Doc 9182, LIM NAT
(1976)

INTERNATIONAL CIVIL AVIATION ORGANIZATION

REPORT OF THE LIMITED NORTH ATLANTIC REGIONAL AIR NAVIGATION MEETING (1976)

Montreal, 25 August - 10 September 1976

This Report contains the recommendations of a Regional Air Navigation Meeting. For details of the action taken on the Report by the Council of ICAO, refer to the Supplement.

Approved by the Meeting
and published by authority of the Secretary General

INTERNATIONAL CIVIL AVIATION ORGANIZATION

LIMITED NORTH ATLANTIC REGIONAL AIR NAVIGATION MEETING (1976)

Montreal, 25 August - 10 September 1976

SUPPLEMENT NO. 1

1. The Council at the 2nd Meeting of its 90th Session on 3 February 1977 and the Air Navigation Commission at the 15th, 16th, 17th, 21st, 22nd, 23rd, 24th, 25th, 26th 27th, 29th and 30th Meetings of its 83rd Session and at the 2nd, 3rd and 4th Meetings of its 84th Session, acting under authority delegated by Council, took action as indicated hereunder, on the report of the Limited North Atlantic Regional Air Navigation Meeting (1976).

2. The recommendations of the Meeting, unless otherwise qualified in the text or in the action taken thereon by the Council or by the Air Navigation Commission under delegated authority, apply only to the Contracting States whose territories or dependencies are located partially or wholly within the area embraced by the air route network considered by the Meeting and those located outside that area, which have notified ICAO that aircraft on their register operate or expect to operate into the area, or which provide facilities and services affecting the area.

3. Recommendations for action by States are addressed to ICAO Contracting States only. Implementation of those recommendations related to facilities and services is governed by Article 28 of the Convention. Inclusion under some of the recommendations of 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 those States.

4. The Secretary General will arrange for the normal follow-up action in respect of all approved Recommendations. Where special action is required to be taken by the Secretary General this is indicated in the text of the action taken by the Council or the Air Navigation Commission.

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(8 pages)

ACTION TAKEN ON THE RECOMMENDATIONS OF THE
LIMITED NORTH ATLANTIC REGIONAL AIR NAVIGATION MEETING (1976)

Report Reference		Action by Council or ANC	Recommendation Title/Action
Rec. No.	Page		
1/1	1-3		Improved presentation of Regional Supplementary Procedures in ICAO Document 7030
		ANC	noted that the subject of this recommendation was already included in the Air Navigation Commission Technical Project List (ANCP) under Task No. 32.14.1-1/74 and requested the Secretary to present appropriate proposals no later than the 85th Session.
1.1/1	1.1-4		Air Traffic Forecasting in the NAT Region for Air Navigation System Planning Purposes
		C	approved the recommendation.
1.1/2	1.1-6		Status of the OMEGA Navigation System
		ANC	approved the recommendation on the understanding that the word "status" as used in the title related to the day-to-day operational status of the system.
1.1/3	1.1-7		Inclusion of Reference to the OMEGA Navigation System in Annex 10
		ANC	approved the recommendation and requested the Secretary to submit proposals in due course under ANCP Task No. 14.5.5-1/74.
1.1/4	1.1-7		Information on the OMEGA Navigation System
		ANC	approved the recommendation and requested the Secretary General to invite the United States to provide ICAO, as early as possible, with appropriate material which could serve as a basis for the information circular.
1.1/5	1.1-8		Deletion of the VOR/DME Akraberg from the NAT Regional Plan
		C	approved the recommendation.
1.1/6	1.1-8		Changes to the Regional Plan for Radio Navigation Aids in the NAM Region
		C	approved the recommendation.
1.1/7	1.1-10		Initial Measures to Reduce Difficulties now Encountered with General Aviation Ferry Flights in the NAT Region
		ANC	approved the recommendation noting its relationship to Recommendation 4/4.

Report Reference Rec. No.	Page	Action by Council or ANC	Recommendation Title/Action
1.1/8	1.1-10		Studies on Problems of General Aviation Flights
		ANC	approved the recommendation.
1.2/1	1.2-3		Use of Guidance Material on MNPS Developed by the 9th AN Conference
		ANC	approved the recommendation. (Recommendation 1.2/8 refers).
1.2/2	1.2-6		Expansion of Monitoring Activities in the NAT Region
		C	approved the recommendation noting that supplementary provisions regarding monitoring activities in the NAT Region are contained in Appendix B to the Report.
1.2/3	1.2-6		Acquisition and Use of Monitoring Data
		ANC	approved the recommendation.
1.2/4	1.2-7		Follow-up Action on Reported Deviations from Assigned Track
		ANC	approved the recommendation and requested the Secretary General to draw the attention of States and IATA to the need for its continuing application.
1.2/5	1.2-7		Information on Monitoring Procedures by States
		ANC	approved the recommendation. (Recommendation 1.2/8 refers).
1.2/6	1.2-7		Monitoring by Operators and Good Operating Practices for NAT Flights
		ANC	approved the recommendation. (Recommendation 1.2/8 refers).
1.2/7	1.2-8		Amendment to Doc 7030
		C	approved the recommendation with the modifications to the proposed regional supplementary procedures set forth in the Attachment.
1.2/8	1.2-9		Publication of Guidance Material Relating to MNPS
		ANC	approved the recommendation.
1.2/9	1.2-9		Phased Implementation of the NAT RAC SUPPS Regarding MNPS
		C	approved the recommendation on the understanding that should an implementation date other than 5 October 1978 become necessary in respect of the supplementary procedures referred to in sub-paragraph b) of the recommendation, an appropriate proposal for such date would be presented for the approval by Council. It further requested the Secretary General to consult States in due course, regarding an appropriate date for introduction of the revised composite separation procedures (sub-paragraph (c) of the recommendation refers).

Report Reference Rec. No.	Page	Action by Council or ANC	Recommendation Title/Action
1.2/10	1.2-11		Further Work of the NAT/SPG
		ANC	approved the intent of the recommendation noting that the Meeting concerned needs to be convened no later than 1 September 1977 to allow time for review and application of any measures that might be recommended by the Meeting which would require approval by Council. It decided to request the Secretary General to: a) inform the NAT/SPG of the Commission's request that the Meeting to consider the tasks listed in sub-paragraph a) of the recommendation be convened no later than 1 September 1977 and that the following task be added to those already listed in sub-paragraph a): "7) develop, for use as guidance material, a list of navigation equipment and combinations thereof which, when properly maintained and operated, will ensure that aircraft so fitted have the required navigational capability in the MNPS airspace." b) request States concerned to provide at least preliminary information as indicated in sub-paragraph b) of the recommendation by 31 May 1977, such information to be confirmed and supplemented as necessary no later than 1 August 1977.
1.3/1	1.3-3		Amendment to Doc 7030
		C	approved the recommendation on the understanding that the relevant supplementary procedures would be editorially corrected in respect of terminology relating to supersonic aircraft. (Recommendation 1.3/2 refers).
1.3/2	1.3-3		Applicability Date for the Amended NAT RAC Procedures
		C	agreed that the amended NAT RAC supplementary procedures will become applicable on 21 April 1977, i.e. the AIRAC date closest to 3 months following their approval by Council. (Recommendation 1.3/1 refers).
1.3/3	1.3-5		Application of Composite Separation in the NAT Region
		C	approved the recommendation.
1.3/4	1.3-6		Possible Application of Reduced Longitudinal Separation in the NAT Region
		ANC	approved the recommendation.

Report Reference Rec. No.	Page	Action by Council or ANC	Recommendation Title/Action
1.3/5	1.3-7		Development of Specifications for Mach Number Indicators
		ANC	noted the recommendation and requested the Secretary General to: a) consult selected States with a view to obtaining information regarding current specifications for Mach Number indicators and the degree to which such specifications satisfy the elements in sub-paragraphs a) and b) of the recommendation; and b) prepare, on the basis of the material received, appropriate proposals for consideration by the ANC.
2/1	2-1		Changes to the Boundaries of FIRs Gander Oceanic, Edmonton, Reykjavik and Søndrestrom
		C	approved the recommendation.
2/2	2-2		Problems regarding ATS Messages and their Automated Exchange between Oceanic Area Control Centres
		ANC	approved the recommendation and requested the Secretary General to: a) consult States concerned with a view to obtaining information on studies undertaken and to take such studies into consideration in work that may be undertaken in follow-up of Recommendation 5/2 of the 9th AN Conference; b) invite the NAT/SPG to undertake any necessary co-ordination work in this field and keep ICAO informed of progress made.
2/3	2-4		Continued Provision of Safe Air Navigation Services over the High Seas
		C	**approved the recommendation on the understanding that its objective is to ensure the continuing safe operation of aircraft over the high seas in the circumstances envisaged.**
2/4	2-4		Advance Notice regarding the Intended Withdrawal of Air Navigation Services due to Industrial Action
		C	while appreciating the intent of this recommendation: a) noted that it would involve ICAO in matters that should be dealt with directly between State administrations and the industrial interests concerned; and b) requested the Secretary General to bring this recommendation to the attention of States.

Report Reference		Action by Council or ANC	Recommendation Title/Action
Rec. No.	Page		
2/5	2-4		Provision of Information on Developments regarding the Operation of the Air Navigation System in Contingency Cases
		C	approved the recommendation.
3/1	3-1		Direct ATS Speech Capability from Santa Maria to New York, Gander and San Juan
		ANC	approved the recommendation.
3/2	3-2		Improvement of the ATS Speech Circuit Prestwick-Santa Maria
		C	approved the recommendation.
3/3	3-2		Reykjavik - Stavanger Direct ATS Speech Capability
		ANC	approved the recommendation noting that it supplemented Recommendation 15/11 of the Fifth NAT RAN Meeting.
3/4	3-3		Edmonton - Søndre Strømfjord - Reykjavik Direct ATS Speech Capability
		C	approved the recommendation noting that the circuit concerned is one of those referred to in the "General Note" on page 3-1 of the Report.
3/5	3-3		Future NAT ATS Speech Arrangements
		ANC	approved the recommendation on the understanding that it is addressed to the provider States of the Region.
3/6	3-4		Modulation Rate on the London - Montreal AFTN Channels
		C	approved the recommendation.
3/7	3-4		Amendments to NAT AFTN Plan
		C	approved the recommendation.
3/8	3-5		Amendments to NAT MET Circuits Plan
		C	approved the recommendation.
3/9	3-5		Automation of the Reykjavik AFTN Centre
		C	approved the Recommendation.

Report Reference Rec. No.	Page	Action by Council or ANC	Recommendation Title/Action
3/10	3-6		Current AFTN Problems
		ANC	approved the intent of this recommendation noting that in taking action on Recommendation No. 7 of ASPENN/3 it had requested the Secretary General to make proposals regarding the most appropriate machinery to be employed.
4/1	4-2		Introduction of SSB in NAT Families A and D
		C	approved the recommendation and requested the Secretary General to draw the attention of the States concerned to part b).
4/2	4-4		Families for Use on Polar Routes
		C	approved the recommendation.
4/3	4-5		Amendment of the NAT AMS Plan
		C	deferred action on the recommendation pending the outcome of the DEN/ICE/3 Conference in Montreal, 1 - 16 March 1977.
4/4	4-6		Misuse of 121.5 MHz
		ANC	approved the recommendation noting its relationship to Recommendation 1.1/7.
4/5	4-6		Maintenance of HF SELCAL Watch
		ANC	approved the recommendation.
4/6	4-7		Amendment of the Shannon HF VOLMET Broadcast Plan
		ANC	approved the recommendation.
4/7	4-8		Presentation of the NAT AMS Plan
		ANC	noted the recommendation and requested the Secretary General to take it into account as appropriate.

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ATTACHMENT

MODIFICATIONS APPROVED BY THE COUNCIL TO THE REGIONAL SUPPLEMENTARY PROCEDURES PROPOSED IN APPENDIX C TO THE REPORT OF THE LIM NAT RAN MEETING ON AGENDA ITEM 1.2

1. On page 1.2-28, in Section 1), REPLACE paragraphs x.1, x.1.1 and associated Note by:

"x.1 Method of application
(A.2 - 5.1.1; A.6, Part I - 4.2, 7.2 and Chapter 3, Note 1; A.6, Part II - 7.2 and Chapter 3, Note 1; A.8 - 8.1).

x.1.1 Aircraft used to conduct flights within the volume of airspace specified in para. x.2.1 shall have navigation performance capability such that:

a) the standard deviation of lateral track errors shall be less than 6.3 NM (11.7 Km);

b) the proportion of the total flight time spent by aircraft 30 NM (55.6 Km) or more off the cleared track shall be less than 5.3×10^{-4};

c) the proportion of the total flight time spent by aircraft between 50 and 70 NM (92.6 and 129.6 Km) off the cleared track shall be less than 13 x 10-5.

Such navigation performance capability shall be verified by the State of Registry or the State of the Operator, as appropriate.

Note: Guidance material of use to those involved in the initial achievement and continued maintenance of the navigation capability set forth in x.1.1 has been issued by ICAO under the title 'Guidance Material related to Air Navigation in the NAT Region' and will be supplemented and updated as required and as new material becomes available."

2. On page 1.2-30, in Section 5), paragraph 1.4.1, line 1, REPLACE the word "between" by "at or above" and REPLACE the word "and" by "up to and including".

- END -

INTERNATIONAL CIVIL AVIATION ORGANIZATION

LIMITED NORTH ATLANTIC REGIONAL AIR NAVIGATION MEETING (1976)

Montreal, 25 August - 10 September 1976

SUPPLEMENT NO. 2

The Council at the Sixteenth Meeting of its 90th Session on 6 April 1977, following its approval of Recommendation No. 3/9 of the Third Conference on 1956 Danish and Icelandic Joint Financing Agreements, took action as indicated hereunder on Recommendation 4/3 of the Limited North Atlantic Regional Air Navigation Meeting (1976).

Recommendation 4/3 (page 4-5)

Approved the Recommendation on the understanding that its decision was not influenced by the fact that certain facilities mentioned in the recommendation were jointly financed.

- END -

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INTERNATIONAL CIVIL AVIATION ORGANIZATION

LIMITED NORTH ATLANTIC REGIONAL AIR NAVIGATION MEETING (1976)

Montreal, 25 August - 10 September 1976

SUPPLEMENT No. 3

The Council at the 8th Meeting of its 95th Session on 27 November 1978, took further action as indicated hereunder, on Recommendation 1.2/9 of the Limited North Atlantic Regional Air Navigation Meeting (1976).

Recommendation 1.2/9 (page 1.2-9)

Revised the applicability date of the NAT RAC Supplementary Procedures referred to in sub-paragraph b) of the recommendation from 5 October 1978 to 19 April 1979.

- END -

(1 page)

INTERNATIONAL CIVIL AVIATION ORGANIZATION

LIMITED NORTH ATLANTIC REGIONAL AIR NAVIGATION MEETING (1976)

Montreal, 25 August - 10 September 1976

SUPPLEMENT No. 4

The Council at the 13th Meeting of its 96th Session on 26 March 1979, took further action as indicated hereunder, on Recommendation 1.2/9 of the Limited North Atlantic Regional Air Navigation Meeting (1976).

Recommendation 1.2/9 (page 1.2-9)

a) deferred application of the NAT RAC Supplementary Procedures, referred to in sub-paragraph b) of the recommendation;

b) noted that the Air Navigation Commission will be kept informed of any progress concerning this subject and will receive a special report on the results of the 16th Meeting of the North Atlantic Systems Planning Group on this subject at the earliest possible time with a view to presenting proposals to the Council at that time for a new applicability date; and

c) requested the Secretary General to write to States, pointing out the difficulties that are being experienced in reaping the benefits that were envisaged with application of the MNPS procedures and seek their co-operation in ensuring compliance with the procedures.

- END -

(1 page)

INTERNATIONAL CIVIL AVIATION ORGANIZATION

LIMITED NORTH ATLANTIC REGIONAL AIR NAVIGATION MEETING (1976)

Montreal, 25 August - 10 September 1976

SUPPLEMENT No. 5

The Council at the 9th Meeting of its 100th Session on 18 June 1980 took further action as indicated hereunder on Recommendation 1.2/9 of the Limited North Atlantic Regional Air Navigation Meeting (1976).

Recommendation 1.2/9 (page 1.2-9)

Approved 30 October 1980 as the applicability date of the NAT RAC Supplementary Procedures referred to in sub-paragraph b) of the recommendation.

- END -

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Peru. Representante de la OACI, Oficina Sudamérica, Apartado 4127, Lima.

Senegal. Représentant de l'OACI, Bureau Afrique, Boîte postale 2356, Dakar.

Spain. Librería de Aeronáutica y Astronáutica Sumaas, Desengaño, 12-3º-3, Madrid 13.

Sweden. C.E. Fritzes Kungl. Hovbokhandel, Fredsgatan 2, Box 16356, Stockholm 16.

Thailand. ICAO Representative, Far East and Pacific Office, P.O. Box 614, Bangkok.

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LETTER OF TRANSMITTAL

To: President of the Council

From: Chairman of the Limited North Atlantic Regional Air Navigation Meeting (1976)

I have the honour to submit herewith the Report of the Limited North Atlantic Regional Air Navigation Meeting (1976) held in Montreal, from 25 August to 10 September 1976.

A.L. Elliott

A.L. Elliott

Montreal, 10 September 1976

TABLE OF CONTENTS

HISTORY OF THE MEETING

ii.1 PLACE AND DURATION OF THE MEETING

The Limited North Atlantic Regional Air Navigation Meeting (1976) was convened by the International Civil Aviation Organization on 25 August 1976 at ICAO Headquarters in Montreal, Canada, and completed its Agenda on 10 September 1976.

ii.2 ORGANIZATION, OFFICERS, OFFICIALS AND TASKS

The Meeting was organized as follows:

ii.2.1 GENERAL COMMITTEE

Chairman	- Mr. A.L. Elliott
First Vice-Chairman	- Mr. L. Magnusson
Second Vice-Chairman	- Mr. T. Kurek
Secretary	- Mr. F.W. Thesen
Assistant Secretary	- Mr. P.J. Ludgate

The General Committee held three meetings. The opening meeting of the General Committee was addressed by the President of the Council, Dr. Assad Kotaite.

The General Committee adopted the Agenda and the Organization Plan for the Meeting, as established by the Air Navigation Commission. It noted the Directives to Regional Air Navigation Meetings and Rules of Procedure for their Conduct in Doc 8144-AN/874/3.

During its closing meeting the General Committee approved this report for transmittal to the President of the Council.

ii.2.2 AIR TRAFFIC SERVICES (ATS) COMMITTEE

Chairman	- Mr. R. Howley
Vice-Chairman	- Mr. N. Berkessov
ICAO Advisers	- Mr. P.J. Berger (Secretary)
	- Mr. K.J. Kleiner

The ATS Committee was charged with Agenda Items 1 and 2.

ii.2.3 COMMUNICATIONS (COM) COMMITTEE

Chairman	- Mr. J.P. Perrin
Vice-Chairman	- Mr. D.J. O'Neill
ICAO Advisers	- Mr. F.E. Sperring (Secretary)
	- Mr. R.E. Malvido

The COM Committee was charged with Agenda Items 3 and 4.

ii.3 WORKING LANGUAGES

The working languages of the Meeting were English and French with interpretation into and from Russian provided in the General Committee. Documentation of the Meeting was issued in English and French.

ii.4 ADMINISTRATIVE SERVICES

The ICAO Officers in charge of the administrative services for the Meeting were:

Administrative Officer	- Mr. A.C.A. Groven
Officer in charge of the Language Services	- Mr. F. Dufau-Labeyrie
Chief Interpreter	- Mr. F. Cordier
Chief, Conference and General Services	- Mr. D.B. Hall
Document Control Officer	- Mr. F.O. Novotny

ii.5 REPRESENTATION

Twenty-one Contracting States, Members of the Meeting, and three International Organizations were represented at the Meeting as follows:

CONTRACTING STATES, MEMBERS OF THE MEETING

Belgium, Canada, Cuba, Czechoslovak Socialist Republic, Denmark, Federal Republic of Germany, France, Iceland, India, Ireland, Italy, Kingdom of the Netherlands, Norway, Poland, Portugal, Sweden, Switzerland, Trinidad and Tobago, Union of Soviet Socialist Republics, United Kingdom and United States.

INTERNATIONAL ORGANIZATIONS

International Council of Aircraft Owner and Pilot Associations (IAOPA), International Air Transport Association (IATA) and International Federation of Air Line Pilots' Asscciations (IFALPA).

ii.6 LIST OF REPRESENTATIVES

A list of the accredited Representatives who attended the Meeting appears on pages ii-3 to ii-6.

The designations employed and the presentation of the material in this report do not imply the expression of any opinion whatsoever on the part of the Secretariat of ICAO concerning the legal status of any country or territory or of its authorities, or concerning the delimitation of its frontiers.

LIST OF REPRESENTATIVES
LISTE DES DELEGUES

Name/Nom	Position in Delegation*/ Qualité dans la délégation*
Contracting States/Etats contractants	
BELGIUM/BELGIQUE	
Deconninck, J.B.	D
CANADA	
Elliott, A.L.	D
Broadfoot, M.D.	Alt
Manuel, I.A.	Alt
Taylor, R.F.	Alt
Barclay, E.L.	Adv
Leblanc, H.J.	Adv
Perrin, J.P.	Adv
Saunders, L.H.	Adv
Yakamovich, W.	Adv
CUBA	
Herrera, J.	D
Ribe, M.E.	Alt
CZECHOSLOVAK SOCIALIST REPUBLIC/ REPUBLIQUE SOCIALISTE TCHECOSLOVAQUE	
Kriha, J.	D
DENMARK/DANEMARK	
Olsen, N. Boserup	D
Nitschke, B.	Alt
Thomsen, I.H.	Alt
FRANCE	
Monnier, A.N.H.	D
Chef, M.	Alt

*D : Delegate/Délégué
Alt : Alternate/Suppléant
Adv : Adviser/Conseiller
Obs : Observer/Observateur

Name/Nom	Position in Delegation*/ Qualité dans la délégation*
GERMANY, FEDERAL REPUBLIC OF/ ALLEMAGNE, REPUBLIQUE FEDERALE D'	
Thau, H.W.	D
Karwath, K.E.	Alt
ICELAND/ISLANDE	
Magnusson, L.	D
Arndal, S.	Alt
INDIA/INDE	
Ramachandran, P.K.	D
IRELAND/IRLANDE	
Howley, R.	D
McCabe, M.F.	Alt
O'Neil, D.J.	Alt
Whitford, R.M.	Alt
ITALY/ITALIE	
Piccinini, M.	D
Ferri, G.	Alt
Pimpinelli, V.	Alt
NETHERLANDS, KINGDOM OF THE/ PAYS-BAS, ROYAUME DES	
Ten Velden, J.	D
Aardoom, W.	Alt
Hardonk, J.	Alt
Pool, A.	Adv
NORWAY/NORVEGE	
Grinde, B.	D
Edvardsen, J.H.	Alt
Guttormsen, B.	Alt
Buck, F.	Adv

Name/Nom	Position in Delegation*/ Qualité dans la délégation*
POLAND/POLOGNE	
Kurek, T.	D
Janowski, J.	Alt
PORTUGAL	
De Araujo, D.N.	D
Luis, L.	Alt
De Brito, M.C.	Adv
SWEDEN/SUEDE	
Leibing, A.	D
SWITZERLAND/SUISSE	
Candrian, H.	D
Siegfried, H.	Alt
TRINIDAD AND TOBAGO/ TRINITE-ET-TOBAGO	
Ahwai, J.M.	D
UNION OF SOVIET SOCIALIST REPUBLICS/ UNION DES REPUBLIQUES SOCIALISTES SOVIETIQUES	
Kiselev, V.	D
Berkessov, N.	Adv
Fedorov, I.	Adv
Kuranov, V.	Adv
Shkliar, I.	Adv
UNITED KINGDOM/ROYAUME-UNI	
White, A.	D
Hurley, J.B.	Alt
Mack, K.R.	Alt
Sweetman, H.	Alt
Wileman, G.W.	Alt
Young, W.T.	Alt
Ingham, T.	Adv
Robinson, W.	Adv

Name/Nom	Position in Delegation*/ Qualité dans la délégation
UNITED STATES/ETATS-UNIS	
Pattison, R.E.	D
Fleming, J.R.	Alt
Moore, F.A.	Alt
Titus, W.M.	Alt
Flanagan, R.M.	Adv
Smith, S.F.	Adv
Vence, R.L.	Adv
Busch, A.	Adv
International Organizations/ Organisations internationales	
INTERNATIONAL COUNCIL OF AIRCRAFT OWNER AND PILOT ASSOCIATIONS/CONSEIL INTERNATIONAL DES ASSOCIATIONS DE PROPRIETAIRES ET PILOTES D'AERONEFS (IAOPA)	
Karant, M.	C Obs
INTERNATIONAL AIR TRANSPORT ASSOCIATION/ ASSOCIATION DU TRANSPORT AERIEN INTERNATIONAL (IATA)	
Tanner, F.S.	C Obs
Aagaard, A.	Obs
Bull, D.A.	Obs
Frederiksen, A.V.	Obs
Ingleton, P.R.	Obs
Jubin, R.	Obs
Lee, L.	Obs
Reynolds, P.R.J.	Obs
Willis, D.C.	Obs
INTERNATIONAL FEDERATION OF AIR LINE PILOTS' ASSOCIATIONS/FEDERATION INTERNATIONALE DES ASSOCIATIONS DE PILOTES DE LIGNE (IFALPA)	
Gerber, R.	C Obs
Gallagher, H.	Obs
Maas, M.S.	Obs

- - - - - - - - -

LIST OF RECOMMENDATIONS

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Agenda Item 1: Aircraft navigation performance and separation

1.1 INTRODUCTION

1.1.1 The Air Navigation Commission, when establishing the Agenda for the Limited NAT RAN Meeting 1976, had decided to subdivide Agenda Item 1 into its three major components in order to facilitate its consideration. However, in preparation for the Meeting it had been found that there was one subject which, while pertinent to the Agenda Item as a whole, could not be classified into any one of the three sub-items. This concerned the presentation of Regional Supplementary Procedures applicable in the NAT Region in Document 7030.

