N. Gold.

NAT SPG/31

* App B (1) + App. A (1) interverted

GROUPE DE PLANIFICATION COORDONNEE ATLANTIQUE NORD

Summary of Discussions and Conclusions of the

Thirty-First Meeting of the

North Atlantic Systems Planning Group

Paris, 12 - 16 June 1995

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AGENDA ITEM 5: ANY OTHER BUSINESS

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LIST OF ABBREVIATIONS

AAD	Assigned Altitude Deviation
ACAS	Airborne Collision Avoidance System
ACARS	Aircraft Communication Addressing and Reporting System
ACC	Area Control Centre
ADS	Automatic Dependent Surveillance
ADSP	Automatic Dependent Surveillance Panel
AFTN	Aeronautical Fixed Telecommunications Network
AIC	Aeronautical Information Circular
AIDC	Air Traffic Services (ATS) Inter-facility Data Communications
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Services
AMSS	Aeronautical Mobile-Satellite Service
ANP	Air Navigation Plan
ASE	Altimetry System Error
ATC	Air Traffic Control
ATCC	Area and Terminal Control Centre
ATMG	Air Traffic Management Group
ATN	Aeronautical Telecommunications Network
ATS	Air Traffic Services
CAA	Civil Aviation Authority
CADAG	Communications, Automation and Data Link Applications Group
CMA	Central Monitoring Agency
CNS/ATM	Communications, Navigation and Surveillance/Air Traffic Management
COMAG	Communications and Air Traffic Management Automation Group
CPDLC	Controller Pilot Data Link Communications
CRM	Collision Risk Model
CTA	Control Area
DFDR	Digital Flight Data Recorder
ELT	Emergency Locator Transmitter
FAA	Federal Aviation Administration
FASID	Facilities and Services Implementation Document
FDPS	Flight Data Processing System
FIR	Flight Information Region
FMS	Flight Management System
GAT	General Air Traffic
GLONASS	Global Orbiting Navigation Satellite System
GMU	Global Positioning System Monitoring Unit

GNE	Gross Navigation Error
GP	General Purpose
GPS	Global Positioning System
HF	High Frequency
HMU	Height Monitoring Unit
ICD	Interface Control Document
ID	Implementation Document
IGA	International General Aviation
IMG	Implementation Management Group
INS	Inertial Navigation System
IPD	Implementation Programme Document
IRS	Inertial Reference System
MASPS	Minimum Aircraft System Performance Specification
MNPS	Minimum Navigation Performance Specifications
MOPS	Minimum Operational Performance Standards
NICE	NAT Implementation Cost Effectiveness
JAA	Joint Aviation Authorities
OAC	Oceanic Area Control Centre
OAG	Official Airline Guide
OCA	Oceanic Control Area
OCD	Oceanic Clearance Delivery
ODAPS	Oceanic Display and Planning System
OTS	Organized Track System
R&D	Research and Development
RSSIG	Reduced Separation Standards Implementation Group
RTCA	Radio Technical Commission for Aeronautics
RHSM	Reduced Horizontal Separation Minima
RVSM	Reduced Vertical Separation Minimum
SAR	Search and Rescue
SARPS	Standards and Recommended Practices (ICAO)
SATCOM	Satellite Communications
SOTA	Shannon Oceanic Transition Area
SUPPS	Regional Supplementary Procedures
TCAS	Traffic Alert and Collision Avoidance System
NAT TFG	NAT Traffic Forecasting Group
TLS	Target Level of Safety
UIR	Upper Information Region
VHF	Very High Frequency
WATRS	Western Atlantic Route Structure

INTRODUCTION

i.1 The Thirty-first Meeting of the North Atlantic Systems Planning Group (NAT SPG) was held in Paris from 12 to 16 June 1995. The meeting was chaired by **Mr. Karsten Theil**, the Member for Denmark.

i.2 In addition to IAOPA, IATA, IACA, IFALPA, IFATCA and Inmarsat, the Group had, as usual, invited Spain and the Russian Federation to attend this meeting. A list of participants is at page i.9.

i.3 The Chairman informed the Group that two colleagues had passed away since its last meeting:

Mr. John Matt had joined the Federal Aviation Administration (FAA) of the United States after 22 years of service in the United States Air Force. He was the Member for the United States of the Group from 1978 to 1984 and had played a highly valuable rôle in the development and implementation of North Atlantic air navigation systems.

Mr. Don Bull had been the Chairman of the IATA NAT Regional Technical Panel and the Observer for IATA to the Group for a number of years and as such he had contributed highly to the work of the Group.

The Group joined in a moment of silence in the remembrance of its two colleagues, their dedication to the work and the friendship they provided.

i.4 In order to progress its work efficiently, the Group established a sub-group to consider the mathematical and statistical aspects of separation minima in the NAT Region, of which **Mr. Andrew du Boulay** of the United Kingdom acted as Rapporteur.

i.5 A sub-group charged with the scrutiny of navigational performance questions, of which **Mr. Jim Benson** of the United Kingdom acted as Rapporteur, had met in London on 6 June 1995 and provided the Group with its report.

i.6 A sub-group dealing with the review of matters related to NAT aeronautical telecommunications, of which **Mr. Phonsie O'Connor** of Ireland acted as Rapporteur, had met in Limerick from 4 to 7 April 1995 and provided the Group with its report.

i.7 The North Atlantic Implementation Management Group (NAT IMG) had met in Reykjavik from 3 to 6 October 1994; in Ottawa from 21 to 23 February 1995 and in Paris from 7 to 9 June 1995 in order to manage the plans for the implementation of Reduced Vertical Separation Minimum (RVSM) and of the ICAO Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM) systems in the NAT Region. **Mr. John Nordbø** of the United Kingdom provided the NAT SPG with a progress report in these areas.

i.8 The Operations Managers of the air traffic services facilities in the NAT Region, of whom **Mr. Michael Pumphrey** of the United States acted as Rapporteur, had met in Washington from 22 to 26 May 1995 in order to address short term operational issues. The NAT SPG was provided with a preliminary summary of the report of the meeting.

i.9 **Mr. Christian Eigl**, ICAO Representative, European and North Atlantic Office, was Secretary of the Meeting and was assisted by Messrs Jacques Vanier and Daniel Oudin, both TOs/RAC/SAR from the European and North Atlantic Office of ICAO, and by Mrs Olga Recasens, Chief of the Joint Financing Section from ICAO Headquarters. The Secretary addressed the Group on specific matters at the opening of the meeting. In so doing, he stressed issues directly related to the work of the Group and in particular the importance of the timely implementation of RVSM.

i.10 In his opening remarks, the Chairman informed the Group that Mr. Ásgeir Pálsson had replaced Mr. Einar Einarsson as the Member for Iceland; Mr. Carlos Monteiro had replaced Mr. Joao Sequeira as the Member for Portugal and Mr. Myles Murphy had replaced Mr. Pat Keating as the Member for Ireland. Also the Chairman announced his nomination as Danish candidate for the election to the Council of ICAO and that, therefore, the Group would have to elect a new chairman during its meeting.

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LIST OF PARTICIPANTS/LISTE DES PARTICIPANTS

CANADA
Don MacKEIGAN*
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Bill STILWELL

DENMARK/DANEMARK
Karsten THEIL*
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LIST OF CONCLUSIONS

AGENDA ITEM 1: DEVELOPMENTS

1.1 Introduction

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

a) ICAO Panels and Committees;

b) Adjacent Regions; and

c) Technology;

1.2 ICAO Panels and Committees

1.2.1 The Group was presented a report on the results of the second and last meeting of the CNS/ATM Systems Implementation Task Force (CASITAF) which had been held in Montreal from 20 to 22 September 1994. The Council's Decision concerning the CASITAF report was examined and in particular that part of the Decision that had a direct bearing on the structure of the NAT SPG, namely:

> "That, on a priority basis, ICAO undertake to encourage the Regional Planning and Implementation Groups to establish Regional Implementation Sub-Groups, when appropriate in light of developments, to focus, in co-ordination with the Regional Offices, on the implementation aspects of CNS/ATM."

1.2.2 The Group agreed that the establishment of the NAT IMG by NAT SPG/30 met the spirit of the above. Accordingly, it was agreed that no further action was required on this matter. As regards the other elements of the Decision, the Group noted that the NAT IMG had agreed to take them into account when planning for the implementation of the ICAO CNS/ATM systems.

1.2.3 In the same context, the Group was informed that IATA's NAT/NAM Regional Co-ordination Group was in the process of establishing a CNS/ATM Implementation Group (CAIG) to assist, from the users perspective, in the planning and implementation of CNS/ATM systems.

1.3 Adjacent Regions

1.3.1 The Group was provided an update on activities relating to the NAM and EUR Regions. It was noted that Canada, Mexico and the United States had established a group to plan for the harmonised implementation of CNS/ATM in their respective States. As regards the EUR Region, it was noted that efforts were under way to implement CNS/ATM routes between Western Europe and the Far East. These routes would probably require FANS-1 functionality on-board the aircraft. In addition, it was noted that plans were being developed to implement RVSM in the EUR Region by the year 2001. Finally, the Chairman informed the group that he had presented an exposé concerning the activities of the NAT SPG to the Global NAVCOM Symposium 95 that had been held in Montreal in May 1995.

1.4 Technology

1.4.1 The Group was presented an update on Traffic Alert and Collision Avoidance System (TCAS) II alerts reported in or around NAT Minimum Navigation Performance Specifications (MNPS) airspace. This information provided by the United Kingdom detailed a number of TCAS alerts (five cases) collected during the period June 1994 to April 1995. The Group noted that an Aeronautical Information Circular (AIC) and a TCAS Transition Programme Newsletter had been issued recently in the United Kingdom to encourage pilots and controllers to report all TCAS events occurring in the NAT Region. It was further agreed that the United Kingdom should continue to record and monitor these events within NAT airspace.

1.4.2 On the basis of the information put forward by the observer from Inmarsat, the Group noted progress made by that Organization in providing a geostationary overlay service in complement to the current Global Positioning System (GPS) and Global Orbiting Navigation Satellite System (GLONASS) satellite constellations.

AGENDA ITEM 2: PLANNING AND IMPLEMENTATION

2.1 Introduction

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

a) Report of the NAT Traffic Forecasting Group

b) Report of the NAT Implementation Management Group

c) Implementation planning

d) Other Issues

2.2 Report of the NAT Traffic Forecasting Group

2.2.1 The 29th Meeting of the NAT Traffic Forecasting Group (TFG) was held at the ICAO Headquarters in Montreal from 3 to 12 May 1995. The major task was to update the NAT annual and peak period forecasts for the 1995 to 2000 period. To this end, the NAT TFG prepared estimates of annual 1994 passengers and flights to use as the base period in preparing the annual forecasts. In addition, they revised the previous estimate of 1993 passengers, from 41.3 to 42.2 million (up 2.2%) and aircraft (from 242,000 to 247,500 (up 1.9%). The July and November 1994 sample data supplied by the oceanic centres served as the base period for the peak period forecasts. They also forecasted the traffic flow between North America and the Caribbean.

2.2.2 Four out of five of the Oceanic/Area Control Centres (OAC/ACC) as well as Edmonton ACC submitted their sample data on computer diskette which greatly reduced the time required to enter the data in the data analysis programme. The NAT TFG acknowledged the co-operation and timely support received from all OAC/ACCs. However, New York was unable to provide the data required. While the problems associated with scarce resources were appreciated, it was hoped that New York would be able to fully participate next year.

2.2.3 Prior to 1989, commercial air carrier passengers and aircraft movements were compiled from data provided by IATA. Since 1989, the NAT TFG has had to base its annual estimates of passengers and aircraft movements on a number of different (and not necessarily comparable) data sources. These data sources included the NAT Provider States, 1994 flag carrier statistics compiled by NAT TFG members, Canadian Aviation Statistics Centre's Statement 6 preliminary counts (nine months only), the United States Immigration and Naturalization service, Portugal's Air Navigation Statistics, flight data from the Official Airline Guide (OAG), Eurocontrol and Gander OAC.

General Observations

2.2.4 The NAT TFG noted that a relatively large decline in traffic had been recorded on the SCAN-NAM and EUR-NAM/MIDWEST routes in July 1994. These declines were confirmed by data from the OAG and reflected some retrenchment and route rationalization by the major airlines. This route rationalization had been anticipated by the NAT TFG.

2.2.5 The NAT TFG, taking due account of the uncertainty surrounding its estimate of the 1994 traffic, was still of the opinion that some of the relationships used in its forecasting models may be changing. Because of this, they felt justified in taking a much broader view than in the past.

2.2.6 The high and low cases were formed by not only varying the economic assumptions, but also by changing the estimates of available capacity arising from changes in growth in other markets and the competitive strategies of the major airlines. It was noted that the NAT TFG made the associated changes in the airline yield assumptions.

Estimated number of movements

2.2.7 The forecasts of both passengers and aircraft movements were similar to those presented last year. The 1999 passenger forecast was 1.1% higher (56.9 versus 56.3 million) while the 1999 aircraft movement forecast was 1.7% lower (314,700 versus 320,100).

2.2.8 In actual terms, the forecast was for the number of passengers to increase by almost 15 million between 1994 (estimated at 44.8 million) and 2000 (59.5 million), an average annual growth rate of 4.8% The equivalent increase in the number of flights was just over 75,000 (4.4% annually), from an estimated 253,200 in 1994 to 327,900 in 2000.

2.2.9 In the pessimistic scenario, the average annual growth rates for passengers and flights were 3.6% and 3.1%, respectively. For the optimistic case the equivalent figures were 5.8% annually for passengers and 4.8% annually for aircraft movements. The range between the 2000 optimistic and pessimistic forecasts was 7.3 million passengers and 31,500 flights (approximately 11-12 aircraft in each direction for the busy hour).

2.2.10 It was stressed that the optimistic and pessimistic scenarios were developed to reflect not only the uncertainties as to economic development but also those associated with the major supply factors, e.g. airline fleet changes, route generation, and airline marketing strategies.

2.2.11 Charter operations were estimated to have totalled 16,200 in 1994. Departing from the last report, it had been assumed that charter flights would range between 16,600 and 17,600 during the 6 year forecast period.

2.2.12 All-cargo flights (approximately 13,600 in 1994) were estimated to be up 3.2% in 1994, largely reflecting the stronger economic growth in both United States and Great Britain. Again, departing from the last report, the Group projected that the number of cargo flights would increase at an average annual rate of 2.6% during the forecast period, reaching 16,000 flights in 2000.

2.2.13 General aviation activity on the North Atlantic totalled approximately 3,500 in 1994. This had been held constant at the 1994 level throughout the forecast period. Based on information from IAOPA, it appeared that this number was 50 % below actual traffic.

2.2.14 Military activity was estimated to have totalled 11,100 in 1994, down only slightly from the previous year. The Group assumed that military activity would remain at that level for the remainder of the forecast period.

2.2.15 The number of the extended-range twin-engine aircraft increased in both sample periods - up 3.2 and 4.7%, respectively, in July and November, while there was little change in the number of three and four-engine wide-body aircraft, down 2.1% in July and up 0.7% in November.

2.2.16 The increase in the use of wide-body twin-engine (A-310 and B-767) aircraft operating across the Atlantic had led to the creation of a ninth aircraft category. This aircraft category has increased from 1.7% of **total commercial** aircraft operations in 1985 to 40.2% in 1994 - 39.9% in July and 40.6% in November. The Group anticipated that this category would account for 48.6% of commercial aircraft movements in 2000 - 48.2% in July and 49.2% in November.

2.2.17 Due to the expected introduction of the B-777 in 1995, and the noticeable trend towards the increased use of the wide-body aircraft with mid-range seating capacity (MD-11, A-330, and A-340), the NAT TFG contemplated grouping these aircraft into a tenth aircraft category when analysing next year's sample flight data. These aircraft accounted for 8.2% of total commercial operations recorded in the 1994 sample data - 7.4% in July and 9.1% in November. It was anticipated that these aircraft (including the B-777) could account for more than one quarter of all commercial aircraft movements by the year 2000.

2.2.18 In addition to the figures shown in the **Appendix A** to the report on Agenda Item 2, which depict the actual and projected traffic growth, the NAT TFG had also produced the medium-term forecasts up to 2000 shown in Table 1 on the following page.

2.2.19 At its 25th meeting (June 1990), the NAT TFG had updated its long-term annual forecasts for the years 2000, 2005 and 2010, which are shown in Table 2 below. In summary, the base case passenger and flight forecasts for the year 2010 were as follows:

a) the number of passengers was expected to increase by 66.1% between 1994 and 2010, going from 44.8 million to 74.4 million.

b) the number of flights was expected to grow by 59.4% over the same time period, from 253,200 to 403,500.

2.2.20 The long range forecasts of passengers and flights were found to be consistent with the short-range forecasts. This appeared to be a little at odds with the impressions given by the graphs shown in **Appendix B** to the report on Agenda Item 2, as the low forecast contained in the long-term set appeared to be far too low. In order to assess this, a simple analysis was carried out of the likely impact on traffic levels of a new very large aircraft (up to 600 seats). By assuming that this aircraft would be introduced only on routes having at least a double daily service of two carriers, this suggested a figure 3.0% below the 403,000 flights forecast for 2010, which was not a significant difference. A similar calculation for the low case passenger forecast suggested virtually no growth in aircraft movements over current levels. Therefore, it was felt, at that stage, that although the long-term passenger forecast needed revision, the range of possibilities in respect to the equipment types, airline mergers and alliances, and airline strategy, suggested that the long-term forecast of aircraft operations was still appropriate.

