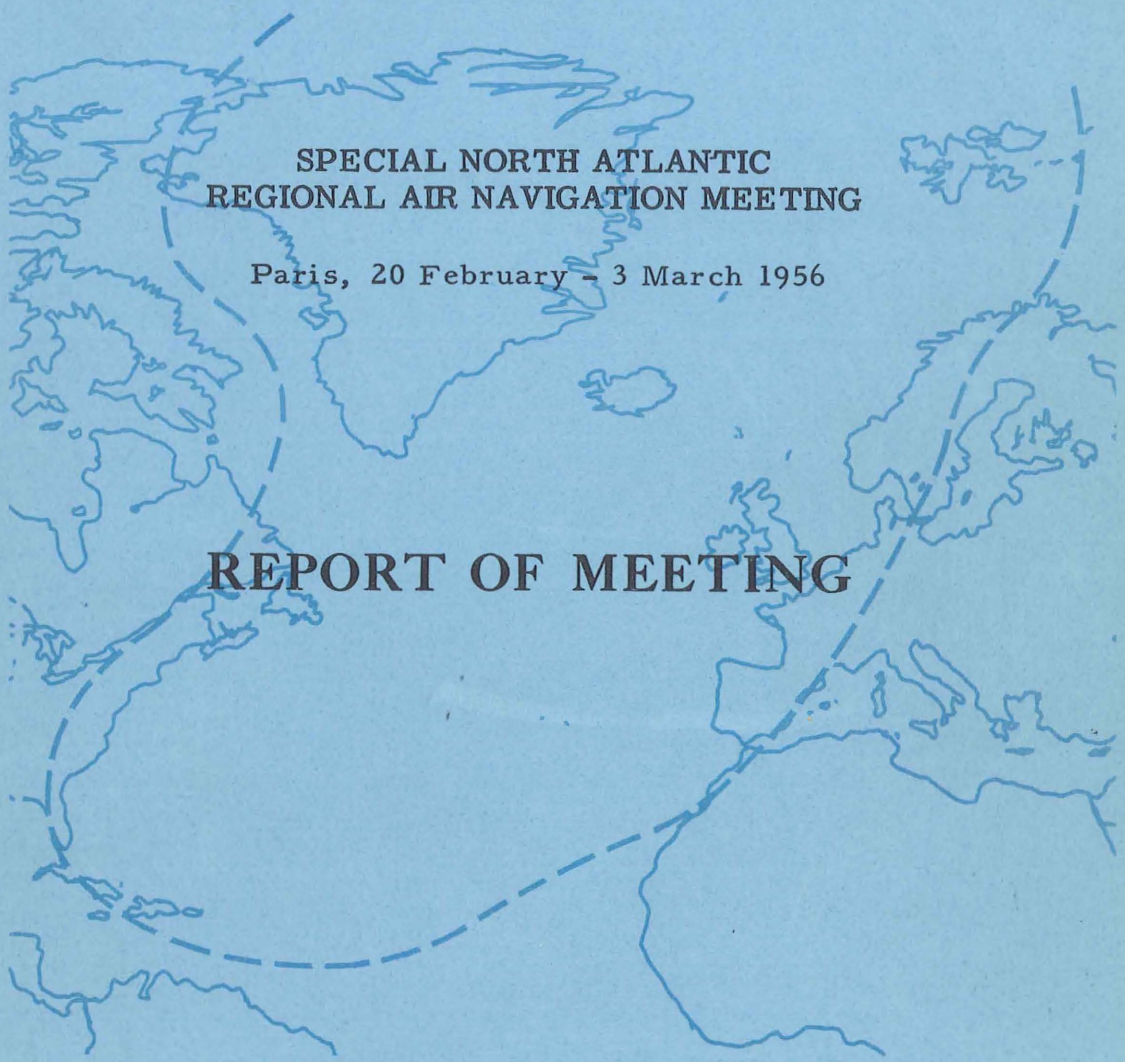
Doc 7677, SP/NAT RAN/I

INTERNATIONAL CIVIL AVIATION ORGANIZATION



SPECIAL NORTH ATLANTIC REGIONAL AIR NAVIGATION MEETING

Paris, 20 February - 3 March 1956

REPORT OF MEETING

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

INTERNATIONAL CIVIL AVIATION ORGANIZATION

REPORT OF THE
SPECIAL NORTH ATLANTIC REGIONAL AIR NAVIGATION MEETING

Paris, February 1956

SUPPLEMENT N°. 1

The President of the Council, acting under power delegated to him by the Council at the 18th Meeting of its 27th Session on 15 March 1956, and with the advice of the Air Navigation Commission in its 475th Report to the Council, took the action indicated herein on the Final Report and Recommendations of the Special North Atlantic Regional Air Navigation Meeting.

RECOMMENDATIONS APPROVED WITHOUT COMMENT

Nos. 1, 2, 12, 13, 14, 15, 17, 19, 20, 21, 25, 26, 27, 28, 29, 30, 31, 36, 37, 38, 39, 40, 41, 42, 43, 45, 46, 47, 48, 49, 50.

ACTION ON OTHER RECOMMENDATIONS

Recommendation No. 3

The President of the Council approved this recommendation and requests States to make information available to the Secretary General to enable him to carry out the intent of this recommendation.

Recommendation No. 4

The President of the Council approved this recommendation, noting that:

- paragraph 2.1.6.1.1

  when reviewing the recommendation of the 2nd Air Navigation Conference for amendment of Annex 2, the Air Navigation Commission will consider amending Appendix C of the Annex to allow for this practice.

- Appendix B

  (a) The example will require editing to align it with similar examples in the PANS-RAC;

(b) The omission of the abbreviation "FL" in item (d) is contrary to the instructions in Attachment A of the PANS-RAC, which should be amended to allow for such omission when specified regionally.

Recommendation No. 5

The President of the Council approved this recommendation with the exception that "DR" must be included, as required by the PANS-RAC, when the fix has been taken by dead reckoning. The President recognized that the classification "DR" would not apply to a position determined by other means since the last position report and projected by dead reckoning to the next compulsory reporting line.

Recommendation No. 6

The President of the Council approved this recommendation, with the addition in paragraph (a) of:

"Tromsø, south of latitude 70°."

Recommendation No. 7

The Air Navigation Commission, acting under delegated authority, approved this recommendation, noting that paragraph (c) would constitute a new item on its work programme.

Recommendation No. 8

The President of the Council approved this recommendation, noting that:

- paragraph 1.1 (b)

  the notification by the pilot of the change in ETA allows him to continue the flight on the basis of the new ETA, subject to further instructions from air traffic should this become necessary to maintain appropriate separation from other aircraft as specified in paragraph 10.2 of Part III of the PANS-RAC.

- paragraph 3.1

  the Supplementary Procedure is not inconsistent with Annex 2 (contrary to the doubt expressed in the statement in paragraph 2.2.1.4, Part II, Section 2 at page 19 of the Report) since the clearance is predicated on the ETA at next reporting line for which it is required that changes be notified to air traffic control. (See para 2.1.2 (b) ii) page 18 of the Report and comment above.)

Recommendations Nos. 9 and 10

The President of the Council approved these recommendations, empha-- sizing the need for close co-operation between operators and administrations, providing ground services, to minimize congestion on air-ground channels.

Recommendation No. 11

The President of the Council approved this recommendation on the understanding that the transmission of meteorological information to aircraft in flight with the concurrence of the operator's local representative would be by agreement between the Meteorological Authority and the operator under the terms of paragraph 2.5.3.7.13 of the PANS-MET.

Recommendation No. 16

The President of the Council approved this recommendation with the substitution of the term "NAT Area Control Centre" for "Oceanic Area Control Centre".

Recommendation No. 18

The President of the Council approved this recommendation and, noting that States of Registry may often be better able to call this recommendation to the attention of the operators of aircraft on their registry than the States operating North Atlantic control areas, suggests that States of Registry also note the Recommendation and bring it to the attention of their operators.

Recommendation No. 22

The President of the Council approved this recommendation noting that the principles proposed by the 2nd Air Navigation Conference have not yet been approved.

Recommendation No. 23

The President of the Council noted this recommendation.

Recommendation No. 24

The President of the Council noted that the procedure desired by the Committee (paragraph 1.9, page 3-5 of Part III and paragraph 2.6, page 9-3 of Part IX of PANS-RAC) is presently applicable - and actually applied - in the North Atlantic, and that it would be in conflict with the PANS-RAC to implement the new phraseology, not yet finalized, recommended by the 2nd Air Navigation Conference, before the amendment to the PANS-RAC comes into force.

The President further noted that the phraseology of this recommendation does not strictly conform to that used by the 2nd Air Navigation Conference in the passage cited, as the current recommendation relates only to clearance to change cruising level and the Conference recommendation was not so limited. The President therefore approved the intent of the recommendation but did not approve the application of the specific phraseology proposed by the 2nd Air Navigation Conference.

Recommendation No. 32

The President of the Council noted that the Air Navigation Commission, acting under delegated authority, approved the intent of this recommendation and instructed the Secretariat to submit, at its next session, proposals for amending the text of paragraph 12.4 - Doc 7181-COM/546/3 taking into account the views expressed by the Meeting.

Recommendation No. 33

The President of the Council, noting that the ICAO Radiotelephony Procedures do not call for a read-back of the MET portion of the AIREP, approved this recommendation and invites States not to require that the MET portion of the AIREP be read back, as a routine measure, at communications stations under their jurisdiction.

Recommendation No. 34

The President of the Council noted that the Air Navigation Commission, acting under delegated authority, agreed that no action was necessary on this recommendation as the present procedures do not call for a read-back of the MET portion of the AIREP.

Recommendation No. 35

The President of the Council approved this recommendation noting that, under paragraph (2) of the Recommendation, in the cases considered it is open to the States suffering interference to inform ICAO of any such interference, suggests that that be done in any such cases.

Recommendation No. 44

The President of the Council approved the intent of this recommendation to the effect that States investigate all possible means for early implementation of the project, once agreement to initiate it is reached.

Recommendation No. 51

The President of the Council took no action on this recommendation, but draws it to the attention of States operating NAT area control centres.

- END -

LETTER OF TRANSMITTAL

To: The President of the Council

From: The Chairman of the Special North Atlantic Regional Air Navigation Meeting, Paris, February 1956

I have the honour to submit herewith, for the consideration of the Council, the Report of the Special North Atlantic Regional Air Navigation Meeting held in Paris from 20 February to 3 March 1956.

D. Haguenau
Chairman

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LIST OF RECOMMENDATIONS

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	A2	-	4		B10	-	36
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	B8	-	34				

AGENDA

1. Preparation of recommendations for measures to expedite the safe and orderly flow of air traffic in the Region, with particular attention to the following elements:

1.1 Position Reporting

a) Alternative position reporting procedures, especially those associated with position reporting at fixed geographical lines in light of the errors and limitations associated with reports at scheduled times;

b) ATS units' requirements for information in the position report relative to present position and estimated future positions;

c) The relationship between the contents of position reports and flights plans;

d) Practicability of a system of abbreviated position reports;

e) Reporting of method of position fixing.

1.2 Air Traffic Control Clearances

a) Improvements in the procedures associated with requests for changes in clearances;

b) Provision of flight plan information from areas outside the Region to Oceanic Area Control Centres in sufficient time to permit advance planning for incoming aircraft.

1.3 Meteorology

a) ATC difficulties caused by differences in flight plans arising from disagreement among the upper air charts prepared at different locations;

b) Practicability of reducing the volume of air-to-ground and ground-to-air MET messages, to relieve congestion on air-ground circuits, including an appraisal of the effectiveness of the VOLMET system;

c) Requirements for 300 mb forecasting.

1.4 General Operating Practices

a) More effective use of lateral separation as a control element;

b) More effective use of the procedures for clearance at odd or even altitudes regardless of the direction of flight;

c) Suitability of the existing separation criteria;

d) Arrangements for reporting and investigating incidents involving the use of incorrect procedures.

1.5 Communications

a) Clarification of certain aspects of the present assignment plan for HF radiotelegraphy and radiotelephony frequencies;

b) Status of Ground Wave RT scheme;

c) ATC inter-centre communications problems, including the possible use of commercial cable;

d) Minimum number of HF and VHF channels needed in aircraft;

e) Present use of the 121.5 Mc/s guard channel.

1.6 Control Centres

a) Long range radar coverage in terminal areas;

b) Implications of any new procedures on personnel and equipment requirements;

c) Exchange of views directed toward improvement in co-ordination and uniform application of procedures and practices among area control centres.

PART I - CHAIRMAN'S REPORT

1.- PLACE AND DURATION OF THE MEETING

1.1 The Special North Atlantic Regional Air Navigation Meeting was convened at the ICAO European and African Office, Paris, on Monday, 20 February 1956 and completed its work on Saturday, 3 March 1956. Two plenary meetings were held.

2.- OFFICERS AND SECRETARIAT

2.1 Mr. D. Haguenau (France) was elected Chairman of the Meeting.

2.2 The Meeting was assisted in its work by Mr. T.S. Banes, Senior ICAO Adviser and by Messrs. O. Lönnqvist, H.E. Pujade and R.M. Soward of the ICAO Secretariat. Mr. L. Bedin of the ICAO Secretariat acted as Secretary General of the Meeting.

3.- REPRESENTATION

3.1 The Meeting was attended by the representatives of the following States and international organizations:

Belgium	Israel	International Airline Navigators Council
Canada	Netherlands	International Air Transport Association
Denmark	Norway	International Federation of Airline Pilots Associations
France	Spain	
Germany	Sweden	International Telecommunication Union
Iceland	United Kingdom	World Meteorological Organization
Ireland	United States	

A list of the representatives accredited as participants in the Meeting and the Committees attended by them is at Appendix H to this Report.

4.- APPROVAL OF THE AGENDA

4.1 The Agenda transmitted to the Meeting by the Air Navigation Commission was accepted subject to modification of Agenda Item 1.5 a) (clarification of certain aspects of the present assignment plan for HF/RT frequencies) to include also the radiotelegraphy part of the NAT Aeronautical Mobile Service HF En-route Plan.

5.- WORKING ARRANGEMENTS

5.1 The Meeting established two Committees (A and B), assigning to them the various Agenda Items, as follows:

Committee A:
- 1.1 Position reporting
- 1.2 Air Traffic Control Clearance
- 1.3 a) ATC difficulties caused by differences in flight plans arising from disagreement among the upper air charts prepared at different locations
- 1.4 General Operating Practices
- 1.6 Control Centres

Committee B:
- 1.5 Communications
- 1.3 b) Practicability of reducing the volume of air-to-ground and ground-to-air MET messages, to relieve congestion on air-ground circuits, including an appraisal of the effectiveness of the VOLMET system
- 1.3 c) Requirements for 300 mb forecasting.

5.2 Mr. R.W. O'Sullivan (Ireland) and Mr. E. Shores (United States of America) were elected Chairmen of Committees A and B respectively. Five meetings of Committee A and four of Committee B were held.

5.3 The Committees formed the following Working Groups to examine and report on specific Agenda Items:

Working Group A-1, - Rapporteur Mr. R.A. Pearson (United Kingdom) /Agenda Items 1.1, 1.4 a), 1.4 b) and 1.4 c)/

Working Group A-2, - Rapporteur Mr. R.W. O'Sullivan (Ireland) /Agenda Items 1.2, 1.4 d), and 1.6/

Working Group B-1, - Rapporteur Mr. W.L. Halnon (United States of America) /Agenda Items 1.3 b) and 1.3 c)/

Working Group B-2, - Rapporteurs Mr. R.G. Fall and Mr. P.H.E. Hope-Ross (United Kingdom) /Agenda Items 1.5 b), 1.5 c) and 1.5 e)/

Working Group B-3, - Rapporteur Mr. H.E. Moeshart (Netherlands) /Agenda Items 1.5 a) and 1.5 d)/

Working Group B-4, - Rapporteur Mr. G.E. Enright (Ireland) /Agenda Item 1.3 b)/

Working Group A-2/B-1 - Rapporteur Mr. W.L. Halnon (United States of America) /Agenda Item 1.3 a)/

5.4 The proceedings of the Meeting was conducted in English and French and the working papers and documents of the Meeting were produced in these languages.

