CAAT
สำนักงานการบินพลเรือนแห่งประเทศไทย
The Civil Aviation Authority of Thailand

GUIDANCE MATERIAL
FOR
Performance-based Communications and Surveillance (PBCS) Operational Approval

Approved by

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(Chula Sukmanop)
Director General
The Civil Aviation Authority of Thailand

Revision Original, 28 September 2018

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RECORDS OF REVISION

Revision No.	Issue Date	Date Inserted	Inserted by
Original	28 September 2018	28 September 2018	CAAT (OPS)

REVISION HIGHLIGHTS

Chapter/Section	Description of Change
All	New issue

LIST OF ABBREVIATIONS

Abbreviation	Definition
ACARS	Aircraft Communications Addressing and Reporting System
ADS-C	Automatic Dependent Surveillance-Contact
AFM	Aeroplane Flight Manual
AIP	Aeronautical Information Publication
AOC	Air Operator Certificate
APAC	Asia and Pacific
ATM	Air Traffic Management
ATS	Air Traffic Service
CMU	Communications Management Unit
CPDLC	Controller Pilot Data Link Communications
CSP	Communication Service Provider
FANS 1/A	Future Air Navigation System
FMC	Flight Management Computer
HFDL	High Frequency Data Link
LatSM	Lateral Separation Minima
LongSM	Longitudinal Separation Minima
MEL	Minimum Equipment List
MMEL	Master Minimum Equipment List
MOU	Memorandum of Understanding
NAT	North Atlantic
OM	Operations Manual
Ops Spec	Operations Specification
PANS	Procedure for Air Navigation Service
PBCS	Performance Based Communication and Surveillance
PBN	Performance Based Navigation
RCP	Required Communication Performance
RNAV	Area Navigation
RNP	Required Navigation Performance
RSP	Required Surveillance Performance
SATCOM	Satellite Communications
SLA	Service Level Agreements
SOPs	Standard Operating Procedures
SSP	Satellite Service Provider
STC	Supplemental Type Certificate
TC	Type Certificate
VHF	Very High Frequenc

