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PANEL
ON
ORIGIN AND DESTINATION STATISTICS
1959 - 1963

FINAL REPORT

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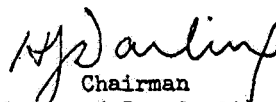
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LETTER OF TRANSMITTAL

To : The Chairman, Air Transport Committee

From: The Chairman, O&D Panel

I have the honour to submit the report on the work of the Panel on Origin and Destination Statistics, which held five Sessions; the first and second in Montreal in October 1959 and June 1960, the third in Paris in April 1961 and the fourth and fifth in Montreal in March 1962 and February 1963.



Chairman
Panel on Origin and Destination Statistics

Montreal, 27 February 1963

FINAL REPORT

TABLE OF CONTENTS

	<u>PAGE</u>
PART I - INTRODUCTION	1 - 4
PART II - MEANING AND DEFINITION OF ORIGIN AND DESTINATION	5 - 11
PART III - POSSIBLE USES OF O & D STATISTICS	13 - 15
PART IV - DESCRIPTION OF THE TWO PROPOSED SYSTEMS FOR ICAO O & D STATISTICS	17 - 32
PART V - EVALUATION OF THE ADVANTAGES AND DISADVANTAGES OF THE PROPOSED SYSTEMS	33 - 42
PART VI - FINANCIAL IMPLICATIONS	43 - 46
PART VII - CONCLUSIONS	47 - 52
 <u>Appendices forming an integral part of the Report</u>	
<u>U.S. CENTRALIZED SYSTEM</u>	
1 - Description of System.	53 - 107
2 - Effects on Formats of Publication of Variations in Routing Detail under the United States Plan for Production of World-wide Passenger Ticket Air Travel Statistics.	109 - 114
3 - Method of Preventing Duplication and Filling Gaps in TOD Statistics.	115
4 - Experience with Electronic Data Processing in the Production and Use of Air Passenger O & D Statistics.	117 - 126
5 - Summary of Responses to U.S. Questionnaire.	127 - 155
<u>FRENCH AIRPORT SYSTEM</u>	
6 - Description of System.	157 - 214
7 - Method for the Elimination of Duplication and the Filling of Possible Gaps.	215
<u>Miscellaneous</u>	
8 - Report of the Working Group on Costs.	217 - 240
9 - Suggested Questionnaire - Parts I and II.	241 - 242
10 - Report on Sampling.	243 - 246
 <u>Additional Appendices</u>	
11 - Description of air passenger statistics in the Federal Republic of Germany ...	247 - 276
12 - The Area Concept.	277 - 282
13 - Summaries which might be added to the Publication Proposals presented in Appendices 1, 2 and 6.	283 - 287
14 - Review of Selected Working Papers.	289 - 291
15 - List of Working Papers of the Panel.	293 - 304

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	Mr. F. J. H. Johnston	O		x			

PANEL ON ORIGIN AND DESTINATION STATISTICS

FINAL REPORT

PART I - INTRODUCTION

Establishment of the Panel

1. The Panel on Origin and Destination Statistics was established by the Council in May 1959 with terms of reference as suggested in Recommendation 9 of the Third Session of the Statistics Division. It originally consisted of individuals nominated by 10 States, Argentina, Brazil, Canada, Federal Republic of Germany, France, Netherlands, Sweden, Switzerland, the United Kingdom and the United States. IATA was invited to send observers to all Panel meetings. It was understood that States could replace their nominated Panel Members by other nominees if desired and that their Members might be accompanied by advisers. At the end of 1959, the Council approved the addition of a nominee from Spain to the Panel, bringing its total membership to 11.

2. The Panel has held five Sessions; the first in Montreal in October 1959, the second in Montreal in June 1960, the third in Paris in April 1961, the fourth in Montreal in March 1962 and the Final Session in Montreal in February 1963. At the first Session Mr. H.J. Darling, the Canadian member of the Panel, was unanimously elected Chairman and he was re-elected at all subsequent Sessions of the Panel. The members, advisers and observers that attended each Session are shown on the opposite page. Mr. B. Kortekaas, Chief of the Statistics Section, acted as Secretary of the Panel; Mr. A.M. Lester, Chief of the Economics and Statistics Branch, acted as ICAO Adviser.

3. As directed by the Air Transport Committee, the Panel carried out its work in an informal manner and did not keep minutes of its discussions but an interim report was prepared after each of the first four Sessions indicating the subjects discussed and the progress made.

Terms of Reference of the Panel

4. Owing to the controversial nature of the subject, the Terms of Reference for the Panel had been carefully drafted in some detail by the Statistics Division and after considerable discussion they were approved by the Council when establishing the Panel. They were divided into three parts as follows:

PRIMARILY

- (i) To analyze the advantages, difficulties, and costs to be met in collecting, compiling, collating and disseminating statistics of true origin and destination of passengers (by cities);
- (ii) to include in this analysis the exploration of the following steps with respect to the amount of detail which may be reported at various stages in the development of the programme:
 - (a) number of passengers originated in the country of the reporting airlines;
 - (b) true origin;

- (c) true origin and destination;
- (d) true origin and destination and on-system origin and destination of the reporting airline;
- (e) true origin and destination and on-system origin and destination of all airlines which co-operated in the transportation;
- (f) true origin and destination, and on-system origin and destination of all airlines plus all stop-overs;

SECONDLY

- (iii) to study also the advantages and disadvantages of different systems, for example those in which the objectives are on-line origin-destination (LOD) or on-system origin-destination (SOD) by themselves or in combination with other objectives;

TO CONSIDER ALSO

- (iv) recommendations as to appropriate methods for the implementation of the initial feasible steps necessary to assure useful world-wide origin-destination statistics and for progressive transition to more complete reporting;
- (v) alternative sources of the statistics, such as ticket sales, ticket uplift, or other sources;
- (vi) the development of suitable methods of sampling;
- (vii) the advantages and disadvantages of various methods of processing and publication and make recommendations as to the most feasible method.

Arrangement of the work

5. In carrying out these Terms of Reference the Panel studied first the different types of origin and destination statistics that had already been discussed in the Statistics Division and reviewed the methods of collection in use by various governments. It was then decided that the best way to proceed with its work would be to examine specific proposals by which ICAO might collect and publish world-wide O&D statistics, establishing criteria by which they might be evaluated and then, so far as possible, evaluating them point by point. The Panel Members were therefore asked to submit detailed descriptions of any schemes that seemed worth examining in this way. Several descriptions were submitted out of which two were selected which became known as the "U.S. Centralized System" and the "French Airport System". The other members of the Panel would like to put on record at this point an expression of their appreciation of the work of the French and U.S. Members in making these presentations, which greatly facilitated the work of the Panel.

6. The subsequent work of the Panel consisted of analyzing and studying the various elements of the problem as set forth in the Terms of Reference in relation to these two proposed systems.

7. The analysis of the difficulties and costs to be met in collecting, compiling, and disseminating statistics of origin and destination by the two proposed schemes (para. (i) of the Terms of Reference), are to be found in PART V of this Report.
8. The expressions "true origin" and "true destination" occurring in paragraphs (i) and (ii) of the Terms of Reference were examined carefully by the Panel in its work and it was decided that the word "true" tended to confuse a number of issues since in many trips a variety of different origins and destinations may be considered to be "true" for different purposes. The Panel, therefore, does not use these expressions in its Report (see PART II of the Report), although they may still be used in contributions made by Panel Members which appear as Appendices to this Report.
9. The analysis of the advantages of O&D statistics in general (para. (i) of the Terms of Reference) and of the advantages and disadvantages of different systems (para. (iii) of the Terms of Reference), and to a lesser extent of the advantages and disadvantages of the various methods of processing and publication (para. (vii) of the Terms of Reference), raised the difficulty frequently met by the Panel in the course of its work, that the advantages of any statistics are related to the need for them and the uses to which they may be put. These were matters on which the Panel had little direct information and concerning which it was not asked to reach conclusions. In order to make some progress on these points, the Panel prepared a tentative list of possible uses to which these statistics might be put by various types of users and has based its studies on these, recognizing that it might be desirable to obtain more definite information before any final conclusions could be reached (see PART III of the Report). A suggested questionnaire for possible use in obtaining information concerning needs and uses is given in Appendix 9.
10. The Panel also prepared a list of criteria by which the usefulness of O&D statistics might be judged once the question of needs and uses has been settled. This list of criteria which is given at the beginning of PART V was then used to make a tentative evaluation of the two proposed schemes.
11. The various degrees of detail set forth in paragraph (ii) of the Terms of Reference, and the different systems of O&D statistics referred to in paragraph (iii), were studied with great care by the Panel and it was found possible both to prepare some definitions and to limit the number of concepts worth studying (see PART II of the Report).
12. Methods for implementing the initial feasible steps necessary to assure useful world-wide O&D statistics, and for progressive transition to more complete reporting (para. (iv) of the Terms of Reference), were considered with respect to both the schemes (see last section of PART IV of the Report).
13. Many alternative sources of O&D statistics were considered (para. (v) of the Terms of Reference). Each of the two proposed schemes contains its own recommended source (see PART IV of the Report).
14. The development of suitable methods of sampling (para. (vi) of the Terms of Reference) was examined at various times by the Panel, principally with respect to the Centralized Plan but also with respect to the Airport Plan. A report on sampling techniques and accuracy is given in Appendix 10.
15. The advantages and disadvantages of various methods of processing and publication of O&D statistics for an ICAO system (para. (vii) of the Terms of Reference) were studied specially by the Panel and the results are given in PART V. A note on the use of electronic data processing equipment for analysing O&D statistics is given in Appendix 4.

Appendices

16. All Appendices attached to this Report are listed in the Table of Contents. In addition to Appendices 1 to 10 which form an integral part of the Report, the Panel decided that it would be useful to have certain additional material, not mentioned in the Report, attached as appendices which might be of special interest to the readers of this Report. These 11 appendices are separately listed in the Table of Contents.

Other matters

17. The question of possible legal obstacles to the collection and publication of O&D statistics by ICAO was discussed by the Panel. Some members referred to laws of their States which might prevent disclosure of the statistics that would identify individual airlines. No position could be taken by the Panel on this subject but it was decided that a question to the existence of any legal difficulties might be included in the suggested questionnaire. Attention of the Panel was drawn to Article 67 of the Convention which obligates governments of States party to the Convention to ensure that the statistics required by the Council will be filed with ICAO, irrespective of any national laws or regulations.

18. Regarding the publication of statistics the Panel noted the following statement made by the Secretary, "... the Secretary General would be prepared to give a firm commitment that certain information collected by microfilm copy of the ticket in the way described in (Appendix 1 to this Report) would be withheld from disclosure to persons other than those required to deal with them in ICAO. It would be understood that the scheme incorporating this confidential element would have been approved by the Council, so that the withholding of information from Council members themselves would thus have Council authorization."

19. The following statement of the official position of IATA with regard to the collection of O&D statistics by ICAO was given to the Panel:

"A substantial majority of IATA's members are opposed to the collection of any form of origin and destination statistics by ICAO. This opposition was based primarily on the amount of work and expense involved, but also included other considerations, such as whether this type of data would be timely or meaningful. Without in any way prejudicing this position, IATA is particularly opposed to the airport system in view of the very heavy burden it would impose on the carriers."

20. The Chairman of the Air Transport Committee addressed the Panel on the final day by the following:

"I want to take this last opportunity of thanking the members of the O&D Panel for the excellent work you have done. I think I can go so far as to say that you have set a record in ICAO regarding both the quantity and the quality of the work you have turned out. No previous Panel has ever worked so long or so hard: and certainly no Panel ever covered the ground more thoroughly.

In scientific procedure it is agreed that the first step toward the solution of a problem is to state the problem. This you have done in a most thorough and efficient manner. Regardless of such future action as ICAO may take on this question there is no doubt that the work you have done in disclosing all the intricacies of passenger movements involved and analysing these in such a way as to fit them into an understandable pattern will be of value in the collection and processing of aircraft statistics for many years to come.

I realize that many of you have made personal sacrifices in order to attend these meetings. It is also realized that the States that have so generously permitted you to attend have done so at some sacrifice both of your services and in some cases in encountering considerable cost in making experimental runs to determine how some of the procedures actually work. On behalf of the Air Transport Committee I want to thank you for the work you have done and your States for making you available to do it."

PART II - MEANING AND DEFINITIONS OF ORIGIN AND DESTINATION

21. The meaning of Origin and Destination in relation to an act of transportation seems, at first consideration, to be reasonably simple. It is basically the naming of the places where a trip starts and where it ends. It can be applied to any form of transport and to passengers, freight and mail. But although the basic concept might appear simple, its application to international air passenger traffic is extremely complicated because the concept of a passenger trip has first to be defined, a problem which has given rise to much discussion and controversy in ICAO and between Member States for many years.

22. A passenger trip can include the use of several forms of transport. In most existing origin and destination statistics of air traffic, ground transport before and after an air trip is excluded. This is a first simplification which the Panel has adopted.

23. An air trip may consist of a series of successive stages. This fact has been overtly recognized in existing concepts of O&D by the use of such technical terms as "true" or "initial" origin and "true" or "ultimate" or "final" destination. In considering definitions of origin and destination, the Panel recognized the ambiguities inherent in the continued use of the term "true" in its statistical sense, since the word "true" in the sense of "real" origin or destination could vary depending on the purpose or concept involved. The Panel, therefore, decided to abandon the term "true" which appears throughout paragraphs (1) and (11) of the Panel's Terms of Reference and at the same time to use the abbreviation TOD for ticket origin and destination as described in paragraph 28 below.

24. The Panel grappled for a long time with the problem of definition, examining many facets of the problem and many possible concepts, including those concepts which had previously appeared in a variety of contexts as well as new concepts suggested by Panel members. Among those considered were:

"effective" origin and destination, which would take into account ground transport at the beginning and end of an air trip;

"purpose" origin and destination, which would reflect the main intent of the passenger;

"stop-over" origin and destination, which would distinguish those points which a passenger has an intention to visit, as distinct from merely changing aircraft;

"line" origin and destination and "route" origin and destination, which would refer to points of embarkation and disembarkation on services or on routes specified in a bilateral agreement.

But although these concepts were considered of descriptive interest in relation to specific circumstances, the Panel rejected them all as concepts which could form part of a rigorous set of definitions of general application in ICAO Origin and Destination Statistics. For example: no practical basis could be developed to distinguish between stops that represent an intention to visit (stop-over) from other stops that are made solely to change aircraft.

25. The Panel decided that for practical purposes a passenger trip should be defined in terms of the information given on a passenger ticket, including conjunction tickets and intermediate surface stages where indicated. A passenger ticket is made up of one or more coupons, each valid for one stage of a trip. The definitions given in paragraph 28 are therefore based on the ticket and various selected elements of information contained therein. (see page 9) For ICAO statistics, tickets involving international stages only would be used and the definition would cover any domestic sections of international tickets.

26. Passenger trips described on the ticket may be considered in terms of two basic types, "one-way" trips and "dual directional" trips. For many requirements of origin and destination statistics it is considered desirable to divide "dual directional" trips into two "one-way" trips and to analyze each directional part separately. However, this introduces a number of complexities. The distinction between the two basic types is not always clear since many trips which might be classified as "one-way" involve a considerable element of return towards the point of departure. Furthermore, many trips which take the passenger back to his original point of departure are circular in nature (circle-trips) and may even be predominantly in one direction as in a trip around the world. In cases where the passenger wishes to visit several places, a concept of "multiple destination" might be considered appropriate but this is excluded if a dual-directional approach is adopted.

27. The problem of dividing such trips into two directional parts can only be resolved through the establishment of a set of rules by which more or less consistent decisions can be taken. Existing collections of Origin and Destination statistics have had to face this problem and must have had to devise such rules. For dual directional trips in which the return portion is an exact duplicate of the "going" the determination of the break-point does not present any problem. For dual directional trips in which the return portion is not an exact duplicate an arbitrary rule is required, such as breaking the trip at the furthest point from the origin. For trips in which a passenger returns part way, a rule must be established to differentiate between a "one-way" trip and an "open-jaw" trip, the latter term being used for a dual directional trip which takes the passenger "near" but not entirely back to his point of departure. The creation of these arbitrary rules inevitably imposes limitations on the usefulness of the statistics for certain purposes. Nevertheless, the adoption of the procedure permits the development of directional origin and destination statistics. Since details of each directional trip may be drawn from a coupon actually lifted at some stage during that directional trip the analysis of each part of a dual directional ticket could be more closely related to the passenger's actual trip in point of time than if the information for the entire ticket were taken from any one coupon.

28. The Panel recognized that using the ticket information to define one passenger trip and breaking "dual directional" tickets into two directional trips inevitably introduces arbitrary simplifications. However, these simplifications have enabled the Panel to arrive at precise definitions which are necessary for the development of fully meaningful statistics. The main consequences are as follows:

- (i) Ground transport before or after the air trip is excluded.
- (ii) More than one ticket may be issued for a trip. Where these tickets are issued in conjunction, they can be treated as one ticket, but occasionally the tickets may be issued separately.
- (iii) Information taken from any one ticket coupon with respect to other stages of a directional trip may misrepresent the actual pattern followed since the passenger may change his itinerary en route.
- (iv) A directional trip reported in one statistical period may actually apply in part to a different statistical period.
- (v) The act of splitting a dual directional trip into two separate directional trips disassociates the two directional parts involving some loss of information. For some types of round-trips it also involves the arbitrary selection of one point as the directional destination/origin.

The definitions of Origin and Destination established by the Panel are as follows:

TOD Ticket Origin and Destination

The first and last points on a whole passenger ticket (or tickets issued in conjunction). A ticket may consist of one or more coupons. The ticket origin is the point of embarkation of the first coupon and the ticket destination is the point of disembarkation of the last coupon. For "round-trip", "circle-trip" and "round the world trip", the ticket origin and the ticket destination coincide.

(It should be noted that the abbreviation TOD in this Report stands for 'ticket O&D' and not for 'True O&D'.)

DOD Directional Origin and Destination

The first and last points on a one-way ticket and the first and last points on each of the two directional parts of a "round-trip", "circle-trip", "open-jaw trip" or "round the world trip" ticket.

(This is the concept that replaces the term 'true O&D' wherever used in the work of the Panel.)

SOD On System Origin and Destination

The points at which a passenger enters and leaves the system of an airline on a one-way trip or on each of the two directional parts of a "round-trip", "circle-trip", "open-jaw trip" or "round the world trip" ticket.

COD Coupon Origin and Destination

The point of embarkation and the point of disembarkation covered by one flight coupon.

(This is the smallest entity of an air trip.)

Routing

A listing in sequence of cities of two or more CODs appearing in a single ticket.

(This concept would be applicable in conjunction with TOD, DOD and SOD concepts as defined above where two or more coupons are involved.)

29. An illustrative example follows on pages 10 and 11 of an international trip of typical (but not abnormal) complexity, analyzed into its various component parts. First a reproduction is given (page 10) of the ticket for this trip and then a diagram is given (page 11) of the trip with the various O&D definitions given in terms of the places on the ticket. The first reproduction of the ticket shows flight coupon no. 1 of ticket number 12345 and the second shows flight coupon no. 1 of ticket number 12346 which is issued in conjunction.

The items of information related to a passenger trip given on a ticket

The diagram shows a form for an International Airways Passenger Ticket. The form is divided into several sections:

- Header:** Issued by INTERNATIONAL AIRWAYS, PASSENGER TICKET AND BAGGAGE CHECK FLIGHT COUPON NO. 1, 0004, 12345.
- FOR ISSUING OFFICE USE ONLY:** FARE CALCULATION (PUBLISHED, CONVERTED), COMPLETE ROUTING THIS TICKET AND CONJUNCTION TICKETS (ORIGIN, DESTINATION, ISSUED IN EXCHANGE FOR, DATE AND PLACE OF ORIGINAL ISSUE).
- ENDORSEMENTS:** BAGGAGE (Free Allowance, Checked, Unchecked, Value Units), FARE CLASS/BASE, VIA CARD/RS, Flight Number, DATE, TIME, Loc. SHED.
- FARE:** EQUIVALENT AMOUNT PAID, TAX, TOTAL.
- FORM OF PAYMENT:** NAME OF PASSENGER, NOT TRANSFERABLE.

Arrows indicate the following information points:

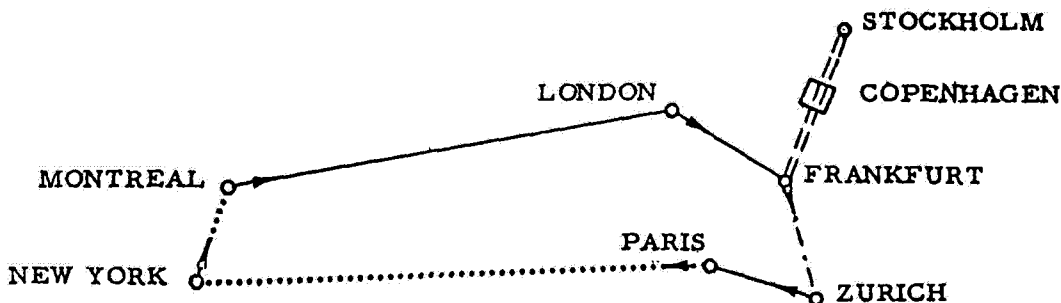
- 1: Issuer (International Airways)
- 2: Place of issue
- 3: Date of issue
- 4: Ticket number (12345)
- 5: Flight coupon number (0004)
- 6: Serial number of conjunction ticket(s)
- 7: Ticket origin and destination
- 8: Fare calculation
- 9: A section containing basic coupon details (Flight Number, DATE, TIME, Loc. SHED)

- 1) Name of issuer of the ticket (agent or airline)
- 2) Place of issue
- 3) Date of issue
- 4) Ticket number
- 5) Flight coupon number
- 6) Serial number of conjunction ticket(s)
- 7) Ticket origin and destination
- 8) Fare calculation, including:
 - (1) Place of origin, places of change-over between carriers, fare construction points and place of destination
 - (11) Name(s) of the carrier(s) involved
 - (111) Fare for the complete routing, including tax, covered by the ticket, or tickets issued in conjunction with one another
- 9) A section containing basic coupon details (for trips needing more than four coupons these details are contained in consecutive conjunction tickets)
 - A) (1) Ticket origin
 - (11) Transfer points between flights and/or carriers, points where a change of class of service takes place and
 - (111) Ticket destination
 - B) (1) Name of carrier for the sections involved
 - (11) Appropriate flight number for each section
 - (111) Date of departure from each station indicated
 - (1v) Local time of departure from airport
 - (v) Reservation status for each section of the trip
 - C) Fare class/basis
 - D) Date of expiry of the ticket
 - E) (1) Free baggage allowance applicable to each leg of the itinerary
 - (11) The checked weight and pieces and the unchecked weight
 - F) Name of passenger.
- 10) Airline identification-number of coupons.

Issued By INTERNATIONAL AIRWAYS <small>SUBJECT TO CONDITIONS OF CONTRACT (See Passbook No. 1)</small>			PASSENGER TICKET AND BAGGAGE CHECK FLIGHT COUPON NO. 1		0004		12345						
FOR ISSUING OFFICE USE ONLY			COMPLETE ROUTING THIS TICKET AND			CONJUNCTION TICKETS			DATE AND PLACE OF ISSUE OF THIS TICKET				
FORMS	CARRIER	FARE CALCULATION		ORIGIN	Form	Serial(s)	ISSUED IN EXCHANGE FOR			DATE AND PLACE OF ORIGINAL ISSUE			
		PUBLISHED	CONVERTED	MONTRÉAL	Form	Serial(s)							
101	BA			MONTRÉAL	Form	Serial(s)	K. L. M MONTRÉAL FEB - 12 '63			AGENT N 1224			
102	BA			MONTRÉAL	Form	Serial(s)							
103	BA			ENDORSEMENTS			ACTG. USE ONLY						
104	BA			BAGGAGE			FARE			AGENT N 1224			
105	BA			From	Checked	Unck'd	VALUE	CLASS/BASS	VIA	Flight	DATE	TIME	Rate
106	BA			kg	kg	kg	UNTIL		CARRIER	Number			
107	BA			19.0			1964	Y	BOAC	606	FEB 19	22.3	100
108	BA			19.0			1964	T	BOAC	594	FEB 21	12.5	61
109	BA			19.0			1964	T	SAS	132	FEB 25	11.5	62
110	BA			19.0			1964	T	SAS	631	FEB 26	12.0	63
EQUIVALENT AMOUNT PAID CAN				NAME OF PASSENGER				NOT TRANSFERABLE					
TAX				MR. PASSENGER									
TOTAL													
FORM OF PAYMENT				IF THE PASSENGER'S JOURNEY INVOLVES AN ULTIMATE DESTINATION OR STOP IN A COUNTRY OTHER THAN THE COUNTRY OF DEPARTURE, THE WARSAW CONVENTION MAY BE APPLICABLE AND THE CONVENTION GOVERNS AND IN MOST CASES LIMITS THE LIABILITY OF CARRIERS FOR DEATH OR PERSONAL INJURY AND IN RESPECT OF LOSS OF OR DAMAGE TO BAGGAGE.									

Issued By INTERNATIONAL AIRWAYS <small>SUBJECT TO CONDITIONS OF CONTRACT (See Passbook No. 1)</small>			PASSENGER TICKET AND BAGGAGE CHECK FLIGHT COUPON NO. 1		0004		12345						
FOR ISSUING OFFICE USE ONLY			COMPLETE ROUTING THIS TICKET AND			CONJUNCTION TICKETS			DATE AND PLACE OF ISSUE OF THIS TICKET				
FORMS	CARRIER	FARE CALCULATION		ORIGIN	Form	Serial(s)	ISSUED IN EXCHANGE FOR			DATE AND PLACE OF ORIGINAL ISSUE			
		PUBLISHED	CONVERTED	MONTRÉAL	Form	Serial(s)							
101	BA			MONTRÉAL <td>Form</td> <td>Serial(s)</td> <td colspan="3" rowspan="2">KLM MONTRÉAL FEB 10 '63</td> <td colspan="3" rowspan="2">AGENT N 1224</td>	Form	Serial(s)	KLM MONTRÉAL FEB 10 '63			AGENT N 1224			
102	BA			MONTRÉAL <td>Form</td> <td>Serial(s)</td>	Form	Serial(s)							
103	BA			ENDORSEMENTS			ACTG. USE ONLY						
104	BA			BAGGAGE			FARE			AGENT N 1224			
105	BA			From	Checked	Unck'd	VALUE	CLASS/BASS	VIA	Flight	DATE	TIME	Rate
106	BA			kg	kg	kg	UNTIL		CARRIER	Number			
107	BA			19.0			1964	T	SR	705	MAR 2	11.0	100
108	BA			19.0			1964	T	AF	183	MAR 5	11.0	101
109	BA			19.0			1964	Y			10	11.0	102
110	BA			19.0			1964	T			10	11.0	103
EQUIVALENT AMOUNT PAID CAN				NAME OF PASSENGER				NOT TRANSFERABLE					
TAX				MR. PASSENGER									
TOTAL													
FORM OF PAYMENT				IF THE PASSENGER'S JOURNEY INVOLVES AN ULTIMATE DESTINATION OR STOP IN A COUNTRY OTHER THAN THE COUNTRY OF DEPARTURE, THE WARSAW CONVENTION MAY BE APPLICABLE AND THE CONVENTION GOVERNS AND IN MOST CASES LIMITS THE LIABILITY OF CARRIERS FOR DEATH OR PERSONAL INJURY AND IN RESPECT OF LOSS OF OR DAMAGE TO BAGGAGE.									

Example and analysis of a complete passenger air ticket



LEGEND:

- — — — Transfer points from one carrier to another
- Carrier unknown
- — — — Transit point
- Direction

DEFINITIONS:

COD: Each leg represents a COD.
The journey is composed of 8 COD's.

SOD:

- 1) Montreal - Frankfurt
- 2) Frankfurt - Stockholm
- 3) Stockholm - Frankfurt
- 4) Frankfurt - Zürich
- 5) Zürich - Paris
- 6) Paris - New York
- 7) New York - Montreal

} SOD split in directional parts.

} Carrier unknown

DOD:

- 1) Montreal - Zürich*
- 2) Zürich - Montreal

TOD: Origin: Montreal
Destination: Montreal

* Zürich is the furthest point on the ticket from Montreal, according to great circle distances.

O&D PANEL
FINAL REPORT
27/2/63

- 12 -

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PART III - POSSIBLE USES OF O&D STATISTICS

Introduction

30. The Terms of Reference of the Panel did not include consideration of whether or not any need for origin and destination statistics exists in the governments of ICAO Contracting States or elsewhere, but it was necessary for the Panel to consider the possible uses to which such statistics might be put in order to assess the comparative value of different origin and destination types and systems. The Panel therefore prepared a list of possible uses, based chiefly upon the results of a questionnaire circulated by the U.S. government to airlines, aircraft manufacturers, economic consultants, etc., but utilizing also the experience of Members of the Panel and the Secretariat to suggest possible uses in governments and in ICAO itself. This list is given below, but it should be emphasized that the Panel has taken no position as to the existence of a demand for O&D statistics for these purposes or how strong such a demand might be if it exists. The list should therefore be regarded as merely an indication of the way in which statistics of this kind might be used, thus serving as a tentative guide in considering the various possible systems and methods.

Questionnaire

31. In the course of this part of its study, the Panel came to the conclusion that the Air Transport Committee or Council might, in due course, wish to explore further this question of the need for O&D statistics and the uses which they could serve before deciding whether or not ICAO should produce such statistics. More definite knowledge of the uses of O&D statistics would also help to choose the best system since different uses involve different kinds of data. The Panel has therefore prepared a preliminary draft which the Committee might use as the basis for a questionnaire on the uses of O&D statistics if it wishes to pursue the matter (see Appendix 9).

List of possible uses

32. (a) Route planning and development

Developing sound route patterns based on traffic requirements through planning of new routes and modifications in existing routes.

(b) Planning air services

Planning the volume, classes, fares, aircraft types and pattern of scheduled services best suited to the needs of the travelling public. Evaluating the effectiveness of the schedules operated in meeting traffic demands and competition.

(c) Developing and administering sales programmes, including travel promotion

Planning sales programmes, including travel promotion, advertising campaigns, geographic, distribution of sales activities, and evaluating the results of sales efforts.

(d) Developing new aircraft or aircraft engine designs

Establishing range, size, speed, interior accommodations and other design requirements for flight equipment on the basis of the particular travel markets to be served.

(e) Airport planning

Planning the requirements for future airport facilities on the basis of the anticipated nature and volume of traffic to be served.

(f) Airways planning

Planning airways to conform with present and future flight operations as measured by the distribution, volume and future potential of passenger traffic.

(g) Investment analysis

Analysing the traffic distribution and forecast potential development of individual airlines with a view to evaluating their securities for investment purposes.

(h) General economic analysis in air transportation, including forecasting

Research, special studies and forecasting in the economics of air transportation not encompassed in the specific needs in (a) through (g) preceding.

(i) Data for studies of tourism, travel and migration

ICAO O&D statistics might provide the air transport section of general statistics on tourism, travel and migration. The United Nations, in consultation with several interested specialized agencies and their member governments, is at present studying these statistics in the hope of improving them for a wide range of different purposes.

(j) Data for statistical studies of general economic activity

Air transport O&D statistics, if available, would, from time to time, form part of the statistical material in general studies of international economic activities.

(k) Data for use in bilateral negotiations

Information concerning the probable volume of passenger traffic to be expected from the addition to or modification of traffic rights exchanged in bilateral agreements.

(l) Information relating to the implementation of the terms of bilateral agreements

Information concerning the origin and destination of passengers carried by each airline as a check in the implementation of the traffic rights granted by bilateral agreements (where these are based on classifications of traffic according to its origin and destination).

(m) Data for studies of various forms of multilateralism in the exchange of commercial rights

Multilateralism in the exchange of commercial rights remains an ultimate objective of ICAO. It is also being studied by ECAC and may later be studied by other regional organizations. Such studies might utilize O&D statistics to show the probable effect of various types of multilateralism.

O&D PANEL
FINAL REPORT
27/2/63

- 16 -

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PART IV - DESCRIPTION OF THE TWO PROPOSED SYSTEMS FOR ICAO O&D STATISTICS

33.1 In the preceding two sections of the Report the Panel has been concerned with questions of definition of Origin and Destination Statistics, and their possible uses, in a general manner unrelated to any specific method of collection. In the following two sections of the Report, the Panel turns its attention to methods. As indicated in the introduction, the Panel has confined its main study of the methods to two proposals put forward for examination by Panel members. The two proposals were submitted by the United States and the French members, respectively. The Panel generally assisted in the examination and the evaluation of the two proposals but for convenience of exposition the two systems are referred to as the "U.S." Centralized System and the "French" Airport System. The words "Centralized" and "Airport" reflect the two principle features of the systems. The two proposals are described in full detail in Appendices 1 to 7. A summary of them is given below together with a commentary on their main similarities and basic differences.

33.2 Under the U.S. Centralized System, international airlines of ICAO member States would be required to microfilm a continuous systematic sample selection of lifted flight coupons and to transmit the microfilms to ICAO for processing of O&D statistics. The sample would consist of all coupons for international flight stages with serial numbers ending in zero or as otherwise stipulated in the approved sample plan. Since collection by microfilm involves no ticket analysis there is no change in either the cost or accuracy of collection whether the scope of the statistics include a single element or the entire information on the ticket. National governments would direct and review the airlines ticket selection and microfilming operations and arrange the transmittal of the microfilms to ICAO. Processing and publication of data would be entirely a function of ICAO. The use of electronic data processing equipment is proposed in order to permit the publication of DOD statistics with full routing detail within an acceptable time lag. Machine processing time on the IBM 7090 for the quarterly U.S. domestic O&D survey is less than 20 hours including print out.

33.3 Under the French Airport System, airlines' staff at international airports of member states would complete a form for each departing international flight recording selected details from lifted flight coupons or other documents (load sheet) of enplaned passengers. The airport would be assigned responsibility for collection of reports and control of report content. The completed documents would then be forwarded to national governments for transmittal to ICAO either in the form received or after transfer to punch cards or summary tabulations. The remainder of the operation would be carried out by ICAO using machine processing methods.

34. The basic objective of the two systems is the introduction of a world-wide system of Origin and Destination Statistics by ICAO. There are fundamental differences in methods and in approach as explained in paragraphs 36 and 37. The similarities are that both systems propose that data concerning the trips of passengers on international services should be sent to ICAO for processing and periodic publication. Both systems refer to the data shown on the passenger ticket as defining a passenger trip between the places shown, these places themselves defining various types of origin and destination (COD, DOD, etc.) as given in PART II.

35.1 The basic difference of method of the two systems is in the means of collection and in the processing of the data. In the U.S. Centralized System, the data would be collected by photomicrographing ticket-coupons at airlines head offices and would be wholly processed at one point, at ICAO. In the French Airport System, the data would be derived by airline agents at airports on forms either from ticket-coupons, in the case of COD-DOD, or other flight documents, in the case of COD alone, and entered on statistical reporting forms. (On these forms other statistical elements could also be entered). The U.S. Centralized System proposes a 10% sample of ticket coupons and the French Airport System proposes a 100% coverage of passengers departing from airports on international services both scheduled and non-scheduled.

35.2 The basic difference of approach between the two systems is that the U.S. centralized system starts with the microfilming of flight coupons sampled, which collects all the information contained in the ticket (DOD and its component parts) and then proceeds to a selection of the elements desired for publication.

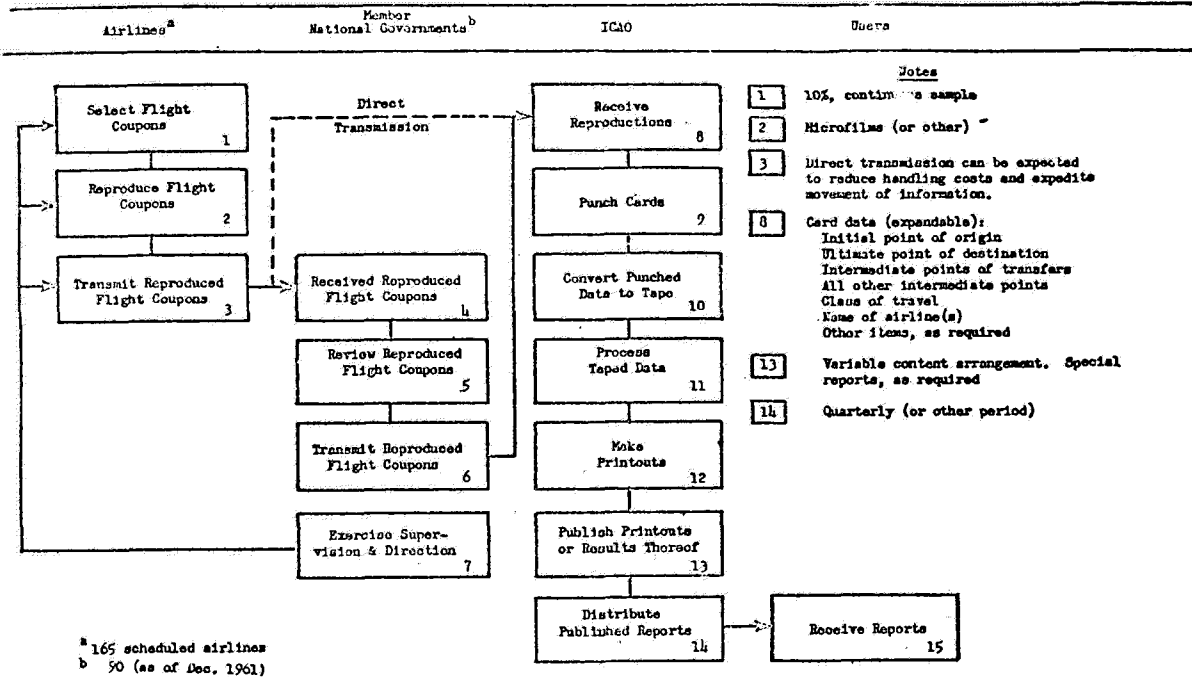
35.3 The French airport system collects only the elements which have been predetermined for publication: information giving the origin and destination of passengers on a flight, and which are collected from loadsheets (COD system), information giving the directional origin and destination which are extracted from the ticket coupons (DOD system). The U.S. centralized system starts thus with the whole passenger ticket including the detail of the routeing, while the French airport system starts with the smallest component, the COD, with the possibility of collecting more complete information giving in addition to the COD the directional origin and destination without other routeing detail.

