

**PLAN FOR THE 8.33 kHz CHANNEL  
SPACING IMPLEMENTATION  
IN EUROPE**

<b>Edition</b>	<b>: 2.0</b>
<b>Edition Date</b>	<b>: 2 December 1996</b>
<b>Status</b>	<b>: Approved by EANPG/38</b>
<b>Class</b>	<b>: General Public</b>

**Document Identification and Status**

<b>Title:</b>	<b>PLAN FOR THE 8.33 kHz CHANNEL SPACING IMPLEMENTATION IN EUROPE</b>
<b>Edition:</b>	Edition 2.0
<b>Date:</b>	2 December 1996

<b>Prepared by:</b>	<b>Name: C. HAMEL</b> <b>Position:</b> Chairman of the 8.33 kHz Drafting Group <b>Date:</b> <b>Signature:</b>
<b>Reviewed by:</b>	<b>Name: A. LEMAIRE</b> <b>Position:</b> Chairman of the EATCHIP Communication Team <b>Date:</b> <b>Signature:</b>
<b>Approved by:</b>	<b>Name: W. PHILIPP</b> <b>Position:</b> EATCHIP Project Leader <b>Date:</b> <b>Signature:</b>

### Document Change Record

The following table records the complete history of the successive editions of the present document.

EDITION	DATE	REASON FOR CHANGE	SECTIONS PAGES AFFECTED
1.0	11 November 1996	Edition 1.0 was fully approved by the ECAC at the 16th Project Board meeting (4 November 1996).	
2.0	2 Dec. 96	Edition 2.0 changes are only related to the flight plan. These changes are in accordance with the outcome of ICAO/EANPG-38 meeting (26-29 November 1996). By early 1997, ICAO will officially notify States on issues and actions contained in this plan.	P38-39 & P42-43

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## LIST OF ACRONYMS AND ABBREVIATIONS

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<b>AG-SG</b>	Air/Ground Communication Sub-Group
<b>AIC</b>	Aeronautical Information Circular
<b>AMCP</b>	Aeronautical Mobile Communication Panel
<b>APATSI</b>	Airport/Air Traffic Systems Interface
<b>ATC</b>	Air Traffic control
<b>ATS</b>	Air Traffic Services
<b>CFMU</b>	Central Flow Management Unit
<b>CIP</b>	Convergence and Implementation Programme
<b>CIPD</b>	Convergence and Implementation Programme Document
<b>CNS/ATM</b>	Communications, Navigation, Surveillance/Air Traffic Mgt
<b>COMT</b>	EATCHIP Communications Team
<b>EANPG</b>	European Air Navigation Planning Group
<b>EATCHIP</b>	European ATC Harmonisation & Implementation Programme
<b>EATMS</b>	European Air Traffic Management System
<b>ECAC</b>	European Civil Aviation Conference
<b>EOBT</b>	Estimated Off Blocks Time
<b>EUROCONTROL</b>	European Organisation for the Safety of the Air Navigation
<b>EUR RAN</b>	European Regional Air Navigation
<b>EWP</b>	EATCHIP Work Programme
<b>FCB</b>	Frequency Coordinating Body
<b>FIRs</b>	Flight Information Regions
<b>FL</b>	Flight Level
<b>FM</b>	Frequency Management issues
<b>FMG</b>	Frequency Management Group
<b>FPL</b>	Flight plan
<b>FU</b>	Follow-Up issues
<b>GAT</b>	General Air Traffic
<b>ICAO</b>	International Civil Aviation Organisation
<b>LoA</b>	Letters of Agreement
<b>MATSE</b>	Meeting on the Air Traffic System in Europe
<b>MTBF</b>	Mean Time Between Failure
<b>NATS</b>	National Air Traffic Services
<b>ODETE</b>	On-line Data Exchange Terminal
<b>OP</b>	Operational issues
<b>REG</b>	Regulatory issues
<b>RET</b>	Airbone & ground retrofit issues
<b>SAAM</b>	System for Assignment and Analysis at a Macroscopic level
<b>SARPs</b>	Standards and Recommended Practices
<b>TOR</b>	Terms of Reference

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## **1. EXECUTIVE SUMMARY**

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### **1.1 INTRODUCTION**

- 1.1.1 In order to alleviate the shortage of VHF radio frequencies available to the Air Traffic Services Units involved in the congested upper airspace of the ICAO EUR region, the Special EUR Regional Air Navigation Meeting (EUR RAN, Vienna September 1994) and the Special Communications/Operations Divisional Meeting (SP COM/OPS/95, Montreal March-April 1995) recommended the introduction of the 8.33 kHz channel spacing.
- 1.1.2 On behalf of the EUR RAN and the COM OPS the EANPG/37 delegated the development of the 8.33 transition plan to EUROCONTROL.
- 1.1.3 The plan proposed in the following pages went through the standard EUROCONTROL approval process and was finally endorsed by the EATCHIP Project Board ( 4th November 1996).

### **1.2 THE 8.33 DRAFTING GROUP**

- 1.2.1 The 8.33 Drafting Group, under the Air/Ground Communication Sub-Group (AG-SG) of the EUROCONTROL EATCHIP Communication Team (COM Team) was created to develop the transition plan in accordance with the recommendations of EANPG/37 and FCB/15.
- 1.2.2 The 8.33 Drafting Group, is formed by experts from the States and EUROCONTROL involved in the fields interacting with the transition plan. These interacting fields are the Operational, the Frequency Management, the Retrofit, the Regulation and the Follow up activities.
- 1.2.3 A permanent concern of the 8.33 Drafting Group was to ensure that the States and their Users were widely informed and could express their needs and constraints.

### **1.3 OUTCOME OF THE PLAN**

- 1.3.1 Due to the already very high level of congestion, both, in terms of traffic flow and frequency spectrum, this plan has to be fully applied and will be requiring the cooperation of all the States concerned. Thus, a very accurate follow up plan will have to be ensured, as soon as this plan is approved.

- 1.3.2 Taking into account all the parameters and with special attention to the operational environment and safety issues, the solutions of the 8.33 Drafting Group to the main issues raised by the transition are:
- The States that will implement 8.33 kHz channel spacing are: Austria, Belgium, France, Germany, Luxembourg, Netherlands, Switzerland, United Kingdom.
  - The date of mandatory carriage is set for 1st January 1999 for the EUR Region above FL 245 generally and FL 195 for France.
  - States may grant exemptions to certain types of aircraft operation.
- 1.3.3 The strong operational constraints, generated by the 8.33 kHz channel spacing implementation, will have to be taken into account by States concerned.
- 1.3.4 The Frequency Management Strategy proposed by the 8.33 Drafting Group and approved by the Special Frequency Management Group meeting (Special FMG - September 1996) involves the creation of an 8.33 kHz sub-band between 132.000 MHz and 134.800 MHz.
- 1.3.5 By simulating realistic future ACC/U and ACC/I requirements in the congested area (assuming a growth rate of 4% per year, as per the last 20 years), the plan for the 8.33 kHz channel spacing will allow sufficient capacity for these services to be created for at least 5 years.
- 1.3.6 Based on preliminary projections of the VHF channel demand, the 8.33 Drafting Group recommends that early actions be undertaken so that the use of 8.33 kHz operation be extended, as necessary, by 2003.

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## **2. INTRODUCTION**

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### **2.1 BACKGROUND**

- 2.1.1 Based on concerns raised by the ECAC States through the EUROCONTROL EATCHIP working structure and on relevant work developed by the Aeronautical Mobile Communication Panel (AMCP), the ICAO special European Regional Air Navigation Meeting (EUR RAN Vienna, September 1994) and the Special Communications/Operations Divisional Meeting (SP COM/OPS/95 Montreal, March-April 1995), recommended the introduction of 8.33 kHz channel spacing as the only solution to face the VHF congestion in Europe.
- 2.1.2 The SP/COM/OPS/95 meeting, attended by the representatives of users and of 79 ICAO Member States, delegated the implementation of the 8.33 kHz channel spacing to the European Air Navigation Planning Group (EANPG).

### **2.2 WORKING ARRANGEMENTS**

- 2.2.1 The EANPG endorsed a plan of action, developed by EUROCONTROL and the FCB at the FCB/15 meeting “to ensure an harmonized planning and implementation” (EANPG 37/report on agenda item 2 paragraphs 2.4.24 and Appendix B). Subsequently, EUROCONTROL established a group called the “8.33 Drafting Group” to carry out this task.
- 2.2.2 The 8.33 Drafting Group consists of frequency management and operational experts from the United Kingdom, France, the Netherlands, Germany and Switzerland as well as representatives of users associations (IAOPA, IATA) and Eurocontrol experts in ATC operations, frequency management, international regulations and airborne retrofit.
- 2.2.3 The 8.33 Drafting Group, in accordance with its Terms Of Reference (TOR), as approved by the EATCHIP Communications Team (COMT), gathered all the information it could within the short time available, in order to devise a comprehensive implementation plan with the minimum of constraints for the aeronautical community.
- 2.2.4 The 8.33 Drafting Group, in accordance with the framework proposed in Appendix A of the EANPG/37 report, prepared a detailed proposal for submission to the Special Meeting of the Frequency Management Group (FMG) of the EANPG of September 1996.

## **2.3 CURRENT SITUATION**

- 2.3.1 The trend within the ECAC States has been to create new sectors in order to provide additional capacity. This implies additional frequency requirements for the new sector(s).
- 2.3.2 Currently, the frequency assignment in the VHF band is frozen until an adequate Transition Plan has been agreed.

## **2.4 SCOPE OF WORK**

- 2.4.1 The Group has developed a proposal entitled:  
“PLAN FOR THE 8.33 kHz CHANNEL SPACING  
IMPLEMENTATION IN EUROPE”.
- 2.4.2 This Plan will describe the implementation of the 8.33 kHz channel spacing in Europe.
- 2.4.3 This plan has been approved by the EATCHIP Project Board on November the 4th, 1996.
- 2.4.4 Some details of the Implementation Plan will require attention beyond the EANPG/38 meeting, and not all of them can be addressed in this initial proposal to the EANPG. Therefore, a number of 8.33 Drafting Group meetings are foreseen after the EANPG/38 meeting to prepare and monitor the implementation. Additional related matters will be addressed and presented to EANPG/39.

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### **3. CONTENT OF THE IMPLEMENTATION PLAN**

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3.1.1 The proposed Implementation Plan is based primarily on inputs provided by States as well as by members of the 8.33 Drafting Group.

#### **3.2 INTERACTIONS**

The following aspects were identified as being major factors for the development of the transition plan:

3.2.1 Frequency Management (FM) issues related to the 8.33 Implementation Plan, including sector transition, frequency shift and spectrum benefits.

3.2.2 Airborne & ground retrofit (RET) issues as an industrial constraint in respect of the number of aircraft and ground stations to be equipped for 8.33 kHz operation, e.g. equipment availability and installation span.

3.2.3 Regulatory (REG) aspects for States and aircraft operators to ensure that the Implementation will comply with all relevant procedures and regulations both international and national.

3.2.4 Operational (OP) issues for both ATC units and aircraft operators and the influence of the new channel spacing on ATS Operations, e.g. traffic handling, mixed environment operation.

3.2.5 Follow-up (FU) strategy to propose methods and tools for the post-launch monitoring of the 8.33 Implementation Plan.