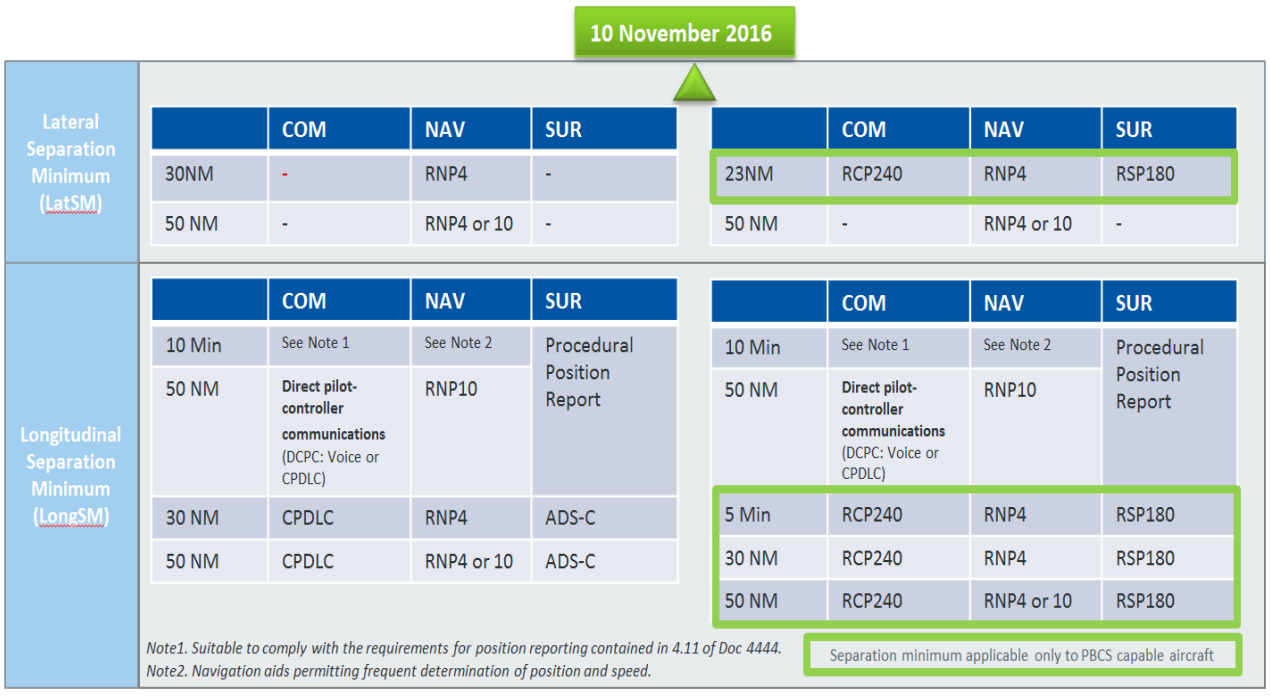
CHAPTER 1

BACKGROUND

As of 10 November 2016, certain separation minima shall be applied only to those pairs of aircraft meeting required communication performance (RCP) and a required surveillance performance (RSP) specifications in accordance with provisions in:

• Annex 6 — *Operation of Aircraft;*
• Annex 11 — *Air Traffic Services;*
• *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444); and
• *Regional Supplementary Procedures* (Doc 7030).

In particular, Amendment 7 to the PANS-ATM (Doc 4444) made changes to the 30NM lateral and 30NM/50NM longitudinal separation standards and introduced a new time-based longitudinal separation as described in in Figure below.



The Asia and the Pacific (APAC) and North Atlantic (NAT) regions, which had applied 30NM lateral and 30/50 NM longitudinal separation minimum, agreed to transition to the implementation of these new requirements from 29 March 2018 in part of their airspace. Operators that wish to continue to take advantage of these performance-based lateral and longitudinal separation standards, in airspace where they are available, will need to obtain a PBCS operational authorization for applicable RCP and RSP specifications. This PBCS authorization will certify that the aircraft and operator meet both the communication and surveillance requirements allocated to them.

When a PBCS authorization is obtained an operator is required to file both P2 (indicating RCP240) in item 10 and RSP180 following SUR/ in item 18 of the flight plan, in addition to the J codes for CPDLC and D1 or G1 for ADS-C in item 10. The correct filing of these two codes will indicate to any ATM ground systems applying performance-based separation minima that the aircraft is eligible for these minima and that the crew have received the relevant training in order to safely operate using the reduced separations.

PROVISION OF PBCS

The provision of PBCS in the Asia and the Pacific (APAC) and North Atlantic (NAT) High Level Airspace applies RCP 240 and RSP 180 specifications. This permits ATC to apply 30 NM, 50 NM or five minutes longitudinal separation minima; and to apply 23 NM lateral separation minimum.

An RCP specification includes communication performance requirements that are allocated to system components in terms of the communication to be provided and the associated transaction time, continuity, availability, integrity and safety and functionality needed for the proposed operation in the context of a particular airspace concept. The following table shows the RCP 240 specification:

RCP Specification	RCP Transaction Time (seconds)	RCP Continuity (probability)	RCP Availability (probability)	RCP integrity (acceptable rate/FH)
RCP 240	240	0.999	0.999 0.9999 (efficiency)	10^{-5}

An RSP specification include includes surveillance performance requirements that are allocated to system components in terms of the surveillance to be provided and the associated data delivery time, continuity, availability, integrity, accuracy of the surveillance data and safety and functionality needed for the proposed operation in the context of a particular airspace concept. The following table shows the RSP 180 specification:

RSP Specification	RSP Delivery Time (seconds)	RSP Continuity (probability)	RSP Availability (probability)	RSP integrity (acceptable rate/FH)
RCP 180	180	0.999	0.999 0.9999 (efficiency)	FOM=Navigation Specification Time at Position Accuracy +/- 1 Sec 10^{-5} (malfunction)

CHAPTER 2

PBCS OVERVIEW

The PBCS concept provides objective operational criteria to evaluate different and emerging communication and surveillance technologies, intended for evolving air traffic management (ATM) operations. Once these criteria have been established and accepted, implementation of a specific ATM operation including its technical and human performance may be evaluated against these operational criteria to assess their viability.

The PBCS concept is aligned with that of performance-based navigation (PBN). While the PBN concept applies required navigation performance (RNP) and area navigation (RNAV) specifications to the navigation element, the PBCS concept applies required communication performance (RCP) and required surveillance performance (RSP) specifications to communication and surveillance elements, respectively. However, there are some differences between the PBCS and PBN concepts:

a) the PBCS concept applies RCP and RSP specifications, which allocate criteria to ATS provision, including communication services, aircraft capability, and the aircraft operator; whereas the PBN concept applies RNP/ RNAV specifications, which allocate criteria only to the aircraft capability and the aircraft operator; and

b) the PBCS concept includes post-implementation monitoring programmes, on a local and regional basis, with global exchange of information; whereas the PBN concept includes real time monitoring and alerting functionality in the aircraft capability.