1.1.2 In view of this, it was agreed that this question should be dealt with under Item 1 and not be attributed to any of its sub-items.

1.2 PROBLEMS ENCOUNTERED WITH ICAO DOCUMENT 7030

1.2.1 The Meeting noted that the presentation of Regional Supplementary Procedures in ICAO Document 7030 had repeatedly given rise to complaint and that, as a consequence, this matter had been referred to the Air Navigation Commission and included in its Work Programme for review in a world-wide context. It further noted that the North Atlantic Systems Planning Group (NAT/SPG), on repeated occasions, had commented on the difficulties it had encountered with the presentation of Regional Supplementary Procedures applicable in the NAT Region, in Doc 7030 and more especially those dealing with the Rules of the Air, Air Traffic Services and Search and Rescue (RAC) since the text was now almost incomprehensible.

1.2.2 As it was expected that this Meeting was likely to establish still some more Regional Supplementary Procedures (the Reports on Agenda Items 1.2 and 1.3 refer) which would require extensive revision of Doc 7030, it was felt that this was an opportune moment to consider a basic review of Doc 7030 with a view to introducing such changes to its format and lay-out as were required to eliminate current shortcomings and facilitate its correct application by users.

1.2.3 Discussion at the Meeting revealed immediately that:

a) there existed not only a general feeling of dissatisfaction with Doc 7030 as now prepared; but

b) there were also a number of suggestions being made on the manner in which existing difficulties could be overcome.

For obvious reasons it was, however, not possible to examine the suggestions made in every required detail. It was nevertheless felt that they should be recorded in order to be taken into account, to the extent possible, in any future work done on this subject by the Air Navigation Commission.

1.2.4 There was however, one point on which the Meeting was unanimous and where it was felt that this should be considered as a basic element in any work done in order to improve Doc 7030 and this was that, in any event, Regional Supplementary Procedures applicable in one ICAO Region should be shown in a distinct and separate part of the document and should no longer be mixed with similar or identical Regional SUPPs applicable elsewhere. (In this context it was also noted that the area wherein, for example, the EUR SUPPs apply was not identical with the area of the EUR Region as defined by Council because it also covered parts of the AFI and MID Regions and that this might be a further cause of confusion to users.)

1.2.5 It was fully realized that meeting the above requirement would result in a slight increase in the production effort because identical provisions applicable in more than one Region would require multiple presentation. However, it was felt that this disadvantage would be by far compensated by improved application of the provisions in Doc 7030, especially in view of the fact that representatives from those States, having not only user interests in a number of different ICAO Regions, stated that the present consolidated presentation of SUPPs did not offer any advantage to them.

1.2.6 When making this suggestion for the separate presentation of Regional SUPPs by Regions, it was however also suggested that ways and means of identification of individual SUPPs should be sought which would permit easy cross-reference between similar or identical SUPPs as applicable in different Regions (either by an appropriate numbering system or any other suitable means).

1.2.7 Further points made in this context were:

a) the need to reduce, to the absolute minimum the number of symbols now used to relate parts of the SUPPs to specific areas or Regions etc. because of the confusion this was likely to cause to the non-initiated user of the document;

b) the need for an improved text explaining the status of Regional Supplementary Procedures, especially with regard to airspace not under the sovereignty of any State;

c) the need to clearly identify those Regional SUPPs which, while essential to the operation of the air navigation system in one Region, by their nature require application in other, adjacent Regions to make them effective;

d) the desirability to eliminate, to the extent possible, minor differences in the formulation of near-identical Regional SUPPs as applied in different Regions so as to avoid an unnecessary complication of briefing for users and providers concerned; and

e) the desirability of including, in the appropriate parts of the Document concerned, a reference to those Regional SUPPs which a in wide-spread use in a number of Regions and can therefore be expected to become world-wide provisions in due time.

1.2.8 Finally, in view of the importance of the provisions contained in Doc 7030, especially as regards the conduct of air navigation services in the NAT Region, the Meeting hoped that the work on the revision of ICAO Doc 7030 would be accelerated to the extent possible so that an improved version of this document would be available at the earliest possible time.

RECOMMENDATION 1/1 - IMPROVED PRESENTATION OF REGIONAL SUPPLEMENTARY PROCEDURES IN ICAO DOCUMENT 7030

That ICAO take action forthwith towards the development of an improved presentation of Regional Supplementary Procedures in ICAO Document 7030 and, in doing so, take due account of the proposals made in this respect in paragraphs 1.2.4 to 1.2.8 of this Report.

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Agenda Item 1.1: Aircraft navigation in the Region

1.1:1 GENERAL

1.1:1.1 Under this Item, the Meeting considered the following subjects:

a) Aircraft navigation equipment situation and provision of station-referenced navigation systems.

b) Continued need for traffic forecasting in the Region.

c) The OMEGA navigation system in the Region.

d) Need for the provision of a VOR/DME at Akraberg.

e) Need to up-date the NAM Regional Plan on radio aids to navigation.

f) Problems caused by ferry flights in the Region.

1.1:1.2 It should also be noted that in doing so, due account was taken of relevant discussions held on some of the subjects listed at the Special NAT/PAC (LORAN-A) RAN Meeting 1974, the 9th Air Navigation Conference, 1976 and at the 12th Meeting of the NAT/SPG in May 1976 as reflected in the Reports or Summaries of these Meetings.

1.1:2 AIRCRAFT NAVIGATION EQUIPMENT SITUATION

1.1:2.1 When reviewing the aircraft navigation equipment situation in the NAT Region, the Meeting realized that such a review had to cover the following three aspects:

a) the situation with regard to aircraft equipped with self-contained navigation equipment;

b) the situation with regard to new, improved station-referenced navigation systems;

c) the situation with regard to aircraft used for operations in the NAT Region but not yet equipped with improved means of navigation, and the possibilities for doing so;

because it was believed that the answers provided in these three fields were an essential element in planning the provision of an improved air navigation system in the NAT Region based on the application of minimum navigation performance specifications (MNPS) and the use of reduced values of separation based on these specifications.

1.1:2.2 With regard to aircraft already equipped with self-contained navigation equipment, data collected by provider States in the Region since the SP NAT/PAC (LORAN-A) RAN Meeting, 1974, confirms that aircraft provided with navigation equipment generally described by the generic term "INS", are capable of maintaining a continuously high standard of navigation performance under a variety of conditions. In addition, since the SP NAT/PAC Meeting in 1974, the number of those operators, as well as that of their aircraft engaged

in NAT operations and equipped with INS, has steadily increased. It can therefore be expected that these aircraft will not encounter any difficulties in meeting possible requirements in navigation performance resulting from the application of MNPS and a consequential reduction in separation.

1.1:2.3 As regards the provision of new, improved station-referenced navigation systems, at the time of the SP NAT/PAC (LORAN-A) RAN Meeting in 1974 it had been noted that the only practical alternative system (in comparison with INS) was the OMEGA Navigation System. However, it had also been noted at that time that the system had not been fully implemented and was therefore still subject to operational trials in a manner corresponding to routine operations in the NAT Region. In addition certain questions regarding the availability of airborne receiving equipment had not yet been resolved at that time. It was therefore essential to clear these outstanding matters at this Meeting.

1.1:2.4 While the question of the operation and use of the OMEGA System in the NAT Region is covered in paragraph 1.1:4 below in more detail, it was noted that the situation regarding the availability of airborne OMEGA receiving equipment had developed in a very satisfactory manner. In fact, the Meeting was informed that such equipment was in quantity production and was therefore readily available to operators. It was further noted that the procurement and use of this equipment was in no way subject to security limitations as to its disposition.

1.1:2.5 As to the question of aircraft not yet equipped with improved means of navigation (see sub-paragraph c) of paragraph 1.1:2.1) the Meeting was provided with information which indicated that, by the time such equipment became an essential pre-requisite for the continued safe and economic operation of the air navigation system in the Region (i.e. the end of 1977 when the LORAN-A Stations in the NAT Region were to be withdrawn from the NAT Plan), it could be expected that the bulk of the commercial air transport operations, would be equipped to meet the requirements for improved navigation. The remainder could be expected to follow this development within a comparatively short time thereafter.

1.1:2.6 With respect to the question of the production of a low-cost airborne OMEGA receiver for use by international general aviation flights, the Meeting was provided with somewhat contradictory information but it appeared that this matter was receiving attention and that ways and means might be found to satisfy such a requirement.

1.1:2.7 Finally, while on this subject, the Meeting was informed that there had been rumours to the effect that the LORAN-A stations in the NAT Region, planned for withdrawal from service on 29 December 1977 in accordance with Recommendation 1/2 of the SP NAT/PAC (LORAN-A) RAN Meeting, 1974, might be retained in service for an unspecified period beyond that date. The Meeting felt it necessary to state categorically that no such intention existed and that it should therefore not serve as a basis for planning of action either on the part of States or operators concerned with NAT operations.

1.1:3 CONTINUED NEED FOR TRAFFIC FORECASTING IN THE REGION

1.1:3.1 The Meeting noted that the NAT/SPG, at its 12th Meeting in May 1976, had made certain proposals aimed at the improvement of air traffic forecasting as conducted by the NAT Air Traffic Forecasting Group (NAT/TFG) so as to ensure that the yearly forecasts would better serve the needs of air navigation planners in that Region. These proposals had been made mainly because experience had shown that, while the forecasts produced by the NAT/TFG were used by a number of administrations and users, the main user of them had been, and could be expected to continue to be, the NAT/SPG. It therefore appeared only reasonable that that Group should be given the possibility to express its views on the most effective way of presentation of content as well as format of these forecasts.

1.1:3.2 Points in question, raised by the NAT/SPG at its 12th Meeting were:

a) That, in view of the growing significance of problems caused by crossing and joining traffic in relation to the main flow, the format of the forecast was no longer suitable to permit an appreciation of the problems likely to be caused to the air navigation services, be it from the air traffic control point of view or for other air navigation aspects. In fact, the relation of traffic flows to only nine traffic axes across the North Atlantic, as is now done, was providing only a very superficial picture of the traffic pattern, and this was believed to be insufficient for present and expected future conditions.

b) That both the provision of data to the NAT/TFG as well as the processing and presentation of the data in the form of a forecast required profound modifications in order to render the forecasts as useful as possible. In addition, more emphasis should be placed on the presentation, in a comprehensive manner, and for the entire NAT Region, of the last observed actual situation as it could be reconstructed from data provided by OACs, while the forecasting itself could possibly be limited to a simplified extrapolation process based on that data, rather than basing it on complex and complicated economico-sociological models as had been done in the past. In this context it was pointed out that one possible data source could be the monthly traffic statistics on the North Atlantic published in specialized aviation publications.

1.1:3.3 It was believed that this latter request was even more feasible because some of the OACs concerned already produced documentation on the actual traffic situation in their control areas which went into considerable detail as to the distribution of traffic onto specific tracks and flight levels and as to its distribution in time. However, the disadvantage of these documents was that their format and lay-out varied from OAC to OAC and that they therefore did not lend themselves readily to the preparation of a consolidated picture of the traffic situation in the entire NAT Region.

1.1:3.4 In view of this situation, the Meeting:

a) agreed that there is a continuing requirement for the provision of traffic forecasts, at yearly intervals, in a format conducive to air navigation system planning in the NAT Region as a whole;

b) requested Canada, the United Kingdom and the USA to continue to provide Members to the NAT/TFG on the understanding that:

1) the composition of the Group ensures that adequate operational expertise is available to it; and

2) the Group maintains close liaison with the NAT/SPG as to questions of format and content of its forecasts so that these correspond to the optimum extent to the need of system planners.

c) requested Canada, Portugal, the United Kingdom and the USA to prepare jointly proposals for the collection and presentation of actual traffic data covering the entire NAT Region for review by the NAT/SPG and onward transmission to the NAT/TFG;

RECOMMENDATION 1.1/1 - AIR TRAFFIC FORECASTING IN THE NAT REGION FOR AIR NAVIGATION SYSTEM PLANNING PURPOSES

That, in view of the continuing requirement for the provision of NAT traffic forecasts, at yearly intervals, in a format conducive to air navigation system planning in the Region as a whole:

a) Canada, the United Kingdom and the USA continue to provide Members to the North Atlantic Air Traffic Forecasting Group (NAT/TFG); and

b) Canada, Portugal, the United Kingdom and the USA jointly prepare proposals for the collection and presentation of actual traffic data covering the entire NAT Region for review by the NAT/SPG; and onward transmission to the NAT/TFG.

1.1:4 THE OMEGA NAVIGATION SYSTEM IN THE REGION

1.1:4.1 As already briefly mentioned in paragraph 1.1:2.3 above, it had been found as early as 1974 that OMEGA was the only possible navigation system apart from INS which, in terms of accuracy and coverage, was expected to be capable of ensuring the degree of improvement in navigation, required to cater for the continued safe and economic operation of the air navigation system throughout the NAT Region in the immediate future.

1.1:4.2 However, at that time the OMEGA navigation system was still under development and only a limited number of the planned eight ground transmitting stations were in operation. While providing valuable experience, trials conducted by a number of States, in some cases in co-operation with operators, could, therefore, not yet be considered conclusive. Accordingly, it was of particular interest for the Meeting to note that Canada, the UK and IATA had provided the NAT/SPG, at its 12th Meeting, with information which seemed to indicate that developments regarding the use of that system in the NAT Region were progressing satisfactorily and that it could therefore be confidently expected that navigation of aircraft using this system, would meet the proposed Minimum Navigation Performance Specifications. In fact, it was indicated that, in mid-Atlantic, signals from eight OMEGA stations were often available to provide valid navigational guidance. The track guidance accuracy derived from OMEGA appears to be of a high order with the great majority of errors being contained within 1-2NM.

1.1:4.3 It was noted that trials regarding the OMEGA coverage provided over Greenland are expected to be conducted later this year and that the determination of the acceptability of OMEGA for the provision of navigational guidance in the NAT Region is expected to be made before the end of 1976. It was pointed out that OMEGA airborne equipment reliability compared very favourably with other airborne equipment and that, from a cost-effectiveness point of view, the provision of OMEGA navigation equipment continued to be very attractive to operators when compared with other available equipment of comparable performance.

1.1:4.4 As to the functioning of the OMEGA navigation system, the Meeting noted that, those States and operators directly concerned with its development and trials had been provided with ample information describing the equipment, its ground and airborne components as well as its manner of operation. However, a comprehensive description of the system had not yet been available to all those parties who might be interested in its use. The Meeting therefore noted in appreciation that the USA had made available to it such information and it felt that this, or similar material should be given widest possible distribution within ICAO in order to permit all interested parties to familiarize themselves with the OMEGA navigation system since it could be expected to constitute a major element in the air navigation system of the NAT Region in the near future and for a considerable time to come.

1.1:4.5 The question of how to include reference to the OMEGA air navigation system in the relevant world-wide provisions of ICAO as well as those supplementary provisions applicable in the NAT Region, generated considerable discussion. One view was that technical specifications regarding the ground elements of the OMEGA system should be included, as soon as possible, into the relevant parts of Annex 10, Volume 1, Part I (Chapter 3 refers) as well as into those parts of Annex 10, Volume 1, dealing with implementation and that detailed requirements for the individual ground facilities forming the ground-based part of the OMEGA navigation system should be included in the NAT Regional Plan. Other views were that, while reference to the OMEGA navigation system was required in the NAT Regional Plan in order to ensure its availability for air navigation services in that Region, there would be no need to include a detailed technical specification of the ground-based part of the system into Annex 10. Following extensive discussion of all aspects involved, and more especially those created within ICAO in this respect by Recommendation 2/1 of

the recent 9th Air Navigation Conference, it was agreed that at this time action by the Meeting should be limited to a recommendation providing for:

a) the inclusion of a reference in the operational requirements governing the NAT Regional Plan to the continuous provision of OMEGA navigational guidance in the NAT Region;

b) consideration by ICAO of an amendment of paragraph 2.4.1 in Chapter 2 of Part 1 of Volume 1 of Annex 10 to include reference to the OMEGA navigation system as one means of meeting the requirement for long-range navigational guidance; and

c) the issue, by ICAO, of an information circular on the OMEGA navigation system. The circular should be based on material provided by the USA and contain a detailed description of the system itself as well as the measures taken for its functioning, provision of information on the operating status of its various elements and measures for monitoring its performance and co-ordination of maintenance of its components required so as not to deprive users of the required navigational guidance at any given time.

1.1:4.6 The action proposed in sub-paragraph c) above was taken by the Meeting after it had received assurance from the Delegate of the USA that his Administration was prepared to provide the required material.

1.1:4.7 With respect to the preparation of technical specifications and guidance material on the OMEGA navigation system for inclusion in the appropriate part of Annex 10, the Meeting felt that, while this was desirable, it was, at least at this stage of developments not a prerequisite for use in the NAT Region of the OMEGA navigation system in conjunction with the application of minimum navigation performance specifications in that Region. It also felt that work on this matter should only be undertaken in the light of further work envisaged by the Air Navigation Commission in its action on Recommendation 2/1 of the 9th Air Navigation Conference.

RECOMMENDATION 1.1/2 - STATUS OF THE OMEGA NAVIGATION SYSTEM

That "the Statement of Operational Requirements and Planning Criteria for the NAT Region" be amended so as to contain, in a suitable location, the following paragraph:

'X. In order to ensure that aircraft, relying on navigational guidance derived from the Omega Navigation System, can meet the Minimum Navigation Performance Specifications established for the NAT Region, it will be essential to provide for continuous and reliable coverage within the NAT Region by the Omega navigation system and for up-to-date status information of all Omega ground stations required to provide such coverage'.

RECOMMENDATION 1.1/3 - INCLUSION OF REFERENCE TO THE OMEGA NAVIGATION SYSTEM IN ANNEX 10

That ICAO consider amending paragraph 2.4.1 in Chapter 2 of Part 1 of Volume 1 of Annex 10 to read along the following lines:

"2.4.1 The requirement for long-range navigational capability is in many cases met by long-distance navigation systems based on self-contained aids such as the inertial navigation system. The OMEGA navigation system using station-referenced signals from a number of transmitters sited so as to provide world-wide coverage is also meeting this requirement. In addition, in some areas, LORAN-A, Consol and NDB facilities will remain in use to meet air traffic requirements until such time as the need for their provision is determined to have ended.

NOTE 3: It is intended that appropriate technical specifications and guidance material on the OMEGA navigation system will eventually be developed for insertion in Part I, Chapter 3."

RECOMMENDATION 1.1/4 - INFORMATION ON THE OMEGA NAVIGATION SYSTEM

That ICAO publish an information circular containing a description of all relevant aspects of the OMEGA navigation system.

1.1:4.8 In the context of discussion of the OMEGA navigation system, the Meeting also noted a report which had been developed by the United Kingdom on the effects of sudden ionospheric disturbances on VLF position fixing accuracy in the North Atlantic. These studies were encouraging and the Meeting felt that such matters could be left to further study and the results obtained made available to the NAT/SPG in due time for further consideration by that Group.

1.1:5 NEED FOR THE PROVISION OF A VOR/DME AT AKRABERG

1.1:5.1 The Meeting noted that the Special North Atlantic Panel (SNAP) had questioned the continued need for the retention, in the NAT Regional Plan, of a requirement for a VOR/DME at Akraberg because it felt that this facility neither constituted a justified operational requirement nor were its anticipated operating costs (some $220,000) justified in these circumstances.

1.1:5.2 The NAT/SPG at its 12th Meeting also reviewed this requirement and, after review of all relevant factors having a bearing on this question, it unanimously concluded that the retention of the requirement for this facility was no longer justified.

1.1:5.3 In view of this situation the Meeting agreed to recommend that the VOR/DME at Akraberg should be deleted from the NAT Regional Plan.

RECOMMENDATION 1.1/5 - DELETION OF THE VOR/DME AKRABERG FROM THE NAT REGIONAL PLAN

That the requirement for the provision of a VOR/DME at Akraberg be deleted from the NAT Regional Plan.

1.1:6 NEED TO UP-DATE THE NAM REGIONAL PLAN ON RADIO AIDS TO NAVIGATION

1.1:6.1 While dealing with the aircraft navigation situation in the NAT Region, the Meeting noted that there existed at present a number of radio navigation aids which, even though located in the NAM Region servedessential NAT operations and which required up-dating. Some of these changes were brought about by the opening of Montreal Mirabel Airport to international air traffic.

1.1:6.2 The facilities concerned and the changes required were:

a) to replace the requirement for a VOR at Deer Lake by a requirement for a VOR at Stephenville;

b) to replace the requirement for a VOR at Kimberley by a requirement for a VOR at Cranbrook;

c) to add a requirement for a VOR/DME at Mirabel;

d) to add a Category II ILS for runway 06 and to add Category I ILS for runways 11 and 24 at Montreal Mirabel Airport; and

e) to add a locator in association with each of the three ILS facilities in d) above.

1.1:6.3 It was understood that a consequential amendment dealing with the AGA and other aspects relating to action on d) and e) above would be submitted by Canada at the earliest possible time.

