NAT SPG/21

SUMMARY OF DISCUSSIONS AND CONCLUSIONS

OF THE

TWENTY-FIRST MEETING OF THE NAT SYSTEMS PLANNING GROUP

(Paris, 2 - 13 April 1984)

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1. Introduction

1.1 The Twenty-First Meeting of the NAT Systems Planning Group (NAT SPG) was held in the European Office of ICAO from 2 to 13 April 1984. In the absence at the opening session of both its Chairman (Mr. F. Rico, the Member from France) and its Vice-Chairman, the Group unanimously appointed Mr. V. Feehan, its Member from Ireland to assume the functions of Chairman for the week from 2 to 6 April 1984. In the continued absence of Mr. Rico, the Vice-Chairman (Mr. G. Matthiasson, the Member from Iceland) conducted the proceedings for the rest of the Meeting. A list of participants is at page 4.

1.2 In addition to IAOPA, IATA and IFALPA, the Group had, as usual, also invited Denmark, Norway, Spain and the USSR to attend this Meeting. However, Norway, the USSR and IAOPA were unable to participate.

1.3 In order to progress its work efficiently, the Group established a number of ad hoc drafting groups to deal with particular aspects of some subjects during the Meeting. These were :

a) a sub-group charged with the scrutiny of observed gross navigation errors, of which Mr. J.Irving of the United Kingdom acted as Rapporteur;

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

c) a sub-group to examine questions relating to the application of separation standards in the NAT Region, of which Mr.N. Craddock of the USA acted as Rapporteur;

d) a sub-group to consider matters related to flight planning in the NAT Region, of which Mr. D.R. Mair of Canada acted as Rapporteur.

1.4 The groups listed under a) and b) above met already in advance of the main Meeting of the NAT SPG on 29 and 30 March 1984, in order to make sufficient progress in their respective fields.

1.5 Mr. C. Eigl served as Secretary of the Meeting and was assisted by Messrs. W. Arcangeletti and S. Zerkovitz, all of the European Office of ICAO. Mr. Eigl was responsible for the preparation of this Report. The Meeting was also attended, part time, by Mr. D. Bartkowski, ICAO Representative, European Office.

2. List of Conclusions

LIST OF PARTICIPANTS / LISTE DES PARTICIPANTS

CANADA

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Agenda Item 1 : Air navigation system safety performance review

1.1 Introduction

1.1.1 Discussions under this Agenda Item were covered under the following headings :

a) The navigation accuracy achieved in the NAT MNPS airspace during the period commencing 1 March 1983 and ending on 29 February 1984;

b) Validation of the continued use of 60 NM lateral separation in the NAT MNPS airspace;

c) Consideration of methods of improving the effectiveness of current monitoring procedures;

d) Consideration of methods of improving the observed standard of navigation performance in the NAT Region;

1.2 Navigation accuracy achieved in NAT MNPS airspace during the period 1 March 1983 to 29 February 1984

1.2.1 The Group completed a scrutiny of observed gross errors of navigation in the NAT Region and found that a total of 87 errors and navigation incidents were reported during the period 1 March 1983 to 29 February 1984. 38 of these errors occurred outside MNPS airspace and were classified as Table "C" errors. Of the remaining 49 errors, 20 were not eligible for inclusion in the risk analysis as defined by NAT SPG/17 and were classed as Table "B" errors. A further consideration of these Table "B" errors is outlined at paragraph 1.2.9.

1.2.2 The following Table contains an analysis of the 29 errors retained in the sample broken down in accordance with established procedures together with an additional entry. In previous summaries the number of errors acceptable in the period according to the MNPS requirements (i.e. 5.3×10^{-4} for eta errors and 1.3×10^{-4} for zeta errors) has been shown. A further level (7.95×10^{-4} for eta errors and 1.95×10^{-4} for zeta errors) is now shown so that the achieved performance can be equated to the level which NAT SPG/19 felt would provide a signal that the error rate had increased significantly and that operational judgement should reflect on the system impact of the increase (see NAT SPG/19-Report, para 1.3.16). For purposes of comparison, the figures for the eta errors from the former monitoring period are given in brackets. It should be noted however that that period was of 11 months duration (1 April 1982 to 28 February 1983).