Table 1

Forecasts of Aircraft Movements in the ICAO North Atlantic Region
(thousands)

SCENARIO	ACTUAL											
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
OPTIMISTIC							269.1	279.9	292.1	307.2	322.4	336.3
BASELINE	182.5	207.1	213.0	228.2	247.5	253.2	267.1	279.9	291.7	302.8	314.7	327.9
PESSIMISTIC							263.2	272.4	280.2	288.3	296.6	304.8

Percentage Change in Aircraft Movements

SCENARIO	ACTUAL											
		1990/89	1991/90	1992/91	1993/92	1994/93	1995/94	1996/95	1997/96	1998/97	1999/98	2000/99
OPTIMISTIC							6.3%	4.0%	4.4%	5.2%	4.9%	4.3%
BASELINE		13.5%	2.8%	7.1%	8.5%	2.3%	5.5%	4.8%	4.2%	3.8%	3.9%	4.2%
PESSIMISTIC							3.9%	3.5%	2.9%	2.9%	2.9%	2.8%

SCENARIO	ACTUAL	FORECAST			
	1994	1995	2000	2005	2010
OPTIMISTIC		269.1	336.3	380.4	437.6
BASELINE	253.2	267.1	327.9	356.4	403.5
PESSIMISTIC		263.2	304.0	286.5	307.6

Table 2. Long Term Forecast (in thousands)

Range of Uncertainty

2.2.21 In the previous report, attention was drawn to the problems of preparing high and low forecasts and the interpretation to be placed upon them. This year the optimistic and pessimistic forecasts should be regarded more as realistic alternatives rather than upper and lower bounds on the range of uncertainty. It was difficult to envisage conditions such that high and low forecasts could be prepared reflecting high and low absolute values as well as consistently higher and lower annual growth rates over a five-year period. The 1995 forecasts reflected cyclical developments which gave rise to some growth rates on the high forecast being lower than their equivalents on the base forecasts.

Level of Participation

2.2.22 Once again both the FAA and Transport Canada strongly raised the issue of both financial cost and availability of staff resources. As one measure of allocating scarce resources and costs, neither Canada nor the United States elected to participate in the ICAO Asia and Pacific (APA) Traffic Forecasting Group. Furthermore, the United States, in a letter to the ICAO APA TFG Chairman, made it known that it would only participate at APA TFG and NAT TFG meetings on alternative years. In terms of impact on NAT TFG activities, this meant that the United States would not participate in the next year's (1996) TFG meeting. This alternate year participation was expected to continue for the foreseeable future.

2.2.23 The Group was informed that prior to the 29th meeting of the NAT TFG, the FAA delegate had been requested to explore the possibility of preparing alternate year forecasts by electronic correspondence. Discussions by the NAT TFG concluded that, based upon its current forecasting methods, updating its forecasts by electronic correspondence would not be a very efficient use of staff resources, either from the standpoint of time or productivity. Nevertheless, the proposal was under review by the NAT TFG.

2.2.24 The Group was informed that the above mentioned forecasts would be incorporated into the NAT FASID (Doc 9635) at the earliest opportunity.

2.2.25 The Group explored the effects of the NAT TFG delivering its report every two years might have. They agreed that it was likely that the interval represented by the pessimistic and optimistic estimates, representing the variability of the mean traffic estimate, would not change much. However, since it would then be necessary to base short-term decisions on forecasts that may range as much as two years and since the forecast accuracy grows with that forecast range, it could be expected that more uncertainty would be included in the forecasts with the consequent results on

decisions. Long-term forecasts and the decisions based on them would be affected as the reassessment of the forecasts biennially would also amplify the forecast uncertainty.

2.2.26 In the ensuing discussion, the Group was also informed that the United Kingdom had begun studies to improve the use of the forecasts so as to look at the planning aspects such as performance indicators. It was noted with appreciation that the United Kingdom would provide NAT SPG/32 with an update on their work in this field.

2.3 Report of the NAT Implementation Management Group

2.3.1 The NAT IMG held three meetings since NAT SPG/30. The thrust of these meetings were, in general, as follows:

a) organize the working structure and methods;

b) develop a long term ATM concept;

c) keep under review the implementation of RVSM; and

d) organize a benefit/cost programme.

2.3.2 As regards the working structure, the Group recalled that the working groups that it had established in the past had been transferred, in terms of management, to the NAT IMG. The working structure of the NAT IMG is illustrated in **Appendix C** to the report on Agenda Item 2.

2.3.3 Recognising the necessity of cost benefit analysis in the development of the NAT system, the NAT IMG had adopted a proposal to institute a specific programme to achieve this objective. This programme would be managed by the NAT IMG Member for Iceland, supported by the United Kingdom, the United States and IATA. It was known as the NAT Implementation Cost Effectiveness (NICE) Programme.

Reduced Vertical Separation Minimum

2.3.4 The programme for reducing the vertical separation in the NAT Region from 2000 to 1000 feet between FL 290 and FL 410 was ongoing. The target dates were for an operational trial to commence on 2 January 1997 followed by full operational status a year later.

2.3.5 The NAT IMG was focusing on two major areas:

a) delays in the development and implementation of the monitoring system were threatening the target date of 2 January 1997; and

b) matters related to Service Bulletins, which were required to be issued by aircraft manufacturers and subsequently approved by national authorities, was an area of major concern if timescales were to be achieved. Individual aircraft approval cannot precede these steps.

CONCLUSION 31/1 - IMPLEMENTATION OF REDUCED VERTICAL SEPARATION MINIMUM (RVSM) IN THE NAT REGION

That States and international organizations concerned ensure that the resources needed to achieve the 2 January 1997 RVSM implementation date are made available so as not to delay the programme.

2.3.6 The Group was informed that in order to facilitate and foster the aircraft approval process, a seminar had been held in Copenhagen in January 1995. Another seminar was planned to take place in Reston, Virginia on 28-29 August 1995. A third seminar was planned to be held in a Russian speaking State by the end of 1995.

Future NAT Oceanic Operating Concept

2.3.7 The Group was presented the results of a study carried out by the United Kingdom that addressed oceanic concepts for the period 2000-2015. The central theme of the study was that the principal driver for change in the NAT ATM operation, as repeatedly emphasised by the airspace users, was the expectation for more fuel and time efficient routings and profiles.

2.3.8 It was noted that the development of oceanic operations had to be set within the context of both Global and NAT Regional ATM planning. Accordingly, the equipage plans of the major airlines would not be dictated by NAT Region considerations alone.

2.3.9 It was recalled that the NAT Regional strategy contained firm plans out to around the year 2000. They included the implementation of RVSM, Automatic Dependent Surveillance (ADS) and (initial) Reduced Horizontal Separation Minima (RHSM), along with a number of other enhancements. Its statements about developments beyond 2000, however, were seen more as goals or visions - whose feasibility, costs and benefits had yet to be assessed. The aforementioned study proposed a programme of logical and pragmatic phases as follows:

- Reduced Vertical Separation Minimum
- Reduced Horizontal Separation Minima
- Enhanced On Track Flexibility
- Improved Organized Track System
- Direct Routes
- Free Flight

2.3.10 The stages were structured to provide progressive improvements in ATM service delivery. They were not expressed as technology developments; technology was considered to be the enabler of improvements, not the improvements themselves.

2.3.11 Together they formed a comprehensive framework for evolving the NAT concept of operations. In particular, they demonstrated that developments were not "open-ended". Each stage was within the context of an evolution towards a near-optimal system, and - for all reasonable purposes - free flight could be thought of as the ultimate NAT concept.

2.3.12 It was intended to convert the concept paper from the United Kingdom, which embodied the users' requirements for the NAT Region, to a generic NAT Region concept. To achieve this goal, all NAT IMG members were to provide their comments to the United Kingdom at the earliest opportunity. It was expected that NAT IMG would commit to this concept at its next meeting.

2.3.13 The Group noted that an important task associated with the foregoing was the overall management of the programme. Although it was premature to try and develop a management scheme before the concept was committed to by all concerned, it was nevertheless felt that the matter would have to be resolved at the same time that commitments were made. In this context, it was pointed out that the ICAO EUR/NAT Office would have great difficulties in providing support to the programme management because of its lack of resources.

Data Link Communications

2.3.14 The Group recalled that the desired end-state was the Aeronautical Telecommunications Network (ATN) and that all options that could possibly delay meeting the end-state should be considered with extreme caution. With this in mind, the Group was provided an update on the latest activities in the development of the ATN and related avionics. It was pointed out that the design for the CNS/ATM-1 package would be frozen in the very near future and that validation of the ICAO Standards and Recommended Practices (SARPS) should begin by the end of 1995. These SARPS would include ADS as well as Controller Pilot Data Link Communications (CPDLC) applications.

2.3.15 Many discussions in the past revolved around the need to support communications traffic coming over the ATN or using the ARINC 622 characteristic. It was pointed out that the service providers responsible for communications traffic passing over the Aircraft Communication Addressing and Reporting System (ACARS) network (ARINC 622) could deliver the information to the air traffic control facilities in such a way that the medium was transparent, although the ground application would recognise whether the source was FANS-1 or CNS/ATM-1. In other words, the need for ground systems supporting two types of communication was no longer essential. The Group agreed that this was indeed good news because the focus could be put on the ATM developments and benefits that should derive from data link applications taking into account the communications media.

2.3.16 Against the above background, the Group examined options for the implementation of data link applications in the NAT Region with, as a guide, the need to agree on minimum communications requirements. Although it was far too early to develop such communications requirements, it was nevertheless agreed that to achieve the significant ATM improvements of the end state, the ATN was necessary. The outstanding issue relating to this matter appeared to be whether or not FANS -1 equipped aircraft could support RHSM in the NAT Region. It was argued that a safety case would be required to support these developments. The NAT SPG would be provided with an update at its next meeting.

Future Meetings

2.3.17 The Group discussed the number of NAT IMG meetings that would be required before NAT SPG/32 as well as the dates and venues. It agreed that a meeting would be needed in early fall 1995 to review and commit to the concept and to distribute the work required in support of implementing the concept. It was stressed that, once the concept has been committed to, the need to hold meetings at such close intervals should diminish.

2.3.18 In closing its discussions on the NAT IMG report, the Group recalled that the NAT IMG had been established in accordance with a decision by the NAT High Level Managers' Meeting in January 1994. It had also been decided that the NAT IMG should be composed of designated officials able to commit their administrations and international organizations to the investments required in connection with the implementation plan and that the NAT IMG should be kept as small as possible. In this context, the Group noted that the NAT IMG Working Groups were open to any State and international organization, able to support and contribute to the work of the NAT IMG.

2.4 Implementation Planning

2.4.1 The Group was informed that the NAT Implementation Document (NAT ID), in particular Part II - the implementation plan, was in the process of being revised by the NAT IMG. The results of this exercise should be published in the autumn of 1995. It was noted however that the time lines that were in Version 1 of the NAT ID would be supplanted by a Lines of Action assignment matrix which had been developed by the NAT IMG.

2.4.2 The Implementation Strategy, which is managed by the NAT SPG itself, was reviewed. No amendments were deemed necessary. The Group noted that the new NAT Air Navigation Plan (ANP) and Facilities and Services Implementation Document (FASID) had been published by ICAO and that their usefulness would be evaluated by the Council in order to ascertain whether to adopt the planning machinery on a permanent basis for the NAT Region.

2.5 Other Issues

Extension of the Brest Transition area

2.5.1 The Group was presented a proposal by the Member for the United Kingdom concerning the extension of the area under the responsibility of Brest ACC for the transition of RVSM operations to conventional separation. This proposal was put forward as a result of a real time simulation held in May 1994 for Ireland and France to assess the feasibility of transition arrangements. A tripartite meeting took place in October 1994, resulting in an agreement to move the Shanwick/Brest interface from 00800W to 00845W. In conjunction with the Shanwick/Brest delegation of control, plans were well under way to delegate control of General Air Traffic (GAT) operations carried out in the south west corner of London Area and Terminal Control Center (ATCC) airspace, thus permitting rationalisation of the Shannon Oceanic Transition Area (SOTA)/Brest interface and its associated link routes. Further meetings were planned to agree and finalize operational procedures.

RVSM Interface Area between Iceland, Norway and the United Kingdom

2.5.2 The Group was informed of the status of transition areas planned to be implemented between Iceland, Norway and the United Kingdom for RVSM operations. States involved held a meeting in October 1994 to co-ordinate the introduction of these transition areas. At the meeting, Iceland and Norway agreed that the transition from RVSM to non-RVSM airspace between Norway and Iceland should be managed in suitably defined transition areas where Norway was providing Air Traffic Services (ATS). It was also agreed that the United Kingdom would establish a transition area west of 00600W and further consider the establishment of a transition area between 00600W and 00236E North of 5831N. To that effect Norway had developed a proposal for the location of a transition area in Bodø Oceanic Control Area (OCA) and over the high seas in Stavanger Flight Information Region (FIR). The United Kingdom would establish a transition area within the Scottish Upper Information Region (UIR) between 00600W and 01000W and were unable to extend East of 00600W due military considerations. Therefore traffic transiting Reykjavik Control Area (CTA)/Scottish UIR boundary outside these longitudes would be provided with a transition in Reykjavik CTA prior to crossing the CTA/UIR boundary. The Group noted that a proposal by Norway to change the classification of airspace of a portion of Stavanger FIR, Trondheim FIR and Bodø FIR (West of 30E) to Class A airspace had been submitted to the ICAO EUR/NAT Office recently and was being circulated.

Allocation of levels in an RVSM environment

2.5.3 With the implementation of RVSM the directional levels as contained in ICAO Annex 2, Appendix 3, paragraph (a) become effective in the NAT Region. In relation to accommodating the majority traffic flows, the NAT Operations Managers would be tasked with developing plans for the utilisation of RVSM Levels. States and organisations should be reminded that all relevant documentation would need to be updated accordingly, particularly Aeronautical Information Publication (AIP) and the MNPS Operations Manual. Finally, this matter would be brought to the attention of the European Air Navigation Planning Group (EANPG).