5.5 For administrative convenience the Paris edition of this Report was printed in two separate parts consisting of the reports of Committee A and Committee B. This present Montreal edition consists of a consolidation of the reports prepared at Paris, and a check list of recommendation numbers, giving a cross reference to the recommendations in the separate reports of Committee A and Committee B, issued in Paris, is included at page 4.

PART II - RECOMMENDATIONS AND CONCLUSIONS

SECTION 1.- GENERAL

1.1 The Meeting was of the opinion that it would be desirable for the Council of ICAO, in approving the recommendations contained in Section 2 of this report, to emphasize the necessity of their implementation by all concerned at the earliest possible date.

1.2 The Meeting also noted that the difficulties which are being experienced in the control of air traffic in the NAT Region would have been reduced significantly had the recommendations of the 3rd NAT RAN Meeting been implemented more fully and might have made it unnecessary to convene this Special Meeting.

1.3 The Meeting also recognized that the action it has taken in no way reduces the importance of the implementation of the current approved plan for facilities and services in the NAT Region and urged that States required to provide facilities and services in territories under their judisdiction pursue vigorously all avenues, unilateral or multilateral that will permit full implementation to be achieved.

1.4 Recommendation No. 1 - That the Council of ICAO, recognizing the severe penalties that the regularity and efficiency of North Atlantic operations will otherwise suffer during the coming summer, urge the States concerned to take immediate action to implement the approved recommendations made by this Meeting.

1.5 Recommendation No. 2 - That the Council of ICAO, recognizing that the implementation of the recommendations of the Special NAT RAN Meeting will not in themselves solve the over-all ATC problem but are in some cases only interim measures, urge States to act promptly to implement in full the currently approved NAT Regional Plan, particularly those parts relating to the provision of navigational aids and improved communications techniques, facilities, and services directly required for better ATC services.

1.6 Recommendation No. 3 - That ICAO provide the States of the Region with progress reports which will reflect not only the status of implementation of facilities and services but also the status of implementation of recommended practices and procedures.

SECTION 2.- ACTION ON THE AGENDA

2.1 Agenda Item 1.1: Position Reporting

a) Alternative position reporting procedures, especially those associated with position reporting at fixed geographical lines, in light of the errors and limitations associated with reports at scheduled times;

b) ATS units' requirements for information in the position report relative to present position and estimated future positions;

c) The relationship between the contents of position reports and flight plans;

d) Practicability of a system of abbreviated position reports;

e) Reporting of method of position fixing.

2.1.1 The Meeting noted that with the existing system of reporting position at hourly intervals, a controller receiving a position report is required to compute the time and latitude at which the meridian of reference would be crossed. For some oceanic control areas, the meridians of reference are at present spaced at intervals of 10° of longitude, for other CTAs at 5° intervals, and for others at 4° intervals. The display system at the corresponding area control centres had been designed accordingly.

2.1.2 The Meeting agreed that the position information available to the Air Traffic Services is not necessarily as complete as that available to aircraft and therefore separation criteria are applied to positions rendered inaccurate through errors of computation. In consequence, there may be an inefficient use of airspace.

2.1.3 It was, therefore, agreed that if the present system of reporting position at fixed intervals of time could be replaced by a system of reporting at fixed geographical lines (reference meridians or parallels) the amount of computation by the ACCs would be reduced, and a gain in airspace utilisation would result.

2.1.4 The principles which guided the Meeting in arriving at these conclusions were:

1) All aircraft would maintain, so far as is possible, their latest cleared track, true airspeed and cruising level.

2) Each position report would be based on the best obtainable navigational fix; the time of fixing aircraft position being arranged so as to provide the most accurate position reports and estimates possible.

2.1.5 In determining the frequency of position reports, the Meeting recognized that too frequent reporting would result in an unacceptable workload in the cockpit and in over-burdening communications channels. It is not envisaged that, with the reporting system proposed, the frequency of reporting position will in general be significantly different from that associated with the present system of hourly position reports. The Meeting noted that, in accordance with PANS RAC Part III, para. 12, additional reports may be requested by the appropriate air traffic services unit when required for air traffic control purposes.

2.1.6 The Meeting also reached agreement on the contents of the flight plan essential for North Atlantic flights under the system of position reporting at fixed geographical lines. In particular, in item (d) of the flight plan the reporting points shown should include those on the designated fixed reporting lines; in addition the true airspeed for the previous sector of the route should be included; on the other hand, average TAS for the whole flight (item g) of the ICAO Flight Plan form is of little value to ATS; furthermore, it was considered unnecessary for North Atlantic flights to file information on navigational and approach aid equipment (item k) or to include the abbreviation FL after the flight level number in item d).

2.1.6.1 Recommendation No. 4.- that the following amendments be made to the Regional Supplementary Procedures (Doc 7030) Part 2, for application in the area defined in Recommendation No. 6:-

Insert the following additional procedures:

2.1.6.1.1 /Page 2-1-3/ - Flight Plans (A2 - 3.3.1 and P - Part II - 7)

"6.1.2 The position on the designated position lines and the true airspeed shall be included in item d). Omit the abbreviation "FL" after the flight level number.

(PANS RAC do not provide for the inclusion of TAS in item d) of the flight plan.)

6.1.3 No entry shall be made in items g) and k).

Note.- An example of the information required for a flight plan for a North Atlantic flight is at Appendix B."

2.1.6.1.2 /Page 2-1-5, para. 7.2/ - "Time or Place of Position Reports" (A2 - 5.3.2 and 5.3.5.1 and P - Part III-12)

"1. Within the NAT flight information regions, unless otherwise required by ATS, position reports shall be made at fixed reporting lines coincident with the meridians spaced at intervals of 10° of longitude from the Greenwich meridian to longitude 70°W. Compulsory position reports may also be required by ATS at intermediate meridians spaced at intervals of 10° of longitude between 5°W and 65°W.

1.1 For aircraft operating at high speed or in northern latitudes, however, ATS may specify position reports at intervals greater than 10° of longitude, e.g. reports might be required at the first fixed reporting line crossed after entering a control area and thereafter at intervals of 20° of longitude.

1.2 In requiring position reports from intermediate meridians (5°W - 65°W) or in specifying position reports at intervals greater than 10° of longitude, the ATS authorities will be guided by the requirement to have position information at approximately hourly intervals and also by the need to cater for varying types of aircraft and for varying traffic and meteorological conditions.

Note.- As a guide, a table of flight times and ground speeds for typical North Atlantic routes is at Appendix C. In practice, a pattern of reporting points should soon be established for any particular route system.

1.3 For aircraft whose track is in a predominantly north-south direction, however, compulsory position on reports shall be made at fixed reporting lines coincident with parallels of latitude spaced at intervals of 5°, or as otherwise specified by ATS.

2. Each position report shall be based on the best obtainable navigational fix. The time of fixing aircraft position shall be arranged so as to provide the most accurate position reports and estimates possible.

3. The position report shall be transmitted at the time of crossing a reporting line or as soon thereafter as possible.

4. Contents of Position Report

4.1 "Position"

"Position" shall be expressed by the latitude and longitude of crossing the fixed reporting line.

4.2 "Estimated next position"

"Estimated next position" shall be expressed as the latitude, longitude and time of crossing the next fixed reporting line.

4.3 Example: 52 30 20W
At 0225
Flight level 190
Sky clear
Estimating 5125 10W at 0320"

2.1.6.1.3 Air Traffic Control Clearances - Use by ATS of abbreviated clearances. (P - Part III - 16.3, A.11 - 3.5.1)

"1. Whenever practicable, clearances issued by ATS shall be abbreviated.

2. A method of accomplishing this is by use of the phrase "cleared via flight planned route" to describe any route, or portion thereof, which lies within the North Atlantic FIRs and is identical to that filed in the flight plan.

2.1 When this phrase is used, the following additional conditions shall be observed:-

2.1.1 The clearance shall include:

a) Specific altitude assignments.

b) Sufficient routing details definitely to establish the aircraft on its flight planned route.

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

2.2 The phrase "cleared via flight planned route" shall not be used when granting a reclearance."

2.1.7 A suggestion was considered that an abbreviated form of position report should be used for on-request reports in order to indicate that an aircraft was flying in accordance with its flight plan. It was agreed, however, that "All's Well" reports are not in general necessary in the NAT Region and that standardization of the form of abbreviated position reports for use in this Region is not necessary at the present time.

2.1.8 The Committee took note of Recommendation No. 18 by the RAC/SAR Committee at the 3rd NAT RAN Meeting, but considered that position reports should not contain an indication of the method of position fixing adopted because the method of fixing does not necessarily in itself indicate the order of accuracy of the fix. The Meeting did not wish, therefore, to qualify the degree of accuracy of the position by a figure in the position report, as had been proposed.

2.1.8.1 Recommendation No. 5 - that position reports should not contain an indication of the method of position fixing adopted.

2.1.8.2 In making the above Recommendation, the Meeting was of the opinion that, in the event of approval by the Council of the amendment to Appendix 1, Page A-2, Item 2, of PANS RAC Doc 7030 RAC 501/5 (the AIREP form) as recommended on page IV-41 of the Report of the 2nd Air Navigation Conference Doc 7625 AN-CONF/2, the Meeting's Recommendation should be reflected in Regional Supplementary Procedures for the NAT Region.

2.1.9 The Meeting recognized the need to introduce a system of reporting position at fixed geographical lines before the seasonal increase in traffic in the summer of 1956 in those FIRs, or parts of FIRs, of the NAT Region lying to the south of latitude 70°N. Although the recommended position reporting procedures include special provisions for aircraft operating in high latitudes, the Committee was of the opinion that it would be preferable for the existing NAT Supplementary Procedures to continue to be applicable in the area to the north of latitude 70°N.

2.1.9.1 Recommendation No. 6 -

(a) that the system of reporting position at fixed geographical lines together with the associated regional supplementary procedures be implemented at Noon GMT on 1st May 1956 in the following FIRs:-

√ Gander Oceanic
√ Narssarssuaq
√ New York Oceanic
√ Reykjavik (south of latitude 70°N)
Santa Maria 15.10.56
√ Shannon/Prestwick
√ Stavanger Oceanic
√ Thule (south of latitude 70°N)

(b) that in those FIRs, or parts of FIRs, of the NAT Region lying to the north of latitude 70°N, namely FIRs:

Nord
Reykjavik (part)
Thule (part)
Tromsø Oceanic (part)

the existing NAT Supplementary Procedures should continue to apply.

Note.- FIR's Nord, Thule and Tromsø Oceanic are not yet implemented.

2.1.10 The Meeting further agreed that it would be necessary to review the system of reporting position at fixed geographical lines and its associated procedures in the light of experience gained during the summer season of 1956. To this end, it is of the utmost importance that Member States

of the NAT Region and interested international organizations notify ICAO by 1st November 1956 of their experience of the system and that the Air Navigation Commission review the comments of States and interested international organizations to ensure that any necessary amendments to the system are introduced before the summer season of 1957.

2.1.10.1 Recommendation No. 7 -

a) that the system of reporting position at fixed geographical lines and its associated procedures be reviewed in the light of experience gained during the summer season of 1956;

b) that Member States of the NAT Region and interested international organizations notify ICAO by 1st November 1956 of their experience of the operation of the system;

c) that the Air Navigation Commission review the comments of States and interested international organizations to ensure that any necessary amendments to the system are introduced before the summer season of 1957.

2.1.11 The new procedures considered essential to the introduction of a fixed line reporting system are recommended for inclusion in Regional Supplementary Procedures for the NAT Region. (Recommendation No. 4) These procedures include provision for the use by ATS of abbreviated forms of air traffic control clearance.

2.1.12 At Appendix C are tables showing, for typical North Atlantic tracks, the flight time at different ground speeds between successive meridians spaced at intervals of 5° of longitude. The Meeting considers that these tables, which were presented by IATA, will provide useful guidance to ATS authorities in the selection of compulsory reporting lines for particular routes or flights in accordance with the recommended procedures.

2.2 Agenda Item 1.2: Air Traffic Control Clearances

2.2.1 Agenda Item 1.2 a): Improvements in the procedures associated with requests for changes in clearances

2.2.1.1 The Meeting was confident that strict compliance with para. 5.3.1 of Annex 2 in respect of adherence to track will help to reduce air traffic control problems in the North Atlantic Region.

2.2.1.2 The great importance of this compliance is strongly emphasized, particularly if greater use of lateral separation is to be made with safety.

2.2.1.3 The Meeting considered that in order to ensure complete understanding between pilots in command and air traffic controllers of the detailed methods to be followed in complying with para. 5.3.1 of Annex 2, amendment of Doc 7030 is necessary.

2.2.1.3.1 Recommendation No. 8 - that the following amendments be made to the Regional Supplementary Procedures (Doc 7030) Part 2:-

Insert the following additional procedures:-

"1. Inadvertent deviation from flight planned track or ETA.

1.1 If an aircraft inadvertently deviates from flight plan, the following action shall be taken:

a) Deviation from track

When the pilot-in-command determines that his aircraft is off the approved track, he shall take action to adjust as soon as possible the path of the aircraft to regain the approved track as soon as is, in the circumstances, reasonable, and not further ahead than 200 nautical miles from the DR position at which heading was altered to regain track. On no account shall positive action to regain track be delayed in anticipation of obtaining a requested reclearance.

b) Error in ETA

If at any time the pilot in command becomes aware that his forward estimate is in error by 10 minutes or more, he shall immediately notify the appropriate ATS unit of his revised ETA for the next designated reporting line or point.

Note.- This procedure does not supersede any published requirements for aircraft approaching a domestic area from the oceanic area.

2. Requests for amended clearance

2.1 When an aircraft requests an amended clearance, the following procedure shall be followed:-

1. Amended clearance to change altitude

Aircraft shall give the revised ETA for the next reporting line.

2. Amended clearance to change track

Aircraft shall give the following information on the requested track:-

a) the latitude (or longitude) of crossing each reporting line, except where the new track is a Great Circle or Rhumb Line route, when these terms may be used;

b) whether -

i) the clearance becomes effective as soon as possible, or

ii) at a time and position ahead.

Requests in accordance with (b) (i) shall designate the position to which amended clearance is requested.

Requests in accordance with (b) (ii) shall designate the time and position from which, as well as the position to which, amended clearance is requested.

Any clearance issued by the ATS unit shall specify the position from which the new track shall commence and shall further specify the position of crossing the compulsory reporting lines, except where the new track is a Great Circle or Rhumb line route, when these terms may be used.

Note.- Other terms such as "Lindy Line", Pressure pattern, etc., shall not be used."

2.2 If the amended clearance is requested at the time a position report is made, the information contained in that report shall be given on the assumption that the aircraft is proceeding in accordance with the current clearance, and not with that which is being requested.

3. Premeditated change of true airspeed

3.1 At any time a change in true airspeed of 10 knots or more from that filed in the flight plan, or portions thereof, is premeditated, with the intention that such increase or decrease in TAS be applicable to that filed for the remaining portion, or relevant portions, of the flight, the pilot in command shall notify the appropriate ATS unit before making the change. If unable to notify ATS before making the change, he shall do so as soon as possible thereafter.

Note.- Annex 2, para. 5.3.1 requires that:- "No deviations shall be made from the requirements of an air traffic control clearance unless an emergency situation arises which necessitates immediate action in which case, as soon as possible after such emergency authority is exercised, the aircraft shall inform the appropriate air traffic control unit of the deviation and, if necessary, obtain an amended clearance."
(See para. 2.2.1.4)

2.2.1.4 The Meeting recognized that the procedure in para. 3.1 of this recommendation may be considered inconsistent with para. 5.3.1 of Annex 2. The Committee was of the opinion, however, that, in the North Atlantic FIRs to which it is recommended the procedure should apply, there is no necessity for pilots in command to request an amended clearance on account of deviations from the true airspeed filed in the flight plan but only to notify ATS of changes in true airspeed, in the circumstances prescribed in para. 3.1 of the Recommendation. The reasons for this opinion are:

a) strict application of the provisions of Annex 2 in this respect is considered impracticable;

b) amendment of the clearance in the event of deviations from the filed true airspeed is not considered essential for air traffic control purposes in the NAT Region at the present time provided that para. 3.1 of the Recommendation is observed;

c) the need to reduce the volume of communications traffic.

