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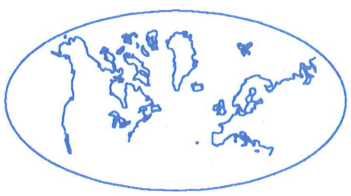
NAT SPG/28

NORTH ATLANTIC SYSTEMS PLANNING GROUP

Summary of Discussions and Conclusions of the Twenty-Eighth Meeting of the North Atlantic Systems Planning Group

Paris, 18 - 29 May 1992



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LIST OF ABBREVIATIONS

AAC	Aeronautical Administrative Correspondence
ACAS	Airborne Collision Avoidance System
ACARS	Aircraft Communications Addressing and Reporting System
ADS	Automatic Dependent Surveillance
ADSP	Automatic Dependent Surveillance Panel
AES	Aeronautical Earth Station
AFTN	Aeronautical Fixed Telecommunications Network
AMCP	Aeronautical Mobile Communications Panel
AMSS	Aeronautical Mobile Satellite Services
AOC	Aeronautical Operational Control
APC	Aeronautical Passenger Communication
ATSC	Air Traffic Services Communications
ATFM	Air Traffic Flow Management
ATN	Aeronautical Telecommunications Network
CMA	Central Monitoring Agency
CNS	Communications-Navigation Surveillance
CRM	Collision Risk Model
CTA/FIR	Control Area/Flight Information Region
DOTS	Dynamic Ocean Track System
ETOPS	Extended-range twin-engined aircraft operations
FDPS	Flight Data Processing System
GAATS	Gander Automated Air Traffic System
GES	Ground Earth Station
GLONASS	Global Orbiting Satellite System
GNE	Gross Navigation Error
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HMU	Height Monitoring Unit
ICD	Interface Control Document
IFSS	International Flight Service Station
IGA	International General Aviation
INMARSAT	International Maritime Satellite Organisation
INS	Inertial Navigation System
MASPS	Minimum Aircraft System Performance Specifications
MNPS	Minimum Navigation Performance Specifications

MWARA	Major World Air Route Area
NAT ID	North Atlantic Regiona Implementation Document
NAT TFG	North Atlantic Traffic Forecasting Group
OAC	Oceanic Area Control Centre
OCA	Oceanic Control Area
ODAPS	Oceanic Display and Planning System
OLDI	On-Line Date-Interchange
OTS	Organized Track Structure
PASC	Practical Application of Separation Criteria
RCC	Rescue Co-ordination Center
RDARA	Regional Domestic Air Route Area
RGCSP	Review of the General Concept of Separation Panel
RNP	Required Navigation Performance
RNAV	Area Navigation
SATCOM	Satellite Communications
SD	Standard Deviation
SICASP	SSR Improvements and Collision Avoidance System Panel
SOTA	Shannon Oceanic Transition Area
TLS	Target Level of Safety
VSM	Vertical Separation Minimum

1. The Twenty-Eighth Meeting of the North Atlantic Systems Planning Group (NAT SPG) was held in Paris from 18 to 29 May 1992. The meeting was chaired by Mr. G. Matthiasson, the Member from Iceland.

2. In addition to IAOPA, IATA, IFALPA, IFATCA and Inmarsat, the Group had, as usual, also invited Norway, Spain and the Russian Federation to attend this meeting. A list of participants is at page 4.

3. In order to progress its work efficiently, the Group established a number of sub-groups to deal with particular detailed aspects of some of the subjects considered during the meeting. These were:

a) a sub-group charged with the scrutiny of navigational performance questions, of which Mr. E.H. Roberts of the United Kingdom acted as Rapporteur;

b) a sub-group dealing with the review of matters related to NAT aeronautical telecommunications, of which Mr. S. Gravesen of Denmark acted as Rapporteur;

c) a sub-group to consider the mathematical-statistical aspects of separation minima in the NAT Region, of which Mr. I. Parker of the United Kingdom acted as Rapporteur; and

d) several ad-hoc working groups were established in the course of the meeting to consider specific points and to report their findings to the Meeting.

4. Mr. Christian Eigl, ICAO Representative, European Office was Secretary of the Meeting and was assisted by Messrs Jacques Vanier, Daniel Oudin, Vincent Galotti, RAC/SAR Technical Officers, Alfred Suban and Vitali Oustinovitch, COM Technical Officers and Bo Barrefors, MET Technical Officer, from the European Office of ICAO. Mr. Rod Heitmeyer, Chief of the Joint Financing and Facility Management Branch, also attended part of the meeting as well as Mr. Gerry Nye. The Secretary addressed the Group on specific ICAO matters at the opening of the meeting. He informed the Group that this was the first meeting since Council's approval of the report of the 10th Air Navigation Conference and the last meeting before the Limited (Communications (COM)/Meteorology (MET)/Rules of the Air and Air Traffic Services (RAC)) NAT Regional Air Navigation (RAN) Meeting. In this context, he stressed the importance of the work of this meeting in order to ensure the success of the RAN meeting.

5. In his opening remarks, the Chairman welcomed Mr. Don MacKeigan who was returning as the Member from Canada and the Revd Gordon Limbrick, the new Member from the United Kingdom. He also informed the Group that Mr. André Berman would be acting for Mr. Jacques Dopagne, the Member from France and Mr. Gerald Richard would be acting for Mr. W. Frank Price, the Member from the United States. Finally, he welcomed Mr. Oleg Troukhtanow from the Russian Federation and Mr. Steve Pearce from the International Federation of Air Traffic Controllers Association. He also stressed the importance of this particular meeting and indicated that every effort would be made to ensure that the heavy work programme would be successfully carried out in the time available.

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AGENDA ITEM 1: AIR NAVIGATION SYSTEM SAFETY PERFORMANCE REVIEW

1.0 Introduction

1.0.1 Under this Agenda Item, the Group considered the following specific subjects:

a) navigation performance achieved in the NAT Region; and

b) mathematical/statistical aspects of the NAT Minimum Navigation Performance Specifications (MNPS) collision risk.

1.1 Navigation performance achieved in the NAT Region

1.1.0 The following matters were discussed:

a) navigation performance accuracy achieved in the NAT Region during the period 1 March 1991 to 29 February 1992;

b) methods of improving the observed standard of navigation performance in the NAT Region; and

c) methods of improving the current monitoring procedures.

1.1.1 Navigation performance accuracy achieved in the NAT Region during the period 1 March 1991 to 29 February 1992

1.1.1.1 The Group completed a scrutiny of observed Gross Navigation Errors (GNE) in the NAT Region and found that a total of 50(52)[1] errors were reported during the period under review. 17(22) of these errors occurred outside MNPS airspace and were classified as Table "CHARLIE" errors. Of the remaining 33(30) errors, 10(8) were not eligible for inclusion in the risk analysis as defined by NAT SPG/17 (amended by NAT SPG/23) and were classified as Table "BRAVO" errors. A review of these Table "BRAVO" errors is given at paragraphs 1.1.1.7 to 1.1.1.10. The remaining 23(22) errors which form the basis of detailed scrutiny were classified as Table "ALPHA" errors.

1.1.1.2 A breakdown of the 23 errors is given at Attachment A to the report on Agenda Item 1. The format is in accordance with established procedures, as in the previous summaries. The number of errors which can be tolerated by collision risk models have been shown.

[1] For comparison purposes, corresponding figures for the last monitoring period (1990-1991) are shown in brackets.

1.1.1.3 The Group noted the similarity in the overall number of Table "ALPHA" errors with the previous monitoring year (23 to 22 in the 1990/91 monitoring year), in conjunction with a 5.8 % rise in observed traffic. The Group also noted that it was the variation in the number of Table "BRAVO" errors (from 10 to 8 in the previous monitoring year) and in Table "CHARLIE" errors (from 17 to 22 in the previous monitoring year) which caused the overall similarity in errors reported within the NAT Region (from 50 to 52).

1.1.1.4 From Attachment A to the report on Agenda Item 1, the breakdown of the 23(22) Table "ALPHA" errors showed two main aspects, namely:

a) the combined number of errors [6(7)] in classification C1 (equipment control error, including waypoint insertion error) and [7(4)] in classification C2 (waypoint insertion due to the correct entry of incorrect position) accounted for more than half the errors reported; and

b) the model 1 and revised model 2 error rates for both OTS and random traffic were below tolerable MNPS levels.

The number of Table "ALPHA" errors in other classifications were similar to those shown in the previous monitoring period (1990/91).

1.1.1.5 The Group was disturbed to note that errors attributed to mistakes involving waypoint insertions accounted for more than half the Table "ALPHA" errors as shown above.

1.1.1.6 The Group noted that of the remaining 5(8) errors which were caused by some failure and/or malfunction of the navigation equipment, 3(3) related to aircraft equipped with Omega, one was attributed to a failure within an Inertial Reference System (IRS) and one with a failure of an Inertial Navigation System (INS). The Group expressed concern regarding the number of such errors attributed to Omega systems.

1.1.1.7 In reviewing the 10(8) Table "BRAVO" errors the Group noted the similarity with the number of these errors in the previous year.

1.1.1.8 The following table shows a breakdown of the Table "BRAVO" errors into the established error classifications:

Error classification	Number of errors
A	1(1)
B	1(1)
C1	5(3)
C2	2(1)
D	0(0)
E	0(0)
F	1(2)
Unclassified	0(0)
Total	**10(8)**

1.1.1.9 The Group noted with concern that, as in Table "ALPHA", the combined errors listed under C1 and C2 comprised more than 50 % of the total Table "BRAVO" errors.

1.1.1.10 The remaining errors in Table "BRAVO" showed little variation from the previous year.

1.1.1.11 The Group then considered Table "CHARLIE" errors, and were pleased to note that the number of errors (17) reported outside MNPS airspace showed a reduction for the fifth year running, in accordance with the following:

63 in the year 1987-1988
40 in the year 1988-1989
31 in the year 1989-1990
22 in the year 1990-1991
17 in the year 1991-1992.

1.1.1.12 The Group noted that of the 17 errors, 5 occurred above MNPS airspace and 12 below. The trend of previous years remains, in that the majority of Table "CHARLIE" errors occurred below MNPS airspace.

1.1.1.13 In accordance with monitoring procedures, follow-up action was taken with any reported error in excess of 50 NM. The Group noted that 4 of the errors above MNPS airspace and 6 below were in this category. The Group found that of the 4 errors above MNPS airspace, three involved the failure of the aircraft's long range navigation equipment (2 - INS and 1 - Omega) and no response had been received from one operator. Of those errors which occurred below MNPS airspace which required follow-up action, 3 involved the failure of navigation equipment, 2 involved aircraft equipped with short range navigation aids only and no response had been received from one operator. The Group felt that the reduction of errors reported below MNPS airspace (12 compared with 19 in the 1990/91 monitoring year) may have been the result of an increased use of Global Positioning System (GPS) receivers by traffic in that area.

1.1.1.14 The Group noted a survey of GNEs attributed to International General Aviation (IGA), Public Transport and Military Traffic against annual traffic counts over the last 5 years. The Group was pleased to note that this survey indicated a reducing trend over the years. The Group felt that this must be due, in no small measure, to the "public awareness" campaign conducted particularly within the business aviation community.

1.1.1.15 The Group noted that a review had been completed, by the Central Monitoring Agency (CMA), of navigation accuracy of non MNPS airspace traffic, and that the review had drawn comparisons with the navigation accuracy of MNPS airspace traffic. The review had considered the accuracy of IGA, Public Transport, and Military aircraft both above and below MNPS airspace. The Group noted that, as with previous such reviews, IGA aircraft performed less well than other categories.

1.1.1.16 The Group noted that established principles regarding the calculation of error rates had been applied, but felt that the results gave an incomplete picture because of the different separation standards outside MNPS airspace together with the examination of only part of the NAT Region regarding errors recorded against overall NAT traffic counts.

1.1.1.17 The Group noted with appreciation the work involved in the CMA review by the IAOPA representative but felt that little more could be gained by attempting to complete further reviews along these lines (paragraph 2.3.5 also refers).

1.1.1.18 The Group noted that core samples of East/West traffic flows had not been completed during the monitoring year and that a survey had been conducted on portions of traffic in the Western Atlantic Route System (WATRS) area. The Group recalled that previous core samples had always produced very satisfactory results (*Eastbound 1989-1990*: 3.358 nms and 1990-1991: 3.967 nms - *Westbound 1989-1990*: 1.87 nms and 1990-1991: 2.05 nms) and felt that little more could be gained from further core samples being examined in the main East/West flows within the existing separation standards environment. The Group felt, however, that should separation standards be reduced in the future, such reviews would be invaluable in the assessment of navigation standards. The Group agreed that the sample conducted in the WATRS area was useful and that further such reviews could aid the on-going assessment of the standards achieved. Canada had indicated that it would provide core samples to NAT SPG/29.

CONCLUSION 28/1 - STUDY OF NAVIGATION ACCURACY

That studies in the form of core samples to further evaluate the navigation accuracy of traffic departing the Western Atlantic Route System (WATRS) be undertaken by the United States.

1.1.1.19 With respect to the continued application of the ten minutes longitudinal separation in MNPS airspace, the Group were pleased to note that only one report of an erosion of longitudinal separation of 3 minutes or more had been received by the CMA during the monitoring year.

1.1.1.20 The Group noted details of reported contingencies within the Shanwick, Gander, Reykjavik, Santa Maria and New York Oceanic Control Areas (OCA) and considered that it was essential that such information be made available. The Group was pleased to note that this information had been available from all the Oceanic Area Control Centres (OAC) or Area Control Centres (ACC) and agreed that the format at Attachment B should be used to report the details.

CONCLUSION 28/2 - RECORD OF IN-FLIGHT CONTINGENCIES

That:

a) all NAT provider States make available information concerning in-flight contingencies to the NAT SPG; and

b) the format, as shown at Attachment B to the report on Agenda Item 1, be used for reporting contingencies to the NAT SPG.

1.1.2 Methods of improving the observed standard of navigation performance in the NAT Region

1.1.2.1 In considering the methods by which the observed standard of navigation performance might be improved, the Group took into account:

a) the lessons derived from the review of navigation performance reported in paragraph 1.1.1 above; and

b) the discussions of, and points emerging from, relevant working papers.

1.1.2.2 In considering GNEs reported in MNPS airspace, the Group noted with concern the number of waypoint insertion errors in which a re-route was involved. The Group was aware that this observation had been made in previous years, but felt that the problems involved required the widest publicity. The Group noted that more recently introduced navigation system displays would help alleviate this problem. The Group further noted that in some circumstances difficulties were experienced with incorrect readback or Radio/Telephony (R/T) procedures when a third person was involved in the communications loop.

1.1.2.3 The Group noted the results of the tactical monitoring of the MNPS approval status of selected operators entering MNPS airspace, as collected by the CMA throughout the monitoring year. The Group was of the opinion that the trend, showing a reduction in the number of aircraft who were not able to confirm their approval status, indicated that the exercise was taking effect. In this context, the Group agreed that the education effort of the last few years was starting to bear fruit. Notwithstanding this conclusion the Group found that non-approved operators were still attempting to use MNPS levels, and was of the opinion that such a situation could prevail in the future. The Group was pleased to note that tactical monitoring procedures were being developed within areas in which such activity had proved not to be possible in the past. The Group agreed that tactical monitoring of the MNPS approval status of selected operators remained a valid means of combatting the problem.

1.1.2.4 The Group noted the results of spot checks of MNPS approval by examination of flight plans for the inclusion of the letter "X", in "item 10". The Group was pleased to note that such checks had been completed in OACs/ACCs where these checks had not been possible in the past, and felt that it confirmed the results obtained in the past from other OACs/ACCs. Nevertheless the Group noted that it had concluded at NAT SPG/27 that such checks no longer represented a valid method of resolving the problem of non-approved users (paragraph 1.1.2.3 NAT SPG/27 Report refers).

1.1.2.5 As in previous years, the Group noted the part played by OACs/ACCs in containing the number of GNEs through timely intervention to prevent incorrect routing.

1.1.2.6 Within the period of the monitoring year, Gander OAC advised the CMA of a total of 17(20) occasions when mistakes were noted, and action taken, by Air Traffic Control (ATC) to prevent a GNE. The causes of these mistakes were broken down as follows:

a) 3 instances in which the aircraft stated that they had been so cleared by other ATC units;

b) 2 instances in which no explanation was offered for an incorrect forward estimated position;

c) 2 instances in which the aircraft admitted a mistake had been made on the flight deck;

d) 2 instances in which aircraft used a flight plan route instead of that which had been issued as the clearance;

e) 2 instances in which aircraft flew different routes from those cleared;

f) 2 instances in which mistakes had been made by ATC in processing the clearance details;

g) 1 instance in which the aircraft misunderstood the clearance;

h) 1 instance in which the aircraft claimed that a reclearance had not been received from a previous ATC unit;

j) 1 instance in which there was a possibility of navigation problems but ATC had language difficulties with the aircraft; and

k) 1 instance in which, although the aircraft had been given a direct routing, it decided to route via an interim position some distance from its "direct to" route.

1.1.2.7 The Group noted that no reports of interventions to prevent a GNE were received from any other OACs during the monitoring year.

1.1.2.8 The Group considered that such interventions were invaluable in preventing GNEs. It was aware that although such interventions took place in other OACs/ACCs, administrative difficulties prevented detailed recording and transmission of the details to the CMA, but was pleased to note that Reykjavik ACC anticipated that it would be able to collect and transmit details in the future. The Group agreed that the typical causes noted in paragraph 1.1.2.6 above represented the type of problems all OACs/ACCs in the Region experienced.

1.1.3 Methods of improving the current monitoring procedures

1.1.3.1 The Group noted the information concerning reports of height deviations and agreed that this information was essential and that it be collected/passed to the CMA for collation. The Group felt that, where possible, information concerning:

a) length of time at incorrect level; and
b) details of loss of separation involved;

should be included in the reports. In this context, the Group agreed that the format shown at Attachment C to the report on Agenda Item 1 was appropriate for the collation of reports. The Group also agreed to the format of the letter to be used by the CMA in its communications with States which is shown at Attachment D to the report on Agenda Item 1.

1.1.3.2 The Group noted with concern that limited or no response had been received by the CMA from some IGA operators involved in GNE reports. The Group felt that States of Registry of aircraft involved should pay particular attention to this problem when overseeing investigative action.

1.1.3.3 The Group noted that in several GNE reports and responses to investigations, information regarding flight plan details, or loss of separation, had not been available. The Group felt that the inclusion of such information would facilitate considerably subsequent scrutiny and analysis of the incident.

1.1.3.4 In concluding its review of navigation performance work, the Group recalled that, at NAT SPG/27, it had indicated that it was aware of occurrences that happened within the NAT Region which did not immediately fall within the confines of the existing reporting structure to CMA and had felt that details of such occurrences should be passed to the CMA. The CMA had received no such reports within the monitoring year; nevertheless, the Group felt that there were still occurrences which could result in an increase of risk to traffic within the Region. The Group agreed that the extent of the problem should be examined between the provider States in order to take remedial action if necessary (paragraph 1.1.3.2 NAT SPG/27 Report refers).

CONCLUSION 28/3 - REPORTING OF OCCURRENCES WITHIN THE NAT REGION

That all NAT provider States report to the Central Monitoring Agency (CMA) occurrences in their respective Oceanic Control Areas, as available, through existing occurrence reporting systems; these occurrences, although not falling within the existing reporting structure, created a risk to air traffic within the NAT Region.

1.2 Mathematical/statistical aspects of the NAT MNPS collision risk

1.2.0 The Group considered the following matters related to mathematical issues and other aspects of the vertical and longitudinal collision risk for the NAT Region:

a) 1991 lateral collision risk estimation;

b) presentation of lateral risk estimates;

c) future operations;

d) Reduced Vertical Separation Minimum (RVSM) operations in the NAT Region; and

e) work programme.

1.2.1 1991 collision risk estimation

Occupancy

1.2.1.1 The Group considered estimates of lateral occupancy derived by Canada for 30°W and 40°W and by the United Kingdom for 20°W and 30°W respectively for both Organized Track Structure (OTS) and random traffic. The estimates were for the monitoring period covering 1 March 1991 to 29 February 1992 and were based on data for the 4th and 15th days of each month, a total of 24 days. However, data for one of the days in the United Kingdom sample were corrupted, therefore its estimates were based on a slightly reduced data set of 23 days.

1.2.1.2 The Canadian and United Kingdom occupancy estimates were combined to give overall average estimates for the 1991/92 monitoring year; these are shown in Table 1.

Table 1 - 1991/92 Occupancy Estimates

	Same Direction			Opposite Direction		
	OTS	Random	Total	OTS	Random	Total
United Kingdom 20W	1.224	0.234	0.865	0.006	0.009	0.007
United Kingdom 30W	1.248	0.251	0.927	0.009	0.007	0.008
Canada 30W	1.217	0.389	0.891	0.009	0.008	0.008
Canada 40W	1.186	0.401	0.881	0.008	0.006	0.007
1991/92 Combined Estimate	1.214	0.325	0.884	0.008	0.007	0.008

Note: The combined estimate is the traffic weighted average of the United Kingdom 20°W estimate and the Canadian 40°W estimate with the traffic weighted average of both 30°W estimates. Table 2 shows the traffic estimates which were used for the weightings.

Table 2 - 1991/92 Traffic Estimates in Sample

	TRAFFIC ESTIMATES		
	OTS	Random	Total
United Kingdom 20W	7433	4225	11658
United Kingdom 30W	7438	3537	10975
Canada 30W	7390	4799	12189
Canada 40W	7388	4711	12099
Average	7412	4368	11780

1.2.1.3 Table 3 presents same and opposite direction occupancy estimates for the years 1987 to 1991. For same direction traffic, it can be seen that the occupancies for both OTS and random traffic have increased from previous years, leading to an overall increase for the total traffic sample (see Figure E-1). [Relevant figures, from E-1 to E-6, are contained in Attachment E to the report on Agenda Item 1].

Table 3 - Occupancy Estimates for the years 1987 to 1991

		Year				
Direction	Traffic	1987	1988	1989	1990	1991
Same	OTS	0.990	1.090	0.995	1.031	1.214
	Random	0.180	0.160	0.302	0.287	0.325
	Total	0.670	0.670	0.697	0.710	0.884
Opposite	OTS	0.002	0.007	0.004	0.002	0.008
	Random	0.002	0.003	0.006	0.006	0.007
	Total	0.002	0.005	0.005	0.004	0.008

1.2.1.4 For opposite direction traffic there has been a large increase in occupancy levels. In part, this may have been due to the practice of publishing OTS tracks for opposite direction traffic 1° separated from other tracks; this practice, which was in operation for the first half of the 1991/92 monitoring year, was subsequently discontinued. Table 4 shows the opposite direction occupancy levels before and after this practice was stopped. As can be seen the occupancy was very high in the first period before returning to a level comparable with historic values in the second period.

Table 4 - Comparison of Opposite Direction Occupancy across the 1991/92 Monitoring Year

	March to August			September to February		
	OTS	Random	Total	OTS	Random	Total
United Kingdom 20W	0.012	0.009	0.011	0.001	0.009	0.004
United Kingdom 30W	0.016	0.009	0.014	0.001	0.006	0.002
Canada 30W	0.016	0.008	0.013	0.001	0.007	0.003
Canada 40W	0.014	0.006	0.011	0.001	0.005	0.003
Combined Estimate	0.014	0.008	0.012	0.001	0.007	0.003

1.2.1.5 Had opposite direction occupancy stayed at its initial high level, the 1991 risk estimate would still not have exceeded the Target Level of Safety (TLS). However, opposite direction occupancy does have a large effect on the estimated collision risk. Publishing opposite direction tracks encouraged opposite direction traffic to fly via these routes. This lead to disproportionately higher opposite direction occupancies when the tracks were adjacent to other OTS tracks. The Group noted that the opposite direction occupancy decreased significantly as a result of the implementation of NAT SPG Conclusion 27/5. If traffic demand is such that opposite direction tracks are required for operational reasons, then they should be placed at least 2° from adjacent tracks.

Applicability of the Revised Model 2 Weighting Set to the Current Environment

1.2.1.6 The error weighted occupancy values used in the derivation of the revised Model 2 weighting set were 0.45 for same direction occupancy and 0.0055 for opposite direction occupancy. If the relative same and opposite direction occupancy levels differed too much from the levels used in the derivation, there would be inaccuracy in the weighting set. However, as discussed at NAT SPG/27, if the ratio of opposite direction to same direction occupancy was within certain bounds (less than 0.022) the weighting set could be assumed applicable. For the 1991/92 monitoring year, the error weighted OTS and random opposite to same direction ratio was well within this bound (0.014). No modifications to the weightings were therefore necessary.

Gross Navigation Errors

1.2.1.7 Taking into consideration the findings of the Scrutiny Group, each risk-bearing error was assigned a revised Model 2 weighting in accordance with its error class and magnitude of deviation to reflect the proportion of time spent in a band ± 10 NM about incorrect route centre lines. The results are presented in Table 5.

Table 5 - 1991/92 Revised Model 2 Weighted Gross Navigation Errors

	GNEs		Weighted GNEs		
Class	>30 NM	Risk Bearing	OTS	Random	Total
A	5	2	0.00	0.98	0.98
B	0	0	0.00	0.00	0.00
C1	6	6	0.33	1.65	1.98
C2	7	7	1.24	2.07	3.31
D	0	0	0.00	0.00	0.00
E	0	0	0.00	0.00	0.00
F	5	3	0.00	1.65	1.65
Unknown	0	0	0.00	0.00	0.00
Total	23	18	1.57	6.35	7.92
Sample Traffic Count			106333	70889	177222
Error Rate x 10-4			0.15	0.90	0.45

1.2.1.8 Table 6 presents revised Model 2 risk-bearing error rates for the years 1987 to 1991. It can be seen that the OTS rate has fluctuated at a low level whilst the random rate has been relatively steady for the last 3 years. The total rate for the two traffic types combined is also holding roughly steady (see Figure 2).

Table 6 - Revised Model 2 Risk-Bearing Error Rates (x 10^{-4}) for the Years 1987 to 1991

Traffic Sample	YEAR				
	1987	1988	1989	1990	1991
OTS	0.16	0.27	0.29	0.16	0.15
Random	1.39	1.73	0.80	0.90	0.90
Total	0.65	0.86	0.49	0.45	0.45

Collision Risk

1.2.1.9 Collision risk levels for OTS and random traffic were estimated directly using the Reich model. To assess the total risk for all MNPS airspace, the number of random aircraft within the airspace, but not included in the count at the error monitoring windows reported to the CMA, must be taken into account.

1.2.1.10 A total of 177,222 MNPS airspace flights, as recorded at the West and East monitoring windows for the monitoring year 1991/92, had been used to estimate error rates. Using the conventional 60/40 OTS/random split resulted in estimates of 106,333 OTS aircraft and 70,889 random aircraft. The NAT Traffic Forecasting Group (NAT TFG) had provided an estimate of 213,000 aircraft operating within NAT airspace during 1991. Thus, 106,667 non-OTS flights were estimated to have transitted the NAT airspace. This figure, however, included aircraft operating above and below MNPS airspace. From Canadian data, the number of random aircraft so operating was 11,599. Thus the total count of random aircraft operating within MNPS airspace was estimated as 95,068. This number was used when OTS and random risks were combined into a weighted average total system risk.

1.2.1.11 Table 7 presents revised Model 2 lateral risk estimates for the 1991/92 monitoring year, for OTS, random and all MNPS traffic. The OTS and random risk estimates have been derived directly from the Reich model. The revised parameter set had been used and Py(60) had been calculated using the following equation:

$$Py(60) \doteq 2\lambda y \times \frac{\text{Zeta Rate}}{20}$$

The Zeta rate was the sum of the weighted risk-bearing errors divided by the total observed traffic. The risk estimate for all MNPS airspace has been calculated as the traffic weighted average of the OTS and random risk estimates. All the estimates were below the TLS of 2×10^{-8}.

Table 7 - 1991 Revised Model 2 Risk Estimates for MNPS airspace

Traffic Type	Total MNPS Count	Risk x 10^{-8}
OTS	106333	0.98
Random	95068	1.83
All MNPS	201401	1.38

1.2.1.12 Table 8 presents revised Model 2 lateral risk estimates for the years 1987 to 1991 (see Figure 3).

Table 8 - Lateral Risk Estimates for the Years 1987 to 1991

Risk (x 10^{-8})	1987	1988	1989	1990	1991
OTS	0.81	1.62	1.49	0.87	0.98
Random	1.42	1.67	1.46	1.59	1.83
All MNPS	1.11	1.64	1.47	1.22	1.38

Breakdown of the Risk into Components

1.2.1.13 Based on the error classes used by the Scrutiny Group, Table 9 presents a breakdown of the 1991 risk by error cause and traffic type. The MNPS breakdown has been estimated from the traffic weighted breakdown of the OTS and random traffic types. Waypoint insertion errors (C1 and C2) accounted for by far the largest proportion of the estimated error and remain at a relatively high level. The tactical monitoring procedures are continuing to keep the non-MNPS approved category (A) at a low level. The Group agreed that continued vigilance in excluding non-MNPS approved users is essential to the safe operation of the NAT airspace (paragraph 1.1.2.3 also refers).