### **3.3 CHARACTERISTICS OF THE IMPLEMENTATION PLAN**

- 3.3.1 This Implementation Plan was defined in coordination with the users in such a way so as to ensure the least possible impact. Subsequent actions, undertaken by each State, shall follow this principle.
- 3.3.2 The pro 8.33 States will require the participation and cooperation of some other States that are not going to implement 8.33 kHz channel spacing in their airspace but are willing to participate in the 8.33 frequency assignment process. The 8.33 States and the participating States are listed in ANNEX 1.
- 3.3.3 The Implementation Plan will allow the release of spectrum under certain conditions. This expectation is based upon the current situation, information gathered from States and the expert opinion of State and EUROCONTROL representatives.
- 3.3.4 The Implementation Plan will confirm the feasibility of, the introduction of 8.33 kHz channel spacing and the resulting benefits in terms of the availability of additional frequencies and corresponding time scales.
- 3.3.5 The Implementation Plan will outline the implementation process and will provide related recommendations to the users in respect of dates, steps, processes and common follow-up tools which, if applied, will ensure the achievement of the desired aims.

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## **4. IMPLEMENTATION DESCRIPTION**

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### **4.1 DATE AND AIRSPACE OF MANDATORY CARRIAGE**

- 4.1.1 Based on the answers to EUROCONTROL questionnaires received from States, aircraft operators, military organizations and from equipment suppliers (refer to synthesis in ANNEX 2), and following further coordination with users, it appears that the possible starting date for the 8.33 kHz operation is dependent mainly on the number of aircraft to be equipped for operation within the airspace concerned. Operators, will have to make a significant effort to equip their whole fleet in time.
- 4.1.2 In accordance with information received from certain State authorities in coordination with their national users, the 8.33 Drafting Group recommends that the mandatory date for the carriage and operation of 8.33 kHz spacing capable radio equipment for flight above Flight Level (FL) 245, be set for 1st January 1999.
- 4.1.3 It is recognized that in some FIR's/UIR's, a lower level may be specified. This level should be no lower than FL 195. This is a French requirement.
- 4.1.4 The area applicability of this carriage requirement should be the whole of the ICAO EUR Region, on the understanding that an individual State may grant exemptions within its area of responsibility.

*Note:*

*The proposal to extend the carriage requirement to the whole of the EUR region is based on the following considerations:*

*Aircraft operators are not expected to regionalise their fleets and aircraft operating above FL 245 are normally expected to operate in the area where 8.33 kHz channel spacing is currently in operation. This will simplify flight planning without unduly penalising aircraft operators.*

*Restricting the applicable area initially to certain specified FIRs/UIRs would make later expansion difficult, possibly resulting in non-equipped aircraft penetrating new areas of 8.33 kHz operation. In addition, based on available information, it was not considered operationally feasible to provide alternative routing for non-equipped aircraft below the level of mandatory carriage. The only possibility is to plan a flight below the level of mandatory carriage and this stresses the need for uniform 8.33 sectors with common minimum flight level.*

*Once the carriage requirement has been implemented, States can proceed with the introduction of 8.33 kHz channel spacing based solely on airspace and Frequency Management considerations, without the need for potentially complicated flight planning arrangements (the non-8.33 States, if they render mandatory the carriage of 8.33 kHz channel spacing capable radios, are not required to implement the matching ground equipment).*

*According to simulations, additional States than those congested today may require to go for 8.33 kHz channel spacing in the near future. Thus, these States will be able to proceed with implementation, based solely on frequency management and ATC operational considerations, without the need for additional co-ordination with aircraft operators..*

*States may grant exemptions to aircraft that will never fly in the airspace of implementation. However such aircraft will have to insert the appropriate indicator in field 18 of the flight plan.*

4.1.5 The date for the start of operation of the 8.33 kHz channel spacing shall be determined individually by States. This date shall not be earlier than the above mentioned date of mandatory carriage, i.e. the 1st of January 1999.

## 4.2 AIRSPACE OF IMPLEMENTATION

4.2.1 Although the mandatory carriage of 8.33 kHz channel spacing capable equipment applies within the whole of the EUR Region, the airspace in which 8.33 kHz channel spacing will be initially implemented is expected to encompass the sectors listed in ANNEX 3. Maps depicting the airspace concerned by flight levels are provided in ANNEX 4.

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## **5. WORK OF 8.33 DRAFTING GROUP ON FREQUENCY ISSUES**

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### **5.1 RECOMMENDATIONS OF THE FCB/15 AND EANPG/37**

In line with the recommendations of the FCB/15 and the EANPG/37:

5.1.1 The work conducted by the 8.33 Drafting Group is based on information gathered, by the mean of questionnaires from the States.

5.1.2 The 8.33 Drafting Group took into account all the constraints, in order "to minimize the negative impacts of this transition on the users" and defined a Frequency Management Transition process safe and compatible with the frequency management, operational, retrofit and regulation requirements.

### **5.2 STATES QUESTIONNAIRES ANALYSIS:**

From answers received from States, the 8.33 Drafting Group was able to gather the following information:

5.2.1 The date for mandatory carriage and for start of operation is to be 1st January 1999.

5.2.2 The list of the candidate assignments to be converted to 8.33 kHz channel spacing, is given in ANNEX 3.

5.2.3 The matching sectors to be converted are depicted in maps of ANNEX 4.

*Note:*

*The information provided by France was corrected according to the data available within EUROCONTROL.*

5.2.4 The European States which notified EUROCONTROL of their readiness to move some of their 25 kHz frequencies in accordance with the EANPG conclusion EANPG 37/1 are:

Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom.

*Notes:*

*- States have coordinated their answers with their users.*

*- One State formally informed EUROCONTROL that no coordination has been made with their national operators.- Questionnaires have also been sent directly to the airlines, the ATC service providers and to the military organisations in order to get their concerns and to adapt as much as possible the Implementation Plan to their specific requirements.*

### 5.3 VALIDATION PROCESS

The validation process made use of co-channel assignments frequency protection criteria based upon the radio horizon method rather than the 14 dB D/U method and of adjacent channel assignments separated by 10 NM separation without any overlap allowed. Thus, the chances of successful implementation of the proposed changes were increased because each of the individual proposals will less likely to be objected to by States involved.

5.3.1 *Note: Changes in the separation criteria would have a direct impact on the simulation results.* The 8.33 Drafting Group carried out a validation process by looking at the influence on the Frequency Management Plan of different parameters such as the sub-band size on the spectrum capacity gain or the area concerned by the sub-band creation.:

5.3.2 The 8.33 Drafting Group also looked at the quality of scenarios on their ability to minimize the burden for the States (in particular those not converting their assignments) and to answer the frequency needs at the earliest for the benefit of the users.

5.3.3 A combination of National data-bases for countries like France, Switzerland, Germany, Belgium, the United Kingdom and the Netherlands supplemented with the information from the ICAO Table COM 2 for all other States was used for the simulations.

5.3.4 Two different types of frequency planning software were used in the initial validation of the results. The results were obtained by applying software developed in the Netherlands. Some checks were done by using the Day-to-Day Frequency Management Tool as distributed by EUROCONTROL.

*Notes:*

*- the information from Table COM 2, as received per March/April 1996 via EUROCONTROL, is not an official version of Table COM 2 and it is therefore important that all countries concerned check the results to be published against their National register as well as the official Table COM 2 as it is at present.*

*- It is each State's responsibility to check the results published on their acceptability.*

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## **6. FREQUENCY MANAGEMENT CONSIDERATIONS**

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### **6.1 SUB-BAND DEDICATED TO 8.33 kHz ASSIGNMENTS**

- 6.1.1 Based on earlier simulation studies, a sub-band of 1.2 to 1.5 MHz was recommended during the EANPG/37 meeting. This width was chosen because it was found to be the minimum width adequate to cater for the 25 kHz assignments candidate to be converted to 8.33 kHz operation. Furthermore, it was assumed that, by taking the minimum width, the impact on States peripheral to the implementation area would be also minimized.
- 6.1.2 However, a more detailed study conducted by the 8.33 Drafting Group, revealed that by taking the minimum width for the sub-band, the chances of successful creation of the sub-band were also minimized. The flexibility to create such a sub-band was very low, and indeed, through several scenarios, it was shown to be rather difficult or even impossible to cater for all the 8.33 kHz candidates inside the sub-band and to move all non 8.33 kHz services in the core area out of the sub-band.
- 6.1.3 As a consequence, the 8.33 Drafting Group investigated possibilities to improve this and concluded that a wider bandwidth would offer the following advantages:
- a) for a high number of proposed moves out, not only a direct replacing channel outside the sub-band could be identified but also several alternatives for States concerned to choose from;
  - b) for a considerable number of moves in of 8.33 kHz candidates also several alternatives could be identified;
  - c) further growth of the number of existing 25 kHz services, to be converted to 8.33 kHz operation is simpler to accommodate.
- 6.1.4 The 8.33 Drafting Group proposes the sub-band to be from 132.0 to 134.8 MHz because with this choice an optimum difference appears to be possible between how many assignments need to be moved out compared to the number of assignments to be moved in. Having to move out less services, diminishes the possibilities of misinterpretation in shifting frequencies and also optimizes the capacity gain for lower airspace services in the core area continuing to operate momentarily in the 25 kHz mode.

### **6.2 AREA CONCERNED BY THE SUB-BAND CREATION**

- 6.2.1 It was recognised that creating a sub-band dedicated to 8.33 kHz services in the core area would require a number of existing 25 kHz services to be moved out of the sub-band. At least some of these existing 25 kHz services may be in States not (yet) implementing 8.33 kHz channel spacing themselves. During FCB/15 the concern for an unnecessarily large number of assignments and States to be

involved in the process was raised. This meeting resulted in a recommendation to limit the area concerned with the creation of the sub-band as far as possible. This was expressed at that time in the convenient measure of a circle of radius 1000 km around the center of the congested area taken as 50° N, 06° E (Luxembourg).

- 6.2.2 Therefore, the 8.33 Drafting Group studied the implications of this recommendation in conjunction with the considerations above on the width of the sub-band. It was concluded that the intent of the recommendation should be taken as being more important than the translation of it as an area of radius 1000 km around the centre of the congested area. The interpretation of the 8.33 Drafting Group is that only those existing 25 kHz assignments should be identified to be moved out of the sub-band which effectively were blocking one or more candidate 8.33 kHz assignments to be moved into the sub-band.

*Note: As a reminder, only the participating States will be requested to move frequencies. Thus, this remains in line with the frame-work proposed by the FCB/15.*

### **6.3 THE 8.33 DRAFTING GROUP PROPOSALS CONCERNING THE SUB-BAND CREATION**

- 6.3.1 The 8.33 Drafting Group recognised the need, arising from operational concerns, for States to have as much as possible freedom as to when an assignment is to be converted to 8.33 kHz standards. This implies that the time scale for moving these converted assignments into the sub-band cannot be specified at present. The identified candidate assignments to 8.33 kHz operation should, therefore, have to remain completely independent of the creation of the sub-band.
- 6.3.2 These operational concerns led the 8.33 Drafting Group to stress the need for care when preparing the sub-band. When this preparatory phase is completed, it will allow a high level of freedom as to when an assignment can be moved into the sub-band.
- 6.3.3 For the moves out, only well established protection criteria for 25 kHz were needed. During the next phase of the creation/filling of the sub-band, 8.33 kHz vs. 8.33 kHz with protection criteria as well as 8.33 kHz vs. 25 kHz protection criteria will have to be developed and applied. The FMG is invited to develop these protection criteria by January 1999.