2.2.2 Agenda Item 1.2 b): Provision of flight plan information from areas outside the Region to Oceanic Area Control Centres in sufficient time to permit advance planning for incoming aircraft

2.2.2.1 The Meeting draws attention to the importance of advanced planning by ACCs of North Atlantic control areas to take account of aircraft coming from domestic FIRs.

2.2.2.2 It is considered desirable that the ATS authorities directly concerned ensure -

i) when necessary, and by mutual arrangement, that the estimated time of crossing the boundary of the North Atlantic control area be included under item (n) of the flight plan.

ii) that the ACCs of the North Atlantic control areas concerned receive, as soon as possible, information transmitted by domestic ACCs for North Atlantic flights.

2.2.2.3 It is important for the ACC of a North Atlantic control area to inform the operator (the pilot in command in flight and the operator's local representative, if any or as agreed locally) as soon as possible if it appears that a considerable change in flight planned route and/or cruising level will be necessary owing to traffic conditions.

2.2.2.4 It is also desirable for ATS to take the initiative in suggesting to the operator alternative routing or altitudes which might be quickly evaluated in the aircraft or by the local representative on the ground."

2.3 Agenda Item 1.3: Meteorology

2.3.1 Agenda Item 1.3 a): ATC difficulties caused by differences in flight plans arising from disagreement among the upper air charts prepared at different locations

2.3.1.1 The subject was approached from the standpoint of firstly clarifying the magnitude of the problem, and secondly considering suggested methods for overcoming the difficulties cited.

2.3.1.2 The lack of statistical evidence relating to the problem hampered the work of the Meeting.

2.3.1.3 The question of ways and means to eliminate or minimize differences between upper air forecast charts prepared by different Meteorological Offices was discussed. No suggestions were forthcoming, however, as to action which might be taken by States in this regard in a relatively short period of time.

2.3.1.4 During the course of the discussions, the following views were expressed:-

a) From the short range viewpoint adoption of the recommended new flight plan and reporting procedures in the North Atlantic Region may serve to alleviate certain of the difficulties through more rigid adherence to the flight plan or appropriate amendment of the flight plan.

b) From the long range viewpoint:

i) the adoption of a system of area forecasts might prove useful;

ii) it is expected that the study in which the WMO is at present engaged as a result of Recommendation 46 (MET IV - CAeM I) may ultimately contribute to alleviating the existing difficulties.

2.3.2 Agenda Item 1.3 b): Practicability of reducing the volume of air-to-ground and ground-to-air MET messages to relieve congestion on air-ground circuits, including an appraisal of the effectiveness of the VOLMET system.

Ground-to-air aspect

2.3.2.1 The Meeting developed the following recommendations in the interest of reducing congestion on the ground-to-air channels:

2.3.2.1.1 Recommendation No. 9 - that States should draw the attention of aircraft operating agencies to the need for pilots to make the maximum possible use of VOLMET Broadcasts in order to keep to a minimum requests for meteorological information available on VOLMET Broadcasts.

2.3.2.1.2 Recommendation No. 10 - that States should draw the attention of aircraft operating agencies to the need to exercise a critical approach both to the number and contents of messages containing meteorological information transmitted to aircraft on the initiative of a ground agency, and to exercise discretion in requests from aircraft for meteorological information, in order that replies need not be unnecessarily lengthy.

2.3.2.1.3 Recommendation No. 11* - that, in order that the operational need for transmission, on ground initiative, of meteorological information to aircraft in flight may be determined by the aircraft operating agencies' local representative, such transmission should normally be initiated by or with the concurrence of that local representative.

(References: PANS MET, paras. 2.5.3.7.13, 2.5.7.1).

2.3.2.2. The Meeting noted

a) the view of the Spanish Delegation that

i) direct Transatlantic flights operating into Madrid do not have adequate Meteorological information relative to that terminal while traversing the Shannon/Prestwick FIR, and

ii) it was desirable that the VOLMET Broadcast Plan cater for a more extensive geographical area.

b) that, since the 3rd NAT RAN Meeting, Dublin and Frankfurt had been assigned the reserved positions in the Shannon and Paris broadcasts respectively, shown in the VOLMET Broadcast Plan as given on page COM-84 of Doc 7550, without an over-all review of the Plan.

c) that, consequent upon the introduction of longer range aircraft, Transatlantic operations could be expected to operate into an increasing number of European terminals;

d) that it had been convened to deal almost wholly with questions of procedures with a view to facilitating Summer 1956 air operations, and consequently was not in possession of the necessary statistics to amend the VOLMET Broadcast Plan prepared by the Third NAT RAN Meeting;

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* See Statement by the Delegation of France at Appendix A.

e) that the plan prepared by the Third NAT RAN Meeting had been introduced as recently as 1st April 1955 and was not yet fully implemented.

2.3.2.3* The Meeting therefore concluded that it was not yet appropriate to amend the VOLMET Broadcast Plan as given on page COM - 84 of Doc 7550. At the same time it recognized that, when it is necessary to review the plan, the factors described above, amongst others, should be considered, and appropriate measures taken to accommodate the changing requirements. In the meantime, States, when filling reserved positions in the broadcasts, should take into account the factors listed above.

2.3.2.4 The Meeting noted that the 3rd NAT RAN VOLMET Plan has been implemented with the exception of the 3 Mc/s frequency at Paris. Additionally, it was noted that substantial improvements are required in the radiotelephone voice quality and service area of the Gander transmissions.

2.3.2.5 It was also recognized that it would be most desirable to replace the radiotelegraphy portion of the broadcasts by radiotelephony at the earliest practicable date so that all aircraft could utilize the two transmission periods each hour. Before this step can be considered, however, the improvements in radiotelephony facilities would have to be effected and the adequacy of the Service then evaluated.

2.3.2.6 The following recommendations were, therefore, developed:-

2.3.2.6.1 Recommendation No. 12**- that steps should be taken to implement fully the 3rd NAT RAN VOLMET Plan with respect to the provision of 3001 kc/s at Paris by May 1st, 1956.

2.3.2.6.2 Recommendation No. 13 - that the radiotelephone voice quality and service area of the Gander VOLMET Broadcast should be improved by May 1st, 1956.

2.3.2.6.3 Recommendation No. 14 - that ICAO should invite States to evaluate and report upon the adequacy of the radiotelephone VOLMET broadcast by January 1st, 1957 with a view to determining the earliest practicable date for replacing the radiotelegraphy portion of the 3rd NAT RAN VOLMET Plan by radiotelephony taking into account the remarks in Doc 7280, EUM III, para. 4, page Sub-42.

2.3.2.6.4 Recommendation No. 15 - that consideration should be given by the States concerned to the use of ground-wave technique at Gander and Shannon to improve the reliability of reception of the VOLMET broadcasts from these stations aboard aircraft during poor propagation conditions.

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* See Statements by the Delegate of the U.S.A. and the Observer of the Federal Republic of Germany at Appendix A.

** See Statement by the Delegate of France at Appendix A.

Air-to-ground aspect

2.3.2.7 Relating to the air-to-ground aspect, the Meeting, after extensive discussion, developed the following recommendation:-

2.3.2.7.1 Recommendation No. 16* - that the present NAT Supplementary Procedures - Meteorology para. 2.3.3 - should be amended as follows, and that the amended procedure should be applied commencing 1 May 1956:-

Air-reports should be transmitted on all flights except:

a) where traffic density makes it necessary to exempt certain aircraft from transmitting routine weather reports. Such exemption, either on a routine or on an individual basis, may be made only on the authority of the meteorological office associated with the Oceanic Area Control Centre. The exemption should be carried out through the Oceanic Area Control Centre and according to the following rule:

Where two aircraft

i) are on the same track, and

ii) will be vertically separated from each other during cruising flight by 2,000 feet or less over the major portion of that track, and

iii) will be within one hour's flight of each other en-route,

one aircraft may be exempted from transmitting all meteorological elements except upper wind information.

Exemption will not, however, apply where a meteorological office providing in-flight service for a flight has arranged for routine reports to be transmitted.

b) in areas where in-flight observation procedures of adjacent continental regions apply. In such areas reports should be transmitted in accordance with the procedures in force in those regions.

2.3.2.7.2 During the course of discussions, the view was expressed that adoption of the spatial criteria set forth in Recommendation No. 16 should not lead to the inference that in-flight reports exempted according to these criteria would have been of no value to the meteorological offices.

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* See Statement by the Delegate of Canada at Appendix A.

2.3.2.7.3 The view was also expressed that a review of the present spatial criteria might be necessary following sufficient experience in application of the principles contained in Recommendation No. 16.

2.3.2.7.4 The requirement for a review of the exemption procedure with respect to in-flight reports might well be enhanced by the possible impact that the new system of position reporting along meridians may have with respect to the adequacy of in-flight weather reporting.

2.3.2.7.5 It was pointed out that the value of the meteorological information contained in Section 3 of the AIREP is directly related to the correct positioning of the meteorological information transmitted. In this connection, it was urged that, unless otherwise specified in the AIREP form, meteorological information contained in Section 3 of the AIREP be capable of direct relation to the location data contained in Section 1.

2.3.2.7.6 Certain of the representatives felt that it was regrettable, in view of existing communications difficulties, that the meeting had failed to agree upon a system of exempting certain aircraft from routine in-flight weather reporting which would have ensured uniform application throughout the Region.

2.3.3 Agenda Item 1.3 c): Requirements for 300 mb forecasting

2.3.3.1 The Meeting recognized that there would be a requirement in the near future for forecasts at increasingly higher levels (above 400 mb). At certain Offices there is a need for forecasts at the 300 mb level in connection with actual operations which will commence as early as January 1957. The requirements for forecast information at these higher levels, as at present stated by IATA, are listed at Appendix D for information only.

2.3.3.2 It further recognized that, so far as practicable, forecasting for these upper levels should be started in advance of the actual operations, so that experience may be gained in the preparation and use of such higher level forecasts. (Reference MET Recommendation 53, Item a) MET IV-CAeM I).

2.3.3.2.1 Recommendation No. 17* - that States which will be providing forecasts for higher level operations should take action to provide the necessary high level forecasts at their affected Offices sufficiently in advance of the actual operations that experience may be gained in the preparation and use of such higher level forecasts.

(In this connection, aircraft operating agencies are urged to provide the notification called for in paragraph 2.1.5.1 a) of Annex 3 well in advance of the actual operations, so that appropriate arrangements may be made by the meteorological authorities concerned.)

* See Statement by the Delegate of Canada at Appendix A.

2.3.3.3 In view of the increasing use which will be made of upper level forecasts, it will become increasingly urgent that every effort be made to effect a more rapid exchange of upper air data. It is noted that this problem is at present before the WMO (Recommendation 23 of the MET Committee at the 3rd NAT RAN Meeting).

2.3.3.4 It is noted that the Recommendation 60 of the MET IV-CAeM I Meeting has been referred by the WMO to its Regional Associations for consideration. This Recommendation deals with the establishment of a programme for the exchange of opinions on the development of high level forecasting techniques. In the light of impending aircraft operations at the 200 mb level (reference Recommendation No. 17), it is felt that particular attention should be given to the exchange programme called for in Recommendation 60.

2.4 Agenda Item 1.4: General Operating Practices

2.4.1 Agenda Item 1.4 a): More effective use of lateral separation as a control element

2.4.1.1 The Meeting agreed that the limited use of lateral separation currently made by ATS was due in large part to the substantial difference between the track as designated in the flight plan or contained in the clearance and that actually flown. It was recognized that if increased use of lateral separation were feasible an increased flow of traffic would be made possible.

2.4.1.2 The Meeting noted that the Third NAT RAN Meeting had already recognized the importance of the maintenance of track and that Recommendation No. 20 of the RAC/SAR Committee of that Meeting had been made accordingly. (Doc 7550-NAT/III, page RAC/SAR-16).

2.4.1.3 It was also noted that not all States had taken action in accordance with the above recommendation. The Meeting therefore made a further recommendation.

2.4.1.3.1 Recommendation No. 18 - that, in the interests of making the best use of airspace in relation to the existing separation minima, and to the application thereof, all States operating North Atlantic control areas take appropriate action to draw the attention of operators to the need for:-

a) close adherence to flight plan track, including the agreed procedures for regaining that track in the event of unintentional deviation, and

b) obtaining an amended clearance before intended deviation from track.

2.4.2 Agenda Item 1.4 b): More effective use of the procedures for clearance at odd or even altitudes regardless of the direction of flight.

2.4.2.1 The Meeting took note of the supplementary procedure which had been recommended by the 3rd NAT RAN Meeting with the object of increasing the capacity of the airspace:-

"When necessary to expedite the flow of air traffic, area controllers may, subject to appropriate prior coordination, assign flight levels irrespective of the direction of flight."

(Doc 7030, Part 2, para. 2.1 (b) Note.)

2.4.2.2 The Meeting favoured the use of this procedure to the maximum extent possible consistent with the communications available, improvement of which, as soon as possible, is considered most important. (Cf. para. 2.5.3 and Recommendation No. 20).

2.4.2.3 The Meeting examined a proposal that the flight levels 200, 220, and 240 should be set aside for eastbound traffic, but, on account of the variations in weather conditions, traffic density, routes, etc., it was believed that permanent reservation of such flight levels would adversely affect necessary flexibility of application. It was considered that on-the-spot co-ordination between controllers is the method of implementation which will best ensure this necessary flexibility.

2.4.2.3.1 Recommendation No. 19 - that the Supplementary Procedure contained in the Note to paragraph 2.1 (b) of Part 2 of Doc 7030 be implemented to the maximum extent possible consistent with the communications facilities available.

2.4.3 Agenda Item 1.4 c): Suitability of the existing separation criteria

2.4.3.1 The Meeting agreed that although the new procedures proposed for implementation on 1st May 1956 may be expected to contribute to better utilization of the airspace, no reduction in the lateral or longitudinal separation minima was feasible in the absence of significantly improved communications facilities and long range aids to navigation. A recommendation was accordingly made drawing attention to the urgency of implementation of plans drawn up by the 3rd NAT RAN Meeting.

2.4.3.1.1 Recommendation No. 20 - that, in order to meet the immediate and growing demands for increased capacity for present traffic in the North Atlantic Region by permitting a reduction of separation minima, the ICAO regional plans for improved communications and long range aids to navigation be implemented at the earliest possible date.

2.4.3.2 The Meeting heard statements from the North Atlantic control authorities on the manner in which they applied longitudinal separation standards particularly in the case of a slow aircraft departing after a faster one. The methods employed necessarily varied greatly according to circumstances and it would be difficult, if not impossible, to lay down any hard and fast rules. In the light of these statements, it was decided that there was no reason to require a change in present procedures. The Meeting recognized, however, the importance of the States concerned being informed of excessive delays apparently resulting from over-cautious application of separation minima by ATS. It was agreed that cases of under-cautious application of separation minima equally merit attention.

2.4.3.2.1 Recommendation No. 21

a) that the States providing ATS in the North Atlantic Region continue to use their existing methods of employing longitudinal separation minima;

b) that operators immediately report to the State concerned any case in which it appeared that aircraft had been unnecessarily delayed by over-cautious application of longitudinal separation minima, particularly in the case of a slow aircraft departing after a faster one.

2.4.3.3 The Committee examined a suggestion that distance instead of time be used in the application of separation minima. It was agreed that this merits further study.

2.4.3.3.1 Recommendation No. 22 - that States review the feasibility of using distance instead of time in the application of longitudinal separation minima, taking guidance from the principles developed by the 2nd Air Navigation Conference.