Table 9 - Analysis of Components of the Risk for 1991

Error Class	Traffic Type		
	OTS % (*)	Random % (*)	MNPS % (*)
A	0.0 (0)	15.4 (2)	7.3 (2)
B	0.0 (0)	0.0 (0)	0.0 (0)
C1	21.0 (1)	26.0 (5)	23.4 (6)
C2	79.0 (3)	32.6 (4)	57.1 (7)
D	0.0 (0)	0.0 (0)	0.0 (0)
E	0.0 (0)	0.0 (0)	0.0 (0)
F	0.0 (0)	26.0 (3)	12.3 (3)
Unknown	0.0 (0)	0.0 (0)	0.0 (0)
Total	100 (4)	100 (14)	100 (18)

* The figures in brackets are the number of each type of risk-bearing error which were observed at the window during the monitoring year.

Model 1 Risk Estimates

1.2.1.14 For comparison with previous years, the risk estimates using Model 1 parameters were presented. In accordance with NAT SPG Conclusion 27/6 it was the last time that such estimates were presented.

1.2.1.15 Table 10 shows the Model 1 occupancy ratios calculated using the original parameter values.

Table 10 - Model 1 Occupancy Ratios for 1991 Using the Original Parameter Values

	OTS	Random	Total
Occupancy Ratio	1.89	0.63	1.25

1.2.1.16 Table 11 shows the Zeta error ratios.

Table 11 - Model 1 Zeta Error Ratios for 1991

	OTS	Random
Observed No of errors	3	7
Tolerable No of errors	13.82	9.22
Zeta error Ratio	0.22	0.76

1.2.1.17 The calculated Model 1 risk ratios for 1990 are shown in Table 12. These indicated that the lateral collision risk estimated in the region was below the lateral TLS of 2 X 10^{-8} fatal accidents per flight hour.

Table 12 - Model 1 Risk Ratios for 1991 Using the Original Parameter Values

	1991 Traffic	Occupancy Ratio	Zeta Error Ratio	Risk Ratio	Risk (x 10^{-8})
OTS	106333	1.89	0.22	0.41	0.82
Random	95068	0.63	0.76	0.48	0.96
All MNPS	201401			0.44	0.89

1.2.1.18 Finally, table 13 shows a comparison between the Model 1 risk estimates and the revised Model 2 risk estimates for the years 1987 to 1991.

Table 13 - Comparison of Model 1 and Revised Model 2
All MNPS Risk Estimates for the Years 1987 to 1991

Risk (x 10^{-8})	1987	1988	1989	1990	1991
Model 1	0.60	1.00	1.16	0.96	0.89
Model 2	1.11	1.64	1.47	1.22	1.38

Proposed Changes for Future Lateral Risk Estimates

INCLUSION OF REPORTS FROM REYKJAVIK

1.2.1.19 The Group agreed that the inclusion of GNE reports from Reykjavik in the risk assessment would be advantageous. This could be done provided accurate estimates of traffic levels through the Icelandic window could be obtained in a similar way to those obtained by Gander and Shanwick and the possibility of double counting could be eliminated. The United Kingdom will investigate the feasibility of obtaining the appropriate information. In this context, the Member from Iceland indicated that the increased number of navaids and radar coverage contributed greatly to the reduction of GNEs.

USE OF TRAFFIC COUNTS

1.2.1.20 The Group proposed that the feasibility of using the actual counts of OTS and Random flights at the windows when error rates are estimated be investigated by the CMA. At the time, the numbers of OTS and random flights were estimated from the total traffic count using a 60/40 split. Use of actual traffic counts would provide better figures for the OTS and random traffic. This would be used in providing separate OTS and random risk estimates.

1.2.1.21 Risk estimates could then be prepared separately for OTS and random flights and a traffic weighted overall average calculated. The OTS traffic counts used could be based on Gander OTS counts. The vast majority of OTS tracks pass through Gander airspace and thus almost all OTS flights are included in the Gander count. Occasionally a track was published which was to the south of Gander airspace (in New York) and any aircraft on it would not be included in the Gander OTS count. This exclusion was felt to have a minor effect on the risk estimate. However, in future, it would be preferable to include actual counts of OTS flights in both Gander and New York airspace.

Other Information

NAVIGATION PERFORMANCE OUTSIDE MNPS

1.2.1.22 The Member from the United States described the results of work performed on the assessment of navigation performance in the WATRS area. It was noted that a considerable improvement in performance had occurred since the last sample was taken in 1983/84. This improvement was attributed to the relative reduction in older types of aircraft seen in the sample. It was unclear whether the sample was representative of all aircraft in the region, since only northbound traffic was sampled for a select set of routes. However, the sample did look at the relative performance of aircraft fitted with modern flight management systems, which included ring laser gyro sub-systems, contrasted against those without such systems. The aircraft with modern equipment showed a markedly better performance over the older types. Investigations are continuing to determine whether the consistently good performance was due to the long-range navigation systems or due to advancements in incorporating shorter-range, land-based navigational aids.

1.2.2 Presentation of Risk Estimates

Models 1 and 2

1.2.2.1 The Group was presented with information regarding the appropriateness of the revised Model 2 method of estimating Zeta rates. The main difference between Model 1 and Model 2 was that, in Model 2, the observed GNEs were multiplied by weighting factors which reflected their contributions to the collision risk in line with the Zeta error requirement. The reason for weighting GNEs was to obtain a better estimate of the Zeta error rate. This parameter was critical for the estimation of the collision risk in the NAT Region. The intent of the information presented was to show that the zeta error rate as a count of GNEs whereas the report of the fourth meeting of the Review of the General Concept of Separation Panel (RGCSP/4) made it clear that it was the proportion of time spent by aircraft in the region within 10 NM of the incorrect track that was the intended measure.

1.2.2.2 The Group felt that the Model 2 approach was fully justified and produced a better estimate of the system collision risk. A full discussion of the issues raised above was not possible because the Representative from IFALPA was unable to address the specific points. In this context, the Group noted that IFALPA could further discuss on this matter at the next Mathematicians' group meeting.

1.2.2.3 The Group agreed that the decision made at NAT SPG/27 to change to the revised Model 2 was indeed valid. Therefore, in accordance with NAT SPG Conclusion 27/6, Model 1 estimates will no longer be presented. All future collision risk estimates will be based on the revised Model 2.

Presentation of Results (The figures are at Attachment E to the report on Agenda Item 1)

1.2.2.4 The interpretation of the information presented as a result of the risk assessment procedures was of the highest importance. In this context, the Group noted that work was continuing in Canada and the United Kingdom to derive confidence bounds for the risk estimate. The objective was to produce risk graphs in the form shown in Figures 4 to 6. The two dotted lines in these diagrams represent the upper and lower 90% confidence bounds around the risk estimate. Such intervals give an indication of the possible variability in the estimate of the risk. The bounds shown in Figures 4 to 6 show only the variability resulting from the estimation of the Zeta error rate. Work was also continuing to incorporate the uncertainty in the estimates of occupancies which is the other major contributor to the variability of the risk estimate.

1.2.2.5 The Group noted that the United States was continuing work on deriving an alternative system risk assessment technique based on sequential sampling. The technique would also include statistical information on the confidence of the assessment.

1.2.2.6 Figures 1 to 3 present data in a graphical form which may aid in the interpretation of the occupancy and Zeta rates which are presented in a tabular form earlier in this report. The Group felt that such a presentation would help in the identification of longer term trends in these parameters.

1.2.2.7 The graphs represented the principal components of interest in estimation of the risk. Occupancy (Figure 1) has been portrayed in "standard units" which incorporates both same and opposite direction lateral occupancy estimates in combination with their respective kinematic parameters from the collision risk model. This allowed the year to year comparison with reference to a common basis.

1.2.2.8 Figure 2 shows the Zeta error rate estimates in terms of proportions, thus reflecting the results of the review of the years' errors. Figures 1 and 2 show the counterbalanced factors of lateral occupancy and Zeta error rates. The high occupancy for OTS traffic in the region was offset by a relatively low incidence of larger errors, while the opposite was true for random traffic. Figure 3 shows the annual risk estimates in the form of bar graphs.

1.2.2.9 The use of rolling annual occupancy estimates for the monthly risk assessment was discussed. At the time, the estimates for the previous monitoring year were used in the monthly reports prepared by the CMA and circulated to members. A more current estimate of occupancy would give a better estimate of the system risk when circulated to the members for monthly review. It was agreed that, for a trial period, Canada and the United Kingdom would attempt to provide occupancy estimates in time for the preparation of the monthly CMA reports.

1.2.3 Future operations

Future Horizontal TLS

1.2.3.1 The Group considered alternative methods of deriving a horizontal TLS for future systems. One method presented was to project the historical trend of world wide scheduled jet aircraft accident rates to determine a future rate of accidents. This method was used previously in the derivation of the current TLS, and contributed to the choice of a TLS for the proposed RVSM operations in the NAT region. The estimate for the overall future accident rate was then partitioned to obtain an accident rate from collisions occurring in the enroute phase of flight. The partitioning factor used in the analysis was the same as that used previously (25%). It was not based on the actual rate of fatal accidents resulting from collisions observed in the more recent 1976 - 1990 data sample, that was used to project the accident trend. The reason for this decision was that the number of collisions in the enroute phase of flight in the sample period was very low. This approach resulted in an estimate of 7×10^{-9} fatal accidents per flight hour in each dimension for the year 2000 and 4×10^{-9} in the year 2010. In this context, the assignment of risk used was based on an equal allocation to each of the three dimensions. However, one opinion was that the important factor was the overall collision risk and the risk need not be allocated in this fashion.

1.2.3.2 The Group also considered three other alternative methods for the derivation of a TLS. The first was based on a target of not more than one collision in 150 years for the NAT region. This approach has the effect of increasing the required level of safety in terms of fatal accidents per flight hour in line with increases in traffic and therefore exposure in the region. The Group used this method in conjunction with forecasts of traffic from the NAT TFG to obtain estimates for the years 2000 and 2010. These were 4×10^{-9} and 3×10^{-9} fatal accidents per flight hour per dimension for the years 2000 and 2010 respectively.

1.2.3.3 The second method presented was based on the United States Federal Aviation Regulations (FAR) part 25. That document described quantative methods for assessing systems which could affect the "continued safe flight and landing" of aircraft. Applying the criteria that a collision would result from a failure of separation minima, and interpreting this as an "extremely improbable" event according to the definitions given in the FAR, requires a probability no larger than 10^{-9}. Using estimates of the frequency of the application of separation minima in the NAT Region in a given year, this method resulted in a stringent TLS of 2.7×10^{-10} fatal accidents per flight hour. The Group observed that this number was not in keeping with the numbers developed using other methods. No future estimates were therefore derived using this method.

1.2.3.4 The last method examined was based on the accumulated historical experience of the safe operation of the NAT system. This method used accumulated flight hours without a collision with jet aircraft to estimate an underlying rate of fatal accidents. This method produced estimates of approximately 10×10^{-9} and 4×10^{-9} fatal accidents per flight hour per dimension for the years 2000 and 2010.

1.2.3.5 Table 14 summarizes the estimates obtained from each of the different methods used above. As a result of these analyses a range for the future TLS values for the year 2000 would be 4×10^{-9} to 10×10^{-9} fatal accidents per flight hour. It should be noted that a value of 5×10^{-9}, as adopted for the future RVSM operations, was not inconsistent with these values. For 2010 the range is smaller (although the uncertainty in the values was larger) $3\text{-}4 \times 10^{-9}$ fatal accidents per flight hour.

Table 14 - Summary of alternative values for the lateral TLS for future systems

	Target level of safety Fatal accidents per flight hour per dimension	
Method	year 2000	year 2010
Historical trend in fatal accidents	7×10^{-9}	4×10^{-9}
Calendar year approach	4×10^{-9}	3×10^{-9}
Accumulated experience of safe NAT operations	10×10^{-9}	4×10^{-9}

1.2.3.6 The Group noted that the methods used were not exhaustive and that other approaches could result in different numbers. The choice of an appropriate TLS was essentially a matter of judgement and responsibility for making this decision rested with the NAT SPG itself. However, it was noted that most of the above results were consistent with the TLS in the NAT region and with those planned for RVSM operations.

Future Technology and the operation of the NAT Region

1.2.3.7 The Group noted with interest the information on Traffic Alert and Collision Avoidance System (TCAS) and looked forward to further information arising from the operation of this system.

1.2.3.8 Information on Automatic Dependent Surveillance (ADS) was also considered. This review reflected the requirements for any reduction in lateral separation minima and examined some possible future scenarios involving ADS. The work was at an early stage but showed that ADS would give considerable benefits in terms of system safety if it reduced GNEs as anticipated. The substantial reduction of GNEs would be a requirement for any reduction in lateral separations. In the future system envisaged by the NAT Implementation Document (ID), ADS would be an essential component in achieving this objective. However, other measures to reduce GNEs might also be required. Further work on the potential benefits of ADS in terms of safety were to be performed by the United Kingdom.

1.2.3.9 The potential for the reduction of longitudinal separation standards was discussed. No recent work has been done in assessing the longitudinal collision risk in the NAT region. Such an analysis would be required before any reduction could be justified. The Group agreed to look at possible sources of data for an analysis of longitudinal collision risk with the objective of providing an analysis, or a plan for a data collection and analysis, for the next NAT SPG meeting.

1.2.3.10 The Group noted with interest the summary of a benefit analysis of reduced separations. A report on this study will be presented to the Mathematicians Group at its next meeting.

1.2.4 RVSM Operations in the NAT Region

Methods of System Assessment

1.2.4.1 The Group discussed different methods of assessing the collision risk in an RVSM environment. It was informed that the United States was working on a method based on sequential sampling while the United Kingdom was working on a method of direct risk assessment. It was intended that both methods be developed in time for NAT SPG/29. Assessments of the 2000ft environment and predictions for the future 1000ft RVSM operation would be made based on the information available at that time.

1.2.4.2 For both methods, an essential requirement would be accurate and complete information on aircraft height-keeping performance. It was anticipated that data on the technical performance of aircraft would be obtained from the planned Height Monitoring Units (HMU). For data on operational deviations, reports from OACs would be used. The Member from Canada presented information which summarized an analysis of vertical deviations which are recorded in the Civil Aviation Daily Occurrence Reporting System (CADORS). The analysis, based on this information, estimated the total amount of time spent by aircraft at the incorrect level. This was an essential piece of information for the estimation of collision risk due to operational errors. In the same context, the Group was presented with information on vertical deviations which had been recorded at the New York OAC.

1.2.4.3 When reviewing the requirement for vertical deviation data reporting included in the proposed RVSM guidance material, the Group agreed that the duration of the excursion from cleared flight level be included in the list of information required.

Estimation of Vertical Occupancy

1.2.4.4 The Member from Canada presented the Group with information which reported the results of work done to estimate the vertical occupancy in the current 2000ft environment. The estimates obtained for the 1991/92 monitoring year are summarised in Table 15 below.

Table 15 - Estimates for the 2000ft Vertical Occupancies for the 1991/92 Monitoring Year

	Same direction	Opposite direction
OTS	1.2564	0.0122
Random	0.2843	0.0318
Total	0.8758	0.02

1.2.4.5 To estimate vertical occupancies which might be expected in a 1000ft environment, simulations can be used. The Group reviewed the results of such a simulation which indicated that large reductions in both vertical and lateral occupancies could result from the implementation of 1000ft RVSM. The reductions were proportionately smaller with higher traffic levels. These results were dependent on the way in which demand patterns would change with the introduction of 1000ft RVSM and with traffic increases. It was planned to investigate this effect further.

Consideration of Lateral Offsets

1.2.4.6 The Group was presented with information which described work performed on the effects of lateral offsets in an RVSM environment. It was assumed that only aircraft with automatic offset capability would be required to fly offsets and looked at the effect of varying proportions of offset flying aircraft on the collision risk was considered. The Group concluded that even with small proportions of aircraft flying offset, there would be reductions in collision risk. These reductions could be considerable if the lateral navigation accuracy of aircraft in the region were to improve.

1.2.4.7 The above information also looked at five different offset scenarios, all of which could accommodate non offset flying aircraft, and to assess their possible effects on collision risk. All of the options considered reduced substantially the estimated collision risk from errors in height-keeping, the amount of the reduction varied amongst the options. Some of the offset scenarios considered would require some ATC involvement but scenarios could be designed which would require no ATC action. The options considered were only a sample of those possible and no preferred option could be identified at that stage.

1.2.4.8 The Representative from IFALPA indicated that, as far as possible, any offset arrangement used in the NAT region should be compatible with arrangements being considered for domestic airspace. The arrangement should not be too complex and should be tolerant of misapplications. Along these lines, the preferred arrangement would be a 1 NM offset to the right for aircraft able to fly offsets and flying at "even" flight levels (320, 340, etc) with other aircraft flying on the track.

1.2.4.9 The Group was informed that improvements in lateral navigation accuracy in the future could eventually make the use of lateral offsets in the NAT Region essential in order to meet the vertical TLS. In this context, the United Kingdom was working to estimate when this condition would be met.

1.2.4.10 The Group agreed that offsets would be required in the future in an RVSM environment in order to achieve the vertical TLS. Based on available data on the lateral navigational performance it was felt that it would not be necessary to mandate offset capability for the existing aircraft fleet. However, this should be considered for new aircraft. This decision could change if future data indicated that there was a substantial proportion of traffic with highly accurate navigation equipment but without offset capability.

CONCLUSION 28/4 - STRATEGIC LATERAL OFFSETS IN MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS (MNPS)/REDUCED VERTICAL SEPARATION MINIMUM (RVSM) AIRSPACE

That, subject to the ability to develop lateral offset procedures (including contingency procedures) which are operationally acceptable:

a) lateral offsets be applied in the future operation of MNPS/RVSM airspace; and

b) in the longer term, it may be necessary to require offset capability on future aircraft builds as an element of MNPS/RVSM approval.

Work on Assessing sites for HMUs

1.2.4.11 The Group reviewed the results of the analysis of the proposed sites for HMUs. In this context, the Group noted that particular emphasis was being placed on assessing the actual tracks of aircraft passing over the proposed sites, identifying flight levels and climbing and descending traffic. The studies would be co-ordinated in order to assess any possible double counting at different locations.

1.2.5 Work Programme

1.2.5.1 The Group identified several areas of work which needed to be progressed over the next year. The main items were:

a) Investigate feasibility of obtaining Reykjavik traffic samples to enable GNE reports to be included in the risk estimation procedure;

b) Investigate feasibility of obtaining New York OAC traffic counts for OTS;

c) Work on confidence bounds for lateral risk estimation;

1) Trial of the provision of occupancy estimates in time for inclusion in monthly CMA reports;

e) Investigation of the possible benefits of ADS;

f) Investigation into the availability of data for the analysis of longitudinal collision risk and review of methodology;

g) Development of alternative methods for collision risk assessment in the NAT Region;

h) Analysis of the effect of demand patterns on occupancy in a 1000ft RVSM environment;

i) Analysis of the effect of navigation accuracy on vertical collision risk in a 1000ft RVSM environment;

j) Further analysis of proposed sites for HMUs;

k) Review of mathematical documentation for NAT RVSM operations; and

l) Perform core sample analysis.

ATTACHMENT A

CLASSIFICATION (see Note 1)	30 NM ETA ERRORS	RISK BEARING ERRORS					
		TOTAL MNPS TRAFFIC		OTS TRAFFIC		RANDOM TRAFFIC	
		Model 1	Revised Model 2	Model 1	Revised Model 2	Model 1	Revised Model 2
A	5(3)	2.00	0.98	0	0	2.00	0.98
B	0(0)	0	0	0	0	0	0
C1	6(7)	2.00	1.98	1.00	0.33	1.00	1.65
C2	7(4)	4.00	3.31	2.00	1.24	2.00	2.07
D	0(2)	0	0	0	0	0	0
E	0(1)	0	0	0	0	0	0
F	5(5)	2.00	1.65	0	0	2.00	1.65
Not classified	0(0)	0	0	0	0	0	0
Total	23	10.00	7.92	3.00	1.57	7.00	6.35
Total in last period	22	14.00	7.61	2.00	1.61	12.00	6.00
Observed traffic		177222		106333		70889	
Last monitoring period		167506		100504		67002	
No. of errors within MNPS Airspace tolerated by the CRM	93.92 (5.3×10^{-4})	23.04 (1.3×10^{-4})		13.82 (1.3×10^{-4})		9.22 (1.3×10^{-4})	
No. of errors tolerated by the CRM before action based on operational judgement is required	140.89 (7.95×10^{-4})	34.56 (1.95×10^{-4})		20.73 (1.95×10^{-4})		13.82 (1.95×10^{-4})	

Note 1: The letters in the classification column means:

A: Aircraft not certified for MNPS Operations
B: ATC System Loop error
C1: Equipment Control error including inadvertent Waypoint Insertion
C2: Waypoint insertion error due to the correct entry of incorrect position
D: Other navigation errors, including equipment failure notified to ATC in time for action
E: Other navigation errors, including equipment failure notified to ATC too late for action
F: Other navigation errors including equipment failure of which notification was not received by ATC

ATTACHMENT B

SUMMARY OF IN-FLIGHT CONTINGENCIES OCCURRING IN THE _____ OCEANIC CONTROL AREA IN 1991

DATE	TIME	CALL SIGN	TYPE	APPROX POSTN	REASON	PRIOR CLEARANCE	START F/L	FINAL F/L	OTS/ RAN	LOSS OF SEPARATION	REMARKS

NS28RAI1.W51

ATTACHMENT C

NORTH ATLANTIC HEIGHT DEVIATIONS REPORTED TO CMA DURING PERIOD COMMENCING 1 MARCH 1992

DATE	FLIGHT IDENT	TYPE	OTS/ RAN	FLIGHT LEVELS		HT DEV'N	CAUSE OF HT DEV'N	SOURCE OF REPORT	REMARKS
				CLD	FINAL				

ATTACHMENT D

Dear Sir,

NORTH ATLANTIC - HEIGHT DEVIATION REPORT

At its 27th meeting the North Atlantic Systems Planning Group (NAT SPG) agreed that it was necessary to improve the effectiveness of the monitoring of height keeping performance in the North Atlantic (NAT) Region. In order to achieve this objective NAT SPG tasked NAT Provider States with improving, where necessary, the effectiveness of reporting of height deviations to the Central Monitoring Agency (CMA). In turn the CMA is required to initiate an investigation into the causes of reported height deviations.

Please find attached details of a report of a height deviation in the NAT Region attributed to an aircraft registered in your State. I would be grateful if you would arrange for the circumstances of this incident to be investigated and advise this office of the causes of the reported deviation from the aircraft's cleared flight level, together with any remedial action you will be taking.