Note: PBCS includes real time alerts (e.g. when a communication transaction expires or a position report is overdue) that are conceptually different than the PBN alerts (e.g. RNP UNABLE).

The PBCS provides air traffic services providers with some level of assurance that the aircraft and flight crew meet the communication and surveillance requirements needed for the application of the performance-based separation standards. PBCS also provides a framework in which all stakeholders (regulators, air traffic service providers, operators, communication service providers (CSP) , manufacturers) continue to collaborate in optimizing the use of available airspace while identifying and mitigating safety risks.

CHAPTER 3

OPERATIONAL AUTHORIZATION

1. GENERAL

1.1 According to Annex 6 Part I, a PBCS operational authorization should be obtained from an assessment of the required elements in the operations manual (OM). CAAT will issue a specific approval and document it in the Operations Specification (Ops Spec), associated with the air operator certificate (AOC) when the assessment for the PBCS operational authorization is satisfactory completed. An example of PBCS Operational Authorization Application is provided in **Appendix A** to this document.

1.2 The assessment for the PBCS operational authorization should take into account the following aspects:

a) aircraft eligibility and airworthiness compliance (any limitations, assumptions or specific procedures considered in the framework of the airworthiness approval must be addressed);
b) documentation and maintenance of operating procedures for the specific data link system(s) including use of message sets;
c) means of ensuring compliance of contracted services, such as those with communication services providers (CSPs) with respect to PBCS operations;
d) documentation and maintenance of procedures for participation in PBCS monitoring programmes including problem reporting;
e) documentation and maintenance of policies and procedures to control configuration of aircraft system including software and communication subnetwork for managing media and routing.
f) flight crew initial training /competency requirements and continuing qualification requirements;
g) training requirements for other personnel (e.g. flight dispatchers and engineers); and

For those that have been granted authorization for data link operations
If the operator has been approved for data link operations, CAAT may assess only additional requirements for PBCS data link operations in comparison to the national requirements if any for data link operations.

2. AIRCRAFT ELIGIBILITY

2.1 The aircraft manufacturer or equipment supplier should demonstrate that aircraft system meets the required communication performance (RCP) / required surveillance performance (RSP) specifications allocated to the aircraft system as contained in the PBCS Manual (Doc 9869).

Note1. For a FANS 1/A CPDLC and ADS-C aircraft system, the 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 contained in the PBCS Manual (Doc 9869, 2nd Edition).

Note 2. FAA AC20-140A or later satisfy the requirement for RCP240/400, RSP 180/400.

2.2 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 demonstrated compliance with specific RCP/ RSP specifications may be documented in one of the following documents;

a) the Type Certificate (TC);
b) the Supplemental Type Certificate (STC);
c) the Aeroplane 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 CAAT, if different.

Note: CAAT can issue an authorization based on the compliance statement issued by aircraft manufacturer as listed above or based on other alternative means of compliance that are acceptable to the CAAT.

2.3 In addition to the indication of compliance with specific RCP/ RSP specifications, the aircraft manufacturer or equipment supplier should document any associated operating limitations, information and procedures in the AFM or other appropriate documents.

2.4 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).

Note: When required for the intended operation, operates 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. Equipment required in current FANS 1/A-capable models is as follows:

a) *VHF, SATCOM, or HFDL[1] 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).*

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

3. OPERATOR ELIGIBILITY

Aircraft system

3.1 The operator should 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.

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

a) configuration and equipment list detailing the pertinent hardware and software components for the aircraft /fleet(s) applicable to the specific RCP/RSP operation;

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[1] The performance monitoring has shown that HFDL does not meet RCP240/RSP180 performance
[2] Corruption of the CPDLC message could occur when printed. Caution should be exercised when reviewing printed versions of CPDLC messages.

b) configuration control for subnetwork, communication media and routing policies; and
c) description of systems including display and alerting functions (including message sets).

Operational procedures

3.3 The operator should ensure that standard operating procedures (SOPs) are established for flight crew and other relevant personnel (flight dispatchers and maintenance engineers). The SOPs should 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)
e) specific regional requirements, if applicable.

Training

3.4 The operator should ensure that flight crew and other personnel (flight dispatchers and maintenance engineers) are proficient with the PBCS operations. The areas of subject that should be addressed during the training are provided in **Appendix B** to this document.

Note: A separate training program is not required if data link communication is integrated in the current training program. However, the operator should ensure that the existing training programme incorporates 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).