### **6.4 ALLOWING A MIXED 8.33/25 kHz ENVIRONMENT**

- 6.4.1 The creation of a sub-band dedicated to 8.33 kHz services suggests that separate and dedicated 8.33 kHz and 25 kHz environments exist. These dedicated environments are appealing to frequency managers at first sight because the managing of assignments in such environments is relatively simple compared to a mixed environment. However, a second and more important point is that in

a mixed environment, 25 kHz assignments are effectively blocking the usage of the channels at  $\pm 8.33$  kHz and to a certain extent even the channels at  $\pm 16.67$  kHz in the same area.

- 6.4.2 In other words, concentration of the 8.33 kHz assignments into a dedicated sub-band is a more efficient spectrum utilisation because those services can be planned much more easily on adjacent channels in this dedicated environment compared to a mixed environment.
- 6.4.3 However, as observed above, operational and frequency management concerns require the 8.33 kHz service candidates to be converted to 8.33 kHz operation **on their original frequency**. This, by itself, led, by default, to the creation of a mixed environment around the converted assignments. Furthermore, FCB/15 recommended that assignments such as "National Aerodromes" entries in TABLE COM 2 are to remain in the sub-band even if they are located in the core area, because these entries stand for a multiplicity of single stations in a country all operating on the same frequency. Again this means that, realistically, a dedicated 8.33 kHz environment cannot be created throughout the whole sub-band.
- 6.4.4 Therefore, the 8.33 Drafting Group stresses that accepting a mixed 8.33/25 kHz environment is absolutely necessary to the implementation of 8.33 kHz in the EUR Region the way it is proposed now.

## **6.5 SATISFYING NEW ACC REQUIREMENTS IN 8.33 kHz CHANNEL SPACING.**

- 6.5.1 The Frequency Management Transition Plan, if adopted, will relieve, within the shortest time frame, the frequency congestion of the upper airspace.
- 6.5.2 Frequency requirements for new 8.33 kHz services must be satisfied as soon as possible after 1st January 1999.
- 6.5.3 The ability of the 8.33 kHz transition plan to satisfy new requirements will vary with time and will largely depend upon the conversion rate of existing 25 kHz services to 8.33 kHz operation. Thus, States will play a key role by implementing the intended conversions to 8.33 kHz as soon as possible.
- 6.5.4 Based on the above, the 8.33 Drafting Group recommends that a limit be set for the end of the conversion of all existing 25 kHz assignments which are 8.33 candidates. The date is 31 December 1999.
- 6.5.5 Any request, put forward by a State for a new service or for a modification to an existing assignment, should indicate whether the requirement is to be satisfied by implementing 8.33 or 25 kHz standards.

- 6.5.6 The FMG is expected to undertake appropriate actions in order to have procedures in place and criteria available to accommodate new requirements after 1999, when the transition is on-going and mixed environments exist.
- 6.5.7 All States will have to cooperate to get the benefits of this plan and to ensure its success.

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## **7. THE FREQUENCY MANAGEMENT STRATEGY**

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### **7.1 PRELIMINARY DEFINITIONS**

7.1.1 The 8.33 States are those that have announced that they intend to implement 8.33 kHz. As of today, these States are:

Austria, Belgium, France, Germany, Luxembourg, Netherlands, Switzerland, United Kingdom.

7.1.2 Participating States are those, as listed earlier, that have announced they will not implement 8.33 but will, however, support the 8.33 kHz implementation of the 8.33 States by accepting to move some of their 25 kHz assignments to facilitate the transition. As of today these States are:

Czech Republic, Denmark, Finland, Hungary, Ireland, Italy, Lithuania, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Ukraine.

7.1.3 The 8.33 candidates are the existing 25 kHz ACC assignments (approximately 100), listed in ANNEX 3.

7.1.4 The list of frequency shifts (moves out of and into the sub-band), based on the list of 8.33 candidates, is to be developed by the Frequency Management Group. It will then be approved by each States concerned, frozen until application.

*Note: The "Frequency Management Transition Plan" in this document refers to the frequency shifts to be implemented in order to achieve the spectrum release.*

## 7.2 THE FREQUENCY MANAGEMENT TRANSITION STRATEGY

For a better understanding, a schematic given in ANNEX 5 illustrates the following operations:

### 7.2.1 ACTIONS BY STATES PRIOR TO 1st OF JANUARY 1999

- States are to validate the frequency shifts (to be developed by the dedicated sub-group of the FMG) and to indicate their preference to the quoted alternatives (\*);
- States are to implement their agreed change(s).

### 7.2.2 ACTIONS BY STATES AFTER 1st OF JANUARY 1999

States are to convert as soon as possible (\*\*), all their 8.33 kHz candidate assignments (refer to ANNEX 3) from 25 to 8.33 kHz channel spacing:

- directly into the sub-band where possible;
- otherwise, convert the candidate to the new spacing on its current frequency and later (\*\*\*) move it into the sub-band.
- Satisfy new ACC upper airspace needs by assigning, preferably, an 8.33 kHz channel from within the sub-band or when not possible, outside the sub-band (when applicable the transfer in the sub-band should be implemented later) (\*\*).

#### *Notes:*

- *For follow-up reasons and to ensure the success of the 8.33 kHz Implementation Plan, the 8.33 Drafting Group proposed that dead lines be set for the period of time referenced by (\*), (\*\*) and (\*\*\*). This may be determined/confirmed by the FMG and endorsed by the EANPG.*

- *The dates proposed below were approved by the FMG meeting (Sept. 96):*

⇒ *For (\*): not later than 1 March 1997;*

⇒ *For (\*\*): not later than 31 December 1999;*

⇒ *For (\*\*\*): as soon as possible and not later than 12 months after the conversion and successful operation in the 8.33 kHz channel spacing.*

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## **8. ACTION PLAN**

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The following activities have to be carried out by all States, in order to ensure a common understanding and to achieve a coordinated implementation.

### **8.1 FREQUENCY MANAGEMENT ISSUES**

- 8.1.1 The 8.33 Drafting Group stresses the need to satisfy, at the earliest the frequency demand. Therefore, the conversion must not depend on the sub-band creation.
- 8.1.2 Based on the relevant proposal of the 8.33 Drafting Group, the Special FMG meeting (23-27 September 1996) accepted the proposed Frequency Management Transition Strategy and, to support its achievement, agreed to undertake the following tasks:
- a) Set up a procedure and time schedule for the validation of the required frequency shifts (moves out of and into the sub-band and freezing to protect the frequency management plan);
  - b) Prepare procedures and criteria to handle new requirements for States prior to the 1st of January 1999 whilst securing the agreed changes of b);
  - c) Prepare procedures and criteria for handling any requirements during the transition phase post 1st January 1999; and
  - d) Develop a mechanism to monitor on-going capacity issues that provides early advice, based on channel reserves and usage trends.

### **8.2 OPERATIONAL ISSUES**

- 8.2.1 The 8.33 Drafting Group believes that the strategy described in **7.2** offers the maximum flexibility and safety to operational people in planning the new requirements. Notably, should a problem occur with a frequency (i.e. interference) in the new mode, it would be easy to go back to the previous mode.
- 8.2.2 The identification of 8.33 kHz equipped aircraft to be operated in the designated airspace will be achieved by means of an appropriate entry in flight plan starting 3 months prior to January 1999. Measurement of the increase of traffic below the minimum level as well as the aircraft retrofit rate will be, then, possible (refer to Annex 7 part 2).
- 8.2.3 Studies concerning eventual effects on the traffic will have to be conducted prior to this 3 month period and the implementation of 8.33 sectors conducted accordingly.
- 8.2.4 All ATC units, involved with 8.33 kHz channel spacing implementation, shall coordinate with adjacent ATC units, through Letters of Agreement (LoA), to cover the cases of not properly

equipped aircraft inadvertently entering their 8.33 kHz channel spacing airspace.

- 8.2.5 States implementing the 8.33 kHz channel spacing should make appropriate arrangements to cater for the requirements of military aircraft operating as General Air Traffic (GAT) and not able to communicate on the 8.33 kHz spaced channels. According to the outcome of the CEAC/NATO meeting of 31 July 1996, it is expected that, "military aircraft which are infrequent users of core Europe civil airspace or aircraft which are soon to go out of service, should be controlled by Air Traffic Control (ATC) using UHF channels". Furthermore, ICAO was requested to "encourage European States to maintain and to achieve sufficient UHF coverage in the areas where the new spacing is introduced and adapt their procedures accordingly".
- 8.2.6 Only 8.33 kHz equipped aircraft will be allowed to enter the airspace for which the carriage and operation of 8.33 kHz channel spacing capable radio equipment has been declared mandatory.
- 8.2.7 No 25 kHz back-up will be available in the 8.33 kHz sectors. Thus, according to relevant regulation (i.e. JAR/OPS 1 of April 1995 for Commercial Air Transport aviation), concerned aircraft will have to be equipped with a minimum of two 8.33 kHz compatible radio equipment.
- 8.2.8 The introduction of the 8.33 kHz channel spacing will not affect the operation of emergency frequency 121.500 MHz.
- 8.2.9 The 8.33 Drafting Group agreed that the 8.33 indication in the flight plan will contribute to the success of the plan. The dissemination of the 8.33 kHz equipment information to the appropriate ATC controllers and its processing, therein, is essential. The above implies the necessity for the CFMU/IFPS to filter the flight plan of the non equipped and non exempted aircraft from the area of mandatory carriage. The processing, for one flight level, could be summarised as follows:

		RFL > FL245	
		Airport of dep. inside IFPS Zone	Airport of dep. outside IFPS Zone
<b>Aircraft not equipped (and not exempted)</b>	<b>Preparation</b> (1.10.98 - 1.1.99) refer to para 8.2.2	Warning in ACK message	Warning in ACK message
	<b>8.33 operation</b> (1.1.99 - →)	Automatic REJ	Warning inserted in FPL and in ACK message

### 8.3 AIRCRAFT RETROFIT ISSUES

The retrofit aspects involving the aircraft operators, the airframe manufacturers and the equipment suppliers have been taken into account by the 8.33 Drafting Group. A synthesis is given in ANNEX 2.

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- 8.3.1 Tests and demonstrations conducted separately by the National Air Traffic Services (NATS, UK) and by the Deutsche Flugsicherung (DFS, Germany) both concluded that, in 8.33 kHz mode and the under worst case operation, there is no perceptible degradation of the speech quality.
- 8.3.2 All aircraft intending to fly within the 8.33 kHz airspace will have to be retrofitted prior to the mandatory carriage date .
- 8.3.3 In order to achieve a maximum rate of equipage, the 8.33 Drafting Group recommends that the ICAO and its member States ensure that the date for the mandatory carriage be published as soon as possible.
- 8.3.4 According to the equipment suppliers, the necessary number of units will be available to satisfy the demand of Commercial Air Transport operators.
- 8.3.5 The aircraft rate of retrofit will have to be assessed prior to the date for mandatory carriage date.
- 8.3.6 Measurement of the rate of retrofit will be achieved through the EATCHIP Central Flow Management Unit (CFMU), the suppliers and the aircraft operators. The retrofit rate will be measured as depicted in paragraph 8.2.2.
- 8.3.7 From the questionnaire sent to the military organisations and from meetings with the equipment suppliers, it was not possible to assess the impact of the 8.33 kHz installation aboard the military fleet. Thus, any influence on equipment suppliers production rate will have to be considered keeping in mind that, initially, the UHF coverage will be sufficient.
- 8.3.8 It is expected, according to the NATO/CEAC meeting of July 1996, that military aircraft “frequently flying using the core Europe civil airspace, should be equipped with the new 8.33 kHz VHF radios”.
- 8.3.9 The FM immunity requirements for VHF communication band should be effectively combined with the start of the 8.33 kHz operation, depending upon States initiative Thus, aircraft operators will be able to match the two retrofit operations to install adequate avionics.