Yours faithfully

E.H. Roberts
NAT CMA

FIGURE 1

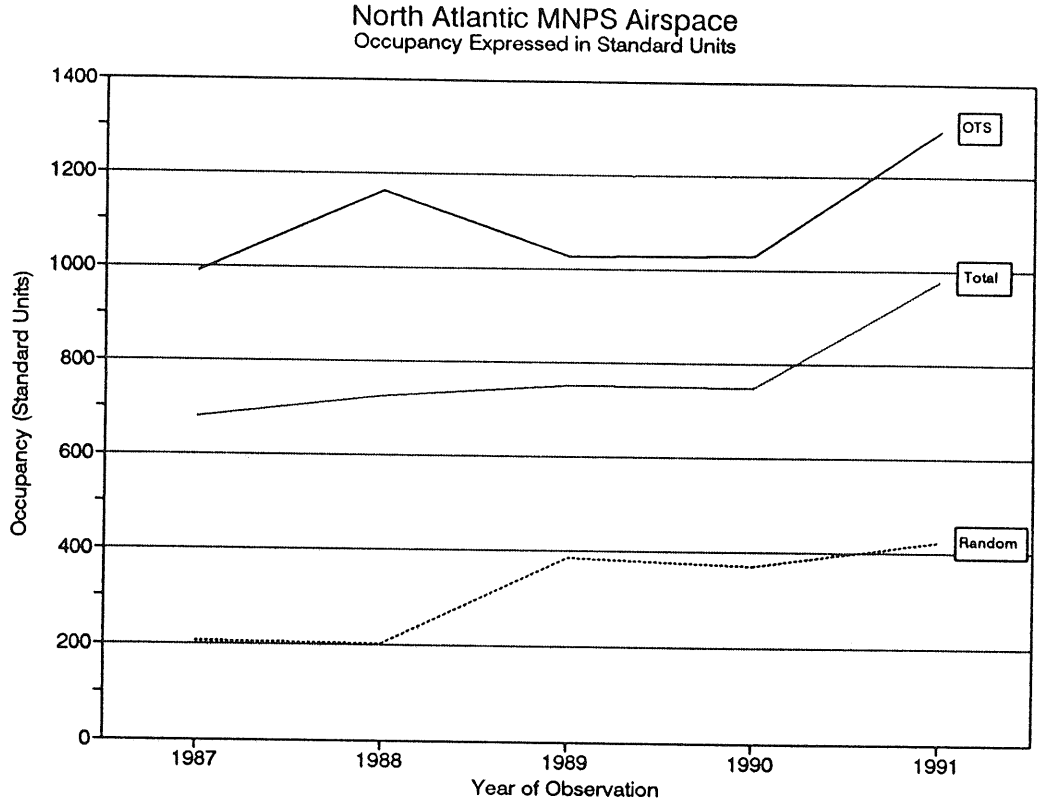


FIGURE 2

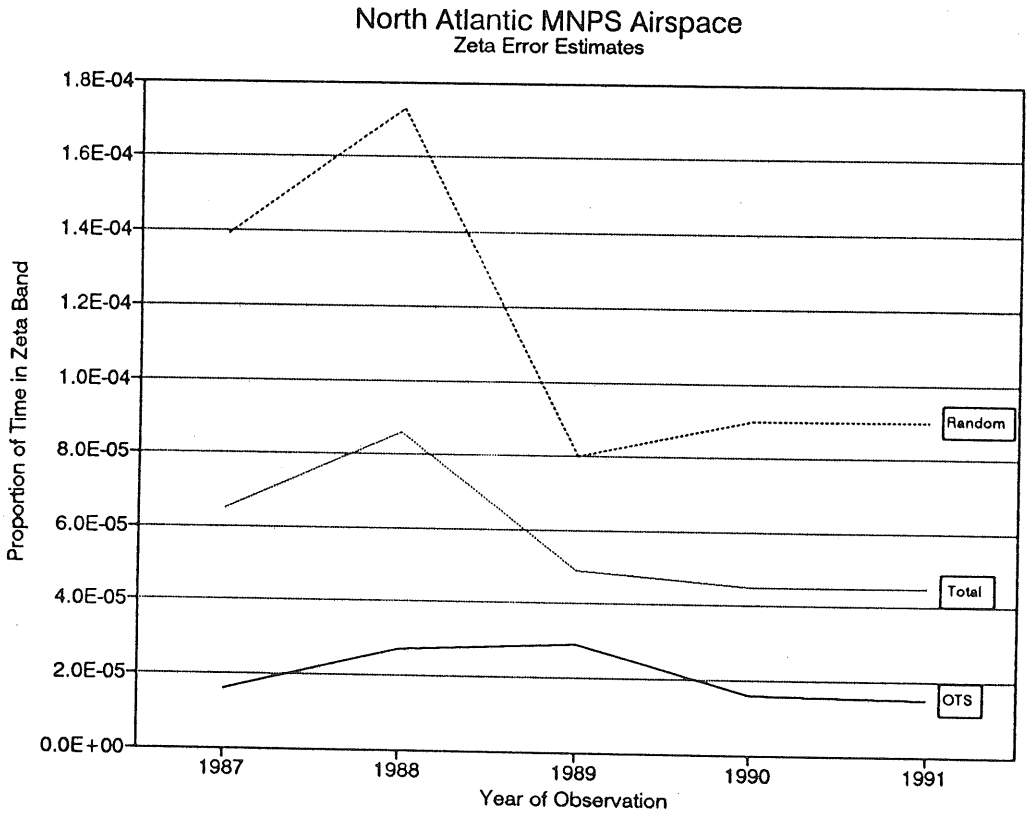


FIGURE 3

North Atlantic MNPS Airspace
Annual Lateral Collision Risk Estimates

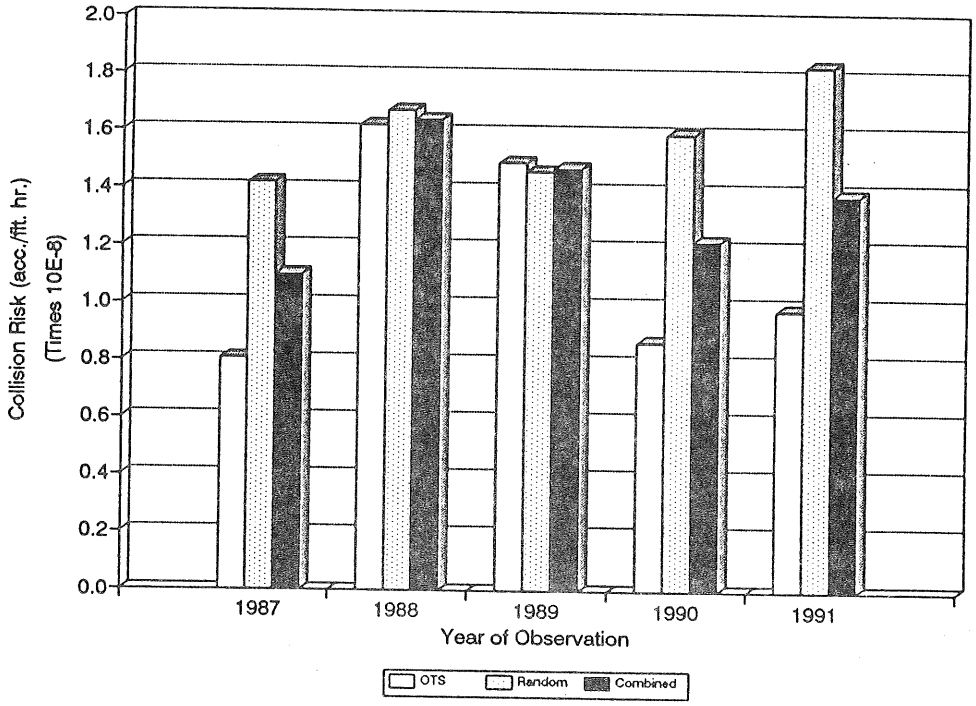
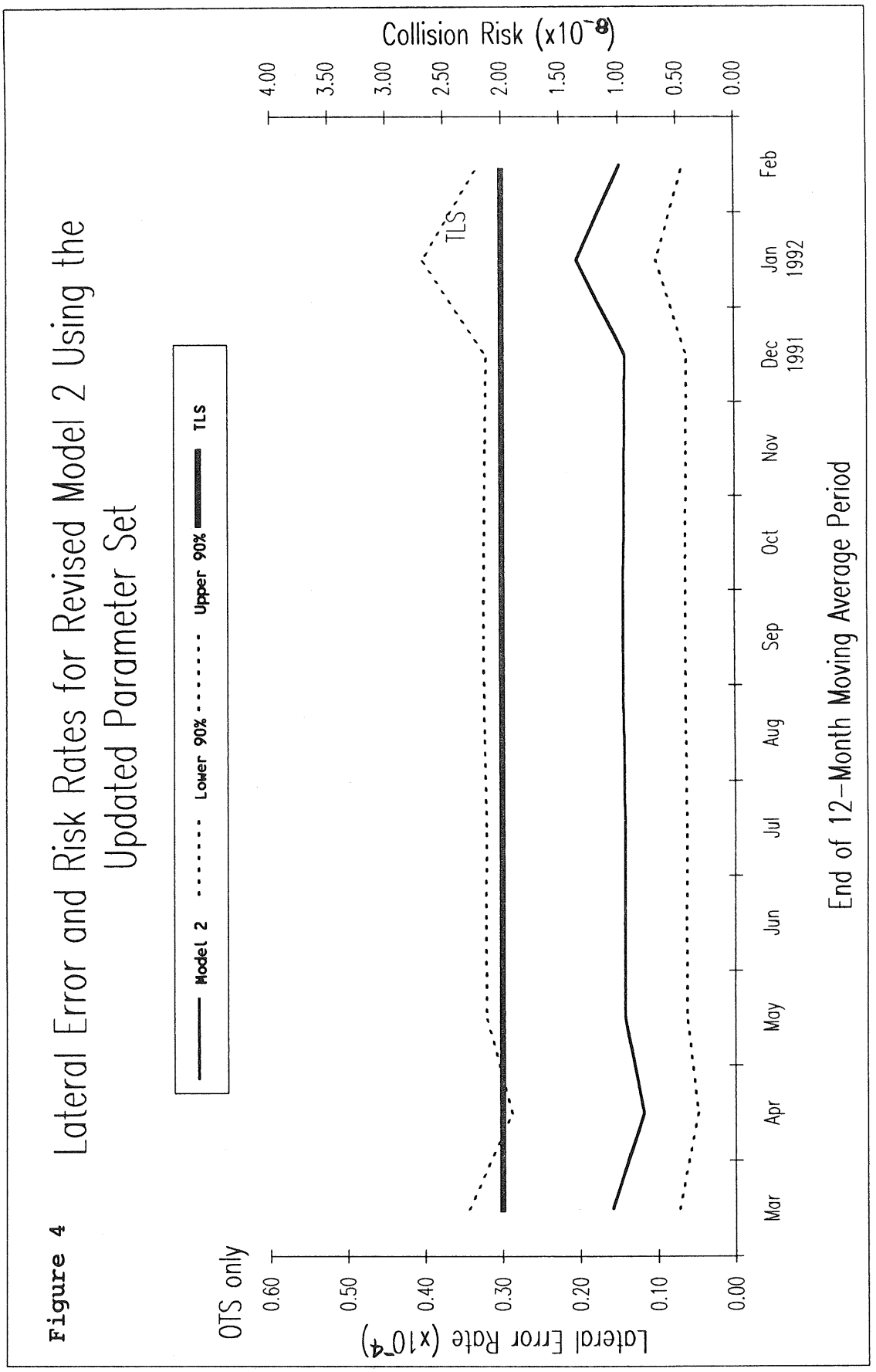


Figure 4 Lateral Error and Risk Rates for Revised Model 2 Using the Updated Parameter Set



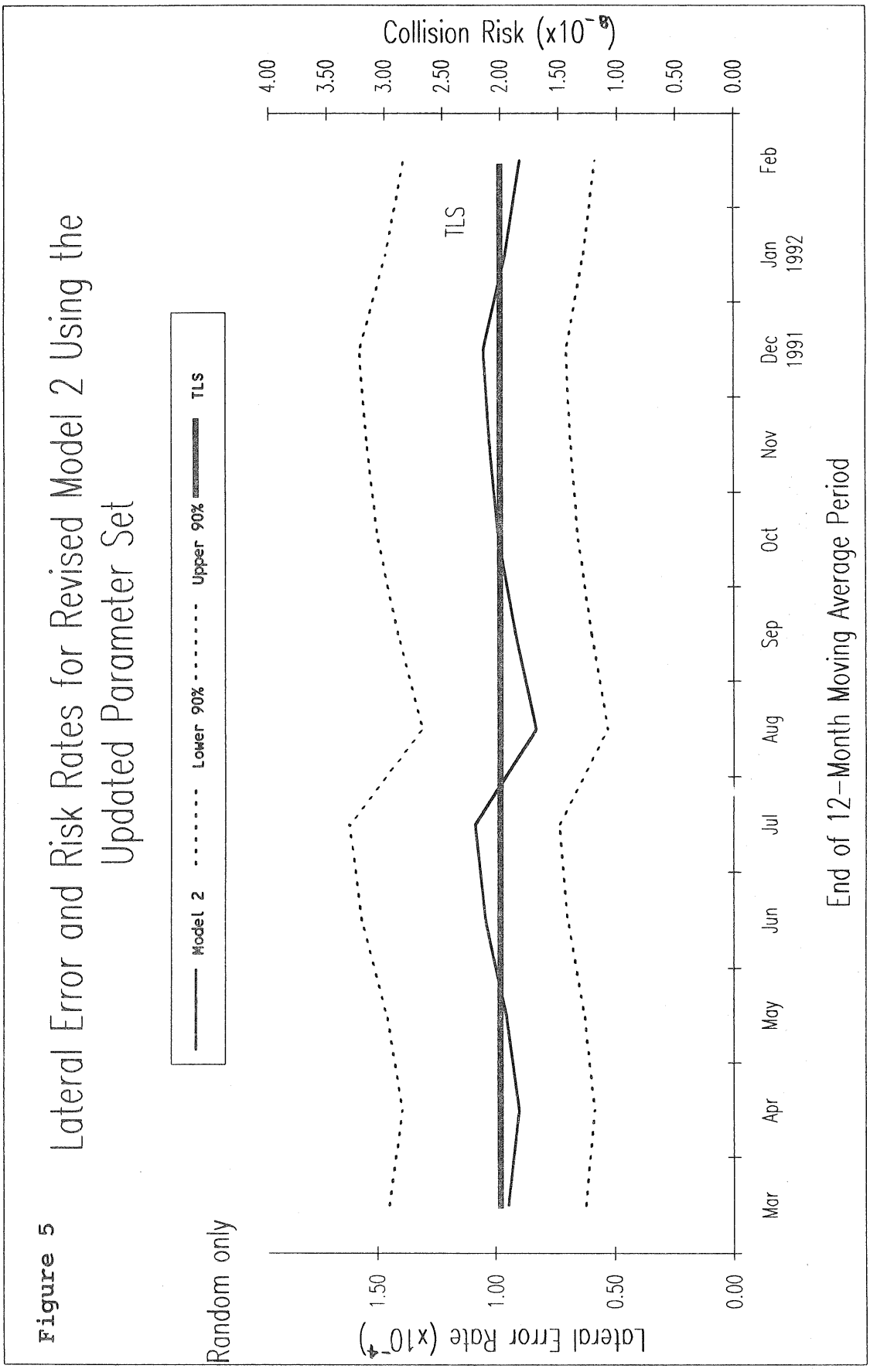
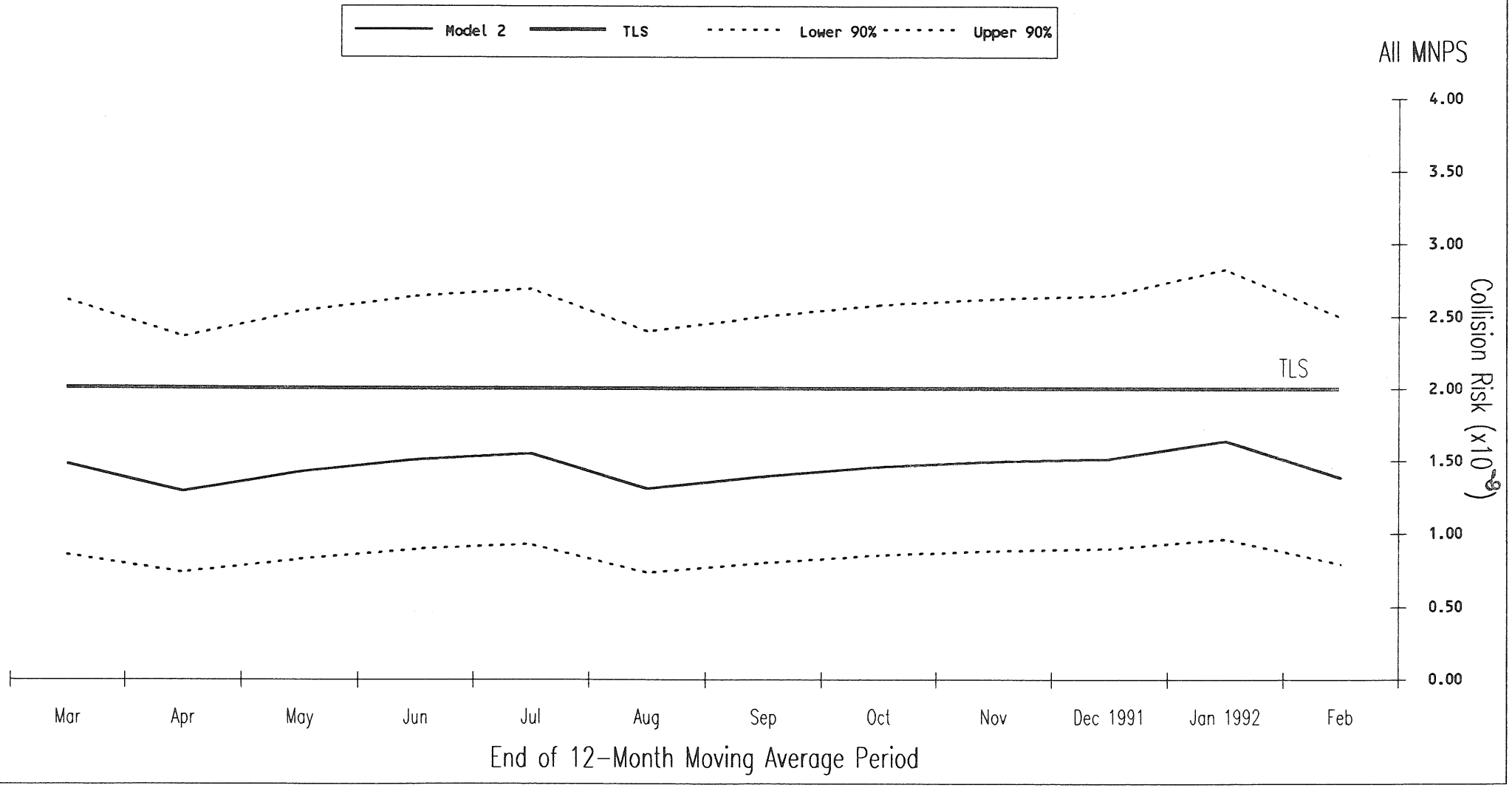


Figure 5
Lateral Error and Risk Rates for Revised Model 2 Using the Updated Parameter Set
Random only
Model 2
Lower 90%
Upper 90%
TLS
Collision Risk (x10⁻⁹)
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
TLS
Lateral Error Rate (x10⁻⁴)
1.50
1.00
0.50
0.00
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
1991
Jan
1992
Feb
End of 12-Month Moving Average Period

Figure 6

Risk Rates for Revised Model 2 for All MNPS Traffic



AGENDA ITEM 2: NAT AIR NAVIGATION SYSTEM OPERATIONS REVIEW

2.0 Introduction

2.0.1 Under this Agenda Item, the Group considered the following specific subjects:

a) air traffic services (ATS) operations;

b) communication operations;

c) determination of the performance assessment of the NAT Air Navigation System and the services provided to the airspace users by ATC; and

d) matters relating to Air Traffic Flow Management (ATFM).

2.1 Air Traffic Services Operations

2.1.0 The Group dealt with the following matters related to NAT ATS operations:

a) application and refinement of separation standards;

b) domestic/oceanic interface and transition problems adjacent to NAT MNPS airspace;

c) possible further short-term ATC improvements and determination of action for their implementation; and

d) extended-range twin-engined aircraft operations in the NAT Region.

2.1.1 Application and refinement of separation standards

Practical application of separation criteria for the NAT Region

2.1.1.1 The Group recalled that, at its Twenty-Seventh Meeting, it had identified an urgent requirement for a common definition of the application of separation criteria, easily understood by both air traffic controllers and software engineers. Accordingly, in its Conclusion 27/8, the Group had agreed that Canada should continue to coordinate the revision of the Practical Application of Separation Criteria (PASC) document, through NAT SPG Members, with the aim of obtaining a consensus prior to NAT SPG/28 and to take the necessary steps in preparation for the publication of the Third Edition of the document.

2.1.1.2 In this context, the Group noted that the Third Edition of the PASC document had been presented to the NAT Air Traffic Management Group (ATMG) at its first meeting in January 1992 (paragraph 4.2.1.3 refers). The Group recognized that it was difficult to draft a document satisfying the twin requirements of clarity for an ATC audience and the formality required by engineers. Therefore, it agreed that work remained to be done in order to ensure that the application of separation was understood by engineers so as to assure commonality of computer algorithms that reflect the agreed criteria to obtain automation harmonization. The Group also agreed that the work should be carried out by the On-Line Data Interchange (OLDI) group who would develop an appropriate Line of Action (Chapter 5) similar to Line of Action 5.10.

CONCLUSION 28/5 - DOCUMENT OF COMMON ALGORITHMS REFLECTING THE PRACTICAL APPLICATION OF SEPARATION CRITERIA

That the NAT On-Line Data Interchange group:

a) develop a document on common algorithms reflecting the practical application of separation criteria which would be directed at software engineers; and

b) develop a new Line of Action similar to Line of Action 5.10.

2.1.1.3 In closing the discussions on this matter, the Member from Canada advised the Group that the document, now entitled "Application of Separation Minima (North Atlantic) [ASM(NAT)]", would be available by the end of June 1992. However, noting that there had been no objections to the amendment proposal with respect to NAT Supplementary Procedures (Doc 7030/4, paragraph 7.1.1 2) c) refers), distribution would be effected as soon as Council has approved the amendment.

Separation standards for turbojet aircraft operating outside MNPS Airspace

2.1.1.3 The Group considered a proposal aimed at eliminating the requirement for a 20 minutes longitudinal separation between turbojet aircraft, when not using the Mach number technique, from the NAT Regional Supplementary Procedures (Doc 7030/4, paragraph 7.2.4 refers). However, in view of the fact that there were requirements for 20 minutes longitudinal separation in several parts of the NAT Region, the matter was not pursued any further.

2.1.2 Domestic/oceanic interfaces and transition problems adjacent to NAT MNPS airspace

ATS route network in Shannon Upper Information Region (UIR) and the Shannon Oceanic Transition Area (SOTA)

2.1.2.1 The Group was presented with the latest developments by the Member from Ireland concerning operations in the SOTA which had started in January 1991. Operations had been monitored closely through co-ordination between France, Ireland, the United Kingdom and IATA. Further to this co-ordination, the following additional modifications to the arrangements had been made:

a) a portion of the southwest corner of the London UIR has been delegated to Shannon and Brest ACC; and

b) the ATS route structure was altered to provide two entry/exit points between the SOTA and Brest UIR.

2.1.2.2 At a meeting held in Shannon in October 1991, further changes to the ATS route structure and link routes in United Kingdom airspace had been agreed upon, with the intention of implementing them in late 1992. Furthermore, it was indicated that plans were well advanced to re-organize the ATS route structure in the upper airspace under the jurisdiction of the Shannon ACC, i.e. the Shannon UIR and the SOTA. The proposed changes identified a need to adapt the ATS route network within the Shannon UIR and the SOTA to cater for air traffic operating to/from Shanwick OCA.

2.1.2.3 It was recalled that the ATS route structure in the Shannon UIR was originally supported by three VOR stations situated near the West coast of Ireland at latitudes of approximately 52N, 53N and 54N. These VORs were used as landfall or anchor points for NAT tracks. The operational handling of traffic, which was based on a flexible sectorization method applied by Shannon ACC, was reviewed upon a request by airspace users who were of the opinion that the landfall/anchor points were too distant from the NAT airspace limits.

2.1.2.4 In response to the above, the proposal put forward by Ireland involved significant changes to the ATS route structure, thus providing a reasonable balance between the needs of Shannon ACC and airspace users' requirements. The proposal was intended for implementation during winter 1992-93, subject to agreement between all parties involved. The Group agreed to the following changes:

a) replacement of existing landfall fix/anchor points with six new points on longitude 12W at each degree of latitude from 49N through 54N;

b) establishment of a landfall fix/anchor point at position 5355N/1034W (approximately) for use when position MASIT (5420N 12W) is a NAT track entry/exit point;

c) a landfall/anchor point will be linked to only one NAT track at a given time;

d) linking of these points direct to the Shannon/United Kingdom boundary or, subject to agreement, to points within the United Kingdom and to the Shannon/Brest boundary with a series of Area Navigation (RNAV) routes thus providing direct routings for the operators;

e) Westbound NAT tracks commencing at 15W but the 12W anchor points would be included in the NAT track signal and the operators must flight plan to route via the anchor point associated with the NAT track; and

f) Eastbound NAT flights would be cleared to landfall and operators may flight plan to follow the route of their choice east of 12W subject to any national regulations that may be in force in Irish or adjacent airspace.

2.1.2.5 It was indicated that the above developments would be supported by improvements to the radar service in Irish airspace as well as Very High Frequency (VHF) communication coverage (paragraph 2.2.2.16 refers). At the time, radar coverage was provided to the Shannon system by three monopulse SSR radars using multi-radar tracking and mosaic techniques. It was intended to improve the radar coverage in the Northwest of Shannon airspace by the provision of a fourth radar station in 1993. This improvement would provide the required redundancy in the North and Northwest of the Shannon FIR/UIR as well as in a significant part of NAT airspace. The Group noted the potential for improved ATS in the NAT Region, which the introduction of this additional radar coverage could provide, and that Ireland the United Kingdom would initiate discussions on its optimum utilization. Furthermore, Ireland emphasized its interest in the sharing of radar data and informed the meeting that negotiations were underway for the supply of data from the Mount Gabriel radar station to Brest ACC. In reciprocity, France was prepared to study the provision of radar data from the Brest radar station to Shannon.

RNAV Structure through Norwegian FIRs

2.1.2.6 The Representative for Norway informed the meeting that further to the introduction of the new airspace classifications in Norwegian FIRs, a review had been initiated aiming at harmonizing the existing RNAV route structure through Norwegian FIRs to/from Reykjavik Control Area (CTA). This review was carried out in co-operation with Denmark, Iceland and airspace users. The plan envisaged various steps of coordination with a target date for implementation of November 1992. Necessary preparations for detailed agreements were under way and publication of necessary procedures was scheduled for 30 September 1992.

2.1.2.7 After an in-depth discussion on the subject, States involved and IATA agreed to maintain the existing RNAV ATS routes within Norwegian domestic airspace. On the basis of these discussions, it agreed to publish the alignment of the links between the Polar Track Structure (PTS) and landfall points in Norway as being recommended but not mandatory for flight planning. Norway also agreed to publish the availability to flight plan random RNAV routes from/to specified landfall points in Norway to/from Reykjavik CTA. In the same context, a map showing the agreed extension of the existing PTS routes in Reykjavik CTA to landfall points in Norway was developed in support of the discussions.

RVSM transition in New York Oceanic Area Control Centre

2.1.2.8 Information was provided by the Member from the United States concerning difficulties in the preparation for operational procedures to be applied within the New York OAC as a result of the introduction of 1000 ft Vertical Separation Minimum (VSM) in MNPS airspace. Because MNPS airspace did not adjoin domestic radar coverage in most of the United States controlled portion of oceanic airspace, transitions would have to be carried out in non-radar airspace. Furthermore, communication delays inherent in oceanic operations using High Frequency (HF) and the lack of alternative separation standards would severely limit controllers' ability to establish separation other than in the vertical plane.

2.1.2.9 Considering that, potentially, twice as many aircraft could operate in the same block of airspace using 1000 ft separation than was possible with 2000 ft separation, the difficulty to move these aircraft appeared to be substantial, in particular as regards the communications workload involved. Accordingly, it was suggested that one solution could be to extend MNPS airspace into the WATRS area. Alternatively, the 1000 ft separation could be extended into the WATRS area, thus allowing domestic radar sectors to handle transition of aircraft in an optimum manner. Other options, such as obtaining radar data from remote radar stations (United States Navy Bermuda radar), were also being contemplated.

2.1.2.10 The above issues were discussed at some length. However, no readily achievable solution could be foreseen at that time. It was noted that, in the context of the EUR/NAT interface transition aspects, States concerned had carried out some work addressing transition problems, culminating in the development of a draft definition of an RVSM transition area and a list of criteria and principles for the establishment and application of air traffic services in such areas. Further discussions on this subject were carried out in the context of the report of the NAT Vertical Separation Implementation Group (VSIG) (paragraphs 4.2.4.14 and 4.2.4.15 refer).

2.1.3 Possible further short-term ATC improvements and determination of action for their implementation

2.1.3.1 In follow-up to the discussions held at NAT SPG/27 on possible measures which might enhance the efficiency and capacity of the NAT oceanic system, the Group addressed the following subjects:

a) provision of ATC services by Canada;

b) use of "cleared flight plan route";

c) use of general purpose VHF coverage;

d) altitude deviations in the NAT Region;

e) delegation of airspace between Shanwick and Reykjavik; and

f) enhancements concerning United States oceanic airspace.

Provision of ATC services by Canada

2.1.3.2 The Group was informed that, further to its upgrading of radar monitoring capabilities undertaken in the early 1980's, Canada has been engaged in the implementation of the Radar Modernization Program (RAMP). This included replacement of existing radar sensors with state-of-the-art equipment, introducing new and improved radar data processing capabilities in each Canadian ACC and replacing the radar display equipment in the busiest ACCs. Major improvements, including expanded surveillance capabilities, were expected from the introduction of monopulse Secondary Surveillance Radar (SSR) processing and sophisticated controller displays.

2.1.3.3 As part of the above improvements, the Gander and St John's RAMP radars will extend coverage further to the East of the Gander Domestic FIR boundary from a 200 NM radius to 240 NM. In order to gain maximum utilization from these systems and provide an improved level of service in this airspace, a CTA within the Gander Oceanic CTA/FIR was to be delegated to Gander

Domestic ACC. The CTA was described as that portion of the Gander Oceanic CTA/FIR at and above FL 60 bounded by a line beginning at CARPE (5305N 5405 W), to 51N 50W, to 49N 48W, to 45N 48W, to 45N 51W, to 49N 51W, to CARPE. A target date of mid April 1993 had been scheduled for its implementation.

2.1.3.4 Further to the preliminary discussions held at NAT SPG/27 concerning the possible provision of radar service to oceanic traffic operating in airspace contiguous to the New York/Moncton/Gander FIR/CTA, the Member from Canada reported that his Administration had examined the issue and had made proposals to the United States which were found to be acceptable in principle. The operational and technical issues would be discussed within the next two months by staff of the units concerned.

2.1.3.5 The proposal, which included the provision of radar service to traffic currently operating on a track "POGGO" to 4500N 5000W, would afford greater flexibility for the handling of eastern seaboard departing oceanic traffic. To achieve this, it was proposed to establish Moncton/Gander CTA's at FL 275 and above within that portion of the New York oceanic FIR/CTA covered by radar stations located at Digby, Halifax, Sydney and St John's. Depending on the results of further discussions between Canada and the United States, in particular with respect to the provision of additional resources required (VHF communication facilities), it appeared reasonable to envisage late 1993 as a possible implementation date.

2.1.3.6 The Member from Canada also informed the Group that steps had been taken to review problems and identify solutions associated to cases of restrictions being imposed on Westbound-NAT traffic transiting Reykjavik and/or Gander OCA into the Montreal ACC North Sectors. It was explained that occasions when Montreal ACC had imposed restrictions had occurred when a North-about Westbound OTS was in place and when an unexpected high volume of traffic was operating on random tracks North of the OTS.

2.1.3.7 In this context, as a result of the co-ordination carried out by Canada, Iceland and the users, it had been possible to set up an agreement whereby up to three additional tracks originating in Reykjavik airspace, starting at 30°W, would be published when a high volume of Westbound traffic north of a North-about system was expected. Furthermore, the agreement provided for the establishment of three unpublished tracks when an unexpected high volume of Westbound traffic was operating on random tracks North of the OTS. It was noted that the proposal, which was co-ordinated with Shanwick OAC, had been implemented on 15 May 1992.

2.1.3.8 Furthermore, the Group noted that co-ordination requirements with respect to Westbound traffic operating at 65N/60W were discussed. It had been agreed that the complexity of co-ordination between Edmonton, Montreal, Gander and Reykjavik could be reduced significantly by the delimitation of CTA's proximate to the Edmonton/Montreal FIR to point of intersection with the Gander/Reykjavik oceanic CTA, at co-ordinates: 6551N/5832W - 6530N/60W - 6430N/70W - 6230N/80W. These measures were planned to be implemented on the 20 August 1992 AIRAC date.

Use of "via cleared flight plan route"

2.1.3.9 The Member from Canada updated the Group on the application by Gander OAC of procedures for the issuance of oceanic clearances to Eastbound aircraft proceeding on a random flight plan route using the term cleared "via flight plan route". It was recalled that Canada had undertaken, subject to favourable results of their trials, to prepare appropriate documentation for possible amendments to ICAO material.

2.1.3.10 After publication of a NOTAM (C0786/91) on 24 April 1991, Gander OAC started a trial in which only Eastbound NAT traffic transiting the Gander Domestic and Gander oceanic FIRs would receive an abbreviated clearance based on the use of the term "flight plan route". Although Canada was able to report that, during the trial period, this procedure had worked very satisfactorily, some arguments were put forward aimed at linking the application of this procedure to the use of Direct Controller/Pilot Communication (DCPC) channels. The reason for this was that some confusion might exist in the interpretation of clearances inherent to the time element involved in HF transmissions.

2.1.3.11 The Group agreed that the text proposed by Canada for amendment of the NAT Regional Supplementary Procedures (Doc 7030/4), to permit the use of "cleared via flight plan route" for oceanic clearances in the NAT Region should amplify the requirements for DCPC as well as the acknowledgement of the cleared flight level in the readback by pilots. It was agreed that, on the basis of the Group's comments, the Member from Canada should document the matter for presentation to the forthcoming LIM NAT (COM/MET/RAC) RAN Meeting. The draft proposal containing changes submitted by Canada **(in bold)** and comments made by the Group *(in italics)* is at Attachment A to the report on Agenda Item 2.