CSP compliance

3.5 The operator should ensure that contracted CSPs comply with the RCP/RSP specification allocations as well as monitoring, recording and notification requirements.

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

Note: The operator may demonstrate the 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

3.7 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.

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

a) 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
b) disclosing operational data in a timely manner to the appropriate PBCS monitoring entities when requested for the purposes of investigating a reported problem
c) investigating and resolving the cause of the deficiencies reported by the PBCS monitoring entities

Flight planning

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

3.10 The operator should ensure that the proper information indicating PBCS operational authorization for RCP/ RSP capabilities is included in the ICAO flight plan as follows:

a) Item 10a - CPDLC descriptors (J1-J7); RCP capability “P1” or “P2”; and
b) Item 10b - ADS-C descriptors (D1 or G1); and
c) Item 18 - “SUR/RSP180” or “SUR/RSP400” to show RSP capability

APPENDIX A

APPLICATION FORM FOR PBCS OPERATIONAL APPROVAL

THE CIVIL AVIATION AUTHORITY OF THAILAND

APPLICATION FOR PERFORMANCE BASED COMMUNICATION AND SURVEILLANCE (PBCS) OPERATIONAL APPROVAL (FOR THAI OPERATORS)

Please complete the form in BLOCK CAPITALS using black or dark blue ink.

This form is designed to elicit all the required information from those operators requiring PBCS (RCP 240/RSP 180) operational approvals.
The completed form and supporting documentation should be submitted to Civil Aviation Authority of Thailand at the address listed below:

Civil Aviation Authority of Thailand (CAAT)
333/105 Lak Si Plaza, Khamphaeng Phet 6 Rd.,
Tarat Bang Khen, Lak Si, Bangkok, 10210, Thailand
Visit our website: www.caat.or.th
E-mail: flightops@caat.or.th
Tel: +66 (0) 2 568 8843
Fax: +66 (0) 2 568 8848

Note: Application submission should be at least 30 days before the start of operations

Name of Operator:		Name of Responsible Person (Title):
Operator Contact's Information:	Mail Address:	
	E-mail Address:	
	Telephone Number:	
	Fax Number:	
Authorised Signature:		Intended date of commencement of PBCS operations:
Applicable type of Aircraft or Aircraft Registration Number:		
Applicable RCP/RSP: ☐ RCP240 ☐ RSP180		

1. Aircraft eligibility: Select one of the following conditions applicable on aircraft or fleet type and provide required document(s)			
Check	***Type of compliance statement***	***Required documents***	***Manual References / Operator Document***
☐	RCP/RSP compliance statement in AFM/TC/other supplemental documents	Documents on RCP/RSP compliance	
☐	Alternate compliance statement by aircraft manufacture	Other documents that include compliance statement Supplemental operator document (if applicable)	
☐	All other means of compliance	All documents supporting the other means of compliance	
Note1: Compliance statement should include applicable sub network (VDLM0/A, VDL M2, HFDL, Inmarsat, Iridium). *Note2: Applicable RCP/RSP specifications would be incorporated into relevant compliance documents.* *Note3: Other means of compliance would be by performance data and other considerable requirement by State of Registry or State of Operator to meet the other components of RCP/RSP specifications (e.g. integrity, availability, safety, and alerting requirement described on Doc 9869).*			
2. Engineering: Provide the following document(s).			
Check	***Required Documents***		***Manual References / Operator Document***
☐	Records of data link equipment installation and maintenance, which includes manufacturer/model and supporting documents (e.g AFM, Service Bulletins and Aircraft Service Changes (ASC), Supplemental Type Certificates (STCs) etc.) *Note 1. Data link equipment refers to FANS 1/A (Satellite, HF, VHF) and, if installed, ATN (VDL 2).* *Not 2. If the operator has already submitted above-mentioned documents for their data link approval, they may not be required to resubmit these documents.*		
☐	Documentation of current configuration (e.g. current avionics software load); aircraft modifications (if applicable, listing of all Aircraft Service Changes (ASC) specific to data link communications, Service Bulletins etc.) *Note: The operator should indicate whether aircraft modifications have affected the data link system. If the system was affected, the operator should confirm compliance with the associated applicable RCP/RSP specifications.*		
☐	Documentation of user modifiable software configuration and its control process *Note: User modifiable software would control communication media and routing policies to meet RCP/RSP specifications.*		