#### **8.4 GROUND STATIONS RETROFIT ISSUES**

- 8.4.1 ATC units concerned shall upgrade their ground based communication installations to operate all 8.33 kHz spaced channels and, where appropriate, UHF coverage shall be provided for military aircraft (refer to paragraph 8.2.5).
- 8.4.2 According to the ground equipment suppliers, the availability of equipment for the ground stations is not critical.

8.4.3 Prior to the operational implementation of an 8.33 kHz spaced channel, all the relevant ground equipment must have been modified.

## **8.5 REGULATORY ISSUES**

8.5.1 Appropriate Aeronautical Information Circulars (AIC) shall be published in due course by each individual State. A proposed text for an AIC is available in ANNEX 6.

8.5.2 Every effort should be made by ICAO for the following amendments to be approved as soon as possible: Proposed amendments to the ICAO Air Navigation Plan - European Region ( Doc. 7754/22) and the Regional Supplementary Procedures (Doc. 7030/4), as given in ANNEX 7.

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## **9. IMPLEMENTATION FOLLOW-UP**

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There will be a need to carry out follow up activities before and after the start of operation of 8.33 kHz channel spacing.

### **9.1 FOLLOW-UP MECHANISMS**

- 9.1.1 The ECAC ground infrastructure implementation will be followed-up through the EATCHIP Convergence and Implementation Programme (CIP) mechanism with its annual CIP Status Report (for a description refer to ANNEX 7).
- 9.1.2 In the Frequency Management domain, each State will continue to manage its frequency assignment. The co-ordination process between States will be done via the normal ICAO/FMG and EANPG coordination mechanism (refer to ANNEX 9 for a description of the current Frequency Management Tools).
- 9.1.3 In the operational domain, the EATCHIP System for Assignment and Analysis at the Macroscopic level (SAAM) will enable the analysis of the effects on the traffic flow and to the production of accurate maps. This tool is described in ANNEX 10.
- 9.1.4 Non ECAC States, which might be impacted by the introduction of 8.33 kHz channel spacing, might have to shift frequencies within the 25 kHz mode. These aspects will be handled by the ICAO/FMG and EANPG procedures.
- 9.1.5 The 8.33 Drafting Group recommends that a dedicated group within the Frequency Management Group (with defined tools) be set up to monitor the achievement of the steps of the Frequency Management Transition Plan described above. This recommendation has been agreed during the Special FMG meeting of September 1996.
- 9.1.6 There is an additional need for:
- Monitoring effects on traffic flow;
  - Following-up the aircraft retrofit rate (world-wide basis);
  - Following-up the Frequency Management Transition Strategy.
  - Following-up CFMU related development.
  - Measuring achievement against retained hypothesis; and
  - Preparing proposals for relevant actions by the parties involved as required.
- 9.1.7 The 8.33 Drafting Group proposes that the required follow-up activities should preferably be delegated to an existing structure (e.g. within EUROCONTROL).

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## **10. EXPECTED RESULTS OF THE 8.33 KHZ TRANSITION PLAN:**

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### **10.1 ASSESSMENT OF THE SPECTRUM CAPACITY GAIN**

- 10.1.1 The additional spectrum capacity obtained via the introduction of 8.33 kHz channel spacing is difficult to measure. The results will vary with the method used to assess this parameter. An attempt to estimate the capacity gain was made utilizing a set of simulated ACC/U and ACC/I requirements in the core area. In this way, it was found that, only with this first phase of the 8.33 introduction, sufficient capacity for these services was created for a period ranging from 5 or more years. This assumes a constant growth rate of the requirements of about 4% each year as has been observed over the past 20 years.
- 10.1.2 The gain in capacity, obtained for services, still operating the 25 kHz standards, is even more difficult to assess because of the variety of services in this category. This ranges from ACC/L, Flight Information, APP/H and so on down to AFIS. Clearly, any assessment of the capacity gain will strongly depend on how one simulates the characteristics of future requirements for these categories. However, a first rough estimate indicates that the capacity gain for these services in the congested area will last for a period of 1-2 years. Subsequently, the same saturation conditions will prevail for these services in the congested area as before the implementation of 8.33 kHz in higher altitude airspace.
- 10.1.3 Based on preliminary projections of VHF channel demand, the 8.33 Drafting Group recommends that early actions be undertaken so that the use of 8.33 kHz operation be extended, as necessary, by 2003.

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**11. LIST OF ANNEXES**

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**ANNEX 1**

STATES INVOLVEMENT IN THE 8.33 kHz IMPLEMENTATION.

**ANNEX 2**

8.33 kHz EQUIPMENT QUESTIONNAIRE SYNTHESIS.

**ANNEX 3**

LIST OF THE 8.33 KHZ CANDIDATE ASSIGNMENTS.

**ANNEX 4**

MAPS OF THE 8.33 KHZ CANDIDATE SECTORS.

**ANNEX 5**

8.33 FREQUENCY MANAGEMENT STRATEGY

**ANNEX 6**

PROPOSED AERONAUTICAL INFORMATION CIRCULAR

**ANNEX 7**

PROPOSED AMENDMENTS TO THE ICAO DOCUMENTATION

**ANNEX 8**

EXECUTIVE SUMMARY OF THE CONVERGENCE AND IMPLEMENTATION  
PROGRAMME (CIP).

**ANNEX 9**

FREQUENCY MANAGEMENT TOOLS DESCRIPTION

**ANNEX 10**

SAAM TOOL DESCRIPTION

**ANNEX 1 - STATES INVOLVEMENT IN THE 8.33 KHZ  
IMPLEMENTATION.**

ANSWERS TO THE 8.33 QUESTIONNAIRE N°1 (27/07/95):

WAITING ANSWERS FROM	NO, TO 8.33 IMPLEMENTATION	but will move 25 kHz
CROATIA	DENMARK	Y
CYPRUS	SLOVENIA	Y
ESTONIA	FINLAND	Y
ICELAND	IRELAND	Y
LATVIA	ITALY	Y
MONACO	LITHUANIA (confirmed during FMG Sept. 96)	Y
ROMANIA	NORWAY	Y
TURKEY	HUNGARY	Y
GREECE	SWEDEN (announced during PB/15 meeting)	Y
BULGARIA	POLAND	Y
MALTA	SPAIN	Y
	CZECH REP.	Y
	PORTUGAL	Y
	SLOVAK REPUBLIC	Y

YES TO 8.33 IMPLEMENTATION	Comments
MAASTRICHT GERMANY NETHERLANDS BELGIUM LUXEMBOURG FRANCE AUSTRIA UNITED KINGDOM SWITZERLAND	cf Maastricht cf Maastricht cf Maastricht

*Note:*

*Those States not implementing 8.33 kHz channel spacing can nevertheless expect an impact as follows :*

- *Operational: rerouting of non equipped aircraft.*
- *Frequency-management: shifting frequency(ies) when so required .*
- *Retrofit: compliance with the EUR Region requirements.*

## **ANNEX 2 - 8.33 KHZ EQUIPMENT QUESTIONNAIRE SYNTHESIS**

### **THE EQUIPMENT EVOLUTION**

Generally speaking, apart from the synthesizer (stability >0.0001%), the new 8.33 filtering and transmitter modulation circuits (able to compress audio frequencies), the introduction of new components with better reliability should improve the quality of the overall radio and should also ensure a better MTBF than that of the former 25 kHz radios.

The quality of the voice was tested by the UK NATS and by the German DFS. The extensive DFS tests, involving controllers and pilots in real conditions, shows that it is not possible to detect the difference between the former 25 kHz radio and the new 8.33, that the transmission quality is average to good and acceptance level appears to be better for 8.33 kHz. This is in line with the NATS test report which states that "there is no perceptible degradation of speech quality for operation under worst case conditions" and that the 8.33 kHz channel spaced system is able to support ATC voice communication.

### **COMMERCIAL AIR TRANSPORT RETROFIT ISSUES**

This market represents 10 000 to 15 000 transceivers for the envisaged fleet. This means at least \$144 Million ( approximately 115 Million ECU).

The manufacturers expect to supply up to 15 000 units over 4 - 5 years and have declared to be able to reach at least 14 000 units by January 99. Should the market so require, the equipment suppliers are confident that they will be able to adapt their production rate to provide the necessary amount of units or kits to satisfy the increased demand.

The price per aircraft will be approximately \$ 43 000 (approximately 34400 ECU) and the estimated number of aircraft concerned could be as many as 5000 (European aircraft and non European aircraft flying within the 8.33 kHz channel spacing airspace). The Commercial Air Transport intermediate and new generation aircraft will possibly be retrofitted prior to January, 1999. However the large airlines will have to ensure very accurate logistics to reach this goal.

The Commercial Air Transport older aircraft may need more time (span > 2 years).

### **GENERAL AVIATION AND AERIAL WORK RETROFIT ISSUES:**

Up to 5730 General Aviation and Aerial Work aircraft flying above FL 195 may be concerned by the 8.33 kHz channel spacing in Europe. Thus, the required number of radio equipment could be as much as 11500 units (assuming dual radio installations).

The very rough cost per General Aviation and Aerial Work aircraft could be comprised between \$ 10 000 and \$ 15 000. Thus, the total cost for European General Aviation and Aerial Work may reach \$ 96 Million.

In respect of General Aviation and Aerial Work aircraft, no figures are available from the interviewed suppliers in terms of production, installation schedule and capability.

**MILITARY AIRCRAFT RETROFIT ISSUES:**

From the questionnaire sent to the military organisations and from meetings with the equipment suppliers, it was not possible to assess the impact of the 8.33 kHz installation aboard the military fleet. Thus, any influence on equipment suppliers production rate will have to be considered.

