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Asia and Pacific Regions

Air Navigation Plan

Volume I, Basic ANP

Not to be used for operational purposes

First edition – 2006

International Civil Aviation Organization

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RECORD OF AMENDMENTS, ADDENDA AND CORRIGENDA

AMENDMENTS			
No.	Date of issue	Date entered	Entered by

ADDENDA AND CORRIGENDA			
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INTRODUCTION

NEW CONCEPT OF AIR NAVIGATION PLANS

1. Air navigation plans set forth in detail the facilities, services and procedures required for international air navigation within a specified area. Such plans contain recommendations that governments can follow in programming the provision of their air navigation facilities and services, with the assurance that facilities and services furnished in accordance with the plan will form with those of other States an integrated system adequate for the foreseeable future.

2. On 26 February 1997, the ICAO Council decided that the regional air navigation plans (ANPs) should be published in two volumes: a Basic ANP and a Facilities and Services Implementation Document (FASID). It was agreed that the Basic ANP would contain stable plan material such as:

a) the geographical area constituted by the flight information regions (FIRs) covered by the plan;

b) the basic operational requirements and planning criteria, as approved by the Air Navigation Commission for application in all regions except Europe; and

c) the latest planning and implementation guidance formulated for the region through recommendations by regional air navigation (RAN) meetings.

3. It was agreed that the FASID would set forth the dynamic material from the plan constituted by the facilities and services required for international air navigation within the specified area. The FASID would also include appropriate additional guidance, particularly with regard to implementation, to complement the material contained in the Basic ANP.

INTRODUCTION OF CNS/ATM ELEMENTS INTO THE PLAN

4. While the traditional focus of a regional ANP has been to cover the facilities and services required for a period of five years, the introduction of communications, navigation and surveillance/air traffic management (CNS/ATM) systems with longer planning horizons is recognized, and CNS/ATM planning and implementation elements are being introduced progressively into regional ANPs.

5. Such introduction of CNS/ATM planning elements is guided by the Global Air Navigation Plan for CNS/ATM Systems (Global Plan), which has been developed so that it has a clear and functional relationship with the regional ANPs. This has been accomplished by dividing the Global Plan into two parts. Volume I guides further development of the operational requirements and planning criteria of the regional ANPs. The tables in Volume II form the framework to guide the implementation of CNS/ATM systems on a global basis, using the traditional regional planning processes, leading to a global integrated ATM system. The document therefore offers, under one cover, a global snapshot of progress achieved and work remaining toward implementation of CNS/ATM systems, thereby serving as a consolidated planning tool.

FORMAT AND SCOPE OF THE PLAN

6. The first volume of this document, the Basic ANP, contains general planning criteria, implementation guidelines and stable plan elements. The second volume, the FASID, sets forth in general terms the facilities, services and procedures required for international air navigation within a specified area. This FASID contains specifications that governments can follow in programming the provision of their air navigation facilities and services, with the assurance that facilities and services furnished in accordance with the basic plan will form with those of other States an integrated system adequate for the foreseeable future.

7. In technical scope, the plans comprise statements of required facilities and services in the AOP, AIS, ATM, CNS, MET and SAR fields in sufficient detail to ensure proper functioning of the plan as a whole and its adequacy to meet present and foreseen operational requirements. They also include any special procedures considered necessary to

supplement the worldwide procedures contained in Annexes and PANS. As living documents, the format and content of the Basic ANP and FASID should be kept under review by planning and implementation regional groups (PIRGs) in order, inter alia, to meet the requirements of the Global Plan.

8. In geographical scope the plan is related to one or more of the nine ICAO air navigation regions. The plan may call for the provision of basic facilities and services beyond the charted boundaries of a region where such facilities and services are necessary to meet the requirements of international air navigation within that region.

STATES' RESPONSIBILITIES

9. Each Contracting State is responsible for the provision of facilities and services in its territory under Article 28 of the Convention. The Council has recommended that these facilities and services include those specified in the ANPs.

10. Inclusion in ANPs of basic facilities and services in non-Contracting States and territories is simply a recognition that they are needed by or likely to affect international civil aircraft operations of Contracting States or the facilities and services of these States.

CONTENTS OF THE PLAN

11. This Basic ANP presents in general terms the ICAO plan for the provision of facilities and services for international air navigation in the ICAO Asia and Pacific regions. It has incorporated in an evolutionary manner requirements emanating from introduction of the Global Plan. The companion document to this plan, the FASID, includes detailed information on States' facilities, services and plans for implementation. Facilities and services outside of the prescribed regional boundaries may also have been included in order to maintain the integrity of "systems" and to ensure in so far as possible that all the facilities and services provided by any one State appear in one ANP.

12. Most of the contents of the plan have originated from recommendations of the Third ASIA/PAC Regional Air Navigation Meeting (Bangkok, May 1993) and the ASIA/PAC Air Navigation Planning and Implementation Regional Group (APANPIRG).

13. The Statement of Basic Operational Requirements and Planning Criteria (BORPC) for regional planning on which the plan is based is found in Part I. In addition, planning in the ASIA/PAC regions takes into account traffic forecasts compiled by the ASIA/PAC Traffic Forecasting Group. Part II — GEN contains information on traffic forecasting in the ASIA/PAC regions. The BORPC for regional planning in Part I is updated in light of proposals from the APANPIRG or by general review by the Air Navigation Commission in preparation for major regional meetings.

14. It should also be noted that the plan does not list all facilities and services existing in the region but only those required as approved by the Council for international civil aviation operations. Aeronautical information publications, NOTAM and other State documents should be consulted for information on additional facilities and services and for operational information in general.

15. Nothing in the manner of presentation of information in the tabulations or in the arrangement of data in this document implies endorsement or acceptance by ICAO in matters affecting the status and boundaries of States and territories.

16. Corrections to this document should be notified to the ICAO Regional Office accredited to the State concerned.

IMPLEMENTATION DATA

17. The Council, at the Seventh and Eighth Meetings of its 121st Session, decided that the explanation of "implemented" as agreed at RAN meetings should be widely publicized and the determination of whether a service or facility is implemented should be examined in that light. The agreed explanation of the term "implemented", as it applies to facilities and services included in this document, is as follows: "Facilities and services specified in the air navigation plan provided, installed, functioning and operated in accordance with appropriate ICAO specifications and procedures".

18. Additionally, the Council, at the Eighth Meeting of its 131st Session agreed to discontinue the practice of including implementation data in air navigation plan publications. Implementation is regularly monitored by the ICAO Regional Offices and the necessary data are brought to the attention of PIRGs.

19. The supplementary procedures for the region are omitted from this document since they are published for all regions in Doc 7030, *Regional Supplementary Procedures*.

DEVELOPMENT OF A CNS/ATM PLAN FOR THE ASIA/PAC REGIONS

20. In September 1991, ICAO held the Tenth Air Navigation Conference to consider the shortcomings of the air navigation systems and examine the new concept of air navigation based on satellite technology proposed by the Council's Future Air Navigation Systems (FANS) Committee (Phase II). The Conference agreed that the systems proposed by the FANS Committee (Phase II), and referred to as the ICAO CNS/ATM Systems, would meet the future needs of the international civil aviation community. Following the Tenth Air Navigation Conference, the Assembly endorsed the new ICAO CNS/ATM Systems which had recommended, inter alia, that in each ICAO region the PIRG concerned be tasked to develop the regional CNS/ATM implementation plan.

21. In view of the above, the APANPIRG developed a high-level CNS/ATM plan which was presented to the Third ASIA/PAC Regional Air Navigation Meeting (Bangkok, May 1993). The plan has been in evolutionary development with the assistance and cooperation of ASIA/PAC States. Elements of the ASIA/PAC CNS/ATM Implementation Plan are progressively incorporated in the appropriate sections of the ASIA/PAC Basic ANP and FASID.

PROCEDURE FOR THE AMENDMENT OF REGIONAL PLANS, INCLUDING FASID MATERIAL

22. The Basic ANP and FASID may be amended by a RAN meeting or by following the amendment procedures below.

PROCEDURE FOR THE AMENDMENT OF APPROVED BASIC AIR NAVIGATION PLANS

Approved by Council on 25 February 1998

1. Introduction

The procedure outlined below has been evolved to provide a means of maintaining basic regional plans in a current condition by correspondence.

2. General criteria

2.1 The Assembly has resolved that regional plans shall be revised when it becomes apparent that they are no longer consistent with current and foreseen requirements of international civil aviation and that, when the nature of a required change permits, the associated amendment of the regional plan shall be undertaken by correspondence between the Organization and the Contracting States and international organizations concerned.

2.2 When a State cannot immediately implement a particular part or a specific detail of a regional plan, although it intends to do so when practicable, this in itself should not cause the State to propose an amendment to the plan.

3. Procedure

3.1 If, in the light of the above criteria, any Contracting State (or group of States) of a region wishes to effect a change in the approved Basic ANP for that region it should propose to the Secretary General, through the ICAO Regional Office accredited to that State, an appropriate amendment to the plan, adequately documented; the proposal should include the facts that lead the State to the conclusion that the amendment is necessary. Such amendments may include additions, modifications or deletions. (This procedure does not preclude a State having previous consultation with other States before submitting an amendment proposal to the ICAO Regional Office.)

3.2 The Secretary General will circulate the proposal, adequately documented, with a request for comments to all provider and user States of the region considered affected as well as to user States outside the region and international organizations which may be invited to attend suitable ICAO meetings and which may be concerned with the proposal. If, however, the Secretary General considers that the proposed amendment conflicts with established ICAO policy, or that it raises questions which the Secretary General considers should be brought to the attention of the Air Navigation Commission, the proposal will be first presented, adequately documented, to the Commission. In such cases, the Commission will decide the action to be taken on the proposal.

3.3 If, in reply to the Secretary General's inquiry to States and selected international organizations, no objection is raised to the proposal by a specified date, the proposal shall be submitted to the President of the Council, who is authorized to approve the amendment on behalf of the Council.

3.4 If, in reply to the Secretary General's inquiry to States and selected international organizations any objection is raised, and if objection remains after further consultation, the matter will be documented for formal consideration by the Commission. If the Commission concludes that the amendment is acceptable in its original or other form, it will present appropriate recommendations to the Council.

3.5 Proposals for the amendment of regional plans submitted by international organizations directly concerned with the operation of aircraft, which may be invited to attend suitable ICAO meetings and which attended the meeting(s) where the relevant plan was prepared, will be dealt with in the same manner as those received from States, except that, before circulating a proposal to States and selected international organizations pursuant to 3.2, the Secretary General will ascertain whether it has adequate support from the State or States whose facilities will be affected. If such support is not forthcoming, the proposal will be presented to the Commission, and the Commission will decide on the action to be taken on the proposal.

3.6 Proposals for the amendment of regional plans may also be initiated by the Secretary General provided that the State or States whose facilities will be affected have expressed their concurrence with the proposal.

3.7 Amendment to regional plans which have been approved in accordance with the above procedure will be promulgated at convenient intervals.

PROCEDURE FOR THE AMENDMENT OF THE FACILITIES AND SERVICES IMPLEMENTATION DOCUMENT (FASID)

Approved by Council on 26 February 1997

1. Amendments to the FASID shall be effected on the basis of an adequately documented proposal submitted by a Contracting State (or a group of States) to the ICAO Regional Office; the proposal should include the facts that lead to the conclusion that the amendment is necessary. Such amendments may include additions, modifications or deletions to the FASID. (This procedure does not preclude a State having previous consultation with other States before submitting an amendment proposal to the ICAO Regional Office.)

2. The ICAO Regional Office will circulate the proposal, adequately documented, with a request for comments to the provider States in the region and to user States except those which obviously are not affected, and, for information and comments if necessary, to international organizations which may be invited to attend suitable ICAO meetings and which may be concerned with the proposal. If, however, it is considered that the proposed amendment conflicts with established ICAO policy, or that it raises questions which should be brought to the attention of the Air Navigation Commission, the proposal will be adequately documented and presented to the Commission. In such cases, the Commission will decide the action to be taken on the proposal.

3. If, in reply to the ICAO Regional Office's inquiry, no objection is raised to the proposal by a specified date, it will be deemed that a regional agreement on the subject has been reached and the proposal shall be incorporated into the FASID.

4. If, in reply to the ICAO Regional Office's inquiry, any State objects to the proposal, and if objection remains after further consultation, the matter will be documented for discussion by the respective planning and implementation regional group (PIRG) and, ultimately, for formal consideration by the Commission, if necessary. If the Commission concludes that the amendment is acceptable in its original or other form, it will present appropriate recommendations to the Council.

5. Proposals for the amendment of the FASID submitted by international organizations directly concerned with the operation of aircraft in the region, which may be invited to attend suitable ICAO meetings where the FASID was prepared, will be dealt with in the same manner as those received from States, except that, before circulating the proposal to all interested States, it will be ascertained whether the proposal has adequate support from the State or States whose facilities or services will be affected. If such support is not forthcoming, the proposal will not be pursued.

6. Proposals for the amendment of the FASID may also be initiated by the ICAO Regional Office provided that the State or States whose facilities or services will be affected have expressed their concurrence with the proposal.

7. Amendments to the FASID which have been approved in accordance with the above procedure will be promulgated at convenient intervals.

ABBREVIATIONS

All abbreviations used in this document are contained in the *Procedures for Air Navigation Services — ICAO Abbreviations and Codes* (PANS-ABC, Doc 8400), with the exception of those used in the explanations of the various tables, which also give their meaning.

Part I

BASIC OPERATIONAL REQUIREMENTS AND PLANNING CRITERIA (BORPC) FOR REGIONAL AIR NAVIGATION PLANNING

INTRODUCTION

1. On 22 February 2005, the Air Navigation Commission approved this Statement of Basic Operational Requirements and Planning Criteria (BORPC) which is applicable to all the ICAO regions.

2. The Commission has considered that in planning the facilities and services related to communications, navigation and surveillance/air traffic management (CNS/ATM) systems, the Global Air Traffic Management Operational Concept, supplemented by the *Global Air Navigation Plan for CNS/ATM Systems* (Doc 9750), provides the framework to be followed. In addition, relevant recommendations, accepted by the Council, contained in the report of the Eleventh Air Navigation Conference (Montreal, 22 September to 3 October 2003) should be taken into account. The importance of planning on the basis of homogeneous areas and major traffic flows, as referred to in the Global Plan, is also stressed. As ATM requirements are developed, the BORPC will be updated to take into account the most up-to-date work on follow-up activities related to the operational concept.

3. The Commission has also considered it unnecessary to repeat in this statement any pertinent requirements already contained in the Convention, Annexes or Procedures for Air Navigation Services.

GENERAL (APPLICABLE TO BOTH INTERNATIONAL COMMERCIAL AIR TRANSPORT AND INTERNATIONAL GENERAL AVIATION)

4. Air navigation facilities, services and procedures recommended for the area under consideration should form an integrated system designed to meet the requirements of all international civil aircraft operations. The plan should meet the requirements of all operations planned to take place in the area during the next five years, but not necessarily limited to that period, taking due account of the long-term planning and implementation strategies regarding CNS/ATM systems. Due account should be taken of the possible effects that changes could have on adjacent regions.

5. Traffic forecasts have a special role in planning the implementation of CNS/ATM systems. The forecasts represent the demand for future ATM. Forecasts of aircraft movements within homogeneous ATM areas and along major international air traffic flows form the basis for planning of the infrastructure and arrangements which will supply the required level of air traffic services (ATS).

6. The planning should be based on historical trends or, if otherwise available, traffic forecasts, and should be used taking into account the normal ranges of operating characteristics of the aircraft. The system should be sufficiently flexible to accommodate aircraft operational characteristics outside the normal range.

7. Aircraft engaged or planned to be engaged in international operations have been grouped into the following categories:

a) turbo-jet aeroplanes;

b) multi-engine turboprop aeroplanes;

c) piston-engine aeroplanes and single-engine turboprop aeroplanes with:

   1) a normal cruising speed of more than 260 km/h (140 kt) (type A); and

2) a normal cruising speed up to 260 km/h (140 kt) (type B);

d) helicopters; and

e) other aircraft (V/STOL, gliders, balloons, etc.).

Note.— Aircraft listed in e) are to be included only to the extent that they require consideration in regional planning.

8. The normal operating characteristics listed below for each group of aircraft should be taken into account in the development of facilities, services and procedures to the extent that relevant categories operate, or will operate, within the system.

8.1 **Turbo-jet aeroplanes.**

a) *Climb performance:* 8 – 25 m/s (1 500 – 5 000 ft/min).

b) *Speed range in cruising flight:* 780 – 1 020 km/h (420 – 550 kt) (Mach 0.71 – 0.92).

c) *Range of desirable cruising levels:* 8 250 – 13 700 m (FL 270 – 450).

d) *Descent performance:* 10 – 25 m/s (2 000 – 5 000 ft/min).

8.2 **Multi-engine turboprop aeroplanes.**

a) *Climb performance:* 5 – 15 m/s (1 000 – 3 000 ft/min).

b) *Speed range in cruising flight:* 460 – 650 km/h (250 – 350 kt).

c) *Range of desirable cruising levels:* 5 200 – 8 250 m (FL 170 – 270).

d) *Descent performance:* 8 – 15 m/s (1 500 – 3 000 ft/min).

8.3 **Piston-engine aeroplanes and single-engine turboprop aeroplanes.**

a) *Climb performance:*

1) Type A: 2 – 10 m/s (500 – 2 000 ft/min);

2) Type B: 2 – 5 m/s (500 – 1 000 ft/min).

b) *Speed range in cruising flight:*

1) Type A: 260 – 460 km/h (141 – 250 kt);

2) Type B: 110 – 260 km/h (60 – 140 kt).

c) *Range of desirable cruising levels:*

1) Type A: up to 6 100 m (FL 200);

2) Type B: up to 3 050 m (FL 100).

d) *Descent performance:*

1) Type A: 5 – 10 m/s (1 000 – 2 000 ft/min);

2) Type B: 2 – 5 m/s (500 – 1 000 ft/min).

8.4 **Helicopters.**

a) *Climb performance:* up to 8 m/s (1 500 ft/min).

b) *Speed range in cruising flight:* up to 370 km/h (200 kt).

c) *Range of desirable cruising levels:* up to 3 050 m (FL 100).

d) *Descent performance:* up to 8 m/s (1 500 ft/min).

Note 1.— Further to 6 above, it is emphasized that the values given in 8 represent average values covering the majority of aircraft types in each category. Also, depending on circumstances (e.g. load, stage length of a flight), considerable deviations from them may occur for specific flights.

Note 2.— Performance of military aircraft not covered by the above values may be considerably in excess of those quoted. It is, however, assumed that in such cases national arrangements will be made to cater for these aircraft.

9. Planning should not include an aerodrome or other facility or service used only by operators of the State in which the aerodrome or other facility or service is located unless such planning is required to protect the integrity of the plan.

10. Planning for facilities and services, in addition to meeting the operational requirements, should take into account the need for:

a) efficiency in operation; and

b) economy in equipment and personnel,

with due consideration being given to capability for future expansion without major redesign or replanning.

11. Planning should take into account the need for an adequate number of technically qualified personnel to be employed in the system to supervise, maintain and operate air navigation facilities and services and should result in recommendations, as necessary, to meet such a need. Human resource development capabilities should be compatible with the plans to implement facilities and services. A systematic and quantitative approach towards analysing human resource needs should be used to ensure that the consequential training capabilities are available and accessible.

12. The facilities, services and procedures recommended for implementation should not result in imposing on flight crew or ground personnel, employed in the system developed in accordance with the plan, a workload level that would impair safety or efficiency. The integration of human factors knowledge into the design and certification of facilities, services and procedures is therefore essential. In order to achieve a workload level that would not impair safety and efficiency, as well as to introduce the capability for future expansion without major redesign or replanning, human factors issues should be considered during the process of design and certification of facilities, services and procedures, before they are operationally deployed.

13. Special operational features of the area under consideration, such as those which may have been associated with causal factors noted in aircraft accident investigation and incident reports, should be taken into account, particularly if there are indications, such as those given in the "recommendations" of aircraft accident investigation and incident reports, that special measures are called for to prevent recurrence of accidents and incidents from the same cause or causes.

14. Planning for facilities and services should normally provide for their availability on a 24-hour basis. In cases where part-time availability is deemed adequate to meet the operational requirements, a brief description of the circumstances should be given in the plan. Lighting aids should be planned when use of the aerodromes at night or during low visibility conditions is expected.

15. It is essential that the overall plan:

a) satisfy the requirements of all aircraft, including domestic and military traffic to the extent that it may affect international traffic;

b) ensure compatibility of facilities, services and procedures with those recommended for operations in adjacent areas;

c) ensure that operators have access to information necessary to exercise effective operational control;

d) provide for speedy exchanges of necessary information between the various units providing air navigation services and between such units and operators; and

e) take account of aircraft performance and navigational capability in specifying requirements for the carriage of airborne equipment, as well as having due regard for the operational environment.

16. In the development of the plan, full cognizance should be taken of the cost-effectiveness of the recommended facilities, services and procedures. Planning should be directed towards facilitating implementation of essential improvements required for existing and anticipated operations in the region. The objective should be to expedite the eradication of current deficiencies in the air navigation facilities and services. Project management techniques should be employed for the implementation of CNS facilities and services to facilitate the phased introduction of ATM system enhancements.

AERODROMES

International commercial air transport operations

17. Regular aerodromes and their alternates should be determined based on the needs identified by users. When studying the requirements for alternate aerodromes, the guiding principle should be that, to the greatest practicable extent, the requirements for alternate aerodromes be satisfied by regular aerodromes used for international aircraft operations. Additionally, the requirements of extended-range twin-engine operations for en-route alternate aerodromes should also be considered.

18. Physical characteristics, visual aids and emergency as well as other services should be determined for each regular and alternate aerodrome required for international operations and should include runway length and strength, as well as the aerodrome reference code(s) selected for runway and taxiway planning purposes.

19. Where at an aerodrome, planning for Category II or III operations, as the case may be, is not a requirement during the plan period but such operations are contemplated at a time beyond the plan period, planning should take into

account the possible requirement for Category II or III operations so that at least one runway and the related ground-air environment may be provided in the future to accommodate such operations.

20. In cases where the extension or development of an aerodrome to meet infrequent critical operations would entail disproportionate expenditures, alternative solutions should be explored.

Note.— If it is found that the full operational requirements cannot be met at an aerodrome, then the maximum practicable development to facilitate operations should be recommended and the relevant reasons for this included in the report.

21. At alternate aerodromes, the physical characteristics should be determined in accordance with the landing requirements of the diverted critical aircraft and the take-off requirements for the aircraft for a flight to the aerodrome of intended destination. To ensure safe taxiing operations, a specified taxiway route should be determined for the diverted critical aircraft. The adequacy of the emergency response and rescue and firefighting services to meet the requirements of the diverted critical aircraft should be reviewed to plan the necessary augmentation from sources nearby.

Note.— Where more than one alternate aerodrome is available, the requirements should be based on the types of aircraft each is intended to serve.

International general aviation (IGA)

22. Aerodromes, in addition to those required for international commercial air transport operations, should be determined to meet the needs of the IGA flights as identified by user requirements.

23. Physical characteristics, visual aids and emergency as well as other services should be determined for each aerodrome to meet at least the needs of the most commonly used aircraft operated or intended to be operated at the aerodrome by IGA and should include runway length and strength, as well as the aerodrome reference code(s) selected for runway and taxiway planning purposes.

Certification of aerodromes and safety management system

24. Annex 14 — *Aerodromes*, Volume I — *Aerodrome Design and Operations*, requires States to certify their aerodromes used for international operations in accordance with the specifications in that Annex, as well as other relevant ICAO specifications, through an appropriate regulatory framework. Additionally, the Annex recommends that States certify aerodromes open to public use. The regulatory framework should include the establishment of criteria for certification of aerodromes. Furthermore, the certification should be based on the review and approval/acceptance of an aerodrome manual to be submitted by the aerodrome operator which would include all relevant information such as location, facilities, services, equipment, operating procedures, organization and management structure of the operator. The aerodrome manual should also include details of the aerodrome safety management system as implemented by the aerodrome operator. The intent of a safety management system is to ensure the implementation of aerodrome safety policies by an aerodrome operator, which provide for the control of safety at, and the safe use of, the aerodrome. Therefore, the safety management system of the aerodrome operator should be compatible with those of the ATS provider and other agencies working on the aerodrome to ensure total system safety.

25. The existence of basic aviation law that empowers a suitable aviation civil regulatory agency is a primary requirement. Such an entity may be the civil aviation authority or the directorate-general of civil aviation, adequately staffed to assess an application for granting of the aerodrome certificate, inspecting and evaluating the aerodrome facilities and services and operating procedures, and coordinating with other appropriate agencies such as the aviation security agency, ATS provider, aeronautical information services (AIS) and meteorological (MET) services as detailed in the aerodrome manual submitted with the application.

Note.— Further guidance on certification of aerodromes can be found in the Manual on Certification of Aerodromes *(Doc 9774).*

AIR TRAFFIC MANAGEMENT

26. Air traffic management should enable aircraft operators to meet their planned times of departure and arrival and adhere to their preferred flight profiles with minimum constraints without compromising agreed levels of safety. The ATS to be provided, the airspace organization, the associated facilities, and the required navigation performance (RNP) should be determined on the basis of an agreed network of ATS routes or organized track system taking account of the type, density and complexity of traffic.

Airspace management

27. The airspace structure and organization should include a network of ATS routes or organized track system established so as to enable aircraft to operate along, or as near as practicable to, the preferred flight path, in both the horizontal and vertical planes, from the departure aerodrome to the destination aerodrome. ATS routes based on area navigation (RNAV) should be recommended where appropriate and feasible. ATS routes shall be great circles between significant points, wherever possible. Standard instrument arrival routes (STARs) should be established when the density of air traffic justifies their application in a terminal control area (TMA) and to facilitate the description of the route and procedure in air traffic control (ATC) clearances. Standard instrument departure routes (SIDs) should be established for each instrument runway.

28. Whenever the circumstances warrant, the airspace organization should be designed to support the ultimate goal of allowing each aircraft to fly its own optimized flight path. To achieve this, procedures that support collaborative decision-making should be developed.

29. The airspace organization should be indicated in accordance with the ICAO airspace classification.

30. Airspace restrictions should be subject to a continuing review procedure with the object of eliminating them or reducing their restrictive effects to a minimum, with particular emphasis on the need to achieve effective civil/military coordination. Permanent segregation of airspace should be avoided. Temporary airspace reservations, where necessary to cater for large formation flights or other military air operations, should be minimized in time and space, closely coordinated, and promulgated in a timely manner. Military operations should not only be promulgated in a timely manner but also through international dissemination (international NOTAM).

Air traffic services

31. Flight information service and alerting service should be provided throughout the area under consideration. The plan of flight information regions (FIRs) should provide for the least number of FIRs compatible with efficiency of service and with economy. In this connection, the evolutionary introduction of CNS/ATM systems should be taken into account and consideration should be given to cooperative efforts for introducing more efficiency in airspace management by reducing the number of FIRs. In delineating FIR boundaries, due consideration should be given to:

a) the need for adequate air-ground communications coverage from the location of the flight information centre/area control centre (FIC/ACC);

b) the need to minimize frequency and secondary surveillance radar (SSR) code changes, position reporting by aircraft, and coordination between FICs/ACCs; and

c) the need to minimize problems relating to climbing and descending traffic at major aerodromes located in the vicinity of FIR boundaries.

32. Area control service should be provided for instrument flight rules (IFR) flights operating in controlled airspace except where the type and density of traffic clearly do not justify the provision of such service. Controlled airspace, in the form of airways, control areas of larger dimensions and TMAs, should be recommended to encompass all relevant ATS routes. In delineating control area boundaries, due account should be taken of the factors listed in 31 above.

33. Approach control service should be provided at all aerodromes used for international aircraft operations and equipped with navigation aids for instrument approach and landing, except where the type and density of traffic clearly do not justify the provision of such service. Controlled airspace, in the form of TMAs and control zones, should be recommended to encompass at least the climb to cruising level of departing aircraft and the descent from cruising level of arriving aircraft.

34. Aerodrome control service should be provided at all regular and alternate aerodromes to be used for international commercial air transport operations. Aerodrome control service should also be provided at those additional aerodromes used by IGA aircraft where the type and density of traffic warrant it. At aerodromes used by IGA aircraft, where the type and density of traffic clearly do not justify the provision of aerodrome control service, the provision of aerodrome flight information service by a unit located at the aerodrome should be recommended.

35. Air traffic advisory service should not be recommended as part of the plan. Where provided (to IFR flights in advisory airspace or on advisory routes), its replacement by ATC service at the earliest possible time should be recommended.

36. The ATS system and procedures should:

a) permit the most efficient use to be made of the airspace by all users and provide for the most expeditious handling of the various types of traffic;

b) be so designed that the number of air-ground communications contacts, frequency changes and SSR code changes required of aircraft, and the amount of coordination required between ATS units, are kept to a minimum;

c) ensure the prompt and timely transmission to all aircraft concerned of information on hazardous meteorological conditions, operational flight information and other available information affecting the safety and efficiency of flight;

d) require the use of uniform altimeter setting procedures throughout the area under consideration when operating below the established transition level or climbing up to the established transition altitude; and

e) establish a common transition altitude on an area basis and, where possible, on a regional basis.

37. Information on destination meteorological conditions, the integrated operational status of facilities associated with the runway in use, and the runway conditions should be provided to aircraft (in voice or data format) by the transmission of operational flight information service (OFIS) messages, including VOLMET, or by the appropriate FIC/ACC upon request, prior to commencement of descent. Where this information is transmitted in voice format, a discrete frequency should be assigned for this purpose. Air-ground data links are particularly efficient for this type of service, as well as for clearance delivery, and should be recommended when a sufficient number of aircraft are appropriately equipped.