36. The costs of both schemes vary according to the amount of detail to be analysed and published. Cost calculations made under a number of assumptions are given in Appendix 8. The minimum cost of the most limited alternative is \$187,574, at 1961 levels of traffic, and the maximum cost under the proposals is \$824,134.

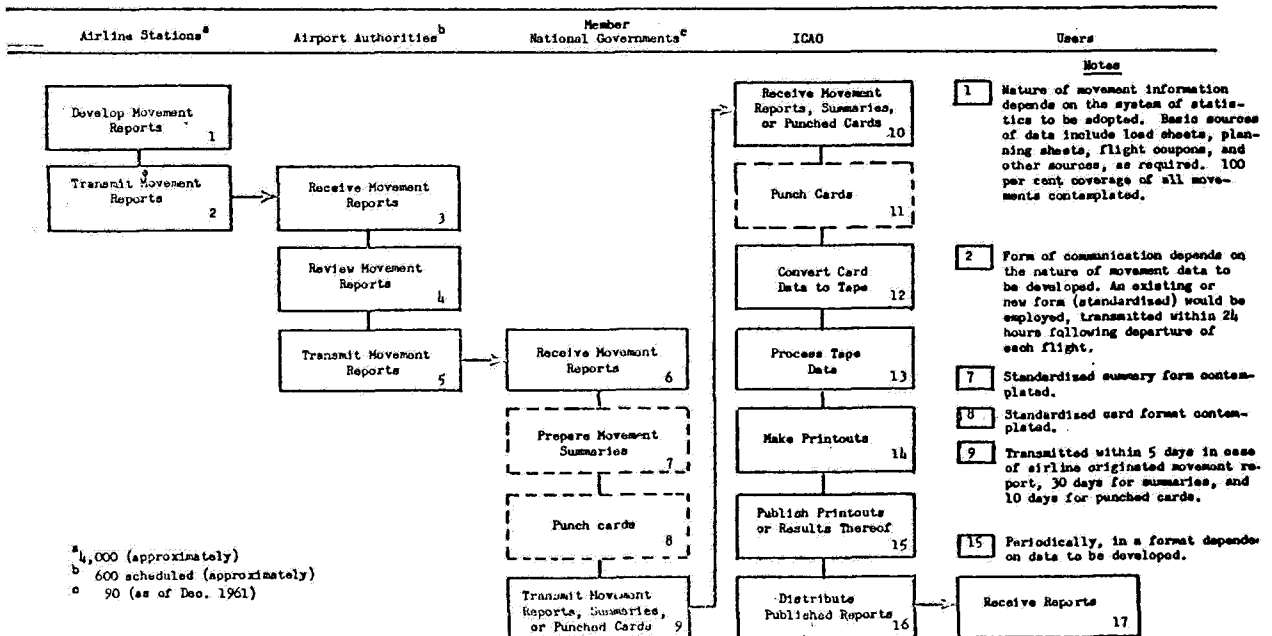
37. A tabulated description of the two systems follows in comparative form to show the main similarities and differences of the two systems.

ATTACHMENT A

U.S. Centralized System



French Airport System



ATTACHMENT A (Cont'd.)

COMPARATIVE DESCRIPTION OF
U.S. CENTRALIZED AND FRENCH AIRPORT SYSTEMS
FOR INTERNATIONAL PASSENGER ORIGIN AND DESTINATION STATISTICS

U.S. Centralized System

French Airport System

A. THE PARTICIPANTS AND THEIR FUNCTIONS

Airlines

Airlines of ICAO Member States operating international scheduled services would microfilm (or otherwise copy) lifted flight coupons from a sample of international passenger tickets with international segments as they arrive at their central offices. (All coupons of the sampled ticket would be micro-filmed.)

The station staffs of airlines at international airports of Member States would select the required information and fill out a form for each international flight, scheduled or non-scheduled.

Airports

Airports not involved.

International airports of ICAO Member States would collect the airlines' statistical reports, enforce complete reporting and control report content.

National Governments of ICAO Member States

The national governments would direct and review the airlines' ticket selection and microfilming operations, and arrange the transmittal of the microfilms to ICAO.

The national governments would send to ICAO, after verification, either the forms collected by their international airports or more processed data (punch cards or summary tabulations).

ICAO

A completely centralized ICAO operation would select, extract, process, verify and publish data from the microfilmed flight coupons received from Member States. With the consent of the States concerned, it could also provide special tabulations to meet particular needs of ICAO and other users involving any information on the ticket

A centralized ICAO staff or a company under contract would transcribe on punch cards the statistical data shown on the forms and would publish them periodically. With the consent of the States concerned, it might also provide special publications in order to meet particular needs of ICAO or of other possible users involving any information reported to ICAO.

U.S. Centralized System

French Airport System

B. NATURE AND SCOPE OF DATA COLLECTED

Data Source

Lifted flight coupons of passenger tickets. COD

Flight coupons,
Load sheets, etc.

DOD

Flight coupons.

Scope of Data

All of the information contained in the passenger ticket would be made available for processing by transmission to ICAO of microfilm copies of ticket sampled. This information includes but is not limited to:

- a) City of initial ticket origin
- b) City of ultimate ticket destination
- c) Intermediate cities of transfer between airlines
- d) All other intermediate cities in the ticket routing.
- e) Class of travel for each passenger stage
- f) Name of airline used for each passenger stage.

Depending on whether ICAO adopts, on a world-wide scale, the COD or DOD system of statistics or a combination of both, the scope of the data to be collected will be as follows:

COD System

For each airport:

Date of departure of the flight considered;
Route of the flight from the airport where the form is transmitted;
Number of passengers taken on, broken down by debarkation stop on the flight.

DOD - COD System

For each airport:

Date of departure of the flight considered;
Route of the flight;
Directional origin and destination of each passenger; and the coupon destination of each passenger on the flight considered.

Operations and Services Covered

Scheduled revenue services of international operations of ICAO Member State airlines.

Scheduled and non-scheduled revenue services of all international operations from ICAO Member State airports.

U.S. Centralized System

French Airport System

C. COLLECTION AND REPORTING METHODS

Coverage

Continuous systematic 10-percent sample of international passenger tickets.

Complete coverage of passengers enplaned on international flights.

Collection and Reporting Procedures

The airlines would select and microfilm the lifted flight coupons for international passenger stages under tickets with serial numbers ending in zero or other designated sample basis. The microfilming would be done at a convenient stage in the ticket accounting procedure selected by the individual airline.

The airlines would submit the microfilms to ICAO through, or under the direction of, the national governments.

The adoption of a COD system would mean that the airline personnel would merely have to report on the OD form by station of destination the data already entered on the airlines' load sheets, generally without consulting the flight coupons.

If on the contrary it is a question of a DOD system, the flight coupons are consulted to determine the origin and the directional destination of the journeys.

The airline stations would submit the statistical reports to airport authorities, which would forward them to the national governments. The latter would send the reports, or punched cards or summaries therefrom, to ICAO.

Report Periods and Timing

The microfilmed flight coupons would be forwarded to governments once a month, within a matter of days after the end of the month in which the coupons arrived in the carriers' office.

The airline stations would file the statistical report with airport authorities within 24 hours after departure of the flight covered .

Transmission to ICAO by national governments would depend on the method adopted. If the statistical reports themselves are forwarded - about 5 days after their completion. If punched cards - about 10 days following the end of the month. If statistical summaries - about 30 days following the end of the month.

Reporting Forms and Instructions

No report form required (only microfilmed flight coupons would be submitted to ICAO).

The statistical report form to be completed by airline stations would be prescribed by individual Member States to meet ICAO requirements. It would be part of an existing airport report form or a separate document.

U.S. Centralized System

French Airport System

Reporting Forms and Instructions (Cont'd.)

A standardized punched card format to be used by Member States would be prescribed by ICAO, if this method of transmission is adopted.

A standardized format for statistical summaries to be prepared by Member States would be prescribed by ICAO, if this method is adopted.

Instructions issued by ICAO for use of Member States and airlines would prescribe the traffic coverage, flight coupon selection method, microfilming operation, and procedure for transmitting microfilms to ICAO.

A manual of instructions would be issued by ICAO for use of Member States, airports and airlines prescribing definitions of terms, traffic coverage, collection and reporting method, responsibility for control of data validity, preparation of punched cards and/or statistical summaries (if adopted), and procedure for transmitting the data to ICAO. A complete list of States and airports participating in the statistical collection would be furnished and kept up to date by ICAO.

D. PROCESSING BY ICAO

Except for ticket selection and microfilming, the entire statistical operation would be performed by and under direct control of a specialized facility in ICAO. This centralized production would encompass the following steps:

A date will be decided (cut-off date) after which no further microfilms will be included in the analysis, etc. described in the next paragraph. A complete list of airlines from which microfilms are available will be made.

Analysis and extraction of data from the ticket coupon microfilms. Eliminate duplicate coupons by selecting only the first one lifted for each one-way trip by an airline participating in the programme; break round trip and open-jaw trips into two single-direction trips and determine origins and destinations; select and record the data to be included in the published statistics on standardized work sheets. This step would be done by specialized staff of ICAO.

The ICAO operation would be primarily a mechanical one of integrating and summarizing into final tabulations the data received from Member States in report forms, punched cards, and/or statistical summaries. This could be done by an ICAO office or by a company under contract which would perform the following steps:

Determine the method of punching the cards in relation to the data to be recorded on them and to possible developments of the form.

Would punch and check the cards directly from the OD forms.

Would centralize the cards punched by the Member States in cases where they punched them themselves.

U.S. Centralized System

French Airport System

D. PROCESSING BY ICAO (Cont'd)

Preparation of data for machine processing. Key punch and verify cards from the work sheets. This work could be either contracted out or done by ICAO.

Would integrate in the tabulations to be published the data prepared by certain States and the data processed directly by ICAO.

Electronic machine processing. Convert cards to tape, perform machine edit, sort and summarize into final tabulations suitable for photographing and printing. The machine work would be contracted out to a firm specializing in electronic data processing (at least so long as ICAO does not have electronic data processing equipment).

E. PUBLICATION OF DATA

Frequency and Time Periods Covered

Quarterly publication, covering either calendar quarters or other quarters selected to best coincide with seasonal changes, is proposed. However, the data could be published monthly, quarterly, semi-annually, or annually covering such time periods as might be desired after weighing needs against costs.

Publication could be monthly, quarterly or semi-annually, it being understood that an annual recapitulation would be prepared. Quarterly publication would appear to be the most acceptable compromise between the desirability of providing recent data and the concern to avoid excessive expenditure.

Time Lag

If microfilms are received in ICAO within one month after the time-period they cover, publication can be completed within two to three months after the end of the period to which the data relate, depending on the procedures and machines used.

If the statistical reports or the punched cards are received in ICAO within one month after the time period they cover, publication can be completed within the two or three months following the end of the period to which the data relate.

Content

A wide choice in the arrangement and detail of the published data is possible. The plan, as presented, proposes publication of two sets of data, as follows:

First, for each city pair in the sample, (1) the number of directional trips classified by directional routing (DOD/COD) and airlines performing the

There are many different possible methods of presenting the data. The plan presented proposes publication of the following data:

COD System

For each base city: Number of COD passengers routed from this city to a city of reference and vice versa; total

U.S. Centralized System

French Airport System

Content (Cont'd.)

the transportation with travel class for each passenger stage and (ii) the number of passenger stages (COD) with directional routeing and travel class identified.

Second, for each city pair in the sample, the number of tickets broken down by type of trip (one-way, round, round-the-world, etc.)

traffic passing from and to the base city; classification of connections in decreasing order according to number of passengers and the corresponding passenger-kilometres.

DOD and COD System

For each base city: Passenger traffic originating there, broken down by city of true destination and traffic that terminates there, broken down by city of true origin. Data relating to the origin and the destination of the passengers by connections (COD). Lastly, number of passengers who made either connections or a stopover in such city, broken down by city of origin and true destination, compared with the total number of passengers who went from such city of origin to such city of destination, by all routes.

Formats

Illustrative formats for the proposed publication of data as described above are presented in Section V of Appendix 1. Variations on the Formats are attached as Appendix 2.

Formats for the proposed publications as described above are presented in Sections I and II of Appendix 6.

Control Over Disclosure of Data

The amount of information from the passenger ticket released through publication or other means would be determined by prior agreement among the Member States participating in the statistical program. Data published would be made available simultaneously to all participating Member States.

Since the initial plan provides that only nonconfidential data are furnished to ICAO by the Member States, their disclosure by ICAO does not pose any problem.

Each Member State would have and could use for its own purposes, as is the case with existing ICAO statistics, prior to its receipt and publication by ICAO, all of the data collected at its own airports from both its own and foreign airlines, including identification of the reporting airlines.

Control over Disclosure of Data (Cont'd.)

Release of the data of one Member State or exchanges between particular States of their own data in the form of special tabulations could be accomplished subject to approval of the individual States involved.

The furnishing of data concerning a State or exchanges of information between Member States in the form of special tabulations could be carried out if the States concerned so agreed.

Submission of the ticket information in the form of unsummarized microfilms of flight coupons and the full control of these by ICAO would guarantee confidential treatment in accordance with whatever agreement might be established.

F. SPECIAL STATISTICAL SERVICES

The availability in ICAO of all the information in the ticket, either in edited machine tapes or the microfilms, would make it possible for the central statistical facility to produce, where appropriately authorized, special tabulations of published or unpublished data to meet demands of ICAO, individual Member States, airlines, and others.

Possibilities of special publications would be limited by the scope of the information shown on the airport forms. With appropriate authorization special tabulations of published or unpublished data could be made available in order to comply with the requests of ICAO or of the Member States.

G. REPORT QUALITY

Airports

Not involved

Qualitative control: the airport authorities would make test-checks to see whether the data shown on the form agreed with the data contained in the trip record. The knowledge that the airport personnel have concerning the characteristics of the traffic will assist the discovery of errors. Rectifications can be made quickly. In addition, all forms are examined from the point of view of general consistency (their coding, numerical data ...)

U.S. Centralized System

French Airport System

G. REPORT QUALITY (Cont'd)

Airports

Quantitative control: the airport authorities would check whether all the airlines had actually transmitted a form for each flight. This function could be performed in the central administration if that would be more appropriate for the national organization.

Central Administrations

Member States could review periodically their airlines' ticket collection and microfilming procedures for conformance with the instructions issued by ICAO. They could also test continuously for completeness in the microfilm coverage of the airlines.

Quantitative control: the central offices would check whether all the airports had actually transmitted the forms collected by them.

ICAO

A specialized staff would be developed in ICAO with full responsibility for the quality of the statistics and the knowledge and skill needed to discharge this responsibility. Complete centralization of responsibility and processing would provide for maximum accuracy and uniformity in the data. The knowledge of world-wide travel patterns and ticketing practices acquired by the specialized staff will greatly facilitate the detection and correction of errors.

ICAO would be responsible for the machine processing, the arrangement of the format and the publication of the statistics and could make such tests for accuracy as could be performed.

Reliability of the data would be assured also through a comprehensive electronic machine edit in which the raw ticket statistics as extracted from the microfilms would be compared against a master list of verified information on airline service patterns, airline and city codes, etc. (In order that a worthwhile edit could be performed, it is recommended that the minimum information fed into the electronic machine - even if less detail is published - be those cities in the routing representing the directional and on-system origin and destination (EOD/SOD) plus the participating airlines.)

U.S. Centralized System

French Airport System

H. POSSIBILITIES FOR FUTURE EXPANSION

Expansion of Data

The total information contained in the passenger ticket would be available to ICAO in microfilms. Therefore, the detail of the information produced could be expanded, within the limits of such total, without change in the collection and reporting procedures of Member States and their airlines.

After a certain length of time it would be possible, with the consent of the Member States, to expand the original plan, whether it be the COD plan or the TOD plan, by collecting further data to be posted on the OD form, and modifying the report procedures.

In such cases, additional instructions would be sent to the Member States.

Additional Participating Member States, Airports and Airlines

Additional Member States and airlines could enter the program at any time without change in instructions to other participating States and airlines or in the procedures followed by the central facility in ICAO.

Additional Member States or airports might join the system in force without the necessity of amending the instructions already given, the list of participating airports being modified accordingly.

I. SCOPE AND MAGNITUDE OF THE STATISTICAL OPERATION

Airlines having to collect data

International scheduled airlines of ICAO Member States: 165

International airlines (scheduled and non-scheduled) that use the airports in member countries of ICAO: 250

Points of microfilming of coupons
or of completion of forms

Central offices of scheduled international airlines of ICAO Member States where coupons will be microfilmed: 165

Ground departments of airlines at the airports of ICAO Member States served by international flights: 5000

(based on the assumption that each airline has only one central location for microfilming.)

Points of centralization of microfilms
or traffic forms

Not applicable

The forms completed by the airlines will be collected at each airport of

U.S. Centralized System

French Airport System

Points of centralization of microfilms
or traffic forms (cont'd.)

ICAO Member States. The list of airports will be prepared by ICAO. It can be thought it will vary from 400 to 600.

Microfilms will be centralized by States for communication to ICAO: 83 States.

The forms will be centralized by States for communication to ICAO: 83 States.

Flight coupons or forms processed
each year by the airlines

2.5 million of 25 million flight coupons will be microfilmed. 1,900 microfilm submissions will be made each year to Member States.

COD system: 1.1 million forms will be completed by copying documents prepared by airlines for their own purposes and submitted to ICAO through Member States.

DOD-COD system: Read and analyse 25 million flight coupons from 1.1 million forms which will be prepared and submitted to ICAO through Member States.

Flight coupons or forms to be
processed each year by ICAO

2.5 million flight coupons will be read and analysed and data from 1.7 million will be extracted, punched and verified on 880,000 punch cards. Cards will be converted to tapes for processing on electronic machines.

COD system: Data from 1.1 million forms which will be punched and verified on 1.6 million punch cards for mechanical processing.

DOD-COD system: Data from 1.1 million forms which will be punched and verified on 8.8 million punch cards for mechanical processing.

J. SPECIAL EQUIPMENT REQUIREMENTS

Airports

Not involved.

None.

Airlines

Microfilm camera (or other copying device).

None.

U.S. Centralized System

French Airport System

National Governments of Member States

None.

None, if the forms are transmitted direct to ICAO. Key punch and verifier machines - if punched cards are to be submitted to ICAO.

Data processing equipment - if statistical summaries are to be submitted to ICAO and if suitable equipment is not already available.

ICAO

Microfilm viewers.

Key punch and verifier machines - if cards are punched by ICAO staff rather than under outside service contract.

Key punch and verifier machines - if cards are punched by ICAO staff rather than under outside service contract.

Tabulating machine(s) could either be rented or purchased by ICAO.

Electronic data processing either under outside service contract or by ICAO through lease or purchase of equipment.

K. ESTIMATED ANNUAL COSTS

See Part VI, page 43

L. POTENTIAL OFFSETTING SAVINGS

The international ticket statistics made available under this plan could meet many needs of States and airlines for which O & D statistics are now collected by some national governments (centrally or at airports), could be exchanged between governments and between airlines, and could be produced by airlines for their own use. As a result, some of these existing national collections might possibly be eliminated or curtailed. In addition, availability of adequate statistics from ICAO might ultimately reduce, in some cases, the need for additional States to impose new O&D collection requirements on the international airlines.

The participation of all the Member States of ICAO in world-wide origin and destination statistics might permit simplification of the national systems based on airport documents in those States which collect the data both on arrival and departure of the aircraft, since collection on arrival might no longer be necessary.

U.S. Centralized System

French Airport System

M. POTENTIAL REVENUES

The proposed statistical publication described under a preceding heading would have considerable value to many users who could be expected to pay a reasonable price for it. Also special services could be made available, as described under a preceding heading, for which charges would be made to the recipient parties. The potential revenues from sale of the published statistics and performance of special services can be applied to cover ICAO's total costs of production.

N. ELIMINATION OF DUPLICATION AND FILLING OF GAPS

Assuming that 100-percent participation were achieved there would be only a problem of duplication. Under this assumption, all airlines would report all zero-ending coupons for international travel. The analyst at ICAO would scan all these coupons using (for DOD) only those coupons covering the first international stage of each trip. Under this procedure there would be no duplication.

If some airlines do not participate, reporting gaps will be created but can be filled partially through the following process. At the cut-off date, before processing begins, the air carriers who have submitted microfilms will be listed and this will become the list of participating airlines to be used in preventing duplications and filling gaps. As the analyst looks at each coupon he determines whether it is the first international segment. If so, the coupon is used. Otherwise, he determines if any prior international segment were carried by a reporting carrier. If so, this coupon is not used. If not, it is used.

This procedure will insure inclusion of those trips where at least one international stage is by a reporting carrier. It will not include those trips where all international segments are carried by nonreporting carriers. In other words, the gap in the data will be confined to

The Airport System, irrespective of participation, either under the COD system or under the DOD system, does not entail any duplication: none is entailed under the COD system because passengers are recorded once only, at the time of embarkment, for that part of their trip for which there is a flight coupon.

- None is entailed under the DOD system, because the form prepared at the airport of true origin of each passenger is the only one that is used for counting passengers whose true origin is at that airport

The System with 100% participation does not entail any gaps either, since at each participating airport no passenger, whether on a scheduled or non-scheduled service will be recorded on a form.

Gaps may occur, however, if the airports of some countries do not participate in the system. Such gaps could, to a certain extent, be filled in the following cases:

- Under the COD system, whenever a passenger who has embarked at a non-participating airport disembarks at a participating airport (an adequate measure will be for the latter airport to prepare a form upon arrival of the flight concerned);

U.S. Centralized System

French Airport System

N. ELIMINATION OF DUPLICATION AND FILLING OF GAPS (Cont'd.)

international passengers whose travel is restricted solely to on-system movements over one or a combination of non-reporting carriers. If the non-reporting carriers are confined to those handling small volumes of traffic, the distortion would be relatively unimportant.

- Under the DOD system, whenever a passenger, originating at a non-participating airport, embarks, at a later stage of his trip, at a participating airport (a possible measure will be for the latter airport to have it mentioned on the form that a special mark is made, opposite the name of the non-participating airport indicated, as the passenger's point of origin).

O. POSSIBILITIES FOR STEP-BY-STEP INTRODUCTION OF EACH SYSTEM

By completely separating the collection and analytical process, the U.S. system is intended to minimize the burden on airlines. The microfilming method is designed to cut down both the expense and complexity of collecting O&D Statistics so that, to the extent that this result is achieved in practice, these particular obstacles to wide participation will be reduced.

Many airlines already collect some form of O&D Statistics and, in this respect, a basis for wide participation at the beginning would exist. The system, however, is capable of step-by-step implementation. For any group of participating carriers, the collection would be complete for their systems. The addition of a new carrier to the system would not affect procedures followed by the other participants, and would require only a slight modification of instructions to be followed by the centralized processing staff at ICAO. Extension of the system by the reporting of new airlines would be independent of the existence or quality of any local or national systems of collection.

The U.S. Centralized System is also adapted to step-by-step implementation of the scope of the statistics. Since the entire information on the ticket is collected in the microfilming procedure, the statistical publications could be started with the processing of the minimum scope and expanded step-by-step as experience permitted a better assessment of the costs of processing and the needs to be served.

The French Airport System is already applied nationally by a certain number of countries, either on a COD or DOD basis.

The progressive application of this system on an international basis could start by the linking together of national systems already in existence. Because of basic similarity of the statistics collected, this operation could be carried out without difficulty by standardising the information to be reported. Its immediate results might include relatively complete information between pairs of nations or within particular regions. Simplification of statistical procedures might also be possible, e.g. the elimination of reporting of statistics of arriving aircraft, to the extent that the same information could be obtained from the aircraft departure reporting of another participating country.

The further extension of the system could proceed along two parallel lines:

- by developing COD statistics, from countries collecting statistics on that basis, into COD-DOD statistics by the extension of uniform reporting methods to the airports of the participating countries;

- by extending to other countries the regional COD or COD-DOD systems once these systems have been perfected by experience.

With the development of the COD system on a regional basis, the information obtained on traffic flow between participating countries would be complete.

PART V - EVALUATION OF THE ADVANTAGES AND DISADVANTAGES OF THE PROPOSED SYSTEMS

38. Any ICAO system of collection of OD statistics must depend upon a very high degree of participation to be widely useful to all member States. Participation by States should be such that a high proportion of international civil aviation is encompassed by any given system adopted.

39. ICAO Member States as a whole and individually in deciding whether an ICAO system is worthwhile would want to evaluate the advantages and disadvantages of the system in light of their own particular needs and uses. In order to assist in such an evaluation process, the Panel has developed a set of basic standards of evaluation, by which the usefulness of O and D statistics could be judged.

40. Evaluation Standards

A. Quality of information

- a) Nature and limitations of sampling
- b) Consistency and uniformity
- c) Reliability of 1) material collected
 ii) procedures.

B. Timeliness

- a) Reporting to ICAO
- b) Availability to users.

C. Completeness

- a) Degree of filing
 - (i) Overall filing (without reference to regions)
 - (ii) Geographical regions (by traffic areas, etc.)
- b) Scope of information (i) collected
 - (ii) in format
 - (iii) expandability.

D. Costs

- a) Burdens to:
 - (i) ICAO
 - (ii) States
 - (iii) Airports
 - (iv) Airlines.
- b) Compensations:
 - (i) Elimination or utilization of existing systems of reporting
 - (ii) Revenues from sales.

41. Application of evaluation standards to possible uses in relation to various types of O & D statistics

The evaluation standards listed under para. 40 cannot be considered in isolation but need to be considered in relation to the possible uses and the possible types of O & D. The Panel does not consider it within its terms of reference to pass judgement on the possible uses — whether or not possible uses are real or important — and in no way attempts to evaluate the usefulness of various concepts. However, the Panel considers that any proposed system of OD statistics should be evaluated in relation to possible uses. Therefore, in carrying out its evaluation process, the Panel as a first step has applied the standards referred to in para.40 to the various possible uses listed in Part III. The result of this examination is summarized as follows:

A. QUALITY

Obviously, a high standard of quality is desirable for all uses but quality must be balanced against cost. It is only perhaps for a few possible uses that quality is an overriding consideration.

Sampling

A world-wide O & D system based on one single sampling ratio might fail to meet the requirements of some important uses. For high traffic volumes 10% sampling could generally be considered adequate but for low traffic volumes, a higher sampling ratio or even a 100% count might be necessary. For instance, for purposes of reviewing capacity under bilateral agreements, it was commonly felt that a 10% sample would be insufficient, except on the higher volume routes. For research purposes, it was felt that 10% would in most cases be adequate. The degree of accuracy for various samples under various conditions are shown in Appendix 10 .

Other quality requirements

A high degree of consistency, uniformity and reliability is desirable for all uses, but here again, it is probable that for general research purposes under Items (c) to (h) of the list of possible uses in Part III, such a high degree of reliability and uniformity is not so essential, especially as O & D data would be used in conjunction with other information.

B. TIMELINESS

The results of the survey on possible uses conducted within the United States suggested that at least as far as users within the United States were concerned, a time lag between three to six months was essential for the statistics to be of maximum use and that a lag of longer than a year will generally seriously impair usefulness. Possibly similar timeliness standards would be required by users in other countries.

The periodicity of publications is considered important to the question of timeliness because the lower the periodicity, the greater is the average time lag in the availability of the statistics. For some uses or users, monthly compilation might be considered desirable but such frequency of general publication would not be practical although special analyses could be produced in this way.

Airlines may need very recent O&D data of their own operations for managerial purposes and it is considered unlikely that ICAO O&D statistics could meet this need.

C. COMPLETENESS

(a) Degree of Filing

As 100% filing is unlikely, gaps are almost inevitable in any system, at least at the outset. The nature of the gaps will vary according to the system adopted and will affect the usefulness for different purposes. Under one system, it may be possible to achieve completeness in individual areas or regions and under another system, it may be possible to achieve completeness for individual airlines.

(b) Scope of Information

Different local conditions and practices in ICAO Member States may result in different evaluations of various O&D elements and therefore different scopes of information may be required.

In some contexts, information about passengers travelling on non-scheduled flights could be considered important. Where O&D statistics are collected for both scheduled and non-scheduled services, the two should be separable for the purposes of analysis and publication.

D. COSTS

The evaluation standard of "costs" is of high importance but it cannot be applied to individual uses in isolation but only to the general usefulness of the statistics. One important aspect of costs is the ability of an ICAO system to replace existing national systems of collection. The possibility of substituting ICAO for national O&D statistics would depend very much on the quality, timeliness and completeness of the ICAO data. Doubts were expressed of the likelihood that national systems would be abandoned following the setting-up of an ICAO system.

42. Application of evaluation standards to the United States (centralized) and the French (airport) proposed systems

- 42.1 The proposals submitted by the U.S. and the French Panel Members are based on completely different considerations and in order to evaluate them properly, these differences must be kept in mind.
- 42.2 The U.S. system introduces a new concept for the collection of international statistics which completely separate the collection and processing procedures thus relieving airlines and States of all responsibility for the technical statistical processing. An international organization (ICAO) collects statistical raw material which is then centrally processed. The scope of information provided under the system is limited only by the content of the basic document (the ticket). The system is based on the technological processes of microfilming of tickets and on electronic computers which will allow the realization of its maximum scope.
- 42.3 The French system follows more conventional methods of international statistical collection which makes airlines, airports and states responsible for technical statistical collection and processing in accordance with standards set by the international organization (ICAO). Under this system the statistical information is generated through national statistical systems and then transmitted to ICAO. Methods of processing of data, transmittal, etc. are adapted to local conditions.
- 42.4 The Panel has made an effort to evaluate the two systems through the application of the set of evaluation standards developed by the Panel, and which have been described in detail in paragraphs 40 and 41 above.

The comparative evaluation appears on pages 37-42.

U.S. SYSTEM

FRENCH SYSTEM

A. QUALITY

(a) Nature and limitation of sampling

The system provides for systematic non-stratified sampling of tickets. The system has been costed on the basis of a 10% sample but is adaptable to other sampling ratios. Whether or not it is adaptable to stratified sampling or other sampling practices has not been explored. Sampling errors of a 10% sample will not be significant for high traffic volumes, but for low traffic volumes estimates based on a 10% sample, particularly estimates for short time periods, will be subject to fairly wide margins of error. (See Appendix 10)

The system is based on a 100% count of passengers departing on international trips from international airports. In order for this method to provide a 100% coverage of arriving passengers, all international airports would have to participate or special procedures would have to be established for counting passengers arriving from nonparticipating airports. The system could in theory be adapted to sampling methods. A sampling scheme applied to 400 or more airports would be difficult to implement and control, but the possibility has not been fully explored.

(b) Consistency and uniformity

A very high degree of consistency and uniformity in the extraction of data should be achievable, since extraction is centralized and performed by specialized staff who would develop high skills in interpreting tickets.

COD The extraction of COD data, from load sheets, or from ticket coupons or from other documents is straight forward and no consistency problems arise.

DOD It will be difficult to ensure consistency and uniformity of interpretation of complicated routings in deriving DOD as the processing of the source document is dispersed over some thousands of airline stations and is performed by airline personnel who also perform other duties. Local knowledge, however, could be helpful where problems of legibility arise. If cards are punched and processed by States, standardized ICAO procedures must be followed to ensure consistency of data.

	U.S. SYSTEM	FRENCH SYSTEM
(c) Reliability (1) of material collected	<p>The first international coupon lifted by a participating airline for the DOD trip (which may contain several coupons) is used for the extraction of data. Changes in routing, changes in airline, or cancellations may be made after such coupon is lifted. Therefore, the destination for the DOD trip and its COD elements following the coupon from which the data are taken may not always be accurately measured and no provision is made for rectification of these discrepancies.</p>	<p>Each coupon lifted is used as the source of data and as the individual COD's are derived from each coupon as it is used errors through ticket changes or cancellations do not arise for COD data. For the unduplicated DOD trip, the first international coupon lifted at a participating airport is the source of the data. Changes may be made in the ticket after this coupon is lifted. Therefore, the directional destination may not always be accurately measured. Other routing elements such as COD and names of airlines would likewise be subject to inaccurate measurement if included in the DOD routing.</p>
(11) of procedures	<p>The possibility of deliberate bias in the reporting of information could arise in two ways. Firstly by the allocation of the tickets nominated for the sample to particular traffic. This risk could be reduced by periodic changes in the ticket number used for the sample. Secondly, by the omission from the sample of tickets which were nominated to be included. States could broadly check the number of tickets submitted by their airlines against other airline statistics available to States.</p>	<p>The possibility of deliberate bias in the reporting of information arises in two ways. Firstly, by incorrect reporting of data on the traffic form by individual airline stations. Secondly by the omission of some traffic from the reporting form. The sample checks by airport staff provided for in the system would reduce the scope for deliberate bias.</p>

U.S. SYSTEM

FRENCH SYSTEM

Protection against clerical and mechanical errors in the transcription and manual processing of the data could be provided by the machine edit in ICAO, which has been included in each of the five scopes costed.

Involuntary errors could have the same effects and could be remedied in the same way. Furthermore, if the staff had forgotten to establish a form, that would also be detected by means of the comparisons made between the number of aircraft departures in one day and the corresponding number of forms.

Accuracy of the information entered on the forms is the responsibility of airports and States. ICAO staff has only the function of general supervision and control of the tabulations.

B. TIMELINESS

(a) reporting to ICAO

Microfilms of coupons lifted are forwarded to ICAO either via State offices or directly by the airlines to the Organization. No intermediate processing is involved in this system and very prompt transmission of information is possible. The airlines would find it to their advantage to microfilm the tickets as soon as possible in order not to delay their own revenue accounting.

The system allows for the possibility of the processing of material by States before submission to ICAO either by summarizing the traffic form or by the production of punched cards. Unless States followed standardized procedures such decentralized processing would delay transmission to ICAO more than it would save processing time in ICAO.

(b) availability to users

Since all processing is done by ICAO, the data is available to all users simultaneously after publication by ICAO. Processing can be completed in accordance with a strict timetable by use of a "cut-off" decision, so that a decision can be made to

Since the system allows for the processing of information by States before transmission to ICAO, each State could have the information relating to the traffic from its airports before it is

U.S. SYSTEM

FRENCH SYSTEM

maintain timeliness by omitting late reporters. Under this system information will be complete at the cut-off date for all airlines from which microfilms have been received.

available to other users through publication by ICAO. Under this system information will be complete at the cut-off date for the departing traffic of all airports from which statistics have been received.

C. COMPLETENESS

(a) Degree of participation

The value of the system would depend on a high degree of participation by airlines which participation is, of course, the responsibility of the State concerned. However, the system provides for the reducing of gaps by utilising any information contained on the coupons submitted by participating airlines relating to stages performed by non-participating airlines. Traffic coverage would be complete for all participating airlines. Gaps would therefore be confined to traffic travelling entirely on tickets in which no participating airline is involved. This technique for partially filling the gaps is confined to the ICAO processing stage and does not require any special procedures in the collection and transmission of data.

The value of the system would depend on a high degree of participation by airports which participation is, of course, the responsibility of the State concerned. Some information about traffic at nonparticipating airports could be obtained from participating airports (e.g., by the use of 'arrival' forms) but this would be a costly procedure involving complicated instructions to airports. However, even if serious gaps exist, statistics relating to COD and DOD traffic between participating airports would be complete and statistics of outgoing traffic at all participating airports would be available. To the extent to which coverage in a given area was complete, it would be possible to obtain a picture of regional traffic.

(b) scope of information

(1) collected

All the information contained on the ticket is collected and is therefore available for processing without any additional cost of collection or transmission. The data transcribed is taken from the first international coupon lifted in a DOD trip.

U.S. SYSTEM

FRENCH SYSTEM

For DOD trips consisting of two or more coupons, it is possible that the detail of the subsequent coupons is not always complete (for example the date and the name of the carrier is often left 'open').

The scope included in the cost estimates is limited to COD and the DOD associated with each COD. Non-scheduled traffic is included.

(ii) in format

The maximum scope of detail for publication which has been included in the cost estimates of the system is DOD with all COD's associated in routing sequence, with participating airline and travel class for each COD. Five different scopes have been costed, the simplest being confined to DOD without intermediate routing.

The maximum scope of detail for publication which has been included in the cost estimates of the system is COD alone and DOD without intermediate routing. The minimum scope included in the costing is COD.

(iii) expandibility

The scope of information made available to the user can be expanded to cover all information contained in the ticket, within agreed limits of disclosure. This expansion would involve no extra costs in collection or transmission, but only in processing. Insofar as the expanded information is required by special users; consideration could be given to re-covering some or all of the extra costs. All coupons of the sample ticket are collected and individual COD data could be based in each case on the corresponding coupon with increases in the estimated costs of processing, but not of collection.