CLASSIFICATION	$\geq$ 30NMLS (ETA ERRORS	ERROR			
		50-70 NMS (ZETA ERRORS)			
		TOTAL MNPS TRAFFIC		OTS TRAFFIC	
		Model 1	Model 2	Model 1	Model 2
A	6 (1)	1	1	-	-
B	5 (2)	3	1.04	-	-
C	11 (5)	9	5.60	5	3.30
D	1 (1)	1	1	1	1
E	- (1)	-	-	-	-
F	5 (2)	1	1	-	-
Not classified	1 (1)	-	-	-	-
TOTAL	29 (13)	15	9.64	6	4.30
Acceptable No. of errors within MNPS requirements	$\frac{45.23}{(5.3 \times 10^{-4})}$	$\frac{11.09}{(1.3 \times 10^{-4})}$		$\frac{7.08}{(1.3 \times 10^{-4})}$	
Acceptable No. of errors before action based on operational judgement	$\frac{67.84}{(7.95 \times 10^{-4})}$	$\frac{16.64}{(1.95 \times 10^{-4})}$		$\frac{10.62}{(1.95 \times 10^{-4})}$	
OBSERVED TRAFFIC		85333		54445	

Note 1 :

The letters in the Classification Column mean :

A : Aircraft not certified for MNPS operations
B : ATC system loop error
C : Equipment control error, including waypoint insertion error
D : Other navigation errors including equipment failure notified to ATC in time for action to be taken
E : Other navigation errors including equipment failure notified to ATC too late for action
F : As for E, but of which notification was not received by ATC

Not classified : Incident occurred on 17 January 1984; details are still awaited.

Note 2 :

In two errors awarded a 'B' classification and one error awarded a 'C' classification, the aircraft was not approved for MNPS operations but this was not seen as the primary cause of the error.

1.2.3 Whilst only 36% of the observed traffic was operated outside the OTS, the Group found that this random traffic accounted for 60% of the total zeta errors in Model 1 and 55% of zeta errors in Model 2 and provided error rates approximately twice that experienced by traffic on the OTS.

1.2.4 The Group noted that the last twelve month period had been the worst for gross navigation errors since 60 NM lateral separation was introduced with just over twice as many errors of 30 NM or more compared to the last monitoring period. The predominant causes were again equipment control errors (of which half were waypoint insertion errors) and aircraft which were not approved for MNPS operations by the State of Registry. In the first instance, it appeared from the replies received from the operators concerned that the cross checking of entries into the aircraft navigation system and the subsequent monitoring of the system were still not being carried out fully by crews. Of the second cause, it was disturbing to note that of the 29 Table "A" errors considered, there were nine cases where the aircraft was not MNPS approved; in six of these cases the lack of such approval was identified as the prime factor of the error.

1.2.5 The Group also noted that, as in the previous period, some crews were failing to advise ATC of navigation difficulties encountered, which put in doubt the integrity of the aircraft's navigation equipment. There was also a marked increase in the number of ATC system loop errors, particularly on the route between Iceland and North-West Scotland.

1.2.6 It was also apparent that anticipated improvements in the time taken to obtain information from aircraft operators and States by the Central Monitoring Agency had not been achieved by the introduction of the revised monitoring procedures (NAT SPG/20-Report, para 1.2.5 refers).

1.2.7 The Group also noted that a specific aircraft type appeared in Table A on five occasions, although the type formed a very small percentage of the total MNPS traffic. It was also noted that the largest eleven operators in the MNPS airspace accounted for some 65% of the traffic, yet less than 25% of the errors.

1.2.8 In concluding the scrutiny of the Table"A" errors, the Group felt that a proposal by IATA to circulate, in narrative form and without identifying the aircraft operators, typical examples of errors occurring in the NAT MNPS airspace was worth pursuing. It was believed useful if operators were to issue periodic bulletins to aircrew with an analysis of gross navigation errors and it was agreed that suitable material should be attached to the Six-monthly Review issued by the European Office . A sample is at Attachment A to this Agenda Item.