RECOMMENDATION 1.1/6 - CHANGES TO THE REGIONAL PLAN FOR RADIO NAVIGATION AIDS IN THE NAM REGION

That:

a) the requirements for VORs at Deer Lake and Kimberley be replaced by requirements for VORs at Stephenville and Cranbrook respectively;

b) a requirement for a VOR/DME at Mirabel be included in the Plan; and

c) requirements for a Category II ILS for runway 06 and Category I ILSs for runways 11 and 24 of Montreal Mirabel Aerodrome, including one locator for each of these ILS facilities, be included in the NAM Plan.

1.1:7 PROBLEMS CAUSED BY FERRY FLIGHTS IN THE NAT REGION

1.1:7.1 The Meeting noted that, at the 12th Meeting of the NAT/SPG, the UK had informed that Group that it was becoming increasingly concerned about operations of General Aviation ferry flights on direct routes between North America and Europe. This was caused mainly by the fact that, although these flights were small in number, many of them did not comply with normal communication and navigation procedures. The result was:

a) unnecessary alerting of the search and rescue services;

b) an unnecessarily high ATC workload;

c) improper use of the international distress frequency 121.5 MHz; and

d) congestion of NAT HF communication channels by ATC enquiries and replies concerning the aircraft.

1.1:7.2 Although actual emergencies were, fortunately, extremely rare, the costs involved in continuing search and rescue operations in accordance with relevant ICAO provisions were high and, in some FIRs, had to be borne by all operators in the form of user charges.

1.1:7.3 According to the UK Delegate, representations to the operators concerned had unfortunately not resulted in any significant improvement in the situation and attempts to pursuade these operators to use routes via Greenland and Iceland have so far met with limited success only.

1.1:7.4 It was therefore believed that concerted action by States concerned aimed at the re-enforcement of current State regulations regarding minimum communication and navigation equipment aboard General Aviation aircraft intending to operate on direct North Atlantic routes, would be essential.

1.1:7.5 In the ensuing discussion it was found that a number of those States concerned by the problem of ferry flights were already undertaking studies of this matter but it was also found that, because of the legal, procedural and operational aspects involved, more time was required to arrive at valid solutions. It was however agreed that those measures which could now be taken to enforce or encourage:

a) better compliance with existing provisions applicable to ferry flights;

b) the elimination of the unjustified use of frequency 121.5 MHz by them (the Report on Item 4 refers); and

c) the use of routes likely to cause less difficulties

should be taken as early as possible in order to reduce to the minimum the existing difficulties. In addition, it was also agreed that States concerned should publish, as early as possible, details regarding recommended routes via Greenland and Iceland for use by aircraft which were not sufficiently equipped to conduct a direct crossing of the North Atlantic.

1.1:7.6 A proposal by the United Kingdom, to generally raise the lower limit of controlled airspace in the NAT Region from the present level (FL 55) to FL 135, was not found to be acceptable at this time, even though it was recognized that this might assist in overcoming some of the difficulties now encountered. It was however agreed that this proposal should be taken into account in further studies on the subject by States concerned so that an early decision on its acceptability could be reached.

1.1:7.7 As to the publication of recommended routes, the Meeting was able to reach agreement on their alignment and the agreed routes are shown in Appendix A to this Report.

RECOMMENDATION 1.1/7 - INITIAL MEASURES TO REDUCE DIFFICULTIES NOW ENCOUNTERED WITH GENERAL AVIATION FERRY FLIGHTS IN THE NAT REGION

That,

a) States concerned with ferry flights of General Aviation aircraft across the North Atlantic take appropriate action to ensure compliance of such flights with applicable provisions regarding communication and navigation equipment aboard such flights as well as compliance by pilots with relevant procedures governing its use;

b) States concerned publish in their aeronautical information publications all relevant details regarding the routes shown in Appendix A to this Report.

RECOMMENDATION 1.1/8 - STUDIES ON PROBLEMS OF GENERAL AVIATION FLIGHTS

That the NAT/SPG undertake studies on the problems of General Aviation flights with a view to proposing, as early as possible, appropriate measures for their resolution.

1.1:7.8 It was noted that the question of designation of the routes mentioned in Recommendation 1.1/7 b) above would be resolved in direct contact between States concerned and the European Office of ICAO immediately after this Meeting.

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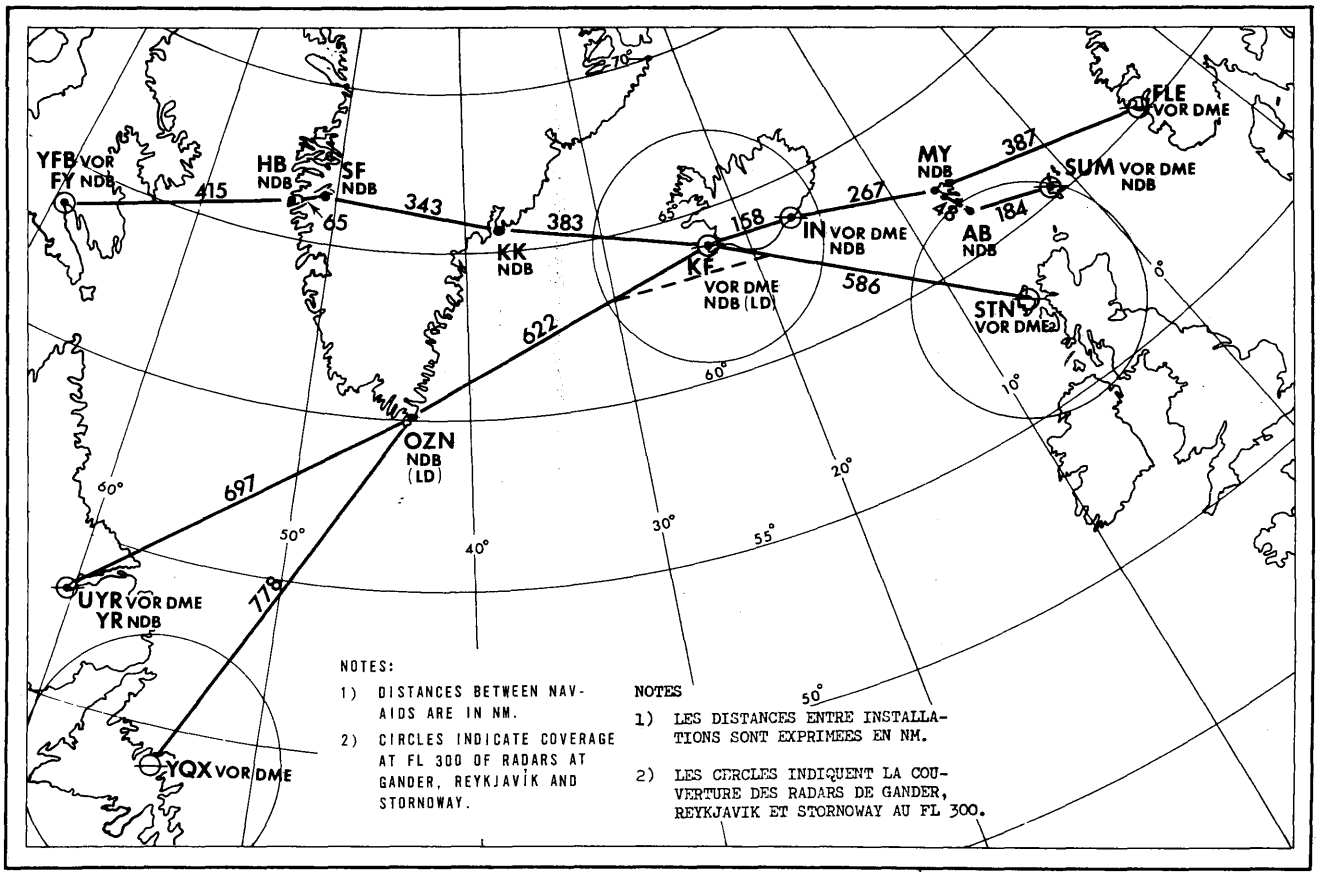
ROUTES FOR USE BY AIRCRAFT NOT SUFFICIENTLY EQUIPPED TO CONDUCT DIRECT CROSSINGS OF THE NORTH ATLANTIC

ROUTES DESTINEES AUX AVIONS DONT L'EQUIPEMENT N'EST PAS SUFFISANT POUR LEUR PERMETTRE D'EFFECTUER DES TRAVERSEES DIRECTES DE L'ATLANTIQUE NORD



Agenda Item 1.2 - Minimum navigation performance specifications

1.2:1 INTRODUCTION

1.2:1.1 The Meeting noted that, having reviewed action by the Special NAT/PAC (LORAN-A) RAN Meeting (1974) on the subject of Minimum Navigation Performance Specifications (MNPS) (Doc 9125, Recommendation 1/5 and paragraph 1.39 refer), the NAT Systems Planning Group, at its 11th Meeting (Paris, May 1975), had agreed in principle that in order to permit a reduction in lateral separation between aircraft on tracks in specified parts of the NAT Region, a new procedure should be developed based on the use of MNPS. Subsequent to that Meeting, various Working Groups made extensive studies and finally developed proposals dealing with both the operational and mathematical aspects of Minimum Navigation Performance Specifications. At the 9th Air Navigation Conference in April-May 1976, the subject was further discussed and resulted in Recommendations 2/1 and 2/2 of that Conference.

1.2:1.2 The NAT/SPG noted that the 9th Air Navigation Conference, in its Recommendation 2/1 had requested ICAO to undertake necessary work required to permit the establishment of Minimum Navigation Performance Specifications. It also noted that, in view of developments in the NAT Region, Recommendation 2/2 of the 9th AN Conference provided for the possibility of introducing Minimum Navigation Performance Specifications in the NAT Region on an interim basis and with respect to aircraft operating in the organized track system (OTS).

1.2:1.3 In view of this situation, when preparing proposals on this subject for consideration by this Meeting at its 12th Meeting in June 1976, the NAT/SPG had limited these to the application to aircraft operating in the organized track system, even though it believed at the time that more advantageous solutions could have been developed if this restriction had not to be observed. The Meeting now noted that the action, taken by the Air Navigation Commission with respect to Recommendation 2/2 of the 9th AN Conference after the 12th Meeting of the NAT/SPG, provided for considerable latitude in the application of MNPS. It was therefore believed useful to review the situation once more in this respect and a comparative study made by the Meeting showed clearly that the application of MNPS on an "area" concept offered significant advantages to both users and providers when compared with its limited application to aircraft operating in the OTS only, provided appropriate arrangements were made to satisfy all legitimate user requirements.

1.2:1.4 In view of this situation, the Meeting therefore agreed to make proposals for the application of MNPS in the NAT Region which are related to aircraft operating in a specified volume of airspace rather than exclusively to aircraft operating in the organized track structure.

1.2:1.5 At the same time the Meeting realized that, in the North Atlantic, planners were faced with a continuously evolving situation where developments in different fields (number of flights conducted, distribution of traffic on different routes, airborne navigation equipment used, fleet utilization by operators, etc.) can have a significant influence on the overall development of air navigation in the Region. As some of these developments cannot as yet be quantified, States and operators concerned were therefore required to keep the overall situation under constant review, in order to make necessary adjustments towards the improvement and extension of the concept of MNPS. This in turn underlines the need for earliest possible action on Recommendation 2/1 of the 9th AN Conference.

1.2:2 BASIC PRINCIPLES REGARDING MNPS

1.2:2.1 During its first meetings (in the period 1966-1968) the NAT/SPG developed a method for assessing the safe separation between aircraft in the NAT Region. In this method, data collected in the NAT Region is used as an input to a mathematical model which expresses the relationship between collision risk and separation. On the basis of other, world-wide, information the NAT/SPG proposed an acceptable measure of collision risk, which is called the target level of safety. By comparing the collision risk calculated for a certain lateral separation with this target level of safety, an indication is provided as to whether this separation can be considered to be sufficiently safe. If it is found that the lateral separation which is being used, or proposed for use, results in an estimated collision risk which does not meet the target level of safety, the responsible authorities will have to consider either an increase in the separation or other measures in order to avoid compromising safety. On the basis of this procedure, adjustments to the lateral separation in the NAT Organized Track System have been made in the past.

1.2:2.2 After it had been agreed at the Special NAT/PAC (LORAN-A) RAN Meeting in 1974 that the provision of LORAN-A in a large part of the NAT Region would be discontinued at the end of 1977, it was believed that, unless steps were taken to improve the overall standard of navigation performance, the withdrawal of LORAN-A could well result in the need for increased lateral separation. On the other hand, studies had shown that the considerable portion of the traffic, that which was equipped with INS, could in fact operate safely with reduced lateral separation.

1.2:2.3 At its 11th Meeting (Paris, May 1975) the NAT/SPG therefore discussed a proposal for the establishment of Minimum Navigation Performance Specifications for aircraft operating in specified parts of the NAT Region. As a result of the expected withdrawal of LORAN-A, it was agreed that the specifications should be such that the large majority of aircraft using present generation INS could be expected to meet it and that operators now using LORAN-A could take the specifications into account when choosing suitable replacement navigation equipment.

1.2:3 DESCRIPTION OF THE USE OF MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS (MNPS)

1.2:3.1 Minimum Navigation Performance Specifications will be established for all aircraft operating within a specified volume of airspace of the NAT Region and a monitoring programme will be undertaken in order to verify that the specifications are being met. (For convenience, the volume of airspace wherein the MNPS apply will, from here on, be referred to as the "MNPS airspace".) These new specifications are designed so as to permit the use of a planned lateral separation of 60NM, including the possibility of the future use of a 30NM/1000 feet composite separation once it had been established that this could be safely applied.

1.2:3.2 The rationale and mathematical foundation for the Minimum Navigation Performance Specifications is given in Appendix A to this Report. The specification states that the demonstrated navigation performance required of an aircraft wishing to fly in the MNPS airspace should be such that:

a) the standard deviation of the lateral track errors shall be less than 6.3NM;

Note: Experience suggests that lateral errors follow an exponential distribution. In this case, therefore, and as a considerable simplification, the above can be interpreted as a need for aircraft to stay within 12.6NM of track for about 95% of the time.

b) the proportion of the total flight time spent by aircraft 30NM or more off track shall be less than 5.3×10^{-4} (i.e. less than 1 hour in about 2000 flight hours); and

c) the proportion of the total flight time spent by aircraft between 50 and 70NM off track shall be less than 13×10^{-5} (i.e. less than 1 hour in about 8000 flight hours).

1.2:3.3 Furthermore operators, and States having jurisdiction over such operators, are to ensure that aircraft equipped with navigation systems which are unable to meet the performance specification do not plan flights in the MNPS airspace.

1.2:3.4 The proposed performance specifications are designed to ensure operation within a target level of safety related to the operating environment for a ten-year period from the time of adoption. During that period, the air traffic situation over the North Atlantic will be kept under continuous review in the light of achieved navigation performance and possible changes to the operating environment. Furthermore, during that period, the collision risk will be periodically re-estimated, based on data obtained through special data collection exercises, in order to assess the impact of system performance upon safety.

1.2:4 EVALUATION PROGRAMME AND OPERATIONAL APPROVAL OF NAVIGATION SYSTEMS IN RELATION TO SPECIFIC MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS

1.2:4.1 The Meeting noted that the 9th AN Conference had adopted basic guidance material on the subject of evaluation programmes and the operational approval of navigation systems in relation to specific MNPS which was based on work which had been done by the NAT/SPG on this subject. It was believed that this material could be of considerable assistance to States in the preparation and application of MNPS in specified parts of the NAT Region and it was therefore hoped that States would use this material to the best advantage. (The guidance material referred to above is contained in the Appendix to Part 2 of Doc 9168, AN CONF/9, the Report of the 9th AN Conference.)

RECOMMENDATION 1.2/1 - USE OF GUIDANCE MATERIAL ON MNPS DEVELOPED BY THE 9TH AN CONFERENCE

That States, when taking necessary action related to the application of MNPS in specific parts of the NAT Region, use the guidance material prepared on this subject by the 9th AN Conference .

1.2:4.2 It was also expected that ICAO, when undertaking work required by Recommendation 2/1 of the 9th AN Conference, would call upon States having already developed national provisions regarding evaluation programmes and approval procedures for navigation systems, to provide to ICAO such material as a basis for the development of world-wide provisions. It was therefore hoped that, when doing so, ICAO would find it possible, in anticipation of completion of its own work on this subject, to publish States' material in an appropriate form so that it could be used in the interim period until the results of ICAO's work became available.

1.2:4.3 In discussing the development and application of the concept of MNPS the Meeting recognized that it would be opportune to give an indication of "Acceptable Means of Compliance" with the specifications in terms of aircraft equipment that would be likely to meet the requirements in the applicable provisions of Annex 6, although other arrangements may prove feasible. However, in providing such advice, it was believed necessary to stress, as emphasized in the appropriate guidance material developed by the 9th AN Conference, that equipment by itself was only a part contributor to the achievement of the total quality of performance required.

1.2:4.4 From experience gained with the use of Inertial Navigation Systems (INS) both in the NAT Region and on a world-wide basis it was clear that combinations of such systems already in use, which had been formulated against the ARINC Specification 561 and later similar specifications, could be deemed likely to satisfy the MNPS. High levels of accuracy and reliabilities in excess of 3,000 hours of in-flight Mean Time Between Failures (MTBF) had been established over the past 6 years. It would appear that a minimum fit of two such systems would be required.

1.2:4.5 Similarly Inertial Sensor Systems (ISS), having similar basic guidance capability to the full INS, but using either direct derivation of position from read-outs given in latitude and longitude associated with chart plotting or advanced electronic computation appear capable of meeting the MNPS on the basis of duplication of the basic fit and satisfactory operating practices.

1.2:4.6 Regarding combinations of other Station-referenced and self-contained systems, experience currently available shows reason for confidence that the OMEGA navigation system, combined with Doppler equipment is also highly likely to prove acceptable. Trials with OMEGA receivers onboard aircraft have shown levels of accuracy as high as, or higher, than those determined for INS. (As a station-referenced system, OMEGA does not suffer accuracy degradation with time.) Initial policy determination regarding such mixed installations suggests that a single OMEGA fit having characteristics appropriate to the ARINC Specification 580 together with a fit of Doppler equipment (the latter having a capability of displaying drift, ground speed and cross track error) could meet the MNPS.

1.2:4.7 Obviously a combination of an INS (or ISS) fit with OMEGA, coupling one of the systems with the auto-pilot, would also be likely to meet the requirement. Combinations of INS (single) with dual Doppler have similar potential.

1.2:4.8 It is also possible that a LORAN-C equipment might be substituted for the OMEGA equipment but this would probably apply only in a limited part of the NAT MNPS airspace and restrictions would be required to the area of use and the types of operations conducted.

1.2:4.9 In all the above examples it must be regarded as highly desirable, if not essential, that the primary navigation system should be capable of an interface coupling with the aircraft auto-pilot in order that continuous navigational guidance is provided rather than intermittent up-dating.

1.2:5 MONITORING OF NAVIGATION PERFORMANCE

1.2:5.1 As indicated, in paragraph 1.2:3.1, the monitoring of actual navigation performance constitutes an essential element of the concept of MNPS. It is therefore believed essential that arrangements should be made for the extension and amplification of monitoring activities which have been already conducted in the NAT Region since 1967. In this respect the Meeting took due account of the basic provisions contained in the guidance material on MNPS developed by the 9th AN Conference. However, it was felt necessary to supplement these in view of the specific local conditions existing in the NAT Region.

1.2:5.2 In this respect, the Meeting wished to recall that monitoring of the navigation performance covered three distinct actions:

a) monitoring of the navigation performance by the operator in co-operation with flight crews concerned;

b) monitoring of the operator by the State, having jurisdiction over the operator in order to ensure that adequate provisions have been and are being applied by the operator while conducting authorized flight operations; and

c) monitoring of actual navigation performance in normal flight operations as observed by means of radar by the ATC units of States providing service in the NAT Region.

1.2:5.3 The Meeting felt that monitoring by operators and by States having jurisdiction over the operator was adequately covered in the basic guidance material developed by the 9th AN Conference and that therefore no such supplementary provisions in this respect were required. It was however understood that this presupposed that both operators and States concerned would take energetic action to ensure compliance by all concerned with the relevant provisions.

1.2:5.4 As regards monitoring of routine flight operations by ATC units of States providing service in the NAT Region, the Meeting noted that, in the past, Ireland, the United Kingdom and Canada had made commendable efforts in this respect. It was however felt that, with the application of the MNPS, additional efforts were required in this respect not only as far as the area covered by monitoring on either side of the North Atlantic was concerned, but also as regards continuity of such monitoring activities by the ATC units concerned. Supplementary provisions regarding monitoring activities in the NAT Region are contained in Appendix B to this Report. The Meeting therefore invited States able to contribute to this activity to make every possible effort to improve existing arrangements or make new arrangements to permit extension of the monitoring functions by ATC services. It would be particularly useful if Portugal was able to expedite its monitoring capability.

RECOMMENDATION 1.2/2 - EXPANSION OF MONITORING ACTIVITIES IN THE NAT REGION

That all States with the necessary capability extend monitoring of the navigation performance of flight operations in the North Atlantic by:

a) the use of all those facilities likely to be useful in this respect;
b) the establishment of new facilities where required; and
c) the provision of adequate manpower and arrangements to permit the continuous performance of monitoring functions by the ATC units concerned.

1.2:5.5 It was further felt that once monitoring data was being collected it would be essential to ensure that such data was presented in a uniform manner by the various collecting units not only in order to facilitate its collective presentation in six monthly summaries by the European Office of ICAO, as has already been done in the past, but also to facilitate its use in assessing activities described in Appendix B to this Report. In this respect it was noted that standardization of presentation of data had already been obtained in collaboration between provider States and the European Office of ICAO and that this would be continued.

RECOMMENDATION 1.2/3 - ACQUISITION AND USE OF MONITORING DATA

That

a) States conducting monitoring activities ensure that monitoring data are collected and presented in a uniform manner in order to facilitate its collective presentation at six monthly intervals to interested parties;

b) the European Office of ICAO continue to prepare six monthly summaries of such data based on submissions from monitoring States for transmission to all interested States and international Organizations; and

c) monitoring data, together with any other relevant information, be provided at regular intervals to the NAT/SPG for assessment purposes, in order to determine whether observed deviations remain within the tolerances upon which the MNPS, applicable in the NAT Region, are based.

1.2:5.6 With regard to observed deviations from assigned track of 25NM or more it was agreed that these should be the subject of specific action in the form of:

a) immediate advice by the observing unit to the pilot of the aircraft concerned regarding the observed deviation and other relevant circumstances; and

b) a letter to the operator and, if appropriate, to the State having jurisdiction over the flight in question requesting appropriate action.

1.2:5.7 Prompt action on the part of operators and/or States on cases notified to them in accordance with b) above were believed to be a pre-requisite for the successful application of the concept of MNPS and it was therefore essential that operators and States concerned would give their full co-operation.

RECOMMENDATION 1.2/4 - FOLLOW-UP ACTION ON REPORTED DEVIATIONS FROM ASSIGNED TRACK

That operators and, if required, States concerned take prompt and efficient follow-up action on all cases of reported deviations of any of their flights by 25NM or more from assigned track in order to prevent repetition of such occurrences.

1.2:5.8 In this context, the Meeting noted that a number of States had already established procedures within their monitoring activities for the follow-up of reported deviations, as well as provisions governing the routine surveillance of operators, in order to ensure compliance with existing provisions and practices regarding NAT operations. The Meeting felt it might be useful if these procedures could be made public so as to permit States to profit from the experience already gained in this respect. The Meeting therefore requested that States, having such material, make this available to ICAO for publication in appropriate form, (see Recommendation 1.2/8 below).

RECOMMENDATION 1.2/5 - INFORMATION ON MONITORING PROCEDURES BY STATES

That States having already developed procedures covering the execution of their required monitoring functions make relevant material available to ICAO for publication in an appropriate manner.