CONCLUSION 28/6 - ISSUANCE OF ABBREVIATED CLEARANCES

That the Member from Canada prepare a relevant proposal for amendment to the NAT Regional Supplementary Procedures (Doc 7030/4), paragraph 6, for submission to the forthcoming LIM NAT (COM/MET/RAC) RAN Meeting, to permit the use of the term "cleared via flight plan route" for oceanic clearances in the NAT Region.

Use of VHF coverage

2.1.3.12 The Group was informed that, subsequent to NAT SPG/27, discussions had taken place between IATA and some provider States regarding special routes for use by aircraft carrying limited communication fits, specially aircraft without HF. Provisions covering these matters were published in the Canadian Aeronautical Information Publication (AIP). However, there were inconsistencies between States AIPs and other documents such as the ICAO Consolidated Guidance Material - North Atlantic Region (NAT Doc 001, T 13.5N/5), the North Atlantic International General Aviation Operations Manual and the North Atlantic MNPS Airspace Operations Manual with respect to the use of VHF in lieu of HF. Taking into account the intent of Iceland and Denmark to expand the VHF coverage over Greenland, the Group agreed to examine the subject in detail. This was done in the context of the updating of the NAT Guidance Material and the relevant discussion is therefore reflected in the report on Agenda Item 5.2 (paragraph 5.2.3. i) refers).

Advisory circulars concerning altitude deviations

2.1.3.13 The Group noted the information provided by the Member from the United States concerning the intention of the Federal Aviation Administration (FAA) to publish an Advisory Circular (AC) drawing the attention of users and providers on height keeping performance in the context of the forthcoming implementation of 1000 ft VSM above FL 290 in the NAT Region. In the proposed material, emphasis was put on the need to increase operator awareness concerning aircraft altitude deviations exceeding $\pm$ 300 ft in the NAT Region. Such deviations would be subject

to scrutiny, similar to the method applied by the FAA for Oceanic Navigation Error Reports. In the same context, the Group noted that Canada will promulgate a similar circular in June 1992 and that Norway and the United Kingdom had already done so.

Shanwick/Reykjavik delegation of airspace

2.1.3.14 The Member from the United Kingdom informed the Group that, subsequent to consultations between his Administration and Iceland, a trial delegation of a small triangle of Scottish UIR airspace adjacent to, and including 61N010W, had started on 12 December 1991. This delegation of airspace, which takes advantage of overlapping radar and R/T coverage from the Faroe Islands and Scotland, obviated the necessity of aircraft routeing via 61N010W to obtain an oceanic clearance from Shanwick if proceeding directly into Reykjavik or Scottish airspace. The trial worked to the satisfaction of both parties involved and had been extended to 31 March 1993 and consideration had been given to permanent status of the delegation. A further delegation of an additional triangle extending between 5939N/61N and 10W/15W was being studied.

Additional short-term improvements

2.1.3.15 Further to a number of issues raised by IATA at NAT SPG/27 concerning possible measures which might enhance the efficiency and capacity of the NAT Oceanic system, an update of the progress made was provided by the Member from the United States as follows:

a) an oceanic planner position had been implemented in the New York OCA and efforts were being pursued to improve clearance delivery procedures; and

b) discussions on the possible introduction of a supplementary ATS route to A699 and A700, in replacement of AR9, had not been conclusive. However, this matter was being considered by the United States military authorities.

2.1.4 Extended-range twin-engined aircraft operations (ETOPS) in the NAT Region

2.1.4.1 The Group was informed by the Member from Iceland that its Civil Aviation Administration (CAA) had, for three years, operated an Automated Terminal Information Service (ATIS) for Reykjavik airport. The system was based on conversion of text to speech using a stored vocabulary of standard phrases and words. This system was also capable of functioning as an automated Meteorological Information for Aircraft in Flight (VOLMET) generator, processing Routine Aerodrome Report (METAR) and Aerodrome Forecast (TAF) messages, without human intervention. The Group was informed that the function may have a practical application for ETOPS in the NAT Region.

2.1.4.2 The Group was informed that the VOLMET transmission would provide continuous broadcasts of weather conditions and forecasts for those airports within the region necessary to support ETOPS. In this context, the Group was informed that runway conditions are included in the METARs and that it appeared feasible to obtain an appropriate HF frequency for such a VOLMET transmission (para 2.2.2.6 also refers).

2.1.4.3 The Representative from IATA advised the Group that there was no user requirement for the additional VOLMET facilities. However, the Group noted that this matter would be reviewed at the forthcoming LIM NAT (COM/MET/RAC) RAN meeting in the context of the review of the ATS requirements for VOLMET in the NAT Region and that this matter should be reconsidered in that forum. In closing the discussions on this issue, the Representative from IFALPA indicated that a VOLMET broadcast dedicated to ETOPS alternate aerodromes in the NAT Region would be very useful as ETOPS flights are unique in their requirement for en-route alternates and ETOPS pilots have an obligation to monitor weather trends at those alternatives. This task was unnecessarily time consuming using the two HF VOLMET broadcasts.

2.2 Communications operations

2.2.0 Under this Agenda Item, the Group considered the following subjects:

a) aeronautical fixed services (AFS); and
b) aeronautical mobile services (AMS).

2.2.1 Aeronautical Fixed Services

Performance of Santa Maria and New York ATS direct speech circuits

2.2.1.1 The Group was provided with information relating to the performance of Santa Maria ATS direct speech circuits. This information showed that there was an overall improvement in the performance of these circuits. The slight degradation experienced in the connection Santa Maria/Shanwick was not considered significant as this circuit maintained the highest figures of availability and reliability. As compared to the previous one year period, there had been a remarkable improvement in the availability of the Santa Maria/New York circuit from September 91 onwards. However, the reliability figures remained low as the number of failures had still been significant. The Santa Maria/Gander connection showed a better performance than the Santa Maria/New York one, in spite of the share by both circuits of a common segment between Santa Maria and New York. However, it was noted that these variations in performance may have been due to less frequent use/fault-monitoring of the Santa Maria/Gander connection.

2.2.1.2 The Group noted that an alternative connection, with a different routing, between Gander and Santa Maria was under study in Portugal following a proposal from Canada. If this possibility proves feasible and cost effective it could be envisaged that, with the existing circuit and the new one, alternative routings could be provided both for the Santa Maria/Gander and the Santa Maria/New York connections.

AFS circuits in the northern part of the NAT Region

2.2.1.3 The Group was informed of the actions taken by Canada, Denmark and Iceland regarding implementation of the new network configuration between those three States and the Faroe Islands in follow up to NAT SPG Conclusion 27/9. There had been two ad-hoc meetings in Reykjavik and Ottawa concerning the technical implementation of the new circuits which will be introduced by 1 October 1992. In this connection, the Group noted that the Informal NAT AFTN/AFS/92 meeting will take place from 9 to 12 June 1992.

2.2.2 Aeronautical Mobile Services

Implementation plan for HF family NAT-F

2.2.2.1 The Group recalled that, at its Twenty-Sixth meeting, it had identified the requirement for an additional HF family of frequencies between Gander and Shanwick. The Group had concluded that "Canada and Ireland take appropriate action within their Administrations to implement NAT-F at Gander and Shanwick as soon as possible".

2.2.2.2 In follow-up to the above, the Member from Canada reported on action taken. The installation of NAT-E between New York and Santa Maria in June 1990 had increased the NAT network capacity and the upgraded terminal equipment had improved communication handling time. Nevertheless, the increasing traffic continued to use up the additional capacity. Furthermore, the forecast growth in the volume of NAT traffic in the time span until the ICAO Global Communications Navigation Surveillance (CNS)/Air Traffic Management (ATM) concept is implemented must be provided for. The impact of the NAT ID on the timing and method of implementation has been studied through analysis of NAT HF network traffic and station handling capacity.

2.2.2.3 The Group agreed that NAT-F be implemented at Gander and Shanwick on a mutually agreeable date, if possible by 7 January 1993. In an effort to reduce shared use of NAT-D, which has reached peak period saturation loading, it was further proposed that Gander and Shanwick vacate NAT-D and install NAT-F using existing equipment. In this connection, the Member from Ireland indicated that every effort would be made to ensure that the proposed implementation schedule for HF family NAT-F would be met. Gander Radio will vacate NAT-D simultaneously with the introduction of NAT-F, Ireland would delay a decision in this matter until further studies have been completed.

2.2.2.4 The Group noted that analyses have revealed that two of the frequencies assigned to NAT-F are unsuitable for use. One of them, 8831 kHz, does not meet separation standards set out in Annex 10, Volume I and the other, 2962 kHz, was previously used on NAT-C but removed because of adjacent channel interference problems. It was further noted that the ICAO Frequency Management Study Group (FMSG) meeting (6-15 May 1992) had determined that additional HF frequencies were not available at that time. The FMSG requested that the NAT SPG reach an agreement on changes required to existing frequencies in use, to enable the installation of NAT-F. Therefore, the Group agreed that, to provide the necessary separation, NAT-A frequency 8825 kHz would be exchanged with NAT-F 8906 kHz and that NAT-F 2962 kHz and NAT-E 3476 kHz would be exchanged. These changes affect New York, Santa Maria, Shanwick and Gander. The Group also felt that 11 and 13 MHz frequencies will be required.

CONCLUSION 28/7 - HF FAMILY NAT-F IMPLEMENTATION

That:

a) at a mutually agreed date, co-ordinated by Canada, the following frequency changes be made to permit NAT-F implementation: NAT-A frequency 8825 kHz be exchanged with NAT-E frequency 8906 kHz at New York, Santa Maria, Shanwick and Gander, and NAT-E frequency 3476 kHz be exchanged with NAT-F frequency 2962 kHz at New York and Santa Maria;

b) NAT-F be implemented at Gander and Shanwick on 7 January 1993; Gander will vacate NAT-D simultaneously;

c) Canada prepare and submit to the LIM NAT (COM/MET/RAC) RAN Meeting a proposal for necessary amendment to the NAT Air Navigation Plan (ICAO Doc 8755); and

d) Canada prepare and submit to the LIM NAT (COM/MET/RAC) RAN Meeting a proposal for necessary amendment to the ICAO Supplementary Procedures (ICAO Doc 7030).

HF family NAT-G

2.2.2.5 The Group recalled that, at its Twenty-Sixth meeting, it had agreed on the need to establish NAT HF Family NAT-G. In this connection, Conclusion 26/10 b) directed Canada to take appropriate action so that NAT-G Family frequencies be authorized and assigned for use in the northern part of the NAT Region. The Group noted that, taking into consideration that all frequencies allotted for Major World Air Route Area (MWARA) in the NAT Region have been assigned, Canada approached the ICAO COM/MET/OPS/90 Divisional Meeting with a request that the frequencies assigned by the International Telecommunications Union (ITU) (see ITU Radio Regulations, Appendix 27, Aer 2) but not used, be re-assigned to meet current HF network requirements. This was recommended by the meeting and was under consideration by the FMSG. However, they have not yet completed their task and did not have frequencies to assign to NAT-G. The Group noted that, to assist the FMSG in their work, NAT SPG should consider the future requirements for HF VOLMET to permit possible re-assignment of frequencies presently assigned to VOLMET NAT (VNAT) and VOLMET EUR (VEUR) but not used and should confirm the NAT-G frequency requirements.

2.2.2.6 On the basis of the above, the Group agreed to undertake a review of HF VOLMET requirements in the NAT Region by their individual State Administrations and report to NAT SPG/29. It also confirmed the requirements for 2, 5, 8 and 11 or 13 MHz frequencies to be assigned to NAT-G. In the same context, the Group noted that NAT-D traffic at Cambridge Bay was approaching saturation loading during peak traffic periods and, because satellite communication coverage in the Polar area was uncertain, HF will be required for an undetermined period. The Group therefore confirmed the requirement to continue efforts to obtain NAT-G frequencies (paragraph 2.1.4.2 also refers).

CONCLUSION 28/8 - HF FAMILY NAT-G FREQUENCY ASSIGNMENT

That:

a) **Provider States and users identify HF VOLMET NAT (VNAT) and VOLMET EUR (VEUR) future requirements and report to NAT SPG/29;**

b) **Canada, on behalf of the NAT SPG, co-ordinate and identify NAT-G frequency requirements to the ICAO Frequency Management Study Group.**

Implementation of 13354 kHz on HF Family NAT-E

2.2.2.7 The Group recalled that, at its Twenty-Seventh Meeting, it had concluded (see Conclusion 27/12) that the United States and Portugal should implement a 13 MHz band frequency at the New York and Santa Maria aeronautical stations. A search for a suitable 13 MHz frequency was carried out by the United States and the frequency 13354 kHz had been identified to effectively communicate with aircraft operating in the NAT HF Family E service area. The Group was informed that the United States successfully implemented frequency 13354 kHz on a time-share basis with stations in the Pacifc (PAC) Region at New York aeronautical station on 19 September 1991. The Group also noted that the United States will prepare and submit to the LIM NAT (COM/MET/RAC) RAN Meeting a proposal for amendment of the NAT Air Navigation Plan in order that frequency 13354 kHz be listed as an operating frequency for the HF Family NAT-E. The Member from Portugal stated that his Administration would implement the frequency once the amendment has been approved.

HF and General Purpose (GP)/VHF data collection

2.2.2.8 The Group recalled that it had agreed that the timeframe for the next NAT HF and GP/VHF data collection exercise, scheduled for 1993, should remain unchanged. However, in view of the need to be able to evaluate the effects on the NAT HF network of annual traffic fluctuation, to assess network efficiency and to plan for future network requirements, it had been decided that the Administrations responsible for the main stations in the NAT HF network should each submit summary reports on volumes of HF and GP/VHF communications traffic in respect of each calendar year. The reports, as requested, had been prepared by the Administrations concerned and exchanged between the respective centres. In reviewing the reports, the Group agreed that they provide a new and valuable source of information. A comprehensive picture of network utilization, family by family, could be drawn and the information could be of much assistance in assessing network performance and in planning changes in network configuration.

2.2.2.9 The Group recalled that the previous HF and GP/VHF data collection exercise, which had been conducted annually up until recently, had been designed to provide the Group with a detailed analysis of data collected over three specially chosen dates during the peak season. The analysis produced statistics which were intended as a measurement of the efficiency of existing air/ground communications methods. The Group agreed, however, that the statistics were of diminishing merit and no longer justified the inordinate resources of manpower required to produce them.

2.2.9.10 In view of the better quality information which was available from the annual reports submitted by the provider States, the Group decided that the traditional HF and GP/VHF data collection exercise be discontinued. Therefore, the exercise planned for 1993 will not take place. The Group agreed, however, that the annual summary reports from the aeronautical centres should be in a standardized format as much as possible. The Group agreed therefore, that each report should normally contain:

a) total number of flight movements in the respective Oceanic Control Areas as recorded at each centre; and

b) total number of air/ground messages, subdivided into HF and GP/VHF groups, as well as readback and intercept reports.

2.2.2.11 In order to better evaluate air/ground frequency loading on an ongoing basis, the Group also agreed that centres should collect and report the data on total readback traffic per frequency and per family on two specified dates per month. In order to harmonize this exercise with other efficiency assessment studies already being conducted, it was agreed that the selected dates be the 4th and 15th of each month.

CONCLUSION 28/9 - HF AND GP/VHF DATA COLLECTION

That:

a) the traditional 3 days HF and GP/VHF data collection exercise be discontinued;

b) Provider States supply, in the agreed format, annual reports on HF and GP/VHF traffic loading; and

c) the annual reports contain the results of studies conducted on the agreed dates each month.

2.2.2.12 Finally, the Representative for IATA offered to support the efforts of the Group in this regard by arranging pilot evaluation of the NAT air/ground communications system on two of the selected days of the year with particular reference to HF and GP/VHF channel congestion.

Additional VHF Facility

2.2.2.13 The Group recalled that, at previous meetings, it had discussed a proposal by Iceland that, in order to improve reliable communications in the northern part of the NAT Region, the possibilities of installing a VHF facility on the east coast of Greenland, remotely controlled from Reykjavik, should be investigated. The Group had concluded that Denmark and Iceland jointly study this possibility and report to NAT SPG/28.

2.2.2.14 From the report, the Group noted that in order to fill a gap in the Reykjavik OCA VHF coverage, between the Reykjavik and Iqaluit (Canada) facilities, and thus provide continuous VHF coverage across that part of the NAT Region for flights above FL 195, it was determined that two VHF stations were required, remotely controlled from Reykjavik. Two sites, Kulusuk and Sondrestrom, had been identified as suitable locations. The availability of these facilities would add 17 reporting points to those already covered by the existing GP/VHF coverage area (See Attachment B to the report on Agenda Item 2). The 60-90 NM gap in the coverage at FL 330

between the Reykjavik and Prins Christian Sund facilities would also be filled by this improved coverage. Furthermore, to support the requirement, a five-day traffic analysis in February 1992 indicated that approximately 30% of the total number of flights in the Reykjavik CTA crossed the proposed VHF coverage area (paragraph 5.2.3 i) also refers).

2.2.2.15 On the basis of the above, the Group agreed that implementation of the proposed VHF facilities would be a valuable addition to the existing VHF coverage. The facilities would help to alleviate traffic congestion on HF, would provide the best solution to filling known gaps and would enhance communications and safety of the operations in the NAT Region.

CONCLUSION 28/10 - IMPLEMENTATION OF VHF FACILITIES IN GREENLAND, REMOTELY CONTROLLED FROM REYKJAVIK

That, as a matter of urgency, Iceland and Denmark:

a) agree on the technical implementation details of VHF facilities in Greenland remotely controlled from Reykjavik;

b) make a submission to the ICAO Joint Support Committee for ICAO Council approval;

c) proceed with these installations; and

d) update the coverage maps published in the various documents.

Expanded VHF communications coverage

2.2.2.16 The Group was provided with information regarding an improvement in VHF communication facilities planned to be put in operation in mid-1993 as part of Ireland's equipment modernization programme. In this connection, it was noted that, in addition to the two existing VHF facilities, two new ones would be installed at Rosslare in the Northwest and Truskmore in the Southwest, thereby providing complete VHF coverage of its areas of responsibility with a high level of back up (paragraph 2.1.2.5 also refers).

Selective Calling (SELCAL) expansion

2.2.2.17 In late 1970, it was recognized that saturation in numbers of assignable SELCAL codes (2970 total) was approaching. Action, which had been taken by ICAO in 1981 to relieve the problem by expanding the number of SELCAL tones from twelve to sixteen, was accepted by States.

2.2.2.18 To date, in excess of 4337 new SELCAL codes have been assigned by Aeronautical Radio, Inc. (ARINC), the ICAO-designated international registrar of SELCAL codes, from the new tone allocation. These tones are discrete, single user codes which would remain unshared for many years. The major manufacturer of aircraft SELCAL equipment has marketed two new models with 16-tone code capability, plus adaptive units that convert 12-tone equipment to 16-tone mode. As more and more of these units are placed in service, the number of users sharing a common code would be reduced.

2.2.2.19 The SELCAL registrar has, over the past six years, widely disseminated information on the availability of the new codes, the new equipment and the advantages of using them. Users requesting SELCAL codes are to determine if they can use the new codes to ensure their maximum use. The SELCAL registrar selects the code on the basis of geographical area(s) in which the aircraft will be operated. If the aircraft is flying in area(s) that differ from those previously specified, a duplication of SELCAL codes becomes possible.

2.2.2.20 When acquiring a previously owned aircraft equipped with SELCAL, the purchaser or lessee must be prepared to change the SELCAL code to ensure that the code has been selected from the codes assigned to the new aircraft operator, or apply to the Registrar for a new SELCAL code if necessary. This will ensure that the SELCAL code will be compatible with the geographic area in which the aircraft is to be operated. Many aircraft operators mistakenly assume that the SELCAL code automatically transfers to the purchaser or lessee.

2.2.2.21 The Group noted that, in follow up to NAT SPG Conclusion 27/13, ICAO urged States throughout the world to implement SELCAL equipment with 16-tone capability. The Group emphasized the requirement that all of the NAT aeronautical stations have 16-tone SELCAL equipment in operation. Taking into consideration this situation, the Group strongly recommended that the NAT aeronautical stations forward all cases related to duplication of SELCAL codes to the SELCAL registrar using AFTN messages addressed to KDCAXAAG. The first line of the text should contain the following: "Attn OPS Dep.". Other information regarding aircraft flight identification, the SELCAL code and date concerned should be incorporated in the text of the report.

Read-back of POS reports by ground stations

2.2.2.22 The Group noted a report indicating that the practice of reading back position reports appeared to be decreasing in the NAT Region. The Group discussed the matter and agreed to investigate it further. However, it was noted that positions transmitted using DCPC are not readback and that this may possibly explain the above. The Representative from IATA agreed to consult with its pilots and report the findings to NAT SPG/29.

Harmful interference to NAT HF operations

2.2.2.23 Information from States relating to the reports of harmful interference on HF NAT families indicated that its effects had declined. The Group believed that this might be explained by the changes in the political environment and better co-operation. The majority of cases of harmful interference caused some difficulties but had little effect on the service and no chronic interference affecting all stations had been identified.

2.2.2.24 However, one State reported on the constant disturbances on one HF frequency from an unidentified source somewhere in the former Soviet Union. Having discussed these disturbances in-depth, advice was given to the Member from this State regarding the method of identifying the location of the source and the procedure to resolve the problem in a more efficient way.

2.2.2.25 The Group also agreed that the practice of exchanging information two months in advance of the NAT SPG meetings was helpful and should continue.

CONCLUSION 28/11 - HARMFUL HF INTERFERENCE

That NAT provider States:

a) continue to gather information on harmful HF interference in the NAT Region and present it in the agreed format to future NAT SPG meetings; and

b) continue to use the existing procedures to resolve specific HF interference problems.

Handling of emergency voice calls by satellite

2.2.2.26 The Group noted that the ICAO CNS/ATM concept provides for distress and emergency calls through the ATS voice or the data network. It further noted that a significant proportion of aircraft equipped for satellite communications could only support Aircraft Public Correspondence (APC). It was therefore likely that some of these aircraft could be faced with an emergency situation that would require the use of the APC system for distress and emergency calls. Furthermore, the Public Switched Telephone Network (PSTN) has been used by the pilot of an aircraft to contact an ACC. This may be the only way to alert ATC when emergency or distress conditions arise in remote areas. Therefore, procedures for handling these situations need to be developed.

2.2.2.27 The Group noted that, because of the urgency, procedures to access a relevant Rescue Co-ordination Centre (RCC) or ACC through the satellite and PSTN, must be simple, and allow the pilot to relay the information in the shortest possible time. This could be achieved if there was universal agreement on a single code for use in case of distress and emergency. For example, users of one service can key # 32 for emergency medical advice.

2.2.2.28 The Group agreed that the issue needed to be addressed. However, it was not possible to make any recommendations at the time. Accordingly, the Representative from Inmarsat agreed to initiate a dialogue with their signatories in order to work out an interim arrangement and to report to NAT SPG/29.

2.3 Determination of the performance of the NAT Air Navigation System and the services provided to airspace users by ATC

2.3.1 An overview of operations within the Gander OAC was provided for 1991. The statistics used in compiling the information had been based on 50°W data collections with the exception of random traffic. That information had been derived by comparing Eastbound traffic to the night time OTS and Westbound traffic to the day time OTS. A breakdown of traffic figures indicated that the high level traffic (FL 280 and above) had increased by 1.1% compared to 1990. Taking into account the increase of 3.6% for low level traffic, the total operations for Gander OAC had increased by 1.1% for 1991 vs 1990. Further breakdowns of figures showed comparisons between the OTS and random traffic by area, direction, hourly and monthly distribution and the flight level utilisation including step climbs. The statistics also showed that the average number of tracks in the daytime system was 7.4 in 1991 compared to 8.1 in 1990. The night time daily track average was 6.4, compared with 6.8 in 1990. The highest night time hourly flow was 76 aircraft compared to 70 for the day time; the maximum hourly flow occurred in June 1991 between 0200 and 0300 UTC

whereas the monthly peak occurred in August 1991. The highest average hourly flows occurred Eastbound between 0100 and 0500 UTC, and Westbound between 1400 and 1800 UTC. A review of the flight level usage for 1991 revealed that FL 370 was the most used flight level in the Eastbound mode, with FL 350 being the most used flight level in the Westbound mode. The use of FL 330 for Westbound traffic and FL 350 for Eastbound traffic was significantly greater North of the OTS, compared to South of it. The Group also noted that there was a slight decrease in the percentage of random traffic (-2.1%). Finally, the Group noted that Eastbound traffic was frequently able to enter the oceanic area at optimum flight levels, due in part to the flight time from departure airports, and radar coverage extending East to the Gander OAC's oceanic boundary.

2.3.2 In accordance with the procedures agreed to at NAT SPG/24, reports on collections of statistical data regarding operations in OACs were provided to the Group (Conclusion 24/11 and Attachment A to the report on Agenda Item 2 of NAT SPG/24 refer). In this context, the figures presented by Canada, in accordance with the categories agreed to at NAT SPG/24, showed that 76.0% of OTS and 81.5% of random traffic had been cleared on the requested track at requested or higher flight levels. The figures produced by the United Kingdom, for the same category, showed 73.2% for the OTS and 55.4% for random tracks and those produced by Iceland showed 84.8% for the OTS and 86.7% for random tracks. From the data presented, it was evident that there was a decrease in the efficiency assessment figures as compared to 1990. The Group was of the opinion that this decrease, which showed up in the three results, was probably due to the continuing increase in ETOPS in the NAT Region, now approaching 35% of all operations. The Group noted that, as ETOPS continued to grow and as more high capacity/speed aircraft (B747-400) are introduced into NAT service, the percentages will probably continue to decrease.

2.3.3 The Group also noted that Eastbound aircraft appeared to favour a change in altitude whereas the Westbound ones preferred a change of track. Although no precise reason could be attributed to this phenomenon, it was felt that it was due to the differences in the operating environments stemming from the effects of the jet stream.

2.3.4 In concluding its discussion on the system efficiency assessment, the Group agreed that, despite the influence of artificial factors such as flow management and capacity constraints which may be caused by domestic traffic and, in the absence of a more satisfactory method to measure the performance and efficiency of the system, States concerned should continue such collections of data in accordance with the specifications established by NAT SPG/24 and report to NAT SPG/29.

2.3.5 The Group was then presented with a report on the breakdown of traffic in Shanwick OCA which showed the percentages of traffic in terms of public transport, military and IGA above, below and within MNPS airspace as well as flight level occupancy. The data showed that within Shanwick OCA, 85% was public transport, 11% was military and 3 % was IGA. Furthermore, above MNPS airspace, 50% of the traffic was public transport, 5% was military and 45% was IGA; below MNPS airspace, 8% was public transport, 18% was IGA and 74% was military traffic. Finally, it was noted that, within MNPS airspace, 89% of the traffic was public transport, 10% was military and only 2% was IGA. The Group noted with appreciation the information presented by the Representative of IAOPA (paragraph 1.1.1.17 refers).

2.4 Matters related to Air Traffic Flow Management

2.4.1 The Group considered matters related to ATFM as reported by the NAT ATMG (paragraph 4.2.1 also refers). In particular, the Group examined issues arising out of the interface of the NAT Region, with the North American (NAM) Region on one side and the EUR Region on the other. In this context, the Group agreed that ATFM had to be viewed as affecting two distinct areas; the first, and most complex, concerns the impact on the NAT Region as a result of the application of ATFM measures in the NAM and EUR regions and the second is the application of ATFM in the NAT Region itself. The Group also agreed that ATFM needed to be addressed in a global context and the most effective way to do so would be to proceed in a coordinated manner taking into account the requirements of both sides of the Atlantic.

2.4.2 As regards the interfaces, the Group noted the proposal that an informal meeting of States and international organizations be convened to discuss ATFM issues. Recalling that, in the context of the ICAO CNS/ATM concept, ATFM and ATS are subsets of ATM, the Group agreed that they should not be discussed in separate fora because the link between the two could be lost. Accordingly, the Group agreed that all matters related to ATFM, which might affect the NAT Region, should come under the umbrella of the ATMG. In the same context, the Group agreed that representation at ATMG should include ATFM as well as ATS expertise. In this way, deviations from the ATM concept should be averted.

2.4.3 On the basis of the above, the Group agreed that a one-time informal meeting of ATFM experts be convened to explore ATFM matters related to the NAT Region and to report its findings to the next meeting of the NAT ATMG. It was further agreed that the United Kingdom would organise the meeting and that all relevant States as well as EUROCONTROL (Central Flow Management Unit [CFMU]), IATA and IFALPA be invited.

CONCLUSION 28/12 - AIR TRAFFIC FLOW MANAGEMENT (ATFM) MATTERS RELATING TO THE NAT REGION

That:

a) the terms of reference of the NAT Air Traffic Management Group (ATMG) be amended to include:

i) "consider all ATFM matters affecting the NAT Region";

b) members of the NAT ATMG ensure representation of ATFM experts in the work of the group; and

c) the United Kingdom make arrangements to convene a one-time informal meeting to explore ATFM matters related to the NAT Region and report its findings to the next meeting of the NAT ATMG.

