European Communities

EUROPEAN PARLIAMENT

Working Documents

1978 - 1979

20 April 1978 DOCUMENT 49/78

Report

drawn up on behalf of the Committee on Regional Policy, Regional Planning and Transport

on the promotion of efficient air traffic control

Rapporteur: Mr L. NOE'

PE 50.962/fin.

English Edition

By letter of 28 October 1976 the Committee on Regional Policy, Regional Planning and Transport requested authorization to draw up a report on the promotion of efficient air traffic control.

Authorization was given by the President of the European Parliament in his letter of 19 November 1976. The Committee on Economic and Monetary Affairs and the Committee on Energy and Research were asked for their opinions.

The Committee on Regional Policy, Regional Planning and Transport appointed Mr Noé rapporteur on 24 January 1977.

It considered the draft report at its meetings of 25 May 1977, 22 September 1977 and 29 March 1978 and unanimously adopted the motion for a resolution and the explanatory statement on 29 March 1978.

Present: Lord Bruce of Donington, chairman; Mr Nyborg, vice-chairman; Mr Noé, rapporteur; Mr Amadei (deputizing for Mr Delmotte), Mr Brosnan, Mr Brugger, Mr Cifarelli, Mr Damseaux, Mr Fitch, Mr Fuchs, Mr Hoffmann, Mrs Kellett-Bowman, Mr Mascagni, Mr Osborn, Mr Pistillo, Mr Radoux (deputizing for Mr Joxe) and Mr Santer (deputizing for Mr Colin).

The opinions of the Committee on Economic and Monetary Affairs and the Committee on Energy and Research are attached.

C O N T E N T S

A

The Committee on Regional Policy, Regional Planning and Transport hereby submits to the European Parliament the following motion for a resolution together with explanatory statement:

MOTION FOR A RESOLUTION

on the promotion of efficient air traffic control

The European Parliament,

- having regard to the report from the Committee on Regional Policy, Regional Planning and Transport and the opinions of the Committee on Economic and Monetary Affairs and the Committee on Energy and Research (Doc. 49/78),

- referring to its previous resolutions on air traffic (Doc. 195/72, Doc. 382/72[1], Doc. 374/75[2] and its debates of 12 November 1975[3] and 15 October 1976[4],

- recognizing that air transport in Europe is at present conducted with a relatively high degree of safety,

- noting that there remains the possibility of improving safety standards within the economic and technical limitations which must ultimately apply,

- being anxious to ensure that all appropriate means are employed to reduce to a minimum the risk of air collisions and other causes of disaster,

1. Is concerned at the fact that the rapid expansion of international air transport and the need to accommodate other types of traffic, such as military and private aviation, poses problems of capacity, which are likely to impede the orderly and rapid movement of air traffic in proper conditions of safety. These problems, which basically stem from the fact that available airspace is limited, are particularly acute in those parts of Western Europe where the air traffic is very dense;

2. Draws attention to the large increase in running costs, the waste of fuel and considerable inconvenience to the travelling public caused by the cancellations and delays in air traffic which arise from these limitations on capacity;

3. Feels therefore, that vigorous measures must be taken to ensure the full use of currently available capacity and, where necessary, the expansion of both air traffic services and airport capacities;

4. Welcomes the considerable work undertaken recently in scientific and technological research into the development and introduction of systems intended to secure the safe separation of aircraft, and believes that this

1 OJ No. C 19, 12.4.1973, p.51
2 OJ No. C 280, 8.12.1975, p.24
3 OJ/Ann. No. 196, p. 132
4 OJ/Ann. No. 207, p.217

research must be continued and encouraged, while insisting on the need to undertake an evaluation of cost effectiveness, taking into account the cost of research, experimentation and the manufacture of the various technological accident prevention systems;

5. Is convinced that efforts have to be made to make the products of the European aeronautical and electronic industries, particularly in air traffic control systems, more competitive and acceptable to the world market;

6. Stresses the importance of achieving compatibility of equipment used or likely to be used in air traffic control with a view to future standardization leading to greater cost effectiveness and efficiency. This is of particular importance in view of the increased use of automation and the introduction of data links between air traffic control centres;

7. Considers that the international bodies, both governmental and non-governmental which are at present engaged in a study of the problems involved in air traffic management should continue and intensify their efforts so as to ensure the most efficient use of available air traffic control capacity;

8. Is convinced that efficient air traffic management should be organized on a supranational basis and that close cooperation is vital in Europe because of its special geographical pattern;

9. The expansion of medium and long-haul air traffic is expected to continue in the future. On some shorter routes, however, airlines may experience strong competition from the railways which are planning substantial improvements to some rail services such as the Paris-Lyons route. It would be desirable for developments in short-haul air traffic and railway services between the same points to be better coordinated at a European planning stage;

10. Calls upon the Commission to study the possibility of improving cooperation between national air traffic control authorities with the aim of ultimately setting up a single European air traffic control system;

11. Pays tribute to Eurocontrol for its many activities which have contributed to the promotion of air traffic control in a section of air space characterized by very heavy traffic and wishes to stress the important role which this organization is playing, especially in the field of training and experimentation, and the role it should play in the future in the field of coordination between national air traffic control services;

12. Calls therefore on the governments of the Member States of Eurocontrol to define the tasks and responsibilities of this organization in the new convention due to replace the existing convention which expires in 1983;

13. Expresses its grave concern at the division between civil and military control of air space and calls upon the European governments concerned to

to achieve a common use of the same air space by civil and military traffic - control being effected by joint civil and military control units - in those areas where this has not yet been realised;

14. Believes, further, that a solution (by means of radar) will be necessary to solve the problems of wind shear at low altitude and to make available to controllers information on the location of hazardous weather conditions;

15. Calls for Community measures to give an added impetus to the application of research being undertaken in various countries into the artificial dispersal of fog at airports;

16. Feels that studies should be undertaken on the provision of improved organizational and procedural systems designed to reduce the incidence of human error by both the pilot and the controller; is aware of the impact of automated and modern air traffic control systems on the authority of the pilot of an aircraft, but is convinced that from the operational point of view the final decision should remain with the captain of the aircraft;

17. Is of the opinion that action should be taken to explore the question of satisfactory conditions of employment and career prospects for air traffic controllers so as to reduce the present incidence of industrial unrest and encourage the continuing availability of suitably qualified personnel for recruitment to the profession;

18. Believes that the States concerned should improve the procedures for the reporting and the analysis of near miss incidents, and other evident deficiencies in the air traffic control systems;

19. Stresses that it is the first parliamentary body to call for suitable measures to improve standards of control, and deplores the fact that the Community institutions have taken no action on the question of air traffic control;

20. Asks the President of the European Parliament, following the adoption of the Resolution, to organize a conference of all interested parties, including the Council of Europe, with a view to developing the recommendations contained in this Resolution;

21. To this end, calls upon the Council to include the question of air traffic control among the civil aviation topics to be studied with a view to Community consultations or action, and this in close cooperation with the competent international organizations, especially with ICAO;

22. Instructs its President to forward this resolution to the Council and Commission of the European Communities and, for information, to the national parliaments, ICAO, ECAC, Eurocontrol, IATA and other interested bodies.

- o -

B

EXPLANATORY STATEMENT

I. INTRODUCTION

1. At its meeting of 21 October 1976 the Committee on Regional Policy, Regional Planning and Transport, on a proposal from Mr Osborn, decided to draw up an own-initiative report on improvements in air traffic control. This decision was taken in the light of the mid-air collision which had occurred the previous month in Yugoslav air space over Zagreb when 176 people died. While this report was still being drawn up, a collision at Tenerife airport in March 1977 resulted in 577 deaths.

2. Despite these tragic disasters your rapporteur considers it would be wrong and unfair to raise a hue and cry, for air transport is in fact characterized by a relatively high degree of safety. Despite the enormous expansion in air traffic during past decades and the increased speeds at which aircraft fly, the number of accidents in this transport sector is relatively low in comparison with others, especially that of road transport. Statistics published by the ICAO (International Civil Aviation Organization) - to be discussed in more detail in a later chapter - prove the truth of this statement beyond any doubt.

3. This relatively high degree of safety does not, however, exclude the possibility of introducing into the present system of air traffic control improvements which could not only reduce the risk of disasters, but also contribute to a greater efficiency of the system. The purpose of this report is, therefore, to examine the improvements which could be introduced, the projects which deserve priority and the contribution which the Community institutions might make.

4. Flight safety depends essentially on four basic factors: the pilots, the aircraft, the infrastructure (including inter alia air traffic control services, airports, navigational aids and aeronautical telecommunications etc.) and the meteorological conditions. Your rapporteur is convinced that measures could be taken or projects set up in each sector to reduce to a minimum the danger of aircraft accidents or collisions.

Research into and the introduction of new advanced techniques, whether in respect of equipment designed for ground traffic control or control equipment to be fitted in the aircraft themselves, are considered by Mr Osborn in the opinion he drew up on behalf of the Committee on Energy and Research. The effect of technological innovations on the industries concerned and the competitive position of the European aeronautical and electronic industries on the world market are essentially the responsibility of the Committee on Economic and Monetary Affairs. Your rapporteur will consider problems related to the air traffic control system, to the organizational and the meteorological aspects which are frequently underestimated.

5. Of course, the four safety factors mentioned above cannot be considered in isolation from one another. Maximum safety can, therefore, only be attained if radical improvements are introduced in each branch and at the same time significant efforts are made to bring about more effective interaction between these branches. Procedural and organizational aspects must be regarded as among the principal aspects analysed in this report. Closely linked is the problem of European and inter-continental cooperation and the resulting institutional problems.

6. Finally, an effort will be made to draw conclusions from the list of problems and the survey of projects undertaken to date so that practical recommendations and suggestions can be drawn up for the improvement of air safety. Attention will be focused principally on international cooperation and the possibility of Community projects; in view of the fact that each nation has sovereignty over its air space and that the amount of air space available to each nation - especially in Western Europe - is limited, this clearly meets an urgent need.

II. GENERAL COMMENTS ON THE DEVELOPMENT OF AIR TRANSPORT, FLIGHT SAFETY AND INTERNATIONAL COOPERATION

7. As stated above, air transport has expanded enormously since the end of the Second World War. It is not only the rapid expansion of air transport as such that has given an entirely new dimension to flight safety but a number of side effects of this gigantic expansion have radically affected air traffic control operations. One of the earliest results of this, in itself alarming, development was a greater international awareness of the problem and this in turn resulted in a number of steps being taken by international institutions to achieve a greater degree of air safety.

In this chapter we shall first illustrate the expansion in air transport, then consider the effects of this development on air traffic control and finally draw up a summary of the efforts made and projects set up by the Community or certain inter-governmental organizations.

A. The expansion in air transport

8. The expansion in air transport since 1945 has been such that statistics are rendered virtually superfluous. Apart from road transport, air traffic is undoubtedly the transport branch which has expanded most rapidly. This remarkable expansion applies to inter-continental, international and regional traffic.

9. Ten years after the end of the Second World War, the airline companies were carrying some 70 million passengers on scheduled services. Ten years later, in 1965, the figure had reached almost 200 million.

The following table shows that there was an average annual increase of 9.1% in the number of passengers carried on scheduled services in the period 1966-1975. In figures this means an increase from 200 million passengers in 1966 to 438 million in 1975 and 473 million in 1976[1].

---

1 ICAO, 'Annual Report of the Council - 1976', Doc. 9188, p.2.

Growth in air transport by scheduled services in the period 1966-1975

Year	Passengers (millions)	Annual increase (%)	Passenger/Kilometres millions	Annual increase (%)
1966	200	-	229,000	-
1967	233	16.5	273,000	19.2
1968	265	13.7	316,000	15.8
1969	293	10.6	351,000	11.1
1970	311	6.1	382,000	8.8
1971	333	7.1	406,000	6.3
1972	368	10.5	464,000	14.3
1973	404	9.9	520,000	12.1
1974	423	4.7	546,000	5.0
1975	438	3.5	569,000	4.2

(Source: ICAO, 'Annual Report of the Council', Doc. 9166, p.2).

These figures refer only to the scheduled services of the airline companies which are members of ICAO, with the exception, however, of the Soviet Union and the People's Republic of China.

10. Apart from scheduled services, the number of charter flights and special tourist flights has increased enormously in the past few years The significant increase in charter traffic can be illustrated by the fact that in 1975, charter flights accounted for 27% of the total air traffic on the North Atlantic route[1].

General aviation[2] is also on the increase, although growth in this branch of air transport is much slower in Europe than in the United States. Statistical information is equally scant for private aviation as for charter traffic.

---

[1] IATA, 'Reports and Proceedings of the 32nd Annual General Meeting', Singapore, November 1976, p.82.

[2] General aviation refers to every civil non-commercial flight.

To complete the picture, mention should also be made of the upward trend in air freight. In 1970, 4.6 million tonnes of freight were carried, and 5 years later the total was 6.5 million tonnes. The figures for 1956, 1960, 1965, 1970, and 1975, expressed in tonnes/kilometre were respectively 1.4 - 2 - 4.8 - 10.6 and 17 million[1].

In conclusion, military aviation needs also to be mentioned. Of course, no precise figures are available for the number of military traffic or military training flights. However, it is known that this traffic has a significant effect on the overall air traffic system.

11. The qualitative development in air travel is doubtlessly as spectacular as the percentage growth in the number of flights or passengers carried. From the point of view of flight safety, qualitative progress relates mainly to the ever-increasing speeds and the height at which aircraft fly. The Anglo-French Concorde which came into service in January 1976 heralded a new era - that of supersonic passenger flights.

B. Development of air traffic control and air safety

12. It is quite clear that the quantitative and qualitative expansion in air transport has caused serious problems for air traffic controllers. However, the personnel responsible for air safety have carried out their duties in admirable fashion and, despite this expansion, have managed to reduce the risk factor in air traffic.

13. The basic system for controlling routes and air traffic currently in use in Europe was introduced in the 1950s. This system, devised for the types of aircraft and the volume of traffic obtaining at that time, was initially quite adequate and allowed air traffic to circulate freely and punctually up to the end of 1965. In 1968, as a result of the increasing use of air transport, a growing congestion in air traffic became apparent.

Attention was drawn to this state of affairs in 1969 by the ICAO and, as a result, several European countries took steps not only to improve the system by all possible means, but also to rationalize the use of air space, a process which initially involved significant restrictions on air transport.

As a result it is now the case that in the centre of Western Europe - which includes Austria, Belgium, Denmark, France, West Germany, Italy, Luxembourg, the Netherlands, Spain, Switzerland and the United Kingdom - the system adopted for the control

[1] ICAO - Doc. 9166, p. 2 and p. 164

services has had to attain a high degree of sophistication to solve the problem of keeping the rate of flow of aircraft. In peripheral areas, where the traffic flow is less heavy and the burden on the system less acute, control problems are not so serious. In some of these areas the governments concerned have adopted less sophisticated control systems which, in normal circumstances, are perfectly able to provide for safe and fluid traffic. However, traffic from central Europe towards the peripheral areas is constantly increasing, particularly during the tourist season, and it is clear that further developments in the air traffic control systems will become essential.

14. Since 1957 the ICAO has been gathering statistics on accidents involving aircraft belonging to the airlines of Member States of the ICAO which operate scheduled services.

In 1957 there were 31 accidents in which 507 passengers lost their lives. Last year there were 20 accidents with 726 victims[1]. The number of fatal accidents per 100 million passenger/kilometre fell from 0.62 in 1957 to 0.11 in 1976.

The following table illustrates the number of fatal accidents which occurred in scheduled civil air transport during the period 1966-1975[2].

Year	Passengers (millions)	No. of accidents	No. of deaths	Deaths per 100 m pass/km.	Fatal accidents per 100 m kilometres	Fatal accidents per 100,000 flying hrs.
1966	200	31	1001	0.44	0.69	0.33
1967	233	30	678	0.25	0.57	0.29
1968	265	35	912	0.29	0.58	0.32
1969	293	32	946	0.27	0.48	0.27
1970	311	28	687	0.18	0.40	0.23
1971	333	31	867	0.21	0.44	0.26
1972	368	42	1210	0.26	0.58	0.34
1973	404	36	862	0.17	0.48	0.28
1974	423	29	1301	0.24	0.39	0.23
1975	438	19	441	0.08	0.25	0.15

[1] It should be noted in passing that the introduction of bigger aircraft, such as jumbo jets has meant a general increase in the number of victims per accident.

[2] Source: ICAO, Doc. 9166, p. 2 and p. 36. The relevant figures for the People's Republic of China and the Soviet Union are not included in this table.

15. The ICAO recently began drawing up statistics on non-scheduled air transport. The figures for 1974 and 1975 relating to the number of fatal accidents per 100 million passenger kilometres for these services amounted to 0.39 and 0.30 compared with 0.24 and 0.08 for scheduled services.

16. To conclude this chapter, we can say that despite the revolution in the air transport sector and the attendant congestion and saturation in certain areas of air space, the availability of improved training of air traffic controllers and better air traffic control facilities have proved that the danger of tragic accidents involving aircraft can largely be averted. International incentives and encouragement to promote air safety should certainly not be discounted in this context.

C. International cooperation

17. As mentioned in the introduction, air traffic control comes within the exclusive jurisdiction of national authorities. However, the fact that a nation has sovereignty over the air space above its territory does not rule out the development at international level of a whole range of measures aimed at cooperation and the coordination of measures to increase air safety.