1.2:5.9 Finally, the Meeting noted that IATA intended to prepare, for use by its member airlines, material on how best to discharge operators' responsibilities for monitoring as well as operating practices relating to the conduct and post-flight analysis of flights in North Atlantic airspace. The Meeting believed that such material could be of considerable benefit to other operators and that it therefore be given the widest possible distribution. It believed that the easiest manner in obtaining this objective was if such material were distributed by ICAO. It therefore invited IATA to provide the relevant material to ICAO as and when it became available.

RECOMMENDATION 1.2/6 - MONITORING BY OPERATORS AND GOOD OPERATING PRACTICES FOR NAT FLIGHTS

That IATA make available to ICAO material on the manner in which operators could best discharge their responsibilities for monitoring as well as material on good operating practices for the conduct and post-flight analysis of flights in North Atlantic airspace, as and when such material becomes available, for publication by ICAO in an appropriate manner.

1.2:6 AMENDMENTS TO THE REGIONAL SUPPLEMENTARY PROCEDURES APPLICABLE IN THE NAT REGION

1.2:6.1 When considering the action required to make MNPS applicable in specific parts of the NAT Region, the Meeting felt that this could best be achieved by the insertion of appropriate RAC Supplementary Procedures in Doc 7030. In the course of development of the appropriate Supplementary Procedures, the following points gave rise to observations:

a) the specific reference to States having jurisdiction over operators in order to ensure compliance with the MNPS;

b) a specific problem related to the application of lateral separation by ATC; and

c) the anticipated inclusion of provisions regarding revised composite separation in the organized track system.

1.2:6.2 With regard to a) above, the view was expressed that the new Regional SUPPS concerning the method of application of MNPS constituted a precedent because it stipulated, for the first time in Doc 7030, that States having jurisdiction over operators would be required to ensure that aircraft have a specific demonstrated navigation performance capability. The question raised was whether States could be expected to assume this responsibility and also whether reference to States in Doc 7030 and the insertion of such material created an undesirable precedent. After extensive discussion the Meeting came to the conclusion that, under present circumstances and as long as work required to be undertaken by ICAO in accordance with Recommendation 2/1 of the 9th AN Conference was not completed, this was the most effective way of ensuring the proper application of the MNPS in the NAT Region.

1.2:6.3 With regard to the problem raised in paragraph 1.2:6.1 b) above, the Meeting agreed to insert in the NAT RAC SUPPS a provision providing guidance to ATC on the manner in which lateral separation between adjacent tracks should be applied.

1.2:6.4 As to the anticipated inclusion of procedures for a revised composite separation in the organized track system, the Meeting, after extensive discussion, felt that such a provision should be included in Doc 7030 on the understanding that it would not be applied until a date jointly agreed between users and providers, after arrangements to ensure its safe application had been made. For this reason an appropriate Note was added.

RECOMMENDATION 1.2/7 - AMENDMENT TO DOC 7030

That Regional Supplementary Procedures in Part I, Rules of the Air and Air Traffic Services and Search and Rescue, applicable in the NAT Region, be amended as shown in Appendix C to this Report.

1.2:7 PREPARATION OF GUIDANCE MATERIAL RELATED TO MNPS

1.2:7.1 Because of the importance attributed to guidance material related to the application of MNPS in the NAT Region, as repeatedly stressed in this Report, the Meeting believed that it would be essential that ICAO publish a consolidated, self-contained document containing all relevant material for use by States and International Organizations on the understanding that this document should be up-dated whenever this was required by circumstances. It noted in this respect that the format of the "Regional Guidance Material regarding ATS Services in the EUR Region", as published by the European Office of ICAO, appeared to meet the requirement.

RECOMMENDATION 1.2/8 - PUBLICATION OF GUIDANCE MATERIAL RELATING TO MNPS

That ICAO issue a self-contained document regarding "Guidance Material related to Air Navigation in the NAT Region" containing all relevant guidance material regarding the application of MNPS in the NAT Region as and when it becomes available, and more specifically:

a) the material contained in Appendix A to this Report;

b) the guidance material on MNPS prepared by the 9th AN Conference;

c) the material contained in Appendix B to this Report;

d) the material referred to in Recommendation 1.2/5; and

e) material made available by IATA in accordance with Recommendation 1.2/6.

1.2:8 IMPLEMENTATION OF THE PROVISIONS REGARDING MNPS AND ADDITIONAL WORK REQUIRED

1.2:8.1 In view of the many factors affecting the implementation of the provisions regarding MNPS, the Meeting found it necessary to develop specific proposals for their phased implementation. These proposals envisage that:

a) the provisions regarding Minimum Navigation Performance Specifications for aircraft operating within the MNPS airspace should become applicable at the time when the LORAN-A stations in the Eastern part of the NAT Region are withdrawn from service;

b) the provisions regarding the use of 60NM lateral separation between aircraft operating within the MNPS airspace should become applicable some 9 months after the date specified in a) above, in order to provide for a sufficiently long monitoring period of the actual navigation performance of aircraft in the NAT Region after the withdrawal of LORAN-A stations;

c) the provision regarding the use of composite separation should become applicable only after the conclusion of arrangements between users and providers ensuring its safe application.

RECOMMENDATION 1.2/9 - PHASED IMPLEMENTATION OF THE NAT RAC SUPPS REGARDING MNPS

That

a) the NAT RAC SUPPs regarding adherence of aircraft to Minimum Navigation Performance Specifications in the MNPS airspace contained in paragraph 1 of Appendix C to this Report become applicable on 29 December 1977;

b) the NAT RAC SUPPs regarding lateral separation and the establishment and use of an organized track system, contained in paragraphs 2, 3, 4 and 6 of Appendix C to this Report become applicable on 5 October 1978, unless another date was agreed between States and operators concerned and notified in due time to ICAO; and

c) the NAT RAC SUPPs regarding the revised composite separation, contained in paragraph 5 of Appendix C to this Report become applicable at a date after 5 October 1978 which has been agreed between users and providers after the conclusion of arrangements ensuring its safe application by ATC and notified in due time to ICAO.

1.2:8.2 With regard to air traffic control problems related to separation of traffic conforming with the MNPS and "non-conforming" traffic, operating within the lateral limits of the MNPS airspace, the Meeting noted that provider States, having explored every feasible possibility, had concluded that the only practical solution was the use of vertical segregation.

1.2:8.3 In order to obtain vertical segregation within the lateral limits of the MNPS airspace, the Meeting noted that the highest flight level which might be available for non-conforming aircraft operating underneath the MNPS airspace would be FL270. The lowest level available above the MNPS airspace for non-conforming aircraft would be FL410.

1.2:8.4 The Meeting noted that paragraphs 1.2:8.2 and 1.2:8.3 above were applicable to aircraft which would not be capable of complying with the MNPS. It, however also recognized, that, during the initial period of application of the MNPS and for approximately one year, there may exist a requirement for aircraft, not meeting the MNPS, to operate within the MNPS airspace. Therefore, in order to provide for an initial period of flexibility, in the application of the MNPS concept, arrangements would be required to accommodate these aircraft. As it was however not possible to determine the size of the problem posed by operations of such aircraft, the Meeting was unable to develop, at this time, specific proposals for action since these depended, for obvious reasons, to a large extent, on the number of aircraft involved and the types of operations likely to be conducted by them. It was therefore agreed that this matter required further study, primarily between provider States in co-operation with operators likely to be confronted with the need to operate within the MNPS airspace with, initially, non-equipped aircraft and it was therefore felt best if this matter were left to further study by the NAT/SPG with a view to develop, and propose for application, arrangements covering this situation.

1.2:8.5 Regarding the lateral separation to be applied between aircraft operating outside the MNPS airspace, this could be a minimum of 120NM except where other specific provisions apply. However, this value will require further study.

1.2:8.6 In addition, the Meeting felt that it would be essential to undertake further work following the LIM NAT RAN Meeting 1976, in order to ensure that the implementation of these provisions could be effected without any degradation in the levels of safety currently afforded within the Region and in a manner ensuring the highest possible economic efficiency of operations. It was believed that such work would have to be based on close monitoring of the situation as it developed after the LIM NAT RAN Meeting 1976. To this extent it was believed best if a Meeting of the NAT/SPG were held in late 1977 to review the situation within the Region as it was likely to exist after 29 December 1977 when the LORAN-A stations would be withdrawn, with a view to:

a) determining and recommending for application, in the light of detailed information then available on the number of aircraft likely to be unable to meet the MNPS, the specific values of lateral separation which will be required to be applied to such aircraft in order to ensure an acceptable level of safety;

b) developing and recommending for application temporary (maximum 12 months) arrangements for specific aircraft, initially unable to comply with the MNPS but needing to operate within the MNPS airspace;

c) developing and recommending for application special arrangements for use along specific routes in MNPS airspace; and

d) determining and recommending the manner of application of the new lateral separation minima.

RECOMMENDATION 1.2/10 - FURTHER WORK OF THE NAT/SPG

That

a) the NAT/SPG be requested to plan a Meeting in late 1977 in order to:

1) review the situation likely to exist within the Region regarding the navigation capability of aircraft after the withdrawal of the LORAN-A stations;

2) determine the number of aircraft which, are likely to be unable to comply with the MNPS when these are implemented;

3) in the light of the above, determine and recommend for application the values of lateral separation required to be applied outside MNPS airspace to ensure a continued acceptable level of safety;

4) develop and recommend procedures for the application of the values agreed under a) 3) above;

5) develop and recommend for application temporary (maximum 12 months) arrangements for specific aircraft, initially unable to comply with the MNPS but needing to operate within the MNPS airspace;

6) develop and recommend for application special arrangements for use along specific routes in MNPS airspace.

b) in order to assist the NAT/SPG in the tasks outlined in a) 1) and 2) above, States, having operators conducting flights in the NAT Region, inform ICAO by mid-October 1977 regarding operators which on 29 December 1977 can be expected:

1) to comply with the MNPS applicable in the NAT Region;

2) to be unable to comply with those specifications.

NOTE: The information under b) 2) above should, if at all possible, be supplemented by an indication as to when compliance by these aircraft with the MNPS can be expected and the nature of their operations (for example, frequency of NAT flights, aircraft navigation equipment and routes and levels required).

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Appendix A to the Report on Agenda Item 1.2

ANALYTICAL DEVELOPMENT OF A MINIMUM NAVIGATION PERFORMANCE SPECIFICATION

1. Introduction

1.1 The purpose of this Appendix is to delineate the rationale and mathematical foundation for the minimum navigation performance specification applicable in the North Atlantic Region proposed in this paper. Presented herein are a statement of the assumptions involved and a derivation of the numerical values used in the specification. The minimum navigation performance specification is established to provide a mechanism to assure that the risk of aircraft collision due to loss of lateral separation will be maintained at a satisfactory level, as defined by the Target Level of Safety (TLS). The navigation performance specification achieves this objective by:

a) providing guidelines for new system design and procurement;

b) establishing criteria for acceptable navigation performance as measured through a lateral deviation monitoring programme; and

c) providing a basis for taking remedial actions in the event that the navigation performance of some aircraft is found, through monitoring, not to meet the specification.

1.2 The performance specification is designed to assure acceptable lateral collision risk in the organized track system environment for a ten-year period from the time of adoption. Before the end of that period, the performance specification will be re-examined in the light of possible changes in the operating environment and equipment technology during that time.

2. Collision Risk Formula

2.1 It is assumed that the collision rate is related to the lateral overlap probability by the NAT/SPG collision risk formula which relates lateral navigation performance to the risk of collision due to

loss of lateral separation. The formula agreed upon by the NAT SPG to represent the lateral collision risk is:

$$N_{ay} = 10^{7} P_y(S_y) P_z(0) \frac{\lambda_x}{S_x} \left\{ E_y(\text{same}) \left[\frac{\overline{|\Delta V|}}{2\lambda_x} + \frac{\overline{|\dot{y}|}}{2\lambda_y} + \frac{\overline{|\dot{z}|}}{2\lambda_z} \right] + E_y(\text{opp}) \left[\frac{2\overline{|V|}}{2\lambda_x} + \frac{\overline{|\dot{y}|}}{2\lambda_y} + \frac{\overline{|\dot{z}|}}{2\lambda_z} \right] \right\} \quad (1)$$

2.2 The parameters used in this equation are defined below and the values used are:

$S_y = 60\text{NM}$ = the lateral separation standard

$P_y(S_y)$ = the probability of lateral overlap of aircraft nominally flying on laterally adjacent paths (the value of this parameter is calculated below)

$P_z(0)$ = 0.25 = the probability of vertical overlap of aircraft nominally flying at the same flight level

λ_x = 0.033 NM (=200ft) = the average length of an aircraft

λ_y = 0.033 NM (=200ft) = the average wing span of an aircraft

λ_z = 0.0085 NM (=50ft) = the average vertical dimension of an aircraft

S_x = 120NM = a parameter used in the calculation of the E_y values

E_y (same)	= 0.5	=	the average number of same-direction aircraft flying on laterally adjacent tracks at the same flight level within segments of length 2 S_x centred on the typical aircraft
E_y(opposite)	= 0.013	=	the average number of opposite direction aircraft flying on adjacent tracks at the same flight level within segments of length 2 S_x centred on the typical aircraft.
$\overline{\lvert\Delta V\rvert}$	= 13 Kt	=	the average relative along-track speed of two aircraft flying at the same flight level in the same direction
$\overline{\lvert V\rvert}$	= 480Kt	=	the average ground speed of an aircraft
$\overline{\lvert\dot{y}\rvert}$	= 47Kt	=	the average relative cross-track speed between aircraft which have lost 60 NM of separation
$\overline{\lvert\dot{z}\rvert}$	= 1Kt	=	the average relative vertical speed of aircraft flying at the same flight level

All the values given above, except those for E_y(same) and E_y (opposite), have been used in all recent calculations of the NAT SPG and are regarded as the best estimates of the operating environment. The values of E_y(same) and E_y(opposite) have been estimated on the basis of the most recent North Atlantic Traffic forecasts and on traffic counts made in the North Atlantic in 1973. Total average traffic flow = 400 flights per day (NAT/TFG baseline forecast for 1982), of which 350 will cross 20°W or 40°W between 45°N and 65°N, where the traffic counts were made and for which computer simulations were available. The values found for E_y (same) and E_y (opposite), therefore, apply only to this area. As the number of flights on parallel tracks in the MNPS Airspace but outside this area can be expected to be much smaller, these values can be regarded as slightly cautious approximations for E_y(same) and E_y(opposite) in the total MNPS Airspace.

2.3 Dropping the subscript y from the separation standard, the lateral overlap probability is related to the overlap integral by the defining relation

$$P_y(S) = 2\lambda_y C(S) \qquad (2)$$

so that the overlap integral is given in terms of the lateral deviation distribution f(Y) by:

$$C(S) = \int_{-\infty}^{\infty} f(Y)\, f(Y + S)\, dY \qquad (3)$$

Here, f(Y) is the probability density function of lateral deviations from course.

2.4 The objective of the minimum navigation performance specification can now be stated in terms of the NAT SPG collision risk formula:

> The level of navigation performance in the North Atlantic Organized Track System shall be such that the risk of collision due to loss of lateral separation does not exceed 0.2 fatal aircraft accidents in 10^7 flying hours.

2.5 Using the values of the collision risk formula parameters given above and $N_{ay}=0.2$, this objective implies that the maximum allowable level of C(S) is $6.45 \times 10^{-6} NM^{-1}$. In the estimation of collision risk from observed lateral deviation data the estimation of C(S) is the crucial point of the procedure. Likewise, in the establishment of a navigation performance specification, the primary concern is to ensure via the specification that C(S) will not exceed the maximum allowable value indicated above.

2.6 In the next section, general characteristics of the lateral deviation distribution, f(Y), inferred from data collected to date in the North Atlantic are discussed in terms of the consequent properties of C(S). This discussion leads to the calculation of parameters used in formulating a minimum navigation performance specification for the North Atlantic Organized Track System.

3. Derivation of the Numerical Values

3.1 During the development phase it was realized that the choice of the parameters, for which limits were to be set in the Specification, depended to some extent on the shapes of the distributions of the deviations which could be expected to occur in practice. It has been observed in data collections in the past that the vast majority of aircraft stay within a narrow interval about the center line Y = 0 while the few remaining aircraft execute larger deviations with a frequency which falls off more or less slowly with respect to the magnitude of the deviation. Roughly speaking, these two groups can be distinguished as "normal operations" and "blunders". Secondary peaks can occur at deviations about equal to the separation (due to "ATC loop errors" or errors in the programming of airborne navigation computers) but it is unlikely that they will occur at any other values of the deviation.

3.2 A careful study showed that the best approach to defining the specification would be to provide limits for:

a) the standard deviation;

b) the probability of deviations beyond the half-separation; and

c) the probability density of the deviations at the separation.

3.3 Taking into account that:

- for any distribution which has a secondary peak at the separation S but meeting the requirement in the specification at that point, the convolution integral will be less than that obtained with a distribution slowly decreasing to the same density at S; and

- that the limit for the density at S should not be so low that a too long time period would be required to determine whether it is being met,

it can be stated that the mathematical determination of the values for these limits can be based on functions meeting the following requirements:

a) symmetric with zero mean;

b) unimodal;

c) most heavily weighted in the inner (core) region; and

d) slowly varying and small in magnitude in the outer (tail) region.

3.4 As a consequence of these properties, a simple approximation for C(S) can be developed. Assumptions c) and d) are restated in a different manner, assuming the existence of a positive number K<S/2:

$$\int_{|Y| \geq K} f(Y)\, dY << 1 \qquad (4)$$

$$\left| \frac{f^{(m)}(Y)}{f(Y)} \right| << \frac{1}{K^m} \qquad \text{(for } |Y|>K \text{ and for all positive integers m)} \qquad (5)$$

3.5 When use is made of the four assumptions mentioned above, eq. (3) can be more conveniently written as:

$$C(S) = 2\int_{\cdot}^{S/2} f(Y)f(S-Y)\, dY$$

$$= 2\int_{-K}^{K} f(Y)\, f(S-Y)\, dY + 2\int_{K}^{S/2} f(Y)\, f(S-Y)\, dY + 2\int_{-\infty}^{-K} f(Y)\, f(S-Y) dY \qquad (6)$$

Denote the first term on the right hand side of the equation above by $C_1(S)$. It is the only term which depends on f(Y) for $|Y|<K$, so it is interpreted as the "core-tail interaction."

3.6 The factor f(S-Y) is expanded in a Taylor series about Y=0 (i.e., about S-Y=S):

$$f(S-Y)=f(S) - Yf'(S) + \frac{Y^2}{2} f''(S) + \ldots + \frac{(-Y)^m}{m} f^{(m)}(S) + \ldots \qquad (7)$$

Direct substitution into the formula for $C_1(S)$ gives:

$$C_1(S)=2\sum_{m=0}^{\infty} \frac{1}{m!} f^{(m)}(S) \int_{-K}^{K} (-Y)^m f(Y) dY$$

$$\leq 2\sum_{m=0}^{\infty} \frac{1}{m!} f^{(m)}(S)\, K^m \int_{-K}^{K} f(Y)\, dY$$

$$=2\left\{ f(S) + \sum_{m=1}^{\infty} \frac{K^m}{m!} f^{(m)}(S) \right\} \int_{-K}^{K} f(Y)\, dY \qquad (8)$$

The inequality follows from replacing $(-Y)^m$ by K^m in the integrand, since $(-Y)^m < K^m$ for $-K<Y<K$. Noting that $\int_{-K}^{K} f(Y)\,dY \approx 1$, and applying the inequality (5), all but the leading term in eq. (8) are negligible and

$$C_1(S) \approx 2f(S) \qquad (9)$$

3.7 As a result of the small magnitude and slow variation of the density function in the tail region, the other terms in eq. (6) are negligible by comparison with $C_1(S)$ and so

$$C(S) \approx 2f(S) \qquad (10)$$

Using the maximum allowable value of C(S) derived in Section 2.5, this requirement becomes:

$$f(S) < 3.23 \times 10^{-6} \ \text{NM}^{-1} \qquad (11)$$

3.8 The quantity f(S) is a measurable function of the navigation performance of the aircraft. It can be approximated by

$$f(S) \approx \frac{\int_{Y_1}^{Y_2} f(Y)\,dY}{Y_2 - Y_1} \qquad (12)$$

if $Y_2 - S = S - Y_1$. It must be noted that $2\int_{Y_1}^{Y_2} f(Y)\,dY$ is the probability that aircraft will be between Y_1 and Y_2 from the centre line on either side of the track. Using S = 60 NM, Y_1 = 50 NM and Y_2 = 70 NM, equations (11) and (12) can be written as

$$2\int_{Y_1}^{Y_2} f(Y)\,dY = 2 \times 20 \times f(S) = 40 \times 3.23 \times 10^{-6} = 13 \times 10^{-5} \qquad (13)$$

or in words:

the proportion of the total flight time spent at lateral deviations from track between 50 and 70NM shall be less than 13×10^{-5}.

3.9 The value of f(S) determined from the relationship given by eq. (10) can be used as a specification of navigation performance. However, a specification in terms of density function alone, both as a guide to manufacturers of navigation systems and as a standard for the measurement of acceptable performance in the track system, would be difficult to implement, since a very large number of lateral deviation measurements is required to demonstrate a navigation system's compliance with the small value of f(S). An alternative specification, employing not only f(S) but also the standard deviation of nominal navigation performance and the probability of lateral deviations at least as large as half separation, can be developed, but a parametric form for the distribution of lateral deviations has to be assumed. The advantage of this specification is that navigation parameters which are more readily adaptable to design goals and performance measurements form a part of the specification, while the restriction on f(S) is maintained. Taking into account the shapes of distributions observed in the past, in which distinct "core" and "tail" regions have often been encountered, the double-double exponential (DDE) function has been chosen to characterize the distribution of lateral deviations from course. This distribution is a weighted sum of two double exponential distributions and has the form:

$$f(Y) = \frac{(1-\alpha)}{2\lambda_1} e^{-|Y|/\lambda_1} + \frac{\alpha}{2\lambda_2} e^{-|Y|/\lambda_2} \quad (0<\lambda_1<\lambda_2<\infty;\ 0\leq\alpha\leq 1) \tag{14}$$

where λ_1 and λ_2 can be thought of as the scale parameters of the core and tails, respectively, in the sense of the "normal operation" and "blunder" interpretation cited previously, with α indicating the relative weight of the tails.

3.10 The standard deviation σ of this distribution is given by:

$$\sigma^2 = 2\left\{(1-\alpha)\lambda_1^2 + \alpha\lambda_2^2\right\} \tag{15}$$

and the probability of deviation by at least half standard is:

$$\eta = \text{Prob}(|Y|>S/2) = (1-\alpha)e^{-S/2\lambda_1} + \alpha e^{-S/2\lambda_2} \tag{16}$$

The overlap integral is

$$C(S) = \left[\frac{1-\alpha}{2\lambda_1}\right]^2 (S+\lambda_1)e^{-S/\lambda_1} + \left[\frac{\alpha}{2\lambda_2}\right]^2 (S+\lambda_2)e^{-S/\lambda_2}$$

$$+ \frac{\alpha(1-\alpha)}{2}\left[\frac{1}{\lambda_2 - \lambda_1}(e^{-S/\lambda_2} - e^{-S/\lambda_1}) + \frac{1}{\lambda_1 + \lambda_2}(e^{-S/\lambda_1} + e^{-S/\lambda_2})\right] \qquad (17)$$

3.11 Combinations of the values of λ_1, λ_2, and α which exactly provide the required value of C(S) (6.45×10^{-6} NM^{-1}) are tabulated in the attached table. The bottom element of each dual number entry is the value of η (denoted by "ETA") corresponding to the specific set of values λ_1, λ_2 and α. The star signs indicate that at the given value of λ_1 no values of λ_2 and α exist, given the definition of the DDE function, such that the required value of C(S) can be achieved.