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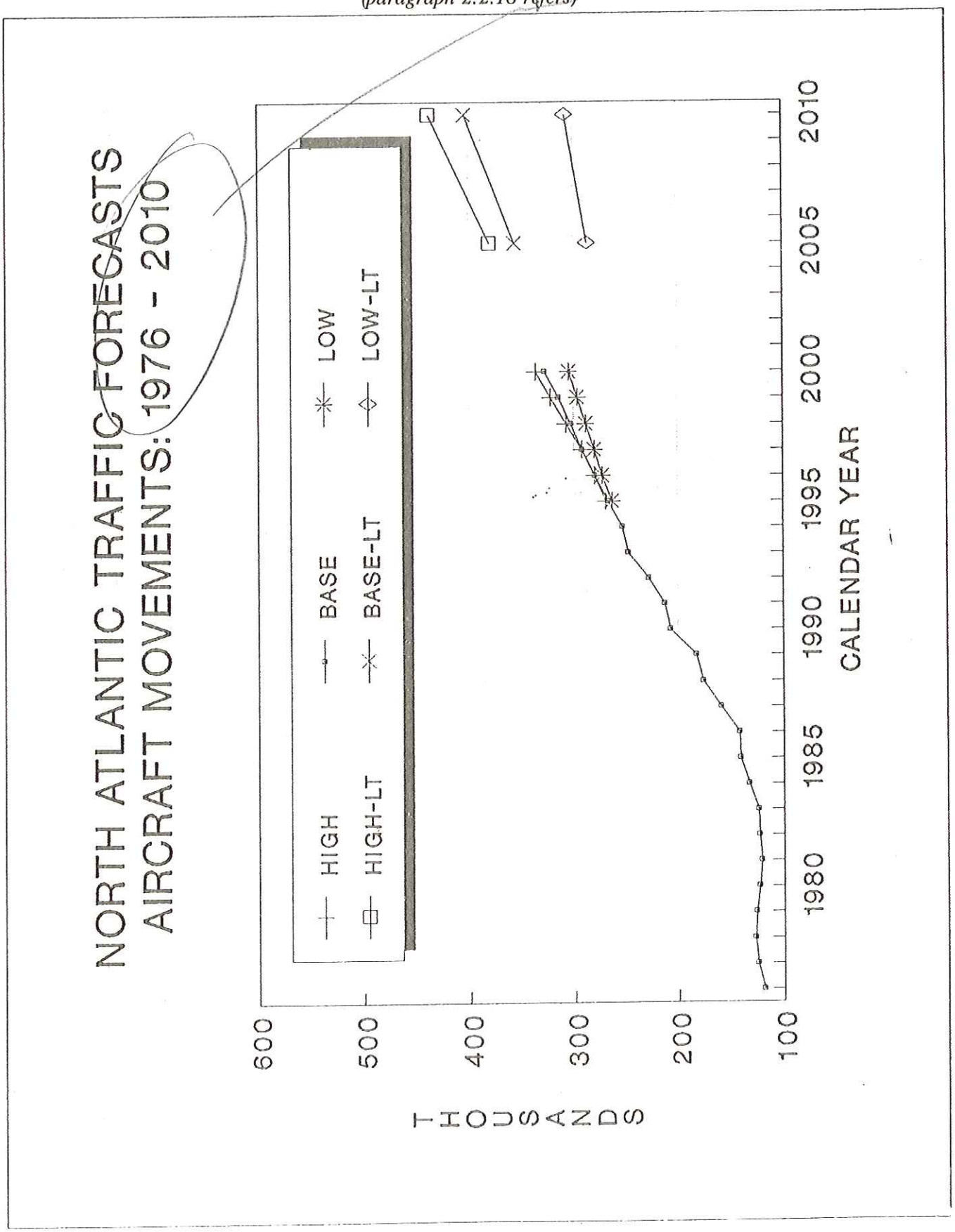
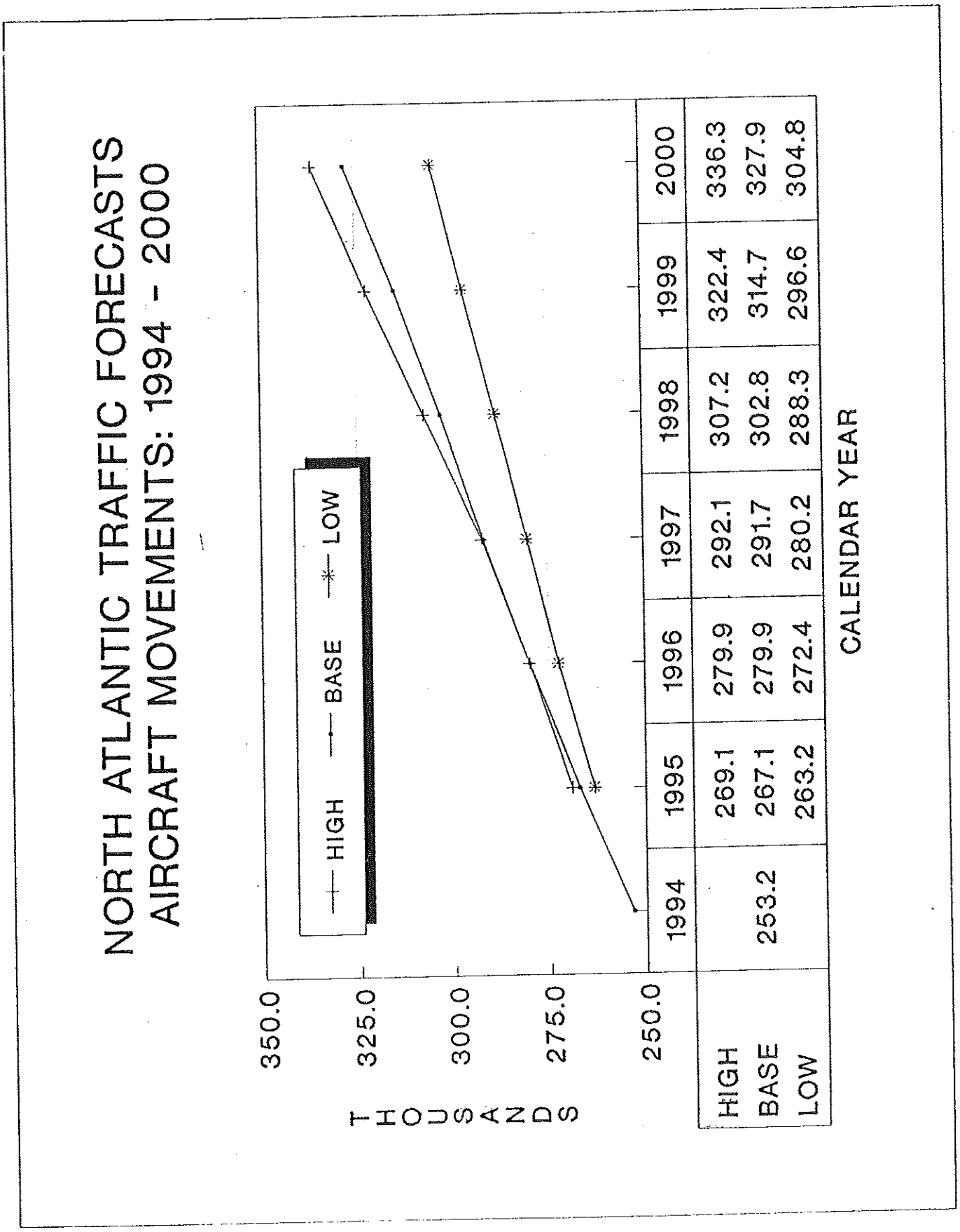
APPENDIX A - NAT TRAFFIC FORECASTS
AIRCRAFT MOVEMENTS: 1976-2000
(paragraph 2.2.18 refers)

1976-2010

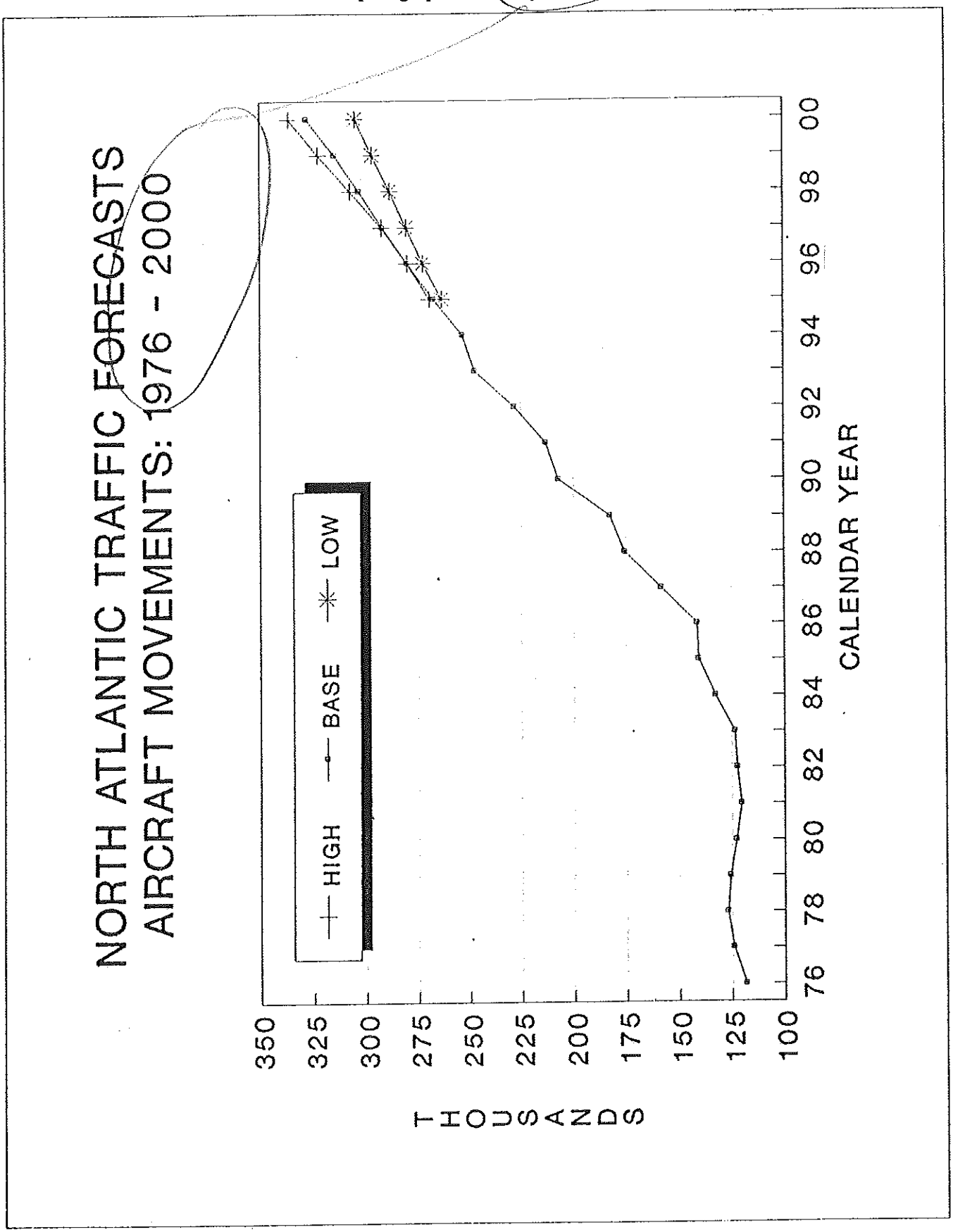


AIRCRAFT MOVEMENTS: 1994-2000

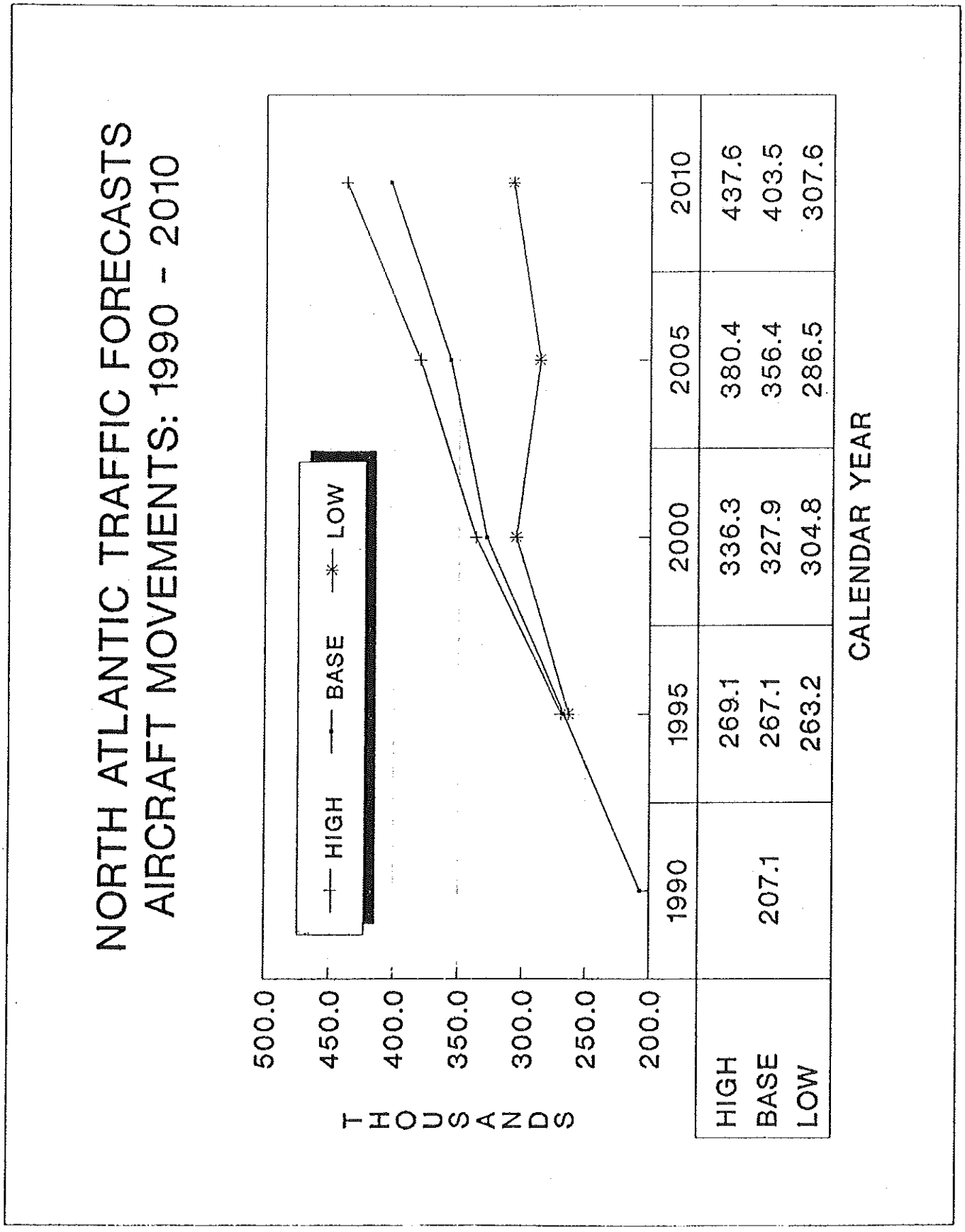


	1994	1995	1996	1997	1998	1999	2000
HIGH		269.1	279.9	292.1	307.2	322.4	336.3
BASE	253.2	267.1	279.9	291.7	302.8	314.7	327.9
LOW		263.2	272.4	280.2	288.3	296.6	304.8

APPENDIX B - NAT TRAFFIC FORECASTS
AIRCRAFT MOVEMENTS: 1976-2010
(paragraph 2.2.20 refers)



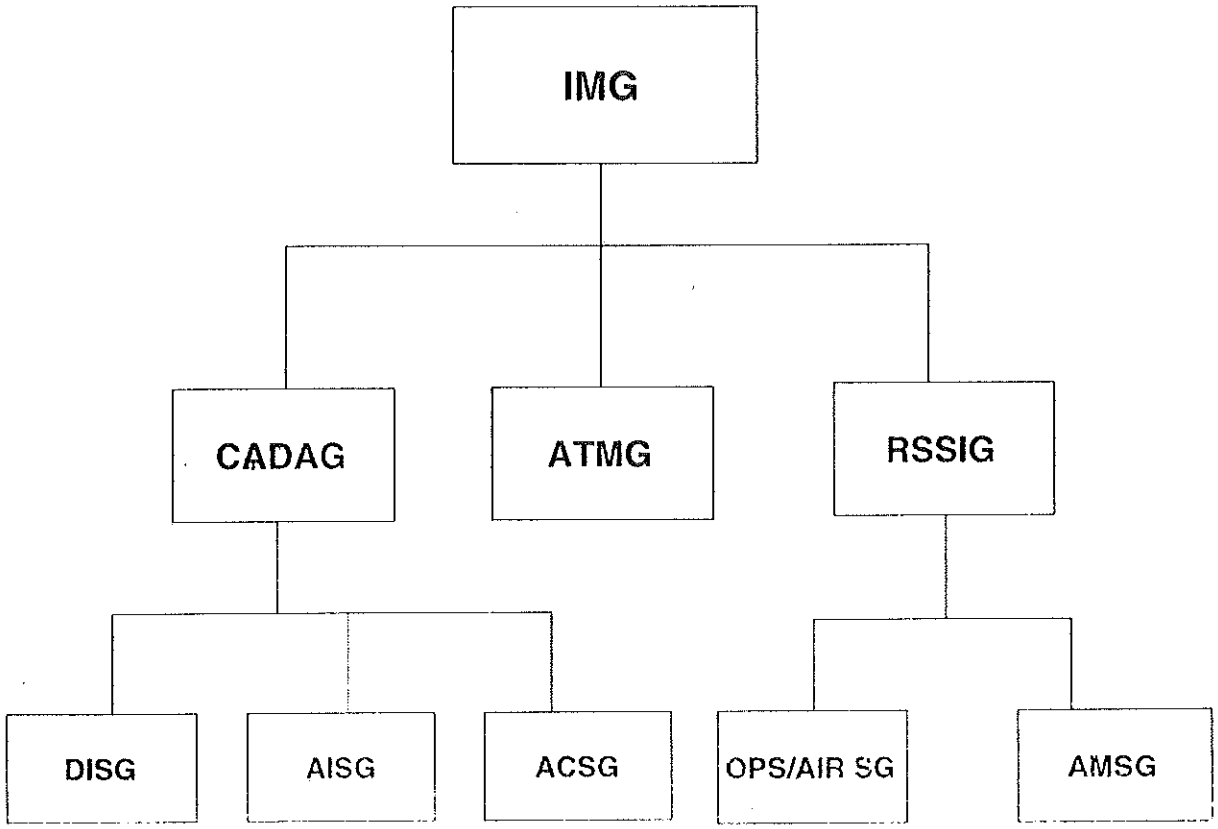
AIRCRAFT MOVEMENTS: 1990-2010



APPENDIX C - NAT IMPLEMENTATION MANAGEMENT GROUP
WORKING STRUCTURE
(paragraph 2.3.2 refers)

NORTH ATLANTIC IMPLEMENTATION MANAGEMENT GROUP

ORGANIZATION



AGENDA ITEM 3: AIR NAVIGATION SYSTEM REVIEW

3.1 Introduction

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

a) Review of system safety performance; and

b) Review of systems operations

3.2 Review of system safety performance

SCRUTINY MATTERS

General

3.2.1 When considering scrutiny matters, the Group reviewed the following specific subjects:

a) the navigation performance accuracy achieved in the NAT Region during the period 1 March 1994 to 28 February 1995;

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

c) consideration of improving the current monitoring process.

3.2.2 In introducing the report, the rapporteur expressed his appreciation to those that helped him prepare the report at short notice. In this context, it was recalled that the scrutiny group had been requested to carry out its work by correspondence. This had not been possible; however, the preparation of the report in advance of the NAT SPG was workable provided some teething problems could be overcome. The Group felt that the procedures for preparing the scrutiny report, which had been agreed to at NAT SPG/30, should continue and that the rapporteur should use his discretion to decide whether or not to convene a meeting. This matter would be further reviewed at NAT SPG/32 in the light of additional experience. The Group then turned its attention to the scrutiny report.