3. Operation: Provide the following document(s).		
Check	***Required Documents***	***Manual References / Operator Document***
☐	Procedures and limitations applicable to the use of specific data link system(s) by aircraft type (e.g AFM, OEM checklist/guide or operations manual)	
☐	Procedures for pilots and other operational personnel that addresses 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 to the local/regional PBCS monitoring agency (e.g. central reporting agency) e) specific regional requirements, if applicable.	
4. CSP Compliance: Select and provide one of the following documents.		
Check	***Required Documents***	***Manual References / Operator Document***
☐	Arrangements with each CSP (copies of contracts or other CSP compliance documents) to ensure the following is provided: a) failure notification; b) recording data link messages; c) CSP Integrity; d) compliance with CSP allocations for RCP/ RSP Specifications, and e) adequate subnetwork coverage for the route flown.	
☐	A record of registration to PBCS Charter (e.g a copy of PBCS Charter web page which includes the name of contracted CSP and the operator)	
5. MEL/MMEL: Provide the following document(s).		
Check	***Required Documents***	***Manual References / Operator Document***
☐	Minimum Equipment List (MEL) and/or Master Minimum Equipment List (MMEL) addressing all data communication equipment related to the operation that requires specific RCP/RSP requirements. *Note: The MEL should highlight the impact of losing an associated system/sub-system on data link operational capability.*	

6. Flight Planning: Provide the following document(s).		
Check	*Required Documents*	*Manual References / Operator Document*
☐	Documentation ensuring that proper information indicating PBCS approved capabilities will be included in the ICAO flight plan	
7. Performance monitoring: Provide the following document(s).		
Check	*Required Documents*	*Manual References / Operator Document*
☐	Process to participate in local or regional PBCS monitoring programmes (e.g registration on the websites of the appropriate monitoring agencies)	
☐	Procedures to report data link failures and/or problems such as log-on failure, disconnect, corrupted messages and excessive delay. The process should include contacting the appropriate monitoring agencies for your area of operation	
☐	Procedures to disclose operational data (data/system logs), including data from its CSPs/SSPs, in a timely manner, to the appropriate monitoring agencies, when requested for the purposes of investigating a reported problem	
☐	Procedures to investigate the cause of non-compliance with applicable RCP/RSP specifications, reported by the appropriate monitoring agencies and to take an action to resolve the reported non-compliance	
8. Training: Provide the following document(s). *Note: For operator with valid approval for data link operation, only records of trainings on PBCS are needed.*		
Check	*Required Documents*	*Manual References / Operator Document*
☐	Pilot training program addressing the operational practices and procedures related to data link communication and PBCS operations (e.g., initial, upgrade, or recurrent training for pilots)	
☐	Training program for dispatch and engineering personnel addressing the datalink communication and PBCS operations	

FOR OFFICIAL USE

Date when application received by CAAT: ..... Date of application: .....

Name (Block Letter): ..... **Signature** .....

APPENDIX B

TRAINING ON DATA LINK AND PBCS OPERATIONS

1. FLIGHT CREW

1.1 Data link communications system theory (relevant to operational use)

1.2 AFM and AFM Supplement limitations

1.3 Normal pilot response to data link communication messages

1.4 Message elements in the message set used in each environment

1.5 Required Communication Performance (RCP) / Required Surveillance Performance (RSP) specifications and their performance requirements

1.6 Implementation of performance-based reduced separation with associated RCP/ RSP specifications or other possible performance requirements associated with their routes

1.7 Other ATM operations involving data link communication services

1.8 Both normal and non-normal (contingency) procedures

1.9 Data link communication failure/problem and reporting

Note 1: If flight crew has already trained on data link operations, additional training only on PBCS is required, addressing a basic concept and requirements that have direct impact on overall data link performance required for provisions of air traffic services (e.g. reduced separation).

Note 2: Training may be provided through training material and other means that simulate the functionality.

2. DISPATCHERS / FLIGHT OPERATIONS OFFICERS

2.1 Proper use of data link and PBCS flight plan designators;

2.2 Air traffic service provider's separation criteria and procedures relevant to RCP/RSP specifications;

2.3 MEL remarks or exceptions based on data link communications;

2.4 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;

2.5 Coordination with the ATS unit related to or following a special data link communication exceptional event (e.g. log-on or connection failures); and

2.6 Contingency procedures to transition to a different separation standard when data link communication fails

3. ENGINEERING AND MAINTENANCE PERSONNEL

3.1 Data link communication equipment including its installation, maintenance and modification

3.2 MEL relief and Procedures for return to service authorizations

3.3 Correction of reported non-performance of data link system

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