The scope of information made available to the user can be expanded to cover identification of airlines for COD without increasing the scope of collection. Any further extension of information could only be achieved by extending the scope of the information to be collected at considerable increase in costs to airlines and to governments. Any extension would probably affect the quality of all the information collected.

U.S. SYSTEM

FRENCH SYSTEM

COSTS

(a) burdens

The costs (based on 1961) of operating this system arise at 165 airline head offices, at 83 Member States and at ICAO. The costs for airlines and for States derive from collection and transmission of data and do not vary with the scope of information to be processed and published. The largest part of the cost falls on ICAO, for the processing and publication of the data, and their costs vary with the scope of information. Because total costs contain a large fixed element, they do not vary greatly with variations in scope of information to be published. The estimated total costs, based on theoretical calculations range from \$240,000 p.a. for the minimum scope to \$414,000 for the maximum scope, which includes a minimum of \$70,000 for machine editing. Thus from a costs viewpoint, the System is at its greatest advantage for the widest scope of information, and is relatively costly for low scope.

The costs (based on 1961) of operating this system are dispersed over a large number of points: 5,000 airline stations, between 400 and 600 airports, 83 Member States and ICAO. Actual costs are likely to vary widely between different airline stations, between different airports and between different States. It depends on the local conditions whether or not airlines can absorb - in their normal workload - the data-collecting work at their airport stations. In certain States or at certain airports, the creation of completely new procedures might be required. Estimated costs based on theoretical calculations show that the largest part of the costs falls on airlines. Total costs are relatively low for the minimum scope of information, but increase rapidly with increases in scope. Total costs range from \$188,000 for the minimum scope to \$824,000 for the maximum scope. Thus from a costs viewpoint, the System is at its greatest advantage for minimum scope of information, and is relatively costly for high scope.

(b) compensations
elimination
or utilization
of
existing
systems of
reporting.

In the long run, with a high degree of participation, reliability and timeliness, some existing national systems of O&D might be abandoned and the need for new national systems averted.

Countries who already operate airport O&D collection systems might utilize existing procedures. Few countries operate DOD systems of airport collection, but many operate COD systems. In the long run, current collection of arrivals information at airports might be abandoned. Airport collection of O&D data might be combined with the collection of other airport activity and traffic statistics such as those related to freight and aircraft type.

PART VI - FINANCIAL IMPLICATIONS

43. In the history of ICAO's consideration of Origin and Destination Statistics, the financial implications have always been a foremost subject of concern. This was also one of the reasons which motivated the Second Statistics Division (1952) in recommending abolition of the system then existing in ICAO.

44. The Third Statistics Division (1958), made recommendations which resulted in the establishment of this Panel, one of whose main tasks was to consider the costs involved in developing systems of origin and destination statistics. At the First Session of the Panel (1959) it was recognized that costs could vary according to the nature and completeness of any proposed system and with the accuracy, reliability and timeliness standards determined. It was also considered that the use of sampling techniques combined with the most up-to-date methods of mechanical and electronic data processing would be an important factor in reducing costs.

45. The Panel's Second Session (1960) concerned itself largely with the cost estimates submitted by the United States member in respect of his system, while the Third Session (1961) studied detailed costing variants of the U.S. ticket analysis proposal. Following this meeting a Working Group of IATA airline representatives was set up to determine the standards to be followed in assessing certain costs which had not been included in the original U.S. cost estimates (e.g. ticket coupon selection and microfilm equipment). In respect of the French Airport System, another Working Group composed of the French, German and Swiss members of the Panel, and a representative of IATA, carried out actual cost studies of the airport collection system at airports in France, Germany and Switzerland.

46. The Fourth Session of the Panel (1962) established a Working Group to consider the work accomplished by the two groups established at the previous session, as well as additional information made available. This Working Group held five lengthy meetings at which every aspect of the costs was examined and debated. It agreed to make a number of changes in the cost estimates of both the airport system and the centralized system of O&D statistics, but could not agree to undertake the collective responsibility of presenting the cost estimates at its own. The Working Group resumed its work at the Fifth Session in 1963, requiring five additional meetings to arrive at a suitable statement of its final conclusions. Reference is made to the full text of the Report, at Appendix 8, the following table being reproduced from Attachment 1 to the Working Group's report:

SUMMARIZED COST COMPARISON BETWEEN THE UNITED STATES CENTRALIZED SYSTEM AND THE FRENCH AIRPORT SYSTEM
 (Based on 1961 Traffic)

UNITED STATES CENTRALIZED SYSTEM - 10% SAMPLE OF COUPONS LIFTED					TOTAL COST TO	FRENCH AIRPORT SYSTEM - 100% COUNT OF DEPARTING PASSENGERS			
DOD/COD airlines, travel class	DOD/COD airlines	DOD/COD	DOD/SOD	DOD		COD	COD-DD	DOD	COD-DOD
		United States Dollars				United States Dollars			
\$ 56 300	\$ 56 300	\$ 56 300	\$ 56 300	\$ 56 300	Airlines	\$ 69 910	\$137 132	\$517 854	\$540 466
-	-	-	-	-	Airports	\$ 19 508	\$ 44 870	\$ 48 230	\$ 54 952
\$ 14 500	\$ 14 500	\$ 14 500	\$ 14 500	\$ 14 500	Governments	\$ 15 976	\$ 15 976	\$ 15 976	\$ 15 976
\$343 500	\$319 900	\$283 600	\$258 300	\$170 300	ICAO, including contract work	\$ 82 180	\$145 900	\$199 712	\$212 740
\$414 300	\$390 700	\$354 400	\$329 100	\$241 100	GRAND TOTAL	\$187 574	\$343 878	\$781 772	\$824 134

Notes to this Table

The Working Group submitted this Table as its collective work, summarizing the cost estimates of both systems as amended, without implying acceptance of the estimates by the Working Group as a whole, leaving the responsibility for each of the cost estimates to its own sponsors.

Reference is made to Part II of this Report, where definitions are given for some of the abbreviations appearing in the column headings, and to Parts IV and V where the contents of the proposals costed here are compared and evaluated, including publication formats. Nevertheless, the column headings are further explained below, for convenience:

A) United States Centralized System

DOD/COD, airlines, travel class

Cities of directional origin and destination with COD components associated in routing sequence and identification of airlines providing the transportation and class of travel for each COD component. This is the maximum scope costed for the U.S. system.

DOD/COD, airlines

Same as above but excluding class of travel.

DOD/COD

Same as the immediately preceding item but excluding airlines.

DOD/SOD

Cities of directional origin and destination with SOD (origin and destination on each carrier system) components associated in routing sequence.

DOD

Cities of directional origin and destination. This is the minimum scope of published data costed for the U.S. system.

For the last three scopes listed above, the cost estimates include the extraction from the tickets of DOD/SOD plus airlines as a minimum and the use of this detail to perform on electronic machine edit which results in the inclusion of approximately \$70,000 in the cost estimates for the DOD scope not required except for the edit.

B) French Airport System

COD

Cities of coupon origin and destination.

COD/DD

Same as above, plus city of directional destination (DD).

DOD

Cities of directional origin and destination.

COD/DOD

Cities of coupon origin and destination and cities of directional origin and destination taken separately, i.e. without being related in routing sequence.

47. In the U.S. system, a COD scope has not been proposed in the system and has not been costed. This is the minimum scope costed under the French Airport System.

48. The absolute level of costs for all scopes above may not be completely accurate, but the pattern of costs shown for the different scopes under each system is meaningful.

Reservations on cost estimates

49. In the course of the Working Group's proceedings a number of major statements were made by the participants. The most important of these are reproduced in Part A below for convenience, but reference to the Working Group's Report at Appendix 8 should be made for the full text of the reservations which are merely described in Part B below.

A) Main statements as to the cost to airlines.

Statement by the United States and the IATA
Representatives on the Working Group

Statement by the French Representative
on the Working Group

With respect to the Statement of the French Representative on the Working Group, appearing on the right, the representatives of the United States and IATA strongly objected to this application of the added cost concept, insisting that the work performed by airline staffs be fully reflected in the cost estimates, that is, on a fully allocated cost basis. It was their view that the added cost concept is justified only if the work being costed can be postponed for periods of time, when necessary, and be eliminated before additional staff must be hired because of increasing overall total workload. Neither of these conditions exist in the airport system because airlines must submit reports within 24 hours after each flight's departure and would not be permitted to eliminate the work.

In connection with the cost to airlines calculated under the French airport system, the French delegation wished to record its view that these costs are theoretical calculations, not necessarily corresponding to real expenditure, and that they may therefore have to be reduced, as the method currently used to fill the required traffic form at the French and German airports, for instance, if extended to the whole world, would in the extreme case, enable the costs to the airlines to be considered as nil.

B) Other statements
(See Appendix 8 for detail)

By U.S. Representative

By French Representative

(i) Costs to Airlines

Production rates for completing basic Form in French system believed too high.

Production rates maintained to be adequate.

(ii) Costs to Airports

Cost of printing traffic forms, checking and transmittal in French system believed too low.

Costs to airport stated to be based on actual experience in 3 countries.

(iii) Costs to Governments

Cost of control believed too low in French system.

Cost of control believed too low in U.S. system.

(iv) Costs to ICAO

Tabulating machine costs believed too low in French system.

Production rates for analyzing tickets in U.S. system considered too high.

Projection of cost estimates

50. The cost estimates for both the U.S. centralized system and the French airport system are based on cost levels and traffic estimates for the year 1961. The Working Group on costs considered whether the cost estimates should be updated and even forecasted for a period up to five years from the present, but did not believe advisable to do so within the time period available to it during the Fifth Panel session. Instead, the Working Group indicated that whenever this may be required in the future the cost estimates, including the cost to ICAO, should be updated on the basis of the information outlined in greater detail in the basic documentation of the Panel.

PART VII - CONCLUSIONS

INTRODUCTION

51. The Panel was constituted to study the technical aspects of O&D statistics collection by ICAO. Matters of policy were outside its terms of reference. But because this subject in which technical and non-technical aspects are interwoven has given rise to much controversy the Panel has had to take much time and particular care in studying the subject and in formulating its conclusions, excluding as far as possible any but technical criteria. The principal sources of the difficulties are:

- a) the extent to which O&D statistics might disclose details of an airlines traffic of benefit to competitors;
- b) the different values placed on different types of O&D statistics by different States;
- c) the different bases of collection of O&D statistics in individual States which in some cases involve incompatible systems;
- d) the lack of knowledge of defined needs and uses of most Member States and ICAO for O&D statistics.

52. The Panel has tried to develop conclusions of the widest possible value to Member States whatever the particular opinions, preferences or purposes that these may have. To properly evaluate the conclusions of the Panel the following assumptions on which they have been based should be noted;

- a) the Panel does not assume or attempt to predict the particular set of conditions in which an international system of O&D statistics would be organized or operated;
- b) the Panel does not presuppose the intentions of Member States or Council and its conclusions have not been drawn with a view to any particular course of action by either;
- c) the Panel has attempted, where necessary, to relate conclusions to specific contexts.

GENERAL CONCLUSIONS

53. (1) A minimum set of concepts and definitions for O&D statistics was developed, comprising TOD, DOD, SOD, and COD, and combinations of these with routeing with the idea that they might be used in future work in O&D statistics by ICAO. Simplification is necessary in any analysis of O&D statistics for practical reasons, and while the Panel considered further refinements such as multi-destinations and stop-overs, it was unable to arrive at definitions sufficiently precise for general application in an international system. (See Part II!) One such necessary simplification is the splitting of dual

directional tickets into two directional halves and the selection of one destination (out of perhaps other possible destinations) as the directional destination. This, and other necessary simplifications, means that certain possible needs (such as those requiring the analysis of stop-over, or of multiple destinations) might not be fully met by a generalized system of O&D statistics.

- (ii) Before the introduction of an ICAO system of O&D statistics, it would be desirable to establish the nature of the needs of Member States and ICAO and assess how far a particular generalized world-wide system would meet these needs. It would be wrong to establish costly procedures for a particular ICAO O&D statistics system if it was not able to meet the needs because of its generalized nature or because of limitations of its scope. The Panel therefore includes in this report (Appendix 9) a suggested questionnaire which could be used as a basis, not only to assess the strength of Member States' needs but also to indicate the nature of these needs. The questionnaire is drawn up in particularly precise terms to achieve this purpose.

- (iii) The Panel developed criteria for the evaluation of O&D systems such as quality of information, timeliness, completeness, and cost and its conclusions on each of these elements and their application to the systems are found in Part V of the Final Report. It is believed that these conclusions may serve as a useful guide for future evaluation of O&D systems by ICAO and Member States.

- (iv) Because of cost considerations, the use of sampling for international O&D statistics will depend on the relationship between scope and volume of data. For statistics of restricted scope, e.g., COD, 100% sample might be feasible in most cases; for wider scopes, mainly DOD, the use of sampling might well be a prerequisite for obtaining any world-wide information of this type.

- (v) For any world-wide system of O&D statistics the ticket would appear to be the most suitable primary source of information. Other sources of information are available and made use of in particular countries but the ticket is generally available for scheduled services and contains the fullest information in a standardized form.

CONCLUSIONS ON "CENTRALIZED" AND "AIRPORT" SYSTEMS

54. General

- (1) The two systems studied in detail by the Panel, the centralized system and the airport system, together with their variants or combinations, represent the more practicable types of O&D statistics collection for international purposes. The Panel's study of these systems was most thorough and no essential technical implications of either are likely to have been overlooked.
- (11) The two systems are basically different in the methods of collection, in the procedures of processing, and in the scope of information produced. The choice between them is thus not reducible to a straightforward selection of one or the other. Each has different points of strength and weakness.

Centralized System

- (iii) The minimum prerequisite for the adoption of this system by ICAO would be the demand for DOD statistics with or without routing on the part of Member States whose airlines carry a significant share of world traffic.
- (iv) Advantages of the system which would be realized under most conditions are:
 - a) transmission of the full information on the ticket to the central processing office would permit the widest possible scope of information now available for analysis and publication;
 - b) separation of the collecting and processing steps would give a single direct control over statistical processing and make high quality and uniformity attainable in that respect;
 - c) due to the use of sampling and collection of data by microfilm, additional participation and wide scope could be obtained at a relatively low incremental cost to the central processing office;
 - d) since raw data is transmitted by microfilm, added coverage or participation by States does not depend on the existence or quality of national systems of statistics, and would not conflict with such systems.
- (v) The system would be most efficient under maximum participation by States. The measure of satisfactory or sufficient participation would be the share of world traffic reported by airlines of participating States. Complete information would always be obtained for traffic of participating airlines, but traffic of

non-participating airlines would be obtained only to the extent that it appeared on the ticket-coupons reported by the participating airlines. The system sample will provide complete coverage of scheduled services between all city pairs where all airlines, serving either city in the pair, participate and it will provide complete coverage for any region and all pairings with cities outside the region where all airlines serving the region participate.

- (vi) The system might produce useful results under conditions of partial participation but could be hampered as an international system both because of the disclosure of statistics of participating airlines to non-participating airlines and by the disclosure of interline traffic of non-participating airlines with participating airlines.
- (vii) Certain limitations would exist even under optimum conditions; the system is based on a sampling procedure and any weaknesses (or advantages) of this process are inherent in the system; it is not adapted to provide COD statistics in their most useful form, i.e., 100% count, and for this reason would not replace national systems for this purpose; the system, as proposed, does not include non-scheduled traffic and the difficulties of including such traffic have not been explored.
- (viii) The centralized system appears more likely to be an ultimate stage in the development of O&D statistics collection on an international scale. If, in the course of their development national and regional systems should reach a point of diminishing returns, there may be a general readiness to turn to a wholly different method of collection. Certain features of the system might be incorporated into national systems based on the reporting of airlines, the centralized processing being carried out by States.

Airport System

- (ix) This system would represent in its main outlines an extension of the methods now followed in a number of countries for the collection of COD statistics, to an international COD and DOD system. A few States have already extended their airport systems to include DOD data. It lends itself to the building up of an international system where methods of airport collection can be standardized and the results exchanged between participating States. It has the advantage

of building upon existing foundations. As regards COD statistics, collection of these at airports is the logical procedure with local control of the quality of the data. This system could give, without difficulty, 100% reporting of data and complete information for city pairs between participating States. An international COD system, even if only regional in extent, could be put into operation at a relatively low cost. A centralized processing office would be required, but much of the processing might be carried out by the participating States. Such a system might be valuable under many different degrees of participation.

- (x) The principal limitations of this system are: firstly, if a DOD system of statistics were required, attempts to expand it for this purpose would involve increasing complexity in the processing procedures with consequent dangers of loss of quality. It would not be practicable to provide DOD with full routing and DOD without routing would require the inspection of each individual coupon at the airport. The big advantage it possesses in the collection of COD in the consolidation of the information on the load sheets would not be available to it for DOD. Secondly, its extension to a world-wide system would involve problems of maintaining quality in the data and uniformity in the procedures. Thirdly, this system inherently results in disclosure to the collecting State of information on the airlines of other States prior to its becoming available to the latter through ICAO's publication.
- (xi) Under this system, changes in scope would involve considerable increases in costs although the amount would vary with different airports. It is impossible, however, to generalize conclusions in this matter since, in airports where no COD statistics are now collected, the costs, due to the adoption of the system, would be heavy. For some airports it is possible that the demands on the system for COD might be met at little extra cost.

Common to both Systems

- (xii) Both systems studied contain features that would create problems in establishing them on a world-wide basis.
- (xiii) Only one example of a system involving a combination of the two systems was investigated by the Panel. It was concluded that integration of the two systems would be difficult even if theoretically possible.
- (xiv) As a decision to adopt any world-wide system would involve for ICAO a commitment for staff, space and equipment to perform the processing at the central office, it would only be justified if wide participation by Member States and permanence of operation were first assured.

OTHER CONCLUSIONS

55. (1) The Panel suggests that ICAO may wish to encourage States and airlines that are utilizing or developing systems of O&D statistics to adopt methods which will result in least cost to all concerned, having regard to the information required.
- (11) The Panel suggests that ICAO may wish to encourage coordination and standardization of existing systems of O&D statistics and of systems under development, either by mutual exchange of information or by transmission of such information on methods to ICAO for dissemination among Member States interested.

APPENDIX 1.

**PLAN FOR CENTRALIZED
PRODUCTION OF WORLD-WIDE
PASSENGER TICKET AIR TRAVEL STATISTICS**



presented by
UNITED STATES MEMBER

to the
**PANEL ON ORIGIN AND DESTINATION STATISTICS
INTERNATIONAL CIVIL AVIATION ORGANIZATION**

February 1960

PLAN FOR CENTRALIZED
PRODUCTION OF WORLD-WIDE
PASSENGER TICKET AIR TRAVEL STATISTICS

CONTENTS

	<u>Page</u>
I. Introduction	55
II. Proposed Initial Plan	59
III. Definition of Terms	63
IV. Collection and Processing	65
V. Publications and Special Services	70
VI. Costs and Revenues	78
VII. Needs and Users	82
VIII. Advantages Summarized	93
Comments by Respondents to Questionnaire as to Value of World-wide Passenger Ticket Air Travel Statistics	<u>APPENDIX A</u> 96

PLAN FOR CENTRALIZED PRODUCTION OF WORLD-WIDE PASSENGER TICKET AIR TRAVEL STATISTICS

I. INTRODUCTION

Importance of Air Travel Statistics

International civil air transportation serves a world-wide travel market. In a few short years air transportation has virtually eliminated the time impediment to world-wide travel. In terms of travel time the world now is much smaller than were our larger countries a few years ago, and not much larger than were our smallest countries. The pattern of world air travel, however, is still new and formative. It will have, for many years to come, a potential for almost unlimited response to the ingenuity and initiative of those responsible for its promotion and development. The full exploitation of such a new and formative market is dependent upon the maximum knowledge of its size, characteristics, motivations, distribution, seasonality, and service requirements, as well as the trends and directions of its development.

Passenger traffic is by far the most dominant product of the air transport industry. The promotion, development, management and regulation of civil air transportation are, therefore, an essential part of the development of world-wide air travel. Accordingly, the continued growth of the industry itself is largely dependent upon knowledge and proficiency in developing world-wide air travel. As the size of the market grows among all countries of the world, the knowledge by which to promote it will necessarily have to keep pace.

The enormous investments which are being committed to air transportation, the speed with which the decisions for such commitments must be made, and the imminent further technological advancements toward timeless travel greatly expand the hazards in both government and management decisions and correspondingly enhance the value of timely facts with which to guide, test and support these decisions. The rapid growth and technological change in world air travel make the risk of trial and error decisions prohibitive. Practical alternatives are open for the accumulation of timely facts and knowledge upon which to base management action. Under these conditions, a body of facts and knowledge with which to give timely support to management decisions must itself be world-wide in scope. The economic hazards of future world air transport development can be minimized by cooperative efforts in the development of such a body of knowledge.

Evidences of Need

The United States has been collecting and publishing air travel ticket statistics for the past 20 years. These publications have come to be known as origin and destination air traffic surveys. The statistics have been collected both for domestic services within the United States and for the international services of the U.S. flag airlines. These statistics are now so widely used by the United States Government, airlines, airports, research organizations, aircraft manufacturers, and by state and municipal governments interested in the planning and development of air transportation that there is universal support for the further development, improvement and expansion of this type of statistics within the United States.

There is constantly increasing evidence that a common need for air travel market statistics exists throughout the world, and that the interest in collecting satisfactory statistics for the development of the air travel market is shared by many countries. Significant examples of this interest include:

1. The preparation of various kinds of origin and destination statistics by the world's airlines for their own use.
2. The widespread exchange of this type of data between airlines and between states.
3. Collection of such statistics by airports.
4. Publication of origin and destination statistics by several governments.
5. The creation of international travel associations and research bureaus primarily to develop market information.
6. The former origin and destination program of ICAO and the continued interest in this subject within ICAO.

The present extent and ultimate growth of such independent and localized activities are rapidly mounting to staggering over-all burdens in duplicated effort and aggregate cost. Through a centralized program of publishing passenger origin and destination statistics, some order can be created from this uncoordinated duplication of effort and some relief brought to the governments, airlines and airports which must bear the growing financial burden.

Passenger Ticket as Source

The most complete description of the passenger's journey is contained in the ticket through which the travel is authorized. The air travel ticket provides the best available source of data for the promotion and development of air travel in the future. This is true whether the travel market is approached from the point of view of airline management interested in developing additional traffic, governments in connection with developing and regulating airlines, the airport operator interested in providing the necessary facilities and services for airline operations, the aircraft manufacturer interested in designing and producing the vehicles for future operations, or the promoter of tourist traffic interested in advancing the economic well-being of his community or country.

Not only has the speed of modern aircraft virtually eliminated the time dimension in world travel and the very substantial cost which is a function of time, but outstanding and revolutionary developments in modern electronic data processing methods have also made great progress toward eliminating the time element in the processing, compilation, summarization, and analysis of statistics. These new processing methods have made feasible for the first time a world-wide system of air travel statistics of a scope and timeliness adequate to provide the knowledge through which to develop the air travel market.

United States Supports Collection

Accordingly, the United States is presenting herewith a proposal for the collection of passenger ticket statistics on a basis which will meet most of the essential needs for such statistics at the present time, will represent a feasible initial program for those who must participate in their collection, and will permit the future development and expansion of this statistical program to meet the expanding needs of the various participants and users. It would also further the facilitation aims of the Member States of ICAO by offering an alternative to the use of manifests and other clearance documents for the collection of statistics. While definite proposals are being presented and supported as the most practicable basis for collecting air passenger statistics which will meet the basic needs of most users, the United States is prepared to join in any workable program for the collection and publication of useful passenger travel statistics which will provide a reliable measure of the size, shape, and distribution of the world air travel market.

As an expression of confidence in the ultimate value of this program, we firmly believe that once such statistics have been collected and distributed on a timely basis, there will be such widespread use that the statistics will have significant

value and will constitute one of the greatest single contributions to the future development of world-wide travel and civil air transportation. Moreover, it is particularly timely that such a system of statistics and such a body of knowledge should have its origin at this time when air transportation has taken an unprecedented advance in terms of speed and is on the threshold of even further accomplishments toward timeless air travel. It is fortunate, also, that this development of air travel has been accompanied by equally extraordinary progress in statistical processing methods which makes possible a world-wide system of air travel statistics of this type. National governments throughout the world have basic responsibilities for the development of air travel. These responsibilities are reflected through government ownership of many national flag airlines, through the financial support given to aircraft manufacturers, airports and airways, through the regulation and subsidization of air carriers, and through the negotiation and exchange of traffic rights. The effective discharge of such responsibilities of necessity requires the fullest practical development of a reliable body of aviation facts. It is, therefore, fitting and proper that the national governments, through ICAO, should now exercise leadership in developing a useful body of world-wide air travel statistics.

This program, therefore, is submitted in the hope that it will be objectively considered from the point of view of the overriding common interests of the ICAO Member States in the development of world air transportation and world-wide travel among the peoples of all countries. The major objectives are common to all countries. If these basic common interests are viewed in proper perspective, they will overcome the conflicting interests of lesser importance and permit the collection of this body of world-wide travel statistics to make a substantial contribution to the realization of the full potential of world-wide air transportation and air travel from which all nations of the world will benefit.

II. PROPOSED INITIAL PLAN

Basic Considerations

In developing a system of passenger ticket travel statistics in air transportation, there is a range of selection from the absolute minimum, such as ticket origin and destination, to the maximum statistical data contained in the passenger ticket. In initiating any plan, it is of utmost importance to start on a basis that is feasible in relationship to all of the parties, factors and problems that will necessarily be involved in the implementation and operation of such a program. Nevertheless, there are certain basic considerations which can be identified and which are of such importance in making a decision as to determine the basic scope, content, and timing of publication necessary to assure any reasonable success for the project.

A program of this type, like any other business venture, involves the elements of cost and value which together will determine demand for the product and the users to provide that demand. The cost-value relationship must be resolved largely in terms of value. This is true because the cost of the project, regardless of scope, is not going to differ greatly. On the other hand, the value to users of the product is wholly dependent upon scope. Accordingly, the scope of the project must be sufficiently broad to provide the basic data widely needed by most users. If the scope of the product is so narrow that only a few users will be interested, there can be little hope of gaining support for paying the financial costs of the project. On the other hand, if the scope of the project is sufficiently wide to serve the interests and needs of most users, it is wholly unlikely that any difficulty will exist in respect to securing financial support.

Plan Conformed to User Needs

In order to survey user requirements, the United States developed and circulated a questionnaire to some 250 users. This questionnaire was distributed to a great number of private and Government users of the United States origin and destination surveys to determine the particular elements of information contained on the ticket which are of most value to, and most frequently used by, the various users. A more detailed description and evaluation of the results of this survey is presented later in this document.

It is clear from the survey that passenger ticket statistics are of great value to users, particularly when provided on a timely basis. With increased competition in air transportation, with growing emphasis on the early development of supersonic aircraft, and with the enhanced economic value of tourist travel and tourist related businesses throughout the world, it is unlikely there would be any difficulty in financing a program for the collection of passenger ticket air travel statistics provided two conditions can be met. The first condition is that the data be of adequate scope to meet the basic needs of most users. The second condition is that the information be made available on a timely basis. The scope of the program which is herewith presented has been designed primarily to meet these two conditions.

Based upon the considerations stated above, the following plan is proposed as representing the optimum conditions for initiating such a statistical program in terms of cost and feasibility to the carriers in collection of the information, the practicability of processing and publishing the statistics, and the value of such statistics in terms of both scope and timeliness of distribution:

A. Participation, Method of Collection and Processing

1. The survey would be based upon a systematic 10-percent sample collected on a continuous basis by international carriers of countries which are members of ICAO.
2. The information would be collected through micro-filming or other method of making facsimiles of all lifted flight coupons with serial numbers ending in zero.
3. Processing of the data collected would be centralized in ICAO and published quarterly.
4. Machine processing of the data would be performed by a service agency under contract to ICAO, utilizing electronic equipment. Actual ownership of the expensive equipment required for this type of operation would not be economically feasible for the conduct of a single statistical program of this size.

B. Scope of Published Data

1. For each ticket sampled, the following information would be published:
 - a. Initial ticket origin.
 - b. Ultimate ticket destination.
 - c. Intermediate points of transfer between airlines.
 - d. All other intermediate points.
 - e. Class of travel for each passenger stage.
 - f. Name of airline used for each passenger stage.
2. The published data would be arranged in two basic formats to show for each city pair:
 - a. The single-direction trips, both on a directional and coupon origin and destination basis, including detail directional routing and class of service used over the single passenger stage of the city pair.
 - b. The number of tickets classified to show separately the one-way, round-trip, circle-trip including round-the-world, and open-jaw tickets.

C. Provision for Future Expansion of Program

Provision for future expansion of program is inherent in the proposed method of collecting the data since actual copies of the ticket would be transmitted to the central agency. This makes potentially possible the statistical summarization and tabulation, if feasible, of the entire information contained on the ticket.

Value Controlled by Needs Served

It is the purpose of the United States to present a practical proposal for the collection of world-wide passenger ticket air travel statistics. The United States takes no fixed position on any detail of the program. However, the detail has been selected with a view of giving the statistics collected such value as will generate wide support among users of the statistics, and will provide a body of knowledge capable of making substantial contributions toward the further development of the air

transport industry and all other economic activities related to it. Each particular item of the detail is believed to have very substantial value to many, not just a few, users. Any curtailment of the scope will reduce the value of the statistics. However, insofar as there would be serious obstacles to the implementation of any particular element in the proposal, the United States will be in a position to consider the problems on an objective basis with a view to reaching a common understanding consistent with the development of a sound body of statistics.

The Panel would undoubtedly want to consider technically feasible alternatives in approaching problems about which basic differences of opinion would exist in order that the report of the Panel would contain adequate information for proper resolution of policy questions related to these matters through appropriate ICAO channels.

This program and various aspects of it are discussed in more detail in the following sections of this document.

III. DEFINITION OF TERMS

In the presentation and discussion of the proposed plan for collecting passenger ticket air travel statistics, various terms are used which may not be entirely clear without further definition. Accordingly, the more important terms as they are used in this presentation are defined below.

Ticket: The booklet containing the auditor's coupon and individual passenger travel authorizations consisting of the flight coupon (or coupons) covering the passenger's complete air travel itinerary authorized in accordance with the fare paid. Two or more booklets fastened together to form a "conjunction ticket" are considered as one ticket.

Flight Coupon: Each of the component parts of a ticket containing separate travel authority for the different subdivisions of the total travel covered by the passenger ticket.

Passenger Stage: The movement of a single passenger from the point where he boards the airplane to the point where he debarks and for which a flight coupon has been issued.

Coupon Origin and Destination: The point of enplanement and the point of debarkation named in the flight coupon. Corresponds to the starting and termination points of a passenger stage.

Ticket Origin and Destination: The first and last points named in the passenger's ticket.

Ticket Routing: List, in sequence, of cities appearing in the ticket beginning with Ticket Origin and ending with Ticket Destination.

Directional Origin and Destination: Points of initial departure and ultimate destination named in the sequence which indicates the direction of travel. In the case of round trips, circle trips and open-jaw trips, the routing is divided at the city farthest from the point of ticket origin into separate outbound and inbound one-directional journeys, each with its own directional origin and destination.

Directional Routing: List, in sequence, of cities for each one-directional trip authorized in the ticket beginning with the Directional Origin and ending with the Directional Destination.

International Passenger Stage: Movement of a passenger from a point where he boards the airplane in one country to a point in another country where he debarks and for which a flight coupon has been issued.

International Passenger: A passenger whose ticket includes at least one international passenger stage.

Round Trip: A trip that starts and ends at the same point in which the inbound portion retraces the path of the outbound portion.

Circle Trip: A trip that starts and ends at the same point in which the inbound portion does not retrace the path of the outbound portion.

Open-jaw Trip: Essentially a circle trip except that the initial and terminal points are not the same but are relatively close to each other.

City Pair: Two cities between which travel is authorized by a ticket or part of a ticket. May be the cities of ticket origin and destination, directional origin and destination, or coupon origin and destination.

IV. COLLECTION AND PROCESSING

The proposed plan provides for collection of the basic data in the form of microfilm copies of flight coupons submitted to ICAO for centralized processing. Such centralization would result in uniformity in description of trips and recording of data. It permits a specialization in work and a standardization in the statistics that could not otherwise be attained. It provides maximum efficiency in collection and processing of data and provides a basis for the rendering of special services on a cost reimbursement basis.

Ticket as Source of Data

The ticket is the only source document common to all airlines giving a complete description of the passenger trip. Passenger questionnaires or interviews which might produce equivalent information would be prohibitive in cost and contrary to the facilitation aims of ICAO. All other sources are deficient in that they can provide only partial information which it is impractical to piece together to give an integrated picture of the entire air trip.

The following information needed under the proposed plan is readily available from the ticket: ticket origin and destination, directional origin and destination, intermediate cities in the routing, airlines performing the transportation, and classes of services used. All of this information is normally available from any one of the coupons in the ticket. Additional information is contained in the ticket which would provide a basis for expansion of the scope of the program as new needs arise and under such conditions as might be agreed to by the Member States. This additional information includes entries indicating date, time, and flight number for travel over each stage; ticket sale information showing date and place of ticket issue and the issuing airline; and passenger fare information including amounts and terms of payment.

The ticket is prepared and handled with greater care than many other documents from which statistics are derived. It represents an obligation of the airline to perform very specific services and is the basis for passenger revenue accounting and proration. Inaccuracies or illegibility in the ticket can cost the airline money and produce serious inconvenience to the passenger. Substantial effort by both airline management and the passengers is continuously exerted to keep this risk at a minimum. A ticket that appears illegible to the occasional reader often poses little or no problem to the statistical clerk accustomed to reading these documents. Regarding legibility, studies by United States airlines indicate that 95 to 98 percent of all flight coupons can be readily interpreted by experienced statistical personnel.

Ticket revisions are not a serious obstacle to the collection of origin and destination statistics from the ticket. A ticket may be revised in several different ways. Some revisions simply involve changes in carrier codes or

flight numbers. Other revisions may be so extensive as to cause a major change in the passenger's routing and fare. These, however, do not occur frequently and largely reflect an uncharted component of the passenger travel. In cases where a passenger may choose to visit one city instead of another, while it does alter a part of his routing, it does not invalidate the other parts of the routing and will tend to be compensated in the total sample by changes of opposite nature. The effects of any ticket revisions which precede the coupon used in the sample would be included in the information reported.

The almost universal use of the IATA ticket form and procedures for international air travel insures a high degree of standardization and consistency in ticket preparation. In the majority of cases, all intermediate cities in the routing are shown. In all single-booklet tickets these cities are shown in the main body of the ticket. In the case of multi-booklet or conjunction tickets, IATA procedures require showing all points involved in fare construction. This includes all cities at which there is a change in class of service or a change of airline. In addition to these points, at least part of the routing can always be identified completely in the "from-and-to" part of the coupon.

While all of the above problems collectively will affect somewhat the accuracy of statistics based on the ticket, they involve a demonstratively small percent of the total tickets. Sample tests made with United States carriers have shown that such distortions as do result are so small as not to materially reduce the value of the statistics. Moreover, with the development of a highly skilled professional staff within ICAO, it is entirely possible that satisfactory corrective measures can be developed after a period of experience.

Use of Systematic Sample

The ticket statistics, under the suggested plan, would be based on a sample of the total traffic. The size of the sample required depends upon the precision necessary for particular uses and the size of the market being analyzed. The exact specifications regarding the precision required by all of the various users of the proposed survey are not known, but it is probable that they do not differ greatly from users in the United States. It is believed that a continuous systematic 10-percent sample of traffic will provide sufficient accuracy for most purposes for which air passenger ticket statistics under the proposed world-wide program will be used. This belief is based upon the extensive consideration given to sample size requirements in connection with both the U.S. domestic and international surveys. Since every airline would submit flight coupons for 10 percent of its trips, each airline would be assured of a representative measure of its traffic appearing in the finished statistics. However, should the 10-percent sample fail to yield the required degree of accuracy for a particular city pair in one survey period, the user might obtain the required accuracy by combining the samples for two or more survey periods. Thus, an estimate based upon sample data for a half year or longer will be superior to one based upon quarterly data alone.

Selection and Transmission of Source Coupons

A 10-percent systematic sample would be achieved through the selection of flight coupon lifts over international passenger stages with ticket serial numbers ending in zero. The use of the serial number to determine the selection guards against bias that might be inherent in other methods. In order to simplify airline procedures, the proposed plan provides for submission of all flight coupons of each ticket in the sample. Copies of all coupons so selected by the airlines would be submitted to ICAO. From these coupons, ICAO would select those to be used in the sample on a basis that would eliminate all duplication.

The proposed plan would be relatively inexpensive for the individual airline or State. The airline would be called upon only to copy by microfilm (or other similar process) all flight coupons lifted by it for international passenger stages under each ticket with a serial number ending in zero and, once a month, to send the microfilms to ICAO. The airline would not have to make any technical determination or analysis beyond the selection of appropriate ticket serial number and international stages. The airline, for example, would not be concerned as to which international coupons to submit; it would not have to examine or analyze the trip routing or extract data; nor would it have to summarize data or prepare a report to ICAO. All of these steps would be accomplished at the central facility where specially-trained personnel, standardized procedures, and modern machines could be employed.