Navigation performance accuracy achieved in the NAT Region during the period 1 March 1994 to 28 February 1995

3.2.3 The Group completed a scrutiny of observed Gross Navigation Errors (GNE) in the NAT Region and found that a total of 32 (40)* errors were reported during the period under review. Of these errors, 9 (15) occurred outside MNPS airspace and were classified as Table 'Charlie' errors. From the remaining 23 (25), 6 (5) were not eligible for inclusion in the risk analysis as defined at

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* *For comparison purposes, corresponding figures for the last monitoring period (1993 -1994) are shown in brackets*

NAT SPG/17 (amended by NAT SPG/23) and were classified as Table 'Bravo' errors. The remaining 17 (20) errors, which form the basis of the scrutiny, were classified as Table 'Alpha' errors.

3.2.4 The Group noted that there had been a decrease in the number of Table 'Alpha' errors from 20 to 17 (15 %) compared with the previous monitoring year and also that the number of Table 'Bravo' errors was up by only one on the previous year. Overall the Group was pleased to note that the combined Tables 'Alpha' & 'Bravo' errors showed a reduction of 2 over the previous year's total of 25 despite a 1.3% increase in traffic.

CLASSIFICATION (SEE NOTE 1)	ETA ERRORS	RISK BEARING ERROR WEIGHTINGS		
		TOTAL MNPS TRAFFIC	OTS TRAFFIC	RANDOM TRAFFIC
A	2 (0)	0	0	0
B	1 (1)	0.33	0	0.33
C1	1 (3)	0	0	0
C2	3 (11)	1.24	0.66	0.58
D	0 (2)	0	0	0
E	1 (0)	0	0	0
F	9 (3)	2.3	0.4	1.9
TOTAL	17	3.87	1.06	2.81
TOTAL IN LAST PERIOD	20	3.95	2.63	1.32
OBSERVED TRAFFIC 94-95		216720	134944	81776
OBSERVED TRAFFIC 93-94		213905	134459	79446

Table 1. Breakdown of Risk Bearing Effect of Table 'Alpha' Errors

Note 1: The letters in the Classification Column mean:

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 Air Traffic Control (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

3.2.5 The breakdown of the 17 Table 'Alpha' errors points to 3 areas of particular note namely:

a) waypoint insertion errors [3(11)] account for around 18% of the reported Table 'Alpha' errors compared with 55% in the previous year;

b) a significant increase in the number of classification F (other navigation errors including equipment failure of which notification was not received by ATC) with around 60% of the errors being attributed to this cause against 25% last year; and

c) after 2 years of no classification A errors (aircraft not certified for MNPS operations) there were 2 identified positively this year plus one other strongly suspected of not being approved.

3.2.6 Whilst the Group was very pleased to note the reduction of Table 'Alpha' errors attributed to mistakes involving waypoint insertions it was less happy to note that all of them could be attributed to circumstances where a re-clearance from the original flight plan had occurred.

3.2.7 It was noted that there was a worrying increase in the number of errors (10) attributed to equipment failures and specifically Omega failures which numbered six.

3.2.8 The Group was concerned that there were 2 classification A errors; furthermore, it was disappointed to note that no response had been received from 2 States following repeated requests from the Central Monitoring Agency (CMA) for the approval status of aircraft registered with them. However, it was pleased to note that not one report of a GNE involved military aircraft.

3.2.9 In reviewing the 6 (5) Table 'Bravo' errors the Group noted only a small increase in the number of these errors from the previous year. Table 2 shows a breakdown of the Table 'Bravo' errors into the established error classifications.

ERROR CLASSIFICATION	NUMBER OF ERRORS
A	0 (0)
B	1 (1)
C1	1 (3)
C2	4 (1)
D	0 (0)
E	0 (0)
F	0 (0)
UNCLASSIFIED	0 (0)
TOTAL	6 (5)

Table 2. Breakdown of Table 'Bravo' Errors

3.2.10 Whilst the total number of errors remained encouragingly low, the Group was disappointed to note that the waypoint insertion errors still comprised a large proportion (83%) of the total Table 'Bravo' errors and that 4 of the 5 errors occurred after a re-clearance from the flight plan route.

3.2.11 The Group, while considering the Table 'Charlie' errors, was greatly encouraged to note that the number of errors reported occurring outside MNPS airspace showed a 40% decrease over the previous monitoring period. Table 3 shows a comparison of the Table 'Charlie' errors over the last 8 years.

MONITORING YEAR	NUMBER OF ERRORS
1987/88	63
1988/89	40
1989/90	31
1990/91	22
1991/92	17
1992/93	10
1993/94	15
1994/95	9

Table 3. Table 'Charlie' errors for the last 8 monitoring years

3.2.12 The Group noted that of the 9 errors, 3 occurred above MNPS airspace whilst 6 occurred below, thus continuing the trend of previous years.

3.2.13 In accordance with monitoring procedures, follow-up action was taken for any reported error in excess of 50 NM. The Group noted that this had to be done for 4 of the 9 reported occurrences and that, of those errors occurring above MNPS airspace, all 3 were due to equipment failure, with 2 of them being attributed to Omega failure. Of the 6 reported occurrences below MNPS airspace, 2 were attributed to equipment failures (one Omega & one Inertial Navigation System (INS)); one ATC loop error; one equipment control error; one waypoint insertion error; and a deliberate pilot action.

3.2.14 The Group was grateful for IAOPA's information related to the number of GNEs in Shanwick OCA. It was noted that this year had seen a continuation in the improving trend of flights per GNE for both International General Aviation (IGA) and military aircraft. However, whilst the number of flights per GNE for military aircraft had improved from 2682 to 2940, this ratio was very high in comparison to the public transport figure of 12588:1, itself an improvement over last year's ratio of 11,290:1. The Group felt that the information provided by IAOPA was indeed very useful and hoped that it would continue to be made available.

3.2.15 As in previous years the Group considered the part played by OACs in containing the number of GNEs through timely intervention to prevent incorrect routing. Within the monitoring period, Gander and Shanwick OACs advised the CMA of 34 (6)* occasions when mistakes occurred and action was taken to prevent a GNE. The Group noted that the number was markedly higher than in previous years, even taking into account the fact that Shanwick was reporting more efficiently than last year. Whilst it did not cause undue concern to the Group, the first statistic in the following list of probable causes was considered to be worthy of note:

a) at least nine instances where the crew were following a flight planned route instead of an issued cleared route;

* *The 1993 -1994 figure is shown in brackets*

b) two instances of ATC loop error; and

c) the remainder could be broadly categorised as either misunderstandings between the clearing agency and the crew or poor flight deck co-ordination.

3.2.16 With respect to the continued application of the 10 minutes longitudinal separation, the Group was pleased to note that only two reports of erosions of longitudinal separation had been received by the CMA during the monitoring year.

Methods of Improving the Observed Standard of Navigation Performance

3.2.17 In spite of the fact that there was an encouraging reduction in the number of GNEs attributable to waypoint insertion errors, the Group was still concerned about the high proportion of Table 'Alpha' and Table 'Bravo' errors involving waypoint insertions following a re-clearance from the original flight planned track. Whilst it was not possible to determine what effect the note appended to the track signal had had on the number of GNEs, the Group considered that the existing note should be amended to so as to reflect the actual number of GNEs caused by re-clearances. Accordingly, the Group agreed that the addition to the track message agreed to at NAT SPG/30 (NAT SPG Conclusion 30/16) should be amended.

3.2.18 The Group also agreed that it would also be advantageous for the CMA to try and determine the areas, OTS vs random, where the problem associated with waypoint insertion errors due to route re-clearance was most prevalent. It would then be possible to develop procedures that might to some extent mitigate the problem.

CONCLUSION 31/2 - CHANGE OF WORDING TO THE TRACK MESSAGE

That the note appended to the NAT track message be changed to read: "*40 per cent of Gross Navigation Errors occur after a re-route. Always carry out waypoint cross-checks*".

3.2.19 The Group felt that action needed to be taken in view of the large number of errors attributed to Omega failure or malfunction. In this context, further discussions were held under Agenda Item 4 on this matter (paragraph 4.3.1 refers).

CONCLUSION 31/3 - ADVICE TO STATES ON THE SOLE USE OF OMEGA

That, in view of the disproportionate number of Gross Navigation Errors (GNE) due to Omega system failures compounded by the fact that Omega may cease operations in the September 1997 timeframe:

a) States discourage operators from seeking approval to operate in Minimum Navigation Performance Specifications airspace using Omega as the sole means of long range navigation;

b) the ICAO European and North Atlantic Office inform NAT user States accordingly; and

c) the United States provide NAT SPG/32 with an update on plans for the gradual withdrawal of Omega.

Monitoring of Height Deviations

3.2.20 The Group noted details of height deviations received by the CMA and further noted that more OACs were now passing information on height deviations to the CMA. In spite of the increase in reports of height deviations, it was pleasing to note that there had been no increase in the time aircraft spend at incorrect levels in MNPS airspace and that the vast majority of crews were executing the correct contingency procedures when required.

MATHEMATICAL MATTERS

1994/95 LATERAL COLLISION RISK ESTIMATION AND RELATED TOPICS

Lateral Occupancy

3.2.21 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. The estimates were for the monitoring period covering 1 March 1994 to 28 February 1995 and were based on data for the 4th and 15th days of each month. However, data for three of the days in the United Kingdom data sample were corrupt so the United Kingdom estimate had to be based on a reduced data set of 21 days.

3.2.22 The Canadian and the United Kingdom occupancy estimates were combined to give overall average estimates for the 1994 monitoring year; these are shown in Table 4. The overall value was the traffic weighted average of the United Kingdom 20°W estimate, the Canadian 40°W estimate and the traffic weighted average of both 30°W estimates. Table 5 shows the traffic estimates which were used for the weightings. As in previous years, some differences were noted between the Canadian and United Kingdom occupancy estimates. However, in order to ensure that these and future differences remained within tolerable bounds, Canada and the United Kingdom agreed to determine an acceptable limit for the difference using previous years' data. Canada and the United Kingdom also agreed to further investigate and document the reasons for the differences. These actions would also apply to the Canadian and United Kingdom estimates of vertical occupancy.

3.2.23 Table 6 presents same and opposite direction occupancy estimates for the five monitoring years 1990/1 to 1994/5. For same direction traffic, it can be seen that the occupancy for OTS traffic had increased year on year whilst that for random traffic had decreased from 1992/3. However, the general trend in occupancy for the total traffic sample remained an increasing one since the OTS traffic dominates the traffic volume. For opposite direction traffic there had been very little change in occupancy throughout the five year period and overall the trend remained static although this year's estimates were slightly lower than last year. However, for opposite direction traffic, the estimated number of proximate pairs involved was relatively small, so the decrease may not be statistically significant. The data on occupancies for the five year period was also portrayed graphically in Figure 1 at **Appendix A** to the report on Agenda Item 3. Note was made that the data extended back to 1987 and that occupancy was expressed in "standard units" that combine both same and opposite direction lateral estimates, weighted according to the kinematic factors of the Reich model.

3.2.24 The representative for IATA pointed out that a couple of changes were occurring or had occurred to the track structure that would result in an increase in the amount of random traffic and that these changes might affect the occupancy estimates for the next monitoring year. The changes made were a reduction in the number of OTS Westbound tracks (in operation for a couple of months) and a reduction in the time period for the Westbound OTS tracks from 19.00 hrs to 18.00 hrs Universal Coordinated Time (UTC) (effective end of June 1995).

3.2.25 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 weights used for GNEs remained applicable. For the 1994/5 monitoring year, both the OTS and random opposite to same direction ratio were within the bound. No modifications to the weightings were therefore necessary.

Gross Navigation Errors and Interventions

3.2.26 Taking into consideration the findings of the scrutiny group, each risk bearing error for the 1994/95 monitoring year was assigned a weighting in accordance with its error class and magnitude of deviation to reflect the proportion of time spent within ±10 Nm of an incorrect route centre line. The results are presented in Table 7. It was noted that, after two clear years, there were two instances of non-approved users this year although the lateral errors involved were not risk-bearing.

	Same Direction			Opposite Direction		
	OTS	Random	Comb	OTS	Random	Comb
United Kingdom 20W	1.487	0.234	1.043	0.002	0.008	0.004
United Kingdom 30W	1.492	0.239	1.081	0.000	0.003	0.001
Canada 30W	1.427	0.288	1.057	0.001	0.007	0.003
Canada 40W	1.416	0.289	1.057	0.001	0.005	0.002
1994/95 Combined Estimate	1.452	0.262	1.056	0.001	0.006	0.003

Table 4. 1994/95 Occupancy Estimation

	Traffic Samples		
	OTS	Random	Comb
United Kingdom 20W	8175	4493	12668
United Kingdom 30W	8179	3999	12178
Canada 30W	9362	4502	13864
Canada 40W	9360	4380	13740

Table 5. 1994/95 Sample Traffic Counts

		Monitoring Year				
Direction	Traffic	1990/91	1991/2	1992/3	1993/4	1994/5
Same	OTS	1.031	1.214	1.335	1.397	1.452
	Random	0.287	0.325	0.350	0.291	0.262
	Comb	0.710	0.884	0.980	1.002	1.056
Opposite	OTS	0.002	0.008	0.002	0.002	0.001
	Random	0.006	0.007	0.008	0.010	0.006
	Comb	0.004	0.008	0.004	0.005	0.003

Table 6. Occupancy Estimates for the Years 1990/91 to 1994/95

3.2.27 Table 8 presents weighted risk-bearing error rates for the monitoring years 1990/1 to 1994/5. Last year (1993/4), against the prevailing trend, there had been an increase in the error rate for OTS traffic and a decrease, as in previous years, in that for random traffic. This year both of these trends had been reversed with a decrease in the rates for OTS traffic and an increase in that for random traffic. This had resulted in the error rates this year returning to roughly the same values as those seen two years ago i.e. the 1992/93 monitoring year. 1992/93 was the first year that there was a significant drop in the error rates primarily because of the introduction of tactical monitoring for MNPS approvals. The data (extended back to 1987) is also portrayed graphically in Figure 2 at **Appendix A** to the report on Agenda Item 3.

3.2.28 The Group also considered a detailed analysis of the interventions that Gander and more recently Shanwick had made to prevent GNEs from occurring. Whereas interventions occur and are documented right across the NAT, actual GNEs were only normally picked up at the monitoring windows. When making the yearly risk estimates, a uniform distribution of GNEs across the NAT had to be assumed to make up for this. This is the basis for the error weightings shown in Table 7. Hence, by studying the distribution of the interventions across the NAT it was hoped to glean some idea of the true distribution of actual GNEs across the NAT.

3.2.29 From the intervention data shown in Table 9, it was evident that a non-uniform distribution across the ocean, with many more interventions occurring as Westbound aircraft neared the Canadian coast, was occurring. However, the data collected so far were incomplete since interventions by Shanwick had only started being recorded since September 1994. For the six month data sample analyzed between September 1994 and February 1995, a slightly more even distribution of interventions was noted.

3.2.30 From the data, two hypotheses were possible. The first assumed that actual GNEs follow the same distribution as interventions. In this case the annual risk estimation process remained valid. This was because a more conservative estimate of risk was being produced than was actually the case since an even distribution of actual GNEs across the NAT was being assumed when the evidence from the interventions suggested that fewer GNEs may actually occur in the middle of the ocean than at the monitoring windows. This begged the question, though, as to why more errors should occur or be prevented from occurring at the edges of the ocean. One possible reason may be the use of "named" waypoints on the North American side, the true positions of which may be less meaningful to pilots than actual latitudes and longitudes. However, it could also be argued that the use of names should reduce the number of waypoint insertion errors.

3.2.31 However, on the other hand, it could be hypothesised that the rate of errors (both actual and preventable) was constant across the ocean. This would mean that more successful interventions near the monitoring windows would imply fewer actual GNEs at the edges of the ocean and consequently more GNEs in the middle. In this case the annual risk estimate would no longer be conservative.

3.2.32 The Group agreed that the information presented uncovered many important questions; Canada undertook to continue to monitor and analyze the data produced by the CMA. Given the availability of the Prestwick data it would now be possible to break down the interventions data by Eastbound and Westbound traffic and the types of error being prevented. It would also be meaningful, once sufficient data were available, to compare the number of interventions near to Canada compared to those near to the United Kingdom in the hope of determining whether the use of "named" waypoints was a contributory factor. Another cause for concern regarding waypoint entry was expressed by IATA who informed the Group that a new 5 digit standard code was being developed for encoding waypoints. This would mean that pilots would have to enter coded and possibly less meaningful information into their Flight Management Systems (FMS) which could lead to more waypoint insertion errors.