1.2.9 There were 20 navigation errors during the period which, although occurring within MNPS airspace, were not eligible for inclusion in the risk analysis. These Table" B" errors, broken down into the relevant error classifications, are shown below:

ERROR CLASSIFICATION	NUMBER OF ERRORS
A	4
B	3
C	9
D	0
E	1
F	3
Not Classified	-
TOTAL	20

1.2.10 The points which emerge from the Table reinforce the lessons drawn from the detailed scrutiny of the Table "A" errors. Equipment control was still the predominant cause with six of the nine errors in this category being the result of waypoint insertion errors. Once again, the high percentage of the errors were made by aircraft which were not approved for MNPS operations by the State of Registry. A total of seven aircraft were in this category and in four cases the "non-approved status" was identified as the primary factor of the error.

1.2.11 The previous points regarding ATC system loop errors and the failure to notify ATC of navigation problems were seen to apply equally to Table "B" errors.

1.2.12 The Group also noted, with some unease, the role played by ATC in clearing non-approved aircraft operating below MNPS airspace (normally at FL270) to climb to FL 290 and thus entering the MNPS airspace. Whilst there could be no doubt that pilots in command bear the responsibility for any unauthorized entry into the MNPS airspace, this type of ATC clearance must be expected to cause confusion.

1.2.13 The Group then reviewed the NAT gross errors which had been observed in non-MNPS airspace (Table C). Although a lower standard of navigation accuracy was implicit in operations outside MNPS airspace, the number of Table "C" errors - 38 showed an appreciable increase over the 28 errors noted in the previous period. It was agreed at NAT SPG/20 that it was not realistic to carry out a detailed investigation of all navigation errors in the $\geq$ 25 NM range for non-MNPS aircraft occurring in non-MNPS airspace, and it was recommended that only navigation errors in the $\geq$ 50 NM range should be examined (see NAT SPG/20-Summary, para 1.2.24). Of the 38 errors noted in Table C during the scrutiny period, 20 errors were in the order of $\geq$ 50NM. Generally there was poor response from operators in that category and possibly the most significant factor to emerge from Table "C" is that eight errors were attributed to aircraft operating above the MNPS airspace, most of these with sophisticated navigation equipment.

1.3 Validation of the continued use of 60 NM lateral separation in NAT MNPS airspace

Occupancy

1.3.1 The Group considered estimates of occupancy derived from monitoring in both Gander and Shanwick OCA during 1983. These estimates were very similar, indicating a consistency throughout this part of the MNPS airspace. For the OTS traffic, the same-direction occupancy was estimated to be about 0.83 for Westbound and 0.67 for Eastbound traffic, giving an overall average of about 0.76. This data indicated an increase in Westbound OTS same-direction occupancy since 1982, but a decrease in the Eastbound case, leading to a net increase in the overall value from 0.71 to 0.76.

1.3.2 For random traffic, the Westbound and Eastbound same-direction occupancies were both found to be about the same, averaging 0.13. This was substantially the same as the value found in 1982. The opposite direction occupancies were about 0.0027 for OTS traffic and 0.0089 for random traffic, averaging to about 0.0055. These values were slightly higher than those found in 1982.

1.3.3 At the time of the MNPS derivation the values assumed were 0.5 for same-direction occupancy and 0.013 for opposite-direction occupancy. For the OTS it was therefore noted that, whilst the same-direction occupancy was above this assumed value, this would be compensated to some extent by the lower opposite-direction occupancy. For random traffic, both the same and opposite-direction occupancies were lower than the assumed values.

Risk estimate

1.3.4 The Group noted that the risk within the NAT MNPS airspace required account to be taken of not only the observed gross error rates, but also the occupancy values. Combining the data presented at the Meeting suggested that the risk estimate for OTS traffic was marginally below (i.e. more safe) than the target level of safety (TLS) using Model 1 and about 30% below using Model 2. For random traffic the risk estimate was about 15% below the TLS for Model 1 and 50% below for Model 2.

1.3.5 The Group therefore concluded that the evidence presented showed that the TLS was being met, notwithstanding the relatively high error rates observed during the previous 12 months. The Group, therefore, saw no reason why the use of 60NM lateral separation could not continue.