**ANNEX 3 - LIST OF THE 8.33 KHZ CANDIDATE ASSIGNMENTS**

(as of 28 October 1996)

Country	Location	Frequ.	Service	sector COM2	DOC	FL low	FL High
G	London	135,425	ACC/U	NERC1	A-450	FL260	FL450
AUT	Wien	119,875	ACC/U	U1	A-450	FL340	FL450
AUT	Wien	135,050	ACC/U	U2	A-450	FL340	FL450
AUT	Wien	126,275	ACC/U	U3	A-450	FL340	FL450
SUI	Geneve	136,575	ACC/U	U	A-450	FL360	FL450
SUI	Geneve	128,150	ACC/U	U	A-450	FL340	FL360
SUI	Geneve	133,625	ACC/U	U	A-450	FL320	FL340
SUI	Geneve	133,150	ACC/U	U	A-450	FL300	FL320
SUI	Zurich	133,400	ACC/U	U	A-450	FL340	FL450
SUI	Zurich	134,600	ACC/U	U	A-450	FL285	FL340
SUI	Zurich	133,050	ACC/U	U	A-450	FL245	FL285
SUI	Zurich	136,150	ACC/U	U	A-450	FL285	FL340
NDL	Amsterdam	127,625	ACC/U	DELTA	A-450	FL245	FL450
BEL	Bruxelles	132,200	ACC/U	U1	A-450	FL245	FL450
BEL	Bruxelles	132,750	ACC/U	U1	A-450	FL245	FL450
BEL	Bruxelles	132,850	ACC/U	U2	A-450	FL245	FL450
BEL	Bruxelles	133,350	ACC/U	U2+3	A-450	FL245	FL450
BEL	Bruxelles	125,975	ACC/U	U1-3	A-450	FL340	FL450
BEL	Bruxelles	121,625	ACC/U	U1-3	A-450	FL245	FL450
BEL	Bruxelles	134,325	ACC/U	U1-3	A-450	FL245	FL450
D	Rhein	128,225	ACC/U	U2+3	A450	FL340	FL450
D	Rhein	128,825	ACC/U	U1+8	A450	FL340	FL450
D	Rhein	132,775	ACC/U	U11	A450	FL340	FL450
D	Rhein	133,275	ACC/U	U9+10	A450	FL340	FL450
D	Rhein	136,525	ACC/U	U8	A450	FL340	FL450
D	Rhein	132,075	ACC/U	U11	A450	FL245	FL450
D	Rhein	120,925	ACC/U	U10	A450	FL245	FL450
D	Rhein	132,400	ACC/U	U9	A450	FL245	FL450
D	Rhein	132,325	ACC/U	U1	A450	FL245	FL450
D	Rhein	124,025	ACC/U	U8	A450	FL245	FL450
D	Rhein	132,150	ACC/U	U3	A450	FL245	FL450
D	Rhein	132,875	ACC/U	U6	A450	FL300	FL450
D	Rhein	132,725	ACC/U	U4+7	A450	FL320	FL450
D	Rhein	127,375	ACC/U	U5+6	A450	FL340	FL450
D	Rhein	133,750	ACC/U	U7	A450	FL265	FL450
D	Hannover	133,850	ACC/U	Munster	A450	FL245	FL450
D	Hannover	135,150	ACC/U	U2	A450	FL245	FL450
D	Hannover	135,450	ACC/U	U1	A450	FL245	FL450
D	Hannover	135,650	ACC/U	U3	A450	FL245	FL450
D	Hannover	133,250	ACC/U	U4+1	A450	FL245	FL450
D	Berlin	126,550	ACC/U	UY2	A460	FL245	FL460
F	Bordeaux ACC	126.850	ACC/I	U/2-4	A-350	FL195	FL320

PLAN FOR THE 8.33 kHz CHANNEL SPACING  
IMPLEMENTATION IN EUROPE

F	Bordeaux ACC	132.425	ACC/I	U/1-4	A-350	FL195	<i>FL320</i>
F	Bordeaux ACC	133.225	ACC/U	U/1-4	A-450	<i>FL320</i>	FL450
F	Bordeaux ACC	133.675	ACC/U	U/4	A-450	FL195	<i>FL320</i>
F	Bordeaux ACC	134.000	ACC/U	U/1+4	A-450	<i>FL320</i>	FL450
F	Bordeaux ACC	135.200	ACC/U	U/3+4	A-450	<i>FL320</i>	FL450
F	Bordeaux ACC	136.050	ACC/U	U/3+4	A-450	FL195	FL450
F	Bordeaux ACC	136.175	ACC/U	U/1+2	A-450	FL195	FL450
F	Bordeaux ACC	133.100	ACC/U	U/2-4	A-450	FL195	FL450
F	Bordeaux ACC	133.575	ACC/I	U/1+2+4	A-350	FL195	<i>FL320</i>
F	Bordeaux ACC	134.725	ACC/U	U/1-4	A-450	<i>FL320</i>	FL450
F	Bordeaux ACC	135.850	ACC/U	U/3+4	A-450	<i>FL320</i>	FL450
F	Brest ACC	129.000	ACC/U	U/1+2	A-450	<i>FL340</i>	FL450
F	Brest ACC	129.500	ACC/U	U/1+2	A-450	FL195	FL450
F	Brest ACC	131.175	ACC/U	U/1	A-450	FL195	FL450
F	Brest ACC	133.000	ACC/U	U/1+2	A-450	<i>FL340</i>	FL450
F	Brest ACC	133.475	ACC/I	U/1+2	A-350	FL195	<i>FL340</i>
F	Brest ACC	134.825	ACC/U	U/1+2	A-450	FL195	FL450
F	Brest ACC	134.875	ACC/U	U/1+2	A-450	<i>FL340</i>	FL450
F	Brest ACC	136.350	ACC/U	U/1+2	A-450	FL195	FL450
F	Brest ACC	136.450	ACC/U	U/1+2	A-450	<i>FL320</i>	FL450
F	Marseille ACC	118.050	ACC/I	U/2	A-350	FL195	<i>FL320</i>
F	Marseille ACC	118.875	ACC/U	U/1+4	A-450	FL195	FL450
F	Marseille ACC	123.625	ACC/I	U/4	A-320	FL195	FL450
F	Marseille ACC	124.650	ACC/I	U/3	A-350	FL195	<i>FL320</i>
F	Marseille ACC	125.850	ACC/U	U/1-3	A-450	<i>FL320</i>	FL450
F	Marseille ACC	126.250	ACC/I	U/3+2	A-350	FL195	<i>FL320</i>
F	Marseille ACC	127.075	ACC/U	U/1+4	A-450	<i>FL320</i>	FL450
F	Marseille ACC	128.775	ACC/U	U/1+4	A-450	FL195	<i>FL320</i>
F	Marseille ACC	131.000	ACC/I	U/1	A-350	FL195	<i>FL320</i>
F	Marseille ACC	132.175	ACC/U	U/1+2+4	A-450	<i>FL320</i>	FL450
F	Marseille ACC	132.250	ACC/U	U/1-4	A-450	<i>FL320</i>	FL450
F	Marseille ACC	133.325	ACC/U	U/2	A-450	<i>FL320</i>	FL450
F	Marseille ACC	133.875	ACC/U	U/2+3	A-450	<i>FL320</i>	FL450
F	Marseille ACC	134.100	ACC/I	U/1-4	A-350	<i>FL275</i>	<i>FL320</i>
F	Marseille ACC	134.700	ACC/U	U/2	A-450	<i>FL320</i>	FL450
F	Marseille ACC	135.400	ACC/I	U/1-4	A-350	FL195	<i>FL320</i>
F	Marseille ACC	136.700	ACC/U	U/2+3	A-450	FL195	FL450
F	Paris/Reims ACC	118.225	ACC/U	U/1+2+4+ 5	A-450	FL195	FL450

PLAN FOR THE 8.33 kHz CHANNEL SPACING  
IMPLEMENTATION IN EUROPE

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F	Paris/Reims ACC	127.850	ACC/U	U/1+2+5	A-450	<i>FL245</i>	<i>FL320</i>
F	Paris/Reims ACC	131.250	ACC/I	U/6	A-350	FL195	<i>FL320</i>
F	Paris/Reims ACC	132.000	ACC/U	U/6	A-450	FL195	<i>FL320</i>
F	Paris/Reims ACC	132.275	ACC/U	U/1-4	A-450	FL195	FL450
F	Paris/Reims ACC	132.375	ACC/U	U/5	A-450	<i>FL320</i>	FL450
F	Paris/Reims ACC	132.500	ACC/U	U/1+2+3	A-450	FL195	FL450
F	Paris/Reims ACC	132.625	ACC/U	U/1-5	A-450	<i>FL340</i>	FL450
F	Paris/Reims ACC	132.825	ACC/U	U/1+2+6	A-450	<i>FL320</i>	FL450
F	Paris/Reims ACC	133.825	ACC/U	U/2-4	A-450	<i>FL245</i>	FL450
F	Paris/Reims ACC	133.925	ACC/U	U/1-6	A-450	<i>FL320</i>	FL450
F	Paris/Reims ACC	134.400	ACC/U	U/1+2+3	A-450	FL195	FL450
F	Paris/Reims ACC	135.500	ACC/I	U/1+2	A-350	<i>FL245</i>	<i>FL340</i>
F	Paris/Reims ACC	135.800	ACC/U	U/6	A-450	<i>FL245</i>	FL450
F	Paris/Reims ACC	135.900	ACC/U	U/4+5+6	A-450	FL195	<i>FL320</i>
F	Paris/Reims ACC	136.325	ACC/U	U/1-4	A-450	<i>FL320</i>	FL450
F	Paris/Reims ACC	136.750	ACC/U	U/4+5	A-450	FL195	FL450

Note: the sectors limits (FL low, FL high) corresponds to the answers from States to questionnaires. When in italics, the sector limits are deduced from Eurocontrol Database

**ANNEX 4 - MAPS OF THE 8.33 KHZ CANDIDATE SECTORS**

The maps of the 8.33 khz candidate sectors are given in the 3 following pages.

- ***This 8.33 initial candidate list was frozen by 31 October 1996.***

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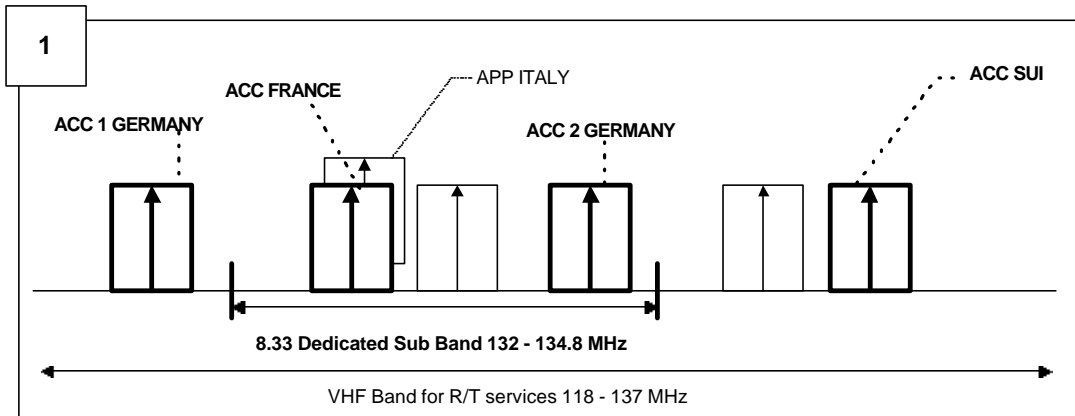




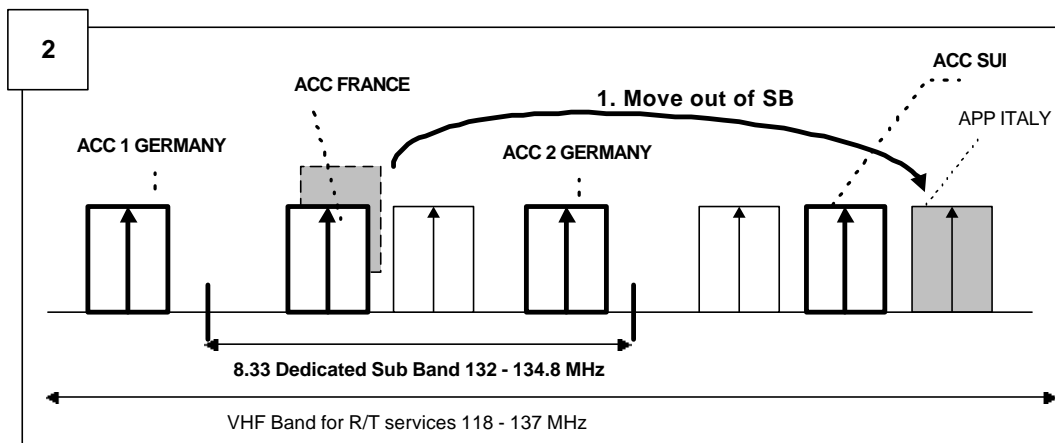
**ANNEX 5 - 8.33 FREQUENCY MANAGEMENT STRATEGY**

**8.33 FREQUENCY MANAGEMENT STRATEGY**

*Action by States prior to 1st of January 1999*



- Because the Spectrum is already saturated, extra capacity will be obtained by converting to 8.33 kHz as many as possible of the existing ACC Upper assignments, currently operating in the 25 kHz channel spacing.
- 8.33 States have notified the 8.33 Drafting Group of the existing candidates to be converted in the future to 8.33 channel spacing.