38. Contingency plans should be developed to mitigate the effects of volcanic eruptions or tropical cyclones as required. In addition, contingency plans should be developed to mitigate disruptions in ATS due to any other cause.

39. To assist in the prevention of controlled flight into terrain (CFIT), efforts should be made to implement a minimum safe altitude warning system or equivalent.

40. To assist in the prevention of CFIT, every effort should be made, in cooperation with the operators, to identify locations at which unwanted ground proximity warning system (GPWS) warnings occur. These warnings can occur due to conflict between ATS procedures, or operator procedures, and the characteristics of the terrain and/or those of the GPWS equipment in use. Effort should further be made, with cooperation between the ATS authority and the operators, to eliminate the occurrence of unwanted GPWS warnings by appropriate adjustment of ATS and/or operator procedures.

Note.— Where adjustment of procedures is not possible, or is not effective, it may be possible to eliminate unwanted warnings, at a specific location, by GPWS envelope modulation. This possibility will be based on technical data of the equipment manufacturer and will be proposed by the operator for acceptance by the operator's authority.

Air traffic flow management and capacity management

41. Air traffic flow management and capacity management should be provided to ensure an optimum flow of air traffic to, from, through or within defined areas during times when demand exceeds, or is expected to exceed, the available capacity of the ATS system, including relevant aerodromes. However, this should not preclude the need for planning airspace to adequately meet demand.

Safety management

42. The Standards and Recommended Practices relating to the implementation by States of safety management programmes for ATS are contained in Annex 11 — *Air Traffic Services*, 2.26. Further provisions relating to the implementation of these safety management programmes are contained in Chapter 2 of the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444).

43. Annex 11, 2.26, requires States to implement systematic and appropriate safety management programmes in relation to the provision of ATS. It will therefore be necessary for all States to establish regulatory provisions concerning ATS safety management, together with the necessary supporting infrastructure to enable them to discharge their responsibilities in relation to oversight of these provisions. There are two prerequisites for the introduction of a regulatory system. These are:

a) the provision, in the basic aviation law of the State, for a code of air navigation regulations and the promulgation thereof; and

b) the establishment of an appropriate State body, hereinafter referred to as the civil aviation authority (CAA), with the necessary powers to ensure compliance with the regulations.

SEARCH AND RESCUE

44. Planning for search and rescue (SAR) service should take into account, to the maximum practicable extent, existing facilities, even if they are provided for purposes not connected with SAR. Such planning should take into account the delimitation of maritime search and rescue regions (SRRs).

45. A single SAR point of contact (SPOC) should be designated for each SRR to facilitate cooperation with the associated mission control centre of the COSPAS-SARSAT* system.

Note.— A SPOC may be an aeronautical or a maritime rescue coordination centre.

46. Where aircraft of the long-range and longer-range categories are required for the provision of air coverage of large oceanic SRRs, but such aircraft cannot be made available by the State responsible for SAR services, specific cooperative arrangements should be made for the deployment of such aircraft from other locations in an attempt to meet the requirements for sufficient air coverage of the appropriate regions.

47. SAR organization, plans, procedures, operations and equipment should be in accordance with the provisions of Volumes I, II and III of the *International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual* (Doc 9731), to the extent practicable.

COMMUNICATIONS

Aeronautical fixed service (AFS) planning and engineering

48. The AFS recommended should be designed to meet the agreed requirements for AIS, ATS, MET, SAR and aircraft operating agencies for voice, message and data communications.

* COSPAS – Space system for search for vessels in distress
SARSAT – Search and rescue satellite-aided tracking

49. The planning of the aeronautical fixed telecommunication network (AFTN) should be based on the guidance material contained in the *Manual on the Planning and Engineering of the Aeronautical Fixed Telecommunication Network* (Doc 8259) and taking into account the predominating characteristics for conditions in the region or area concerned.

50. The AFS should be designed so as to meet transit time criteria as follows:

In the peak season of the year, even in the average peak hours, at least 95 per cent of the messages should achieve transit times of less than the following:

SIGMET and AIRMET messages, volcanic ash and tropical cyclone advisory information and special air-reports	5 minutes
Amended aerodrome forecasts (in meteorological code (TAF))	5 minutes
METAR/SPECI, trend forecasts and TAF	
from 0 to 900 km (500 NM)	5 minutes
for distances exceeding 900 km (500 NM)	10 minutes

Transit times for request/reply for international operational meteorological (OPMET) data banks should be less than 5 minutes.

51. TAF bulletins originated by meteorological offices in the region should be available, at all locations in the region to which they are addressed, at least 30 minutes before their period of validity commences.

52. The dissemination means for world area forecast system (WAFS) products should be such as to guarantee availability of these products throughout the region at international aerodromes and other locations as appropriate to meet operational needs.

53. Planning of ATS ground-to-ground communication networks comprising direct and switched ATS speech circuits should take account of operational voice communication requirements. It should also take into account relevant ICAO documentation with regard to the application of analogue and digital voice switching and signalling systems.

54. With the introduction of automation in ATM, many coordination functions will be accomplished through data interchange between ATM systems using aeronautical telecommunication network (ATN) applications such as ATS

interfacility data communication (AIDC) or ATS message handling services (ATSMHS). As such, the planning for ATN should include the provision of suitable gateways to facilitate the exchange of information between existing and newly established networks.

55. For planning of AFS, attention should be paid to the establishment of institutional arrangements for the implementation by States of coordinated digital networks, using appropriate technology to meet, in an integrated way, current and future communications requirements.

Aeronautical mobile service (AMS) and aeronautical mobile satellite service (AMSS)

56. Air-ground data link and voice communications facilities should be recommended to meet effectively and reliably the agreed requirements for ATS as well as, to the extent required, all other classes of traffic acceptable on the AMS. The facilities should employ voice and data communications links based on available transmission media (e.g. HF, VHF, satellite). This decision should be based on system performance and economical criteria to comply with operational needs.

57. Regional planning should take into account AMSS ground earth station (GES) redundancy requirements in coordination with the AMSS service provider(s) with a view to avoiding an unnecessary proliferation of facilities.

58. Automatic terminal information service and VOLMET or OFIS broadcasts should be recommended only if overloading of air-ground channels due to request/reply communications has occurred, or is expected to occur. When justified by the number of aircraft suitably equipped, data links should be recommended for these functions, as well as for certain clearance deliveries.

59. Aerodromes having a significant volume of IGA traffic should be served by stations of the AMS, and such stations should operate on frequencies within the bands normally used by aircraft constituting this traffic.

60. Selective calling (SELCAL) devices should be employed, wherever possible and necessary, at aeronautical stations.

61. An air-to-air VHF communication channel (INTERPILOT) on the frequency 123.450 MHz should be used over remote and oceanic areas, provided users are out of range of VHF ground stations, to enable pilots to exchange the necessary operational information.

Frequency assignment plans

62. Frequency assignment planning should be done in accordance with the method applicable to the region and using the relevant ICAO Regional Office Frequency Lists.

NAVIGATION

General

63. The planning of navigation aids should be on a system basis, recognizing that the requirements for both long-range and short-range navigation may be met by different navigation systems having RNAV capability, including the global navigation satellite system (GNSS). It may be practicable to establish ATS routes not provided with ground station-referenced aids for suitably equipped aircraft. For routes or areas which require that aircraft achieve an acceptable level of navigation accuracy, the requirement should be specified, e.g. in the form of a required navigation performance (RNP) type to support a selected horizontal separation minimum, or a minimum aircraft system performance specification to support a selected vertical separation minimum. The navigation systems should meet the needs of all aircraft using it and form an adequate basis for the provision of ATS.

64. Where aircraft are using different systems for navigation and position determination within the same controlled airspace, the facilities involved should, in so far as practicable, be located and oriented to enable a fully integrated ATC structure to be established.

65. Planning should take into account the need of civil aircraft for sufficiently accurate navigation guidance to remain clear of restricted, prohibited and danger areas as required.

International commercial air transport operations

En-route aids

66. The en-route aids to be recommended should provide navigation assistance to permit en-route navigation on the agreed ATS route network with the accuracy required.

67. It is expected that GNSS will ultimately meet all requirements for en-route navigation. Planning for other en-route aids should take due account of the need for a gradual transition towards the use of GNSS in lieu of en-route ground-based navigation aids. Pending implementation of GNSS, VHF omnidirectional radio range (VOR) supplemented as necessary by distance measuring equipment (DME) should be installed as the primary aid for this purpose.

68. Where VOR is used, supplemented as necessary by DME, a total navigation error value for VOR of ±5° (95 per cent probability) should be assumed for planning purposes. However, the specific value of VOR radial signal error for individual facilities/radials should be obtained by flight checking, and if these values are worse than ±3°, appropriate precautions should be taken in respect of the routes concerned.

69. Long-distance radio navigation aids should continue to be provided where required.

Terminal area aids

70. The terminal area aids should permit navigation for arrival and approach, holding and departure to be carried out with the accuracy required.

71. It is expected that GNSS will ultimately meet all requirements for terminal navigation. Planning for other terminal aids should take due account of the need for a gradual transition towards the use of GNSS in lieu of terminal area ground-based navigation aids. Introduction of GNSS-based navigation services, such as Basic GNSS and satellite-based augmentation system (SBAS), should be considered as initial transition steps.

72. Where VOR is used as the primary aid, it should be so located as to permit the most efficient approach and ATC procedures, and to give the pilot maximum assistance in adhering to requisite patterns. Whenever possible, VORs should be located and operated so that they can serve both the requirements for en-route and terminal navigation guidance, including holding. Where the provision of VORs for holding is not practicable, non-directional beacons (NDBs) can be used for this purpose.

73. Consideration should be given to the provision of DME to be collocated with VORs whenever this is required to ensure necessary ATC flexibility in the routing of air traffic in a given TMA using RNAV procedures based on VOR/DME and when improved accuracy in navigation is a prerequisite to such flexibility.

74. Consideration should also be given to the provision of suitably located DMEs in support of RNAV procedures based on DME/DME.

Non-visual aids to final approach and landing

75. The standard non-visual aids to final approach and landing (ILS, MLS and augmented GNSS), supporting precision approach and landing operations, shall comply with general provisions in Annex 10 — *Aeronautical Telecommunications,* Volume I — *Radio Navigation Aids,* 2.1, and technical specifications in Chapter 3, and their introduction and application are expected to be in line with the strategy contained in Attachment B to Volume I.

76. In planning the requirements for aids to final approach and landing, each aerodrome should be considered in relation to its traffic, its meteorological conditions and other aspects of its physical environment. In addition, the following two aspects should be taken into consideration in the determination of specific requirements:

a) *The aerodynamic and handling characteristics of the aircraft.* Turbo-jet aeroplanes need precise approach path guidance during approach and landing, irrespective of weather conditions. Such guidance should be provided to runways intended to serve these aeroplanes as follows:

   1) On a runway having significant traffic, the facilities to be provided should be an ICAO standard non-visual aid to final approach and landing, complemented by a visual approach slope indicator system. When a standard non-visual aid cannot be implemented in the first instance, this should not delay the installation of a visual approach slope indicator system.

   2) On a runway not having significant traffic, the facilities to be provided should at least include a visual approach slope indicator system.

b) *Routine auto-coupled approaches.* Where auto-coupled approaches are to be made on a routine basis, an ICAO standard non-visual aid to final approach and landing, i.e. ILS, MLS or GNSS (GBAS), should be provided as appropriate to the type of operation planned at the aerodrome. In the case of an ILS of facility performance

Category I, the ILS should be of Category II signal quality, without necessarily meeting the associated reliability and availability criteria for back-up equipment and automatic changeover of facility performance Category II. It should be adjusted and maintained to the greatest possible extent and accuracy, and its performance characteristics should be published in Aeronautical Information Publications or other suitable documents.

Precision approach and landing procedures

77. Precision approach and landing operations are to be based on standard non-visual aids indicated in 75 above.

Approach with vertical guidance

78. Consideration should be given to approach with vertical guidance.

Non-precision instrument approach procedures

79. Non-precision instrument approach procedures are to be based on terminal area aids (see 70 to 74 above) which should also support SIDs and STARs. These approach procedures should be constructed whenever possible in accordance with the concept of the stabilized approach; to provide an equivalent three degree final approach glide path; to eliminate stepped approaches; and to provide a final approach fix.

80. Particular account should be taken of 79 in the design of non-precision instrument approach procedures for use with GNSS which should also support SIDs and STARs.

RNAV procedures

81. RNAV procedures can be based on terminal area aids (e.g. VOR/DME, DME/DME) or GNSS (e.g. Basic GNSS, SBAS or GBAS positioning services).

International general aviation

Short-distance aids

82. Appropriate aids such as GNSS for short-distance navigation should be provided to serve the additional aerodromes referred to in 22 where the density of traffic and the meteorological conditions so warrant, with due account being taken of the airborne equipment carried by aircraft. These aids should, as appropriate, be located so as to permit instrument approaches.

Flight testing of visual and non-visual navigation aids

83. Cooperative arrangements for the flight testing of visual and non-visual navigation aids (Annex 10, Volume I, 2.7) should be recommended where flight testing on a national basis would be impracticable or uneconomical.

SURVEILLANCE

84. Surveillance systems should provide adequate support to all phases of flight and meet ATM requirements. A table of surveillance facilities/services (including radars, automatic dependent surveillance (ADS) and automatic dependent surveillance-broadcast (ADS-B)), together with an associated chart, is considered to be a useful tool in the planning and implementation of surveillance systems.

85. Surveillance should be provided as an integral part of ATC where practicable and desirable or necessary in the interest of safety, efficiency and economy of operations, in particular for those areas where traffic density and/or the multiplicity or complexity of ATS routes create constraints. Primary and/or secondary surveillance radar systems may be used to fulfil this requirement. Subject to availability and cost-effectiveness, and provided that the required level of safety is maintained, ADS and ADS-B may be used in airspace where surveillance by radar is impracticable or cannot be justified.

86. Provision should also be made for the use of surveillance systems for the purpose of monitoring air traffic and identifying civil aircraft in areas where they might otherwise be intercepted.

Note.— This requirement does not constitute a justification or operational requirement for installation of new radars. Since interceptions would normally only take place under existing military radar control, this should be interpreted as a requirement for a State to make better use of existing measures and to improve civil/military coordination.

METEOROLOGY

World area forecast system (WAFS) — regional aspects

87. Planning for regional aspects of the WAFS should be undertaken, with particular reference to user States' requirements for WAFS products, service areas and areas of coverage of charts to be included in flight documentation. Areas of coverage of charts to be provided under the WAFS should be selected so as to ensure the required coverage for flights departing aerodromes.

88. Requirements for the issuance of medium-level significant weather (SIGWX) forecasts (FL 100 – 250) under the WAFS should only be specified for limited geographical areas having a large number of international flight operations using those flight levels and for extended-range operations.

Meteorological services at aerodromes

89. The meteorological service to be provided for operators and flight crews should be specified for each international aerodrome.

Aerodrome forecasts

90. TAF and amendments thereto should be exchanged to meet the needs of current flight operations, including IGA. TAF for the aerodromes of departure and destination and their respective alternates, and en-route alternates, should be disseminated so as to be available at departure aerodromes and at ATS units designated to provide data link-VOLMET or VOLMET broadcasts for aircraft in flight. In addition, they should be disseminated to be available at ATS units for transmission to aircraft in flight up to a distance from the aircraft corresponding to two hours' flying time.

91. The determination of the aerodromes at which landing forecasts are required should take into consideration relevant operational and climatological factors, including the weekly number of flights requiring those forecasts and the incidence of adverse meteorological conditions.

Meteorological observations and reports

92. Meteorological observations and reports should be made at hourly intervals. However, the intervals should be half-hourly at aerodromes where the volume of traffic and the variability of meteorological conditions so justify, and/or reports are required for data link-VOLMET or VOLMET broadcasts, and relevant OPMET bulletin exchange schemes.

93. METAR and SPECI should be exchanged to meet the needs of current flight operations. METAR and SPECI for the aerodromes of departure and destination and their respective alternates, and en-route alternates, should be disseminated so as to be available at departure aerodromes and at ATS units designated to provide data link-VOLMET or VOLMET broadcasts for aircraft in flight. In addition, they should be disseminated to be available at ATS units for transmission to aircraft in flight up to a distance from the aircraft corresponding to two hours' flying time.

Aircraft reports and SIGMET and AIRMET information

94. For international air routes having a high density of air traffic, air-reporting exemption or designation procedures should be developed to reduce the frequency of routine air-reports commensurate with the minimum requirements of meteorological offices. The procedures should be included in the *Regional Supplementary Procedures* (Doc 7030).

95. SIGMET and AIRMET messages, as well as special air-reports which have not been used for the preparation of a SIGMET, should be disseminated to meteorological offices so as to be available at departure aerodromes for the whole route and at ATS units designated to provide data link-VOLMET or VOLMET broadcasts for aircraft in flight. In addition, they should be disseminated to be available at ATS units for transmission to aircraft in flight for the route ahead up to a distance corresponding to two hours' flying time.

International airways volcano watch (IAVW) — regional aspects

96. Planning for regional aspects of the IAVW should be undertaken, including the designation of volcanic ash advisory centres (VAACs) and selected State volcano observatories.

Tropical cyclone watch — regional aspects

97. Planning for regional aspects of the tropical cyclone watch should be undertaken for regions affected by tropical

cyclones, including the designation of tropical cyclone advisory centres (TCACs) among the centres of the WMO Tropical Cyclone Programme.

AERONAUTICAL INFORMATION SERVICES AND AERONAUTICAL CHARTS

98. The designation of international NOTAM offices and their areas of responsibility should be based on maximum efficiency in the dissemination and exchange of aeronautical information/data by telecommunications and on optimum use of the AFS.

99. Arrangements for the international exchange of elements of the Integrated Aeronautical Information Package and aeronautical charts should be established to meet the needs of all forms of international civil aviation.

100. Arrangements for the transmission and exchange of NOTAM should be planned with a view to recommending measures to ensure that adequate information is available to users in a timely manner, and that their presentation is efficient as to format and selective as to contents.

101. The advantages of using integrated automated AIS systems should be considered when planning the exchange of aeronautical information/data.

102. Priority for the planning and implementation of aerodrome AIS units should be based on aerodrome designation (RS, RNS, RG, AS and EAS) as set out in the Appendix to Part III — AOP.

103. Pre-flight information bulletins (PIBs) should be made available at designated international aerodromes at least one hour before each flight in order to meet the operational requirements of users.

104. Planning and arrangements should be made for the introduction by States of a quality management system for aeronautical information and chart services. The system must include procedures, processes and resources necessary to ensure that the procedures are put in place for all the functional stages of the aeronautical data process, from origination until the next intended user.

105. Aeronautical geographical coordinates should be stated in terms of the World Geodetic System — 1984 (WGS-84).

106. Arrangements should be made for those States that have not yet done so, to make available, as applicable, at least the following types of charts:

a) Aerodrome Obstacle Chart — ICAO Type A;

b) Aerodrome Obstacle Chart — ICAO Type C;

c) Precision Approach Terrain Chart — ICAO;

d) Enroute Chart — ICAO ;

e) Area Chart — ICAO;

f) Standard Departure Chart — Instrument (SID) — ICAO;

g) Standard Arrival Chart — Instrument (STAR) — ICAO;

h) Aerodrome/Heliport Chart — ICAO;

i) Instrument Approach Chart — ICAO;

j) Visual Approach Chart; and

k) World Aeronautical Chart — ICAO 1:1 000 000.

107. States which have not yet produced the World Aeronautical Chart — ICAO 1:1 000 000 should in accordance with established sheet distribution and regional arrangements, take measures to ensure the preparation of the sheets for which they are responsible, either through individual effort or with the collaboration of other States or specialized cartographic agencies.

Note.— When operational or chart production considerations indicate that operational requirements can effectively be satisfied by Aeronautical Chart — ICAO 1:500 000, the chart may be made available instead of World Aeronautical Chart — ICAO 1: 1 000 000.

Part II

GENERAL PLANNING ASPECTS (GEN)

INTRODUCTION

1. As traffic volumes grow worldwide, the demands on the air traffic services (ATS) provider in a given airspace increase, as do the complexities of air traffic management. The number of flights unable to follow optimum flight paths also increases with an increase in traffic density. This creates pressure to upgrade the level of ATS by, inter alia, reducing separation standards.

Air traffic forecasts

2. Air traffic forecasts are produced in response to the needs of Contracting States of ICAO, air navigation service providers and regional planning groups, in particular the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG). Long-range forecasts of passenger traffic are produced for the Asia/Pacific regions, encompassing the intra-Asia/Pacific and trans-Pacific[1] markets, along with city-pair forecasts to include the forty busiest routes in terms of passengers carried within these regions. In addition, aircraft movements are forecast for a five-year horizon, initially for trans-Pacific traffic and city-pairs of three selected flight information regions (FIRs) of the intra-Asia/Pacific traffic. Also produced for the trans-Pacific market are forecasts of peak-period traffic of selected route groups. To this end, flight data are collected from air traffic control centres/air navigation service providers. The Asia/Pacific Area Traffic Forecasting Group (APA TFG) forecasts are updated periodically in conjunction with APA TFG meetings, and their format and content will be modified progressively to respond to the requirements of primary users such as APANPIRG.

3. Using the underlying passenger forecasts produced by the APA TFG, the aircraft movement forecasts apply aircraft size and load factor parameters, and are contained in the ASIA/PAC FASID. The actual traffic growth has consistently been within the range of forecasts produced by APA TFG. Therefore, planning is based on the assumption that aircraft movement in the ASIA/PAC regions by 2014 will have doubled over 1998.

4. At present, wide-body aircraft dominate the trans-Pacific market, and they are expected to continue to be dominant. Average aircraft size, in terms of seats, is expected to increase by an average annual growth rate of 1.5 per cent over the 1998–2014 period from 345 seats per flight in 1998 to 438 seats in 2014. Load factors are high in the trans-Pacific market and are expected to remain so. Only a modest increase is expected over the forecast period, with assumed gradual increase from today's estimated 71 per cent load factor to 72 and 74 per cent in the years 2003 and 2014, respectively.

5. Implementation of communications, navigation and surveillance/air traffic management (CNS/ATM) systems are expected to be able to provide sufficient capacity to meet the increasing demand, while producing additional benefits in the way of more efficient flight profiles and increased levels of safety. The potential of new technologies to significantly reduce service costs, however, will require new arrangements in the provision of services and changes in ATM procedures.

6. Chapter 3 of the Global Plan provides the means to begin the process of identification of ATM requirements, on the basis of identified homogeneous ATM areas and major international traffic flows, followed by the determination of the regional and global CNS system elements needed to meet the ATM requirements.

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1. For the purpose of these forecasts, Asia/Pacific is defined as the ICAO statistical region concerned, while trans-Pacific is defined as traffic between the ICAO statistical region of North America (Canada and United States) on the one hand and the ICAO statistical region of Asia/Pacific on the other hand (broken down in the use of United States data into "Asia" and "Oceanic").

Regional Implementation Concept

7. The Regional Implementation Concept defined by APANPIRG is linked to ATM improvement for the ASIA/PAC regions and the CNS requirements this generates. ATM improvements have been defined on the basis of the major international traffic flows identified in the homogeneous areas as set out in Part II of the FASID.

8. The method of identifying homogeneous ATM areas involves consideration of the varying degrees of complexity and diversity of the worldwide air navigation infrastructure. Based on these considerations, it is considered that planning could best be achieved, at the global level, if it were organized based on ATM areas of common requirements and interest, taking into account traffic density and level of sophistication required.

9. Major international traffic flows consist of areas which include groupings of routes wherein it is specified a detailed plan for the implementation of CNS/ATM systems and procedures, where the objective is to attain a seamless system throughout the area concerned. These are defined by origin and destination geographic areas which could be States/Territories, specific portions of States/Territories, or groupings of smaller States/Territories. They may also include oceanic and continental en-route areas.

10. The basic planning parameter is the number of aircraft movements which must be provided with ATM services along a particular international flow. Estimates and forecasts of annual aircraft movements over the planning period are required for high-level planning. Forecasts of aircraft movements in peak periods, such as during a particularly busy hour, are needed for detailed planning. Additionally, the establishment of major international traffic flows will require appropriate civil/military coordination and consideration of special use airspace.

11. Considering the global guidelines described in the preceding paragraphs, the ASIA/PAC regions should take into account the need to coordinate their regional plan with the adjacent regions, specially with the EUR and MID regions, since air traffic density between these regions and the ASIA/PAC regions is quite high. Coordination of the regional ASIA/PAC plan for the CNS/ATM transition with the indicated regions will be necessary. Finally, in the long term there would be a continuing need for coordination after the completion of the Global Transition Plan.

States'/Territories' plans

12. States/Territories have the responsibility for implementation of the new CNS/ATM system within their areas of responsibility. It will, however, be necessary for each State within the ASIA/PAC regions to develop and publish its own CNS/ATM implementation plan. These State plans should be coordinated within the FIRs and with adjacent FIRs to ensure the optimum use is made of all aspects of CNS/ATM.

Airlines' plans

13. The airlines have already invested significant sums to equip aircraft with transitional CNS/ATM systems such as FANS, data link, RNAV and Satcom. These systems permit use of currently available technologies to obtain early benefits within the CNS/ATM concept. To retain a cost-effective evolution towards CNS/ATM, the airlines believe that it is imperative to ensure that appropriate accommodation for these transitional systems be retained. The airlines will continue to pursue implementation of CNS/ATM on an evolutionary basis.

Benefits

14. With the benefits from the new CNS/ATM systems, there is need and enthusiasm for its implementation, but there are many hard decisions to be made, particularly on timing. Global and regional cooperation on an unprecedented scale will be required.

15. The regional planning process is the principal engine of ICAO's planning and implementation work. It is here that the top-down approach, comprising global guidance and regional-harmonization measures, converges with the bottom-up approach constituted by States/Territories and aircraft operators and their proposals for implementation options.

16. In its most basic form, the output from the regional planning process should be a listing of air navigation facilities and services, together with their achievable time frames, necessary for CNS/ATM systems implementation. These listings will be included in the ASIA/PAC regional air navigation plan (ANP) and updated by the APANPIRG with the assistance of the Regional Offices.

17. The objective of the Global Plan is to guide a progressive and coordinated worldwide implementation of the

elements of the future air navigation system in a timely and cost-beneficial manner. To this end, the plan fulfils two principal functions:

a) it provides guidelines for use by regional planning bodies, States/Territories, service providers and users, for transitions from the current ground-based air navigation system to the future satellite-based system; and

b) it functions as a benchmark for the evaluation of implementation progress.

18. The implementation of the current CNS/ATM systems has basically been a regional responsibility, i.e. States/Territories or groups of States/Territories working together within the framework of the concept and implementation strategy developed for the respective region by the corresponding regional planning group. ICAO air navigation planning should continue to be conducted through the established regional planning process.

Evolution and implementation

19. In considering the overall system concept, the questions of evolution and transition are most important. For instance, careful planning will be necessary to ensure that aircraft of the future are not unnecessarily required to carry a multiplicity of existing and new CNS equipment. In addition, as already referred to, there is a close relationship between the required CNS services and the desired level of ATM and, finally, there is, for reasons of both economy and efficiency, a need to ensure that differences in the pace of development around the world do not lead to incompatibility between elements of the CNS/ATM system. Particularly, because of the wide coverage of satellite CNS systems, the above considerations call for conscientious worldwide and regional coordination of the planning and implementation if such systems are to be optimized.

Human factors considerations

20. The high level of automation and interdependency of the CNS/ATM system raises several human factors issues. Lessons learned concerning human factors indicate that they should be considered as an integral part of any plan to implement the new technologies. The most important human factors issue regarding the human-machine interface is the ability of the human operator to maintain situational awareness. A by-product of degraded situational awareness is mode error. Mode error is defined as a joint human-machine system breakdown in which a human loses track of the current machine configuration, and a machine interprets the human's input differently from that intended. The "joint human-machine system" should be considered during design of the systems so that mode errors can be pro-actively anticipated and eliminated. Furthermore, existing air navigation systems and CNS/ATM systems will operate in parallel for a period of time. Operating old and new systems in parallel will introduce human factors considerations that will also need to be considered.

21. Human factors issues should be considered before CNS/ATM technologies are implemented, during the process of design and certification of the technology and associated standard operating procedures. States in the ASIA/PAC regions and organizations which design and provide CNS/ATM systems should take into account ICAO guidelines when developing national regulations and incorporate human factors Standards in the processes of design and certification of equipment and procedures.

22. Involving human factors expertise during technology design might incur additional initial expenses, but the costs are paid once in the system's lifetime. Coping with flawed human-technology interfaces through training will result in a requirement for continuous training and higher costs.

Training planning

23. A major goal of CNS/ATM systems is to create a seamless air navigation system. A seamless air navigation environment will require an international team prepared to perform their jobs in such an environment. At the same time, shortcomings in human resource planning and training are frequently cited as an important reason for the lack of implementation of regional ANPs. Human resource development challenges will be compounded during the transition period to CNS/ATM systems. As the existing and emerging air navigation technologies will operate in parallel for a period of time, civil aviation personnel will need to learn new skills, as well as retain the skills needed to operate and maintain existing systems. To meet this challenge, a cooperative approach should be used in civil aviation training within the ASIA/PAC regions. This approach should:

a) ensure that the training requirements of the ASIA/PAC regions are available within the regions;

b) facilitate a training planning process that would help to determine the training capabilities needed within the

region or sub-regions for specialized types of training that individual States cannot justify based on their national training needs alone;

c) ensure that an adequate market exists to support the development and ongoing implementation of high-quality training within one or more training centres within the region or sub-regions; and

d) endeavour to distribute regional training activities among more training centres within the region or sub-regions.