The suggested procedure of collecting all international flight coupons for tickets in the sample would result in an airline submitting to ICAO more than one coupon for some tickets. However, elimination of this duplication in coupons by the airline would require a system calling for examination of the ticket routing in the airline's office which it is believed would involve more work than the extra microfilming under the suggested procedure. The duplication in trips represented in the flight coupons submitted can be eliminated more easily and on a more standardized basis as a step incident to the processing at the central facility, where ticket routings must be examined in any event.

Microfilming is a fast and economical process. In suggesting the use of microfilming equipment, the problem of legibility is always raised. It is not possible to include a written report of this type proof of the legibility of microfilm projected images of flight coupons. We have, however, made two sample films in which we deliberately used coupons that were difficult to read. From this experience we are convinced that a microfilm image projected on a screen to twice the size of the original document is as legible as the original document itself. Modern cameras, such as that which we have examined for the purpose of this study, are designed to remove many of the problems that existed with the older style cameras; for example, the roll of film can be cut off and extracted from the camera at any time thus eliminating wasted film when cutoff dates do not coincide with complete use of the film. The camera is capable of exposing two films at each exposure. Thus, a duplicate film may be kept as a safeguard against loss in transit.

The light source is easily adjusted so that the best possible exposure for any given color of paper is readily achieved, a system of safety signals instantly notifies the operator should any part of the camera not be functioning correctly and finally, an inexpensive test kit is available to make periodic checks to assure that the film is being exposed properly.

The ticket coupons could be copied by microfilm (or such other equivalent means as might be decided upon) at a convenient point in the ticket accounting procedure of the airline with little delay or interruption to the flow of the tickets. One large U. S. carrier has determined that a single camera operated by one employee could be placed at the desk next to the clerk who maintains the control records as flight coupons are received in the accounting office from all of the flights that are operated. All coupons pass over this clerk's desk. With the camera located at this point, it would be a simple matter to photograph the necessary coupons without seriously affecting the flow of the documents through the accounting office. The cost of a microfilm camera varies with model and other circumstances, but a camera suitable to microfilm ticket coupons can be purchased for \$915 in U. S. currency. Film costs, even for a large volume of tickets, are nominal. For any airline that does not have a centralized accounting office to which all lifted flight coupons are sent, some variation in the procedure would be necessary.

Besides its simplicity for the airline, transmitting copies of the flight coupons to the central facility provides flexibility in the scope of the data to be extracted, processed, and published without affecting the procedures followed by the airlines. The airlines' part in the program would be no different whether the statistics are minimum or maximum in their scope. The instructions to the airlines will be very simple and they will not need revision each time there might be some change in the statistics to be produced. The statistics can be expanded or contracted as may be agreed to by the States without the onerous and prolonged procedures of drafting revised detailed reporting instructions, circulating these for comment, and ultimately issuing them for implementation by all airlines.

Processing by the Central Facility

For maximum economy and speed of production, the electronic machine processing of the passenger ticket statistics should be performed by a service agency on a contract basis operating under the direction of the ICAO Secretariat. It would not be economical or feasible for ICAO itself to rent the electronic equipment necessary to process the data since it could use only a small percentage of the total time available on the equipment. A service agency is in a position to achieve maximum utilization by doing work for a number of organizations charging each on the basis of only the actual hours of usage of the equipment.

The microfilmed coupons submitted by the States would be edited and

analyzed by the ICAO staff using microfilm readers. This analysis would be preparatory to transcription of the necessary information into data processing cards. It would include elimination of duplication by selecting from the microfilmed coupons submitted by all States only the first international coupon lifted by an airline participating in the program. It would also include determination of directional routings for round, circle and open-jaw trips. The actual punching of the data into the cards might be performed by ICAO staff or it could also be contracted out to a service agency specializing in this work.

The remainder of the statistical processing would be performed by an outside service agency. The data in the cards would be converted to electronic tapes from which a master computer would sort the data, accumulate totals, and produce a finished tabulation suitable for photographic reproduction for printing. This tabulation would then be turned over to the printer by ICAO for preparation of the published volumes.

For the purpose of developing this plan, the use of an electronic machine comparable in speed and capacity to the IBM 7070 with 1401 peripheral equipment has been assumed. However, the machine actually to be used could be chosen from among those available at suitable locations with due regard for costs of processing quoted by potential contracting agencies.

V. PUBLICATIONS AND SPECIAL SERVICES

Collection of ticket facsimiles at a central processing agency makes it technically possible to publish all of the data appearing on the ticket. The selection of information to be published depends upon the usefulness of the data, the cost of processing and publishing it, and the willingness of the governments to permit publication of the data. Information collected but not published will provide a reservoir of facts from which to perform valuable special studies and special services when and if needed and authorized.

Users in the United States have found many applications for the information on the ticket which describes the movement of traffic, the carrier, and class of travel. The basic information of almost universal usefulness is the directional routing (directional origin and destination with intermediate points listed in sequence). This is the core of the entire body of origin and destination statistics. The body is filled out by the identification of the airline performing the transportation on each passenger stage, and by indication of the class of travel. Identification of the airline is of value in most uses of the statistics and it is a requirement for some uses. Knowledge of class of travel is also a valuable marketing tool.

Ticket, as opposed to directional, origin and destination statistics also have several uses. Since the identity of ticket origin and destination is lost when trips are broken into directional routings, it is proposed that round, circle, and open-jaw trips be identified in order to provide a basis for determining ticket origin and destination. The directional routing automatically produces coupon origin and destination statistics. In view of the extensive need for coupon origin and destination statistics, it is suggested that they be included in the publication. The various other items of information appearing on the ticket all have at least some application and would, therefore, be of value to certain users on an occasional or limited basis. Owing to their limited usefulness, their publication is not provided for in the initial plan.

The many ways in which origin and destination statistics are used in the United States by governments at all levels, airlines, airports, aircraft and aircraft engine manufacturers and others are discussed in considerable detail in Section VII.

The Basic Publication

There are several methods by which the data could be distributed from the processing agency to users. The basic method suggested is a quarterly publication,¹ printed in two different formats designed to present all of the data to be published in as organized, compact and usable an arrangement as possible. The first format (See Example 1, p. 72) provides for tabulation of the following information:

- 1) Directional origin and destination (DOD)
- 2) Directional routing
- 3) Coupon origin and destination (COD)
- 4) Airline performing the transportation on each passenger stage
- 5) Class of service (first class or other) for each passenger stage

The second format (See Example 2, p. 73) provides for tabulation of the number of tickets by city pair broken down as follows:

- 1) Total number of tickets
- 2) One-way trips
- 3) Round-trips
- 4) Round-the-world trip
- 5) Other circle trips
- 6) Outbound portions of open-jaw trips

The foregoing information would be printed for each city pair in the sample. The figures used in the examples are fictitious and are used only for illustration. All figures shown would be those derived from the 10-percent sample. Estimates for the total ticket population would be obtained by the addition of a zero.

Example 1 shows the volume of traffic on directional routings in three columns Total Both Ways for city pair stage, From Base, and To Base. Each of these columns is further divided to show separately the total volume of traffic and the first-class traffic. Only first-class traffic is identified separately in order to conserve space. Further distinction between class of service is

^{1/} Either calendar quarters or other quarters selected to best coincide with seasonal changes.

EXAMPLE 1

PROPOSED FORMAT FOR PUBLICATION OF DIRECTIONAL
 AND COUPON ORIGIN AND DESTINATION STATISTICS

BASE CITY REFERENCE CITY DIRECTIONAL ROUTING	NUMBER OF PASSENGERS IN SAMPLE					
	TOTAL BOTH WAYS		FROM BASE		TO BASE	
	All Classes	First Class	All Classes	First Class	All Classes	First Class
PARIS FRANCE <u>ROME ITALY</u>						
PAR AF ROM	22	18	10	8	12	10
PAR AZ ROM	16	9	8	5	8	4
PAR PA ROM	16	10	9	4	7	6
PAR TW ROM	20	14	10	8	10	6
PAR AF ZRH TW ROM	3		3			
PAR AZ MIL AZ ROM	3		2		1	
Total DOD Volume	80		42		38	
ABY UK LGA PA PAR TW ROM	3	1			3	1
LON BE PAR AF ROM PA IST	6	3	4	2	2	1
MAN BE PAR UK ROM UK CAI UK BOM	1		1			
Total COD Volume	84	55	42	27	42	28
Total Volume for City Pair	90		47		43	
<u>RUYADH SAUDI ARABIA</u>						
PAR TW CAI UK RUH	2		2			
Total DOD Volume	2		2			
Total Volume for City Pair	2		2			
BASE CITY TOTAL DOD Volume	654		326		328	
COD Volume	875	590	435	285	440	305

felt to be unnecessary. Travel at fares above first-class would be included in the first-class category. Traffic other than first-class can be derived by subtracting amount of first-class from the total traffic.

Routings tabulated under PARIS-ROME are listed in two major categories: (1) those in which PARIS is the directional origin and ROME is the directional destination, and (2) those in which PARIS and ROME are the coupon origin and destination, but not the directional origin and destination. Journeys having directional origin and destination PARIS-ROME are listed first. Each directional routing is shown on a separate line, and the volume of traffic in the routing is shown in the appropriate column. The directional routing identifies all intermediate points and the airline on each stage. Total directional origin and destination, PARIS-ROME, without regard to routing, is summarized on a separate line beneath the routings.

The second group of routings are those in which PARIS-ROME is a coupon origin and destination, but not the directional origin and destination. The complete routing is shown, enabling the user to associate the coupon origin and destination with the total directional journey. The total volume of traffic based on coupon origin and destination is shown on a separate line including only the single-coupon journeys listed as a subdivision of directional origin and destination category. The resulting total COD traffic of 84 passengers for the PARIS-ROME pair excludes the six passengers via ZRH and MIL which move between PARIS-ROME on two rather than a single coupon.

The total city pair volume for the PARIS-ROME market is measured by the unduplicated COD volume of 84, plus the non-COD volume of six.

The example shows RUYADH SAUDI ARABIA as the next (alphabetical) reference city listed under the base city, PARIS. In the routing shown under PARIS-RUYADH the second airline is shown as UK, indicating that its identity is not known. There is no coupon origin and destination for this city pair, therefore, there is only one category of routings listed under this pair in contrast to the two for PARIS-ROME.

The figures beneath the break in the table indicate the volumes of traffic to and from the base station (PARIS).

Class of travel is indicated wherever the base and reference cities are the coupon origin and destination points. Thus, class is shown for the PAR AF ROM routing because it is a coupon origin and destination (as well as being a directional origin and destination), while it is not shown for the routing PAR AF ZRH TW ROM

because there is no PARIS-ROME coupon. In the coupon origin and destination portion of the listing, the figures relating to class refer only to the PARIS-ROME stage. The proposal that class of service be indicated only for the stage embraced by the base and reference cities rather than for all stages in the directional routings shown under the base city groupings is a compromise with space and cost. Because the class of travel on a directional routing might change from stage to stage, and for different passengers the changes of class might occur at different points, many additional lines would be required in the report to print all of the combinations which could occur for all of the separate stages appearing under each base city group.

Example 2 provides information which is vital in sales and other analyses. The volumes shown are unduplicated ticket counts as opposed to the directional routing or one-way trip volumes shown in Example 1, and would indicate to some extent the volume and type of international tickets being sold at points around the world.

The data on the printed page of the publication would require considerably less page space than the typewritten examples. It would appear in the lettering of a machine listing, reduced in size, photographically. The United States' domestic air traffic survey is printed by this process and it carries approximately 200 lines per page (10" x 14"). Although it is difficult to forecast the number of pages required to print the entire world-wide survey, it is estimated that it could be printed on less than 4,000 pages. This includes cross printing; that is, printing everything twice. Thus, all of the material listed under the pair PARIS-ROME in the examples would be listed once under PARIS as a base city and again under ROME as a base city. By this arrangement, one can readily locate and extract total data for any given city.

The total quarterly publication could be in the form of three or four printed volumes. The statistics could be arranged first by country and then by base city, alphabetically, within each country. The countries could be arranged alphabetically or they could be grouped on a regional basis: Europe, North America, South America, etc., and published by volumes corresponding to regions or other appropriate groupings. This type of publication would permit purchase of only the volume containing the country or region for which information is desired. That volume would contain all of the statistics on traffic from and to the country since the page format makes provision for all traffic "from" and "to" each base city.

It would be possible to go even further toward permitting the user to purchase only the statistics he needs. They could

EXAMPLE 2

PROPOSED FORMAT FOR PUBLICATION OF
TICKET ORIGIN AND DESTINATION STATISTICS

BASE CITY <u>REFERENCE CITY</u>	NUMBER OF TICKETS IN SAMPLE		
	TOTAL BOTH WAYS	FROM BASE	TO BASE
PARIS FRANCE			
<u>ROME ITALY</u>			
Total tickets	50	30	20
One-way trip	15	10	5
Round trip	8	5	3
Round-the-world trip	0	0	0
Other circle trips	13	6	7
Outbound portions of open-jaw trips	14	9	5
<u>TOKYO JAPAN</u>			
Total tickets	42	20	22
One-way trip	15	7	8
Round trip	10	5	5
Round-the-world trip	6	4	2
Other circle trips	5	2	3
Outbound portions of open-jaw trips	6	2	4
BASE CITY TOTAL		234	252
GRAND TOTAL ALL BASE CITIES		20,486	20,486

be produced in loose leaf fashion and sold separately for each country. This is mentioned here only to point out the flexibility of the basic publication.

The sample page formats are by no means the only workable ones. These formats are suggested only to illustrate ways of tabulating the data. They are intended to make maximum use of the space on the page, to be understandable and to summarize the data for each city pair to permit convenient use.

In addition to the basic arrangement of data, as discussed above, it may be desirable to publish various summaries. It would be advisable to print an index, a section describing the tabulations, and a table showing the reliability of estimates of various sizes.

The publication need not be limited to the printed volume. There is a reproduction system, DACOM, that utilizes microfilm in place of the conventional printed paper volume. In this process each microfilm image (corresponding to a page in the paper volume) can be indexed by means of machine code on the film adjacent to the image. With the use of a special viewer, the desired subject can be set into the viewer and the film will automatically and at high speed locate the desired image. This system makes readily accessible huge quantities of data that can be stored in a relatively small space. Some users might prefer this form of publication to the printed volume.

Special Services of the Central Processing Agency

The foregoing discussion has been limited to the basic quarterly publication. But the product available for purchase need not be limited to this form used for general distribution.

A user having a particular requirement for selected data contained in, but not readily available from, the basic publication might have the central agency produce special tabulations of the data arranged in a format to suit the need. Thus, if the problem were to determine the class of travel in an area or between two states or on the routes of a particular airline, the central agency, already having the data in the electronic machine, could make special tabulations bringing together the necessary data from various places in the basic publication. In addition to such special tabulations of data contained in the basic publication, provision might also be made for procurement of additional ticket data not normally published.

There are many potential ways in which special service productions might prove valuable. Aircraft manufacturers might request special tabulations for a selected group of airlines, for an individual airline or a summarization by stage length. A small airline, without machine accounting equipment of its own, might find it advantageous to have the centralized processing agency prepare certain accounting reports from its own microfilms. Airlines may request occasional tabulations showing place of ticket issue or duration of stopovers in given cities. Two governments may agree, in advance of a bilateral negotiation, that a special report based on the reports of their own airlines be prepared. The ICAO Secretariat may request special tabulations for use in studies such as "The Economic Implications of the Introduction Into Service of Long-range Jet Aircraft" and the current supersonic study.

We have not investigated the procedures that might be developed by the processing agency to enable it to prepare special reports at the least possible cost. There is one process that we do know of, however, that might prove useful in this area. The system involves a reproduction of a microfilm image onto a card the same size and shape as the standard IBM card. A deck of such cards with the information appearing in the regular report punched into them and with a half-size photograph of the flight coupon printed on them would make possible the sorting on the basis of any information appearing in the particular report and the manual extraction from the photograph of the flight coupon of the special information being sorted. The advantage to this system is that the desired flight coupons can be selected by machine without the necessity of having to search the original microfilm reports or to prepunch all of the secondary information into the card.

This kind of service would obviously require the prior approval of the States submitting the data to be used. Special reports could be obtained upon request to ICAO so long as the requesting party pays the costs of the report and appropriate authorization has been given for use of the required data. A service of this kind could become widely used and ultimately may defray a substantial share of the total cost of the project.

VI. COSTS AND REVENUES

Costs to ICAO

While it is not possible, at this stage, to determine accurately the costs or revenues involved, it is nevertheless necessary to have reliable estimates of the range within which the cost burden and revenue relief will fall before the practicability of the project can be evaluated. Consequently, very considerable effort has been made to determine the range of costs for the over-all processing and publication. The estimates have been made on a basis of actual statistical installations and methods of processing now available in the United States. We have considered the use of electronic equipment comparable in speed to the IBM 7070 with 1401 peripheral equipment in making the estimates. Substantial reliance has also been placed upon the actual experience of the United States in processing its own domestic and international origin and destination traffic surveys.

The costs to ICAO will be of two types, the non-recurring set-up cost and the recurring costs for the periodic processing and publication of the statistics. The non-recurring costs will consist largely of the programming for electronic machine processing,^{1/} the recruiting and training of personnel with which to carry out the project, and the acquisition of microfilm viewers and other miscellaneous equipment. Based on U. S. experience, the programming costs for the entire project should run between \$5,000 and \$7,000. An adequate number of viewers could be purchased for approximately \$15,000.

The recurring costs will cover largely the following broad operations:

1. Editing and analysis, including supervision and control.
2. Key punching of machine cards and verifying, including supervision.
3. Machine transference from cards to electronic tape.
4. Computer processing at contract prices.
5. Printing and distribution.

These costs will vary somewhat depending upon the nature and location of the machine processing installation, the efficiency of the supervision, and the availability of qualified personnel. Based on

^{1/} "Programming" is the procedure of developing the specific routines that the machine will have to follow to produce the information in the form desired.

experience in the United States, both airline and government, the recurring costs are estimated at between \$175,000 and \$250,000 per year. While this is a rather wide range, it nevertheless gives substantially reliable limits within which the cost should fall based on various different assumptions and numerous variations in scope and content of the survey ultimately to be adopted, as well as the number of volumes of the finished product to be published. Once a specific plan has been crystallized, it will be possible to estimate the costs within a fairly narrow range.

Offsetting Revenues

The cost burden should be considered in relationship to the revenue-producing capabilities of the statistics. While it is beyond the scope of this Panel to propose a detailed plan for financing, which is, of course, something to be worked out by the ICAO Air Transport Committee and the Council, we do point out that this program potentially may well be made substantially self-supporting. With a publication of the value expected from the proposed plan, there will, in all probability, be a widespread demand for the product. It would be widely used by commercial firms and organizations who would be willing to pay a reasonable price for the finished product. Discussions with such potential users in the United States substantiate this view. Moreover, it would be possible to develop an arrangement by which each government would itself become a subscriber to the service at some established fee. On the basis of such subscription, a certain number of copies would be provided without further charge. This would tend to distribute the cost on the basis of use.

The plan proposed by the United States also contemplates that there will be a demand for special service runs of information that could be provided from the ticket statistics collected but not published, or on the basis of different combinations or arrangements than those published. These services could be priced on the basis of the added cost to the processing agency plus a fixed percentage which would be added to the revenues received from the sale of the regular published reports. The revenues from all sources could, depending on the policies adopted by ICAO, approximate the total costs of production.

Value Enhanced by Quality and Timeliness of Statistics

The real problem of financing turns more upon the quality and timeliness of the product than upon the amount of the cost incurred in its production. If the product itself is of sufficient scope to be widely useful, there will be little difficulty in financing it either by direct support given by various national governments or through the avenue of selling the published product and special services inherently available to both government and private users.

In order to enhance the value of the product, it is necessary not only that the statistics be of sufficient scope to be valuable, but it is equally necessary that they be published on a timely basis. The questionnaire survey which the United States circulated to users has indicated that the range of a timely basis would be from three to twelve months after the period to which the statistics apply. The United States' domestic survey will be published within three months after the period covered. Utilizing similar procedures the publication of the ICAO reports should be reasonably attainable within six months after the end of the reporting period. The publication of statistics on such a timely basis will greatly enhance their value, increase the support for the statistics, and minimize the problem of financing the costs of collection, processing, and publication.

Collection Costs to Airlines and Offsetting Savings

It was pointed out earlier that the cost to airlines of producing the microfilm will be minimal. The U. S. airline with the largest volume of international traffic has estimated that its annual collection cost would be about \$4,200. This stands in sharp contrast to the aggregate burden being imposed on the airlines in many parts of the world by governments who require various kinds of local traffic reports.

The world's airlines now provide origin and destination statistics on passenger manifests and airport reporting forms at many of the major traffic cities on their routes. Some compile traffic statistics that are exchanged with other governments under the terms of bilateral agreements. Many airlines produce origin and destination statistics for their own use. A study of these requirements as related to U. S. air carriers indicates that the cost of providing such statistics at the present time probably exceeds the estimated cost of providing the complete origin and destination data to ICAO under the method here proposed. As one example of the cost burden now borne by airlines, it was found that in one country, two U. S. airlines jointly employ one person full time and a second person on a part time basis whose sole function is to produce passenger origin and destination statistics for submission to the government.

While information is not available by which to evaluate the actual needs which these statistics serve locally, there is reason to believe that statistics collected on a centralized basis and provided within a reasonable time can be made to serve adequately the local needs. If a program of local collection at all airports in the world were to come into being, the cost to the airlines could be extremely burdensome.

The collection of origin and destination statistics at all airports would in essence constitute a world-wide program of collection without making such information available to the world as an integrated body of knowledge. Moreover, there is good reason to believe that a centralized body of world-wide statistics would serve vastly broader needs of both the air carriers and governments of all Member States,

would meet vital needs of numerous other users that cannot be served at all from airport collection, and could be produced on a timely basis at only a fraction of the total cost and interference with traffic movements that could reasonably result from decentralized collection at airports.

The problem of collecting statistics through airports has long been a matter of concern to ICAO through its Facilitation Division. This problem was recently further considered by this Division in its recent December meeting in Rome where further problems in respect to using the clearance form for the collection of statistics arose. As a result of its consideration of these problems in that meeting, the Facilitation Division adopted the following resolution:

- "1) that Contracting States refrain as soon as possible from using clearance documents for statistical or other purposes;
- 2) that, until Contracting States can fully comply with 1) above, clearance documents as prescribed in Annex 9 should not be amplified for any purpose other than that for which they were originally intended; furthermore, that when used for purposes other than accomplishment of frontier formalities, they should not be used until after the completion of those formalities, and should not be retained in existence solely for such other purposes;
- 3) that the Council, taking into account the experience of Contracting States and the work of ECAC in the field of facilitation and statistics and the work of the ICAO Origin/Destination Panel in the latter field:
 - a) request its bodies to study the means by which Contracting States can obtain the information they need for various purposes, without recourse to clearance documents,
 - b) invite Contracting States to adopt, to the extent they find advisable and in conformity with their own objectives and requirements, the means which the Council may suggest."

It is apparent, therefore, that this Panel and the Facilitation Division have many problems in common. It would seem desirable that the two groups work closely together in developing the best possible approach to the collection of statistics on a basis that will help to facilitate the movement of air traffic throughout the world and will at the same time be directed toward preventing unnecessary duplication of effort and consequent cost burden to the airlines and governments of Member States. Such a joint program could itself make substantial contributions to the further development of air travel throughout the world.

VII. NEEDS AND USERS

In an industry so widespread and complex as international air transport, it is necessary for a large number of organizations to cooperate in the development and movement of traffic from country to country and city to city throughout the world. To effectively perform their various functions in the industry, these organizations need an adequate body of statistics with which to describe and measure the actual traffic carried as well as the scope, nature, and controlling characteristics of the potential air travel market. The needs for such statistics are varied and the nature of the statistics needed can differ according to the uses to be made of them.

User Need Survey Results

To secure more adequate information on the needs for air travel ticket statistics and how these needs might best be met, the views of a representative cross section of users of such statistics in the United States were solicited through circulation of a detailed questionnaire. These included airlines, airports, aircraft and aircraft engine manufacturers, Federal and state government agencies, research organizations and consultants, and chambers of commerce. A summary of the uses of these statistics as expressed by 91 respondents in various categories is presented below:

<u>Types of Use</u>	<u>Number of Respondents</u>
Route development	73
General economic analyses in air transportation including forecasting	73
Airport planning	50
Sales admin. & travel promotion	38
Schedule planning	35
Airline analyses for investment purposes	27
Design requirements for new aircraft	17
Other purposes	17
Airways planning	8

The responses of each category of users evidenced a strong interest in the use of ticket statistics not only to meet needs which are primary to their own operations but also for related needs in which they have vital interests. For example, not only did all or most of the airlines express

needs for the statistics for route planning and development, planning flight schedules and for sales purposes, but some of the airlines indicated needs related to new aircraft designs, airport and airways planning, investment analyses, and general economic analyses in air transportation. Similarly, virtually all of the airports find the statistics necessary for airport planning purposes and at least some of them identify their interests under each of the other needs listed. In the same way, all but one of the manufacturers need such statistics in developing design requirements for new aircraft and some or all of these also identify needs related to route planning and development, planning flight schedules, sales activities, investment and general economic analyses in the industry. A large majority of all the categories of users indicated use of the statistics for general economic analyses and forecasting.

The survey of needs for the statistics also included inquiries concerning the relative value, for the different purposes served, of the various items of information contained in the ticket. The responses to these inquiries are summarized in the following table showing for each item of information contained in the ticket the number of respondents, out of a total of 91, that value the item as either very useful or useful for one or more purposes. For convenience of use, the items are ranked in the table by frequency of need expressed by the respondents.

<u>Item of information</u>	<u>Number of respondents</u>
Origin	91
Destination	91
Class of travel	83
Transfer points between airlines	83
Participating airlines	83
All intermediate points	75
Passenger stopover identification	70
Length of passenger stay at each point	62
Date of travel over each stage	56
Place of ticket issue	54
Fare amount	53
Airline issuing ticket	51
Flight number for each stage	47
Date of ticket issue	37
Terms of payment	36

It is clear from the responses summarized above that every item of information recorded in the ticket is valued by some users for one purpose or another. However, it is not practical to initiate a program encompassing all of this information. The items of greatest value to most users, in order of rank, are the origin, destination, class of travel, transfer points between airlines, participating airlines, and all intermediate points. These are the six highest ranking items in the table, thus indicating they are of the greatest need to

the most users. Accordingly, these six items have been selected to delineate the scope of the program for the collection of passenger ticket air travel statistics proposed by the United States. (See Appendix A for extracts from user comments.)

Despite the considerable need indicated in the survey for stop-over information, it is not provided for in the initial plan as proposed. Because of the technical difficulties which still exist in identifying stopover points, it would be substantially more burdensome to produce than the other elements in the proposed plan. In view of the widespread user interest in stopover points, it is suggested that continued efforts toward overcoming present technical difficulties would be desirable.

Because of the variety of applications of the statistics in respect to various uses identified by the survey, a more detailed discussion of how the air passenger travel statistics are used in meeting particular needs is presented below.

Route Development

The Member State governments and airline managements alike are vitally concerned with the continued development of air routes on a sound economic basis. At least in the United States, airports, local governments and business associations also take an active interest in this activity.

A measure of the value of passenger ticket statistics in route development was given by the responses to the United States user need survey in which 73 of the 91 respondents expressed a need for the statistics for such purpose. The relative usefulness for this purpose of the different items of information in the ticket as reflected by these replies is indicated by the following summary showing how many of the 73 respondents rated each item as either very useful or useful.

<u>Item of ticket information</u>	<u>Number of respondents</u>
Destination	73
Origin	71
Transfer points between airlines	64
Participating airlines	60
Class of travel	59
All intermediate points	56
Passenger stopover identification	45
Place of ticket issue	34
Airline issuing ticket	33
Date of travel over each stage	30
Length of passenger stay at each point	30
Flight number for each stage	27
Fare amount	26
Date of ticket issue	13
Terms of payment	8

It is of interest to note that the six items ranking highest with respect to route development are identical to the six highest ranking items in the preceding table summarizing user needs for all purposes.

It is necessary for the governments and the industry to establish sound route patterns that will provide an opportunity for the airlines to operate most efficiently and profitably while meeting the needs of the traveling public.

To determine the market potential of a new route, it is essential to have available information about the existing volume and pattern of air travel in and through the area of the proposed operation.

The basic purpose of analyzing statistics for route development is to forecast the market that would be available to a given airline over a given route. This can be done by measuring the historic traffic volumes and patterns and by projecting trends to future periods. Other measures, economic and social, are usually used in connection with actual origin and destination traffic in order to permit a more accurate measure of the future market potential. Nevertheless, the more detailed the measure of the historic traffic in specific markets, the more accurate the forecasts are likely to be. In fact, the validity of all forecasts must ultimately be tested against actual results. Errors in forecasting can result in costly and ill-advised airline expansion that is detrimental to the airlines themselves and to the public. It may also result in an omission of service that could be profitably introduced and for which there is a need. There have been many examples of airlines withdrawing service for which the anticipated demand failed to materialize. There have also been examples of service that were introduced and were met with such an immediate traffic volume as to indicate that the service had been needed for some time.

A complete directional routing is the most valuable basic traffic statistic for this purpose. It provides a measure of the existing passenger movement both as to pattern of movement and number of passengers. It is important to show the intermediate cities because the contract of sale (the passenger ticket) includes the passenger's entire air journey and is, therefore, a factor in the sale of the ticket. An evaluation of isolated passenger stages, without regard to other parts of the routing that precede or follow a given stage, can be misleading. For example, a passenger desiring to go from point A to point C where no through service exists between these two points may purchase a ticket providing transportation from A to B and from B to C. An airline evaluating the desirability of flying between B and C would want to know out of the total number of passengers between B and C how many actually originated in B and how many originated in other points such as A, for if this latter number is sufficiently large the introduction of non-stop service between A and C could materially reduce the available market between B and C. The airline is also interested in knowing whether the airlines with whom it will be competing between B and C

have route systems that give them an advantage in competing for the traffic not only between B and C, but also at A. Governments, in performing their regulatory functions, are also concerned with measuring the diversion from other airlines that would result from the authorization of new routes.

If traffic volumes are available on a seasonal basis, airlines can evaluate the effect the traffic variations will have on the utilization of and need for equipment. The problem of overcoming seasonal fluctuations in traffic volumes is a major one for some of the world's airlines and probably significant in some degree to all of them.

To determine whether any given route operated would be financially successful, it is necessary to forecast the revenues that would be received. These forecasts will be more accurate if the existing composition of the market by class of travel and the prevalence of one-way and round-trip routings is known. Forecasts of this type constitute a vitally important part of the factual basis used in the United States in formal proceedings involving the authorization of both domestic and international routes.

Many users also point to the need for routing information that would identify intermediate cities on the directional routing which the passenger desired to visit as opposed to cities transitted solely for the purpose of making connections between flights of the same or different airlines.

Airport Planning

Airport operators are aware of the values inherent in air travel ticket statistics, particularly as applied to the broad planning problems facing the airport--large and small--domestic and international. Solutions to these problems are made easier and airport operators can do a better job for the future if more complete statistical information of this type is available on a continuous basis.

In responses to the user need questionnaire, 29 out of the 31 answering airports (and 50 out of the total 91 respondents) indicated a need for passenger ticket statistics for airport planning. In terms of the specific information judged to be very useful or useful, the airport responses rank the items contained in the ticket as follows:

<u>Item of information</u>	<u>Number of airports</u>
Origin	29
Destination	29
Passenger stop-over identification	28
Airline transfer points	26
All intermediate points	25
Participating airlines	25
Class of travel	24
Length of passenger stay at each point	24
Place of ticket issue	17
Date of travel over each stage	15
Airline issuing ticket	14
Fare amount	13
Date of ticket issue	13
Flight number for each stage	13
Terms of payment	4

One significant departure in the rank of importance of items of ticket information for use in airport planning is the high value attached to passenger stop-over data. Whereas in other uses, this item of information does not appear in the five top-ranked items, the airport planners give it a rank almost equal to the ticket origin and destination which are ranked at the top by all uses. This points up again the importance of stop-over information even though it has not been included as an item of information to be published in the initial plan as proposed by the United States.

The airport operator is vitally concerned with using these statistics in conjunction with airport planning, determination as to adequacy of air service for the area served by the airport, securing better scheduling and equipment through negotiations with airlines, studying traffic flow, analysis of airlines routes, and forecasting of the volume and nature of traffic for purposes of airport development including financing. Since construction of new facilities must be planned and financed many years in advance of the need, it is vital that the forecasts of traffic volume be based on sound historical data. Directional routings provide the basic information necessary to measure the traffic patterns and volumes. From the directional routing the coupon origin and destination of passengers to and from the city can be determined and the future effect of additional non-stop flights bypassing the city can be estimated.

A special need on the part of airports serving international traffic is for data on the number of passengers that will be requiring facilities for entry into or exit from the country, such as customs, public health, and immigration, so that such facilities can be properly developed. At some airports the entry procedures vary with the points of origin of arriving passengers and thereby require different facilities for their clearance.

For these various purposes, the airports need information on passenger trips including cities of origin and destination, intermediate cities at which there were transfers between flights, cities at which the passenger made stopovers, the airlines providing transportation, and the class of travel used. Additionally, they can also make use of information on date of travel, length of passenger stay at each city, and place of ticket issue. It is also important in airport planning to have continuing measures of length of passenger haul into and out of the airport.

Sales Administration and Travel Promotion

Measures of the volume, seasonality, class of service, origin of traffic and pattern of movement are useful to those administering the sales activities of airlines and to those in other organizations concerned with the development of tourism and increasing international air travel.

Thirty-eight of the respondents to the United States user need survey expressed a need for passenger ticket statistics as an aid in sales administration or travel promotion. The relative value of the information contained in the ticket is indicated by the number of these respondents that rated each item to be either very useful or useful, as follows:

<u>Item of information</u>	<u>Number of respondents</u>
Origin	38
Destination	38
Participating airlines	36
Class of travel	36
Transfer points between airlines	29
Passenger stop-over identification	26
Date of travel over each stage	23
All intermediate points	22
Place of ticket issue	21
Airline issuing ticket	21
Length of passenger stay at each point	19
Fare amount	19
Terms of payment	16
Date of ticket issue	13
Flight number for each stage	10

In general, the items ranked highest correspond to the high-ranking items for other purposes. However, it is noted particularly that "passenger stop-over identification" in the above summary is among the top six displacing "all intermediate points" which is sixth in rank for all purposes combined.

In budgeting sales expenditures, a knowledge of the market available in a country is valuable in determining personnel requirements

and sales outlets. For example, the workload on a ticket office must be estimated to make proper budget authorizations. The time required to service an originating passenger is not the same as for a passenger visiting the city enroute to another point. For this reason, the number of passengers enplaned and deplaned may provide a misleading measure of the workload imposed on the airline's ticket office in a given city. A measure of the sales of the office reflects the workload imposed by originating passengers, but omits the stopover or transfer passenger. Origin and destination statistics, showing directional routings and ticket issue point or ticket origin provide a measure from which the number of passengers in each category can be determined.

By examining the ticket origin or point of ticket issue of the passengers carried over its routes, an airline can determine in what off-line cities new sales offices should be opened, where the size of its sales force should be changed and how sales territories might be revised. A State's tourist development agency can use this information in the same way in locating tourist offices in foreign countries and allocating its funds for promotional activities.

Those directing advertising campaigns are interested in the same measurements that were enumerated at the beginning of this section, except that ideally this information should be related to the passenger's residence, place of business or other places where he might be exposed to advertising. Information on the residence of passengers is extremely limited and, of course, does not appear on the ticket. Ticket data can, however, provide a useful substitute by showing the city of ticket origin or place of ticket issue. When this information is coupled with the volume, seasonality, class of service and pattern of movement, an analysis can be made to identify areas where advertising would be most productive and what services should be stressed.

Origin and destination statistics are used to identify markets where promotional fares might be introduced. By comparing the traffic originating in a given area with that in other areas, it is possible to determine whether the traffic has been slow to develop and might call for the introduction of promotional fares.

Simultaneously with the planning analysis, the same statistics are used to evaluate the results of past sales efforts. Market growth and the airline's share of the total market are used for this purpose. It is not sufficient for a sales administrator to know the facts only with relation to traffic carried by his own airline. He must be able to compare his own traffic growth with that of his competitors and the total market, then he can determine which programs produced the desired results and which did not. In the field of fare construction, since most of the airlines charge the same fares, it is the effect on the total market that must be known.

Fare Construction and Tariff Publication

The size of markets is a prime consideration in the determination of passenger fare levels. Such information is vital in setting local and through fares. In the process of developing through fares, it is necessary to know the volume of the passenger markets between city pairs so that the best possible fares affecting the selling area can be achieved.

In publishing tariffs, airlines include fares between each pair of cities for which they believe there will be sufficient use to justify including fares in the tariff. It is common practice to deliberately err on the side of publishing fares for too many city pairs rather than too few. If a measure of the total market between each city pair were readily available, it could be determined as to whether a particular city pair should or should not be included in the airline's tariff. With such a measure present, tariffs could be reduced in size, would be easier to use and would cost less to publish.

For both of the above uses, a summary of the number of passengers by directional origin and destination is the only meaningful statistic. A monthly publication covering the previous 12-months total traffic would be ideal. Reports containing 3-month summaries would be very useful. No such statistics exist today except for certain small isolated markets.

International Exchange of Air Traffic Rights

Air passenger ticket statistics provide useful information to States and airlines in evaluating routes to be sought as well as routes to be granted in the route exchanges made in air transport agreements between Member States. This type of evaluation is virtually identical to the route development function explained in detail at another part of this section.