3.12 The table shows that η has a minimum of 5.3×10^{-4}. It is proposed to use that minimum as the limit value for the navigation performance. The second requirement can therefore be expressed as

the proportion of the total flight time spent by aircraft 30NM or more off track shall be less than 5.3×10^{-4}.

3.13 Analysis has shown that if the two requirements defined in Sections 3.8 and 3.12 are met, the collision risk is relatively independent of the standard deviation of the core. It was nevertheless deemed useful to define a requirement for this standard deviation as a guide to designers of equipment and as a basis for certification tests. Based on previous experience with the parameters of distributions found for similar equipment, a value of 6.3NM was chosen. This value is equivalent to $\lambda_1 = 4.5$NM for the core ($4.5\sqrt{2} = 6.3$).

The third requirement can be expressed as

> the standard deviation of the lateral track errors shall be less than 6.3NM

It should however be noted that the requirement given in Section 3.12 may be the more stringent constraint for navigation systems for which the number of errors due to unreliability and ergonomic causes are relatively large.

3.14 In summary, combining the results of both the analyses carried out above, the specification is:

a) the standard deviation of the lateral track errors shall be less than 6.3NM;

b) the proportion of the total flight time spent by aircraft 30NM or more off track shall be less than 5.3×10^{-4};

c) the proportion of the total flight time spent by aircraft between 50 and 70NM off track shall be less than 13×10^{-5}.

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TABLE I

COMBINATIONS OF LAMDA 1, LAMDA 2, AND ALPHA WHICH GIVE THE TARGET LEVEL OF C(I)

C(I) = 0.00000645280220000
SEPARATION STANDARD = 60. N.M.

LAMDA 2 (N.M.)		LAMDA 1 (N.M.) 1.	2.	3.	4.	5.	6.
7.	ALPHA =	0.186714	0.140122	0.107741	0.142653	0.052536	********
	ETA =	0.002570	0.002479	0.002347	0.002438	0.003072	********
8.	ALPHA =	0.084147	0.080993	0.075466	0.064634	0.023293	********
	ETA =	0.001979	0.001905	0.001817	0.002037	0.002969	********
9.	ALPHA =	0.043389	0.041935	0.039447	0.034369	0.012490	********
	ETA =	0.001548	0.001496	0.001451	0.001760	0.002893	********
10.	ALPHA =	0.025303	0.024580	0.023354	0.020673	0.007615	********
	ETA =	0.001260	0.001224	0.001207	0.001571	0.002839	********
11.	ALPHA =	0.016300	0.015906	0.015239	0.013663	0.005097	********
	ETA =	0.001066	0.001041	0.001041	0.001439	0.002799	********
12.	ALPHA =	0.011349	0.011116	0.010721	0.009709	0.003660	********
	ETA =	0.000932	0.000913	0.000925	0.001345	0.002770	********
13.	ALPHA =	0.008397	0.008249	0.007998	0.007300	0.002776	********
	ETA =	0.000835	0.000821	0.000841	0.001275	0.002748	********
14.	ALPHA =	0.006517	0.006418	0.006249	0.005739	0.002197	********
	ETA =	0.000765	0.000753	0.000778	0.001223	0.002731	********
15.	ALPHA =	0.005254	0.005185	0.005065	0.004675	0.001800	********
	ETA =	0.000711	0.000702	0.000731	0.001183	0.002718	********
16.	ALPHA =	0.004369	0.004318	0.004231	0.003920	0.001517	********
	ETA =	0.000670	0.000663	0.000694	0.001152	0.002708	********
17.	ALPHA =	0.003726	0.003688	0.003621	0.003367	0.001309	********
	ETA =	0.000638	0.000632	0.000665	0.001128	0.002699	********
18.	ALPHA =	0.003245	0.003215	0.003163	0.002949	0.001149	********
	ETA =	0.000613	0.000608	0.000643	0.001108	0.002693	********
19.	ALPHA =	0.002875	0.002852	0.002810	0.002626	0.001026	********
	ETA =	0.000593	0.000588	0.000625	0.001093	0.002688	********
20.	ALPHA =	0.002586	0.002566	0.002533	0.002371	0.000929	********
	ETA =	0.000577	0.000573	0.000610	0.001081	0.002684	********
21.	ALPHA =	0.002354	0.002338	0.002310	0.002167	0.000851	********
	ETA =	0.000564	0.000561	0.000599	0.001071	0.002680	********
22.	ALPHA =	0.002167	0.002153	0.002130	0.002000	0.000787	********
	ETA =	0.000554	0.000551	0.000590	0.001064	0.002678	********
23.	ALPHA =	0.002012	0.002001	0.001981	0.001863	0.000734	********
	ETA =	0.000546	0.000543	0.000583	0.001058	0.002676	********
24.	ALPHA =	0.001884	0.001874	0.001857	0.001748	0.000689	********
	ETA =	0.000540	0.000537	0.000577	0.001053	0.002675	********

25.	ALPHA =	0.001776	0.001767	0.001752	0.001651	0.000652	********
	ETA =	0.000535	0.000533	0.000573	0.001050	0.002674	********
26.	ALPHA =	0.001684	0.001677	0.001663	0.001569	0.000620	********
	ETA =	0.000531	0.000529	0.000570	0.001047	0.002673	********
27.	ALPHA =	0.001606	0.001599	0.001587	0.001499	0.000593	********
	ETA =	0.000529	0.000527	0.000568	0.001046	0.002672	********
28.	ALPHA =	0.001539	0.001533	0.001522	0.001438	0.000569	********
	ETA =	0.000527	0.000525	0.000567	0.001045	0.002672	********
29.	ALPHA =	0.001480	0.001475	0.001465	0.001385	0.000549	********
	ETA =	0.000526	0.000525	0.000566	0.001045	0.002672	********
30.	ALPHA =	0.001429	0.001425	0.001416	0.001339	0.000531	********
	ETA =	0.000526	0.000524	0.000566	0.001045	0.002673	********
31.	ALPHA =	0.001385	0.001380	0.001372	0.001299	0.000515	********
	ETA =	0.000526	0.000525	0.000567	0.001046	0.002673	********
32.	ALPHA =	0.001346	0.001342	0.001334	0.001263	0.000502	********
	ETA =	0.000527	0.000526	0.000568	0.001047	0.002674	********
33.	ALPHA =	0.001311	0.001308	0.001301	0.001232	0.000489	********
	ETA =	0.000528	0.000527	0.000569	0.001049	0.002675	********
34.	ALPHA =	0.001281	0.001277	0.001271	0.001204	0.000479	********
	ETA =	0.000530	0.000529	0.000571	0.001051	0.002676	********
35.	ALPHA =	0.001254	0.001250	0.001245	0.001180	0.000469	********
	ETA =	0.000532	0.000531	0.000574	0.001053	0.002677	********
36.	ALPHA =	0.001229	0.001227	0.001221	0.001158	0.000460	********
	ETA =	0.000534	0.000533	0.000576	0.001056	0.002678	********
37.	ALPHA =	0.001208	0.001205	0.001200	0.001138	0.000453	********
	ETA =	0.000537	0.000536	0.000579	0.001058	0.002679	********
38.	ALPHA =	0.001189	0.001186	0.001182	0.001121	0.000446	********
	ETA =	0.000540	0.000539	0.000582	0.001061	0.002680	********
39.	ALPHA =	0.001172	0.001169	0.001165	0.001105	0.000440	********
	ETA =	0.000543	0.000542	0.000585	0.001065	0.002682	********
40.	ALPHA =	0.001157	0.001154	0.001150	0.001091	0.000435	********
	ETA =	0.000546	0.000546	0.000589	0.001068	0.002683	********
41.	ALPHA =	0.001143	0.001141	0.001137	0.001079	0.000430	********
	ETA =	0.000550	0.000549	0.000592	0.001072	0.002684	********
42.	ALPHA =	0.001131	0.001129	0.001125	0.001068	0.000426	********
	ETA =	0.000554	0.000553	0.000596	0.001075	0.002686	********
43.	ALPHA =	0.001120	0.001118	0.001114	0.001058	0.000422	********
	ETA =	0.000557	0.000557	0.000600	0.001079	0.002688	********

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Appendix B to the Report on Agenda Item 1.2

MONITORING OF NAVIGATION PERFORMANCE

Note: The following material is supplementary to the general provisions regarding the monitoring of navigation performance contained in para 3.2 of the "Guidance Material related to Acceptable Methods of Compliance with Specifications of Minimum Navigational Performance as Conditions for Operation in specified portions of the Airspace" prepared by the Ninth Air Navigation Conference, 1976.

1. Outline of the monitoring process to be used in the NAT Region

1.1 Radar stations will collect data to be used in the monitoring process. The data collection process will consist of 2 parts:

a) continuous collection of all deviations of 25 NM or more;

b) collection of data on the deviations of less than 25 NM at regular intervals, e.g. for one month every year.

1.2 When a deviation from track of 25 NM or more by a flight has been detected the appropriate authority of the State which collects the data will investigate the causes for each deviation in co-operation with the operator and, where appropriate, with the authorities of the State having jurisdiction over the operator of the aircraft. Such a procedure is already applied by the UK and Ireland in relation to the observations of Shannon Radar, and to a more limited extent, by Canada based on observations by Gander Radar.

1.3 All information about the detected deviations and all essential information concerning the causes of the large deviations will be made available to the NAT/SPG. States are invited to present any information they may have on the navigation accuracy of North Atlantic flights to the NAT/SPG through the European Office of ICAO. The data will be regularly analysed (e.g. every six months) in order to determine whether the tolerances upon which the MNPS are based are being met. Such analysis will be made:

a) on all available data, in order to determine the overall safety; and

b) on the data concerning specific navigation systems or specific operators, if it is suspected that they may no longer meet the specification.

1.4 If it is found that one or more of the tolerances of the MNPS are exceeded, the NAT/SPG will review the data and, if necessary, propose appropriate action. It should be borne in mind that there are at least two general classes of error which can result in large lateral deviations. One of these concerns a progressive deviation from track because of navigational inaccuracy, and the other covers cases where the aircraft flies to or along a track adjacent to its intended track as the result of some operational error. The second type, though extremely dangerous, cannot be prevented by increasing the lateral separation but must be eliminated by improvements to the operating procedures.

1.5 If there is an indication that the tolerances are exceeded by a large amount, rapid response to the causes of the problem may be necessary. In such a case, the States responsible for ATC in the NAT Region will take prompt action, after consultation with at least the major affected users. An example where such prompt action may be necessary could be a serious disturbance of the coverage of station-referenced systems, for instance due to unserviceability of ground stations or to very severe ionospheric disturbances. Such action must be possible even when the number of large deviations in the limited area in which the navigation performance is monitored is not excessive, if there is reason to believe that large errors might occur elsewhere.

1.6 When the exceedance of the tolerances is not very great or when the observed performance merely shows a trend toward degradation, it will be more useful to have a detailed investigation made, for instance by the NAT/SPG. This may take several months, but it must be kept in mind that the target level of safety is equivalent to expecting about one collision every 150 years and that a small increase in the statistical probability of collision during a six (or twelve) month period is therefore acceptable. Such an investigation may show that the causes for the large deviations can be eliminated by improved procedures. Such procedures will then be proposed and be brought to the attention of the operators and/or controllers through the appropriate channels. Results of the actions will then be closely observed. If the causes cannot be eliminated quickly States of registry of the aircraft concerned should temporarily exclude offending aircraft types or operators from operation in the MNPS airspace. An increase in lateral separation, in order to restore the situation, should be made only in extreme cases and only when every other action has failed to produce the desired results.

2. Some practical aspects related to the execution of performance monitoring in the NAT Region

2.1 The data collected by radar observations for the monitoring procedure will, in the main, relate to aircraft towards the end of an Ocean crossing. The assumption will be that this data will be representative of the deviations throughout the MNPS airspace, i.e. that the relative amount of time spent outside each value of the lateral deviation will be the same as the proportion of measurements outside that lateral deviation observed near the Eastern and Western boundaries of the Oceanic Area. It

is relevant to look at the consequences of this assumption more closely:

a) For INS-equipped aircraft, it is known that the normal navigation errors tend to increase with the time elapsed since the last alignment or updating of the INS equipment. As far as blunder-type errors are concerned, there seems to be no reason to suppose that the occurrence of this type of error near the Eastern and Western boundaries will not be representative of the whole Oceanic Area. Taking these two aspects into account, the collision risk calculated on the basis of these data will probably be higher than if data for the whole ocean were available. This over-estimation may be appreciable if adjacent tracks are used by opposite-direction traffic, but will be small for tracks used for same-direction traffic. As the traffic over the North Atlantic is predominantly unidirectional, it would seem that the above-mentioned assumption would only have a small effect on the calculated collision risk.

b) For aircraft navigating on station-referenced navigation aids with sufficient coverage throughout the MNPS airspace, it seems likely that the lateral deviations will be independent of the time flown. For these cases the above-mentioned assumption seems correct.

c) For aircraft using station-referenced navigation aids with insufficient coverage outside the area where the measurements are made, a calculation of the collision risk based only on measurements in that area would provide too low a value of the collision risk. Special care may have to be taken with temporary effects on this coverage, such as those caused by station outages.

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Appendix C to the Report on Agenda Item 1.2

AMENDMENTS TO THE NAT RAC SUPPS

Note: The following amendments refer to Doc 7030 as amended by Amendment No. 138.

Amend the NAT RAC SUPPs as follows:

1) Insert, before paragraph 1. "Separation of aircraft" a new paragraph as follows:

"x. Minimum navigation performance specifications (MNPS)

x.1 Method of application

x.1.1 States having jurisdiction over operators intending to conduct flights within the volume of airspace specified in paragraph x.2.1 shall ensure that aircraft used for such operations have demonstrated navigation performance capability such that:

a) the standard deviation of lateral track errors shall be less than 6.3NM;

b) the proportion of the total flight time spent by aircraft 30NM or more off the cleared track shall be less than 5.3×10^{-4} ;

c) the proportion of the total flight time spent by aircraft between 50 and 70NM off the cleared track shall be less than 13×10^{-5}."

Note: This requirement can initially be met by prescribing the provision of navigation equipment likely to meet the MNPS, appropriate regulations for its installation, maintenance and use by operators and aircrews and initial observation of a number of flights conducted as routine operations. Subsequent action can be based on monitoring data covering flights in the Region.

x.1.2 Adequate monitoring of flight operations in the NAT Region shall be conducted in order to assist in the assessment of continuing compliance of aircraft with the MNPS.

Note: Monitoring will be conducted in accordance with the appropriate guidance material issued by ICAO.

x.2 Area of applicability

x.2.1 The MNPS shall be applicable in that volume of airspace between FL275 and FL400 extending between latitude 27°N and latitude 67°N, bounded in the East by the Eastern boundaries of FIRs Santa Maria Oceanic, Shanwick Oceanic and Reykjavik and in the West by longitude 60°W within FIR New York Oceanic, the western boundary of FIR Gander Oceanic and the western boundary of FIR Reykjavik.

Note: This volume of airspace will be referred to as the "MNPS airspace"."

2) Under paragraph 1.1 "Lateral Separation", insert in the appropriate place a new paragraph as follows:

"y 60 nautical miles between aircraft which meet the MNPS and which operate in the MNPS airspace." .

Note: See x above

3) Replace the existing paragraph 1.1.1 1) a) under "Lateral Separation" by the following:

" 90 nautical miles between aircraft operating outside the MNPS airspace:

i) between the United States or Canada and Bermuda;

ii) between the United States, Canada or Bermuda and points in the CAR Region;

iii) between the Iberian Peninsula and the Azores Islands; and

iv) between Iceland and points in Scandinavia and in the United Kingdom;"

4) At the end of the paragraph on "Lateral Separatiom", insert the following new paragraph:

"z. In the practical application of the above minima, parallel tracks may be spaced with reference to their difference in latitude, using 1° instead of 60NM, 1 1/2° instead of 90NM and 2° instead of 120NM, provided that, in any interval of 10° longitude, their change in latitude does not exceed 2° while North of 56°N or 3° while South of 56°N. Where the above rates of change of latitude are exceeded, the required lateral separation must be ensured by reference to the track spacing expressed in nautical miles.".

5) Replace the existing paragraph 1.4 "Composite Separation" by the following:

"1.4 Composite separation

Note: Use of this separation is dependent on the conclusion of arrangements ensuring its safe application by ATC and notification of an application date jointly agreed between users and providers.

1.4.1 For aircraft operating between FL290 and FL390 within the organized track system as established in accordance with paragraph 3.5, composite separation, consisting of the combination of 30 nautical miles lateral and 300 metres (1000 feet) vertical separation may be applied.

1.4.2 This type of separation may be applied between aircraft operating in the same or opposite directions."

6) Replace the existing paragraph 3.5 "Establishment and use of organized tracks" by the following:

"q. Establishment and use of an organized track system (OTS)

q.1 When necessary in order to permit the optimum use of the airspace, the area control centres serving Gander, New York, Santa Maria and Shanwick Oceanic control areas may, subject to coordination with each other and, when appropriate, with Reykjavik area control centre, establish an organized track system. The following procedures shall then be applied:

q.1.1 Operators conducting scheduled or non-scheduled flight operations at or above FL280 within Gander Oceanic, New York Oceanic, Shanwick Oceanic and Santa Maria (north of 30°North) Oceanic control areas shall provide information to the area control centres concerned regarding the tracks likely to be requested by turbojet aircraft during peak traffic periods. Such information shall be provided as far in advance of the anticipated peak periods as practicable and as specified in appropriate aeronautical information publications.

q.1.2 Based on the above information an organized track system may be established. The location of the organized tracks will depend on traffic demand and other relevant factors. The related organized track messages will be disseminated to operators by Shanwick Oceanic area control centre for the predominant Westbound flow of air traffic and by Gander Oceanic area control centre for the predominant Eastbound flow of air traffic. These messages shall be disseminated at least three hours in advance of each anticipated peak traffic period. Any subsequent change made to the track system shall be notified to the operators as soon as possible.

q.2 When composite separation is used in the organized track system the following provisions apply:

q.2.1 Aircraft may be cleared to join the outer track of the organized track system at points other than the normal entry points in the oceanic control areas provided required minimum longitudinal or vertical separation will exist between such aircraft and others operating along this track.

q.2.2 Aircraft flying along the outer track of the organized track system may be cleared to leave the system provided that the lateral separation from all other aircraft in the system continuously increases or another form of separation is established.

q.2.3 Aircraft changing tracks within the organized track system or which are crossing the organized track system shall be cleared to do so only if they are provided with minimum longitudinal, lateral or vertical separation with respect to other aircraft.

q.2.4 Aircraft operating in the organized track system may be cleared to change levels on the same track."

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Agenda Item 1.3: Separation minima

1.3:1 GENERAL

1.3:1.1 Under this Item, the Meeting considered the following subjects:

1) proposals for amendment of RAC Supplementary Procedures applicable in the NAT Region relating to:

   a) lateral, longitudinal and vertical separation;

   b) abbreviated clearances;

   c) establishment of organized tracks for SST aircraft;

   d) position reporting by SST aircraft;

   e) special procedures for in-flight contingencies applicable to subsonic and SST aircraft;

2) application of composite separation within the organized track system;

3) possible further reduction of longitudinal separation minima;

4) ability of OACs to meet planned or requested routes and/or flight levels for operations in the NAT Region.

1.3:1.2 The Meeting noted that some aspects of the subject of separation minima had already been considered under Agenda Item 1.2. This was necessary because of the inter-relationship and interactions between Minimum Navigation Performance Specifications (MNPS) and lateral separation minima. The discussion under Agenda Item 1.3 therefore confined itself with those separation aspects which had not been considered under Agenda Item 1.2.

1.3:1.3 The Meeting appreciated the extensive preparatory work done by the NAT/SPG also on this subject, particularly in respect of development of proposals for amendment of the NAT Regional Supplementary Procedures covering SST operations in the NAT Region.

1.3:1.4 With regard to the use of the terms "SST operations" and "SST aircraft", the Meeting was informed of the decision of the Air Navigation Commission to use the term "supersonic aircraft" in the Annex and PANS provision in lieu of "SST aircraft". However, note was taken that the States represented in the NAT/SPG had agreed to use the term "SST aircraft" rather than "supersonic aircraft" to make it quite clear that the procedures in question were applicable to civil transport aircraft only. It was stressed that the procedures had been developed on the basis of known navigation performance of civil supersonic transport aircraft only. In the light of these explanations, the Meeting agreed to retain the term "SST aircraft".

1.3:2 PROPOSALS FOR AMENDMENT OF NAT REGIONAL SUPPS

1.3:2.1 When reviewing the amendment proposals submitted for consideration under this Agenda Item, the Meeting noted that, except for a proposal relating to longitudinal separation applicable to subsonic aircraft, all other proposals had been developed by the NAT/SPG to cover SST operations in the NAT Region. It was also noted that these proposals had been the subject of extensive consultations between the States and International Organizations concerned, and that the final version of the proposals, as presented, took into account the comments received on earlier proposals and had been drafted in a form which could eventually be recommended for adoption by other ICAO Regions in which SST aircraft would operate. The Meeting was informed that the three NAT ATC provider States concerned with the initial operation of SST aircraft between Europe and North America (Canada, United Kingdom and USA) had already promulgated procedures in support of SST operations for interim use, pending publication of relevant amendments to the NAT Regional SUPPs.

1.3:2.2 The proposals prepared by the NAT SPG provided for a minimum lateral separation of 60NM between SST aircraft at or above FL450, to cover the supersonic phases of flight. This proposal was based on data available in respect of navigation equipment carried by SST aircraft and the accuracy and reliability of such equipment.

1.3:2.3 With regard to vertical separation, the proposals of the NAT SPG provided for a minimum of 4 000 ft above FL450. It was noted that this value had been developed by the NAT V RAN Meeting in 1970 and that the assumptions made at that time were still valid, since no material had come to light which would justify a lower minimum at this time.

1.3:2.4 Another proposal arising from the NAT SPG provided for a minimum of 10 minutes longitudinal separation between SST aircraft in supersonic flight, provided that the aircraft concerned reported over the same entry point into the oceanic controlled airspace with a time interval of at least 12 minutes and followed the same or continuously diverging tracks until another form of separation is established. The Meeting noted that in developing this proposal a rather cautious approach had been taken, in view of the experience gained in respect of the capability of SST aircraft to navigate accurately along-track and to adhere closely to the Mach number approved by ATC.

1.3:2.5 The Meeting examined whether in these circumstances there was a need for confirmation by radar of the required initial minimum time interval of 12 minutes. Noting that originally only 8 minutes time interval had been considered sufficient within the oceanic airspace, it was agreed that now that this interval had been increased to 10 minutes, there was no need for radar confirmation of the required initial minimum of 12 minutes at the entry point, except in the case of aircraft not crossing the same entry point. Where the conditions for 10 minutes longitudinal separation could not be met, it was agreed that 15 minutes between successive SST aircraft would be adequate.

1.3:2.6 A proposal was submitted by Portugal and supported by the USA aimed at the uniform application, throughout the control areas of the NAT Region, of 15 minutes longitudinal separation between turbo-jet aircraft applying Mach number technique. The Meeting agreed to this proposal, taking into account the improved navigational capabilities of the aircraft operating in the Region. It was also recognized that by introducing this procedure, the currently existing differences in the application of longitudinal separation in various control areas and under various conditions would be eliminated, which would simplify the task of the ATC units concerned without derogation of safety of flight.