- A selected number of existing assignments have to be moved out of the sub-band.
- A detailed Frequency Management Plan, to be prepared by the FMG, is to list the concerned assignments as well as their host channel out of sub-band.

**LEGEND**



Normal 25 kHz assignment



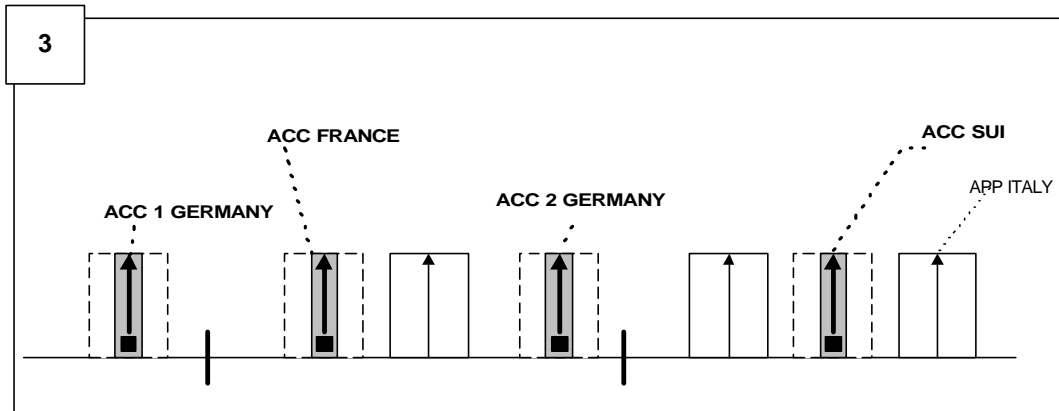
25 kHz ACC Upper assignment to be converted to 8.33



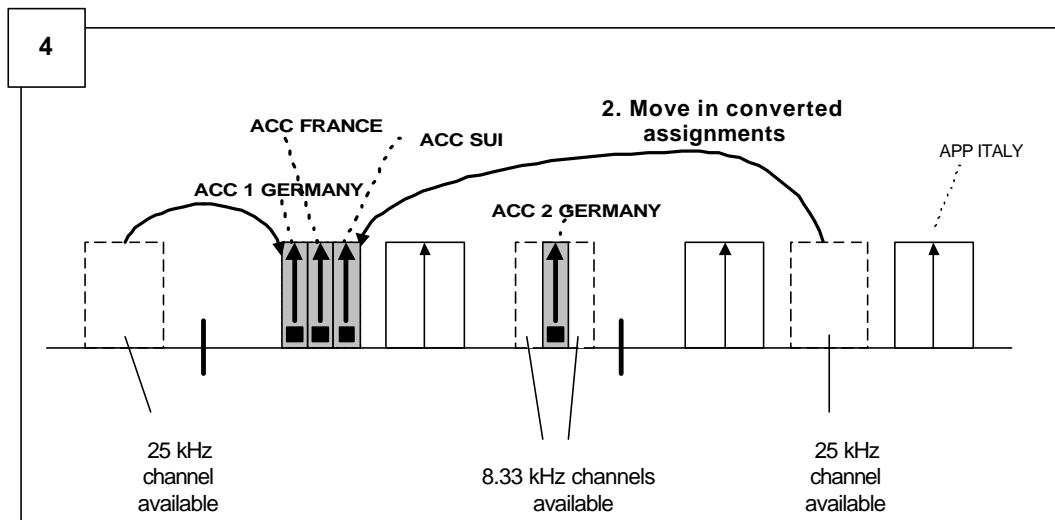
ACC Upper assignment in 8.33 Channel Spacing

8.33 FREQUENCY MANAGEMENT STRATEGY

*Actions by the States after the 1st of January 1999*



- Conversion of existing 25 kHz assignments candidates in 8.33 kHz channel spacing.



- Move in the sub-band the 8.33 converted assignments which are out of the sub-band.
- Spectrum use optimisation by packing 8.33 kHz assignments which are geographically close to each other.
- 8.33 kHz and 25 kHz spectrum extra capacity is obtained in the congested area of Europe (proximity effect).
- Start planning new assignments in 8.33 kHz channel spacing in the sub-band.

**ANNEX 6 - PROPOSED AERONAUTICAL INFORMATION CIRCULAR**

**SPECIMEN AERONAUTICAL INFORMATION CIRCULAR (AIC) TO BE  
PROMULGATED BY STATES INVOLVED IN THE IMPLEMENTATION OF 8.33 KHZ  
SPACED CHANNELS**

August 1996

*(State's details)*

AIC



*(Number)*

## **IMPLEMENTATION OF 8.33 KHZ CHANNEL SPACING IN THE VHF RADIO COMMUNICATIONS BAND**

This AIC is issued to give advance notice of the intended introduction of 8.33 kHz channel spacing in *(State)* and the relevant situation in the ICAO European (EUR) Region. Further AIC(s) will be issued as more details of the Implementation Plan are agreed.

### **1. INTRODUCTION**

Over the past decades, experience has shown that the number of VHF frequency assignments required for air/ground communication services has been directly proportional to the growth of the air traffic demand.

To cope with this growth and meet relevant user requirements, a number of changes and refinements have been made to the VHF communications band. In 1954, channel spacing was reduced to 50 kHz whilst in 1959 the upper limit of the band was extended from 132 to 136 MHz. Subsequently, in 1974 the VHF channel spacing was further reduced to 25 kHz and the usage of the VHF band extension from 136 to 137 MHz was made available from 1990 onwards.

Furthermore, over the past years, the ICAO European Frequency Coordinating Body (EUR FCB) have improved their planning and coordination procedures in order to extend the lifetime of the present 25 kHz channel spacing system as far as possible. However, in spite of these measures, the ever growing air traffic demand has outstripped available channel capacity in Europe.

To match this air traffic growth, additional VHF frequency assignments will be required in the near future for the provision of air traffic services and to meet other operational users' requirements. The VHF band is, however, severely congested and there is an acute shortage of assignable VHF communication channels throughout the EUR Region. This has been acknowledged by the Special Regional Air Navigation Meeting (Vienna, September 1994) which developed a coordinated VHF Relief Strategy to be applied as a solution to the severe VHF congestion in Europe.

### **2. ICAO DECISION**

The ICAO Special Communications/Operations Divisional Meeting (Montreal, March/April 1995), based on the above Strategy, decided that, in order to increase channel capacity, the VHF communications band should be further split from 25 to 8.33 kHz channel spacing. It was noted that this measure was a near term improvement for regions experiencing severe VHF frequency spectrum congestion, in anticipation of the development and implementation of the future digital VHF radio system.

### 3. IMPLEMENTATION

#### 3.1 International planning

ICAO Standards and Recommended Practices (SARPs) have already been adopted and become applicable for both air and ground use of 8.33 kHz channel spacing VHF transmitters and receivers. The operational use of equipment based on these new standards is expected to start at or as soon after the 1st of January 1999.

New technical standards for the use of airborne 8.33 kHz channel spacing equipment are available as EUROCAE ED 23b (equipment class E). In addition, standards for the ground equipment are available as European Telecommunication Standard Institute (ETSI) Document : ESI pr300 676 (Ref: DE/RES-007) which is available from *(to be specified accordingly)*.

The ICAO European Air Navigation Planning Group (EANPG) has invited EUROCONTROL to develop, in conjunction with the newly established Frequency Management Group (FMG), a plan for the transition from the 25 to 8.33 kHz channel spacing in Europe. This plan has already been endorsed by the EANPG/38 Meeting in November 1996. The initial phase of the transition to the 8.33 kHz channel spacing operation has been limited to the upper airspace, above FL 245 / FL 195 (as appropriate) and to the part of the ICAO EUR Region mostly suffering from VHF spectrum congestion. The transition plan will require a number of existing 25 kHz assignments to be moved to other 25 kHz, channels in order to allow the creation of a sub-band required for 8.33 kHz spaced channels' operation. However the number of these shifts will be kept to a minimum.

The transition plan has recommended that the mandatory date for the carriage and operation of 8.33 kHz channel spacing capable radio equipment for flights above FL 245 /FL 195 (as appropriate) throughout the ICAO EUR Region, be set for the 1st of January 1999. Following its approval, the ICAO Regional Supplementary Procedures (Doc 7030/4, European Regional Supplementary Procedures Part ) will be amended accordingly to reflect this agreement. Furthermore, the transition plan has recommended the following operational procedures which, when approved, will be, also, included in Doc 7030/4:

***As of the 1st of October 1998, in the filed flight plan (FPL) of an aircraft planned to operate in the ICAO EUR Region above FL245/195, as appropriate,***

- ***the letter "Y" shall be inserted in field 10 of the flight plan, for aircraft equipped with 8.33 kHz capable radio equipment; or***
- ***the indicator "STS/EXM833", shall be inserted in field 18, for flights which are not equipped but which have been granted exemption from the mandatory carriage requirement.***

***Notes:***

- ***Absence of the above letter/indicator shall be taken as a lack of 8.33 kHz capable equipment.***
- ***All flights subject to RPL are assumed to be 8.33 kHz equipped. In case a flight is operated with a non equipped aircraft, a change message for the day of operation shall be sent not earlier than 20 hours before the EOBT.***

***- In the case of “ STS/EXM833 “, a list of exemptions will have to be published in the States AIPs.***

***In case of a change in the 8.33 kHz capability status for a flight planned to operate in the ICAO EUR Region above FL 245 / FL 195, as appropriate, a modification message shall be sent with the appropriate indicator inserted and, in case of an RPL, this shall be sent not earlier than 20 hours before the EOBT.***

***As of the 1st of January 1999, aircraft not equipped with an 8.33 kHz capable radio shall not be planned to operate above FL 245 / FL 195, as appropriate.***

***Regardless of the above provisions, exemptions may be granted by States concerned to certain types of aircraft operation.***

***When UHF ground infrastructure permits, state aircraft not equipped with an 8.33 kHz capable radio will be allowed to operate in the airspace designated for 8.33 kHz channel spacing operations.***

***Aircraft normally capable of operating above FL245 / FL195, but planning to fly below these levels shall, nevertheless, insert the appropriate indicator.***

The States concerned ground infrastructure implementation will be followed-up through the EATCHIP Convergence Implementation Programme (CIP) mechanism with its annual CIP Status Report.

### **3.2. Implementation in (State)**

(State) intends to implement the 8.33 kHz channel spacing system for all sectors (*or for the following sectors:...*) in its upper airspace, i.e. above FL 245/FL 195 (as appropriate), starting at (*date*).