2.4.3.4 Vertical separation at high altitudes

2.4.3.4.1 The United States delegation made the following proposal concerning the use of greater vertical separation minima at higher altitudes:-

a) a temporary minimum of 2000 feet vertical separation be provided between aircraft operating above 29,000 feet, regardless of direction of flight, pending resolution of current altimetry studies; and

b) cruising levels separated by 4,000 feet, commencing with 31,000 feet (i.e., 31,000, 35,000, 39,000, etc.) be used for westbound flights, and commencing with 33,000 feet (i.e., 33,000, 37,000, 41,000, etc.) be used for eastbound flights, except when prior co-ordination has been effected with the centres concerned, for use of an altitude not corresponding to the above.

2.4.3.4.2 The States responsible for the provision of ATS in the North Atlantic control areas agreed to implement this proposal on 1st May 1956.

2.4.3.4.3 Since, however, there are at present no civil aircraft flying at such altitudes and since procedures for the control of future high flying types of civil aircraft have not yet been determined, the Meeting did not favour the addition of these new separations minima to the North Atlantic Regional Supplementary Procedures for the time being.

2.4.3.4.3.1 Recommendation No. 23 - that ICAO note the action to be taken by States providing ATS in the North Atlantic control areas in respect of the provision of vertical separation for high-flying aircraft, but that the Regional Supplementary Procedures remain unamended for the time being.

2.4.3.5 Air Traffic Control clearance for an IFR flight to climb in accordance with visual flight rules at night.

2.4.3.5.1 The Meeting examined objections to the issue to IFR flights at night of clearances to climb in accordance with VFR. The Meeting was informed that the use of VFR at night is contrary to IFALPA policy and that the Association was particularly concerned at the use of this type of clearance in the North Atlantic Region especially for long climbs. IFALPA considered that conditions in the Region are such that it is frequently impossible for a pilot to determine whether he can complete a long climb in accordance with VFR. On occasions he may find find himself in IFR weather conditions without prior indication which would enable him to take avoiding action to remain in VFR weather conditions.

2.4.3.5.2 On the other hand, the Meeting recognized that some use of the procedure of granting clearances to climb in accordance with VFR at night is at present indispensable in the North Atlantic Region if very much more serious traffic delays than have hitherto been experienced are to be avoided. The Meeting was made aware that some ACCs when issuing clearances to climb in accordance with VFR have not been furnishing alternative instructions to be followed if VFR flight becomes impracticable. It is hoped that the new position reporting procedures recommended by the Meeting will, by facilitating the task of area controllers in assessing the traffic situation, permit alternative IFR clearances to be determined more readily and may also reduce to some extent the present dependence on the use of VFR climbs at night.

2.4.3.5.3 The Meeting considered that the existing situation would be improved by the application in the NAT Region of the procedures relating to clearances to IFR flights to change cruising level maintaining visual weather conditions developed by the 2nd Air Navigation Conference but not yet approved by the ICAO Council. (Doc 7625 AN-CONF/2, Page IV-25).

2.4.3.5.3.1 Recommendation No. 24 - that the procedures relating to clearances to IFR flights to change cruising level maintaining operation in visual weather conditions, as developed by the 2nd Air Navigation Conference (Doc 7625 AN-CONF/2, page IV-25), be applied immediately in the NAT Region.

2.4.4 Agenda Item 1.4 d): Arrangements for reporting and investigating incidents involving the use of incorrect procedures

2.4.4.1 The Meeting considered that an effective system of reporting and analyzing incidents involving ATS and aircraft including the prompt passing of reports directly from the ACC, concerned to the operator whose aircraft was involved or from the operator to the ACC, would contribute to the maintenance of efficient air traffic control on trans-Atlantic routes.

2.4.4.1.1 Recommendation No. 25 - that States and operators provide a system of reporting incidents involving ATS and aircraft within 24 hours of their occurrence, and that these reports be addressed directly from the area control centre concerned to the interested operator or from the operator to the ACC.

2.4.4.2 The Meeting further considered that the dissemination of complete information on special ATS and COM procedures and practices applicable in "Oceanic" and adjacent "domestic" control areas and flight information regions would result in a more complete understanding between interested personnel, therefore achieving more strict compliance with procedures.

2.4.4.2.1 Recommendation No. 26 - that in order to reduce the number of incidents, States ensure that their AIPs or similar publications contain all necessary information on air traffic services and communications procedures and practices peculiar to their respective North Atlantic and adjacent "domestic" control area or flight information regions.

2.5 Agenda Item 1.5: Communications

2.5.1 Agenda Item 1.5 a): Clarification of certain aspects of the present assignment plan for HF radiotelegraphy and radiotelephony frequencies

2.5.1.1 Explanation of the North Atlantic en-route radiotelephony HF Plan

2.5.1.1.1 The Meeting endorsed the HF radiotelephony frequency utilization pattern envisaged in Recommendation No. 27/COM of the Third North Atlantic Regional Air Navigation Meeting, and decided to adopt the Chart shown at Appendix E to facilitate the ready understanding and application of that Recommendation by appropriate personnel in aircraft and at ground stations.

2.5.1.1.2 The Chart indicates the planned utilization of the three radiotelephony frequency families, i.e., Family D to be used primarily for flights operating within the D networks (D1, D2, D3, D4) referred to as outer circle operations, and Families B and C for the principal over-ocean crossings referred to as inner circle operations - Family B to be used for Westbound flights and Family C for Eastbound flights.

2.5.1.1.3 This pattern of frequency utilization is intended to effect a reasonably equitable distribution of traffic loading over the three radiotelephony frequency families through recognition of the primary use of each family, and provision for such secondary use as may be necessary to meet random shifts in air traffic volume.

2.5.1.1.4 Recommendation No. 27 - that ground stations and aircraft should adhere as closely as possible to the frequency utilization pattern indicated by the Chart at Appendix E with Family B to be used for Westbound inner circle operations, Family C for Eastbound inner circle operations and Family D primarily for outer circle operations. Additionally Family D frequencies should be used to supplement Family B and C frequencies (inner circle operations) during those periods when traffic loading on either frequency family becomes excessive. Family D may also be used additionally for messages between outer circle ground stations and aircraft flying in the NA MWARA.

2.5.1.2 Efficiency of the North Atlantic Aeronautical Mobile Service En-route HF Plan

2.5.1.2.1 To ensure the efficient functioning of the HF aeronautical mobile service in the North Atlantic Region, the Meeting considered it to be essential that ground stations should exercise their responsibility for assigning primary and secondary frequencies, taking into account existing propagation conditions and aircraft loading. This point has been the subject of several recommendations at past ICAO meetings, but to date it is not considered they have been adequately fulfilled. Failure on the part of the ground stations properly to carry out this responsibility may be attributed in large measure to:

a) the fact that, often, State Administrations do not make available to the ground stations basic frequency prediction data, and the lack of instruction of ground station personnel in the use of such data even when available;

b) insufficient personnel to man additional air-ground positions when these are rendered necessary by concentration of air traffic.

2.5.1.2.1.1 Recommendation No. 28 - that 'provider' States in the NAT Region should

a) assure the availability of basic frequency prediction data at ground stations under their responsibility;

b) arrange for proper instruction of ground station personnel in the use of such data;

c) remind ground station personnel of their obligation to assign primary and secondary frequencies to aircraft taking into account existing propagation conditions and channel loading.

d) assure the availability of adequate numbers of ground station personnel to permit manning of multiple air-ground positions as required.

2.5.1.3 Use of the North Atlantic Aeronautical Mobile Service HF En-route Frequencies

2.5.1.3.1 The Meeting noted that the practice followed by some intra-European flights of making use of North Atlantic frequencies is adding to the congestion on these frequencies and thereby causing delays in the exchange of essential ATC messages between ACCs and aircraft engaged in North Atlantic operations.

2.5.1.3.1.1 Recommendation No. 29 - that flights originating and terminating in the EUM area should use aeronautical mobile frequencies other than those allotted to the North Atlantic Major World Air Route Area (MWARA-NA).

2.5.1.3.2 The Meeting further noted the practice by some aircraft engaged in transatlantic services, when in European FIR, of using the NAT HF radiotelephony frequencies for communicating with ground stations. It recognized that these contacts, often duplicated on the EUM aeronautical mobile service, impose an additional load on the NAT HF radiotelephony service, thus degrading that service.

2.5.1.3.2.1 Recommendation No. 30 - that, to reduce the load on the NAT aeronautical mobile service, aircraft engaged in transatlantic flights, when operating within the overlap area of the NA and EU MWARA's should, to the maximum extent practicable, avoid the use of the NAT aeronautical mobile service HF channels for communications in that area, and make use of the EUM aeronautical mobile service.

Note.- See the Chart at Appendix F.

2.5.1.3.3 The Meeting noted the wide interpretation which may be given to para. 12.4 of Doc 7181-COM/546/3 and recognized that the existing wording inevitably results in the use of the NAT HF radiotelephony service for point-to-point communications which should be handled by other communication channels.

2.5.1.3.3.1 Recommendation No. 31 - that the aeronautical mobile service should not be used for communication between network ground radio stations except for the exchange of information essential to interstation liaison when such exchanges cannot be made expeditiously over other communication channels. In such exceptional cases, this type of communication should be restricted to the absolute minimum, and, if possible, should be effected over network frequencies not being used at that time for the bulk of air-ground communications.

2.5.1.3.3.1.1 Recommendation No. 32 - that para. 12.4 of the Radiotelephony Procedures (Doc 7181-COM/546/3) should be amended so as to take into account the preceding Recommendation No. 31.

2.5.1.3.4 The Meeting noted a proposal by the Spanish Delegation to assign en-route frequencies of NAT Family D to Madrid, with a view to meeting new operational requirements which had arisen since the date of the 3rd NAT RAN Meeting. The Meeting, however, considered that, owing to ATC reasons and to the present overloading of NAT Family D, such additional assignments were not acceptable. Nevertheless, it agreed to record the request of the Spanish Delegation that the matter be reconsidered when, after the withdrawal of radiotelegraphy facilities in the NAT Region, an additional radiotelephony family becomes available.

2.5.1.4 Readback of the Meteorological Portion of AIREP Messages

2.5.1.4.1 The Meeting noted that, according to the existing Radiotelephony Procedures, the routine "readback" of correctly received information may be dispensed with. The routine "readback" of the meteorological portion of the AIREP, even though the station working the aircraft has received the information correctly, is in many cases causing undue congestion on the air/ground circuit.

2.5.1.4.1.1 Recommendation No. 33* - that routine "readback" of the meteorological portion of the AIREP should be eliminated.

2.5.1.4.1.1.1 Recommendation No. 34 - that para. 12.5 of the Radiotelephony Procedures (Doc 7181/COM/546/3) should be supplemented by a paragraph incorporating the preceding Recommendation No. 33.

* See Statement by the Delegate of France at Appendix A.

2.5.1.5 Interference to NAT Aeronautical Mobile Service HF Channels

2.5.1.5.1 The Meeting noted that interference is being caused to certain NAT aeronautical mobile service HF channels by transmissions, mainly 'out of band', originating in certain non-contracting European States. It also noted the attempts by the United Kingdom, both directly and indirectly with these States, to alleviate such interference to the frequencies 5641.5 kc/s, 5671.5 kc/s and 8913.5 kc/s, and the proposal submitted by that State to ICAO suggesting a means whereby interference to the frequency 2945 kc/s from the EUM A1 VOLMET Broadcast Service might be reduced. It also recorded that certain military fixed and mobile services in Europe are using channels in the aeronautical mobile (R) bands.

2.5.1.5.1.1 Recommendation No. 35

1) that ICAO should take steps immediately to eliminate the interference now experienced on the frequency of 2945 kc/s by requesting the States concerned in the EUM A1 VOLMET broadcast service to change the frequency of 2949.5 kc/s to 2950.5 kc/s as soon as possible;

2) that States suffering from interference due to 'out of band' operations by non-contracting States should each directly approach the latter, in accordance with the provisions of article 14 of the ITU Radio Regulations, requesting them to take action to remove or reduce the interference as soon as possible.

3) that States should ensure that aeronautical mobile service (R) band frequencies are operated in strick accordance with No. 256 of the ITU Radio Regulations; and that States should take the speediest action necessary to enable frequency assignments to be made to other mobile services at present operating in the aeronautical mobile (R) frequency bands, and to fixed services, in cases where they are causing or are liable to cause harmful interference to the aeronautical mobile service.

2.5.2 Agenda Item 1.5 b): Status of the Ground Wave Radiotelephony Scheme

2.5.2.1 The Meeting, when examining this item, was of the opinion that the coverage provided by MF ground wave radiotelephony stations had certain aspects in common with the coverage provided by VHF en-route stations, particularly those with extended coverage, mainly because, during periods of ionospheric disturbances, both offered possibilities of effecting air-ground communication. The Meeting therefore decided to examine the problems relating to VHF en-route stations at the same time as those relating to the MF ground wave radiotelephony stations.

2.5.2.2 Ground Wave Stations

2.5.2.2.1 The Meeting endorsed the Recommendation of the 3rd NAT RAN Meeting (Doc 7550, Sub-1, Recommendation No. 11) that Ground Wave Aeronautical Mobile Service Stations should be implemented at Gander, Southern tip of Greenland, Reykjavik and Shannon.

2.5.2.2.1.1 The Meeting noted that the following Aeronautical Mobile Service Ground Wave Stations were already in operation:

Grindavik	(Iceland)
Prins Christians Sund	(Greenland)
Simiutak	(Greenland)

2.5.2.2.1.2 The Meeting noted that the following Aeronautical Mobile Service Ground Wave Stations were either projected or in the course of installation:

Angmagssalik	(Greenland)	- in course of installation
Mangersta	(U.K.)	- experimental
Shoe Cove	(Canada)	- experimental installation to be operative by Summer 1956
Valentia	(Ireland)	- experimental - reception only.

2.5.2.2.1.3 Statements by the States who have acquired experience of Ground Wave techniques through the installation of Ground Wave Stations in their territories are given in Appendix G, Part 1.

2.5.2.2.2 Integration of Ground Wave Stations with the overall en-route communications system

2.5.2.2.2.1 The Meeting endorsed the Recommendations of the 3rd NAT RAN Meeting (Doc 7550, COM Recommendation No. 37) that the Ground Wave radiotelephony stations established on an operational basis should be integrated with the overall en-route communications system.

2.5.2.2.2.1.1 The Meeting noted that

a) the Prins Christians Sund and Simiutak stations were non-integrated with the Narssarssuaq centre by the use of aeronautical mobile channels, but that they were operated locally;

b) the station of Grindavik was non-integrated with the Reykjavik centre by landline;

c) subject to it being satisfactorily established that there is a justification for a ground wave station at Shannon, it will be located at a site which can be connected to the Shannon communication centre by a VHF link;

d) the system of integration of the Mangersta station was under study. It would probably be effected by radio link/landlines via Stornoway in the first instance.

2.5.2.2.2.1.2 Recommendation No. 36 - that the use of aeronautical mobile frequencies for the integration of the Prins Christians Sund and Simiutak ground wave stations should cease as soon as possible and should be replaced by a fixed service liaison using frequencies in the appropriate bands.

2.5.2.2.2.1.3 Recommendation No. 37 - that the integration of the Angmagssalik ground wave station with the Reykjavik centre should be effected by a fixed service radio link on frequencies in the appropriate bands.

2.5.2.3 VHF en-route communications

2.5.2.3.1 Recommendation No. 38 - that the implementation of the VHF en-route mobile service communications plan covered by COM Recommendation No. 19 of the Report of the 3rd NAT RAN Meeting (Doc 7550) should be completed as soon as possible.

2.5.2.3.2 Recommendation No. 39 - that the implementation of the en-route channel of 127.9 Mc/s at Narssarssuaq (Doc 7550, COM Recommendation No. 19) should be considered as an urgent requirement.

Note.- Should Narssarssuaq cease to be the designated aeronautical communications centre, the channel of 127.9 Mc/s would be re-assigned to the new location chosen.

2.5.2.3.3 Extended VHF Coverage

2.5.2.3.3.1 The Meeting noted that the provision of extended VHF coverage of the order of 200 NM at 10,000 ft. had been made or was projected at the following locations:

Boston	(provided)
Gander 126.9 and 127.1 Mc/s	(in course)
Prestwick 127.9 Mc/s	(experimental)
Reykjavik 127.9 Mc/s	(1957)
Shannon 127.9 Mc/s	(in course)

2.5.2.3.3.1.1 Recommendation No. 40 - that the provision of extended VHF coverage as contemplated at para. 2.5.2.3.3.1 above should be effected as soon as possible, and that, additionally, similar extended coverage should be provided at Mont-Joli and Goose Bay.

