11

SUMMARY OF DISCUSSIONS AND CONCLUSIONS

OF THE

ELEVENTH MEETING OF THE NAT SYSTEMS PLANNING GROUP

(Paris, 6 - 15 May 1975)

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INTRODUCTION

1. Convening and conduct of the Meeting

1.1 The Eleventh Meeting of the NAT Systems Planning Group (NAT/SPG) was held in the European Office of ICAO from 6 to 15 May 1975. In addition to normal participation by all Members of the Group and participation on invitation by IATA and IFALPA, the Group had also invited Denmark, Iceland, Norway and Portugal to attend this Meeting because of the need to take into account their views on some of the subjects discussed. With the exception of Norway, all those States were present. The Meeting was chaired by Mr. J.G. ten Velden, Member from the Netherlands.

1.2 In the morning of 6 May 1975, the Group met in closed session in order to discuss matters of internal interest and elect its new Chairman (Summary of Agenda Item 1 refers). Apart from Item 1, all other Agenda Items were discussed in open meetings with all participants present as shown on page vii.

1.3 For the detailed consideration of Agenda Item 2, the Group created an ad hoc Working Party for which Mr. T.E. O'Dalaigh, the Member from Ireland, acted as Rapporteur.

1.4 Mr. P.G. Berger served as Secretary of the Meeting, assisted by Mr. C. Eigl. Messrs. F.E. Sperring and A. Bruinenberg also participated part-time in the Meeting and acted as advisers with regard to communication and meteorological questions respectively. All four are members of the European Office of ICAO.

AGENDA

Item 1 : Election of the Chairman and determination of the duration of his mandate.

Item 2 : Review of the HF air-ground communication situation in the NAT Region.

Item 3 : Review of the situation with regard to the re-organization of the airspace and air traffic services in the Northern part of the NAT Region.

Item 4 : Review of the status of the proposal for amendment of the NAT RAC SUPPs regarding SST operations and in-flight contingencies of subsonic aircraft and further related action.

Item 5 : Review of the navigation situation in the NAT Region after the Special NAT/PAC (LORAN A) RAN Meeting.

Item 6 : Development of basic principles for minimum navigating capability specifications for aircraft on oceanic and long-range flights.

Item 7 : Operational problems of current interest:

a) Developments regarding vertical separation in the EUR Region and possible effects on NAT operations;

b) Review of consequences on the NAT Region of the provision of an ATS route in the North Sea used by sub-polar and polar flights;

c) Application of longitudinal separation based on the use of Mach number techniques in the NAT Region;

d) Fuel conservation measures in the NAT Region;

e) Improvement in operating conditions for air traffic operating in the Southern part of the NAT Region;

f) Follow-up action on Recommendations of the 5th Meeting of the SST Panel of interest to the NAT/SPG;

g) Relations with the NAT Traffic Forecasting Group.

Item 8 : a) Development of a tentative work- and Meeting-schedule for the Group until the next LIM NAT RAN Meeting, tentatively planned to be held in the latter part of 1976, and taking account of the need for providing supporting documentation to the 9th AN Conference on its Agenda Item 2;

b) Arrangements for the next Meeting.

LIST OF CONCLUSIONS

LIST OF PARTICIPANTS

CANADA

M.D. Broadfoot
*A.L. Elliott
J.P. Perrin
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L.H. Saunders

DENMARK

N. Boserup Olsen
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FRANCE

M. Chef
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* Members of the Group

Summary of Agenda Item 1 : Election of the Chairman and determination of the duration of his mandate.

1.1 On 21 March 1975, Mr. J.F. Sapin had informed all other Members of the NAT/SPG by letter that, due to certain changes in the French Administration, his personal situation had also changed and that as a consequence he was required to relinquish his position as Member and Chairman of the NAT/SPG. As a result of this development the Group, contrary to established procedure, found itself forced to elect its new Chairman at the opening of this Meeting instead of at the end.

1.2 Therefore, after having paid due tribute to the outstanding services rendered by Mr. J.F. Sapin to the Group during his association with it from its First Meeting in October 1965 and as its Chairman since the end of its Third Meeting in April 1967, the Group unanimously elected Mr. J.G. ten Velden, the Member from the Netherlands, as its new Chairman.

1.3 As to the duration of the mandate of Mr. ten Velden as Chairman of the Group, it was recalled that at the end of the Sixth Meeting it had been agreed that the mandate of the Chairman should extend until such time as either the Chairman himself or a Member of the Group requested that this matter be raised again. Therefore, at the end of this Meeting, the Group confirmed that Mr. ten Velden would be Chairman of the NAT/SPG until this situation arose.

1.4 In this context it was also confirmed that any correspondence between a Member of the Group and the Chairman or Secretary should always be copied to both of them in order to facilitate coordination of necessary follow-up action.

Summary of Agenda Item 2 : Review of the HF air-ground communication situation in the NAT Region.

Amended provisions for the distribution of NAT HF aeromobile message traffic between the NAT frequency families

2.1 It was recalled that the proposals for the redistribution of NAT HF aeromobile message traffic between the NAT frequency families developed by the Tenth Meeting of the Group had been submitted to ICAO by Ireland in the form of amendments to NAT COM SUPPs and to the NAT Regional Plan. The amendment to the SUPPs had been approved by the President on behalf of the Council on 21 March 1975 and had become effective on 24 April 1975. In the course of the consultation of States, the USA had, however, raised an objection to one paragraph of the revised SUPP. Nevertheless, to avoid delay in their introduction, the USA had withdrawn its objection on the basis that reconsideration would take place at the Eleventh Meeting of the Group.

2.2 The USA Delegate drew the attention of the Group to the paragraph which read as follows:

> "In the event of heavy loading of a Family occurring, Shannon and/or Gander may, for the expected duration of the condition, and after co-ordination between themselves, and advice to all other aeronautical stations concerned, offload aircraft of one or more aircraft operators from that Family to another appropriate Family. Canada and Ireland will reach prior agreement on appropriate local procedures for the proper application of this procedure."

He pointed out that, whilst the intent was supported, the wording seemed not only to exclude the possibility that some aeronautical station other than Gander or Shannon should initiate such action, but also to permit those two stations to take a decision without consulting other stations concerned.

2.3 The Group agreed that the wording could and should be improved. It was pointed out that, in any event, the wording appeared to cover only the ad-hoc short-term tactical action to be taken if overloading of a Family actually occurred, whereas provision needed to be made also for advanced strategic action when overloading was foreseen in advance. The Group agreed that, in any case, Shannon and Gander, which between them handled the majority of NAT aeromobile message traffic, and which both guarded all four Families, were in the best position to take a final decision.

2.4 Arising from this discussion the Group agreed the following revised wording:

> "In the event of overloading of a Family actually occurring or being anticipated, aircraft of one or more aircraft operators may be offloaded from that Family to another appropriate Family for the expected duration of the condition. This offloading may be requested by any station, but Shannon and Gander will be responsible for taking a decision after co-ordination with all the NAT aeronautical stations concerned."

2.5 Ireland, having handled the original proposal, agreed to submit this amended text to ICAO.

2.6 The attention of the Group was also called to an inconsistency in the new table of Family deployment in the SUPP. The table, as drafted, showed Family D as for use only by DSB-equipped aircraft on Central and Northern routes. However, both DSB- and SSB-equipped aircraft on polar routes should also normally use Family D. The Group agreed that the particular case of polar routes would best be met by adding an asterisk against Family D under the "Northern Route" column, associated with a Note reading as follows:

> "*Note : All aircraft flying polar routes should use Family D. Such aircraft, when SSB equipped, should use A3H emission."

Ireland agreed also to submit this addition to ICAO. (It was noted that these changes would require consequential changes to the NAT/NAM/PAC ANP Document.)

Problems with dual-mode operation on Family A at Santa Maria

2.7 The Portuguese Delegate drew attention to the fact that, at Santa Maria, difficulties were being experienced in receiving messages from DSB-equipped aircraft on Family A due to heavy interference from the SSB transmissions from other Network stations. He pointed out that, when the organized track system was using Southerly tracks, the loading at Santa Maria was high, and the interference then caused severe problems. He proposed that Family A be made an SSB Family, and that all DSB traffic should be handled on Family D. He said that Portugal was prepared to implement Family D at Santa Maria for this purpose.

2.8 The Group agreed that dual-mode operation on a heavily-loaded Family was undesirable. However, it had been expected that Family A would be lightly loaded with the new deployment of Families. It was pointed out that to change the mode of operation on Family A would cause problems at other stations such as New York and San Juan. A proposal was made to make Family A a compatible SSB Family, with only A3 and A3H permitted. However the Group felt that this would be a backward step. It was noted that other Family A stations should also have experienced the same problem but had apparently not done so. The Group finally concluded that the problem could well be related in some way to the equipment or its technical installation, or to propagation conditions at Santa Maria. In any event, the recent changes in Family deployment might have alleviated it. It was agreed that it would be useful if there were to be a mutual exchange of technical information and personnel between Canada, Ireland and Portugal (Santa Maria). In the meantime, Santa Maria could, when necessary, apply the new offloading procedure (para. 2.4 refers). In addition, States would remind their communicators of the need to avoid causing interference to air-ground communications at Santa Maria because of the problems encountered there.

The United Kingdom analysis of the 1974 annual NAT HF data collection

2.9 The Group noted with appreciation the UK analysis of the 1974 data. The total number of position reports was somewhat down on the 1973 figures (1907 as against 2056). Particularly noteworthy was the effect of the encouragement to aircraft to use VHF when inside appropriate coverage. In the case of Gander, the number of HF reports fell to 488 as compared with 746 in 1972 and 800 in 1973. 512 reports were received by Gander on VHF, one factor in this case being the increased coverage now provided by the VHF stations remotely controlled from Gander.

2.10 The Group realized that the results were valid for only one day and for a particular organized track structure position, and, as Portugal had pointed out, the latter had a considerable influence (c.f. para. 2.7 above). The Group consequently decided that the next data collection should preferably relate to three days, corresponding to Northern, central and Southern positions of the organized track structure respectively. The Group further agreed it to be desirable that the next exercise should relate to 1975, and the United Kingdom agreed to present the analysis in due course, provided other States edited the data for them as hitherto.

2.11 It was queried whether it would be worthwhile to repeat the 1972 exercise, i.e. collecting data on individual messages rather than position reports, and doing an aircraft count. It was agreed that this procedure, apart from making the analysis very laborious, was really not justified and that position reports rather than messages should be counted. On this occasion no attempt need be made to collect

data relating to use of HF when VHF coverage was available. As regards aircraft counts, Canada, Iceland, Ireland and Portugal felt they could probably derive adequate statistics from other sources (flight plans, charges data etc.). Canada and Ireland agreed to do a "post-factum" exercise to assess the SSB/DSB mix. Ireland agreed also to co-ordinate the trials and the choice of dates as in previous years.

2.12 In connexion with discussion of this subject, it was queried why the delay in handling messages on VHF should increase when the VHF channels were lightly loaded - a point which had previously been noted on HF. No explanation could be found, and it was agreed that States should be requested to make on-the-spot investigations when the situation was noted to occur, and to report to a future Meeting of the Group. The Group, in connexion with a suggestion that INS installation data could be secured at the same time as the data collection, came to the conclusion that it was not only impracticable to do so, but in any case undesirable from a communications point of view to use air-ground communications for the purpose.

Communications aspects of the re-organization of airspace over Greenland etc.

2.13 It was recalled that the previous Meeting had requested Denmark and Iceland, with the assistance of Canada, to carry out trials aimed at assessing the practicability of providing HF en route air-ground communications over the new "polar" CTA from Reykjavik. These trials had been made in the first four months of 1975, but for a number of reasons were less conclusive than hoped for. Inconsistencies appeared between the data derived from various sources. Iceland had been unable, in the time available, to make all the antenna changes and improvements intended, nevertheless a high success rate had been attained. It was finally agreed that the existing basis of the trial, i.e. for the aircraft to contact Søndre Strømfjord and then for Reykjavik to attempt to contact them on the same frequency, was incapable of giving the required answer. Sometimes the frequency order was inappropriate for Reykjavik, in other cases aircraft used VHF with Søndre Strømfjord and so on.

2.14 The Group endorsed the view expressed at its Tenth Meeting, i.e. that the best future arrangement would be for Reykjavik to be the primary HF station, and Søndre Strømfjord (if retained) a secondary or back-up HF station for the upper airspace. It was therefore agreed to discontinue the current trial, and to start a fresh trial in 1976 on a date to be agreed between Denmark, Iceland and Canada. The basis for this trial would then be for aircraft outside VHF coverage always to attempt to work Reykjavik when in the new "polar" CTA.

In case of lack of contact with Reykjavik, aircraft should first attempt to contact Frobisher or Cambridge Bay before calling Søndre Strømfjord HF station. The value of the latter station would then emerge clearly, and its possible withdrawal could then be assessed at a later Meeting. Canada, Iceland and Denmark agreed that the NOTAMs to be issued later in 1975 would make clear the rôles of the stations, and the data collection tests should be made starting as soon after 1 January 1976 as practicable.

2.15 The question of the practicability and cost of having Reykjavik use the three Søndre Strømfjord remote VHF stations on a remote-control basis was raised. The Group decided that it could only usefully come back to this matter when the over-riding question of the retention or otherwise of the international HF aeronautical station at Søndre Strømfjord had been decided.

2.16 As regards trials of the use of 11303 kHz at Reykjavik and Cambridge Bay, the frequency appeared free from interference and some useful contacts had been made. As the 13 MHz frequency of Family D (13328 kHz) was currently too high for Northerly routes, it was agreed that trials should be made at Cambridge Bay, Frobisher, Søndre Strømfjord and Reykjavik using 11303 kHz with polar flights. A3/A3H/A3J emissions might be used.

Provision of further VHF coverage

2.17 The Group considered briefly the question of providing additional VHF coverage from Vagar (Faroe Islands) and Frederikshaab (Greenland) but reached no conclusions in the absence of operational requirement assessments on the one hand, and adequate cost estimates on the other.

Follow-up of the Conclusions to the Summary of Agenda Item 2 at NAT/SPG/10

2.18 The Group reviewed the action taken arising out of the Conclusions relating to aeromobile service discussions at the Tenth Meeting. It concluded that necessary action had been taken and concluded on all of the items listed (see para. 2.22 of the Report of that Meeting) except in the case of trials concerning HF service to the new "polar" CTA - regarding which see paras 2.13 to 2.16 above.

CONCLUSION 11/1 - ACTION ON HF AIR-GROUND COMMUNICATION MATTERS

That:

a) Ireland should formally submit to ICAO the change and addition to the NAT SUPPs as explained in paras 2.4 and 2.6 above.

b) a mutual exchange of technical information and, if necessary, personnel should take place between Canada, Ireland and Portugal (Santa Maria) regarding interference problems at Santa Maria. In the meantime, Portugal should, when necessary, apply the offloading procedure, and States would remind their Family A communicators of the need to avoid causing interference to air-ground communications at Santa Maria.

c) A three-day data collection exercise should be conducted in 1975 as explained in paras 2.10 and 2.11 above and in Appendix A to this Summary. The exercise will be co-ordinated and the dates chosen by Ireland as in previous years, whilst the United Kingdom will collate the results for the Group. In connexion with the exercise it was agreed, inter alia, that:

i) position reports only would be recorded;

ii) Canada, Iceland, Ireland and Portugal will derive aircraft count statistics;

iii) Canada and Ireland will assess the SSB/DSB mix;

iv) information on position reports passed on both HF and VHF should be obtained;

v) information that some HF contacts were made when within VHF coverage is not required.

d) States should conduct on-the-spot investigations into delays associated with position reports passed on VHF during off-peak periods as and when such delays are noticed, with a view to reporting back to the Group.

e) The change over to the new "polar" CTA communication arrangements on 1 January 1976 should be on the basis of Reykjavik being primary HF aeronautical communication station and Søndre Strømfjord being secondary, and the NOTAM to be co-ordinated between Canada, Denmark and Iceland will make this clear.

f) Communications trials (see paras 2.13 and 2.14) should be initiated as soon as practicable after 1 January 1976 with a view to assessing the need to keep Søndre Strømfjord as an HF station on Family D. An interim report should be made to NAT/SPG/12.

g) 11303 kHz should be introduced on a trial basis at Reykjavik, Søndre Strømfjord, Frobisher and Cambridge Bay for A3/A3H/A3J use by polar flights.

APPENDIX A
to Summary of
Agenda Item 2

NAT ANNUAL DATA COLLECTION

INSTRUCTIONS FOR COMPILATION OF ANNUAL RETURN

1. Air-ground communications data

1.1 Count POSITION REPORTS only - and only those position reports where you are the station of read-back.

1.2 Prepare a table for your particular station, divided into hours for each frequency as shown in Specimen A on page 2-11. The time in the left-hand 'hour' column refers to the time of receipt of the REPORT, not the time of the position. Hour 0000-0059 covers the period midnight to 0059, hour 0100-0159 the period 0100-0159, etc. You may use either the frequency letters or state the frequency in figures at the top of each column. Complete the table with hourly totals for all frequencies used during the Data Collection days.

1.3 When this table is complete, the two busiest frequencies should be determined as follows:

a) San Juan, New York, Santa Maria, Reykjavik and Sondrestrom

Choose the two frequencies which have the highest totals of position reports for the whole 24 hours.

b) Gander, Shannon

Choose the two frequencies which show the heaviest total over a period of two to three hours (e.g. Gander would choose QN and VF; Shannon would choose QN and QL).

If there are more than two heavily-loaded frequencies then one SSB and one DSB should be chosen if possible.

Since this is a 'sampling' exercise, if the totals are very nearly equal, making choice difficult, it is not likely to make much difference which two are chosen.