Discussion

1.3.6 In the related discussion, the Group expressed serious concern over the overall deterioration in navigation performance, especially when also taking into account the figures reported by NAT provider States for same-direction occupancy.

1.3.7 To some extent, however, action to reduce the occurrence of errors had already been taken. During the second half of 1983 considerable publicity had been given by ICAO to the deterioration. Following this, both IFALPA and IATA had taken action to recommend closer attention by pilots to various aspects, such as the need for rigid adherence to cross-check procedures.

1.3.8 There were two other factors which the Group felt influenced the high error rate and which merited attention. One of these was the occurrence of a very significant proportion of total errors in an area which was not considered to be typical of the MNPS airspace (see para 1.4.2 below). The other factor concerned operations in the MNPS airspace which were carried out without certification by the State of Registry. It was hoped that enhanced awareness would soon reduce this problem.

1.3.9 The Group took account of actions which had been taken since August 1983 (e.g. by IATA and IFALPA) and was pleased to note that, compared with that month, the rate of occurrence of navigation errors had dropped markedly.

1.3.10 It was obvious that a continued, relatively high level of error rate could not be tolerated for a long period, and therefore close monitoring of the error situation should be continued. In view of the changes in occupancy observed between 1982 and 1983, and because of the importance of occupancy as one factor in determining the safety of the system, monitoring of occupancy was also essential, so that a re-assessment of the position could be made, should the rate of occurrence again increase markedly.

Fall-back measures

1.3.11 The Group reviewed the fall-back measures developed at its Special Co-ordinating Meeting (1980) for the case that navigation performance in NAT MNPS airspace deteriorated to the point that intervention by the provider States became necessary and confirmed their continued validity (para 2.4 of the Summary of the Special Co-ordinating Meeting (1980) refers). Although preferably a lead-time of 60 to 90 days should be provided, it was confirmed that 120NM lateral separation could be implemented with immediate effect at any time, should this become unavoidable. A subsequent introduction of 60NM/1000ft composite separation would require some time to be effected because of the need for training of ATC staff.

CONCLUSION 21/1 - APPLICATION OF 60NM LATERAL SEPARATION

That:

a) 60NM lateral separation continue to be applied in NAT MNPS airspace in view of evidence that it still meets the agreed target level of safety;

b) the fall-back measures developed by the Special NAT SPG Coordination Meeting remain valid for the case of a further marked deterioration of navigation performance in NAT MNPS airspace.

1.4 Consideration of methods of improving the effectiveness of current monitoring procedures

1.4.1 At NAT SPG/20, the Member from Canada informed the Group of the extension Northwards of the Gander/Moncton Window. The revised window currently extended from 45N to 55N along 50W. In practice, this extension meant that part of the window now lies outside radar coverage and this created some problems in making true assessment of the size of navigation errrors (at the crossing of the window line) and could thus distort the Risk Model. Canada and the Central Monitoring Agency had now proposed to resolve the problem by a realignment of the window. Ideally, of course, the window would lie within coastal radar coverage but outside the range of all short-range navigation aids, thus ensuring that observed errors are representative of the NAT Region. In practice this was not completely possible and the Group agreed that the proposed line joining points 45N 50W, 47N 50W, CARPE, OYSTR, SCROD, LOACH, PORGY would be an effective compromise. A map illustrating the matter is at Attachment B to this Agenda Item.

1.4.2 The Central Monitoring Agency reported that a sample of traffic over seven months, originating in Iceland/Greenland and flying Eastwards through the Shanwick window in MNPS airspace, showed that this traffic comprised less than 5% of the overall traffic. However, this traffic contributed over 27% of the total errors in Table A and 20% of the errors in Table B. The Group discussed the view that the errors attributed to this short-range traffic was not typical of the errors in NAT MNPS airspace and was unnecessarily distorting the risk model. The Group concluded, however, that it would be inappropriate to consider classifying this traffic as not eligible for inclusion in the risk analysis.