Another important use of origin and destination statistics is in the application of the capacity clauses of bilateral air transport agreements. It is recognized that differences exist between governments as to the appropriate basis for allocating traffic to Freedom categories. Certain governments desire the directional origin and destination as shown on the ticket, whereas other governments prefer the origin and destination shown on the manifest. The plan proposed by the United States would supply both types of origin and destination statistics and thereby meet the needs of all States. This would not be true of other systems of statistics designed to provide only manifest or on-line origin and destination which would supply the needs of some States but totally disregard the needs of other States.

Schedule Planning

For schedule planning purposes airlines try to estimate the total number of passengers moving between a given city pair to measure the

need for capacity and to evaluate the effectiveness of their schedule pattern.

In the United States user need survey, every one of the 23 responding airlines stated that passenger ticket statistics are needed in planning schedules. The relative value of the items of information in the ticket for planning schedules is indicated by the number of respondent airlines rating each item as either very useful or useful, as follows:

<u>Item of information</u>	<u>Number of airlines</u>
Origin	23
Destination	23
Participating airlines	22
Transfer points between airlines	20
Class of travel	17
All intermediate points	13
Passenger stop-over identification	9
Flight number for each stage	8
Place of ticket issue	8
Airline issuing ticket	8
Date of travel over each stage	7
Length of passenger stay at each point	4
Date of ticket issue	3
Fare amount	3
Terms of payment	0

For schedule planning, as for other purposes, the six highest ranking items are origin, destination, participating airlines, airline transfer points along with all other intermediate points, and class of travel.

While the respondents expressing a need for ticket travel statistics in schedule planning were predominantly airlines, other respondents including government agencies, airport operators and aircraft manufacturers expressed a need for this information for schedule analysis.

Origin and destination statistics are used to measure the total number of passengers between a given city pair on a coupon origin and destination basis. Directional routings are used to determine the advisability of introducing one-plane or non-stop schedules between a pair of cities showing a substantial number of passengers using circuitous routings. The data should be summarized to show the seasonal variations in the pattern and volume of traffic. Class of traffic is a refinement that permits even more precise evaluations to be made.

From this information, an airline can determine whether its schedule pattern is effective in holding or improving its participation in a given market.

Identification of the routings with the name of the participating airlines in the routings makes the statistics far more meaningful in the above cited uses. In addition, it becomes possible to measure the effect of schedule changes made by different airlines in a given market.

Design Requirements and Sales of New Aircraft

In designing passenger aircraft it is important to know a great deal about air passenger traffic patterns. It is not sufficient merely to have generalized information on air traffic volumes. Rather, it is necessary to be able to describe, identify, and measure the particular traffic that is to be served by the aircraft. For this purpose, information in terms of the individual passenger trip is vital.

Air travel ticket statistics are helpful in determining the range, size, speed, interior accommodations, and other design requirements for an aircraft. By revealing the points between which travel is performed or needed, distances of travel, and class of travel, such statistics indicate the service that the aircraft must be capable of performing. Moreover, the ticket statistics provide a guide to both the source and over-all potential of the demand for aircraft of a new design by making it possible to segregate and measure the volume of traffic having given characteristics to which the aircraft is adapted.

Air travel ticket statistics are also valuable in the sale of the new aircraft, and in somewhat the same manner as in its design. For sales purposes they are used to analyze the actual or potential traffic of a particular airline to determine whether the aircraft is suitable for its operations and, if so, to demonstrate this to the airline. Both the manufacturer and the airline, of course, value the statistics for this purpose.

On a broader basis aircraft and aircraft engine manufacturers have an interest in the growth and development of the air transport industry. This concern finds expression in research and analysis in the economics of air transportation including forecasts of traffic volume and its characteristics. The ticket statistics are very useful for these purposes.

For these various needs, the manufacturers of passenger aircraft generally find most valuable those statistics which describe the entire passenger trip including all intermediate points of transfer between flights, participating airlines, and classes of travel. In some cases, identification of points at which the passenger made stopovers is needed.

VIII. ADVANTAGES SUMMARIZED

Ticket is Natural Statistical Unit

There are numerous advantages inherent in the program as proposed by the United States for the collection of passenger ticket air travel statistics. One of the more important of these advantages lies in the fact that the ticket provides the most complete measure and description of the passenger air travel market of any available source. No passenger travel by air can be completed without a detailed authorization in the form of a passenger ticket. The ticket is the unit of sale in the passenger travel market. It embraces the total service contracted for between the passenger and the airline or airlines combining to provide the total travel. It reflects all aspects of the contract entering into this agreement. It likewise identifies the air carriers which participate in the performance of the travel contracted for. It similarly identifies the cities visited during the period of travel authorized by the ticket. The air passenger ticket, therefore, provides the most complete description that exists anywhere of the current air passenger travel market.

The passenger ticket is the indivisible unit of sale in air travel. The individual coupons of the ticket represent component parts of the single market package which is sold in the form of a ticket. While each one of these coupons has distinct and significant value in itself as an instrument in measuring segments of the market, it is only a subordinate part of a single, integrated ticket. Although coupons can measure local traffic movements, they cannot give over-all market perspective. Since the purpose of the air carriers and the promoters of air traffic generally is to develop the over-all market, it is necessary that the statistics, in order to serve this purpose effectively, be developed so as to reflect the market in its broadest perspective. Such perspective is best reflected by the total ticket. The ticket, therefore, not only encompasses the total expense of the passenger's travel under a single contract, but it also identifies the local elements of the travel market on a coupon basis, thereby providing the most complete over-all measure available of the air travel market.

Moreover, the airline ticket is essentially reliable. It controls the amount of money collected by the airline and expended by the passenger for the total travel involved. The ticket also serves as a basis of settlement between the participating airlines in the division of revenues. It is carefully prepared to insure its total reliability and, therefore, constitutes the most reliable single source for air passenger travel statistics. Moreover, the validity and reliability of the ticket must be established independently of the statistics themselves and, therefore, these extra increments of statistical value are available through the ticket without added burden to the airlines.

Hence, the passenger ticket is inherently the best source from which reliable air passenger travel statistics can be collected.

Plan Develops Professional Know-How

Statistics, however sound in concept, can be developed only by an adequate facility and expert personnel. For that reason, the United States' program has been designed to create and utilize a highly competent professional organization for the development, processing and publication of the statistics. Accordingly, the entire responsibility for the quality of the statistics would be concentrated in the centralized processing agency to be developed under the auspices of the ICAO Secretariat. The method proposed provides for the microfilm copying of the actual ticket, selected on the basis of ticket serial number to provide the size of sample desired. (In the United States' plan, the proposed sample is 10 percent.) The raw data, without modification or evaluation, is sent to the centralized processing agency. There, the statistical product is developed by a single professional staff. The standards, evaluations, interpretations, definitions, and applications will always be controlled by this single professional group which will grow in skill and know-how with time and experience.

Moreover, the centralized professional group provides the maximum opportunities for future improvement and development of the passenger air travel statistics. This is true not merely by reason of the skills which will be developed through the centralized processing of the data as submitted to ICAO, but also because this highly skilled central group will help to perfect ways and means for subsequent improvements in the quality of the statistics.

Provides Maximum Value to Most Users

Statistics of any type are valuable only if useful. Based on demonstrated needs by the most frequent users of passenger ticket air travel statistics, the proposed program will produce statistics that should have maximum value to the greatest number of users. Accordingly, the element of value has been considered as the most important single objective to be achieved from the statistical program. This is true because the value is much more directly related to the scope than to the cost of production. While the value of the product will be controlled almost entirely by the elements of information included in it, variations in these elements will have relatively little effect on the aggregate cost of production and no effect on the cost of collection. Hence, the decisions of the Panel in regard to the program must be directed primarily toward assuring the maximum usefulness of the statistics collected since the total cost will not vary greatly between a low and high value product.

Facilitates Timely Publication

The plan as proposed by the United States gives particular emphasis to the timeliness of the publication. This is reflected first in the method of collection which reduces to an absolute minimum the problems to the airlines in the collection and transmission of the required data. The microfilming process which has been suggested removes entirely from the airlines all necessity for making statistical determinations beyond the simple selection of the ticket lift coupons with a serial number ending in zero. Once the microfilming process has been set up, there is no obstacle to prompt submission of the sample coupon lifts. In fact, the use of the flight coupon for inter-airline billing purposes compels the participating airlines to complete the microfilming function before the flight coupons are forwarded to the issuing airlines for purposes of inter-line settlement.

The establishment of a centralized professional staff will maximize the speed of processing. The data can be rapidly converted to punch cards and electronic tape for processing on modern electronic machines. While some time will be required to establish the necessary procedures, and to develop and train the needed staff, the recurent time lag for publication can reasonably be reduced to not more than six months on the basis of the world-wide program envisioned by the United States' proposal. Statistics provided on such a timely basis will adequately meet the needs of most users throughout the world for passenger ticket air travel statistics.

It is highly appropriate that this Panel and ICAO should, at this time, be working toward the development and timely publication of a body of air travel statistics since, with the recent jet and imminent supersonic advances in the speed of air travel, there is perhaps more urgent need for timely statistics in the air travel market than in any other commercial market in the world economy.

APPENDIX I

COMMENTS BY RESPONDENTS TO QUESTIONNAIRE AS TO
VALUE OF WORLD-WIDE PASSENGER TICKET AIR TRAVEL STATISTICS

In addition to answering the questionnaires circulated, a number of users submitted additional comments regarding the value or uses of such statistics to the individual respondent. In the case of the Airport Operators, a complete analysis was made by the Airport Operators Council of the questionnaires submitted by the individual airports.

Since this analysis and the various comments of other users regarding the statistics give a better feel of the user attitude, there is submitted in the following pages of this Appendix:

- Part 1 - the report of the Airport Operators Council
- Part 2 - extracts from comments of various other users, broken down to differentiate between types of users.

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Part I

AIRPORT OPERATORS COUNCIL
(INCORPORATED)

1700 K STREET, N. W. WASHINGTON 6, D. C. TELEPHONE: DISTRICT 7-4530

OFFICE OF THE
EXECUTIVE VICE PRESIDENT

February 8, 1960

The Hon. James R. Durfee
Chairman
Civil Aeronautics Board
Washington 25, D. C.

RE: Worldwide O & D Statistics

Dear Mr. Durfee:

By arrangement with the staff of the Civil Aeronautics Board, the Airport Operators Council was able to send your letter of December 18 and attachments directly to its United States members.

Our members enthusiastically support the program for the collection and dissemination of worldwide passenger origin and destination statistics. They are aware of the values inherent in a project of this type particularly as applied to the broad planning problems facing the airport operator - large and small - domestic and international. Solutions to these problems will be made easier and airport operators can do a better planning job for the future if reliable statistical information of this type is made available on a continuous basis.

Copies of the replies received to date have been furnished the statistical section of the Board and are summarized in the attachments to this letter as follows:

Attachment I - General Comments of AOC Members to
CAB O & D Survey

Attachment II - Summary and Analysis of Replies of AOC
Members to CAB O & D Questionnaire

We appreciate this opportunity to participate in your survey and if we can be of further assistance please let us know.

Yours very truly,

/s/ E. T. Burnard

E. Thos. Burnard
Executive Vice President

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Attachment No. I to AOC
Letter of Feb. 8, 1960

GENERAL COMMENTS OF AOC MEMBERS TO CAB O & D SURVEY

Listed below are comments of United States AOC Members confirming the airport operator's substantial interest in and support of the proposed survey program.

"We have felt the need for this type of information for many years and have urged such a point of view at every opportunity. The project is one of considerable magnitude but worth every ounce of energy which can be put into it. We endorse the proposal wholeheartedly." (A Major East Coast International and Domestic Airport Complex)

"We agree that the Board's request deals with an area which should furnish very helpful information to airport operators." (A Major East Coast Domestic Airport)

"We are in favor of such a gathering and publication of passenger statistics. The proposed study would provide information such as origin, destination and length of passenger stay at each point which would be of tremendous help in airport planning and management." (A Major International Airport)

"We feel this kind of data (origin of traffic at a particular airport city by passenger's city of residence) is especially valuable to communities such as ours who lose the statistical identity of much of their traffic because of proximity to a nearby major traffic center. Our ability to develop a sensible estimate of our off-shore and transatlantic traffic potential from present O & D surveys is completely inadequate." (A Major East Coast Airport)

"The Airport Department is vitally concerned with these important statistics in conjunction with airport planning, determination as to adequacy of air service for the area served by the airport, in studying traffic flow, and in determining the needs for governmental space used in connection with the processing of international passengers...." "At the present time, there does not seem to be an adequate source that will show the number of international passenger arrivals involving the use of governmental inspection and examination facilities. If this additional data could be provided to show the number of passengers requiring the services of the Bureau of Customs, Immigration and Naturalization Service, Public Health Service and the Bureau of Entomology and Plant Quarantine, by air carrier, it would greatly assist the airports in the development or provision of such facilities...." "The lack of data from international foreign flag carriers has made it difficult to establish a base upon which we may plan our international arrival facilities." (A Major West Coast International and Domestic Airport)

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Attachment No. II to AOC
Letter of Feb. 3, 1960

SUMMARY AND ANALYSIS OF REPLIES OF AOC MEMBERS TO CAB O & D QUESTIONNAIRE

I. Needs Served by Ticket Data

Our members feel uniformly that the major needs served by ticket data are "1. Route Planning and Development"; "5. Airport Planning" and "8. General Economic Analysis in Air Transportation Including Forecasting," with a lesser need expressed for "3. Developing and Administering Sales Programs Including Travel Promotion."

With respect to Route Planning and Development, origin and destination cities, columns (3) and (4) in the CAB reporting form were classified as "very useful" by almost all of the airports reporting and columns (5), (6), (7), (8) and (9) were classified as "very useful" or "useful" by a majority of the airports replying.

Columns (3) and (4) were marked as "very useful" by all but one of the airports classifying Airport Planning as one of the major needs served by ticket data. Additionally columns (5), (6), (7) and (8) were named as "very useful" by a majority of the airports replying and columns (9), (10), (12) and (14) were marked as "very useful" or "useful" by a majority of the reporting airports.

Somewhat the same picture is evident with respect to the use of ticket data in meeting the need for General Economic Analysis In Air Transportation Including Forecasting. The predominant number of airports reporting find the origin and destination cities "very useful" and a majority find columns (5), (6), (7) and (8) "very useful." Columns (9), (10), (12), (14) and (16) were "very useful" or "useful" to a majority of the reporting airports.

Other needs as enumerated by various airports on the questionnaire are as follows:

1. Determining community requirements for air service
2. Present O & D Surveys do not show intermediate cities where passenger changed flights on same airline. This information needed for use in route development, adequacy of service proceedings, better scheduling and equipment through negotiations with airlines and analysis and forecasting for airport development including financing.
3. Number of international passengers requiring facilities for entry or exit e.g. customs, public health, immigration, etc.

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4. Recommend that O & D survey include City, County and place (house, office, hotel, military base etc.) of passengers and airport used if more than one airport located in metropolitan area. Consideration should also be given to including supplemental, intrastate, and non-scheduled airlines in the part of the survey applying to the U.S.

II. Compilation of Passenger Ticket Information for General Use and Special Needs

A. Summaries That Might be Published to Meet Common Needs

Essentially all reporting airports said that summaries 1, 2 and 4, respectively "All Traffic In Terms Of Actual Ticket Routing", "All Traffic In Terms Of Travel Needed" and "Total Arriving and Departing Passengers by Airport" would be of value to them. The international airports reporting stated that the "International Travel Summary" would be valuable to them.

Time periods needed were generally evenly divided between "monthly", "quarterly" and "annually". On balance, the "annual" period seemed somewhat more popular.

Time lag after period covered by the data was "one year" maximum with the minimum range from "3 to 6 months" after the period covered by the data.

On all the summaries the preponderance of airports desired "regular" reporting and felt that the value of the reports would be enhanced if the "participating airlines were identified."

Other summaries needed and comments of reporting airports on summaries listed in questionnaire are as follows:

Summaries Needed

1. Summary of estimated traffic projected to 1965 and 1970
2. Summary of routes certificated to each carrier together with restrictions
3. Summary of total originating and terminating passengers by individual cities (airports) in terms of length of trip
4. Summary of total arriving and departing passengers by individual cities (airports) in terms of days of the week and hours of the day.

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Other tabulations needed and comments of reporting airports on tabulations listed in questionnaire, are as follows:

Tabulations Needed

1. Need distribution of traffic at particular city between originating, termination and transit passenger and for each of these by class of service and then by day of week and time of day
2. Need origin of traffic at particular airport by passenger's city of residence

Comments on Tabulations Listed in Questionnaire

- Tabulation B - 1 1) Same comments as 2) and 3) in Summary A - 1
- Tabulation B - 2 1) Same comment as 3) in Summary A - 1.
- Tabulation B - 8 1) Very important in airport planning to have constant check on average length of passenger haul out of airport

Consolidated replies of Airport Operators Council Members are shown on the CAB Questionnaire attached:

I. Needs Served by Ticket Data

Column (2) shows the number of airports of the 25 replying expressed a need for each item listed. In Columns (3) through (17) we have placed a number 1 if a majority of the airports that needed that information found it to be "very useful," we have placed a number 1 and 2 in the square if a majority found it to be "very useful" or "useful" and a number 3 in the square if a majority of the airports found it "not useful". If there was no majority opinion the space was left blank. This breakdown is shown only for those needs mentioned by a majority of the reporting airports.

II. Compilations of Passenger Ticket Information for General Use and Special Needs

Column (2) shows the number of airports of the 25 reporting that state the specific summary would be of value to them. Columns (3), (4) and (5) show the number of airports that have indicated a preference for "monthly", "quarterly" or "annual" time periods. Where a majority of the replying airports indicate one time period, that is shown, otherwise the two time periods that make up a majority are listed. Columns (7), (8), (9) and (10) reflect the majority views of the airports responding to each question.

Part 2

AIRLINES

1. This company "always welcomes efforts by the Civil Aeronautics Board to improve the collection and distribution of helpful airline travel statistics, and we hope the current program may prove to be a significant step forward. Accordingly, we are pleased to return the questionnaire, which, as completed, pretty well sets forth our needs for air travel statistics."

.....

"While our comments relate primarily to domestic travel data, our views about international statistics are much the same. Simplification, rather than expansion, should be the first goal. There is a greater need for working out short cuts in the collection and publication of existing information than for adding various supplementary, though only occasionally useful, details about the passenger's journey."

2. "The implementation of such a program, as envisioned by this questionnaire, will supply a long standing need by U.S. Flag carriers for information on passenger origin and destination traffic statistics on a worldwide basis. Obviously, the value of any such program is conditioned upon the accuracy of the reporting carrier or carriers and the uniformity with which the underlying data is accumulated. We endorse any efforts on your part to further the program along the lines set forth in the questionnaire especially those touching upon accuracy, consistency and uniformity of reporting procedures."
3. "In completing this questionnaire form, we have been guided by two basic factors - the need for simplification in the issuance of origin/destination statistics and the importance of early publication so that the reports will have maximum utility."
4. "For example, we have shown in item 2 of part I that the data serves a need in our planning of flight schedules. However, its use for that purpose has been so limited due to the one or two year time lag as to render it virtually useless. We should like to make it crystal clear that although in filling out the questionnaire, we have indicated the desirability of more elaborate data, the real fundamental need is for more current production of the existing data. We see no reason why the quarterly origin-destination data cannot be produced and distributed within three months after the close of the period or why the annual data could not be reproduced within four months after the close of the period. Such a time schedule would provide airline management with a useful, current tool which would be extremely helpful in the programming and planning of its operations."

MANUFACTURERS

1. "As you will see from the answers, we are vitally interested in a program for the collection and publication of passenger origin and destination traffic statistics on a world-wide basis. In 1959, we spent a large expenditure on trying to establish this information for 1957. The data is especially needed for our future aircraft development. Information obtained from the proposed study could give us guidance as to the range, size, and performance our future aircraft should have."

.....

".....I am hopeful that with your help it will be possible to establish this program of collecting origin and destination statistics on a world-wide basis."

2. "We do believe that there is a decided lack of good statistical data regarding passenger traffic moving over international route segments. In general terms, any survey undertaken to improve the data currently available should include as basic requirements, (1) an Origin-Destination Survey, which would encompass a breakdown by tariff classifications -- that is, first class, tourist, economy or thrift; (2) a segment analysis also encompassing a breakdown into the various tariff classifications. This latter type of information should be segregated by particular segment, rather than the method presently used by ICAO, whereby it is classified by country/by airline. Additional information such as classification of major traffic generating centers, length of passenger hauls from these centers, and other types of data relative to the international air traffic picture, provide valuable tools for evaluation of potential market for manufacturers of aircraft."
3. "Please find the completed ICAO survey questionnaire enclosed. We consider this to be a very worthwhile effort which will have many valuable uses for the future development of air travel.

"When this survey is implemented our needs would best be served if the basic data could be made available in selected sets of tabulation cards which could be processed on our own computing equipment."

4. "Data which would be contained in summaries such as are defined in this questionnaire would be used in studies pertaining to aircraft design feasibility, economic analysis and operational studies."

5. "While we have completed the questionnaire in some detail perhaps the best way to sum up our feelings on this is to tell you that we would like very much to have ICAO publish data similar to your O&D and Competitive Surveys.

"The one major breakout that we would like to have in both the present CAB and proposed ICAO surveys concerns routing of a passenger between two points. For example: Where TWA flies a passenger from New York to Los Angeles we would like to know whether he is routed non-stop or via some point such as Chicago, St. Louis, etc. We would like this information even though the passenger never leaves the plane at these intermediate points. Information of this sort would permit comparison of passengers flown with seat miles scheduled."

6. "The information indicated in this questionnaire would be very helpful to us in our sales efforts and in studies we are making to determine engine sizes required for commercial aircraft. This is one phase of airline operation on which we rarely have sufficient information, so that we are very interested in obtaining anything that would increase our knowledge with respect to the traffic patterns in both domestic and international travel."

RESEARCH, CONSULTING AND LEGAL FIRMS AND OTHERS

1. "In addition to the entries in Part I, NEEDS SERVED BY TICKET DATA, and considering No. 5, 'Airport planning' to mean airport facility and financial planning, our firm finds all of the information available in the passenger ticket very useful for Community Air Service Studies.

"It would be desirable to have international travel summaries based on ticket routings in terms of origin and destination cities rather than gateway cities. This would be useful in international travel studies, where a new concept of routing other than gateway cities be considered.

"In addition, we would like to suggest, summaries of connecting passengers showing, by connecting point, points of origin and destination. This information would aid in determining the adequacy of air service between the point of origin and point of destination by indicating the volume of passengers between a city pair that utilize connecting service at a given airport.

"The information referred to in the section on ticket sales activity is occasionally very useful to aid in determining the distribution of locally and non-locally generated passengers for a given community. As indicated on the questionnaire, to our knowledge, this data is not presently available in any form.

"We would like to add, connecting traffic analysis indicating volumes between carriers at specific stations. This data would be helpful in air service requirement studies and facility planning at an airport."
2. "We have long used this statistical information on domestic traffic. It is helpful to us in many ways, for example, in supporting applications of some carriers, helping us determine what points we have the greatest community of interest with and handling with the carriers for improved services in some instances.

"I am not sure whether our city at the present time has very much overseas transportation or not but we do have considerable to Mexico and Canada, perhaps more than we think to other foreign countries, and we would like to have the information if it could be purchased without too great expense."
3. "Our interests stem from a long-range airline study project called Project 328, whose objectives are to detail all of the data processing requirements of the airline

industry. The Project's point of view is that of designing a single centralized On-Line system for one or more airlines that would mechanize all those functions within the airline that could be economically automated. Included among these functions are automatic ticket issuance and fare calculation on an industry-wide basis. Most of the information we suggest in our reply to you is of use in the fare calculation application.

"In addition to the items requested in the questionnaire we would also like to obtain information on:

1. The fare basis - that is, the type of discount or surcharge which may appear on tickets.
2. Conjunction ticket information - that is, the degree of ticket issuance for group travel, family plan, teams, etc.
3. Time of issue of ticket by point of issue.
4. Indication whenever fare construction class of service does not correspond to class of service used.
5. Frequency of ticket refund and exchanges."

O&D PANEL
FINAL REPORT
27/2/63

- 108 -

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EFFECTS ON FORMATS OF PUBLICATION OF VARIATIONS
IN ROUTEING DETAIL UNDER THE UNITED STATES PLAN
FOR PRODUCTION OF WORLD-WIDE PASSENGER TICKET
AIR TRAVEL STATISTICS

Airlines identified: A proposed format for publication of directional routeing (DOD/COD), airlines performing the transportation, and class of service information is presented as "Example 1" in Section V of the United States plan (Appendix 1). The manner in which such proposed format might vary with different amounts of detail published is illustrated in Attachment 1 hereto.

Format A in Attachment 1 is the same as Example 1 in the United States plan, except that some new routeings have been introduced to better illustrate the differences in format with various levels of detail. Format B is based on publication of directional routeing (DOD/COD) with participating airlines but without information as to class of service. It differs from Format A only by omission of three columns labeled "First Class."

Airlines not identified: Formats C, D, and E in the attachment are basically the same as Format A in outline but reflect the decreased detail in the summarization to be published. Format C illustrates publication of directional routeing (DOD/COD) but without identification of participating airlines or class of service. Format D illustrates a further reduction to a routeing containing only cities of directional origin, intercarrier transfers, and directional destination (DOD/SOD). Finally, Format E illustrates the publication of city pairs of directional origin and destination only (DOD), eliminating from the published statistics all COD subcomponent travel under the ticket. Thus, essentially the same format could be used for these various levels of detail.

The format for publication of ticket origin and destination statistics proposed in "Example 2" in the United States presentation is based on a classification of data by ticket origin, directional origin and destination, and type of trip (one-way, round trip, etc.). Since there is no direct provision in the format to reflect participating airlines or routeings no modification in the format is needed because of these differences in detail as reflected in Formats A through E.

ATTACHMENT 1

ILLUSTRATION OF EFFECTS OF VARIATIONS
 IN DETAIL ON FORMAT OF PUBLICATION

FORMAT A
 DOD/COD, PARTICIPATING AIRLINES, AND CLASS OF TRAVEL

BASE CITY <u>REFERENCE CITY</u> DIRECTIONAL ROUTING	NUMBER OF PASSENGERS IN SAMPLE					
	TOTAL BOTH WAYS		FROM BASE		TO BASE	
	All classes	First class	All classes	First class	All classes	First class
<u>PARIS FRANCE</u> <u>ROME ITALY</u>						
PAR AF ROM	22	18	10	8	12	10
PAR AZ ROM	16	9	8	5	8	4
PAR PA ROM	16	10	9	4	7	6
PAR TW ROM	20	14	10	8	10	6
PAR AF ZRH TW ROM	3		3			
PAR AZ MIL AZ ROM	3		2		1	
Total DOD volume	80		42		38	
ABY UK LGA PA PAR TW ROM	1	1			1	1
DCA AA LGA AF PAR AF ROM	1		1			
DCA EA LGA PA PAR PA ROM	3	1	1	1	2	
DCA AA LGA AF PAR AF ROM AF IST	2		1		1	
LON BE PAR AF ROM PA IST UK CCU	2	2	1	1	1	1
MAN BE PAR UK ROM UK CAI UK BOM	1		1			
Total COD volume	84	55	42	27	42	28
Total volume for city pair	90		47		43	
<u>RUYADH SAUDI ARABIA</u>						
PAR TW CAI UK RUH	2		2			
Total DOD volume	2		2			
Total volume for city pair	2		2			
BASE CITY TOTAL DOD volume	654		326		328	
COD volume	875	590	435	285	440	305

ILLUSTRATION OF EFFECTS OF VARIATIONS
IN DETAIL ON FORMAT OF PUBLICATION

FORMAT 5
DOD/COD AND PARTICIPATING AIRLINES

BASE CITY <u>REFERENCE CITY</u> DIRECTIONAL ROUTING	NUMBER OF PASSENGERS IN SAMPLE		
	TOTAL BOTH WAYS	FROM BASE	TO BASE
<u>PARIS FRANCE</u> <u>ROME ITALY</u>			
PAR AF ROM	22	10	12
PAR AZ ROM	16	8	8
PAR PA ROM	16	9	7
PAR TW ROM	20	10	10
PAR AF ZRH TW ROM	3	3	
PAR AZ MIL AZ ROM	3	2	1
Total DOD volume	80	42	38
ABY UK LGA PA PAR TW ROM	1		1
DCA AA LGA AF PAR AF ROM	1	1	
DCA EA LGA PA PAR PA ROM	0	1	2
DCA AA LGA AF PAR AF ROM AF IST	2	1	1
LON BE PAR AF ROM PA IST UK CCU	2	1	1
MAN BE PAR UK ROM UK CAI UK BOM	1	1	
Total COD volume	84	42	42
Total volume for city pair	90	47	43
 <u>RUYADH SAUDI ARABIA</u>			
PAR TW CAI UK RUH	2	2	
Total DOD volume	2	2	
Total volume for city pair	2	2	
BASE CITY TOTAL DOD volume	654	326	328
COD volume	875	435	440

ILLUSTRATION OF EFFECTS OF VARIATIONS
 IN DETAIL ON FORMAT OF PUBLICATION

FORMAT C
 DOD/COD

BASE CITY <u>REFERENCE CITY</u>	NUMBER OF PASSENGERS IN SAMPLE		
	TOTAL BOTH WAYS	FROM BASE	TO BASE
DIRECTIONAL ROUTING			
<u>PARIS FRANCE</u> <u>ROME ITALY</u>			
PAR ROM	74	37	37
PAR ZRH ROM	3	3	
PAR MIL ROM	3	2	1
Total DOD volume	80	42	38
ABY LGA PAR ROM	1		1
DCA LGA PAR ROM	4	2	2
DCA LGA PAR ROM IST	2	1	1
LON PAR ROM IST CCU	2	1	1
MAN PAR ROM CAI BOM	1	1	
Total COD volume	84	42	42
Total volume for city pair	90	47	43
<u>RUYADH SAUDI ARABIA</u>			
PAR CAI RUH	2	2	
Total DOD volume	2	2	
Total volume for city pair	2	2	
BASE CITY TOTAL DOD volume	654	326	328
COD volume	875	435	440

ILLUSTRATION OF EFFECTS OF VARIATIONS
 IN DETAIL ON FORMAT OF PUBLICATION

FORMAT D
 DOD/SOD

BASE CITY <u>REFERENCE CITY</u>	NUMBER OF PASSENGERS IN SAMPLE		
	TOTAL BOTH WAYS	FROM BASE	TO BASE
<u>ROUTING</u>			
<u>PARIS FRANCE</u> <u>ROME ITALY</u>			
PAR ROM	77	39	38
PAR ZRH ROM	3	3	
Total DOD volume	80	42	38
ABY LGA PAR ROM	1		1
LON PAR ROM IST CCU	2	1	1
Total SOD volume	80	40	40
Total volume for city pair	83	43	40
<u>RUYADH SAUDI ARABIA</u>			
PAR CAI RUH	2	2	
Total DOD volume	2	2	
Total volume for city pair	2	2	
BASE CITY TOTAL DOD volume	654	326	328
SOD volume	835	415	420

ILLUSTRATION OF EFFECTS OF VARIATIONS
IN DETAIL ON FORMAT OF PUBLICATION

FORMAT E
DOD

BASE CITY REFERENCE CITY	NUMBER OF PASSENGERS IN SAMPLE		
	TOTAL BOTH WAYS	FROM BASE	TO BASE
PARIS FRANCE			
ROME ITALY	80	42	38
RUYADH SAUDI ARABIA	2	2	
BASE CITY TOTAL DOD volume	654	326	328

APPENDIX 3

METHOD OF PREVENTING DUPLICATION AND FILLING GAPS IN TOD STATISTICS
UNDER THE U.S. PLAN

(presented by Mr. Hord)

The U.S. plan has been designed to make participation by airlines and member States relatively easy. This should encourage a high degree of participation so as to minimize the problem of gaps in the statistics. Assuming that 100-percent participation were achieved there would be only a problem of duplication. Under this assumption, all airlines would report all zero-ending coupons for international travel. The analyst at ICAO would scan all these coupons using (for TOD) only those coupons covering the first international stage of each trip. Under this procedure there would be no duplication.

If some airlines do not participate, reporting gaps will be created but can be filled partially through the following process. The analyst at ICAO would be provided with a list of those carriers that have not submitted data. As the analyst looks at each coupon he determines whether it is the first international segment. If so, the coupon is used. Otherwise, he determines if any prior international segment were carried by a reporting carrier. If so, this coupon is not used. If not, it is used.

This procedure will insure inclusion of those trips where at least one international stage is by a reporting carrier. It will not include those trips where all international segments are carried by nonreporting carriers. In other words, the gap in the data will be confined to international passengers whose travel is restricted solely to on-system movements over one or a combination of nonreporting carriers. If the nonreporting carriers are confined to those handling small volumes of traffic the distortion would be relatively unimportant.

O&D PANEL
FINAL REPORT
27/2/63

- 116 -

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APPENDIX 4

EXPERIENCE WITH ELECTRONIC DATA PROCESSING IN THE PRODUCTION AND USE
OF AIR PASSENGER ORIGIN DESTINATION STATISTICS
IN THE UNITED STATES

(Presented by the United States of America)

In 1960 when the U.S. Plan for Centralized Production of World-Wide Passenger Ticket Air Travel Statistics was submitted to the Panel, provision was made for the processing of such statistics on EDP facilities. However, at that time the Civil Aeronautics Board had had no experience in the use of EDP facilities, and both the processing procedures and related costs had to be estimated. In May 1962, the Civil Aeronautics Board did install an IBM 1401 computer system. While our over-all statistical program is by no means fully converted to this system, we have now had substantial experience in producing the O&D statistics through EDP procedures. It is believed that a general summarization of this experience will be helpful to the Panel and to ICAO, and possibly also to representatives of various States in evaluating the contributions that these new methods of processing can make, not only in respect to the production of O&D statistics, but to other types of statistics as well. This paper is presented in the belief that such an example of actual experience with an EDP facility may be of some value to the Panel as it proceeds toward the preparation and documentation of its final report.

Background

In the more than 23 years that the United States has been making origin destination surveys of air passenger traffic, the processing methods used have progressed from manual procedures to automatic production on card punch equipment and then to electronic data processing. These advances in processing methods have made it possible not only to cope with the substantially increased volume of O&D survey work resulting from the tremendous growth in the air transport industry during these years but also to provide O&D statistics of much expanded scope and greater frequency of issue.

The first automatic processing of the O&D surveys was through an outside service arrangement beginning in 1948 under which the Bureau of Census performed the work on punch card equipment for the Civil Aeronautics Board. In 1950, the Board established its own punch card facility to do the work. Then, in 1959 the domestic survey was converted to electronic data processing at the Bureau of Standards so that it was again under an outside service arrangement. Repeating its experience with punch card processing, the Board installed its own EDP facility early in 1962 and produced the first O&D survey on this "in-house" facility in August 1962.

In changing from outside services to its own facility - first with punch card equipment then with electronic data processing equipment - the Board did so because it found that for a cost not substantially more than that for producing the surveys alone it could have a greatly increased capacity for doing other work, too. This has been especially true for EDP where the increased capacity embraces not only recurrent statistical products but extends to performance of special services that relieve analytical and other staff of time-consuming manual effort in adapting the published data to particular uses.

Description of the EDP Facility

The Board's new EDP data processing programme is built around its IEM 1401 four-tape drive electronic processing facility with an 8-K memory unit. Although relatively modest in size and cost as compared with many EDP installations, the Board's 1401 facility has a very large capacity for statistical processing work. Moreover, its basic capacity can be greatly increased, without disrupting established machine programmes or procedures, either by increasing the hours of operation of the equipment, up to three full shifts a day, or by changing to different or by adding additional components of equipment.

The staff of the facility totals 18. Of these, 7 are machine programmers, 3 are machine operators, 6 are card punch operators, with the supervisor and secretary composing the other two. In setting up the operation, considerable programming and other assistance was secured through outside contract.

Work Programme of the EDP Facility

The EDP facility is now, or will later, perform major recurrent projects in the Board's statistical programme and certain administrative tasks. Of at least equal interest and importance, however, it will also provide special services tailored to particular needs throughout the Board that are now met by costly manual work or, in some cases, not being met at all. Through loan of the Board's electronic tapes, air carriers and others outside the Board will also be able to obtain such special services. The performance of recurrent projects and special services are discussed separately under the following two headings.

Performance of Recurrent Projects

The principal recurrent projects already in operation on the Board's EDP facility are as follows:

- 1) Origin destination surveys of air passenger traffic. The domestic surveys and related "Competition Studies" were the first order of production by the EDP facility - beginning with the survey for the quarter of 1962. The first international survey to be produced by EDP (March 1962) is now in process on the machine.

- 2) General traffic and financial statistics reported on CAB Form 41. Monthly reports of air carrier traffic statistics have been produced for a number of months and the quarterly report of air carrier financial statistics is now in machine processing. Final machine tabulations have been completed for the first issue of a new and expanded Airport Activity Statistics of Certificated Route Air Carriers - containing detailed data on aircraft departures and traffic originations and enplanements by carrier and airport. The production of these statistical publications is preceded by a comprehensive "machine edit" to verify the reported data for accuracy and test its conformance with prescribed uniform requirements.