1.4 All Stations

1.4.1 As shown in Specimen B on page 2-13, a table can be prepared for each of the two selected frequencies. Go through the hard copy for the two selected frequencies for the whole 24 hours, but remember - for position report messages only, and only where you are the station of read-back. Look at the time of receipt of the report and compare it with the time of the position, the difference being the time of delay. Insert a tick in the relevant place in the table, remembering that the time in the left-hand 'hour' column refers to the time of receipt of the report, not the time of the position.

e.g: Position Report received at 14.05
Time of position 13.55

Time difference .10 minutes

Therefore, tick the '10 minute' delay box for the period 1400-1459.

1.5 If the delay is more than 12 minutes, tick the >12 box and note the actual delay in the 'Notes' column. If you receive a report at say 1401 and it refers to a position at 1402, tick the '-1' column. If the delay time difference relates to a domestic fix or to a light low level aircraft, include the tick in the appropriate column, but place an asterisk against the tick. This factor can then be taken into account if necessary in the analysis. If an occasional 'delay' of -2 minutes arises, you can annotate the tick in the '-1' column with, say, a + and note the actual 'delay' in the 'Notes' column. (In calculating the mean delay, 'negative' delays are treated as zero delays - see below.)

1.6 To obtain the mean delay for each hour, obtain the total delay of all reports for that hour, and divide by the number of reports. An example of this for the period 1400-1459 is shown in the Specimen at page 2-13.

2	reports	of	-1	minute	delay	=	0
4	"	"	0	"	"	=	0
6	"	"	1	"	"	=	6
4	"	"	3	"	"	=	12
1	"	"	4	"	"	=	4
1	"	"	10	"	"	=	10
1	"	"	13	"	"	=	13
1	"	"	15	"	"	=	15
Total reports 20					Total delay		60 mins

Mean delay = 60 ÷ 20 = 3.0 mins

1.7 When the three forms are completed, send them to:

Civil Aviation Authority
(Attn. CG2)
Room 428
The Adelphi
John Adam Street
LONDON WC2N 6BQ
United Kingdom

Retain the 'hard copy' for the collection day for a period of three months from date of despatch of the forms in case we wish to ask you for any additional information after the returns for the other stations have been examined.

1.8 If you have any information you wish to pass on (e.g. severe electrical interference distorted the delay results for one of the hours) this can be written on the back of the form. If you have any queries while you are preparing the information, ask Shanwick (Ballygirreen) for advice, using the AFTN address EIAAYF. If they cannot supply the answer immediately, they will be able to contact the United Kingdom CAA Section CG2, and obtain further advice.

1.9 The data days will normally be in either July or August each year, and the decision on the dates will be made early in September.

2. Aircraft and related position report counts

2.1 Data for each of these exercises will be compiled by Gander, Reykjavik, Santa Maria and Shannon only.

2.2 Each station will furnish data on the identification of each aircraft worked on HF, and the number of position reports 'read back' from the aircraft on each of the days of the data collection exercise.

2.3 Details of the method of presentation of the data will be agreed between the four stations concerned, prior to the date of the exercise.

2.4 The data should be forwarded to:

Officer-in-Charge
Shannon Airadio
Newmarket-on-Fergus
Limerick
Ireland

for collation and subsequent transmission to the United Kingdom for inclusion, with other data, in the Report on the Annual Communications Data Collection Exercise.

3. Estimate of DSB/SSB aircraft mix

3.1 Gander and Shannon will make an assessment of the numbers of DSB and SSB equipped aircraft in the NAT system, on a busy day during the 1975 Summer peak activity period.

3.2 The breakdown of the data, and the date and details of this exercise, will be mutually agreed between Shannon and Gander.

(Page 2-10 left blank intentionally)

SPECIMEN A

DISTRIBUTION OF POSITION REPORTS BY TIME AND FREQUENCY

STATION: REYKJAVIK

DATE: 27.7.75

HOUR	FREQUENCY														
	2987	5673	8889	2945	5638	8854	2868	5624	8910	13288	13328	11303	VHF GP		TOTAL
0000-0059				1			2						3		6
0100-0159	2	4			2		1	3					2		14
0200-0259	1	2		3	2		3	3	2				4		20
0300-0359	4	2		4	3		4	2	1				3		23
0400-0459															
0500-0559															
0600-0659															
0700-0759															
0800-0859															
0900-0959															
1000-1059															
1100-1159															
1200-1259															
1300-1359															
1400-1459															
1500-1559															
1600-1659															
1700-1759															
1800-1859															
1900-1959															
2000-2059															
2100-2159															
2200-2259															
2300-2359															
TOTAL															

Note 1: In the column(s) headed "VHF GP", insert the number of position reports received on the VHF GP channel(s).

Note 2: Four lines have been entered, as examples of the completed tabulation.

(Page 2-12 left blank intentionally)

SPECIMEN B

POSITION REPORT DELAYS

STATION:

DATE:

FREQUENCY:

Delay times in minutes

HOUR	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	>12	Mean delay per hour	Notes
0000-0059																	
0100-0159																	
0200-0259																	
0300-0359																	
0400-0459																	
0500-0559																	
0600-0659																	
0700-0759																	
0800-0859																	
0900-0959																	
1000-1059																	
1100-1159																	
1200-1259																	
1300-1359																	
1400-1459	✓✓	////	//// ✓✓		////	//// ✓						✓*			✓✓	$\frac{60}{20} = 3.0$	13 mins, 15 mins
1500-1559																	
1600-1659																	
1700-1759																	
1800-1859																	
1900-1959																	
2000-2059																	
2100-2159																	
2200-2259																	
2300-2359																	
TOTALS																	

* Domestic fix or light low-level aircraft.

Summary of Agenda Item 3 : Review of the situation with regard to the re-organization of the airspace and air traffic services in the Northern part of the NAT Region.

3.1 The Group noted that, after appropriate co-ordination with all parties concerned, Denmark, also on behalf of Canada and Iceland, had recently formally submitted a proposal for amendment of the NAT Regional Plan which was intended to introduce those changes to the organization of the airspace and air traffic services in the Northern part of the NAT Region which, based on a request of the Second DEN/ICE Conference (Recommendation 9 of that Conference refers), had been prepared since its Ninth Meeting by the NAT/SPG.

3.2 It was also noted that this proposal had been circulated by the European Office of ICAO under the designation EUR 75/18 - ATS/13 - COM/120 and that it could be expected that action on it would be completed some time in early Autumn 1975 provided no objections were raised to it, which, in fact, was anticipated. The intended date of implementation given in the proposal was 1 January 1976 and, thanks to the co-operation of all parties involved, and especially the USA which had agreed to prolong the provision of some essential services now provided by them up to that date, no more than the usual transitory "teething troubles" during the initial period immediately after the change were expected.

3.3 The representatives from Denmark and Iceland presented to the Group a brief summary of the negotiations which had been conducted between parties concerned on this subject since the Tenth Meeting of the Group in April 1974, and stated that these had covered the diplomatic and the financial as well as the technical aspects.

3.4 As to the diplomatic aspects involved, an appropriate agreement between Denmark and Iceland regarding the exercise of ATS functions by Iceland within the airspace over part of Greenland had been concluded and was now ready for signature by the two States concerned.

3.5 As to the financial aspects, the representatives from Iceland and Denmark both stated that the expected costs of the re-organization, established at the Tenth Meeting of the NAT/SPG, would probably not be exceeded and that they were in contact with ICAO, inter alia to ensure that appropriate arrangements for their coverage by the applicable joint financing agreements would be made in good time.

3.6 With regard to the technical aspects, the representative from Iceland informed the Group that the question of re-naming the FIR had been resolved, that the additional five controllers required at Reykjavik ACC to provide service in the extended area would be available by the time of the change and that revised letters of agreement between Reykjavik ACC and adjacent ATC units concerned were in the process of being negotiated. He also pointed out that while air traffic movements in the present Reykjavik FIR had not changed in 1974 when compared with those of 1973, it had now been found that during the first three months of 1975 they had decreased by 3.2 percent when compared with those of the same period in 1974.

3.7 The Group took this opportunity to express its appreciation to all concerned by this matter, and especially Denmark and Iceland, for the efforts which had been made in order to resolve this complicated task in such a satisfactory manner and within a comparatively short time.

CONCLUSION 11/2 - ACTION ON THE RE-ORGANIZATION OF THE AIRSPACE IN THE NORTHERN PART OF THE NAT REGION

That, in view of the situation described in this Summary, there was no further need for the NAT/SPG to concern itself with this subject unless specific future operational problems were brought to its attention by any of the States concerned.

Summary of Agenda Item 4 : Review of the status of the proposal for amendment of the NAT RAC SUPPs regarding SST operations and in-flight contingencies of subsonic aircraft, and further related action.

Status of proposal for amendment of the NAT RAC SUPPs regarding SST operations

4.1 The Group was informed by its Secretary that the proposal for amendment of the NAT RAC SUPPs regarding SST operations, developed by the Group at its Tenth Meeting, had now been formally transmitted to ICAO for action in accordance with established procedures and that it was now with States and International Organizations concerned for review and comment. It was expected that, barring any unforeseen developments, the amendment would be cleared and ready for approval in late 1975.

Establishment of initial NAT SST tracks and routes in the adjacent European transition area

4.2 The Member of the United Kingdom informed the Group that, based on the agreement reached at its Tenth Meeting to provide initially one track for eastbound and one for westbound SST flights, further studies had resulted in the establishment of the following two tracks:

* Track SM (Westbound)	5041N 1500W - 5050N 2000W - 5030N 3000W - 4916N 4000W - 4703N 5000W - 4610N 5300W
* Track SN (Eastbound)	4510N 5230W - 4554N 5000W - 4810N 4000W - 4926N 3000W - 4949N 2000W - 4941N 1500W

4.3 In addition, negotiations between all parties concerned on the European side of the North Atlantic had resulted in the organizational arrangements and the establishment of transition routes for SST flights in the area immediately adjacent to the NAT Region which were believed to cover satisfactorily at least the initial requirements of such operations. A pictorial presentation of both the NAT tracks and the European transition routes is contained in Appendix A to this Summary.

4.4 In this context it was also noted that the amendment proposed to the NAT RAC SUPPs and covered in Appendix A to the Summary of Agenda Item 7 adequately covered a problem which had come to light when developing the transition routes shown in Appendix A to this Summary.

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* Provisional designation

4.5 As to the provision of SST transition routes in the airspace immediately West of the NAT Region, it was understood that work on this subject was under way between all parties concerned.

4.6 Because of the provision of only one SST route per direction of flight and present plans to operate such flights from at least two different aerodromes on either side of the North Atlantic, attention was drawn to the need, in the scheduling of such flights, to avoid conflicts in longitudinal separation between them when they arrived over the starting point of the respective SST track.

CONCLUSION 11/3 - ACTION ON SST OPERATIONS IN THE NAT REGION

a) That the tracks described in para. 4.2 above should be established in order to cover initial commercial SST operations in the NAT Region.

b) That work on the development of appropriate transition routes on the Western side of the North Atlantic should be pursued so as to ensure their provision in good time prior to assumption of commercial SST operations in the NAT Region.

c) That, in scheduling SST flights in the same direction but departing from different aerodromes, care should be taken to avoid the creation of longitudinal separation conflicts between such flights over the starting point of their SST track.

Guidance material for Air Traffic Controllers concerned with SST operations by "Concorde"

4.7 The Group noted that ICAO, in 1972, had published an ICAO Circular on "Planning of Air Traffic Services for SST Aircraft" which had been developed by its SST Panel (Circular 109 - AN/82) which was intended to assist ATS Planning Authorities in their preparations for the advent of SST operations in their areas of responsibility. In addition it was noted that, in this Circular, it had been recognized that there existed a need for the preparation of suitable procedures and guidance material for use by air traffic controllers directly concerned with SST operations.

4.8 In accordance with this approach, the United Kingdom had now prepared specific guidance material for air traffic controllers concerned with "Concorde" operations and the UK Member had presented this to this Meeting. The Group agreed that this presented very useful material which could well serve as a basis for more detailed local material by other States, and it therefore agreed to:

a) include it in this Summary so that it may be used by other NAT States concerned for development of their material;

b) request ICAO to bring it to the attention of all other States likely to be concerned with occasional or regular SST operations by "Concorde" aircraft so that controllers will be aware of the specific operating characteristics of that aircraft.

CONCLUSION 11/4 - GUIDANCE MATERIAL FOR AIR TRAFFIC CONTROLLERS ON SST OPERATIONS BY "CONCORDE" AIRCRAFT

a) That the guidance material contained in Appendix B to the Summary on this Item should be used by other NAT States in the preparation of their own material on this subject.

b) That ICAO should be requested to bring this material, in suitable form, to the attention of all other States likely to be concerned with occasional or regular SST operations by "Concorde" aircraft for appropriate use by their air traffic controllers.

4.9 This Conclusion was formulated on the understanding that the material contained in Appendix B would be up-dated as appropriate and that it would be superceded as and when adequate regional and/or world-wide guidance material became available from ICAO.

Situation with regard to in-flight contingencies in the NAT Region

4.10 When developing, at its Tenth Meeting, the revised procedures for in-flight contingencies in the NAT Region now covered by the proposal for amendment of the NAT RAC SUPPs mentioned in para. 4.1, it had been noted by the Group that only very vague information was available as to the occurrence of such incidents. The UK Member had therefore indicated that he would provide more detailed information on this subject at this Meeting. This was now done.

4.11 From the data provided by the UK Member it was noted that during the nine months from 1 July 1974 to 31 March 1975, 44 incidents had occurred within the Shanwick OAC. These comprised 4 turn-backs, 12 descents and 28 combined turn-backs and descents. In 34 of the 44 cases an ATC clearance had been obtained prior to taking any action by the aircraft concerned, while in 10 cases no prior ATC clearance had been requested by the pilots concerned. However, even in those cases later investigation showed that there was no evidence that the pilots had not complied with existing procedures.

4.12 The major cause of these incidents (27 cases) was either the failure of one engine or the need to shut it down because of oil pressure problems. Other causes were low fuel temperature, hydraulic failure, severe turbulence and fumes in the cockpit due to fluid cargo leakage. With respect to the problems caused by low fuel temperature and resultant solidification, IATA pointed out that, while this had been somewhat of a problem to certain of its operators in Winter 1974/75, it was now hoped that this might be overcome by the next Winter.

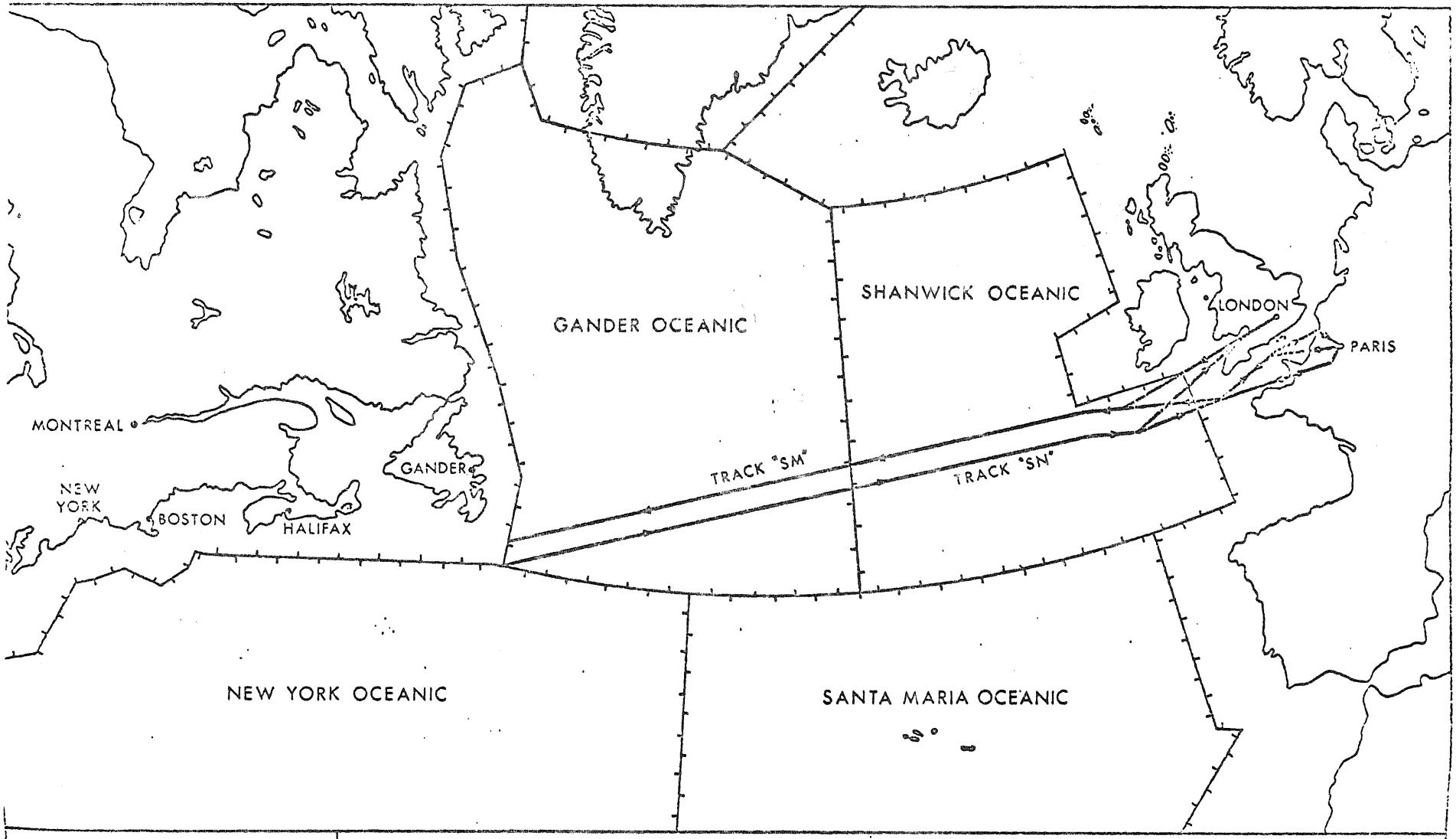
4.13 The UK Member also informed the Group that at Shanwick OAC an incident reporting procedure covering these cases was instituted and that each incident was subsequently analyzed in order to keep the situation under review. He also pointed out that the data thus obtained was available for review by interested parties.