1.4.3 Upon further examination, the Group noted that many of the errors on this route were associated with non-HF equipped aircraft being re-routed from 60N 10W to 61N 10W to avoid Shanwick Oceanic airspace, and with the presence of aircraft which were not approved for MNPS operations on even the special routes via Iceland/Greenland. The Group agreed therefore that the published description of the route in question should be annotated to the effect that it was only available to HF equipped aircraft. Similarly, the routing via 61N 10W for aircraft equipped with VHF only, should be published. Finally it was agreed also to update the NAT Guidance Material accordingly.

CONCLUSION 21/2 - AVAILABILITY OF THE ROUTING BETWEEN STORNOWAY/BENBECULA AND KEFLAVIK

That:

a) the route published between Stornoway/Benbecula - 60N 10W -61N 1234W - LIMA - Keflavik be annotated as available for HF equipped aircraft only;

b) a routing via 61N 10W be published for use by aircraft not equipped with HF;

c) the NAT Guidance and Information Material be updated accordingly.

1.4.4 Since similar series of errors had occurred also to the West of Iceland, the Group agreed that a survey should be conducted on the Eastbound traffic operating on the special routes between Greenland, Iceland and Scotland in order to identify the cause of the errors.

CONCLUSION 21/3 - SURVEY OF NAVIGATION PERFORMANCE OF EASTBOUND FLIGHTS ROUTING VIA GREENLAND - ICELAND - SCOTLAND

That a navigation performance survey be carried out concerning flights operating Eastbound via Greenland - Iceland - Scotland to determine the cause of frequent navigation errors observed on that routing.

1.4.5 The Group considered several suggested amendments to the NAT Guidance Material in order to prevent unnecessary time delays and repetitious correspondence in the navigation performance monitoring process. Agreed revised text for the Error Report Message, the Error Report Letter, the Error Investigation Form and the Letter to the State of Registry is contained in Attachment C to this Agenda Item.

1.4.6 The Group considered the continuing problems being encountered by the Central Monitoring Agency in obtaining responses from some operators and States, despite several reminders being issued. A proposal to seek the assistance of ICAO if an adequate response had not been received by the Monitoring Agency within three months of the occurrence was not retained at this stage. It was agreed, however, that the United Kingdom would inform both the State of Registry concerned and the European Office of ICAO of a lack of response occurring. At the same time, the matter should be brought to the attention of the NAT SPG so that the Group may be aware of the situation.

1.4.7 Concluding its discussion of the subject of navigation performance monitoring, the Group unanimously expressed its appreciation and gratitude to the United Kingdom for its continuing efforts in this respect and the excellent services rendered by the Central Monitoring Agency.

1.5 Consideration of methods of improving the observed standards of navigation performance in the NAT Region

1.5.1 The Group agreed that the present system of State approval of aircraft for MNPS operations, and of the recording of such approvals, appeared to be less than fully effective and it was also agreed that there was a need for more frequent spot checks to identify offending operators.

1.5.2 Recognizing the amount of effort that was required to identify those operators whose current MNPS approval was not immediately apparent and to conduct a spot check with the State of Registry concerned, it was felt that not more than two or three such checks could reasonably be carried out per year by any given NAT provider State. The Members of Canada, the United Kingdom and the USA confirmed agreement in principle with the idea and would make necessary arrangements within their respective Administrations to that effect.

CONCLUSION 21/4 - SPOT CHECKS ON MNPS APPROVAL OF AIRCRAFT OPERATORS

That the NAT provider States make efforts to carry out spot checks at irregular intervals on the MNPS approval of selected operators in NAT MNPS airspace.

1.5.3 The Group noted the continuing occurrence of equipment control errors, in particular waypoint insertion errors, and observed that this had reached a peak in August 1983. It was felt that this might be associated with the appearance of less experienced crews and operators in the NAT Region to meet the rise in summer traffic. In an attempt to prevent a similar occurrence in 1984, the Group felt that the European Office of ICAO should be asked again to approach all States drawing attention to the problem and urging that operators be reminded of the need for adherence to standard operating procedures such as those recommended in the North Atlantic MNPS Airspace Operations Manual.

1.5.4 In view of the occurrence of the Olympic Games in Los Angeles in summer 1984 and the resulting likelihood of considerable additional traffic in the NAT MNPS airspace by operators not normally using that airspace, it was suggested that a letter be circulated to all States in all Regions.To assist the European Office, the Group developed an outline for such a circular letter and this is contained in Attachment D to this Agenda Item.