24. Appropriate bodies should be established to facilitate regional and sub-regional training planning. A quantitative approach should be used to determine the training capabilities needed within a region or sub-region. Decisions concerning training capabilities required should be based on an aggregate of training demand for existing air navigation technologies, as well as emerging technologies. A State-to-State consultative process should be used to formulate a plan for the establishment of specific regional training centres.

25. APANPIRG should ensure that training offered within the ASIA/PAC regions is sufficient to meet the implementation requirements of the regional ANP.

IMPLEMENTATION STRATEGY

26. This section deals with the steps that can be taken and the options that can be explored to increase the probability of the facilities and services called for by the plan being fully implemented according to the sets of time lines set out in the ANP, as well as ensuring that the number of shortcomings and deficiencies is minimized. While the plan represents the collective commitment of ASIA/PAC States to provide and maintain the infrastructure that the facilities and services defined in the plan constitute as a whole, it is expected that users of the infrastructure will also cooperate to contribute indirectly to maintaining a safe and efficient environment in the region. The implementation strategy for this plan is based, therefore, on the premise that all partners involved in aviation in the region will work together harmoniously, for the most part within the APANPIRG mechanism.

27. In this regard, irrespective of the relationships that exist between service providers and users, financing is required if plans are to be implemented. Since facilities and services need to be put into place before benefits can be enjoyed, it follows that States initial commitment to obtaining the necessary initial financing for "their" parts of the plan is key.

28. States can, of course, enact that commitment alone, but it is likely that in those cases the benefits that derive, for example, from cooperative or sharing options such as international cooperative ventures including international operating agencies, joint charges collection agencies, multi-national facilities and services or joint financing arrangements, would not be obtained.

29. Similarly, it is not always economically efficient to manage alone the expenses incurred in purchasing facilities and services and the income gathered from users of the infrastructure. Key here are the elements of cost-recovery policy with a possible emphasis on autonomy at the national level. This might lead to the creation of independent entities or bodies being established for the purpose of operating certain facilities and providing specific services, and being granted operational and financial freedom to carry out their functions.

30. If States are committed to implementing the plan, then the implementation strategy should address how that can be achieved in the most cost-effective way.

31. The vehicle for this commitment to seek out cost-effective implementation techniques is the APANPIRG mechanism where States can explore the possibilities of sub-regional approaches not only to their planning activities but also to the implementation of those plans. Such approaches might be developed with the help of the General Guidelines on the Establishment and Provision of a Multinational ICAO ASIA/PAC Air Navigation Facility/Service, set out in Part II of the FASID. Furthermore, the new involvement of the ICAO Technical Co-operation Programme in the regional planning process creates opportunities for service providers and users to work out mutually attractive implementation strategies.

32. The way in which this overall approach can move forward will be conditioned by the emphasis being placed on planning according to homogeneous areas and major traffic flows, most of the latter of which extend beyond the limits of the ASIA/PAC regions. The work being done in the context of the South Atlantic Task Force and the Technical Co-operation Programme initiative calls for work groups comprised of selected States and users to develop concrete plans for the areas defined by the major traffic flows.

33. Resources from ICAO's modest special implementation budget or help from the Technical Co-operation

Programme to support implementation should therefore be channelled into this approach. The next steps can involve APANPIRG formalizing the work group approach mentioned in 32 and developing it as a model for use by other planning and implementation regional groups (PIRGs). This would be a natural development since other PIRGs have defined areas of interest which extend beyond their region. In addition, when such an approach gathers momentum it can serve as a key element of ICAO's inter-regional planning which strives to balance global and regional priorities through bodies such as ALLPIRG or an ALLPIRG sub-group.

34. ICAO is active in all the above areas and stands ready to support initiatives by all partners in the planning process to achieve the steps towards the safe and efficient implementation of the planned infrastructure.

Part III

AERODROME OPERATIONAL PLANNING (AOP)

INTRODUCTION

1. This part of the Asia and Pacific (ASIA/PAC) Basic Air Navigation Plan contains elements of the existing planning system and introduces the basic planning principles, operational requirements and planning criteria related to aerodrome operational planning (AOP) as developed for the ASIA/PAC regions.

2. As a complement to the Statement of Basic Operational Requirements and Planning Criteria (BORPC) set out in Part I, Part III constitutes the stable guidance material considered to be the minimum necessary for effective planning of AOP facilities and services in the ASIA/PAC regions. A detailed description/list of the facilities and/or services to be provided by States in order to fulfil the requirements of the plan is contained in the ASIA/PAC Facilities and Services Implementation Document (FASID). During the transition and pending full implementation of the future communications, navigation and surveillance/air traffic management (CNS/ATM) system, it is expected that the existing requirements will gradually be replaced by new CNS/ATM system-related requirements. Further, it is expected that some elements of CNS/ATM system will be subject to amendment, as necessary, on the basis of experience gained in their implementation.

3. The Standards, Recommended Practices and Procedures to be applied and related guidance material are contained in:

a) Annex 14 — *Aerodromes*, Volumes I and II;

b) Annex 10 — *Aeronautical Telecommunications* — Volume I;

c) *Aerodrome Design Manual* (Doc 9157);

d) *Airport Planning Manual* (Doc 9184);

e) *Airport Services Manual* (Doc 9137).

4. Background information of importance in the understanding and effective application of this part of the plan is contained in the *Report of the Third Asia/Pacific Regional Air Navigation Meeting* (Doc 9614, ASIA/PAC/3 (1993)) on Agenda Items 2, 3 and 4.

5. A regional air navigation meeting recommendation or conclusion shown in brackets below a heading indicates the origin of all the paragraphs following that heading.

AERODROME OPERATIONAL PLANNING (AOP)

General (FASID Table AOP 1)

[ASIA/PAC/3, Recs. 2/2 and 3/1]

6. A basic list of aerodromes (including their designations) required in the ASIA/PAC regions to serve international civil aviation operations is given in the Appendix to this part. The list of regular and alternate aerodromes required for international scheduled air transport, non-scheduled air transport and general aviation operations as agreed in the ASIA/PAC/3 RAN Meeting is given in Table AOP 1 of the FASID.

Runway friction measurements

[ASIA/PAC/3, Rec. 4/2]

7. States should procure the necessary equipment and carry out periodic measurements of runway friction characteristics and take remedial action as necessary.

Removal of disabled aircraft
[ASIA/PAC/3, Rec. 4/3]

8. States should ensure that adequate coordination between airline operators and airport administrations exists to plan for the removal of disabled aircraft on or adjacent to movement areas, and that information concerning the capability for such aircraft removal is included in Aeronautical Information Publications.

Creation of bird control units
[ASIA/PAC/3, Rec. 4/6]

9. States should encourage airport authorities to create a bird control unit responsible for reducing bird hazards to aviation on each airport and to submit bird strike reports to ICAO to facilitate the effective use of the ICAO Bird Strike Information System (IBIS).

Closure of regular aerodromes
[ASIA/PAC/3, Conc. 2/3]

10. When a regular aerodrome is to be closed, States should ensure that sufficient alternate aerodromes remain open to provide for the safety and efficiency of aircraft approaching the regular aerodrome that may be required to divert to an alternate.

Scheduling aerodrome maintenance
[ASIA/PAC/3, Rec. 4/8]

11. States, when planning major runway maintenance work that would affect the regularity of international aircraft operations, should consider the need to notify aircraft operators sufficiently in advance prior to undertaking the scheduled work.

Aerodrome equipment, installations and services
[ASIA/PAC/3, Rec. 4/10]

12. For the general improvement of the safety, efficiency and regularity of aircraft operations, States should, with a degree of urgency, take appropriate action to provide and maintain the equipment, installations and services specified in the related Annex 14, Volume I specifications.

Aerodrome emergency plan
[ASIA/PAC/3, Conc. 4/4]

13. Each State of the ASIA/PAC region should prepare and keep up to date an appropriate aerodrome emergency plan for each international aerodrome. Guidance material for the preparation of such plans are available in the *Airport Services Manual* (Doc 9137), Part 7.

Appendix

INTERNATIONAL AERODROMES REQUIRED IN THE ASIA/PAC REGIONS

EXPLANATION OF THE LIST

CITY/AERODROME — Name of the city and aerodrome, preceded by the location indicator.

DESIGNATION — Designation of the aerodrome as:

RS — international scheduled air transport, regular use
RNS — international non-scheduled air transport, regular use
AS — international scheduled air transport, alternate use

Note 1.— When an aerodrome is needed for more than one type of use, normally only the use highest on the above list is shown. An exception is that AS aerodromes are identified even when they are required for regular use by international non-scheduled air transport or international general aviation, as some specifications in Annex 14, Volume I place special requirements on these aerodromes.

Example — An aerodrome required for both RS and AS use would only be shown as RS in the list. However, this table may still show specific requirements for AS use.

Note 2.— When the aerodrome is located on an island and no particular city or town is served by the aerodrome, the name of the island is included instead of the name of a city.

City/Aerodrome/Designation	

AMERICAN SAMOA (United States)

NSTU	PAGO PAGO/Pago Pago Intl
	RS

AUSTRALIA

YPAD	ADELAIDE/Adelaide
	RS
YBAS	ALICE SPRINGS/Alice Springs
	AS
YBBN	BRISBANE/Brisbane
	RS
YBCS	CAIRNS/Cairns
	RS
YPXM	CHRISTMAS I./Christmas I.
	RS
YPCC	COCOS I./Cocos I.
	RS
YPDN	DARWIN/Darwin
	RS
YMHB	HOBART/Hobart
	RS
YMML	MELBOURNE/Melbourne Intl
	RS
YSNF	NORFOLK I./Norfolk I.
	RS
YPPH	PERTH/Perth Intl
	RS
YPPD	PORT HEDLAND/Port Hedland
	RS
YBRK	ROCKHAMPTON/Rockhampton
	AS
YSSY	SYDNEY/Kingsford Smith Intl
	RS
YPTN	TINDAL/Tindal
	AS

City/Aerodrome/Designation	

YBTL	TOWNSVILLE/Townsville
	RS

BANGLADESH

VGEG	CHITTAGONG/M.A. Hannan Intl
	RS
VGZR	DHAKA/Zia Intl
	RS

BHUTAN

VQPR	PARO/Paro Intl
	RS

BRUNEI DARUSSALAM

WBSB	BRUNEI/Brunei Intl
	RS

CAMBODIA

VDPP	PHNOM PENH/Phnom Penh
	RS
VDSR	SIEM REAP/Siem Reap
	AS

CANADA[1]

CYXX	ABBOTSFORD/Abbotsford
	AS
CYYC	CALGARY/Calgary Intl
	RS
CYQQ	COMOX/Comox
	AS
CYEG	EDMONTON/Edmonton Intl
	RS
CYVR	VANCOUVER/Vancouver Intl
	RS
CYYJ	VICTORIA/Victoria Intl
	RNS

City/Aerodrome/Designation	

CHINA

ZBAA	BEIJING/Capital
	RS
ZGHA	CHANGSHA/Huanghua
	RS
ZUUU	CHENGDU/Shuangliu
	AS
ZUCK	CHONGQING/Jiangbei
	RS
ZYTL	DALIAN/Zhoushuizi
	RS
ZSFZ	FUZHOU/Changle
	RS
RCKH	GAOXIONG/Gaoxiong
	RS
ZGGG	GUANGZHOU/Baiyun
	RS
ZGKL	GUILIN/Liangjiang
	RS
ZSHC	HANGZHOU/Xiaoshan
	RS
ZYHB	HARBIN/Taiping
	RS
ZSOF	HEFEI/Luogang
	AS
ZBHH	HOHHOT/Baita
	RS
ZSJN	JINAN/Yaoqiang
	RS
ZWSH	KASHI/Kashi
	AS
ZPPP	KUNMING/Wujiaba
	RS
ZLLL	LANZHOU/Zhongchuan
	AS

City/Aerodrome/Designation	

ZSNJ	NANJING/Lukou
	RS
ZGNN	NANNING/Wuxu
	AS
ZSQD	QINGDAO/Liuting
	RS
ZJSY	SANYA/Phoenix
	RS
ZSSS	SHANGHAI/Hongqiao
	RS
ZSPD	SHANGHAI/Pudong
	RS
ZYTX	SHENYANG/Taoxian
	RS
ZGSZ	SHENZHEN/Bao’an
	RS
RCSS	TAIBEI/Songshan
	AS
RCTP	TAIBEI CITY/Taibei Intl
	RS
ZBYN	TAIYUAN/Wusu
	AS
ZBTJ	TIANJIN/Binhai
	RS
ZWWW	URUMQI/Diwopu
	RS
ZHHH	WUHAN/Tianhe
	RNS
ZSAM	XIAMEN/Gaoqi
	RS
ZLXY	XI'AN/Xianyang
	RS
ZUXC	XICHANG/Qingshan
	RNS

City/Aerodrome/Designation

COOK IS.

NCRG RAROTONGA/Rarotonga Intl
RS

DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA

ZKPY SUNAN/Sunan
RS

EASTER I. (Chile)

SCIP ISLA DE PASCUA/Mataveri
RS

FIJI

NFFN NADI/Nadi Intl
RS

NFSU SUVA/Nausori
RS

FRENCH POLYNESIA (France)

NTTG RANGIROA/Rangiroa
AS

NTAA TAHITI/Faaa
RS

GUAM (United States)

PGUA GUAM I./Andersen AFB
AS

PGUM GUAM I./Guam Intl
RS

HONG KONG, China

VHHH HONG KONG/Hong Kong Intl
RS

INDIA

VAAH AHMEDABAD/Ahmedabad
AS

City/Aerodrome/Designation

VIAR AMRITSAR/Amritsar
RS

VOCL CALICUT/Calicut
RS

VOMM CHENNAI/Chennai
RS

VIDP DELHI/Indira Gandhi Intl
RS

VECC KOLKATA/Netaji Subhash Chandra Bose
RS

VABB MUMBAI/Chhatrapati Shivaji Intl
RS

VANP NAGPUR/Nagpur
AS

VEPT PATNA/Patna
RS

VOTR TIRUCHCHIRAPPALLI/Tiruchchirappalli
RS

VOTV TRIVANDRUM/Trivandrum
RS

VIBN VARANASI/Varanasi
RS

INDONESIA

WAPP AMBON/Pattimura
RNS

WADD BALI/Ngurah Rai
RS

WALL BALIKPAPAN/Sepinggan
RS

WAOO BANJARMASIN/Syamsudin Noor
AS

WIDD BATAM/Hang Nadim
RS

WABB BIAK/Frans Kaisiepo
RS

	City/Aerodrome/Designation
WIHH	JAKARTA/Halimperdana Kusuma
	RNS
WIII	JAKARTA/Soekarno Hatta
	RS
WAJJ	JAYAPURA/Sentani
	RS
WATT	KUPANG/El Tari
	RS
WAMM	MANADO/Sam Ratulangi
	RS
WIMM	MEDAN/Polonia
	RS
WAKK	MERAUKE/Mopah
	RNS
WIMG	PADANG/Tabing
	RS
WIPP	PALEMBANG/Sultan Mahmud Badaruddin II
	RNS
WIBB	PEKANBARU/Sultan Syarif Kasim II
	RS
WIOO	PONTIANAK/Supadio
	RS
WARR	SURABAYA/Juanda
	RS
WIDN	TANJUNG PINANG/Kijang
	RNS
WALR	TARAKAN/Juwata
	RS
WABP	TIMIKA/Moses Kilangin
	RNS
WAAA	UJUNG PANDANG/Hasanuddin
	RNS

JAPAN

RJFF	FUKUOKA/Fukuoka
	RS
RJCH	HAKODATE/Hakodate
	AS
RJOA	HIROSHIMA/Hiroshima
	RS
RJFK	KAGOSHIMA/Kagoshima
	RS
RJBB	KANSAI/Kansai Intl
	RS
RJFT	KUMAMOTO/Kumamoto
	RS
RJFU	NAGASAKI/Nagasaki
	RS
RJGG	NAGOYA/Chubu Centrair Intl
	RS
ROAH	NAHA/Naha
	RS
RJSN	NIIGATA/Niigata
	RS
RJFO	OITA/Oita
	RS
RJOB	OKAYAMA/Okayama
	RS
RJOO	OSAKA/Osaka Intl
	RS
RJCC	SAPPORO/New Chitose
	RS
RJSS	SENDAI/Sendai
	RNS
RJOT	TAKAMATSU/Takamatsu
	RS
RJAA	TOKYO/Narita Intl
	RS
RJTT	TOKYO/Tokyo Intl
	AS

City/Aerodrome/Designation

JOHNSTON I. (United States)

PJON JOHNSTON ATOLL/Johnston I.
RS

KIRIBATI

PLCH KIRITIMATI I./Christmas I.
RS

NGTA TARAWA/Bonriki Intl
RS

LAO PEOPLE'S DEMOCRATIC REPUBLIC

VLVT VIENTIANE/Wattay
RS

MACAO, China

VMMC MACAO/Macao Intl
RS

MALAYSIA

WMKJ JOHOR BAHRU/Sultan Ismail
RS

WBKK KOTA KINABALU/Kota Kinabalu Intl
RS

WMKD KUANTAN/Kuantan (RMAF)
RS

WBGG KUCHING/Kuching
RS

WBKL LABUAN/Labuan (RMAF)
RS

WMKM MALACCA/Malacca
RS

WBGR MIRI/Miri
RS

WMKP PENANG/Penang Intl
RS

WMKL PULAU LANGKAWI/Pulau Langkawi
RS

City/Aerodrome/Designation

WMKK SEPANG/KL Intl
RS

WBGS SIBU/Sibu
RS

WMSA SUBANG/Sultan Abdul Aziz Shah
RS

WBKW TAWAU/Tawau
RS

MALDIVES

VRMG GAN/Gan
AS

VRMM MALE/Male Intl
RS

MARSHALL IS.

PKMJ MAJURO ATOLL/Marshall Is. Intl
RS

MICRONESIA (FEDERATED STATES OF)

PTPN POHNPEI I./Pohnpei Intl
RS

PTKK WENO I./FM Chuuk Intl
RS

PTYA YAP I./Yap Intl
RS

MONGOLIA

ZMUB ULAANBAATAR/Ulaanbaatar
RS

MYANMAR

VYYY YANGON/Yangon Intl
RS

NAURU

AUUU NAURU I./Nauru I.
RS

City/Aerodrome/Designation	

NEPAL

VNKT KATHMANDU/Kathmandu
RS

NEW CALEDONIA (France)

NWWW NOUMEA/La Tontouta
RS

NEW ZEALAND

NZAA AUCKLAND/Auckland Intl
RS

NZCH CHRISTCHURCH/Christchurch Intl
RS

NZWN WELLINGTON/Wellington Intl
RS

NIUE (New Zealand)

NIUE NIUE/Niue Intl
RS

NORTHERN MARIANA IS. (United States)

PGRO ROTA I./Rota Intl
RS

PGSN OBYAN/Saipan Intl
RS

PAKISTAN

OPGD GWADAR/Gwadar
RS

OPRN ISLAMABAD/Chaklala
RS

OPKC KARACHI/Jinnah Intl
RS

OPLA LAHORE/Allama Iqbal Intl
RS

City/Aerodrome/Designation	

OPNH NAWABSHAH/Nawabshah
AS

OPPS PESHAWAR/Peshawar
RS

PALAU

PTRO BABELTHAUP I./Koror
RS

PAPUA NEW GUINEA

AYPY PORT MORESBY/Port Moresby
RS

AYVN VANIMO/Vanimo
RS

PHILIPPINES

RPMD DAVAO/Francisco Bangoy Intl
RNS

RPLI LAOAG/Laoag Intl
AS

RPVM LAPU-LAPU/Mactan Cebu
RS

RPLL MANILA/Ninoy Aquino Intl
RS

RPLB SUBIC BAY/Subic Bay Intl
RNS

RPMZ ZAMBOANGA/Zamboanga Intl
RNS

REPUBLIC OF KOREA

RKTU CHEONGJU/Cheongju
RS

RKTN DAEGU/Daegu
RS

RKPK GIMHAE/Gimhae
RS

City/Aerodrome/Designation	
RKSS	GIMPO/Gimpo
	AS
RKSI	INCHEON/Incheon
	RS
RKPC	JEJU/Jeju
	RS
RKNY	YANGYANG/Yangyang
	RS
SAMOA	
NSFA	FALEOLO/Faleolo Intl
	RS
SINGAPORE	
WSAP	PAYA LEBAR/Paya Lebar (RSAF)
	AS
WSSL	SELETAR/Seletar
	RS
WSSS	SINGAPORE/Changi
	RS
SOLOMON IS.	
AGGH	HONIARA/Henderson
	RS
SRI LANKA	
VCBI	COLOMBO/Bandaranaike Intl
	RS
VCCH	HIGURAKGODA/Mineriya
	AS
THAILAND	
VTBD	BANGKOK/Bangkok Intl
	RS
VTCC	CHIANG MAI/Chiang Mai Intl
	RS

City/Aerodrome/Designation	
VTCT	CHIANG RAI/Chiang Rai Intl
	RS
VTUK	KHON KAEN/Khon Kaen
	RS
VTPP	PHITSANULOK/Phitsanulok
	RS
VTSP	PHUKET/Phuket Intl
	RS
VTBU	RAYONG/U-Taphao Intl
	RS
VTSS	SONGKHLA/Hat Yai Intl
	RS
VTSB	SURAT THANI/Surat Thani
	RS
VTUU	UBON RATCHATHANI/Ubon Ratchathani
	RS
TONGA	
NFTF	FUA'AMOTU/Fua'amotu Intl
	RS
NFTV	VAVA'U/Vava'u
	RS
TUVALU	
NGFU	FUNAFUTI/Funafuti Intl
	RS
UNITED STATES[1]	
PANC	ANCHORAGE/Anchorage Intl
	RS
PAED	ANCHORAGE/Elemendorf AFB
	AS
PACD	COLD BAY/Cold Bay
	AS
KPAE	EVERETT/Snohomish County-Paine Field
	AS

City/Aerodrome/Designation	
PAEI	FAIRBANKS/Eielson AFB
	AS
PAFA	FAIRBANKS/Fairbanks Intl
	RS
KFAT	FRESNO/Fresno Air Terminal
	AS
PHTO	HILO/Hilo Intl
	AS
PHNL	HONOLULU/Oahu Intl
	RS
PHOG	KAHULUI/Kahului
	AS
PAKN	KING SALMON/King Salmon
	AS
KLAX	LOS ANGELES/Los Angeles Intl
	RS
KOAK	OAKLAND/Metropolitan Oakland
	AS
KONT	ONTARIO/Ontario Intl
	AS
KPMD	PALMDALE/Palmdale P.F.T.I.
	AS
KPDX	PORTLAND/Portland Intl
	AS
KSMF	SACRAMENTO/Metropolitan
	AS
KSAN	SAN DIEGO/San Diego (AFSS)
	AS
KSFO	SAN FRANCISCO/San Francisco Intl
	RS

City/Aerodrome/Designation	
KSJC	SAN JOSE/San Jose Intl
	RS
KBFI	SEATTLE BOEING FIELD/King County Intl
	AS
KSEA	SEATTLE/Seattle-Tacoma Intl
	RS
KGEG	SPOKANE/Spokane Intl
	AS
KSCK	STOCKTON/Metropolitan
	AS
KIAD	WASHINGTON/Dulles Intl
	RS
VANUATU	
NVVV	PORT VILA/Bauerfield
	RS
NVSS	SANTO/Pekoa
	RS
VIET NAM	
VVDN	DA NANG/Da Nang
	RS
VVNB	HA NOI/Noi Bai
	RS
VVTS	HO CHI MINH/Tan Son Nhat
	RS
WALLIS AND FUTUNA IS. (France)	
NLWW	WALLIS/Hihifo
	RS

Note 1.— Outside ASIA/PAC. Indicated for coordination.

Part IV

COMMUNICATIONS, NAVIGATION AND SURVEILLANCE (CNS)

INTRODUCTION

1. This part of the Asia and Pacific (ASIA/PAC) Basic Air Navigation Plan contains elements of the existing planning system and introduces the basic planning principles, operational requirements and planning criteria related to communications, navigation and surveillance (CNS) as developed for the ASIA/PAC regions.

2. As a complement to the Statement of Basic Operational Requirements and Planning Criteria (BORPC) set out in Part I, Part IV constitutes the stable guidance material considered to be the minimum necessary for effective planning of CNS facilities and services in the ASIA/PAC regions. A detailed description/list of the facilities and/or services to be provided by States in order to fulfil the requirements of the plan is contained in the ASIA/PAC Facilities and Services Implementation Document (FASID). During the transition and pending full implementation of the future communications, navigation and surveillance/air traffic management (CNS/ATM) system, it is expected that the existing requirements will gradually be replaced by new CNS/ATM system-related requirements. Further, it is expected that some elements of CNS/ATM system will be subject to amendment, as necessary, on the basis of experience gained in their implementation.

3. The Standards, Recommended Practices and Procedures to be applied are contained in:

a) Annex 10 — *Aeronautical Telecommunications*, Volumes I, II, III, IV and V;

b) Annex 11 — *Air Traffic Services*; and

c) *Regional Supplementary Procedures* (Doc 7030).

4. Background information of importance in the understanding and effective application of this part of the plan is contained in the *Report of the Third Asia/Pacific Regional Air Navigation Meeting* (Doc 9614, ASIA/PAC/3 (1993)) on Agenda Items 10, 11 and 12.

5. The elements of the material referred to above are presented in the following paragraphs with appropriate cross-references to recommendations and/or conclusions of ASIA/PAC/3 and regional planning groups.

COMMUNICATIONS

General

6. The plan and details of the operational requirements for communications are contained in Tables CNS 1A, CNS 1B, CNS 1C, CNS 1D, CNS 1E, CNS 2, CNS 3, CNS 4A and CNS 4B, and associated charts of Part IV of the FASID.

Ground-ground communications

Aeronautical fixed service (AFS)

7. The aeronautical fixed service comprises:

a) the aeronautical fixed telecommunication network (AFTN);

b) data communications subnetworks and associated systems supporting the ground-ground applications of the aeronautical telecommunication network (ATN), namely the ATS message handling services (ATS MHS) and ATS inter-facility data communications (AIDC);

c) ATS direct speech circuits; and

d) meteorological operation circuits, networks and broadcast systems.

Aeronautical fixed telecommunication network (AFTN)

8. States should ensure that telecommunication agencies engaged in providing aeronautical circuits be impressed of the need for:

a) high reliability terrestrial links connecting aeronautical facilities and common carrier terminals inclusive of priority restoration of service commensurate with the requirements of a safety service; and

b) rapid restoration of circuits in the event of breakdown.
[ASIA/PAC/3, Conc. 10/1]

9. States operating AFTN circuits which do not function satisfactorily 97 per cent of the time during which the circuit is scheduled to be in operation should exchange monthly circuit performance charts on the form provided in Attachment A. Where a circuit consistently achieves 97 per cent reliability, the exchange of performance charts may cease. The circuit performance charts should be exchanged directly between the correspondent stations, with copies to the administrations concerned and to the ICAO Regional Office. States should also identify the causes for inadequate circuit performance and take necessary remedial measures.
[ASIA/PAC/3, Conc. 10/2]

10. States responsible for the operation of AFTN circuits which are not adequately meeting transit time requirements should record transit time statistics on the twenty-third day of each third month (January, April, July and October) of each year, in accordance with the existing practices, for the AFTN circuits and terminals under their jurisdiction which do not meet the specified transit time criteria. The data recorded should be exchanged directly between the correspondent stations, with copies to administrations concerned and to the ICAO Regional Office.
[ASIA/PAC/3, Conc.10/3]

11. States operating AFTN circuits should:

a) record AFTN statistics on the form contained in Attachment B, from 23 to 25 April and October each year;

b) exchange the circuit loading data for each circuit with each correspondent station and provide a copy to the ICAO Regional Office; and

c) evaluate circuit loading and take appropriate remedial action when occupancy level exceeds permissible levels specified in the *Manual on the Planning and Engineering of the Aeronautical Fixed Telecommunications Network* (Doc 8259).
[ASIA/PAC/3, Conc. 10/4]

12. States concerned should take positive measures to ensure system reliability and provide adequate management and supervision of facilities to eliminate system failure, and to ensure data integrity and timely delivery of messages.
[ASIA/PAC/3, Conc. 10/5]

13. The AFTN entry/exit points:

a) between ASIA/PAC and AFI should be Brisbane and Mumbai;

b) between ASIA/PAC and EUR should be Bangkok, Singapore and Tokyo;

c) between ASIA/PAC and MID should be Karachi, Mumbai and Singapore;

d) between ASIA/PAC and NAM should be Brisbane, Nadi and Tokyo; and

e) between ASIA/PAC and CAR/SAM should be Brisbane.
[APANPIRG/11, Conc. 11/6]

Technical aspects of AFTN rationalization.

14. The main trunk circuits interconnecting main AFTN communication centres should be provided by landline teletypewriter (LTT) facilities, operate at a modulation rate commensurate with operational requirements, and employ International Alphabet Number 5 (IA-5) and character-oriented data link control procedures — system category B, or bit-oriented data link control procedures as defined in Annex 10, Volume III, Part I, Chapter 8.