1.3:2.7 The remaining proposals presented to the Meeting aimed at the introduction of additional procedures necessary to facilitate SST operations. These proposals concerned abbreviated clearances and position reports, establishment of an organized track system for SST operations and its use, and special procedures for in-flight contingencies. The Meeting agreed with little or no discussion to the proposals. With regard to the special procedures for in-flight contingencies, the Meeting noted that they would have to be re-examined and probably modified in due course in order to make them compatible with the proposed introduction of reduced composite separation between aircraft operating in the organized track system. It was understood that the NAT/SPG would pursue this matter and take the necessary actions which will ensure that this problem is resolved by the time the reduced composite separation will become applicable.

1.3:2.8 The Meeting noted that the incorporation into Doc 7030, Part 1 of the above provisions also required some editorial restructuring and extensive renumbering of paragraphs. Also, some editorial improvements to existing texts had been proposed and were agreed to. Noting the relevant Recommendation of the Ninth Air Navigation Conference (1976), the term "reporting line" was deleted in one provision. The Meeting also agreed to delete the references to Søndrestrøm control area in relevant procedures to reflect the recent airspace reorganization above FL195 over Greenland.

RECOMMENDATION 1.3/1: AMENDMENT TO DOC 7030

That the Regional Supplementary Procedures in Part I, Rules of the Air and Air Traffic Services and Search and Rescue applicable in the NAT Region be amended as shown in the Appendix to this part of the Report.

1.3:2.9 Taking into account the time frame for the further processing of the proposed amendments, and recognizing the desirability of early application of the procedures following approval by Council of the proposed amendments, the Meeting recommended 21 April 1977 as the common AIRAC date on which the amended procedures should be made applicable.

RECOMMENDATION 1.3/2: APPLICABILITY DATE FOR THE AMENDED NAT RAC PROCEDURES

That the NAT RAC SUPPs contained in the Appendix to this part of the Report be made applicable on the AIRAC date of 21 April 1977.

1.3:3 APPLICATION OF COMPOSITE SEPARATION IN THE NAT REGION

1.3:3.1 Taking account of the discussion on this subject under Agenda Item 1.2, the Meeting examined the continuing validity of Recommendation 10/5 of the Fifth NAT RAN Meeting (1970) which specified:

"That provider States concerned with the application of composite separation within the organized track system of the NAT Region, prior to the application of such separation take necessary action to ensure that:

a) radar coverage is provided in those parts of the entry/exit areas where composite separation is applied;

b) the navigation guidance in the exit/entry areas is such that aircraft can navigate accurately along the routes assigned to them;

c) the entry/exit procedures in the transition areas to and from the oceanic areas provide for an orderly transition between the fixed continental ATS route network and the organized track structure."

This Recommendation was approved by the ANC without comment.

1.3:3.2 In the discussion, the following points were made in support of proposals for amending the requirements in NAT V Recommendation 10/5 a) and b):

a) experience gained with the use of composite separation had shown that local conditions had a significant influence on this matter and could allow the application of a variety of procedures, not all of them presupposing the existence of radar coverage as an essential feature;

b) a significant factor for determining the need for radar coverage were traffic density and complexity of traffic;

c) in some areas the extension of radar coverage to include the exit/entry points of the oceanic controlled airspace would result in prohibitive costs, if technically feasible at all;

d) the current and planned radar coverage would permit to ensure that aircraft would navigate along the correct track towards the entry point, and with the required lateral spacing, when leaving the area of radar coverage;

e) the navigational performance of the majority of aircraft has greatly improved in terms of accuracy and will continue to do so, enabling aircraft to navigate accurately along the assigned track while operating in those exit/entry areas which are outside of radar coverage;

f) the specific land based navigation aids required to satisfy the need for navigational guidance would continue to be identified in the Regional Air Navigation Plan publication in accordance with the "statement of basic operational requirements and planning criteria" for the NAT Region;

g) the introduction of Minimum Navigation Performance Specifications would enhance significantly the overall navigational accuracy of aircraft operating in the NAT Region, particularly in the exit/entry areas of the organized track system.

1.3:3.3 However, IFALPA strongly insisted that the requirement for radar coverage and navigation guidance, laid down in a) and b) of Recommendation 10/5 of the Fifth NAT RAN Meeting, were a prerequisite for the application of composite separation in these areas. It felt that they were essential safeguards and should therefore be retained.

1.3:3.4 Regarding the question how far inland the transition areas should or could extend, the Meeting recognized that this depended largely on the local circumstances, and that various factors had to be taken into account. It was agreed however, that in the interpretation of the term "transition area", a rather liberal approach was acceptable.

1.3:3.5 In the light of these discussions, and noting IFALPA's position, the Meeting agreed that there was no need to retain the Recommendation in b), and that some modifications to the lead-in part and to a) of NAT V Recommendations 10/5 should be made.

RECOMMENDATION 1.3/3 - APPLICATION OF COMPOSITE SEPARATION IN THE NAT REGION

That provider States concerned with the application of composite separation within the organized track system of the NAT Region take necessary measures to ensure that:

a) radar coverage is provided in those parts of the **entry/exit areas where** composite separation is applied and **where the density and complexity of air traffic are such that radar coverage must be considered an essential prerequisite;**

b) the entry/exit procedures in the transition areas to and from the oceanic airspace provide for an orderly transition between the fixed continental ATS route network and the organized track structure.

Note: This Recommendation supersedes NAT V Recommendation 10/5.

1.3:4 POSSIBLE FURTHER REDUCTION OF LONGITUDINAL SEPARATION MINIMA

1.3:4.1 The Meeting had before it a proposal aimed at further reduction of the longitudinal separation minima currently specified in paragraph 1.2.1.4 a) of Doc 7030.

1.3:4.2 This proposal was based on the following assumptions:

a) turbojet aircraft using the Mach number technique and following the same track at the same level within a time envelope of 20 minutes would encounter wind and temperature conditions which are similar;

b) reported times and positions over entry/exit points are reasonably correct;

c) time keeping in the air and on the ground corresponds and is accurate within specified tolerances;

d) navigation accuracy is adequate and conforms to MNPS;

e) the mathematical model used for the development of MNPS verifies that the proposed reduction in longitudinal separation can be achieved without requiring a consequential adjustment of lateral separation.

1.3:4.3 The Meeting, while agreeing in principle with the intent of the proposal, felt however that, at present, insufficient data were available in respect of the accuracy of reports of time and position over significant points along tracks by subsonic aircraft. It therefore considered it premature to take specific action regarding the reduction of longitudinal separation in the NAT Region and it was felt that further studies on this subject were required to confirm the assumptions on which the proposal by IATA was based. In this respect it was particularly important to obtain additional and reliable data on the accuracy with which aircraft are able to make good times over reporting points.

RECOMMENDATION 1.3/4 - POSSIBLE APPLICATION OF REDUCED LONGITUDINAL SEPARATION IN THE NAT REGION

That

a) States and International Organizations concerned pursue studies aimed at a possible reduction of longitudinal separation in those parts of the NAT Region where aircraft will be required to meet Minimum Navigation Performance Specifications;

b) as a first step, Canada, Ireland and United Kingdom organize a data collection to study the progress of flights along tracks;

c) the NAT/SPG examine the results of this survey and, in the light of the results of this survey and other relevant information which may have

been made available, make appropriate proposals for further action to be taken in respect of the possible reduction of longitudinal separation in the NAT Region.

1.3:4.4 In the context of the proposal aimed at the possible reduction of longitudinal separation minima between aircraft applying the Mach number technique, emphasis was placed on the need for the pilot to be able to operationally determine and maintain the true Mach number in order to adhere to the cleared Mach number within the tolerances stated in the application of the Mach number technique (± 0.01 Mach). It was noted that Annex 6 covered the requirement for all turbojet aeroplanes with speed limitations expressed in terms of Mach number, to be equipped with a Mach number indicator. Whilst the above Standard did not preclude the use of the airspeed indicator to derive the Mach number for ATC purposes, it was nevertheless important that the design, calibration and maintenance of the Mach number indicator should be such that the pilot could use the instrument with confidence.

1.3:4.5 The Meeting noted that, despite recommendations from the 6th AN Conference (1969), the Special NAT RAN Meeting (1965), and the Asia/PAC RAN Meeting (1973) on the subject, no progress had been made on the development of approved international standards. Strong views were expressed that appropriate provisions were required covering the Mach number indicator, and that States who had developed draft specifications on the subject should be requested to provide ICAO with appropriate material.

RECOMMENDATION 1.3/5 - DEVELOPMENT OF SPECIFICATIONS FOR MACH NUMBER INDICATORS

That ICAO, based on material provided by States able to do so, develop, as a matter of urgency, specifications for:

a) the desired criteria for the presentation of the information on the Mach number and specific standards of accuracy and reliability within given tolerances; and
b) the calibration and maintenance of Mach number indicators which would meet the operational requirement for aircraft to adhere to the Mach number approved by ATC within the specified tolerance of ± 0.01.

1.3:5 ABILITY OF OCEANIC AREA CONTROL CENTRES (OACs) TO MEET PLANNED OR REQUESTED ROUTES AND/OR FLIGHT LEVELS FOR OPERATIONS IN THE NAT REGION

1.3:5.1 The Meeting noted that Canada, Portugal, the United Kingdom and the USA, following a conclusion of the NAT/SPG reached at its 12th Meeting, had undertaken a data collection on actual traffic in the NAT Region during a representative period (15-21 July 1976) in order to obtain an indication of the extent to which the ATC system was able to meet the intentions of operators and to what extent and degree ATC was obliged, for air traffic control reasons, to issue clearances not meeting operators' intentions.

1.3:5.2 The need for undertaking this data collection arose from the recognition of difficulties experienced by OACs to accommodate flights conducted in the NAT Region along tracks which do not follow the major East-West flow of traffic. In order to explore all possible measures for resolving this problem, it was considered indispensable to obtain first a reasonably representative indication of the magnitude of the problem.

1.3:5.3 The results of the data collection exercise conducted by Canada, Portugal, the United Kingdom and the USA were examined and discussed by the Meeting. It was noted that one oceanic control centre was able to clear 91.3% of the flights either as requested or within the specified tolerances of ± 60NM of the required track and/or ± 2000ft of the requested level. For the other three centres the percentages were 72.2%, 74.2% and 79%.

1.3:5.4 The Meeting was of the opinion that implementation of the various procedures considered under Agenda Items 1.2 and 1.3, particularly the introduction of MNPS and reduced lateral and longitudinal separation minima, would significantly improve the situation and make it possible for OACs to clear a considerably higher percentage of the flights as planned or requested. The Meeting also noted that States concerned had agreed to pursue their studies of the problems posed by traffic in the NAT Region which crosses the main East-West flow of air traffic in that Region with a view to resolve, to the extent possible, the difficulties currently experienced by operators as well as ATC.

1.3:5.5 Noting that this problem continues to receive the attention of the States and International Organizations represented in the NAT/SPG, it was agreed that no action was required by the Meeting.

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Appendix to the Report on Agenda Item 1.3

AMENDMENTS TO THE NAT RAC SUPPS

Note: The following amendments refer to Doc 7030 as amended by Amendment No. 138

Amend the NAT RAC SUPPs as follows:

1. In section "1.1 - Lateral separation",

add a new sub-paragraph at an appropriate place to read:

"60 nautical miles between SST aircraft operating at or above FL450;"

2. In section "1.2 - Longitudinal separation"

a) add a new sub-paragraph at an appropriate place to read:

"10 minutes between SST aircraft in supersonic flight provided that:

i) both aircraft are in level flight at the same Mach number or the aircraft are of the same type and are both operating in cruise climb;

ii) the aircraft concerned have reported over the same entry point into the oceanic controlled airspace with a time interval of at least 12 minutes and follow the same or continuously diverging tracks until another form of separation is established.

Note: An ATC clearance authorizing the commencement of the deceleration/descent phase of the flight of the aircraft concerned may be issued while the above separation minimum is being applied.

This separation minimum may also be applied between SST aircraft which have not reported over the same entry point into oceanic controlled airspace (but comply with all other provisions) provided their respective entry points, as

well as the point from which they either follow the same track or start following continuously diverging tracks, are located within the radar coverage of the controlling ATC unit and it is therefore possible, by radar monitoring, to ensure that the appropriate time interval will exist between the aircraft concerned, at the time they start to follow the same or continuously diverging tracks.";

b) add a new sub-paragraph at an appropriate place to read:

"15 minutes between SST aircraft in supersonic flight but not covered by a) above"

c) amend sub-paragraphs 1.2.1 4) a) i) and ii) to read:

"15 minutes between turbojet aircraft provided that the Mach number technique is applied and
.....
....."

d) amend sub-paragraph 1.2.1 4) b) i) to read:

"i) turbojet aircraft not covered by a) above;"

e) delete in sub-paragraph 1.2.1 4) b) all text following sub-paragraph 1.2.1 4) b) ii);

f) delete sub-paragraph 1.2.1 4) c) i) in toto;

g) amend sub-paragraph 1.2.2 1) to read:

"1) within controlled airspace;" ;

3. a) add a new section "Vertical separation" at an appropriate place;

b) add in the new section a new sub-paragraph to read:

"Above FL450, vertical separation between SST aircraft, and between SST aircraft and any other aircraft, shall be considered to exist if the flight levels of the two aircraft differ by at least 4000 ft."

4. In section "3.4 Contents of clearances"

a) amend sub-paragraphs 3.4.1.1 and 3.4.1.2 to read:

"3.4.1.1 When an abbreviated clearance is issued it shall include:

1) cleared track specified by the track code;

2) cleared flight level(s);

3) cleared Mach number (if required);

4) if the aircraft is designated to report meteorological information in flight "SEND MET REPORTS.";

3.4.1.2 On receipt of an abbreviated clearance, the pilot shall read back the contents of the clearance message. In addition the pilot of a subsonic aircraft shall read back full details of the track specified by the code letter.";

b) add in sub-paragraph 3.4.3 in the second line the word "subsonic" between the words "to" and "turbojet".

5. In section "3.5 Establishment and use of organized tracks"

a) amend the section title to read:

"3.5 Establishment and use of organized tracks for subsonic air traffic".

6. a) add, at an appropriate place, a new section:

"Establishment and use of organized tracks for SST operations.";

b) add, in the new section a new sub-paragraph:

"Where appropriate, an organized track system may be promulgated for SST operations. When promulgating such an OTS the requirements for position reporting and the applicability of abbreviated position reports shall be included.".

7. In section "4.3 Contents of position reports"

a) amend paragraph 4.3.1 to read:

"4.3.1 Position

4.3.1.1 Except as provided in 4.3.1.2, position shall, for flights outside the ATS route network, be expressed in terms of latitude and longitude. For flights whose tracks are predominantly East or West, latitude shall be expressed in degrees and minutes, longitude in degrees only. For flights whose tracks are predominantly North or South, latitude shall be expressed in degrees only, longitude in degrees and minutes.

4.3.1.2 Aircraft operating in the organized track system for SST operations may report their positions by reference to the track code with the longitude of the reporting point."

b) amend sub-paragraph 4.3.2.2 to read:

"4.3.2.2 If the estimated time for the next position last reported to ATC is found to be in error by 3 minutes or more for supersonic aircraft, or 5 minutes or more for subsonic aircraft, a revised estimate shall be transmitted to the ATS unit concerned, as soon as possible.";

c) add, at an appropriate place, a new paragraph:

"Level

Aircraft cleared for cruise climb shall report their level to the nearest 100 ft.

Note: Levels so reported, e.g. 554, may not necessarily be flight levels as defined in PANS/OPS Part III, paragraph 1.1.1.1.1";

d) add, in paragraph 4.3.4, the following new sub-paragraphs:

"4.3.4.2 When operating in an organized track system for SST aircraft, position reports may be abbreviated as notified by the appropriate ATS authority concerned.

4.3.4.3 Abbreviated position reports for SST aircraft shall consist of aircraft identification, position and time only.".

8. Amend section "5. Special procedures for in-flight contingencies" as follows:

"5. SPECIAL PROCEDURES FOR IN-FLIGHT CONTINGENCIES

5.1 The following procedures are intended for guidance only. Although all possible contingencies cannot be covered, they provide for such cases as inability to maintain assigned level due to weather, aircraft performance, pressurisation failure and problems associated with high level supersonic flight. They are applicable primarily when rapid descent, turn-back or both, are required. The pilot's judgement shall determine the sequence of actions taken, having regard to the specific circumstances.

5.2 General Procedures

The following general procedures apply to both subsonic and supersonic transport aircraft.

5.2.1 If an aircraft is unable to continue flight in accordance with its ATC clearance, a revised clearance shall, whenever possible, be obtained prior to initiating any action, using the radiotelephony distress or urgency signal as appropriate.

5.2.2 If prior clearance cannot be obtained, an ATC clearance shall be obtained at the earliest possible time and, in the meantime, the aircraft shall broadcast its position (including the Track Code, if appropriate) and intentions, on frequency 121.5 MHz at suitable intervals until ATC clearance is received.

5.3 Special procedures for subsonic aircraft

5.3.1 Initial action

If unable to comply with the provisions of 5.2.1, the aircraft should leave its assigned track by turning 90° to the right or left whenever this is possible. The direction of the turn should be determined by the position of the aircraft relative to any organized track system, e.g. whether the aircraft is outside, at the edge of, or within the system, whether composite separation is used, the levels allocated to adjacent tracks and, if appropriate, terrain clearance.

5.3.2 Subsequent action

5.3.2.1 **An aircraft able to maintain its assigned level should, nevertheless, climb or descend 150m (500ft) while acquiring and maintaining in either direction a track laterally separated by 30NM from its assigned track.**

5.3.2.2 **An aircraft not able to maintain its assigned level should start its descent while turning to acquire and maintain in either direction a track laterally separated by 30NM from its assigned track. For subsequent level flight, a level should be selected which differs by 150m (500ft) from those normally used.**

5.4 Special procedures for supersonic transport aircraft

5.4.1 Turn-back Procedures

5.4.1.1 If a supersonic transport aircraft is unable to continue flight to its destination and a reversal of track is necessary, it should:

1) When operating on an outer track of a multi-track system, turn away from the adjacent track;

2) When operating on a random track or on an inner track of a multi-track system, turn either left or right as follows:

   a) if the turn is to be made to the right, the aircraft should attain a position 30NM to the left of the assigned track and then turn to the right onto its reciprocal heading, at the greatest practical rate of turn;

   b) if the turn is to be made to the left, the aircraft should attain a position 30NM to the right of the assigned track and then turn to the left onto its reciprocal heading, at the greatest practical rate of turn;

3) While executing the turn-back, the aircraft should lose height so that it will be at least 6000ft below the level at which turn-back was started, by the time the turn-back is completed;

4) When turn-back is completed, heading should be adjusted to maintain a lateral displacement of 30NM from the original track in the reverse direction, if possible maintaining the flight level attained on completion of the turn.

5.4.2 Emergency descent

5.4.2.1 A supersonic transport aircraft compelled to make a rapid descent, whether continuing to destination or turning back, should, if its descent will conflict with an organized track system for subsonic air traffic:

1) proceed to a point mid-way between a convenient pair of subsonic tracks, prior to entering that track system;

2) while descending between FL450 and FL280, maintain a track which is mid-way between and parallel with the subsonic tracks;

3) after passing through FL280, proceed in accordance with the relevant provisions for subsonic aircraft in 5.3.

5.4.2.2 The pilot of a supersonic transport aircraft which, during any period of its flight, is likely to operate in the vicinity of an organized track system for subsonic air traffic, shall be in possession of detailed information regarding that system as it is in operation during the period of his flight.

9. Delete the reference to "Søndrestrøm (south of 70°N)" in the following sub-paras:

a) 3.1.3.1 1)
b) 3.1.4.1
c) 3.4.3 1)

and amend the text accordingly.

10. a) Number the added new paragraphs as appropriate; and

b) re-number existing paragraphs accordingly.

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Agenda Item 2: Airspace organization

2.1 INTRODUCTION

2.1.1 Under this Item, the Meeting discussed the following three subjects:

a) a proposal by Canada and by Denmark and Iceland to make changes to the alignment of the boundaries between FIRs Gander Oceanic, Edmonton, Reykjavik and Sondrestrom;

b) specific requirements regarding ATS messages and their automated exchange between Oceanic area control centres; and

c) measures required to cater for contingencies affecting the operation of the air navigation system in the NAT Region.

2.2 CHANGES TO THE BOUNDARIES BETWEEN FIRs GANDER OCEANIC, EDMONTON, REYKJAVIK AND SONDRESTROM

2.2.1 The Meeting was presented with a proposal by Canada containing changes to the alignment of the Gander Oceanic FIR boundary. This proposal was made in order to eliminate certain co-ordination difficulties between Gander Oceanic ACC and Edmonton ACC on those occasions when the orientation of the organized track system was such that flights were subsequently operating through the area covered by the proposal.

2.2.2 When considering this proposal, the Delegate from Denmark, supported by Iceland, made a further proposal to simplify the alignment of the western boundary of the Reykjavik, Sondrestrom and Gander Oceanic FIRs.

2.2.3 In view of the fact that these proposals were expected to resolve a number of ATC problems, at at the same time, improve the conduct of flight operations in the area in question, the Meeting accepted the proposals.

RECOMMENDATION 2/1 - CHANGES TO THE BOUNDARIES OF FIRs GANDER OCEANIC, EDMONTON, REYKJAVIK AND SONDRESTROM

That

a) the common boundary between FIRs Gander Oceanic and Edmonton between 6400N 6300W and 6530N 5839W be re-aligned so as to extend from 6400N 6300W to 6500N 6000W thence along 6500N to the point of intersection of this parallel of latitude with the Western boundary of Sondrestrom/Reykjavik FIRs;

b) the common boundary between FIRs Edmonton and Sondrestrom/Reykjavik south of 7600N 7600W be realigned so as to extend in a straight line from 7600N 7600W to 6500N 5745W (i.e. the point of intersection of parallel 6500N with the Western boundary of FIRs Sondrestrom/Reykjavik, mentioned in a) above).

2.3 REQUIREMENTS FOR ATS MESSAGE FORMATS IN AN AUTOMATED DATA EXCHANGE BETWEEN OCEANIC ACCs IN THE NAT REGION

2.3.1 In a paper presented by the United Kingdom, the Meeting was informed that preliminary discussions held between those Administrations responsible for the operation of Oceanic ACCs in the NAT Region and planning the implementation of an automated exchange of ATS messages between OACs and OACs and associated air-ground communication stations had found that there existed a number of special requirements regarding the content and format of such messages which were neither covered by the existing provisions in the PANS-RAC nor by the amendments made to these provisions by the recent 9th AN Conference under its Agenda Item 5.

2.3.2 At the same time, it was however pointed out that the above was, at this time, only the result of a preliminary review of the problems likely to be encountered with the introduction of new automatic data processing systems between Oceanic ACCs and therefore required further, more detailed study of technical projects by States concerned to meet the requirements of the new systems. It was not yet possible to establish, with any degree of certainty, whether the expected specific requirements were of such a nature that they required coverage in the world-wide provisions regarding ATS messages or whether, because of their local nature, they required simply the development of appropriate regional procedures, supplementary to those in effect at the time these provisions needed to be formulated.

2.3.3 In view of this situation, and having noted that it could be expected that, in accordance with a recommendation made to this effect by the 9th AN Conference, further studies would be conducted within ICAO and within the NAT/SPG, the Meeting agreed that, States concerned with this matter should keep ICAO posted on any developments in this field, through appropriate channels, so that the problems raised could be covered in due time either by appropriate world-wide provisions or regional supplementary procedures.