2.4.4 As regards to ATFM matters solely affecting the NAT Region, the Group endorsed the NAT ATMG position that this work be carried out on the basis of Chapter 8 of the NAT ID.

2.4.5 The Group noted the problem of the unpredictability of the Eastbound NAT traffic and the subsequent difficulty of integrating it into the European flows which are virtually all subject to flow management. The NAT traffic can therefore have a severe impact on available slots. The Group was informed that, to try and alleviate this problem representatives from Canada and the United Kingdom met early in 1992, following discussions in the NAT OLDI group, to explore this matter. Subsequently, a solution was developed whereby European landfall data was transmitted to the London Flow Management Unit (FMU) when the Eastbound clearance was issued by Gander (paragraph 4.2.3.7 refers). The resulting increased lead time enabled London FMU to integrate the NAT traffic more effectively therefore permitting a more optimum use of available slots. The Group was informed that, seven weeks after the definition of the problem and the solution was agreed on, Canada had implemented the procedure and London FMU was using the data operationally. The Member from the United Kingdom expressed his appreciation to Canada for the effort they put into implementing this procedure in a very timely way.

ATTACHMENT A

PROPOSAL FOR AMENDMENT TO THE NAT REGIONAL SUPPLEMENTARY PROCEDURES (DOC 7030/4) paragraph 6

It is recommended that the NAT Regional Supplementary Procedures (Doc 7030/4), paragraph 6, be amended to permit the use of "cleared flight plan route" for oceanic clearances in the NAT Region, as follows:

"6.1.1 An abbreviated clearance shall only be issued by ATS when clearing an aircraft to follow one of the organized tracks throughout its flight within the NAT control areas or along one of the Polar tracks within Reykjavik CTA, **or when clearing an aircraft to follow its flight plan route.** In all other circumstances full details of the cleared track shall be specified in the clearance message.

6.1.1.1 When an abbreviated clearance is issued **to follow one of the organized tracks or Polar tracks,** it shall include:

1) cleared track specified by the track code;

2) cleared flight level(s);

3) cleared Mach Number (if required);

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

6.1.1.2 On receipt of an abbreviated clearance the pilot shall read back the contents of the clearance message. In addition, when cleared to follow one of the organized tracks, the pilot of a subsonic aircraft shall read back full details of the track specified by the code letter, except where alternative procedures using VHF techniques exist which include provision for the confirmation of cleared track by the pilot.

6.1.1.3 When an abbreviated clearance is issued to follow the flight plan route, ***it shall be issued using direct controller/pilot communication,*** **and shall include:**

1) the expression cleared "via flight plan route";

2) cleared flight level(s);

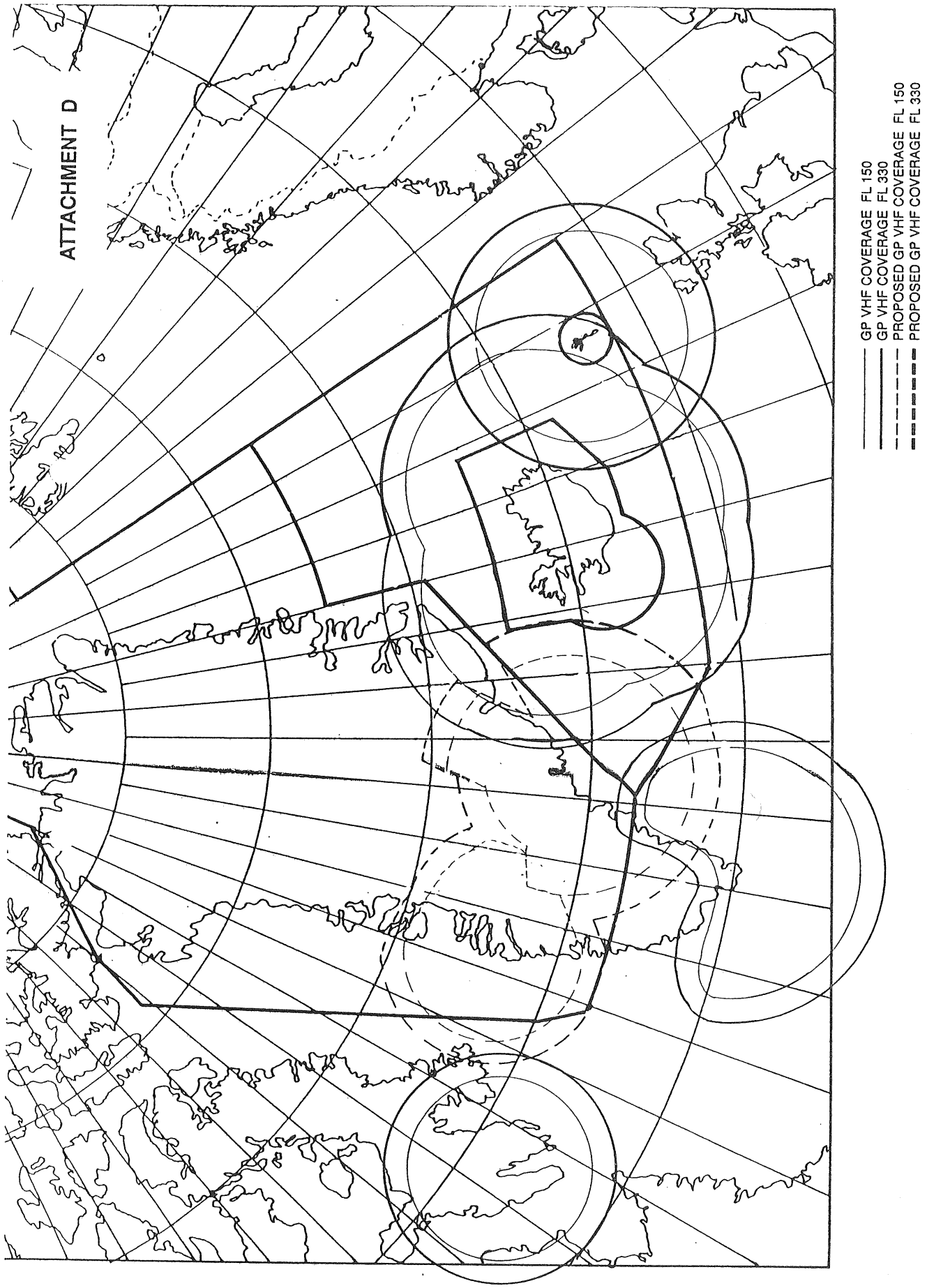
3) cleared Mach Number (if required);

6.1.1.4 On receipt of an abbreviated clearance, the pilot shall read back the contents of the clearance message. In addition, when cleared via "flight plan route", the pilot of a subsonic aircraft shall read back full details of the flight plan route.

6.1.2 A pilot-in-command shall, if at any time in doubt, request a detailed description of the route from ATS.

6.1.3 The ATC-approved Mach Number shall be included in each clearance given to subsonic turbojet aircraft operating within Bodo Oceanic, Gander Oceanic, New York Oceanic, Reykjavik, Santa Maria Oceanic and Shanwick Oceanic control areas."

ATTACHMENT B



AGENDA ITEM 3: TECHNOLOGICAL DEVELOPMENTS OF INTEREST IN THE NAT REGION

3.0 Introduction

3.0.1 Under this Agenda Item the Group considered the following subjects:

a) ATC automation and traffic display systems in Oceanic Area Control Centres;

b) developments in Global Navigation Satellite Systems;

c) data link developments; and

d) other technological developments of relevance to the NAT Region.

3.1 ATC Automation and traffic display systems in Oceanic Area Control Centres

3.1.1 The Member from Canada informed the Group that the Gander Automated Air Traffic System (GAATS) provided an increased planning function to the Gander OAC Staff following the successful re-hosting of Phase I software enhancements carried out in March 1991. The changes included a high level conflict prediction, regardless of direction of flight as well as a link between GAATS and the new Radar Data Processing System (RDPS). This link was an order of magnitude more sophisticated than that previously required between GAATS and the Joint En route-Terminal Radar System (JETS) because of the need for more information for route parsing purposes in the RDPS and standardized field formats is also required for data interchange with the National Flight Data Processing Systems (NFDPS). While the original GAATS was designed for use in high level airspace, the Phase I enhancements extended automation into the lower altitudes therefore providing low-level flight progress strips.

3.1.2 While Phase I enhancements improved the System's capabilities for planning, it was recognized that there was a need to progress to more automated assistance in the control functions. Phase II enhancements allow the GAATS to accept the position reports from the International Flight Service Specialists (IFSS) directly through the Gander Automated Message Processing System (GAMPS) for dynamic database update and conflict prediction before presentation to the controller. Furthermore, the enhancements provided flexibility in sectorization, permitting consolidation or splitting of workstation responsibilities dependent on traffic load. Tabular data displays, messages from the flight service station and amended flight progress strips are therefore updated appropriately at the assigned workstation.

3.1.3 The trial probe feature in GAATS allowed a controller to investigate various route assignment options. However, if another live flight was injected into the system utilizing elements of the profile, this was not known to the probing controller. As a result, on attempting to assign the previously probed profile, the controller would immediately be faced with a conflict. Phase II permits the protection of two provisional profiles within the system, prior to actual assignment. Phase II also provides additional ground/ground data links to various domestic and external agencies and the functionality of the IFSS-GAMPS link will be incorporated into GAATS therefore, providing a conduit for air/ground data link messages generated during NAT ADS trials.

3.1.4 Two operational requirements, identified in respect of step climbs, were being incorporated into an immediate post-Phase II software change which permits step climbs to be recognized as they occur between two time restrictions and issues appropriate warning messages to the controllers to remind them of step climb restrictions in effect. Finally, the Group noted that every effort was being made to install and commission an operational version of the software and modifications relating to step-climbs by autumn of 1992.

3.1.5 The Group was informed that the Icelandic CAA was engaged in a major modernisation effort involving multiple automation projects as well as the construction of a new ATC centre. The need for automation stems in part from the ICAO CNS/ATM concept, specifically its ADS component. The communications, data processing, and presentation requirements associated with ADS clearly required advanced automation systems in order to derive full benefits from this technology. The projects were for the most part limited in scope but were designed as part of an evolutionary process to reach well-defined goals. Thus, systems for flight data processing on the one hand, and radar data processing on the other, would initially be developed as independent systems with relatively simple but well defined interfaces. The level of integration would subsequently be increased without sacrificing the capability of independent operation. This modular approach minimized system complexity in the early development phases and provided reliability through redundancy.

3.1.6 The development of an automated Flight Data Processing System (FDPS) was proceeding in two phases. In Phase I, the FDPS included all the facilities required for creating and maintaining a dynamic flight data base of all flights under the control of Reykjavik ACC. Facilities for performing conflict probes, automatic monitoring of the progress of air traffic, and the handling of inter-centre, as well as intra-centre, co-ordination were essential features of this system. The facility to print flight progress strips was retained in the Phase I. The basic system was designed with significant growth capability which would allow the accommodation of advanced techniques which were under development. Delivery of the system was expected in late 1992/early 1993 and commissioning for full use in the winter of 1993/94.

3.1.7 The Group was informed that Phase II, which was originally defined as the addition of a graphical situation display of air traffic derived from flight plan and position report data, was planned to include the integration of surveillance data (derived from radar and ADS) for a combined presentation at the Controller Work Station.

3.1.8 As far as the radar data processing development program was concerned, this involved the development of the capability for processing and displaying secondary and primary radar data from six radar sites. Emphasis was placed on high availability and integrity. In this context, the Group was also provided with information on the radar data switch which enabled controllers to dynamically select a radar source for display and also provided the capability for storing, recording, and replaying radar data. Work was under way to enhance the radar data switch which would, as an adjunct, add the capability of tracking aircraft which was an important prerequisite for further integration of radar data.

3.1.9 The systems described above formed the mainstay of tools provided for the control of air traffic. However, in order to make effective use of these systems, a number of support systems were required such as an Integrated Communications Control System (ICCS) and an Automated Information Management System (AIMS). To accommodate all of this, a new building was under construction and was expected to be completed in late 1992 while the installation of equipment would start in early 1993. Finally, the Group was informed that future projects included duplication of the enhanced radar data switch, an enhanced radar console system, and the integration of flight and radar data processing systems. The Icelandic CAA was also carrying out studies and trials in support of the ICAO CNS/ATM concept such as the use of HF data links.

3.1.10 The Member from Portugal updated the Group in respect of the information presented to NAT SPG/27. In this context, it was noted that the programme was progressing, with a few months delay, to the point where the system suppliers have been chosen and contracts have been prepared.

3.1.11 The Member from the United States informed the group that implementation of the Oceanic Display and Planning System (ODAPS), without conflict probe, was scheduled for WATRS in May 1992. Similar implementation was planned for the entire New York OAC by January 1993. Conflict probe was expected to be fully functional by mid-1993. It was emphasized that ODAPS was to be the United States platform on which new technology such as ADS was to be built.

3.1.12 In concluding its discussion on this item, the Group stressed the importance of ensuring a harmonised development. In this context, the Group recalled that this issue was one of the main focuses of the work being carried out by its working groups.

3.2 Developments in Global Navigation Satellite Systems (GNSS)

3.2.1 The Representative from Inmarsat informed the Group that his Organization was actively involved in identifying navigation applications that would use the capabilities of its third generation satellites to enhance the service provided by other satellite navigation systems such as Global Positioning System (GPS) and the Global Orbiting Satellite System (Glonass). Since the navigation transponders operate in the same frequency band as GPS and Glonass, the signals they broadcast could be received by suitably designed navigation receivers on board aircraft; therefore, there was no need for a separate receiver. The following services were being studied:

a) differential corrections which would allow users to correct for position errors caused by the limitations of the GPS/Glonass systems. The provision of two levels of correction were a possibility. One correction would be generic applying to all the area within the global beam while the other would cover particular areas within the beam;

b) integrity transmissions would send information to users on the operational status of the GPS and Glonass constellations and could also be transmitted using the navigation payload. This transmission would use the band set aside for GPS and Glonass and could thus be received directly by navigation receivers; and

c) wideband navigation overlay, which would provide additional "signals in space", would augment the two national systems with one under international civil control. The signals would be almost identical to those transmitted by the GPS/Glonass satellites and could be processed by the receivers. Each Inmarsat III navigation package would be the equivalent of three orbiting GPS or Glonass satellites.

3.3 Data link developments

3.3.1 As regards to ground/ground data links to support OLDI, the Member from the United States informed the Group that his Administration will not be implementing a Common ICAO Data Interchange Network (CIDIN) gateway in Atlanta in accordance with the future NAT ATS concept description (NAT Concept Description Part II Pars. 1.3.1 and 1.3.2 refers.). Instead, an Aeronautical Telecommunications Network (ATN) interface was to be implemented. In this context, assurances were given that OLDI connectivity would not be jeopardized. The United States proposed that the diagram in the concept description be amended accordingly. The Group noted that this was a major departure from the original concept, which could preclude the provision of a total network approach to OLDI in the NAT Region. In view of the fact that the Portugal/United States connection would be specifically affected, the Portuguese Member suggested0 that bilateral discussions between their respective COM experts would be required to clarify these implications prior to the LIM NAT (COM/MET/RAC) RAN. The Group agreed that a new diagram depicting logical connections be developed and submitted to the LIM NAT (COM/MET/RAC) RAN Meeting.

CONCLUSION 28/13 - GROUND/GROUND DATA LINK INFRASTRUCTURE

That the Member from the United States make arrangements within his Administration to submit to the LIM NAT (COM/MET/RAC) RAN meeting:

a) proposed modification to the logical data link diagram; and

b) a suitable proposal for the physical ground/ground data link infrastructure, for eventual inclusion in the future NAT Air Navigation Plan.

3.3.2 The Group was also informed that, as the ICAO CNS/ATM concept was implemented, the addition of OLDI data formats to ICAO Doc 4444 would probably be required. Accordingly, two issues which were considered important for the use of these formats in ATC automation were identified:

a) separation of data processing functions; and

b) the ability to exchange the data over a variety of communications paths.

The first issue could be addressed by identifying the two elements in the OLDI data formats which convey information which is normally part of an International Standards Organization (ISO) protocol specification. The second issue could be addressed by adopting a common message header for OLDI data messages thus providing application transparency for the underlying communications channel. Following this approach allows the initial organization of OLDI applications to be Open System Interconnection (OSI) consistent and would also simplify the transition to the ATN.

3.3.3 The Group expressed its appreciation for the information and requested that the Member from the United States arrange to have it presented to the next meeting of the OLDI group. The Group also felt that a continuous dialogue between the engineering and operational areas of expertise was essential in order to ensure a smooth migration to the future systems.

3.3.4 The Group was informed that, at its October 1991 General Session, the Airlines Electronic Engineering Committee (AEEC) agreed to begin the definition of a standard for HF data link with the caveat that an exploratory meeting be held beforehand. The impetus for this action was analogous to the history of data link in the VHF band. Efficiency and effectiveness gains could be made by moving from voice to data communications and technology could provide a relatively high data throughput. The AEEC intended that the definition of the HF data link be completely consistent with the ICAO CNS/ATM concept. An initial AEEC exploratory meeting recommended in favor of developing an HF standard.

3.3.5 In the same context, the Group was informed that the first official meeting of the HF data link subcommittee was held in May 13-15, 1992 in Munich, Germany and the second one August 19-21, 1992 in Vancouver, BC, Canada. The subcommittee expected the modulation scheme and media access method to be established at that point. Work that would firm up the definition of the provisions for protocol and signal interfaces was approaching maturity.

3.3.6 The Group noted the information presented and in the general discussion that followed, it was explained that advances in signal processing had enabled research to proceed. However, it was noted that very few HF frequencies were available for possible HF data link applications and it would therefore be necessary to either designate some voice frequencies for data use or to obtain additional HF frequencies from the spectrum at the next World Aeronautical Radio Conference (WARC).

3.3.7 The Member from Canada informed the Group that the datalink between GAATS and Air Canada's Air Ground Communication System (AGCS) VHF datalink continued to provide oceanic air traffic control clearances directly to the cockpit of the aircraft. The procedure had been refined to the point where the pilot of a data-linked aircraft needed only to read back the printed message for verification and validation of the anticipated flight level. Where the aircraft was capable of down-linking the received clearance message , GAATS carried out an automatic integrity check, and the voice verification became only a sequence number read-back, with flight level validation. The voice contact (much abbreviated) remained as the method of translating the clearance "message" into a valid clearance. Although the system had been reliable and efficient, problems have arisen where, aircraft logged-on to another Aircraft Communications Addressing and Reporting System (ACARS) service provider, have not changed frequency in a timely fashion resulting in non-delivery of the clearance message. Accordingly, steps were being taken within Transport Canada to investigate the possibilities of using multiple service providers to deliver the message thereby overcoming this difficulty.

3.3.8 The Member from Iceland informed the group that the Icelandic CAA data link trial was primarily concerned with the delivery of oceanic clearances directly from a computer at the air traffic controller's workstation to a computer on board an aircraft, where hard copy of the clearance was normally generated. The objective of this effort was to demonstrate the feasibility of such data linking and to discover what revisions were required to local procedures. Software and hardware components in support of the data link trials have been commissioned gradually since August 8, 1991 and the full trial went into operation on March 19, 1992. The data link trial was conducted in conjunction with Société Internationale de Télécommunication Aéronautique (SITA), Iceland Aeradio and a number of major carriers. Participating aircraft received their clearances via both normal channels and VHF or satellite AIRCOM - an ACARS compatible communications service provided by SITA.

3.3.9 Two ATC computer systems at Reykjavik OAC were enhanced for the trial. When a processed plan for a particular flight was received by the Message Distribution System (MDS) it was used to "prime" an oceanic clearance for the flight. When the controller was ready to issue the clearance, the oceanic clearance editor presented an almost complete clearance containing the flight plan route, destination, requested Mach number, allocated SSR code and oceanic entry time. The controller could amend any or all of the fields contained in the clearance, but usually would only enter the cleared flight level and the oceanic entry time. When the controller decided to issue the clearance, the MDS generated a specially formatted oceanic clearance message (OCM) and transmitted one copy to be uplinked to the aircraft through SITA's communications network and another to Iceland Aeradio. In the first phase of the trial, the pilot read back the data linked clearance for confirmation by ATC controllers or Iceland Aeradio operators.

3.3.10 The Group was also informed that several airlines were preparing to join the data link trial. Remote Ground Station (RGS) selection, based on aircraft position, would be done by the MDS to improve the uplink hit rate and delivery speed over that provided by SITA. Furthermore, the database of participating aircraft was being moved from the interface software to the MDS and the interface software would be replaced by software capable of bi-directional switching of a more generalised message suite. This was necessary to accommodate reclearance messages. Also, SITA was implementing a message delivery assurance function which should greatly enhance ATC applicability of data linking as it would provide positive acknowledgment of message delivery to the aircraft rather than only notifiing the user of uplink failures some 5 to 15 minutes after the message was transmitted.

3.3.11 As for the future, the handling of data link requests for oceanic clearance was a logical step in increasing automation and the Icelandic CAA hoped to be able to accommodate such requests. To do so would require the interface to be adapted to support bi-directional message flow. Also, due to the increasing use of satellite AIRCOM combined with Iceland's unique position of having VHF data link ground stations located within the oceanic area, data link handling of en-route requests, reclearances position reports at cleared waypoints using the Position (POS) message format and general message exchange via data link, appeared to be feasible.

3.3.12 The representative from Norway informed the Group that the Norwegian CAA, in cooperation with Scandinavian Airlines System (SAS), had started experiments with automatic position reporting and data message exchange via satellite and VHF. SAS took delivery of a Boeing 767-300ER equipped with a satellite data terminal (Data 1) in February 1992. This aircraft was used on routes from Copenhagen to Seattle and Los Angeles. The SITA network connected Bodø ACC to the satellite/VHF ground station.

3.3.13 One of the objectives of the above trials was to determine the quality of satellite communications at high latitudes. In this connection, the position derived from the automatic position reporting was compared to the position data obtained from the filed flightplan which was updated manually.

3.3.14 In the same context, the Norwegian CAA, in cooperation with Helicopter Service, Inmarsat, Norwegian Telecom and ARINC/SITA Joint Venture, started trials with automatic position reporting and data messaging via satellite in the Norwegian sector of the North Sea. The experiment, which used one Sikorsky S-61N from Helicopter Service, would be finished in the summer of 1992. If the trials were successful, the Norwegian CAA hoped it would be possible to install similar equipment on-board all helicopters operating in the Norwegian sector of the North Sea within 3-5 years. The Group noted that this was the first known Satellite Communication (SATCOM) trials involving a helicopter in flight.

3.3.15 The Member from Portugal informed the Group that Santa Maria OAC VHF data link trials started in September 1991. These trials involved the exchange of test messages between the OAC and an L 1011 from TAP-Air Portugal. The results were satisfactory. After this initial phase, it was expected that new airlines would join the trials and contacts to this effect were being made and positive answers had been received from a number of airlines.

3.3.16 The Member from the United States informed the Group that the expansion of satellite communications into the NAT Region had begun with the delivery and commissioning of two United Airlines aircraft. These Boeing 767-300ER aircraft would alternate on routes between points in North America and Northern Europe or South America. These routes and aircraft would facilitate the implementation of satellite communications trials in the NAT and the WATRS regions.

3.3.17 In this context, it was noted that the aircraft operating in the NAT Region were intending to provide their satellite-based ADS reports to Transport Canada for inclusion in their ADS trials being implemented. This introduction of data will be broadened to include other ATS messages as the air traffic providers' end systems mature.

3.3.18 These first two aircraft would be followed by an additional 8-10 aircraft by the end of 1992, all of which would operate in the NAT Region. There was much to be gained by introducing these satellite equipped aircraft into the various trials being conducted in the NAT Region. The Group was also informed that United Airlines would continue to focus its efforts on enhancement of procedures and avionics to support the development of operational benefits in the PAC Region as many of these same benefits could be applied to the NAT Region operations when providers have developed appropriate procedures for using data communications.

3.3.19 The Member from the United Kingdom informed the Group that its trials which will be carried out at its ATC Evaluation Unit (ATCEU) with "live" air-ground-air data transfer, are the first to use bit orientated messages. The overall objectives were to validate international standards and to prepare for the implementation of an ADS based ATC system for the Shanwick OCA. Accordingly, the equipment used was as near as possible to compliance with the developing ICAO Standards and Recommended Practices (SARPS). At the ATCEU, the performance of the communications system will be evaluated and ADS facilities and techniques developed, evaluated and demonstrated. At Shanwick OAC, further demonstrations would be held and preparations made for integrating the satellite communications system with the Oceanic ATC data processing facilities.

3.3.20 In this context, the main objectives of the trials were to:

- assess system integrity and identify potential weaknesses;
- develop a ground data communications infrastructure, ultimately to ATN compliance;
- evaluate the aircraft high gain antenna performance, e.g. the coverage;
- develop requirements for a Shanwick ADS-based ATC system;
- validate the evolving ICAO Aeronautical Mobile Satellite Service (AMSS) and ADS SARPS and other international standards (e.g. ARINC 745) in a realistic environment;
- evaluate satellite voice characteristics for ATC applications;
- demonstrate ADS to operational personnel;
- develop technical specifications for ATC system data manipulation;
- forward meteorological data to the United Kingdom Met Office for evaluation and assessment of its usefulness;
- identify any ADS related problems at Oceanic/Domestic airspace interfaces;
- assess flight profile adherence accuracy by comparison of ADS parameters with the Cleared Flight Plan (CPL) and radar plots in both the lateral and vertical planes; and
- acquire GPS data for evaluation by EUROCONTROL.

3.3.21 As regards timescales, pre-trial work and system testing was underway and was planned to be completed by June 1992. Flight trials (voice and data) were scheduled to start in July 1992.

3.3.22 The Group recalled that, at NAT SPG/27, it had agreed on a common format for the delivery of oceanic ATC clearance by data link (Conclusion 27/16 refers). The Group also recognized the importance of standardizing phraseology for the voice delivery of oceanic clearances (paragraph 4.2.4.9 refers). In the same context, the Group agreed that all data link "phraseology" should also be standardised in line with voice phraseology if possible. The Group agreed that there was an urgent need to standardize the format of the Request for Oceanic Clearance message (RCL) used in connection with VHF data links. Accordingly, the Group agreed on a format for the RCL message and to amend the format of the clearance delivery message agreed to in NAT SPG/27 Conclusion 27/16 in order that the two messages be aligned.

CONCLUSION 28/14 - COMMON MESSAGE FORMAT FOR THE REQUEST AND DELIVERY OF OCEANIC ATC CLEARANCES

That the message formats shown in Attachment A to the report on Agenda Item 3 be used for the request and delivery of oceanic ATC clearances via VHF data link. This conclusion supersedes Conclusion 27/16 of NAT SPG/27.

3.4 Other technological developments of relevance to the NAT Region

3.4.1 The Group was informed that Inmarsat was operating eleven satellites and that, with the successful launching of all four of the second generation satellites, the seven first generation ones would revert to the role of hot standbys. The Group noted that there was no aeronautical spectrum available on any first generation satellite and that communications with aircraft using these satellites was only possible in the maritime band. Each of the second generation satellites has 3 MHz (both ways) in the aeronautical mobile-satellite (R) service. One satellite was at position 015.5°W Atlantic Ocean Region (AOR) East (E) and had started operations on 13 April 1991. Another satellite, which served the AOR West (W) as of the end of May 1992, was at 54.0°W.

3.4.2 The Group was also informed that a contract for the manufacture of 4 Inmarsat III satellites, with options for up to five more, had been awarded and that delivery of the first satellite was expected in July 1994 and successive spacecraft deliveries would be at four month intervals. These satellites would have the ability to form spot beams concentrated on particular parts of the earth, the full aeronautical spectrum of 10 MHz in each direction and channelization arrangements that allocate various parts of the spectrum for different users. In this context, the spot beams would allow Inmarsat to use the scarce spectrum more efficiently and would also allow frequency reuse within the Inmarsat system thereby preventing interference with other users of the spectrum.

3.4.3 The Inmarsat III satellites would include a navigation payload that would enable development of a civil complement to GPS and Glonass as well as provide an L-band to L-band link for direct mobile to mobile communications. When a third generation satellite becomes operational, the second generation ones would remain in orbit as hot standbys or in an operational role. Inmarsat was also studying the requirements of fourth generation satellites that would be launched in the 21st century.

3.4.4 The Group was informed that 127 aircraft had been commissioned to use an Aircraft Earth Station (AES), a prerequisite for satellite communication. In this context, it was noted that seventy voice installations were in operation and that requests to commission data installations were being received almost daily, mostly for B747-400 aircraft. The airlines and service providers had carried out pre-operational testing and operational service had started. It was further noted that forecasts suggested that there would be 350 aircraft equipped for SATCOM by the end of 1992 with about 1800 by 1995. Most of those aircraft would of course be operating on long range routes.