15. Also, the tributary circuits interconnecting tributary AFTN communication centres with main AFTN communication centres, with other tributary AFTN communication centres, or with AFTN stations should be provided with LTT facilities where available and feasible, preferably operate at a modulation rate commensurate with operational requirements, and employ IA-5 code and procedures and an appropriately controlled circuit protocol.
[ASIA/PAC AFS RPG/3, Rec. 3/1]

16. To support data communication requirements and to provide needed data integrity and minimal transit time, the

CCITT X.25 protocol should be used between AFTN COM centres and main and tributary COM centres in the ASIA/PAC regions.
[APANPIRG/4, Conc. 4/27 and APANPIRG/7, Conc. 7/14]

17. States should consider implementing digital communication networks or circuits in a coordinated manner in order to meet current and future AFS communication requirements for data/voice communications and to facilitate the introduction of ATN.
[APANPIRG/11, Conc. 11/14]

ATN infrastructure transition and implementation

18. The ATN transition plan outlines the requirements to increase bandwidth and upgrade protocols for those trunk circuits that will support main data flow of traffic in the ASIA/PAC regions. The plan also provides target dates for implementation of boundary intermediate systems (BIS) and backbone BIS in the ASIA/PAC regions.
[APANPIRG/12, Conc. 12/14]

19. ATN development should be introduced in an evolutionary and cost-effective manner based on available ICAO SARPs and regional ATN technical and planning documents. The ATN infrastructure transition is expected to be implemented in three phases as follows:

a) *Phase 1.* Upgrade of existing AFTN circuits where necessary to support the introduction of the ATN backbone BIS;

b) *Phase 2.* Implementation of the ATN regional backbone BIS; and

c) *Phase 3.* Implementation of supporting ATN BIS.

20. States should consider establishment of gateways, where required, to allow inter-operation between AFTN and ATS MHS.

ATS direct speech circuits

ATS direct speech communications.

21. States concerned should assign a high priority to the establishment, in accordance with Annex 11, 3.6.1.1, of efficient direct-speech communications between ATS units serving adjacent areas in order to permit proper use of air-ground frequencies and further implementation of the air traffic control (ATC) service.
[ASIA/PAC/3, Conc. 5/21]

22. Voice switching centres should be provided at the following locations:

1)	Auckland	2)	Bangkok
3)	Beijing	4)	Mumbai
5)	Calcutta	6)	Guangzhou
7)	Jakarta	8)	Karachi
9)	Lahore	10)	Kuala Lumpur
11)	Chennai	12)	Nadi
13)	Tokyo	14)	Brisbane

[ASIA/PAC/3, Rec. 10/15]

23. Dissemination of World Area Forecast System (WAFS) products in the ASIA/PAC regions will be accomplished by satellite broadcast.
[ASIA/PAC/3, Rec. 10/19]

ATS inter-facility data communications (AIDC) circuits

24. States should consider implementing the ATN application AIDC in order to enable the exchange of ATS messages for active flights related to flight notification, flight coordination , transfer of control surveillance data and free (unstructured) text data.

Air/ground communications

Aeronautical mobile service and aeronautical mobile satellite service

Frequency utilization list.

25. States in the ASIA/PAC regions should coordinate, as necessary, with the ICAO Regional Office all radio frequency assignments for both national and international facilities in the190–526.50 kHz, 108–117.975 MHz, 960–1215 MHz and 117.975–137 MHz bands. The ICAO Regional Office, based on the information provided for this purpose by the States, will issue Frequency Lists Nos. 1, 2 and 3 at periodic intervals.
[ASIA/PAC/3, Conc. 11/4, 11/5 and 12/9]

HF en-route communications

26. States should be urged to coordinate on a national basis with the appropriate interested authorities, a programme directed towards achieving the elimination of the interference currently being experienced on some of the frequencies

allocated to the Aeronautical Mobile (R) Service in the ASIA/PAC regions. When reviewing methods for developing such a national programme, consideration should be given to the procedures in Article S15 of the ITU Radio Regulations.

27. In the case of an unidentified interfering station, States should notify the ICAO Regional Office concerned, utilizing the procedure and report form developed by the Fifth Session of the Communications Division (1954) and updated by the Communications Divisional Meeting (1978). The Harmful Interference Report Form is provided in Attachment C. However, in the case of persistent harmful interference to an aeronautical service which may affect safety, it should be immediately reported to ICAO and to the ITU, using the prescribed format, for appropriate action.
[ASIA/PAC/3, Conc. 11/6]

Air-ground elements of ATN

28. With the implementation of the air-ground applications of ATN, it is important to ensure that transit response times are kept to a minimum level so as not to affect the overall response time that it takes for traffic such as automatic dependent surveillance (ADS) reports and controller-pilot data link communications (CPDLC) messages to be delivered to their final destination. This also reflects the need to ensure that critical ground links within the ASIA/PAC regions are capable of handling this information efficiently.

29. One important factor with air-ground traffic is the generation of routing information caused by aircraft that will move between various ATN routing domains. As aircraft move through various coverage media and FIR boundaries, the ATN routing backbone will be notified of the changing routing data for each mobile aircraft in the region. To allow this routing information to be propagated within the region will require a minimum number of backbone routers to be implemented which protect all other ATN routers form being inundated with routing information.
[ASIA/PAC ATN transition plan]

NAVIGATION

General

30. The plan and details of operational requirements for radio navigation aids are contained in Table CNS 3 and associated charts of Part IV of the FASID.

31. States should continue to provide ICAO with information on their flight inspection activities for inclusion in the *ASIA/PAC Catalogue of Flight Inspection Units* and circulation to States in the ASIA/PAC regions and to the ASIA/PAC Air Navigation Planning and Implementation Regional Group (APANPIRG).
[ASIA/PAC/3, Conc. 12/8]

32. The development of the radio navigation aids plan, and its subsequent documentation in relevant air navigation plan (ANP) publications, defines the respective radio navigation aid requirements at each location without reference to discrete frequency assignments. The ICAO Regional Office will continue to maintain its frequency selection and co-ordination role, including the maintenance and promulgation of Frequency Lists Nos. 1 and 2 in a timely and periodic manner.
[ASIA/PAC/3, Conc. 12/9]

Radio navigation aid requirements

33. States that have not yet done so should install VHF omnidirectional radio range (VOR) supplemented by distance measuring equipment (DME) as the primary aid for en-route navigation and, except in specified circumstances, delete any parallel requirement for a non-directional radio beacon (NDB) from the ANP.
[ASIA/PAC/3, Rec. 5/22]

SURVEILLANCE

General

34. The plan and details of operational requirements for surveillance are contained in Table CNS 4A of Part IV of the FASID.

35. Surveillance systems for terminal and en-route ATC purposes should be installed, maintained and operated at international aerodromes and en-route area control centres whenever it is necessary to improve the safe and expeditious handling of air traffic and wherever the traffic density and associated complexity of operations, system delays, meteorological conditions and/or transition from oceanic to continental airspace would justify these installations.
[ASIA/PAC/3, Rec. 5/28]

36. Where different systems are used for navigation and position determination within the same controlled airspace, the ground facilities involved should be collocated and/or

orientated so as to provide compatible flight paths and to ensure, as far as practicable, a fully integrated ATC pattern. [ASIA/PAC, Rec. 7/14]

37. The ASIA/PAC regions are characterised by the use of:

a) secondary surveillance radar (SSR) Mode A, C and, in the near future, Mode S in some terminal and high-density continental airspace;

b) ADS in some parts of the ASIA/PAC regions; and

c) the diminishing use of primary radar.

38. ADS is becoming available over the oceanic and continental airspace of the ASIA/PAC regions. SSR (augmented as necessary with Mode S) will continue to be used in terminal areas and in some high density airspace.

Automatic Dependent Surveillance (ADS)

Coordination of activities related to the implementation of ADS

39. The introduction of air-ground data links, together with sufficiently accurate and reliable aircraft navigation systems, presents the opportunity to provide surveillance services in areas lacking such services in the present infrastructure, in particular oceanic areas and other areas where the current systems prove difficult, uneconomic, or even impossible, to implement. ADS is a function for use by ATS in which aircraft automatically transmit, via a data link, data derived from on-board navigation systems. As a minimum, the data should include the four-dimensional position. Additional data may be provided as appropriate. The ADS data would be used by the automated ATC system to present information to the controller. In addition to areas which are at present devoid of traffic position information other than pilot-provided position reports, ADS will find beneficial application in other areas including high-density areas, where ADS may serve as an adjunct and/or backup for SSR and thereby reduce the need for primary radar. Also, in some circumstances, it may even substitute for secondary radar in the future. As with current surveillance systems, the full benefit of ADS requires supporting complementary two-way pilot-controller data and/or voice communication (voice for at least emergency and non-routine communication).

40. States should closely cooperate in the development of procedures for the implementation of ADS in the ASIA/PAC regions and participate to the extent possible in trials and demonstrations related to the implementation of ADS.
[ASIA/PAC/3, Conc. 14/21]

Secondary surveillance radar (SSR)

Implementation of surveillance systems

41. Implementation of surveillance systems should be pursued as an enhancement to ATS where so required and the use of SSR alone, in accordance with the procedures in the *Regional Supplementary Procedures* (Doc 7030), should be considered as a cost-effective alternative to primary surveillance radar.
[ASIA/PAC/3, Rec. 14/20]

Attachment A

LANDLINE TELETYPEWRITER (LTT) CIRCUIT PERFORMANCE

Instructions for use of the form

1. The serviceability of the circuit should be given to the nearest 7½ minutes.

2. The copies of the form should be dispatched to the other States concerned as soon as possible, but in no case later than the fourteenth day of the following month.

3. Data should be entered only for the reception over the circuit concerned. When the circuit is "IN", insert the figure in the appropriate square. When the circuit is "OUT", insert the cause of outage according to the "outage code".

4. The serviceability percentage can be computed by dividing the number of minutes the circuit is in operation by the total in a particular month, and multiplying by 100.

5. The term "outage" means communications circuit failure.

6. When the term "other" is used to indicate outages on the chart, additional information should be provided to define the cause of the outage.

LANDLINE TELETYPEWRITER CIRCUIT PERFORMANCE CHART

Receiving station:	% of circuit availability for the month:
Transmitting station:	Circuit No.:
Month:	Year:

Time	Dates																															Time
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
0000																																0000
0100																																0100
0200																																0200
0300																																0300
0400																																0400
0500																																0500
0600																																0600
0700																																0700
0800																																0800
0900																																0900
1000																																1000
1100																																1100
1200																																1200

Time	Dates																														Time
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
1300																																1300
1400																																1400
1500																																1500
1600																																1600
1700																																1700
1800																																1800
1900																																1900
2000																																2000
2100																																2100
2200																																2200
2300																																2300
2400																																2400
Daily %																																Daily %

Outage legend:

Leased circuit	Line between COM centre and comon carrier terminal	Equipment RX terminal COM centre	Equipment TX terminal COM centre	Other

Attachment B

AFTN CIRCUIT LOADING STATISTICS

Instructions for use of the form

1. *Originating station:* Insert the name and four-letter location indicator of the station reporting the statistics.

2. *Correspondent station(s):*Insert the name and four-letter location indicator of the distant end station of the circuit (in case of multipoint circuits, list all distant end stations and their four-letter location indicators).

3. *Signalling speed:* Transmission speed in Baud or bits per second.

4. *Number of channels:* List the number of channels on a direct AFTN circuit between the originating and correspondent stations indicated on the form. If there is more than one channel on a circuit, data to be indicated in the respective columns for each channel should be added separately, and an average figure should be indicated in the respective columns.

5. *Average loading:* Total the daily input/output percentage, as applicable, by the number of days sampled and enter the result as a percentage in the respective column.

6. *Date:* Date that the traffic sample was taken (dd/mm/yy).

7. *Peak hourly:* Insert data for the peak hour of each day for both received (input) and transmitted (output) in the respective columns.

8. *Total daily:* Total number of characters received and sent for each day to be entered in the respective daily input/output columns.

9. *Percent hourly/daily:* Calculate utilization sent and received, hourly and daily.

   a) To calculate hourly percentage, divide the peak hour character count (input/output) separately by the effective circuit capacity (listed below). Multiply the result by 100. Enter this figure as the percentage in the respective column.

   b) To calculate daily percentage, divide the total daily character count (input/output separately), by the effective circuit capacity (listed below x 24). Multiply the result by 100 and enter this figure as a daily input/output percentage in the respective columns.

   c) The effective circuit capacities below are based on the code set used.

ITA-2 Code	
Signalling speed (Baud)	Effective characters/hour
50	24 000
75	36 000
100	48 000
150	72 000
300	144 000

IA-5 Code, Asynchronous (1 stop bit)		
Signalling speed (bits/s)	Effective characters/hour	
	Without protocol	CAT B protocol (93%)*
300	108 000	100 400
600	216 000	200 880
1 200	432 000	401 760
2 400	864 000	803 520
4 800	1 728 000	1 607 040
9 600	3 456 000	3 214 080

IA-5 Code, Synchronic		
Signalling speed (bits/s)	Effective characters/hour	
	CAT B protocol (93%)*	HDLC (97%)**
2 400	1 004 400	1 047 600
4 800	2 008 800	2 095 200
9 600	4 017 600	4 190 400

X.25 Circuits		
Signalling speed (bits/s)	Maximum number of bytes	
	Per hour	Per day
9 600	4 320 000	103 680 000
64 000	28 800 000	691 200 000

* Actual characters per hour have been derated to 93 per cent to allow for protocol overhead.

** Actual characters per hour have been derated to 97 per cent to allow for protocol overhead.

AFTN CIRCUIT LOADING STATISTICS

Originating station: (name)						Location indicator:		
Correspondent station: (name)						Location indicator:		
Signalling speed:						Total number of channels:		
Average loading:		Input		%		Output		%
Date	AFTN centre / Station input				AFTN centre / Station output			
	Peak hourly	Percent hourly	Total daily	Percent daily	Peak hourly	Percent hourly	Total daily	Percent daily

Attachment C

HARMFUL INTERFERENCE REPORT FORM

This form should be used in cases of harmful interference with aeronautical services and only in those instances where the procedure outlined in the ITU-R Radio Regulations has not produced satisfactory results. The form should only be submitted after at least the sections marked with an asterisk have been completed.

* State or organization submitting report . . . . . .

* 1. Frequency of channel interfered with . . . . . .

* 2. Station or route interfered with . . . . . .

* 3. Is the interference persistent? . . . . . .

* 3.1 Date, time, altitude and position at which interference was observed:

Date	Time (GMT)	Altitude	Position
Note.— Report forms should not be sent unless the interference has been observed a sufficient number of times to justify setting international administrative machinery into motion, or unless it is considered to be endangering a radio navigation or safety service.			

4. Has your administration already applied, regarding this case of interference, any part(s) (state which) of the ITU procedures laid down in Article S15 of the ITU-R Radio Regulations?

. . . . . .

* 5. Call sign of IS (IS = interfering station) (See note below.) . . . . . .

6. Name of IS corresponding to the call sign . . . . . .

7. Notified frequency on which IS should operate (if known) . . . . . .

8. (a) Approximate frequency of IS . . . . . kHz/MHz (circle applicable abbreviation)

(b) Strength of IS (QSA or SINPFEMO — See ICAO Doc 8400) . . . . . .

9. Class of emission of IS . . . . . .

10. Language used by IS . . . . . .

11. Call sign of station in communication with IS . . . . . .

Note.— If the call sign referred to in 5 could not be received, or if the call sign received is not in the international series and cannot be interpreted, the report form should not be sent unless at least one of the questions under 12, 13 and 14 can be answered.

12. Location of the IS (accurate or approximate coordinates) . . . . . .

13. Country where interfering station is believed to be located . . . . . .

14. Bearing (in degrees true) of the IS (with indication of location of D/F station) . . . . . .

ITU DEFINITION OF HARMFUL INTERFERENCE

Harmful interference: interference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with these Regulations.

Part V

AIR TRAFFIC MANAGEMENT (ATM)

INTRODUCTION

1. This part of the Asia and Pacific (ASIA/PAC) Basic Air Navigation Plan contains elements of the existing planning system and introduces the basic planning principles, operational requirements and planning criteria related to air traffic management (ATM) as developed for the ASIA/PAC regions.

2. As a complement to the Statement of Basic Operational Requirements and Planning Criteria (BORPC) set out in Part I, Part V constitutes the stable guidance material considered to be the minimum necessary for effective planning of ATM facilities and services in the ASIA/PAC regions. A detailed description/list of the facilities and/or services to be provided by States in order to fulfil the requirements of the plan is contained in the ASIA/PAC Facilities and Services Implementation Document (FASID). During the transition and pending full implementation of the future communications, navigation and surveillance/air traffic management (CNS/ATM) system, it is expected that the existing requirements will gradually be replaced by new CNS/ATM system-related requirements. Further, it is expected that some elements of CNS/ATM system will be subject to amendment, as necessary, on the basis of experience gained in their implementation.

3. The Standards, Recommended Practices and Procedures to be applied are contained in:

a) Annex 2 — *Rules of the Air*;

b) Annex 6 — *Operation of Aircraft*;

c) Annex 11 — *Air Traffic Services*;

d) *Procedures for Air Navigation Services — Air Traffic Management* (Doc 4444);

e) *Procedures for Air Navigation Services — Aircraft Operations* (Doc 8168); and

f) *Regional Supplementary Procedures* (Doc 7030).

4. Background information of importance in the understanding and effective application of this part of the plan is contained in the *Report of the Third Asia/Pacific Regional Air Navigation Meeting* (Doc 9614, ASIA/PAC/3 (1993)).

5. The elements of the material referred to above are presented in the following paragraphs under the headings of Airspace Management (Part V.I — ASM), Air Traffic Services (Part V.II — ATS) and Air Traffic Flow Management (Part V.III — ATFM), with appropriate cross-references to ASIA/PAC/3 recommendations and conclusions.

OBJECTIVES OF AIR TRAFFIC MANAGEMENT

General

6. The primary objective of an integrated ATM system in the ASIA/PAC regions is to enable aircraft operators to meet their planned times of departure and arrival and adhere to their preferred flight profiles with minimum constraints and with no compromise to safety. To accomplish this, the technologies afforded through new CNS systems will have to be fully exploited through international harmonization of ATM standards and procedures. From the aircraft operator's point of view, it is desirable to equip aircraft operating internationally with a minimum set of avionics usable everywhere. Additionally, many of the expected service improvements cannot be meaningfully implemented by one State, but must be implemented in contiguous regions. Therefore, the ATM regional concept of providing ATM over expanded areas must be pursued.

Elements of the ATM system

7. The envisaged ATM system in the ASIA/PAC regions will consist of several sub-elements; these are: airspace management (ASM), air traffic services (ATS), air traffic flow management (ATFM) and the ATM-related aspects of flight operations. These sub-elements will evolve and take on different roles, mainly because they will integrate into a total system. Rather than viewing ground and air as separate functions, the ATM-related aspects of flight operations will be fully integrated as a functional part of the ATM system. Ultimately, this interoperability and functional integration into a total system is expected to yield a synergy of operations that does not currently exist. Through the use of data link for data interchange between elements of the ATM system, this functional integration will be accomplished.

Airspace management

8. The objective of ASM is to maximize, within a given airspace structure, the utilization of available airspace by dynamic time-sharing and, at times, segregation of airspace among various categories of users based on short-term needs. It is also an adjunct to air traffic control (ATC) along the same lines as ATFM.

9. In the seamless, global ATM system, ASM will not be limited only to tactical aspects of airspace use. Its main scope will be toward a strategic planning function of airspace infrastructure and flexibility of airspace use.

Air traffic services

10. ATS will continue to be the primary element of ATM in the ASIA/PAC regions. ATS is composed of several sub-elements: alerting service, flight information service (FIS) and ATC. The primary objective of ATC service is to prevent collisions between aircraft and between aircraft and obstructions on the manoeuvring area, and to expedite and maintain an orderly flow of air traffic. The objective of FIS is to provide advice and information useful for the safe and efficient conduct of flights. The objective of the alerting service is to notify appropriate organizations regarding aircraft in need of search and rescue aid and assist such organizations as required.

Air traffic flow management

11. The objective of ATFM is to ensure an optimum flow of air traffic to or through areas during times when demand exceeds or is expected to exceed the available capacity of the ATC system. The ATFM system in the ASIA/PAC regions should therefore reduce delays to aircraft both in flight and on the ground and prevent system overload. The ATFM system will assist ATC in meeting its objectives and achieving the most efficient utilization of available airspace and airport capacity. The ATFM system in the ASIA/PAC regions should also ensure that safety is not compromised by the development of unacceptable levels of traffic congestion and, at the same time, assure that traffic is managed efficiently without unnecessary flow restrictions being applied.

ATM system regional evolution and implementation timelines

12. Although changes in the ATM system in the ASIA/PAC regions will be implemented in an evolutionary manner, the design of the emerging system should allow for the implementation of a series of well-planned and feasible improvements with a favourable cost-benefit ratio. The ATM system should satisfy user needs while meeting safety, capacity, efficiency, regularity and environmental protection requirements. The implementation plan should allow for incremental improvements, so that the services provided are appropriate to given applications and areas, thereby ensuring homogeneous, continuous and effective service from gate-to-gate. A well-planned implementation schedule is also essential to guarantee an interface between adjacent systems so that boundaries remain transparent to airspace users.

13. The evolution of ATM in the ASIA/PAC regions has been planned on the basis of an integrated regional infrastructure. This is accomplished through planning based on a series of homogeneous areas and major international air traffic flows. Nine areas have been identified, taking into consideration the varying degrees of complexity and diversity in the region. A high-level view of ATM system implementation is depicted in the *Asia Pacific Regional Plan for the New CNS/ATM Systems* (ASIA/PAC Document 007/4).

Part V.I

AIRSPACE MANAGEMENT (ASM)

OBJECTIVES OF ASM

14. Best use of airspace and airport capacity requires an efficient airspace structure which permits collaboration planning between the aircraft and the ground ATM system. The airspace structure should be capable of dynamically adapting to changing circumstances and also accommodating the capabilities and desires of the airspace users, utilizing all available data.

15. The careful monitoring and efficient coordination of airspace use is essential to ATM. Therefore, the main objective of ASM is the avoidance of permanent reservation of parts of the airspace for one particular user. This applies to all airspace, but the objective is of special importance in airspace where the ATM system is based on a less rigid track structure, as opposed to a fixed network of ATS routes. When airspace user requirements conflict, resolution should be accomplished through coordination among all parties concerned with a view to sharing airspace when possible and keeping the exclusive use of blocks of airspace to a minimum. Finally, close cooperation should result in information being readily available on expected and actual utilization of temporarily reserved airspace. The principles below highlight the main points of effective ASM:

a) airspace use should be carefully coordinated and monitored in order to cater for the conflicting legitimate requirements of all users and to minimize any constraints on operations;

b) when it is unavoidable to segregate different categories of traffic, the size, shape and regulation category of airspace should be tailored to the minimum required to protect the operations concerned;

c) permanent segregation of airspace should be avoided in favour of flexible use of airspace; however, where it is necessary to cater for specific flight operations (e.g. military), reservation of airspace for such events should be limited in time and space to the minimum required; and

d) efficient communications should be provided between the entities providing services to air traffic, in order to enhance civil/military coordination in real time.

16. The aim of airspace sectorization should be to develop an optimum airspace configuration, in combination with the use of other suitable methods for increasing ATM system capacity.

17. In order to accomplish this aim, the following functions are necessary:

a) collection and evaluation of all requests that require temporary airspace allocation;

b) planning and allocation of the required airspace to the users concerned where segregation is necessary;

c) activation and de-activation of such airspace within narrow time tolerances, in close cooperation with ATS units and civil or military units concerned; and

d) dissemination of detailed information, both in advance and in real time, to all parties concerned.

GENERAL GUIDELINES

A cooperative approach to ASM

18. Taking into account the evolutionary introduction of CNS/ATM systems, States and the ASIA/PAC Air Navigation Planning and Implementation Regional Group (APANPIRG) should give consideration to cooperative efforts for introducing more efficiency in ASM, particularly in optimizing routings and transfer points, in order to decrease pilot and controller workload and facilitate the safe, orderly and expeditious flow of air traffic resulting in economy for airspace users.

Civil/military coordination
[ASIA/PAC/3, Rec. 5/13]

19. In order to achieve optimum civil/military coordination and joint use of airspace with a maximum degree of safety, regularity and efficiency of international civil air traffic, States should:

a) establish appropriate civil/military coordination bodies to ensure, at all levels, the coordination of decisions relating to civil and military problems of ASM and ATC;

b) make known to military authorities the existing ICAO provisions (Assembly Resolution A32-14, Appendix P and Annex 11, 2.16 and 2.17) and guidance material (*Manual Concerning Safety Measures Relating to Military Activities Potentially Hazardous to Civil Aircraft Operations* (Doc 9554) and *Manual Concerning Interception of Civil Aircraft* (Doc 9433)) related to civil/military coordination and promote familiarization visits by military personnel to ATS units;

c) arrange permanent liaison and close coordination between civil ATS units and relevant military operational control air defence units, in order to ensure the daily integration or segregation of civil and military air traffic operating within the same or immediately adjacent portions of airspace, employing civil and/or military radars as necessary, and to obviate the need for civil aircraft to obtain special "air defence" clearances; and

d) take the necessary steps to prevent, as far as possible, penetration of controlled airspace by military aircraft without coordination with the ATC unit concerned.

20. In support of Annex 11, 2.16, civil/military cooperation guidelines, developed for the purpose of assisting States in the improvement and efficiency of airspace management by civil and military authorities within the region, are included in the *Air Traffic Services Planning Manual* (Doc 9426), Part II, Chapter 11.

Contingency planning

21. In accordance with Doc 9426, each State shall establish a contingency plan covering all possible situations that would cause disruption to air traffic flow in the airspace of its responsibility. It is the State's responsibility to coordinate with other States who are expected to provide the support services in the event of a contingency situation. The Contingency Plan shall be prepared in advance and submitted to ICAO Headquarters through the Asia/Pacific Regional Office for review and approval by the President of the ICAO Council on behalf of the Council. The contingency plan should be updated at regular intervals as required.

22. Implementation of the contingency plan is needed when the services are disrupted. However, before implementation, there is a need for verification by the State concerned that all conditions envisaged in the contingency plan are met, e.g. that there has been no change to the services provided in adjacent FIRs and that those services will not be affected. Any amendments to the approved plan will need to be further approved by ICAO.

23. As implementation of a contingency plan constitutes a temporary deviation from the services to be provided in accordance with the regional air navigation plan, approval by the President of the Council, on behalf of the Council, will be necessary prior to implementation.

24. It is recognized that in some cases the short time required for approval of implementation of a contingency plan may be insufficient, e.g. in case of natural disasters. Implementation of a contingency plan (without changes) prior to approval of that implementation may be necessary. However, in such cases ICAO should be informed immediately.

Promulgation of prohibited, restricted and danger areas
[ASIA/PAC/3, Rec. 5/14]

25. States should refrain, to the extent possible, from establishing prohibited, restricted or danger areas, bearing in mind that, in accordance with Annex 15, prohibited areas or restricted areas may only be established over the territories of a State and not over international waters, and apply the following principles when the establishment of prohibited, restricted or danger areas becomes unavoidable:

a) give due regard to the need not to prejudice the safe and economical operation of civil aircraft;

b) provide adequate buffer, in terms of time and size, within the designated area, appropriate to the activities to be conducted;

c) use standard ICAO terminology in designation of the areas;

d) promulgate information regarding the establishment and day-to-day use of the areas well in advance of the effective date(s);

e) arrange for the closest possible coordination between civil ATS units and relevant units responsible for activities within the restricted or danger areas so as to enable the ATS units to authorize civil aircraft to traverse the areas in emergencies, to avoid adverse weather and to indicate whenever the restrictions do not apply or the areas are not active; and

f) review the continuing need for the prohibited, restricted or danger areas at regular intervals.

26. When reservation of airspace outside territorial limits becomes unavoidable, it should be of a temporary nature and States should apply the following principles:

a) prior to requesting the establishment of a temporary airspace reservation, the requesting authority shall obtain full information on the likely effect of such a reservation on air traffic. Such information shall include areas of high traffic density which may exist in the vicinity or at the planned location of the airspace reservation, as well as information on peak periods of traffic operating through such areas. In the light of that information, the requesting authority should, to the extent possible, select the site of the airspace reservation, and the time and duration so that this will have the least effect on normal flight operations conducted in the area in question;

b) in specifying the extent of a requested temporary airspace reservation and its duration, the requesting authority shall limit the size of the area to the absolute minimum required to contain the activities intended to be conducted within that area, taking due account of:

   1) ATS route structure and associated airspace arrangement;

   2) operational requirements of civil aircraft;

   3) the navigation capability of aircraft or other vehicles within the airspace reservation;

   4) the means available to monitor those activities so as to guarantee that they will be confined within the airspace reservation;

   5) the ability to interrupt or terminate activities;

c) the duration of the airspace reservation shall be limited, taking a realistic account of preparation of the activities and the time required to vacate the reservation after the completion of the activities; and

d) the actual use of the temporary airspace reservation shall be based on appropriate arrangements made between the ATS unit normally responsible for the airspace and the requesting authority. Such arrangements shall be based on the general agreement reached previously between the competent ATS authority or ATS authorities and the requesting authority. They should, *inter alia,* cover:

   1) the start of the use of the temporary airspace reservation;

   2) the termination of its use;

   3) emergency provisions in case of unforeseen events affecting the activities to be conducted within the temporary airspace reservation.

27. When developing the plans for future ATS systems, prime consideration should be given to the creation of a flexible ASM system capable of integrating the requirements of all categories of users in the most effective manner.

Designation of flight information regions (FIRs)/ upper flight information region (UIRs)
[ASIA/PAC/3, Rec. 5/26]

28. The term "flight information region (FIR)" should continue to be applied in those cases where the lateral limits of an FIR in the lower and upper airspace are the same and where the service is provided by the same ATS unit. The term "upper flight information region (UIR)" should be applied to describe upper airspace only in those cases not covered above.

Plane of division between lower and upper FIRs
[ASIA/PAC, Rec. 7/1]

29. The plane of division between lower and upper FIRs, when necessary, should be established uniformly at FL 245.

Identification of area control centres/ flight information centres (ACCs/FICs) in voice communications
[ASIA/PAC/3, Rec. 5/27]

30. States having selected, in accordance with Annex 11, 2.9.1, geographical names for their FIRs which are cumbersome or difficult to pronounce in voice communications, should select an abbreviated, contracted or simplified version of the geographical name for use in the call sign of the centre serving the FIR.