2.5.2.3.3.2 Statements by the States which have acquired experience of extended coverage VHF stations through the installation of such stations in their territories are given in Appendix G, Part 2.

2.5.3 Agenda Item 1.5 c): ATC inter-centre communications problems, including the possible use of commercial cable

2.5.3.1 The Requirements for direct speech inter-centre communications

2.5.3.1.1 The Meeting recognized that there was a requirement for establishing direct speech inter-centre communications (maximum connection time: 15 seconds) not later than May 1956, between the following locations:-

NB Regarding the implementation aspect see para. 2.5.3.1.3.

✓Shannon	-	Prestwick
Gander	-	Narssarssuaq
Reykjavik	-	Narssarssuaq
✓Gander	-	New York
Reykjavik	-	Shannon/Prestwick
Gander	-	Shannon/Prestwick
Gander	-	Reykjavik
Shannon	-	Paris

2.5.3.1.2 Having investigated the practicability of early implementation, taking into account the availability of landline circuits, the Meeting made the following Recommendation:-

2.5.3.1.2.1 Recommendation No. 41 - that direct speech circuits should be provided before the Summer 1956 peak air operations between the following locations:-

Prestwick	-	Shannon
New York	-	Gander

2.5.3.1.2.2 Recommendation No. 42 - that direct speech communications between the other pairs of area control centres listed in paragraph 2.5.3.1.1 above should be provided as soon as possible. In the meantime, every endeavour should be made to provide direct printed communications by the diplexing of existing or planned AFTN/RTT circuits so as to ensure an exclusive ACC teletypewriter channel, or by such other improved ACC/AFTN liaison as States responsible for the respective ACC may regard as appropriate.

2.5.3.1.3 The Meeting reviewed the status of implementation of the above-mentioned recommended speech communication facilities (Recommendations Nos. 41 and 42), especially with a view to ascertaining the intentions of the responsible Administrations as regards those not already implemented.

a) Shannon - Paris

No speech communications exist. There is no immediate possibility of securing a circuit to this effect. The French and Irish Administration would consider the diplexing of the existing RTT circuit. As an immediate improvement, certain steps may be taken for eliminating some of the co-ordination difficulties experienced. France will shortly implement a new semi-automatic system of communications between the RTT terminal and the ACC, thus reducing the time delay between these two locations to one minute. Additionally, with the consent of the United Kingdom Administration, use might be made of the existing speech circuits between Paris and London and between London and Shannon.

b) Shannon - Prestwick

Continuous speech communications are provided both through Preston and through London. Improved quality of communications through London will be obtained as from March 1956 by the provision of an automatic telephone exchange. Additionally, Ireland and the United Kingdom expect to be in a position to provide a direct circuit by 1st July 1956.

c) Gander - New York

Continuous speech communications are provided, but through two switching positions. This situation is not satisfactory. The United States Administration is ready to implement a direct circuit, subject to the concurrence of Canada.

d) Reykjavik - Shannon/Prestwick

No speech communications are now provided between Reykjavik and Shannon/Prestwick. The United Kingdom does not consider that the diplexing of the London - Reykjavik RTT circuit is justified, or operationally desirable, as an alternative means of communication between the Reykjavik and Shannon/Prestwick centres pending proper implementation of the required speech communications facilities. It considers that, preferably, arrangements should be made between the Administrations concerned for improving the capacity, liaison arrangements and standard of service of the existing AFTN printed communications facilities.

e) Gander - Shannon/Prestwick

No speech communications are provided. Ireland is ready to envisage the diplexing of the RTT circuit Shannon-Gander, subject to the concurrence of the Canadian Administration, and providing that the serviceability of the existing circuit will not be impaired by such diplexing. It is the intention of the United Kingdom to use the public channels in the trans-atlantic telephone cable for Prestwick-Gander calls, as soon as this cable becomes available.

f) Gander-Reykjavik

No speech communications are provided.

g) Gander - Narssarssuaq and

h) Reykjavik - Narssarssuaq

No speech communications are provided. The implementation of the Regional Plan is progressing and is, at the same time, being reviewed with the purpose of selecting the most suitable ACC location with particular attention to the requirement for instantaneous inter-centre communications.

2.5.3.2 Techniques by which inter-centre speech communications could be provided

2.5.3.2.1 The Meeting reviewed the techniques which could be used for providing the direct inter-centre speech communications to meet the requirements as listed in paragraph 2.5.3.1.1 above.

2.5.3.2.1.1 Use of the transatlantic telephone cable

2.5.3.2.1.1.1 The Meeting noted that, as from October 1956, the trans-atlantic telephone cable would be available for public communications. The utilization of this commercial cable could provide the solution for the direct speech communications between Gander and Shannon/Prestwick.

2.5.3.2.1.2 Use of the VHF forward scatter technique* .

2.5.3.2.1.2.1 The Meeting was of the opinion that the use of this technique may provide a satisfactory solution to the problem of inter-centre direct speech communications.

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* See statement by the ITU Observer at Appendix A.

2.5.3.2.1.2.2 Recommendation No. 43 - that States should make available to other States through ICAO all relevant information available on scatter techniques.

2.5.3.2.1.2.2.1 The object of Recommendation No. 43 is to advance the date on which States can decide whether such a programme can be initiated.

Note.- See the information provided by IATA, at Appendix G, Part 3.

2.5.3.2.1.2.3 Recommendation No. 44 - that States, recognizing

a) the urgency of speech communications for ATS purposes,

b) the incompatible delay which could be expected to be involved in Joint Support action,

c) the difficulty of provision, particularly between Shannon/Prestwick and Reykjavik, and between Shannon/Prestwick and Gander,

should investigate all possible means of effecting early implementation of such a project, if agreement to initiate it is reached.

2.5.3.3 Improvement in the AFTN

2.5.3.3.1 The Meeting endorsed the Recommendations of the 3rd NAT RAN Meeting designed to effect improvement in the AFTN, with particular emphasis on the relationship between the serviceability of RTT facilities and the rapidity of printed communications between ACCs.

2.5.3.3.1.1 Recommendation No. 45 - that the further improvements in terminal facilities envisaged in COM Recommendations 4, 5, 6, 10, 11 and 12 of the 3rd NAT RAN Meeting should be implemented at the earliest possible date.

Note.- See the information provided by UK at Appendix G, Part 4.

2.5.3.3.2 The Meeting also noted the desirability of improving the ATC communication liaison between Shannon and Madrid, recommended by the Third NAT RAN Meeting (see Doc 7550, page COM-31).

2.5.4 Agenda Item 1.5 d): Minimum number of HF and VHF channels needed in aircraft

2.5.4.1 The Meeting considered it necessary, taking into account the requirements of safety and the present serious ATC problem in the North Atlantic Region, that the attention of States and aircraft operating agencies should be drawn to the importance of ensuring that aircraft under their jurisdiction engaged in North Atlantic operations are equipped for transmission and reception on all North Atlantic frequencies currently in use.

2.5.4.1.1 Recommendation No. 46 - that aircraft engaged in trans-atlantic operations should, as a minimum, be equipped for transmission and reception on North Atlantic frequencies, in accordance with the following schedule:

i) Aircraft using radiotelephony only

a) If the route is expected to fall within the Inner Circle Networks only:

Eastbound	Westbound
- - - (kc/s) - - -	
2945	2987
5641.5	5671.5
8862.5	8888
13264.5	13284.5

b) If the route is expected to fall within Outer Circle Networks only:

2868 (kc/s)
5626.5
8913.5
13324.5

c) If the route is expected to fall within both the Inner and Outer Circle Networks, the flight should be required to carry all the frequencies listed in a) and b) above.

d) In addition, the following VHF channels should be carried:

121.5 (Mc/s)
126.9
127.9

as well as any other necessary VHF channels associated with the flight in question.

ii) Aircraft using radiotelegraphy only should have the following frequencies:

2931 (kc/s)
5611.5
8947.5
13354.5

In addition, the following VHF channels should be carried:

121.5 (Mc/s)
126.9
127.9

as well as any other necessary VHF channels associated with the flight in question.

iii) Aircraft using both radiotelegraphy and radiotelephony will need to satisfy the conditions of both i) and ii) above.

2.5.4.1.1.1 Note.- It is recognized that, under certain circumstances, some military aircraft may be unable to comply with this Recommendation.

2.5.5 Agenda Item 1.5 e): Present use of the 121.5 Mc/s guard channel

2.5.5.1 The Meeting endorsed the need in the NAT Region to apply the Standard in paragraph 4.1.3.1.1 of Annex 10, Part 2, that the emergency channel (121.5 Mc/s) shall be used only for genuine emergency purposes, but noted that this frequency was sometimes employed for communications not coming within this category. To facilitate the reservation of this frequency for the purpose intended in paragraph 4.1.3.1.1 of Annex 10, Part 2, the Meeting made the following recommendation:-

2.5.5.1.1 Recommendation No. 47 - that the frequency of 127.9 Mc/s should normally be used by aircraft to establish contact with Ocean Station Vessels. Where this is not possible, 121.5 Mc/s may be used to establish contact, but subsequent communications should be conducted on the route frequency of 127.9 Mc/s.

2.5.5.1.2 Recommendation No. 48 - that, to the maximum extent possible, arrangements should be made aboard Ocean Station Vessels to enable a continuous guard to be maintained on 121.5 Mc/s during communication on 127.9 Mc/s at the same operating position.

2.5.5.2 At the same time, it was noted that, in addition to the circumstances envisaged in paragraph 4.1.3.1.1 of Annex 10, Part 2, it was necessary upon occasions to communicate between aircraft on 121.5 Mc/s in order to initiate clearance of essential communications traffic.

2.5.5.2.1 Recommendation No. 49 - that, where it is necessary to use the emergency frequency of 121.5 Mc/s to establish contact between aircraft, subsequent communications should be conducted either on the route frequency of 127.9 Mc/s or on another mutually agreed frequency of the aircraft concerned.

2.5.5.3 The Meeting took into consideration the possibility of mutual interference between aircraft-to-aircraft communications at high altitude and communications with VHF ground stations operating with extended cover. It noted that the increase of aircraft movements and higher altitude flying may accentuate this difficulty. The possibility was therefore envisaged of providing either:-

a) a discrete frequency other than the en-route frequency for communications between aircraft and Ocean Station Vessels; or

b) a discrete frequency other than the en-route frequency for VHF ground stations operating on extended cover; or

c) a third frequency at Ocean Station Vessels,

when and if the possibility of mutual interference to a significant extent becomes established.

2.6 Agenda Item 1.6: Control Centres

2.6.1 Agenda Item 1.6 a): Long range radar coverage in terminal areas

2.6.1.1 The Meeting noted the requirements for surveillance radar stated by the RAC/SAR Committee of the 3rd NAT RAN Meeting (Doc 7550 NAT/III RAC/SAR Appendix h) and considered that traffic congestion, and the delays being experienced by aircraft, in some areas in the Region might be appreciably relieved by the use of long range radar to assist controllers in the handling of inbound, outbound and overflying traffic.

2.6.1.1.1 Recommendation No. 50 - that in terminal areas and en-route sectors where the traffic density is such that traffic cannot be handled effectively, and without undue delays, by existing ATS methods, consideration be given by the States concerned to the use of long range radar as an additional method of reducing or eliminating such delays and aiding in the effective control of traffic.

2.6.2 Agenda Item 1.6 b): Implications of any new procedures on personnel and equipment requirements

2.6.2.1 The Meeting was informed that the United Kingdom authorities were actively investigating improved methods of presenting traffic information to ACC controllers.

2.6.2.2 Continuing study of this matter by all States responsible for providing air traffic services in the North Atlantic FIRs is important. The Meeting believes that the presentation of traffic information, as well as any other personnel or equipment requirements at ACCs resulting from introduction of the new position reporting procedures, merits further consideration by States and ICAO when the new procedures themselves are reviewed in the light of experience gained during the coming summer season.

2.6.3 Agenda Item 1.6 c): Exchange of views directed toward improvement in co-ordination and uniform application of procedures and practices among area control centres.

2.6.3.1 The Meeting examined various methods of improving inter-ACC co-ordination and agreed that the best method available at this time would be frequent visits between officers in charge of ACCs. The Meeting wished to amplify Recommendation No. 24 on this subject by the RAC/SAR Committee of the 3rd NAT RAN Meeting to specify the interval between such visits as not more than one year, while recognizing that more frequent visits are essential in certain areas. The greatest possible benefit would be obtained from the visits if they were made before the next peak traffic season. The Meeting therefore made Recommendation No. 51 and took note of an offer by IATA that its member airlines would endeavour to assist in the implementation of this recommendation by facilitating the transport of the personnel concerned to the extent possible within the framework of IATA transportation regulations and agreements.

2.6.3.1.1 Recommendation No. 51 - that the Chief Controller of each North Atlantic ACC should visit other North Atlantic ACCs at least once per year, and more frequently where necessary.

Note.- Implementation of the recommendation would be facilitated if the co-operation of the airlines and other users could be secured in providing special conditions of transport. IATA has stated that its member airlines would endeavour to assist in the implementation of this recommendation by facilitating the transport of the personnel concerned to the extent possible within the framework of IATA transportation regulations and agreements.

2.7 Other Matters

2.7.1 Obligation on aircraft not landing at Shannon to avoid overflying the territory of Ireland.

2.7.1.1 In the course of its work, the Committee was made aware of operational and air traffic control difficulties resulting from the present provisions forbidding aircraft not landing at Shannon to overfly Irish territory. Typical examples of these difficulties are:-

a) An eastbound trans-Atlantic flight which, after flight planning for Shannon, finds en route that it can continue without landing to a British or Continental terminal, may be obliged to make a large detour to avoid crossing Irish territory.

b) A non-stop flight from Goose to a British or Continental terminal, if obliged to fly south of Ireland, crosses the tracks of aircraft flying between Gander and Shannon or between New York and Prestwick.

Both cases illustrate problems, in particular of additional ATS and communications load and of lateral separation, which would not arise if direct overflying of Ireland was permitted.

2.7.1.2 The Delegate of Ireland informed the Committee that he did not think it was appropriate to argue at this meeting the case for refusing permission to overfly Shannon. He would, however, acquaint his Government with the Meeting's discussions. He pointed out that the enforcement of these provisions had helped in obtaining at Shannon facilities of value to North Atlantic traffic in general.

2.7.1.3 Purely from the point of view of air traffic conditions, the Committee hopes that the situation will receive further consideration by the responsible authorities.

APPENDIX A

STATEMENTS BY DELEGATIONS

1. Statements by the Delegate of Canada

1.1 Agenda Item 1.3 c): Recommendation No. 17

The Meteorological Division of the Canadian Department of Transport is making every effort to be ready to provide forecasts for high-level commercial transatlantic operations when they begin, in so far as operators have previously informed us of their plans. Although it is not practicable immediately to undertake a full programme of routine forecasts for simulated flights, if operators will communicate their requirements they will be carefully considered.

1.2 Agenda Item 1.3 b): Recommendation No. 16

With reference to the procedure for limiting the transmissions of in-flight weather reports (Recommendation No. 16), inasmuch as this procedure is untried and a procedure for the same purpose was tried a few years ago and had to be abandoned after failure, the Canadian delegation must reserve the position of its Administration with respect to this procedure.

2. Statements by the Delegate of France

2.1 Agenda Item 1.3 b): Recommendation No. 33

The French Delegation drew the meeting's attention to a practice of making aircraft observations more rapidly available to certain meteorological services.

This practice consists of intercepting AIREP reports as they are transmitted; the interception is made as the reports are read back, on account of the greater strength of the ground-to-air transmission.

One of the results of Recommendation No. 33 will therefore be to delay receipt by certain meteorological services of information of prime importance contained in the meteorological portion of air reports.