			Weighted GNEs		
Class	>30 NM	>50 NM	OTS	Random	Comb
A	2	0	0.00	0.00	0.00
B	1	1	0.00	0.33	0.33
C1	1	0	0.00	0.00	0.00
C2	3	3	0.66	0.58	1.24
D	0	0	0.00	0.00	0.00
E	1	0	0.00	0.00	0.00
F	9	5	0.40	1.90	2.30
Unknown	0	0	0.00	0.00	0.00
Total	17	9	1.06	2.81	3.87
Sample Traffic Count			134944	81776	216720
Error Rate x 10^{-4}			0.08	0.34	0.18

Table 7. 1994/95 Weighted Gross Navigation Errors

Traffic Sample	MONITORING YEAR				
	1990/1	1991/2	1992/3	1993/4	1994/5
OTS	0.16	0.15	0.05	0.20	0.08
Random	0.90	0.90	0.31	0.17	0.34
Comb	0.45	0.45	0.15	0.18	0.18

Table 8. Weighted Risk-Bearing Error Rates (x 10^{-4})for the Years 1990/91 to 1994/95

	Inside Coastal Fix	Coastal Fix or 60W	50W	40W	30W	20W	15/10W
Gander (1992/93 to date)	12%	39%	24%	12%	4%	8%	2%
Gander/Shanwick (Sep 94 to Feb 95)	5%	26%	11%	21%	16%	16%	5%

Table 9. Distribution of "Interventions to Prevent a GNE"

3.2.33 The representative from IATA also pointed out that it was very likely that there were a number of interventions occurring in the New York and Santa Maria areas due to the prevalence of crossing traffic, the practice of giving tactical clearances and the resulting number of re-clearances that were required. The Group agreed that all States concerned should collect intervention data and provide the results to the CMA.

CONCLUSION 31/4 - COLLECTION OF INTERVENTION DATA

That all States concerned, to the extent possible, collect record and transmit to the Central Monitoring Agency data on Air Traffic Control interventions that prevented a Gross Navigation Error in the NAT Region.

3.2.34 The Group also noted information which detailed GNEs by class of aircraft (Public Transport, Military or IGA). As regards the data which concentrated on IGA aircraft GNEs, concern was expressed at the number involving aircraft equipped with GPS and it was questioned whether the equipment was in fact approved.

Lateral Collision Risk

3.2.35 Collision risk estimates for OTS and random traffic can be calculated using the Reich model. However, to combine the OTS and random risk estimates into a total system risk estimate for all MNPS airspace, the number of random aircraft within the airspace but not seen at the monitoring windows and counted by the CMA, must be taken into account.

3.2.36 The CMA reported a total of 216,720 flights at the monitoring windows for the 1994/95 monitoring year of which 134,944 flights were due to OTS traffic and 81776 were due to random traffic. The NAT TFG provided an estimate of 253,200 aircraft operating within NAT airspace during the 1994 calendar year. Thus, making the assumption that all OTS flights were seen at the monitoring windows, 118,256 random flights were estimated to have occurred within NAT airspace. This figure, however, included random aircraft operating above and below MNPS airspace. From Canadian data, the number of random aircraft so operating was estimated to be 14,490 for the 1994 calendar year. Thus the total number of random aircraft operating within MNPS airspace was estimated as 103,766.

3.2.37 When considering the number of random aircraft operating within MNPS airspace, the Group noted the necessity of having to mix estimates from both calendar and monitoring years. Although, the resulting errors were likely to be small, this inconsistency could be eliminated if the monitoring year would end in December rather than February. This would also have the benefit of assisting the Scrutiny Group complete its analysis prior to NAT SPG now that they no longer met simultaneously. The Group agreed with the above proposal.

CONCLUSION 31/5 - MONITORING PERIOD

That, as of 1995, the monitoring period coincide with the calendar year.

3.2.38 Table 10 presents lateral risk estimates for the 1994 monitoring year, for OTS, random and all MNPS traffic. The OTS and random risk estimates had been derived directly from the Reich model, $P_y(60)$ having been calculated using the following equation, where zeta denotes the weighted risk bearing error rate:

$$P_y(60) = \frac{\lambda_y \; zeta}{10}$$

The risk estimate for all MNPS airspace had been calculated as the traffic weighted average of the OTS and random risk estimates. All the estimates were below the Target Level of Safety (TLS) of 2×10^{-8} fatal accidents per flight hour.

Traffic Type	Total MNPS Count	Risk x 10^{-8}
OTS	134944	0.59
Random	103766	0.56
All MNPS	238710	0.58

Table 10. 1994/95 Risk Estimates for MNPS airspace

3.2.39 Table 11 presents lateral risk estimates for the monitoring years 1990/91 to 1994/95. When compared to last year, the 1994/95 risk estimate for OTS traffic had decreased whilst that for random traffic had increased. Overall the collision risk for all MNPS traffic had gone down from last year but was still above the 1992/93 level.

Risk (x 10^{-8})	1990/1	1991/2	1992/3	1993/4	1994/5
OTS	0.87	0.98	0.33	1.43	0.59
Random	1.59	1.83	0.69	0.34	0.56
All MNPS	1.22	1.38	0.49	0.98	0.58

Table 11. Lateral Risk Estimates for the Years 1990/91 to 1994/95

Error Class	Traffic Type		
	OTS % (n)	Random % (n)	MNPS % (n)
A	0.0 (0)	0.0 (0)	0.0 (0)
B	0.0 (0)	11.7 (1)	5.1 (1)
C1	0.0 (0)	0.0 (0)	0.0 (0)
C2	62.3 (2)	20.6 (1)	44.2 (1)
D	0.0 (0)	0.0 (0)	0.0 (0)
E	0.0 (0)	0.0 (0)	0.0 (0)
F	37.7 (1)	67.6 (4)	50.7 (5)
Unknown	0.0 (0)	0.0 (0)	0.0 (0)
Total	100 (3)	100 (6)	100 (9)

Table 12. Analysis of Components of the Risk for 1994/95

3.2.40 Based on the error classes used by the Scrutiny Group, Table 12 presents a breakdown of the 1994/95 risk by error cause and traffic type. The MNPS breakdown had been estimated from the traffic weighted breakdown of the OTS and random traffic types. This year, unlike previous years, Type F equipment error (not notified to ATC) accounted for a large proportion of the estimated risk while Type C2 waypoint insertion errors (correct insertion of incorrect information) accounted for most of the rest. For the years 1987 to 1994, the proportions of human error (Types B, C1 and C2), non-approved users (Type A) and equipment error (Types D, E, F) are shown graphically in Figure 3 at **Appendix A** to the report on Agenda Item 3. The re-emergence of equipment error as a potential cause for concern can clearly be seen. It should be noted that this graph only shows the risk bearing errors so the two confirmed non-approved users mentioned earlier are not shown.

Core Navigation Study

3.2.41 The Group noted that plans were underway for both Canada and the United Kingdom to conduct a core navigation study during the Summer (start date 1 July 1995). The purpose of the study would be to determine the typical distribution of cross-track errors as aircraft both leave and enter the ocean. In addition, this year, since Canada and the United Kingdom would both be collecting data in the same time period, an attempt would be made to determine the change in lateral position keeping of individual aircraft that had crossed the ocean. When looking at individual aircraft performance, care would have to be exercised since the radar errors involved on the Canadian and United Kingdom sides may be different.

3.2.42 The data would also be analyzed by aircraft type and operator/aircraft type in the hope of obtaining some information on navigation performance versus equipment fit. To this end the United States agreed to draft a questionnaire for IATA to send out to various airlines in order to determine typical navigational equipment fit of their various fleets operating in MNPS airspace.

3.2.43 In order to get a true picture of navigation performance, cross-track errors should ideally be measured just as aircraft come within radar cover since after that point there was always the possibility that ATC would correct any deviation. It was noted that there were many more

powerful radars in place and aircraft were increasingly able to lock into ground-based DME equipment much earlier with the consequent ability to correct any course deviation prior to crossing the monitoring window. Since the monitoring windows were also used to estimate GNEs and were critical to the collision risk analysis, the Group agreed that the mathematicians should regularly re-evaluate the location of the windows in the light of improvements in ground based surveillance and navigational aids.

Future Developments in Lateral Risk Estimation

Future Collision Risk Model

3.2.44 Canada presented information which documented the work to date on their horizontal collision risk simulation model for a future NAT CNS/ATM environment. The model was not a static analytical model but required high levels of computational capability to implement on a real-time basis. The information also reported additional work that had been performed since NAT SPG/29 to incorporate into the model components of system load, minimum great circle routes considering wind data, the capability of analysing more than one navigation performance distribution, and methods of estimating the probability of horizontal overlap. Canada informed the Group that further development work was still required but that this would need to wait until operational system planning allowed modelling of the actual intended system to take place. Until that time, the information would serve as a useful reference document. The United Kingdom undertook to inform their cost benefit section, who are also working in this area, about the above. In addition the project manager of the NICE programme would be informed of developments.

Collection of Cross-Track Errors ≥ 15 NM and < 25 NM

3.2.45 Recalling NAT SPG Conclusion 30/19 relating to the collection of cross-track errors less than 25 NM, the Group thanked both Gander OAC and Shannon ATC for participating in a trial. The results showed however that "Manual" collection of data did not guarantee a comprehensive data set. Since Shannon were in the process of installing software to automatically collect cross-track errors it was decided that they should continue with the trial. Other States should also consider the similar provision of automatic means of collecting the data so that the effect on collision risk of moving to a 30 NM separation environment could be adequately determined.

RVSM TOPICS

Vertical Occupancy and Risk

3.2.46 The Group considered data presented by Canada and the United Kingdom which presented the results of assessments of vertical occupancy in the NAT region during the 1994/95 monitoring year. The vertical occupancy was an important element in the assessment of vertical collision risk. Both analyses used the same techniques and data as were used for the lateral occupancy work described above. The results of the analyses are summarised in Table 13 below.

			OTS	Random	Combined
United Kingdom 20W	Same	East	1.664	0.235	1.140
		West	1.296	0.202	0.923
		Total	1.486	0.220	1.037
	Opposite		0.006	0.046	0.020
United Kingdom 30W	Same	East	1.656	0.211	1.163
		West	1.304	0.181	0.952
		Total	1.486	0.198	1.063
	Opposite		0.002	0.015	0.006
Canada 30W	Same	East	1.653	0.252	1.176
		West	1.247	0.236	0.937
		Total	1.458	0.245	1.064
	Opposite		0.002	0.020	0.008
Canada 40W	Same	East	1.668	0.259	1.207
		West	1.259	0.226	0.939
		Total	1.471	0.244	1.080
	Opposite		0.002	0.021	0.008

Table 13. Summary of Vertical Occupancy Estimates for 1994/95

The same data expressed as equivalent opposite direction passing frequencies, as discussed at NAT SPG/29, are given in Table 14. Both the Canadian and United Kingdom data showed that over the last few years the vertical occupancy for OTS traffic had been increasing whilst that for random traffic had been in decline. As for the lateral case, some differences in the Canadian and United Kingdom occupancy estimates were seen and the Group noted that this would be investigated.

	OTS	Random	Combined
United Kingdom 20W	0.272	0.221	0.253
United Kingdom 30W	0.256	0.093	0.202
Canada 30W	0.251	0.120	0.208
Canada 40W	0.252	0.124	0.211

Table 14. Summary of Vertical Equivalent Opposite Direction Passing Frequencies (EODPF) for 1994/95

3.2.47 Using the United Kingdom vertical occupancy estimates, an estimate of the vertical collision risk solely due to large height deviations reported to the CMA during the 1994/95 monitoring year was examined. A value of 0.27×10^{-8} fatal accidents per flight hour due to the loss of vertical separation was determined. This compared with the current TLS of 2×10^{-8} fatal accidents per flight hour. For $RVSM_1$ based on an estimate of an initial reduction of 60% in vertical occupancies, a value of 0.11×10^{-8} fatal accidents per flight hour due to the loss of vertical separation was determined compared to the more stringent TLS of 0.5×10^{-8} fatal accidents per

flight hour. It should be noted, though, that the RVSM estimate did not take into account the effect of increases in traffic levels or the possible bunching of traffic towards a core track both of which would increase the risk. These effects had also been discussed at NAT SPG/30.

3.2.48 Another important point was that these estimates only presented risk due to operational errors. To obtain the full estimate, vertical height keeping performance needed to be taken into account along with the risk associated with contingency events and effects due to turbulence. Even without these other factors included, it was clear from the figures presented, that operational errors resulting in large height deviations consumed a large part of the available TLS. Despite some improvements this year reported by the Scrutiny Group, the concern was expressed that the CMA summaries continued to be dominated by height deviation reports from only a few of the OAC/ACCs. Without the full picture, the collision risk estimation process could be flawed.

CONCLUSION 31/6 - REPORTING OF LARGE (300 FT OR GREATER) HEIGHT DEVIATIONS

That all States concerned report to the Central Monitoring Agency all height deviations of 300 ft or greater occurring within the NAT Region including those resulting from Air Traffic Control loop errors or as a result of in-flight contingencies.

Aircraft Dimension Parameters

3.2.49 As part of the preparations for RVSM, the parameter values used within the vertical collision risk model were being reviewed. The United Kingdom provided up-to-date estimates of average aircraft dimension parameters in the North Atlantic (Table 15). These parameter values were last calculated in 1988 and the new values, reproduced below, show a drop (between 4% and 8%) in all three dimensions. This was primarily due to the increase in the smaller Extended Twin Engined Operations (ETOPS) aircraft such as the Boeing 767 which accounted for a higher percentage of trans-Atlantic traffic.

	Units	Length	Span	Height
New Values	**Metres**	**56.61**	**50.37**	**16.00**
(Old Values)		(61.12)	(53.71)	(16.67)
New Values	**International Nautical Miles**	**0.0306**	**0.0272**	**0.0086**
(Old Values)		(0.0330)	(0.0290)	(0.0090)
Difference between Old and New		-8%	-7%	-4%

Table 15. New Aircraft Dimension Parameters for use in Collision Risk Analysis

3.2.50 In order to determine these values, aircraft dimension parameters (wing span, length and height with undercarriage retracted) had to be found for all aircraft that cross the NAT. These values and the sources of the data were presented and it was noted that this information might serve

as a useful reference for other studies. Other useful information, which showed the frequency with which different aircraft types crossed the NAT was reviewed. This data was abstracted from data supplied by the NAT TFG and the Group expressed its gratitude for their help in this matter.

3.2.51 The Group endorsed the new dimension parameters shown in the table which would be used in future collision risk estimates for the NAT. The Group also felt that the aircraft dimension parameters values would need to be re-estimated after a maximum time period of five years subject also to the introduction of the larger Boeing 777 in that period being closely monitored.

Aircraft Contingency Events

3.2.52 The Group noted information which showed in-flight contingencies for Gander, Santa Maria and Shanwick FIRs and for Reykjavik CTA for 1994 as well as data which included all contingency events resulting in large height deviations that were reported to the CMA for the 1994/95 monitoring year.

3.2.53 In order to assess the part played by contingency events towards the overall collision risk, it was important to know for each incident whether the correct contingency procedures had been followed and also whether prior clearance had been obtained from ATC. If lateral separation had been achieved prior to descent then the risk to the system would be minimised. For those cases where procedures were not or could not be followed (e.g. sudden de-pressurisation), the number of levels crossed and the rate of descent were required in order to ascertain the proportion of time spent at incorrect levels. This could then be used to determine the collision risk.

3.2.54 Because the above information was not always available on these events, their part in the vertical collision risk had not been completely quantified. However, with the need to provide a full vertical risk assessment during RVSM verification, this situation needed to be rectified. To this end the Group agreed that all OAC/ACCs provide as much of the information as possible.

CONCLUSION 31/7 - INFORMATION ON CONTINGENCY EVENTS

That, when States report to the Central Monitoring Agency, height deviation of 300 ft or greater in the NAT Region resulting from in-flight contingencies, every effort be made to include the following information where available:

a) the date, location and cause of the incident;

b) the flight identification and the type of flight (Random or OTS);

c) the aircraft type involved;

d) an indication of whether correct contingency procedures were followed;

e) an indication of whether prior ATC clearance was obtained;

f) the initial and final flight level; and

g) an estimate of the rate of descent.

3.2.55 It was noted that the United Kingdom, in conjunction with the United States, undertook to draft a scheme whereby default values for both "descent rates" and "levels crossed" could be assigned to those contingency event reports containing incomplete information. The classification scheme would make use of information on previous incidents and it was suggested that it should be submitted to the Operations Managers and the OPS/AIR sub-group, through the NAT IMG, for comment. To this end, IATA provided some useful information on typical aircraft drift down and rapid decent rates during different types of emergency and for different types of aircraft.

Deviations due to Meteorological conditions

3.2.56 In order to make a vertical risk assessment, the effects of turbulence also needed to be considered when determining overall aircraft height-keeping performance. The representative from IFALPA reported that all States should have promulgated a NOTAM which would indicate that pilots should include altitude deviations in their moderate and severe turbulence reports and that these should be copied to the CMA. The Group was pleased to note that progress had been made on this matter and thanked IFALPA for their part in bringing it about.

TCAS

3.2.57 The Group further considered the information, which contained an update from that reported at NAT SPG/30 on TCAS events occurring in the NAT Region over the last year. It was encouraging to note that notices had gone out requesting pilots and controllers to report all TCAS events occurring in the NAT Region. However, the number of TCAS events reported remained small, and the Group expressed concern that those reported events involving losses of longitudinal or vertical separation might not be included in the monthly CMA summaries. It was particularly difficult to do this since the information on these events was sparse and often not reported to the United Kingdom TCAS evaluation unit until some months after they had occurred. The United Kingdom undertook to ensure that their TCAS evaluation unit passed reports on to the CMA.