RECOMMENDATION 2/2 - PROBLEMS REGARDING ATS MESSAGES AND THEIR AUTOMATED EXCHANGE BETWEEN OCEANIC AREA CONTROL CENTRES

That

a) States undertake studies on the question of the automated exchange of ATS messages between Oceanic area control centres, and keep ICAO informed, through appropriate channels, of any problems encountered so as to permit timely development of appropriate provisions including a decision whether such provisions need to be included in the world-wide material on this subject or whether they could, more appropriately, be covered by regional supplementary procedures; and

b) to the extent possible, the NAT/SPG be used to advance and co-ordinate such studies.

2.4 CONTINGENCY PLANNING IN THE NAT REGION

2.4.1 The Meeting noted that pursuant to Assembly Resolution A21-21, Appendix N, Associated Practice 3, States were encouraged to undertake contingency planning regarding the provision of air traffic services over the high seas. In addition, the Meeting noted that some recent events in the NAT Region had indicated that such action was extremely useful, although in one regrettable instance the lack of timely notice of withdrawal of service had initially negated the value of the advance planning. The view was expressed that inadequate notice not only prevents the timely implementation of contingency plans but in extreme cases can pose a real threat to the safety of aircraft and their passengers.

2.4.2 In view of this situation, the Meeting made a brief review of problems encountered and possible action likely to assist in overcoming them, taking into account the results of discussions which had recently taken place at the 12th Meeting of the NAT/SPG on the same subject.

2.4.3 After discussion, the Meeting came to the conclusion that, because circumstances relevant to this matter varied considerably from States to State, it would be unrealistic to develop hard and fast rules as situations were likely to change from case to case, both as regards the operational and other aspects involved. It felt, however, that it would be worthwhile undertaking further exploratory work in this field and encouraging States, faced with a particular contingency situation, to take measures, permitting the users to obtain reliable up-to-date information on the latest stage of developments so that they could take corresponding compensatory action.

2.4.4 The Meeting therefore agreed that:

a) ICAO should hold exploratory talks on the subject of the continued provision of air navigation services over the high seas with representative International Organizations such as IATA, IFALPA and IFATCA towards reaching agreement on preventing any hazards and disruptions which might result from the withdrawal of such services due to domestic industrial action;

b) in conducting such talks it should also be explored whether it would be possible to reach agreement on a minimum period of time which should be observed before any part of the air navigation system would be withdrawn from service because of industrial action;

NOTE: It was also hoped that any agreement reached on the above question could be recommended for application by the parties concerned in purely national industrial action.

c) States faced with the withdrawal from service of any part of the air navigation system provided by them should establish, if practicable, a central agency capable of providing, on a 24-hour basis, up-to-date information on the situation until the system has returned to normal operation.

RECOMMENDATION 2/3 - CONTINUED PROVISION OF SAFE AIR NAVIGATION SERVICES OVER THE HIGH SEAS

That ICAO, together with appropriate International Organizations, undertake exploratory discussions aimed at the development of principles ensuring the continuing safe operation of air navigation services over the high seas in cases where personnel, engaged in providing these services, may be involved in industrial action.

RECOMMENDATION 2/4 - ADVANCE NOTICE REGARDING THE INTENDED WITHDRAWAL OF AIR NAVIGATION SERVICES DUE TO INDUSTRIAL ACTION

That, when undertaking work in accordance with Recommendation 2/3, efforts be made to obtain agreement between parties representing the industrial interests of personnel engaged in the provision of air navigation services for an adequate period of advance notice whenever they plan to reduce or stop the provision of part or all of those services.

RECOMMENDATION 2/5 - PROVISION OF INFORMATION ON DEVELOPMENTS REGARDING THE OPERATION OF THE AIR NAVIGATION SYSTEM IN CONTINGENCY CASES

That States

a) faced with the withdrawal from service of any part of the air navigation system provided by them establish, if practicable, a central agency capable of providing, on a 24-hour basis, up-to-date information on the situation until the system has returned to normal operation; and

b) inform recognized Organizations representing user interests of the manner in which an agency, so established, will operate.

2.4.5 With regard to the anticipated preparation of specific contingency plans covering the unavailability of parts or all of a given air navigation system, the Meeting noted that, in the past, occasions where such contingency planning would have been required had varied not only in scope but, in some cases, it also involved certain non-technical and outright political aspects. It had therefore not been possible to detect a common denominator as to the level of co-ordination or the extent of planning which might reasonably be required. Nevertheless, the Meeting hoped that, should future needs for contingency planning arise, States concerned would use their best judgement in determining the necessary level of co-ordination as well as its extent.

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Agenda Item 3: Aeronautical fixed telecommunications services

General Note It was noted that a number of recommended COM circuits and facilities in the NAT Region were currently supported by links provided free of charge or at reduced cost and that the action to be taken by ICAO if and when the conditions regarding the provision of those links were changed would be reviewed at that time in the light of all relevant factors.

ATS DIRECT SPEECH CIRCUITS

3.1 The Meeting noted that the basic ATS requirement was for provision of telecommunication facilities giving direct speech communication capability. It also noted that Annex 11, Chapter 6 paragraph 6.2.2.1.2 did not require the availability of direct circuits provided that speech communication could normally be established within approximately fifteen seconds. It was therefore agreed that, unless the load on one of the component circuits was so high as to preclude it, through-switching of two circuits at a centre common to them could be accepted. In many cases this would lead to a more cost-effective arrangement, whilst at the same time adequately satisfying the ATS requirement.

3.2 Application of the foregoing concept was considered relevant in the case of the ATS requirement for direct speech capability between:

a) New York-Santa Maria;

b) Gander-Santa Maria; and

c) San Juan-Santa Maria.

The first of these speech links was currently provided by HF radiotelephony, but the speech quality was often poor. To provide independent good-quality direct circuits could require three separate HF radio or satellite circuits from Santa Maria, which would clearly be unreasonably expensive in view of the low speech loadings normally experienced. It was agreed that it appeared more logical, when Santa Maria had satellite capability, to provide, for example, one speech circuit via satellite New York-Santa Maria, with through-switching arrangements at New York permitting connexion to that circuit, as required, of the landline speech circuits either from Gander or from San Juan. Noting that Canada and Portugal had started installation of a direct HF radiotelephony circuit Gander-Santa Maria, it was nevertheless agreed that the three States concerned should consult on more cost-effective solutions.

RECOMMENDATION 3/1 - DIRECT ATS SPEECH CAPABILITY FROM SANTA MARIA TO NEW YORK, GANDER AND SAN JUAN

That Canada, Portugal and the USA perform a joint study to establish the most cost-effective means, taking into account foreseen traffic loadings, for providing adequate direct ATS speech capability between Santa Maria, on the one hand, and Gander, New York and San Juan, on the other hand, with a view to proposing a corresponding amendment to the NAT Regional Plan.

3.2.1 The Meeting noted, in the same context, that Portugal and the USA, pending agreement on, and installation of, revised arrangements, would give attention to improving speech quality between New York, Santa Maria and San Juan, and, in particular to alleviating reported delays in the establishment of contact between Santa Maria and San Juan.

3.2.2 The Meeting was informed of serious difficulties arising from inadequate speech quality on the radiotelephony ATS speech circuit used for co-ordination between the Shanwick (Prestwick) and Santa Maria Oceanic ACCs. It noted with appreciation the declared intention of the Portuguese and United Kingdom Administrations to continue with implementation of the conversion of the United Kingdom-Lisboa radio link to cable at as early a date as possible.

RECOMMENDATION 3/2 - IMPROVEMENT OF THE ATS SPEECH CIRCUIT PRESTWICK-SANTA MARIA

That the recommended mode of operation of the Prestwick-Lisboa segment of the Prestwick-Santa Maria ATS speech circuit be landline telephony.

3.3 The Meeting agreed that the current NAT Regional Plan Publication needed some modification to provide a better presentation of the requirements, and decided that this could best be done by adding a tabulation to the Chart of ATS speech capability presently given in the Plan Publication. A suggested table is shown at Appendix A to this part of the Report.

3.4 As regards the requirement for direct speech capability between Reykjavik and Stavanger, it was agreed that the current compromise relay arrangements at Prestwick could be tolerated in the near future. The speech traffic loading was light between Norway and Iceland. Noting, however, that in the longer term the United Kingdom planned to modernize the switching arrangements at Prestwick, the Meeting considered that the original recommendation to provide through-switching at Prestwick of the Stavanger-Prestwick and Prestwick-Reykjavik speech circuits should be maintained. The United Kingdom was also reported to be awaiting international agreement on some switching system suitable for use on international leased telephone circuits. The Meeting agreed that these matters should be pursued in due course.

RECOMMENDATION 3/3 - REYKJAVIK-STAVANGER DIRECT ATS SPEECH CAPABILITY

That, at such time as the plans for the new switching arrangements at Prestwick have been finalized, Iceland, Norway and the United Kingdom co-ordinate arrangements for through-switching at Prestwick of the Stavanger-Prestwick and Prestwick-Reykjavik ATS speech circuits.

Comment: See also Recommendation 3/5 below regarding switching systems.

3.5 It was agreed that there was a need to include in the Plan means to provide direct ATS speech capability between Edmonton ACC, Søndre Strømfjord FIC and Reykjavik ACC.

RECOMMENDATION 3/4 - EDMONTON-SØNDRE STRØMFJORD-REYKJAVIK DIRECT ATS SPEECH CAPABILITY

That the NAT Plan be amended by adding the requirement to provide direct ATS speech capability between:

a) Edmonton-Søndre Strømfjord;

b) Edmonton-Reykjavik (via Søndre Strømfjord),

over a landline quality speech circuit joining the three locations.

3.6 The Meeting gave some consideration to the way ATS direct speech capability should best be provided in the NAT Region in the future. It was felt that there would be increased use of data exchange between NAT centres, and that this would tend to reduce the volume of speech communications. Although it was probable that speech communications could never be eliminated entirely, it was possible that, in the longer term, the volume of speech traffic could become quite low.

3.6.1 On grounds of cost, international speech links often used only single circuits or common cable routings, which rendered them vulnerable. Even so they were expensive. One possible solution to this situation appeared to lie in the network connexion of a more limited number of circuits. Using through-switching, this could provide an adequate and flexible speech network with the necessary integrity at minimum cost. It was recalled that the current ICECAN/SCOTICE cable contracts terminated in 1983.

3.6.2 The Meeting noted, however, that there was currently no internationally agreed automatic switching and signalling system for use on international leased speech circuits. It was agreed that it would be desirable to elaborate an operational requirement and to seek the co-operation of the appropriate Posts and Telegraphs authorities and international agencies in arriving at a suitable system.

RECOMMENDATION 3/5 - FUTURE NAT ATS SPEECH ARRANGEMENTS

That NAT States give early consideration to the possible use of a switched network of speech circuits in the Region, and to the concurrent need to standardize and implement an automatic switching and signalling system on that network, with a view to future discussion and agreement in an appropriate ICAO forum, sufficiently in advance of termination of the current NAT cable leases.

AFTN CIRCUITS AND AFS MET CIRCUITS

3.7 The Meeting agreed that the current NAT AFTN Plan adequately satisfied present requirements. Some simplification and up-dating was, however, required. In accordance with ICAO practice, purely national circuits could, in most cases, be deleted from the Plan. It was noted that the presentation in the NAT Plan Publication could be improved if AFTN circuits and MET circuits were better segregated. A suggested revised table is shown at Appendix B to this part of the Report. It is intended also to differentiate between recommended arrangements and implementation details.

3.8 It was noted that there was a continuing increase in the AFTN traffic between London and Montreal. The two channels (Nos. 3 and 4) on the SCOTICE/ICECAN cable system currently operated at 75 bauds. It appeared that an increase in modulation rate to 100 bauds should be investigated.

RECOMMENDATION 3/6 - MODULATION RATE ON THE LONDON-MONTREAL AFTN CHANNELS

That Canada and the United Kingdom investigate the practicability of increasing the modulation rate of the two direct AFTN channels on the SCOTICE/ICECAN cable system from 75 to 100 bauds and, if feasible, introduce the increased rate by bilateral agreement when operationally required.

3.9

RECOMMENDATION 3/7 - AMENDMENTS TO NAT AFTN PLAN

That the NAT AFTN Plan be amended as follows:

a) Bermuda NAS-Kansas City. Delete "NAS".

b) Kansas City-Lisboa. Delete the requirement for routing via Santa Maria.*

c) Kansas City-New York. Delete.

d) Kansas City-Suitland. Delete.

e) Montreal-Vancouver. Delete.

f) Narssarssuaq-Reykjavik. Delete

g) Reykjavik-Søndre Strømfjord. Amend the recommended service to read: LTT (Eastern segment of channel 1 on ICECAN cable plus VHF RTT Frederiksdal-Søndre Strømfjord).

h) Add the requirement for a circuit Reykjavik-Søndre Strømfjord on VHF RTT with the Note: "To be retained pending achievement of adequate reliability of the VHF RTT link Frederiksdal-Søndre Strømfjord".

*Comment: This was agreed to be implementation information, not a Plan requirement.

3.10

RECOMMENDATION 3/8 - AMENDMENTS TO NAT MET CIRCUITS PLAN

That the Plan of MET circuits (AFS) be amended as follows:

a) Kansas City-Miami. Delete.

b) Kansas City-New York. Delete.

c) Kansas City-San Juan. Delete.

d) Kansas City-Santa Maria. Delete.

e) Kansas City-Lisboa. Delete.

f) Kansas City-Suitland. Delete.

g) Kulusuk-Reykjavik. Delete.

h) Reykjavik-Søndre Strømfjord. Delete.

i) Add the requirement for a circuit Suitland-Lisboa; (LTT/RTT).

Note: See Appendix B to this Part of the Report.

3.11 The Meeting noted that the textual material at pages 3-0-1, 3-0-2 and 3-0-3 of Doc 8755 would need to be amended by the Secretariat consequent upon the above Recommendations (when approved by Council). It was further noted that the charts at pages 3-1-11 and 3-1-12 of Doc 8755 would need to be amended as consequential amendments.

3.12 The Meeting agreed that it had become necessary, in the interest of increased efficiency, cost-effectiveness, and reduced transit times, that the AFTN centre at Reykjavik should be fully automatic.

RECOMMENDATION 3/9 - AUTOMATION OF THE REYKJAVIK AFTN CENTRE

That Iceland arrange to replace the torn-tape equipment at the Reykjavik AFTN centre by a fully automatic AFTN relay installation.

3.13 It was noted that, whilst, within the NAT Region, no serious AFTN problems existed, there were numerous AFTN problems in contiguous Regions which had an adverse impact on the NAT AFTN. Through the presence of Delegates who were Members of the ASPENN Regional Planning Group, the Meeting was made aware of ASPENN/3 Recommendation No. 7, and decided that it should be formally supported.

RECOMMENDATION 3/10 - CURRENT AFTN PROBLEMS

That means be found to give effect to the intent of ASPENN/3 Recommendation No. 7 as soon as possible.

Note: Relevant extracts from the Report of ASPENN/3, as well as the text of Recommendation No. 7, are given at Appendix C to this Part of the Report.

3.14 In connexion with planning for the future AFTN in the NAT Region, Delegates made known the plans of their Administrations as follows:

Canada	Negotiations had taken place between Canada and the USA, and a medium-speed circuit Montreal - Kansas City, using character-oriented procedures, was expected to become operational in March 1977. Canada would consider the use of code and byte-independent procedures when USA and/or United Kingdom were ready to do so.
United Kingdom	The London AFTN centre had the necessary capability, but there was no target date for introducing "CIDIN" type procedures or Category II circuits.
Belgium	A Meeting would be held before the end of 1976 with the United Kingdom and aimed at introducing "CIDIN" type procedures between Bruxelles and London in late 1978/ early 1979. The Netherlands would attend the Meeting and was expected to aim at introducing the same arrangements in 1979/1980.
Ireland	Ireland was planning to replace its old computer-controlled AFTN centre around 1979/1980, and expected then to have the necessary capability to use "CIDIN" type procedures at medium data transfer rates.
France	Use of Category II circuits on the links Paris - London and Paris - Bruxelles was not envisaged until after 1981. In the meantime, discrete computer-computer links might be established between some centres (e.g. CAUTRA-MADAP). Concepts regarding the introduction of "high capacity" circuits were under discussion and were unlikely to be finalized before early 1977.

3.15 The availability of cable and satellite facilities on the North Atlantic was noted to be such that aeronautical communications were, in any case, becoming much less dependent on the SCOTICE/ICECAN cable system. It was suggested that renewal of the corresponding leases would probably not be in the best interest. Future circuit planning would need to be done in a manner providing optimum network integrity whilst taking into due account commercial rental terms.

3.16 The Meeting held a brief exchange of views regarding contingency planning, but agreed that the matter would best be taken care of by national or bilateral arrangements, particularly since all breakdown possibilities could not be foreseen. As regards centres, whilst full duplication of large centres appeared unjustified, some application of mini-processors seemed to hold promise and should be considered in future planning, particularly when new centres were envisaged. As regards circuits, the situation would be taken care of by the inherent integrity of "high-level" networks being considered, whilst the continued availability of speech circuits would play a supplementary back-up role.

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Appendix A to the Report on Agenda Item 3
Part 1: Plan for NAT direct ATS speech capability

Terminals	Recommended Mode of operation	Implementation information
Boston-New York	LTF (direct)	-
Edmonton-Reykjavik	LTF (direct with drop at Søndre Strømfjord)+	-
Edmonton-Søndre Strømfjord	LTF (direct)+	-
Gander-New York	LTF (direct)	-
Gander-Prestwick	LTF (direct)	Speech channel on SCOTICE/ICECAN cables.
Gander-Prestwick	LTF (direct with drop at Reykjavik)	Speech channel on SCOTICE/ICECAN cables*.
Gander-Reykjavik	LTF (direct)	Speech channel on ICECAN cable*.
Gander-Santa Maria	RTF**	Under installation. Currently LTF/RTF with relay at New York.
Gander-Søndre Strømfjord	LTF (direct with drop at Goose)	-
Lisboa-Santa Maria	RTF (direct)	-
Madrid-Santa Maria	LTF/RTF (to be switched at Lisboa)	-
Moncton-New York	LTF (direct)	-
New York-San Juan	LTF (direct)	-
New York-Santa Maria	RTF (direct)	-
Prestwick-Reykjavik	LTF (direct)	Speech channel on SCOTICE cable*.
Prestwick-Santa Maria	LTF/RTF (to be switched at Lisboa)	Cable channel (LTF) from Prestwick to Lisboa under installation to replace RTF.
Reykjavik-Søndre Strømfjord	LTF (direct)+	-
Reykjavik-Stavanger	LTF (to be switched at Prestwick)	Relay at Prestwick.
San Juan-Santa Maria	LTF/RTF (to be switched at New York)	-

*Conference-type communications possible.
**To be replaced by LTF/RTF with switching at New York when New York-Santa Maria RTF adequate (see Recommendation 3/1).
+Using the same circuit.

Appendix A to the Report on Agenda Item 3
Part 2: Plan for combined speech/remote control capability

Terminals	Recommended Mode of operation	Implementation information
Gander-Prins Christian Sund) -Fredriksdal)	LTF/remote control	Speech channel on the Western segment of the ICECAN cable replacing telegraph channel 1.

Appendix B to the Report on Agenda Item 3
Part 1: Plan for NAT AFTN circuits

Terminals	Recommended Mode of operation	Implementation information
Bermuda-Kansas City	LTT	-
Goose-Montreal	LTT	-
Goose-Søndre Strømfjord	VHF RTT	-
Kansas City-Lisboa	LTT/RTT	Provided via New York.
Kansas City-Miami	LTT	-
Kansas City-Montreal	LTT	-
Kansas City-San Juan	LTT	-
Lisboa-Santa Maria	RTT	-
London-Montreal	LTT	a) 1 channel on common carrier. b) 2 channels (Channels 3 and 4) on SCOTICE/ ICECAN Cable System.
London-Reykjavik	LTT	Channels 1 and 2 of SCOTICE cable.
Montreal-Reykjavik	LTT	Channel 2 of ICECAN cable.
Reykjavik-Søndre Strømfjord	LTT	Eastern segment of channel 1 on ICECAN cable plus VHF RTT Frederiksdal-Søndre Strømfjord.
	VHF RTT*	Standby circuit.
Santa Maria-Shannon	RTT	-

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*To be retained pending achievement of adequate reliability of the VHF RTT link Frederiksdal-Søndre Strømfjord.

Appendix B to the Report on Agenda Item 3
Part 2: Plan for NAT AFS MET circuits

Terminals	Recommended Mode of operation	Implementation information
Lisboa-Santa Maria	RTT	-
Lisboa-Suitland	LTT/RTT	Provided via New York.

Appendix C to the Report on Agenda Item 3
Extracts from the Report of the Third Meeting
of the ASPENN Regional Planning Group

(c.f. Recommendation 3/10 at page 3-5)

"8.9 In the course of the Meeting, a number of problems on the current AFS needing rapid resolution were brought to its attention. These required study as follows:

(1) Drafting of low-speed ITA-2 controlled circuit protocols for potential optional application to enhance AFTN circuit and message assurance;

(2) Consideration of possible application of an incoming message acknowledgement procedure, as an option, to low-speed ITA-2 circuits of the AFTN;

(3) Review of the continued need for message numbering as a mandatory requirement on low-speed ITA-2 AFTN circuits (relates to items (1) and (2) above);

(4) Review of existing Annex 10 AFTN provisions and actual present practices applicable to message servicing procedures, with a view to developing improvements including standardization of service message format and phraseology, and definition of the conditions on which generation of service message are based.

(5) Review of existing AFTN message rejection practices, with a view to developing guidance applicable to responsibility(ies) for message protection and associated servicing procedures;

(6) Review of and potential improvement of ITA-2 and ICAO-7 AFTN message format and procedures, with a view to:

a) expanding the addressing limitation beyond a single line, by providing for a discrete end-of-address signal;

b) providing a discrete end-of-text signal;

c) providing for address stripping (optionally), so as to limit addressees to those appropriate to the outgoing circuit concerned.

RECOMMENDATION No. 7 - CURRENT PROBLEMS WITH THE AFS

That steps be taken, as a matter of urgency, to resolve current problems encountered world-wide on the AFS and of the type indicated in paragraph 8.9 above."

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Agenda Item 4: Aeronautical mobile telecommunications services

General Note

It was noted that a number of recommended COM circuits and facilities in the NAT Region were currently supported by links provided free of charge or at reduced cost, and that the action to be taken by ICAO if and when the conditions regarding the provision of those links were changed would be reviewed at that time in the light of all relevant factors.

4.1 HF EN-ROUTE COMMUNICATIONS

4.1.1 The Meeting reviewed the current plan for HF en-route communications in the NAT Region. It noted that, in general, it was operating satisfactorily and adequately. However it was decided first to examine certain cases where it was believed either that no further requirement existed for recommended facilities, or that modifications were necessary.

4.1.2 The Meeting first considered the case of the recommended provision of Family NAT A at Port-of-Spain (Trinidad and Tobago). It was noted that the facility had not been implemented, and that no resultant difficulties had been reported. VHF coverage of the FIR concerned was almost complete, and adequate HF coverage of the remaining part was provided by other stations on Family A. Bearing in mind the current loading on Family A, it was considered that implementation of the facility would not now be in the best interest. The Meeting agreed that the requirement should be deleted from the plan.

4.1.3 The Meeting examined the requirement for HF en-route facilities at Søndre Strømfjord. It was noted that the responsibility of FIC Søndre Strømfjord, following a revision of the ATS plan, did not extend above FL 195. Above that level Reykjavik acted as the ACC and was the location of the primary HF en-route station. The Meeting was informed that trials, made over the first seven months of 1976, had shown good HF coverage of the area from Reykjavik, and, further, that improved antennas, giving some gain in the direction of Greenland, were being installed. There was agreement, however, that, in the severe blackout conditions often occurring during sunspot maximum periods, continuous coverage on HF from Reykjavik could not be guaranteed, nor even could complete VHF coverage be provided at low flight levels by Greenland VHF stations. Informed that many international flights by IGA aircraft traversed the Søndre Strømfjord FIR below FL 195, the Meeting agreed that there was a clear international requirement for the provision of HF communications at the FIC. It was noted that IATA airlines had no such requirement because they flew in the upper airspace.