CONCLUSION 11/5 - ACTION ON IN-FLIGHT CONTINGENCIES IN THE NAT REGION

a) That, in view of the action taken with regard to the application of the revised procedures regarding in-flight contingencies, no further action was required by the Group.

b) That the Member from the United Kingdom would keep the Group informed of any developments in this field when he felt that this was warranted, based on data which became available to him through the reporting procedure in effect on this subject in Shanwick OAC.

NAT ORGANIZED TRACK SYSTEM FOR SST AIRCRAFT



NOTE: TRANSITION ROUTES WITHIN AND ADJACENT TO USA STILL UNDER NEGOTIATION -EN ROUTE COORDINATES SHOULD NOT BE AFFECTED

TRACK COORDINATES "SM" (WESTBOUND): 50°41'N 15°W – 50°50'N 20°W – 50°30'N 30°W 49°16'N 40°W – 47°03'N 50°W – 46°10'N 53°W

TRACK COORDINATES "SN" (EASTBOUND): 45°10'N 52°30'W – 45°54'N 50°W – 48°10'N 40°W 49°26'N 30°W – 49°49'N 20°W – 49°41'N 15°W

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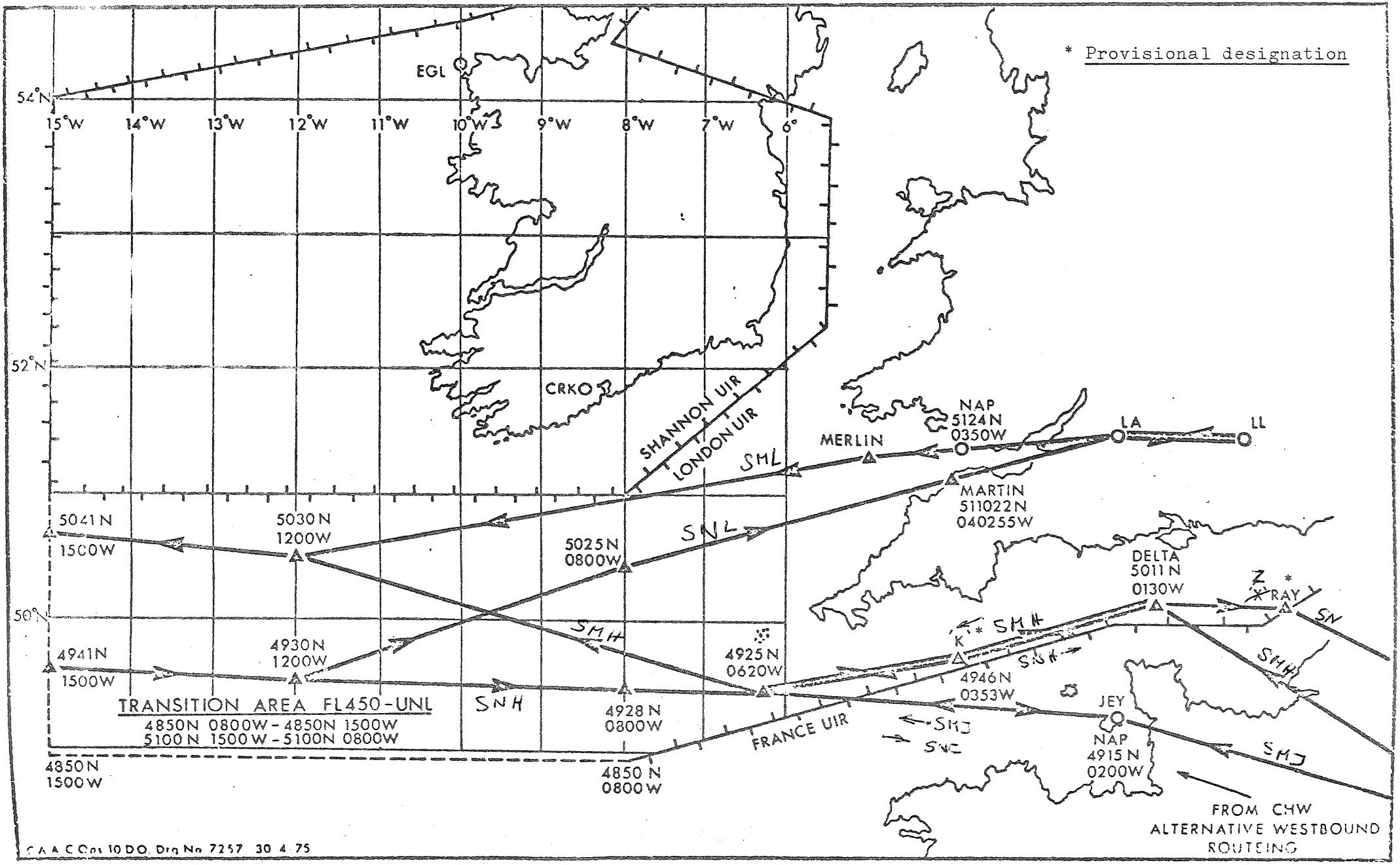
APPENDIX A
to Summary of
Agenda Item 4

TRANSITION ROUTES FOR SUPERSONIC FLIGHTS



APPENDIX B
to Summary of
Agenda Item 4

GUIDANCE MATERIAL FOR AIR TRAFFIC CONTROLLERS CONCERNED WITH SST OPERATIONS BY "CONCORDE"

1. INTRODUCTION

1.1. The Concorde aircraft has certain operational characteristics which have to be taken into account during tactical control manoeuvres. The aircraft is very sensitive to any deviation from the optimum flight path and the economic operation of the aircraft can, in certain circumstances, depend very much on the understanding and judgement of the controller. Therefore, the aim of this guidance material is to familiarise air traffic controllers with the operational performance and special requirements of Concorde. The information is based on the results of flight trials and ATC simulation studies.

2. OPERATIONAL CHARACTERISTICS

Speed Flexibility

2.1. Concorde is capable of operating efficiently at subsonic or supersonic speeds although, as with any other type of aircraft, there is an optimum speed-altitude relationship for maximum economy. Sustained operation in the speed range covering acceleration and deceleration (see para 7) is not practicable and operation in this regime should be restricted to the acceleration and deceleration phases of a flight.

2.2. As will be seen later, the transonic acceleration phase is a critical one in many respects. One particular aspect affecting the economics of the operation is the extremely high fuel consumption up to a speed of about M 1.4, of the order of twice as high as in cruise, which is one of the most important differences between an SST and a subsonic jet. The payload/total fuel weight ratio of Concorde is considerably lower than for a subsonic jet, hence the significance of deviations from the optimum flight path will be much greater, possibly to the extent of rendering a potentially economic operation uneconomic.

Fuel Trim

2.3. When airspeed increases the aerodynamic centre of pressure moves rearward; this necessitates retrimming the aircraft. Subsonic aircraft achieve this by aerodynamic means (elevator trim tabs). However, at supersonic speeds the extra drag

caused by elevon trimming would cause a significant fuel penalty. Concorde retrims for various flight attitudes by transferring fuel about the aircraft. For acceleration fuel is transferred from a group of tanks forward of the CG to fuel tanks in the rear fuselage (diagram 1). Likewise, after supersonic cruise the fuel is transferred forward (diagram 3) to restore the subsonic CG position.

IN FLIGHT FUEL TRANSFER

Diagram 1.

REARWARD TRANSFER--TRANSONIC ACCELERATION

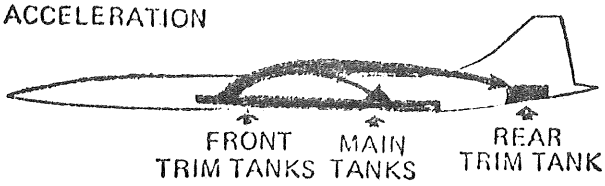


Diagram 3.

FORWARD TRANSFER–END OF CRUISE

Diagram 2.

EMERGENCY DECELERATION TRANSFER

Diagram 4.

RETRIMMING FOR LANDING AFTER PROLONGED SUBSONIC FLIGHT

3. FLIGHT PROFILE

3.1. The ideal flight profile for optimum economic operation would commence with an uninterrupted climb to supersonic cruise, followed by an uninterrupted descent to destination. It would include the following combination of flight phases:

subsonic climb, transonic acceleration climb, supersonic climb and cruise climb, transonic deceleration and descent and subsonic descent.

However, this idealised operation will often be impossible to arrange because of sonic boom and the presence of other aircraft in the system.

3.2. The entire flight profile is discussed in detail in the following paragraphs, highlighting the special aspects of SST operation. A typical performance table for Concorde in ISA conditions at maximum AUW is shown at Appendix A.

4. TAXI, TAKE-OFF AND INITIAL CLIMB

4.1. When operating at maximum weight the extra fuel for ground running is carried in a partly filled tank provided for trim adjustment. This fuel must be used up to reduce the aircraft weight to the maximum permissible for take-off, but nevertheless, time on the ground should be minimised because of the high fuel flow during engine ground operation. Any ATC delays should be absorbed prior to engine start up time. The start up clearance should be given so that a subsequent take-off clearance can reasonably be assured within about 15 minutes.

4.2. On receipt of take-off clearance Concorde will normally depart without delay. Take-off speed will be about 210 kts. After take-off and depending upon local noise restrictions, reheat will be cancelled and power is reduced at about 500 ft. The TMA climb out speed will be 300 kts. When airspeed restrictions are lifted Concorde will accelerate to the optimum subsonic climb speed of 400 kts CAS* which will give the greatest rate of climb.

*NOTE: Calibrated airspeed is obtained by applying instrument and position error corrections to indicated airspeed.

5. SUBSONIC CLIMB

5.1. When Concorde has attained the subsonic climb speed (400 kts CAS) the controller could be faced with overtaking problems with other subsonic aircraft. The rate of climb during the subsonic climb out phase will vary between 3000 and 6000 ft per minute. A "level off" clearance should normally be passed to the pilot not later than a time when the aircraft is between 3000 ft and 5000 ft below the cleared level. The later the warning, the greater will be the negative G forces imposed upon the aircraft occupants. Tactical adjustments of the flight path by radar vectors are preferable to interruption of the climb.

6. SUBSONIC CRUISE

6.1. The subsonic cruising speed of Concorde will be M .93 (CAS 400 kts). The optimum subsonic cruising level will be in the band FL250/370, the precise level depending on aircraft weight and ambient temperature. At heavy AUW prior to the transonic acceleration phase the optimum subsonic cruise level is FL250. The aircraft is unable to maintain level subsonic cruise above FL290. Instructions to climb above FL290 will require the use of reheat which could cause sonic boom problems, deplete the fuel reserves and affect the economic operation of the particular flight. At light AUW after the transonic deceleration phase Concorde can maintain subsonic level flight in the preferred cruising level band FL310/370.

6.2. During subsonic cruise, overtaking problems may occur with other subsonic jet traffic, due to the higher speed of the SST. When necessary the pilot will prefer to change flight level rather than reduce speed. Sustained deviations from optimum Mach values result in economic penalties and should therefore be avoided. During subsonic cruise the manoeuvrability of SST aircraft is similar to subsonic jet aircraft.

7. TRANSONIC ACCELERATION

7.1. The transonic acceleration clearance should be given at least 3 minutes before the planned start of acceleration to allow for the necessary cockpit preparation. The clearance should extend at least to the supersonic climb phase. Reheat is applied at the beginning of the acceleration. It enables a more rapid climb to be achieved through the relatively high drag regions encountered during the transonic acceleration phase. Although there is a much higher fuel consumption during acceleration, reheat leads to an overall fuel saving because supersonic cruise level and speed is attained earlier, thus allowing a greater proportion of the sector time to be flown in the supersonic cruise mode.

7.2. During the transonic acceleration Concorde will be significantly less tolerant of track and/or flight profile deviations. The reasons for this are aerodynamic, economic and environmental (sonic boom) considerations. (See Para 15.) Only in exceptional circumstances should Concorde be required to level-off while flying a transonic acceleration profile. If interruption of the climb is essential it should be as brief as possible, ie 2 minutes or less. Protracted discontinuation of the climb during acceleration might oblige the aircraft to return to subsonic flight. Having returned to subsonic speed and related operating level it is unlikely that a second attempt at transonic acceleration would be possible, due to the large fuel penalty involved. Turns not exceeding a bank angle of 15° (which corresponds to a heading change of about 20°/min) will be acceptable.

8. SUPERSONIC CLIMB

8.1. On reaching M 1.4 Concorde will normally be above the levels at which subsonic traffic normally operate and will continue to climb at a decreasing rate, with the Mach number increasing towards the cruise figure. During this flight phase (known as the supersonic climb phase), the aircraft will be able to tolerate track and flight profile deviations more easily than in the transonic acceleration phase although, because of the high speed, the radius of turn will be large and rates of turn will not exceed about 25°/minute. Any turn at this stage will have the effect of reducing the rate of climb.

9. SUPERSONIC CRUISE

9.1. The cruising Mach number is reached somewhere between FL450 and FL550, depending on aircraft weight and ambient temperature. Normally supersonic cruise operations will be conducted in the cruise climb mode. The order of preference for supersonic cruise operations will be:

(a) cruise climb

(b) stepped cruise

(c) level cruise

9.2. During the cruise climb the engines will be operating at or near maximum continuous power settings giving the optimum cruise climb profile. Variations from the optimum cruise climb profile become progressively more penalising in fuel consumption as the vertical difference increases. As a general guide the economic operation of Concorde demands the optimum profile or not more than 4000 ft below it, no matter whether cruise climb, stepped cruise, or level cruise methods are employed (see diagram 5 below). Level supersonic cruise clearly becomes less acceptable as a planned method of operation over long distances. However, for short periods it could be employed where, for example, a measure of tactical control is needed to provide vertical separation between crossing traffic.

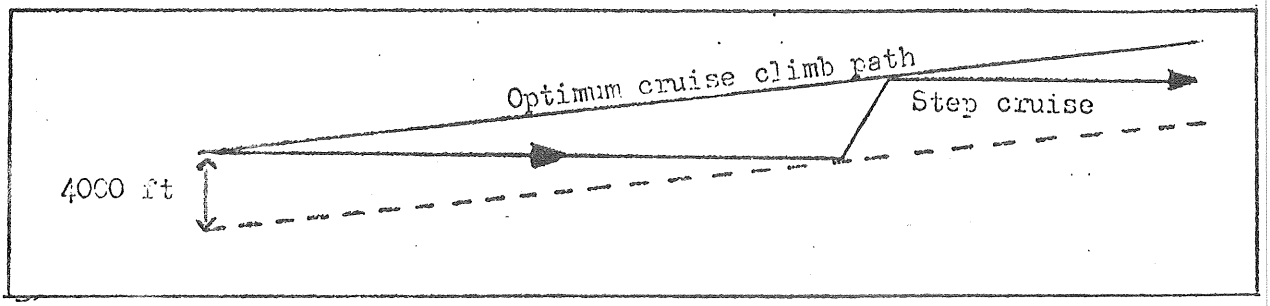


Diagram 5

9.3. For aircraft applying the cruise climb technique there is no clear distinguishing line in the flight profile between the end of the supersonic climb and the start of cruise climb. After reaching cruise Mach number, the rate of climb gradually decreases to about 50 ft/min. The band of flight levels likely to be used between the start and finish of cruise climb will be in the region of FL450 to FL600.

9.4. The cruising speed of Concorde will be limited by a speed/altitude/temperature combination (ie the V_c*/Altitude limit or the M_c**/total temperature limit).
The optimum cruising speed will be the highest speed permitted by the application of these limiting factors. Only large variations from the optimum will have a significant effect upon longitudinal separation even when applied over long cruise distances. This is shown in the Table 1 (below) where cruise flight times are given for various speeds and cruise distances, assuming ISA conditions and still air.