3.2.58 The United States provided some information on the proposed logic change for TCAS Version 7. The United Kingdom informed the Group that their TCAS evaluation unit, in conjunction with the United States, were planning to investigate the effects of TCAS in the RVSM transition areas and that they were aware that their results would need to be made available prior to September 1996 in order to feed into the decision on RVSM implementation.

RVSM Implementation

3.2.59 The Group was provided a report on work being carried out in the following areas:

a) setting of trigger levels to detect "aberrant" and "non-compliant" aircraft;

b) finalisation of the height monitoring database structure and the various interfaces; and

c) changes to the wording of the monitoring requirements.

3.2.60 The Group was informed that the United Kingdom were investigating the feasibility of four different methods of obtaining aircraft identification information for the prototype HMU data (which does not include Mode S information). Three methods relied on the use of flight plan data to obtain the registration number. This had the disadvantage that the registration number was not always filled in on the flight plan. In this context, it was recalled that Recommendation 6/6 of the

Limited North Atlantic Regional Air Navigation (LIM NAT RAN) (1992) Meeting added a requirement for all aircraft to include the registration in field 18 of the flight plan as of 1 January 1996.

3.2.61 The United States presented information which outlined a procedure to relate the non-compliant Altimetry System Error (ASE) trigger level to the TLS. The purpose of the procedure was to determine the suitability of any proposed trigger level by ascertaining if it would detect a sufficient proportion of non-compliant aircraft (with the aim of removing them from the system) to ensure that the TLS was not jeopardised. The United Kingdom undertook to incorporate this procedure into its documentation which it would produce when more height keeping data became available. In addition, the United Kingdom would incorporate some additional comments received from the United States during the past few months.

3.2.62 Information was also presented which corrected ASE information for various aircraft types as had been reported to the sixth meeting of the Review of the General Concept of Separation Panel (RGCSP/6). Although, the new data did not result in any major changes, the Group was asked to note them. This was particularly important because the RGCSP/6 report was used as a standard reference and everyone was asked to amend their copies of this document.

3.2.63 In response to a question that had been asked as to whether information on large Assigned Altitude Deviations (AAD) occurring near to the oceanic boundary could be obtained, the Group was informed that some States do have procedures in place to collect large AADs from incident reports and that the CMA should be informed (although to date none have been forthcoming). Whilst the Height Monitoring Units (HMU) should provide a large source of data on AADs, Canada undertook to investigate whether Mode C data and assigned levels could be collected automatically making feasible a special study of aircraft in Canadian airspace.

3.2.64 The Group was made aware of a desire, when RVSM was implemented, to allocate levels to be used to accommodate the traffic planning to join or cross major flows. Canada and the United Kingdom undertook to investigate the possible effects this could have on occupancies and hence the collision risk estimates.

Preparation for RVSM Verification

3.2.65 It was important to try out the procedures involved in producing the vertical collision risk estimate prior to the start of RVSM verification. To this end it was resolved that a trial risk assessment (including both the direct assessment and the sequential sampling technique) would be performed making use of whatever prototype HMU and GPS Monitoring Unit (GMU) data were available even if a large portion of it was on non-Minimum Aircraft System Performance Specification (MASPS) approved aircraft. Also required would be a year's worth of CMA reports on large height deviations including contingency events, and any turbulence data collected. The techniques covered would include both the direct assessment of system risk and the sequential sampling method. Estimates of occupancies under RVSM using the Canadian model would also be required including Nx (equivalent) values for combined random and OTS traffic. Where possible, up-to-date data should be used but it was stressed it was the procedures rather than the collision risk estimates that were being tested at that stage. The first true preliminary assessment of collision risk was planned for the Spring of 1996 subject to the availability of sufficient data.

3.2.66 On this point, concern was expressed at the slippage in the MASPS approval process and the consequent effects on RVSM verification. The verification period had originally been envisaged as a one year period at the start of which a large proportion of aircraft should already have been MASPS approved. This was the basis on which the number of airframes that would be

seen by the HMUs was estimated. This verification period had already been shifted to allow for a decision date in September 1996 and was being further eroded by the fact that there would be fewer MASPS approved aircraft available to monitor than was originally envisaged. The minimum monitoring targets were 60% of all airframes and 80% of IGA aircraft to have been approved and monitored during the verification phase. The latest estimates for MASPS approvals did not lend much support to the view that these minimum monitoring targets would be met by September 1996. It was recalled that these were "minimum" monitoring targets and they did not guarantee compliance with the TLS. Sufficient data had to be collected during the verification period to provide evidence of the long term stability of ASE and to detect and rectify any non-compliant aircraft. Only then would it be possible to predict with some degree of confidence that the TLS would be met under RVSM. The Group felt that this matter needed to be kept under close surveillance leading up to the go/no go decision.

3.2.67 In response to the foregoing, the representative from IATA stated that the effects of the delays in HMU production on the RVSM verification, and therefore on the RVSM implementation schedule, would be equal to or greater than any of the factors cited in the above paragraph.

LONGITUDINAL COLLISION RISK

Clock Accuracy and Gain/Loss Studies

3.2.68 Information was presented which reported the results of a special data collection undertaken at Gander ACC to provide information on the accuracy of on board clocks used to provide waypoint times. Aircraft were contacted on Very High Frequency (VHF) and asked to provide a time readout which was compared to a time provided according to a world clock. A total of 124 samples were obtained over five days, consisting of 94 Eastbound and 30 Westbound aircraft. Considering the full sample, a mean difference of +2.06 seconds was observed, having a standard deviation of 13.26 seconds. A graphical presentation of the distribution of clock errors is shown in Figure 4 at **Appendix A** to the report on Agenda Item 3. Sixty two (50%) of the observations were 2 seconds or less different from the reference clock. Two aircraft reported differences of 60 seconds or greater. As the opportunity arose during the survey, pilots were asked about the time source used to initialise the aircraft clocks. Of the replies received, 40% cited ACARS, 28% a High Frequency (HF) source, and the remainder a variety of other sources.

3.2.69 Canada thanked the United States for their assistance through the provision of advice and the use of the software developed for their previous studies conducted in the Western Atlantic Route Structure (WATRS) area, and reported to previous NAT SPG meetings. The timely completion of this study would not have been possible without this support. The Group agreed that the data presented provided valuable information which was necessary before reduced longitudinal separation minima could be contemplated. These studies detected large errors which had a disproportionate effect on the risk of collision.

3.2.70 It was agreed that the value of this work would be greatly increased by obtaining a larger sample. However, these studies were time consuming and require the active participation and co-operation of both pilots and controllers, whose contributions in the Canadian study were gratefully acknowledged. The NAT SPG agreed that additional work would be of value. Canada, resources permitting, would conduct an additional sample, which could be combined with these reported results.

Effects of Reduced Longitudinal Separation on Lateral and Vertical Occupancies

3.2.71 The results of a study of the effects of reduced longitudinal minima on lateral and vertical occupancies, as requested by NAT SPG/30, were presented. The Canadian NATTAM computer model had been used to predict traffic patterns which would be seen if longitudinal separation minima were reduced to 5 minutes in-trail and 10 minutes for crossing traffic. Twelve days of actual 1994 traffic, as observed by Gander OAC, were used as the initial input to the model and concentrated towards the centre of the track system. Occupancy estimates were made for present traffic levels and traffic levels increased by 50% and 100%.

3.2.72 At present traffic levels, little change in occupancies had been observed with reduced longitudinal separation minima, as expected. Increased occupancies were seen for both 50% and 100% traffic increases. Although the results for random and opposite direction traffic were variable, the Group noted that the reported differences in occupancies for OTS same direction traffic (which forms the principal factor in most analyses) would be indicative of the effects that reduced longitudinal separation minima would have on both lateral and vertical occupancies. This highlighted the interaction between reduced minima in one dimension and collision risk in others. The information presented was considered to be a valuable reference source for use when considering the effects of reduced longitudinal separations on collision risk.

Review of Longitudinal Collision Risk Model

3.2.73 The Group was informed that a substantial body of work undertaken by the United States in anticipation of the reduction in longitudinal separation planned by the NAT SPG had been carried out. Several novel themes had been investigated and reported. The work required further development, maturation and consideration before actual application. The United Kingdom undertook to perform an assessment of the United States longitudinal work to date.

3.2.74 Information was presented which examined North Atlantic data to produce a distribution of the proportion of aircraft pairs that were separated by t minutes longitudinally upon entry to the oceanic system. The information described an empirical exercise using routine position reporting data obtained from Transport Canada and characterised the distribution of initial separations from these data as a starting point for determining the shape and characteristics of a distribution of initial separations for use within the longitudinal collision risk model.

3.2.75 Information was also presented which described a correction of the standard equation for determining the rate of collisions due to the loss of planned longitudinal separation. The information revealed an inconsistency in the standard equation that had been used in many studies of longitudinal separation. It also explained the nature of the inconsistency and suggested a way to correct the equation that relates traffic volume to the risk of collision. The standard equation as usually stated pertained only to consecutive pairs of aircraft. The correction allows for collisions between all aircraft pairings.

3.2.76 A model for determining the rate of collisions due to the loss of planned longitudinal separation was presented. In addition to determining the rate of collisions, it refined the standard longitudinal collision risk model to allow the use of improved estimates of the probability of an overtake and the average speed of an overtake.

3.2.77 The Group examined a theory which described initial longitudinal separation on oceanic routes. The standard formula for estimating the rate of collisions due to the loss of planned longitudinal separation included an expression denoting the probability that two aircraft flying along the same route and flight level passed over the route's entry fix t minutes apart. In past studies of

oceanic routes systems, such probabilities were estimated from collected data. The information presented proposed a theory which may allow analysts to estimate such probabilities for hypothetical or future environments, those for which it was not possible to make direct, empirical estimates.

3.2.78 Information was presented which described a procedure to estimate the probability of an aircraft pair losing longitudinal separation from one waypoint to the next. It was based on individual aircraft time-keeping, longitudinal distance-keeping and speed-keeping systems. Consideration was given to the correlation of the speed between the following aircraft and the lead aircraft. The procedure linked individual aircraft sub-systems to the probability of longitudinal overlap. Through a co-operative effort with Transport Canada, the United States was able to develop preliminary following-aircraft conditional distributions given lead-aircraft estimated time of arrival errors. A set of tools needed to develop individual aircraft sub-system requirements necessary to satisfy the allowable risk associated with reduced longitudinal separation was noted.

3.2.79 The Group expressed its appreciation to the United States for their major contribution recognising that it involved substantial original work. In response, the Member for the United States stated that it intended to advance the work in the longitudinal dimension with the view toward producing a preliminary list of performance criteria necessary for a safe reduction of longitudinal separation in the NAT Region.

MATHEMATICIANS' WORK PROGRAMME AND ACTIONS FOR 1995/96

3.2.80 In order to meet the required work schedule for RVSM verification, it was agreed that the Mathematicians' Working Group (MWG) would meet twice during the next year, outside of the NAT SPG itself. The tentative schedules were:

	Venue	**Dates**	**Main Agenda Items**
MWG/7	London	30th Oct to 3rd Nov 1995	Results of Core Navigation Study Supplement to NAT Doc 002 Trial Risk Assessment
MWG/8	Ottawa	25th Mar to 29th Mar 1996	First full risk assessment

3.2.81 Because NAT SPG would be meeting in September 1996, a further meeting of the mathematicians working group would be required in June 1996 in conjunction with the Scrutiny Group, in order to perform the annual risk assessment. It was likely that the venue for this meeting would be London.

3.2.82 The agreed Mathematicians' work programme for 1995/96 is shown in **Appendix B** to the Report on Agenda Item 3. In accordance with existing plans, most RVSM tasks had been given highest priority whilst tasks relating to reductions in longitudinal separation had been given medium priority. Tasks relating to future reductions in lateral separation had been given the lowest priority. Against each action, the target completion date and the main participants are shown.

3.3 Review of systems operations

AIR TRAFFIC MANAGEMENT

North Atlantic Operations Managers' Meeting

3.3.1 The Group was presented with a summary report of the North Atlantic Managers' (NAT OPS MNG) Meeting which had been held in Washington D.C. from 22 to 26 May 1995. The Group was informed that a full report of the meeting would be made available in mid-July 1995.

3.3.2 Amongst the various subjects dealt with, the NAT OPS MNG Meeting reviewed a draft NAT Contingency Plan. Recognizing that any such plan could not cover all possible contingency situations, the NAT OPS MNG had recommended an amendment to the introduction of the final plan allowing additional actions, depending on the specific scenario, in order to expedite the flow of air traffic. In concluding its discussions on this matter, the Group agreed that all States concerned should review the contingency plan and provide the Secretary with their comments. As regards the future management of the contingency plan, it was agreed that this matter would be reviewed at NAT SPG/32.

3.3.3 The NAT Managers also discussed the revision of the Canada/United States delegated airspace. Canada has assumed control responsibility of the airspace from 50W to 40W, North of 4430N (in all the airspace previously delegated) at and above FL055. This eliminates the shelf that existed at FL 275 and it was noted that the extension had not posed any operational difficulties.

3.3.4 Generally speaking, no major operational problems were reported to the NAT SPG. However, the Group noted that the conference telephone link to discuss daily track placement had not yet been implemented.

3.3.5 The Group's attention was drawn to the deep concern expressed by the NAT OPS MNG meeting over the flights performed by the Earthwinds balloon. It was reported that costly penalties would be faced by NAT operators should the balloon be afforded IFR separation if penetrating the NAT MNPS airspace. Because of its configuration, the balloon would occupy three flight levels and, since not able to manoeuvre, large areas of the airspace would have to be closed to regular NAT operators. It was also noted that, despite being fitted with all the navigation and communications equipment, the balloon was unable to navigate to any specific point. There were doubts as to whether this craft could satisfy the MNPS requirements. The NAT OPS MNG recommended and the Group agreed that the Earthwinds balloon flight as currently planned should not be approved by NAT provider States.

CONCLUSION 31/8 - EARTHWINDS BALLOON FLIGHT

That, due to uncertainties surrounding the ability of the balloon to meet Minimum Navigation Performance Specifications (MNPS) criteria and the severe constraints and penalties that would be induced by the flight on regular NAT air traffic, the earthwinds balloon flight as currently planned should not be approved by the NAT provider States for operation within NAT MNPS airspace.

3.3.6 The NAT OPS MNG also raised the question of radio communications failures in the North Atlantic and noted that considerable differences of interpretation existed on the matter. Noting that the procedures as such were not in question, the NAT SPG agreed that this problem needed to be solved as soon as possible and noted the on-going work of the ATMG on this matter. The Group was informed that a proposal for amendment to the Regional Supplementary Procedures was in the making and that the Air Navigation Commission, at its current Session, had addressed communications failure procedures and had reviewed a draft amendment to Annex 2 and the PANS-RAC.

3.3.7 The Group recalled the discussions held during NAT SPG/30 concerning the establishment of a mechanism to address short term operational issues and in particular that the work of the NAT IMG did not include this matter. It was also recalled that the NAT SPG would no longer have a mechanism to carry out this function. Accordingly, it had been agreed that short term operational issues, in particular those that fall within a 12-month time frame should be addressed outside the NAT IMG and Conclusion 30/3 - The need to address short term issues - was framed and agreed to.

3.3.8 With the above in mind, the Group reviewed the terms of reference and working methods of the NAT Operational Managers in the light of experience gained from its first meeting. It felt that the chairman of the meeting should be provided by the host State and should not necessarily be the NAT IMG member as stipulated in Conclusion 30/3. Meeting sites should be co-located with the ATC facility concerned. The Group agreed that the meetings should be held in the autumn and that the working methods contained in the NAT SPG handbook should be expanded. The Group then agreed that Conclusion 30/3 be replaced with the following:

CONCLUSION 31/9 - TERMS OF REFERENCE AND WORKING METHODS FOR THE NAT OPERATIONS MANAGERS MEETING

That:

a) on the basis of the terms of reference and working methods shown in Appendix C to the Report on Agenda Item 3, the annual NAT Operations Managers meeting be tasked to address short term operational issues, in particular those that fall within a 12-month timeframe;

b) the above meeting be expanded to include civil and military users;

c) the meeting shall be chaired by the host State who should provide secretariat services;

d) the NAT SPG Member of the host State shall report the outcome of the meetings to the NAT SPG; and

e) the meeting may invite participation by representatives of other air traffic control and flow management units as required by the agenda.

Requirements for Non-Directional Beacons (NDB) in the NAT Region

3.3.9 The Group was presented with an input from Denmark concerning the current situation of NDBs in Greenland and the Faroe Islands. These NDBs were essential in order to maintain the Blue Spruce routes. After some discussion involving the advent of new technology

versus conventional ground aids, the Group was of the opinion that a buffer period of five years was reasonable to maintain the NDBs in the expectation of the approval of more modern navigation means. It was also agreed to seek the views of the NAT Implementation Management Group (NAT IMG) on this policy matter.

CONCLUSION 31/10 - REQUIREMENT FOR NON DIRECTIONAL BEACONS (NDB) IN THE NAT REGION

That:

a) the requirement for NDBs in the NAT Region for ground based navigational aids as currently stated in the NAT Facilities and Services Implementation Document (FASID - Doc 9635) should continue to exist for at least 5 years; and

b) in the light of new technology, the NAT Implementation Management Group develop a policy for the gradual withdrawal of ground based navigational aids in the NAT Region.