The following paragraphs contain a summary of the principal projects which the major international organizations have carried out or are carrying out in this field. They also include a few marginal notes on their respective powers.

Although the first section deals with Community projects, your rapporteur would also point out that on the matter of concrete results in the sphere of air safety, the Community unfortunately has little grounds for satisfaction. Nonetheless, he considers it appropriate to illustrate briefly Community efforts - especially those made by Parliament - as the essential background to the proposals drawn up in the following chapter.

1. The European Community

18. Pursuant to article 84(1) of the Treaty of Rome, the provisions of the Treaty relating to transport do not apply to sea and air transport. Article 84(2) reads as follows:

> 'The Council may, acting unanimously, decide whether, to what extent and by what procedure appropriate provisions may be laid down for sea and air transport'.

The unanimity required undoubtedly explains the absence of Community decisions or regulations in respect of these two transport sectors.[1]

The European Parliament

19. The European Parliament has laid the foundations in the field of air transport. Its efforts were twofold: it sought on the one hand to have Article 84(2) and consequently Community provisions relating to air transport implemented and, on the other, to have measures to increase flight safety drawn up.

20. As long ago as 1961, the report by Mr Corniglion-Molinier (Doc. 107/61), on behalf of the then Committee on Transport, advocated a common air transport policy. In the same year a supplementary report was published on questions of air transport in the context of the European Communities (Battistini report, Doc. 117/61). In 1965 the Committee on Transport drew up a second own-initiative report which more specifically concerned the integration of civil avaiation in the Community (report by Mr Drout-L'Hermine, Doc. 24/65). In 1970 the Committee on Transport was authorized to draw up an own-initiative report on matters relating to European air transport. During the preparation of this report, for which your rapporteur also served as rapporteur, the Commission submitted to the Council a proposal for a decision on the first measures of a common approach to air transport (Doc. 134/72). The report (Doc. 195/72), which of course also dealt with the draft decision, was referred back to the Commission by the Assembly on 17 January 1973 because of the large number of amendments. Two months later the European Parliament adopted a supplementary report (Doc. 328/72).

These reports called for greater technical, operational and commercial cooperation between the national airline companies of the Member States of the Community and closer contact with the airline companies of third countries within the framework of the appropriate international organizations. The view was also expressed that a common air transport policy would have to be developed as an integral part of the common transport policy. Numerous written and oral questions to the Council and Commission and debates in the Assembly showed that many delegates to the European Parliament supported this line.

---

[1] It should be pointed out that the general provisions of the Rome Treaty also apply to air transport, as has been made clear by the Court of Justice in its judgement of 4 April 1974 in Case 167/73.

21. Air safety as such was indeed broached by the European Parliament in the report mentioned above, but was truly emphasized for the first time in its opinions on the draft decision of 1972. At your rapporteur's request, Parliament proposed that the text of the Commission document concerned should be amplified so as to include, 'joint action to improve air safety', in future Community projects in the air transport sector[1].

22. During its sitting of 13 May 1975 the European Parliament adopted a resolution tabled by Mr Fellermaier on behalf of the Socialist Group (Doc. 83/75), in which he expressed concern at a possible cutback in the work of Eurocontrol. On 12 November 1975 a debate was held on air traffic safety on the basis of oral questions on behalf of the Committee on Regional Policy and Transport to the Council and Commission (Doc. 346/75 and Doc. 347/75). Further to this debate, a resolution tabled by your rapporteur, Mr Nyborg, Mr Osborn, Mr Schwabe and Mr Seefeld (Doc. 374/75) was adopted. In this resolution the Commission was requested to submit to the Council without delay a proposal for joint action in the field of air traffic safety with a view to bringing the entire aerospace under the control of a single body[2].

One year later, on 15 October 1976, following the mid-air collision over Zagreb[3], a further debate was held in plenary sitting on improvements in air safety on the basis of an oral question tabled by Mr Osborn, Mr Berkhouwer and your rapporteur (Doc. 328/76). On that occasion the Commission was asked what progress had been made in the field of air traffic control. A further series of oral and written questions to the Council and Commission on this subject were tabled by Mr Durieux, Mr W. Müller, Mr Glinne, Mr Zywietz and others; this clearly illustrates the importance attached to this matter by Members of the European Parliament.

---

[1] Noé report (Doc. 328/72), OJ No. C 19, 12.4.1973, p.55.

[2] OJ No. C 280, 8.12.1975, p.24, para. 1 of the resolution.

[3] Members recently received a note on the causes of and background to the Zagreb disaster - see Notice to Members, PE 50.262.

23. Parliament also drew up reports on proposals from the Commission concerning the matter under consideration. For example, in the case of the communication from the Commission to the Council containing initial proposals for priority projects in data processing, Mr Cousté, on behalf of the Committee on Economic and Monetary Affairs, drew up a report (Doc. 199/75) to which was annexed an opinion drawn up by Mr McDonald, on behalf of your committee, on one of the proposed priority projects relative to the setting up of a study of real-time data processing systems required for air traffic control (ATC) in the 1980's. Then your rapporteur drew up an opinion on behalf of this committee for Mr Guldberg's report, on behalf of the Committee on Economic and Monetary Affairs, on the communication from the Commission to the Council concerning an action programme for the European Aeronautical Sector (Doc. 203/76).

- Commission and Council

24. In its communication on guidelines for Community action to improve traffic safety[1], the Commission stated expressly that increased safety must always be given priority by the bodies responsible for matters relating to traffic. This substantial document deals in great detail with road traffic safety but totally ignores air traffic safety. The same applies to the Commission's proposal for a Council decision on the first measures of a common approach to air transport (Doc. 134/72). Air traffic safety was not mentioned in this document either, not even in the explanatory memorandum.[2] In reply to a three-part written question by Mr W. Müller on the subject of Eurocontrol, the Commission replied curtly that 'the issue has not been the object of any Community action'[3].

25. During the debate in plenary sitting on 15 October 1976, the former Member of the Commission, Mr Guazzaroni, explained its point of view as follows: 'the problem of air traffic control is of worldwide importance and must therefore be solved at world level and not on a purely regional level. Moreover, it is a highly technical problem and the Commission does not have the technical know-how or the specialized staff necessary to follow problems of air safety'[4].

---

[1] Commission Document 237/VII/71.

[2] This proposal has been withdrawn by the Commission (See Bulletin of the EP, 53/77, p.21.)

[3] OJ No. C 97, 16.8.1974, p.20

[4] Proceedings of the Assembly of 15.10.1976, OJ Annex No. 207, p. 218

During the meeting of the Committee on Regional Policy, Regional Planning and Transport of 22 September 1977 the present Commissioner responsible for transport, Mr Burke, took a similar line.

26. On the other hand, the communication from the Commission concerning an action programme for the European Aeronautical sector of October 1975 (Doc. 319/75) includes a draft decision concerning the creation of a common policy in the civil aircraft and aviation sector. It is a hopeful sign that this proposal (and others) is based on Article 84 of the EEC Treaty and, in Article 3(a) of this proposal for a decision, the Commission postulates 'the creation of a European airspace to be managed on a Community basis'[1].

27. Unfortunately, this important document does not make a single reference to air traffic control. Your committee regrets that the addition proposed by Mr Guldberg - at the request of your rapporteur - to Article 3 of the draft decision, that is, the inclusion of flight safety in the overall plan[2], was not accepted by the Commission in its alteration of the draft decision of February 1977[3]. On 2 August 1977 the Commission submitted to the Council a communication concerning an action programme for Aeronautical Research (Doc. 246/77) which does take full account of flight safety. This communication was debated in plenary on 17 January 1978 on the basis of Mr Carpentier's report (Doc. 454/77).

28. Of great importance to air traffic control is the proposal from the Commission, already referred to in paragraph 23, for priority projects on data processing (Doc. 21/75) and, more specifically, the fourth priority project which is directly related; for the object of this study is to make European industry better able to meet future European requirements as regards the application of data processing to ATC[4].

29. With reference to the topic being discussed here, the Council of the European Communities has not to date published any guidelines whatsoever. In the Community budget for 1977, it simply entered 8 million units of account to finance research in the aircraft industry.

---

[1] OJ No. C 265, 19.11.1975, p.2

[2] Interim report by Mr Guldberg, Doc. 203/76, OJ No. C 178, 2.8.1976, p.10

[3] OJ No. C 40, 17.2.1977, p. 11

[4] OJ No. C 99, 2.5.1975, p.20

On 14 March 1977, with reference to industrial policy in the aeronautical sector, the Council made a statement concerning the objectives of this policy[1]. Although air safety is not mentioned in so many words, this statement is important because it is the first move made by the Council towards joint action likely to have a beneficial effect on air traffic safety.

30. With regard to air traffic safety, taken in the strict sense of the term, Mr Thorn, speaking in his capacity as President-in-Office of the Council on 10 March 1976 in answer to an oral question by Mr Durieux on the future role of Eurocontrol, said that 'the question of air safety does not at present fall within the jurisdiction of the Community'. He added that he could give no further details until the Commission's proposal concerning an action programme for the European Aeronautical Sector had been studied by the Council[2].

31. Since then, at its meeting of 28 and 29 June 1977, the Council has agreed to a proposal by Mr Rodgers, Minister for Transport of the United Kingdom, that certain matters falling within the civil aviation sector should be examined and instructed the Permanent Representatives Committee to prepare its subsequent discussions in this connection[3]. At its following meeting on 27 October 1977 the Council took note of the oral report by the President-in-Office, Mr Chabert, Minister for Transport of the Kingdom of Belgium. It stressed the need for a Community approach to civil aviation problems and said that priority should be given to the question of cooperation with international air transport organizations (such as the ECAC and ICAO) and to the coordination of the positions of the Member States in these bodies. The Council also expressed its desire to receive proposals as soon as possible on other priority measures to be taken by the Community in the field of air transport[4].

32. In conclusion, we can say that, although the European Community has so far drawn up no concrete policy guidelines with a view to increasing air traffic safety, the first steps have been taken in the direction proposed by Parliament. After long years of disillusionment the present moves being taken by the Council are felt by the European Parliament to be both an acknowledgement and an incentive to further effort.

---

[1] OJ No. C 69, 19.3.1977, p.6

[2] Proceedings of the Assembly of 10.3.1976, p. 19

[3] Council Press release, see PE 49.588, p.2

[4] Council Press release, see PE 51.151, p.4

2. The International Civil Aviation Organization (ICAO)

33. ICAO is the specialised agency of the UNO for all international civil aviation matters in all fields. The present membership of ICAO is 141 states including all EEC States (on 31.1.1978)[1].

The ICAO was set up at the Chicago Conference in 1944 in which 52 states, not including Russia and China, took part, and which concluded with the adoption of the Convention on International Civil Aviation. Although this document is the basic source of public law in air navigation for scheduled flights, it is limited by the text of Article 1, under which every Member State has complete and sole sovereignty in the atmospheric airspace above its territory.

34. The signatory states to the Convention consider their membership of the ICAO to be characterized by equality and cooperation, and any waiver of national sovereignty to be purely voluntary, deriving from the nature of the provisions agreed in the organization.

In practice, Member States may choose to adopt from among the regulations drawn up by the ICAO to increase the safety and efficiency of air traffic, only those which each of them accepts as the most suitable.

35. The functions of ICAO are threefold: they include standards and recommended practices (which become annexes to the Convention), drafting regulations and lay-down plans for the facilities and facilities on services recognized as necessary for the international air navigation. These plans are adopted by regional air navigation (RAN) - meetings held every 5 years or so in each one of the ICAO regions (North Atlantic, Europe, Middle East etc.). The implementation of and amendments to the air navigation plans between RAN meetings is one of the functions of the 6 ICAO regional offices at Bangkok, Cairo, Dakar, Lima, Mexico and Paris - the latter is accredited to 30 European and Mediterranean States.

ICAO has also the function of providing technical assistance to developing countries (including the formation and training of specialists in the various air navigation and air transport fields). United Nations Development Plan (UNDP) projects concern civil aviation and are carried out by the ICAO technical assistance services.

A special regional planning group called the European Air Navigation Planning Group (EANPG) concerns itself with air navigation problems and complexities in the European region. It keeps the European situation at a constant review and recommends an appropriate action by the European States.

---

[1] In its recent Communication to the Council on the priority business for a Community Transport Working Programme to 1980 (COM (77) 596 final), the Commission stresses closer and more effective relations with ICAO and ECAC. Commissioner Burke did the same before your Committee on 28 February 1978 (cf. PE 52.699).

36. The ICAO studies the problems arising today in air traffic control and ways of improving the present system. The European states take part in its deliberations in various ICAO world-wide and regional bodies, which are also actively assisted by specialists from the airline companies, who attend in the IATA delegations. The point of view of pilots and control staff is also represented by the delegations from the International Federation of Airline Pilots Associations (IFALPA) and the International Federation of Air Traffic Controllers Associations (IFATCA). Other airspace users, i.e. pilots and owners of private aircraft, are represented in turn by the International Aircraft Owners and Pilots Association (IAOPA).

37. Problems relating to the coordination of civil and military operations are discussed in the NATO committee for the European airspace coordination (CEAC), and at national level, too, detailed studies are made on this subject.

The activities of these organizations should provide ample opportunity for discussing and solving the problems inherent in air traffic. Nevertheless some problems persist, either through a lack of acceptable solutions or through failure of the Member States to take action once agreement has been reached.

3. European Civil Aviation Conference (ECAC)

38. Like the European Conference of Ministers of Transport (ECMT) the European Civil Aviation Conference was set up at initiative of the Council of Europe, by the Conference on coordination of air traffic in Europe, convened by ICAO in Strasbourg in April 1954. Since its establi shment in 1955, this Conference has been, as it were, a European division of the ICAO.

39. One of its tasks is to keep a watch on the development of air transport in Europe and promote coordination between its members with a view to increased profitability in this transport sector. Pursuant to its States, the European Civil Aviation Conference may investigate any specific problem relating to the orderly development of air transport.

Formed initially with 19 states, the current membership is 21 states (including Yugoslavia which joined ECAC in 1977). ECAC is provided with accommodation and administrative and secretarial services by the Paris office of ICAO. Although not subordinated to ICAO, the work programmes of ICAO and ECAC are closely coordinated. ECAC deals mainly with air transport matters. The Technical Committee of ECAC tackles, however, European aspects of the implementation of ICAO air navigation standards and recommended practices. Air traffic control questions are regarded as a world-wide problems and are not in ECAC's work programme.

4. Eurocontrol

40. The European Parliament has on several occasions considered the problems of Eurocontrol and its operation with respect to the foreseeable growth of air traffic[1].

Eurocontrol, which was set up by the Convention of 13 December 1960, ratified at the time by France, West Germany, the Netherlands, Belgium, Luxembourg and the United Kingdom and later by Ireland, after an initial period of operation[2], was in practice excluded from the direct exercise of control in France and the United Kingdom. These two countries said that they wished to manage air traffic services under their own responsibility and, in order to avoid a formal amendment of the Convention, which had been ratified, recourse was had to a formula whereby this national management was carried out on behalf of Eurocontrol, on an agency basis.

41. The difficulties which subsequently arose are well known. They concerned the financing of the organization both as regards the scale of contributions to be paid by Member States and as regards the operation of the Eurocontrol central route charges office in Brussels.

This office collects charges on users, that is to say the airlines, (these charges amount to 15%, will gradually be increased to 60% and may be subsequently increased to cover expenditure entirely) but the proceeds are paid to Member States (and a number of associated states) and the office's function is merely an accounting one.

42. As a result of this uncertainty about the future of Eurocontrol over the next period (the present Convention expires in 1983), it was agreed in 1975 that the Permanent Commission of Eurocontrol would come to a decision on the basis of a report by civil and military representatives of the Member countries of the Commission.

This report dealt with four hypotheses:

(1) pure and simple application of the Convention;

(2) maintenance of the status quo, that is to say, allowing derogations;

(3) extension of the Convention to lower airspace;

(4) removal from Eurocontrol of all statutory responsibility and the abolition of common financing.

---

[1] The Secretariat drew up a note on Eurocontrol in 1975; see PE 41.621.

[2] Cooperation agreements were signed with Denmark, Norway, Sweden, Switzerland, Italy, Portugal and Austria.

From the attitudes of various national administrations it can be deduced that there is a certain tendency to reconsider this problem from a national angle.

In several countries individual problems have arisen. In the Netherlands, for example, since the development of a new radar system, consideration is being given to taking air traffic under its own control except for simple overflights. In West Germany it is considered necessary to take full control of upper airspace and to entrust it to the Karlsruhe Centre at present operated by Eurocontrol.

43. In addition to these difficulties, caused partly by the problems of coordinating control in lower and upper airspace, there are certain others such as the joint purchasing of control and navigation equipment.

It is also clear that the problem of the survival of Eurocontrol has very important institutional and social aspects.

5. Council of Europe

44. As regards general problems of air transport and air traffic control, the Parliamentary Assembly of the Council of Europe has taken similar initiatives aimed at achieving similar objectives as those of the European Parliament. The report by Mr de Bruyne on Air Transport in Europe (Doc. 3761 of 3 May 1976), which strongly supports international cooperation, belongs to the first category.

As regards air traffic control, in September 1977 on the basis of a report by Mr Treu (Doc. 4028 of 21 September 1977), the Parliamentary Assembly adopted a recommendation on the introduction of systems to prevent mid-air collisions. We shall come back to this very worthwhile report at a later stage.