* V_c = Design Maximum Cruising Speed

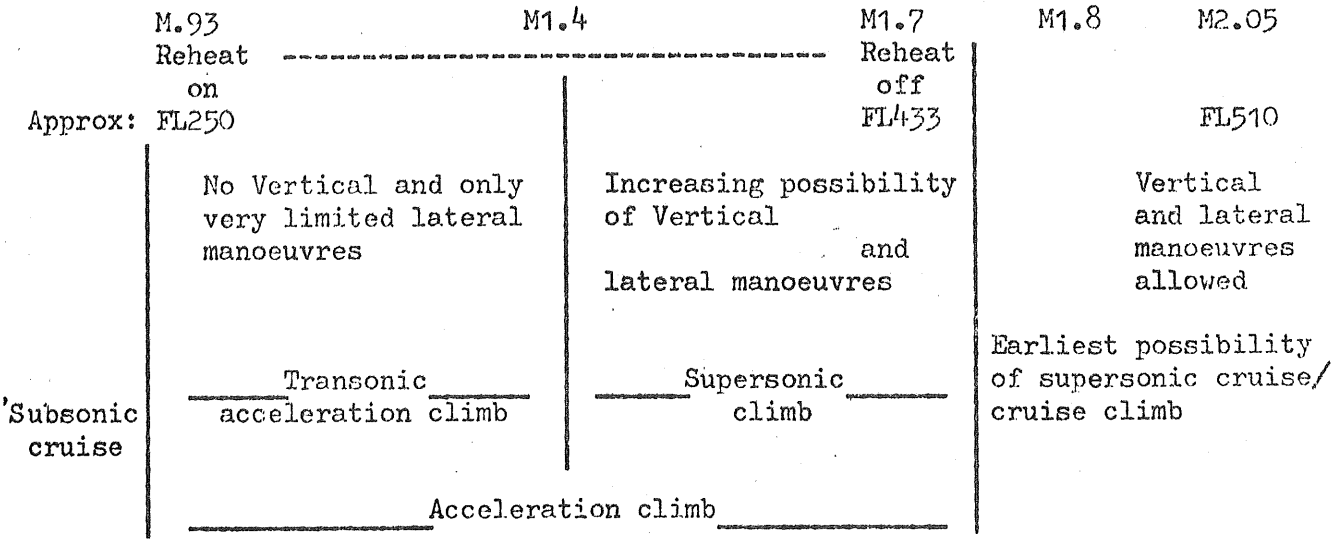
** M_c = Design Maximum Cruising Mach Number

Cruise Mach No.	Cruise Distance/Time			
	1 000 NM	1 500 NM	2 000 NM	2 500 NM
2.25	46.5 MIN	69.5 MIN	92.5 MIN	116 MIN
2.0	52 MIN	78.5 MIN	104.5 MIN	130.5 MIN
1.95	53.5 MIN	80.5 MIN	107 MIN	134 MIN
1.9	55 MIN	82.5 MIN	110 MIN	137.5 MIN
1.85	56 MIN	84.5 MIN	113 MIN	141 MIN
1.8	58 MIN	87.5 MIN	116 MIN	145 MIN
1.75	60 MIN	89.5 MIN	119.5 MIN	149 MIN
1.7	61.5 MIN	92.5 MIN	123 MIN	153.5 MIN

TABLE 1

9.5. When operating supersonically, the Concorde will have greatly increased turning radii and much reduced rates of turn compared with subsonic jets. For example in the case of an aircraft at M 2.05, a temperature range of ISA $\pm$ 10°C gives a range of turning radii from 40 NM to 43.5 NM for a bank angle of 25°.

9.6. The tactical control situation for Concorde may be summarised as follows:



10. DECELERATION AND DESCENT

10.1. The descent clearance should be given well in advance of deceleration to allow for the necessary pre-deceleration checks. It should preferably extend at least to subsonic levels. The deceleration will necessitate either a gradual descent at a constant pitch angle or an increasing pitch angle in level flight, followed by a descent at a constant CAS. If the lowest prescribed descent speed (approx 325 kts CAS) is used, the aircraft will assume a very high drag attitude and the application of maximum continuous power will be insufficient to enable it to level off until approximately FL480 and M 1.4. After deceleration the highest stabilised subsonic level will be about FL370 depending on weight and temperature.

10.2. When Concorde has reached subsonic speed and corresponding levels during the descent it will be capable of much greater operational flexibility than during the earlier phases of the descent. The descent may be interrupted when necessary, but from a fuel economy viewpoint there will be significant advantages to be gained by paying particular regard to specific holding speeds and levels.

11. HOLDING PROCEDURES

11.1. Concorde will, when necessary, hold by the conventional holding pattern method. The procedure of laddering down in the holding stack will be acceptable providing that lengthy periods are not spent at uneconomic levels. Terminal holding procedures carried out at speeds normally used by subsonic jet aircraft would impose an excessive fuel penalty. Therefore, Concorde holding should be based on the following:

	A Above FL140	B FL140 and below
Speed	280 Kt CAS	250 Kt CAS
Bank angle	30	30
Outbound Time	1¼ min	1 min
Temperature	+15	+15

CAUTION **If Concorde is holding at 280 kt, local Air Traffic Control instructions should be consulted concerning the effect of the higher speed (and increased turning radius) on separation from adjacent traffic patterns and routes.**

11.2. On occasions when terminal delays are expected to be in excess of 30 minutes, it would be preferable, from the fuel economy aspect, for Concorde to absorb such delays en-route by descending early and cruising at reduced speed and lower cruising level - generally subsonic - to destination rather than joining a holding pattern. Clearance for early descent to absorb en-route, expected TMA delay would require that the aircraft be allowed to retain its original position in the approach sequence. The facility of en-route absorption of delay will only be applicable to TMA's where special procedures have been published for its provision.

12. APPROACH

12.1. The manoeuvrability and behaviour of Concorde during approach is compatible with other heavy subsonic jet aircraft except that the speed may be higher. Operation for prolonged periods at speeds below the optimum will result in high angles of attack, high drag conditions, high power requirements to maintain normal glide paths, and therefore in high rates of fuel consumption and increased noise. Speed adjustments required by radar directors in TMA operations should therefore take account of this.

12.2. The intermediate approach speed of Concorde will be of the order of 230/250 kts; this will reduce to 200 kt at the start of final approach and then to 160 kt at the runway threshold. The SST/subsonic aircraft speed differential is therefore about 50 kt at the start of intermediate approach reducing to about 10 kt at the runway threshold.

12.3. Wake Turbulence Trials and comparisons indicate that Concorde wake produces effects no worse than those of heavy subsonic jet aircraft (B747, DC10).

13. IN FLIGHT CONTINGENCIES

13.1. On rare occasions Concorde may be obliged to carry out an unscheduled descent and/or turnback due to in flight contingencies such as engine failure, loss of air conditioning or pressurisation, or solar cosmic radiation. The procedures to be adopted by supersonic aircraft are laid down in ICAO Doc 7030 as amended.

13.2. Engine Failure

13.2.1. In the event of engine failure, subsequent action will depend upon the point at which the failure occurs. Immediate descent to subsonic cruise levels (FL250 - FL370) and continuance of the flight or turnback at subsonic speed may be necessary or, if the failure occurs in the later stages of supersonic cruise, continuance of the flight at reduced supersonic speed and level may be acceptable. Descent could then take the form of a drift down to a stabilised level where supersonic flight could be continued.

13.3. Loss of Pressurisation/Air Conditioning

13.3.1. The procedure adopted when loss of pressurisation or air conditioning is experienced will depend on the type and extent of the loss sustained. A slight loss of pressure may be supportable by the aircraft systems to the extent that no special measures are required. A partial loss of pressurisation/conditioning systems may not lead to a serious loss of pressure but the reduced rate of air change within the cabin may lead to passenger discomfort such that speed and hence airframe heating have to be reduced and this will entail a normal descent to a lower cruise level. In the extreme case of a serious loss of pressure, an immediate and rapid descent to about FL150 or below will be necessary.

13.4. Solar Cosmic Radiation

13.4.1. In order to protect passengers and crew from the effects of solar cosmic radiation at cruise levels the SST may need occasionally to descend to a lower flight level. The following points are relevant:-

a. Solar cosmic radiation requiring a descent from supersonic cruise levels will be a rare event.

b. Forecasts may become available in future, warning of the possibility of the onset of solar events. However, Concorde will carry a radiation detection meter.

c. All SSTs in a particular airspace will be affected.

d. Action will probably consist of a descent to about FL450. The rate of descent need not be in excess of normal.

e. Solar cosmic radiation may also affect HF communications, resulting in a temporary loss of contact.

f. Because of (e) the pilot-in-command of an aircraft may find it necessary to descend without ATC clearance. He will notify ATC as soon as possible.

Descent to a lower level will reduce the aircraft cruising speed but in this instance the whole SST flow will be affected and not merely individual aircraft.

14. SEPARATION

14.1. Radar Separation

14.1.1. The application of radar separation to SST aircraft in the transonic and supersonic phases of flight will be more demanding than the application of radar separation to aircraft at subsonic speeds. Nevertheless, studies indicate that the minima laid down for subsonic aircraft can equally be applied to SST aircraft. Basic techniques in the application of radar separation remain the same, ie controller's tactical solutions will be designed to preserve separation which is not less than the prescribed minima. However the greatly increased speeds of aircraft in supersonic flight and the limited manoeuvreability during transonic acceleration/deceleration, require that controllers initiate early action to resolve individual traffic problems.

14.2. North Atlantic Procedural Separation Standards

14.2.1. The procedural separation minima to be used for SST aircraft in supersonic flight will be those laid down in ICAO Doc 7030 as amended.

15. SONIC BOOM ASPECTS

15.1. In developing European transition route structure for SSTs it has been assumed that because of the adverse effects of sonic boom, all supersonic flight will be confined to routes over the sea. On approaching the acceleration point at the coast and subject to ATC instructions, Concorde will commence transonic acceleration. The deceleration to subsonic flight will normally be completed prior to crossing the coast inbound, at such a position that sonic boom effect will not reach land areas.

15.2. It is considered that determination of the first point of acceleration and the last point of deceleration to avoid sonic boom over land areas is the responsibility of the operator. Nominal acceleration and deceleration points will be established for predetermined routes. Descent at the nominal deceleration points would normally be expected to meet sonic boom requirements but pilots may request earlier descent.

15.3. The sonic boom will first occur during the transonic acceleration phase at approximately M 1.15 when it will reach the ground as a focused boom affecting a comparatively small area. Thereafter a boom will follow the SST along its track until shortly before it again becomes subsonic. The effect of the boom across track is not constant: its effects decrease as it ages.

15.4. Changes in aircraft speed and/or direction can produce localised increases in the sonic boom overpressure on the ground. Accelerations and turns affect the paths taken by successive shock waves, resulting in two or more shock waves arriving at the same point in phase with each other. This causes higher peak overpressures and is known as focusing. It is important to remember that all accelerations from subsonic to supersonic speeds will produce a focused boom ahead of the point of generation. Therefore, the SST should adhere very closely to the acceleration route in order not to put sonic booms down in an area where adverse effects must be avoided (over land). Similarly in order to avoid the risk of focusing the boom during supersonic flight and transonic deceleration:

a. the aircraft should adhere closely to its assigned track

b. any interruption to or irregularity in the deceleration should be avoided

c. large turns or change of pitch should be avoided.

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TYPICAL CONCORDE PERFORMANCE FLIGHT PROFILE (MAX AUW IN ISA)

	DIST (NM)	ELAPSED TIME (MINS)	ALT (FT)	SIGNIFICANT OPERATIONAL ASPECTS	SPEED			APPROX CLIMB RATE (FT/MIN)
					CAS (KTS)	TAS (KTS)	MACH NO	
SUBSONIC CLIMB	0	0	1,000	Power reduced after TO to Max Continuous Dry	250	253	.385	3,800
	10	1.8	5,000	Achieve and Maintain 400 kts. CAS	400	427	.657	6,100
	17	2.7	10,000		400	457	.716	5,200
	25	3.8	15,000		400	489	.781	4,400
	35	5.0	20,000		400	524	.854	3,600
	50	6.6	25,000	Optimum level for subsonic cruise at initial A.U.W	400	562	.934	2,700 Dry 5,100 R/H
TRANSONIC ACCELERATION	0	0	25,000	Reheat 'ON' Start Transonic Regime	400	562	.934	5,100
	12	1.3	30,000		400	603	1.022	3,100
	34	3.4	36,089	(a) Commence acceleration from 400 kts to 530 kts (CAS) (b) First (focused) sonic boom reaches ground, approx 15½ nm ahead of aircraft position at this time	400	657	1.146 1.154	2,665 but 1,305 for accel
	112	9.2	43,305	Reheat 'OFF'	522	975	1.7	1,149 R/H 370 Dry
	133	10.4	43,750	Achieve 530 kts (CAS)	530	999	1.741	350 Accel
	181	18.9	48,000		530	1094	1.907	370
	440	27.4	50,324	Rate of climb reduces to 200 ft/min- Start of cruise/climb phase	530	1150	2.006	200
SUPERSONIC CRUISE			50,324	Start cruise/climb	530	1150	2.00	200
			51,325	Achieve Mach No. for Mo.	530	1176	2.05	100
			52,000		523	1176	2.05	65
			53,000		512	1176	2.05	50
		0	58,000	End of Supersonic Cruise	460	1176	2.05	50
DECELERATION AND DESCENT	37	2.2	56,000	Speed reduction in level flight to 325 kts Commence Descent	325	843	1.47	3820
	64	4.6	50,000		325	719	1.25	3900
	78	5.8	45,000		325	653	1.14	3890
	103	8.1	36,089	FL at which MO-93 subsonic operation is possible	325	549	0.96	2560
	123	10.3	30,000		325	501	0.85	2680
	138	12.2	25,000		325	465	0.77	2710
	152	13.0	20,000		325	432	0.70	2770
	164	15.2	15,000	Preferred Minimum level for subsonic holding (280 kts - CAS)	325	401	0.64	2860
	175	16.9	10,000		325	373	0.58	2910
	186 194	19.3 21.7	5,000 1,000	Start Deceleration to 250 Kts CAS, Final Approach speed 200 kts 10 nm final reducing to 160 Kts at touch-down	325 250	348 252	0.54 0.52	2912 2750

Summary of Agenda Item 5 : Review of the navigation situation in the NAT Region after the Special NAT/PAC (LORAN A) RAN Meeting.

Introduction

5.1 The Group agreed that under this Item the following seven questions should be reviewed:

a) Final arrangements for the withdrawal of Station Porspoder (France) from LORAN A rates 1S3 and 1S4 and their conversion to the new rate 1H5;

b) Preparation of a data collection regarding INS-equipped aircraft operating in the NAT Region;

c) Review of errors in navigation experienced with automated navigation systems and required corrective action;

d) Review of the situation with regard to observed gross errors in deviation from track by flights in the NAT Region and required action;

e) Evaluation trials of the OMEGA navigation system and other systems in the NAT Region;

f) Development of initial general guidance material intended to assist in the assessment of new navigation systems;

g) Arrangements for the LIM NAT RAN Meeting 1976.

Withdrawal of LORAN A Station Porspoder

5.2 It was recalled that in November 1974 the Special NAT/PAC (LORAN A) RAN Meeting recommended, in its Recommendation 1/1, that the LORAN A Station Porspoder in France should be withdrawn and that a new rate (1H5) should be provided by the two remaining stations at East Blockhouse (UK) and El Ferrol (Spain), and that this Recommendation had been made as a consequence of a proposal developed by the NAT/SPG at its Tenth Meeting.

5.3 The Group noted with appreciation that considerable efforts had been made by all parties concerned in order to effect the necessary reconversions of the two remaining LORAN A Stations and that the implementation of the change within the specified time limit was mainly due to the co-operation which States concerned had received from the USA, and more specifically the US Coast Guard.

5.4 After a brief discussion of the manner in which the withdrawal should best be effected and during which it was:

a) established that, as of the beginning of June 1975, it could be expected that the revised North Atlantic Aircraft Position Chart 3071 would become available to operators;

b) agreed that a further delay in the withdrawal of Porspoder or a limited simultaneous operation of both the old and the new LORAN A rates was neither feasible nor financially justified,

it was agreed that the Station Porspoder should definitely be withdrawn from operation on 19 June 1975 and that, on the same day, the new rate 1H5 should start operation. Appropriate NOTAMs to this effect will be published by France and the United Kingdom on 22 May 1975 in order to conform with the AIRAC system as previously agreed.

CONCLUSION 11/6 - WITHDRAWAL OF LORAN A STATION PORSPODER

a) That, on 19 June 1975, LORAN A Station Porspoder should be permanently withdrawn from service and that the new rate 1H5 formed by Stations East Blockhouse and El Ferrol should start operation on the same day.

b) That relevant information on the above changes should be published by France and the United Kingdom on 22 May 1975 in the form of AIRAC NOTAMs.

c) That operators concerned should take all necessary measures to ensure that the revised North Atlantic Aircraft Position Chart 3071, expected to be available as of early June 1975, be made available to flight crews concerned in sufficient time to ensure that the new rate can be operationally used as of its starting date.

Data collection regarding INS-equipped aircraft in the NAT Region

5.5 In order to be able to assess developments in the NAT Region with regard to the provision of INS onboard aircraft operating in that Region, IATA proposed that, in the course of this Summer, a data collection be organized with the aim of obtaining exact information on this subject covering all users in that Region. As it was believed that this proposal also went some considerable way to meet the intent of Recommendation 1/3 a) of the Special NAT/PAC (LORAN A) RAN Meeting 1974, the Group accepted this proposal.

5.6 After a brief discussion on the most effective and economical ways and means of making this data collection, the Member from the United Kingdom stated that his Administration, in collaboration with other parties concerned, would be prepared to undertake this task in the following manner:

a) the data collection would be made for one week during July 1975;

b) during these seven days a count of all long haul turbo-jet traffic in the following areas:

Gander OCA, Santa Maria OCA north of the Azores, Shanwick OCA and Reykjavik OCA

would be made at 0500, 1000, 1500 and 2200 hours GMT, thus covering the eastbound and westbound peak periods as well as the slack traffic period in-between;

c) based on information already available or obtained from operators, it would be shown, in tabular form, whether the aircraft present in the area and at the times specified in b) above were INS-equipped or not. However, no difference would be made between aircraft having single, dual or triple INS installations;

d) Portugal would provide information on traffic in the Santa Maria OCA to the UK together with any information they might have on aircraft navigation fits, while IATA would assist the UK, to the extent possible, in providing navigation fit information on its member airlines;

e) for <u>one</u> peak recording period during the collection week as selected by the UK, a chart would be produced showing the position of each of the aircraft, its flight level and its navigation fit, thus providing an illustration permitting a better appreciation of the tabulated data.

5.7 It was further agreed that the above data should not only be provided to the next Meeting of the Group but that it should also be made available to the European Office of ICAO at the earliest opportunity, for appropriate use in follow-up action within ICAO on Recommendation 1/3 a) of the Special NAT/PAC (LORAN A) RAN Meeting.