3.4.5 As regards to Ground Earth Stations (GES), the Group noted that eleven were in operation serving suitably equipped aircraft worldwide. These GES's provided at least dual redundant coverage in all ocean regions with four GES's covering the NAT. The normal mode of operation of the Inmarsat Aeronautical System would be stand-alone, unlike the maritime system that depends on Network Coordination Stations (NCS) to assign frequencies. It would therefore be possible to operate so that no single failure would cause a communication outage. Finally, both voice and data services were available from all GES's.

3.4.6 The Member from the United States informed the Group of developments concerning the implementation of the ATN taking into account the proposed operational data link trials planned for the NAT Region using the ACARS. In this context, it was mentioned that these trials should also focus on the need for end-to-end integrity for ATC applications (examining implications beyond position reporting with procedural backups), thus demonstrating the ground communications network and the ability to operationally handle a mixed equipment environment. The Group recalled that the ATN is an integrated Air/Ground (A/G) and Ground/Ground (G/G) packet switching system that is based on the ISO/OSI Reference model (RM). Standards for the A/G part of this network were being completed by the ICAO Surveillance Improvement Collision Avoidance System Panel (SICASP), while the G/G standards were being developed by the ICAO Aeronautical Fixed Service ASP Panel (ASPP). Applications development and Satellite/VHF sub-networks were the purview of the ICAO ADS Panels.

3.4.7 The Group was further informed that an ATN Project (ATNP) had been established to validate and evaluate emerging SARPS. The ATNP participants would build and test ground and air ATN routers, an ADS application compliant with ARINC Characteristic 745-Supplement 1, an Airline Operational Control (AOC) application, Context Management (services and addressing) Application and a Network Management application. The ATNP has two builds. The first phase called Build 1, would demonstrate network connectivity without a policy/Quality of Service (QOS) selection capability and would exchange the following applications data: ADS, AOC, Context Management, and a limited Network Management scheme. Additionally, Build 1 data would be used to validate the Satellite and the Mode S data link SARPS. Build 1 was scheduled to begin flight testing in mid 1993. Build 2, which was scheduled to begin flight testing in the 1st quarter of 1995, would demonstrate full SICASP SARPS compliant QOS/Policy based routing, system security and a more robust network management architecture.

3.4.8 The Group was informed that the ATNP had been proposed to be used as the vehicle to integrate operational evaluations of the ATS data link applications and underlying data communications services; the schedules showed that the NAT operational evaluation would be coincident with the ATNP. Part of the outcome of the trials and the ATNP was that participants should be able to commit themselves to schedules for implementation of fully operational systems. Successful completion of each build in the ATNP/NAT ADS trials should be used where possible to migrate those pieces ready for operational use into service. On the basis of the above, NAT provider States, as well as system users, were requested to participate in the upcoming trials. The Group noted the request and agreed that it would review this matter at its next meeting.

3.4.9 The Group was informed that an international evaluation of the Airborne Collision Avoidance System (ACAS) was being conducted under the auspices of the ICAO SICASP. In this connection, the Group recalled that at its last meeting (June 1991), it had determined that the question of whether this system should be mandatory for operation in MNPS airspace would not be considered until:

a) safety analyses conducted by the SICASP are complete; and,

b) ACAS SARPS have been published by ICAO.

3.4.10 The Group was further informed that an operational evaluation of ACAS, commonly referred to as the TCAS Transition Program (TTP), was being conducted in the United States. This evaluation involved the collection of voluntarily submitted data from several sources, including:

a) TCAS data recorders fitted in 21 aircraft;

b) pilot report questionnaires; and

c) controller questionnaires.

3.4.11 The primary objective of the TTP was to assess the operational impact of a large number of TCAS II-equipped aircraft operating in the national airspace system and to identify potential refinements. Data collected under TTP guidelines from 1 June, 1990 through 31 October, 1991 had been made available. TCAS aircraft altitude at the time of the alert was provided to the TTP via pilot and controller questionnaires for 1,106 TCAS events. Sixty-two of these TCAS events, approximately 5%, were reported at or above FL 290. None of the 186 resolution advisories recorded by the airborne data recorders occurred at or above FL 290. The TTP found that the 62 high altitude deviations were larger than expected at all flight levels. One reason for these larger than expected deviations was that some pilots used a climb/descend rate that was larger than required. Another was the erroneous pilot belief that the aircraft should climb/descend to the next legal altitude. It was expected that this problem would be ameliorated through modifications in the pilot training program and increased use of and familiarity with TCAS.

3.4.12 In concluding its discussion on this matter, the Group noted that the United States intends to pursue the benefits that the use of ACAS in the NAT, and other oceanic regions, may provide and, as additional data becomes available from TTP and other studies, the NAT SPG will be informed accordingly.

ATTACHMENT A

COMMON MESSAGE FORMAT FOR THE REQUEST AND DELIVERY OF INITIAL OCEANIC AIR TRAFFIC CONTROL CLEARANCES

The following message formats are to be used for the initial request and delivery of oceanic ATC clearances.

CLEARANCE REQUEST FORMAT

PRIORITY DESTINATION ADDRESS COPY ADDRESSES
ORIGIN ADDRESS
MESSAGE LABEL
AN AIRCRAFT NUMBER/FI FLIGHT ID
ENTRY POINT/TIME RQSTD SPEED FLIGHT LEVEL - RMK/ADDITIONAL INFORMATION (Optional)

The following is an example of this format:

QU PIKCOXS LONTOXS
. YYZOAAC
RCL
AN GABCD/FI BAW123
- 55N010W/1234 M084 F350
- RMK/ABLE F370

CLEARANCE DELIVERY FORMAT

PRIORITY DESTINATION ADDRESS COPY ADDRESSES
ORIGIN ADDRESS
MESSAGE LABEL
AN AIRCRAFT NUMBER/FI FLIGHT ID
- // ATC XXX EGGX TEST CLRNCE DATE TIME
FLIGHT ID CLRD TO DESTINATION VIA ENTRY POINT
ROUTE DETAILS
FM ENTRY POINT/TIME MNTN FLIGHT LEVEL SPEED
ATC/ATC FIELD

Note: The ATC/ ATC FIELDS line will only be present if there are ATC FIELDS present in the FDPS OCM to be expanded

The following is an example of this format:

QU QXSXMXS CPYXXXX PIKCOXS LONTOXS
. PIKCOXS
AGM
AN N606UA/FI UAL915
- // ATC XXX EGGX TEXT CLRNCE 910621 1206
UAL915 CLRD TO KIAD VIA 53N015W
NAT FOXTROT
FM 53N015W/1330 MNTN F370 MO80

AGENDA ITEM 4: PLANNING AND IMPLEMENTATION IN THE NAT REGION

4.0 Introduction

4.0.1 Under this item, the Group discussed the following specific subjects:

a) air navigation systems planning and production of supporting statistical data on future traffic demand;

b) management of the NAT Implementation Document:

i) report of the ATM Group;
ii) report of the ADS development Group;
iii) report of the OLDI Group;
iv) report of the VSI Group;
v) report on the management of the NAT ID

c) possible extension of MNPS airspace;

d) preparation for the Limited NAT Regional Air Navigation Meeting.

4.1 Air navigation systems planning and production of supporting statistical data on future traffic demand

4.1.1 Commenting in general on the availability of air traffic demand data, the Group noted that the NAT TFG figures available to the Group were those produced at the 1991 meeting. The 1992 NAT TFG meeting had been held at ICAO Headquarters in Montreal in May 1992 but the report had not become available in time for the NAT SPG/28 meeting. On the understanding that at least part of the NAT TFG's purpose was to assist the NAT SPG, the Group agreed to request that the members of the NAT TFG arrange their meetings with this requirement in mind. In doing so, the Group recalled that the forecasts produced by NAT TFG were to be used in lieu of the traditional Table of Aircraft operations as a basis for planning in the NAT Region.

CONCLUSION 28/15 - AVAILABILITY OF NAT TRAFFIC FORECASTS

That the ICAO secretariat on behalf of the NAT SPG:

a) inform the members of the NAT TFG of the requirement to have the annual forecasts in advance of the NAT SPG meetings; and

b) request the NAT TFG to hold their meeting at least one month in advance of the NAT SPG meeting in order to ensure that its findings are made available to the NAT SPG.

4.1.2 The Member from Iceland provided information concerning the possible impact on the NAT Region airspace capacity resulting from planning initiatives carried out in other Regions; on the basis of this information, the use of excess capacity in Reykjavik ACC was explored. It was noticed that in 1991, traffic had decreased by 8.4% which brought the total traffic count down to the same level as 1989. In this context the experience gained through the application of the Route Orientation Scheme (ROS) was considered to be of interest. Although recognizing that the issue merited to be pursued in future, the Group refrained from tasking the ATMG with an in-depth activity in this respect.

4.1.3 The Group was also presented with a survey of air traffic operating in the NAT Region in the Shanwick OCA on 27 July 1991. The categories of aircraft recorded were broken down into numbers of flights by operator (East and Westbound), by departure points, by flight level occupancy, by aircraft types, by city pairs, by hourly count of traffic crossing the Shanwick Oceanic FIR boundary, and showed a traffic situation display at 0500 UTC Eastbound and at 1300 UTC Westbound. The survey was indicative of a typical summer day (Saturday). It showed in particular that in the Eastbound mode, the traffic (374 total flights) was spread mainly on the FL 330, 350, 370 band with 86, 92 and 122 flights respectively. In the Westbound mode, the traffic was more concentrated on FL 310, 330, 370 with 96, 113 and 112 respectively. It was also noted that, at times, more than 30% of the total aircraft were twin-jet aircraft.

4.2 Management of the NAT Implementation Document (NAT ID)

4.2.1 Report of the Air Traffic Management Group

4.2.1.1 The Rapporteur of the ATMG, which had been established pursuant to decisions taken by NAT SPG/27, informed the Group that the NAT ATMG had held one meeting in Washington D.C (January 1992). In reviewing the work carried out by the ATMG, the Group noted that the ATMG had established a prioritized list of tasks, which took into account those identified in the Lines of Action assigned to it by the NAT SPG and tasks emanating from other groups as well as possible inputs to the LIM (COM/MET/RAC) NAT RAN meeting. The Group was informed that no specific item was identified as requiring action in advance of the RAN meeting.

4.2.1.2 The Group was informed of progress made by its ATMG concerning the following matters:

a) Practical Application of Separation Criteria Document;

b) contingency planning;

c) air traffic flow management;

d) airspace management;

e) reduction of horizontal separation minima; and

d) review of Lines of Action assigned to the group.

Practical application of Separation Criteria

4.2.1.3 The Group noted the review of the Third Edition of the PASC Document as presented by Canada (NAT SPG Conclusion 27/8 refers). The NAT SPG wished to place on record its appreciation towards Canada for its efforts in the development of the above document. Unanimous agreement on the contents and interpretation of the document had been achieved. Canada would publish the English version on behalf of the NAT SPG (likely by June 1992) and the European Office of ICAO would translate and publish the document in other languages as required (paragraph 2.1.1.2. also refers).

Air Traffic Flow Management (ASM)

4.2.1.4 ATFM matters dealt with by the ATMG were discussed under Agenda Item 2 (paragraph 2.4 refers).

Airspace Management

4.2.1.5 The Group was informed that the NAT OLDI Group was proposing to develop a message set to support ASM, if there was a need, and to include it in the NAT Interface Control Document (ICD). It was also informed that the NAT VSIG had recommended that standardization of the Altitude Reservation (ALTRV) procedures was needed. The Group noted that these were indeed desirable and that close cooperation with altitude reservation units would be necessary in order to ensure that their requirements would be taken into account as well as those of ATM. In this context, it was agreed that operational requirements would have to be jointly developed by the NAT OAC Chiefs and the altitude reservation units concerned. It was further agreed to study the need to standardize Individual Flight Plans From this Point (IFPFP) procedures (paragraph 4.2.3.6 and Conclusion 28/22 also refer).

CONCLUSION 28/16 - COORDINATION WITH AIRSPACE RESERVATION UNITS

That:

a) States concerned coordinate with their respective airspace reservation units and Oceanic Area Control Centre Chiefs with a view to determining the desirability of standardizing Individual Flight Plans From this Point (IFPFP) procedures;

b) proposals derived from the coordination in (a) above be presented to the next NAT Altitude Reservation coordination meeting; and

c) the NAT Air Traffic Management Group be informed of the results of the above.

Contingency Planning in the NAT Region

4.2.1.6 The Secretariat informed the Group of latest developments concerning contingency planning. The Group noted the view of the ATMG that the only way to progress this issue was to obtain clear instructions on what can and cannot be done in the event of an OAC being unable to provide services. It agreed that the ATMG should continue its work for the time being on the basis of non-delegation of airspace. Members undertook to determine the legal and institutional problems that may be encountered in the event of a transfer of airspace and to report to the next meeting of the NAT SPG.

Expansion of Radar Coverage

4.2.1.7 The Group was informed of the possibilities of expanding radar coverage in the NAT Region. It was noted that, after the incorporation of radar data from the Faroe Islands in Reykjavik OAC, there would only be one radar gap in the northern area of the NAT Region and that this gap could be closed with the installation of a radar station in Greenland. Accordingly, the Group agreed to invite Denmark and Iceland to study issues concerning this possibility.

CONCLUSION 28/17 - EXPANDED RADAR COVERAGE IN GANDER AND REYKJAVIK OCEANIC CONTROL AREAS

That:

a) Denmark and Iceland study the feasibility, including the cost-effectiveness, of installing radar in Southern Greenland and of transferring the data to Reykjavik Area Control Centre; and

b) the results of the study be reported to NAT SPG/29.

Radio Communications Failure Procedures

4.2.1.8 The Group noted that the ATMG had reviewed radio communications failure procedures and had concluded that problems that arise were not really ones of the NAT Region itself as the procedures were very clear as far as the oceanic area was concerned. However, it was noted that a problem arises when an aircraft experiencing a radio failure exits the oceanic airspace at a landfall point different from the one on its original route of flight. The Group was aware that additional problems might be expected when 1000 ft VSM is applied.

4.2.1.9 It was recalled that the NAT SPG had addressed this issue at its 25th meeting (Conclusion 25/7 refers). Nevertheless, the Group agreed that States concerned be informed of the need to clarify the radio communications procedures applicable after landfall and to ensure that the information be promulgated in national AIPs. It therefore tasked the ATMG to further study this matter.

CONCLUSION 28/18 - RADIO COMMUNICATIONS FAILURES

That:

a) the ATMG be tasked with devising and coordinating common procedures for radio communications failure for aircraft entering or exiting the NAT airspace; and

b) the ATMG report the results of this work to NAT SPG/29

Future work

4.2.1.10 The Group noted that, having completed work on the common application of separation standards, the ATMG would now concentrate on the definition of the requirements for advanced Flight Data Processing Systems, the refinement of ATFM measures and contingency planning.

4.2.2 Report of the Automatic Dependent Surveillance Development Group (ADSDG)

General

4.2.2.1 The Group recalled that at its Twenty-Seventh meeting (June 1991), it had established the NAT ADSDG to coordinate pre-operational ADS trials and to address other ADS related matters of importance in the NAT Region (Conclusion 27/17 refers). Accordingly, the ADSDG had held its first meeting in Paris from 2 to 6 December 1991. The main objective of the first meeting was to review the work programme established for the ADSDG by the NAT SPG and, on the basis of the review, agree on how best to advance the work.

4.2.2.2 The Group was presented with an update of on-going ADS related work. It noted that, in general, a common thread ran through all this work, namely the Human-Machine Interface, the need for suitable simulations, the need to study the ADS/non-ADS airspace environments and the advisability of timely implementation of elements of ADS and data link, even if progress was not at the same rate for all the participating States. In this context, it was stressed that, where neighbouring States were not at the same level of development, care had to be taken to ensure that developmental steps taken in one State should not adversely affect the other. In fact, in the early trial and demonstration stages, where non-SARPS techniques and/or equipment might be used, it was seen as essential that current procedures should be emulated as closely as possible, at least in data interchanges across FIR boundaries.

4.2.2.3 The Group noted that the following three issues were examined individually by the ADSDG in order to keep a clear view of the planning requirements associated with each issue:

a) the introduction of position reporting using data links;

b) the introduction of ADS; and

c) the introduction of data link direct controller/pilot communications.

The introduction of position reporting using data links

4.2.2.4 On the basis of the experience gained in the Pacific Engineering Trials (PET), the Group examined the possibility of adding to the HF position reporting procedures, the possibility of using ones based on VHF or satellite data link. It was noted that these additional procedures simply involved composing the periodic position report on the ACARS then sending it to the appropriate radio station or OAC using the data link rather than HF voice. In this context, it was noted that one airline expected approval to carry out data link position reporting by some of its aircraft operating in the Pacific Region and that others have indicated that they would be able to carry out this method of position reporting in the NAT Region. During the discussions, it was pointed out that some benefits could accrue to both the operators and the users because data link position reporting would reduce the load on the already heavily congested NAT HF system. Furthermore, data link position reports could reduce the number of operational errors due to problems of phraseology (NAT SPG Conclusion 27/24 refers).

4.2.2.5 In the same context, the Member from the United States informed the Group that, on 31 March 1992, based on the overwhelming success of United Airlines' certification flight, on 26/27 March 1992, the FAA signed an Operational Specification authorizing use of the satellite data link for waypoint position reporting. This historic step authorized the first operational use of satellite communications in the oceanic regions for air traffic communications. Additionally, this step supported the phased approach to the implementation of the ATN.

4.2.2.6 The Group agreed that the ability to gradually implement this position reporting procedure was indeed desirable. In this context, the Group agreed that, before implementation could begin, a common message format had to be defined. The Group noted that Canada, the United States and IATA had agreed to initiate work on this matter taking into account the provisions of ICAO Doc 4444, the existing POS message and the NAT position reporting procedures. The Group agreed that the NAT Regional Supplementary Procedures (Doc 7030, SUPPS) would need to be amended and that matters relating to certification would need to be clarified before implementation could begin.

4.2.2.7 It was noted that some provider States indicated that they did not foresee the possibility of introducing this facility into operational service prior to the utilization of SARPS compliant equipment and systems.

CONCLUSION 28/19 - DATA LINK POSITION REPORTS

That the Member from Canada make arrangements within his Administration to submit to the Limited NAT Regional Air Navigation meeting the following proposal for amendment to the NAT Regional Supplementary Procedures (Doc 7030) permitting the use of data link position reporting in addition to verbal position reporting:

"4.2.1.1 *Verbal* position reports shall be identified by the spoken word "Position" transmitted immediately before or after the aircraft identification."

Implementation of ADS - the way ahead

4.2.2.8 The Group was informed of the various technical and operational aspects which needed to be addressed in order to develop a transition strategy from today's ATS environment to the one proposed in the Future NAT ATS system concept. The Group noted that the ADSDG had developed a skeleton implementation plan which it intended to substantially enlarge at its next meeting. As regards the technical aspects, the Group agreed that, in the absence of world-wide SARPS, the proliferation of various ADS message formats needed to be halted and, if possible, the existing ones should be converged to a common one. In this context, the Group was informed that a proposed character oriented message format was being developed.

4.2.2.9 As for operational issues, the Group noted that some of them were relatively easy to resolve whereas others were very complex. Furthermore, in order to carry out the necessary simulation studies needed to develop new ATC procedures, some of the issues would have to be resolved in advance, whereas assumptions would have to be made for others. The Group noted the following non-exhaustive list of tasks which the ADSDG had identified:

a) agreement on the size of areas of common interest;

b) agreement on whether the airspace would be of an 'exclusive' nature, requiring the mandatory carriage of ADS;

c) certification of aircraft in order to be able to apply reduced horizontal separation minima;

d) determination of the basic assumptions required to carry out simulations; and

e) establishment of the separation minima that would be applied and the underlying philosophy used to determine them.

4.2.2.10 When discussing the need to develop a transition strategy from the existing ATS system to tomorrow's, the Group felt that it was still too early to go into details; nevertheless, it did agree that incentives for the airlines to equip their fleets for ADS should be an important objective of any strategy. Furthermore, the Group agreed with the ADSDG's assessment that the role of ADS was surveillance and not to support other functions, such as MET data collection.

4.2.2.11 The Group also noted that there appeared to be some overlap with the work of other groups, notably the OLDI group. This was particularly evident as the OLDI group's terms of reference included the task " to ensure standardization of data link messages to support current trials". On the other hand, the ADSDG's terms of reference included the need to coordinate ADS trials. Accordingly, keeping in mind the scarcity of resources and the need to avoid duplication of effort, the Group agreed that all tasks associated with air/ground data links should be under the responsibility of the ADSDG and that all ground/ground data link messages should be the purview of the OLDI group. It was however stressed that the two groups should co-ordinate closely amongst themselves because of the inter-relationship of many of the two message sets.

CONCLUSION 28/20 - AMENDMENTS TO THE TERMS OF REFERENCE OF THE ON LINE DATA INTERCHANGE (OLDI) AND AUTOMATIC DEPENDENT SURVEILLANCE DEVELOPMENT (ADSD) GROUPS

That:

a) the terms of reference of the ADSD Group be changed to include the following:

i) "To ensure standardization of data link messages to support current trials"; and

b) the above task be removed from the terms of reference of the OLDI Group.

Data link Direct Controller Pilot Communications

4.2.2.12 The Group noted that DCPC, using data links, was a completely separate function from ADS but that it used the same data link as well as the same ground communications networks. Therefore, the technical issues were essentially the same as for ADS except that a larger set of common messages, that would allow communications between the pilot and the controller, needed to be defined. In this context, it was noted that the ICAO ADS Panel was carrying out this task. The Group endorsed the ADSDG position that initial emphasis must be put on the implementation of ADS and that data link DCPC would be addressed later. Nevertheless, the Group agreed that, as for ADS, equipage incentives should play an important role in developing the implementation plan.

4.2.2.13 The Member from the United States provided the Group with an update on their two-way communications trials using satellite data links being carried out in the Pacific Region. The trials had demonstrated improved communication performance in the oceanic non-radar environment through the use of DCPC. Preliminary evaluations had shown greater accuracy of interpretation and timeliness of the ATC clearance which should improve ATC efficiency and safety. Initially, the communications were routed through the ARINC communications centre. However, enhancements

to the ground controller's environment would permit direct two way data link to be established between the controller and aircraft with satellite voice as a back up.

Future work

4.2.2.14 The Group was informed that, because of insufficient data from operational demonstrations, the ADSDG had agreed that its next meeting should be held in Ottawa the week of 14 September 1992 at which time some information should be available. It also noted the work programme which had been developed as the basis for that meeting.

4.2.2.15 In concluding discussions under this item, the Member from Canada informed the Group that his Administration had set up a CNS/ATM transition planning group to oversee and coordinate the work being done in pursuance of ADS and other CNS related issues. He also presented the Group with their programme transition plan for ADS.

4.2.3 Report of the On-Line Data Interchange Group

General

4.2.3.1 The Group was informed that since NAT SPG/27, the NAT OLDI group had met twice, in Lisbon from 30 September to 4 October 1991 (OLDI/3) and in Dublin from 23 to 27 March 1992 (OLDI/4). The main objectives of the third meeting were to review the Group's terms of reference and work programme in the light of NAT SPG Conclusion 27/28 and to ensure that the ICD could be used by States to start replacing the then current ICDs.

4.2.3.2 The Group was informed that, at its fourth meeting, the OLDI Group had concentrated on fine tuning the ICD, on starting development work on an air/ground relay ICD, on establishing the framework for a common data base structure and its management and on examining the message needs of ATFM and ASM.

The Interface Control Document

4.2.3.3 The Group noted that the ATS coordination ICD was now under configuration management and that it was almost ready for publication. The ICD had been divided into various sections depending on the use of the messages. The most important Section being PART II - NAT ATS coordination messages. This Section included all of the NAT core messages as well as the existing NAT interim messages. Furthermore, in order to make the ICD as comprehensive as possible, the NAT/EUR ATS interface messages had also been included but in a different Section.

4.2.3.4 The Group noted that messages will need to be developed, and incorporated in the ICD, for the other elements of ATM, namely ATFM and ASM. The Group was informed that the NAT ICD had been used in other Regions as a starting point for the elaboration of requirements specific to the Region in question. Because of the need to ensure that the there was no proliferation of approaches to OLDI throughout the world, the Group agreed that it was now time to approach ICAO with a view to standardizing the OLDI message set for world-wide use. Furthermore, as far as the OLDI group was aware, the NAT ICD was the most mature document of its kind and should therefore be put forward as a baseline document for developing the world-wide procedures. In the same context, any evolving ATFM and ASM messages would also need to be considered in a world-wide setting.

CONCLUSION 28/21 - WORLD-WIDE PROCEDURES TO SUPPORT ON-LINE DATA INTERCHANGE

That the ICAO Representative, European Office, in his capacity as Secretary of the NAT SPG, submit the NAT Interface Control Document to ICAO for consideration during any future revision to the Procedures for Air Navigation Services - Rules of the Air and Air Traffic Services (PANS RAC, Doc 4444).

4.2.3.5 The Group was informed that one outstanding issue remained from the discussions on the ICD which had to do with the NAT message used to promulgate the OTS. It had been put forward that the same message could be used in other parts of the world if the structure and contents were modified to take into account all requirements. The Group noted that matters relating to the definition and promulgation of the OTS extended beyond OLDI itself because of the widespread automated handling of the existing NAT message by airline operators. The Group agreed that this issue would need considerable study before any changes could be agreed to as the system had not given rise to any difficulty in the past. To change it at this time could cause more problems than it solves. Nevertheless, the Group requested the OLDI group to study this matter and to report back to NAT SPG/29.

4.2.3.6 The Group noted that the OLDI group had been requested to develop ATFM and ASM messages for use in the NAT Region. Noting that no world-wide messages existed and that procedures to develop these messages were not sufficiently clear, the Group agreed that operational requirements needed to be clearly defined before message sets could be developed. The Group agreed to task the NAT OAC Chiefs with the job of developing the respective operational requirements. These requirements would then be coordinated with appropriate ATFM and altitude reservation units to ensure that their needs were being taken into account, and then with the NAT ATMG. Finally, the OLDI group would develop appropriate message sets on the basis of the identified needs (paragraph 4.2.1.5 and Conclusion 28/16 also refer). Matters related to the interconnection of OLDI links were discussed under Agenda Item 3 (paragraph 3.3.1 refers).

CONCLUSION 28/22 - OPERATIONAL REQUIREMENTS FOR AIR TRAFFIC FLOW MANAGEMENT (ATFM) AND AIRSPACE MANAGEMENT (ASM) MESSAGES

That:

a) the NAT Oceanic Area Control Centre (OAC) Chiefs be requested to develop operational requirements for ATFM and ASM messages for use in the NAT Region;

b) the NAT OAC Chiefs coordinate the above requirements with the NAT Air Traffic Management Group; and

c) the On-Line Data Interchange group be informed of these requirements through its Secretary.

4.2.3.7 Notwithstanding the above, the Group was informed that an urgent need existed to develop and implement a message that would increase the notification time to London ATFM Unit of Eastbound NAT traffic. Accordingly, the OLDI group had developed the Flow Notification Message (FNM) which was transmitted to the appropriate ATFM/ATS Units as soon as the aircraft received its oceanic clearance (paragraph 2.4.5 also refers).

Data bases

4.2.3.8 The Group noted the efforts that had been put into developing a common data base to support OLDI in follow up to NAT SPG Conclusion 27/28 and that the structure as well as the scope and type of data required for the data base had been established. Furthermore, the Group agreed that the data should be compiled using dBase compatible file formats. On the basis of this initial work, the other aspects of common data bases, such as management and financial aspects were considered. The Group examined several options and agreed that the European Office of ICAO was in the best position to provide a cost effective approach to the establishment of the data base provided that States assisted it in its creation. The Group was informed that, once the data base was established, the updating and distribution of the data was not expected to be very complex as most of the information is relatively static. Accordingly, the Group agreed that all States concerned should provide all required data to the European Office of ICAO which would then collate the information and retransmit it to the States concerned. The Group also agreed that this matter should be fine-tuned by the OLDI group in conjunction with the ICAO European Office in order to develop the procedures for the continuing maintenance of the data base. The common data base structure is illustrated in Attachment A to the report on Agenda Item 4.

CONCLUSION 28/23 - ESTABLISHMENT AND MANAGEMENT OF A COMMON DATA BASE TO SUPPORT ON LINE DATA INTERCHANGE

That:

a) NAT Provider States send to the ICAO European Office all relevant common data base material in accordance with the guidelines found at Attachment A to the report on Agenda Item 4;

b) the European Office of ICAO collate the data and distribute it to States concerned; and

c) the States provide the European Office of ICAO with regular updates which will be redistributed to all States concerned.

4.2.3.9 In this context, it was noted that the Master List of Fixes, which had been part of the coordination ICD, (NAT SPG/27 para 4.5.3 a) refers) would be subsumed by the common data base document.