Looking further into the future additional recurrent work will be placed on the EDP facility, including:

- 1) Payroll, personnel and other administrative records of the Board.
- 2) Safety statistics including a complete file of accidents by causes.
- 3) Flight schedules of all U.S. domestic and international air carriers.
- 4) Tariffs filed with the Board.
- 5) Details of route and service authorizations granted to carriers.

Plans are also under consideration for air cargo O&D surveys that will require processing on electronic equipment.

Performance of Special Data Processing Services

The major objective of the Board's EDP facility is not simply to produce statistics with minimum time lag and maximum economy, as important as these are, but to modernize the methods for using the great quantity of O&D, general traffic, financial and other data available. Countless man-hours have been spent by the Board and airline staffs and many other persons in manually selecting, rearranging and manipulating the published data to meet their particular needs. If the total cost of such obsolete manual statistical effort - and the limitations it places on the facts and analyses available for planning and decisional purposes - could be known it would surely dwarf the statistical production costs by comparison.

Accordingly, the EDP facility is set up to perform special tabulating services that will provide statistical end products in the precise form required to meet all major Board needs. In this way, it is planned to make the use of the O&D and other data within the Board largely independent of manual transcriptions from published surveys and other documents. This will not only relieve operating staff of much burdensome manual statistical work but opens the door upon entirely new vistas of fact finding. Freedom from previous monopolization in manipulating papers and numbers provided the analyst with the time to focus on his primary task.

of improving analytical techniques and expediting sound solution of basic problems. These special tabulating services are expected to save more cost in staff time than the total cost of the EDP facility.

The key to performance of these special services is in preplanned generalized programmes for selection of data from the electronic tapes. This new methodology makes all of the O&D detail accessible in any combination desired at a computer speed thousands of times that of manual procedures. For example, for any list of city pairs that a user may name, up to 300 at one time, the electronic machine can examine the total information in the U.S. domestic O&D survey for a single quarter or a full year and select out and print the full detail of all routings of which any part is common to anyone of the city pairs named. Moreover, this selection and printing process can be done in less than three hours of machine time for any such group of pairs. If some rearrangement or change from the standard format is desired this can be readily accomplished with only minor adaptations in present generalized programmes. Any one job of this nature is equivalent to examining 2,000 pages in the annual survey publication, visually inspecting every detail in the 200,000 different routings, manually recording the routings and other detail selected, and typing the results - and undertaking that would be far too costly for use in most applications.

Reduction in Time Lag

EDP largely removes machine processing as an element in the time lag required to make statistics available to users. The great speed of the electronic equipment reduces machine time to a matter of hours or days as compared with weeks and months by older machine methods. For example, the total running time for the U.S. domestic O&D survey for one quarter, including edit, is less than 60 machine hours. Any further significant reduction in time lag would have to come from shortening the carriers' report-filing period.

The total elapsed calendar time from the end of the period covered by the statistics to completion of the U.S. O&D statistics by the Board's EDP facility, both in final tabulations ready for printing and in electronic tapes ready to meet special requests for tabulating services, will be reduced to three months. Such schedule was actually achieved when the survey was processed by the Bureau of Standards' electronic installation. This compares with a lag of nearly a year that was normal when the survey was processed on punch card equipment. The improvement is due entirely to the increased speed and capability of EDP. This is indicated by the following approximate breakdown of the elapsed calendar time attributable to each of the principal processes involved for a domestic O&D survey:

	<u>Number of months</u>	
	<u>Processed by EDP</u>	<u>Processed on punch card equipment</u>
Submission of data by carriers	1.5	1.5
Manual processing	1.0	2.5
Machine processing	0.5	7.0
	<hr/>	<hr/>
Total	3.0	11.0

The most obvious gain from EDP indicated by the above figures is, of course the reduction in machine processing time from 7 to 0.5 months. However, the large reduction in manual processing time is due, also, to EDP. It is the direct result of EDP taking over much edit work that was formerly done manually. Moreover, in addition to relieving the O&D staff of this manual effort, EDP is performing in the shorter time a much more thorough edit of the data than was feasible with punch card equipment.

Recurrent Operating Cost of the EDP Facility

The annual cost for the recurrent operation of the EDP facility, in total and that portion applicable to the O&D surveys, is summarized as follows:

	<u>Total EDP facility</u>	<u>O&D surveys</u>
Staff-technical and administrative	\$121,300	\$20,700
Machine rentals	88,200	29,400
Supplies and space rentals	22,800	7,600
	<hr/>	<hr/>
Total*	\$232,300	\$57,700

This total cost for the U.S. O&D work covers both the domestic and international surveys, including the domestic "Competition Studies". The domestic survey is processed quarterly with an annual summary and the international surveys are processed twice a year. Moreover, this represents the cost for O&D statistics of very broad scope. For example, the domestic data include the following detail:

Directional origin and destination with routing consisting of intermediate points of transfer between airlines and change in class of service;

Airlines performing the transportation;

Airlines reporting the data;

Class of service used, i.e., first-class and coach/economy;

Identification of one-way and round trips;

Trip distances on a great circle city-center-to-city-center basis;

Identification of domestic portions of international journeys; and

Data on tickets refunded.

* Based on a one-shift operation. Because of reduced machine rental rates and other economies for additional shifts the costs assignable to O&D surveys would be less if two or more shifts were operated. For two shifts, total EDP facility costs would be about \$274,200; O&D costs, \$38,600. For three shifts, the comparable figures would be \$385,900 and \$34,300.

The machine programmes also provide for additional detail the collection of which is now under consideration including (1) identification of all intermediate points in the trip routing, (2) identification of passenger stopovers, and (3) identification of an increased number of different fare classes. Thus, the detail now produced plus that provided for encompasses a large part of the total information in the passenger ticket.

It is of interest that the total cost of \$57,700 for electronic data processing of the U.S. O&D surveys set forth in the preceding table is just about half of the \$115,500 covering electronic machine processing on an outside service basis included in the cost estimates for the U.S. centralized system of maximum scope as presented to the Panel*. Since processing by ICAO under the U.S. system should require no more machine capacity than the total for the U.S. surveys, which use only about one third of the capacity of the Board's EDP facility for a single shift, this gives an indication of the potential cost advantages in an EDP facility where it can be justified on the basis of an over-all statistical programme.

Processing of the O&D surveys on the Board's EDP facility includes a comprehensive machine edit to check the uniformity and accuracy of the statistics. The edit procedures and results are described in Appendix A (page 124) attached to this paper. The annual machine hours and the portion of the total O&D cost required for the edit are stated separately below:

	<u>Machine hours</u>	<u>Total cost</u>
Electronic Machine Edit	96	\$11,500
Other machine processes	394	46,200
Total	490	\$57,700

The electronic machine edit accounts for 20 percent of the total machine capacity and over-all cost of the O&D surveys. However, experience has proved the edit to be so vital to the attainment of acceptable standards of accuracy that production of the O&D statistics without the enhanced reliability from the edit would no longer be considered.

The electronic machine edit is not only used to effect immediate correction of the errors discovered in the survey in process but the results of the edit are used in a follow-up procedure to improve the accuracy of the carrier reporting. A copy of the error print-out for each carrier listing all of the errors discovered is transmitted to the carrier with a request that it be studied and corrective action taken in subsequent O&D reports. Moreover, two major carriers have adopted the Board's edit procedures to perform a "pre-edit" with the result that their O&D data subsequently have been virtually error-free when received by the Board.

* See page 224

Nonrecurrent Programming Costs

Developing an EDP facility and planning each new project to be processed therein involves certain nonrecurrent costs. This is represented basically by the programming staff and the machine time required for testing the programmes. For example, the programmes for processing the U.S. O&D surveys on the Board's facility required total staff and machine costs of approximately \$40,000. Once completed, the programmes can be used indefinitely without further cost and can even be applied to similar statistical programmes on other installations. Thus, the U.S. programmes could be made available for an ICAO O&D operation. If the ICAO processing were on the same type of equipment as used by the Board the cost of adapting the programmes would be nominal. If a different type of equipment were used by ICAO availability of the U.S. programmes would still substantially reduce ICAO's initial costs because the basic logic of the programmes would not differ.

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APPENDIX A

ELECTRONIC MACHINE EDIT OF U.S. DOMESTIC O & D SURVEY

Master file of information

The machine edit is based on a "Master Table Look-up" which contains an up-to-date listing of all cities receiving scheduled air service, the airlines serving each city and the class of service provided by each airline at each city. The information includes alphabetic and numeric codes and spelling of city and, in some cases, state names. (State name is always included in cases of two or more cities with the same name.)

Performance of machine edit

Using the "Master Table Look-up" in accordance with a predetermined program, the electronic data processing machine:

1. Checks validity of all city and airline codes. When errors are found the machine either (a) effects corrections automatically in accordance with the predetermined program or (b) rejects the routing, if correction is not provided for in the program, for manual analysis and correction as needed.
2. Checks each segment of each routing to verify that the airline named for the segment serves the two cities involved and that it provides the indicated class of service. Errors are handled as described in 1. preceding.
3. Reconciles total passenger and record counts to control totals at progressive stages of the operation.

Volume of errors

Over-all, approximately 2,600 routings per quarter are rejected by the electronic machine for manual analysis and correction as needed. It is estimated that at least an equivalent number of routings are corrected automatically by the machine without rejecting them.

The total volume edited per quarter is about 160,000 routings so that the over-all error rate is about 2 percent. The error rates for individual airlines vary widely, however, as indicated in Attachment 1 hereto based on the routings rejected in the machine edit. (A count of errors corrected automatically by the electronic machine is not currently available.)

Types of errors

Examples of errors identified with explanation of the corrective action taken are set forth in Attachment 2 hereto.

ATTACHMENT 1

ELECTRONIC MACHINE EDIT OF U.S. DOMESTIC O & D SURVEY
NUMBER OF ERRORS IDENTIFIED AND REJECTED
RELATED TO TOTAL VOLUME OF CARDS EDITED
SECOND QUARTER OF 1962

<u>Airline 1/</u>	<u>No. of errors</u>	<u>Original card count</u>	<u>Errors as a percent of card count</u>
A	371	27,838	1.3
B	39	2,838	1.4
C	25	8,462	0.3
D	2	821	0.2
E	83	2,387	3.5
F	90	5,287	1.7
G	391	14,205	2.8
H	618	21,449	2.9
I	18	1,696	1.1
J	80	1,729	4.6
K	0	27	-
L	147	1,800	8.2
M	73	5,730	1.3
N	14	2,796	0.5
O	69	3,585	1.9
P	128	7,693	1.7
Q	21	3,264	0.6
R	8	1,394	0.6
S	39	2,908	1.3
T	21	2,765	0.8
U	63	1,812	3.5
V	215	17,180	1.3
W	11	37,466	2/
X	64	3,170	2.0
Y	40	1,385	2.9

1/ Each letter represents an actual airline.

2/ Less than 0.05 percent. Low error percent due to the carrier using the CAB's edit list and correcting the report before submission to the Board.

ATTACHMENT I

ELECTRONIC MACHINE EDIT OF U.S. DOMESTIC O & D SURVEY
 EXAMPLES OF ERRORS IDENTIFIED AND CORRECTIVE ACTION TAKEN

Reporting carrier	Class of service	Origin	Destination	Routing	Explanation
American	1st	BNA	TXY	AA MEM TT	Machine rejected. TXY invalid city code. Changed manually to TXK.
American	1st	CHI	SEA	NA	Machine rejected. NA invalid carrier code for CHI-SEA, changed manually to NWA.
Continental	combination	MKC	MLI	CO1 MKC OZO	Machine rejected. Connecting point and origin identical. Continental portion eliminated manually and remainder shifted to 1st class.
Delta	1st	AVL	GRR	DL CHI N/	Machine rejected. Garbled code. Changed manually to NO.
Delta	1st	CHA	CHA	DL	O & D same point. Rejected completely because no correction possible.
Lake Central	1st	LAN	MIE	NO CMH LC	Machine rejected. North Central does not serve CMH (Columbus Ohio), but might be another Columbus. Machine tested against Columbus, Georgia and Columbus, Mississippi. Still no match, so machine rejected. Manually changed CMH to CLE.
Lake Central	combination	YNG	RO3	LCO BUF UAI	Machine rejected. RO3 invalid city code. Manually changed to ROC.
Northeast	combination	CSG	MIA	SOO ATL EAO MOB NA JAX EAL ORL	Machine rejected. No carrier shown between ORL O and MIA. Manually eliminated "ORL O".
North Central	1st	MNM	YYZ	NO CHI TC	Machine rejected. YYZ not a valid domestic code (It would be in Canada). Manually cut off international part of the routing, and classified remainder as domestic portion of international trip.
Northwest	coach	PIE	TPA	EAL	Machine changed PIE to TPA because the two cities represented (St. Petersburg and Tampa) are considered as one point. Then, origin was same as destination, so trip was rejected completely because no correction was possible.

O&D PANEL
 FINAL REPORT
 APPENDIX 4
 27/2/65

APPENDIX 5

PANEL ON ORIGIN AND DESTINATION STATISTICS

(Fourth Meeting)

**SUMMARY OF RESPONSES TO
QUESTIONNAIRE ON NEEDS FOR TRAVEL STATISTICS
FROM THE AIRLINE PASSENGER TICKET**

(Presented by the United States Panel Member)

Civil Aeronautics Board
Washington, D.C.

May 1960

O&D PANEL
FINAL REPORT
27/2/63

- 128 -

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OVER-ALL SUMMARY OF RESPONSES TO
SECTION I, NEEDS SERVED BY TICKET DATA
NUMBER OF RESPONDENTS 1/ RATING EACH ITEM OF INFORMATION
AS EITHER VERY USEFUL OR USEFUL FOR ONE OR MORE PURPOSES
(Ranked by frequency of need expressed)

<u>Item of information</u>	<u>Number of respondents</u>
Origin	91
Destination	91
Class of travel	83
Transfer points between airlines	83
Participating airlines	83
All intermediate points	75
Passenger stopover identification	70
Length of passenger stay at each point	62
Date of travel over each stage	56
Place of ticket issue	54
Fare amount	53
Airline issuing ticket	51
Flight number for each stage	47
Date of ticket issue	37
Terms of payment	36

1/ Total number of respondents: 91

SUMMARY OF RESPONSES TO SECTION 1, NEEDS SERVED BY TICKET DATA
 QUESTIONNAIRE ON NEEDS FOR TRAVEL STATISTICS FROM THE AIRLINE PASSENGER TICKET

I. NEEDS SERVED BY TICKET DATA

Designate your needs for data by check in column (2). For each such need checked, insert number in columns (3) through (17) to indicate the value of each item of information in serving that need according to the following scale: Very useful--1; Useful--2; Not useful--3

Name and address of respondent
 NUMBER OF RESPONDENTS RATING EACH
 ITEM OF INFORMATION AS EITHER VERY
 USEFUL OR USEFUL FOR THE INDICATED
 NEEDS 17

Need served	Description	Information available in the passenger ticket																
		Origin	Destination	Transfer between flights of *		Passenger stopover	Participating airlines	Class of travel (1st, 2nd, etc.)	Date of travel (month, day, year)	Flight number, by segment	Length of passenger stay at each point	Ticket sale			Passenger fare			
				Same airline	Different airlines							Date of issue	Price of fare	Issuing office	Amount	Fare basis (cash, check, card, etc.)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)		
1. Route development																		
Airlines		23	23	13	20	7	21	17	5	5	4	4	10	11	3	0		
Airports		26	26	23	23	17	17	19	12	12	14	6	13	9	10	3		
Manufacturers		5	5	3	4	4	4	5	1	1	2	0	0	2	4	2		
Consultants, etc.		10	10	10	10	10	9	10	4	4	6	1	6	8	6	2		
State authorities		3	3	2	2	3	3	3	2	2	2	1	1	1	2	1		
Chambers of commerce		5	5	4	4	3	5	4	3	3	2	1	3	2	1	0		
CAB		1	1	1	1	1	1	1	1	0	0	0	1	0	0	0		
Total		71	73	56	64	45	60	59	30	27	30	13	31	33	26	8		
2. Schedule planning																		
Airlines		23	23	13	20	9	22	17	7	8	4	3	8	8	3	0		
Airports		3	3	2	2	1	3	2	3	1	2	1	2	2	2	1		
Manufacturers		4	4	3	3	3	4	4	2	2	1	0	0	1	2	0		
Consultants, etc.		4	4	3	3	2	4	4	1	1	1	0	0	1	1	0		
Chambers of commerce		1	1	0	0	0	1	0	0	0	0	0	0	0	0	0		
Total		35	35	21	29	15	33	27	13	14	8	5	11	11	8	1		
3. Sales admin., travel prom.																		
Airlines		19	19	7	14	9	18	17	6	3	6	5	12	12	3	5		
Airports		8	8	6	6	8	8	8	8	3	7	5	5	4	6	5		
Manufacturers		5	5	4	4	4	5	5	5	1	1	0	1	1	5	2		
Consultants, etc.		4	4	3	3	3	4	2	2	3	1	1	2	3	2	2		
Chambers of commerce		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
FAA		1	1	1	1	1	1	1	1	0	1	1	1	1	1	1		
Total		38	38	22	29	26	36	36	23	10	19	13	21	21	19	16		
4. Design requirements for aircraft																		
Airlines		6	6	2	3	3	3	5	0	0	0	0	0	0	0	0		
Airports		2	2	1	1	1	1	2	1	1	1	1	1	1	1	1		
Manufacturers		8	8	6	7	6	8	8	3	3	1	0	0	0	7	1		
Chambers of commerce		1	1	0	0	0	1	1	1	1	0	0	0	0	1	1		
Total		17	17	9	11	10	13	16	7	5	4	1	1	1	9	3		
5. Airport planning																		
Airlines		6	6	2	4	1	4	4	0	0	0	1	1	1	1	0		
Airports		29	29	25	26	28	25	24	15	13	24	13	17	14	13	4		
Manufacturers		8	8	7	7	6	7	7	5	3	4	3	6	5	5	2		
Consultants, etc.		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
State authorities		5	5	4	4	3	4	4	3	3	2	3	3	3	3	2		
Chambers of commerce		1	1	1	1	1	1	1	1	0	1	1	1	1	0	0		
FAA		1	1	1	1	1	1	0	1	1	1	1	2	2	0	0		
Total		50	50	40	43	40	42	40	25	21	32	21	29	24	23	9		
6. Airway planning																		
Airlines		4	4	0	1	0	1	1	0	0	0	0	0	0	0	0		
Airports		3	3	3	3	1	1	1	1	1	1	1	1	1	1	1		
Manufacturers		1	1	1	1	1	1	1	1	1	1	0	1	1	1	1		
Consultants, etc.		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Total		8	8	4	5	2	3	3	2	2	2	2	2	2	2	2		
7. Investment analysis																		
Airlines		5	5	2	4	1	2	3	0	0	0	0	0	0	1	1		
Airports		4	4	4	4	4	4	3	4	2	4	2	2	2	2	2		
Manufacturers		6	6	2	2	3	4	4	4	2	2	1	2	2	4	2		
Consultants, etc.		12	12	8	9	7	7	11	5	3	3	0	3	3	6	3		
Chambers of commerce		1	1	1	1	1	1	1	1	0	1	1	1	1	1	1		
Total		27	27	17	20	16	18	22	14	7	10	4	8	8	14	8		
8. Gen'l. econ. analysis, forecasting																		
Airlines		18	18	10	15	7	15	16	3	1	5	4	7	6	4	3		
Airports		26	26	23	23	21	22	22	11	10	19	9	11	12	10	9		
Manufacturers		9	9	6	7	7	8	8	6	3	3	0	4	2	6	2		
Consultants, etc.		11	11	9	10	8	9	10	5	6	7	7	7	5	8	4		
State authorities		2	2	2	2	2	2	2	2	2	2	1	1	1	2	1		
Chambers of commerce		4	4	3	3	3	3	4	3	3	2	2	2	2	3	3		
FAA		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
CAB		1	1	1	1	1	1	1	0	0	0	0	0	0	1	1		
Dep't. of Commerce		1	1	1	1	0	1	1	0	0	0	0	0	0	1	0		
Total		73	73	56	63	50	62	65	34	26	40	20	33	29	42	24		
9. Other needs																		
Airlines		3	3	3	3	3	3	2	1	1	2	0	2	1	0	0		
Airports		5	5	5	5	4	5	4	3	2	3	1	3	2	3	1		
Manufacturers		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Consultants, etc.		6	6	5	6	5	6	5	5	5	4	3	4	4	5	3		
CAB		1	1	1	1	1	1	1	0	1	0	0	0	0	1	1		
Total		16	16	15	16	14	16	13	10	10	11	5	10	8	10	6		
10. Total number of respondents																		
Airlines																23		
Airports																31		
Manufacturers of aircraft and aircraft engines																9		
Consultants and research organizations																16		
State aviation authorities																3		
Chambers of commerce																6		
Federal Aviation Agency (FAA)																1		
Civil Aeronautics Board (CAB)																1		
Department of Commerce																1		
Total																67		

2/ See page 131.

2/ Other needs specified by respondents:

Facility planning (Airline)*
Evaluation of impact of fare changes (Airline)
Commercial tariff policy problems (Government agency)
Specific commercial tariff problems (Government agency)
Application of bilateral air transport agreements (Airlines,
government agency)
Determine community requirements for air service (Airports,
consultant)
Promotion for new air service (Airport)
Determine intermediate cities where passenger changed flights
on same airline (Airport)
Ticket sales each city pair (Consultant)
Determine passenger preference for each aircraft type (Consultant)
Analysis of competitive sharing of traffic (Consultant)
Develop airline data processing systems (Electronic systems firm)
Research into various economic aspects of air transportation
(Aircraft manufacturers, university; both also checked 8,
General Economic Analysis)

* Indicates respondents identifying the need. Where similar needs were mentioned by more than one respondent, they have been combined.

SUMMARY OF RESPONSES TO SECTION II, COMPILATIONS OF PASSENGER TICKET INFORMATION
FOR GENERAL USE AND SPECIAL NEEDS

NUMBER OF RESPONDENTS INDICATING DESCRIBED TABULATIONS
WOULD BE OF VALUE TO THEM

<u>Description of tabulation</u>	<u>Number of respondents</u>
A. <u>SUMMARIES THAT MIGHT BE PUBLISHED TO MEET COMMON NEEDS</u>	
1. Summary of all traffic in terms of actual ticket routing with origin, points of transfer between flights, and destination	82
2. Summary of all traffic in terms of travel needed by passenger, reflecting origin, passenger stopover points, and destination	56
3. International travel summary based on ticket routings in terms of countries and gateway cities	53
4. Summary of total arriving and departing passengers by individual cities (airport) in terms of route segments between city and first prior boarding point and first subsequent debarking point	72
B. <u>SUBJECTS FOR SPECIAL TABULATION TO MEET PARTICULAR NEEDS</u>	
(Assuming a central facility with modern equipment for processing and publishing ticket data existed, special tabulations such as those described below might be produced to the order of individual users at reasonable cost.)	
1. The total movement of traffic between any pair of cities in terms of originating, terminating, and transferring passengers	80
2. International travel for a given country consisting of journeys originating, terminating and transferring in the country with routing and other ticket detail as needed	44
3. Traffic pattern for a particular airline in terms of ticket origin and destination, airline system origin and destination, and other routing and ticket detail as needed	41
4. Traffic pattern for a particular city (airport) reflecting ticket origin and destination, trip segments between city and first prior boarding point and first subsequent debarking point, cities of ticket issue, and other needed information	65

SUMMARY OF RESPONSES TO SECTION II, COMPILATIONS OF PASSENGER TICKET INFORMATION
FOR GENERAL USE AND SPECIAL NEEDS
QUESTIONNAIRE ON NEEDS FOR TRAVEL STATISTICS FROM THE AIRLINE PASSENGER TICKET
NUMBER OF RESPONDENTS INDICATING DESCRIBED TABULATIONS
WOULD BE OF VALUE TO THEM

<u>Description of tabulation</u>	<u>Number of respondents</u>
B. <u>SUBJECTS FOR SPECIAL TABULATION TO MEET PARTICULAR NEEDS</u> (cont.)	
5. Total traffic over a major route segment or for a defined geographic area according to origin and destination, or other desired elements of the ticket routing	48
6. Total passenger traffic between given city pairs or countries, over major route segments, or for a defined geographic area broken down by class of fare (first-class, coach, etc.) used	46
7. Ticket sales activity at a particular city consisting of total tickets issued, issuing airline, money amount of tickets, origin and destination, or other detail as needed	47
8. Distribution of traffic by length of trip measured in terms of the total trip, the trip segment between passenger stopovers, or any other desired segment of the ticket	41

SUMMARY OF RESPONSES TO SECTION II
ADDITIONAL COMPILATIONS OF PASSENGER TICKET INFORMATION
SUGGESTED BY RESPONDENTS
FOR GENERAL USE AND SPECIAL NEEDS

A. Summaries that might be published to meet common needs

Summaries of connecting passengers showing, by connecting point, points of origin and destination. (Airport, consultant)^{1/}

Summary of total arriving and departing passengers by individual cities (airport) in terms of days of the week and hours of the day. (Airport, consultant, chamber of commerce)

Summary of total arriving and departing passengers by individual cities (airport) (Domestic and international traffic). (Airline)

Same as No. A-4 ("description of tabulation" as stated), except second O & D points. (chamber of commerce)

Summary by airline for description item II-A-4 preceding. (government agency)

On-line origin-destination passenger survey into four groups: single-carrier, connecting traffic and stop overs sub-divided between simple and multiple. (Consultants)

Summary of total originating and terminating passengers by individual cities (airport) in terms of length of trip. (Airport, consultant, chamber of commerce)

Passengers and passenger-miles by distance blocks (1-50; 51-100; 101-150, etc.) based on (1); total and by geographical area. (Aircraft manufacturer, government agency)

Five hundred leading pairs of points ranked by (a) passenger-miles (b) passengers. (Two airlines)

International travel summary in terms of: (a) at published fare or by (b) special fare calculation. (Electronic systems firm)

Breakdown of travel (origin-destination) as to class of travel--
Re: first, economy, etc. (Airport)

Special summaries of night coach, special promotional fares, economy, etc. to note their (1) impact on traffic and (2) effect on over-all yield. (government agency)

^{1/} Indicates respondents suggesting the compilation. Where similar compilations were suggested by more than one respondent, they have been combined.

Special summaries of "family" plan, military discounts, and children's half fares to establish factors for estimating effect on over-all yield. (government agency)

Complete "Foreign Flag" tabulation (not only for Foreign-flag-U.S. domestic carrier trips as it is now). (Aircraft manufacturer)

Traffic flow data between domestic cities--reactivation of the former system. This information is most important in airport planning. (government agency)

Summary as in II-A-1 and II-A-3 but including direction of travel, indication of incoming or outgoing portion of round-trip and length of stopovers. (government agency)

Summary of the major international markets. Passenger and passenger-miles in total and for each carrier. (Consultant)

B. Subjects for special tabulation to meet particular needs

Connecting traffic analysis indicating volumes between carriers at specific stations. (Airport)

Origin of traffic at a particular airport city by passenger's city of residence. (Airport)

Final origin or destination (by city) of traffic using "Area Airports" (i.e., in New York area--Brooklyn, Yonkers, Newark, Manhattan, etc.) at GSO - High Point; Greensboro, Winston-Salem, Reidsville, Burlington, etc.). (Airport)

Distribution of traffic at a particular city as between originating, terminating and transit; and, for each of these, by class of service; and then by day of week and time of day. (Airport, consultant, chamber of commerce)

Distribution of total revenue passengers departing a particular city distributed as between those originating locally, those making on-line connections, those making inter-line connections, and those going through on same flight on which they arrived. (Consultant, chamber of commerce)

Connecting traffic analyses indicating volumes between carriers at specific stations. (Consultant)

Modification of "B-7": Ticket sales activity at each station to show (1) total tickets issued (2) by airline (3) money amount accruing to issuing (originating) airline. (Consultant)

Miles and number of flights by equipment type and class by distance blocks (1-50; 51-100; 101-150, etc.) total and by geographical area. (Aircraft manufacturer)

For international and domestic traffic a tabulation similar to the present "Competition Study" should be published. Suggested revisions in this tabulation are:

- (1) That directional data be incorporated for both local and connecting traffic.
- (2) That the point at which the connecting traffic connects be designated, i.e., over x-y segment how much of the connecting traffic connects at x and at y respectively.
- (3) That all pairs of points be listed alphabetically in both directions instead of the single alphabetical listing published in the present study. (Airline)

Would prefer to obtain selected sets of data cards. (Aircraft manufacturer)

Breakdown by equipment type or by jet, prop-jet vs. piston. (Consultant)

Helicopter travel study showing passengers using service to (1) originate or terminate air trips (2) connect flights at two different airports in same area (3) other (not related to other air travel). (government agency)

Same as II-B-5 for specific airline or airlines. (government agency)

SUMMARY OF RESPONSES TO SECTION II

QUESTIONNAIRE ON NEEDS FOR TRAVEL STATISTICS FROM THE AIRLINE PASSENGER TICKET

II. COMPILATIONS OF PASSENGER TICKET INFORMATION FOR GENERAL USE AND SPECIAL NEEDS

Some tabulations of ticket data which might be made to meet various needs are described below. Please add in the spaces provided in column (1) any different tabulations in which you would be interested. Then, check in column (2) all of the tabulations that would be of value to you. For each tabulation checked, including any added by you, furnish the information called for in columns (3) through (11).

Description of tabulation	Make entries in these columns opposite each tabulation checked in column (2)										Comments When significant, indicate any special need or purpose served by the tabulation.	
	Which tabulations would be of value to you? (check)	Time periods needed (check)				What are limits of useful range in time lag after period covered by data?		Is need regular, occasional, or infrequent? (Specify frequency)	Would participating airlines need to be identified? (Yes or no)	(11)		
		Month	Quarter	Year	Other (describe)	Preferably within (months)	But not later than (years)					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)		
A. SUMMARIES THAT MIGHT BE PUBLISHED TO MEET COMMON NEEDS						1/7	1/9	Rg	Yes			
								Oc	No	Rg--regular Oc--occasional		
1. Summary of all traffic in terms of actual ticket routing with origin, points of transfer between flights and destination.										Total number of respondents		
Airlines	20	5	12	7				16	4	18	2	23
Airports	29	13	9	13				19	8	23	6	31
Manufacturers of aircraft and aircraft engines	7	2	2	4	1			6	1	6	1	9
Consultants and research organizations	14	7	6	5				9	4	13	1	16
State aviation authorities	3		2		1			3	0	3	0	3
Chambers of commerce	6	1	4	3				3	3	5	1	6
Federal Aviation Agency (FAA)	1	1						1	0	1	0	1
Civil Aeronautics Board (CAB)	1		1					1	0	1	0	1
Department of Commerce	1		1	1				1	0	1	0	1
Total	82	29	37	33	2			59	20	71	11	91
1/ See next page.												

Summary of responses in columns (7) and (8) of Section II regarding
limits of useful range in time lag after period covered by data

Col. (7) "Preferably within (months)"

Most of the answers fell within a range of 1 to 6 months, with 3 months and 6 months being common answers.

Col. (8) "But not later than (years)"

The typical answer was one year. Some responses indicated a lesser period (such as, 6 months or 9 months), and a few indicated a longer period (such as, 2 years).

As a general rule the responses did not vary significantly with the nature of the tabulation--the individual respondents tended to give the same answers for the different tabulations described.

QUESTIONNAIRE ON NEEDS FOR TRAVEL STATISTICS FROM THE AIRLINE PASSENGER TICKET

II. COMPILATIONS OF PASSENGER TICKET INFORMATION FOR GENERAL USE AND SPECIAL NEEDS

Some tabulations of ticket data which might be made to meet various needs are described below. Please add in the spaces provided in column (1) any different tabulations in which you would be interested. Then, check in column (2) all of the tabulations that would be of value to you. For each tabulation checked, including any added by you, furnish the information called for in columns (3) through (11).

Description of tabulation (1)	Make entries in these columns opposite each tabulation checked in column (2)												
	Which tabulations would be of value to you? (check)	Time periods needed (check)			What are limits of useful range in time lag after period covered by data?				Is need regular, occasional, one time? (Specify frequency)		Would participating airlines need to be identified? (Yes or no)	Comments When significant, indicate any special need or purpose served by the tabulation. (11)	
		Month	Quarter	Year	Other (describe)	Practically within (months)	But not later than (years)	(7)	(8)	(9)			(10)
	(2)	(3)	(4)	(5)	(6)								
2. Summary of all traffic in terms of travel needed by passenger, reflecting origin, passenger stopover points, and destination.									Rg ¹	Yes		Rg--regular	
Airlines	5	2	4	3					4	1	5	0	Oc--occasional
Airports	27	10	11						18	7	20	7	
Manufacturers of aircraft and aircraft engines	4	2	3	3					3	1	3	1	
Consultants and research organizations	13	5	3	8					8	5	11	2	
State aviation authorities	2		1		1				2	0	2	0	
Chambers of commerce	3	2	1	2					2	1	2	1	
Federal Aviation Agency (FAA)	1	1							1	0	1	0	
Civil Aeronautics Board (CAB)	1	1							1	0	1	0	
Department of Commerce													
Total	56	22	24	16	1				39	15	45	11	

R&D PANEL
 FINAL REPORT
 APPENDIX F
 2/2/63

QUESTIONNAIRE ON NEEDS FOR TRAVEL STATISTICS FROM THE AIRLINE PASSENGER TICKET

II. COMPILATIONS OF PASSENGER TICKET INFORMATION FOR GENERAL USE AND SPECIAL NEEDS

Some tabulations of ticket data which might be made to meet various needs are described below. Please add in the spaces provided in column (1) any different tabulations in which you would be interested. Then, check in column (2) all of the tabulations that would be of value to you. For each tabulation checked, including any added by you, furnish the information called for in columns (3) through (11).

Description of tabulation (1)	Make entries in these columns opposite each tabulation checked in column (2)										Comments When significant, indicate any special need or purpose served by the tabulation. (11)
	Which tabulations would be of value to you? (check)	Time periods needed (check)				What are limits of useful range in time lag after period covered by data?		Is need regular, occasional, one time? (Specify frequency)	Would participating airlines need to be identified? (Yes or no)		
		Month	Quarter	Year	Other (describe)	Preferably within (months)	But not later than (years)				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
3. International travel summary based on ticket routings in terms of countries and gateway cities.								Rg	Yes	Rg--regular	
Airlines		9	1	8	4			6	2 7 2	Oc--occasional	
Airports		17	5	6	12			10	7 13 4		
Manufacturers of aircraft and aircraft engines		6	2	2	4			5	1 6 0		
Consultants and research organizations		12	4	3	8			6	5 8 3		
State aviation authorities		1		1				1	0 1 0		
Chambers of commerce		5		3	2			3	2 3 2		
Federal Aviation Agency (FAA)		1			1			0	1 1 0		
Civil Aeronautics Board (CAB)		1		1	1			0	1 1 0		
Department of Commerce		1		1	1			1	0 1 0		
Total		53	12	25	33			32	19 41 11		

QUESTIONNAIRE ON NEEDS FOR TRAVEL STATISTICS FROM THE AIRLINE PASSENGER TICKET

II. COMPILATIONS OF PASSENGER TICKET INFORMATION FOR GENERAL USE AND SPECIAL NEEDS

Some tabulations of ticket data which might be made to meet various needs are described below. Please add in the spaces provided in column (1) any different tabulations in which you would be interested. Then, check in column (2) all of the tabulations that would be of value to you. For each tabulation checked, including any added by you, furnish the information called for in columns (3) through (11).

Description of tabulation	Which tabulations would be of value to you? (check)	Make entries in these columns opposite each tabulation checked in column (2)									
		Time periods needed (check)				What are limits of useful range in time lag after period covered by data?		Is need regular, occasional, one time? (Specify frequency)	Would participating airlines need to be identified? (Yes or no)	Comments When significant, indicate any special need or purpose served by the tabulation.	
		Month	Quarter	Year	Other (describe)	Preferably within (months)	But not later than (years)				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
								Rg	Yes	Rg--regular	
4. Summary of total arriving and departing passengers by individual cities (airport) in terms of route segments between city and first prior boarding point and first subsequent debarking point.								Oc	Nb	Oc--occasional	
Airlines		17	2	14	9			14	2	11	4
Airports		25	10	8	2			17	6	18	6
Manufacturers of aircraft and aircraft engines		7	2	3	4	1		5	1	7	0
Consultants and research organizations		14	4	4	7			8	5	11	3
State aviation authorities		3		2				2	0	2	0
Chambers of commerce		4	1	1	3			2	2	3	1
Federal Aviation Agency (FAA)		1			1			1	0	1	0
Civil Aeronautics Board (CAB)		1		1				1	0	1	0
Department of Commerce											
Total		72	19	33	36	1		50	16	54	14

QUESTIONNAIRE ON NEEDS FOR TRAVEL STATISTICS FROM THE AIRLINE PASSENGER TICKET

II. COMPILATIONS OF PASSENGER TICKET INFORMATION FOR GENERAL USE AND SPECIAL NEEDS

Some tabulations of ticket data which might be made to meet various needs are described below. Please add in the spaces provided in column (1) any different tabulations in which you would be interested. Then, check in column (2) all of the tabulations that would be of value to you. For each tabulation checked, including any added by you, furnish the information called for in columns (3) through (11).