CONCLUSION 11/7 - DATA COLLECTION REGARDING INS-EQUIPPED AIRCRAFT IN THE NAT REGION

a) That the UK, in collaboration with other provider States concerned and IATA, undertake a data collection in accordance with the provisions in para. 5.6 in order to permit an assessment of the existing situation with regard to the provision of INS onboard aircraft operating in the NAT Region.

b) That the results of the data collection be made available, both to the NAT/SPG and to the European Office of ICAO, as soon as possible.

Errors in navigation experienced with automated navigation systems and corrective action

5.8 With the advent of automated navigation systems, it had been noted that one specific type of navigation error had taken on a new significance. While it had previously also been possible that misunderstandings and/or mistakes occurred in the transmission and/or application of those parts of an ATC clearance relating to the route on which flights were cleared (or with respect to its level, but in this case more rarely because pilots knew what to expect within certain limits), such mistakes were in general rapidly detected because of the frequent requirement to check the route and up-date its navigation.

5.9 With automated navigation systems coming into use, and more especially INS equipment, such mistakes have taken on a new significance because, apart from misunderstandings in the description of the route in ATC clearances, there is now also the danger that, even when no such misunderstandings occur, errors are being made during the insertion of the appropriate data into the automatic airborne equipment, either through typing errors or by the insertion of data in the wrong sequence. The result of this is that cases have been noted where aircraft were navigated with high precision along a wrong track.

5.10 The danger with these errors was still further increased by the fact that, due to the nature of the organized track system in the NAT Region, where tracks are normally spaced at intervals of two degrees of latitude (or one in the case of composite separation), an error in only one figure digit in latitude would place the aircraft a full 60 NM north or south of its assigned track. However, errors in the order of 120 NM and up to 300 NM have also been noted in the past. When this is compared with the fact that observations made in the NAT Region since 1972 have shown that there is not one single case on record of error that is due to a technical malfunctioning of INS equipment, it would appear that such errors are entirely attributable to "human error" and, as investigations have revealed, mostly by pilots when inserting data into the automated navigation equipment used.

5.11 It was therefore believed that all possible measures should be taken by operators, States and professional Organizations concerned to reduce this source of potential flight hazards to the absolute, unavoidable minimum. The Group noted with appreciation in this respect that IATA airlines were making considerable efforts, by appropriate training and flight check procedures, to keep their pilots continuously alerted to the need for care in the use of the equipment

in question and that IFALPA, through its publications, had also started a campaign with the same objective. However it had also been noted that, in some cases, all desirable measures had not yet been taken in this respect and it was for this reason that the Group felt the need for additional action on its part.

5.12 Based on proposals made by the Members from Canada and the United Kingdom and by IATA, it was therefore agreed to propose two types of action:

a) one aimed at the education of both operators and pilots not yet sufficiently aware of this problem; and

b) one of a recurring nature, intended to recall periodically the attention of all concerned to this subject.

5.13 With regard to a) above, the Group developed guidance material addressed to both operators and pilots, drawing, on the one hand, their attention to the effects likely to result from careless or superficial use of automated navigation equipment and, on the other, proposing certain training and cockpit drills with such equipment which had already proved to be effective in practical operation. This material is contained in Appendices A and B to this Summary and the Group requested the European Office of ICAO that, in addition to its incorporation into this Summary, it should be brought separately to the attention of all States and International Organizations and in a form which will ensure its distribution to that level where effective measures are required to be taken.

5.14 As to sub-para. b) in para. 5.12, the Group noted that for some time measures had been taken by both Canada and the United Kingdom to ensure that the daily track messages giving details of the OTS were printed in double-spacing as far as the description of the tracks were concerned, in order to minimize the possibility for pilots to inadvertently extract data from the wrong line. It was now suggested that, at certain intervals, this track message should be supplemented by a brief reminder to users recalling the need for care in handling its contents and also to remind reproducers of this message to retain the chosen double-spacing in its presentation to pilots.

CONCLUSION 11/8 - NAVIGATION ERRORS WITH AUTOMATED NAVIGATION SYSTEMS

a) That States and operators concerned should ensure that adequate training and flight check procedures are applied with the use of automated navigation equipment in order to avoid navigation errors resulting from careless or superficial use of such equipment.

b) That the European Office of ICAO should undertake to bring the material contained in Appendices A and B to this Summary to the attention of States and International Organizations, and this in such a manner as to ensure that it can be distributed to personnel at the required level.

c) That, as of 1 June 1975 and for a period of two months, the daily track message should be supplemented with the following text:

"Operators and flight crews are reminded that care is essential in ensuring that way-point co-ordinates are correctly transposed from this message into flight plans and automated navigation systems."

and that this procedure shall be repeated at intervals and for a duration agreed between the originators of such messages in the light of results achieved during this first period of publication.

d) That, on 1 June 1975 and thereafter at intervals of four months (i.e. on 1 October 1975 and 1 February 1976), the track message of that day should be supplemented by the following text:

"Agencies receiving this message should ensure that, in further copies, double-spacing between the description of NAT tracks is retained. This is to help prevent extremely dangerous errors caused by misreading of the track co-ordinates."

Observed gross errors in deviation from track and required action

5.15 Statistical data on observed gross errors in deviation from track by flights in the NAT Region, presented by the Member from Ireland and based on the six-monthly Summaries prepared on this subject by the European Office of ICAO, indicated that, at least until the end of 1974, the number of observed gross errors (i.e. those exceeding 30 NM off track) had not decreased while there had been a steady decrease in the number of total and of significant deviations (i.e. those showing a deviation of between 21 and 30 NM off track). It was however also stated by the Member of the United Kingdom that during the last five months only one gross error exceeding 30 NM had been observed.

5.16 In the light of what has been recorded in paras 5.8 to 5.14, the Group noted that since 1968 the causes of such gross errors had changed significantly. Up to 1968 gross errors were mostly due to malfunctioning or serious reduction of the navigational capability of the aircraft concerned, and therefore gradually developed to proportions which depended largely on the skill and alertness of the flight crew concerned. However, with the advent of INS-equipped aircraft and related errors in data insertion into such or similar devices, a large part of the observed gross errors resulted from this cause and the aircraft concerned therefore navigated quite accurately - but based on wrong information. Hence the action proposed in Conclusion 11/8.

5.17 This situation had a further effect, however, and this resulted from the fact that errors caused by faulty insertion of basic data into automated navigation equipment frequently resulted in lateral deviations by the aircraft concerned which were multiples of 60 NM (paras 5.9 and 5.10 refer). It was thus impossible to off-set the collision risks created by such errors by an increase of the lateral separation minima since their occurrence was not random in nature (and thus mathematically assessable) and had no relation to the question of accuracy in navigation and related separation questions. It was therefore agreed that, on an appropriate occasion, it would be necessary to review this subject further and determine to what extent such errors should be considered in any mathematical model.

5.18 In any case it was agreed that the present procedure used for follow-up of observed gross errors with the operators concerned should be continued, including the request for information on corrective action taken by the operator.

CONCLUSION 11/9 - ACTION ON GROSS ERRORS IN DEVIATION FROM TRACK

a) That the question of gross errors in deviation from track, caused by erroneous insertion of basic data into automated navigation systems, should be kept under close review by States concerned.

b) That those gross errors should be followed up with the operators concerned in accordance with usual practice, on the understanding that specific emphasis be placed on the need for immediate and efficient corrective action.

c) That, depending on future developments in this field, consideration be given to the way in which these errors should be treated in methods used to determine the levels of safety and related separation questions.

Evaluation of OMEGA and other long-range navigation systems in the NAT Region

5.19 When dealing with this subject, the Group was informed of trials with OMEGA now under way in various States and by a number of operators. This information seemed to indicate that:

a) as long as all OMEGA ground stations were not yet in operation, it was not possible to come to definite conclusions as to its suitability as a world-wide navigation system;

b) with present trials it had not yet been possible, even in limited areas such as the NAT Region, to determine whether OMEGA alone, without the additional use of a back-up navigation system, would be acceptable as the primary means of navigation;

c) efforts to improve the performance of existing airborne equipment were being made by manufacturers but had not yet been completed.

5.20 In view of this situation it was therefore believed that it would not be possible to come to definite conclusions as to the suitability of OMEGA as a valid replacement for LORAN A until later in this year and that it would therefore be necessary to await that time before firm commitments were made with regard to the future rôle of this navigation system in the NAT Region.

5.21 As to the manner in which future OMEGA trials were conducted, the Group felt that a reasonable mixture between specialized flight tests by qualified personnel with sophisticated test equipment and tests made in the routine operational environment by normal flight crews would probably provide the best results in order to draw valid operational conclusions. At the same time it was stressed that full and unrestricted information on test results should be exchanged between all parties involved in testing OMEGA in order to avoid duplication of effort and to ensure that a common level of experience was achieved.

5.22 In this context, the Group noted with some concern certain sales efforts made by manufacturers of new navigation equipment not yet officially approved or accepted because they seemed to be based on claims regarding achievable operating performances with this equipment which had not yet been confirmed by actual operating practice. In the case of OMEGA this was regretted even more because the Group was of the opinion that:

a) if OMEGA coverage could be provided as planned; and

b) ground as well as airborne equipment could be made to operate as conceived,

it was probable that the navigation performance achievable with this system might be at least as good as that now obtained with the use of INS. That this was not yet the case was mainly due to the fact that, as pointed out above, a number of necessary developments were not yet completed.

5.23 Under this item the Member from the USA informed the Group that they were also looking into the possibility of permitting the use of other VLF navigation systems which made use of signals from VLF military telecommunication transmitters as well as in some cases certain OMEGA signals. It was emphasized, however, that:

a) there is no commitment for a continuous signal from these telecommunication transmitters and there exists no provision for NOTAM service to supply information on their operating status;

b) in view of the problems in a), these systems are now being considered only as supplementary navigation systems.

CONCLUSION 11/10 - EVALUATION OF OMEGA AND OTHER LONG-RANGE NAVIGATION SYSTEMS

a) That States and operators concerned should continue their trials of OMEGA and ensure that any results achieved are freely exchanged between all interested parties to avoid duplication of effort.

b) That no definite conclusions as to the suitability of OMEGA as a long-range navigation system for use in the NAT Region should be drawn until present evaluation work, planned until the end of 1975, had been concluded.

c) That States concerned should, within their means, ensure that no undue claims were made as to the performance of new navigation equipment, not yet officially approved or accepted, unless this could be substantiated by evidence obtained with practical use of the system.

d) That the investigation into the use of other navigation systems based on the use of VLF should only be considered as supplemental and should, in no case, detract from the need to definitely determine, at the earliest suitable time, the suitability of OMEGA as a replacement for LORAN A in the NAT Region.

Initial guidance material for the assessment of new navigation systems

5.24 In view of the situation described in paras 5.19 to 5.23, and in anticipation of action on this subject by the 9th AN Conference of ICAO, the Group felt that it would be useful if, already at this time, some initial guidance material were provided to States confronted with the need to assess the acceptability of long-range navigation systems planned for use by their operators when flying on the organized track system of the NAT Region.

5.25 It was therefore agreed that the material contained in Appendix C to this Summary should be brought to the attention of States concerned for use as appropriate and until such time as it is superseded by material developed on this subject by ICAO.

CONCLUSION 11/11 - GUIDANCE MATERIAL FOR THE ASSESSMENT OF NEW NAVIGATION SYSTEMS

That the material contained in Appendix C to this Summary should be brought to the attention of States concerned for appropriate use until such time as it is superseded by relevant material expected to be developed by ICAO.

Arrangements for the LIM NAT RAN Meeting 1976

5.26 Further to what is recorded in paras 5.5 to 5.7 and in Conclusion 11/7 regarding follow-up action on Recommendation11/3 a) of the Special NAT/PAC (LORAN A) RAN Meeting 1974, the Group agreed that it would be useful to have a brief and informal exchange of views on the need for the LIM NAT RAN Meeting 1976 to concern itself once more with the question of LORAN A in the NAT Region and resultant consequences on the most appropriate timing of this Meeting. In this respect it was noted that the present provisions of Recommendation 1/3 provided that ICAO seek the views of States and International Organizations to:

a) determine whether a further review of the LORAN A question was at all required; and

b) make provisions, if this were the case, for such a review not later than mid-1976.

The timing specified in b) above was based on the eventual need to allow necessary measures to be taken by States and operators and especially Denmark, which had a particular supply problem with regard to the two LORAN A Stations located in Greenland (para. 1.33 of Doc 9125, SP NAT/PAC (1974) refers).

5.27 In further discussion of this subject it was pointed out that the present military funding arrangements for certain LORAN A Stations in the NAT Region are scheduled to be terminated at the end of 1977, and some States involved in such funding have already stated clearly that they are not prepared to contribute to any new arrangements. In addition, as recorded in the Report of the Special NAT/PAC RAN Meeting, a number of States have also made it quite clear that, after the withdrawal date for LORAN A Stations in the NAT Region specified in Recommendation 1/2 of that Meeting, they will disassociate themselves from any scheme intended to provide joint financing ensuring the continued operation of the LORAN A Stations in question. It might therefore be difficult to conceive a scheme extending the life of LORAN A Stations in the NAT Region beyond the end of 1977, unless it covered also complete plans for their funding.

5.28 The Group was therefore at a certain loss to assess further developments in the NAT Region should a requirement for the continuing of LORAN A Stations in the NAT Region be forthcoming, because it felt that any further Meeting putting into question the withdrawal date for LORAN A Stations in the NAT Region, specified in Recommendation 1/2 of the Special NAT/PAC RAN Meeting, would have to concern itself almost exclusively with questions regarding the continued financing of these Stations.

5.29 A short, purely informative consultation amongst representatives present at the Meeting, taken after the above-recorded discussion, showed that the following appeared to have no wish to see the LORAN A question re-discussed:

Canada, Denmark, France, Iceland, Ireland, Portugal and the United Kingdom.

The Netherlands indicated that they were still involved in studies regarding this question but that in all likelihood these would conclude that they also saw no need for another review of this subject. A similar position was stated by the USA.

5.30 However, IATA pointed out that, as of this time, their position had not changed from that recorded in its Statement made at the Special NAT/PAC RAN Meeting 1974, because some of its member airlines still had problems with the withdrawal of LORAN A from the NAT Region. In addition, it was noted that the question of providing an adequate substitute for LORAN A navigation for some Eastern European airlines was still meeting with political difficulties. It was however further noted that efforts were being made to overcome these.

5.31 Apart from that, the Group believed that, if the timing of the Limited NAT RAN Meeting in 1976 was no longer conditioned by the LORAN A issue, it should then be postponed to the latter part of 1976 in order to provide more time for preparations of measures required by that Meeting as a consequence of the results of the 9th AN Conference. (The Summary of Agenda Item 6 refers.)

5.32 Finally, it was also mentioned that, in scheduling the LIM NAT RAN Meeting 1976, due account would have to be taken of the accommodation situation created in Montreal by the Olympic Games.

CONCLUSION 11/12 - SCHEDULING OF THE LIM NAT RAN MEETING 1976

That, if not required to reconsider the LORAN A situation in the NAT Region, the Limited NAT RAN Meeting 1976 should be scheduled for the latter part of 1976 and preferably some time in late September/October of that year.

APPENDIX A
to Summary of
Agenda Item 5

THE USE OF AUTOMATED NAVIGATION SYSTEMS IN OCEANIC AIRSPACE

1. In the second half of 1974 the ATC radars monitoring the exit areas from the North Atlantic organised track structure have detected a number of gross navigational errors involving turbo-jet aircraft using automated navigational systems. The effect of these errors has been that aircraft had deviated from their assigned track and become established on an adjacent track being used by other aircraft flying in either the same or opposite direction. Such loss of the lateral or vertical separation normally provided by track structure design must result in very considerable hazard of collision.

2. In the past the lack of absolute precision in the processes of normal navigation using, for example, Loran A or Astro provided some protection under such circumstances in that even should a gross deviation occur it was of low probability that any two aircraft would be navigated with sufficient precision to cause a collision. However, with the development of the Inertial Navigation System and station referenced systems which provide a similar degree of accuracy, with provision for programming the entire flight path of the aircraft on the flight deck, it was realised that special care would be necessary to avoid mistakes in programming. It was appreciated that the magnitude of errors in maintaining a particular track depended not only on the accuracy limitations of the navigation aid being used but also on whether the track being flown was in fact that assigned by the air traffic control organisation. It was evident that an experienced and otherwise competent crew member could easily negate the value of the basic navigation system by feeding in wrong information. Most operators have devised drills intended to prevent such mistakes or to ensure that they are detected before flight progress was adversely effected. As a result the initial years of use of these systems during the period from 1969 to mid-1974 had been remarkably free of incidents arising from faulty insertion of data.

3. During the latter part of 1974, however, there was evidence that perhaps familiarity with these new systems had bred a degree of complacency, and that some crew members had been failing to comply with the flight deck drills which had been designed to prevent mistakes. ATC radars recorded six cases of major error by aircraft leaving the ocean, all of which showed multiples of 1° of latitude. In addition, one error of 3° of latitude occurred outside radar coverage but was reported by the operating crew. A typical example was:

> A B707 aircraft was cleared on Track Echo at Flight Level 330, reports over 52N 20W at 1126 and was estimating 52N 15W at 1146. The aircraft was identified by ATC Radar at 1155 over 54N 14W

on Track Delta. The pilot initially advised ATC that his Inertial Navigation System was unserviceable but the operator eventually acknowledged that the error was due to the insertion of incorrect way-points into the INS. According to the operator, the First Officer, due to sickness, had not been on the flight deck when the way-points were inserted into the INS and established cross-check procedures were therefore not followed. The resultant deviation from track was not noticed due to concentration of the crew on copying weather information and obtaining a domestic ATC clearance.

The remedial action taken by operator was:

a) Check flight for pilot-in-command concerned;

b) A change of Procedures requiring the flight engineer to participate in the insertion of data into the INS whenever one of the pilots is absent from the flight deck.