COMMUNICATIONS

3.3.10 In the light of the changes to the previous working methods, the Group noted with appreciation that the new format proved to have worked well. Accordingly, it was agreed that the working arrangements, as agreed to at NAT SPG/30, should continue.

NAT HF message intercept procedure

3.3.11 In response to NAT SPG Conclusion 30/23, Canada, Iceland and Ireland jointly conducted an evaluation exercise of suspending the intercept procedure in the NAT HF network for a trial period in 1994. The exercise took place from October 2 to 29 1994, inclusive.

3.3.12 Canada confirmed that Gander OAC did not report any adverse effects and that both civil and military users had indicated no impact on the level of service on HF during the trial. However, Canada was of the opinion that the results of the 1994 trials were inconclusive due to anomalies that occurred in the exercise. It proposed therefore that a second joint exercise be conducted in 1995 over a period of eight weeks at a time of peak traffic load, during which the filing of intercept messages would be suspended at all NAT aeradio stations.

3.3.13 Iceland, which had conducted a detailed analysis of the trial results, maintained that the HF intercept procedure enhances flight safety, creates greater efficiency in air-ground operations, contributes to the alleviation of channel congestion on HF and encourages both network co-operation and better watch keeping practice. These views were shared by others who also noted that there were benefits for other services such as OPMET and airline operational control in retention of the HF intercept procedure. The results from Ireland showed that the suspension of the intercept procedure led directly to the unnecessary generation of *overdue reports* by the Shanwick Flight Data Processing System (FDPS) in 45 recorded cases.

3.3.14 The general view shared by Iceland, Ireland, Portugal and the United States was that the exercise did not confirm that there would be advantages in suspending the intercept procedure in the NAT HF network.

3.3.15 The outcome of discussions led the meeting to conclude that another evaluation exercise was unnecessary as it would probably produce similar results. It was agreed that, if operational requirements should arise, the provisions of Annex 10, Vol II, would not prohibit an individual NAT provider State from unilaterally abandoning the HF network intercept procedure. It was not envisaged that such action would be opposed by other provider States. In this context, the member for Canada informed the Group that it did not plan to abandon the NAT HF intercept procedures at this time.

CONCLUSION 31/11 - NAT HIGH FREQUENCY (HF) MESSAGE INTERCEPT PROCEDURE

That:

a) further evaluation of the intercept procedure in the NAT HF network was unnecessary; and

b) an individual provider State may choose to suspend the intercept procedure in the NAT HF network.

Reduced Hours of Service, HF Family NAT-A at Gander

3.3.16 The Group noted that, with effect from 30 March 1995, Canada had reduced the hours of operation on HF family NAT-A at Gander International Flight Service Station (IFSS) from H24 to H16. This had followed a trial evaluation conducted in September 1994 during which no adverse impact on the NAT HF communications system had been detected. The view of user groups and other NAT provider States had been obtained in the matter. The daily hours of operation of HF family NAT-A coincided with peak activity periods at Gander IFSS, and were as follows:

0030-0830 UTC, and
1130-1930 UTC.

During the period of Canadian daylight-saving time, the hours would be:

2330-0730 UTC, and
1030-1830 UTC.

Canadian AIRAC NOTAM 05/95 refers.

HF VOLMET - Revised Broadcast Plans, Canada, Ireland and United States

3.3.17 NAT SPG Conclusion 30/24 required Canada to submit, on behalf of Canada, Ireland and the United States, a proposal for amendment of the NAT FASID concerning changes to the Shannon and Gander/New York HF VOLMET broadcast plans agreed at NAT SPG/30. The States concerned were required to implement the proposed changes within six months after the amendment was approved.

3.3.18 The agreed proposal for amendment of the NAT FASID was submitted to ICAO in October 1994 and had been circulated to States for comment, with a request to respond by 24 April 1995. The Group was informed that the amendment proposal had been submitted to the President of the Council for approval on 6 June 1995.

Note: The amendment was approved by the President on behalf of the Council on 2 July 1995.

3.3.19 The meeting noted this information. It also noted the intentions of the States concerned to adhere to the agreed implementation schedule following approval of the amendment.

HF & General Purpose (GP)/VHF Data Collection 1994

3.3.20 States concerned had prepared detailed statistical reports for 1994 based on the results of HF and GP/VHF data collection exercises conducted in accordance with NAT SPG Conclusion 30/26. The results were consolidated in a single report compiled by Portugal. This provided an analysis of individual station performance and a global overview of network operations.

3.3.21 The network produced 2,829 million air-ground messages in 1994 - 79.4% HF and 20.6% VHF. The statistics included both readback and intercept messages.

3.3.22 The Group expressed satisfaction with current HF loading patterns. While certain channels continued to be congested during peak traffic hours, the addition to the network of HF families NAT-E and NAT-F, and the increased use of GP/VHF, had helped to alleviate the problems. It was considered that no requirement existed at present for additional frequencies in the HF network.

3.3.23 In follow up to NAT SPG Conclusion 30/25, Spain informed the meeting that it would be prepared to change from HF Family A to HF Family E in the Canarias Islands. On the basis of advice from the Group, Spain was prepared to begin the administrative procedures.

3.3.24 Regarding the format of future surveys, it was agreed that there was a requirement to incorporate in further reports statistics on readback traffic, hourly loads and numbers of user aircraft. The meeting agreed that the effects of RVSM, planned for implementation in the NAT Region in January 1997, would require appropriate planning to ensure that the NAT HF and GP/VHF communications system were adequate to handle the greatly increased communications workload. Although changes may not, in the short term, significantly add to the volume of flight movements, it could cause an increase in the number of air-ground messages per flight, with consequential effects upon network capacity.

3.3.25 Several options to reduce HF traffic were examined, including the possibility of reducing the requirement for MET reporting by random traffic. The Group was not in a position to come to any conclusion on this matter; however, it did agree that the NAT OPS MNG should address this issue. Furthermore, the United Kingdom undertook to review the MET requirements with their meteorological services and to report to NAT SPG/32.

3.3.26 It was considered that the results of a 3-day data collection exercise, conducted in the format of earlier such surveys, differentiating between intercept and other air-ground message traffic, would provide the necessary information on changes to network capacity, congestion problems and frequency assignment issues. Ireland offered to co-ordinate the selection and notification of appropriate dates for this exercise.

3.3.27 The Group expressed its appreciation to Portugal for the quality and scope of the consolidated report and acknowledged its usefulness to the various administrations involved. It was agreed that there should be a similar exercise, with agreed changes, conducted in 1995, and that Portugal would again co-ordinate the details with the States concerned.

CONCLUSION 31/12 - HIGH FREQUENCY (HF) AND GENERAL PURPOSE (GP)/VERY HIGH FREQUENCY (VHF) DATA COLLECTION 1995

That States concerned

a) continue to conduct an annual HF and GP/VHF data collection exercise and present the information in the format outlined at Appendix C to the Report on Agenda Item 2 of NAT SPG/29, with the exclusion of the requirement to report busiest day statistics; and

b) report the following:

i) statistics on the number of user flights;

ii) the results of a detailed analysis, including a differentiation of readback and intercept traffic, of hourly loads on all frequencies, conducted over three 24-hour periods during peak traffic season, on dates co-ordinated by Ireland when the orientation of the Organised Track System (OTS) is North, Central and South about, respectively.

Harmful Interference on HF

3.3.28 As agreed at NAT SPG/30, information was presented on harmful interference on HF encountered during 1994 at the various network stations. The general conclusion derived from these reports was that, while the interference occasionally made communications difficult and was a source of annoyance, it was not of a nature to endanger the safety of the air-ground communications system. It appeared also that the measures being adopted by individual administrations against illegal transmissions on NAT HF channels were effective. One State reported a case of hoax transmissions with deliberate intent to interfere with air safety operations. The matter was being investigated by police authorities.

SYSTEM EFFICIENCY

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

3.3.29 As at previous meetings, the Group was presented with information on the efficiency of the NAT air navigation services in the format agreed to at NAT SPG/24 (Conclusion 24/11 refers). It was noted that nothing untoward needed to be reported. The Group did note with appreciation the data presented by the representative from IAOPA on the distribution of traffic in Shanwick OCA.

3.3.30 As regards the system efficiency numbers submitted by the United Kingdom, it was noted that they intended to develop a different and more comprehensive method of presenting the data which would take into account historical data. The Group felt that the proposal had merit and therefore requested the United Kingdom to provide NAT SPG/32 with additional information on this matter.

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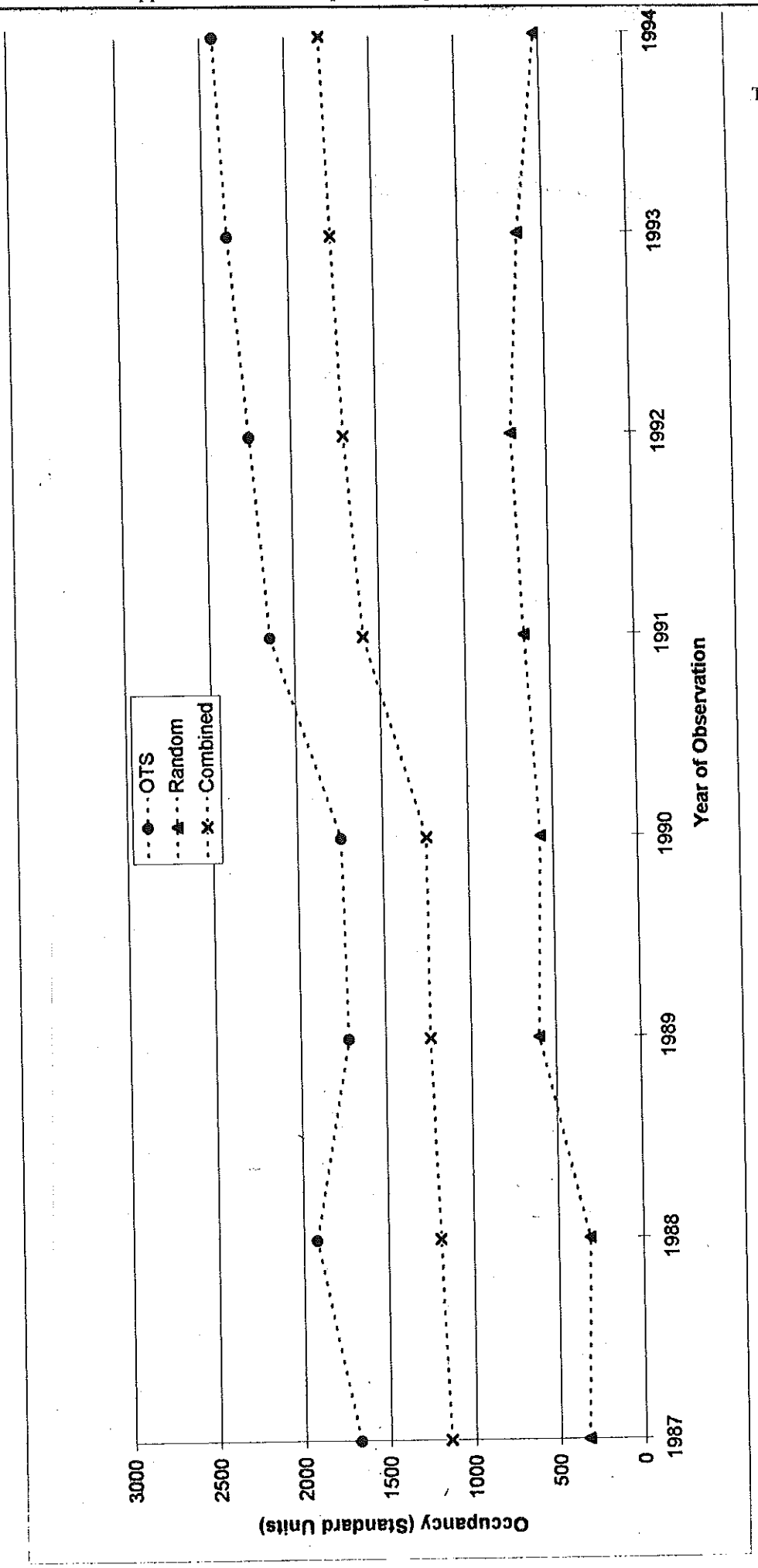
APPENDIX A

FIGURE 1 - NORTH ATLANTIC MNPS AIRSPACE OCCUPANCY EXPRESSED IN STANDARD UNITS

(paragraph 3.2.23 refers)



NS31RA3.W51

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FIGURE 2 - NORTH ATLANTIC MNPS AIRSPACE RISK-BEARING ERROR RATES
(paragraph 3.2.27 refers)

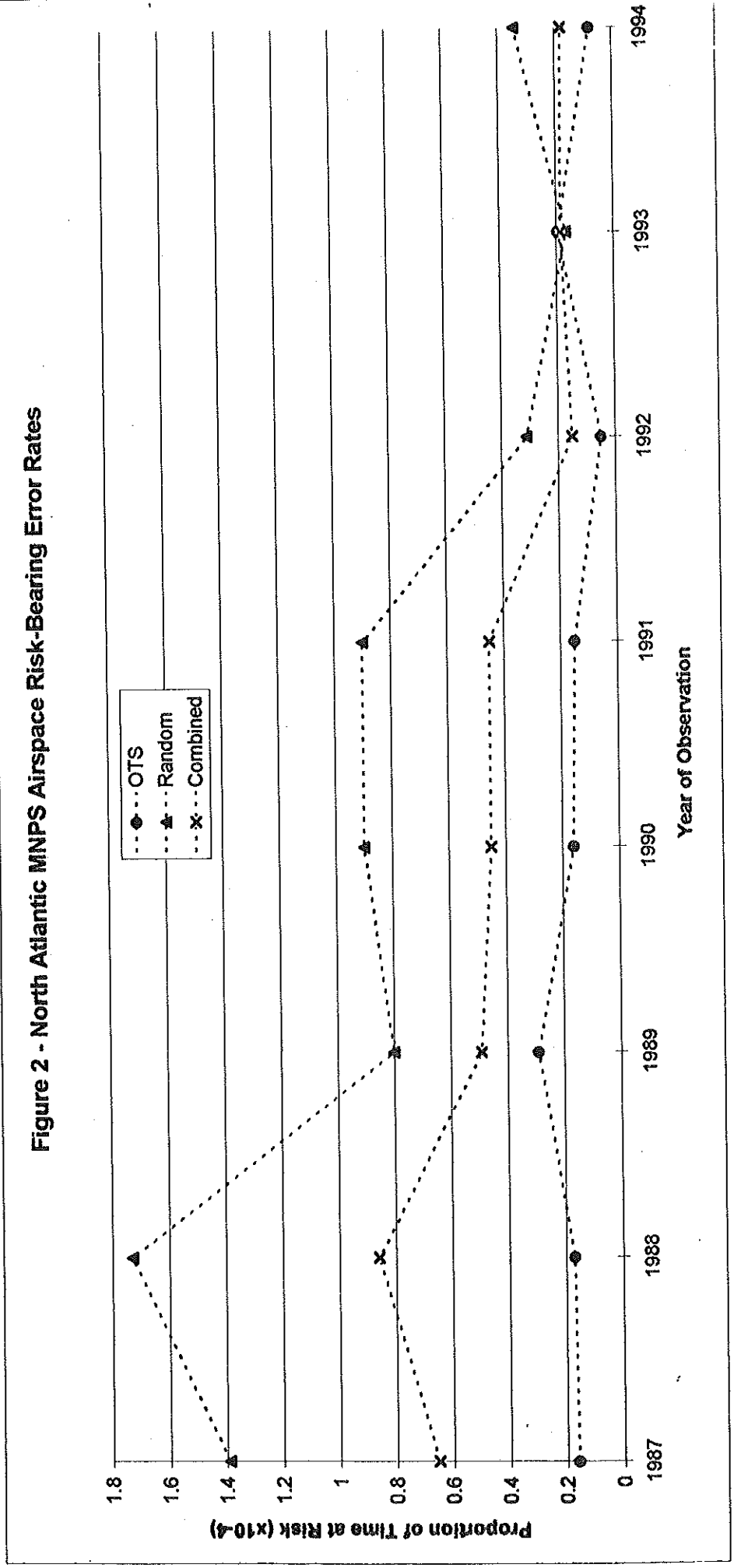

FIGURE 3 - UNWEIGHED NUMBER OF GNES > 50 NM
(paragraph 3.2.40 refers)