6. The International Air Transport Association (IATA)

45. IATA was set up in 1945 by the airline companies and at the end of 1976 comprised 108 companies, of which 87 were members and 21 associate members. IATA's objectives are to facilitate international air traffic and in particular to promote standardization in a wide range of fields through

cooperation between the airlines for the benefit of passengers[1]. IATA is not simply concerned with problems of rates and tickets, but also with a variety of technical matters such as standardization of aircraft equipment and ground facilities, airport questions, etc., and with environmental protection. In all matters that require Government decisions and hence cannot be settled by the airlines themselves, IATA cooperates closely with ICAO, being permanently represented on all the main committees, including EANPG.

46. IATA also plays a leading role in the field of air safety. Indeed, a large number of its activities are directly or indirectly concerned with the promotion of safety. Examples of this are studies on landing systems, improvement of radio links for air traffic, the development of warning systems for potential hazards in the proximity of airports and equipment to disperse fog at airports, the preparation of an information programme on the incidence of wind shear and the like[2].

Since 1967 IATA has also been gathering statistics on near misses in Europe, forwarded by its member companies.

Last year IATA devoted special attention to the 'human factor' in flight safety. A document was drawn up for the benefit of pilots containing essential data on air safety which is to be regularly updated. In Lucerne in November 1976, IATA's Technical Committee organized a conference on pilot selection and training.

47. The list of international and European organizations contained in this chapter is of course not exhaustive. Anyway, there would be little point in listing all the activities of the bodies concerned. The aim has simply been to give an insight into the efforts being made to promote air safety by cooperation and integration. Discussion of Eurocontrol has deliberately been kept brief seeing that a following chapter will be considering in detail the future and role of Eurocontrol.

---

[1] See Noè report, Doc. 195/72, p. 17, point 26, second paragraph.

[2] IATA, 'Report on Proceedings of the 32nd Annual General Meeting', pp. 43-46.

III. MEASURES TO IMPROVE AIR SAFETY

48. It is almost universally agreed that there is room for improvement in air traffic control. In making this statement your rapporteur by no means wishes to deny the astonishing results which have been achieved in the field of air safety; on the contrary, he pays the warmest of tributes to all the organizations and individuals who, in one way or another, have contributed to improving air safety.

49. In view of the human suffering and substantial economic damage[1] caused by air crashes, every effort must be made to ensure the greatest possible degree of flight safety. In this chapter a number of measures are suggested which might contribute to achieving this. For practical and methodological reasons these measures are divided up into the following categories:

- measures in the area of research and development of flight safety techniques;
- organizational and procedural measures;
- measures in the meteorological field.

Obviously, to divide measures into categories in this way is somewhat arbitrary given the considerable interdependence of the various factors. Even drastic improvements in each individual area will not suffice to ensure greater safety and efficiency in air traffic control if the interdependence of the various safety factors is disregarded. In other words, optimal flight safety can be achieved only if practical measures in the technological, organizational and meteorological fields are accompanied by measures which take account of the inter-action between the various safety factors. In Chapter IV, which deals with international cooperation and the possibilities of Community action, special attention will therefore be paid to this interdependence between the various individual areas.

A. Measures in the field of technological research and development

50. The problem of research and the introduction of new techniques and systems with a view to improving flight safety is dealt with only briefly here since, according to the distribution of tasks agreed upon by your rapporteur and Mr Osborn, draftsman of an opinion for the Committee on Energy and Research, these aspects are to be considered in detail by the appropriate committee. Your rapporteur, who took part in the discussion

---

[1] The following example gives an idea of the astronomic sums involved here: according to 'Le Monde' of 9 April 1977 the insurance companies paid out $350 million in compensation following the aircraft collision at Tenerife in March 1977.

on Mr Osborn's opinion in the relevant committee, fully supports the arguments and conclusions contained in that opinion (PE 48.238/fin.) regarding research and technology. Your rapporteur has unhesitatingly incorporated the recommendations contained in that opinion into the motion for a resolution and the conclusions. As far as technology is concerned, therefore, this section will be confined to stressing certain aspects and making a number of additional comments.

51. As much encouragement as possible must be given to the study and development of systems to promote flight safety[1]. Priority should be given to the following projects: development and marketing of techniques to prevent aircraft collision, including airborne collision avoidance systems and ground based conflict detection and resolution systems; development of data processing techniques for use in air traffic control; improvements in accuracy of some altimeters used in the upper airspace; and development of improved approach and landing systems. The latter are particularly desirable when one considers that almost fifty percent of all air crashes occur on landing. Investigations should also be carried out into ways of ensuring wider and more intensive use of ground radar systems.

52. The selection of research and development projects and the drafting of research and development programmes must be guided by the following criteria:

- the extent to which a particular project may contribute to improving air traffic safety;
- the extent to which a given project will contribute to the optimal utilization of existing capacity and/or the expansion of capacity (of airspace and airports);
- the role of a given project in an overall package of measures;
- the extent to which individual actions can be linked up and integrated in an international context;
- the avoidance of duplication and the dispersion of effort and financial resources;
- economic profitability and financial implications;
- the foreseeable impact of a project or programme on the competitive position of the European industrial sectors concerned on the world market;
- the mutual compatibility of techniques and equipment.

---

[1] See points 19-21 of Mr Osborn's opinion.
See also, for more technical details, the Treu report (Doc. 4028) of the Council of Europe.

The establishment and application of well-defined criteria constitutes an essential requirement, given the high cost of research into and the testing and introduction of new techniques and the limited financial resources available for this purpose.

53. Some of these general objectives require a word of explanation.

Firstly, as regards profitability and financial implications, it must be stressed that the most advanced flight safety systems are extremely expensive. Consequently your committee feels that it is absolutely essential for estimates to be made of the cost of research, testing and marketing of the relevant projects. In this connection, the cost of purchase and maintenance for the user must not be overlooked. It is only on the basis of a reliable assessment of expected and possible costs that judicious choices can be made. Such assessments would undoubtedly best be made by means of cost-benefit analyses.

Clearly, cooperation can lead to substantial economies of scale. This question of cooperation, which also involves incalculable advantages from the point of view of the elimination of expensive and unnecessary duplication and the avoidance of dispersion of effort and financial resources, will be the subject of further consideration in the following chapter.

54. The need to strengthen the competitive position of the relevant European industries constitutes an objective which must constantly be borne in mind when research and development programmes are being drawn up. It is, to say the least, regrettable that Europe has been obliged to give up its leadership in the advanced technology industries to the United States and that the gap separating them is getting gradually bigger. In the area of the development of collision warning and electronic systems to prevent air crashes, the European industries are lagging hopelessly behind. Your rapporteur considers it absolutely unacceptable that European know-how and advanced scientific experience in other sectors are being so poorly applied in this area. If we are to have any chance of successfully combating this unfortunate situation and giving the necessary impulse to the European electronic and aircraft industry, it would seem once again that cooperation is a primary necessity. To this end efforts currently being made to bring about European cooperation must be speeded up[1].

55. Finally, there must be a very high degree of mutual compatibility between air traffic control apparatus and equipment. The present situation

---

[1] In reply to a written question by Mr Dondelinger (No. 623/75) the Commission stated that action needed to be taken to ensure that Europe did not lose control of the development of key advanced technology industries (OJ No. C 67, 22.3.1976, p. 41).

is that in an effort to improve the ability of an air traffic controller to handle increasing numbers of aircraft and to improve the overall efficiency of the air traffic control service, some European ATC centres are making increased use of automated services. At present these facilitate the provision to the controller of the information which he requires to fulfil his control functions, through the correlation of flight progress data obtained from a number of sources, such as flight plans, transfer of control messages from adjacent centres, and data from radar. In further development these facilities may provide information to the controller on impending conflicts between aircraft movements and the action he should take to resolve them. They may also be integrated automatically with information to and from the aircraft. All this will demand installation of automated equipment in the various European centres which is compatible, so as to facilitate the smooth exchange of information and data between adjacent control centres.

In June 1976 the Assembly of the Western European Union (WEU) adopted a recommendation urging maximum standardization of control systems and equipment in order to increase the efficiency and reduce the cost thereof[1].

56. Although standardization indisputably offers certain advantages, it should be pointed out that mutual compatibility is not synonymous with complete standardization. In view of the major variations in air traffic density between congested and peripheral areas it would hardly be realistic to require that the same costly apparatus should be available everywhere. What matters is that the apparatus, installations and equipment used for air traffic control may be coordinated at all times without particular difficulty.

57. Consideration of the problem of air traffic control from the scientific and technological point of view cannot be complete without some mention being made of research in the field of <u>air traffic control with the aid of satellites</u>. Research has been going on in this field for several years now and although it can be assumed that 15 years will elapse between a research programme being drawn up and the results of that research being put into practical effect it is of vital importance that attention should be paid <u>now</u> to the possible effects of such air traffic control systems on air safety. Air traffic control by means of satellites presents the two-fold advantage of indicating the position of aircraft much more precisely and making it possible to control all

[1] Recommendation 289 of the WEU Assembly.

airspace. It is a fact that aircraft on transatlantic routes are given radio assistance comparable with that on transcontinental flights only while they are within 300 miles of the coast; satellites will therefore clearly be of use over the oceans as well as those land masses where there are few air traffic control stations. Moreover, it can almost certainly be assumed that the utilization of satellites in air transport will add a completely new dimension to air traffic control.

58. A first attempt to use a satellite for the purposes of safer air traffic control and better communication between aircraft and ground was made in France but the 'Dioscures' programme was dropped after only incomplete experimentation. At the moment a European-American-Canadian project, the AEROSAT project, is under consideration; this project is aimed at improving navigation, control, weather information and telecommunications. An ambitious project such as AEROSAT will probably take many long years to realize, especially as a certain amount of resistance must be expected from, for example, potential users who fear that the apparatus to be installed in aircraft will be too expensive[1]. IATA has expressed its opposition to this project on the ground that its fundamental design is unsuitable, that the project is itself premature (according to IATA a satellite system on the North Atlantic route will not be necessary until 1995) and that the cost involved (about $500 million) is really too heavy[2]. The United States Congress has recently refused to finance the project and as a result the programme, as originally designed, has been suspended. The AEROSAT project is not dead yet, however, and it is to be hoped that work will continue, if only on an amended programme.

On 23 November 1977 the European Space Agency succeeded in putting into orbit the first European weather satellite, METEOSAT, and this testifies to the tremendous progress which has been made in this area. As far as air traffic control is concerned, the various projects may be divided into three categories: the first of these, SAT (Satellite-to-Aircraft Techniques) are intended to make flying easier and safer by providing information from synchronized satellites; the second is a more modest category of projects called RAST (Random Access Aircraft-to-Satellite Techniques), which is designed for control purposes alone, and the final and most complex category of studies, CAST (Coordinated Aircraft-to-Satellite Techniques) is intended to

---

1 Pierre CONDOM, 'La Navigation des Jets', in 'Science et Vie', No. 119, 'Aviation 77', p. 58

2 Report by Mr NODA, chairman of the Technical Committee of IATA at the 33rd annual meeting of IATA, November 1977 in Madrid, Document No. 1, paragraphs 21-25

coordinate the four abovementioned objectives (navigation, control, radio communications and meteorological information)[1]. Another important point which should be noted in this connection is that the 'NAVSTAR Global Positioning System' of the United States Ministry of Defence, the aim of which is to create a worldwide network of satellites for air transport, will almost certainly be operational sooner than originally expected[2].

59. It is clear from the above that the development of air traffic control systems using satellites is more than just a castle in Spain; this system deserves as much attention and consideration as other air traffic control systems. In other words, in the further development of this technology the same criteria must be applied, European interests should be protected and international cooperation is highly desirable.

B. Procedural and organizational measures

60. Progress in matters of procedure and organization is often much more difficult to achieve than technological progress. This is certainly true for air traffic control. Air traffic control has become an extremely complicated field in which use is made of impressively complex apparatus and in which a very large number of people are employed. Moreover, the organizational context greatly increases the complexity of the problems with which air traffic controllers are confronted.

61. One of the main problems is unquestionably related to the artificial compartmentalization of the airspace and of authority over it. Present difficulties in this area can be better understood if the following facts are borne in mind[3]:

---

[1] Giovanni B. STRACCA, 'Prevedibili sviluppi dell'assistenza alla navigazione aerea', in 'L'Aerotecnica Missile e Spazio', No. 1-2/1976, p. 113

[2] Barry MILLER, 'Defense Navstar Program Progressing' in 'Aviation Work and Space Technology', January 1976, p. 45

[3] This passage is taken from a note on air traffic control drawn up a few years ago by the Directorate-General for Research and Documentation, PE 41.621, p. 3, paragraph 6

- The airspace as a whole is usually divided into 'upper' and 'lower' airspace, the boundary between the two being 20,000 feet or 25,000 feet depending on the Member State.[1]

- All flights in the upper and lower airspace that are part of General Air Traffic (GAT) are controlled by the civil authorities. GAT comprises all flights, including military, that conform to ICAO rules.

- A high proportion of air traffic (varying according to the Member State) ranks as GAT and is controlled by the civil authorities in both the upper and lower airspace; certain military aircraft, however, such as interceptors in the climb phase, do not come under civil control.

- Operational Air Traffic (OAT) i.e. military training flights and military traffic on and in the immediate vicinity of military airfields, is controlled by military ATC units which make an organizational, but not an official distinction between upper and lower airspace.

- Unfortunately, a large number of military areas proper exists, including terminal approach areas around airfields and a number of well-defined training areas.

62. In the preceding paragraph the key issue of the demarcation of responsibilities between the military and civil air traffic authorities was raised. The question will now be treated in greater detail in this section. Certain other aspects also come within the scope of this chapter and your rapporteur feels that they also belong under organization and procedure and, if tackled effectively, are bound to substantially improve safety in the airspace.

1. The demarcation between military and civil powers

63. With the exception of Italy, where control over military and civil air traffic is the responsibility of the military authorities, and Norway where it is the responsibility of the civil authorities, the air traffic control powers of military and civil authorities in the Member States of the Community are separate. Of course, various forms of coordination exist between the military and civil authorities but this varies considerably in scope and practical efficiency in the various countries.

[1] The division level between upper and lower airspace is not even uniform throughout the areas of responsibilities of the Eurocontrol Member States, which adversely influences pilot communications and ATC workload.

Given the extreme density of air traffic in Western Europe and the clear-cut boundaries determining the jurisdiction of the various countries in the relatively small West European airspace it is clear that this separation of control responsibilities represents a permanent danger. Although there have hitherto been relatively few actual collisions between military and civil aircraft - which is itself something of a miracle - there have been an alarming number of near-misses[1]. On 12 November 1975 Mr Seefeld pointed out during a debate in the European Parliament that in the first nine months of 1975 above 300 near-misses had been recorded in the Federal Republic of Germany!

Clearly, such a situation is unacceptable from the point of view of air traffic safety. In a letter to Mr Osborn IFALPA (International Federation of Airline Pilots Associations) described the situation as extremely disturbing and stressed that the problem of air traffic safety will not have been satisfactorily solved until this situation improves. At IATA's annual meeting in November 1977 in Madrid the technical committee decided that special attention should be paid to this matter.

64. The distribution of air traffic control responsibilities between military and civil authorities also raises problems in the area of the capacity and the control of flight movements. Certain sectors of the airspace are temporarily or permanently reserved for military flights. This means that in particularly busy periods, for example during the tourist season when the saturation point is reached, considerable delays occur or flights are cancelled (with inevitable financial consequences) because civil aircraft are refused access to certain sectors of the airspace even if these sectors are only occasionally used by the military authorities. Moreover, the existence of reserved air corridors or zones for military purposes restricts the ability to plan the most optimum civil route structure. Furthermore changes in military requirements introduced at short notice and conduct of military exercises, have unforeseeable effects on the civil air route pattern and may prevent the adoption to the fullest extent of a fully automated civil ATC system[2].

---

[1] 162 people lost their lives on 31 July 1971 following a collision between a Japan Air Lines Boeing and a military jet-fighter.

[2] See in this connection the 'Preliminary Study of Long-Term Air Traffic Systems in Europe' by the British Department of Industry (London, August 1977, Vol. 1, pp. 3 and 94)

65. This problematic aspect of the organization of air traffic control has already been the subject of a number of studies which have practically all come to the same conclusion, namely that in the interests of optimal safety, the air space should not be divided between civil aviation and military aviation, but control thereof should be exercised jointly. The coordination of military and civil control over the airspace should also fulfil the highest safety requirements so that ultimately the integration of the military and civil aviation services should lead to the best possible safeguards. In this context reference might be made to the original and effective system proposed when the air traffic control centre was set up in Karlsruhe; this consisted of housing civil and military air traffic controllers in the same building thus making possible uniform air traffic control.

66. The Committee on Regional Policy, Regional Planning and Transport consequently considers that it is of vital importance that a satisfactory solution should be found for this difficult problem in the foreseeable future. This solution must take account of military requirements and also the requirements of smoothly and safely operating air traffic. In paragraph 13 of the motion for a resolution an appeal for action along these lines is made to the highest authorities in the countries concerned.

2. Air traffic control and strategic planning

67. The matter of air traffic control systems and strategic planning is dealt with exhaustively in Mr Osborn's opinion (see points 28 to 36) and your rapporteur can therefore confine himself to a number of general comments aimed at giving an overall picture of the background against which the problem must be set.