OAD PANEL
 FINAL REPORT
 APPENDIX F
 2/27/63

Description of tabulation (1)	Make entries in these columns opposite each tabulation checked in column (2)										
	Which tabulations would be of value to you? (check)	Time periods needed (check)				What are limits of useful range in time lag after period covered by data?			Is need regular, occasional, one time? (Specify frequency)	Would participating airlines need to be identified? (Yes or no)	Comments When significant, indicate any special need or purpose served by the tabulation.
		Month	Quarter	Year	Other (describe)	Probably within (months)	But not later than (years)	(years)			
(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)		
B. <u>SUBJECTS FOR SPECIAL TABULATION TO MEET PARTICULAR NEEDS</u>											
1. The total movement of traffic between any pair of cities in terms of originating, terminating, and transferring passengers.											
Airlines	19	5	12	8				13	5	16	3
Airports	28	10	14	13				18	9	21	6
Manufacturers of aircraft and aircraft engines	7	3	3	4				4	3	6	1
Consultants and research organizations	14	7	5	6				5	9	12	2
State aviation authorities	3		2					2	0	1	1
Chambers of commerce	6	2	3	3				3	3	5	1
Federal Aviation Agency (FAA)	1	1						1	0	1	0
Civil Aeronautics Board (CAB)	1		1					1	0	1	0
Department of Commerce	1		1	1				1	0	1	0
Total	80	28	37	35				48	29	64	14

QUESTIONNAIRE ON NEEDS FOR TRAVEL STATISTICS FROM THE AIRLINE PASSENGER TICKET

II. COMPILATIONS OF PASSENGER TICKET INFORMATION FOR GENERAL USE AND SPECIAL NEEDS

Some tabulations of ticket data which might be made to meet various needs are described below. Please add in the spaces provided in column (1) any different tabulations in which you would be interested. Then, check in column (2) all of the tabulations that would be of value to you. For each tabulation checked, including any added by you, furnish the information called for in columns (3) through (11).

Description of tabulation	Make entries in these columns opposite each tabulation checked in column (2)									
	Which tabulations would be of value to you? (check)	Time periods needed (check)				What are limits of useful range in time lag after period covered by data?		Is need regular, occasional, one time? (Specify frequency)	Would participating airlines need to be identified? (Yes or no)	Comments When significant, indicate any special need or purpose served by the tabulation.
		Month	Quarter	Year	Other (describe)	Preferably within (months)	But not later than (years)			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
2. International travel for a given country consisting of journeys originating, terminating and transferring in the country with routing and other ticket detail as needed.								Rg	Yes	
								Oc	1b	Rg--regular Oc--occasional
Airlines	6	5	3					3	3	5
Airports	16	4	5	12				10	6	14
Manufacturers of aircraft and aircraft engines	7	3	3	4				4	3	5
Consultants and research organizations	8	3	2	4				2	6	8
State aviation authorities	1									
Chambers of commerce	3		2	1				2	1	3
Federal Aviation Agency (FAA)	1	1						1	0	1
Civil Aeronautics Board (CAB)	1		1					1	0	1
Department of Commerce	1		1	1				1	0	1
Total	44	11	19	25				24	19	38

QUESTIONNAIRE ON NEEDS FOR TRAVEL STATISTICS FROM THE AIRLINE PASSENGER TICKET

II. COMPILATIONS OF PASSENGER TICKET INFORMATION FOR GENERAL USE AND SPECIAL NEEDS

Some tabulations of ticket data which might be made to meet various needs are described below. Please add in the spaces provided in column (1) any different tabulations in which you would be interested. Then, check in column (2) all of the tabulations that would be of value to you. For each tabulation checked, including any added by you, furnish the information called for in columns (3) through (11).

Description of tabulation	Which tabulations would be of value to you? (check)	Make entries in these columns opposite each tabulation checked in column (2)									Comments When significant, indicate any special need or purpose served by the tabulation.
		Time periods needed (check)				What are limits of useful range in time lag after period covered by data?		Is need regular, occasional, one time? (Specify frequency)		Would participating airlines need to be identified? (Yes or no)	
		Month	Quarter	Year	Other (describe)	Inter-ably within (months)	But not later than (years)	Rg	Oc		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
3. Traffic pattern for a particular airline in terms of ticket origin and destination, airline system origin and destination, and other routing and ticket detail as needed.								Rg	Yes		Rg--regular
								Oc	No		Oc--occasional
Airlines		9	1	5	6			2	6	8	0
Airports		10	4	2	6			7	2	8	2
Manufacturers of aircraft and aircraft engines		6	3	1	4			5	1	6	0
Consultants and research organizations		10	5	3	4			5	5	10	0
State aviation authorities		2		1				1	0	1	0
Chambers of commerce		2		1	1			2	0	2	0
Federal Aviation Agency (FAA)											
Civil Aeronautics Board (CAB)		1		1				1	0	1	0
Department of Commerce		1		1	1			1	0	1	0
Total		41	13	15	23			24	14	37	2

OLD PANEL
 FINAL REPORT
 APPENDIX 5
 2/2/63

QUESTIONNAIRE ON NEEDS FOR TRAVEL STATISTICS FROM THE AIRLINE PASSENGER TICKET

II. COMPILATIONS OF PASSENGER TICKET INFORMATION FOR GENERAL USE AND SPECIAL NEEDS

Some tabulations of ticket data which might be made to meet various needs are described below. Please add in the spaces provided in column (1) any different tabulations in which you would be interested. Then, check in column (2) all of the tabulations that would be of value to you. For each tabulation checked, including any added by you, furnish the information called for in columns (3) through (11).

Description of tabulation	Which tabulations would be of value to you? (check)	Make entries in these columns opposite each tabulation checked in column (2)									Comments When significant, indicate any special need or purpose served by the tabulation.
		Time periods needed (check)				What are limits of useful range in time lag after period covered by data?			In need regular, occasional, one time? (Specify frequency)	Would participating airlines need to be identified? (Yes or no)	
		Month	Quarter	Year	Other (describe)	From - daily within (months)	But not later than (years)	(7)				(8)	(9)	(10)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
4. Traffic pattern for a particular city (airport) reflecting ticket origin and destination, trip segments between city and first prior boarding point, and first subsequent debarking point, cities of ticket issue, and other needed information.								Rg	Yes	Rg--regular	
								Oc	No	Oc--occasional	
Airlines		10	1	8	6			5	5	9	1
Airports		24	9	8	11			18	6	20	3
Manufacturers of aircraft and aircraft engines		6	3	3	3			3	3	5	1
Consultants and research organizations		13	5	3	9			5	8	11	2
State aviation authorities		3	2					2	0	1	1
Chambers of commerce		6	1	3	3			3	3	5	1
Federal Aviation Agency (FAA)		1			1			0	1	1	0
Civil Aeronautics Board (CAB)		1			1			1	0	1	0
Department of Commerce		1			1			1	0	1	0
Total		65	19	29	34			38	26	54	9

QUESTIONNAIRE ON NEEDS FOR TRAVEL STATISTICS FROM THE AIRLINE PASSENGER TICKET

II. COMPILATIONS OF PASSENGER TICKET INFORMATION FOR GENERAL USE AND SPECIAL NEEDS

Some tabulations of ticket data which might be made to meet various needs are described below. Please add in the spaces provided in column (1) any different tabulations in which you would be interested. Then, check in column (2) all of the tabulations that would be of value to you. For each tabulation checked, including any added by you, furnish the information called for in columns (3) through (11).

Description of tabulation	Which tabulations would be of value to you? (check)	Make entries in these columns opposite each tabulation checked in column (2)									
		Time periods needed (check)				What are limits of useful range in time lag after period covered by data?			Is need regular, occasional, one time? (Specify frequency)	Would participating airlines need to be identified? (Yes or no)	Comments When significant, indicate any special need or purpose served by the tabulation.
		Month	Quarter	Year	Other (describe)	Preferably within (months)	But not later than (years)	(9)				(10)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
5. Total traffic over a major route segment or for a defined geographic area according to origin and destination, or other desired elements of the ticket routing.								Rg	Yes	Rg--regular	
								Oc	No	Oc--occasional	
Airlines		10	2	4	7			4	5	10	0
Airports		14	2	6	9			6	7	10	3
Manufacturers of aircraft and aircraft engines		6	2	2	2	1		3	3	5	1
Consultants and research organizations		9	2	2	4			2	5	7	1
State aviation authorities		3	2					2	0	2	0
Chambers of commerce		3	2	1				1	2	2	1
Federal Aviation Agency (FAA)		1		1				1	0	0	1
Civil Aeronautics Board (CAB)		1		1				1	0	1	0
Department of Commerce (CAB)		1		1	1			1	0	1	0
Total		48	8	20	25	1		21	22	38	7

OLD PANEL
 FINAL REPORT
 APPENDIX 5
 2/12/63

QUESTIONNAIRE ON NEEDS FOR TRAVEL STATISTICS FROM THE AIRLINE PASSENGER TICKET

II. COMPILATIONS OF PASSENGER TICKET INFORMATION FOR GENERAL USE AND SPECIAL NEEDS

Some tabulations of ticket data which might be made to meet various needs are described below. Please add in the spaces provided in column (1) any different tabulations in which you would be interested. Then, check in column (2) all of the tabulations that would be of value to you. For each tabulation checked, including any added by you, furnish the information called for in columns (3) through (11).

Description of tabulation	Make entries in these columns opposite each tabulation checked in column (2)										
	Which tabulations would be of value to you? (check)	Time periods needed (check)				What are limits of useful range in time lag after period covered by data?		Is need regular, occasional, or infrequent? (Specify frequency)	Would participating airlines need to be identified? (Yes or no)	Comments When significant, indicate any special need or purpose served by the tabulation.	
		Month	Quarter	Year	Other (describe)	From-ably within 1 month	But not later than (years)				(9)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
6. Total passenger traffic between given city pairs or countries, over major route segments, or for a defined geographic area broken down by class of fare (first-class, coach, etc.) used.								Rg Oc	Yes No	Rg--regular Oc--occasional	
Airlines		8	1	5	5			3	5	7	1
Airports		9	2	3	7			4	4	9	0
Manufacturers of aircraft and aircraft engines		8	3	3	4	1		6	1	6	1
Consultants and research organizations		12	3	3	7			1	11	10	1
State aviation authorities		1									
Chambers of commerce		5	1	2	3			1	4	4	1
Federal Aviation Agency (FAA)		1	1					0	1	1	0
Civil Aeronautics Board (CAB)		1	1					1	0	1	0
Department of Commerce		1		1	1			1	0	1	0
Total		46	11	18	27	1		17	26	39	4

QUESTIONNAIRE ON NEEDS FOR TRAVEL STATISTICS FROM THE AIRLINE PASSENGER TICKET

II. COMPILATIONS OF PASSENGER TICKET INFORMATION FOR GENERAL USE AND SPECIAL NEEDS

Some tabulations of ticket data which might be made to meet various needs are described below. Please add in the spaces provided in column (1) any different tabulations in which you would be interested. Then, check in column (2) all of the tabulations that would be of value to you. For each tabulation checked, including any added by you, furnish the information called for in columns (3) through (11).

Description of tabulation	Make entries in these columns opposite each tabulation checked in column (2)										Comments When significant, indicate any special need or purpose served by the tabulation.
	Which tabulations would be of value to you? (check)	Time periods needed (check)				What are limits of useful range in time lag after period covered by data?		Is need regular, occasional, one time? (Specify frequency)	Would participating airlines need to be identified? (Yes or no)	(11)	
		Month	Quarter	Year	Other (describe)	Earlier than (months)	But not later than (years)				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
7. Ticket sales activity at a particular city consisting of total tickets issued, issuing airline, money amount of tickets, origin and destination, or other detail as needed.								Rg	Yes	Rg--regular	
								Oc	No	Oc--	
Airlines	9	2	5	7				5	4	6	2
Airports	16	5	5	10				12	4	14	1
Manufacturers of aircraft and aircraft engines	1	1	1								
Consultants and research organizations	12	4	4	6				0	11	6	4
State aviation authorities	2	1						1	0	0	1
Chambers of commerce	5	1	2	3				3	2	5	0
Federal Aviation Agency (FAA)	1	1						0	1	1	0
Civil Aeronautics Board (CAB)	1							0	1		
Department of Commerce											
Total	4	7	14	28	26			21	23	32	8

O&D PANEL
 FINAL REPORT
 APPENDIX 5
 2/2/65

QUESTIONNAIRE ON NEEDS FOR TRAVEL STATISTICS FROM THE AIRLINE PASSENGER TICKET

II. COMPILATIONS OF PASSENGER TICKET INFORMATION FOR GENERAL USE AND SPECIAL NEEDS

Some tabulations of ticket data which might be made to meet various needs are described below. Please add in the spaces provided in column (1) any different tabulations in which you would be interested. Then, check in column (2) all of the tabulations that would be of value to you. For each tabulation checked, including any added by you, furnish the information called for in columns (3) through (11).

Description of tabulation (1)	Which tabulations would be of value to you? (check) (2)	Make entries in these columns opposite each tabulation checked in column (2)								Comments When significant, indicate any special need or purpose served by the tabulation. (11)
		Time periods needed (check)				What are limits of useful range in time lag after period covered by data?				
		Month (3)	Quarter (4)	Year (5)	Other (describe) (6)	Primarily within (months) (7)	But not later than (years) (8)	Is need regular, occasional, one time? (Specify frequency) (9)	Would participating airlines need to be identified? (Yes or no) (10)	
								Rg: Yes	No	Rg--regular
8. Distribution of traffic by length of trip measured in terms of the total trip, the trip segment between passenger stopovers, or any other desired segment of the ticket.								Oc: No	Yes	Oc--occasional
Airlines	5	1	4	5				3	4	0
Airports	9	2	2	9				5	4	6
Manufacturers of aircraft and aircraft engines	8	3	3	5				6	1	6
Consultants and research organizations	10	3	3	6				0	10	7
State aviation authorities	3		1	1				2	0	0
Chambers of commerce	3		2	1				1	2	2
Federal Aviation Agency (FAA)	1			1				1	0	1
Civil Aeronautics Board (CAB)	1							0	1	1
Department of Commerce	1				1			0	1	
Total	41	9	15	28	1			18	20	27

December 18, 1959

COVERING LETTER TO RECIPIENTS OF
QUESTIONNAIRE ON NEEDS FOR TRAVEL STATISTICS
FROM THE AIRLINE PASSENGER TICKET

The International Civil Aviation Organization, an affiliate of the United Nations, is currently considering a program for the collection and publication of passenger origin and destination traffic statistics on a worldwide basis. The present statistical program of this organization, consisting of 74 member nations, does not include the collection of origin and destination traffic statistics.

In response to an interest by many states in the collection of these statistics, a panel of experts, in which the United States is participating, has been established to develop a practical system for the collection of such statistics. The ultimate decision as to whether a program of this sort should be implemented will depend to a large extent on the value of these statistics in meeting the needs of government, industry, and other users.

The Board's own international passenger origin and destination survey of U.S. flag carriers has also been under study with a view to improving its usefulness and reliability. In addition, although the domestic origin and destination survey was recently significantly revised, further improvements in particular features of this survey undoubtedly will be made.

The nature and adequacy of both the domestic and international origin and destination statistics available in the future will be determined in large part by the broad consideration now being given to this subject. The study under way affords a unique opportunity to develop statistics of maximum utility for the many different purposes that air travel statistics can serve. Hence, you as a user can make an important contribution to the successful accomplishment of this task by promptly filling in the attached questionnaire and providing any additional information which will assist us in developing the most thorough and practical system of worldwide ticket origin and destination statistics.

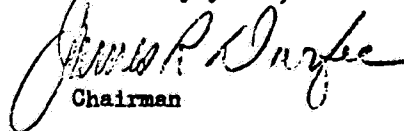
A questionnaire is attached for your convenience in presenting information on your needs for origin and destination statistics and the answers given to the questionnaire should be based upon both domestic and international origin and destination statistics.

In addition to completing the questionnaire as fully as possible you are encouraged to present, in any desired form, all the comments, information, and ideas necessary to a full statement of your needs for origin and destination statistics or any other aspects of the subject in which you have an interest whether or not covered by the specific questions in the attachment.

We greatly need and earnestly solicit your full cooperation in developing the most complete inventory of actual and potential uses for ticket origin and destination statistics.

In order to meet our own deadline for the submission of a proposed program to ICAO by the end of January, it is of great importance that your response be submitted at the earliest feasible date, and if at all possible, before January 8, 1960.

Sincerely yours,



Chairman

Attachment

QUESTIONNAIRE ON NEEDS FOR TRAVEL STATISTICS FROM THE AIRLINE PASSENGER TICKET

II. COMPILATIONS OF PASSENGER TICKET INFORMATION FOR GENERAL USE AND SPECIAL NEEDS

Some tabulations of ticket data which might be made to meet various needs are described below. Please add in the spaces provided in column (1) any different tabulations in which you would be interested. Then, check in column (2) all of the tabulations that would be of value to you. For each tabulation checked, including any added by you, furnish the information called for in columns (3) through (11).

Description of tabulation	Which tabulations would be of value to you? (check)	Make entries in these columns opposite each tabulation checked in column (2)									Comments When significant, indicate any special need or purpose served by the tabulation.
		Time periods needed (check)				What are limits of useful range in time lag after period covered by data?			Is need regular, occasional, one time? (Specify frequency)	Would participating airlines need to be identified? (Yes or no)	
		Month	Quarter	Year	Other (describe)	Preferably within (months)	But not later than (years)				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
A. SUMMARIES THAT MIGHT BE PUBLISHED TO MEET COMMON NEEDS											
1. Summary of all traffic in terms of actual ticket routing with origin, points of transfer between flights, and destination											
2. Summary of all traffic in terms of travel needed by passenger, reflecting origin, passenger stopover points, and destination											
3. International travel summary based on ticket routings in terms of countries and gateway cities											
4. Summary of total arriving and departing passengers by individual cities (airport) in terms of route segments between city and first prior boarding point and first subsequent debarking point											
Are there other summaries that you think should be published for general use? If so, please describe them below:											
5. _____ _____											
6. _____ _____											

II. COMPILATIONS OF PASSENGER TICKET INFORMATION FOR GENERAL USE AND SPECIAL NEEDS (Continued)

OGD PANEL
 FINAL REPORT
 APPENDIX 5
 27/2/65

Description of tabulation	Make entries in these columns opposite each tabulation checked in column(2)										
	Which tabulations would be of value to you? (check)	Time periods needed (check)				What are limits of useful range in time lag after period covered by data?			Is need regular, occasional, one time? (Specify frequency)	Would participating airlines need to be identified? (Yes or No)	Comments When significant, indicate any special need or purpose served by the tabulation.
		Month	Quarter	Year	Other (describe)	Preferably within (months)	But not later than (years)				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
<p>B. SUBJECTS FOR SPECIAL TABULATION TO MEET PARTICULAR NEEDS</p> <p>(Assuming a central facility with modern equipment for processing and publishing ticket data existed, special tabulations such as those described below might be produced to the order of individual users at reasonable cost.)</p>											
1. The total movement of traffic between any pair of cities in terms of originating, terminating, and transferring passengers											
2. International travel for a given country consisting of journeys originating, terminating and transferring in the country with routing and other ticket detail as needed											
3. Traffic pattern for a particular airline in terms of ticket origin and destination, airline system origin and destination, and other routing and ticket detail as needed											
4. Traffic pattern for a particular city (airport) reflecting ticket origin and destination, trip segments between city and first prior boarding point and first subsequent debarking point, cities of ticket issue, and other needed information											
5. Total traffic over a major route segment or for a defined geographic area according to origin and destination, or other desired elements of the ticket routing											

II. COMPILATIONS OF PASSENGER TICKET INFORMATION FOR GENERAL USE AND SPECIAL NEEDS (Continued)

Description of tabulation	Which tabulations would be of value to you (check)	Make entries in these columns opposite each tabulation checked in column (2)									Comments When significant, indicate any special need or purpose served by the tabulation
		Time periods needed (check)				What are limits of useful range in time lag after period covered by data?			Is need regular, occasional, one time? (Specify frequency)	Would participating airlines need to be identified? (Yes or No)	
		Month	Quarter	Year	Other (describe)	Preferably within (months)	But not later than (years)	(7)				(8)	(9)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
6. Total passenger traffic between given city pairs or countries, over major route segments, or for a defined geographic area broken down by class of fare (first-class, coach, etc.) used											
7. Ticket sales activity at a particular city consisting of total tickets issued, issuing airline, money amount of tickets, origin and destination, or other detail as needed											
8. Distribution of traffic by length of trip measured in terms of the total trip, the trip segment between passenger stopovers, or any other desired segment of the ticket											
Are there other special tabulations that would be of value to you? If so, please describe.											
9. _____ _____ _____											
10. _____ _____ _____											

Return completed questionnaire to
Civil Aeronautics Board, Washington 25, D.C.,
Attention: Office of Carrier Accounts and Statistics

O&D PANEL
 FINAL REPORT
 APPENDIX 5
 27/2/63

O&D PANEL
FINAL REPORT
27/2/63

- 156 -

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APPENDIX 6

PLAN

FOR THE COLLECTION OF ORIGIN
AND DESTINATION STATISTICS AND
FOR THEIR PUBLICATION THROUGH ICAO

Presented by Mr. P. Rivoal

O&D PANEL
FINAL REPORT
27/2/63

- 150 -

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INTRODUCTION
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The plan outlined hereunder for a statistical system relating to air passenger traffic flows throughout the world is based, for the collection of data, on a method already used for a variety of statistical purposes in a certain number of countries. It makes use of a document to be remitted by the airlines to the airport authorities.

In point of fact, most airports already collect data on the movements and traffic of aircraft for their own requirements or for use by the aeronautical administrations under whose authority they come. As a rule, this information is required by the airlines themselves for operational or commercial use and is contained in one or more documents for each flight.

In spite of their diversity, these documents have a number of common elements: indication of the arrival or departure of the aircraft, date, and possibly flight number, followed by the number of passengers, weight of cargo and mail discharged or taken on.

By means of a duplicate, or as an extract, these data are filed with the airports concerned and through them with the national aeronautical administrations. They are a valuable source of information for States on the activity of their airports and, to a certain extent, also on the activity of airlines using these airports.

ICAO itself also considered it useful to receive information on the activity of airports since, starting on 1 January 1960, it is requesting Member States to provide such information using Form I specially prepared to that end.

Making further use of documents of this type, a certain number of countries also use them to determine the traffic into or out of their national airports.

In this case, the documents used contain additional entries concerning the origin and destination of the traffic embarked or disembarked at each stop. Generally this involves the origin and destination on each flight and at times the true origin or destination.

It therefore appeared worthwhile to attempt to generalize the use of such documents with a view to their serving as the basis of a world-wide system of origin and destination statistics.

In the attached plan it is intended to outline the practical application of such a system.

The plan is drawn up in two separate parts; the first part permits the preparation of origin and destination statistics for each stage (the COD system), and the second gives the true origin and destination statistics (the TOD system).

I - THE C O D SYSTEM

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With this system it will be possible to calculate the number of passengers having made direct trips between two cities. (1)

For this purpose, the system records the trip made by a passenger between two steps A and B which are the point of embarkation and the point of disembarkation of this passenger on an international flight.

Point of embarkation A may either be the initial origin of the trip, or the origin of a part of a trip comprising several stages. In the latter case, a change of carrier takes place at A, or a change of routes served by the same carrier, or again a change of flight along the same route.

Point of disembarkation B may either be the final destination of the journey, or the destination of a part of a journey comprising several stages. In the latter case, the traveller will continue his journey beyond B by a different carrier or on another route served by the same carrier or on another flight along the same route.

1. DEFINITIONS:

Except for a few modifications, the proposed definitions are largely the same as those given in the plan presented by the United States:

C O D:

The points of embarkation and disembarkation of a passenger which limit the part of the whole trip for which the flight coupon is good. (2)

Stage:

Name given to the part of the trip which a passenger can make with one flight coupon.

(1) It should be noted here that the multiplication of direct connections between the various points of the globe will place ever-increasing value on such statistics.

(2) See OD 1-WP/10 of 12 November 1959.

International Stage:

A stage, the city of origin and the city of destination of which are not in the same country.

City Pair:

Two cities between which travel is authorized by a ticket or part of a ticket. The cities may be those of ticket origin and destination, directional origin and destination or coupon origin and destination.

Base City:

A city, listed in its alphabetical order in the published survey, under which are listed, also in alphabetical order, all other cities (reference cities) which were destinations for trips from the base city in the survey period, together with data related to the trips.

Reference City:

A city listed in its alphabetical order under a base city in the published survey, together with data related to the trips between such city and the base city.

Abbreviations:

- Three-letter abbreviations for cities. The abbreviations of city names appearing in the December issue of the Official Airline Guide or in the ABC World Airways Guide of the year preceding the year in which the survey is made will be used.
- Operators will give the full name of any cities for which abbreviations are in the Official Airline Guide or in the ABC World Airways Guide.

2. PUBLICATIONS

= =====

Two types of publications might be considered:

- first, a basic publication;
- second, a supplementary publication.

a) Basic Publications

The following data will have to be published for each base city:

- COD statistics from the base city to a reference city and from this reference city to the base city for a given stage, with an indication of the total;
- the grand total of traffic from and to this base city.

The suggested format appears in the table on the next page.

The table contains four main columns:

Column 1:

Indication of the base city.

Indication of reference cities (listed in alphabetical order).

Column 2:

Total of passengers carried from the base city to the reference city:
e.g. Paris-Frankfurt 29,692.

Column 3:

Total of passengers carried from the reference city to the base city:
e.g. Frankfurt-Paris 32,180.

Column 4:

Total of passengers carried between base city and reference city:
e.g. Paris-Frankfurt 61,672.

<u>Base City</u>			
Reference City	From Base	To Base	Total
1	2	3	4
<u>Paris:</u>			
Frankfurt	29,692	32,180	61,872
(Fed.Rep.of Germany)			
London	274,500	265,000	540,500
(United Kingdom)			
Montreal	11,133	8,106	19,239
(Canada)			
New-York	112,130	88,980	201,110
(United States)			
Rio de Janeiro	2,990	3,001	5,991
(Brazil)			
Tokyo	1,515	1,871	3,386
(Japan)			
.....
Grand Total:	1,125,000	1,025,000	2,125,000

Total:

Finally, the total number of passengers will be added up for each base city:

- Column 2: on departure from base city,
- Column 3: on arrival at base city,
- Column 4: in each direction.

b) Supplementary publications:

These publications would provide a classification of the stages in decreasing order i) according to the number of passengers carried and ii) according to the corresponding number of passenger/kms.

There would be two tables for a given base city, each one containing five columns.

1) First Table:

Passenger traffic by stages.

A consolidated list of the various stages for each base city, classified in decreasing order according to the number of passengers carried (arrival + departure) - (see page 157)

Column 1:

Number of passengers (Arrival + Departure)

Column 2:

Classification number

Column 3:

Reference cities

Column 4:

Stage classification according to the corresponding number of passenger/kilometres.

Column 5:

Number of passenger/kilometres in thousands.

2) Second Table

Passenger/kilometre traffic by stages.

Consolidated list of the various stages by base cities, classified in decreasing order according to the number of passenger/kilometres (arrival + departure) - (see page 165).

Column 1:

Number of passenger/kilometres in thousands

Column 2:

Classification number

Column 3:

Reference cities

Column 4:

Stage classification according to number of passengers carried

Column 5:

Number of passengers carried

*
* * *

In addition, the following indications will be found at the bottom of the above-mentioned columns of these two tables:

- Column showing the number of passengers: (Grand total for all stages for which (the base city is either the origin or (the destination.
- Column showing stage classification according to the number of passengers: (Classification of the base city in (relation to the world's cities as a (whole for the number of passengers on (arrival and departure.
- Column showing the number of passenger/kilometres: (Grand total for all stages for which (the base city is either the origin or (the destination.
- Column showing stage classification according to the number of passenger/kilometres: (Classification of the base city in (relation to the world's cities as a (whole for the number of passenger/ (kilometres on arrival and departure.

Model for Table 1

<u>Base City: Paris</u> Number of Pax. 1	Classification 2	Reference Cities 3	Classification 4	Number of Pax/Km in thousands 5
540,500	1	London	4	199,175
201,110	2	New York	1	1,172,470
61,872	9	Frankfurt	23	28,709
19,239	13	Montreal	8	106,391
5,991	20	Rio. de Janeiro	15	48,558
3,886	24	Tokyo	17	45,484
.....
Grand total	World classification		World classification	Grand total

Model for Table 2

<u>Base City: Paris</u> Number of Pax/km in thousands 1	Classification 2	Reference Cities 3	Classification 4	Number of passengers 5
1,172,470	1	New York	2	201,110
199,175	4	London	1	540,500
106,391	8	Montreal	13	19,239
48,558	15	Rio de Janeiro	20	5,991
45,484	17	Tokyo	24	3,886
28,709	23	Frankfurt	9	61,872
.....
Grand Total	World classification		World classification	Grand Total

Furthermore, these publications could be supplemented by two tables classifying base cities in their order of importance (i) according to the total number of passengers (arrival + departure) and (ii) according to the corresponding number of passenger/kilometres (see pages 170 and 171).

*
* *

These figures are of course obtainable by each administration from the basic publication, but the operation would be accomplished more easily and at less cost by ICAO.

3. COLLECTION AND PROCESSING

The proposed traffic form is not a standard form. This means that the primary objective is to ensure that the same particulars are entered on the different forms used at airports, if possible in the same order and following the same format. However, in addition to such entries, States are entirely free to have airlines enter such other data as the States consider essential for their own requirements, as is the common practice at the present.

Thus, a comparison of the German and French forms reveals that although common entries are found on their forms the following additional data is entered on the German form:

- number of seats available;
- capacity available in kg.;
- type of flight, etc.

not shown on the French form, while the latter requests more specific information on freight.

Before describing the actual process of collection and compilation it is necessary to point out that:

- 1) the survey will only concern international flights, scheduled and non-scheduled services;
- 2) the form will be completed on departure only.

It can indeed be said that a traffic record on departure suffices to ascertain existing traffic flows and, what is more, it will avoid duplication.

Number Pax.	Classification Pax.	Cities	Classification Pax/km	Number Pax/km in thousands
6,400,000	1	New York	1	6,000,000
4,500,000	2	London	4	4,000,000
2,340,000	3	Paris	3	5,000,000
.....
Enter Grand Total				Enter Grand Total

Number Pax/km in thousands	Classification Pax/km	Cities	Classification Pax.	Number Pax.
6,000,000	1	New York	1	6,400,000
5,000,000	3	Paris	3	2,340,000
4,000,000	4	London	2	4,500,000
.....
Enter Grand Total				Enter Grand Total

For instance, the Paris Airport will file with ICAO statistical data for the Paris-Rome stage, and Rome airport will provide statistical information on the Rome-Paris stage. (1)

a/Format:

The proposed form, which is to provide all the information listed above, is shown on the next page.

Theoretically, it appears that it could be introduced at all airports with variations depending on whether:

1) the country having jurisdiction over the airport already collects statistics by means of a traffic form.

In this case the form to be completed by each airline could consist of an original and a duplicate. (2)

- On the original the airline would enter the data to be reported to ICAO and the data required for purely internal purposes.
- By an appropriate carbon-paper system, the duplicate intended for ICAO would show only the data to be reported to the Organisation. Only the form which provides for the entry of such data is submitted, the blanks on such forms being those corresponding to the particulars that States wish to see entered for their own requirements.

2) the country having jurisdiction over the airport collects statistics by any other means or collects no statistics.

In this case the form to be completed would contain a single sheet on which only the information requested by ICAO would be entered.

-
- (1) - A special "Arrival" form may be provided to analyse traffic from non-member countries of ICAO (e.g., Eastern European countries). Reference to the information provided by the Swiss delegation in OD 2-WP/5 of 29 February 1960 will give a rough idea of the data sought, and experience shows that "Arrival" traffic is practically equal to departing traffic.
 - (2) - Needless to say, extra copies could be inserted by any State for its own requirements.

Model form

(Box 1) Airport	LON	(Box 3) Itinerary	PAR	ROM	ATH	KHI	TYO			
(Box 2) Date	15.11.60	(Box 4) Number of passengers	5	5	10	10	20			
								Official stamp	(Box 5)	

Portion not copied on the duplicate - and therefore not transmitted to ICAO - in which States can have airlines enter information not required by ICAO.

These forms will therefore show:

- Box 1 : name of airport;
- Box 2 : date of aircraft departure;
- Box 3 : flight itinerary beyond the airport at which the form is filed;
- Box 4 : number of passengers embarked, broken down by points of disembarkation along the flight;
- Box 5 : finally, a special box is provided for a stamp to be affixed whenever the form has been checked.

b/ Completion of the forms :

The forms will be completed by airline officials or by a specialized service jointly used by the airlines represented at each airport (1), all forms being deposited with the staff in charge of collection. The filing time has been so calculated as to enable airline officials to complete the forms after the departure of the aircraft (see para. e)).

c/ Airports involved :

There are about 800 international customs airports (2); it is conceivable that the collection of the traffic forms could be organized at all these airports. In actual fact, however, some of them might not be taken into account in the plan, in view of the small volume of their international traffic.

The final list of airports required to file traffic forms will have to be drawn up at a later stage by ICAO on the basis of criteria to be defined.

The forms will be completed by airline representatives on the basis of an internal document (load sheet, planning sheet, flight coupon, etc.) one form to be completed for each flight.

(1) - see Attachment 1, page 137.
(2) - Customs airports as defined by Article 10 of the Chicago Convention, a list of which should be available at ICAO.

d/ Responsibility for collection of traffic forms :

The traffic forms must be delivered to a State official, or to a sworn person stationed on the premises.

e/ Time limit :

In order to conform to the recommendations of the FAL Division, these forms shall not be considered as clearance documents and therefore need not be filed before the departure of the aircraft, but can be deposited within a period of 24 hours after departure. This system achieves the main objective of all facilitation policy which is to avoid extending the duration of stops and prolonging the waiting periods imposed on passengers on departure or on arrival.

f/ Control :

France considers that a world-wide system, or for that matter a national system, for the collection of statistics can be valid if the phases of the collection operations are controllable by States.

a) General Control :

May be made every day at every airport. Indeed it will be easy to check whether the number of forms collected is equal to the number of take-offs performed (in the aggregate or by each airline).

b) Control of contents

It would appear important to allow States freedom of choice in the control methods to be organized on their territory to check the authenticity of the documents filed, it being nevertheless understood that, while remaining effective, the selected control procedure must affect neither the duration of stops nor passenger reporting times.

The advantages of the Swiss system may be emphasized in this connection. There should be no objection to control by simple sampling, but it is necessary to ensure that ICAO can check the extent of such sampling. It will be noted in this connection that a box is provided on the forms destined for the Organization (this can be indicated on the punched card) in which the person in charge of control must affix his stamp.

4. TRANSMISSION TO ICAO :

The completed document consequently is now in the hands of a State official, and three solutions are open :

- a/ The State transmits either the original or the duplicate of the form directly to ICAO;
- b/ The State retains the form and punches a card,
 - containing only ICAO data, in which case a duplicate of the card is sent to ICAO;
 - containing all the data requested on the form (domestic and ICAO requirements) and transmits a duplicate or a complete card giving only the data to be reported to ICAO (1);
- c/ The State itself does the processing of the traffic forms, summarizes them for insertion in the ICAO statistical publications following a standard pattern and regularly forwards them to the Organization.

The punched cards, or the duplicates of the forms, will be transmitted to a machine processing agency under contract with ICAO, or to ICAO itself, should the Organization decide to have its own machine processing service.

It should also be noted from the outset that production costs vary in cases a), b) and c) above.

System a), which consists of filing the duplicate of the form, is the simplest method for each State, since it involves only the physical operation of collection;

System b), according to which cards are punched in each State, represents a higher cost for the State.

Although at first sight system c) (processing of forms and preparation of statistical summaries) appears to involve the greatest expense for each State, this method may in some cases be combined with the preparation of national statistics in each State and thus prove of relatively little cost by comparison with the first two.

(1) - Since either procedure is feasible, it is of course understood that, if the cards are punched by the State, it will be necessary to adhere to an internationally recognized method chosen by the centralizing agency.

5. TIME LIMITS FOR SUBMISSION :

According to the system adopted, the time limits for submission could be as follows :

- System a) :

Traffic forms should be sent within five days of their completion, either by the airports or through the State authorities.

- System b) :

Punched cards should be sent as soon as they are completed and at the latest within the ten days following the end of the month.

- System c) :

The surveys should be sent to ICAO within the thirty days following the end of the month.

Experience gained at the French airports has convinced us that these fairly short limits are reasonable.

6. PROCESSING BY ICAO

A contract would be drawn up between ICAO and a processing agency, which would be entrusted with :

- determination of the method of punching the cards in relation to the data to be recorded on them and to the possible developments of the form;
- centralization of the duplicates of the forms and transcription on cards of the data obtained;
- centralization of the cards punched by the States;
- transfer of the data thus obtained to tapes, so that the sorting of the data could be done by an electric computer which would add the totals and produce tables suitable for photographing and printing. These tables would then be sent by ICAO to a printer with a view to subsequent publication.

7. PERIODICITY OF PUBLICATION AND TIME-LIMITS :

Publication could be monthly, quarterly or half-yearly, it being understood that an annual recapitulation would be prepared.

- 1) Monthly publication has the advantage of corresponding to a time unit generally adopted by the airports and airlines for their statistical work. However, such frequent publication would involve a risk of fairly high costs.
- 2) Half-yearly recapitulation could be adopted. The half-yearly period could be a calendar year, or could correspond to the half-yearly changes in the airline's timetables, i.e. 1 October to 31 March and 1 April to 30 September.
- 3) Quarterly publications would appear to be the most acceptable compromise between the desirability of providing sufficiently recent data and the concern to avoid excessive expenditure.

