aa) **ICAO:** International Civil Aviation Organization;

(bb) **MEL:** Minimum Equipment List;

(cc) **MMEL:** Master Minimum Equipment List;

(dd) **NAT:** North Atlantic;

(ee) **PORD:** Private Operator Registration Document;

(ff) **PBC:** Performance-based Communications;

(gg) **PBCS:** Performance-based Communications and Surveillance;

(hh) **PBN**: Performance-based Navigation;

(ii) **PBS:** Performance-based Surveillance;

(jj) **RCMP:** Required Communication Monitored Performance;

(kk) **RCP:** Required Communications Performance;

(ll) **RNP:** Required Navigation Performance;

(mm) **RSMP:** Required Surveillance Monitored Performance;

(nn) **RSP:** Required Surveillance Performance;

(oo) **RTCA:** Radio Technical Commission for Aeronautics;

(pp) **SA:** Special Authorization;

(qq) **SATVOICE:** Satellite Voice;

(rr) **SOP:** Standard Operating Procedures;

(ss) **SSP:** Satellite Service Provider;

(tt) **STC:** Supplemental Type Certificate;

(uu) **SVOM:** Satellite Voice Operations Manual;

(vv) **TCCA:** Transport Canada Civil Aviation.

4 BACKGROUND

(1) The standards and procedures for an Air Traffic Management (ATM) operation that are predicated on communication and surveillance capabilities, such as the application of a reduced separation minimum, must refer to the appropriate Required Communications Monitored Performance (RCP)/Required Surveillance Performance (RSP) specification. The RCP/RSP specifications provide the operational performance criteria and associated allocations to the ATM subsystems for the communication and surveillance capabilities supporting the ATM operation.

(2) Performance-based operations and monitoring have been implemented in the North Atlantic (NAT) High Level Airspace (HLA) to ensure the ongoing safety and efficiency of ATM operations. The performance of FANS 1/A (and equivalent) Controller-Pilot Data Link Communications (CPDLC) and ADS-C are monitored in the NAT HLA against the RCP 240 and RSP 180 specifications. In the near future, flights will be required to indicate compliance with these specifications in order to qualify for certain separation minima. It is expected that RCP and RSP compliance will be required for operations in other airspaces as well.

5 REQUIRED COMMUNICATIONS PERFORMANCE (RCP) 240 AND REQUIRED SURVEILLANCE PERFORMANCE (RSP) 180

5.1 General

(1) The Performance-Based Communications and Surveillance (PBCS) provision applies RCP 240 and RSP 180 specifications to the application of 55.5 km (30 NM), 93 km (50 NM) and 5 minute longitudinal separation minima; and application of a 42.6 km (23 NM) lateral separation minimum (formerly 55.5 km (30 NM) lateral).

(2) The Air Traffic Services (ATS) system, Communications Service Provider/Satellite Service Provider (CSP/SSP) system, operator and the aircraft system must all comply with an RCP/RSP specification.

(3) The aircraft system is approved by the State of Design and/or State of Manufacture, which typically issues design, production and airworthiness certificates to an aircraft manufacturer or equipment supplier in accordance with national regulations. However, The PBCS requirements for the design of the aircraft system concern its functionality, interoperability and performance in accordance with national airworthiness standards. There are no additional PBCS requirements concerning the production and airworthiness certificates other than those provided by national regulations. Certificates issued for design, production and airworthiness approval of the aircraft system do not constitute operational approval to use the system for PBCS operations.

(4) The aircraft operator must obtain an operational approval in the form of a Special Authorization from Kuwait DGCA to be eligible for PBCS operations. The operational approval must address flight crew training and qualification, Minimum Equipment List (MEL), maintenance, user modifiable software and CSP/SSP service agreements.

5.2 Conditions for Special Authorization

(1) Appendix A provides the specific conditions that must be met in order to qualify for RCP 240 and RSP 180 Special Authorization. The intent is to transcribe these conditions into the operator's Air Operator Certificate (AOC) or Private Operator Registration Document (PORD) by reference to Appendix A.

(2) Appendix B provides guidance which is applicable to the specific conditions in Appendix A.

(3) Additional guidance is provided in the documents referenced in section 2.1 above.

APPENDIX A CONDITIONS REQUIRED FOR INCLUSION IN SPECIAL AUTHORIZATION FOR REQUIRED COMMUNICATIONS PERFORMANCE (RCP) 240 AND REQUIRED SURVEILLANCE PERFORMANCE (RSP) 180

1.0 OPERATOR REQUIREMENTS

(1) The operator shall ensure that procedures are established and the flight crews and other personnel are trained and qualified for Performance-based Communications and Surveillance (PBCS) operations. The flight crew procedures and training shall include normal operations and those associated with alerts provided by the aircraft system to indicate failures when the aircraft is no longer capable of meeting the Required Communications Performance (RCP)/Required Surveillance Performance (RSP) specification prescribed for the associated Air Traffic Management (ATM) operations.