CONCLUSION 21/5 - CIRCULAR LETTER ON NAT MNPS OPERATIONS

That the European Office of ICAO circulate, not later than early May 1984, a letter to all States stressing the need for the maintainance of highest navigation standards when operating in NAT MNPS airspace.

1.5.5 While on the subject of action that could assist in reducing the occurrence of navigation errors, the Group felt that it might be useful to provide specific information pertaining to operations in MNPS airspace to pilots by means of a suitable annotation on the cover of air navigation charts used by aircrew. It was therefore agreed that an approach be made to the companies (Jeppesen, IAL) responsible for the production of route planning and navigation charts to seek their co-operation in improving the presentation of information on operation in the NAT MNPS airspace, with particular emphasis on :

i) existence and extent of the NAT MNPS airspace;

ii) need for aircraft to be approved by the State of Registry/ operator for operations in the MNPS airspace;

iii) requirement for insertion of "X" in Field 10 of the flight plan for MNPS approved operations;

iv) action to be taken in the event of equipment failure;

v) special routes for use by MNPS approved aircraft with only one long-range navigation system;

vi) operation of the NAT Organised Track System (NAT OTS).

1.5.6 The Members of the United Kingdom and the USA offered to approach IAL and Jeppesen respectively and the Group developed suitable material, contained in Attachment E to this Agenda Item.

CONCLUSION 21/6 - ANNOTATION OF AIR NAVIGATION CHARTS

That Chart producing agencies consider annotating air navigation charts covering the NAT Region with suitable text drawing the attention of flight crews to the particular operational requirements when flying in NAT MNPS airspace.

1.5.7 The Group had a lengthy discussion on the role which might be played by ATC in identifying the existence of non-MNPS approved operators in the NAT MNPS airspace. Possible ATC action discussed covered the following :

a) ATC should not offer MNPS flight levels to aircraft which have flight planned and are operating below the MNPS levels without confirmation by the pilot that the operation is MNPS approved;

b) future automatic flight plan processing systems be programmed to identify any flight plan which was filed for MNPS operations but which did not contain an "X" in Field 10. In such cases the operator/aircraft should be contacted at the earliest possible opportunity to determine whether the flight was approved for MNPS operations. Subsequent requests for clearance into MNPS airspace should be handled in the normal way, however, the relevant State of Registry should be advised of the full details of the occurrence.

1.5.8 The Group was mindful of the implications and possible consequences of these measures on the ATC system as a whole and could therefore not commit itself to firmly recommend such action. It agreed however, that the assistance of the ATC authorities of the NAT provider States be sought to develop measures aimed at the exclusion of non-MNPS approved aircraft from NAT MNPS airspace.

CONCLUSION 21/7 - ACTION TO EXCLUDE NON-MNPS APPROVED AIRCRAFT FROM NAT MNPS AIRSPACE

That NAT provider States consider measures involving ATC designed to exclude non-MNPS approved aircraft from NAT MNPS airspace.

1.6 Situation regarding longitudinal separation

1.6.1 The Group agreed that continued use of 10 minutes longitudinal separation in NAT MNPS airspace was justified. Some concern was expressed, however, at an apparent tendency for assigned Mach number adherence to be relaxed and the Group agreed that provider States should examine this situation.

EXAMPLE OF MATERIAL FOR CIRCULATION TO AIRCREW FOR ILLUSTRATION OF PARTICULAR NAVIGATION ERRORS

1. Introduction

1.1 The following contains anecdoted accounts of some of the incidents of gross errors of navigation which have occurred in the NAT MNPSA.

2. Background

2.1 It has been generally agreed that it is useful for operators to issue periodic bulletins to crews, with an analysis of gross navigation errors made by all operators. This helps to maintain an awareness in the cockpit of the need for navigation accuracy and it may assist crews in helping them to know what mistakes have to be avoided.

2.2 It is pointed out that full legally constituted enquiries are not held regarding these incidents, and thus the details of some of them may not be absolutely correct. To prevent criticism on this score, the accounts which are given totally disidentify the operators involved.