At the present time one of the major problems in Europe arises from the large increase in air traffic which has been experienced during the last few years, and which has had the effect of overloading the air traffic control systems. This has resulted during peak summer months in extensive delays, and in some cases, cancellation of flights with resultant economic penalties for airlines, deterioration in the service offered to the public and potential effects on safety[1].

[1] The cost to aircraft operators, of an average delay of only 4 minutes, at an airport handling 1,000 movements a day, was in 1975 of the order of £20,000 ($46,000) per day.
See ICAA (International Civil Airports Association), 15th annual congress, WP 15 by Mr B. Adderley, Brussels 1975

The limitations in ATC capacity arise partly from the fact that the present systems have been designed to handle lower numbers of aircraft, and partly from industrial action (partial or complete strike) taken by controllers as a result of dissatisfaction with existing conditions of employment. The latter cause is discussed elsewhere in this report.

Concerning the first of these causes, it is necessary to secure an expansion in the available ATC capacity by restructuring of the ATC organization and/or introduction of improved facilities to assist the controller to handle more traffic. Such facilities may include the increased use of automation, including automatic conflict detection and resolution, the increased use of secondary radar, and the possible introduction of air/ground data links such as Adsel or Dabs. These measures can be supplemented by the short-term tactical or long-term strategic planning of the flow of air traffic through the introduction of flow control measures and the setting up of traffic management units.

68. In conclusion, the activities of the European Air Navigation Planning Group (EANPG) of ICAO must be given the strongest possible encouragement in this area, and it is of vital importance that Europe, like the United States, should have a single central planning service in the relatively near future. It therefore seems essential that the necessary studies should be undertaken straightaway and that those studies already available should be used by the national competent bodies.

3. Language and phraseology used in radiotelephony

69. To ensure the correct interpretation by pilots of instructions transmitted by air traffic controllers, it is essential that the speech which is used to convey such instructions is clear and unambiguous. ICAO have developed over the years a number of phrases for use by pilots and controllers which are now in common use and which avoid the possibility of misunderstanding. Unfortunately, however, this phraseology is not always fully used in practice, and moreover has become to some extent inadequate through developments in operational practices.

One other aspect considered by ICAO has been the question of which language should be used between pilot and controller. The present ICAO recommendations permit the use of both English and the national language of the location concerned. There is, however, now a body of opinions that only one language should be used for communication with aircraft operating in controlled airspace.

To guard against misunderstanding of control instructions which may have contributed to such accidents as the recent one on the ground at Tenerife and the mid-air collision near Zagreb[1], it is necessary that there should be further study of the twin problems of language and phraseology used in Air Traffic Control Communications.

IATA has initiated a general review of ICAO voice communications procedures and R/T phraseology, and also intends to seek early remedial measures in ICAO.

4. The forwarding and centralizing of data on air transport incidents

70. For several years now data have been collected in a number of countries, albeit on a purely national basis, concerning situations in which air crashes were narrowly avoided. Since 1967 IATA has been collecting similar data on near-misses in Europe. This system admits only information concerning near-misses involving aircraft of airline companies belonging to IATA, to the extent that airlines are reporting them, and consequently excludes data concerning near-misses between, for instance, a military aircraft and a private plane or between a military plane and an airliner of a company which is not a member of IATA.

---

1 cf. Notice to Members on the Zagreb mid-air collision (PE 50.262)

71. The available data show that incidents can be divided into three main groups:

(1) cases involving only airline aircraft, usually due either to overloading of the control system or to manoeuvring errors;

(2) cases involving airline aircraft and military aircraft. These are caused either by a lack of coordination between civil and military staff and/or by flights by controlled civil aircraft and uncontrolled military aircraft;

(3) cases involving airline aircraft and light aircraft. They usually happen at low altitudes near airports and are often the results of rule-breaking by the light aircraft or sometimes by incorrect manoeuvres.

72. The present incident-reporting system is, as pointed out above, inadequate. Mr Osborn rightly points out in his opinion (point 43) that many carriers are reluctant to provide information regarding incidents to IATA's Safety Information Exchange out of fear of possible legal sanctions and heavy claims for compensation.

The systematic collection and analysis of data on the causes and circumstances of air crashes, collisions or near-misses between aircraft should nevertheless be treated as a matter of priority since precise information concerning technical defects, human error and failure of control apparatus and the dissemination of such information could help to avoid the recurrence of similar accidents. Ways must therefore be sought at international level of ensuring that the forwarding of information to an international centre set up for that purpose becomes obligatory.

5. The training, qualifications and working conditions of air traffic controllers

73. This report has so far dealt with various aspects of the problem of air traffic control, such as the tremendous increase in air traffic, high speeds, frequent congestion, the utilization of extremely sophisticated apparatus, the division of powers and so on, which give an idea of the heavy demands which the organization of rapid, orderly and safe air transport poses today for all those involved in air traffic control. It is therefore not surprising that human error is unfortunately often the cause of air accidents. Moreover, the complexity of air traffic

situations is often such that the air traffic controller is no longer able to keep within specific safety limits in doing his job and restrictions on capacity are becoming unavoidable.

Technological innovations in the last 15 years have had a considerable impact on the jobs of pilot and air traffic controller. Increasing automation, the generalized use of computers, the use of Secondary Surveillance Radar and modern approach and landing systems - to name but a few - have in fact had a two-fold effect on the role of the air traffic controller: on the one hand they have lightened his actual workload and enabled him to concentrate on his main tasks, but on the other they have introduced the disadvantages of monotony and routine. Another consequence of this development is that the pilot is becoming increasingly more dependent on the air traffic control services.

74. Given the situation it is important, in the interests of optimum safety, for the utmost attention to be paid to problems of vocational training and general working conditions.

75. In Western Europe the training and qualifications of pilots and air traffic controllers are, on the whole, of a high standard. However, this is not the case in certain peripheral regions in which there is a lack of fully qualified air traffic control personnel. In these areas therefore efforts must be made to bring training up to a comparable level. However, even in control centres in which highly specialized staff operate further training is necessary in order to ensure that they keep abreast of technological developments. For both purposes the Eurocontrol training institute in Luxembourg, with its reputation for excellent quality, can play a useful role. In this connection it must be borne in mind that the training period, especially for controllers operating radar equipment, is fairly long.

76. The general working conditions of air traffic controllers are a more complex and more delicate issue. In recent years there have been strikes and unrest in various Member States of the Community (e.g. France and the United Kingdom)[1] and this clearly shows that there is a certain amount of discontent in this respect. In addition to the problem of ensuring that remuneration is consistent with the heavy responsibilities of air traffic controllers, the main problems in connection with their conditions of employment are that their professional status receives inadequate recognition and that they lack adequate promotion prospects. There is therefore a need to take measures, after due research and consideration, to upgrade their profession. It also seems necessary to

[1] Unrest and strikes also occurred in Austria, Belgium, Germany, Greece, Italy, the Netherlands and Spain.

determine what measures should be taken to ease the tasks of air traffic controllers. The problem of remuneration is particularly acute in certain developing countries in which air traffic controllers, after completing lengthy and costly training, leave their jobs on account of low wages and seek work in the private sector. This problem can only be solved by providing high wages and good promotion prospects.

---

77. Technological development raises the extremely delicate problems of final responsibility for the aircraft. The introduction of certain flying and landing techniques is encountering psychological resistance. In a letter to Mr Osborn the International Pilots Federation (IFALPA) pointed out that in the last resort the pilot must be allowed to retain control over his aircraft. Clearly, this delicate psychological problem must not be overlooked when research and development programmes are being drawn up. A recent report by British Airways says in this connection that: 'The coming decades will see an increase in "engineering out" of the routine tasks which controllers have always performed, but any attempt to introduce systems without human "fall-back" capability undoubtedly will need to be of convincing reliability to be acceptable'[1].

78. Finally, the problem of responsibility of air traffic controllers and the legal implications thereof is illustrated by the following incident. After the mid-air collision over Zagreb an air traffic controller, Gradimir Tasic, was arrested by the Yugoslavian authorities. IFALPA lodged a formal protest against this action. In a press communiqué IFALPA pointed out that although pilots and traffic controllers may be guilty of oversights or errors of judgment they should not be prosecuted since in such cases no criminal intent is involved[2]. IFALPA therefore appealed to the governments to apply the relevant legislation in such cases. This is another matter which merits further attention at international level.

---

1 British Airways, 'Towards 2000 - Air Traffic Control' (para 5.8)

2 IFALPA press communiqué, 13 June 1977

C. Meteorological factors and flight safety

79. Mention has been made above of meteorological factors which may cause problems for flight safety, but further study in this field is necessary to assess whether the situation in Europe can be improved.

In general it appears that dangers to flights from meteorological factors have always been somewhat minimized even when two or three decades ago, aircraft characteristics and their consequent inability to fly at their present very high altitudes made them more vulnerable to major meteorological disruption.

There is no doubt that at present the improved characteristics both of aircraft and of the aid provided from the ground to aircraft in flight have in general made flying more immune to meteorological dangers.

However there are still some meteorological factors which, during flights can cause critical situations and for which existing safety margins could be improved. These include wind shear, fog and violent storms.

1. Wind shear

80. Wind shear consists of discontinuity in the horizontal component of the wind; this term is moreover applied more extensively to other less typical cases, such as variations in the vertical component of the wind or sudden variations in temperature. This phenomenon is of greatest danger to an aircraft in the final stages of its approach when it has already been stabilized for some time in the last part of its descent, a short distance from the ground and at low speed, not much above the minimum safety limit.

This danger was less apparent before the entry into service of jet aircraft of large dimensions, large basic weight and high speed. Several serious accidents to aircraft on airline service in recent years during the final approach stages and with precision instrument procedures have been attributed to wind shear conditions. There have been for example the Iberia DC 10 disaster at Boston Airport on 19 December 1973, the Eastern B 727 at Kennedy Airport New York on 24 June 1975 and another B 727 at Denver Airport on 7 August 1975.

There are increasingly numerous reports from captains on dangerous situations where they have encountered similar conditions, while managing to bring the aircraft under control without serious consequences. Analysing these situations it becomes clear that they are marked by a sudden variation - in a restricted space - in wind direction and / or wind speed in the lower atmosphere.

Dangerous, although somewhat less serious situations can arise with aircraft climbing immediately after takeoff. In general these cases depend more on sudden sharp increases in temperature, leading to a loss of power in the jets, which are adjusted for temperatures decreasing with height.

- Causes of this phenomenon

81. Sharp discontinuity in air currents at low levels can be caused by local factors, and at medium and large scale atmospheric levels. More specifically by:

(a) temperature inversion of local origin, through re-radiation of heat from the ground (sharp rise in temperature); but normally there is little or no wind shear proper;

(b) local cold fronts, associated with storm systems (these are tongues of cold air originating in downdrafts caused by precipitation, which on the front of the system slip under the hot humid air which is flowing towards the area of the main updrafts); these can be extremely intense and give rise to very strong shear;

(c) wide, broken fronts (especially where active warm fronts are moving forwards). These cases too, are associated with wind shear and strong temperature inversion but are usually less intense than in the preceding case.

The conditions described in case (a) can be dangerous at take-off while points (b) and (c), particularly (b), are dangerous on landing. In the latter case wind gradients can reach very high values (for example 30 to 40 knots per 100 m altitude) and are concentrated horizontally in restricted areas (10-20 km) which are difficult to identify and whose progress is difficult to follow.

- Current forecasting ability

82. The above phenomena cannot - at least for the time being - be artificially modified by man, and therefore technical efforts are directed primarily towards discovering and localizing them in time.

In this connection the ICAO (International Civil Aviation Organization) has begun a project in which the United States Federal Aviation Administration (FAA) is in the forefront.

This programme, carried out in collaboration with various other USA bodies but particularly with the National Oceanic and Atmospheric Administration (NOAA) has been running for six years and has the following aims:

(a) to define the characteristics of wind shear;
(b) to define its consequences on various types of flight and types of aircraft;
(c) to develop ground-based measuring devices;
(d) to develop on-board measuring devices;
(e) automated data collection;
(f) incorporation of wind shear data in the general airspace information network.

The FAA is at present concentrating on ground-based wind shear detection devices, which at the present stage of research appear more promising, although the pilots' associations would prefer devices installed in the aircraft.

- Ground detection devices

(a) Doppler acoustic radar

83. In the area where the descent path falls to less than 400-500 feet above runway level, is set up a pulsed acoustic transmitter, which sends a beam through a narrow sub-vertical band. A receiver placed nearby receives the impulses reflected from any irregularity in the atmospheric layer up to 800-1000 feet and measures wind speed in 100 feet sections, using the Doppler principle.

To give a complete picture, therefore, several of these must be placed along the same descent path and this becomes problematic in large airports with several instrumentalized runways. Systems of this kind are being tested at Kennedy Airport in New York and Logan Airport in Boston.

(b) Barometric system

84. This is cheap and simple but not very accurate, and provides more an average value than a specific localized reading. It is very useful as an auxiliary element to the complex equipment of other more precise systems but more limited as regards the scope of the measurements.

(c) Laser systems

85. These can be either the continuous wave (CW) type or the pulsed type. CW systems have comparable features to acoustic systems and unlike the latter, which break down under heavy precipitation, are almost completely independent of meteorological conditions, except ground fog (but in these conditions air traffic is disrupted anyway).

The cost is similar to that of acoustic radar.

(d) Microwave radar systems

86. These have the advantage of exploring a volume of atmosphere, rather than a linear trajectory with all the atmospheric conditions, although they are less sensitive than acoustic and laser systems.

Conclusions

87. From this brief analysis it is clear that there is no ideal solution for detecting the presence of wind shear. Probably the best - although the most expensive - would be the combination of several systems, to eliminate the disadvantages and incorporate the positive features of the various systems.

Once these systems are installed in airports they can also be used to reveal the presence of vortices produced by the wing tips and the bodies of the large aircraft currently in airline service. These vortices, which persist for a long time, can be extremely dangerous to small aircraft and constituts a problem to all others.

2. Fog

88. Horizontal and vertical visibility beyond certain limits is still a vital condition if landing and takeoffs are to be carried out with the necessary degree of safety, at least for public transport flights.

There are already exceptions to this rule for certain specific kinds of aircraft work, for example mail transportation services in France, where crews are trained to land with zero/zero visibility and have been effectively carrying out such landings for some time.

The main obstacle as regards visibility in the lower areas of the atmosphere is fog. This can be of various kinds, with quite different origins and characteristics. As regards origins there is a distinction between fogs caused by temperature inversion and dynamic advection; these two sources produce two different kinds of droplets which constitute fog.

As regards temperature, there is a distinction between below-freezing or warm fogs, depending on whether the temperature of the air in which they form and persist is below or above freezing poirt. All these differences are of great importance for dealing with fogs.

In general temperature inversion fogs are more frequent in the cold season, with the presence of atmospheric high pressure and the formation - especially at night - of a layer of still air which cools down in contact with the ground, which in turn loses energy through radiation into the atmosphere in the absence of cloud systems of sufficient thickness to provide an insulating effect.

Once the inversion layer has stabilized, all the humidity is contained and, in given hygrometric conditions, condensation forms a persistent fog with almost no vertical movement. The stability of the suspended droplets in the almost completely still air is attributed to the reciprocal colloidal actiom between the droplets themselves, the impurities in the atmosphere (Aitken nuclei) and the air molecules. The molecules are in a state of supersaturation (or, if the temperature is below zero, are super-cooled).

Advection fogs are caused on the other hand when a mass of humid air, through the movement of the atmosphere, passes over land or water whose temperature is lower than the air itself. This is usually a more fluid situation, and the circulation of the air means that the density and persistence of fog are usually lower than for stable inversion fogs.

A particular type of reduction of visibility can also be caused when the condensation level independently of any inversion or advection phenomena, is below ground level. In this case everything on or above ground is immersed in cloud proper. This case, which occurs rarely at altitudes close to sea level, can become frequent at airports situated at high altitudes in regions where turbulent and humid air is common.

The density of this obstacle to visibility is usually lower than that of fog proper but can still in practice hinder circulation in the air space around the airport.

- Minimum safety levels

89. Aircraft are permitted to land on a given runway when the meteorological conditions are equal to or better than specified minima. These vary according to the equipment available in the aircraft and on the ground. Lowest landing minima are achieved when conducting precision approaches using ILS, in which case the determining meteorological factor is the visibility (Runway Visual Range). Whilst it is technically feasible to land in zero visibility conditions, this is not practiced at present in commercial operations.

The landing minima currently applied for precision approaches are generally of the order of 600-400 meters runway visual range.

It is clear that technical progress in equipment and radio aid systems would in future allow these minimum safety limits to be progressively reduced.

In some cases the relevant minima are established by the State concerned. In other cases it is left to the operator to establish such minima, working within the critical values established by ICAO.

- Dispersal systems

90. The main technological and experimentation effort is directed towards temperature inversion (radiation) fogs, since they are the most frequent and persistent and because the conditions in which they occur make it possible to concentrate dispersal methods in time and in space. This would be particularly difficult in the case of advection fogs and clouds proper forming at ground level.

The following therefore applies principally to protection against heat inversion fogs which most concern European airports. The methods which have been given greater study are:

(a) brute force systems

91. These procedures aim to remove the temperature inversion situation which produces the fog by burning huge quantities of fuel oil or petrol while at the same time operating a series of blowers.