Avoidance of non-standard ATS airspace terminology
[ASIA/PAC/3, Rec. 5/29]

31. In describing their airspace organization and ATS units, States should avoid the use of non-standard terms such as "sub-FIR" and "sub-FIC". In cases where delegation of the responsibility for providing FIS within a portion of an FIR is found to be necessary in the interest of efficiency, the ATS units to which the responsibility is designated should continue to carry their normal designation (e.g. TWR, APP) and, when necessary, the area to be served by such units should be referred to as (name) sector of the FIR.

Establishment of a common, region-wide transition altitude
[ASIA/PAC/3, Rec. 6/3]

32. The pursuit of a common, region-wide transition altitude should be discontinued and States in the ASIA/PAC regions, when establishing transition altitudes, should take due account of transition altitudes in neighbouring States. Furthermore, States in the ASIA/PAC regions should establish transition altitudes above 10 000 ft.

Delegation of responsibility for the provision of ATS (for short distance ATS routes)
[ASIA/PAC, Rec. 7/9]

33. In cases where ATS routes traverse FIRs for short distances and agreement cannot be reached on adjustment of the FIR boundaries, the States concerned should attempt to reach agreement regarding the delegation of responsibility for the provision of ATS to flights along such route segments, so as to reduce cockpit workload and the need for coordination between the ATS units concerned.

ATS structure, ATS routes and reporting points

34. The general objective of the ASIA/PAC airspace structure is to move, in an evolutionary manner, towards a seamless ATM environment based on the ASIA/PAC CNS/ATM implementation plan. One of the principle aims of this objective is to design an airspace structure based on homogeneous ATM areas and major traffic flows to be developed on the basis of the *Asia/Pacific Regional Plan for the New CNS/ATM Systems* (ASIA/PAC Document 007/4).

35. The plan of ATS routes as shown in Table ATS 1 forms the ATS route network for the ASIA/PAC regions.
[ASIA/PAC/3, Rec. 5/19]

36. Whenever practicable, States in close coordination with operators, should attempt to establish the most direct routings between entry and exit points of terminal control areas for aircraft in transit without landing.
[ASIA/PAC/3, Rec. 7/15]

Procedures for the approval of reduced vertical separation minima (RVSM) operations
[ASIA/PAC/3, Conc. 6/5]

37. States, when developing criteria, programmes and procedures for the approval of aircraft and operators for reduced vertical separation minima (RVSM) operations, should take into account material on RVSM published by ICAO.

Reduction in separation minima
[ASIA/PAC/3, Rec. 6/6]

38. States should implement CNS/ATM systems as necessary to permit the application of a 10-minute separation minimum on ATS trunk routes.

Characteristics of control areas

39. The lateral and vertical limits of control areas to encompass the ATS routes shown in Table ATS 1 should be determined in accordance with the following criteria:

a) *Lateral limits.* To be determined by the States concerned in consultation with the operators, taking full account of the limitations of navigation aids available and the need to allow for flexibility in the routing of aircraft to avoid adverse weather, resolve traffic conflicts and employ more direct routings when traffic and other conditions permit. In establishing the width of airways, the following planning principles should apply:

   1) for ATS routes defined by a VHF omnidirectional radio range (VOR), an overall system accuracy figure should be assumed to be ±5 degrees;

   2) for ATS routes defined by non-directional radio beacons (NDB), the overall system accuracy should be assumed to be ±7 degrees;

   3) other overall accuracy figures may be used in the light of flight check information or to meet specific national criteria. Recognizing the variances which may exist in the airborne equipment, however, any reduction in the tolerances mentioned above should be made only after consultation with the operators concerned;

   4) the overall width of an airway defined by navigation aids and serving a single ATS route should be not less than 4 NM on either side of the track up to and including 20 000 ft, and 5 NM on either side of the track above 20 000 ft, unless the guidance material in Annex 11 is found to be applicable;

   5) the width of an airway which is not defined by ground-based navigation aids may be increased to not more than 50 NM on either side of the track.

b) *Vertical limits.* To be determined by States in consultation with the operators concerned taking into account all operational requirements and the following criteria:

1) *Upper limit.* At least:

— for SST aircraft, approximately FL 660

— for turbo-jet aircraft, FL 460

— for turboprop aircraft, FL 360

— for aircraft with reciprocating engines, FL 255

2) *Lower limit.*

— FL 245 for control areas established only in the upper airspace

— FL 55 for control areas over oceanic areas or 900 m (3 000 ft) for control areas above land and adjacent territorial waters.

c) In applying the foregoing, States should:

1) ensure that the airspace allocations are adequate to contain the type of operations to occur therein;

2) having satisfied 1), determine an adequate buffer airspace;

3) in promulgating the airspace, include the selected buffer within the controlled airspace boundary.

d) In connection with a), b) and c), attention should be drawn to the PANS-ATM (Doc 444)4 which specify a minimum track difference of 15 degrees between aircraft using VOR and 30 degrees between aircraft using NDB for separation at a distance of 15 NM or more from the facility.

[ASIA/PAC/3, Rec. 5/12]

Uniformity in cruising levels
[ASIA/PAC/3, Rec. 6/1]

40. States that have not already done so should implement, in the airspace under their jurisdiction, the table of cruising levels as prescribed in Annex 2, Appendix 3.

Control of VFR flights in control zones and terminal control areas
[ASIA/PAC/3, Rec. 5/30]

41. In terminal control areas and control zones where traffic density so requires, ATC service should be applied to all aircraft, including VFR traffic, in order to provide separation in accordance with the provisions related to airspace classification contained in Annex 11 for aircraft executing arrival, departure, holding and noise abatement procedures. Relevant procedures should be developed in consultation with operators since this is a complex problem greatly influenced by local conditions.

Aerodrome control service

Determination of transition altitudes and transition levels

42. States in the area under consideration should:

a) ensure that all international aerodromes are assigned a transition altitude and a transition level, as appropriate, in accordance with the PANS-OPS (Doc 8168); and

b) publish corresponding procedures in their respective Aeronautical Information Publication (AIP).

[ASIA/PAC/3, Rec. 6/2]

Establishment of standard arrival and departure routes

43. States that have not already done so should establish standard departure and arrival routes wherever necessary, taking into account relevant provisions in Annex 11, Appendix 3 and guidance material in Doc 9426.
[ASIA/PAC/3, Rec. 5/20]

Air traffic advisory service
[ASIA/PAC, Rec. 7/27]

44. Where air traffic advisory service is implemented on international ATS routes, it should be provided on an interim basis only, when facilities or personnel are not yet fully adequate for permitting the immediate introduction of ATC service. Such service should be converted to ATC service at the earliest time possible.

IMPLEMENTATION

Implementation and promulgation of ATS routes
[ASIA/PAC/3, Rec. 14/13]

45. Those new or modified ATS routes as shown in Table ATS 1 should be established as soon as possible, except for such routes where no immediate operational requirements exist, or where the alignment is subject to negotiations. The latter routes should be implemented as soon as international aircraft operations are introduced or, as applicable, when the negotiations have been completed.

46. Implementation of ATS routes or segments of ATS routes extending into the airspace of an adjacent State should be effected at a common agreed date among States concerned.

47. States should endeavour to urgently implement those facilities required for the implementation of all ATS routes.

48. States should implement, to the extent possible, RNAV routes.

Part V.II

AIR TRAFFIC SERVICES (ATS)

GENERAL

Repetitive flight plans
[ASIA/PAC/3, Rec. 6/12]

49. States should implement the system of repetitive flight plans (RPLs) in areas where RPLs are not used at present but where such use may be beneficial to both ATS and operators.

Air traffic incident reporting
[ASIA/PAC/3, Rec. 6/14]

50. States that have not already done so should:

a) implement procedures for the timely reporting of air traffic incidents;

b) publish reporting procedures in their AIPs and relevant ATS documents and make the model ATS Incident Report Form available at ATS units including those offices used for pre-flight and post-flight pilot briefing;

c) establish procedures for the investigation of causes and circumstances concerning significant air traffic incidents; and

d) emphasize, in national documentation, the need for rapid notification of the results of investigations to all parties concerned including pilots, aircraft operators, ATS units, ICAO and other affected States or agencies.

Expression of altimeter settings in air-ground communications
[ASIA/PAC/3, Rec. 6/19]

51. States, due to the continuing use of millibars and inches of mercury in some States in air-ground communications concerning altimeter settings should:

a) give particular emphasis in instructions issued to their ATC and communications personnel to the need to apply correct radiotelephony phraseologies when transmitting altimeter setting information to aircraft and to specify, on a routine basis, the unit of measurement employed;

b) invite the attention of operators and pilots to the need to ascertain whether altimeter setting information is given in hectopascals (millibars) or in inches of mercury.

FLIGHT INFORMATION SERVICE
(Charts ATS 1 and ATS 2)

Interception of civil aircraft
[ASIA/PAC/3, Rec. 5/15]

52. States that have not yet done so should ratify, as soon as possible, the Protocol incorporating Article 3 *bis* into the Chicago Convention as established in Assembly Resolutions A25-1 and A25-2.

Reduction of the need to intercept civil aircraft
[ASIA/PAC/3, Rec. 5/16]

53. States should examine the adequacy of present regulations and administrative directives, promulgated information and arrangements for communications and co-ordination between ATS units and intercept control units, as well as between ATS units serving adjacent areas, with the objective of eliminating or reducing the need for interception of civil aircraft.

Publication of information in AIPs
[ASIA/PAC/3, Rec. 5/17]

54. States that have determined that there is a risk of interception in case of penetration of certain areas adjacent to ATS routes, should include in their AIPs, as soon as possible, text relating to the potential risk of interception, including the navigation requirements to keep clear of the area.

55. States that have not determined the existence of interception risk, but which are affected by a situation of this nature, should adopt, as soon as possible, all measures which may be necessary to comply with the indications referred to in 53.

56. States that possess the facilities to monitor deviations from track which may involve the possibility of penetrating airspaces where interception procedures are implemented, should include in their AIPs that such deviations will be communicated to the aircraft concerned.

57. AIS units should prepare a separate pre-flight bulletin on dangers to air navigation with details on activated areas, for distribution to flight crews and operations personnel.

Operational letter of agreement between ATS and military units
[ASIA/PAC/3, Rec. 5/18]

58. In order to facilitate uniformity in the application of ICAO Standards and Recommended Practices relating to the interception of civil aircraft, States should, as far as possible, when establishing agreements between ATS units and between ATS units and appropriate military units, use, to the extent possible, the model letter of agreement appearing at Appendix B to Doc 9433.

VOLMET
[ASIA/PAC/3, Rec. 5/24]

59. The HF radiotelephony VOLMET broadcast plans for the ASIA/PAC regions are presented in FASID Table ATS 2 and FASID Chart ATS 4.

Part V.III

AIR TRAFFIC FLOW MANAGEMENT (ATFM)

GENERAL PRINCIPLES OF THE ATFM SERVICE

61. In airspaces with high volumes of air traffic, ATFM is needed to support ATM as a planning tool by providing for an optimum flow of air traffic to or through areas during times when demand exceeds or is expected to exceed, the available capacity of the ATM system. The oceanic ATFM service should be interfaced with domestic ATFM organizations/units to provide maximum harmonization.

62. When operationally required, the APANPIRG should develop appropriate procedures for the provision of the ATFM service within the ASIA/PAC regions to cater for the requirements of flights to and from FIRs in the regions and adjacent to it. To achieve this, the following basic principles should be covered in the future ATFM system:

a) pro-active ATFM requires the ability to dynamically interact with the strategic planning of traffic flows. Therefore, ATFM in the ASIA/PAC regions should be interfaced with the overall ATFM strategies in other regions. To this end, the ATM system should also be capable of adjusting to the varying requirements;

b) re-active ATFM is required to take account of short-term contingencies. The ATM system should be able to react quickly and provide early information and advice to the controller and the pilot of the best tactical response necessary to achieve ATFM objectives;

c) data should be collated on likely future demand using historical information, planned development by airports and airlines, aircraft manufacturers, plus the economic forecasts and trends in States of the regions;

d) a recognized and common methodology for the assessment of the capacity of the current and planned ATM system should be developed to include sector capacities and in particular “choke” points;

e) regions should consider the introduction of a centralized flow management unit; and

f) where more than one flow management unit exists, plans to harmonize procedures and practices with adjacent units should be developed.

Appendix A

TABLE ATS 1 — ATS ROUTES

EXPLANATION OF THE TABLE

Routes are listed consecutively, in alphabetical order, beginning with the lower ATS routes and followed by the upper ATS routes.

The designator of each ATS route is shown above the route.

Significant points defining the ATS routes are given. Only prominent locations have been listed. Additional points where facilities are provided to complete navigational guidance along a route, but not otherwise marking significant characteristics of the route (change of heading of centre line, intersection with other routes, etc.) have normally not been included. Locations shown in parentheses indicate significant points outside the ASIA/PAC regions.

LOWER ATS ROUTES

A1

(DUBAI/SHARJAH)
JIWANI
KARACHI
PRATAPGARH BAGO
CALCUTTA
BANGKOK
UBON
DANANG
BUNTA, 1650.0N 10923.7E
CAVOI, 1713.5N 11000.0E
DAGON, 1905.3N 11151.9E
CHEUNG CHAU
ELATO, 2220.0N 11730.0E
MAKUNG
TAIBEI
KAGOSHIMA
MIYAKE JIMA

A201

LASHIO
AGARTALA
RAJSHAHI
MONDA, 2521.0N 08626.25E
PATNA
LUCKNOW

A202

BANGKOK
KORAT
SAVANNAKET, 1718.0N 10600.0E
VILAO, 1718.0N 10600.0E
DONGHOI
XONUS, 1804.2N 10714.0E
ASSAD, 1820.28N 10405.3E
SAMAS, 2030.3N 11029.7E
SIKOU, 2050.6N 11130.0E
CHEUNG CHAU

A204

TESIO, 4454.4N 14146.9E
REBUN
AKSUN, 4545.1N 14054.3E
(SELTI), 4713.3N 14013.3E

A205

LABUAN
OLKIT, 0450.1N 11149.1E

LOWER ATS ROUTES

A209

ELATI, 0200.0S 08957.7E
PORT HEDLAND

A211

MANADO
TARAKAN
TAWAU

A212

PUPIS
PAGO PAGO
NIUE

A214

PEKANBARU
BUSUX, 0355.0S 06000.0E
(PRASLIN)

A215

PORT MORESBY
MERAUKE
HASANUDDIN
KEVOK, 0425.0S 11500.0E

A216

COOKTOWN
AKMIP, 1200.0S 14448.6E
KIKORI
GUNNY, 0500.0N 14400.0E
RICHH, 1711.49N 14249.12E

A217

DOPID
JAMESHEDPUR

A218

HARBIN
(EKIMCHAN)
(MYS SHMIDTA)
BARROW

A219

KARACHI
NAWABSHAM

LOWER ATS ROUTES

KALAT, 2902.0N 06635.0E
SERKA, 2951.0N 06615.0E
KANDAHAR
(TERMEZ)

A220

CLUKK, 3605.0N 12450.1W
TAHITI

A221

GUAM
ROTA IS
TINIAN IS
SAIPAN

A222

GUAM
POHNPEI
KOSRAE
KWAJALEIN

A223

RUSAR, 2951.7N 12750.4E
FUKUOKA

A224

JOHOR BAHRU
MERSING

A326

SHIGEZHUANG
OKTON, 3911.2N 11653.5E
TIANJIN
MAKNO, 3827.6N 12110.0E
SANKO, 3814.2N 12228.4E
DONVO, 3734.0N 12320.0E
AKARA, 3130.0N 12330.0E

A327

PHUKET
KADAP, 0200.0S 08409.6E
KALBI, 0852.3S 07500.0E
(PLAISANCE)

LOWER ATS ROUTES

A330

MEDAN
MADURAI
KAGLU, 1231.2N 07200.0E

A331

ZIGIE, 2419.0N 15717.5W
SEDAR, 4530.4N 12643.0W

A332

APACK, 2402.8N 15619.3W
AMITY, 2626.0N 15229.0W
HEMLO, 4318.2N 12640.8W

A334

HAT YAI
KOTA BHARU

A335

TUMURTAI
ULAN BATOR
(IRKUTSK)

A337

ADKAK, 3354.0N 14210.0E
TEGOD, 2100.0N 14512.0E
JUNIE, 1132.5N 14706.3E
KISME, 0500.0N 14805.4E

A338

CHRISTCHURCH
APORO, 0500.0S 17120.0E
BYRD

A339

PERTH
CURTIN
ELBIS, 0905.9S 12743.7E
SHREE, 0539.0N 13109.2E
KEITH, 2100.0N 13456.8E
SABGU, 2529.9N 13459.3E
MAKDA, 2716.0N 13551.2E
TAXON, 3000.0N 13714.5E
MIYAKEJIMA

LOWER ATS ROUTES

A340

RAYONG
BISOR, 1221.0N 10247.0E
PHNOM PENH

A341

KOTA KINABALU
SANDAKAN
ZAMBOANGA

A342

COLD BAY
OLCOT, 5125.8N 16533.3E

A344

ROZAX, 0245.0S 11140.0E
SUMBAWA

A345

PYONGYANG
GOLOT, 4012.5N 12430.5E
FENGCHENG
KAIYUAN
HAILAR
KAGAK, 4916N 11806E
MANLI, 4935N 11727E
TELOK, 4938N 11722E
(CHITA)

A346

HAMILTON IS
AUCKLAND

A348

MELBOURNE
EAST SALE
NISEP, 4144.6S 15601.5E

A349

BANGKOK
PATHEIN
CALCUTTA

LOWER ATS ROUTES

A364

SHACHE
KASHI
KURUM, 4006.0N 07407.0E

A450

DENPASAR
HASANUDDIN
KOROR
YAP IS
GUAM
WAKE
KATHS, 2104.6N 16123.4W

A451

(ADEN)
ANGAL, 1614N 06000.0E
MUMBAI

A452

GOLEM, 1157.6N 06722.2E
ELKEL, 0149.0N 06911.0E
(DIEGO GARCIA)

A453

(KANDAHAR)
(ZAHEDAN)
(BANDAR ABBAS)

A456

AMRITSAR
LAHORE
MOLTA, 3012.0N 07236.2E
BINDO

A457

HAT YAI
TAMOS, 0632.2N 10024.0E
ALOR SETAR
PENANG
KUALA LUMPUR
JOHOR BAHRU

LOWER ATS ROUTES

A460

KUQA
REVKI, 4232.5N 08013.2E
(KIRBALTABAY)

A461

DAWANGZHUANG
WEIXIAN
ZHOUKOU
HEKOU
LONGKOU
LILING
YINGDE
SHILONG
BEKOL, 2232.6N 11408.0E
CHEUNGCHAU
NOMAN, 2000.0N 11640.3E
MUMOT, 1859.8N 11749.4E
AVMUP, 1759.1N 11908.0E
SAN FERNANDO
CABANATUAN
MANILA
SAN JOSE
ZAMBOANGA
AMBON
DARWIN
ALICE SPRINGS
LEIGH CREEK

A462

CALCUTTA
DHAKA

A463

MADURAI
BIKOK, 0817.0N 07836.0E
COLOMBO
COCOS IS
PERTH

A464

CHIANG MAI
BANGKOK
HAT YAI
IPOH
BATU ARANG
KUALA LUMPUR
SINGAPORE
TINDAL

LOWER ATS ROUTES

TAROOM
LORD HOWE IS
AUCKLAND

A465

CALCUTTA
METIM, 2055.0N 08750.0E
VISHAKAPATNAM
CHENNAI
COLOMBO

A466

(KABUL)
SANAM, 3305.0N 07003.0E
DERA ISMAIL KHAN
JHANG, 3116.0N 07218.0E
SAMAR, 3120.8N 07434.0E
ASARI, 3048.3N 07509.6E
DELHI

A467

BIRATNAGAR
KATIHAR
CALCUTTA

A468

KUQA
KAMUB, 4134.0N 07850.0E

A469

HO CHI MINH
CONSON IS

A470

CHEUNG CHAU
MAGOG, 2217.3N 11549.4E
SHANTOU
XINGLIN
FUQING
LIANJIANG
YUNHE
TONGLU
HANGZHOU
LISHUI
BANTA
PIXIAN

LOWER ATS ROUTES

A473

JALALABAD
NEPALGUNJ
KATHMANDU

A474

DELHI
MUMBAI
MURUS, 0600.0S 06319.7E
(PLAISANCE)

A575

PYONGYANG
GOLOT, 4012.5N 12430.5E
FENGCHENG
DONGYANGJIAO
DAHUSHAN
CHAOYANG
ANDIN, 4106.0N 11843.5E
GUBEIKOU
FENGNING
EREN
INTIK, 4341.5N 11155.0E
SAINSHAND
ULAN BATOR
(KYZYL)

A576

MEDAN
SINGAPORE
DENPASAR
CURTIN
ALICE SPRINGS
PARKES
SYDNEY

A577

SHIKANG
KADET, 2100N 11934E

LOWER ATS ROUTES

A578

TONIK, 3200.0N 14600.0E
POHNPEI
NAURU
TARAWA
FUNAFUTI
NADI
AUCKLAND

A579

SYDNEY
NADI
CARRP, 1904.4N 15935.0W

A580

AUCKLAND
NAUSORI
APIA

A581

BAGO
CHIANG MAI
CHIANG RAI
PONUK, 2018.8N 10023.0E
SAGAG, 2111.5N 10137.4E
BIDRU
KUNMING
MAGUOHE
QIANXI
HUAYUAN
LINLI
WUHAN

A582

JOMALIG
CHINEN
KAGOSHIMA
IKISHIMA
BUSAN
SEOUL

A583

CHEUNG CHAU
SABNO, 1859.1N 11550.7E
MAVRA, 1738.4N 11625E
AKOTA, 1627.7N 11708.0E
IBOBI, 1418.7N 11811.6E
REKEL, 1335.4E 11835.1E
LEGED, 1255.5N 11854.0E
TOKON, 1142.0N 11940.3E
ZAMBOANGA

A584

TONGA
NIUE
APIA
FUNAFUTI
NAURU
KOSRAE

A585

PALEMBANG
JAKARTA
PORT HEDLAND
CEDUNA
ADELAIDE

A586

INTOS, 3722.0N 13120.0E
BUSAN
JEJU
ERABU
NAHA

A587

SUMBAWA
ALICE SPRINGS

A588

DALIAN
WAFANGDIAN
WANGBINGOU
KAIYUAN
CHANGCHUN
HARBIN
SIMLI 5017.4N 12722.1E

A590

JOMALIG
MINAMI DAITO
MIYAKE JIMA
KAGIS, 3549.0N 14234.0E
PABBA, 3700.0N 14400.0E
PASRO, 4817.1N 16040.5E
(AMOTT), 6054.0N 15121.6W

A591

QINGDAO
XUEJIADAO
LATUX, 3532.0N 12044.0E
MUDAL, 3651.0N 12322.0E
AGAVO, 3710.0N 12400.0E

A592

PUPIS, 1000.0S 17105.5W
APIA
VAVA'U
TONGA

A593

TANGHEKOU
XILIUHETUN
SHIGEZHUANG
POTOU
PIXIAN
WUXI
SHANGHAI
NANHUI
FUKUE

A594

MALE
SUNAN, 0028.7S 07800.0E
DADAR, 0200.0S 07927.1E
PERTH

A595

FUKUOKA
IKISHIMA
JEJU

A596

HUAIROU
HUAILAI
TIANZHEN
LIANGCHENG
BAOTOU
DENGKOU
YABRAI

LOWER ATS ROUTES

A597

GOBOH
KUSHIMOTO
MONPI, 2100.0N 14036.0E
GUAM
HONIARA
NOUMEA
AUCKLAND

A598

BRISBANE
HONIARA
NAURU
MAJURO

A599

CHITTAGONG
LINSO, 2322.5N 09855.0E
GENGMA
KUNMING
LUXI
BOSE
LAIBIN
GAOYAO
PINGZHOU
ZHULIAO
WONGYUAN
NANXIONG
GANZHOU
NANFENG
SHANGRAO
TONGLU
NANXUN
SHANGHAI

B200

ENKIP, 3547.0S 17730.0E
FICKY, 3133.6N 12123.5W

B201

NIUE
AUCKLAND

LOWER ATS ROUTES

B202

UBON
PAKSE
PLEIKU

B203

KATHMANDU
BAGDOGRA
GUWAHATI
SILCHAR
IMPAL
LASHIO

B206

URUMQI
FUKANG
ALTAY
GOPTO, 4905.5N 08728.0E
(AKTASH)

B209

JAMSHEDPUR
KHAJURAHO
TIGER, 2828.8N 07214.9E

B210

BHUBANESWAR
TASOP, 2513.3N 07048.0E
NAWABSHAH

B212

GANGWON
NIIGATA

B213

LHASA
CHENGDU

B215

DAWANGZHUANG
TAIYUAN
YINCHUAN
YABRAI
JIUQUAN
HAMI
FUKANG

LOWER ATS ROUTES

URUMQI
KUQA
SHACHE
HONGQILAPU
PURPA, 3656.5N 07524.5E
GILGIT
ISLAMABAD

B218

KUNMING
SIMAO, 2243.1N 10058.2E
SAGAG, 2111.5N 10137.4E
VIENTIANE

B219

PENANG
KOTA BHARU

B220

BRISBANE
PORT MORESBY

B221

NINAS, 3100.0N 12215.0E
PINOT, 3125.2N 12214.2E
SAGUT, 3500.0N 12040.3E
XUEJIADAO

B223

HAILAR
QIQIHAR
HARBIN

B326

HONIARA
CHOKO, 2022.6N 16053.0W

B327

KATCH, 5400.0N 13600.0W
KODIAK
CAPE NEWENHAM
NULUK, 5822.9N 17706.1W
BAMOK, 5625.5N 17249.3W
(NIKOLSKOE)

LOWER ATS ROUTES

B328

EREN
TUMURTAI
TIANZHEN
NANCHENGZI
WEIXIAN

B329

PHNOM PENH
PAKSE

B330

HONG KONG
TAMOT, 2221.5N 11352.0E
PINGZHOU
GAOYAO
DOUJIANG
QIANXI
FUJIACHANG
JINGTAI
YABRAI
MORIT, 4202.0N 10249.0E
NIDOR, 5029.4N 09125.8E
(NOVOKUZNETSK)

B331

CHEUNG CHAU
KAPLI, 2110.0N 11730.0E
HENGCHUN

B332

SANKO, 3814.2N 12228.4E
TOMUK, 3843.0N 12400.0E
PYONGYANG
SINSONGCHON
SONDO, 3947.0N 12713.6E
KANSU, 3838.0N 13228.5E

B333

AUCKLAND
PORT MORESBY

LOWER ATS ROUTES

B334

BEIJING
TANGHEKOU
FENGNING
TONGLIAO

B335

KUALA LUMPUR
PEKANBARU
POSOD, 0329.5S 09409.9E
PEDPI, 1316.6S 07500.0E
(PLAISANCE)

B337

(TAKHTOYAMSK)
ANIMO, 4508.3N 14337.8E
ASAHIKAWA

B338

MERSING
TEKONG
ANITO, 0017.0S 10452.0E

B339

POLHO 4447.0N 11315.0E
FENGNING

B340

TRIVANDRUM
BIKOK, 0817.0N 07836.0E
COLOMBO
LEARMONTH
MOUNT HOPE
ADELAIDE

B344

(PLAISANCE)
LELED, 1116.5S 07500.0E
ELATI, 0200.0S 08957.7E
KETIV, 0042.0S 09200.0E
MEDAN

B345

LHASA
NONIM
TUMLINGTAR

LOWER ATS ROUTES

KATHMANDU
BHARATPUR
BHAIRAHAWA
LUCKNOW

B346

LUANG PRABANG
NOBER, 1516.6N 10040.1E
BANGKOK

B348

HENGCHUN
POTIB, 2100.0N 12045.5E
LAOAG
SAN FERNANDO
MANILA
TOKON, 1142.0N 11940.3E
PUERTOPRINCESA
OSANU, 0741.4N 11717.6E
KOTA KINABALU
BRUNEI
KAMIN, 0235.1N 10855.7E
SABIP, 0209.7N 10750.5E
TOMAN, 0121.5N 10547.0E

B349

BALI
POTIP, 2141.6S 12508.0E

B450

SYDNEY
LORD HOWE IS
NORFOLK IS
PAGO PAGO

B451

HAILAR
QIQIHAR
HARBIN
BISUN, 4314.0N 13111.8E
(VLADIVOSTOK)
IGROD, 4139.0N 13647.0E
KADBO, 3914.0N 13745.0E

LOWER ATS ROUTES

B452

TONIK, 3200.0N 14600.0E
HONIARA
NADI

B453

MIDDLETON IS
KATCH, 5400.0N 13600.0W
DAASH, 4226.5N 12600.1W

B454

PAGO PAGO
RAROTONGA
TONYS, 3019.9N 12249.2W

B455

VAVA'U
NISEX, 1547.3S 17136.4W

B456

WEWAK
JAYAPURA

B457

(IZKI)
BELGAUM
BELLARY

B459

MUMBAI
CLAVA, 0134.0N 06000.0E
(PRASLIN)

B462

MACKAY
HAMILTON IS
PORT MORESBY
KADAB, 0458.0S 14100.0E
BIDOR, 0400.0N 13130.0E
TACLOBAN
MANILA
CABANATUAN
LAOAG
MIYAKO JIMA
OKINAWA