4. Investigation has revealed that all the seven errors reported occurred with different operators. The casual factors can be summed under three headings:

i) Failure to correctly copy the Oceanic Clearance or to extract the correct data from the track message.

ii) Initial failure to insert the correct way-point data into the navigational computer for a significant portion of the route.

iii) Subsequent failure to check the outputs from the automated navigation system against either the ATC Clearance or the aircraft's pre-computed flight plan (i.e. actual tracks/distances against required tracks/distances or present position against cleared co-ordinates).

5. In the case of i) above, the UK National Air Traffic Services have already taken action to improve the format of the track message by introducing double-spacing between the track listings. Oceanic Centres have introduced this new format and it is hoped that operators will follow suit in distributing the material to operating crews. This should reduce the possibility of transcription error but care must nevertheless be continued to be exercised. In the case of ii) and iii) above, co-operation between IATA and other Agencies has led to the production of the material contained in Appendix B to the Summary of Agenda Item 5. This material has been developed from a more comprehensive document entitled "Advice on the use of INS over the North Atlantic" (IATA Doc GEN 2391). Although, in this case, the

reference is to navigation with Inertial Navigation Systems, it should be appreciated that this advice applies equally to any other systems such as Doppler or VLF equipment in which a high degree of automation is dependent for its precision on absolute accuracy by the operating crew in the insertion of data.

6. To sum up, freedom from collision in Oceanic airspace can only be assured by the vigilance of operating crews in maintaining safe and proper operational procedures. Only the most extreme emergency could be acceptable as a reasonable excuse for not following the appropriate drills laid down for the use of these new precision navigational equipments.

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APPENDIX B
to Summary of
Agenda Item 5

PROPOSED PROCEDURES FOR USE BY OPERATORS AND PILOTS TO AVOID BLUNDERS IN THE USE OF AUTOMATED NAVIGATION EQUIPMENT

1. INTRODUCTION

1.1 It is always important to be careful and accurate when navigating. When INS is being used, and because of its very precision, this care and accuracy is even more vital. Blunders must be prevented from occurring. Just as safety is no accident, so the avoidance of blunders calls for a deliberate programme involving both the operator and the flight crew. The following summarises such a programme.

2. MEASURES TO BE TAKEN BY THE OPERATOR

2.1 The operator must impress upon each pilot the need to achieve a minimum performance standard with regard to en-route navigation.

2.2 The operator must make sure that this awareness is maintained amongst its pilots.

This can be achieved during periodic route checks and refresher courses ; and, for example, by issuing at periodic intervals details of any serious INS blunders which may have occurred. It may also be useful to encourage crews to report cases of mishandling of INS equipment. However, checks and reminders should not be so elaborate or so frequent as to be self-defeating.

2.3 The operator must make sure that the position co-ordinate data which is supplied to its pilots is accurate and in standard form (e.g. N 5427.3 W 113 34.6)

2.4 The operator must weigh the advantages of in-flight up-dating against the risks of mistakes being made, and lay down rules for crews to follow.

3. STEPS TO BE TAKEN BY THE FLIGHT CREW

3.1 Irrespective of the number of INS carried, the insertion of way-points and of present position must never be carried out in its entirety by a single individual. Another competent crew member must participate independently. This applies on the ground, in flight, and particularly when a re-clearance is received. (Some operators do not favour this participation being simultaneous, and obviously in flight it is preferable for one pilot to be exercising normal flight surveillance).

3.2 When data is being inserted it should always be transcribed from the most direct source available and not from some indirect copy.

3.3 Over each way-point, the track angle and distance to the next way-point should be checked.

3.4 For Oceanic flights, all track way-points must be cross-checked against the track message and the Oceanic clearance. It is desirable to insert the co-ordinates of at least the first few Oceanic way-points before leaving domestic airspace.

3.5 It is, of course, normal good airmanship for one pilot, probably the pilot in command, to consider himself responsible for the progress of the navigation. He should compare the cross-track and along-track data of the different INS. He should also check heading and flight progress by referring to alternative sources of information such as radio facilities, visual landmarks, even the approximate azimuth of sun or other celestial bodies.

Note : Many operators use the following procedure as a ready means of continuous cross-check between IN systems : one INS is coupled to the auto-pilot, and the other is made to display cross-track mileage and track error ; divergence between the systems is thus readily apparent.

3.6 The greatest care must be taken regarding in-flight up-dating which should only be done under conditions approved by the operator. Where terminal errors are recorded for accuracy and reliability assessment, the up-date must be removed before recording the terminal co-ordinates.

3.7 Examples of safeguards applied by some operators are as follows :

i) On approaching a way-point, when the alert light illuminates, press the "hold" button on the steering INS ; read off the present position (POS) and copy this onto the flight plan. Check that the latitude agrees with the cleared latitude (apart from the minor discrepancy which can result from the possible time difference). When the alert light goes out, check that the coordinates of the next way-point agree with the ATC clearance which is currently effective. At this stage, make the check of track and distance to the next way-point, as well as the coordinates of the next way-point ;

ii) When recording item 5 of the AIREP, "Next Position and Time Over", the co-ordinates of the next position are read off the CDU display of the INS unit to which

the auto-pilot is coupled by setting the display selector switch to WPT, and the WPT selector switch to the appropriate WPT number (1 through 9). This procedure will ensure that if an error in inserting the way-point co-ordinates has occurred, then the erroneous co-ordinates - differing from clearance - are reported to the OACC. It is expected that this will cause the air traffic controller to query them which, in turn, will alert the crew to the error.

3.8 In addition, the following is included because blunders are believed to have occurred as a result of failures to take the precautions mentioned:

i) Minor emergencies must not be allowed to distract the pilot to the extent that the INS is mishandled;

ii) If the auto-pilot is disconnected during cruise because of turbulence, the usual care must be taken. The INS guidance should be followed, and when the auto-pilot is re-engaged, the INS navigation mode should be re-selected.

Note : If the system which is being used sets a specific value on the boundary of automatic capture, the across track indications should be monitored to ensure that the programmed flight path is recaptured.

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APPENDIX C
to Summary of
Agenda Item 5

PRELIMINARY

GUIDANCE MATERIAL FOR THE INITIAL ACCEPTABILITY OF LONG-RANGE NAVIGATION SYSTEMS FOR USE IN THE OTS OF THE NAT REGION

1. Introduction

1.1 With the adoption by the Council of Recommendation 1/2 of the Special NAT/PAC (LORAN A) Meeting, that the Loran A facilities will cease operation in the North Atlantic Region on 29 December 1977, it is necessary to consider how the operational requirements of any replacement long distance navigation aid should be evaluated. As the North Atlantic is the most critical specific area, a general agreement on the methodology to be followed in the process of such an evaluation is necessary to ensure that any new system will not degrade navigation performance which, in turn, would necessitate an increase in the separation standards of the OTS.

2. General

2.1 It is suggested that the process of evaluation by national authorities can be conveniently divided into three phases:

Phase 1: Airworthiness Requirements of both the equipment and its installation in the aircraft.

Phase 2: Assessment of the performance of the navigation equipment. This should include the in-flight determination of the error and reliability characteristics of the system.

Phase 3: Operational approval of the entire system.

3. Phase 1

3.1 The essentials for this Phase are already covered by Airworthiness Requirements.

4. Phase 2

4.1 Accuracy

4.1.1 A significant sample of flights, determined by the national authority in accordance with relevant circumstances, will be required for the evaluation of the navigational performance of the equipment. The ATS radars on both sides of the Atlantic could be used

to monitor the aircraft or alternatively the equipment position could be compared to fixes of comparable accuracy (e.g. DME/DME ranges). Currently acceptable aids (Loran A, Astro, Doppler or INS) will have to be used to check for any gross errors in the Oceanic area outside the cover of the radars. The results of this exercise should be presented in the form of a distribution of observed navigation errors. Some of the data could be collected in continental airspace where short-range aids, such as VOR/DME, provide a means of rapid fixing of the aircraft's position.

4.1.2 The acceptability of the level of accuracy achieved will depend on the minimum navigational performance specifications developed for the NAT Region, but tentative figures are outlined in Note 1 to para. 2.7 of Attachment A to Part 1 of Annex 10.

4.2 Reliability/Integrity

4.2.1 During the accuracy evaluation described in para. 4.1, it will be possible to obtain some idea of the reliability of the equipment when fitted in an aircraft, but an MTBF calculated on the basis of bench testing should be sufficient at this stage.

5. Phase 3

5.1 The objective of this Phase is to consider the equipment under evaluation in terms of the total navigation system onboard the aircraft. The operational requirements of long-range navigation systems are set out in para. 2.4 of Attachment A to Part 1 of Annex 10. Navigation systems can be considered under two main headings:

a) "Station Referenced" systems, and

b) "Self-Contained" systems.

5.2 Station Referenced Systems

5.2.1 The factors to be considered for these systems are the action required in the event of failure, malfunction or interruption of the equipment or of any other aircraft system necessary to its function (rate aid). In addition the failure, malfunction or interruption of the station reference must also be considered. The required stations must be sufficient in number and geographically located so as to provide adequate fixing coverage throughout the OTS. Where a station referenced aid is used by civil aircraft there must be assurance that the service will remain continuously available for such purposes, preferably by direct agreement between the provider States. This agreement should also include appropriate arrangements for the notification of short- or long-term deficiencies/outages and the co-ordination of maintenance periods. The sum of these system reliability calculations should be as near 100% as is achievable.

5.3 Self-Contained Systems

5.3.1 The same considerations as stated in para. 5.2 apply to these systems with the exception that there is no station reference to be considered. In practice the use of a self-contained system to supplement a station referenced system should enhance the integrity of the total navigation system and increase the possibility of achieving the given reliability level.

5.4 Training Programmes

5.4.1 Adequate training programmes which cover the duties and responsibilities of flight crew members, ground operational and maintenance personnel should be established. These programmes should include the manner in which the system is to be operated in the OTS.

Summary of Agenda Item 6 : Development of basic principles for minimum navigating capability specifications for aircraft on oceanic and long-range flights.

Introduction

6.1 Following discussions which had taken place in the past within the NAT/SPG when dealing with the LORAN A situation in the NAT Region, it had been found that, at one time or another, it would be essential to approach the question of minimum navigation performance specifications for certain areas if safety was to be maintained and full advantage taken of means and capabilities available in this respect amongst the majority of the users of such areas. When determining the items for discussion at the 9th AN Conference of ICAO, it had therefore been agreed that an item covering this subject should be included in the Agenda of that Meeting.

6.2 At the Special NAT/PAC (LORAN A) RAN Meeting in 1974 it was confirmed that such an item was of considerable importance to the NAT Region, and Recommendation 1/5 of that Meeting requested that work in this field be undertaken by ICAO at the next suitable opportunity and this not only on a world-wide basis but also with specific reference to the NAT Region.

6.3 In addition, in para. 1.39 of the Report of that Meeting, specific mention was made to work done in this field by the NAT/SPG and the Group was invited to give this "subject further priority attention so that it would be able to provide supporting documentation to ICAO as and when required". (Doc 9125, SP NAT/PAC (1974), page 1-13 refers.)

6.4 As it was now definitely agreed that the question of "minimum navigating capability" formed an Agenda Item of the 9th AN Conference, the Group had decided to prepare material on this subject for use by that Conference, and in undertaking this task at this Meeting it adopted the following approach:

a) to make a complete review of all those ICAO provisions likely to be affected by the subject;

b) to prepare, to the extent possible, at this Meeting specific proposals for action on the affected ICAO provisions;

c) to develop, for those cases where action under b) could not be completed, at least a line of attack for future work on them by the Group.

In any case it was fully appreciated by the Group that whatever material it would eventually produce had to be in the hands of ICAO by November 1975 at the latest.

6.5 In line with the above approach, the Group was subsequently able to produce basic material on the following:

a) the question of terminology used to describe the subject;

b) specific proposals for amendment to Annex 6;

c) review of other affected Annexes;

d) development of guidance material for inclusion in Annex 6;

e) proposed action for amendment of the PANS-RAC;

f) proposals for action in the formulation of "basic operational requirements" applicable to specific ICAO Regions;

g) proposed action with respect to Regional Supplementary Procedures as a result of action under para. f).

Proposed terminology

6.6 The Group noted that, when dealing with the subject under consideration, the Special NAT/PAC (LORAN A) RAN Meeting 1974 had used the term "Minimum Navigation Performance Specifications", while the ASIA/PAC RAN Meeting in 1973, when dealing with the same subject, had used the term "navigational capability", and the Agenda of the 9th AN Conference now referred to "minimum navigating capability" on the understanding that this latter term was still tentative, the definite designation to be determined by the Air Navigation Commission at its 79th Session in June 1975.

6.7 It was pointed out that two operators might have identical equipment on their aircraft and that this might suggest that they would have similar capabilities; however, in the NAT Region, experience had shown that the performance of two such operators might be completely different. The further point was made that the term "capability" seemed more appropriate to the components of a system rather than to the performance of the total system. Therefore, the Group agreed to propose that its originally chosen term, i.e. "minimum navigation performance" should be retained from here on to refer to the subject under consideration.

Amendments to Annex 6

6.8 After a brief discussion on the principal question of whether necessary changes to Annex 6 to permit the prescription of minimum navigation performance specifications should be inserted in Chapter 4 or in Chapter 7 of Annex 6, and after having agreed that its inclusion in Chapter 7 would not only be entirely satisfactory from the point of view of covering the intended purpose but would also have significantly fewer subsequent requirements for changes of appropriate parts of national legislation by the States affected, the Group developed specific proposals for the amendment of both Parts I and II of Annex 6. These are reflected in Appendix A to this Summary.

Review of other affected ICAO Annexes

6.9 When making the proposal for amendment to Annex 6 described in para. 6.8, the Group was aware of the fact that this might result in the need for consequential amendments to other ICAO Annexes and PANS. Annexes in question were believed to be:

a) Annex 2
b) Annex 8
c) Annex 10
d) Annex 11.

6.10 With respect to Annex 2 the Group was, in fact, certain that at least para. 3.5.2.1 in Chapter 3 required amendment. However, in view of its present complicated wording, it was believed that the task of incorporating into that paragraph the consequential intent emanating from the amendment made to Annex 6 should best be left to the ICAO Secretariat which, in the opinion of the Group, was best qualified to undertake such work.

6.11 As to Annex 10, the Group noted that already at the Special NAT/PAC RAN Meeting certain difficulties had arisen with respect to the continued validity of para. 2.4 in Part I of Volume I of Annex 10. It also noted that, as a consequence of these difficulties, the Air Navigation Commission had requested its secretary to study the propriety of retaining this standard in Annex 10. In view of this situation, and fully convinced that the standard in question had in fact been superseded by events, the Group strongly suggested its deletion.

6.12 Without being able to identify the need for consequential amendments in Annexes 8 and 11, it was again agreed that this task, together with the formulation of detailed proposals for amendment, should be left to the ICAO Secretariat in view of what has been said in para. 6.10 about its qualifications.

Guidance material for inclusion in Annex 6

6.13 When considering the question of providing guidance material for the application of the new provisions of Annex 6 regarding minimum navigation performance specifications, the Group noted that for some considerable time material germane to this question had been contained in para. 2.4 of Attachment A to Part I of Volume I of Annex 10. The Group felt, however, that the larger part of this material, as it was related to operational rather than technical considerations, should now be amalgamated with some new material developed around the question of minimum navigation performance specifications and, in its new form, should be incorporated as guidance material into Annex 6, leaving it to the appropriate body within ICAO to re-formulate the remaining material in Annex 10, related to technical aspects only, for retention in that Annex.

6.14 As there was insufficient time at the Meeting to completely review and re-draft the intended guidance material for inclusion in Annex 6, the Group contented itself at this time with the development of the format of such material together with an indication of the material now contained in Annex 10 and its expected future place in the new material. This was done on the understanding that further work should be undertaken in accordance with the method proposed in the Summary of Agenda Item 8. The outline of the material prepared at this Meeting is shown in Appendix B to this Summary.

Amendments of the PANS-RAC

6.15 Apart from the need for as yet undefined consequential amendments to the PANS-RAC, resulting from the amendment to Annex 6, the Group was definitive in its views that paras 7.1.1 and 9 in Part 3 of the PANS-RAC required modification.

6.16 With respect to para. 7.1.1 in Part 3 of the PANS-RAC, dealing with the application of lateral separation, the Group felt that as a first measure it should be sub-divided into two parts, one dealing with application aspects in airspace not falling under the sovereignty of a specific State and another part dealing with airspace where the question of sovereignty was definitely established. In this context the Group was advised that the RGCS Panel was at present also engaged in a review of this paragraph and it was therefore hoped that this Panel would include in its review the above considerations.

6.17 As regards para. 9 in Part 3 of the PANS-RAC dealing with the reduction in separation minima, it was expected that any immediately apparent need for consequential action caused by the amendment of Annex 6 would be taken care of by the ICAO Secretariat.

6.18 However, it was also felt that, in view of subsequent action described below, it might also be required to extend the entire concept of this paragraph in order to deal not only with the possibility of reductions but also with increases in separation minima, if so dictated by significant changes to the navigation environment upon which the separation minima applied in a specific area were based.

6.19 Finally, it was recognized by the Group that Attachment A to the PANS-RAC concerning factors governing the determination of aircraft separation minima may require up-dating in the light of action taken as described above.

Action on the "Statement of Basic Operational Requirements and Criteria for Regional Planning"

6.20 It was expected that, if the 9th AN Conference accepted the provisions for the formulation of minimum navigation performance specifications, these would have to be translated into detailed specifications for application in specific ICAO Regions. The Group felt that these should best be incorporated into the relevant "Statement of Basic Operational Requirements and Criteria for Regional Planning". At the same time it was believed useful if an example of such an application to a specific Region would be given in order to illustrate the consequences resulting from positive action taken by the 9th AN Conference on this subject.