In the USA a programme of this kind was set up in 1926 and during the last war the take-offs and landings of bombers in fog were facilitated by this method.

Currently, Paris airports have operational systems based on the use of aircraft jet engines installed along the runway. The cost of fog dispersal has been calculated for a plan which will shortly enter into operation at Los Angeles airport. The cost to the airlines of closing the airport is approximately 200,000 dollars an hour and, what is of more concern to this report, by adopting systems of this kind the risks due to fog can be reduced. It is estimated that deaths due to fog total approximately 100 a year in the USA alone.

(b) microphysical systems

92. In the case of warm fogs, various research activities and practical experiments have been under way for some time to identify effective and less cumbersome and expensive methods than the brute force system.

These systems are based on the practical use of the properties of atmospheric aerosols on a micro scale. They are methods based on the use of chemical agents, which serve as condensation nuclei, others based on the use of electric fields to break down the colloidal state in which the fog droplets exist, and others still on the use of ultrasound to force the droplets themselves to coalesce.

Unfortunately none of these methods has yet been put into operation and such a step appears more than ever necessary to evaluate the real potential of alternatives to the brute force method, especially in view of the high consumption of petroleum products of this method.

As regards supercooled fogs (completely or partly below zero) progress in technology in providing artificial ice-forming nuclei for use in other sectors (stimulation of precipitation, hail protection methods) mean that highly efficient technical equipment is available; the problem still to be completely resolved is that of how to distribute the active agent most commonly used in this method, silver iodide.

- Conclusions

93. It is clear first and foremost that fog is one of the most important factors causing interruption or inconvenience to regular air communications and to flight safety, and that at present the only system tested at practical level with satisfactory results in combating temperature inversion fogs is the brute force method which causes the droplet to evaporate and breaks up the inversion strata by heating and remixing the atmospheric strata concerned.

It would appear desirable therefore to take steps to bring out of the laboratory into full scale experimentation those more promising alternative systems under study for some time, such as aerosol dispersion with condensation nuclei for warm clouds and the controlled diffusion of silver iodide for cold fogs.

3. Storm systems

The physical phenomenon

94. The formation of a storm can be induced by a limited number of concurrent factors, the result of which is to lead to atmospheric instability, in which large volumes of humid air are raised from the lower strata of the atmosphere up to the edges of the stratosphere, and corresponding volumes of high-altitude air are projected into the lower atmosphere. The whole process liberates large quantities of dynamic energy leading to high vertical wind speeds, violent and extensive turbulence, and the formation of enormous amounts of liquid and solid precipitation.

The energy in play is provided first of all by heat from the sun, then by the change of state of the water in the atmosphere and - in the case of the more violent and redoubtable multi-cell or super-cell systems - in addition by the dynamic combination of a system with the rapid and persistent substratospheric currents (jets). This energy, relative to the active life of the system, can sometimes equal and indeed exceed that of the explosion of a nuclear fusion bomb. The quantity of air drawn in by a simple storm system can easily reach several thousand million cubic metres a second. The cooling down of this mass of humid air, with a high average humidity content, from the temperature of the lower layers to stratospheric temperatures involves a liberation of energy equivalent to thousands of millions of kWh in the course of the active life of the storm system.

Much of this energy is transformed into kinetic energy by the air currents, and to a lesser extent into electrostatic potential and - subsequently - into heat through electrical discharges.

It is easy to see, therefore, that a storm system consists primarily of a vast area of space characterized by intense turbulence, strong electrostatic fields, intense precipitation and large volumes of condensed and supercooled humidity, moving rapidly upwards.

Effects on flights

95 . The last paragraph of the preceding section summarizes all the factors which are decisively hostile to the flight of aircraft and capable of reducing by varying degrees the necessary safety levels.

(a) Turbulence

96. This consists of rapid variations in direction and speed of air movements which, together with the inertia of the mass of the aircraft, can in themselves constitute a danger to the aircraft structure, as well as to the correct functioning of the control equipment needed to ensure stability in flight. Secondly, turbulence can affect the attitude in flight of the aircraft and in particular - if it is intense and prolonged - can cause pilot disorientation, leading him to take erroneous corrective measures, which in turn can place dangerous stresses on the aircraft structure. Inquests into a number of accidents where aircraft structures have failed have demonstrated that this latter effect is more probably, frequent and dangerous than the direct action of turbulence, which can rarely reach sufficient intensity to make it likely that the structure of the aircraft will give way.

(b) Electrostatic fields and discharges

97. The intense electrostatic fields which an aircraft entering a storm system encounters disturb or block regular radio communication and can also interfere with some of the automatic direction finder radio navigation aids; these drawbacks are not usually a cause for great concern unless the aircraft is executing urgent air traffic manoeuvres controlled from the ground areas. Atmospheric discharges rarely strike an aircraft in flight but even if this happens the consequences are not usually serious if the connections and electric protection of the structure are carried out according to the standards in force. On the other hand the complexity of the increasingly sophisticated electronic equipment can cause problems in modern aircraft, since it uses semiconductor devices which for the most part are sensitive to sudden sharp increases in charge, such as occur in the electrical system on board when lightning strikes the aircraft directly in flight or is discharged nearby. From this point of view it is true that large passenger aircraft are now more sensitive to the effects of admospheric discharges than they were in the past.

(c) Intense precipitation

98. Generally speaking the crossing of areas of intense liquid precipitation has no particular effects; however this is not the case when precipitation consists of hailstones of some size. These can easily cause serious damage to external structures; particularly

exposed to damage are the leading edges of load-bearing and control surfaces, with important results for their aerodynamic properties of support and control; often the extreme front cone of the fuselage is damaged, (the radar antenna is usually placed here). In some cases the glass of the cockpit is broken causing disorientation and difficulties for piloting and a sudden depressurization of aircraft flying at high altitudes.

(d) Supercooled clouds - formation of ice on aircraft structure

99. The strong updrafts present when storm clouds are forming (vertical wind speeds can reach 35 to 40 m/sec) are capable of supporting areas with high liquid water content - in the form of superfused drops - at very high altitudes. Some researchers (especially in the Soviet Union) have put forward the view that, because of the complex circulation, dynamics accumulation zones form where through the dispersion of the updraft up to 60 to 80 g/m^3 of liquid content can be found. Near the upper limits these areas are highly superfused, so that an aircraft in flight among such atmospheric masses is subject to the formation of sheet ice which can rapidly become thick enough to present dangers to the aerodynamics of the load-bearing and control surfaces, and to the propellers, and increase the total weight beyond acceptable limits. On the other hand, in typical storms with pronounced vertical development, the time taken to enter and cross them is generally limited for conventional aircraft, and so the total amount of ice which can form rarely reaches dangerous levels. It is also clear that these phenomena cannot arise if the air temperature at flight level is above zero.

Ways and means of reducing risk

100. This section summarizes briefly the methods and procedures which can be introduced to eliminate or reduce risks connected with flights through areas subject to storms.

a) Turbulence

101. As regards dangers to the aircraft's structure, the effects of turbulence can be reduced by slowing down and taking care not to resist rigidly or violently the variations in altitude of the aircraft; by completely or partially avoiding use of the automatic pilot, but at the same time taking care to maintain the aircraft on an even keel at a controlled speed. Absolute care should be taken

not to allow the aircraft to depart from normal manoeuvring attitudes, since - as has been seen - attempts to recover aircraft from altitudes induced by turbulence are the main cause of structural failure or collapse with the disastrous consequences which have been noted in accidents due to storm turbulence (this applies particularly to small aircraft).

(b) Atmospheric discharges

102. Protection in this case is preventive, based essentially on correct design and careful construction and maintenance of the earth connections of all metallic parts, and the screening of non-metallic parts. Particular care should be taken in the protection of caps and coverings of fuel tanks. There are, however, precise technical standards in this matter. During flight it is advisable as far as possible to avoid areas of high precipitation, since atmospheric discharges are usually more frequent there. It is prudent - when crossing areas with high electrostatic discharge - to leave connected only the essential communication and radio navigation equipment, to protect at least in part the equipment as a whole and prevent a complete breakdown in case of a direct discharge on the aircraft.

(c) Hail

103. The only possible protection is to cut speed to reduce the kinetic energy of the impacts, apart obviously from any manoeuvres which appear useful to escape from the hailstorm as quickly as possible.

(d) Formation of ice

104. All modern aircraft approved for instrumental flight must be equipped with de-icing devices. Besides ensuring that these devices are switched on in time, a compromise has to be found between the need to limit speed to reduce the relative effects of superfused water on the aircraft and the need to offer the lowest possible profile, by avoiding as much as possible a tail- down attitude.

(e) Radar assistance

105. We have listed the drawbacks and dangers of storm systems for flight safety and examined ways of eliminating or at least reducing their effects, granted that aircraft have sometimes to face up to such situations. However, it is clear that the best method of preventing the above dangers is, when possible, to avoid stormy areas or at least the air space where the most intense and concentrated storms form.

This is possible for an aircraft in flight within available airspace if it possesses precise and up-to-date information on storms actually occurring and forecasts of those which will develop during the course of the flight. Conventional meteorological observation and forecasting methods make it possible to some extent to ascertain and forecast the formation of storm clouds (and would do so to an even greater extent if more use were made of techniques for detecting and localizing atmospheric discharges with electromagnetic wave receives and triangulation).

106. But it is above all the arrival of meteorological radar, operating on a lower wavelength than normal radar, which has made it possible to achieve a reliability and precision which bear no comparison with the past.

Ordinary radar used for air traffic control is not suitable for observing meteorological phenomena (and indeed is designed specifically to reduce interference to a minimum when localizing aircraft position). Fixed ground radar systems therefore usually use radar in band S (10 cm), C (5 cm) and X (3 cm); whereas on board aircraft, radar in band X is used almost exclusively for reasons of size and weight, as the other kinds are not compatible with aircraft requirements.

Great importance should be attached to observations from fixed radar stations whose power, sensitivity and precision permit an accurate and significant examination of echoes from precipitation (it should be borne in mind that radar in the wavelengths indicated does not show cloud masses but only areas where precipitation is occurring; and that there is no direct relation between the intensity of the echo and the intensity of precipitation (On this subject studies are still in an experimental and tentative stage).

On-board radar equipment is unlike that on fixed stations and moreover, since it is fixed on a platform (the aircraft) which is moving in space through three basic axes, the information must always be interpreted and correlated with the true position of the aircraft.

Nevertheless, in the case of precipitation within a storm system both types can provide valuable information to aircraft in flight to allow them to ensure that the route avoids direct and unexpected contact with these systems. Particularly if it is equipped with iso-echo devices (which measures areas of reflection at several levels) radar observation can allow the aircraft's route to be kept under constant observation so as to avoid or limit to a minimum passage through turbulent areas and thus eliminate or reduce the probability of encountering the dangerous situations described.

Theoretical study and practical experience have allowed a large volume of case data to be amassed and a significant correlation between the nature of the echoes and the phenomena associated with storm areas to be established.

107 In conclusion, the danger represented by violent storms is greatly reduced by the rational use of radar. Since observations from fixed stations are much more precise and detailed than those supplied by on-board radar it would be desirable for the work of coordinating observations from meteorological radar and air traffic control to be **further developed as much as possible so that pilots can be supplied, whenever necessary, with relevant** information on storm areas and their probable development, independently of the readings - which are nevertheless extremely useful - obtained by on-board radar.

In terminal areas, controllers are increasingly using the radar display to direct aircraft to fly on specific tracks so as to achieve maximum utilisation of airspace. This process is known as radar vectoring. Unfortunately there is a risk that controllers can inadvertently direct aircraft through hazardous weather conditions, especially through severe thunderstorms, which can cause extensive damage to aircraft and affect safety. This problem can be solved by providing the air traffic controller with information on the location of these hazardous weather areas, and one method is to use a picture derived from meteorological radars. There are, however, a number of problems associated with this question and further work is required.

IV. INTERNATIONAL COOPERATION AND COMMUNITY ACTION

108. An effective policy to improve air traffic safety cannot, of course, be confined to a few incidental and isolated measures, however desirable these may seem in themselves. It is of the utmost importance that the measures to be taken should be based on an overall policy and this is only possible within an international framework.

In Chapter 2 a brief summary was given of the main activities and initiatives which have taken place in this area within certain international organizations. This subject receives further consideration in this chapter.

109. Your rapporteur feels that the existence and activity of international air traffic organizations does not constitute an alibi for not investigating what measures can be taken at Community level to achieve improved safety in European air transport. However, the general rule also applies here that unnecessary duplication must be avoided as far as possible. This chapter therefore contains certain practical suggestions concerning action which might be pursued by the Council, the Commission and the European Parliament.

A. International cooperation

110. Air transport is *par excellence* a matter of international concern which cannot be treated satisfactorily at purely national level. The history of civil aviation shows that this is not just a pious hope since when the first national airline companies were set up in 1919 the first international air traffic organization - the International Air Traffic Association - was also established, its purpose being to draw up international rules for civil aviation. Although immediately after the Second World War, ICAO and other international organizations were set up, it must be remembered that they can only make recommendations or take decisions which are binding on their members alone. Thus international cooperation exists still on a merely voluntary basis.

To sum up, while there is increasing cooperation in air transport the situation with regard to air traffic control is rather different. Indeed, in some countries there has been something of a revival in recent years of the concept of national sovereignty over airspace, mainly for defence reasons. The developments within Eurocontrol are characteristic of this trend.

111. Before examining the practical areas in which international cooperation must be promoted, it might be useful to consider the foreseeable development of air transport in the coming decades. Mention was made in Chapter 2 of the spectacular expansion of air traffic between 1945 and 1975. Although, as a consequence of the energy crisis and the general economic situation, this expansion has slowed down somewhat since 1974, it can be assumed that the volume of international and inter-regional air transport will pick up again. Making predictions is always a hazardous business and consequently the utmost caution is necessary in interpreting the various hypotheses made in this area. According to an IATA prediction the average annual increase in air traffic between 1976 and 1982 will be 7.9%. Expressed in absolute terms this means an increase from 256 thousand million passenger/kilometres in 1976 to about 405 thousand million in 1982.[1] According to an OECD (Organization for Economic Cooperation and Development), the Commission of the European Communities and the ECMT (European Conference of Ministers of Transport) there are expected to be 2.4 times as many passengers travelling on intra-European flights in 1985 than at present and the present figure is expected to be quadrupled by the year 2000. Owing to the use of aircraft with greater capacity, the number of actual flights, however, is expected to be only 2.55 as high[2]. Finally, another study forecasts that the number of flight movements in the United Kingdom, which totalled 780,000 in 1976, will rise to a minimum of 1.4 million and a maximum of 1.97 million by the year 2000[3].

112. A steady increase in the number of supersonic flights (Concorde and Tupolev), must also be expected, plus an increase in shuttle services, freight transport by air and military air traffic. The putting into service of VTOL/STOL (vertical and Short Take-Off and Landing) aircraft may also have a profound impact on the air transport scene in the next few years.

---

1 These figures relate to scheduled airline traffic involving aircraft belonging to airline companies which are members of the IATA.

2 The study referred to here is COST action 33, a survey on passenger transport requirements between major European cities, Final Report on 22 February 1977, Doc. ITP (76) 9 final, p.649

3 'Preliminary Study of Long-term Air Traffic Systems in Europe', United Kingdom Department of Industry, p.30.

In view of the specific characteristics of this sort of aircraft - in fact a combination of the advantages of the helicopter (possibility of take-off and landing in town centres) and of the conventional aeroplane (speed) - VTOL/STOL aircraft may become an important alternative to inter-city rail and road transport. The volume of transport by private aircraft will in all probability also increase.

113. To sum up, although it is difficult to forecast the development of air traffic in precise terms, those responsible for medium and long-term planning in air transport and for taking measures to improve air traffic safety must assume that the density of traffic in the European airspace will increase and the implications of this fact for air traffic control should be taken into consideration.

114. At the present time there are, as pointed out above, a number of international organizations which are active in the field of civil aviation. The desired international cooperation does not therefore necessitate the creation of a new international organization but can be achieved by extending the terms of reference of existing organizations and fostering closer cooperation between them.

115. With reference to the wide-ranging harmonization of standards in respect of air traffic safety and the standardization of air traffic control systems mention should first and foremost be made of the work of the International Civil Aviation Organization. ICAO has drawn up standards (International Standards and Recommended Practices) which are of the utmost importance for efficient, regular and safe air transport. These standards should in principle be applied by all the Member States of ICAO. Unfortunately, however, Article 38 of the Chicago Convention on International Civil Aviation provides that Member States may apply divergent rules provided that these are notified to the Council of ICAO. ICAO draws up complimentary rules, called Regional Supplementary Procedures, which apply to specific areas but this by no means compensates for the regrettable lack of compulsory uniform standards at world level. Consequently it is certainly advisable to consider ways in which the application of rules which diverge from those laid down by ICAO can be prevented.

116. It is obviously necessary that divergent trends in the research and development of new advanced air traffic control technologies are avoided (see points 55 and 56). The need to ensure compatibility between the various air traffic control systems and to eliminate unnecessary duplication in scientific research naturally necessitates a supranational approach.