LOWER ATS ROUTES

B463

KOTA BHARU
DAWEI
BAGO
MANDALAY
LASHIO

B465

CALCUTTA
CHITTAGONG
MANDALAY
LUANG PRABANG
HANOI

B466

JOHOR BAHRU
BATU ARANG
CHENNAI
MUMBAI

B467

GANGWON
INTOS, 3722.0N 13120.0E
KANSU, 3838.0N 13228.5E
NULAR, 4059.2N 13411.0E
(TEKUK), 4241.0N 13527.4E
VELTA 4529.0N 13710.0E
YEDINKA

B469

SINGAPORE
JAKARTA
CARNARVON
GERALDTON
PERTH
CAIGUNA
WHYALLA
GRIFFITH
SYDNEY

B470

SINGAPORE
PANGKALPINANG
JAKARTA

LOWER ATS ROUTES

B472

LIPA
ILO ILO
COTABATO
SELSO, 0400.0N 12616.0E
TOREX, 0724.0S 13335.0E
GOVE
NORMANTON

B473

LIPA
ROXAS
CAGAYAN-DE-ORO
DAVAO
SADAN, 0400.0N 12805.0E
CAIRNS

B474

SYDNEY
SANTO
NANUMEA
CHOKO, 2022.6N 16053.0W

B480

(RAZDOLIYE)
LETBI, 5011.9N 10330.6E
MORIT, 4202.0N 10249.0E

B483

(SELTI), 4713N 14013E
AKSUN 4545N 14055E

B575

AUCKLAND
TONGA
PAGO PAGO

B576

TAIBEI
JEJU
SEOUL

LOWER ATS ROUTES

B577

NADI
WALLIS IS
APIA
PAGO PAGO
FICKY, 3133.5N 12123.5W

B578

BRISBANE
NOUMEA
TAHITI

B579

DELHI
NAGPUR
VISHAKHAPATNAM
PORT BLAIR
PHUKET
LANGKAWI
PENANG

B580

SYDNEY
NOUMEA
CHOKO, 2022.6N 16053.0W

B581

NADI
FICKY, 3133.5N 12123.5W

B583

BRUNEI
DARWIN

B584

DENPASAR
ELANG, 0056.0S 11449.5E
KOTA KINABALU
VINIK, 0838.6N 11613.8E

B586

NOUMEA
SEKMO, 1949.1S 16229.3E
KAPKI, 1014.9S 14817.7E
PORT MORESBY
GUAM
OMLET, 2100.0N 14259.2E
TATEYAMA

LOWER ATS ROUTES

B587

ST GEORGE
KOWANYAMA
OPABA, 0851.5S 13804.0E
TIMIKA
BIAK
RENAN, 0330.0N 13416.6E
ENDAX, 1415.0N 13000.0E
ATVIP, 2100.0N 12422.0E
HUALIEN

B589

PORT MORESBY
KAPKI, 1014.9S 14817.7E
BUKA
MAJURO

B590

NOUMEA
PORT VILA
NAURU

B591

SHANGHAI
TAIBEI
HENGCHUN

B592

KOTA KINABALU
JAKARTA

B593

CALCUTTA
COMILLA
AGARTALA
GUWAHATI

B595

TAHITI
KONA

LOWER ATS ROUTES

B596

RAROTONGA
DOVRR, 1843.0N 15740.0W

B597

ERABU
TANEGASHIMA
SHIMIZU

B598

DARWIN
THURSDAY IS
PORT MORESBY
KAPKI, 1014.9S 14817.7E
HONIARA
PORT VILA
NADI
NAUSORI
TONGA
RAROTONGA

B599

NOUMEA
NADI
TAHITI

G200

CHRISTMAS IS
COCOS IS
(PLAISANCE)

G202

(KANDAHAR)
ZHOB
RAHIM YAR KHAN

G203

MIHO
BUSAN

G204

ELNEX, 2938.0N 11925.0E
SHENGXIAN
ANDONG
SHANGHAI

LOWER ATS ROUTES

G205

HAMILTON IS
GURNEY
JUNIE, 1132.6N 14706.3E

G206

(KABUL)
SABAR, 3537.0N 07131.0E
PURPA, 3656.5N 07524.5E

G208

MUMBAI
KARACHI
PANJGUR
(ZAHEDAN)

G209

LEARMONTH
CHRISTMAS IS
PALEMBANG

G212

(KHABAROVSK)
ARGUK, 4753.5N 13439.4E
HAIQING
JIAMUSI
HARBIN
TONGLIAO
GUBEIKOU
QINBAIKOU
NANCHENGZI
TAIYUAN
YIJUN
SANYUAN
XIAOYANZHUANG
NINGSHAN
WUFENGXI
FUJIACHANG
WEINING
MAGUOHE
KUNMING

G213

BIAK
BEKUB, 0350.0N 13845.0N
GUAM

LOWER ATS ROUTES

G214

JIWANI
PANJGUR
RAHIMYAR KHAN
MOLTA, 3012.0N 07236.2E

G215

DUTCH HARBOR
OLCOT, 5125.8N 16533.3E

G218

HOHHOT
TUMURTAI
POLHO, 4447.0N 11315.0E

G219

VIRUT, 0230.8N 10402.7E
TEKONG

G220

JAKARTA
TANJUNG PANDAN
KIKOR, 0023.0S 10706.1E
BOBOB, 0222.1N 10706.1E
LUSMO, 0333.7E 10655.7E

G221

BAOLONG
HAIKOU
SAMAS, 2030.3N 11029.7E
SIKOU, 2050.6N 11130.0E

G222

SAPDA, 1200.0S 11125.6E
BROOME
AYERS ROCK
PARKES

G223

TATEYAMA
TONIK, 3200.0N 14600.0E
NAURU
NADI
NAUSORI
NIUE
AITUTAKI

LOWER ATS ROUTES

TAHITI
(LIMA)

G224

NORFOLK IS
NADI
PAGO PAGO
TAHITI
ISLA DE PASCUA
(SANTIAGO)

G325

COLOMBO
TIRUCHCHIRAPPALLI

G326

BALI
TENNANT CREEK
BRISBANE

G327

NANHUI
NINAS, 3100.0N 12215.0E
AKARA, 3130.0N 12330.0E

G329

BRISBANE
NORFOLK IS

G330

NANXIANG
POMOK, 3127.0N 12107.0E
PIKAS, 3210.0N 12044.0E
PIMOL, 3215.0N 11944.0E

G331

PHUKET
PADET, 1000.0N 09816.0E
DAWEI

G332

TANGHEKOU
CHAOYANG

LOWER ATS ROUTES

G334

KUALA LUMPUR
TIOMAN
BUNTO, 0242.0N 10600.0E
KAMIN, 0235.1N 10855.7E
SIBU

G335

KATHMANDU
JANAKPUR
PATNA

G336

DHANBAD
PATNA
SIMARA
KATHMANDU

G337

PERTH
CHRISTMAS IS
PEKANBARU

G339

BUSAN
FUKUOKA
KAGOSHIMA
TANEGASHIMA
PAKDO, 2100.00N 13749.18E
GUAM

G340

QINGBAIKOU
HUAILAI

G341

CHANGCHUN
WANGQING

G342

CAIRNS
HONIARA

LOWER ATS ROUTES

G344

COMFE, 3624.0N 14618.0E
CUTEE, 4624.9N 16218.6E
CUDDA, 5647.9N 16018.1W

G345

UNTAN, 3212.5N 12017.5E
CHANGZHOU
LISHUI

G346

KIMCHAEK
NULAR, 4059.2N 13411.0E
IGROD, 4139.0N 13647.0E

G347

AUCKLAND
POPIR, 2500.0S 17804.8W
DOVRR, 1843.0N 15740.0W

G348

PARO
BAGDOGRA

G424

(DAR ES SALAAM)
VUTAS, 0912.0N 06000.0E
ALATO, 1340.7N 06344.0E

G450

(MOGADISHU)
MUMBAI
NAGPUR
CALCUTTA

G452

(ZAHEDAN)
RAHIM YARKHAN
TIGER, 2828.8N 07214.9E
DELHI

LOWER ATS ROUTES

G454

(PLAISANCE)
BOBOD, 0600.0S 06941.1E
PADLA, 0446.1N 07800.0E
COLOMBO

G455

SHANGHAI
HENGSHA
PINOT, 3125.2N 12214.2E
AKARA, 3130.0N 12330.0E

G457

DOVRR, 1843.0N 15740.0W
ELLMS, 0500.0S 16704.1W
PAGO PAGO
FAROA, 2500.0S 17502.3W
DIVSO, 3452.3S 17624.5E

G458

BANGKOK
SURAT THANI
PHUKET

G459

CAIRNS
TIMIKA

G460

KUCHING
SIBU
BINTULU
BRUNEI

G461

JAKARTA
CIREBON
SEMARANG
SURABAYA

G462

(IZKI)
TRIVANDRUM
COLOMBO
JAKARTA
INDRAMAYU

LOWER ATS ROUTES

MADIN, 0617.9S 11023.0E
CUCUT, 0617.7S 11106.0E
SURABAYA
BALI
DARWIN

G463

RAJSHAHI
DHAKA
CHITTAGONG
BAGO
BETNO, 1505.8N 09812.7E
BANGKOK

G464

PONTIANAK
ROZAX, 0245.0S 11140.0E
BALI
KARRATHA
BALLIDU
PERTH

G465

(PRASLIN)
MALE
COLOMBO
PORT BLAIR
DAWEI
BANGKOK

G466

KUALA LUMPUR
KOTABHARU

G467

JOMALIG
GUAM

G468

PENANG
MEDAN

G469

PORT HEIDEN
ST PAUL IS
NYMPH, 5324.5N 16814.4E

LOWER ATS ROUTES

G470

XIANYANG
FENGHUO
CHANGWU
JINGNING
JINGTAI

G471

SHILONG
LONGMEN
GUANGZHOU

G472

KARACHI
AHMEDABAD
NAGPUR
BHUBANESHWAR
PATHEIN
BAGO

G473

BAGO
MAKAS, 1649.7N 09830.0E
PHITSANULOKE
DANANG
LUBANG

G474

BANGKOK
MENAM, 1357.3N 10247.7E
SOURN, 1345.5N 10600.0E
ANINA, 1359.0N 10725.0E
PHUCAT

G489

(AKTAS), 5019N 08735E
GOPTO, 4905N 08728E

G491

GABAL, 5313N 11650E
SULOK, 4954N 11545E
CHOYBOLSAN
BARUUN-URT
ARSHANDIIN BULAG
FENGING

LOWER ATS ROUTES

G494

(BLAGOVESHCHENSK)
(SIMLI), 5017N 12722E
HAIKHE
HARBIN
TONGLIAO
BEIJING

G575

TAHITI
RANGIROA
FICKY, 3133.5N 12123.5W

G576

CHEER, 5310.0N 14000.1W
SPONJ, 4992.0N 13005.1W

G578

GURAG, 2100.0N 12725.0E
DILIS, 1431.0N 12600.0E
TACLOBAN
MACTAN
ZAMBOANGA
DENPASAR
PORT HEDLAND
PARABURDOO
PERTH

G579

JAKARTA
PALEMBANG
SINGAPORE
JOHOR BAHRU

G580

SINGAPORE
TOMAN, 0121.5N 10547.0E
NIMIX, 0124.9N 10759.2E
ATETI, 0125.7N 10830.1E
KUCHING
MIRI
BRUNEI
KOTA KINABALU

LOWER ATS ROUTES

G581

HONG KONG
ELATO, 2220.0N 11730.0E
HENGCHUN
MIYAKO JIMA
BISIS, 2647.0N 12633.0E
ERABU
MIYAKE JIMA

G582

PUGER, 0324.1N 10017.6E
BATU ARANG
PEKAN

G583

EMMONAK
BESAT, 5945.0N 17925.1E
(UST-BOLSHERETSK)
BISIV, 4456.3N 14412.3E
MONBETSU

G584

KUALA LUMPUR
PEKAN

G585

MIHO
POHANG
SEOUL

G586

YINGDE
ERTANG

G587

TAIBEI
PABSO, 2538.0N 12252.0E
BULAN, 2704.0N 12400.0E

G588

MOOREN
KHOVD
TEBUS, 4725.1N 09027.7E
TESAN, 4701.7N 08947.8E
FUKANG

LOWER ATS ROUTES

G590

SIMARA
VARANASI
KHAJURAHO
BHOPAL
INDORE
BODAR, 2236.3N 07413.3E

G591

CAIRNS
NOUMEA
NORFOLK IS
AUCKLAND

G593

FUNAFUTI
NAUSORI
NIUE
RAROTONGA

G594

TIAMU, 0252.0N 12000.0W
TAHITI
RAROTONGA
AUCKLAND
SOLIT, 2355.0S 07500.0E
(PLAISANCE)

G595

(TAHITI)
SYDNEY
MABAD, 2648.4S 07500.0E
(PLAISANCE)

G597

DONVO, 3734.0N 12320.0E
AGAVO, 3710.0N 12400.0E
SEOUL
GANGWON
MIHO
OTSU
KOWA
OSHIMA
VENUS, 3518.2N 14042.1E

LOWER ATS ROUTES

G598

LUCKNOW
APIPU, 2658.6N 08300.0E
SIMARA

G599

AUCKLAND
TAHITI

R200

PINGZHOU
LIANSHENGWEI
BIGRO, 2134.2N 11149.6E
ZHANJIANG

R201

BANGKOK
UTAPAO

R203

COLOMBO
PHUKET

R204

KEITH, 2100.0N 13456.5E
KALIN, 0000.0 14200.0E
LIDIT, 0918.0S 14220.0E
HORN IS
CAIRNS

R205

ANARAK
BIRJAND

R206

PORT HEDLAND
CHRISTMAS IS
JAKARTA

LOWER ATS ROUTES

R207

VIENTIANE
NAN
CHIANG MAI
MANDALAY

R208

KUALA LUM PUR
KUALA TRENGGANU
IGARI, 0656.2E 10335.2E

R209

TATOX, 0857.0N 09702.0E
LANGKAWI

R210

PORT MORESBY
CAIRNS

R211

KASMI, 3601.3N 14040.3E
DAIGO
NIIGATA
KADBO, 3914.0N 13745.4.0E
AVGOK, 4336.0N 13815.0E
(VELTA), 4529.0N 13710.0E

R212

(DIEGO GARCIA)
GUDUG, 0704.6S 07500.0E
PIBED, 0520.2S 09044.0E

R215

CHIANG RAI
NAN
LUANG PRABANG

R216

URUMQI
(ALMA ATA)

LOWER ATS ROUTES

R217

NODAN, 4025.0N 14500.0E
ASTER, 3913.9N 14232.0E
SENDAI
NIIGATA

R219

(SHARJAH)
MAROB, 2225.6N 06309.3E
MUMBAI

R220

DAIGO
IWAKI
NANAC, 3854.2N 14313.9E
NIPPI, 4942.6N 15920.8E
NODLE, 6117.0N 15200.0W

R221

MERSING
PULAU TIOMAN

R222

AVGOK, 4336.0N 13815.0E
(YEDINKA)

R223

BRUNEI
ELANG, 0056.0S 11449.5E

R325

KATHMANDU
JANAKPUR
DUMKA, 2411.0N 08721.3E
CALCUTTA
PHUKET
HAT YAI
IPOH
JOHOR BAHRU

R326

NORFOLK IS
CHRISTCHURCH

LOWER ATS ROUTES

R327

GISBORNE
FAROA, 2500.0S 17502.3W

R328

KARACHI
MINAR, 2350.0N 06800.0E
SAPNA, 2330.0N 06750.0E
BILAT, 2058.4N 06800.0E
MUMBAI

R329

KAGLU, 1231.2N 07200.0E
MALE
GAN
(DIEGO GARCIA)

R330

SHEMYA
POWAL, 5024.3N 16530.8E

R332

MAJURO
BONRIKI
AKUMO, 0614.9S 17535.5E
ROTUMA
NADI

R334

RAYONG
KOH KONG
PHNOM PENH

R336

ADAK
CARTO, 4840.5N 16847.0E

R337

TACLOBAN
KOROR

R338

NOME
NINNA, 5455.7N 17158.8E

LOWER ATS ROUTES

R339

SIKOU, 2050.6N 11130.0E
HUGUANG
NANNING
BOSE

R340

AMBON
WALGETT

R341

KODIAK
NINNA, 5455.7N 17158.8E

R342

MANADO
BONDA, 0200.0N 12451.2E
PEDNO, 0400.0N 12521.0E
GENERAL SANTOS
DAVAO

R343

NANXIANG
WUXI
LISHUI
HEFEI
WUHAN
LONGKOU
LAOLIANGCANG
DARONGJIANG
LAIBIN
NANNING

R344

KATHMANDU
BIRATNAGAR
KATIHAR
RAJSHAHI

R345

VIENTIANE
TAKHAEK
PAKSE
STREUNG TRENG
RUPED, 1111.0N 10548.2E

LOWER ATS ROUTES

R346

TOWNSVILLE
PORT MORESBY

R347

NIIGATA
SADO
EKVIK, 3944.7N 13636.5E
IGROD, 4139.0N 13647.0E
(VELTA), 4529.0N 13710.0E

R348

KADAP, 0200.0S 08409.6E
LATEP, 0610.3S 07500.0E
(DIEGO GARCIA)

R349

LEMOK, 1000.0N 10302.2E
RASER, 1000.0N 10506.0E
HO CHI MINH

R450

KIETA
HONIARA

R451

ADAK
OGDEN, 4929.2N 16102.3E

R452

SONDO, 3947.0N 12713.6E
HAMUN, 3955.1N 12731.1E
KIMCHAEK
UAMRI, 4217.6N 13041.8E
(TEKUK), 4241.0N 13527.4E

R453

NADI
APIA

R455

PONTIANAK
KUCHING

LOWER ATS ROUTES

R456

(IZKI)
BOTAN, 2006.6N 06022.0E
MALE
MABIX, 0315.0N 09454.0E

R457

TRIVANDRUM
MALE

R459

MANADO
BALIKPAPAN
ELANG, 0056.0S 11449.5E
PONTIANAK
MINOS, 0000.0 10901.7E
TANJUNG PINANG

R460

DELHI
LUCKNOW
VARANASI
GAYA
CALCUTTA

R461

MUMBAI
BELGAUM
COIMBATORE
COLOMBO
MEDAN
KUALA LUMPUR

R462

(SEEB)
DENDA, 2442.5N 06054.8E
JIWANI
KARACHI
DELHI

R463

APACK, 2403.0N 15619.0W
ALCOA, 3750.0N 12550.0W

LOWER ATS ROUTES

R464

BITTA, 2332.0N 15529.0W
BEBOP, 3700.0N 12500.0W

R465

CLUTS, 2300.0N 15439.0W
CLUKK, 3605.0N 12450.0W

R466

(YUZHNO-SAKHALINSK)
ANIMO, 4508.3N 14337.8E

R467

KUALA LUMPUR
GUNIP, 0429.9N 09931.9E

R468

MUMBAI
VISHAKHAPATNAM
BANGKOK
BOKAK, 1257.5N 10230.0E
PHNOM PENH
SAPEN, 1102.2N 10611.0E
HO CHI MINH

R469

PEKANBARU
SINGAPORE

R470

VIENTIANE
UDON THANI
KHON KAEN

R472

CALCUTTA
RAJSHAHI
GAWHATI

LOWER ATS ROUTES

R473

LILING
NANXIONG
WONGYUAN
ZHULIAO
PINGZHOU
TAMOT, 2221.5N 11352.0E

R474

GAOYAO
NANNING
LONGZHOU
HANOI
VIENTIANE
BANGKOK

R576

DENNS, 2222.0N 15353.0W
DINTY, 3329.0N 12235.0W

R577

EBBER, 2143.0N 15309.0W
ELKEY, 3241.0N 12203.0W

R578

FITES, 2049.0N 15300.0W
FICKY, 3133.5N 12123.5W

R579

PADANG
PEKANBARU
MALACCA

R580

OATIS, 3800.0N 14345.0E
OMOTO, 4859.7N 16000.7E
AMOTT, 6053.9N 15121.8W

R581

CALCUTTA
MONDA, 2521.0N 08626.4E
SIMARA

LOWER ATS ROUTES

R582

NORFOLK IS
RAROTONGA

R583

TAIBEI
BISIS, 2647.1N 12633.1E
OKINAWA
MINAMIDAITO
SABGU, 2529.9N 13459.3E
BUNGO

R584

OKINAWA
KEITH, 2100.00N 13456.48E
GUAM
TRUK
POHNPEI
KWAJALEIN
MAJURO
JOHNSTON IS
CHOKO, 2022.9N 16053.2W

R585

CITTA, 2818.9N 14507.2W
GATES, 3412.7N 12303.9W

R587

BRISBANE
PORT VILA

R588

PHUKET
RELIP, 0804.4N 10026.5E
KAKET, 1051.0N 10236.0E
PHNOM PENH
PLEIKU

R590

AMBON
COTABATO

LOWER ATS ROUTES

R591

CAPE NEWENHAM
AKISU, 4734.3N 16119.3E
ABETS, 3605.0N 14425.0E

R592

BALI
ONSLOW
PERTH

R593

MUMBAI
(HAIMA)

R595

ANPU
MIYAKOJIMA
KEITH, 2100.00N 13456.48E
GUAM

R596

HENGCHUN
TIDEL, 1912.24N 13000.00E
GUAM

R597

CABANATUAN
SARSI, 1642.0N 12316.9E
SKATE, 1716.7N 12423.0E

R598

CALCUTTA
RAJSHAHI
SAIDPUR
COOCH BEHAR
PARO

R599

KIETA
GIZO
HONIARA
PORT VILA
WHANGAREI
AUCKLAND

LOWER ATS ROUTES

RNAV ROUTES

L500

(SANTIAGO)
AUCKLAND

L501

(RIO GALLEGOS)
AUCKLAND

L502

ISLA DE PASCUA
(LOS ANGELES)

L503

BRISBANE
IGEVO, 3636.5S 16300.0E
CHRISTCHURCH

504

SINGAPORE
MANADO

L508

CHRISTCHURCH
MELBOURNE

L513

PERTH
HOBART
AUCKLAND

L521

SYDNEY
AUCKLAND

L625

LUSMO, 0333.7N 10655.7E
AKMON, 0812.8N 11013.4E
ALDAS, 1056.9N 11212.3E
ANOKI, 1222.0N 11315.0E
ARESI, 1358.4N 11427.0E
AKOTA, 1618.4N 11708.0E
AVMUP, 1757.1N 11908.0E

LOWER ATS ROUTES

AGVAR, 1919.4N 12037.0E
MEVIN, 2100.0N 12233.0E

L628

IBOBI, 1416.7N 11811.6E
GUKUM, 1410.3N 11652.9E
ARESI, 1358.4N 11427.0E
MESOX, 1358.8N 11302.7E
DAMEL, 1358.7N 11130.6E
VEPAM, 1358.0N 11000.0E
PHUCAT

L629

PEKAN
DOLOX, 0448.7N 10522.9E

L635

PEKAN
MABLI, 0417.3N 10612.9E

L637

BITOD, 0715.3N 10407.3E
TANSONNHAT

L642

CHEUNG CHAU
EPDOS, 1900.0N 11333.3E
ENBOK, 1833.4N 11329.5E
EPKAL 1751.5N 11257.3E
EGEMU, 1700.0N 11217.0E
EXOTO, 1521.5N 11103.0E
VEPAM, 1358.0N 11000.0E
PHANTHIET
CONSON
ESPOB, 0700.0N 10533.4E
ENREP, 0452.4N 10414.8E
MERSING

L643

TANSONNHET
CONSON

L644

CONSON
JAKARTA

LOWER ATS ROUTES

M522

VINIK, 0838.5N 11613.8E
KOTA KINABALU
MAMOK, 0405.1N 11547.2E
DENPASAR

M625

MELBOURNE
WELLINGTON

M635

SINGAPORE
RAMPY, 0615.05 11320.8E
CURTIN

M636

SYDNEY
WELLINGTON

M639

IGEVO, 3636.5S 16300.0E
WELLINGTON

M643

HOBART
CHRISTCHURCH

M750

KILOG, 2152.5N 11441.6E
ENVAR, 2159.5N 11730.0E
MOLKA, 2639.5N 12400.0E
MOMPA, 3050.5N 12955.1E
MANEP, 3242.9N 13340.0E
KUSHIMOTO

M751

MERSING
PEKAN
KOTA BHARU
REGOS, 1200.0N 10035.1E
BANGKOK

M753

ENREP, 0452.4N 10414.8E
BITOD, 0715.3N 10407.3E

LOWER ATS ROUTES

PHUQUOC
PHNOM PENH

M754

BRUNEI
VINIK, 0838.6N 11613.8E
TENON, 0915.3N 11616.5E
LULBU, 1108.0E 11631.4E
NOBEN, 1244.8N 11643.0E
GUKUM, 1410.3N 11652.9E
AKOTA, 1618.4N 11708.0E

M758

PEKAN
LUSMO, 0333.7N 10655.7E
TERIX, 0415.4N 10934.7E
OLKIT, 0450.1N 11149.1E
KOTA KINABALU

M759

OLKIT, 0450.1N 11149.1E
BRUNEI

M761

PEKAN
BOBOB, 0222.1N 10706.1E
SABIP, 0209.7N 10750.5E
AGOBA, 0158.7N 10830.0E
KUCHING

M763

PEKAN
ENREP, 0452.4N 10414.8E

M765

KOTA BHARU
IGARI, 0656.2N 10335.2E
BITOD, 0715.3N 10407.3E
CONSON
DAGAG, 0927.8N 10826.5E
MAPNO, 1013.1N 11020.1E
ALDAS, 1056.9N 11212.3E
PANDI, 1138.1N 11400.0E
NOBEN, 1244.8N 11643.0E
REKAL, 1331.0N 11835.6E
MANILA

LOWER ATS ROUTES

M767

JOMALIG
TOKON, 1142.0N 11940.3E
TENON, 0915.3N 11616.5E
TEGID, 0857.2N 11551.6E
TODAM, 0631.7N 11235.4E
TERIX, 0415.4N 10934.7E
BOBOB, 0222.1N 10706.1E
TOMAN, 0121.5N 10547.0E

M768

DARWIN
BRUNEI
DOGOG, 0525.3N 11407.5E
ASISU, 0559.1N 11320.8E
TODAM, 0631.6N 11235.6E
LAGOT, 0716.5N 11132.7E
AKMON, 0812.9N 11013.1E
MOXON, 0849.5N 10921.3E
DAGAG, 0927.8N 10826.5E
TANSONNHAT

M771

MERSING
DOLOX, 0448.7N 10522.9E
DUDIS, 0700.0N 10648.7E
DAGAG, 0927.8N 10826.5E
DOXAR, 1220.0N 11022.7E
DAMEL, 1358.7N 11130.6E
DALBA 1434.0N 11155.5E
DOSUT,1702N 11340.8E
DULOP, 1814.2N 11432.6E
DUMOL, 1900.0N 11426.8E
CHEUNG CHAU

M772

OSUKA, 0117.5S 11024.7E
LAXOR, 0949.6N 11448.5E
DULOP, 1814.2N 11432.6E

M774

SINGAPORE
KIKEM, 0952.9S 12607.4E

N500

TANSONNHAT
PHANTHIET
DAMVO, 1106.5N 10932.7E

LOWER ATS ROUTES

MIMUX, 1118.3N 11106.29E
AGSAM, 1128.3N 11235.3E
PANDI, 1138.1E 11400.0E

N645

BRUNEI
ELANG, 005535.64S 1145003.10E
SURABAYA

N750

SYDNEY
CHRISTCHURCH

N759

MELBOURNE
AUCKLAND

N774

AUCKLAND
SYDNEY

N875

DENPASAR
PONTIANAK
ARUPA, 0031.7N 10848.8E
NIMIX, 0124.9N 10759.4E
BOBOB, 0222.1N 10706.0E
ENREP, 0452.4N 10414.7E

N884

MERSING
LUSMO, 0333.7N 10655.7E
LAGOT, 0716.6N 11132.5E
LAXOR, 0950.3N 11447.9E
LULBU, 1108.0E 11631.4E
LEGED, 1255.5N 11854.3E
MANILA

N891

PAPA UNIFORM
ENREP, 0452.4N 10414.8E
IGARI, 0656.2N 10335.2E
SAMOG, 0800.0N 10314.6E
RAYONG
BANGKOK

LOWER ATS ROUTES

N892

HENGCHUN
KABAM, 2100.0N 11952.8E
MUMOT, 1859.8N 11749.9E
MAVRA, 1738.4N 11625.8E
MIGUG, 1516.4N 11400.0E
MONBO 1430N 11325.7E
MESOX, 1358.8N 11302.7E
MUGAN, 1222.0N 11152.3E
MAPNO, 1013.1N 11020.1E
MOXON, 0849.5N 10921.3E
MELAS, 0704.9N 10808.4E
MABLI, 0417.3N 10612.9E
MERSING

P766

DORAX, 04059.16S 16300.00E
SLOPE HILL VOR, 04459.03S
16846.57E

P648

KOTA KINABALU
KAKARTA

P761

CHENNAI
PORT BLAIR

P880

IGEVO, 03636.29S 16300.00E
SLOPE HILL VOR, 04459.03S
16846.57E

LOWER ATS ROUTES

UPPER ATS ROUTES	UPPER ATS ROUTES	UPPER ATS ROUTES

UB467

YEDINKA
VELTA ,4529N 13710E
TEKUK, 4241N 13527.4E
NULAR, 4059.2N 13411E
(KANSU), 3838.0N 13228.5E

UL425

(KUTVI)
ASPUX, 1744.0N 06000.0E
DONSA, 1435.14N 06511.32E
VANVO, 1043.0N 07200.0E
TRIVANDRUM

UM501

BHUBANESHWAR
PHUKET

UM551

DONSA, 1435.3N 06511.6E
ANGAL, 1614.1N 06000.1E
(AVAVO), 1646.3N 05526.1E

Part VI

METEOROLOGY (MET)

INTRODUCTION

1. This part of the Asia and Pacific (ASIA/PAC) Basic Air Navigation Plan contains elements of the existing planning system and introduces the basic planning principles, operational requirements and planning criteria related to aeronautical meteorology (MET) as developed for the ASIA/PAC regions.