6.21 Due to lack of time it was, however, not yet possible to develop a specific proposal covering this aspect.

Consequential action required for the development of appropriate Regional SUPPs

6.22 In line with the views expressed in para. 6.20, the Group felt that there would also exist a requirement for the development of appropriate Regional Supplementary Procedures covering the application and other measures related to minimum navigation performance specifications in a defined area of applicability.

6.23 It was believed that such Regional SUPPs would essentially have to cover:

a) the separation minima applied, based on the minimum navigation performance specifications contained in the Statement of Basic Operational Requirements;

b) provisions for the continued monitoring of the navigation performance achieved by aircraft in actual operation to ensure that it remained within the minimum navigation performance established;

c) corrective measures to be taken whenever the condition specified in b) was no longer met.

6.24 Again, due to lack of time, it was not possible to develop specific proposals covering the above.

Possible consequences on other Agenda Items of the 9th AN Conference

6.25 When considering the question mentioned in para. 6.23 b) above, it was believed that, in order to permit responsible authorities to discharge themselves of the serious responsibilities resulting from this task, it might be necessary to request operators to provide more detailed information on the type of navigation equipment available on-board the aircraft and possibly the use made of it than was now required by existing provisions. It was therefore felt that it might be useful if the 9th AN Conference, under its Agenda Item 5, would take this aspect into account depending on the decision taken with respect to its Agenda Item 2.

CONCLUSION 11/13 - BASIC PRINCIPLES FOR MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS FOR AIRCRAFT ON OCEANIC AND LONG-RANGE FLIGHTS

a) That the Group should prepare supporting documentation on the subject of minimum navigation performance specifications for submission to the 9th AN Conference and that such documentation should be completed not later than by November 1975.

b) That the documentation mentioned in a) above should cover the following points:

i) a proposal for a definite terminology covering the subject;

ii) the specific amendment to Annex 6 contained in Appendix A to this Summary;

iii) a specific proposal to delete para. 2.4 in Part I, Volume I of Annex 10;

iv) a specific proposal for the inclusion of guidance material into Annex 6 in accordance with the lay-out shown in Appendix B to this Summary;

v) proposed wording to cover minimum navigation performance requirements for inclusion in the "Statement of Basic Operational Requirements and Criteria for Regional Planning";

vi) a list of points and, if required, proposed wording for them, requiring the development of Regional Supplementary Procedures covering the application of minimum navigation performance specifications.

c) That the ICAO Secretariat, based on the material provided by the Group, should prepare proposals for relevant consequential amendments to Annexes 2, 8, 10 and 11, and para. 9 in Part III and Attachment A to the PANS-RAC.

d) That the RGCS Panel, in its work on the revision of para. 7.1.1 in Part III of the PANS-RAC, should take into account the need for its modification resulting from the work done by the Group on the subject of minimum navigation performance specifications.

e) That necessary arrangements be made by ICAO to permit, under Agenda Item 5 of the 9th AN Conference, consideration of those aspects mentioned in para. 6.25 above.

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PROPOSED AMENDMENT TO ANNEX 6, PARTS I AND II

1. Annex 6, Part I:

Amend, in Chapter 7, para. 7.2.1 to read:

"7.2.1 An aeroplane shall be provided with navigation equipment which will enable it to proceed:

a) in accordance with its operational flight plan;

b) in accordance with the requirements of air traffic services; and

c) where established by Regional Air Navigation Agreement, in accordance with standards of minimum navigational performance established as conditions for operation in specified portions of the airspace or on specified ATS routes or route systems;

except when, if not so precluded by the appropriate ATS authority, navigation for flights under the visual flight rules is accomplished by visual reference to landmarks."

2. Annex 6, Part II:

Amend, in Chapter 7, para. 7.2.1 to read:

"7.2.1 An aeroplane shall be provided with navigation equipment which will enable it to proceed:

a) in accordance with its operational flight plan;

b) in accordance with the requirements of air traffic services; and

c) where established by Regional Air Navigation Agreement, in accordance with standards of minimum navigational performance established as conditions for operation in specified portions of the airspace or on specified ATS routes or route systems;

except when, if not so precluded by the appropriate ATS authority, navigation for flights under the visual flight rules is accomplished by visual reference to landmarks at least every 60 nautical miles."

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APPENDIX B
to Summary of
Agenda Item 6

BASIC LAY-OUT OF GUIDANCE MATERIAL RELATED TO MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS FOR INCLUSION IN ANNEX 6

A. Proposed title:

"Guidance material related to acceptable methods of compliance with standards of minimum navigational performance established as conditions for operation in specified portions of the airspace."

B. Proposed content:

1. General aspects related to minimum navigation performance specifications

In this section the substance of the following paragraphs of the present Attachment A to Part I of Volume I of Annex 10 should be reflected, and preferably in the order listed:

1.2.2

1.2.3

1.2.4

2.7

1.3.3

2. System Performance Requirements

2.1 Basic requirements.

2.2 Essential operating procedures.

2.3 Evaluation programmes.

2.4 Limitations to the approval of equipment (for guidance, a list containing levels of approval normally applied should be added).

3. Method of application of minimum navigation performance specifications based on regional air navigation agreements

3.1 Action to obtain compliance.

3.2 Monitoring procedures.

3.3 Publication in applicable Regional documents.

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Summary of Agenda Item 7 : Operational problems of current interest.

Introduction

7.1 Under this Item the Group dealt with a variety of operational problems which had accumulated since its last Meeting and which required resolution because they referred to matters which were either of direct interest to NAT operations or could be expected to become so in the very near future. The problems in question were:

a) Developments regarding vertical separation in the EUR Region and possible effects on NAT operations;

b) Review of consequences on the NAT Region of the provision of an ATS route in the North Sea used by sub-Polar and Polar flights;

c) Application of longitudinal separation based on the use of Mach number techniques in the NAT Region;

d) Fuel conservation measures in the NAT Region;

e) Improvement in operating conditions for air traffic operating in the Southern part of the NAT Region;

f) Follow-up action on Recommendations of the Fifth Meeting of the SST Panel of interest to the NAT/SPG;

g) Relations with the NAT Traffic Forecasting Group.

Developments regarding vertical separation in the EUR Region

7.2 The Group was informed that the European Air Navigation Planning Group (EANPG) had requested ICAO to instruct its Panel conducting a General Review of the Concept of Separation (RGCSP) to undertake, as a matter of priority, work on the feasibility of reducing the vertical separation minima above FL 290 in the EUR Region or in specified parts thereof. It was likely that, should the separation be changed, this would have immediate consequences on the handling of air traffic in the transition area between the EUR and NAT Regions, and it was therefore believed useful to briefly review the situation.

7.3 Due to the fact that Mr. White, the Member from the United Kingdom, is also a Member of the RGCSP, it was possible to obtain first-hand information on the present situation and from this it became apparent that, based on existing conditions, there was very little likelihood that the present vertical separation minima now applied in the EUR Region above FL 290 could be changed safely in the near future.

7.4 In fact, while there were indications that a reduction could be feasible between aircraft equipped with modern type altimetry equipment including automatic height-locks and operated with the automatic controls engaged, this was no longer the case when, because of turbulence or for other reasons, the height-lock had to be disengaged and the aircraft had to be flown manually. In addition, in areas where civil and military air traffic mixed, the latter also constituted an obstacle to any reduction because their altimetry equipment (and especially the means used for altitude correction) was not yet in all cases comparable to that of modern civil aircraft.

7.5 It was therefore felt that the application of reduced vertical separation above FL 290 would have to be made dependent on so many conditions that it would become impracticable for controllers, and this even in those conditions where the restrictions created by the presence of inadequately equipped military aircraft were removed.

CONCLUSION 11/14 - REDUCTION IN VERTICAL SEPARATION ABOVE FL 290

That there was no immediate need to consider the effects of a reduction in vertical separation above FL 290 in the EUR Region on NAT operations.

Consequences on the NAT Region of an ATS Route in the North Sea used by sub-polar and polar flights

7.6 In the past, the Group had repeatedly been required to concern itself with the situation regarding ATS routes over the North Sea because of the incidence their alignment had on the integration of traffic using them into the overall flow of air traffic in the transition area between the EUR and NAT Regions. At this Meeting it was noted that this question had, once more, come up as a consequence of an Informal Meeting on ATS problems in the North Sea Area held in May 1974 in København, where it had been agreed that IATA should propose one route serving both sub-polar and polar flight operations departing from Western Europe for subsequent negotiation with those States and Organizations directly concerned by such a route. The Group was also informed that, on 24 April 1975, a Meeting dealing with such a route had taken place between all parties concerned but that it had not been possible to reach a definite agreement on its ultimate alignment on this occasion.

7.7 When discussing this matter, the Group wanted it to be clearly understood that it did not wish to become involved in problems which were essentially to be resolved amongst EUR States, and that its intervention was strictly limited to those of its aspects which could have a bearing on NAT operations. These were basically twofold:

a) to have the route in question enter the NAT Region at a point where the integration of traffic operating on it would cause the least difficulties to the OAC's concerned (Shanwick or Reykjavik OAC's);

b) to arrange for an alignment of the route within the EUR Region so as to facilitate co-ordination between the last EUR ACC concerned with the flight and the first NAT OAC whose Oceanic CTA the flight was entering.

7.8 The Group noted that, in order to meet the requirements in para. 7.6, IATA was now proposing a route extending from point "Bluebell" (intersection of B1 with Amsterdam FIR boundary) via 5500N 0300E and 5800N 0100E to 6100N 0030W (where it would enter the Reykjavik Oceanic CTA). This proposal had the advantage that co-ordination of flights operating on this route could be effected between Scottish ACC (Prestwick) and Reykjavik OAC on the existing ATS direct speech circuits between Scottish ACC, Shanwick OAC and Reykjavik OAC, while a more northerly alignment of the route, penetrating the Stavanger FIR, would only aggravate the long-standing co-ordination difficulties between Stavanger ACC and Reykjavik OAC, mainly caused by the absence of a reliable ATS direct speech circuit between these two ATC units. (Summary NAT/SPG 8, paras 4.2 and 4.8 and Summary NAT/SPG 9, para. 5.2.4c) refer.)

7.9 As to the integration into the NAT traffic flow of air traffic entering the NAT Region at 6100N 0030W, this was not believed to present any special difficulties.

7.10 It was however noted that the alignment of the route as proposed by IATA was likely to cause difficulties in the Scottish FIR where it conflicted with areas of intense military operations. As this problem was entirely located within the EUR Region, the Group, in accordance with the principles recorded in para. 7.7, agreed that its resolution should be left to further negotiations between the interested parties in the EUR context.

CONCLUSION 11/15 - ATS ROUTE FOR SUB-POLAR AND POLAR FLIGHTS

That, if at all possible, an ATS route across the North Sea and used by sub-polar and polar flights departing from Western Europe should be aligned so as to avoid entering the Stavanger FIR prior to entering the NAT Region.

7.11 This Conclusion was formulated on the understanding that further necessary co-ordination regarding the detailed alignment of the route in the EUR Region, its implementation and conditions of use would be effected by all parties concerned outside the scope of the NAT/SPG.

Application of longitudinal separation based on the use of Mach number techniques in the NAT Region

7.12 At the present time, the application of 15 minutes longitudinal separation between turbojet aircraft in certain parts of the NAT Region (and its reduction to 10 or 5 minutes under specified conditions) is governed by the provision that the aircraft concerned have reported over the same entry point into oceanic controlled airspace. (Para. 1.2.1 4) a) on page RAC 1-2 of Doc 7030 refers.)

7.13 In the ensuing discussion on the application of longitudinal separation based on the use of Mach number techniques, it became apparent that different interpretations seemed to exist of what constituted the "entry point into oceanic controlled airspace". One view held was that this was the last land-based navigation aid crossed by a flight before starting the over-water portion of its flight, while the majority view was that this term defined the point at which aircraft entered the NAT Region as defined in Doc 7030 and the NAT Regional Plan, i.e. that area where the NAT Regional SUPPs applied. It was therefore agreed that, in order to avoid further confusion on this issue, it should be confirmed definitely that the term "entry point into oceanic controlled airspace" referred to those points where the aircraft entered the NAT Oceanic Control Areas.

7.14 Following this clarification it was noted that there were now cases where aircraft could be allowed to enter the oceanic controlled airspace via different entry points but within primary and/or secondary surveillance radar coverage and, while still within such radar coverage, pass over a point or points from which to proceed on the same or on continuously diverging tracks. It was believed that, under these circumstances, it should be permissible to use the longitudinal separation minima referred to in para. 7.12.

7.15 At the same time it was pointed out that a similar situation was likely to arise with regard to aircraft in supersonic flight and that therefore similar arrangements should be made to permit the application of the proposed minimum longitudinal separation now covered in a proposal for amendment to the NAT RAC SUPPs to them in those cases where they entered the oceanic controlled airspace over different entry points but within radar coverage.

7.16 It was therefore agreed that an appropriate amendment of the relevant NAT RAC SUPPs should be proposed and the Member from the UK indicated his willingness to take the necessary action. The specific proposals for amendment of the NAT RAC SUPPs are contained in Appendix A to the Summary of Agenda Item 7.

CONCLUSION 11/16 - PROPOSAL FOR AMENDMENT OF THE NAT RAC SUPPs - APPLICATION OF LONGITUDINAL SEPARATION

That the proposals for amendment of the NAT RAC SUPPs shown in Appendix A to the Summary of Agenda Item 7 should be presented to ICAO for immediate processing and that the Member from the United Kingdom would take necessary action to this extent.

Fuel conservation measures in the NAT Region

7.17 At its Tenth Meeting, the Group had discussed various possibilities intended to assist operators in saving aviation fuel. Some of these measures envisaged efforts by all parties concerned to ensure that most recent MET data could be used not only for the establishment of the organized track system (OTS) but also by operators to up-date their flight planning in the light of actual MET conditions encountered by preceding flights. (NAT/SPG Summary/10, paras 7.2.6 to 7.2.10 refer.)

7.18 The Member from Canada informed the Group of a number of measures which had already been taken or were being pursued by Canada in co-operation with the USA, and especially the United States National Weather Service, in order to provide for improved use of MET information for the establishment of the OTS. In this respect it was noted that, at present, a three hours delay in the publication of the Gander night-OTS message was experienced simply because the prognostic chart (PROG) which is used for this purpose, together with minimum time track (MTT) information from operators and ATC, is received three hours later than the other information, even though it is derived from the same forecast weather information. It was stated that this delay in the provision of the required PROG chart appeared to be due primarily to the inability to obtain an earlier scheduled transmission time on the Montreal-Gander weather facsimile circuit over which the chart is transmitted after receipt from the US National Weather Service at Suitland.

7.19 A proposal by Canada to eliminate this delay by the use of the 1800 PROG chart instead of the 0000 chart now used, because it appeared that there were only minor deviations between them and thus in the effect on the OTS, was not accepted by the operators because they felt that there might be occasions where this might have adverse effects on their fuel consumption. A counter-proposal by IATA to eliminate the need of a PROG chart as a pre-requisite for the establishment of the OTS and basing it exclusively on MTT information was not, however, retained either, because Gander OAC insisted on the need of this chart for the determination of the OTS. It was therefore agreed that efforts should be concentrated on the earliest possible provision of the required PROG chart to Gander OAC so as to reduce the present delay as much as possible.

7.20 As to medium- and long-term improvements in this field, Canada stated that a number of studies, simulation exercises and real time evaluations, all aimed at the use of most recent and reliable MET data for planning as well as for current up-dating of such data, were being pursued but that it would be some time before significant changes could be expected, not only because of the complexity of the task but also because of the need for constant consideration of the cost-effectiveness aspect of work in this field.

7.21 The Member from the United Kingdom reported that work in this field in his Administration had been somewhat delayed since the Tenth Meeting because of a re-organization and resultant personnel changes, but that it could now be expected that work would be resumed on all those aspects mentioned in the Summary of the Tenth Meeting of the Group. He stated however that, in contacts with the UK MET services, it had been mentioned that the existing provisions for MET reporting by pilots were not complied with in all cases and that it might therefore be useful to recall them to the attention of pilots.

7.22 Finally, it was suggested that it might be worthwhile to consider whether improvements could be made in the provision of MET data at times corresponding more closely with peak traffic demands in the Region rather than with a schedule determined by operationally non-significant fixed clock hours.

CONCLUSION 11/17 - ACTION ON FUEL CONSERVATION MEASURES IN THE NAT REGION

a) That Canada should make every effort to reduce the present delay of three hours in the provision of the PROG chart, on which the determination of the OTS was based, to Gander OAC so that the OTS message could be issued much earlier than was now the case.

b) That States and Operators concerned continue work in order to obtain earliest possible improvements with respect to those points mentioned in para. 7.2.7 of the Summary of the Tenth Meeting of the NAT/SPG.

c) That States and Operators concerned, through appropriate measures, ensure full compliance by pilots operating in the NAT Region and all other parties concerned with those provisions concerning MET reporting applicable in that Region.

Improvement in operating conditions for air traffic operating in the Southern part of the NAT Region

7.23 IATA proposed to the Meeting to consider certain improvements to the operating conditions for air traffic originating from or flying across the Iberian Peninsula and continuing into the NAT Region because it could, in their view, be expected that this traffic would continue to increase. When discussing this subject it was found, however, that there existed a number of other, related problems affecting the Southern part of the NAT Region and it was therefore agreed to briefly review all of them on the understanding that the development of detailed measures, aimed at the improvement of shortcomings and/or difficulties should be left to negotiations between the parties directly concerned, including the affected operators. The following therefore only contains a brief description of problems encountered and possible solutions which should be further explored by the parties concerned.