In (*State*) parallel operation of 25 and 8.33 kHz spaced VHF channels for the same airspace sector will not be achievable. Accordingly, from the date of implementation of 8.33 kHz spaced channels in (*State's*) airspace, all aircraft requiring the provision of a GAT air traffic service in the airspace designated for 8.33 kHz channel spacing operation will be expected to be equipped with radios compatible with the new reduced channel spacing.

Aircraft VHF radio equipment in the ICAO EUR Region will still be required to be able to tune to 25 kHz spaced channels and receive in an environment which uses offset-carrier systems (the so-called CLIMAX operation). Airspace users should take into account that these offset-carrier systems may continue to be used throughout Europe for many years.

## **4. FURTHER INFORMATION**

Further information on the policy, planning and implementation of 8.33 kHz spaced channels in (*State*) can be obtained from :  
(*Specify details*)

Note : Text in Italics will be inserted by the State concerned as required

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<b>ANNEX 7 - PROPOSED AMENDMENTS TO THE ICAO DOCUMENTATION : PART 1.</b>
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(Note: proposed new text is in Bold Italics)

**Proposed amendments to the  
AIR NAVIGATION PLAN  
EUROPEAN REGION  
PART X - COM  
AERONAUTICAL TELECOMMUNICATIONS**

**“6. FREQUENCY ASSIGNMENT PLANNING FOR AMS**

PC 6.1 Frequencies should be assigned to all VHF AMS facilities, taking into account:

***a) agreed geographical separation criteria based on 8.33 kHz interleaving between channels for the area where this channel spacing is applicable.***

- a) becomes b)
- b) becomes c)
- c) becomes d)

MA 6.4 In order to avoid restrictions on frequency assignment possibilities .... appropriate to 25 kHz channel spacing operation. In addition, States should ensure that any aircraft flying over .... is fitted with airborne equipment having frequency stability and selectivity appropriate to 25 kHz channel spacing operation.

***Similar measures should be undertaken by those States which do not yet have a requirement to implement 8.33 kHz channel spacing but which are located within air-to-air interference range of another State which has to employ that channel spacing***

“

**ANNEX 7 - PROPOSED AMENDMENTS TO THE ICAO  
DOCUMENTATION : PART 2.**

(Note: proposed new text is in *Bold Italics*)

**Proposed Amendments to the  
REGIONAL SUPPLEMENTARY PROCEDURES (Doc 7030/4)  
EUROPEAN (EUR)  
REGIONAL SUPPLEMENTARY PROCEDURES**

“

**1.0 PART I - RULES OF THE AIR, AIR TRAFFIC SERVICES AND SEARCH  
AND RESCUE**

.....

2.2 Submission of a flight plan  
( A2 - 3.3.1; P -RAC, Part II - 8.2 )

.....

**2.3 *Indication in the flight plan of 8.33 kHz channel spacing capable  
radio equipment:***

**2.3.1 *As of the 1st of October 1998, in the filed flight plan (FPL) of an  
aircraft planned to operate in the ICAO EUR Region above FL245/195, as  
appropriate,***

- *the letter “Y” shall be inserted in field 10 of the flight plan, for aircraft equipped with 8.33 kHz capable radio equipment; or*
- *the indicator “STS/EXM833”, shall be inserted in field 18, for flights which are not equipped but which have been granted exemption from the mandatory carriage requirement.*

**Notes:**

- *Absence of the above letter/indicator shall be taken as a lack of 8.33 kHz capable equipment.*
- *All flights subject to RPL are assumed to be 8.33 kHz equipped. In case a flight is operated with a non equipped aircraft, a change message for the day of operation shall be sent not earlier than 20 hours before the EOBT.*
- *In the case of “ STS/EXM833 “, a list of exemptions will have to be published in the States AIPs.*

**2.3.2 *In case of a change in the 8.33 kHz capability status for a flight planned to operate in the ICAO EUR Region above FL 245 / FL 195, as appropriate, a modification message shall be sent with the appropriate indicator inserted and, in case of an RPL, this shall be sent not earlier than 20 hours before the EOBT.***

**2.3.3 *As of the 1st of January 1999, aircraft not equipped with an 8.33 kHz capable radio shall not be planned to operate above FL245 / FL 195, as appropriate.***

**2.3.4 Regardless of the above provisions, exemptions may be granted by States concerned to certain types of aircraft operation.**

**2.3.5 When UHF ground infrastructure permits, state aircraft not equipped with an 8.33 kHz capable radio will be allowed to operate in the airspace designated for 8.33 kHz channel spacing operations.**

**2.3.6 Aircraft normally capable of operating above FL245 / FL 195, but planning to fly below these levels shall, nevertheless, insert the appropriate indicator.**

*Sub-paragraph 2.3 becomes 2.4*

## **2.0 PART 2 - COMMUNICATIONS**

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### **1.0 AERONAUTICAL MOBILE SERVICE**

#### **1.1 Carriage and operation of 8.33 kHz channel spacing radio equipment**

***With effect from 1 January 1999, the carriage and operation of 8.33 kHz channel spacing radio capable equipment shall be mandatory for all IFR flights operating within the ICAO European Region above FL 245. In the FIRs of..... this flight level is FL 195. Exemptions may be granted by States concerned as required.***

***When UHF ground infrastructure permits, state aircraft not equipped with an 8.33 kHz capable radio will be allowed to operate in the airspace designated for 8.33 kHz channel spacing operations.***

#### **1.2 Measures to be undertaken by States**

***States concerned should establish relevant implementation dates, starting as early as the 1st of January 1999 or later according to their actual needs and project schedules.***

*Sub-paragraph 1.1 becomes 1.3*

**ANNEX 8 - EXECUTIVE SUMMARY OF THE CONVERGENCE AND  
IMPLEMENTATION PROGRAMME (CIP).**

1. BACKGROUND
2. PURPOSE OF THE CONVERGENCE AND IMPLEMENTATION PROGRAMME (CIP)
3. METHODOLOGY
4. TIME FRAME
5. STRUCTURE AND SCOPE OF THE CIP DOCUMENT (CIPD)
6. ROLE OF STATES
7. ROLE OF THE AGENCY
8. ROLE OF THE PROJECT BOARD

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## 1. BACKGROUND

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EATCHIP - The European Air Traffic Control (ATC) Harmonisation and Integration Programme - is a co-operative programme of the European Civil Aviation Conference (ECAC) Member States, co-ordinated and managed by the EUROCONTROL Agency. Its objective is to complete the harmonisation of European ATC Services between 1995 and 1998 and then to integrate them by the early years of the 21st century.

The management of the Programme is performed from two complementary perspectives. The first one focuses on the activities which are relevant to the overall Programme, and results in the EATCHIP Work Programme; the second one focuses on contributing activities which are necessary at local level, and results in the Convergence and Implementation Programme. The two Programmes are outlined as follows:

- **The EATCHIP Work Programme (EWP)**

This provides a detailed description and plan of the common work to be carried out by the EATCHIP partners (EUROCONTROL Agency, National Administrations, Industry) under the central management of the Agency. It covers in particular the production of common deliverables which are required to provide a basis for various objectives of the CIP.

- **The Convergence and Implementation Programme (CIP)**

This contains all necessary information on common and local convergence and implementation actions pertinent to the harmonisation and integration process within and between states. It provides a reference and a framework for national and multinational plans as well as for plans for common projects to ensure that they remedy the deficiencies identified during Phase 1 and that they converge to meet the objectives of the ECAC Strategy. To that effect, the CIP contains CIP Objectives, milestones and local actions reflecting the commitment of States to achieve objectives by agreed target dates.

Edition 1 of the Convergence and Implementation Programme Document (CIPD), published in October 1993, was endorsed by the Project Board at its tenth meeting (November 1993) "as the basis for the harmonisation and integration process"; the Project Board also "confirmed the commitment of all States participating in EATCHIP as regards the provision of national inputs to the CIPD".

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## **2. PURPOSE OF THE CONVERGENCE AND IMPLEMENTATION PROGRAMME**

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The purpose of the CIP is to provide a reference and a framework for national and multinational plans as well as for plans for common projects, ensuring that they follow recommendations made during EATCHIP Phase 1 and that they converge to meet the objectives of the ECAC Strategy. Since "Convergence" stands for a coherent evolution of all parties concerned towards the progressive harmonisation and integration of the overall European Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM) Systems, the CIP is bound to have an impact on existing national plans, which will require adjustment to secure the timely attainment of the objectives set by the ECAC Transport Ministers. These ECAC objectives comprise the operational and implementation objectives of the "ECAC Strategy for the 1990s" for en-route ATC and for relieving congestion in and around airports (Airport/Air Traffic Systems Interface -APATSI), and subsequent decisions taken at ECAC Transport Ministers' Meetings on the Air Traffic System in Europe (MATSE). However, in the present edition of the document, the APATSI objectives have not been taken fully into account.

As a first priority this edition of the CIPD ***"concentrates on completing the harmonisation and progressive integration of the en-route ATC system in the 1990's."***

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## **3. METHODOLOGY**

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### **3.1. Identification of CIP Objectives**

In order to ensure the timely attainment of the ECAC objectives, these have been broken down into more specific CIP Objectives. In addition, some further CIP Objectives have been included because they complement or contribute to the convergence process.

In cases where ECAC Strategy objectives do not apply uniformly to the whole ECAC area, different functional performance levels have been defined for the corresponding CIP Objectives; the applicability of these different levels depends on the category of ATC complexity pertaining to the area considered. To that effect, a classification of ATC Centres according to ATC complexity, to which certain CIP Objectives are applicable, has been defined (see Annex C of the CIP document part 1).

### **3.2. Link between the CIP Objectives and the Specialist Objectives of the Work Programme**

The CIP Objectives result from a more precise translation of the ECAC Strategy objectives. They relate to the implementation of the required facilities and functions. In order to reinforce traceability towards the ECAC objectives, while making clear the links between CIP and EWP, an intermediate set of objectives pertinent to each of the EATCHIP Domains has been developed: they are called Specialist Objectives. They relate to the common work to be performed including design, development and implementation.

CIP Objectives appear thus as a subset of the Specialist Objectives. To avoid confusion, clear links between them have been established; these are illustrated

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on diagrams preceding each set of CIP Objectives in Part 1 of the CIP Document.

### **3.3. Elaboration of local actions according to CIP Objectives**

Actions required to achieve locally applicable CIP Objectives are identified in a specific CIP Document for each individual State, taking into account the prevailing situation in that State and the varying levels of sophistication to be attained by the future air traffic management system.