2. As a complement to the Statement of Basic Operational Requirements and Planning Criteria (BORPC) set out in Part I, Part VI constitutes the stable guidance material and considered to be the minimum necessary for effective planning of MET facilities and services in the ASIA/PAC regions. A detailed description/list of the facilities and/or services to be provided by States in order to fulfill the requirements of the plan is contained in the ASIA/PAC Facilities and Services Implementation Document (FASID). During the transition and pending full implementation of the future communications, navigation and surveillance/air traffic management (CNS/ATM) system, it is expected that the existing requirements will gradually be replaced by new CNS/ATM-related requirements. Further, it is expected that some elements of the CNS/ATM system will be subject to amendment, as necessary, on the basis of experience gained in their implementation.

3. The Standards, Recommended Practices and Procedures to be applied are contained in:

a) Annex 3 — *Meteorological Service for International Air Navigation*; and

b) *Regional Supplementary Procedures* (Doc 7030).

4. Background information of importance in the understanding and effective application of this part of the plan is contained in the *Report of the Third Asia/Pacific Regional Air Navigation Meeting* (Doc 9614, ASIA/PAC/3 (1993)), supplemented by information appropriate to the ASIA/PAC regions which is contained in the reports of the other regional air navigation (RAN) meetings.

5. A RAN meeting recommendation or conclusion, ASIA/PAC Air Navigation Planning and Implementation Regional Group (APANPIRG) conclusion or ICAO operations group conclusion shown in brackets below a heading indicates the origin of all paragraphs following that heading. A RAN meeting recommendation or conclusion, APANPIRG conclusion or ICAO operations group conclusion shown in brackets below a paragraph indicates the origin of that particular paragraph.

METEOROLOGICAL SERVICE REQUIRED AT AERODROMES AND REQUIREMENTS FOR METEOROLOGICAL WATCH OFFICES

(FASID Tables MET 1A and MET 1B)

6. The service to be provided at international aerodromes listed in the Appendix to Part III of the Basic ANP is set out in Table MET 1A.
[ASIA/PAC/3, Recs. 8/1 and 8/16]

7. The service to be provided for flight information regions (FIRs), upper flight information regions (UIRs), control areas (CTAs) and search and rescue regions (SRRs) is set out in Table MET 1B.
[ASIA/PAC/3, Recs. 8/2 and 8/16]

8. Hourly routine observations should be made at all aeronautical meteorological stations, to be issued as local routine reports and METAR, together with special observations to be issued as local special reports and SPECI.
[ASIA/PAC/3, Rec. 8/16]

9. Aerodrome forecasts should be issued as TAF, normally at intervals of six hours, with the period of validity beginning at one of the main synoptic hours (00, 06, 12, 18 UTC). The period of validity should be of eighteen or

twenty-four hours' duration to meet the requirements indicated in Table MET 1A. The filing time of the forecasts should be approximately two hours before the start of the period of validity.
[ASIA/PAC/3, Rec. 8/16]

10. The forecast maximum and minimum temperature together with their respective times of occurrence should be included in TAF for certain aerodromes as agreed between the meteorological authorities and the operators concerned.
[ASIA/PAC/3, Rec. 8/16]

11. Trend forecasts should be provided at the aerodromes as indicated in Table MET 1A.
[ASIA/PAC/3, Recs. 8/1 and 8/16]

12. Meteorological service should be provided on a twenty-four-hour basis, except as otherwise agreed between the meteorological authority, the air traffic services (ATS) authority and the operators concerned.
[ASIA/PAC/3, Rec. 8/16]

13. At aerodromes with limited hours of operation, METAR should be issued prior to the aerodrome resuming operations to meet pre-flight and in-flight planning requirements for flights due to arrive at the aerodrome concerned as soon as it is opened for use. Furthermore, TAF should be issued with adequate periods of validity so that they cover the entire period during which the aerodrome is open for use.
[ASIA/PAC/3, Rec. 8/16]

14. When a meteorological watch office (MWO) is temporarily not functioning or is not able to meet all its obligations, its responsibilities should be transferred to another MWO and a NOTAM should be issued to indicate such a transfer and the period during which the office is unable to fulfil all its obligations.
[ASIA/PAC/3, Rec. 8/16]

15. Details of the service provided should be indicated in the Aeronautical Information Publication (AIP) in accordance with the provisions of Annex 15.
[ASIA/PAC/3, Rec. 8/16]

16. As far as possible, English should be among the languages used in meteorological briefing and consultation.
[ASIA/PAC/3, Rec. 8/16]

17. Tables MET 1A and MET 1B should be implemented as soon as possible, on the understanding that only those parts of the briefing and documentation called for in Column 7 of Table MET 1A that are required for current operations need to be available, and that the implementation of a new MWOs or changes to the area served by existing MWO indicated in Table MET 1B, Columns 1 and 3 respectively, should take place coincidently with the implementation of, or changes to, the FIR/UIR/CTA/SRR concerned.
[ASIA/PAC/3, Rec. 8/16]

AIRCRAFT OBSERVATIONS AND REPORTS
(FASID Table MET 1B)

18. The meteorological authority should adopt the approved list of ATS/MET reporting points, as it relates to points located within and on the boundaries of the FIR for which the State is responsible. Those ATS/MET reporting points should be published in the AIP, under GEN 3.5.6 — Aircraft reports, of the State concerned.
[ASIA/PAC/3, Rec. 8/16]

Note.— The approved list of ATS/MET reporting points is published and kept up to date by the ICAO Regional Office concerned, on the basis of consultations with ATS and MET authorities in each State and the provisions of Annex 3 in this respect.

19. The MWOs designated as collecting centres for air-reports received by voice communication with the corresponding FIR/UIR are shown in Table MET 1B.

SIGMET AND AIRMET INFORMATION
(FASID Tables MET 3A and MET 3B)

20. The period of validity of SIGMET messages should not exceed four hours. In the special case of SIGMET messages for volcanic ash cloud and tropical cyclones, the validity period should be extended up to six hours and an outlook should be added giving information for an additional period of up to twelve hours concerning the trajectory of the volcanic ash cloud and positions of the centre of the tropical cyclone respectively.
[ASIA/PAC/3, Rec. 8/16]

21. In order to assist MWOs in the preparation of the outlook included in SIGMET messages for tropical cyclones, tropical cyclone advisory centres (TCACs) Darwin, Honolulu, Miami, Nadi, New Delhi and Tokyo have been designated to prepare the required advisory information and disseminate it to the MWOs concerned in the ASIA/PAC regions. Table MET 3A sets out the area of responsibility, the period(s) of operation of the TCAC(s) and the MWOs to which the advisory information should be sent. Advisory information should be issued for tropical cyclones in which

the surface wind speed averaged over ten minutes is expected to equal or exceed 63 km/h (34 kt).
[ASIA/PAC/3, Recs. 8/4 and 8/16]
[APANPIRG/12 Conc. 12/33]

22. In order to assist MWOs in the preparation of the outlook included in SIGMET messages for volcanic ash, volcanic ash advisory centres (VAACs) Anchorage, Darwin, Tokyo, Washington and Wellington have been designated to prepare the required advisory information and disseminate it to the MWOs and area control centres (ACCs) concerned in the ASIA/PAC regions following notification/detection of the ash cloud. Table MET 3B sets out the areas of responsibility of the VAACs and the MWOs and ACCs to which the advisory information should be sent.
[IAVWOPSG/1, Conc. 1/1]

23. In order for the VAACs to initiate the monitoring of volcanic ash from satellite data and the forecast of volcanic ash trajectories, MWOs should notify the relevant VAAC immediately on receipt of information that a volcanic eruption has occurred or volcanic ash has been observed in the FIR for which they are responsible. In particular, any special air-reports of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud received by MWOs should be transmitted without delay to he VAAC concerned. Selected State volcano observatories have been designated for direct notification of significant pre-eruption volcanic activity, a volcanic eruption and/or volcanic ash in the atmosphere to their corresponding ACC, MWO and VAAC.
[IAVWOPSG/1, Conc. 1/1]

24. AIRMET messages are not required to be issued by MWOs.
[APANPIRG/7, Conc. 7/22]

EXCHANGE OF OPERATIONAL METEOROLOGICAL (OPMET) INFORMATION
(FASID Tables MET 2A, MET 2B, MET 4A, MET 4B and MET 4C)

Exchange of METAR, SPECI and TAF

25. Tables MET 4A and MET 4B set out the Regional OPMET Bulletin Exchange (ROBEX) Scheme for the collection and dissemination of METAR, SPECI and TAF. These tables contain information regarding the designated ROBEX centres and their respective areas of responsibility.
[ASIA/PAC/3, Recs. 9/6 and 9/8]
[APANPIRG/7, Conc. 7/20]

Note.— Details of the ROBEX procedures regarding the exchange of OPMET information required under the scheme are given in the ROBEX Handbook prepared by the ICAO Asia and Pacific Regional Office (Bangkok) in coordination with the ICAO Middle East Regional Office (Cairo).

26. Tables MET 4A and MET 4B should be updated, as necessary, by the ICAO Regional Office on the basis of changes in the pattern of aircraft operations, the Statement of Basic Operational Requirements and Planning Criteria and in consultation with those States and international organizations directly concerned.
[ASIA/PAC/3, Rec. 9/8]

27. Requirements for METAR, SPECI and TAF not carried on the ROBEX Scheme which should be available at meteorological offices are contained in Table MET 2A. This table should be updated, as necessary, by the ICAO Regional Office on the basis of changes in the pattern of aircraft operations, the Statement of Basic Operational Requirements and Planning Criteria, and in consultation with those States and international organizations directly concerned.
[ASIA/PAC/3, Recs. 9/1 and 9/8]

28. The exchanges indicated in Table MET 2A should be implemented as soon as possible, but only for those related to current aircraft operations. New exchanges should be started coincidently with the introduction of new aircraft operations. Any changes in this respect (i.e. additional OPMET information needed or OPMET information no longer required) should be notified to the corresponding meteorological authority which, in turn, should inform the ICAO Regional Offices concerned.
[ASIA/PAC/3, Rec. 9/8]

OPMET data banks to support the ROBEX Scheme

29. The OPMET data banks in Bangkok, Brisbane, Nadi, Singapore and Tokyo have been designated to support the ROBEX scheme and serve States in the ASIA/PAC regions to access OPMET information which is required but not received. Table MET 4C sets out the responsibilities of the ASIA/PAC OPMET data banks for collection and dissemination of OPMET bulletins to support the ROBEX Scheme.
[APANPIRG/7, Rec. 7/20]

Note.— A list of the OPMET information available at the OPMET data banks to serve the ASIA/PAC regions, together with the procedures to be used in communicating with the data banks, is contained in the Asia/Pacific OPMET data

banks interface control document prepared by the ICAO Regional Office, Bangkok.

Exchange of SIGMET information and air-reports

30. The exchange requirements for SIGMET and special air-reports are contained in Table MET 2B. This table should be updated, as necessary, by the ICAO Regional Office on the basis of changes in the pattern of aircraft operations, the Statement of Basic Operational Requirements and Planning Criteria, and in consultation with those States and international organizations directly concerned.
[ASIA/PAC/3, Recs. 9/2 and 9/8]

31. Each MWO should arrange for the transmission to all aerodrome meteorological offices within its associated FIR of its own SIGMET messages and relevant SIGMET messages for other FIR, as required for briefing and, where appropriate, for flight documentation.
[ASIA/PAC/3, Rec. 8/16]

32. Each MWO should arrange for the transmission to its associated ACC/FIC of SIGMET information and special air-reports received from other MWOs.

33. Each MWO should arrange for the transmission of routine air-reports received by voice communication to all meteorological offices within its associated FIR. Special air-reports which do not warrant the issuance of a SIGMET should be disseminated by MWOs in the same way as SIGMET messages, in accordance with Table MET 2B.

WORLD AREA FORECAST SYSTEM (WAFS)
(FASID Tables MET 5, MET 6 and MET 7
and Charts MET 4, MET 5 and MET 6)

34. Table MET 5 sets out the ASIA/PAC regions' requirements for WAFS forecasts to be provided by WAFC London and WAFC Washington.
[WAFSOPSG/1, Conc. 1/2]

35. The levels for which forecasts of upper-air wind and temperature and SIGWX forecasts in chart form are to be provided by WAFC London and WAFC Washington, and the areas to be covered by these charts, are indicated in Table MET 5.
[WAFSOPSG/1, Conc. 1/2]

Note.— WAFCs will continue to issue forecasts of upper-air wind and temperature and of SIGWX in chart form until 1 July 2005.

36. Table MET 6 sets out the responsibilities of WAFC London and WAFC Washington for the production of WAFS forecasts. For back-up purposes, each WAFC should have the capability to produce WAFS forecasts for all the required areas of coverage.
[WAFSOPSG/1, Conc. 1/2]

37. The projection of the WAFS forecasts in chart form and their areas of coverage should be as indicated in Charts MET 4, MET 5 and MET 6 associated with Table MET 6; their scale should be $1{:}20 \times 10^6$, true at 22.5° in the case of charts in the Mercator projection, and true at 60° latitude in the case of charts in the polar stereographic projection.
[WAFSOPSG/1, Conc. 1/2]

Note.— WAFCs will continue to issue forecasts of upper-air wind and temperature and of SIGWX in chart form until 1 July 2005.

38. WAFS products should be disseminated by WAFC London using the satellite distribution system for information relating to air navigation (SADIS) and by WAFC Washington using the international satellite communications system (ISCS2). To fulfil the requirements of long-distance flights, trans-mission of WAFS products should be completed not later than eleven hours before validity time.
[WAFSOPSG/1, Conc. 1/2]

39. The amendment service to the SIGWX forecasts issued by WAFC London and WAFC Washington should be by means of amended binary universal form for the representing of meteorological data (BUFR) files disseminated through SADIS and ISCS2.
[WAFSOPSG/1, Conc. 1/2]

40. Each State should make the necessary arrangements to receive and make full operational use of WAFS products disseminated by WAFC London and WAFC Washington. Table MET 7 lists the authorized users of the SADIS and ISCS2 satellite broadcasts in the ASIA/PAC regions and location of the operational VSATs.
[WAFSOPSG/1, Conc. 1/2]

Part VII

SEARCH AND RESCUE (SAR) SERVICES

INTRODUCTION

1. This part of the Asia and Pacific (ASIA/PAC) Basic Air Navigation Plan contains elements of the existing planning system and introduces the basic planning principles, operational requirements and planning criteria related to search and rescue (SAR) services as developed for the ASIA/PAC regions.

2. As a complement to the Statement of Basic Operational Requirements and Planning Criteria (BORPC) set out in Part I, Part VII constitutes the stable guidance material considered to be the minimum necessary for effective planning of SAR facilities and services in the ASIA/PAC regions. A detailed description/list of the facilities and/or services to be provided by States in order to fulfil the requirements of the plan is contained in the ASIA/PAC Facilities and Services Implementation Document (FASID). During the transition and pending full implementation of the future communications, navigation and surveillance/air traffic management (CNS/ATM) system, it is expected that the existing requirements will gradually be replaced by new CNS/ATM-related requirements.

3. The Standards, Recommended Practices and Procedures to be applied and related guidance material are contained in:

a) Annex 12 — *Search and Rescue;*

b) *Regional Supplementary Procedures* (Doc 7030); and

c) *International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual* (Doc 9731).

4. Background information of importance in the understanding and effective application of this part of the plan is contained in the *Report of the Third Asia/Pacific Regional Air Navigation Meeting* (Doc 9614, ASIA/PAC/3 (1993)) on Agenda Item 7.

5. A regional air navigation (RAN) meeting recommendation shown in brackets below a heading indicates the origin of all paragraphs following that heading. A RAN meeting recommendation shown in brackets below a paragraph indicates the origin of that particular paragraph.

PLAN FOR SEARCH AND RESCUE REGIONS (SRRs)

[ASIA/PAC/3, Rec. 7/21]

6. The plan for search and rescue regions (SRRs) is shown on Chart SAR 1.

SEARCH AND RESCUE SERVICES

Organization and facilities

7. The list of SAR facilities shown in Table SAR 1 of the FASID constitutes the plan for SAR facilities in the ASIA/PAC regions.
[ASIA/PAC/3, Rec. 7/22]

Note 1.— Rescue sub-centres (RSCs) are not shown except when located in a State different from that in which the relevant rescue coordination centre (RCC) is located.

Note 2.— Facilities listed are the minimum required for SAR purposes and it is recognized that many States have facilities available in addition to those listed.

Note 3.— Facilities listed need not be used exclusively for SAR operations but may be suitably equipped aircraft or ships also used for other missions that can be made available for SAR operations at short notice.

Note 4.— The type of facility listed must be readily available for SAR within its intended area of operation either directly or on a "redeployment" basis.

8. States within the region should establish and/or maintain RCCs or RSCs on a 24-hour basis and ensure continual availability of SAR facilities listed in Table SAR 1 of the FASID.
[ASIA/PAC/3, Rec. 7/23]

Coordination with maritime SAR authorities and the International Maritime Organization

9. To ensure compatibility between aeronautical and maritime SRRs, aeronautical SAR authorities in States should maintain close liaison with their maritime counterparts and the International Maritime Organization.
[ASIA/PAC/3, Rec. 7/3]

Continuous provision of SAR facilities

10. States, when necessary, should take urgent action to ensure the continuous provision of SAR facilities in accordance with the regional air navigation plans.
[ASIA/PAC/3, Rec. 7/6]

Capacity of rescue units and associated facilities
[ASIA/PAC/3, Rec. 7/5]

11. States should:

a) take due account of the large size and passenger-carrying capacity of commercial aircraft operating within their area of responsibility, and of the possibility of aircraft ditching in water near airports, in planning for SAR and emergency care facilities; and

b) be encouraged to provide and use for SAR, wherever practicable, helicopters equipped with suitable winching equipment.

Satellite-aided SAR
[ASIA/PAC/3, Rec. 7/7]

12. States should:

a) take appropriate action to reduce the number of false alarms on 121.5/243 MHz caused by inadvertent activation of emergency transmitters and eliminate unauthorized use of those frequencies;

b) encourage the early introduction of emergency locator transmitters (ELTs) transmitting on 406 MHz and establish a register of such ELTs;

c) make available information on how ELT registration information can be obtained rapidly by RCCs of other States; and

d) provide to ICAO a SAR point of contact (SPOC) for inclusion in Table SAR 1 of the FASID.

SAR escort service
[ASIA/PAC/3, Rec. 7/24]

13. States should provide SAR escort service to aircraft in difficulties.

Assistance in establishing SAR services
[ASIA/PAC/3, Rec. 7/11]

14. States requesting assistance in establishing or improving SAR services should first endeavour to satisfy the following basic requirements:

a) a RCC/RSC location (which could be an air traffic control (ATC) unit);

b) a designated RCC chief, knowledgeable in ATC and trained in the planning of searches and the coordination of SAR missions;

c) personnel to be trained to serve as SAR mission coordinators;

d) adequate staff for 24-hour operation of the RCC; and

e) appropriate RCC material and equipment.

Communications between aircraft and ships
[ASIA/PAC/3, Rec. 7/12 a)]

15. States should develop procedures to be included in the detailed SAR plans which enable civil aircraft and SAR aircraft to enter rapidly into communications with ships when necessary.

SEARCH AND RESCUE OPERATIONS

Communications for survivors
[ASIA/PAC/3, Rec. 7/13]

16. States should encourage operators to carry means for survivors to communicate with aircraft on 121.5 MHz.

Ship reporting systems

17. States should:

a) through their maritime authorities, encourage ships to participate in an appropriate ship reporting system for SAR; and

b) record information on the position of ships at sea and disseminate such information to SAR authorities of other States requesting it, to facilitate response to cases of distress.

[ASIA/PAC/3, Rec. 7/16 a) and b)]

18. RCC and RSC plans of operation should provide guidance on how information from available ship reporting systems can be obtained.
[ASIA/PAC/3, Rec. 7/16 c)]

Note.— The Automatic Mutual-assistance Vessel Rescue (AMVER) system is a worldwide ship reporting system for SAR, operated by the United States Coast Guard. Any RCC can obtain information about ships in the vicinity of a distress by contacting any RCC of the United States Coast Guard.

SAR exercises
[ASIA/PAC/3, Rec. 7/17]

19. States which introduce a SAR organization, handle relatively few actual SAR cases or need to coordinate SAR operations with neighbouring States, should use SAR exercises to improve proficiency and procedures.

Note.— Exercises may be conducted on three levels: communications exercises; coordination exercises (without involving SAR units); and field exercises (involving actual SAR unit deployment).

SAR training
[ASIA/PAC/3, Rec. 7/18]

20. States should be encouraged to:

a) arrange for regular high-quality SAR training for its RCC personnel, nationally or regionally, as part of its aeronautical training or maritime SAR schools;

b) grant scholarships to SAR personnel as necessary to enable them to attend a SAR training course; and

c) make use of the ICAO TRAINAIR course development methodology to assist in the production of standardized training packages in the field of SAR.

Note.— The ICAO TRAINAIR programme provides for an effective means of analysing and determining skills required, creates training objectives by setting standards for job performance and produces material-dependent courseware.

COOPERATION BETWEEN STATES
[ASIA/PAC/3, Rec. 7/9]

21. To promote greater efficiency and economy in the provision and use of available SAR facilities, States providing SAR services in adjacent SRRs should enter into formal arrangements for mutual assistance in order to:

a) help meet and exceed the minimum requirements specified in Table SAR 1 of the FASID at minimal cost;

b) ensure full SRR coverage;

c) provide for technical and operational SAR cooperation and coordination;

d) establish common SAR procedures, where practicable;

e) conduct joint training and exercises, as appropriate, to maximize proficiency; and

f) promote effective liaison between air traffic services and RCC personnel within and between the States involved.

Note.— SAR agreements are particularly important for border areas where concerns for sovereignty and saving lives must be balanced, high seas areas, and inhospitable areas where rapid response is essential to successful SAR operations.

STATE PROCESSES
TO IMPROVE THE SAR SYSTEM
[ASIA/PAC/3, Rec. 7/15]

22. States, when undertaking the continued improvement in the provision of SAR services, should consider the following:

a) the establishment of a national SAR coordinating committee to improve inter-agency cooperation, information exchange and development of national SAR policies and procedures;

b) nationally or in cooperation with neighbouring States, development of:

1) SAR manuals;

2) SAR plans and agreements for cooperation, coordination and the effective use of all available SAR resources;

3) RCC/RSC plans of operation and other operational documents;

4) SAR training capability, especially for search planners, SAR mission coordinators and on-scene commanders; and

5) organizational and operational working relationships; and

c) effective use of relevant international documents.

Part VIII

AERONAUTICAL INFORMATION SERVICES AND CHARTS (AIS/MAP)

INTRODUCTION

1. This part of the Asia and Pacific (ASIA/PAC) Basic Air Navigation Plan contains elements of the existing planning system and introduces the basic planning principles, operational requirements and planning criteria related to aeronautical information services and charts (AIS/MAP) as developed for the ASIA/PAC regions.

2. As a complement to the Statement of Basic Operational Requirements and Planning Criteria (BORPC) set out in Part I, Part VIII constitutes the stable guidance material considered to be the minimum necessary for effective planning of AIS and MAP facilities and services in the ASIA/PAC regions. A detailed description/list of the facilities and/or services to be provided by States in order to fulfil the requirements of the plan is contained in the ASIA/PAC Facilities and Services Implementation Document (FASID). During the transition and pending full implementation of the future communications, navigation and surveillance/air traffic management (CNS/ATM) system, it is expected that the existing requirements would gradually be replaced by new CNS/ATM-related requirements. Subsequently, it is expected that some elements of the CNS/ATM system will be subject to amendment, as necessary, on the basis of experience gained in their implementation.

3. The Standards, Recommended Practices and Procedures to be applied and related guidance material are contained in:

a) Annex 4 — *Aeronautical Charts*;

b) Annex 11 — *Air Traffic Services*;

c) Annex 14 — *Aerodromes*, Volume I — *Aerodrome Design and Operations* and Volume II — *Heliports*;

d) Annex 15 — *Aeronautical Information Services*;

e) *Aeronautical Information Services Manual* (Doc 8126);

f) *Procedures for Air Navigation Services — ICAO Abbreviations and Codes* (PANS-ABC, Doc 8400);

g) *Aeronautical Chart Manual* (Doc 8697); and

h) *World Geodetic System — 1984 (WGS-84) Manual* (Doc 9674).

4. Background information of importance in the understanding and effective application of this part of the plan is contained in the *Report of the Third Asia/Pacific Regional Air Navigation Meeting* (Doc 9614, ASIA/PAC/3 (1993)).

5. A regional air navigation (RAN) meeting recommendation shown in brackets below a heading indicates the origin of all paragraphs following that heading. A RAN meeting recommendation shown in brackets below a paragraph indicates the origin of that particular paragraph.

GENERAL PROCEDURES

Introduction

6. The major objective of AIS is to ensure the flow of information necessary for the safety, regularity and efficiency of international civil aviation. To support the CNS/ATM systems, AIS/MAP should be directed towards the real-time provision of electronic aeronautical information/data that would ensure quality and integrity of the information provided.

7. In the CNS/ATM systems, the future users' requirement will be to access, on a global basis, quality aeronautical information by all users at all times. To achieve this high-level requirement, aeronautical information must be provided electronically, based on a commonly agreed and standardized data model. Strict quality assurance principles should be put in place in order to ensure that aeronautical data is of the required quality (accuracy, resolution and integrity), verified and validated before it is provided to the users. This will give users the required confidence in the quality of information that is critical to flight safety.

8. To support the CNS/ATM systems, the following basic AIS/MAP requirements should be satisfied in the future:

a) real-time provision and exchange of electronic aeronautical information/data, through a system that guarantees the quality and integrity of the information provided;

b) provision and exchange of aeronautical information/data through modern communications means, including data link, which would allow interrogation of aeronautical data-bases on the ground from the aircraft; and

c) harmonization of AIS and MET information/data to support combined automated pre-flight and in-flight briefing facilities.

Quality system

9. The AIS involved in the provision and maintenance of aeronautical data should be organized in such a manner that the quality system is introduced at all the functional stages of the aeronautical data process, from data origination to the distribution/provision of data. The quality system should be in conformity with the International Organization for Standardization (ISO) 9000 series of quality assurance standards and be certified by an approved organization.

Support for the AIS and MAP services

10. To enable the AIS/MAP to function efficiently and in accordance with the defined requirements, sufficient funds should be allocated by States in their budgets which will ensure that all the administrative and operational requirements of AIS/MAP are met, including the availability of sufficient and properly qualified personnel with all the required facilities, equipment and material.

11. The requirements for printing of AIS documentation, including charts, should be ascertained and given the highest priority. Where practicable, printing facilities should be placed under the direct control of the AIS headquarters.

12. Personnel working for AIS/MAP services should possess the skills and competence required to perform specific assigned functions. The required skills and competencies should be demonstrated by AIS and MAP personnel through initial and periodic assessments on which basis the corresponding certificate of competence equal to an AIS licence may be accorded.

13. AIS and MAP personnel should be accorded the status comparable to that assigned to technical personnel of other air navigation services.

Coordination between AIS and other technical services

14. Coordination/liaison on a permanent basis should be established between AIS/MAP and other technical services responsible for planning and operating air navigation facilities and services. At least one person from those services should be assigned and be responsible for maintaining continuous liaison with AIS/MAP and providing it with "raw" information as and when required.

15. Technical services responsible for origination of the raw aeronautical information should be acquainted with the requirements for promulgation and advance notification of changes that are operationally significant as established in Annexes 11 and 14 and other relevant ICAO documentation.

16. Appropriate AIS and MAP personnel should be included in the air navigation planning processes. This should ensure the timely preparation of appropriate AIS documentation and that the effective dates for changes to the air navigation system and procedures are satisfied.

Training of AIS and MAP personnel

17. Within the context of the quality system implemented, the AIS and MAP training programme should ensure that AIS and MAP personnel are appropriately trained according to the skills and competencies required to perform specific assigned functions.

18. AIS personnel should receive professional training commensurate with the most recent technological developments requiring high-level knowledge and skills. AIS personnel should have, as an essential part of their training, sufficient knowledge of aeronautical cartography to permit them to verify information that is published on charts. In addition, AIS personnel should possess a sufficient background in automation and knowledge of the English language as are necessary for the performance of their duties.

19. In addition to the conventional cartographic and geography training programme, knowledge of the following elements should also be taken into account when developing a training programme for MAP personnel:

a) hardware-scanners, plotters, computers, soft proofing devices (CRTs), image setters, and digital memory systems;

b) local area networks and worldwide area networks;

c) software — programming familiarity, flow chart usage and creation, operating systems, communication formats, digital code systems, and documentation skills; and

d) cartographic equipment and software operations skills (developed through "hands on" experience).

20. Periodic checks should be undertaken to ensure that AIS and MAP personnel continue to meet the required standards and if shortfalls in knowledge, skills or competence are detected, corrective measures should be taken.

ORGANIZATION OF AERONAUTICAL INFORMATION SERVICES

Aerodrome AIS units
(FASID Tables AIS 1, AIS 2 and AIS 4)

21. The aerodrome AIS units to be provided at international aerodromes listed in the Appendix to Part III are set out in Table AIS 1.

22. The aeronautical information to be made available at international aerodromes listed in the Appendix to Part III is set out in Table AIS 2.