2.2 Agenda Item 1.3 b): Recommendation No. 11

In order to solve the problem raised, the French Delegation proposed to aim at a reduction of the elements to be kept under review during flight meteorological watch (see PANS MET, para. 2.5.3.7.3).

The French Delegation considers that in the North Atlantic Region, this reduction might lead to in-flight service which would involve the transmission of essential information only, as is already the case in regions of high traffic density in accordance with area meteorological watch procedures.

It regrets the fact that Recommendation No. 11 may give rise to some confusion between in-flight service (see PANS MET, para. 2.5.3) and operational planning service for aircraft in flight (see PANS MET, para. 2.5.1.5); such confusion cannot but reduce the efficiency of meteorological service provided to international air navigation.

2.3 Agenda Item 1.3 b): Recommendation No. 12

The French Delegation stated that it did not consider it would be possible to introduce the frequency of 3001 kc/s in Paris before the end of the current year.

3. Statement by the Delegate of U.S.A.

3.1 Agenda Item 1.3 b)

"The closing sentence of paragraph 2.3.2.3 of Part II of the Report lends undue emphasis to the factors set forth in the preceding paragraph of the Report. The volume of request-reply traffic for a particular observation or forecast should be the primary basis upon which decisions should be reached with respect to filling reserved positions on the VOLMET Broadcast Plan."

4. Statement by the Observer of the Federal Republic of Germany

4.1 Agenda Item 1.3 b)

"The German Delegation, being aware that paragraph 2.3.2.3 of Part II of the Report gives France the formal right to delete Frankfürt in the Paris VOLMET Plan (Doc 7550, NAT/III-COM/84) as at present in operation, draw the attention of the Meeting to the fact that if France would use this formal right, the consequence would be a considerable increase of request/reply MET-reports on air-ground channels, which would be directly in contradiction to Recommendation No. 9 of this meeting.

This increase would result from the fact that all transatlantic flights operating directly into Frankfürt and all transatlantic flights using Frankfürt as an alternate, would henceforth be unable to receive the Frankfürt weather reports by VOLMET Broadcasts well in advance."

5. Statement by the Observer of the ITU

Agenda Item 1.3 c) - paragraph 2.5.3.2.1.2.

5.1 Frequencies for the projected forward scatter circuits

"As the frequencies used for the projected forward scatter circuits may be capable of propagating interference over very long ranges during high sunspot conditions, Administrations of the countries desiring to install such circuits should take early steps to co-ordinate the clearance and use of suitable frequencies."

APPENDIX B

SPECIMEN FLIGHT PLAN FOR A NORTH ATLANTIC FLIGHT

(cf. Recommendation No. 4)

A flight plan for a North Atlantic flight from Prestwick to Gander would take the following form:-

a) TCA 538/22 (or Aircraft registration letters)

b) L 1049

c) GGBA (Prestwick)

d) (Cruising level) (EET/Lat/Long/TAS)

120	118/5530/10/220 246/5510/20/230 426/5400/30/230 603/5300/40/242 737/5010/50/252

e) CYQX (Gander)

f) 2318Z

g) -

h) 821

i) CYQY CYQM (Sydney and Moncton)

j) RUT

k) -

l) 54 SMITH

m) 1200 hr

n) TOG 107000 PNR 600

Note.- Items shown thus (.....) are explanatory and would not appear on an actual flight plan.

APPENDIX C

TABLES OF FLIGHT TIMES AND GROUND SPEEDS FOR TYPICAL NORTH ATLANTIC ROUTES

(cf. Rec. No. 4)

i)	Gander	-	Keflavik via Gar	- Great Circle
ii)	Keflavik	-	Fort Chimo	- Great Circle
iii)	Gander	-	Bushmills	- Great Circle
iv)	Gander	-	Shannon	- Great Circle
v)	New York	-	Bushmills	- Rhumb Line
vi)	Bermuda	-	Santa Maria	- Great Circle

(i) GANDER - KEFLAVIK VIA GAR (GREAT CIRCLE)

From	To	Distance in N. Miles	Time at Ground Speed of (kts) 160	200	240	280	320	340	360
Gander	Gar	136	:51	:41	:34	:29	:25	:24	:23
Gar	50°	122	:46	:36	:31	:26	:23	:21	:20
50°	45°	234	1:27	1:10	:58	:50	:44	:42	:39
45°	40°	220	1:22	1:06	:55	:47	:41	:39	:37
40°	35°	210	1:19	1:03	:53	:45	:39	:37	:35
35°	30°	194	1:13	:58	:49	:42	:36	:34	:32
30°	25°	184	1:10	:55	:46	:40	:35	:32	:31
25°	Kef	82	:31	:24	:21	:17	:15	:14	:13

(ii) KEFLAVIK - FORT CHIMO (GREAT CIRCLE)

From	To	Distance in N. Miles	Time at Ground Speed of (kts) 160	200	240	280	320	340	360	380
Fort Chimo	65°	134	:50	:40	:34	:28	:25	:23	:22	:21
65°	60°	182	1:08	:55	:45	:39	:34	:32	:30	:29
60°	55°	167	1:02	:50	:42	:36	:31	:29	:28	:26
55°	50°	151	:58	:45	:38	:32	:28	:26	:25	:24
50°	45°	132	:49	:40	:33	:28	:24	:23	:22	:21
45°	40°	132	:49	:40	:33	:28	:24	:23	:22	:21
40°	35°	131	:49	:40	:33	:28	:24	:23	:22	:21
35°	30°	132	:49	:40	:33	:28	:24	:23	:22	:21
30°	25°	132	:49	:40	:33	:28	:24	:23	:22	:21
25°	Kef	60	:22	:18	:15	:13	:11	:10	:10	9.5

(iii) GANDER - BUSHMILLS (GREAT CIRCLE)

From	To	Distance in N.Miles	Time at Ground Speed of (kts) 160	200	240	280	320	340	360
Gander	Shark	127	:47	:38	:32	:27	:24	:22	:22
Shark	50	60	:22	:18	:15	:13	:11	:10	:10
50	45	195	1:13	:57	:49	:42	:36	:34	:32
45	40	189	1:11	:58	:47	:41	:35	:33	:31
40	35	190	1:11	:58	:47	:41	:36	:33	:31
35	30	187	1:10	:56	:47	:40	:35	:33	:31
30	25	187	1:10	:56	:47	:40	:35	:33	:31
25	20	183	1:09	:55	:46	:39	:34	:32	:30
20	15	178	1:07	:53	:44	:37	:33	:31	:30
15	10	174	1:05	:52	:44	:37	:33	:31	:29
10	Bush-mills	124	:46	:37	:31	:27	:23	:22	:21

(iv) GANDER - SHANNON (GREAT CIRCLE)

From	To	Distance in N. Miles	Times at Ground Speed of (kts) 160	200	240	280	320	340	360
Gander	Shark	127	:47	:38	:32	:27	:24	:22	:22
Shark	50°	61	:23	:18	:15	:13	:11	:11	:10
50°	45°	203	1:16	1:00	:51	:43	:38	:36	:34
45°	40°	193	1:12	:58	:48	:41	:37	:34	:32
40°	35°	186	1:10	:56	:47	:40	:35	:33	:31
35°	30°	183	1:09	:55	:46	:39	:34	:32	:30
30°	25°	181	1:09	:54	:46	:39	:34	:32	:30
25°	20°	179	1:07	:54	:45	:38	:34	:32	:30
20°	15°	180	1:07	:55	:45	:39	:34	:32	:30
15°	10°	182	1:08	:56	:46	:39	:35	:33	:30
10°	SNN	44	16	13	11	:9	:8	:8	:7

(v) NEW YORK - BUSHMILLS (RHUMB LINE)

From	To	Distance in N.Miles	Time at Ground Speed of (kts) 160	200	240	280	320	340	360
Cod	65°	140	:53	:42	:35	:30	:26	:25	:23
65°	60°	228	1:25	1:08	:57	:49	:43	:40	:38
60°	55°	228	1:25	1:08	:57	:49	:43	:40	:38
55°	50°	222	1:23	1:07	:56	:48	:42	:39	:37
50°	45°	218	1:22	1:05	:54	:47	:41	:37	:37
45°	40°	214	1:20	1:04	:53	:46	:41	:37	:36
40°	35°	209	1:18	1:02	:52	:45	:39	:37	:33
35°	30°	202	1:16	1:00	:51	:43	:39	:35	:33
30°	25°	200	1:15	1:00	:50	:43	:37	:35	:33
25°	20°	193	1:11	:58	:48	:42	:37	:34	:32
20°	15°	190	1:11	:58	:48	:41	:37	:34	:32
15°	10°	184	1:08	:55	:46	:39	:34	:32	:31
10	Bush-mills	128	:48	:38	:32	:28	:23	:23	:21

(vi) BERMUDA - SANTA MARIA (GREAT CIRCLE)

From	To	Distance in N.Miles	Times at Ground Speed of (kts) 160	200	240	280	320	340	360
Bermuda	60°	250	1:34	1:15	1:03	:53	:47	:44	:42
60°	55°	261	1:38	1:18	1:05	:56	:49	:46	:44
55°	50°	255	1:35	1:17	1:04	:55	:48	:45	:43
50°	45°	250	1:33	1:15	1:02	:53	:47	:44	:42
45°	40°	243	1:31	1:13	1:01	:52	:45	:43	:40
40°	35°	242	1:31	1:13	1:01	:52	:45	:43	:40
35°	30°	241	1:31	1:13	1:00	:52	:45	:43	:40
30°	SMA	232	1:27	1:10	1:58	:50	:43	:41	:39

APPENDIX D

IATA REQUIREMENTS FOR 300 AND 200 mb. FORECASTS

(Cf. para. 2.3.3.1, page 24)

Note.- It should be understood that the dates, frequency and routings of flights relating to future operations are necessarily provisional, but represent the best indication available at the Meeting of planned operations.

1. Forecasts for Actual Operations

a) 300 mb.

Requirement Starting	Route	Frequency of Operation
January 1957	Stockholm and Copenhagen to -	To be supplied later to local MET authorities
	i) Los Angeles via Søndre Strømfjord	
	ii) New York	
	iii) Anchorage via Polar Route	
	Hamburg - New York	
	Amsterdam - Søndre Strømfjord - Vancouver	
June 1957	London - New York	Total of five flights per week each way
	Paris - New York	
Spring 1960	Zürich - New York	1 per day each way

b) 200 mb.

1960	Hamburg - New York	-
	Zürich - New York	-
	Bruxelles - New York	-
	Montreal - London	-

New York - Paris New York - London	1 per day each way
Amsterdam - New York	10 per week each way
Amsterdam - Montreal	4 per week each way
Copenhagen and Stockholm to -	
i) Los Angeles via Søndre Strømfjord	-
ii) New York	-
iii) Anchorage via Polar Route	-

2. Forecasts for Paper Operations

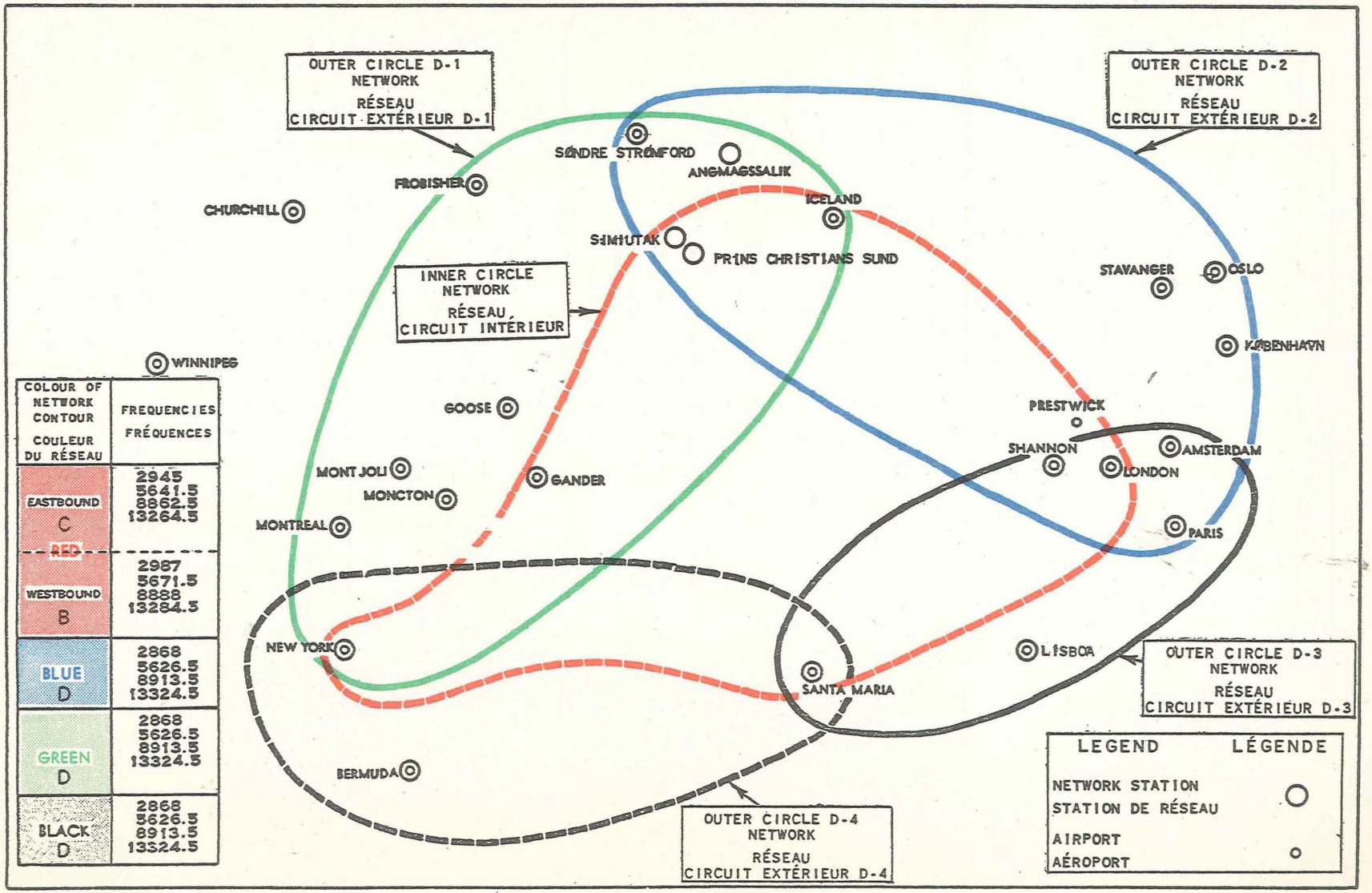
a) 300 mb.

Requirement Starting	Route	Frequency of Operation
Now	Hamburg - New York	Daily forecasts required
"	Amsterdam - Søndre Strømfjord - Vancouver	"
"	New York - London	"
"	New York - Paris	"
"	New York - Amsterdam	"
"	Montreal - London	"
"	Montreal - Amsterdam	"
	Copenhagen or Stockholm to -	
"	i) Los Angeles via Søndre Strømfjord	"
	ii) New York	"
	iii) Anchorage via Polar Route	"
September 1956	Zürich - New York	"
"	Bruxelles - New York	"

b) 200 mb.