7.24 With regard to westbound traffic originating in or operating across the Iberian Peninsula into the NAT Region, it was noted that at present there were, on many occasions, only two tracks available to cater for this traffic, namely the one extending from Lisboa into the NAT Region and one extending from Santiago, the latter with the disadvantage that it was only a tributary route joining a major track in the NAT Region, a fact which limited its traffic acceptance capacity very seriously. The next full NAT track to the North was normally one which extended from Quimper in France into the NAT Region. Furthermore, the ATS routes in Spain permitting access to Santiago for flights from Barcelona and points further East were at present not aligned on the shortest route possible.

7.25 It had also been found that planning flights across the Bay of Biscay on freely chosen tracks could be very penalizing because flights concerned were, at times, suffering considerable re-routing in order to avoid other activities in this area. It was therefore believed that there existed an urgent need for at least one additional route based on Bilbao and extending from there into the NAT Region and that possibilities to provide, under certain conditions, a route extending from Cognac and one starting at Porto in Portugal should be investigated as a matter of urgency. In the latter case, it would also be required to negotiate a reasonable access to Porto from suitable points in Spain via established ATS routes.

7.26 It was suggested by IATA that the problem of accommodating these additional tracks in the organized track system (OTS) might be overcome by the extended use of composite separation in its Northern part, thus permitting a compression of established tracks in that area. It was however pointed out that this was not the entire problem because there would still remain the question of providing additional exit and land-fall points on the North American side of the Atlantic to

accommodate traffic operating on these additional routes. It was therefore agreed that this subject needed further study but that, in any case, both Spain and Portugal should be requested to study the possibilities of providing additional routes to the NAT Region starting from Bilbao and Porto respectively and including the question of access to these points via the EUR ATS Route Network.

7.27 A further question concerned the provision of one or more tracks at night to accommodate eastbound traffic from the New York area towards the Iberian Peninsula. It was noted that in the year ending on 30 September 1974 a track catering for such traffic had been established on thirteen occasions only, usually extending from points Cod or Tuna to Santiago. These thirteen cases were well scattered throughout the year in question but the track had usually been established when the main jet stream (and consequently the OTS for eastbound traffic to the London/Paris/Frankfurt area) was situated well to the South. When such eastbound tracks are established, consideration should also be given to traffic from Canada to the Iberian Peninsula to ensure that such traffic is not adversely affected.

7.28 In addition, New York, Shanwick and Santa Maria OAC's were frequently confronted with considerable problems created by the crossing of, on the one hand, air traffic departing from numerous departure points situated in Florida and further South in the CAR Region and bound for the London/Paris area, and on the other hand air traffic departing from the New York area and bound for destinations on the Iberian Peninsula and points further East.

7.29 It was believed that these problems could be eased considerably if flight planning for this traffic along random tracks could be reduced, i.e. by the more frequent provision of one or two organized tracks starting at points Codds and Tunna respectively. However, in order to make optimum use of such tracks, it would be required that operators provide New York OAC with advance information of their intentions in accordance with the provisions in para. 3.5.1.1 of the NAT RAC SUPPs, which they are not required to do at present. IATA pointed out that, in their view, the application of this procedure with New York OAC would not create any difficulties to its operators if they were requested to do so. In fact, with appropriate advance notice, it was believed that this could be applied on a trial basis even before the appropriate provisions in Doc 7030 had been amended. The adoption of the latter course of action was also believed to be opportune because it was learned that the New York OAC was at present in the process of revising its local operating procedures. It was therefore agreed that this matter should be further pursued by direct negotiations between the parties concerned.

7.30 Finally it was noted that, on those occasions when, due to MET conditions, the day-time OTS for westbound traffic had to be established well to the South in the NAT Region, crossing tracks were required to permit eastbound traffic operating between New York and London to cross that westbound traffic operating between the Iberian Peninsula and New York or points situated further to the North. It was noted that, on occasion, such "crossing tracks" had been provided and IATA requested that more extended use be made of them whenever conditions so required. In addition, it was requested by IATA that, in certain conditions, crossing tracks should be provided for eastbound traffic at night to permit flights originating from the Montreal area and bound for the Iberian Peninsula or Italy to cross the OTS in their flight to the South in order to be able to operate at economically suitable levels. In this context it was noted, however, that this question was likely to have repercussions on the problems mentioned in paras 7.27 to 7.29 and that it would therefore have to be treated in conjunction with them.

CONCLUSION 11/18 - IMPROVEMENT OF OPERATING CONDITIONS IN THE SOUTHERN PART OF THE NAT REGION

That States and Operators concerned, and more especially Portugal, Spain and the USA, undertake necessary co-ordinated studies in order to resolve the problems described in paras 7.23 to 7.30 at the earliest possible time.

Follow-up action on SSTP/5 Recommendations of interest to the NAT/SPG

7.31 The Group was informed by its Secretary that the Air Navigation Commission, when reviewing the Report of the Fifth Meeting of the SST Panel, had requested the Secretary General of ICAO to bring certain material developed at this Meeting to the attention of the NAT/SPG so that it could be taken into account in their future work on SST operations in the NAT Region. This concerned essentially three subjects:

a) application of vertical separation between SST aircraft;

b) application of radar separation to SST aircraft;

c) provision of essential information to SST aircraft.

7.32 With regard to para. a) above, it was noted that the SSTP had developed material which appeared to imply that vertical separation between SST aircraft could be those used at present between subsonic aircraft, i.e. 300 m (1000 feet) up to FL 290 and 600 m (2000 feet) above that level. At the same time, the SSTP had requested that this material be used by appropriate bodies, such as the NAT/SPG, to formulate respective operating procedures for practical application.

7.33 When dealing with this subject, the Group noted that a proposal for amendment of the NAT RAC SUPPs, developed by the Group at its Tenth Meeting and thereafter formally submitted to ICAO for processing by the United Kingdom (NAT SUPPs - RAC/1 of 2 May 1975), specified that at least 4000 feet vertical separation should be provided between SST aircraft while they were in supersonic flight. (Proposed new para. 1.5.1 in Part 1 of Doc 7030.)

7.34 After having reviewed the material provided by SSTP/5 on this subject (see the report on its Agenda Item 8 together with SSTP/5 - WP's 16 and 35), the Group concluded that:

a) some of the technical assumptions made in the supporting documentation used by the SSTP appeared not to be substantiated by actual operating experience;

b) the condition that SST aircraft in supersonic flight would always be flown with automatic control, including the use of the height-lock, was not yet confirmed by practical experience;

c) the environment in which SST operations in part of the NAT Region were likely to operate included other traffic and that it was therefore essential to take account of this as well in practical application.

7.35 It was therefore unanimous in its view that the requirement for a minimum of 4000 feet vertical separation between SST aircraft in supersonic flight should be maintained for the time being and that any changes thereto should only be made once substantive evidence based on practical experience had come to hand, showing that a reduction was possible without any risk to flight safety.

7.36 With regard to the application of radar separation to SST aircraft (sub-para. b) of para. 7.31 refers), the Group noted that SSTP/5 Recommendation 6/1 required in its sub-para. b) that States should provide "for special training of radar controllers required to handle SST aircraft in the transonic and supersonic phases of flight". When discussing this requirement, the provider States likely to be concerned with SST operations in the NAT Region and in adjacent transition areas were unanimous in their views that, while it was necessary to adequately brief controllers concerned with such operations on the particular operating characteristics of these aircraft and arrange for appropriate on-the-job training, there was definitely no need for the provision of specialized <u>formal</u> training, mainly because:

a) the number of controllers required to handle such aircraft was originally very limited and would only grow slowly; and

b) many of these controllers were already now familiar with supersonic operations because of military operations conducted in their area of coverage and, partly, under their control.

7.37 As to the question of providing adequate briefing material on SST operations to controllers, the Group noted that this had already been covered in its Summary on Agenda Item 4.

7.38 On the question of provision of essential information to SST aircraft in flight (sub-para. c) of para. 7.31 refers), the Group noted Recommendation 7/2 of SSTP/5 and the preceding material. It also noted, however that, as regards the information on the operational status of facilities (para. 7: 4.1 of the SSTP/5 Report), the Panel had been extremely vague and that it would therefore be difficult to formulate any reasonably concise procedures in this respect.

7.39 In addition, because of the very limited number of ATC units and aerodromes, initially expected to be concerned with SST operations in the NAT, EUR and NAM Regions (e.g. about two aerodromes on either side of the North Atlantic Ocean), it was not believed very useful to engage in the development of formal procedures at this stage but rather to rely on the fact that States concerned would make adequate ad-hoc arrangements which could be improved in the light of practical operating experience and by mutual co-ordination between States and operators until they had reached a degree of maturity, both as regards content and format as well as method of provision, warranting their adoption as Regional SUPPs and/or world-wide provisions.

CONCLUSION 11/19 - FOLLOW-UP ON SSTP/5 RECOMMENDATIONS

a) That the requirement for the provision of at least 4000 feet vertical separation between SST aircraft operating in supersonic flight in the NAT Region should be maintained unchanged until such time as conclusive evidence, based on practical experience, showed that this could be reduced without any risk to flight safety.

b) That provider States, likely to be concerned with SST operations in the NAT Region, ensure, by appropriate briefing and on-the-job training, that radar controllers required to handle SST aircraft in the transonic and supersonic phase of flight are able to provide this service safely and efficiently.

c) That provider States likely to be concerned with SST operations in the EUR, NAT and NAM Regions:

i) make adequate arrangements for the timely provision of essential information on aerodrome facilities and services and runway conditions to SST aircraft on request prior to deceleration/descent from supersonic cruise;

ii) improve such arrangements in the light of actual operating experience in co-ordination with the operators concerned;

iii) keep the NAT/SPG informed on this subject to permit the development of proposals for appropriate regional and/or world-wide procedures as and when considered suitable.

Relations with the NAT Traffic Forecasting Group (NAT/TFG)

7.40 The Group noted with appreciation that the latest NAT Air Traffic Forecasts for the period 1974-1978 with a projection to 1983 had been very accurate for the year 1974 when compared with actual traffic figures of that year. However, it also noted, and this with considerable concern, that these Forecasts, which had been prepared essentially in June 1974 (i.e. some ten months after the actual data of 1973, on which it was based, had become available), had not been made available to ICAO until March 1975, i.e. some fifteen months after the beginning of the forecast period covered. In addition it was noted that, when providing the Forecasts to ICAO in March 1975, the document had contained an inordinately large number of typing errors and other mistakes which had required the subsequent issue of a Corrigendum by ICAO.

7.41 The Group therefore felt that its concern over this situation should be recorded together with the request to the NAT/TFG to ensure that in future the recurrence of similar incidents with a document of this importance should be avoided, both as regards the delay in preparation and apparent lack of care in its presentation.

7.42 As to the next edition of the Forecasts, it was agreed that, because of:

a) certain changes in the composition of the NAT/TFG;

b) the delay to the issue of the last Forecasts;

c) the present fluctuating state of air traffic developments in the NAT Region; and

d) the known intention of the NAT/TFG to modify their present traffic forecast and projection method,

it might not be too useful if a Forecast covering the period 1975 to 1979 were prepared and that it might therefore be better to skip this Forecast altogether and concentrate on the timely preparation of one covering the period from 1976 to 1980 with a projection to 1985, based on actual air traffic data as recorded during the agreed data collection period in 1975.

CONCLUSION 11/20 - RELATIONS WITH THE NAT/TFG

That the NAT/SPG Members from Canada, the United Kingdom and the USA should take appropriate action to ensure that the NAT/TFG Members of those States be made aware of the comments of the Group contained in paras 7.40 to 7.42 and arrange their future activities within the NAT/TFG accordingly.

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APPENDIX A
to Summary of
Agenda Item 7

1. PROPOSAL FOR AMENDMENT OF REGIONAL SUPPLEMENTARY PROCEDURES (ATS)

NORTH ATLANTIC REGION

a) Proposing State : (United Kingdom)

b) Proposed Amendment : (cf. Regional Supplementary Procedures, Doc 7030/2 - Part 1 - Rules of the Air, Air Traffic Services and Search and Rescue, as amended by Amendment ...)

Amend the NAT SUPPs in the section dealing with "Longitudinal Separation" (para. 1.2) as follows:

i) Add, at the end of para. 1.2.1 4) a) the following text:

"The above separation minima may also be applied between aircraft which have not reported over the same entry point into oceanic controlled airspace (but otherwise 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 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 following the same or continuously diverging tracks."

Note : The use of SSR alone for the application of this procedure is governed by the applicable provisions of para. 12.2.1.2.

c) Date when proposal received:

(To be inserted by ICAO)

d) Proposer's reasons for amendment:

To permit optimum use of control possibilities offered by radar facilities available to the ATC units concerned.

e) Proposed effective date of the Amendment:

Three months after approval by Council.

f) Action by the Secretary General:

(To be completed by ICAO)

g) Secretariat Comment:

The above text should be inserted into Doc 7030 at the very end of para. 1.2.1.4.a so as to cover also the provisions relating to longitudinal separation provided to aircraft in supersonic flight now being processed in amendment proposal NAT SUPPs - RAC/1.

Summary of Agenda Item 8 : Development of a tentative work and Meeting schedule until the next LIM NAT RAN Meeting and arrangements for the next Meeting.

Development of a tentative work and Meeting schedule until the next LIM NAT RAN Meeting

8.1 Taking into account the relevant proceedings recorded in the Summaries on Agenda Items 5 and 6, the Group noted that its work schedule until the next LIM NAT RAN Meeting would be primarily dictated by three considerations:

a) the need for timely preparation of the supporting documentation on minimum navigation performance specifications for submission to the 9th AN Conference;

b) subsequent preparation of detailed minimum navigation performance specifications for application in the NAT Region;

c) the timing and primary theme of the next LIM NAT RAN Meeting.

8.2 With regard to a) above, the Group agreed to establish an ad-hoc Working Party composed of representatives from:

Canada, the Netherlands, Portugal, the United Kingdom, the USA, IATA and IFALPA

charged with the task of completing outstanding work on the subject covered by Conclusion 11/13 (page 6-6 refers). The Group requested the USA to appoint the Rapporteur of that Working Party and noted that it was intended to convene a meeting of the Party in the second week of September 1975 in Washington D.C.

8.3 Immediately following that meeting, the completed supporting documentation for the 9th AN Conference would then be made available to the Secretary of the Group for onward transmission to and comment within the briefest possible time by all participants in this Meeting of the Group. The consolidated comments would then be provided by the Secretary to the members of the ad-hoc Working Party for appropriate action and decision on which of the States represented in the Party would formally forward the material to ICAO.

8.4 The same Working Party should then continue in existence and start work, as soon as possible after its September Meeting, on the subject mentioned in para. 8.1 b) in anticipation of a positive decision by the 9th AN Conference on the subject in question and in anticipation of the next Meeting of the Group and the LIM NAT RAN Meeting 1976.

8.5 From the above it became evident that this work schedule, further to the views expressed in paras 5.28 to 5.33, supported the desirability of postponing the LIM NAT RAN Meeting 1976 if an earlier convening was not required by further review of the LORAN A situation.

8.6 Assuming that the very undesirable eventuality described in paras 5.28 and 5.29 did not arise and that it would therefore be possible to postpone the LIM NAT RAN Meeting 1976 as proposed in Conclusion 11/12, the next Meeting of the NAT/SPG was then planned to be held some time in the latter part of May 1976 with the main aim to develop proposals for detailed minimum navigation performance specifications for application in the NAT Region for submission to the LIM NAT RAN Meeting 1976.

CONCLUSION 11/21 - DEVELOPMENT OF MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS FOR APPLICATION IN THE NAT REGION

a) That an ad-hoc Working Party composed of representatives from:

Canada, the Netherlands, Portugal, the United Kingdom, the USA, IATA and IFALPA

be formed to complete outstanding work on the supporting documentation for the 9th AN Conference of ICAO regarding minimum navigation performance specifications.

b) That, immediately after completion of work described above, the ad-hoc Working Party start work on the development of detailed minimum navigation performance specifications for application in the NAT Region so as to be available at the next Meeting of the full Group.

Arrangements for the next Meeting

8.7 On the assumptions stated in para. 8.6, the Group agreed that, for the time being, plans should be made to hold the next Meeting of the Group some time in the latter part of May 1976 in the European Office of ICAO. As to the duration of this Meeting, the Group felt that this should be tentatively planned for a maximum of eight calendar days starting on a Tuesday.

8.8 With regard to items for discussion at that Meeting, the Group tentatively retained the following two subjects at this time:

a) development of detailed minimum navigation performance specifications for application in the NAT Region and resultant consequences on the lateral separation minima applied therein;

b) development of necessary measures to accommodate flight operations in the NAT Region unable to comply with the required minimum navigation performance specifications.

8.9 As to participation in that Meeting, the Group agreed that this should be identical to this Meeting. In addition, following up on a decision taken at the Tenth Meeting of the Group (paras 7.6.6 and 7.6.7 d) of NAT/SPG/10 refer), the Chairman was requested to continue action aimed at obtaining the participation of non-scheduled operators in Meetings of the Group.

Supplementary action

8.10 The Group hoped that, as has been the case in the past, ICAO would find it possible to provide it with adequate secretariat and other assistance so as to enable it to continue its work.

8.11 In order to simplify future reference to the work of the Group it was agreed that, as of this Meeting, the Conclusions of a Meeting of the Group should be numbered consecutively, preceded by the serial number of the Meeting (e.g. 11/1). In addition, the Secretary was requested to undertake, prior to the next Meeting, the task of reviewing all Conclusions of previous Meetings as to their continued applicability and to develop a reference document permitting their numbering.

LIST OF NAMES AND ADDRESSES OF THE MEMBERS OF THE NORTH ATLANTIC SYSTEMS PLANNING GROUP/

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