23. The exchange of aeronautical information documentation and availability of such documentation from international aerodromes listed in the Appendix to Part III is set out in Table AIS 4.

24. AIS at aerodromes should be provided on a 24-hour basis, except as otherwise agreed between the AIS authority, the air traffic services (ATS) authority and the operators concerned. Agreed operational hours of the aerodrome AIS units and details of the service provided should be indicated in the Aeronautical Information Publication (AIP) in accordance with Annex 15.

25. English should be among the languages used in aeronautical information briefings and consultations.

26. The aerodrome AIS unit should provide full pre-flight information/briefing service to flight operations personnel and flight crews for the entire coverage zone. The coverage zone for pre-flight information service at each aerodrome AIS unit should be determined taking into account the final destination of aircraft departing from the aerodrome concerned. This should be done in consultation with aircraft operators and be reviewed from time to time and/or when the air traffic pattern is expected to change.

27. The aerodrome AIS units should be adequately staffed and properly equipped for the provision of effective pre-flight information service. Installation of systems for the automated processing (storage, retrieval and preparation) of pre-flight information bulletins (PIB) should be considered at an early stage.

28. Aerodrome AIS units that provide pre-flight information services should be established at locations conveniently accessible to flight operations personnel at the aerodromes, preferably on the ground floor (apron level) of aerodrome terminal buildings.

29. Arrangements should be made between the aerodrome AIS unit, airline operations personnel (including flight crews) and ATS for an effective cooperation, coordination and reporting of post-flight information on inadequacies in the status and operation of air navigation facilities. To ensure submission of post-flight reports to aerodrome AIS units without delay, arrangements should be made at aerodrome that a suitable post-flight report form, such as the one provided in Doc 8126, be made available to ATS, airline operations offices and aerodrome AIS units.

30. Tables AIS 1 and AIS 2 should be implemented as soon as possible.

International NOTAM offices
(FASID Table AIS 3)

31. The international NOTAM offices to be provided in the ASIA/PAC regions are set out in Table AIS 3.

32. International NOTAM offices should be adequately staffed and properly equipped for the provision of effective 24-hour service.

33. Table AIS 3 should be implemented as soon as possible.

INTEGRATED AERONAUTICAL INFORMATION PACKAGE

Aeronautical Information Publication (AIP)

34. States that have not yet done so should, as a matter of urgency, prepare and publish their AIP in the new, restructured format, either individually or collectively. The format is prescribed by Annex 15 and the guidance material is provided in Doc 8126.

35. Information contained in the AIP should be complete and thoroughly checked for correctness before it is provided to users. To ensure consistency throughout the AIP, changes to the AIP should be made in such a way that information on the same facility, service, procedure, etc. affecting one part be changed in the other part(s), if applicable.

36. The differences between the national regulations and practices and the corresponding Standards and Recommended Practices (SARPs) should be provided in the appropriate part of the AIP.

AIP Amendments

37. In view of the vital importance of the aeronautical information contained in the AIP to the safety of air navigation, information in the AIP should be kept up to date. This should be done by publishing AIP Amendments on specific publication dates or in accordance with a publication schedule based on regular intervals.

38. AIP Amendments should be issued at least once every six months.

39. The AIRAC AIP Amendment shall be used to promulgate operationally significant changes to the AIP.

AIP Supplements

40. Any temporary changes of long duration (three months or longer) affecting the contents of an AIP must be promulgated as AIP Supplements and a checklist of all AIP Supplements currently in force shall be issued at intervals of not more than one month.

41. Where applicable, aeronautical information of operational significance requiring substantive amendments to flight documentation (e.g. promulgation of new and/or revised instrument approach procedures) promulgated by an AIRAC AIP Supplement should be accompanied by charts or diagrams, as appropriate, to aid interpretation.

42. The AIRAC AIP Supplement shall be used to promulgate operationally significant temporary changes to the AIP.

43. Information in the AIP Supplement appropriate for inclusion in the AIP should be incorporated therein with a minimum of delay.

44. Information in the AIP Supplement that is still valid at the end of six months should be re-issued with a new number indicating clearly that the new Supplement is a replacement and that the information it contains remains unchanged from that previously issued.

45. To enable users of aeronautical information to keep records of current information, checklists of AIP Supplements in force should be provided regularly through the monthly printed summary of NOTAM.

Aeronautical Information Circulars (AIC)

46. AIS should establish contact with the relevant services providing AIS with raw aeronautical information to coordinate the preparation and production of Aeronautical Information Circulars (AIC) strictly in accordance with Chapter 7 of Annex 15 and Doc 8126.

47. Checklists of current AIC must be issued at least once a year, irrespective of the number of AIC in force.

Use and validity of NOTAM

48. States should ensure that:

a) aeronautical information to be distributed by NOTAM is originated strictly in accordance with the guidance for the completion of the NOTAM Format contained in Annex 15;

b) the duration of aeronautical information promulgated by NOTAM does not exceed three months and if the information is to remain valid after that period, an appropriate AIP Amendment or Supplement is issued;

c) strict compliance with the requirement to provide at least seven days' advance notice of the activation of established danger, restricted or prohibited areas and of activities requiring temporary airspace restrictions, other than for emergency operations, is observed;

d) a "trigger" NOTAM is originated whenever an AIRAC AIP Amendment or Supplement is published, giving a brief description of the contents, the effective date and the reference number of the AIP Amendment or Supplement. Such a NOTAM must come into force on the same effective date as the AIP Amendment or Supplement;

e) the monthly printed plain-language summary of NOTAM in force also contains information on the latest AIP Amendments, AIP Supplements and AIC issued, and that it is distributed to the recipients with a minimum of delay by the most expeditious means.

49. AIS should exercise the proper selectivity in the origination and distribution of NOTAM by use of the flight information service or, whenever possible, automatic terminal information service (ATIS), for distribution of information that is valid for only a few hours.

50. States capable of introducing a pre-determined distribution system for NOTAM are encouraged to do so.

51. NOTAM should be mainly used for promulgation of information of a temporary nature and of short duration. Temporary information promulgated by NOTAM should not remain in force longer than three months. In exceptional cases, if temporary information promulgated by NOTAM remains in force for longer than three months, a replacement NOTAM should be issued.

52. Use of the abbreviations WIE ("with immediate effect") and UFN ("until further notice") in the NOTAM Format under Items B and C respectively must be avoided and instead, a ten-figure group giving year, month, day, hours and minutes in UTC should be used when originating NOTAM. When information on timing is uncertain, a ten-figure date-time group should be followed by an EST to indicate the approximate duration of information.

AIRAC system

53. States that have not yet done so should implement the AIRAC system in accordance with the requirements of Annex 15 with a minimum of delay.

54. States should ensure that adequate coordination between AIS and other air navigation services exists to permit effective implementation of the AIRAC system.

55. Successful implementation of the AIRAC system depends directly on the level of coordination established among the relevant technical services and the AIS. To ensure a high level of coordination, States should prepare their national regulations so that they well define the duties and responsibilities of those technical services involved in the provision of raw AIRAC information to AIS for publication. The technical services involved should be familiar with the AIRAC system and comply with it in accordance with specifications provided in Annexes 11, 14, Volumes I and II, and 15.

56. A schedule of AIRAC publication dates should be issued which includes a list of latest dates for the receipt of the raw information to be promulgated by AIRAC, printed on the reverse side of the Aeronautical Information Promulgation Advice Form.

57. To ensure that aeronautical information of operational significance reaches users at least 28 days in advance of the AIRAC effective date, measures should be taken to ensure that:

a) information/data prepared in hard copy format is issued and distributed at least 56 days prior to the effective date; and

b) information/data provided in electronic format is distributed at least 35 days in advance of the effective date.

58. Changes to the information promulgated by the AIRAC system should be avoided by all means, especially during the period consisting of the first 28 days.

59. States should ensure that responsible AIS personnel participate in the State's administrative and technical meetings where aerodrome and air navigation planning systems are discussed, in order that:

a) adequate consideration can be given to the AIS production, publication and advance notice of material issued by those meetings; and

b) such AIS personnel take part in the determination of applicability of changes in air navigation facilities and procedures, taking into account the required advance notification and cut-off dates relevant to the AIRAC system.

WORLD GEODETIC SYSTEM — 1984 (WGS-84)

Introduction

60. In order to support implementation of the future CNS/ATM systems, States should make every effort to implement WGS-84 and provide geographical coordinates referenced to this system. A detailed description/list of the WGS-84 coordinate data to be provided by States in order to fulfill the requirements of the plan is contained in the FASID.

61. The SARPs to be applied in respect of WGS-84 are contained in:

a) Annex 11 and Annex 14, Volumes I and II, for accuracy of the field work (surveying); and

b) Annex 4 and Annex 15 for charting and publication resolution, respectively.

62. To assist States in the uniform implementation of the WGS-84-related SARPs, the guidance material on the provision of geographical coordinates referenced to the WGS-84 datum is provided in Doc 9674.

WGS-84 requirements
(FASID Table AIS 5)

63. Table AIS 5 sets out the requirements for geographical coordinates referenced to the WGS-84 datum at international aerodromes, in flight information regions, en-route and in terminal areas.

64. States that have not yet done so should make the necessary arrangements to develop a national WGS-84 implementation plan and such a plan should contain a timetable for implementation. When developing a national WGS-84 plan, States should establish a committee composed of personnel from the appropriate aeronautical and geographic/geodetic departments of the State. Such a committee should be tasked with the management of the WGS-84 implementation plan.

65. States in a position to do so should provide assistance in the implementation of WGS-84 to other States needing such assistance.

66. Before the geographical coordinates based on WGS-84 are published in the AIP and on charts, every effort must be made to validate and verify them.

67. States that have common boundary points should coordinate WGS-84 data for those points prior to publication of this information in their respective AIPs.

68. In order to ensure that quality (accuracy, resolution and integrity) and traceability requirements for the WGS-84-related geographical coordinate data are met, States must take measures to develop and introduce a quality system programme. This programme containing procedures, processes and resources should be in conformity with the International Organization for Standardization (ISO) 9000 series of quality assurance standards.

AERONAUTICAL CHARTS

Aeronautical charting programme
(FASID Table AIS 6)

69. States, individually or collectively, should include in their AIP, derived from their aeronautical chart production programmes, at least the following types of charts:

a) Aerodrome Obstacle Chart — ICAO Type A;

b) Aerodrome Obstacle Chart — ICAO Type C;

c) Precision Approach Terrain Chart — ICAO;

d) En-route Chart — ICAO;

e) Area Chart — ICAO;

f) Standard Departure Chart — Instrument (SID) — ICAO;

g) Standard Arrival Chart — Instrument (STAR) — ICAO;

h) Aerodrome/Heliport Chart — ICAO;

i) Instrument Approach Chart — ICAO;

j) Visual Approach Chart;

k) World Aeronautical Chart — ICAO 1:1 000 000.

Note.— In the production of Aerodrome Obstacle Charts — ICAO Type A, Aerodrome Obstacle Charts — ICAO Type C, Instrument Approach Charts — ICAO, Aerodrome/Heliport Charts — ICAO and Precision Approach Charts — ICAO, States shall take into account ICAO Annex 4 requirements and Table AOP 1.

70. The detailed aeronautical chart requirements are set out in Table AIS 6.

Production responsibility for sheets of the World Aeronautical Charts — ICAO 1:1 000 000
[ASIA/PAC/3, Rec. 13/19]
(FASID Table AIS 7)

71. States that have not yet produced the World Aeronautical Chart — ICAO 1:1 000 000, in accordance with the sheet distribution shown in Table AIS 7, should take the necessary measures to ensure the preparation of the sheets for which they are responsible, either through individual effort or with the collaboration of other States or specialized cartographic agencies.

72. The production responsibility for sheets of the World Aeronautical Chart — ICAO 1:1 000 000 are set out in Table AIS 7 and illustrated on Chart AIS 2.

73. Where the agency producing the charts is not under the control of the aviation administration, States should ensure good liaison between them, and accord the necessary priority in their national chart production programmes to the production of the required aeronautical charts.

Aeronautical chart production

74. States that have not yet produced the aeronautical charts specified hereunder should produce them as soon as possible.

a) Aerodrome Obstacle Chart — ICAO Type A;

b) Aerodrome Obstacle Chart — ICAO Type C;

c) Precision Approach Terrain Chart — ICAO;

d) En-route Chart — ICAO;

e) Instrument Approach Chart — ICAO;

f) Aerodrome/Heliport Chart — ICAO;

g) World Aeronautical Chart — ICAO 1:1 000 000.

75. When information on specific aeronautical charts is amended, all related charts affected by the changes should be amended and published.

76. State authorities should ensure that the appropriate topographical information is made available to the AIS/MAP so that requirements for the production of aero-nautical charts can be fulfilled.

AUTOMATION IN AIS

77. Automation in AIS should be introduced with the objective of improving the overall speed, accuracy, efficiency, and cost-effectiveness of AIS in the region.

78. AIS automation should offer a service to meet the individual requirements of the various categories of users. This goes beyond the provision of pre-processed data and the PIB types traditionally provided manually or by early automated systems. For reasons of cost-effectiveness, such a service should strike a balance between the degree of complexity of the system required and the sophistication of the products provided.

79. The development of automation within AIS should be based on an integrated ASIA/PAC regional automated AIS system concept, in order to obtain a general standardization of procedures, products and services to users and to avoid potential divergencies, incompatibilities and duplication of effort.

80. The implementation of such a system should permit a cost-effective evolution of the regional system, taking account of the present and future technical possibilities and should be governed by the following principles:

a) participating national automated AIS systems should closely cooperate in adopting the different elements that will make up the integrated ASIA/PAC regional automated AIS system, taking into account their current and planned degree of development;

b) States that have not yet done so should initially automate NOTAM service within their own AIS while taking into account the users' requirements;

c) certain national automated AIS systems should cooperate with other not-yet-automated AIS systems, carrying out agreed functions to improve the efficiency and the quality of processing of basic aeronautical information and of its distribution both within an agreed area of the system and externally;

d) optimum use should be made of available communication and public networks as well as of new communication technology for the distribution, exchange and retrieval of aeronautical information, particularly NOTAM;

e) the ICAO NOTAM Format containing the necessary qualifiers to facilitate the sorting and retrieval of NOTAM information in accordance with users' requirements should be used exclusively;

f) a system interrogation capability that takes account of the different categories of systems users should exist;

g) common "user friendly" query procedures for the interrogation of AIS or NOTAM databases should be used. These procedures should be in accordance with the different levels of user requirements;

h) States must establish quality systems and procedures which will ensure that the available aeronautical information is of appropriate quality (accuracy, resolution, integrity) and timeliness;

i) a State that decides not to automate its AIS may arrange, in the interest of improved efficiency, on the basis of bilateral or multilateral agreements between States or other non-governmental organizations, for the provision of automated services on its behalf. The arrangement must take into account the non-transferable responsibility of a State for the provision of aeronautical information as well as other technical and administrative aspects associated with such agreement.

81. The development of the integrated ASIA/PAC regional automated AIS system should take into account provisions of Annex 15 for the use of WGS-84, the adopted common geodetic reference system, when aeronautical geographical coordinates are provided.

Attachment

CONCEPT FOR AN INTEGRATED AUTOMATED AIS SYSTEM FOR THE ASIA/PAC REGIONS

SYSTEM CONFIGURATION

1. The system should be based on the facilities of participating States with the following structure:

a) national automated AIS systems of States providing national service;

b) multi-national automated AIS systems of States providing, on the basis of bilateral and multilateral agreements, service to other State(s) in addition to national service; and

c) non-automated AIS.

AREA TO BE SERVED

2. The system should have the potential capacity of holding aeronautical information to fulfil the operational requirements for AIS pre-flight briefing service for flights from point of origin to final destination.

SYSTEM SERVICE

3. The system overall should provide a service that is capable of satisfying the users' operational requirements, as detailed in 17 to 25 below.

National service

4. The primary role of a national automated AIS system should be to provide aeronautical information to users in a given State either in accordance with predetermined arrangements or by computer interrogation. A national automated AIS system should collect appropriate aeronautical information from national sources, process it, produce it in the form of a NOTAM, store it in the a national automated AIS system database and make it available within the State, the integrated regional system and worldwide in accordance with predetermined arrangements.

5. Conversely, the required aeronautical information relative to other States should be received in the NOTAM Format for direct input into the database or for further processing, if required, so that specific requirements for international aeronautical information can also be carried out by the national system.

6. The national automated AIS system should be able to provide service to users in another participating State that does not have an automated AIS system as well as any other State for which the service is provided in accordance with pre-arranged agreements. States not having an automated AIS system but participating in the regional system would have the option, resulting from bilateral agreement, to be linked with a national automated AIS system via an intelligent or non-intelligent remote terminal.

SYSTEM FUNCTIONS

7. A number of system functions should be performed at regional and national levels.

COMMUNICATION

8. The aeronautical fixed service should satisfy the communication requirements at an international level.

Optimum use should be made of available communication networks for the distribution, exchange and retrieval of aeronautical information, particularly NOTAM.

9. The selection of the means for the retrieval of data at a national level should be at the discretion of the individual State and should be largely dependent on the availability and cost of the various services, communication links available and user requirements.

SYSTEM RELIABILITY AND REDUNDANCY

10. The system configuration should assure adequate reliability and redundancy.

FALLBACK PROCEDURES

11. In the case of a system failure, the service within the related service area should be continued in accordance with the pre-arranged and established procedure for each service area, which should also cover the necessary communications arrangements.

RESPONSE TIME

12. With the features provided by the system, the use of modern computer techniques and means of communication, short response times should be assured.

PLANNING AND IMPLEMENTATION

13. The planning and implementation of the system should be guided and adjusted by considerations related to efficiency, cost-effectiveness and experience.

14. Relevant bilateral or multilateral agreements should aim at minimizing costs through work and equipment savings beneficial to all participants.

15. A planning and implementation regional group should coordinate the general development of the system and the activities required of States and should monitor the overall situation for the purpose of detecting in advance divergencies in developments that could lead to incompatibilities.

SYSTEM MANAGEMENT

16. The strategic operation of the system should be closely monitored by States to permit speedy reaction to problems encountered and to shortcomings identified. An appropriate form of system management should be developed by the planning and implementation regional group.

USER REQUIREMENTS IN AN AUTOMATED AIS SYSTEM

17. The latest pre-flight information bulletin (PIB) of the specific type needed (i.e. route, area or aerodrome) should be available.

18. Information on specific items for given areas required by flight planning services, air traffic services (ATS), AIS or other users, should be provided.

19. A list of NOTAM entered into the system after a specific date-time group, to facilitate briefing, should be obtainable.

20. Immediate notification capability of items of urgent operational significance should be provided.

TYPE OF INFORMATION TO BE PROVIDED

21. The system should provide NOTAM covering the area of service.

22. The system should additionally provide the following PIBs and lists:

a) route type bulletin containing NOTAM relevant to aerodrome of departure, the planned route based on flight information regions (FIRs) crossed, aerodrome of destination, and alternate aerodromes;

b) area type bulletin containing NOTAM relevant to FIR or State;

c) aerodrome type bulletin containing NOTAM concerning any aerodrome or group of aerodromes;

d) immediate notification items;

e) checklists of NOTAM by State, FIR and aerodrome; and

f) list of NOTAM for a specific period or NOTAM entered into the system after a specific date-time group.

23. The updating of PIBs should be covered by system products listed in 22 d), e) and f), or by request for a new PIB.

24. The system features described in 28 to 37 below should permit PIBs to be tailored to the needs of users and should provide flexible options for information content ranging from full system data coverage to data of urgent operational significance.

25. PIBs should be provided in a standard format and ascending sequence of information.

MULTI-ACCESS TERMINALS

26. AIS terminals should ultimately be capable of providing OPMET information relating to pre-flight bulletins.

27. AIS terminals should ultimately be capable of being used for the filing of a flight plan.

SYSTEM FEATURES

NOTAM

28. The NOTAM, in standard ICAO NOTAM Format, should constitute the basic data exchange source in the system.

29. The NOTAM should be prepared only once, at the entry into the system.

30. The system should provide for automatic exchange of the NOTAM between national automated AIS systems.

Common set of qualifiers (Item Q)

31. A common set of qualifiers, forming an integral part of the NOTAM Format (Item Q) should be used to assure compatibility in data exchange and to permit the production of standard system output products.

Decoded NOTAM text

32. The NOTAM text (Item E) of the NOTAM Format should be prepared by using the significations/uniform abbreviated phraseology assigned to the ICAO NOTAM Code, complemented by ICAO abbreviations, indicators, identifiers, designators, call signs, frequencies, figures and plain language.

NOTAM selection criteria

33. The NOTAM Code contained in the PANS-ABC (Doc 8400) is the most comprehensive description of information requiring NOTAM promulgation and should, therefore, constitute criteria for:

a) the storage and retrieval of information;

b) the decision as to whether a particular item is of operational significance;

c) the decision as to the relevance of particular items for various types of flight operations; and

d) the selection of items of operational significance that require immediate notification.

34. Consequently, the NOTAM Code should constitute the basis for the determination of the qualifiers for TRAFFIC, PURPOSE and SCOPE.

Geographical reference qualifier

35. Sufficient flexibility and tailoring of information for the first stage of automation in AIS is achieved by the use of the geographical reference qualifier. This qualifier consists of latitude and longitude to one minute resolution and referenced to the World Geodetic System — 1984 (WGS-84) geodetic datum accurate to one minute resolution, and a three-digit distance figure giving radius of influence in nautical miles.

36. The provision of more flexible and referred data retrievals can be satisfied by the application of a geographical reference system which may be required for the expansion of the overall system in order to meet future requirements. These requirements may derive from the introduction of RNAV operations, the expansion of automation within the ATS and users' systems.

37. Consequently, in the evolution of the regional system, the geographical reference system based on LAT/LONG coordinates of WGS-84 must be used as a standard.

SYSTEM QUERY PROCEDURES

38. The system should provide a common set of query procedures.

39. The common set of query procedures should make the best use of the database management system in use in order to give rapid response to simple and short requests.

40. The query procedures should also provide user-friendly access to the system without assistance of AIS personnel to obtain the required information.

Appendix

SUMMARY OF AMENDMENTS TO THE BASIC ANP

Approved by the President on behalf of the Council

January 1998 — January 2006

BORPC Amendment of Part I — BORPC (A16/8.4 — 05-065)

AOP Amendment of Part III — AOP (APAC 00/3)

Amendment of the requirements in the Appendix as they relate to the Republic of Korea (APAC 02/2)

Addition to requirements in the Appendix as they relate to the Republic of Korea (APAC 03/5)

Amendment of the requirements in the Appendix as they relate to Japan (APAC 04/9)

CNS Amendment of Part IV — CNS (APAC 00/3 and 03/8)

ATS Amendment of the requirements for the Adelaide, Brisbane, Darwin, Melbourne, Perth and Sydney FIRs as they apply to Charts ATS 1 and ATS 2 (APAC 96/8)

Amendment of the requirements for the Honiara FIR as they relate to Chart ATS 3C (APAC 98/7)

Amendment of the requirements for the Auckland FIR as they relate to Chart ATS 1, ATS 2 and ATS 3C (APAC 98/8)

Amendment of Part V — ATS (APAC 00/3)

Amendment of the requirements for the Oakland Oceanic/Anchorage Oceanic FIRs as they apply to Charts ATS 1, ATS 2 and ATS 3B (APAC 03/3)

ATS Amendment of the requirements for the Oakland Oceanic FIR as they apply to Charts ATS 1, ATS 2 and ATS 3B (APAC 03/11)

Amendment of the requirements for the Tokyo, Naha and Fukuoka FIR s as they apply to Charts ATS 1, ATS 2 and ATS 3A (APAC 05/1)

Amendment of the requirements for the Ujung Pandang and Jakarta FIRs and the deletion of the Bali and Biak FIRs as they apply to Charts ATS 1 and ATS 3D (APAC 05/10)

Amendment of routes A210, B203 and G348 (APAC 93/8)

Amendment of routes B332, B347, B467, B355 and B/UB467 (APAC 97/5)

Amendment of routes A216, A337, A339, A597, B586, G339, R204, R584, R595 and R596 (APAC 97/9)

Amendment of route R332 (APAC 97/16)

Addition of route M750 (APAC 97/12)

Amendment of routes A329, B597, G585 and R220 (APAC 97/10)

Addition of routes P766 and P880 (APAC 98/5)

Amendment of routes A467, A473, B579, G424 and R209 (APAC 98/2)

Amendment of routes A457, A464, B335, B466,G334,G579, G582, G584, R208, R325 and R467 (APAC 97/6)

ATS	Amendment of routes A218, B328, B330, B334, B458, B331 and B480 (APAC 99/1)
	Amendment of routes B333, A455, G225 and R458 (APAC 99/8)
	Amendment of routes G204, G330 and G455 (APAC 99/7)
	Amendment of routes A204, A339, B337,G583, R217, R220 and R583 (APAC 98/15)
	Amendment of route A586 (APAC 00/2)
	Amendment of route A581 (APAC 99/11)
	Amendment of routes G334, G461, B588, R218 and R597 (APAC 00/1)
	Amendment of routes B330, B480, B483, G489, G491 and G494 (as applicable to the ASIA/PAC region from amendment EUR/NAT 00/2)
	Amendment of routes A459, A466, B345, B457, G452, G598, G669, R328, R331, R462 and UL425 (APAC 99/4)
	Amendment of routes A1, A202, A205, A461, A470, A583, A590, B222, B584, G220, G334, G453, G466, G467, G580, G584, R208, R223, L625, L628, L642, M754, M765, M771, N500, N884 and N892 (APAC 01/2)
	Amendment of the FIR as it applies to the Republic of Korea and amendment of routes A582, A586, A595, B212, B467, B576, G203, G339, G589 and G597 (APAC 02/2)
	Amendment of routes G211 and A341 (APAC 04/3)
	Amendment of route UM551 (APAC 04/7)
	Amendment of routes L644 and M772 in and the deletion of column 3 (cruising levels) (APAC 04/11)
	Addition of route B345 (APAC 05/3)
ATS	Addition of route P761 (APAC 05/4)
	Addition of the routes L504, M522, M635, M774, N645, P648 and amendment of routes A211, M768 and N875(APAC 05/5)
	Amendment of routes A202 and R339 and deletion of routes A203, R333 and R335 (APAC 05/18)
	Addition of routes A468, B339 and G218 and amendment of routes A335, A588, B206, B451 and G341 (APAC 05/19)
	Amendment of routes B456 and B589 (APAC 05/20)
	Deletion of route G589 (APAC 05/21)
	Addition of route B346 (APAC 05/24)
MET	Amendment of Part VI — MET as it applies to SIGMET and AIRMET information (APAC 97/15)
	Amendment of Part VI — MET as it applies to the World Area Forecast System (WAFS) (APAC 98/3)
	Amendment of Part VI — MET (APAC 00/3 and 04/06)
	Amendment of Part VI — MET as it applies to regional procedures (APAC 02/4)
SAR	Amendment of the requirements to the search and rescue services by extending the boundary of Auckland SRR to coincide with the FIR boundary on Chart SAR 1 and to amend the eastern boundary of Nadi SSR accordingly (APAC 98/8)
	Amendment of Part VII — SAR (APAC 00/3)
	Amendment of the designation of search and rescue as it applies to the Republic of Korea and Chart SAR 1 (APAC 02/2)
AIS/MAP	Amendment of Part VIII — AIS/MAP (APAC 00/3)

– END –

ICAO TECHNICAL PUBLICATIONS

The following summary gives the status, and also describes in general terms the contents of the various series of technical publications issued by the International Civil Aviation Organization. It does not include specialized publications that do not fall specifically within one of the series, such as the Aeronautical Chart Catalogue *or the* Meteorological Tables for International Air Navigation.

International Standards and Recommended Practices are adopted by the Council in accordance with Articles 54, 37 and 90 of the Convention on International Civil Aviation and are designated, for convenience, as Annexes to the Convention. The uniform application by Contracting States of the specifications contained in the International Standards is recognized as necessary for the safety or regularity of international air navigation while the uniform application of the specifications in the Recommended Practices is regarded as desirable in the interest of safety, regularity or efficiency of international air navigation. Knowledge of any differences between the national regulations or practices of a State and those established by an International Standard is essential to the safety or regularity of international air navigation. In the event of non-compliance with an International Standard, a State has, in fact, an obligation, under Article 38 of the Convention, to notify the Council of any differences. Knowledge of differences from Recommended Practices may also be important for the safety of air navigation and, although the Convention does not impose any obligation with regard thereto, the Council has invited Contracting States to notify such differences in addition to those relating to International Standards.

Procedures for Air Navigation Services (PANS) are approved by the Council for worldwide application. They contain, for the most part, operating procedures regarded as not yet having attained a sufficient degree of maturity for adoption as International Standards and Recommended Practices, as well as material of a more permanent character which is considered too detailed for incorporation in an Annex, or is susceptible to frequent amendment, for which the processes of the Convention would be too cumbersome.

Regional Supplementary Procedures (SUPPS) have a status similar to that of PANS in that they are approved by the Council, but only for application in the respective regions. They are prepared in consolidated form, since certain of the procedures apply to overlapping regions or are common to two or more regions.

The following publications are prepared by authority of the Secretary General in accordance with the principles and policies approved by the Council.

Technical Manuals provide guidance and information in amplification of the International Standards, Recommended Practices and PANS, the implementation of which they are designed to facilitate.

Air Navigation Plans detail requirements for facilities and services for international air navigation in the respective ICAO Air Navigation Regions. They are prepared on the authority of the Secretary General on the basis of recommendations of regional air navigation meetings and of the Council action thereon. The plans are amended periodically to reflect changes in requirements and in the status of implementation of the recommended facilities and services.

ICAO Circulars make available specialized information of interest to Contracting States. This includes studies on technical subjects.

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