Now	Hamburg - New York	Daily forecasts required
"	New York - London	"
"	New York - Paris	"
"	London - Montreal	"
"	Amsterdam - New York	"
"	Amsterdam - Montreal	"
September 1956	Zürich - New York	"
1957	Copenhagen or Stockholm to -	
	i) Los Angeles via Søndre Strømfjord	"
	ii) New York	"
	iii) Anchorage via Polar Route	"
	Bruxelles - New York	"

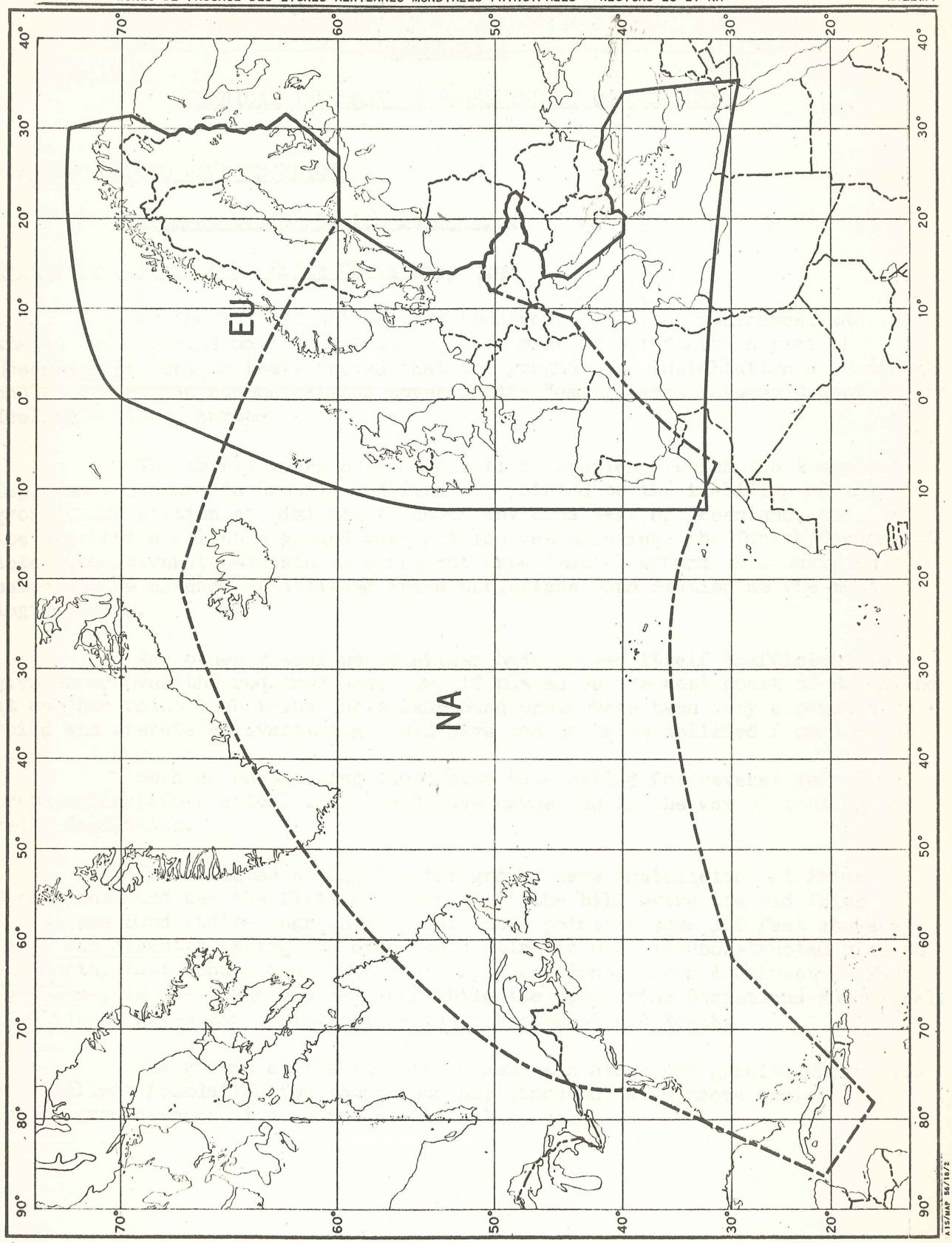
Note.- With reference to the daily need for these forecasts, it should be noted that the need is not necessarily a continuous one.



COLOUR OF NETWORK CONTOUR / COULEUR DU RÉSEAU	FREQUENCIES / FRÉQUENCES
EASTBOUND C	2945 5641.5 8862.5 13264.5
RED	
WESTBOUND B	2987 5671.5 8888 13284.5
BLUE D	2868 5626.5 8913.5 13324.5
GREEN D	2868 5626.5 8913.5 13324.5
BLACK D	2868 5626.5 8913.5 13324.5

EU AND NA MAJOR WORLD AIR ROUTE AREAS

ZONES DE PASSAGE DES LIGNES AÉRIENNES MONDIALES PRINCIPALES - RÉGIONS EU ET NA



APPENDIX G

TECHNICAL INFORMATION SUBMITTED BY DELEGATIONS

Part 1.- GROUND WAVE TECHNIQUE

i) Statement by the Danish Delegation

Ground Wave Station at Prins Christians Sund

At the 3rd NAT RAN Meeting (Montreal 1954), a requirement was stated for a ground wave installation to be made in the Southern part of Greenland if further tests proved that the ground wave installation at Simiutak could not provide communications cover in the "empty" area between Greenland and Iceland/Northern Europe.

The thirty years of communication experience which the Greenland Department has had in Greenland definitely pointed to the inability of the ground wave station at Simiutak to cover any area east of Greenland, and, as the need for a reliable ground wave station was pressing, the Danish Government acted upon several requests to carry out experimental ground wave work, and selected the already established Prins Christians Sund station as the most logical site.

Any other siting would either have proved itself inefficient to give cover over the required area, or, if placed on the east coast of Greenland at another point than Prins Christians Sund would have been very expensive to build and operate as everything would have had to be established from scratch.

Such an undertaking would also have called for several years' preparation before actual work could have commenced in the way of testing the radio facilities.

The selected siting for the ground wave installation at Prins Christians Sund was the flattened terrain of the hill where the old Prins Christians Sund radio-range used to be. This point is some 300 feet above sea level and directly facing the open North Atlantic with an unobstructed view to the North, East, South and South-westerly directions. From Southwest to West/Northwest, is the Greenland Mainland while the open Prins Christians Sund itself (the fjord) gives an opening between West/Northwest and North.

The ground at the site is of mountain stone and granite which give an excellent foundation for towers and buildings but also prove useless for normal ground-connection in the electrical sense.

The radiating tower is a new steel structure of about 200 feet (5/8 wavelength) high. The ground-connection consists of an insulated counterpoise hung on wires supported by steel beams about 15 feet above the ground in order to keep the counterpoise off any snow-banks. This is done in order to obtain stable radiation at all times.

The foot of the radiating-tower is the centre of the circular counterpoise which has 60 radials each of half a wavelength long.

The transmitter building is situated outside the counterpoise, and non-radiating feederlines run between the transmitter and the tower.

The present transmitters are only temporary installations, and the receivers have also the same status and are placed in the same building, although they are operated from a different site where the station's regular receivers are placed, and where the operational functions are performed. When and if the permanent and duplicated equipment is installed, the transmitters will remain at the present building whilst the receiving units will be placed in the operational building and new suitable antennae erected for receiving.

During the past three months, extensive tests and ordinary operation have been carried out, and very excellent results have been obtained. It has been proved during this time that contact with Iceland and the United Kingdom and any station in the area between Prins Christians Sund and the places named has been possible. Contacts as far South as Santa Maria are frequent, and even New York and Gander have been contacted on freak occasions. Several of the trans-Atlantic airline operators of various nationalities have already expressed their satisfaction with the Prins Christians Sund contacts.

Although three months' operation is too short a time on which to base a full report on the results, they have been so good that we are confident that the Prins Christians Sund ground wave station will provide the missing communications cover between Greenland and Europe.

The Danish Government is preparing the permanent installations which could be completed by the end of 1956.

ii) Statement by the Icelandic Delegation

Ground Wave Station at Grindavik

a) General

The station has been in 24 hours operation for 1-1/2 years using 750 W transmitters and crystal controlled receivers on the frequencies of 2868 and 2945 kc/s. The station is located about 150 feet from the coast on porous lava with sea-water penetration below the antenna system. The propagation path is entirely over sea for all present air-routes in

the area, this being essential to avoid the high ground wave attenuation associated with the lava terrain inland. The antenna, common to the two frequencies, is a 5/8 wavelength single self-radiating steel tower (210 feet high) giving optimum ground wave radiation with non-radiating feeder about 500 feet long. 150 ground radials at least 210 feet long are used as an earth system. The tower is used, by relay switching of the feeder in the transmitter hut for both transmission and reception and the station is remote controlled by landline cable from the operating positions at Gufunes aeronautical receiving station.

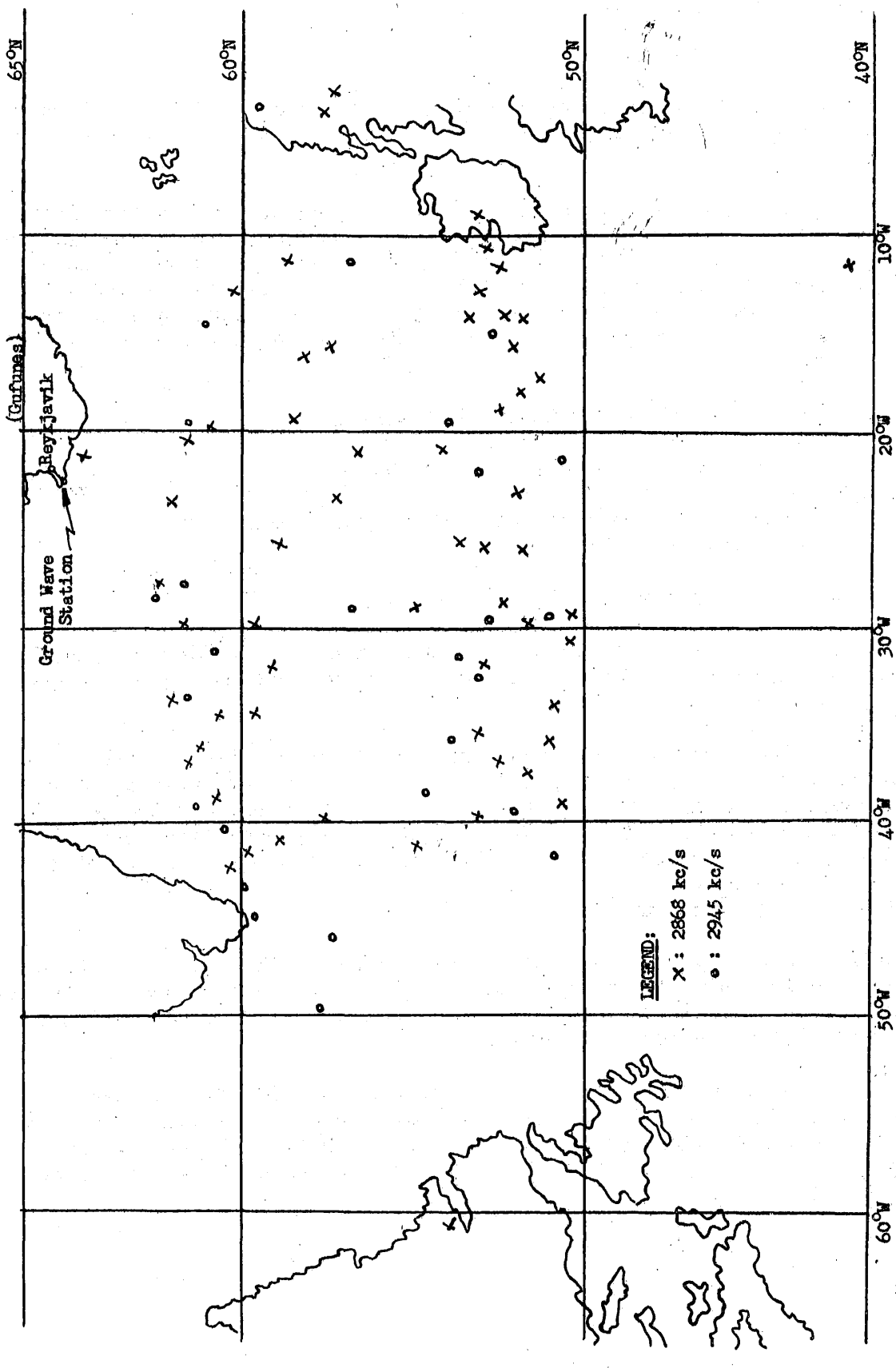
b) Results

Reference is made to the attached chart which shows the contacts made with aircraft on the two ground wave frequencies when radio conditions were such that there was a "blackout" with normal ionospheric propagation. The attached table shows a comparison of reports obtained on signals from the ground wave station at Grindavik and from the local transmitting station at Rjupnahaed.

Comparison of Grindavik (Grv) and Local Transmitters (Rjh) and Receivers on 2945 and 2868 Kc/s

GM Time:	Station:	Freq.:	Grv. xmtr	Rjh. xmtr	Grv. rx	Local rx	Remarks:
Oct. 28., 1954							
1551	SBW415	2945	5	2	5	4/5	
1551	SBW415	2868	5	2	5	4	" No answer received
1636	SBW415	2945	3/4	unable	4/5	4/5	
1636	SBW415	2868	3	nil ans	4/5	4	
1704	SBW415	2945	5	nil ans	3/4	3/4	
1704	SBW415	2868	4	nil ans	4	3/4	
1733	SBW415	2868	unable	0	3/4		
1755							SW415 now on 5626.5 Kc/s qsa 4, says qsa 5
2045	SA	2945	5	2	5	4	
2045	SA	2868	5	2/1"	5	4	" qsb
Oct. 29., 1954							
0042	WY	2868	2	0	3/4		
0042	SA	2868	5	0	5		
0045	SA	2945	5	4/5	4/5		
0205	SA	2945	5	5	5	5	
0315	SA	2868	5	4	5	5	
0316	AM	2868	3	2	3	3	
0316	CH	2868	3	1	3	2	
0335	PA101	2945	5	3	5	2/3	A/C 1.40 hrs out of Kf.
0400	PA101	2945	4	0	1/2	0	
0500	PA101	2868	4	0	1/2	0	
	Sa qrl rest of morning.		Qsa 5 on 2945 and 2868				
0800	SA	2945	3/4	3/4	3	3	Condition changing
0850	SA	2945	4	0	2	0	
1036	SA	2945	5	2/3	5	4	
1134	SA	2945	2/3	nil ans	3/4	1/0	
1235	SA	2945	2/3	nil ans	2/3	0	
1344	SA	2945	2/3	nil ans	2/3	0	
1436	SA	2945	3/4	1/0	3/4	1/0	
1520	SA	2945	3/4		3/4	0	Worked from Grv.
1520	SA	2868	3/4		3/4	0	Worked from Grv.
1535	SA	2945	5	0	3/4	1/0	
1630	SA	2945	4/5	1/0	4	3/4	
1734	SA	2945	5	2	3/4	2/3	
1825	SA	2945	5	2/3	5	3	
1825	ZV	2868	5	0	0	3/4	Rx Grv off
1908	MVA	2868	3/4	0	0	3/4	Rx Grv off
1930	SA	2945	3	3	3/4	3/4	
1908	Ps143	2868	5		3/4	5	Rx Grv off. A/C pos. 30 mins out of Hamburg
2037	MVA	2945	3/4	3/4	3/4	3/4	
2037	SA	2945	2/3	3	3	3	
2236	SA	2945	5	2	5	5	

SA: Shannon
WY: Santa Maria
AM: Amsterdam
CH: Copenhagen
ZV: Stavanger
MVA: London



Aircraft positions on occasions when contact was only possible by ground wave

iii) Statement by the Irish Delegation.

Ground Wave Stations at Valentia

The Irish Civil Aviation Administration has engaged in a programme designed to evaluate the Ground Wave technique, and to compare it with conventional techniques.

A ground wave receiving antenna was erected at the Maritime Radio Station at Valentia, on a cliff site, approximately 200 feet high, immediately overlooking the sea. In addition a ground wave antenna was erected at Shannon Receiving Station, which is situated on the Shannon estuary approximately 35 miles from open sea. Tests to determine the range of reception of aircraft, transmitting on the two megacycle order frequencies, were made, and the results achieved, using:

a) the ground wave antenna at Valentia,

b) the ground wave antenna at Shannon,

c) conventional omnidirectional and directional aerials at Shannon, were compared.

The results may briefly be summarized as follows:

a) a considerable increase in the range of reception by ground wave, as compared with conventional antennae, was achieved during daylight hours;

b) the range of reception achieved during hours of darkness, using the ground wave antenna, did not show a clear cut superiority over that achieved using conventional antennae. However neither the period of test, nor the number of occasions on which skip conditions were experienced, were sufficient to enable firm conclusions to be reached.