To this effect it would be logical for ICAO to be approached first since it has the necessary services and also maintains close contact with those directly affected, i.e. the airline companies and the pilots, through representatives of IATA and IFALPA respectively. In some countries, for example the United Kingdom, there is a certain amount of discontent about the fact that air traffic controllers are not allowed to participate sufficiently in drawing up research and development programmes on air traffic safety. Your rapporteur feels that the very least that could be expected is that the people who will ultimately be operating the equipment should be consulted before the go-ahead is given for research into an air traffic control system.

Your rapporteur is aware of the fact that in the initial stages of research a certain amount of duplication is not only inevitable but in fact desirable since this gives rise to a certain amount of healthy competition which subsequently makes it possible for a responsible choice to be made from among various projects. An international body should therefore be informed of the various research activities and have the power at a given moment to assess the technical and economic advantages of a particular project and decide, on the basis of this assessment, to continue or stop the research concerned. Clearly, the usual guarantees must apply in order to protect scientific or industrial secrecy and the composition of the responsible international body must not be such as to give rise to discrimination.

The Committee on Regional Policy, Regional Planning and Transport is convinced that this method would make it possible to promote scientific research without promising projects being stifled in their infancy or mutually incompatible systems being put into operation.

Moreover, cooperation makes it possible to achieve economies of scale which, in view of the enormous financial burden involved in scientific research and development in this sector and the scarce financial resources available, are of obvious importance.

117. In addition to the international harmonization of flight rules and the coordination of research and development programmes, most of the measures to improve air traffic safety analysed in the previous chapter should be adopted in an international context. This is most certainly true as regards the setting up of an <u>incident-reporting centre</u>. This cannot be discussed in detail here but the reader is

referred to points 70 to 72 of this explanatory statement and point 43 of the opinion drawn up by Mr Osborn on behalf of the Committee on Energy and Research. It is interesting in this connection to note a statement by the Commission of the European Communities which, in reply to a written question by Mr Glinne, said that it 'naturally favoured the greatest possible dissemination of information on air crashes which could avoid the same faults recurring' but that 'present machinery seemed adequate to that purpose'[1]. This opinion of the Commission is naturally unacceptable to your rapporteur and is even more unacceptable to air navigation circles. The system used to obtain, centralize, analyse and disseminate data on air traffic incidents should be perfected as soon as possible in an international context.

118. The same applies to the problem of telecommunications in air navigation. Breakdowns and interference occur, and there also seems to be a crying need for synchronization. According to reports, the collision between a KLM Boeing 747 and the Pan Am Boeing 747 at Los Rodeos (Tenerife) airport in March 1977 was mainly due to a communication breakdown[2]. In this connection there is also the problem of language and terminology in telecommunications between pilot and air traffic controller (see point 69 of the explanatory statement). Here too international cooperation is desirable.

119. A final point which should be mentioned in this section on international cooperation relates to the procedure and criteria used for preventing collisions between aircraft in the airspace. In order to avoid collisions there are specific provisions regarding the distance to be maintained between aircraft. Owing to frequent congestion in particular sectors of the airspace and the financial implications thereof (cancellation of flights, delays, fuel wastage etc.) consideration is being given at the present time to the possibility of reducing these minimum distances in order to achieve better use of available airspace. Although the criteria applicable vary from region to region according to the density of traffic and available air traffic control apparatus it seems desirable for the minimum separation standards to be examined and laid down within the framework of ICAO after all those concerned have been consulted.

---

1 OJ No. C 294, 13.12.1976, p.22

2 Flight International of 23 April 1977, p.1093

B. Cooperation in Europe

120. What has been said about international cooperation obviously applies also to Europe, where much more intensive cooperation must be sought urgently in order to come to terms with the geo-political structure (Western Europe is a patchwork of small and medium-sized independent states) and the very high air traffic densities in most of its airspace.

121. European airspace is divided into a series of Flight Information Regions (FIR), each of which is the responsibility of an air traffic control unit. Cooperation between the units is less than satisfactory, however. It would be possible to improve cooperation up to a point by procedural measures alone, but your rapporteur takes the view that ultimately the only way to achieve satisfactory air safety standards is to set up a single air traffic control centre for European airspace as a whole.

122. A particularly serious problem is the demarcation between military and civil air traffic responsibilities already discussed on pages 32 and 33. This is a constant danger in air travel, as the alarming number of near-misses recorded makes clear. The military and civil authorities should therefore give urgent consideration at the highest level in the organizations concerned - NATO, WEU, the European Civil Aviation Conference (ECAC) - to some form of integration of military and civil air traffic control.

123. In any consideration of how to improve cooperation on air-traffic control, the question of the future of Eurocontrol is bound to arise. The difficulties have already been outlined in Chapter II (paragraphs 40 to 43), and your rapporteur would like to raise some further points here.

124. The uncertainty surrounding the fate of Eurocontrol after 1983, when the Convention now in force expires, is basically a political question. In the absence of the political resolve and foresight to see the advantages of transferring national authority to an international body, what has emerged has been a kind of Eurocontrol 'à la carte', with the result that the initial enthusiasm of the users has understandably turned to disappointment, and ultimately to opposition to the idea.

The Convention setting up the European Organization for the Safety of Air Navigation of 13 December 1960 contains two major restrictions: the optional arrangements for giving Eurocontrol responsibility for lower airspace and national responsibility for military flights which do not conform to ICAO standards. This has led in practice to the two-fold distinction between military and civil air traffic on the one hand, and between upper and lower airspace on the other. The fact that the horizontal distinction (based on understandable technical considerations) was intended to replace the vertical distinction (national boundaries) only temporarily would not have mattered had it not been that three years after the Convention came into force, France and the United Kingdom invoked precisely these two distinctions in order to avoid transferring responsibility for air traffic control to Eurocontrol, as laid down by the Convention. The Permanent Commission (comparable to the Council of the European Communities) resolved the situation by adopting the Maroni-Walton report stipulating that these two countries would be responsible for their own air traffic control operations, but would act on behalf of Eurocontrol.

This first serious encroachment on the Eurocontrol Convention was followed by another disruption towards the end of the 60's. This time the problem was the system of charges and financing. It is particularly regrettable that neither of these infringments of the Convention was sanctioned by any parliament. Later still, difficulties arose with Ireland (the Shannon air-traffic control centre was virtually nationalized) and the Netherlands and Germany (see point 42), so that of the seven Member States, only Belgium and Luxembourg have not caused Eurocontrol any major headaches.

125. By 1975, the outlook had become so grim that there were fears for the very survival of Eurocontrol, as a succession of questions, debates and resolutions in the European Parliament clearly shows.

At the meeting of the Permanent Commission of 20 November 1975 in Maastricht (Netherlands) chaired by Mr Westerterp, the Netherlands Minister of Transport, Water Control and Construction, the governments of the Member States reached agreement on the preparation of a new convention for the period after 1983 on a ten point basis[1]. The second paragraph states that 'the Member States believe that the joint financing system of Eurocontrol should be maintained and, where appropriate, further developed', but this must be compared with paragraph 7: 'The Member States agree that the fact that a State is a full member of Eurocontrol does not necessarily mean that the control of all or part of its airspace must be transferred to the organization.' Moreover, paragraph 9 states: 'The transfer to Eurocontrol by the Member States of air traffic control responsibilities will be contingent

[1] Committee on Regional Policy and Transport, Notice to Members (PE 43.031)

on national defence requirements as well as political, operational, technical, economic and social considerations and must be compatible with the general aim of ensuring at all times, with optimum effectiveness and safety, the control of traffic in the airspace of the Member States.'

126. It is true that on this occasion the survival of Eurocontrol was solemnly affirmed as a matter of principle, but the fundamental question of whether the agency would actually be responsible for air traffic control afrer 1983 remained unanswered. Three Member States (France, the United Kingdom and Ireland) specifically adopted the position that a general commitment to transfer responsibility for actual air traffic control operations to one large central organization should be considered as having been overtaken by events[1]. With the Netherlands and Germany now threatening to withdraw from Eurocontrol,there is a very real danger that the operational function of the organization will be irretrievably lost. The fact that it has performed valuable work in other fields and in all probability will continue to do so, is small consolation.

127. Your rapporteur wishes to take this opportunity to express his appreciation of the considerable achievements Eurocontrol already has to its credit. These includethe air traffic control centres in Maastricht and Karlsruhe which were set up to cover operations in the Benelux countries and the Federal Republic of Germany, the Shannon auxiliary radar station, the training institute opened in 1970 in Luxembourg to provide air traffic control operators, technicians, engineers and computer staff with instruction and professional training and the experimental centre in Brétigny (south of Paris) which has been experimenting with new systems and techniques for improving and automating air traffic control since 1963[2].

128. The creation of Eurocontrol was initially welcomed enthusiastically by all air traffic control organizations, but in view of the unfortunate political decisions taken since and the risk of further encroachments on the organization's responsibilities, there has understandably been a decisive change in the attitude of many organizations. For instance IATA, which advocated the creation of a single air traffic control body in 1956, reported twenty years later that, with the exception of the Maastricht control centre, Eurocontrol could not expect to take part in any future activities involving direct responsibility for air traffic control operations[3].

---

[1] Letter of 26 May 1975 from Mr Westerterp to the chairman of the Standing Committee on Transport and Water Control of the Second Chamber of the States General (Doc. No. 13419 of proceedings of the Second Chamber 1974/75).

[2] See the note from the Secretariat, PE 41.621

[3] IATA memorandum on the future of Eurocontrol, 16 January 1975, in Eurocontrol working document CN/45/7, annex 9, page 4. (It should be noted that IATA favours continuing and expanding Eurocontrol's other duties)

Your rapporteur can sympathise with this attitude, since the airlines have to pay route charges for the control services which are continually rising in the current period of inflation and economic crisis and through the application of increasing proportions of costs recovered from the airspace users. They can ill afford the additional costs arising from the present unsatisfactory division of responsibility between Eurocontrol and Member States. Moreover the present situation is resulting in a duplication or overlapping of research activities, the efficient of the overall ATC system is adversely affected, and there arise problems relating to the irrational divison of labour.

129. The Committee on Regional Policy, Regional Planning and Transport therefore considers it essential to end this ambiguous situation quickly, and urges that the duties to be performed by Eurocontrol in future should be precisely stipulated as soon as possible after consultation with all the organizations concerned, in particular user organizations such as IATA, the International Air Carriers Association and the Council of Aircraft Owner and Pilot Associations.

Now that there is a substantial consensus on a number of well defined duties, your committee feels that this action can be taken without insuperable difficulty. These duties concern, in particular:

- intensification of the vocational training programme for air traffic controllers in Luxembourg;
- continuation of research activity in Brétigny;
- coordination of scientific research and air traffic control procedures and standardization of equipment;
- gradual development of a European system of centralized management of air traffic;
- continuation of the central collecting agency for route charges.

In his opinion, Mr Osborn stresses the importance of the experimental and coordinating role to be played by Eurocontrol in the future (paragraph 37) and the responsibilities that could be trusted to Eurocontrol in the coordination of air traffic flow throughout Europe (paragraph 38).

130. The operational function has always been by far the most important one, and here unfortunately there is a complete absence of consensus. It seems moreover that in the future Eurocontrol will be prevented from directly carrying out air traffic control operations or that its powers in this area will be restricted even further. It would therefore be unrealistic to try to go against the tide and advocate the effective exercise of air traffic control by Eurocontrol. Regrettable though this development may be, the time seems to have come to think about possible alternatives.

131. A new role which might be entrusted to Eurocontrol is that of co-ordinating the various national air traffic control centres and services. A coordinated policy, under which Eurocontrol would exercise important responsibility, would offer two advantages: firstly, it would ensure that use is made of the experience and knowledge acquired within Eurocontrol and, secondly, it would prevent an unnecessary proliferation of national air traffic control centres (e.g. on either side of a national frontier) charged with differing functions. In addition, in view of the probable impact on the standardization of air traffic control apparatus and equipment, the active involvement of Eurocontrol in coordination and planning would at the same time benefit the European electronics industry. Finally, such an arrangement would help to avoid mass dismissals of Eurocontrol staff.

132. Your committee therefore urges the governments of the Member States of Eurocontrol to face up to their responsibility to ensure that when the existing Convention expires, the organization will not be restricted to its present range of activities, but the opportunity will be created for it to exercise an important role in coordinating air traffic control operations in Western Europe. There can be no justification for allowing one of the first and most successful institutionalized forms of European integration in a specific field to disintegrate[1]. At the same time, it is essential that closer relations be established between the European Community and the European Organization for the Safety of Air Navigation.

---

[1] See 'Eurocontrol: A Reappraisal of Functional Integration' by J.B. Collester and H. Burnham in Journal of Common Market Studies

C. Community action

133. Since no civil aviation authority in Europe has real decision-making powers, it is important for the European Community to take an interest in the problems of air traffic safety. The European Parliament has repeatedly called for the implementation of a Community air traffic policy as an integral component of Community transport policy. An adequate air traffic policy presupposes Community measures on air safety.

At a debate in the plenary sitting of 12 November 1975 on an oral question on this subject, your rapporteur outlined the goal the Community should seek to achieve in this connection[1]. On take-off and landing and in the immediate vicinity of airports, an aircraft would be under the control of the airport control tower; outside the radius of action of the airport, Europe, unlike the United States, has no central air traffic body which takes over control of the aircraft, because of the vertical division of airspace according to national frontiers. The Community should therefore take the necessary steps to put the situation in Europe on a par with that in the United States.

This section of the report proposes measures that might be taken by each of the Community institutions in the future with a view to improving air traffic safety.

- The Council

134. As already stated, at its meeting of 28 and 29 June 1977, the Council instructed the Committee of Permanent Representatives to determine what Community action in the field of civil aviation should be given priority. The Committee on Regional Policy, Regional Planning and Transport considers it absolutely essential for the safety question to be included in the action programme, which it is hoped will be drawn up as soon as possible.

Your committee also urges the Council to give the Commission of the European Communities a mandate to consider a number of activities on which the Community might take the initiative and which are outlined in the following paragraphs.

---

[1] OJ Annex No. 196, November 1975, pp. 133 and 134.

- The Commission

135. In various aviation circles it is considered desirable for a detailed inquiry to be held into the problems of air traffic safety and air traffic control in Europe which would deal in depth with the procedural, administrative technological and other aspects of a safety policy orientated towards the demands of the future. The Commission would appear to be the most suitable Community institution to conduct this. If lack of funds and suitably qualified staff prevent the Commission - as it has repeatedly told the European Parliament - from conducting this inquiry itself, then it should instruct a specialized body, to act on its behalf.
Comparable action has often been taken in the past. An inquiry of this kind would be an obvious preliminary to drawing up a rational policy.

136. The inquiry should cover the following items in particular:

- future air transport developments in Europe;
- more rational use of available capacity and its possible growth;
- coordination of scientific research and development;
- approximation of technologies and equipment, and their economic viability;
- socio-professional aspects (training and working conditions);
- the demarcation between the powers of military and civil aviation authorities;
- weather conditions;
- the forwarding, centralization and distribution of data on air transport incidents;
- the requirements of the European industries involved, in particular the aircraft construction and electronics sectors;
- air traffic flow organization, strategic and tactical air traffic planning;
- integration of national air traffic control services and the role of Eurocontrol;
- cooperation with third countries and through existing inter-governmental organizations.

On the basis of the outcome of this inquiry, the Commission should consult representatives of all aviation organizations concerned, with a view to fixing priorities for Community action and ultimately drawing up appropriate and specific proposals for ensuring air traffic safety in the Community.

137. Pending this in-depth inquiry, the Commission could determine what specific measures might be taken within the general terms of reference of the Community, such as the application of the provisions of the EEC Treaty in the social sector.

138. The Committee on Regional Policy, Regional Planning and Transport feels that it would be useful if, before Community action was implemented, negotiations were opened with the countries bordering on the Community, in particular Switzerland, Austria, the Scandinavian countries and the countries applying for accession to the Community, with a view to outlining Community action and determining joint options on air traffic control.

Most of the countries associated with the Community lack modern and efficient air traffic control equipment. In view of their economic position, these countries have other priorities than acquiring this exceptionally expensive machinery, even if their air traffic is continuing to increase in volume, owing mainly to tourism. The Community might therefore consider transferring to the Associated States equipment which has become obsolete in the Community but is still useable, as part of its development programme. At the same time, it would be pointless for an airport or an air traffic control centre to have technically advanced equipment at its disposal if it were unable to use it because it lacked suitably qualified staff. The Community could therefore also consider providing the necessary professional training. This would be a matter for the Eurocontrol experts who have appropriate training facilities at their Luxembourg centre.

- The European Parliament

139. Mr Osborn proposes in his opinion that the committee of the European Parliament responsible for transport matters should organize a hearing to which representatives of both civil and military air traffic control services, as well as representatives of government transport ministries, airlines and air pilot organizations would be invited (paragraph 46). He also suggests that an open forum should afterwards be organized, involving government transport and aviation ministries, airline companies, the electronics industry, the civil aviation and airport authorities 'to review the situation and to find out who should take the initiative for coordination in Europe' (paragraph 47).

In an initial exchange of views at its meeting of 22 September 1977, the Committee on Regional Policy, Regional Planning and Transport gave its approval in principle to Mr Osborn's suggestions, as reflected in paragraph 20 of the motion for a resolution.

140. Mr Osborn also asks in his opinion for the relevant committee of the Council of Europe to be associated with a conference on air traffic control matters.