Air/ground relay ICD and data link trial messages

4.2.3.10 The Group noted that the OLDI group had started developing an ICD to cover communications between OACs/FICs and aeradio stations. It was again noted that no world-wide standards existed for these types of communications and that it was indeed necessary to standardize their use for the NAT Region. The Group noted that this ICD would be a separate stand-alone document to avoid unnecessary confusion with the coordination ICD. From the report of the ADSDG, it was apparent that overlaps would exist in this area because of the need to ensure that the

manual and automated messages should be as similar as possible. However, provided that the OLDI group restricted itself to the ground/ground aspects and the ADSDG to the air/ground parts, whilst coordinating between themselves, no duplication of effort should arise. Accordingly, the Group had agreed to change the terms of reference of the two groups concerned (Conclusion 28/20 and paragraph 4.2.2.11 refer).

Future work

4.2.3.11 In concluding its discussions on this item, the Group noted that the next meeting of the OLDI group would be in Washington from 25 to 29 January 1993.

4.2.4 Report of the Vertical Separation Implementation Group

General

4.2.4.1 The Group was informed that, since NAT SPG/27, the NAT VSIG has held two meetings, the first in Paris from 18 to 22 November 1991 (VSIG/1) and the second in Annapolis from 30 March to 3 April 1992 (VSIG/2). The following issues, arising from the work of the VSIG, were brought to the attention of the NAT SPG:

a) Cost Sharing/Recovery Methodology;

b) Height Monitoring Units:
   1) Use of the HMU data; and
   2) Recommendations on the number and location of HMUs;

c) Meteorological phenomena in the NAT Region;

d) Facilities for non-Minimum Aircraft System Performance Specification (MASPS) aircraft;

e) Use of standard phraseology;

f) Standardized air-ground communications failure procedures;

g) Contingency procedures;

h) Cost/Benefit issues;

i) Transition to/from Reduced Vertical Separation Minimum airspace;

j) Definition of Minimum Navigation Performance Specification airspace;

k) Implementation timescale; and

l) Future work.

Cost Sharing/Recovery Methodology

4.2.4.2 The Group recalled that it had requested ICAO to develop cost sharing/recovery material which met with the needs of the NAT Region (NAT SPG Conc. 27/25 refers). Therefore, in follow-up to the aforementioned Conclusion, the Chief of the Joint Financing and Facility Management Branch at ICAO Headquarters was contacted with the view to initiating this task. In response to the above request, material was developed on the basis of a clearly defined Project Description, which established the need for HMUs, the number of HMUs required, Research and Development (R&D) costs as well as operational running costs, a description of the overall configuration - including communications requirements, and the implementation timetable. From the project description, a draft methodology for cost sharing/recovery was developed. The Group noted that any cost/sharing recovery scheme should be simple and take into account the Danish and Icelandic joint financing arrangements. The Group also recognised the need to designate an administrator of the arrangements. In this context, the Group was informed that ICAO would be prepared to administer the programme.

4.2.4.3 On the basis of the above, the Group reviewed the proposal put forward by the Secretariat. States that would have to install HMUs indicated that they agreed in principle with the proposal. However, it was recognised that the Group did not have the appropriate expertise to evaluate all the ramifications of the proposal. The Group agreed that this matter should be resolved before the LIM NAT (COM/MET/RAC) RAN Meeting. Accordingly, it was agreed to request ICAO to organise a meeting of financial experts from States and organisations concerned, supported by operational expertise as required, with the view to agreeing on a proposal that could be put to the RAN Meeting. In this context, it was noted that Canada would host the meeting and that invitations would be sent to all NAT Providers as well as IATA.

CONCLUSION 28/24 - **MEETING OF FINANCIAL EXPERTS TO DEVELOP A COST SHARING/RECOVERY MECHANISM FOR PRESENTATION TO THE LIM NAT (COM/MET/RAC) RAN MEETING**

That ICAO be invited to organise a meeting of financial experts, supported by operational experts as needed, in Ottawa in early September 1992 with a view to developing a cost sharing/recovery mechanism agreeable to NAT Providers and users.

Height Monitoring Units

4.2.4.4 The Group noted that the basic purpose of HMUs, which was to gather data to provide an ongoing assessment and evaluation of collision risk in the vertical plane, had been expanded into a "Safety Assurance" role. Essentially this required that all aircraft which are identified by an HMU as failing to meet the prescribed performance criteria were denied access to RVSM airspace by ATC. To meet this expanded purpose, the following requirements must be satisfied:

a) the HMUs output needs to meet high standards of reliability, accuracy and integrity;

b) the output criteria (error thresholds) must be defined and agreed upon;

c) the output will have to provide a real time "Alert" to the ATC authority which is controlling the aircraft whenever the agreed thresholds are exceeded;

d) the "Alert" mechanism must satisfy all existing ATC equipment specifications and standards;

e) the air traffic controller must have clear and unambiguous procedures to apply whenever the "Alert" is activated; and

f) pilots must have clear and unambiguous procedures to follow whenever they are notified that they have activated an "Alert".

4.2.4.5 As this "Safety Assurance" role for the HMU/ATC interface is a new development to the existing monitoring function, the Group endorsed this approach and, in doing so, noted that the requirement will place more demanding technical specifications on the acquisition and provision (to ATC) of the HMU data.

CONCLUSION 28/25 - ROLE OF HEIGHT MONITORING UNITS (HMU)

That the role of HMUs be expanded beyond the current monitoring function so as to include a safety assurance role. This will require that:

a) the HMU output shall provide a real time "alert" to the ATC authority controlling the aircraft at the time the agreed threshold is exceeded;

b) the HMU output must meet high standards of reliability, accuracy and integrity;

c) the HMU output criteria (error thresholds) must be defined and agreed upon;

d) "the alert" mechanism must satisfy all existing ATC equipment specifications and standards;

e) air traffic controllers must have clear and unambiguous procedures to apply whenever the "alert" is activated; and

f) pilots must have clear and unambiguous procedures to follow whenever they are notified that they have activated an "alert".

Number and location of HMUs

4.2.4.6 When discussing the number and location of HMUs, the Group noted that, assuming the sample was random and representative, monitoring approximately 40% of the traffic operating in the NAT Region on a daily basis would provide sufficient data to verify the height keeping performance for the major aircraft types in the region with an acceptable level of confidence. To achieve such a sample the Group agreed, on the basis of initial studies, on a possible deployment of HMUs.

CONCLUSION 28/26 - NUMBER AND SITING OF HEIGHT MONITORING UNITS (HMU)

That the proposed system of HMUs be developed with the objectives of observing a sample which is random and representative and of observing approximately 40% of the traffic operating in the NAT Region on a daily basis. This would provide sufficient data to verify the height keeping performance for the major aircraft types in the region with an acceptable level of confidence. Initial studies, which were subject to further evaluation, indicated that the objective may be achieved as follows:

a) three HMU's in Canada in the vicinity of:
i) Gander;
ii) Goose Bay; and
iii) St. John's, Newfoundland.

b) three HMUs in the United Kingdom, in the vicinity of
i) Lands End;
ii) Stornoway;
iii) Strumble; and

c) two additional HMUs, one in the Northern part and one in the Southern part of the Region, to observe aircraft which do not normally cross the NAT in the core area.

Meteorological Phenomena in the NAT Region

4.2.4.7 The Group noted that a considerable amount of time had been spent in attempting to evaluate the extent and frequency of height deviations and, to a lesser degree, tactical diversions from planned track as a consequence of meteorological phenomena such as jet stream activity, thunderstorms and turbulence. The Group further noted that there had not been any positive evidence to suggest that such deviations constituted a significant contribution to the overall risk of collision in the vertical plane. Nonetheless, efforts were continuing in order to quantify this possible contributory factor. Accordingly, the Group agreed that States be urged to provide available data on deviations from assigned flight level which were attributable to meteorological causes.

CONCLUSION 28/27 - DEVIATIONS FROM ASSIGNED ALTITUDES AS A RESULT OF METEOROLOGICAL CAUSES

That:

a) NAT Provider States and operators employ all reasonable means to collect data on altitude deviations resulting from meteorological sources; and

b) such data be forwarded to the European Office of ICAO for analysis.

Facilities for non-MASPS certified aircraft

4.2.4.8 The Group agreed that aircraft which did not satisfy the requirements of the MASPS should not normally be accommodated within the RVSM environment. Such aircraft would be cleared above or below the RVSM airspace or would require an airspace reservation from which all other aircraft would be excluded for the period of the validity of the reservation. In this context, the Group agreed that the parallel to the "BLUE SPRUCE" special routes was not valid because the short range aids, when used on the special routes, were capable of achieving the required MNPS accuracy and this afforded the necessary system redundancy in the event of the failure of the one long-range aid. However, in the event of the failure of the one primary altimeter, the secondary altimeter could not achieve the required vertical performance accuracy and would pose an unacceptable hazard to other aircraft in the RVSM airspace. On the basis of the above, the Group agreed that non-MASPS but otherwise MNPS certified aircraft be excluded from RVSM airspace or be accommodated by means of an airspace reservation wherever possible.

CONCLUSION 28/28 - EXCLUSION ON NON-MINIMUM AIRCRAFT SYSTEMS PERFORMANCE SPECIFICATIONS (MASPS) FLIGHTS

That aircraft not meeting the MASPS, but otherwise MNPS certified, be excluded from the defined RVSM airspace or be accommodated by means of an airspace reservation whenever possible.

Use of standard phraseology

4.2.4.9 The Group noted that the VSIG, in the follow-up to NAT SPG/27 Conclusion 27/24, had developed standardized phraseology in order to address one of the identified causes of height deviations due to operational errors. The Group agreed that States be invited to adopt this phraseology, which is at Attachment B to the Report on Agenda Item 4, to publish it in the necessary operations manuals and to promulgate it to the Aviation Community.

CONCLUSION 28/29 - STANDARDIZED PHRASEOLOGY FOR USE BY AIR TRAFFIC SERVICES AND PILOTS IN THE NAT REGION

That NAT Provider States:

a) adopt the phraseology as shown in Attachment B to the report on Agenda Item 4;

b) publish the phraseology in their respective ATC operations manuals;

c) promulgate the phraseology to the aviation community; and

d) implement the phraseology on 7 January 1993.

Standardized air-ground communications failure procedure

4.2.4.10 The Group noted that aircraft which experience a communications failure in RVSM airspace will, of course, also operate in the adjoining domestic airspace of several different States following such a failure. Therefore, the problem clearly extends beyond the NAT SPG area of responsibility. Accordingly, the Group agreed that such procedures be developed on a global basis. Therefore, it agreed to request ICAO to initiate work on this matter.

CONCLUSION 28/30 - DEVELOPMENT OF WORLD WIDE RADIO COMMUNICATIONS PROCEDURES FOR REDUCED VERTICAL SEPARATION MINIMUM (RVSM) AIRSPACE

That ICAO be requested to develop world wide procedures for aircraft which experience a radio failure in RVSM airspace.

Aircraft certification

4.2.4.11 The Group was presented with the proposed time-table for the development of airworthiness material needed to certify aircraft to operate in RVSM airspace. The Group noted that the FAA and the Joint Aviation Authorities (JAA) were co-operating to develope an Aeronautical Circular and an Advisory Material Joint (AC/AMJ). It is expected that this work would be completed by February 1993. In this context, the Group noted that on the basis of the timescale State approval of aircraft/operators could begin in April 1993.

Contingency procedures

4.2.4.12 In addressing the need for a revision to the contingency procedures in the Regional Supplementary Procedures (Doc 7030) to encompass the RVSM, in particular with respect to twin engine aircraft operations, the Group agreed that the current material did not satisfy the existing requirements for day-to-day operations. The Group agreed that revised contingency procedures, which would take into account RVSM, needed to be developed and they should be in the form of an amendment to Regional Supplementary Procedures to be submitted to the LIM NAT (COM/MET/RAC) RAN Meeting. The procedures would be developed by the OPS/AIR working group of the VSIG.

CONCLUSION 28/31 - CONTINGENCY PROCEDURES FOR THE NAT REGION

That the Rapporteur of the OPS/AIR sub-group of the NAT Vertical Separation Implementation Group make arrangements within his Administration to develop contingency procedures, taking into account Reduced Vertical Separation Minimum, and submit them to the LIM NAT (COM/MET/RAC) RAN Meeting.

Cost-Benefit Issues

4.2.4.13 The Group noted the revised cost-benefit analysis concerning the implementation of RVSM . In this context, the Group accepted that it would be possible to continue to update the costs and benefits of this project every time an estimate was revised. However, it was also clear that a positive benefit to cost ratio existed regardless of major fluctuations in these estimates; therefore, repeated revisions did not appear to serve any purpose. The Group, whilst accepting the need for these analyses, were of the opinion that benefit/cost considerations were now of a secondary

importance in the implementation of the RVSM. The primary reason being the increased airspace capacity which will accrue to ATC authorities. Accordingly, the Group agreed that, unless significant changes occured, the cost benefit analysis was completed and did not require any further updates.

Definition of RVSM Airspace

4.2.4.14 The Group examined the vertical dimensions of MNPS airspace taking into account the implementation of RVSM. In this context, the Group noted that it would be advantageous to raise the lower limit from FL 275 to FL 290 so as not to penalize operators who would wish to fly in that range. As regards to the upper limit, the Group felt that further studies would have to be carried out in order to decide on this limit. The Group agreed that until the implementation of RVSM, the limits of FL 275 to FL 400 would remain intact. However, the Group agreed that the amendment proposal to the Regional Supplementary Procedures should show the intent of the NAT SPG to review the vertical dimensions.

Transition to/from RVSM Airspace

4.2.4.15 The Group was made aware of the work which was taking place in Canada, the United States, and Europe (through the ICAO European Air Navigation Planning Group (EANPG)), to develop a methodology for the transition of aircraft to/from the 1000 ft RVSM environment. The Group was advised of the critical need for early ATC simulation programmes, real and fast-time, to identify and resolve the many unknown operational issues in this key area. In this context, the Group was informed that no real-time simulation slot was available in Europe until May 1994 and that this might lead to delays in implementation. The Group agreed to urge States and organizations, with access to ATC simulation facilities real and fast-time, to give priority to the RVSM project and to take whatever action is possible to gain early simulation slots for this programme. The Group acknowleged that without the necessary slots in 1992-93 the introduction of the RVSM could be delayed (paragraph 2.1.2.10 also refers).

CONCLUSION 28/32 - SIMULATION OF REDUCED VERTICAL SEPARATION MINIMUM (RVSM) TRANSITION AREAS

That States concerned make every effort to provide sufficient simulation time to carry out the required simulation of the RVSM transition areas so as to avoid any consequent delay in the implementation of the RVSM.

Guidance Material

4.2.4.16 The Group was informed that a substantial amount of work on the Guidance Material for the implementation of 1000 ft vertical separation had been completed and incorporated in the draft document. The Group also noted that further work, which was on-going, needed to be incorporated in the draft version to be presented to the LIM NAT (COM/MET/RAC) RAN Meeting. The Group agreed that the Guidance material should be in a mature state of development before presentation to the RAN meeting.

Implementation Timescale

4.2.4.17 The Group reviewed the current implementation timescales and associated Lines of Action. In this context, the Group was informed of the various delays in the development and acquisition of HMUs. The Group also noted that questions relating to transition planning and aircraft certification would probably also cause delays. On this basis, the Group noted with regret that the timescale for implementation would be delayed by two years and the timescales were modified as follows:

(i) Start Verification phase in mid 1995;

(ii) Start Operational Trial (1000 ft RVSM) in January 1997; and

(iii) Full Implementation - January 1998.

Go/NoGo decision

4.2.4.18 In concluding its discussion on implementation timescales, the Group noted that the provision of HMUs was entirely responsible for one year of the delay and that other aspects could be ready for the start of an operational trial in January 1996. The Group strongly supported the proposals of the VSIG to make every endeavour to reduce this delay.

4.2.4.19 As regards to the decision to proceed with planning for the implementation of RVSM in the NAT Region, the Group agreed that the VSIG should continue in accordance with the above timescale. It also agreed that this decision was subject to the results of the LIM NAT (COM/MET/RAC) RAN Meeting and would be revised if need be (paragraph 6.2.4 also refers).

Future work

4.2.4.20 The Group noted that a significant amount of work remained to be done in preparation for the LIM NAT (COM/MET/RAC) RAN Meeting. In particular, it noted that the working paper to be submitted to the RAN Meeting, as well as the Guidance Material, needed to be reviewed in the light of ongoing work. In this context, the Group noted that a meeting of the VSIG would take place in London during the week of 24-28 August 1992 to address these issues. The Group agreed that the role and structure of the VSIG would have to be reviewed at NAT SPG/29 taking into account the results of the LIM NAT (COM/MET/NAT) RAN Meeting and the state of progress of work. In this respect the Group agreed that subsequent to the RAN Meeting the work of the NAT VSIG ATC sub-group would be subsumed by the ATMG.

4.2.5 Report on the management of the NAT ID

4.2.5.1 The Group recalled that, at its Twenty-Seventh meeting (Paris, 10 - 21 June 1991), it had agreed that the most efficient method to manage the NAT ID was to request the European Office of ICAO, supported by States and NAT SPG working groups as necessary, to carry out this task. In this context, the Group had assigned every Line of Action from the NAT ID, except those in chapter 11, to a working group which was then to act as the group of primary interest for that Line of Action. The Group noted that most of the Lines of Action had been reviewed by one of the working groups since NAT SPG/27 and that, as a result of these reviews, several changes of a non-controversial nature were introduced. On the basis of the above, the Group agreed that the changes to the NAT ID developed by its working groups be issued as Amendment 1 to the NAT ID.

4.2.5.2 The Group noted that the ATMG had requested it to review the assignment of all of the Lines of Action to the various groups. This was done and the Group agreed that the original distribution was essentially valid with the exception of the following changes:

a) Items 1.2 (Development and Introduction of Datalink Applications) and 1.3 (Development of AMSS) should be re-assigned from the ATMG to the ADSDG.

b) Similarly, the second part of Line of Action 5.10, which was currently titled, "Practical Application of Separation Criteria", could be subsumed by the OLDI group as that group had more automation expertise than the ATMG, which had completed its work on identification of common applications. A new Line of Action would be introduced titled "Automated Implementation of Algorithms Related to the Practical Application of Separation Criteria".

c) The ADSDG Lines of Action, as amended, remained applicable. However, item 5.7 (Full ADS Capability within AMSS Coverage) could move eventually to the ATMG, once initial trials were complete and operational service initiated.

d) Line of Action 6.1 (Replacement of HF VOLMET by data link) should remain with the ATMG for the time being, but it was felt that it could migrate eventually to the COM group, for on-going administration.

e) Item 7.3 (Distribution of SATCOM Distress Traffic) could also be transferred to the COM group in the future.

f) Items 3.3 and 5.4 (Development and Application of a Plan for the Implementation of 1000 ft Reduced VSM in the NAT Region) and (Vertical Separation between FL 290 and FL 410 in MNPS Airspace) respectively could eventually be transfered to the ATMG.

4.2.5.3 The Group recognised the need for close inter-communication amongst the various groups as has been high-lighted in the amended time lines for item 8.1 (Common Standard of ATFM) and 9.1 (Common Approach to Airspace Reservations), where the ATMG had already indicated the need for the development of appropriate OLDI messages. In support of this, the OLDI group had identified an appropriate task in its workplan. The Group agreed to the above which is reflected in the amended list of Lines of Action allocated to the groups which is at Attachment C to the Report on Agenda Item 4.

4.2.5.4 The Group then turned its attention to the management of the NAT ID in general. It noted that the experience gained over the last year had shown an approach to more effectively and punctually manage the NAT ID. Firstly, the European Office of ICAO would regularly examine the ID to ensure that time lines are up to date and to request information from States or others on the basic contents of the ID. This was in line with the agreement reached at NAT SPG/27. This would be a straight forward bookkeeping exercise and would only involve non-controversial issues. The second level of management would involve the working groups themselves, or the Secretariat through correspondence with all concerned. At this level, decisions regarding the adjustment to the time lines and the descriptions to the Lines of Action would be done. Decisions at this level could be far reaching and may involve overlap with other groups; nevertheless, the resulting action should not generate any controversy. If a consensus cannot be reached, the matter would then be put to the NAT SPG for guidance.

4.2.5.5 The third and final level of management would be the NAT SPG itself. Policy decisions that would have a bearing on the ID, such as the addition/deletion of Lines of Action or Chapters, as well as major modifications to the descriptions, significant changes to the time lines which could have an effect on other parts of the document or changes to the overall strategy. These issues would be dealt with through correspondence, if urgent, or at the annual NAT SPG meeting.

4.2.5.6 On the basis of the above procedure, two annual amendments to the NAT ID could be envisaged. The first would be shortly after the NAT SPG meeting and the other would be six months later, providing there were changes to the document.

4.2.5.7 The Group accepted the above suggestion noting that the results of the LIM NAT (COM/MET/RAC) RAN Meeting could have an effect on the procedure. The Group also agreed that it would, if needed, review the assignement of the Lines of Action as a matter of routine during its meetings. Finally, the Group agreed to review this matter at its next meeting.

4.2.5.8 The Group recalled that at its last meeting (Conclusion 27/20 refers), it had requested the ICAO Representative to document, for the Council, the financial and manpower requirements to support NAT planning activities in general and the NAT ID in particular. The Group noted that this had indeed been done; however, no response had yet been received to the submission. Nevertheless, a vacant RAC/SAR Technical Officer position had been filled, thereby completing the staffing for that discipline, and more office automation had been installed. These changes had permitted the European Office to redeploy more resources to NAT planning activities, making it possible to pay closer attention to the management of the NAT ID.

4.3 Implementation of Class A airspace in Bodø Oceanic FIR

4.3.1 The Representative from Norway advised the Group of their intention to implement Class A airspace in Bodø Oceanic FIR (FL 195-FL 460). The Group noted that the information had been promulgated in accordance with the AIRAC process and circulated to all concerned by letter from the European Office of ICAO. The Group was also informed that a NOTAM had been issued stating that the change would be effective on 23 July 1992 and that the upper limit of Class A airspace would be changed to unlimited on 12 November 1992.

4.3.2 In the ensuing discussion, the following points were noted and, where relevant, were agreed to by States concerned and IATA:

a) ATC service will be provided from an oceanic sector in Bodø ACC; the user should see little, if any, difference from current operations;

b) oceanic clearances will be issued, from coast-out fix to coast-in fix in the case of Westbound flights, by Bodø , and, Eastbound by the relevant ACC/OAC issuing the clearance (Reykjavik, Gander);

c) the Norwegian and Icelandic Administrations had directed their respective Chief controllers to complete the necessary agreements/co-ordination details;

d) Bodø ACC will apply lateral separation minima in accordance Doc 7030/4 with respect to operations outside MNPS airspace;

e) Bodø ACC will apply the longitudinal separation minima applicable to operations outside MNPS airspace for traffic that will not operate to or from MNPS airspace; and

f) Bodø ACC will apply the longitudinal separation minima consistent with NAT SUPPS Doc 7030/4 for aircraft operating wholly or partly in MNPS airspace.

4.3.3 The Group recognized that, in order to afford the benefit of reduced lateral separation to aircraft operating in the Bodø CTA to/from MNPS airspace, an amendment would be required to Doc 7030/4. In this connection, the introduction of controlled airspace had resulted in the imposition of the "outside of MNPS airspace" lateral separation minima applicable to the NAT Region . This separation was greater than that applicable to aircraft within MNPS airspace. Accordingly, the Group agreed that Norway should submit an amendment proposal to the Limited NAT (COM/MET/RAC) RAN Meeting.

CONCLUSION 28/33 - AMENDMENT TO NAT/RAC SUPPLEMENTARY PROCEDURES

That the Representative from Norway make arrangements within his Administration to submit to the LIM NAT (COM/MET/RAC) RAN Meeting the following amendment to the NAT Regional Supplementary Procedures (Doc 7030/4):

Para 7.1.1 2) add the following:

"d) while operating in the Bodø Oceanic Control Area, are in transit to/from MNPS airspace."

4.4 Preparation for the Limited NAT Regional Air Navigation Meeting (1992)

General

4.4.1 The Group noted the approved agenda, work programme and structure of the forthcoming LIM NAT (RAC/COM/MET) RAN Meeting which will be held in Cascais, Portugal, from 3 to 18 November 1992. In particular, the Meeting was to cover: additions, if required to the Statement of Basic Operational Requirements and Planning Criteria; ATM; Search and Rescue (SAR); CNS; Meteorology (MET); and Implementation programming.

4.4.2 It was noted that the meeting would be the first RAN Meeting after the 10th Air Navigation (AN) Conference (Montreal, September 1991). It had been structured essentially in accordance with conventional ICAO RAN Meetings; however, it would follow an agenda which reflected the aim of transiting towards and implementing of the ICAO CNS/ATM concept. The tasks of the meeting were considered ambitious and the time set aside for it to complete them was very limited.

4.4.3 The structure of the Meeting foresaw a General Committee, its Implementation Working Group, ATM, COM and MET Committees, as well as several Working Groups sitting simultaneously. This made the planning of the size of, and expertise within delegations of crucial importance to ensure full coverage of all subjects and a successful completion of the Meeting.

NAT Regional Air Navigation Plan

4.4.4 The Group recalled that the 10th AN Conference, in its Recommendation 8/1, recommended, inter alia, that ICAO should plan for implementation of the ICAO CNS/ATM Concept through the ICAO regional planning groups and that all regional air navigation plans be reviewed, including their format, in line with the global co-ordinated plan and regional strategies for implementation of the Concept. The Group also recalled that the 10th AN Conference had endorsed the ICAO CNS/ATM Concept as developed by the ICAO Future Air Navigation System (FANS) Committee and had noted the work already done by the NAT SPG in producing an ATS system concept for the NAT Region.

4.4.5 In keeping with the foregoing, the Secretariat had produced a new draft air navigation plan for the NAT Region incorporating all elements of the CNS/ATM system, as developed by the NAT SPG, which had a bearing on future planning. Of necessity, the new plan was to be a transitional one in which certain material from the existing NAT/NAM/PAC ANP (Doc 8755) related to the NAT Region had to be retained to ensure continuity. Such material was expected to become redundant or to be largely replaced by new requirements as the new system was being implemented.

4.4.6 The proposed new draft NAT ANP comprised eight parts, as opposed to six in the current NAT/NAM/PAC Plan. The breakdown of the draft plan format was as follows:

a) Table of contents,
Concept of Air Navigation Plans,
Development of a CNS/ATM system for the NAT Region,
Procedure for amendment of regional plans,
List of States and Territories.

b) Part I - Basic Operational Requirements and Planning Criteria (BORPC). The statement had been developed by the Air Navigation Commission for the LIM NAT (COM/MET/RAC) RAN Meeting (1992). The BORPC could be subject to further additions at the meeting.

c) Part II - General Planning Aspects (GEN). This part would deal with the production of traffic forecasts by the NAT TFG which have a bearing on planning in the NAT Region. It would also deal with the technical means required to ensure effective implementation of the CNS/ATM system in the Region, as well as highlighting the fundamental requirements that have to be met to satisfy user needs.

d) Part III - Aerodrome Operations (AOP). Only the eight aerodromes located *in* the NAT Region would be included in this Part. The contents may need to be amended in the light of recent changes in the AOP field.

e) Part IV - Communications - Navigation - Surveillance (CNS). Elements of the existing COM Part were incorporated with those emanating from the concept as developed by the NAT SPG. Tables contained only data related directly to NAT requirements. This Part would be subject to further amendment as a result of recommendations emanating from the LIM NAT (COM/MET/RAC) RAN Meeting.

f) Part V - Air Traffic Management (ATM). This Part was further sub-divided into sections dealing with Air Traffic Services , Air Traffic Flow Management and Airspace Management. ATM, ATFM and ASM emanated directly from the NAT SPG concept, while ATS contained relevant material from the NAT/NAM/PAC ANP, integrated with material produced by the NAT SPG. This Part would also be subject to amendment as a result of action taken by the LIM NAT (COM/MET/RAC) RAN Meeting.

g) Part VI - Meteorology (MET). This Part contained data for MET planning related to the NAT Region, extracted from the current NAT/NAM/PAC ANP. The contents would be subject to amendment as a result of action taken by the LIM NAT (COM/MET/RAC) RAN Meeting.

h) Part VII - Search and Rescue Services (SAR). This Part showed SAR services and facilities related to the NAT Region. Some changes related to alerting service developed by the NAT SPG were included in the introductory material. The contents would be subject to amendment as a result of action taken by the LIM NAT (COM/MET/RAC) RAN Meeting. Further changes may be necessary in the light of experience gained in the implementation of the CNS/ATM System in future.

i) Part VIII - Aeronautical Information Services (AIS), contained information related to AIS planning in the NAT Region.

4.4.7 From the above, it was clear that the LIM NAT (COM/MET/RAC) RAN Meeting should be invited to agree to remove all NAT elements from the present ICAO NAT/NAM/PAC Regional Air Navigation Plan Publication and to establish a self-contained NAT Regional ANP, preferably in accordance with the format and content outline as described above.