Tests are still continuing.

In the meantime, a survey has been made of the coast, to the west from Shannon, with a view to determining the most suitable location for a permanent installation, capable of being integrated by means of VHF link with the aeronautical mobile communications station at Shannon.

In the light of possible future requirements, e.g. VOLMET broadcasts, the complex subject of operating a number of simultaneous frequencies from the same location is being investigated, so that, after the installation of one simplex airground circuit, further development will be possible without suffering economic penalty.

iv) Statement by the U.K. Delegation.

HF Ground Wave Installation

a) A ground wave trial installation has been made at the Loran Station, Mangersta, Outer Hebrides.

b) Initially a temporary 1/4 wavelength aerial was used with the transmitter of nominal output 3kW. Owing to unusual difficulties experienced at this remote and rugged location which is exposed to inclement weather conditions, the appropriate 5/8 wavelength vertical mast radiator was not installed until the end of 1955. A single radiator is used for common Tx/Rx operation and it has been matched with transmitter to give an effective radiated power of the order of 2.5kW. A conventional radial earth mat, well bonded between radials, is used to reduce earth losses to a minimum and maintain vertical polarization. The site is near the edge of a cliff top some 100 feet above sea level.

Satisfactory solutions were found and applied to overcome mutual interference between the R/T and Loran transmissions experienced at the start.

c) Trials using the temporary aerial system were commenced in the Spring of 1955 (U.K. - M.T.C.A. - Information Circular No. 23/1955 dated 23rd February 1955, refers) and were suspended during the Autumn to allow the installation of the vertical mast radiator to be completed. Trials were recomenced in January 1956 and may extend to April 1956 so as to sample as many propagation disturbances as possible during a time of the year when such disturbances are most prevalent. Current investigations are being made on 2945 kc/s and the status of the station is purely experimental.

d) Considering that, among other things, one of the primary objectives of these trials is to determine the extent to which the ground wave service from Mangersta can supplement the "normal" service to the U.K. ACC particularly during adverse propagation conditions the amount and quality of information available from the earlier trials is not sufficient to justify proceeding with a permanent installation. However, it is hoped to have sufficiently conclusive evidence by the end of the next phase to enable the permanent installation to be implemented.

e) In this event, it is envisaged that, in the first instance, the station will be equipped and staffed as soon as possible to provide a service on one of the lowest order frequencies of the NAT HF R/T families and possibly a supplementary service on one of the higher order frequencies. Furthermore the station will be integrated with the other components of the U.K. radio terminal of the NAT Aeromobile Communication Service and with the ACC using Radio Link/Landline facilities operated by suitably located highly trained communications staff.

f) Any further extension of the HF R/T facilities at this location will depend on the resolution of a number of technical/administrative problems, which in any case could not ordinarily be resolved in less than two years.

g) The United Kingdom believes that satisfactory "service cover" for all northerly transatlantic routes may be provided by similar "ground wave" installations located in Iceland, Greenland and in Canada. Therefore, it is most interested in the plans and trials results of "ground wave" installations noted for them and other States in the NAT Regional Plan, and looks forward to the fullest exchange of information.

Part 2.- EXTENDED COVERAGE VHF STATIONS

i) Statement by the Irish Delegation.

VHF Extended Cover at Shannon

The question of providing VHF extended cover has been investigated. Initially it was felt that the location of the station should be on the west coast, thus obtaining improvement in coverage, to the west, by geographical displacement of the station location 35 miles westwards from Shannon Airport. However practical tests, with equipment based on a hilltop site, (1010 feet elevation), some 10 miles from Shannon, indicated that satisfactory extended cover could be obtained. Using VHF transreceiving equipment which could not be regarded as being highly efficient, by present day standards, ranges of 225 NM, at 10,000 feet, were obtained in a number of directions, and specifically to the western Atlantic approaches.

The final arrangements for the installation of a station on the hilltop site are under study and the proposals include the provision of diversity reception using directional antennae. The station can be integrated, by VHF link, into the Aeronautical Communications Service at Shannon.

The provision of power, acquisition of site, etc., will naturally take time, and it is not possible, at present, to indicate when the scheme will be completed.

ii) Statement by the U.K. Delegation.

VHF En-route Installation

a) A series of tests are being conducted using a trials installation at Mangersta with a high gain directional aerial array beamed on the U.K./Iceland route.

b) A stacked dipole array with reflector of maximum gain approximately 14 dB mounted approximately 100 feet above sea level (approximately 200 feet above mean sea level) is connected through low loss aerial feeders to the Tx/Rx installation which comprises a 50 Watt (nominal output) transmitter and low noise factor receiver. A single aerial array is used for Common Tx/Rx operation. The site is the same as that for the Loran and ground wave installations. The frequency used is 127.9 Mc/s.

c) So far the tests are most satisfactory in the sense that a high proportion of the contacts made have exceeded theoretical estimates of radio line of sight ranges (normal refractive index conditions) for the aircraft altitudes concerned by amounts which average out at 30% increase, and generally are such as to provide a very useful service area. These trials are continuing.

d) It is hoped to complete the trials by April 1956 when sufficient evidence should be available to justify permanent installation.

e) In this event (even as it is envisaged for the HF ground wave installation), it is planned to equip and staff the permanent installation as soon as possible to serve as an efficient component of the U.K. radio terminal of the NAT Aeromobile Communication Service and the ACC.

f) Also consideration is being given to the possibility of having to provide a similar radio station on the en-route frequency at another location, possibly in Northern Ireland, to fill any significant gap in cover which may be shown to exist between the service areas provided from installations at Mangersta and Valentia. Naturally, such a requirement will not become evident at the earliest until at least the Mangersta trials have been completed.

g) The U.K. is most interested in the plans and results of extended cover installations noted for implementation by other States in the NAT Region and looks forward to the fullest exchange of information.

h) Whilst existing installations on British Weather Ships (Stations A, I, J and K) are arranged to provide an "On Request" service on 127.9 Mc/s, space considerations on board these ships do not at present permit a continuous watch being kept on this channel.

Part 3.- VHF FORWARD SCATTER TECHNIQUE

Statement by the IATA Delegation

A study project was initiated by some of the North Atlantic airline operators to investigate the applicability of VHF Forward Scatter techniques

to meet the North Atlantic point-to-point communications requirements. Although this project is not complete, certain information is available:

a) It was ascertained that at least one manufacturer had suitable equipment, designed specifically for this technique, in production. This equipment includes 20kW SSB transmitters, paralleling equipment so that two such transmitters may be employed to provide 40kW output, plus multi-channel signalling equipment providing one voice channel and up to 16 teletypewriter channels utilizing the latest signalling techniques (predicted wave signalling), which provides a 7 to 8 db improvement over conventional frequency shift signalling. Also, techniques in signal combining are employed in diversity reception, offering substantial advantage over diversity switching methods, which is of particular significance in improving voice transmission. This, along with new methods of audio-compression and expansion, makes voice entirely feasible with VHF Scatter, which is characterized by large and rapid excursions in received signal strength. In such a system time division multiplex permits data to be transmitted with little consequence from "sputter" or "Dopler" interference from meteor activity.

b) Since the equipment employs a frequency source of extremely high stability, better than 1 part in 108 per day, very narrow band width is employed in the receiving and terminal carrier equipment with no allowance having to be made for frequency stability reasons. The voice channel can be confined to 300 cycles and each teletypewriter channel to 50 cycles (for 60 WPM).

c) Inasmuch as two 20kW transmitters are employed, standby is automatically provided, with but 3 db loss in transmitted power should one unit fail. This loss is significant only under the very worst propagation conditions.

d) Each VHF Scatter terminal requires two antennae. One is employed for simultaneous transmission and reception, through high efficiency filters, the other is employed for reception only for diversity purposes.

e) There are at least three types of antennae suitable for this technique, each providing in excess of 20 db power gain, with a high degree of signal coherence in the presence of signals arriving from various angles; the half parabola the corner-reflector and the multiple Yagi types, all of which may be of such mechanical design as to avoid the necessity of special de-icing facilities. The general size of such antennae is approximately 140 feet in height and 140 feet width overall, varying somewhat depending upon the VHF frequency order involved. Frequencies in the range of 30-50 Mc/s are considered suitable, with preference in the range of 36-42 Mc/s. Transmit/receive frequencies must be separated by approximately 3.5 Mc/s or more at any given location.

f) It is of interest to note the antennae siting factors that must be taken into account. Antennae must be located on flat ground with substantially flat; clear terrain for a minimum of 2000 feet in the signal path and that the terrain clearance should be within an angle of less than 4 degrees, subtended from this point, for a circuit length of 850 NM (which is close to the optimum length for VHF Scatter techniques). It is estimated also that a system including three links could be installed in about nine months elapsed time (excluding any period of interruption, for climatological reasons for example).

g) Based on the results of existing circuits, including those in northern latitudes, the predicted reliability for a voice circuit across the North Atlantic would be:

One Hop - 99.8% yearly and 99.2% during the worst month;
Three Hops - 99.3% yearly and 97.3% during the worst month;

Reliability of the teleprinter circuits is predicted to be virtually 100%, with negligibly small error rate under the very worst propagation conditions.

h) With respect to voice quality, it is predicted that the percentage of the time throughout the year that intelligibility will be impaired (channel test tone-to-noise ratio below 15 db) is only .3% for one hop, .6% for two hops and 1.5% for three hops.

i) As an indication of the general magnitude of the cost of one complete terminal, including electronic equipment, power generators, fuel storage, buildings antennae, shipping and installation charges; it is roughly estimated at approximately $350,000 = £125,000. This figure may be higher or lower depending on variations in labour and material costs, availability of primary power (125kW), etc.

Part 4.- DATA ON IMPROVEMENT OF NAT RTT CIRCUITS (U.K.)

Statement by the U.K. Delegation

The United Kingdom has since the 3rd NAT Regional Air Navigation Meeting, bearing in mind COM Recommendations 2, 8, 9 and 11, and believing that continuous availability of RTT circuits is an essential prerequisite to the efficient exercise of ATC Traffic Control, kept a careful record of the relation between the serviceability of RTT circuits and the features of the installations at RTT terminals.

Over the period December 1954 to January 1956, while there has been a progressive improvement in two-way communications on the RTT circuits London - Gander, London - New York and London - Reykjavik, the United Kingdom has found that during the period of survey the incoming serviceability to London has been below that of the outgoing serviceability from London by the amounts shown below:

		Gander	New York	Reykjavik
December	1954	5%	5.12%	12.88%
January	1955	5%	2.39%	13.37%
February	1955	5%	5.34%	11 %
March	1955	5%	2.85%	14.4 %
April	1955	5%	1.24%	18.5 %
May	1955	5%	0.45%	8.7 %
June	1955	3%	-	0.8 %
July	1955	5%	0.8 %	6 %
August	1955	5%	2.2 %	6.8 %
September	1955	5%	5.4 %	16.7 %
October	1955	5%	1.2 %	9.6 %
November	1955	5%	3 %	13 %
December	1955	5%	0.85%	16 %
January	1956	6.65%	2.49%	13.81%

Associating this data with:

a) the transmitting powers (40 kW at London, 15 kW at Gander, 12 kW at New York and 3 kW at Reykjavik);

b) the fact that the receiver employed at the London terminal of the New York circuit during the period in question was a highly selective receiver and at the other London terminals a general purpose receiver was employed (difference in performance is shown at Appendix B COM-97 of the 3rd NAT Final Report)

the United Kingdom drew the conclusion that the full implementation of COM Recommendation 11 of 3rd NAT RAN was essential if the high serviceability necessary to instantaneous communication was to be provided. Consequently all United Kingdom NAT terminals are to be converted to the selective receivers, used previously in the New York circuit only, as from March 1956. Beyond that point further improvements are dependent upon increased power of transmission at remote terminals and triangulation as envisaged in COM Recommendation 2 of 3rd NAT. Trials, in conjunction with the United States, have been conducted via San Juan over the past year to cover the southerly route and it is hoped that this may become an operational facility in the near future. A northerly triangulation route appears to be dependent on the development of Scatter techniques referred to in para. 2.1.2.2.1 under Agenda Item 1.5 c) at Section 2 of the Report.

APPENDIX H

LIST OF REPRESENTATIVES AND COMMITTEES ATTENDED

		Committee Attended	
		A	B
BELGIUM			
F. Taburiaux	Head of Delegation	X	
H. Martin	Delegate		X
CANADA			
C.C. Bogart	Head of Delegation	X	
R. Graham	Delegate		X
T. Myrick	"		X
R.H. Smith	"	X	
H. Ferris	Adviser		X
A.W. Loke	"	X	X
W.B. Millar	"	X	
DENMARK			
V. Mosdal	Head of Delegation		X
O. Amundsen	Delegate		X
A. Hansen	"	X	
H. Holiten Møller	"		X
H. Mølgaard	"	X	X
L. Søndergaard	"		X
C. Hastrup	Adviser	X	
FRANCE			
D. Haguenau	Head of Delegation	X	X
R. Balat	Delegate	X	
J.P. Barberon	"		X
P. Bernadet	"		X
P. Corfa	"	X	X
L.A. Danel	"		X
R. Davidson	"	X	
G. Hoerter	"		X
J. Levéque	"	X	
R. Mittner	"	X	X
FEDERAL REPUBLIC OF GERMANY			
G. Glunz	Observer	X	X
F. Hentschel	"	X	
H. Schweitzer	"		X

		A	B
ICELAND			
B. Jonsson	Head of Delegation	X	
F. Diego	Delegate	X	X
E. Palsson	"		X
IRELAND			
A. Kennan	Head of Delegation	X	
G.E. Enright	Delegate		X
T.O. Dalaigh	"		X
R.W. O'Sullivan	"	X	
P.K. Rohan	"		X
L. Sinnott	"	X	
ISRAEL			
J. Williams	Head of Delegation	X	X
NETHERLANDS			
O.J. Selis	Head of Delegation	X	X
H.E. Moeshart	Delegate		X
H.M. de Jong	Alternate		X
P.J.C. Rombouts	"	X	X
A. Van Der Aa	Adviser		X
NORWAY			
J.H. Edvardsen	Head of Delegation	X	X
G.K. Kristiansen	Delegate	X	
R. Bougge	"		X
SPAIN			
E. de Ugarte	Head of Delegation	X	
J.M. Arbeloa	Delegate	X	X
SWEDEN			
A. Landin	Head of Delegation	X	
L.E. Enderlein	Adviser	X	X
UNITED KINGDOM			
N.V. Lindemere	Head of Delegation	X	
J.C. Cumming	Delegate		X
R.G. Fall	"	X	X
P.H.E. Hope-Ross	"		X
A.R. Kirk	"	X	
R.A. Pearson	"	X	
E.W. Pike	Adviser	X	

		A	B
UNITED STATES			
H.H. McFarlane	Head of Delegation	X	X
Col. W.O. Ezell	Alternate	X	
W.L. Halnon	"		X
W. Hendershot	"	X	
E.V. Shores	"		X
J.R. Abbott	Adviser		X
H. Helfert	"		
R.F. Link	"	X	
R. Nye	"		
G.H. Pratt	"		X
International Airline Navigators Council			
H. Almin	Observer	X	
J. Dubost	Observer	X	
International Air Transport Association			
A.O. Powell	Head of Delegation	X	
D. Anderson	Observer	X	
P. Auberson	"		X
H.T. Blaker	"	X	X
R.F. Brown	"	X	
J. Edwards	"		X
B. Frost	"	X	
J. Gilmore	"		
J.M. Hardouin	"	X	
E.P. Henley	"	X	X
J.J. Kennyhertz	"		X
O.P. Koch	"	X	
B. Liljequist	"	X	
J. Meline	"	X	
W.B. Miller	"	X	
L.A. Nilsson	"	X	X
P.G. Powell	"	X	
R.S. Roda	"		X
J. Suttorp	"		X
O.H. Wiles	"	X	X
C. Williams			
International Federation of Airline Pilots Associations			
J. Woodman	Observer	X	X
International Telecommunications Union			
J.A. Gracie	Observer		X
World Meteorological Organization			
N. Veranneman	Observer		X

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