141. In the report already referred to on the introduction of systems for preventing near-misses, Mr Treu the rapporteur on behalf of the Science and Technology Committee of the Council of Europe, approves this initiative[1]. Your rapporteur has also taken this suggestion into consideration in paragraph 20 of the motion for a resolution. If effective cooperation between both these democratic institutions can be assured from the very beginning, it should be possible to involve the whole of Western Europe simultaneously (i.e. all twenty one Member States of the Council of Europe) in the promotion of efficient air traffic control.

142. It goes without saying that the Committee on Regional Policy, Regional Planning and Transport will draw up a report on the outcome of the proposed hearing and open forum. In the meantime it will of course continue to follow closely developments in the field of air traffic control and safety.

---

[1] Report by Mr Treu, Doc. 4028, 21.9.1977, p.29 paragraph 93.

V. CONCLUSIONS

143. As this own-initiative report has demonstrated, the level of air traffic safety has improved despite the enormous quantitative and qualitative increase in traffic during the past decade. This remarkable result is attributable in particular to the improved training of air traffic controllers, sound air safety techniques and international cooperation.

Despite this welcome trend, your rapporteur is firmly convinced that a number of improvements can be made to reduce further the risk of tragic air disasters, an exceedingly important task in view of the likelihood that air traffic will increase rapidly in the next few years.

144. Measures which could be taken to this end were considered in Chapter III. Particular attention was devoted to measures in the field of technological research and development, organizational and procedural improvements and measures in the meteorological field.

145. Since the technological aspects are fully discussed by Mr OSBORN in his opinion on behalf of the Committee on Energy and Research, your rapporteur has confined himself in this report to a few supplementary remarks. In addition to the possible consequences of air traffic control by means of satellites, the need for mutual compatibility of techniques and equipment is stressed. Both your rapporteur and the Committee on Economic and Monetary Affairs have also pointed to the desirability of strengthening as far as possible the competitive position of the relevant European industries, in particular the aircraft and electronic industries.

146. With regard to procedural and organizational measures, the need to put an end to the artificial separation of military and civil air traffic control authorities warrants especial mention. Clearly from the point of view of air traffic safety, the aim must be to find some way of integrating the military and civil air traffic control authorities as soon as possible.

The report called in the same chapter for the establishment of an international centre for the collection, analysis and reporting of data on air traffic incidents, the introduction of a minimum level of uniformity in the language and phraseology used in telecommunications and the implementation of long-range strategic planning of the flow of air traffic. The professional aspects, i.e. vocational training and working conditions, were of course also considered in detail.

147. The impact of meteorological factors on flight safety has been discussed at some length in this report, your rapporteur taking the view that meteorological phenomena are frequently and unjustifiably underestimated and that measures exist which could substantially improve current safety margins. This is certainly the case with techniques for combating wind shear, fog and storm systems.

148. It is abundantly clear that optimum air traffic safety cannot possibly be achieved by taking a few incidental and isolated measures. Individual projects must therefore be coordinated in an overall approach to air traffic safety.

149. Such an overall and coordinated approach can of course only be obtained through international cooperation; nor should this be confined to European or Community air space. Worldwide cooperation is vital and here the ICAO and IATA are the appropriate organizations in their respective fields.

150. In view of the particular geographical situation of Western Europe and the extreme density of air traffic, still more intensive cooperation is desirable. Given the increasing level of cooperation which exists in air transport, there is nothing to prevent a similar development in air traffic control.

The revival of the idea of national sovereignty is thus ominous for the future of Eurocontrol. It is becoming increasingly unlikely that Eurocontrol will assume extensive operational responsibility on expiry of the present Convention; every effort must therefore be made to ensure that, after 1983, Eurocontrol is given a new task in addition to its present functions - that of coordinating the various national air traffic control authorities.

151. Finally, your rapporteur is inclined to the view that the European Community can make a useful contribution to increasing air traffic safety. The prime requirement here is for the Council to authorize the Commission to include the question of safety in the priority action programme for civil air transport. The Commission should in turn give close consideration to the aspects detailed in this report, and draw up as soon as possible a coherent package of appropriate and specific proposals.

In the meantime, the committee will continue to take a close interest in the promotion of efficient air traffic control and improved air traffic safety, and intends to conduct a hearing on this question in the near future.

OPINION OF THE COMMITTEE ON ECONOMIC AND MONETARY AFFAIRS

Letter from the Chairman of the committee to the Chairman of the Committee on Regional Policy, Regional Planning and Transport

Luxembourg, 23 February 1978

Dear Mr Chairman,

At its meeting of 20 February 1978 the Committee on Economic and Monetary Affairs discussed the draft report of the Committee on Regional Policy, Regional Planning and Transport concerning the promotion of efficient airtraffic control (PE 50.962).

In Section II of the draft report, the Committee on Regional Policy, Regional Planning and Transport deals with the evolution, or to be more precise, the expansion of air transport and the associated development of airtraffic control. The same section also contains comments on international cooperation, which plays a crucial part in efficient airtraffic control. In addition to procedural and organizational measures and the effects of meteorological conditions, which require no comment from the Committee on Economic and Monetary Affairs, the section on the improvement of airtraffic control also mentions measures in the field of technological research and development which have important economic implications.

In this connection the Committee on Economic and Monetary Affairs feels that it should point out that aviation safety is not only a matter of traffic density, the structure of airtraffic control and staff training, but also depends to a very large extent on the design of aircraft, airports and control towers. The development of better aircraft components and a determined effort aimed, for instance, at making greater use of existing - and developing new - electronic equipment in the aviation sector is extremely important to the future growth of such major branches of industry as aviation and electronics and to a large number of sub-contractors. Moreover, it will also improve the international competitiveness of undertakings of this type in the years to come. It should also be remembered that product development in the abovementioned industries has traditionally been a constant source of technical innovation in other branches of industry. In addition, your committee points in its draft report to the need here to strengthen the competitive position of the industries concerned (see point 54 of the explanatory statement in the draft report PE 50.962)

The Committee on Economic and Monetary Affairs has already asked the Commission to submit proposals for a common air transport policy, including measures on aviation safety. As will be recalled, the Committee on Economic and Monetary Affairs drew up in 1976 an interim report (Doc. 203/76) on the Commission's proposal for an action programme for the European aeronautical sector; on the basis of this report the European Parliament adopted an amendment to Article 3 of the draft Council decision inviting the Commission, in drawing up concrete proposals for a common air transport policy, to include flight safety in the overall plan[1].

It goes without saying that attempts should be made to improve aviation safety by means of suitable research and development. In view of the high cost of aviation safety systems and of research in this field, there should be careful selection of research and development projects. Your committee has stressed, in its draft report, the need to avoid duplication and minimize dissipation of effort so as to keep costs down. Attention is also drawn to the importance of a very high degree of mutual compatibility between airtraffic control apparatus and equipment, and of standardization to improve efficiency and reduce costs (see points 54 and 55 of the explanatory statement in the relevant draft report of the Committee on Regional Policy, Regional Planning and Transport, PE 50.962). It is also clear that Community and international cooperation is desirable in this connection. National measures and the duplication of work which these often involve are inappropriate, as the Committee on Economic and Monetary Affairs has already pointed out several times, for example in its report (Doc. 454/77) on the communication from the Commission concerning an action programme for aeronautical research[2], in which it states its views on research in the aviation industry. However, this Commission communication relates only to the manufacture of airframes and to helicopters. The Commission proposal for a research programme in the field of electronics and equipment intended for use in the aviation sector is not yet available; the committee will support any efforts to expedite as far as possible the drawing up of this research programme.

In this connection it should also be pointed out that the first set of priorities in the field of data processing provided for a study of requirements in regard to computer-operated airtraffic control systems. However, this study was not approved by the Council.

---

[1] OJ No. C178, 2.8.1976, p.8

[2] OJ No. C210, 2.9.1977, p.8

The Committee on Economic and Monetary Affairs expressed its views on the financing of research in the field of air transport in point 21 of the explanatory statement contained in its interim report on the Commission proposal for an action programme for the European aeronautical sector. Here it states that it agrees that Community aid to research and development in the aircraft industry should be financed partly from the Community budget and partly from funds raised on the capital market. It adds that such aid should come in the main from the Community budget since the Community's role as coordinator would then be strengthened.

Finally, the Committee on Economic and Monetary Affairs would draw attention to the judgment of 4 April 1974 delivered by the Court of Justice, which ruled that the general provisions laid down in the EEC Treaty, including the rules on competition, were applicable to the aviation sector. The Committee does not intend to deal with this very difficult question in detail at the present stage, as it is awaiting the Commission's proposal for implementing provisions. Nevertheless, there is no doubt that the efforts to achieve maximum safety in the aviation sector will have a bearing on the way in which the rules on competition laid down in the EEC Treaty are to be applied in practice to that sector.

I would ask that this letter be regarded as the unanimously adopted[1] opinion of our committee on the draft report (PE 50.962).

.....

(sgd) E. GLINNE

---

[1] Present: Lord Ardwick, acting chairman; Mr Deschamps, Mr Lange, Mr Müller-Hermann, Mr Noè (deputizing for Mr Schwörer), Mr Nyborg, Mr Ripamonti, Mr Starke and Mr Verhaegen

OPINION OF THE COMMITTEE ON ENERGY AND RESEARCH

Draftsman: Mr. J.H. Osborn

On 21 December 1976 the Committee on Energy and Research appointed Mr. J.H. Osborn draftsman.

It considered the draft opinion at its meetings of 27 January 1977, 28 March 1977 and 21 June 1977, and adopted it unanimously with three abstentions on 21 June 1977.

Present: Mr. Veronesi (Vice-chairman, acting Chairman); Mr. Osborn, rapporteur; Mr. Edwards, Mr. Ellis, Mr. Fuchs, Mr. Liogier, Mr. H.W. Müller, Mr. B. Nielsen, Mr. Noè and Mr. Zeyer.

I INTRODUCTION

1. General Air Traffic Control policy is essentially the concern of the Committee on Regional Policy, Regional Planning and Transport. Their concern is for administrative and technological efficiency combined with adequate safeguards, but with a view to maximum efficiency and minimum duplication in order to keep the cost of safe flying to a minimum. The basic terms of reference of the Committee on Energy and Research are such that the present Opinion must limit itself to an examination of research and technological aspects of ATC and in consequence of the industrial implications for the avionics, electronics and aviation suppliers and sub-contractors to the aviation industry. But again this problem will be the subject of a separate opinion from the Economic and Monetary Affairs Committee.

2. Air Traffic Control is concerned with the safe and expeditious management of air transport; that this necessitates considering the subject on a supranational scale is immediately obvious. Most flights, particularly in Europe, are international, taking off from one country, landing in another, having perhaps overflown one or more other countries en route. Ideally the problems of Air Traffic Control should be dealt with at world level, and an international body, the International Civil Aviation Organisation (ICAO), is making efforts in this field. ICAO's aim is to persuade its member nations to standardise air traffic control techniques and systems up to an acceptable level. As ICAO's role in this respect is advisory, it cannot coerce nations into such standardization. The most suitable forum for debate would be the I.C.A.O. Assembly. The regional Commissions of the United Nations, including the Economic Commission for Europe (ECE) should also consider the problems of air traffic control. While it is highly desirable that air traffic control equipment throughout the world be brought up to an acceptable minimum standard, too often the achievement of this ideal is hampered by lack of financial resources in many countries, though this is hardly the case in the Member States of the European Community. There is evidence that adequately maintained and sufficiently modern equipment is not available to some of the countries immediately outside the Community.

3. In October 1976 the Committee on Regional Policy, Regional Planning and Transport decided to draw up an own-initiative report on the promotion of safety in Air Traffic Control. This decision was brought about by the air collision that took place on 10 September 1976 over Zagreb, and by the subsequent debate held in the Plenary session of the European Parliament on 15 October 1976. This debate followed an oral question tabled by Mr Noè, Mr Berkhouwer and the draftsman of this opinion. Your draftsman

is convinced that the European Parliament must put pressure on governments and others having authority in the field of Air Transport, so as to ensure that the citizens of Europe can travel by air with the greatest possible degree of safety. With this end in view, your draftsman calls on the Committee responsible for the report, the Commission of the European Communities, the governments of the Member States and, outside the European Community, the other Member States of the Council of Europe, to take the necessary steps to bring airports and Air Traffic Control Systems that are inadequately equipped, maintained or operated up to a high level and to give priority to research and development of avionics, electronics and other equipment, that would contribute to the safety of air travel. Your draftsman believes that the European Parliament constitutes the one democratic body capable of doing anything about this problem at international level, if only within the European Community. The urgency of this matter has been tragically emphasised by the collision at Los Rodeos Airport, Tenerife on 27 March 1977 and the recent near miss over Spain involving a British Airways Trident, and Iberia 747 and a Dan-Air 727 approaching Valencia.

4. Europe is economically an advanced and relatively homogeneous continent. The nine countries of the Community have highly developed, modern Air Traffic Control systems working in close contact with one another. Safety considerations, which must be paramount in air transport, have, however, along with other considerations led to reduced economic efficiency. All aircraft are not able to take off at times dictated by market forces and fly by the optimum route to their destinations at the optimum height. Crowding of European airspace, political considerations and the requirements of military aviation have led to the division of airspace into different types of airspace.

5. The airspace over Europe is divided into flight information regions (FIRS) each of which is the responsibility of an air traffic control unit (ACC) normally located at one of the principal centres in the country, for example Amsterdam, Paris, Milan, Rome. The FIR boundaries generally follow the national boundaries.

The area within the FIR is basically divided into controlled and uncontrolled airspace.

Within controlled airspace the following services are provided:

(a) Aerodrome control which is concerned with movements of the aircraft on the ground and in the immediate vicinity of the airport.

(b) Approach control which deals with the arrival and departure phases of controlled flight.

(c) Area control normally provided within airways ten miles wide connecting the principal centres. This type of controlled airspace is further divided in Europe into upper and lower sections. The dividing line is located either at 19500 ft,flight level 195 or 24500 ft, flight level 245 depending on the country concerned.

6. Within controlled airspace aircraft which operate on instrument flight rules (IFR) require a certain standard of crew training and compliance to certain air traffic control procedures. Within this airspace the air traffic control unit ensures the safe separation of such aircraft. According to the minimum standards recommended by the International Civil Aviation Organization (ICAO) aircraft are either separated horizontally by time or distance intervals which vary according to various cirsumstances or they are separated vertically again to varying criteria. For the en route phase of flight the vertical separation is 1000 ft up to 29000 ft and 2000 ft above 29,000 ft.

7. Within controlled airspace separation is achieved by two principle means. The first which is named procedural control requires the controller to maintain the minimum separations by means of forward estimates of the horizontal and vertical positions of the aircraft flying within his sector. In the second method known as radar control the controller maintains separation by means of the visual picture of aircraft positions presented to him on the radar screen. Advanced systemsalso provide height information. Radar control often enables the minimum separation between aircraft to be decreased and hence increases the capacity of the air traffic control centre.

8. In some European countries VFR aircraft are also permitted to fly through controlled airspace although they themselves are not under control. In other countries this is prohibited. The accident at Biggin Hill raises the whole question of the use of VFR, and there is a need for consistency in European airspace, even if the approach is different elsewhere in the world.

9. Outside of controlled airspace a more limited service is provided to aircraft. This is designated flight information service (FIS).

Aircraft in the uncontrolled part of the FIR normally operate on visual flight rules (VFR). These do not require the same standard of crew and aircraft capability but do require that the aircraft remain at specified horizontal and vertical distances away from cloud. The basic concept is that aircraft will avoid each other through visual observation.

10. Within the flight information region the flight information centre (FIC) is responsible for providing information to known aircraft on significant changes to the weather, serviceability of navigational aids, and conditions at aerodromes. It also provides information on collision hazards to those aircraft which are not controlled but this is of doubtful accuracy and completeness as it relates only to aircraft which are known to the FIC.

In Europe there also exists to a limited extent an advisory service which is an improved form of flight information service.

11. Controlled airspace is widely available within Europe for those aircraft wishing to make use of it. There are however areas where it is required but not provided. In some countries the upper limit of controlled airspace does not include the higher altitudes frequently used by commercial aircraft.

12. One of the problems involved in air traffic control in some countries is the division of both airspace and authority between civilian and military aviation. This problem has been resolved, in different ways, with varying degrees of success, by the nine Member States of the Community. Consideration of this problem, however, would lie outside the terms of reference of this Committee, but this problem must not be evaded and the Member governments of each European country, including the nine EEC Member States, should be persuaded to look at this problem again together. Eurocontrol has its own ministerial direction, but as your draftsman sees it, is in no way the subject to democratic comment, except, perhaps, in the Assemblies of the Council of Europe and the European Communities.

13. Up to now, the European Communities have played no direct role in air traffic control. This was considered, according to the nation or airspace involved, to be a matter either for the Member State concerned or for Eurocontrol, with coordination taking place through a number of specialised international organisations. Eurocontrol is the European Organisation for the Safety of Air Navigation which was set up by International Convention to strengthen cooperation between the contracting States 'in matters of air navigation and in particular to provide for the common organisation of the air traffic services in the upper airspace'.

II. INCREASED SAFETY AND EFFICIENCY IN AIR TRAFFIC CONTROL

14. This opinion is particularly concerned by the problem of aircraft collisions and air misses (near misses). This is not a major problem from the point of view of fatalities, though it can be a source of considerable worry to air passengers. The possible number of fatalities

would increase if the use of larger aircraft becomes widespread. The problem of ground collision, is considered a hazard by some experts. The seriousness of this danger was highlighted by the recent tragedy at Tenerife. A ground radar system exists and would warrant implementation on more airports.