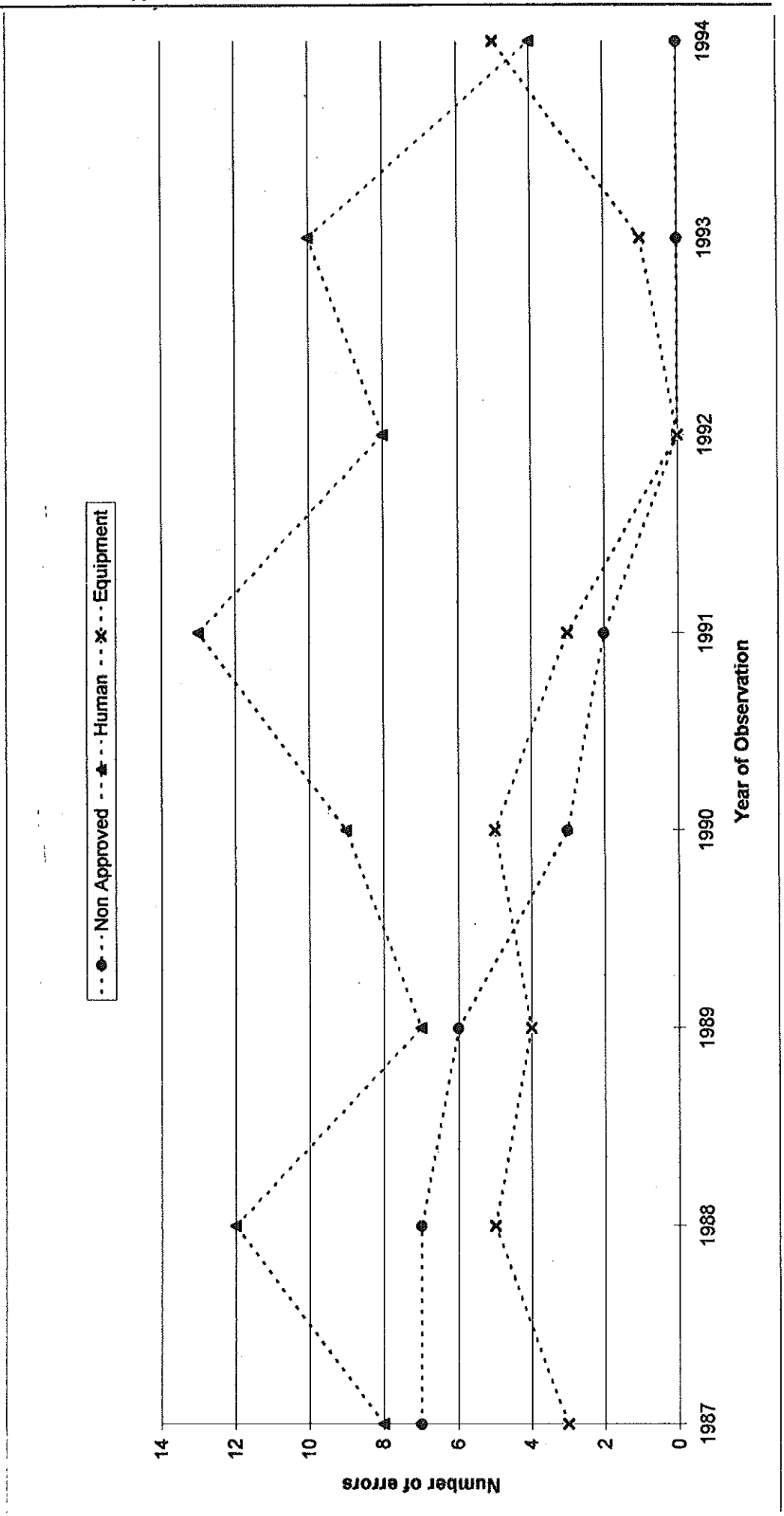

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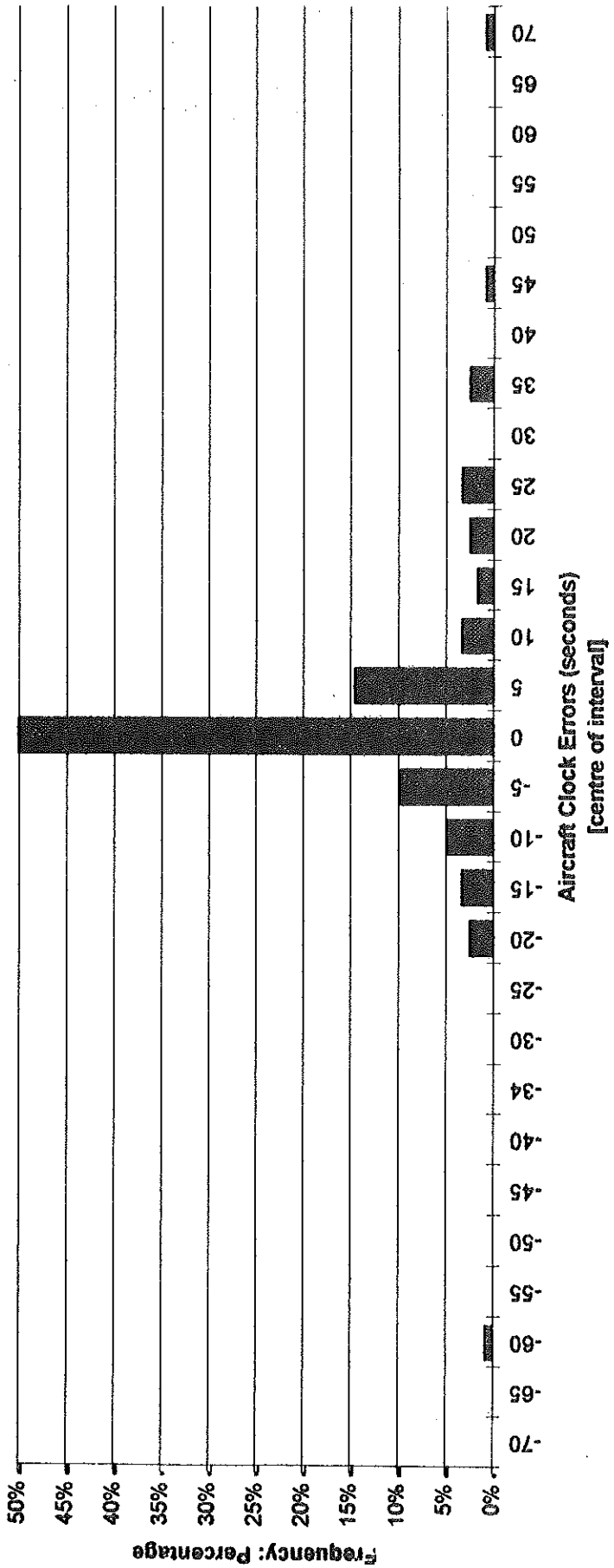
FIGURE 4 - PERCENTAGE DISTRIBUTION OF AIRCRAFT CLOCK ERRORS
(paragraph 3.2.68 refers)



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APPENDIX B - MATHEMATICIANS' WORK PROGRAMME AND ACTIONS FOR 1995/96

(paragraph 3.2.82 refers)

ACTION	TARGET COMPLETION DATE	PARTICIPANTS
Inform ICAO of changes to MWG entry in NAT SPG Handbook	NAT SPG/31	UK
Prepare for RVSM verification	MWG/7	All
Produce next version of Supplement to NAT Doc 002	MWG/7	UK
Conduct and analyze core navigation study	MWG/7	UK/Canada
Draft questionnaire on aircraft equipment fit	MWG/7	USA/IATA
Inform UK Cost Benefit Group of Canadian work on simulation model	MWG/7	UK
Draft contingency event classification scheme	MWG/7	UK/USA
Ask UK TCAS group to pass on NAT TCAS events to the CMA	MWG/7	UK
Amend RGCSP/6 ASE table	MWG/7	All
Undertake feasibility of performing AAD study	MWG/7	Canada
Review Trigger Levels Paper	MWG/8	UK/USA
Assess USA longitudinal work to date	MWG/8	UK
Update "Cumulative Sum" paper	NAT SPG/32	USA
Review the remainder of the CRM parameters for use with RVSM	NAT SPG/32	UK
Consider how Reykjavik data can be incorporated into the collision risk estimate	NAT SPG/32	Canada/UK
Implement rolling 12 month occupancy assessments in monthly CMA reports	NAT SPG/32	UK
Progress work on risk assessments of 30 NM lateral separations with ADS.	NAT SPG/32	UK

ACTION	TARGET COMPLETION DATE	PARTICIPANTS
Perform further Gain/Loss studies	NAT SPG/32	Canada
Perform further Time-keeping studies	NAT SPG/32	Canada/USA
Advance longitudinal work to produce a preliminary set of performance criteria	NAT SPG/32	USA
Investigate lateral and vertical occupancy differences	NAT SPG/32	Canada/UK
Analyze intervention data	NAT SPG/32	Canada
Determine effects under RVSM of increased crossing traffic on collision risk	NAT SPG/32	UK/Canada
Produce annual lateral risk assessment	NAT SPG/32	UK/Canada

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APPENDIX C - TERMS OF REFERENCE AND WORKING METHODS FOR THE ANNUAL MEETING OF THE NAT OPERATIONS MANAGERS

(paragraph 3.3.8 refers)

Terms of Reference

1. Review common application of separation minima

2. Review standardisation of NAT phraseology

3. Review issues relating to traffic management

4. Review of short term operational developments

5. Co-ordination of airspace changes

6. Co-ordination of airspace reservation activity - normally limited to one day (replacing the NAT ALTRV Conference)

Working Methods

1. The work of the NAT Operations Managers meeting is to be accomplished in five days, a day each shall be given to the military and civil users respectively. Any additional user participation would be decided depending on agenda items, as determined by the host state.

2. The next meeting would be held in New York in November 1995 and subsequent meetings sequentially as follows:

Gander, Shanwick, Reykjavik, Portugal, New York etc...

3. The host State shall be responsible for providing the chairman, preferably not one of the participating delegates, as well as secretariat services.

4. Proposed agenda and call for papers should be sent out 90 days prior to the meeting.

5. Working papers and information papers, including user input, shall be submitted 45 days prior to the meeting.

6. The final agenda, with associated working papers and information papers, should be distributed to the participants 30 days prior to the meeting.

7. The NAT IMG member of the host State will receive documentation for the meeting, and participate to the extent necessary to ensure compatibility with overall NAT SPG objectives.

AGENDA ITEM 4: DOCUMENTATION UPDATE

4.1 Introduction

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

a) MNPS OPS Manual;

b) IGA Manual; and

c) the NAT SPG handbook.

4.2 General

4.2.1 The Group was informed that KK NDB had been replaced by DA locator and that all NAT documentation concerned needed to be updated. The editors of the various documents took note and indicated that the next edition of their respective documents would reflect the foregoing.

4.3 MNPS OPS Manual

4.3.1 The Group noted that the sixth edition of the NAT MNPS OPS Manual had been published by the United Kingdom on behalf of the NAT SPG. The Group was also informed that the document was available in French and Russian. Recalling the problems associated with the use of Omega as a sole means of navigation and the subsequent effects on costs of re-issuing a new edition of the MNPS OPS manual, the Group noted that the ICAO European and North Atlantic Office would distribute a "pink corrigendum", regarding the use of Omega as a sole means of navigation (paragraph 3.2.19 also refers).

4.4 IGA Manual

4.4.1 The Group noted that the second edition of the NAT IGA Operations Manual had been published by the United States and expressed its appreciation for the quality of the product.

4.5 NAT SPG Handbook

4.5.1 The Group noted with appreciation that the first edition of the NAT SPG handbook, which had been produced by the Chairman, had been very well received. Accordingly, it was agreed that the document should, as originally planned, be updated by the Chairman after NAT SPG meetings. With this in mind, all participants had been invited to provide their inputs in order to update the manual.

AGENDA ITEM 5: ANY OTHER BUSINESS

5.1 Introduction

5.1.1 Under this Agenda Item, the Group discussed the following specific subjects:

a) handling of inadvertently activated 406 MHz emergency locator beacons containing 121.500 MHz homing transmitters;

b) summary of Search and Rescue incidents in the NAT Region;

c) election of Chairman;

d) next meeting of the NAT SPG; and

e) farewells.

5.2 Handling of inadvertently activated 406 MHz emergency locator beacons containing 121.500 MHz homing transmitters

5.2.1 Denmark informed the Group that a number of States prescribe 406 MHz Emergency Location Transmitters (ELT) containing 121.500 MHz homing transmitters to be carried on board ships. The Group was also informed that a number of States had established a procedure whereby a shipborne 406 MHz ELT that had inadvertently been activated should be left transmitting until the appropriate Search and Rescue (SAR) authorities advise that the ELT has been located and can be turned off.

5.2.2 The Group felt that the above mentioned procedure could lead to an increased workload on ATS facilities in the NAT Region due to aircraft reporting transmissions from inadvertently activated 121.500 MHz homing transmitters onboard ships. It was also felt that such transmissions could eventually block the aeronautical emergency frequency for extended periods of time.

5.2.3 The Group agreed that ICAO should inform the upcoming meeting of the Joint ICAO/International Maritime Organization (IMO) Working Group on SAR of the concern of the NAT Provider States that the procedures adopted for maritime use could eventually cause problems for the aviation community.

CONCLUSION 31/13 - HANDLING OF INADVERTENTLY ACTIVATED 406 MHZ EMERGENCY LOCATOR BEACONS CONTAINING 121.500 MHZ HOMING TRANSMITTERS

That ICAO inform the upcoming meeting of the Joint ICAO/IMO Working Group on Search and Rescue of the concern of the NAT Provider States that the procedures adopted for maritime use in the event of an inadvertently activated 406 MHz ELT containing 121.500 MHz homing transmitter could eventually cause problems for the aviation community.

5.3 Summary of Search and Rescue Incidents in the NAT Region

5.3.1 The Group was presented a summary of SAR incidents which had occurred in the NAT region in recent years. It noted that there had been a significant decrease in SAR incidents since the peak years 1988 - 1990. However, SAR trends in the region should be monitored on a regular basis and States should submit annual returns in respect of aeronautical SAR incidents. The United Kingdom collected and collated the annual number of SAR incidents for consideration by the NAT SPG. The results of this exercise are at **Appendix A** to the report on Agenda Item 5. The Group supported with appreciation the United Kingdom's efforts to collect and collate such information.

5.4 Election of Chairman

5.4.1 Mr. Karsten Theil, the Member for Denmark and current Chairman of the NAT SPG, informed the Group of his appointment to the position of Head of the Nordic Delegation to ICAO and Danish candidate for election to the Council of ICAO at the 30th Session of the ICAO Assembly. As he was no longer in a position to conduct the business of the Group he therefore presented his resignation.

5.4.2 The Members paid tribute to Mr. Karsten Theil's close involvement with the work of the NAT SPG for more than 15 years and thanked him for his wisdom and guidance in leading the work of the Group. They wished him every success in his new and very important assignment.

5.4.3 Upon a proposal from its Member for Canada, seconded by its Member for Iceland, the Group unanimously elected its Member for Ireland, Mr. Myles Murphy, as its new Chairman.

5.4.4 Mr. Karsten Theil then informed the Group that he would continue as the NAT SPG contact person until such time as his State appoints a replacement in the Group.

5.5 Next Meeting

5.5.1 Taking into account that a go/no go decision on the implementation of RVSM in the NAT Region would have to be made in September 1996, the Group agreed that its next meeting should be held in Paris from 16 to 20 September 1996. In this context, it was also agreed that a special meeting of the NAT SPG could be convened earlier, should circumstances so require, and that the NAT SPG Meeting for 1997 should be scheduled for the month of June.

5.6 Farewells

5.6.1 The Group had been informed that its Member for Iceland, Mr. Einar Einarsson, would retire from his service with the Civil Aviation Administration of Iceland and had been replaced in the Group by Mr. Ásgeir Pálsson. The Group expressed its appreciation for the contributions from Mr. Einar Einarsson to its work during the past years and wished him all the best in the future.

5.6.2 The Group was informed that Mr. Pat Keating, who had been the Member for Ireland, had been replaced by Mr. Myles Murphy. The Group expressed its appreciation for Mr. Pat's Keating contributions to the work of the Group over many years and wished him the best of luck in his future endeavours.

5.6.3 Similarly, the Group had been informed that its Member for Portugal, Mr. Joao Sequeira, who had been with the Group for several years, had been assigned new tasks within his administration and would no longer be able to participate in the NAT SPG. Therefore, he had been replaced in the Group by Mr. Carlos Monteiro. The Group expressed its appreciation for Mr. Joao Sequeira's contributions over the years and wished him all the best in his new functions.

5.6.4 The Group was also informed that its Member for the United Kingdom, Mr. Paul Wood, would retire from his service with the National Air Traffic Services of the United Kingdom before its next meeting, and that he would continue as the NAT SPG contact person until such time as his State appoints a replacement in the Group. The Group expressed its appreciation for the contributions from Mr. Paul Wood to its work during the past years and wished him all the best in future.

5.7 Secretariat's support to the NAT SPG

5.7.1 The Group noted that the achievements that had been made since its last meeting could not have been possible without the high quality of the secretariat's support, not only to the various part of the NAT SPG working structure but in particular to the NAT SPG itself. It was agreed that the workload connected with these activities often exceeded what was normally to be expected.

5.7.2 With this in mind, the Group expressed its high appreciation of the support provided by the staff of the European and North Atlantic Office of ICAO and thanked them warmly for their extreme effort and their dedication.

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APPENDIX A - SAR INCIDENTS

(paragraph 5.3.1 refers)

	1987	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**
Denmark	1	4	10	5	3	1	1	0
Ireland/UK	5	4	7	4	3	4	3	1
USA	2	2	4	2	0	0	0	2
Portugal	2	0	2	2	0	4	3	3
Iceland	N/A	12	5	10	2	0	2	3
Norway	N/A	N/A	N/A	1	0	0	0	0
Canada	N/A	N/A	N/A	N/A	0	2	0	0
Totals (for date received)	10	22	28	24	8	11	9	9
Average (for RCCs reporting)	2.5	4.4	5.6	4.0	1.1	1.6	1.3	1.3

- END -