(2) The operator shall ensure that

(a) contracted services, such as with Communications Service Providers (CSPs)/Satellite Service Providers (SSPs), are bound by contractual arrangements stipulating the RCP/RSP allocations, including any monitoring or recording requirements.

(b) contractual arrangements include a provision for the CSP/SSP to notify the Air Traffic Service (ATS) units appropriate for the route system of the aircraft operator of failure conditions impacting PBCS operations; or

(c) in lieu of (a) and (b), the air operator joins and follows the PBCS Charter.

(3) The operator shall ensure that the aircraft system has been approved for the intended use in accordance with the RCP 240 and RSP 180 specifications.

(4) The operator shall ensure that aircraft system is properly maintained, including configuring user modifiable software, such as software used to manage communication media and routing policies, to meet the RCP 240 and RSP 180 specifications.

(5) The operator shall participate in Air Navigation Service Provider (ANSP) and regional PBCS monitoring programs, which are applicable to the aircraft operator's route system, and shall provide the following information to regional PBCS monitoring entities specified in the Aeronautical Information Publication (AIP) Canada (International Civil Aviation Organization (ICAO):

(a) operator name;

(b) operator contact details; and

(c) other coordination information.

(6) The operator shall advise the appropriate PBCS monitoring entities of any changes to the information listed above.

(7) The operator shall establish procedures to report problems identified by the flight crew or other personnel, to the regional PBCS monitoring entities identified in AIPs (or equivalent publications) associated with the route of flight on which the problem occurred.

(8) The operator shall ensure procedures are established to disclose operational data, including data from its CSPs/SSPs, in a timely manner, to the appropriate PBCS monitoring entity, when requested for the purposes of investigating a reported problem.

(9) When filing RCP/RSP capabilities, the operator shall ensure that the planned use of associated communication and surveillance capabilities for the flight will be in accordance with regulations, policies and procedures in control areas for the flight as published in the AIP.

(10) The operator shall ensure that the proper information to denote PBCS capabilities is included in the ICAO flight plan as follows:

(a) In Item 10 of the flight plan, the aircraft operator shall insert “P2” to identify an aircraft’s RCP 240 capability; and

(b) In Item 18 of the flight plan, the aircraft operator shall file the RSP 180 capability by inserting the indicator “SUR/RSP 180”.

2.0 AIRCRAFT REQUIREMENTS

(1) The “RCP 240 and RSP 180” Special Authorization is specific to each individual airframe.

(2) The aircraft manufacturer or supplier must demonstrate that aircraft system meets the RCP 240 and RSP 180 allocations as per ICAO’s Performance-based Communications and Surveillance Manual (Doc 9869) and Global Operational Data Link Document (GOLD).

(3) The aircraft manufacturer or equipment supplier shall demonstrate that the aircraft meets the RCP 240 and RSP 180 integrity criteria and associated safety requirements as per ICAO Doc 9869 (PBCS Manual) and Doc 10037 (GOLD Manual) .

(4) The aircraft manufacturer or supplier shall demonstrate that the aircraft system meets the RCP 240 and RSP 180 availability criteria. The aircraft manufacturer or supplier shall demonstrate that the aircraft system, when operating with a representative ATS provision (i.e. simulation or real ground system), is capable of meeting the operational RCP 240 and RSP 180 time and continuity criteria.

(5) The aircraft manufacturer or supplier shall demonstrate that the aircraft system provides the flight crew with alerts in case of aircraft system or connectivity failures that would cause the aircraft to no longer be capable of meeting the RCP 240 and RSP 180 specification.

(6) The aircraft manufacturer or equipment supplier shall identify any specific items related to PBCS capability in the master minimum equipment list (MMEL).

(7) The aircraft manufacturer or equipment supplier shall identify the demonstrated PBCS capability of the aircraft, any associated operating limitations, information and procedures, in the flight manual.

APPENDIX B – GUIDANCE MATERIAL FOR REQUIRED COMMUNICATIONS PERFORMANCE (RCP) 240 AND REQUIRED SURVEILLANCE PERFORMANCE (RSP) 180

The following table contains specific guidance concerning the requirements for RCP 240 and RSP 180 special authorization. The guidance material listed below is contained in International Civil Aviation Organization (ICAO) Doc 9869 (PBCS Manual) and refers directly to the conditions provided in Appendix A of this document.