15. According to figures produced by the United States Federal Aviation Administration, over the past 15 years there has been an average of 29 mid-air collisions resulting in 60 fatalities annually. This represents only 5% of the civil aviation fatalities and 1% of accidents.

16. In mainland Europe, the situation is quite different. Largely due to the smaller proportion of general aviation aircraft and the great proportion of aircraft operating in controlled airspace in Europe mid air collisions have, happily, been extremely rare over Europe. Air misses, however, do constitute a problem, and the rate of air misses has been too high in certain parts of the Community to permit complacency. It should be noted that the figures for Europe and the United States are not comparable because of basic differences between the types of airspace user.

17. Considerable work has been carried out in recent years on aircraft separation assurance. Research on aircraft separation assurance has led to work on the development of, amongst other things, conflict detection and resolution systems, ACAS and BCAS systems.

18. Conflict detection systems are used in the U.S. Automatic Conflict Detection makes use of centre computers to "look ahead" of a transponder-equipped aircraft's position to determine if a potential conflict with another aircraft might occur and to alert the appropriate traffic controller accordingly. A start is being made in Europe by bringing into service, later this year, an automatic conflict alert system at the Eurocontrol Centre at Maastricht. All this involves avionics, electronics and radar techniques. The lead enjoyed by the United Kingdom 20 - 30 years ago, immediately after World War II, has given way to a predominantly US based technology. This influences not only what goes into the cabin of the aircraft, due to the fact that the USA builds 80% of civil aircraft capacity, but more specifically much of the ground control equipment. It is here that there is a need for a European industrial and technological competence in order to work hand in hand with that being developed by the industries of the USA.

19. Separation assurance might also be improved in some areas through the use of Airborne Collision Avoidance Systems (ACAS) and Beacon Collision Avoidance Systems (BCAS). The great disadvantage of an ACAS System would be that aircraft equipped with such a system would be protected only from collision with other similarly equipped aircraft. Another

disadvantage of ACAS is that it would require additional expensive equipment to be fitted into every aircraft. As a result, work on ACAS has now been dropped.

20. Development of BCAS systems is now underway, but again, mainly in the USA and under FAA direction, and, though not yet operational, systems are being tested in the United States. The advantage of a BCAS system is that all aircraft fitted with transponders and the Data link would be provided with conflict information through a ground station (Beacon) that would automatically interrogate all air traffic entering its area. As one ground station would be able to deal with many aircraft, BCAS would be likely to be easier to implement than ACAS. It seems to the Energy and Research Committee that initiatives and the momentum for this are now concentrated in the USA, and that Europe, in too many industrial fields, is becoming a sub-contractor to US technology. This aspect of the problem must be the subject of comment by the Commission of the European Communities. Airborne anticollision devices are not the only possible means of collision avoidance. Systems are under development for implementation in air traffic control centres which would be capable of automatically predicting a conflict between the flight paths of aircraft and automatically indicating the action to be taken to resolve the conflict.

21. Collision avoidance systems such as BCAS though favoured by the United States Federal Aviation Administration and the American Airline Pilots' Association (ALPA), have their critics. The responsibility for the action required to avoid a potential near miss situation requires to be defined in view of debate on the relative roles to be played by the ATC unit and the pilot. It can be argued that the question of ensuring safe separation of aircraft must lie with the controller in the air traffic control unit, and if the control system is working adequately near miss situations will not arise. If, however, in spite of all precautions taken in the ATC unit, an incident does arise, it must rest with the pilot to take whatever last minute emergency action is required to avoid a collision. Obviously administrative and operational decisions on this must be international, and will determine the equipment to be developed. It is argued that such systems, which are very costly both to develop and then to install, would not result in sufficient additional safety to make them cost efficient in Europe. This is particularly true if the number of aircraft movements in Europe does not increase perceptibly over the next 10 years. It has been argued that a large-scale increase in European traffic movements seems unlikely owing to lack of aerodrome space on which more aircraft could land, and environmental constraints, particularly noise limitations, imposed by governments on airport authorities, as well as lack of air traffic control capacity. This view is not universally held, and some experts believe that the volume of

air traffic will continue to grow, even during the next ten years. It is widely felt that, though the number of passengers and quantities of freight might increase, the additional capacity would have to be provided by the use of larger aircraft. It should also be remembered that larger aircraft could mean more casualties in the event of an accident. The Committee responsible for the report on this subject might consider the relative probability of casualties resulting from greater numbers of smaller aircraft, or fewer large aircraft, using the world's airspace.

22. Work has been carried out on systems for Computer Aided Approach Sequencing and Ground Movement Control, and there is a need to review this work to see if a line of research or development can be found which would lead to greater utilisation of existing airports.

23. Collision avoidance systems might be more necessary in the American context, largely due to the greater number of general aviation aircraft in the United States.

24. In Europe, because of limitations imposed by military aviation and the general density of air traffic over a relatively small land-mass, air corridors are narrow and tight control by radar is imposed in controlled airspace from the ground. As a result, the strict discipline of European air traffic may well be a factor in reducing the risks of mid-air collision. However this must raise the cost of effective Air Traffic Control, and an assessment should be made.

25. Added to this, Europe is served by well-equipped air traffic control systems that reduce the likelihood of collision to the minimum. Increased efficiency of existing ATC systems, might however provide equally satisfactory results, at lower cost in the European context.

26. The Committee on Energy and Research feels that it would be in the interests of European aviation to investigate the cost efficiency of collision avoidance systems and any other new technique that would improve safety, and feels that the Commission, with technical and economic expertise at its disposal, would be the most appropriate body for the implementation of such a study. To this Committee, there does not seem to be a sufficiently effective coordinating body adequately representing European interests, and this is a role that the Commission could well take up, possibly drawing on the expertise available in Eurocontrol.

27. Added to this, the Commission should take on a coordinating role ensuring the compatibility of ATC equipment, particularly equipment carried on aircraft from different countries. It is this Committee's opinion that compatibility is more important than standardisation. Equipment must be able to "talk to" other equipment, and this is particularly important when considering equipment in the air traffic control units which are involved in the process of coordination between adjacent units.

III. FLOW CONTROL SYSTEMS AND STRATEGIC PLANNING

28. In the United States, there is a nationwide flow control system, with its Central Headquarters in Washington D.C., and twenty air route traffic control centres, each identically equipped, throughout the U.S. This system can control the flow of traffic over the whole country, and is particularly useful when traffic has to be diverted in the event of a major airport having to restrict the number of aircraft landing.

29. A flow controller gives precise instructions to local centres and regulates the flow of long distance traffic. A flow controller would have an overall view of the general situation over a large area such as the United States.

30. Europe has a form of flow control, by means of contacts between national ATC and airport authorities, and no aircraft can enter the airspace of a control authority without authorisation to do so. The ICAO European Air Navigation Planning Group, EANPG, is considering the question of managing the air traffic in such a way that delays to movements may be avoided. Some delays are occurring at the present time due to the inability of certain European air traffic control centres to handle the number of aircraft movements which wish to operate through their airspace and could at the present time be reduced through improved coordination between the centres concerned.

31. Delays can occur with greater frequency in the summer months, when airports which accept charter and special flights due to the tourist trade become overcrowded. This can lead to delays throughout Europe, with consequent interference in other routes, mainly affecting scheduled flights, as aircraft are unable to take off unless they have an airport on which to land.

32. An American-type flow control system would mean that pilots would only need to contact one central authority rather than several national authorities, in the event of flow controlling being necessary. There is a need for such a study of European Airspace and the first step should come from the EEC as a result of an initiative taken by the Commission. Eurocontrol is already making trial applications of fast-time circulation for improving the organisation of traffic flow over most of western Europe.

33. Delays also occur on crossing points, where, for example, North-South and East-West traffic cross. Such delays are aggravated by the necessity of doubling vertical separation distances (from 1000 to 2000 feet) for aircraft flying in the upper part of the upper airspace (over 29,000 feet) owing to the lack of precision of existing altimeters. Here it should be remarked that increased altimeter accuracy would lead to more effective utilisation of airspace at crossing points.

34. Delays on the ground lead to lack of efficiency, and delays in the air result in considerable waste of fuel. Efficiency could be increased and fuel saved by improving the situation at points where traffic is congested and by a more efficient European flow control system jusdging by the experience reported from the USA, to deal with delays caused by congestion or other impediments to landing at affected airports. At present European nations are unwilling to accept an American-style central flow control system with authority, as it would interfere with the sovereignty of national Air Traffic Control systems. The Committee on Energy and Research urges the Committee on Regional Policy, Regional Planning and Transport to consider the utility and feasibility of a European flow-control authority.

35. In addition to expanding ATC capacity the concept of strategic planning of flights might be examined, so as to determine whether or not a system of air traffic management can be evolved which would increase, perhaps considerably, the efficiency of the use of the airspace.

36. Careful tactical planning also can help to increase safety and efficiency. Your draftsman calls on the Committee on Regional Policy, Regional Planning and Transport to consider the optimum mechanism for and organisation of tactical planning. Eurocontrol is also studying possible improvement of both strategic and tactical planning.

IV. THE EUROCONTROL QUESTION

37. The broad question of Eurocontrol, and the drafting of the new Eurocontrol Convention to replace the existing agreement which will expire in 1983, is outside the terms of reference of this Committee. The Energy and Research Committee should ask the Committee on Regional Policy, Regional Planning and Transport to take steps to determine the content of any new Eurocontrol Convention, and make certain that this Convention, whilst recognizing the national desires to operate Air Traffic Control Stations under national control, also realises that, particularly for small countries, advantage can be gained from joint international centres, as witnessed by the existing Eurocontrol Centre at Maastricht serving the upper airspace of Belgium, Luxemburg and North Germany, and that there is an important role for coordinated Air Traffic flow systems throughout Europe. Eurocontrol does, moreover, have an experimental centre at Bretigny (France). Your draftsman is of the opinion that the experimental role of Eurocontrol should be strengthened by its new Convention and that Eurocontrol might have a coordinating role to prevent duplication of research, and calls upon the Committee on Regional Policy, Regional Planning and Transport to incorporate into its motion for a resolution a paragraph to this effect.

38. Eurocontrol could also help to coordinate Air Traffic Flow throughout Europe, and the Committee on Regional Policy, Regional Planning and Transport might consider investigating the feasibility of this, and possibly, pressing for the inclusion of a section to this effect in the new Eurocontrol Convention. Your draftsman recommends that the opinions of user organisations and the International Civil Aviation Organisation should be sought on this subject, and the attention of ECAC called to this.

V. CONCLUSIONS

39. The Committee on Energy and Research believes that the Commission of the European Communities should study the advisability and cost efficiency of different systems for improving air safety, to determine if any system would result in sufficient increased safety, in the European context, to justify the costs involved.

40. The Council will probably set up a Group to investigate what initiatives would be of benefit to the Community in the field of civil aviation. It would study the application of the Treaty to Civil Aviation, as well as the effects of the European Court of Justice's ruling on Article 84 of the EEC Treaty.

The Commission is at present elaborating an action programme based on the five points dealing with Civil Air Transportation in the Spinelli report.

The Committee on Energy and Research notes with approval that the Commission intends to launch a long term Community research programme covering all sectors of civil aviation, and in particular:

- airframe
- aero engines
- helicopters
- avionics and equipment
- research infrastructures (that could be jointly operated, such as wind tunnels)

The Commission has been in touch with industry and the governments of the Member States in this field.

In the short term, the Commission intends to carry out work in the fields of (1) helicopters, and (2) airframe materials. Because of structural difficulties within the civil aviation industry, the Commission has, up to now, been unable to establish research priorities in the equipment and avionics sector. Work in this direction is at present proceeding satisfactoraly, and the Commission hopes to establish a cooperation programme during the course of 1978.

41. This Committee would like to suggest to the Committee responsible for the report on this topic that a study of air traffic management, planning and control techniques to reduce the risk of mid-air collisions, be undertaken.

42. There is also need for further research in the following fields:

- the use of increased automation
- conflict prediction and resolution
- performance prediction - climb and descent trajectories
- data link using an ADSEL/DABS system
- wake vortex prediction and destruction

- computer assisted approach sequencing
- computer assisted ground movement control
- area navigation systems
- advanced approach and landing systems
- STOL/VTOL aircraft

as well as research into the coordination of flight planning and management.

43. The exchange of information on accidents is of importance for all those concerned with safety in aviation. Nevertheless many carriers refuse to submit reports to the IATA Safety Information Exchange. This is because any document which an airline might submit to the scheme would be exposed to discovery by the courts and would be considered evidence of what took place and of what corrective action had been taken. If such steps were found to be wrong or inadequate, then that airline could be exposed by heavy liability payments by the courts, in the event of a claim resulting from the accident. Such a situation must be remedied at international level, and the Committee on Regional Policy, Regional Planning and Transport might consider this problem.

44. The Committee on Energy and Research has consistently stressed the importance of coordinating all aspects of European research so as to eliminate unnecessary duplication. Indirect and concerted actions in the field of Air Traffic Control and navigational systems are to be encouraged. This Committee feels that the Commission's services have a useful role to play in this respect, as has Eurocontrol. The Committee also believes that the Commission should use its influence to ensure a strengthening of Eurocontrol's function as a coordinator of ATC research, and in the organisation of traffic flow, in the convention to be negotiated.

45. The Committee on Energy and Research also calls on the Committee on Regional Policy, Regional Planning and Transport to consider the further implementation of ground collision avoidance systems as an adjunct to a properly developed air traffic control system.

46. This Committee urges the Committee on Regional Policy, Regional Planning and Transport to organise a hearing to which representatives of both Civil and Military Air Traffic Control services, as well as representatives of government transport Ministries, airlines and air pilot organisations, would be invited. Such a hearing could help to illustrate the ways civil and military air traffic management systems are organised, and the degrees of coordination and integration which might be possible.

47. Afterwards, an open forum should be organized involving government transport and aviation ministries, airlines, aircraft manufacturers, the electronics and avionics industry - namely sub-contractors to the aerospace industry concerned with ATC equipment, civil aviation authorities and airport authorities, to review the problem and to find out who should take the initiative for coordination in Europe. This request should be put, by the Committee on Regional Policy, Regional Planning and Transport, to the Council of Ministers to support.

48. Your draftsman hopes that the Committee responsible for the report on this subject will make contact with the relevant Committee of the Council of Europe, so that it could present its views, through the Council of Europe, to the governments of nineteen European nations. Your draftsman also suggests that safety in Air Traffic Control should be the subject of the Annual meeting between the European Parliament and the Council of Europe. The importance and urgency of this problem reinforces the need to put pressure on as many governments as possible to take positive action.

49. The Committee on Regional Policy, Regional Planning and Transport is requested to call on the Commission to formulate a Research and Development programme to support the European Avionics and Electronics industry in the development of airborne and ground equipment for Air Traffic Control and aircraft safety, including ground collision avoidance systems and more accurate altimeters for use at higher altitudes.

50. The Committee on Energy and Research requests the Committee on Regional Policy, Regional Planning and Transport to consider the possibility of Community aid to associated states in the Third World, through, perhaps, the European Development Fund, for the dissemination of knowledge about suitable air traffic control equipment and for the development of ATC systems specifically designed for local conditions. The Community body responsible for the coordination of air traffic control research might also be given the power to act as consultants for, and, possibly, propose outline designs for ATC systems for Associated States in the Third World. This Committee believes that the Commission should, by its research and development programmes, help European industry to develop Air Traffic Control systems suitable for the Third World countries. Moreover the need for training technicians and controllers to maintain and operate such equipment must not be overlooked, and in this field Eurocontrol, under a new Convention, could also have a role to play.

51. In conclusion, the Committee on Energy and Research stresses the need for a political will on the part of the governments of the Member States to work together in close coordination with the appropriate international bodies. Without such a will real progress in the field of air safety cannot be made.

ANNEX

Organisations with which Mr John H Osborn has held meetings in connection with his Opinion on Safety in Air Traffic Control

1. Air Traffic Control Centre - West Drayton

   Mr Jellett, Mr Field

2. British Airways

   Mr Ratledge

3. Commission of the European Communities

   Dr Kühne, Mr Valentin, Mr Bol, Mr Sorensen

4. Eurocontrol - Brussels

   Mr Bulin (Director General) and Mr Stewart

5. Eurocontrol Centre - Karlsruhe

   Colonel Mieth, Mr Massie, Mr Zeller, Mr Ward

6. European Civil Aviation Conference

   Mr Ropars

7. International Air Transport Association

   Mr Kershaw, Regional Technical Director-Europe;
   Mr Zehnder, Chairman, European Technical Panel;
   Mr Pimpinelli, Vice-Chairman, European Technical Panel;
   Mr Strauss, Advisor

8. International Civil Aviation Organisation

   Mr Montgomerie, Mr Berger, Mr Sperring, Mr Veres

9. International Federation of Air Line Pilots Associations

10. U.K. Civil Aviation Authority

    Lord Boyd-Carpenter, Air Marshal Sir Ivor Broom, Air Vice Marshal Pedder, Mr Morris

11. U.K. National Air Traffic Services

    Air Vice Marshal Pedder

12. U.S. Federal Aviation Administration

    Mr P. Petersen and Mr D.C. Neiner