4.4.8 It was considered to be of great importance that the ICAO Regional ANP would be designed and maintained as a live document of high useability for State planners in their work on the transition towards and the implementation of the ICAO CNS/ATM system in the NAT Region. To that extent, the content of the draft NAT ANP embodied the planning principles, was basic in nature and stable by design. Its contents would be subject to the established ICAO Council approved procedure of formal amendment. All other information necessary to achieve implementation of the Plan, would be contained in a NAT ID, complemented with tabular material of detail regarding individual facilities and services, milestones, etc.

4.4.9 The Group also agreed that the proposed format of the draft NAT Regional ANP should be presented to the RAN Meeting for approval. Upon acceptance by the Meeting, ICAO would prepare a final NAT ANP, incorporating the results and recommendations of the LIM NAT (COM/MET/RAC) RAN Meeting as soon as possible after approval of the Report by the ICAO Council. That version of the NAT ANP would then constitute the approved ICAO Regional ANP for the NAT Region and would henceforth be subject to the normal amendment procedure.

4.4.10 Similarly, the Secretariat would update, subsequent to the LIM NAT (COM/MET/RAC) RAN Meeting, the NAT ID, which would then be kept current by the NAT SPG and its working groups, as necessary, with the assistance of the European Office of ICAO. In that fashion the many separate documents now pertaining to NAT Regional air navigation planning would be reduced to two comprehensive documents of distinctly different status and would simplify NAT air navigation systems planning towards and during the implementation phases of the ICAO CNS/ATM system in that Region.

CONCLUSION 28/34 - THE NEW ICAO NAT REGIONAL AIR NAVIGATION PLAN (ANP)

That the LIM NAT (RAC/COM/MET) RAN Meeting (1992) be invited to:

a) remove all NAT elements from the ICAO NAT/NAM/PAC Regional Air Navigation Plan Publication (Doc 8755);

b) adopt the format for a self-contained new NAT Regional ANP with contents, as developed by the Meeting, reflecting clearly the basic planning principles for the ICAO CNS/ATM system for the NAT Region, subject to the formal ICAO Council approved procedure for the amendment of Regional Plans; and

c) endorse the principle of a comprehensive NAT Implementation Document, updated under the auspices of the NAT SPG as necessary, containing guidance material for implementation, and details on facilities and services as may be required to ensure coherent progress towards the implementation of the NAT Regional ANP.

4.4.11 The Group then noted a presentation by the representative of IATA on their philosophy of reducing the numbers of NAT Oceanic FIRs and OACs, commensurate with latest technology and in the interest of economy. The representative of IATA indicated that a working paper to that effect was expected to be presented by his organization to the forthcoming LIM NAT (COM/MET/RAC) RAN Meeting (1992).

ATTACHMENT A

COMMON DATA BASE STRUCTURE TO SUPPORT ON-LINE DATA INTERCHANGE IN THE NAT REGION

(Conclusion 28/23 refers, page 4-10)

1. Introduction

1.1 Three data bases are required for locations, routes and areas respectively. The location data base contains information on airports, navigational aids and fixes. The route data base contains those routes that are within or adjoin the NAT Region. The area data base contains FIR/CTA boundaries as well as defining those other permanently defined areas of interest within the region. These data base structures are defined in the following paragraphs.

2. Data base contents

2.1 Locations

2.1.1 The location indicator and position of all international airports within the region must be known. Also those extra-regional airports which are deemed proximate (airports from which flights require an oceanic clearance prior to departure). Additionally, those other extra-regional airports used by trans-Atlantic traffic.

2.1.2 The relevant details must be known for all navaids and fixes within the region. Also for extra-regional navaids and fixes which are used to anchor the oceanic route, that is, valid coast-out/landfall points. Selected navaids and fixes in FIRs adjacent to the region should also be included. Other extra-regional navaids and fixes may be essential to individual providers and should be included as required.

2.2 Routes

All fixed route structures within the region should be held in the database. Also any routes which terminate at the regional boundary. Additional routes should be included as required.

2.3 Areas

2.3.1 Jurisdictional areas (Centre boundaries) and permanent special use areas within the region (military areas, restricted areas) will be included.

3. Database Structure

3.1 Locations

3.1.1 For each location, the following data shall be stored. The letters within parentheses are field names. Also specified for each field is the characteristic and length of the field (C = character, N = number).

a) Class (CLASS) - C1

Although stored in a single file, Airports, Navaids, and Fixes constitute three different categories. To differentiate, a single letter classification (A, N, or F) will be stored.

b) Type (TYPE) - C3

This field indicates the type of entry with one of the codes taken from the following table:

APT Airport
NDB Non-directional Beacon
VOR VHF Omni-directional Range
TAC Tactical Navigation (TACAN) Beacon
VOD VOR/DME
VTD VOR/TACAN/DME
FIX Fix

c) Identifier (ID) - C5

For airports, the ICAO four letter location indicator; for navaids and fixes, the two, three or five letter identifier.

d) Full Name (NAME) - C20

This field lists the full name of airports and navaids using the ISO 8859/Latin 1 character set. For fixes, this field is left blank.

e) Latitude (LAT) - N8.1

This field contains the latitude specified to an accuracy of decimal seconds. For airports, the position of the aerodrome reference point will be stored.

f) Longitude (LON) - N9.1

This field contains the longitude specified to an accuracy of decimal seconds. For airports, the position of the aerodrome reference point will be stored.

g) Elevation (ELEV) - N4.0

Elevation, specified to the nearest foot; the elevation of fixes is listed as zero.

h) Magnetic Variation (VAR) - N3.0

Variation at the time of data entry. This datum changes with time and therefore requires periodic updating.

i) Flight Information Region (FIR) - C4

This datum will be used to resolve navaid naming conflicts. If, at some time, all name conflicts are resolved on a world-wide basis, this datum may not be required. When a fix lies on an FIR boundary, the FIR entry will be decided by mutual agreement.

j) Reference model (REF) - C15

The geodetic reference used to determine the position of the location. This information is used for geodetic transformation between national ellipsoids and WGS/84.

k) Group (GRP) - C1

As indicated above, airports external to the region will be included in the database. Some of these are defined as proximate whereas others are not. In order to distinguish between these airports, the following three categories will be used: Regional (R), Proximate (P), and Other (O).

Navaids external to the region will also be included in the database. Some of these navaids are valid route anchor points and will be identified as Coastal (C).

l) Fix category (CAT) - C1

Fixes are typically derived from the geographic location of other positions, usually navaids. This field indicates the category of the fix as Projected (P), Absolute (A) or Derived (D) and is used for their transformation to WGS/84.

4. Routes

4.1 Routes will be stored as sequences of fixes, starting at their westernmost end. Each route will be stored in a separate table, individual fixes being entries in that table. For named fixes, only the identifier will be stored, the fix being looked up in the fix database to determine its position. For unnamed fixes, the latitude and longitude will be stored in this table (the total length of the field needs to be agreed on).

4.2 The field structure will be ID, LAT and LON, as described above.

5. Areas

5.1 Areas will be stored as sequences of points, proceeding counter-clockwise from an arbitrary point of origin. Each will indicate the nature of the segment connecting it with the next point. The last point specified will also indicate the nature of the segment connecting with the point of origin (the total length of an area record needs to be agreed on).

5.2 Three categories of segments are defined, great circles (G), parallels of latitude (P), and arc segments (C). Great circles and parallels of latitudes will be specified as such, no further description being required. For arc segments, the center of the small circle will be specified. Each record will contain LAT, LON, line type and, if the type is C, LAT and LON again. The following are illustrations of the above:

6100N 00000W	G	
8200N 00000W	P	
8200N 01100E	G	
9000N 01100E	G	
6000N 01000W	C	6200N 01000W
6237N 01723W	G	
6300N 02000W	G	

6. Allocation of responsibilities

6.1 Each Provider State will be responsible for supplying and updating data for its own regional FIR as well as any extra-regional FIRs for which that State undertakes to supply data.

ATTACHMENT B

STANDARD PHRASEOLOGY FOR THE NAT REGION
(Conclusion 28/29 refers, page 4-15)

1. CLEARANCE

{ATC CLEARS (aircraft identification)} or {(aircraft identification) IS CLEARED} TO (destination) VIA (significant point/track letter) FROM (entry point) MAINTAIN FLIGHT LEVEL (level) MACH (number).

Optional: MAKE REQUEST FOR HIGHER/LOWER/ROUTE CHANGE/ SPEED CHANGE {AFTER PASSING (significant point) or AT (time)}.

2. RE-CLEARANCE - HEIGHT

(aircraft identification) AMENDED LEVEL CLEARANCE. {ATC CLEARS (aircraft identification) or (aircraft identification) IS CLEARED} TO CLIMB/TO DESCEND TO AND MAINTAIN FLIGHT LEVEL (number).

Optional: REPORT LEAVING/PASSING FLIGHT LEVEL (level). REPORT REACHING. CROSS (significant point) LEVEL or BE LEVEL BY (time).

3. RE-CLEARANCE - HEIGHT (POINT TIME)

(aircraft identification) AMENDED LEVEL CLEARANCE. {ATC CLEARS (aircraft identification) or (aircraft identification) IS CLEARED} AFTER PASSING (significant point)/AT (time) TO CLIMB/DESCEND TO MAINTAIN FLIGHT LEVEL (level).

Optional: REPORT LEAVING/PASSING FLIGHT LEVEL (level). REPORT REACHING. CROSS (significant point) LEVEL or BE LEVEL BY (time).

4. RE-CLEARANCE - ROUTE

(aircraft identification) AMENDED ROUTE CLEARANCE. {ATC CLEARS (aircraft identification) or (aircraft identification) IS CLEARED} AFTER PASSING (significant point) REROUTE VIA (significant points).

5. RE-CLEARANCE - SPEED

(aircraft identification) AMENDED SPEED CLEARANCE. {ATC CLEARS (aircraft identification) or (aircraft identification) IS CLEARED} TO MAINTAIN MACH (number).

6. UNABLE

(aircraft identification) UNABLE HIGHER/LOWER LEVEL DUE TO TRAFFIC.

Optional: MAKE REQUEST AGAIN {AFTER PASSING (significant point) or AT (time)}

ATTACHMENT C

THE NAT ID LINES OF ACTION ARE ALLOCATED AS FOLLOWS:
(paragraph 4.2.5.3, page 4-18 refers)

OLDI Group	ADSD Group	ATM Group		VSI Group and sub-groups
2.1	1.2	~~1.2~~	5.7	3.3*
5.3	1.3	~~1.3~~	6.1*	5.4*
5.11	1.4	3.5	6.2	
5.12	1.5	4.1	6.3	
5.13	3.4	5.6	7.1	
5.16	4.2	5.8	7.2	
	5.1	5.9	7.3*	
	5.2	5.10	8.1	
	5.7*	5.14	9.1	
		5.15	10.1	

COMM Group	MATHS Group	Central Monitoring Agency
1.1	3.1	5.5
2.2	3.2	
6.1	3.6	
7.3		

Lines of Action (LoA) associated with NAT ID, Chapter 11, Human Resources, were not allocated to specific groups as they need to be further developed by NAT SPG Members and individual States.

* starred items indicate LoAs which will be transferred when appropriate.

AGENDA ITEM 5: GENERAL MATTERS

5.0 Introduction

5.0.1 Under this item the Group discussed the following specific subjects:

a) status of processing of outstanding proposals for amendment of Regional NAT Supplementary Procedures (Doc 7030) and the NAT/NAM/PAC ANP (Doc 8755); and

b) updating of the NAT Guidance and Information Material, the NAT MNPS Airspace Operations Manual and the Manual on International General Aviation.

5.1 Status of processing of outstanding proposals for amendment of Regional Supplementary Procedures and the Air Navigation Plan

5.1.1 The Group was informed of the latest status of outstanding amendment proposals to the NAT Regional Supplementary Procedures. In this context the Group noted that the amendment proposal concerning the use of SSR had been submitted to ICAO headquarters for approval in March 1992 and that the approval was imminent. As regards to the amendment proposal concerning operations above or below MNPS airspace, the Group noted that the closing date for comments was 22 May 1992 and that it had been sent to ICAO headquarters for approval as no objections had been received. Finally the Group noted that the amendment proposal concerning position reporting in the NAT Region was still outstanding. Accordingly, the Secretary was requested to submit this amendment proposal to the LIM NAT (COM/MET/RAC) RAN Meeting for consideration.

5.2 Updating of the NAT Guidance and Information Material, the NAT MNPS Airspace Operations Manual and the Manual on International General Aviation

5.2.1 Pursuant to the decision taken at NAT SPG/27 (report on agenda item 5, paragraph 5.2 refers), a draft copy of the Sixth Edition of the NAT Guidance Material (NAT Doc 001) had been developed and circulated to all concerned prior to NAT SPG/28. One of the primary objectives of the latest amendment was to clear up the problems generated by the ambiguities of the Fifth Edition.

5.2.2 NAT SPG members, observers and participants had been invited to provide comments/additions etc. to the draft edition (State letter T 13/5N - 0357, 30 March 1992 refers) in order to incorporate them into the final version which would be published after NAT SPG/28. Several States had responded and their comments had been presented to the Group for review and guidance. In this context, the Group noted that comments of an editorial nature had been handled by the Secretariat.

5.2.3 A sub-group was formed to address States' comments, those developed by the Secretariat as well as those stemming from the discussions during the meeting. After reviewing the material, the Group agreed that the following changes and additions to the Guidance Material be made:

a) a statement with respect to MASPS would be included in the foreword to the document. The United Kingdom (VSIG rapporteur) will provide the wording to the Secretariat;

b) the ICAO classification of airspace, as applicable, would be incorporated into paragraph 1.1.1;

c) FIR and MNPS airspace charts would be included and will reflect the change of status of Bodø oceanic FIR;

d) Norway and Iceland would provide updated information on the Polar Track Structure to the Secretariat;

e) there was no requirement for a Polar Track Structure diagram, however, references would be included in text to refer the reader to the appropriate AIPs;

f) the United Kingdom and Iceland would review the need to retain the HF requirements on the 60N10W and 61N10W routes and advise the Secretariat;

g) the requirements, as detailed in paragraph 3.4.3.1, with respect to equipment would remain unchanged i.e., dual FMCS. It was felt, however, that more in-depth information on new systems was required by the Group before changes could be made to this paragraph except for the following: editorial - ... 3rd line ... INS and ... deleted;

h) the wording proposed by the Member from France should replace current wording in paragraph 3.4.7.1 a) iii) "one navigation system using the inputs from one or more Inertial Reference System (IRS), or OMEGA Sensor System, or any other Sensor System complying with MNPS specification" (paragraph 5.2.10 refers);

i) Communications: (paragraph 2.1.3.12 and 2.2.2.14 also refer)

- VHF charts showing coverage from facilities serving the NAT Region would be included for FLs 100, 200 and 300. Iceland would co-ordinate the inputs from States and provide the charts to the Secretariat by 31 July 1992;

- coverage from VHF stations in Greenland would be shown on FLs 100 and 200 charts. The FL 300 chart would indicate the availability of these facilities for emergency use only; and

- Norwegian facilities would be included in the coverage charts and in the list of States in paragraph 6.2.5.

5.2.4 The Group noted that the draft Sixth Edition of the NAT Guidance Material incorporated the "tactical monitoring concept". As such, with the publication of the document, the trial period for the procedure effectively ended and therefore became a permanent NAT procedure. Furthermore, the Fifth Edition and the draft Sixth Edition both contained separation values for airspace reservations in MNPS airspace of 120 NM for non-MNPS aircraft within the reservation.

5.2.5 The Group further noted that the goal of tactical monitoring was to exclude operators that are not MNPS certified from operating in MNPS airspace and, that the issue of NAT MNPS airspace integrity, in particular GNEs committed by non-approved operators, was equally applicable to airspace reservation traffic.

5.2.6 On the basis of the above, the Group agreed that moving airspace reservations should not be authorized in MNPS airspace for non-MNPS approved aircraft. The Group also agreed that, for formation flights in a reservation, at least one of the aircraft in the formation must be MNPS approved in order to operate in MNPS airspace. In this context, the procedure described above would make the separation values for non-MNPS aircraft in moving airspace reservations in MNPS airspace no longer required and only those separation values for MNPS operations would be applied.

5.2.7 In concert with the above, the NAT Guidance Material, draft Sixth Edition, would be amended as follows:

(Part VII, page 43-paragraph 7.2.8)

ADD new paragraph: "Moving temporary airspace reservations will not be approved in MNPS airspace for non-MNPS approved aircraft. For formation flights in an airspace reservation, at least one of the aircraft in the formation must meet MNPS in order to satisfy the MNPS requirement."

(Part VII, page 44-paragraph 7.3.3 a) iii)

DELETE "120 NM between the track of an aircraft operating under the control of the ATC unit concerned and the closest track of any of the aircraft for which the airspace is reserved, whenever none of the aircraft contained in the airspace reservation meet the MNPS."

(Part VII, page 45-paragraph 7.3.5 a) ii)

DELETE "120 NM between the closest tracks of any of the aircraft for which the airspace is reserved when not all of the aircraft or formation flights concerned meet the MNPS."

5.2.8 The group was informed that the incorrect use of Emergency Location Transmitters (ELT) in the COSPAS/SARSAT[1] system, which was capable of positioning an ELT accurately and timely, puts undue pressure on the Search and Rescue (SAR) services while causing a waste of valuable time for both ATC supervisors and the SAR personnel. In this context the Group agreed to the benefit of including information on the optimum use of ELTs in the COSPAS/SARSAT environment in relevant documentation. Along the same lines, the Group agreed to include additional SAR material as and when necessary. Accordingly, it agreed to expand the North Atlantic Guidance Material to include a section IX dealing with matters concerning SAR.

[1] COSPAS - Space system for search of vessels in distress
SARSAT - Search and rescue satellite-aided tracking"

5.2.9 On the basis of the above, the Group agreed that the following description of how best to use the COSPAS/SARSAT system be incorporated in the NAT Guidance Material and when appropriate, in the Second Edition of the International General Aviation (IGA) Operations Manual as follows:

"The COSPAS/SARSAT* System uses near-polar orbital satellites to detect and localize signals from Emergency Locator Transmitter (ELT). A number of countries including Canada, France, Norway, United Kingdom and the United States have Local User Terminals (LUT) and associated Mission Control Centres (MCC) in the NAT Region or close by. The LUTs transmit ELT locations to the nearest MCC which again makes a coordination with other MCCs and informs the relevant Rescue Coordination Centre (RCC). The COSPAS/SARSAT operates on 121.500/243.000 and 406 MHz. The location accuracy is normally better than 20 km on 121.500 and 243.000 MHz and better than 5 km on 406 MHz. The CORPAS/SARSAT will detect transmissions on any of these three frequencies throughout the NAT Region. the maximum waiting time, which is the time between ELT activation and satellite detection, should not exceed 90 minutes in the NAT Region and will normally be much quicker than this.

With the COSPAS/SARSAT system in orbit, pilots are encouraged to activate their ELTs as soon as an emergency occurs. The system will quickly detect position and process an ELT through the MCCs and transmit the information to the relevant RCC. This will place the RCC in a better position to enable SAR forces to react expeditiously to an emergency.

Even without an ELT, the COSPAS/SARSAT system can be used to give a rough position if an aircraft makes a continuous transmission on 121.500/243.000 MHZ on request from an ATS unit or an RCC at a specified time and for a specified period/length of time. The detected transmission might be 30 minutes old but still usable for both, the pilot in question and the ATS/SAR system, as one will have a time specified last known position.

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

5.2.10 The Group noted that the present generation of complex navigation systems incorporated some or all of a wide and varied range of features e.g., navigation sensors, derivation of aircraft position, flight data computation and display, performance management and automatic steering guidance. As a consequence, the use of terms such as Flight Management System (FMS) and Flight Management Computer System (FMCS) could be mis-interpreted. The group agreed that it would be necessary to undertake more detailed studies in order to more accurately define the future requirements of the MNPS airspace; therefore, it agreed to review this matter at its next meeting.

5.2.11 As regards to the North Atlantic MNPS Airspace Operations Manual, the Group agreed on the need for a sixth edition to be published by mid 1993. On the basis of the above, the Group stressed the importance of receiving input from IFALPA, as well as from States, prior to the next amendment of the document.

AGENDA ITEM 6: UPDATING OF THE WORK PROGRAMME OF THE NAT SPG

6.0 Introduction

6.0.1 Under this item the Group considered the following items:

a) review of the work programme;

b) arrangements for the next meeting and election of the Vice-Chairman; and

c) NAT SPG Membership.

6.1 Review of the future work programme

6.1.1 The Group undertook its customary review of its future work programme, updating and amending it as required. As a result of this review and taking into account the agreement that the NAT ID be the framework for future planning, the following items were retained:

PART I - AIR NAVIGATION SYSTEM SAFETY PERFORMANCE REVIEW

1. Review of Gross Navigational Errors
(Scrutiny: Rapporteur United Kingdom):

   a) lateral performance;

   b) longitudinal performance;

   c) vertical performance; and

   d) tactical monitoring.

2. Review of in-flight contingencies.

3. Lateral collision risk estimation
(Mathematicians: Rapporteur United Kingdom):

   a) occupancy;

   b) lateral collision risk;

   c) review of MNPS criteria;

   d) core lateral performance; and

   e) review of the basic model and assumed parameter values.

4. Short and long-term contingency (fall-back) procedures, alternative track structures and the target level of safety.

5. Mathematical/statistical issues relating to vertical and longitudinal collision risk.

PART II - AIR NAVIGATION SYSTEM OPERATIONS REVIEW

1. Air Traffic Services Operations:

   a) application and refinement of separation standards;

   b) domestic/oceanic interface and transition problems adjacent to NAT MNPS airspace;

   c) possible further short-term ATS improvements and determination of action for their implementation;

2. Communications Operations
   (Communications: Rapporteur Denmark):

   a) fixed services; and

   b) mobile services.

3. Determination of the performance assessment of the NAT air navigation system and the services provided to the airspace users by ATC.

PART III - TECHNOLOGICAL DEVELOPMENTS

1. ATC automation and traffic display systems in Oceanic Area Control Centers.

2. Developments in global navigation satellite systems.

3. Data-link developments.

4. Other technological developments of relevance to the NAT Region.

PART IV - PLANNING AND IMPLEMENTATION IN THE NAT REGION

1. Air navigation systems planning and production of supporting statistical data on future traffic demand.

2. Management of the NAT ID

   a) report of the ATM group;

   b) report of the ADS development group;

c) report of the OLDI group;

d) report of the VSI group; and

e) report on the management of the NAT ID.

3. Possible extension of MNPS airspace.

4. Follow-up action from the Limited NAT Regional Air Navigation (RAN) Meeting (1992).

5. ICAO activities relevant to planning in the NAT Region

6. ATS operational contingency planning in the NAT Region, as necessary.

PART V - GENERAL MATTERS

1. Status of processing of outstanding proposals for amendment of the NAT Regional Supplementary Procedures and the NAT Regional Air Navigation Plan.

2. Updating of the NAT Guidance and Information Material, the NAT MNPS airspace Operations Manual and the Manual on International General Aviation.

6.2 Arrangements for the next meeting

6.2.1 Whilst addressing the subject of administrative arrangements for the next meeting, the Group considered whether it would be appropriate to introduce some changes to the internal proceedings of the NAT SPG. The point raised was that during the first part of the meeting, the Group had to carry out its work in Plenary in parallel with its usual three sub-groups (Scrutiny, Communications, Mathematicians) which, in some cases, could be time consuming for the Members. It was also considered that NAT SPG members should be able to conduct their discussion on the basis of the input by the three sub-groups which, in general, was not available before at least the fourth day of the first week of the meeting. It was therefore agreed that experts who participate in the NAT SPG sub-groups should commence their work three days in advance of the full meeting of the Group. The NAT SPG would start in Plenary session on the next Monday. The meeting could then proceed in a more effective manner through the week and complete its work over the second week-end. As a result, it would be possible for delegations to release some of their experts during the first week of the NAT SPG as their work would be completed. In addition, the report reading phase could start, upon completion of input of the sub-groups, earlier than usual in these circumstances.

6.2.2 The Group agreed that it should attempt to conduct its work in accordance with the above principles at its next meeting. In this context, it was emphasised that a clear distinction should be made as regards to the format of documentation (working papers, information papers) to be presented. Working papers should be reserved to issues requiring formal action by the Group whereas material presented in information papers should not be subject to formal presentation in Plenary nor will the material be recorded in the Summary of Discussions unless the Group directs otherwise. This material however will receive the appropriate consideration by the various sub-groups and should not be tabled again in Plenary. In order for the procedure to be effective, the Group agreed that all papers which would normally be referred to the sub-groups for consideration must reach the Secretary at least 30 days in advance of the convening of the sub-group; the Secretary would then apportion the

papers to the various sub-groups. In the same context, the Group noted that many papers for NAT SPG/28 had been submitted and distributed in advance of the meeting and that this had proven to be very useful. Accordingly, the Group agreed that participants should continue to make every effort to send their papers to the Secretary so that they can be distributed in advance.

6.2.3 The Group agreed that its next meeting be planned to be held in Paris from the 7 to 16 June with an option to extend to 18 June 1993, if required. In addition, on the basis of the new arrangements proposed, it was understood that NAT SPG sub groups' (Communications, Scrutiny, Mathematicians) activities would start in advance of the main meeting of the Group on 2 June 1993. Details of these arrangements, as well as the need to submit papers 30 days in advance of the meeting, will be contained in the letter of invitation sent in January 1993.

6.2.4 Finally, as regards to the possible need for an extraordinary meeting of the NAT SPG after the LIM NAT (COM/MET/RAC) RAN Meeting, the Group agreed that as they would all be present in Lisbon for the above meeting, they could review this matter in the light of the results of the RAN Meeting. In this context, the Group agreed to proceed with planning for the implementation of RVSM on the basis of the revised timescales and, if anything untowards should occur at the LIM NAT (COM/MET/RAC) RAN Meeting, this decision could be reviewed on the basis of the above procedure (paragraph 4.2.4.18 also refers).

6.2.5 The Group was informed of the possibility that its chairman, Mr. G. Matthiasson, the Member from Iceland, might have to move to another function within his Administration before the next meeting. Having left the Vice-Chairman position unfilled for some time, the Group reverted to this matter and unanimously elected Mr. Karsten Theil, the Member from Denmark, as its Vice-Chairman.

6.3 Membership of the NAT SPG

6.3.1 The Group was informed that the Netherlands had withdrawn their membership in the NAT SPG. Noting that the Netherlands was a founding member of the NAT SPG, the Group expressed its sincere appreciation for their contributions over the years. The Group also reviewed a request from Norway to become a Member of the NAT SPG. Taking into account the reduction in the size of the Group as a result of the Netherlands withdrawal and bearing in mind that Norway was the only NAT Provider State which was not a Member of the Group, their application for membership was unanimously endorsed. Accordingly, the Group requested that the Secretary take appropriate action to formalize this matter.

6.3.2 The Group had also reviewed a request by SITA and the ARINC/SITA Joint Venture to participate in the work of the Group as observers. Recalling the discussions which were held when the NAT SPG was created, and bearing in mind the need to keep the Group as small as possible in order to ensure its effectiveness, the Group felt that the admission of new international organizations could dilute its efficaciousness. However, it was agreed that these two organizations be invited to participate in the work of the Group through the various NAT SPG working groups as required.

6.3.3 The Group was informed that Mr. Joe Irving and Mr. Ted Roberts, both from the United Kingdom, would be going on a well deserved retirement in early 1993. The Group expressed their appreciation for their contributions over the years and wished them and their families a very happy retirement.

AGENDA ITEM 7: ANY OTHER BUSINESS

7.0 Introduction

7.0.1 Under this item the Group considered the following items:

a) NAT users meeting; and

b) seminar on the implementation of the ICAO CNS/ATM concept in the NAT Region.

7.1 Nat users meeting

7.1.1 The Member from Canada informed the Group that a NAT users meeting, to be hosted by Canada, would be held in Gander Newfoundland from 1 to 3 September 1992.

7.2 Seminar on the implementation of the ICAO CNS/ATM concept in the NAT Region

7.2.1 The Group discussed the merits of holding a seminar/symposium to explain to the international aviation community some of the changes that could be expected as a result of the implementation of the ICAO CNS/ATM concept in the NAT Region. In this context, the Group recalled that the Tenth AN Conference had recommended (Recommendation 7/1 refers) that the subject of global transition planning be included in ICAO's programme of regional seminars and workshops. On the basis of the above and taking into account the need to consider the outcome of the LIM NAT (COM/MET/RAC) RAN Meeting, the Group agreed that ICAO should be requested to organize a seminar in late 1993 which would address global transition planning, the ICAO CNS/ATM concept,as adapted for the NAT Region, the implementation of 1000 ft VSM as well as other issues of importance to the NAT user community.

CONCLUSION 28/35 - SEMINAR ON THE IMPLEMENTATION OF THE ICAO CNS/ATM CONCEPT IN THE NAT REGION

That ICAO be requested to organize a seminar on the implementation of the ICAO CNS/ATM concept in the NAT Region which should be held in late 1993.

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c) report of the OLDI group;

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