Appendix A Condition	Guidance
1.0 (1)	"Other personnel" refers to aircraft maintenance, and flight operations officer/flight dispatcher personnel. If, as a result of system degradation, the aircraft is no longer capable of meeting the RCP/RSP specification prescribed for the associated ATM operations, Air Navigation Services Provider (ANSP) such as NAV CANADA would expect flight crews to respond in accordance with global procedures described in *Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM, Doc 4444)* ***(Degraded aircraft performance).*** Whenever, as a result of failure or degradation of navigation, communications, altimetry, flight control or other systems, aircraft performance is degraded below the level required for the airspace in which it is operating, the flight crew shall advise the Air Traffic Control (ATC) unit concerned without delay. Where the failure or degradation affects the separation minimum currently being employed, the controller shall take action to establish another appropriate type of separation or separation minimum.
1.0 (3)	This provision ensures appropriate ATS units are notified in cases when the ANSP does not have a contractual arrangement with a particular CSP/SSP, and services are provided through internetworking among CSPs/SSPs.
1.0 (4)	For a FANS 1/A CPDLC and ADS-C aircraft system, RTCA DO-306/EUROCAE ED-122 is equivalent to RCP 240, RCP 400, RSP 180 and RSP 400 specifications. For an ATN B1 or FANS 1/A CPDLC aircraft system, RTCA DO290/EUROCAE ED-120 provides performance criteria for the European Region. The aircraft manufacturer should state aircraft compliance with the RCP 240 and RSP 180 specifications in the Aircraft Flight Manual (AFM). This alone does not constitute operational approval to participate in PBCS operations.
1.0 (10)	RCP/RSP capabilities are inserted only when the descriptors J2 through J7 for CPDLC, M1 through M3 for Satellite Voice (SATVOICE), and/or D1 for ADS-C, are also inserted. While RCP/RSP capability denotes performance, the descriptors J2 through J7, M1 through M3 and D1 in item 10 denote the interoperability for the aircraft equipment.

1.0 (11)	***Note :**. Refer to ICAO Doc 4444, Appendix 2, for flight plan requirements.* ***Note 2:** The inclusion of PBCS capability in the filed flight plan indicates that the relevant aircraft equipment comprising the aircraft system is approved and serviceable, and that the operator is eligible (e.g. flight crew training and qualification) to use the equipment for PBCS operations. If these conditions are not met then PBCS capability should not be included in the flight plan.* ***Note 3:** The ATS unit uses the flight plan information to determine when to apply particular ATM operations that are dependent on the capability and to configure the system (e.g. set timer threshold values) for efficient operation when required communication and/or surveillance performance varies.*
2.0 (2)	For a FANS 1/A CPDLC and ADS-C aircraft system, RTCA DO-306/EUROCAE ED-122 is equivalent to RCP 240, RCP 400, RSP 180 and RSP 400 specifications. For an ATN B1 or FANS 1/A CPDLC aircraft system, RTCA DO290/EUROCAE ED-120 provides performance criteria for the European Region. The aircraft manufacturer should state aircraft compliance with the RCP 240 and RSP 180 specifications in the AFM. This alone does not constitute operational approval to participate in PBCS operations.
2.0 (3)	RCP/RSP integrity is typically shown by analysis, design, system architecture, and evaluations of Human-machine interface (HMI), taking into account flight crew training and qualification programs instituted by the aircraft operator.
2.0 (4)	RCP/RSP availability is typically shown by evaluation of equipment failure and the number of similar components (redundancy) installed on the aircraft. ***Note 1:** For voice communication, the number of radios and types of radios required may be specified by operating rules and airspace requirements (i.e. the Aeronautical Information Publication (AIP) or equivalent publication).* ***Note 2:** It would be impractical to exhaustively demonstrate compliance at the aircraft system level.*
2.0 (5)	***Note:** Examples of alerts include failure of a particular communication means, definitive connectivity loss, or failure of the communication or surveillance functions. There is no consolidated RCP/RSP capability directly displayed to the flight crew. Appropriate procedures and flight crew training associated with the alerts ensure continued compliance with PBCS operations.*
3.0 (1)	NAV CANADA is responsible for the PBCS monitoring program in the North Atlantic (NAT) High Level Airspace (HLA) (Gander Oceanic airspace) and any other Canadian airspace that is identified for the application of PBCS separations. NAV CANADA shall follow the guidance material in Appendix D of ICAO Doc 9869, PBCS Manual which describes post-implementation monitoring and corrective action. The Transport Canada Civil Aviation (TCCA) Office of Primary Interest (OPI) for problem reporting and resolution is still to be determined and will be published in a revised edition of this document.