4.1.3.1 It was suggested that RDARA frequencies should be employed. In reply, it was pointed out, firstly, that the operations concerned hardly fell into that category, and secondly, that there were advantages both for Søndre Strømfjord and for other Family D Network stations if Family D channels were used. The Meeting finally agreed that, in order primarily to serve the Søndre Strømfjord FIR (i.e. not above FL 195) the 2, 5, 8 and 13 MHz channels of Family D should be retained; however, as not more than two frequency orders are needed to be guarded at any one time, Note 5 (implementation only when operationally

required) should be applicable. Further, it was agreed that, on a purely secondary (non-interference) basis, 11303 KHz should replace the 13 MHz Family D channel at Søndre Strømfjord until further notice. The recommended mode of operation on 11303 KHz would be A3H/A3J. /This would be the subject of a new Note - see below/.

4.1.4 The Meeting considered the recommendation of the NAT Systems Planning Group (NAT/SPG) that 11303 KHz should be provided, also on a secondary basis, at Bodø (Norway) using A3H/A3J. It was agreed to recommend this addition as it would result in improving communications assurance on polar routes.

4.1.5 In this connexion, it was noted that, following NAT/SPG consideration, 11303 KHz had already been introduced on a secondary basis at the North Canadian stations Cambridge Bay and Frobisher Bay and at Reykjavik to replace the 13328 KHz channel of Family D. The Meeting agreed formally to endorse this situation, which could be taken care of by the new Note in the NAT Air Navigation Plan Document (Doc 8755).

4.1.6 The Meeting then considered the need to retain HF en-route Family D assignments at Edmonton, Resolute and Winnipeg. It was agreed that, in view of the HF coverage provided from Cambridge Bay, Churchill, Frobisher Bay and Gander, deletion of the three stations should be recommended.

4.1.7 Noting that the inevitable future trend in the HF en-route mobile service world-wide was to full SSB (A3J) operation, the Meeting gave consideration to a possible timescale for its introduction in the NAT Region. Already some 75 to 80% of aircraft flying in the NAT Region were SSB equipped, and Families B and C already used the A3J mode exclusively. The Meeting agreed that Families A and D should move towards use of A3H/A3J. Whilst there would be DSB-equipped aircraft in the system until a date or dates to be decided by the ITU at the World Administrative Radio Conference for the AeM(R) Service, 1978, ground station SSB capability should be provided at an early date.

4.1.8 The proposal was made that, to provide better en-route service to SSB-equipped aircraft, operation on Family D should eventually become A3J. However, in the meantime, A3H/A3J mode operation would be necessary. To permit this to be done, it was agreed to be a requirement that all aeronautical stations concerned should be equipped with A3H/A3J capability as soon as possible. Canada was ready, and Iceland, Norway and Denmark (Greenland) could be ready within 12 months. Ireland could not provide full A3H/A3J capability within the same time period, but provision at least of A3H/A3J receivers at Shannon was necessary to help avoid the mixed A3/A3H/A3J difficulties experienced on Family A. Such arrangements would not, however, avoid problems caused by DSB-equipped aircraft (currently some 20% in NAT operations overall) attempting communication whilst A3J contacts might be in progress in Family D in other parts of the Network. Ireland could provide A3H/A3J receiver capability on Family D at Shannon by early 1978.

RECOMMENDATION 4/1 - INTRODUCTION OF SSB IN NAT FAMILIES A AND D

a) That all States operating aeronautical stations on the frequencies of NAT Families A and D take steps to provide A3H/A3J transmitting

and receiving capability on those frequencies as soon as possible, and by not later than the end of 1979; and

b) That the States operating aeronautical stations on Family D (Canada, Denmark, Iceland, Ireland and Norway) study and consult on the procedure and most appropriate date for the conversion of Family D to A3H/A3J operation, with a view to appropriate amendment of the NAT Plan and COM SUPPS; and

c) That NAT States encourage the equipping of those aircraft of their registry and operating in the NAT Region so as to provide A3J capability as soon as possible.

4.1.9 The Meeting considered briefly a proposal that two or more NAT Families should share one 3 MHz channel, but the matter was not pursued, noting inter alia that 3 MHz channels need not be guarded if no useful purpose would be served. (c.f. Doc 8755 Part III, COM, Introduction paragraph 3.3.2 Note.)

4.1.10 In the general context of future NAT HF en-route AMS planning, the Meeting considered the future requirement for a fifth NAT Family of frequencies. It was clear that it would not be required in the immediate future. However it was recalled that the NAT/SPG, as a result of the analysis of actual statistics collected on NAT traffic, had in 1973 forecast a need for a fifth Family in 1979. Because of the stagnation in NAT traffic movements caused by the oil crisis and the general world economic situation, that date was now meaningless. Nevertheless the basic forecasting methods were still valid, and, even taking into account that increased VHF coverage in the Northern part of the Region was now taking rather more of the communication load, it was certain that the current upward movement in the growth rate of NAT traffic would in due course make availability of a fifth Family essential. Based on information at its disposal, the Meeting agreed that a firm need for a fifth NAT HF en-route Family could be foreseen after about 1981/82. It would be required to relieve the load on Families B and C used on Central NAT Routes.

4.1.11 The Meeting reviewed briefly the revised NAT Supplementary Procedure, regarding the use of NAT Families, which had been approved by the President of the Council on 29 June 1976 for implementation on 8 October 1976. It was pointed out that the procedures as worded were hardly crystal clear, and some of the terms used had not been properly defined. It was explained, in reply, that further definition, for example, as regards the limits of the Central and Northern Routes, was almost impossible due to the wide variety of tracks flown. It was finally agreed that no basic change to the SUPP was required. However, to facilitate communications for flights having A3J mode capability and operating on polar routes using Family D, the possibility was considered of allowing such flights greater freedom in selecting alternative Families in cases of communication difficulties on Family D. It was agreed that the Note in the SUPP needed to be made more flexible.

RECOMMENDATION 4/2: FAMILIES FOR USE ON POLAR ROUTES

a) That the Note associated with the tabulation in the COM SUPP dealing with NAT Radiotelephony Network Operation be amended to read as follows (cf Doc 7030, Part 2, Communications para 1.1.1):-

"* Note: All aircraft flying polar routes should normally use Family D. Such aircraft, when SSB equipped, should use A3H emission. However, when experiencing communication difficulties on Family D, such aircraft may use Families B or C, as appropriate, using A3J emission."

and

b) That this amendment become effective on the first AIRAC date following four months after the date of approval by the Council.

4.2 VHF AIR-GROUND COMMUNICATIONS

4.2.1 The Meeting reviewed the NAT Plan for VHF air-ground communications. In general, both the terminal area and en-route situations were satisfactory. Some changes were, however, required in the case of Canada, both to correct errors in the Plan, and to include certain facilities which had been omitted although required to serve international operations. These were agreed.

4.2.2 As regards the en-route station at Frederiksdal (Greenland) it was agreed to include a Note that it was remote-controlled from Gander, and, in the same context, it was agreed to list remote-controlled general purpose VHF stations in all similar cases.

4.2.3 As regards Søndre Strømfjord, it was noted that the recommended retention of HF channels to serve the FIR would permit the corresponding retention of the remotely controlled GP VHF stations at Kulusuk and Qaqatoqaq until such time as the remote-control circuits were withdrawn, and it was agreed to add the latter station to the Plan. It was recalled that the entries for Søndre Strømfjord appearing in Doc 8755/8 had recently been amended (Serial EUR 75/18).

4.2.4 The Meeting then held an extensive discussion on the VHF situation in Iceland, and was assisted in those discussions by the Secretary of the Special North Atlantic Panel. It was noted that, with the use of high sites and the extended range technique, some overlapping of the VHF coverage of stations in Iceland was inevitable. In severe winter conditions this circumstance was valuable, since remote-control circuits to individual stations could go out of service for one or two days at a time. In any event it was recalled that the NAT/V RAN Meeting as recently as 1970 had decided that, for over-water areas, overlap of coverage was desirable. Such overlap was, of course, less at lower flight levels.

4.2.5 The Meeting noted that not only did the GP coverage from Gagnheidi, Hafell and Thorbjorn overlap, but the coverage from Hafell extended into the Shanwick Oceanic Area, so that the deletion of Hafell seemed feasible. The Meeting recalled, however, that in 1965 the extended range coverage from Hafell had been introduced precisely to give VHF coverage in the Northern part of the Shanwick Oceanic Area which could not be reached by ER stations in Scotland or Ireland. The area concerned was often traversed by aircraft on tracks of the organized track structure. For these reasons the retention of Gagnheidi and Hafell were justified.

4.2.6 As regards Thorbjorn, it was noted that its withdrawal would leave a very serious gap in coverage between the Southwest limit of its coverage and the Northeast limit of reliable coverage from Prins Christian Sund. For this reason the retention of Thorbjorn was justified.

4.2.7 The Meeting was then informed that reception trials made at Thverfjall in the Northwestern part of Iceland had shown very good coverage from there over Northeastern Greenland, which could not be served from Kulusuk. A remote-control line from Reykjavik could be made available, and transmitting facilities be provided at moderate cost. Having studied coverage diagrams, and the requirement for coverage in the area in poor HF propagation conditions, the Meeting came to the conclusion that, in its opinion, the benefit of increasing the VHF GP coverage to the Northwest of Iceland would justify the additional expenditure, and so agreed to recommend the inclusion of a station at Thverfjall in the Plan.

4.2.8 As a general comment, the Meeting wished it to be recorded that its action in recommending GP VHF coverage from stations in Greenland and Iceland, as explained above, arose from their great value in providing the only means of communication with aircraft during the conditions of poor HF propagation and blackouts experienced in the area in the years around sunspot maximum.

4.2.9 The Meeting agreed to recommend changes to the Aeronautical Mobile Service on HF and VHF as explained above.

RECOMMENDATION 4/3 - AMENDMENT OF THE NAT AMS PLAN

That the NAT aeronautical mobile service plan be amended as indicated in Appendix A to the Report on Agenda Item 4, the revised plan to be effective as from the date of approval by the Council.

Note: Reference is made to the NAT Air Navigation Plan Publication (Doc 8755/8).

4.3 THE USE OF 121.5 MHZ IN THE NAT REGION

4.3.1 The Meeting discussed the use of 121.5 MHz in the NAT Region. Although it had been recommended that the use of 121.5 MHz should be restricted to emergency purposes (see Doc 8755 page 3-0-4 paragraph 3.2.1.8) it was recalled that aircraft on long

overwater flights had to guard 121.5 MHz (see Annex 10 Volume II paragraph 5.2.2.1.1.1). Consequently use of 121.5 MHz to relay messages was very logical, and, in fact, was justified when ground stations were unable to contact aircraft on HF and had to resort to relay via other flights. However it was reported that a practice had grown up amongst some ferry or delivery flights to rely solely on 121.5 MHz to provide communications on trans-Atlantic flights. It was agreed that such wilful misuse was wrong and unacceptable. It appeared to be a regulatory problem, needing stricter enforcement. The Meeting agreed that the situation should be watched.

RECOMMENDATION 4/4 - MISUSE OF 121.5 MHZ

That NAT States note discovered cases of wilful misuse of 121.5 MHz by inadequately equipped flights, with a view to applying appropriate enforcement measures as necessary.

4.3.2 It was noted that apart from the wilful misuse aspect, the lack of adequate means of communications to and from the flights in question had led to expensive and fruitless SAR operations. (See also the Report on Agenda Item 1.1).

4.4 MAINTENANCE OF SELCAL WATCH ON HF

4.4.1 It was reported that, on occasions, when aircraft were within extended VHF coverage from a station, it was found not possible to contact them on HF from the HF station associated with the Oceanic Area in which they were flying. It was also reported that aircraft leaving VHF coverage could, on occasions, not be contacted on HF until the time of their next position report, although they had been assigned primary and secondary frequencies by the ground station. This was perhaps either because SELCAL had been transferred from the HF to the VHF equipment, or because the HF receiver was on an unsuitable frequency order. One important aspect of this matter arose from the existence of gaps in VHF coverage, and that flights might not always be aware when they had left VHF coverage.

RECOMMENDATION 4/5 - MAINTENANCE OF HF SELCAL WATCH

That States should encourage their aircraft operators so far as possible to maintain HF SELCAL watch on an appropriate order of frequency to enable them to receive calls from the aeronautical station serving the Oceanic Area in which they were flying, even when they were in VHF contact with or in an area of VHF coverage of an aeronautical station serving another Oceanic Area.

4.5 THE HF VOLMET BROADCAST PLAN

4.5.1 The Meeting noted that the NAT area was served by VOLMET Broadcasts from Gander and New York on the one hand and from Shannon (EUR) on the other.

4.5.2 In the case of the Gander and New York broadcasts there were no proposals for changes, although it was commented that they were full, whilst data for stations such as Keflavik was required to be broadcast. This pointed to a growing requirement for provision of an additional NAT VOLMET Family.

4.5.3 As regards the Shannon broadcast, the Meeting agreed that there was a NAT operational requirement to revise the contents as follows, so as to include Lyon/Satolas:

a) In Block 3 (10-15 and 40-45) replace Birmingham by Barcelona.

b) Revise Block 4 as follows:

15-20	MADRID	45-50	SANTA MARIA
	LISBOA		ATHINAI
	PARIS/ORLY		PARIS/CH. DE GAULLE
	Madrid		Madrid
	Lisboa		Lisboa
	Santa Maria		Santa Maria
	Paris/Orly		Paris/Orly
	Paris/Ch. de Gaulle		Paris/Ch. de Gaulle
	Lyon/Satolas		Lyon/Satolas.

c) In Block 5 (20-25 and 50-55) replace Barcelona by Athinai.

The Meeting noted that, as the Shannon Broadcast also served the EUR Region and flights entering it, EUR States must be consulted before the change could be formally approved.

RECOMMENDATION 4/6 - AMENDMENT OF THE SHANNON HF VOLMET BROADCAST PLAN

That EUR States be consulted on the changes proposed by the LIM NAT Meeting and set out in sub-paragraphs a), b) and c) above, with a view to amendment of the EUR Plan at the earliest possible AIRAC date.

4.5.4 It was noted that, in view of the urgency, Shannon would make the change on an experimental basis as from the AIRAC date in November 1976, with the understanding that, if this action resulted in a positive and justified objection by an EUR or NAT State, on the basis of actual difficulties being experienced, Shannon would revert to the current plan. It was recalled that request/reply means of obtaining data on HF was always possible outside areas of appropriate VHF VOLMET coverage. The Meeting verified that the current MOTNE transmission schedule permitted the inclusion of Barcelona earlier in the broadcast.

4.6 PRESENTATION OF THE NAT AMS PLAN

4.6.1 The Meeting and its Delegates experienced difficulty and delay in the course of its work in using the presentation of the NAT AMS Plan in the NAT Air Navigation Plan Publication (Doc 8755) on two grounds: firstly States in the NAM, NAT and PAC Regions

were placed in alphabetical order rather than by geographical area, and, secondly, the en-route and terminal area communication channels were intermixed in a confusing way in one tabulation. It was reported, in the second case, that the EUR presentation, listing en-route and terminal channels separately, was easier to use.

RECOMMENDATION 4/7 - PRESENTATION OF THE NAT AMS PLAN

That, in any future discussions on the presentation of Regional Air Navigation Plan Documents, the views expressed above be taken into account.

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Appendix A to the Report on Agenda Item 4
Amendments to the NAT AMS Plan
(c.f. Recommendation 4/3)

Note: Reference is to Table CON 2 of Doc 8755/8.

1. CANADA

a) Calgary - Delete first two lines of present tabulation (whole Calgary entry)

b) Calgary/Intl.

Col. 2 - amend "APP" to read "APP-LU"*
Col. 3 - insert "2" against APP-LU
Cols. 6 and 8 - insert symbol sss
Col. 10 - delete remarks

c) Cambridge Bay

Col. 2 - delete "FIS-U"
Col. 10 - insert "Note X" against 13328

d) Churchill

Col. 2 - amend "FIS-U*" to read "GPS"
Col. 3 - insert "1"
Col. 8 - add "ER" against symbol
Col. 10 - delete "Edmonton FIR"

e) Edmonton

Col. 2 - amend entry to read "ACC-LU"
- add "GPS"
Col. 3 - insert "2" against "ACC-LU"
- insert "1" against "GPS"
Col. 8 - insert symbol sss against "GPS"
Cols. 9 and 10 - delete entries

f) Col. 1 - add Edmonton/Intl.
Col. 2 - insert "TWR/SMC"
- insert "APP-L"
Col. 3 - insert "1" against "TWR/SMC"
- insert "1" against "APP-L"
Col. 4 - insert "25" against "TWR/SMC"
Col. 5 - insert symbol sss against "TWR/SMC"
Col. 6 - insert synbol sss against "APP-L"

*In the NAT Region APP-LU means approach service up to FL 450.

g) Frobisher Bay

Col. 2 - amend entry to read "GPS"
Col. 3 - amend entry to read "1"
Col. 5 - delete entry
Col. 8 - add "ER" against symbol
Col. 10 - insert "Note X" against 13328

h) Gander**

Col. 2 - amend "ACC" to read "ACC-LU"
- amend "GPS-U" to read "GPS"
Col. 10 - add "See also Frederiksdal and Prins Christian Sund, (Greenland)"

i) Gander/Intl.

Col. 3 - insert "1" against "TWR/SMC"
Col. 4 - insert "25" against "TWR/SMC"

j) Col. 1 - insert "Goose"
Col. 2 - insert "GPS"
Col. 3 - insert "1"
Col. 8 - insert "SSS ER"
Col. 10 - insert "See also Hopedale"

k) Goose/Goose

Col. 3 - insert "1" against "APP-L"

l) Halifax/Intl.

Col. 3 - insert "1" against "TWR/SMC"
- insert "1" against "APP-L"
Col. 4 - insert "25" against "TWR/SMC"

m) Col. 1 - insert "Hopedale"
Col. 2 - insert "GPS"
Col. 3 - insert "1"
Col. 8 - insert "SSS ER"
Col. 10 - insert "Remote controlled from Goose"

n) Moncton ACC

Col. 2 - amend entry to read "ACC-LU"
Col. 3 - insert "2"

o) Montreal

Col. 2 - amend "ACC" to read "ACC-LU"
Col. 3 - insert "2" against "ACC-LU"
- insert "1" against "GPS"

Col. 6 - delete symbol §§§ against "GP3"

p) Col. 1 - amend "Montreal/Dorval Intl." to read "Montreal/Dorval"
Col. 3 - insert "1" against "TWR/SMC"
- insert "1" against "APP-L"
Col. 4 - insert "25" against "TWR/SMC"
Col. 5 - move the symbol §§§ against "APP-L" to against "TWR/SMC".

q) Col. 1 - insert "Montreal/Mirabel Intl."*
Col. 2 - insert "TWR/SMC"
Col. 3 - insert "1"
Col. 4 - insert "25"
Col. 5 - insert symbol §§§

r) Ottawa - delete first two lines of tabulation (whole Ottawa entry)

s) Ottawa/Intl.

Col. 2 - amend "APP" to read "APP-LU"**
Col. 3 - insert "1" against "TWR/SMC"
- insert "2" against "APP-LU"
Col. 4 - insert "25" against "TWR/SMC"
Cols. 6 and 8 - insert symbol §§§ against "APP-LU".
Col. 8 - delete symbol against "TWR/SMC".
Col. 10 - delete remarks

t) Resolute

Col. 3 - insert "1"
Col. 9 - delete entry
Col. 10 - delete remarks

u) Saglek - delete whole entry

v) St. John's/St. John's

Col. 3 - insert "1"
Col. 4 - insert "25"

w) Schefferville

Col. 2 - amend entry to read "GPS"
Col. 3 - insert "1"

x) Sydney/Sydney

Col. 3 - insert "1"
Col. 4 - insert "25"

*Inclusion of this entry is subject to approval of a corresponding proposal for amendment of the NAT AGA Plan. See also Report on Agenda Item 1.1.
**In the NAT Region APP-LU means approach service up to FL 450.

y) Toronto

Col. 2 - amend entry to read "ACC-LU"
Col. 3 - insert "2"

z) Toronto/Intl.

Col. 2 - amend "APP" to read "APP-L"
Col. 3 - insert "1" against "TWR/SMC"
Col. - insert "1" against "APP-L"
Col. 4 - insert "25" against "TWR/SMC"

aa) Vancouver - delete first line of tabulation (APP-L entry)

Col. 2 - insert "GPS"
Col. 3 - insert "1" against "GPS"
Col. 6 - insert symbol §§§ against "ACC-LU"
Col. 8 - insert symbol §§§ against "GPS"

bb) Vancouver/Intl.

Col. 2 - amend "TWR" to read "TWR/SMC"
- delete existing SMC entry (whole line of tabulation)
- insert "APP-L"
Col. 3 - insert "1" against"APP-L"
Col. 6 - insert symbol §§§ against "APP-L"

cc) Windsor/Windsor

Col. 3 - insert "1"
Col. 4 - insert "25"

dd) Winnipeg

Col. 2 - amend "ACC" to read "ACC-LU"
Col. 3 - insert "2" against "ACC-LU"
- insert "1" against "GPS"
Col. 6 - delete symbol §§§ against "GPS"
Col. 9 - delete whole entry
Col. 10 - delete remarks

ee) Winnipeg/Intl.

Col. 2 - amend "APP" to read "APP-L"
Col. 3 - insert "1" against "TWR/SMC"
- insert "1" against "APP-L"
Col. 4 - insert "25" against "TWR/SMC"

2. DENMARK

a) Frederiksdal, Greenland

Col. 10 - insert remarks "Remote controlled from Gander"

b) Col. 1 - insert "Qaqatoqaq Greenland"
Col. 2 - insert "GPS"
Col. 3 - insert "1"
Col. 8 - insert "127.9"
Col. 10 - insert "Remote controlled from Søndre Strømfjord"

c) Søndre Strømfjord

Col. 2 - delete "ACC-U*"
- amend "FIS-LU*" to read "FIS*"
Col. 10 - amend remarks to read "* FIS communications provided from Søndrestrøm Radio for flights below FL 195 within Søndrestrøm FIR"

- add "Note 5" associated with 4 frequencies in Col. 9
- add "Note X" associated with frequency 13328 KHz in Col. 9

3. ICELAND

a) Reykjavik

Col. 8 - delete "127.9 ER" against "ACC"
- insert "127.9 ER" against "GPS"
Col. 10 - insert "See also Gagnheidi, Hafell, Thorbjorn and Thverfjall" against "GPS"

b) Col. 1 - insert four new entries: "Gagnheidi", "Hafell", Thorbjorn" and "Thverfjall"
Col. 2 - insert "GPS" against each station
Col. 8 - insert "127.9 ER" against each station
Col. 10 - insert "Remote controlled from Reykjavik" against each station

4. NORWAY

a) Bodø

Col. 10 - insert "Note X"

5. TRINIDAD AND TOBAGO - delete whole entry

NOTES

NOTE 5: Amend to read: "To be implemented only as operationally required".

NOTE 6: Delete entirely

NOTE X: Add a new Note to read: "11303 KHz to be implemented on an experimental secondary basis (see Note 4) and providing A3H/A3J capability."

Comment 1: Note 8 appearing in Doc 8755/8 was amended 29/6/1976.

Comment 2: Chart COM 4 will need consequential amendment.

- 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 world-wide 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.