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## **4. TIME FRAME**

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- 4.1. The CIP Document is intended to include all EATCHIP-related convergence and implementation programmes in progress throughout the ECAC Area<sup>1</sup> within a time scale of at least five years. This edition of the CIP Document generally addresses implementation activities until 1998, although some of the proposed CIP Objectives show target dates beyond.
- 4.2. The CIP is a dynamic programme, which will further develop with the passage of time, constantly being adapted to the needs of the changing ATC environment as new opportunities for harmonisation emerge and new technologies become available.  
The convergence process will continue well into the early part of the next century, with the gradual transition to the future European Air Traffic Management System (EATMS).
- 4.3. The normal update cycle for the document is one year, resulting in a yearly new edition. This is the second edition, which includes mainly the clarifications required in respect of Edition 1, without challenging the scope of the Programme. As the programme is to remain reasonably stable over a certain period of time, long term new objectives are to be gradually introduced; changes to existing objectives will result from a revision process which can only be finalised after the mutual agreement of all parties concerned.
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## **5. STRUCTURE AND SCOPE OF THE CIPD**

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The present edition of the CIP Document comprises two different but complementary documents:

Part 1 of the CIPD (CIP Objectives and Target Situation) gives a general presentation of the CIP and the definition of the CIP Objectives addressing the whole, or specific parts of, the ECAC area;

Part 2 of the CIPD (Status Report) presents an overall summary of the current situation with reference to the CIP Objectives as defined in Edition 1,

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<sup>1</sup> The area covered by the CIP includes the airspace of all ECAC Member States with the exception of Oceanic Flight Information Regions (FIRs).

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on the basis of the local actions planned, in progress or already achieved by the ECAC States.

In addition, local CIP Documents detail, for each ECAC State, the various CIP Objectives that are locally applicable (the applicability criteria are based on the revised classification of ATC Centres agreed by the Project Board on 19/20 April 1994) and the corresponding local actions which are planned in order to achieve these objectives.

The relationship between the various CIP Documents and the local or multi-national plans, through the CIP Data Base (under development) is illustrated in Fig. 1.

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## **6. ROLE OF STATES**

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According to the level of applicability, a given CIP Objective implies a commitment of the participating Authority, not only for its integral achievement, but also in respect of its target date. The participating Authorities are responsible for the accomplishment of the local actions required to meet the agreed CIP Objective and for any required co-ordination with neighbouring States. These local actions may be amended in due time, if and where needed, in view of the full achievement of the corresponding CIP Objective. The Agency should be periodically informed of progress achieved.

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## **7. ROLE OF THE AGENCY**

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The Agency is responsible for establishing a cohesive harmonisation and convergence programme containing commonly agreed CIP Objectives, monitoring progress during the convergence and implementation process and supporting this process to the extent possible.

The CIP serves as a reference tool for these multiple purposes. The monitoring role of EUROCONTROL, as managing agent of EATCHIP, consists of steering the execution of the programme, and ascertaining that work is undertaken accordingly. In this context, the Agency, provided with all the necessary information, is responsible for monitoring the execution of the appropriate actions, and assessing the results.

In so doing, EUROCONTROL will identify problems in the programme execution and propose solutions/actions in order to ensure the success of the overall process.

The Agency will report regularly to the Project Board on the progress achieved.

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## **8. ROLE OF THE PROJECT BOARD**

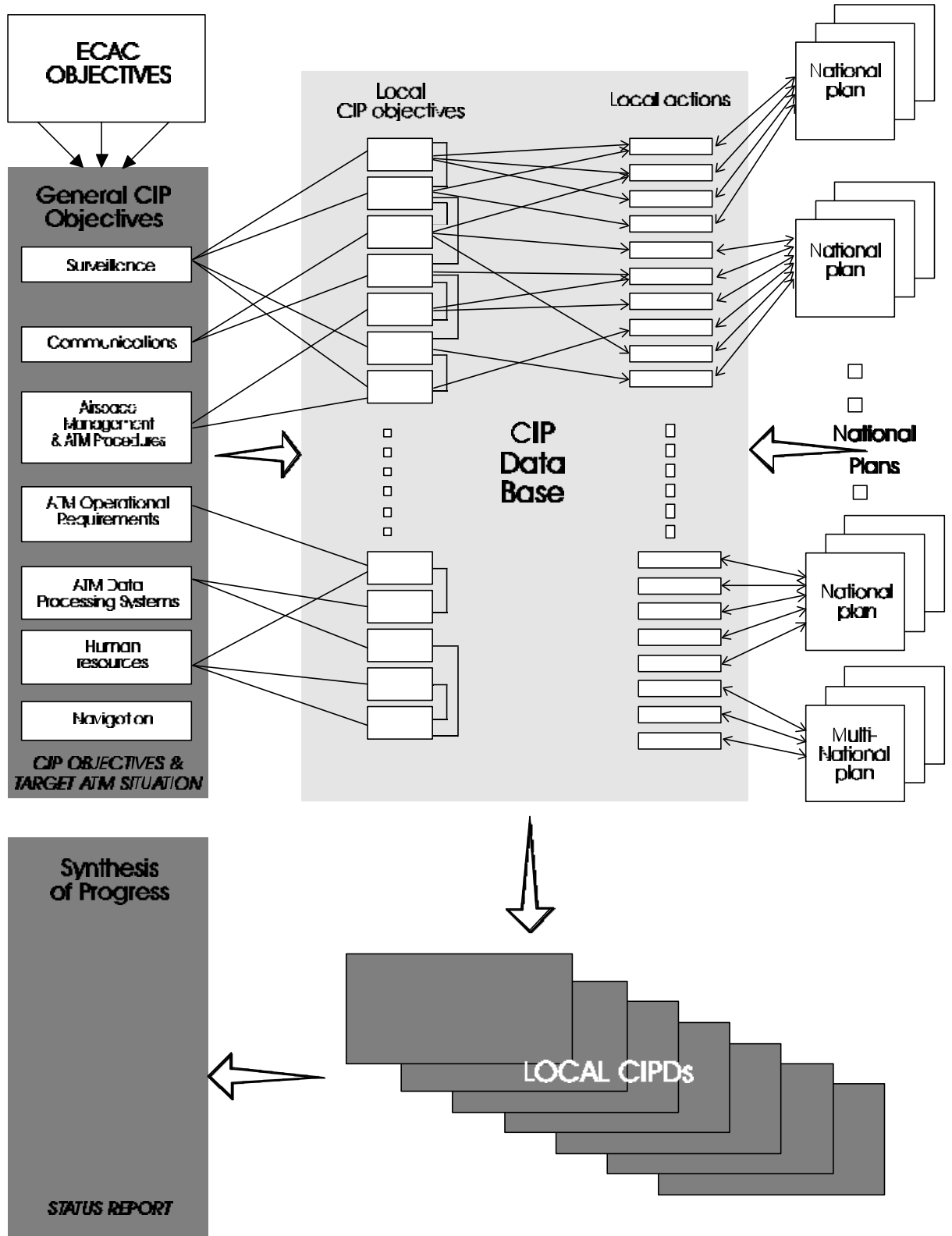
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The EATCHIP Project Board is vested with responsibility for the overall management control of the programme. In particular it will:

- endorse the definition of CIP Objectives proposed by the Project Leader, generally following recommendations made by the EATCHIP Teams in which States are represented;
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- agree on proposed target dates associated to these CIP Objectives in cases where no target date had been previously set or in cases where an existing target date has to be revised;
- agree on the applicability criteria for CIP Objectives, which depend on the classification of ATC Centres and Major Terminal Manoeuvring Areas (Major TMAs);
- assess progress in the achievement of the CIP objectives, on the basis of progress reports presented by the Project Leader; and
- examine unresolved problems reported by the Project Leader regarding the achievement of local CIP Objectives and decide between proposed courses of actions.

Fig 1 - RELATIONS BETWEEN CIP DOCUMENTS



## **ANNEX 9 - FREQUENCY MANAGEMENT TOOLS DESCRIPTION**

### **COM TABLES MAINTENANCE SYSTEM (ODETE On-line Data Exchange Terminal with EUROCONTROL)**

EUROCONTROL has been supporting ICAO in developing, maintaining and providing a software tool for managing the ICAO COM tables and its associated publications. It runs on a UNIX machine with an ORACLE data base. It is currently in its release 1, operationally used by ICAO Paris. The ODETE tool can provide the database content in any specific format required by other applications like the Frequency Management Tool (see following section).

Release 2 is planned beginning 1997. It will enable graphical displays.

### **DAY TO DAY FREQUENCY MANAGEMENT TOOL**

EUROCONTROL has undertaken, in the context of EATCHIP, the development of a software tool to assist States in their daily management of aeronautical frequencies.

This Day to Day Frequency management tool runs, in its version 1, on a MS-DOS PC using Paradox database from Borland. Its licence, free of charge to all States of the ICAO European Region and adjacent states, was delivered in May 1996 by EUROCONTROL. Version 2 (MANIF) will be delivered in 1997. It will run under WINDOWS and will integrate the 8.33 kHz frequency management aspects.

### **BLOCK PLANNING TOOL**

This tool is to plan new frequency requirements (approximately 200) put forward by States participating in EANPG/FMG planning meetings.

Version 1 was used in previous FCB planning meetings. It is available in EUROCONTROL in order to support further planning meetings.

Version 2 (PLANIF) is under development and will be available in 1997. It will run under WINDOWS and will integrate the 8.33 kHz frequency management aspects

## ANNEX 10 - SAAM TOOL DESCRIPTION

### 1 CURRENT FUNCTIONALITIES

The System for Assignment and Analysis at a Macroscopic level (SAAM) is a software tool providing specific assistance to route planners in giving a quick and broad assessment of loads on ATC structures, for instance:

- loads on route segments;
- loads on airspace volumes (sectors, centres); and
- density maps for a given flight level slice.

It was designed to work on a Europe wide scale with a large amount of traffic demand. The users have the possibility of creating and modifying route network as well as airspace structures and they can tune the automatic traffic flow assignment process in order to master, if necessary, the allocation of main flows. At any time, it is possible to request the path followed by a given traffic flow or for an exhaustive identification of the traffic flow present on a given route segment: origin, destination, type and status (evolving, steady) of aircraft, companies. Several analysis functions are provided along with geographical maps which allow the users to check, experiment with and establish comparisons. In particular, they permit examination of the:

- effect of the creation of new ATS routes or modification of the network structure;
- effect of strategic traffic re-organization (e.g. structural routing, specializing ATS routes or traffic distribution scheme to relieve congested areas);
- effect of a new traffic demand (e.g. increasing the demands of x% between two countries) or the use of a traffic forecast in order to test the validity of a scenario for the future; and
- comparison of different scenarios combining network modification, traffic orientation changes and traffic demand variation, in particular, comparison with the current situation (in terms of loading of ATC structure, route extensions, number of conflicts)

It is a useful tool for quickly preparing scenarios before fast time simulation, while the short response time also allows it to be used interactively during meetings.

### 2 FUTURE STATE

The final step consists of providing a macro-simulator which will be able to assess figures related to actual controller workload. For that purpose the following functionalities are under development:

- a conflict evaluator which will give a good estimate of the total number of potential conflicts between aircraft pairs for a given scenario and for a given time period. Assuming that less conflicts generate less controller workload which, in turn, helps to increase the capacity, this facility may lead to a measure which reflects the impact of a scenario on capacity;
- integration into SAAM and checking on the separate module which counts the traffic flow entrance rate in airspace volume.

Other minor developments were defined to improve or extend current facilities in order to give the user better assistance in handling and supervising the different parameters related to the preparation of a scenario. These will enable the user to:

- extend the assignment process to allocate, if needed, more than one route for each city-pair;

- input profile constraints, on the 3D computerized model facility, which when introduced by the planner, could alleviate important crossovers at departures or arrivals for given routes;
- make use of a 3D viewer to evaluate the location “in space” of conflicting areas by showing the 3D paths of traffic flows and /or the results from the conflict evaluator;
- make use of a 3D viewer to assess the efficiency of a specific profile constraint using the 3D paths; and
- utilise the airspace volume designer to improve the current possibilities of creating, editing and modifying the geometry of sectors.