2.3 It should be appreciated that the examples given are intended to illustrate the various types of errors being made. In fact, many of the errors which occurred in the summer of 1983 were insertion errors, and most typically these were errors of 1^{o} of latitude. It does seem that such errors are more prone to be made when, after following one latitude for some time, the track changes to another latitude (eg. 54 at 50, 54 at 40, 54 at 30, 54 at 20, 53 at 15). This is a risk which could usefully be drawn to the attention of crews.

NAT ERRORS OF NAVIGATION

Example A: This flight was from UK to USA at FL350. It was observed by Gander Control approximately 47 NMs from its cleared track. Subsequent investigation indicated that the navigation system was INS x 3. The cleared track was via 49N 40W and 48N 50W, but the pilot inadvertently programmed 49N for both of these meridians. He then failed to comply with the procedures laid down by his company, both for approaching a waypoint and for leaving a waypoint, so that he did not detect the original error. The potential serious consequences were made clear to the crew by their airline.

Example B: This was from Europe to North America at FL350. The flight was observed by Gander to be 35 NM from its cleared track. Navigation was by dual-Omega, but the type of navigation system was not directly relevant to the navigation error, which stemmed in the first instance from a switch of aircraft. The original aircraft would have had to land at Gander for refuelling, and the flight plan had been based on this assumption. Consequently, the OMEGA Navigation System was programmed for the landing route instead of for the cleared overflying route. The eventual divergence from the cleared track was subject to some confusion which would perhaps not have occurred if the crew had been more experienced in North Atlantic operations.

Example C: This flight from Europe at FL310 was observed by Gander approximately 120NM north of track. Investigation suggested that before take-off, and at a critical stage of pre-flight preparation, the aircraft experienced a ground-power failure. This led to hurried procedures during which the wrong initial coordinates were inserted in the INS. It is not clear when the pilot realised the extent of the problem, but he did advise ATC of the unreliability of his navigation about 40 minutes before reaching radar cover, thus helping to reduce risk.

Example D: This flight at FL 370 was observed by Shannon 60 NM from track. The aircraft had been given a reclearance by Shanwick, but although the crew correctly acknowledged this, they nevertheless followed the original clearance. Therefore the cause of the divergence from track does not seem to be an "error in the ATC-loop" but seems to stem from the crews' standard of the English language being inadequate.

Example E: This flight was not observed by radar, but according to the Air Report was 1° South of cleared track at 30°W. The original fault lay with the person operating the company flight planning computer: when inserting the coordinates for the Organized Track which the aircraft would eventually follow, he put 52N instead of 53N for the 30W meridian, and this appeared on the ATS flight plan. However, subsequent failures occurred:

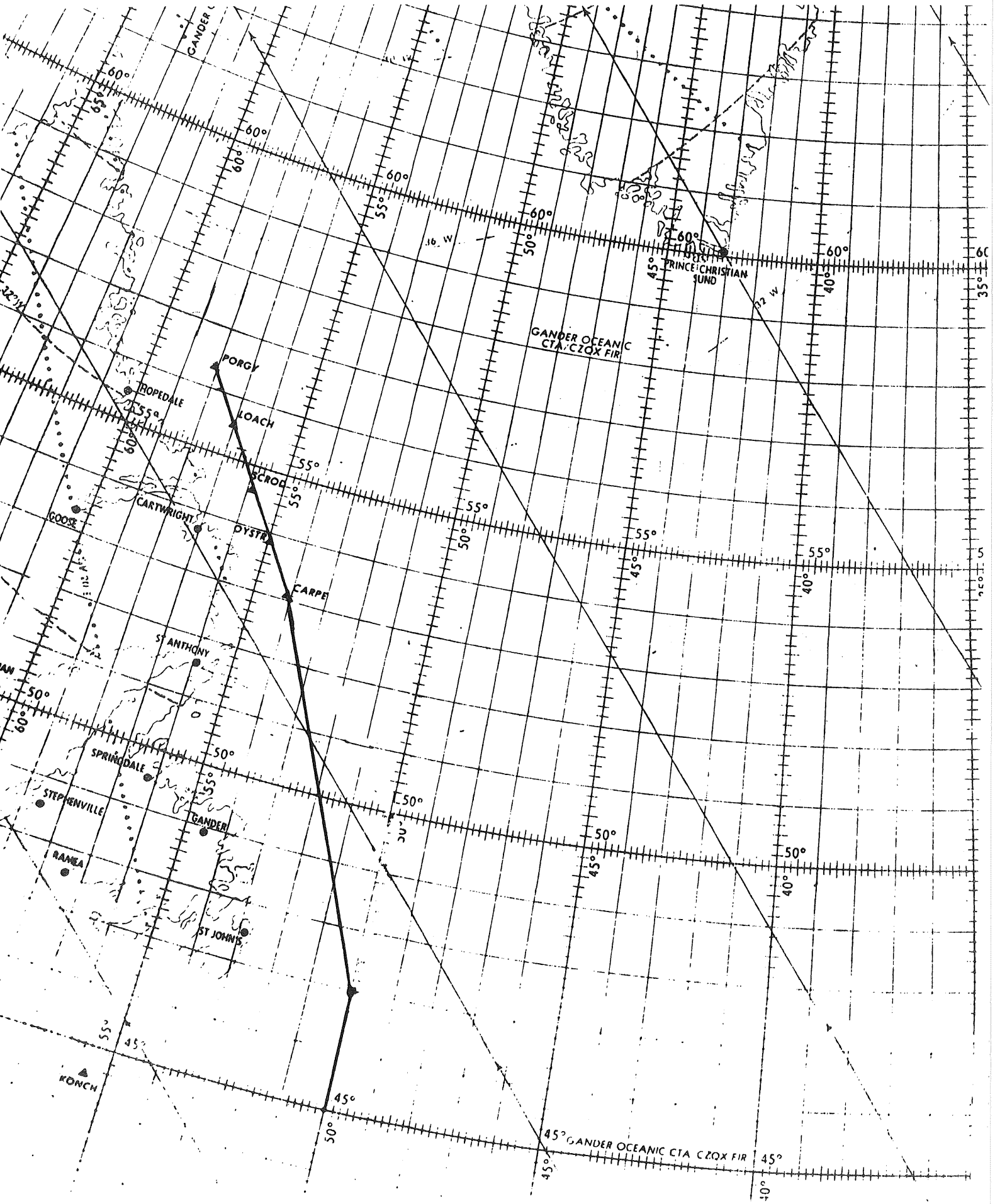
a) the crew should have noted the difference when checking the electronic flight plan against the OTS message, but failed to do so;

b) the crew was authorised to check the NAT track details by listening to the special VHF broadcast, but when they did this they failed to check the operational flight plan co-ordinates as required by company procedures, checking instead the details fo the OTS message, which was of course correct;

c) ATC failed to note that the forward position in the Air Report was incorrect, even though it was given both at 15W and 20W.

Example F: The flight was eastbound at FL330 and observed 60 NM North of track. Investigation showed that this was due to the navigator inserting the incorrect latitude for the Oceanic boundary. Some other task interrupted the cross check procedures and these were not completed as laid down by the company.

Attachment B
to Agenda Item 1



REVISED FORMATS USED BY CENTRAL MONITORING AGENCY

(3 - 27)

MESSAGE FORMAT FOR THE INITIAL NOTIFICATION OF OPERATORS AND/OR STATES OF REGISTRY AND THE CENTRAL MONITORING AGENCY OF AN OBSERVED DEVIATION

The following format should be used for messages serving as an initial notification of an observed deviation of 25NM or more from track.

This format should be used regardless of the means of communication chosen for the transmission of the initial notification.

GROSS NAVIGATION ERROR REPORT MESSAGE

REPORTING AGENCY

DATE

TIME

AIRCRAFT IDENTIFICATION AND OPERATOR

AIRCRAFT TYPE

ATC CLEARED TRACK (including positions prior to radar cover)

RADAR OBSERVED POSITION (in Latitude and Longitude)

CLEARED FLIGHT LEVEL

PLEASE ACKNOWLEDGE RECEIPT