If the States send their documents within the times specified in paragraph 5, the results could be published within the two or three months following the end of the period under analysis.

The rapidity of such publication would make it particularly interesting and valuable.

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II - THE T O D SYSTEM

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It is also possible to use the airport forms to establish statistics on flow of traffic, with indication not only of the origin and destination of the passengers on each flight, but also their true origin and destination. The following is a description of a system giving the latter type of information - the so-called TOD system. If combined with the COD system it could also provide information of the former type.

First of all, a number of concepts peculiar to TOD statistics must be defined. With some modifications, the definitions given by the USA are reproduced here. Some of them would incidentally merit further study by the Panel.

1. DEFINITIONS

= =====

Origin and destination of a complete trip:

First and last points (given on the passenger's ticket) for the passenger's complete trip.

Origin and destination of a single trip:

In the case of a single trip, point of origin and point of destination of the complete trip. In the case of return trip, the complete trip is considered as two single trips, the point of return being taken as the point of destination on the outbound trip and the point of origin being taken as the destination on the inbound trip.

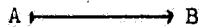
In the case of a round trip or open-jaw trip, the complete trip is considered as two single trips, the most distant point (by great circle) being taken as the point of destination on the outbound trip and the point of origin being taken as the destination on the inbound trip.(1)

One-way trip:

A trip which goes from the point of origin to the point of destination in a direct or indirect routing.

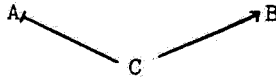
Example 1 :

- Direct routing:



Example 2:

- Indirect routing:

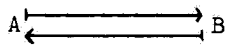


Round trip:

"A trip which starts and ends at the same point in which the inbound portion retraces the path of the outbound portion".

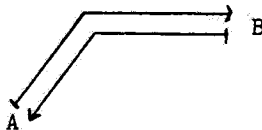
Example 1:

- 2 single trips AB + BA:



Example 2:

- 2 single trips AB + BA:

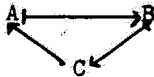


(1) Some airlines already put a check against the most distant point from the point of origin on the ticket when it is sold; some go by the fare, others by the great circle distance.

Circle trip:

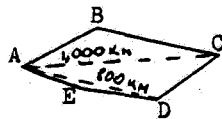
Example 1:

- 2 single trips AB + BA:



Example 2:

- 2 single trips AC + CA:

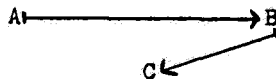


Open-jaw trip:

A trip which only differs from the round trip in that the points of origin and destination are not the same, but are relatively close to each other. The length of each of the going and returning segments should in principle be greater than the distance as the crow flies between the points of origin and destination:

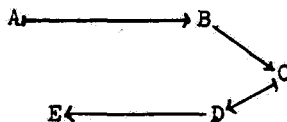
Example 1:

- 2 single trips AB + BC



Example 2:

- 2 single trips AC + CE



(1) The definitions proposed in the COD system refer to the international stage of the base and reference cities; the abbreviations are equally valid for the TOD system, subject to the necessary transpositions.

(1) the city pairs

2. PUBLICATIONS

= =====

There can be an infinite variety of methods of presenting the collected data; here also we have selected the method we consider to be clearest, in order to facilitate the work and reduce the production costs - and hence the price of the publications - in the interests of the services responsible for publications and also of those responsible for using the data.

The results could be presented as in the tables on pages 185 and 186.

TABLE I:

Table I indicates, for a given city, considered as base city, the passenger traffic having its initial origin there, traffic according to city of true destination, and traffic terminating there according to city of true origin (TOD statistics).

This table will also include indications on the origin and destination of passengers according to stages of their journey (COD statistics) coming from or proceeding to the city concerned.

Interesting comparisons could be made by considering the data in the two parts of the table.

The data will be arranged by base city and reference city.

The base cities will be classified in alphabetical order and grouped by continent or group of continents, making it possible to have several volumes which would be easier to handle than one large volume.

The reference cities would also be arranged in alphabetical order under each base city.

The two parts of the table are arranged as follows:

- First Part (TOD):

Column 1:

Indication of the base city and the reference cities.

Column 2:

Indication of the number of passengers with the base city as their true origin and the reference city as their destination, e.g. for Paris-Frankfurt:

- Paris-Frankfurt direct
- Paris-Zurich-Frankfurt
- Paris-Geneva-Frankfurt etc..

Column 3:

Indication of the number of passengers with the reference city as their true origin and the base city as their true base city, e.g. for Frankfurt-Paris:

- Frankfurt-Paris direct
- Frankfurt-Zurich-Paris
- Frankfurt-Geneva-Paris etc..

Column 4:

Total of columns 2 and 3.

- Second Part (COD):

This includes all the COD traffic (by stage) between the base city and reference city whatever the true origin and destination of the journey, e.g.:

In Column 5:

The Paris-Frankfurt passengers from the preceding table, not including the trips with an interchange point other than in direct transit between Paris and Frankfurt;

Paris-Frankfurt passengers on all connecting flights, such as for example:

- Paris-Frankfurt-Vienna
- London-Paris-Frankfurt
- London-Paris-Frankfurt-Vienna etc..

provided that there was an intermediate stop other than a direct transit stop at Paris and at Frankfurt.

Column 6:

Traffic between Frankfurt and Paris classified according to the same criteria.

Column 7:

Total of columns 5 and 6 by city pair.

- A grand total would be given at the foot of each column.

TABLE II

This table would indicate for a given city the number of passengers passing through it and either changing to another flight or spending some time in the city; these passengers would be distributed by city of true origin and city of true destination.

The passenger could have continued his trip by another carrier, or on a different route of the same carrier, or on another flight without change of route.

Example: (see table on page 186).

In the tabulation under Intermediate Stop - Paris will be listed all the cities of true origin of a trip where a stop other than a direct transit stop is made at Paris.

This table will have 6 columns:

Column 1:

Indication of cities of true origin of trips passing through Paris (in alphabetical order) as follows:

Amsterdam,
Basle,

Column 2: (in alphabetical order):

Indication of the cities of true origin of these trips:

Athens,
Rome,
Teheran,
Sydney,

Column 3:

Indication of the number of passengers going from the city of origin to the city of destination and making a transit stop for connection at Paris.

Column 4:

Indication of the number of passengers with the city of destination as true origin and the city of origin as true destination who have made a transit stop for connection at Paris.

Column 5:

Total number of passengers making a trip between the city of origin and the city of destination (all routes) - (TOD statistics).

Column 6:

Total number of passengers making a trip between the city of destination and the city of origin (all routes) - (TOD statistics).

TABLE I

Base City. Reference cities 1	Number of passengers T.O.D.			Number of passengers C.O.D.		
	Reference city True destination 2	Base city True destination 3	Total 4	From the base 5	To the base 6	Total 7
PARIS:						
Frankfurt (Fed. Rep. of Germany)	18,040 *	22,637	40,677	29,692	32,180	61,872
London (United Kingdom)	250,000	262,000	512,000	274,500	265,000	540,500
Montreal..... (Canada)	8,643	6,537	15,180	11,133	8,106	19,239
New Ycrk (United States)	101,200	80,400	181,600	112,130	88,980	201,110
Rio de Janeiro (Brazil)	1,513	1,640	3,153	2,990	3,001	5,991
Tokyo (Japan)	1,432	1,703	3,135	1,515	1,871	3,386
GRAND TOTAL.....	.....	.....	.....	.....	.....	.....

(*) All the figures given are entirely fictitious.

TABLE II
 =====

Intermediate Stop : Paris		Transit stop for connection at Paris		All routes including Paris	
City of true Origin	City of true destination	→	←	→	←
1	2	3	4	5	6
Amsterdam	Athens	800 (*)	600	6,500	7,800
	Rome	6,200	4,300	102,000	95,700
	Teheran	80	102	7,600	4,537
	Sydney	64	53	947	654
Total		.....	.....	.....	.....
Basle :	Beyrouth	10	27	530	434
	Caracas	75	94	803	245
	Hong-Kong	104	213	1,514	2,043
	Lima	48	74	383	427
Total		.....	.....	.....	.....
.....
GRAND TOTAL		-	-	-	-

(*) All the figures given are entirely fictitious.

Totals by city of origin will be given in each column.

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A more complex presentation could be envisaged, taking into account the fact that on departure from each airport, not only are the true origin and destination of each passenger known, but also the first stage flown by the passenger from that airport.

Moreover, the publications described above could be completed by supplementary publications identical to those presented in the initial proposed plan and would then only refer to COD statistics.

2. COLLECTION AND PROCESSING :

Before proceeding further, it must be pointed out that:

- 1) The inquiry refers to international trips, scheduled or non-scheduled, including, as far as TOD statistics are concerned, the stages within these trips;
- 2) Only revenue passengers would be taken into account;
- 3) The form would only be filled in on departure - i.e. on departure for each international stage.

A/Format :

As in the COD plan, the layout of the form would vary according to whether the country having jurisdiction over the airport in question collects statistics by means of a traffic form or not.

Each form should indicate :

Box 1 : the name of the airport;

Box 2 : the date of departure of the aircraft;

Box 3 : the itinerary of the flight for which a form is filled in at departure from the airport in question;

Box 4 : number of passengers travelling from the city of origin to the city of destination for any type of trip.

MODEL FORM
 =====

(Box 1) Airport	Paris
(Box 2) Date	15.11.1960

There is no carbon copy of this part and therefore it is not transmitted to ICAO; States can request the airlines to include here information not to be taken into account in the ICAO project.

(Box 8)		Official stamp			
Routing (Box 3)	ROM	IST			
No. of passengers (Box 4)	True origin (TOD) (Box 5)	Coupon destination (COD) (Box 6)	True intended destination (TOD) (Box 7)		
30	PAR	ROM	ROM		
10	NYC	ROM	ROM		
1	PAR	ROM	IST		
14	PAR	IST	IST		
1	LON	IST	THR		

Box 5 : City of true origin of the trip (in code);

Box 6 : City at which the passenger disembarks on the flight (this point may coincide with the city of true destination);

Box 7 : True intended destination (in code);

Special box 8 : Finally, a special box is provided to be stamped after each checking of the corresponding form.

B/Completion of the forms :

A particular problem arises here with regard to TOD statistics. Among the airports collecting forms for return trips, circular trips, and open-jaw trips, one must be chosen as the airport of destination of the first trip and the origin of the second. Duplications or gaps are to be avoided.

In this respect more systematic use could be made of the practice, already followed by some airlines, of checking off the airport in question when the ticket is sold.

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The proposals made for the COD plan concerning the airports at which the form would be filled in, the agents responsible for collecting them, the time for delivery to these agents and the control, also apply to the TOD plan.

In practice, in addition to the indications on the COD form, 3 extra letters will be included for a passenger whose city of embarkation or disembarkation on the flight corresponds to the city of true origin or true destination of his journey as a whole, and 6 extra letters for a passenger whose city of embarkation or disembarkation on the flight do not correspond to the city of true origin or true destination of his journey taken as a whole.

4. TRANSMISSION TO I.C.A.O. :

The indications given on this subject for the COD plan apply equally here.

5. TIME-LIMITS FOR SUBMISSION :

The time-limits given in the COD plan will no doubt be slightly extended because of the extra data to be collected and, where necessary, processed by the States before transmission to I.C.A.O.

6. PROCESSING BY I.C.A.O. :

The principles set forth in the COD plan can also be used for the TOD plan.

7. PERIODICITY OF PUBLICATIONS AND TIME-LIMITS :

Because of the larger number of data to be processed and published, the time-limits for publication could be slightly longer than may be expected for COD statistics.

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III - FINANCIAL ASPECTS OF THE PROJECT

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It has not appeared necessary or desirable to attempt any accurate determination of the costs, for the airlines, the States, and ICAO, of setting up and operating the system. Such a task would be extremely difficult, premature and incomplete :

- premature, because it would not have the benefit of the advice and opinions given at the next meeting of the Panel;
- incomplete, because only France would have been included. Now, the case of this country may be considered as a particular one, since statistics are already collected at the airports by means of a traffic form.

It would seem preferable for the study of costs to be taken in hand by countries which would provide an example of one of the types of collecting system proposed, e.g. :

- 1/the countries not collecting any statistics on traffic flow at the airports;
- 2/the countries collecting statistics on traffic flow at airports, distinguishing between :
 - a) countries only collecting global figures;
 - b) countries collecting C.O.D statistics;
 - c) countries collecting C.O.D. and T.O.D. statistics.

A study conducted in the countries corresponding to these different categories and on similar bases, should permit very interesting information to be obtained, which would make it possible to draw up valid conclusions.

The bases for such a study could be as follows:

1. Time taken to fill in COD and TOD forms for a given flight :

Flights on long-distance and medium-distance aircraft could be taken into consideration.

It will be noted that although, in certain countries, the cost corresponding to the whole of the time spent in filling in the form must be taken into account, this will not be the case for the States which already collect statistics by means of this document.

In this case, if the ICAO form does not require more data than those already collected by the State in question, there will in theory be no extra charges.

On the other hand, if the ICAO form is more complete than the national form, the difference to be considered is that between the time spent to fill in the national form and the time spent to fill in the ICAO form, and only this extra time should be taken into account in calculating the costs, in so far as the work cannot be done entirely by the existing airlines staff.

2. Control :

The study could be based on the following two principles :

- a) the control would be done on the spot according to the method practised in Switzerland;
- b) only 10% of the forms submitted by the airlines would be checked.

3. Preparation of punched cards.

4. Presentation of data :

As indicated earlier, instead of submitting the traffic form to ICAO, certain States, if they so wish, could send the punched cards or a summary of the punched cards they have used, or an initial presentation of the data.

Points 3 and 4 should be studied in relation to these proposals.

5. Transmission to ICAO:

The forms, punched cards or tables presenting the data would then be sent by air to Montreal. It should be possible to study the cost of carriage from an estimation of the international flights in the State concerned and from the forms, or punched cards, or tables.

6. Costs of the agency:

7. Publication:

It will be difficult to give any very exact indications on these two points; however, ICAO could define within what limits the costs could vary, taking into account the number of international stages flown in the world and the corresponding number of passengers as well as the costs of the present publications.

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Finally, it seems that the problem of covering the expenses by the sale of publications or some other means cannot be usefully considered until an approximate calculation of the costs has been made.

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★ ★

IV - CONCISE DESCRIPTION OF THE ADVANTAGES OF A SYSTEM OF ORIGIN AND
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DESTINATION STATISTICS BASED ON THE COLLECTION
=====

OF THE DATA AT THE AIRPORTS
=====

The establishment of a system of this kind would offer numerous advantages.

The adoption of one form for each flight on departure from an airport would bring about a considerable reduction, as compared with a system based on the passenger ticket, in the number of basic statistical documents. This reduction will tend to become more significant with the increase in the average capacity of the aircraft in service on international routes.

The form also allows an initial regrouping of the data within the frame of a flight, since the passengers whose origin and destination are the same and who embark on the same aircraft will be shown on the airport embarkation form by one single figure.

Furthermore, there would be no need to try to reduce this relatively small number of basic documents by resorting to simple sampling procedures. This will avoid the risks of error inherent in such a process, which are particularly great in the case of relatively light traffic.

The quality of the statistics obtained from a 100% recording of the data will furthermore be improved by the possibility of having their authenticity checked by the national administrations.

Origin and destination statistics drawn up on the basis of an airport form will be more accurate and also more precise. Since data on passengers will be recorded on the form at the time of embarkation at an airport, not only will the volume of the traffic and its directional flow be known, but also its distribution in time, on departure from each airport.

On the organizational plane, the collection of data at the airports will be facilitated by the fact that the airports of practically all countries are centres for collection of statistics both for their own needs and those of the national administrations.

The data needed by ICAO can thus be recorded, if this is not already done, on current airport documents. The proposed plan can thus be integrated in the national statistical systems, generally without any substantial modifications.

In addition, the participation of all the member States of ICAO in world-wide origin and destination statistics will permit simplification or improvement of the national systems based on airport documents.

They will be simplified in those States which collect the data both on arrival and departure of the aircraft, since collection on arrival will no longer be necessary. They will be improved in those States which collect data only on departure and thus obtain less reliable information on the origin of the passengers coming from another country and disembarking on their airports.

The proposed plan provides, moreover, a more universal and more flexible system than one established on the basis of passenger tickets.

It is more universal in the sense that a single form which is established in several copies, with any necessary variants, will meet the needs of the airports, the States and ICAO. It is also more universal since the form can cover more varied aspects of the airlines' activity, in particular all categories of traffic : freight and mail as well as passengers.

It is in fact a more flexible instrument for obtaining information than the ticket. The ticket does not include all the data already collected by the States for their own requirements nor those which ICAO might wish to obtain, and it restricts the types of information that can be used in statistical work. Thus, relatively elementary information such as the capacity of the aircraft, the length of their stop at the airport, and the actual take-off time, cannot be supplied by the passenger tickets.

On the other hand, the airport form is specially designed for statistical purposes and can be adapted, within certain limits, to the different needs to be fulfilled.

In a general way, it provides a basis for a more open statistical system, capable of further development.

Moreover, the proposed plan, as conceived, is not in conflict with the requirements of facilitation in the field of air transport : since the airport form is not a clearance document, it would not have to be delivered to the airport authorities before accomplishment of frontier formalities.

Nor will the plan cause any difficulties for airlines or States which, for practical or legal reasons, are required not to communicate certain information of a commercial nature.

The submission of tickets to an international organization for statistical purposes, on the contrary, raises delicate problems on the legal plane, since they contain certain indications - name of the passenger, name of the airline - which are considered in some countries as commercial secrets.

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ATTACHMENT I

MODEL FOR THE COMPLETION OF FORMS FOR A GIVEN FLIGHT

(Collection of C.O.D. Statistics)

--:-

DEVELOPMENT OF FLIGHT FOR WHICH THE ATTACHED FORMS
ARE COMPLETED AT EACH AIRPORT

	Points of call :	LON	PAR	ROM	ATH	KHI	TYO
Airport (1)	Number of passengers on departure from each airport listed in column (1) destined for one of the points of call of the flight						
LON	↔	5	5	10	10	20	
PAR			↔	5	0	10	0
ROM				↔	10	5	5
ATH					↔	20	10
KHI						↔	15
			5	10	20	45	50

ATTACHMENT I - A

At each airport the forms will be filled according to the following tables.

A T T A C H M E N T I - B

Airport	LON	Itinerary	PAR	ROM	ATH	KHI	TYO						
Date	15.11.60.	Number of Passengers	5	5	10	10	20						
Official Stamp													

ATTACHMENT I-C

Airport	PAR	Itinerary	ROM	ATH	KHI	TYO					
Date	15.11.60	Number of Passengers	5	-	10	-					
							Official Stamp				

ATTACHMENT I - D

Airport	ROM	Itinerary	ATH	KHI	TYO						
Date	15.11.60	Number of Passengers	10	5	5						
										Official Stamp	(/)

(A control was in fact carried out)

A T T A C H M E N T I - E

Airport	ATH
Date	15.11.60

Itinerary	KHI	TYO							
Number of Passengers	20	10							

Official
Stamp



ATTACHMENT I - F

Airport	KHI
Date	16.11.60

Itinerary	TYO								
Number of Passengers	15								

Official
Stamp

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O&D PANEL
FINAL REPORT
27/2/63

- 204 -

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A T T A C H M E N T I I

M O D E L F O R T H E C O M P L E T I O N O F F O R M S

F O R A G I V E N F L I G H T

(Collection of T.O.D. Statistics)

-:-

DEVELOPMENT OF FLIGHT FOR WHICH THE ATTACHED FORMS ARE
COMPLETED AT EACH AIRPORT

	Points of call :	LON	PAR	ROM	ATH
<u>Airport</u> (1)	Number of passengers on departure from each airport listed in column (1) destined for one of the points of call of the flight				
LONDON	↔	O D LON 5 PAR AMS 5 ROM		O D LON 8 ROM NYC 2 KHI	O D LON 4 ATH BER 3 TYO
PARIS		↔		LON 1 ROM CCS 2 ATH MOW 3 THR PAR 2 ROM	AMS 2 ATH FRA 4 LCA PAR 3 ATH
ROME				↔	HEL 1 IST ROM 3 KHI ROM 6 ATH
		10		18	26

APPENDIX I I-A

(1) - At each airport the forms will be completed in the manner shown in the following tables.

ATTACHMENT II - B

Airport	London
Date	15.11.1960.

		Official stamp					
Flight itinerary	PAR	ROM	ATH				
Number of passengers	True origin TOD	Coupon destination (COD)	True intended destination (TOD)				
5	LON	PAR	PAR				
5	AMS	PAR	ROM				
8	LON	ROM	ROM				
2	NYC	ROM	KHI				
4	LON	ATH	ATH				
3	BER	ATH	TYO				

ATTACHMENT II - C

Airport	Paris
Date	15.11.1960

(//)		A control was in fact carried out				
Flight itinerary	ROM	ATH				
Number of passengers	True Origin TOD	Coupon destination (COD)	True intended destination (TOD)			
1	LON	ROM	ROM			
2	PAR	ROM	ROM			
2	CCS	ROM	ATH			
3	MOW	ROM	THR			
3	PAR	ATH	ATH			
4	FRA	ATH	LCA			
2	AMS	ATH	ATH			

ATTACHMENT II - D

Airport	Rome
Date	15.11.60.

		Official stamp					
Flight Itinerary	ATH						
Number of passengers.	True Origin TOD	Coupon destination (COD)	True intended destination (TOD)				
3	ROM	ATH	KHI				
6	ROM	ATH	ATH				
1	HEL	ATH	LST				

O&D PANEL
FINAL REPORT
27/2/63

- 210 -

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ATTACHMENT III

The purpose of this note is to deal in more detail with two problems which gave rise to numerous discussions during this session of the Panel:

- elimination of duplications
- possibility of filling in the gaps resulting from the non-participation of some airports in the system.

I - Elimination of duplications

a) COD System

Such as it was designed, this system cannot be the source of duplications in the count of journeys since the passengers, for each part of their trip corresponding to a flight coupon, will only be recorded once, at the time of their departure.

Moreover, it should be remembered that no compilation of forms on arrival of aircraft is provided for.

b) TOD System

No duplication is possible in this system either.

Let us, in effect, assume a journey from NYC to ROM via LON PAR

According to the French plan:

NYC will enter in TOD - NYC - ROM
in COD - NYC - LON

LON will enter in TOD - NYC - ROM
in COD - LON - PAR

PAR will enter in TOD - NYC - ROM
in COD - PAR - ROM

In the publications prepared in accordance with the methods suggested in pages 185 and 186 which reflect accurately the airport forms, these statistical data would appear as follows:

- <u>At New York Airport</u>		<u>TOD</u>	<u>COD</u>
(same table as on page 185)	NYC	ROM	LON
- <u>At London Airport</u>			
(same table as on page 186)	NYC	(LON)	ROM
- <u>At Paris Airport</u>			
(same table as on page 186)	NYC	(PAR)	ROM

To obtain, without duplication, the total breakdown of passengers, it is enough to add up the number of passengers entered in the TOD columns of the tables prepared according to those on page 185, that is, in this case, the number of passengers registered at New York Airport only.

It should be pointed out on the other hand that, on the table corresponding to a specified city, no passenger can be registered several times.

II - The problem of gaps

First, it should be emphasized that the suggested system does not in itself allow of any gap. On the other hand, just as in any other system, including the American one, if part of the elements which are to provide the statistical data fail to do so, the data collected will not be complete.

To what extent and by which means would it be possible to fill in possible gaps?

a) in COD system

- a.1. - If neither the airport of departure nor the airport of arrival of the passenger participate, it is impossible to fill in the gap.
- a.2. - If the airport of departure of the passenger participates, whereas the airport of arrival does not, there is no gap since, as provided for in the suggested plan, the passenger can be registered at the time of departure.
- a.3. - If the airport of departure of the passenger does not participate while the airport of arrival does, the gap can be filled in through filing a special "arrival" form with the airport of arrival.

b) Under a TOD system

Two cases may be considered:

- b.1 - The passenger does not call at any participating airport until the final destination of his trip.

Supposing a trip NYC (N.P¹) PAR (P²)

In this case the gap practically cannot be filled. In this connection reference may be made to a previous paper in which the Swiss expert stated, on the strength of his experience with Swiss airports, that over a one-year period the traffic in one direction (outbound or inbound) was almost equivalent to the traffic recorded for the other direction (inbound or outbound)

If applied, this method would produce a first approximation of no uncertain value.

- b.2 - The passenger, whose initial point of origin is a non-participating airport, calls in the course of his trip at a participating airport.

Supposing a trip NYC (N.P.) PAR (P) ROM (P) ATH (P)

In this case the most practical means of filling without duplication the gap represented by the non-participation of NYC would be to have a punch-card prepared on the basis of the report form filled up by the first participating airport (in this case Paris) which is the first stop after the non-participating airport:

one assigned to Paris
the other to replace the card corresponding to the report form which should have been prepared by NYC.

(1) N.P. non-participating
(2) P. participating

The above procedure would not materially increase the total cost of the system, its sole effect being to transfer the task from one airport to another.

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Two conclusions seem to be justified:

- with regard to the C.O.D. system, that the problem posed by gaps could easily be solved;
 - with regard to the T.O.D. system, that the above-mentioned procedures would make it possible to fill most, if not all, gaps that could result from the non-participation of a few airports in the system.
-

APPENDIX 7

METHOD FOR THE ELIMINATION OF DUPLICATIONS AND THE FILLING OF POSSIBLE GAPS

(Page 31, Part N)

(Presented by Mr. Rivoal)

The French system was designed so that participation of States (and therefore airports) in the system would be extremely easy. This should have the twofold result of ensuring a very high degree of participation and of reducing to a minimum the problem of gaps.

In neither of the two proposed plans (COD or COD/TOD) are there any duplications since:

- In the COD system, on the one hand, passengers are recorded once only, at the time of their departure, for each part of the trip corresponding to a flight coupon;
- In the TOD system, on the other hand, the form completed at the airport of true origin of each passenger is taken into account in the total count of passengers whose true origin is at that airport.

If some airports do not participate, the gaps can, under both systems, easily be filled, if not completely, at least to a major extent through the use of certain procedures:

- In the COD system each time a passenger who has embarked at a non-participating airport, disembarks at a participating airport;
- In the TOD system each time a passenger who originates at a non-participating airport, embarks, at a later stage of his trip, at a participating airport.

In other words there will be gaps:

- In the COD system, only if the passenger neither embarks or disembarks at a participating airport;
- In the TOD system, only if the passenger does not call at a participating airport during his trip, or calls at one only but at the final destination of his trip.

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O&D PANEL
FINAL REPORT
27/2/63

- 216 -

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APPENDIX 8

REPORT OF THE WORKING GROUP ON COSTS

Terms of Reference

1. The Working Group's task was to examine the estimates of costs prepared for the French Airport System and the United States Centralized System for collecting O D statistics as presented on OD 4-WP's 5, 7, 9, 11, 12 and OD 5-WP/18 and to put these estimates of cost on a comparable basis, standardizing where possible, the cost elements common to both plans. These papers are summarized in Attachment 5 hereto which also contains all relevant material not superseded by action of the Working Group or elsewhere contained in its Report.

Membership

2. The Working Group comprised the following members:

- Chairman: *Mr. R.G. McLaughlin (Canada)
- France: Mr. A. Binet
*Mr. J. Darras
*Mr. L.P. Ropars
- United States: Mr. G.L. Stillwagon
Mr. S.H. Preece
*Mr. B. Myers
- IATA: Mr. R. Heitmeyer
Mr. J. Van Smirren
- Secretary: Mr. R.G. Pouliot *Part time

Preliminary Remarks

3. The Working Group held 10 meetings and examined the working papers referred to above, within the framework suggested by the two main proposals for world-wide collection of origin and destination statistics as described in OD 4-WP/10: the proposal of France for collecting O D statistics at airports, with provision for collecting COD statistics or a combination of COD and DOD statistics, both being based on a 100% count of the traffic, and including the non-scheduled airlines; the proposal of the United States for collecting OD statistics from the microfilming of coupons lifted on the basis of a 10% sample, providing for directional origin and destination of passengers and their full routeing, including the participating airlines. (The U.S. Centralized system does not provide for non-scheduled airlines). The Working Group examined the cost estimates of both plans with the variations of scope stated in the tabular heading to Attachments 1, 2 and 3 hereto.

4. The Working Group agreed to recommend a number of changes in the cost calculation, as described in this Report, the financial consequences appearing in the revised tables at Attachments 2 and 3. In the course of this work, certain major reservations were made, the net effect of which was to leave the responsibility for each of the cost estimates to its own sponsors. These reservations are described in subsequent paragraphs of this report. The Working Group submits Attachment 1 hereto as its collective work, summarizing the cost estimates of both schemes as amended, without implying acceptance of the estimates by the Working Group as a whole. Attachment 4 lists the assumptions made by the Working Group in comparing the plans.

5. In connection with the cost to airlines calculated under the French Airport System, the French delegation wished to record its view that these costs are theoretical calculations not necessarily corresponding to real expenditure, and that they may therefore have to be reduced, as the method currently used to fill the required traffic form at the French and the German airports, for instance, if extended to the whole world, would in the extreme case enable the costs to the airlines to be considered as nil. The representatives of the United States and IATA on the Working Group strongly objected to this application of the added cost concept, insisting that the work performed by the airline staffs be fully reflected in the cost estimates, that is, on a fully-allocated cost basis. It was their view that the added cost concept is justified only if the work being costed can be postponed for periods of time when necessary and be eliminated before additional staff must be hired because of increasing over-all total workload. Neither of these conditions exist in the airport system because airlines must submit reports within 24 hours after each flight's departure and would not be permitted to eliminate the work.

6. The Working Group did not feel that it could go into the matter of the revenues that might be derived from systems of collecting OD statistics, nor that it could estimate the offsetting value of existing systems of collection.

TRAFFIC BASIS

7. The Working Group agreed that both systems should be based on the following ICAO statistics on international traffic, for the year 1961:

INTERNATIONAL OPERATIONS

I. Scheduled Airlines of ICAO Member States

<u>A) Scheduled Services</u>	<u>thousands</u>	
1. Passengers carried	26,000	
less territorial services	<u>- 1,300</u>	<u>24,700</u>
2. Number of take-offs	952	
less territorial services	<u>- 50</u>	
	902	
Provision for non-reporting States	<u>98</u>	<u>1,000</u>
3. Single-direction passenger trips excluding territorial services		<u>16,600</u>
4. Number of flight coupons to be micro- filmed under U.S. system on basis of 10% sample		<u>2,470</u>
 <u>B) Non-scheduled Services</u>		
1. Passengers carried excluding territorial services		1,260
2. Number of take-offs excluding territorial services		70

thousands

II. Non-scheduled Airlines of ICAO Member States

1. Passengers carried	540
2. Number of take-offs excluding territorial services	30

III. Total - scheduled and non-scheduled airlines

1. Passengers carried	26,500
2. Number of take-offs	1,100

COST TO AIRLINES

Salary Rates

8. Considering firstly items 1.1 and 1.3 (Attachment 3, page 226), the Working Group agreed that the rate of \$1.00 per hour was satisfactory as a world average of the direct salary costs involved in preparing the 1,100,000 forms to be completed under the French airport system, with 100% added to cover fringe benefits (social insurance and allowances), office space, lighting, heating and basic office equipment, and supervision. Similarly, in respect of the U.S. Centralized System, the Working Group agreed that the average direct salary rate for clerical handling, selection and microfilming should be changed to \$1.00 per hour, to which would be added 100% for overhead as under the French airport system, and 5% to cover the cost of eliminating from the coupons to be microfilmed those representing domestic stages of international services.

Rates of production

9. The United States representative could not agree to the rates of production in section 1.1, Attachment 3, page 226, because they represent airline averages for existing national reporting systems at airports where the tests were conducted rather than the requirements of a world-wide TOD system. He also said that the rates of production under the French plan seemed disproportionately high as compared with the rates used in the United States plan.

10. The French representative pointed to the 14 minutes and 30 seconds allowed for completing one form under the COD-DOD system, as opposed to 1 minute and 40 seconds required under the COD system, also emphasizing that a 100% coverage provided for the work of non-reporting airports being performed at those airports that did report. Moreover, he indicated that the rates of production had been based on calculations made by the airlines themselves at airports where the system was actually in operation.

Postage costs

11. The Working Group agreed to add \$500 to cover the costs of mailing the microfilm by the airlines to their governmental authorities. The United States representative, although accepting the cost, pointed out that the microfilms could be transmitted directly to ICAO by the airlines, under procedures established by governmental authorities, rather than being forwarded through the governments.

Maintenance of microfilm machines

12. The Working Group agreed to add 1% to cover the cost of maintenance.

Cost of Microfilm Machines

13. Referring to the cost of microfilm machines estimated in Attachment 2, page 224 at U.S. \$950. plus 25% for duty (total \$1,188.) as an average for the world as a whole, the Working Group noted the following local price quotations obtained for the same type of manual equipment: Japan: \$750.; United States and Canada: \$950.; Germany: \$1,000.; France: \$1,576.

Distribution of Costs

14. The representatives of the United States and IATA stressed that the airline costs under the airport system of up to \$540,466. are incurred at some 5,000 airline stations at airports. The French representative expressed the opinion that under the United States centralized system, airline costs of lifting flight coupons at these stations and transmitting them to head offices theoretically might be included. The United States and IATA representatives did not agree as the cost estimates of the U.S. centralized system begin at the airline head offices under existing airline procedures.

COST TO AIRPORTS

15. The United States Representative could not accept the low estimates of costs to airports as calculated under the French airport system. He pointed out that an overall annual cost of \$54,952. allocated to some 400 airports, would result in a cost of \$137. per airport per year, or \$0.37 per day, and he could not see how the work that was required of airport personnel could be done for that amount. The United States Representative also explained that nearly all of the 89 U.S. International airports are locally owned. He explained that for the U.S. Federal Government to assume its proper responsibility for seeing that ICAO's instructions are carried out it will be necessary to station government employees at the airports on a full or part-time basis. He estimated that the cost to do this in the United States would be several times the total amount estimated in the French system for the world-wide cost.

16. The French Representative indicated that the costs to airports had been estimated on the basis of the experience and the practice of the three countries that had participated in the study, in liaison with a representative of IATA, and that part of the costs incurred at airports under the French airport system could be found under the chapter of costs to airlines. For the majority of airports responsible for a small part of the traffic, it was his opinion that these average costs would be excessive. Nevertheless, the Working Group considered these costs as those applicable to the airports of the three countries that had participated in the basic study, where a system of airport collection of O and D statistics was in effect.

COSTS TO NATIONAL ADMINISTRATIONS

17. With respect to the U.S. centralized system, the French Representative stated that the method of control described for the United States in OD-4-WP/11 (see Attachment 5) might compel a certain number of states to develop a new form to be completed at the airlines' expense to check the number of coupons microfilmed. In the same manner, certain States might have to hire part or full-time inspectors to supervise coupon selection and micro-filming at airline headquarters. It seemed to him obvious therefore, that the amount allotted by the United States to cover this function was entirely inadequate at \$150. per annum for each country.

18. The United States Representative could not accept the estimate of \$10,000. as the total world-wide cost for control by National Administrations in the airport system. He indicated that in his opinion, in the United States, the Federal Government would have to establish a small unit to administer the operation of the system at the 89 United States airports. This would involve the training and supervision of the more than 89 government employees performing the airport function, assistance in interpreting ICAO instructions, handling of airport reports and contacts with ICAO. The direct salary cost of this unit would exceed the estimated total cost for national administrations in all 83 Member States.

19. The Representative of France reiterated that the check upon the accuracy of the traffic forms would take place at the airport level for which an annual expense of \$21,388 had been provided. The additional \$10,000. were provided solely to cover supervision of form transmission by airports to their governments.

COSTS TO ICAO

Rates of production

20. The Working Group agreed to standardize the card punching operations of both systems on the basis of 10,000 card perforations per employee per hour, although the United States Representative believed this rate to be too high. The French Representative also had reservations on the rates calculated in the United States centralized system for analyzing the tickets and extracting the data from them as he could not believe it possible, within the times stated, to perform all the operations deemed necessary, such as reading the routeing, selecting the coupons from which data for the trip are to be selected, identifying the participating airlines, copying the information on to a pre-printed work sheet. In his opinion, the foregoing and the need to look through the work sheets to locate the assigned position of a given routeing would be so time consuming that, instead of one coupon per minute, he thought that one coupon in four minutes would be more appropriate.

Cost of cards

21. Noting that the cost of cards had not been included in the U.S. Centralized System, the Working Group agreed to provide for this item, at the same rate as under the French airport system, namely, \$2.00 per 1,000 cards. In order for the U.S. system to compare with the French airport system, the United States Representative accepted adding 10% to the number of cards to allow for wastage.

ICAO processing vs commercial processing

22. The Working Group noted that under the US Centralized System, only the analytical stage was to be performed at ICAO Headquarters, whereas in the French airport system, the punching, checking and correction, tabulation and sorting would have to be done in ICAO, and that the hourly rates of pay for these operations differed under the two systems. The Working Group agreed accordingly to cost all the machine operations of both proposals on the basis of commercial rates, using for this purpose, hourly salary rates of \$2.00 per hour plus 100% for overhead. In this connection, the Working Group agreed to consider as equivalent to commercial rates the costs estimated in paragraph 4.4 of Attachment 3, page 230, for tabulation and sorting.

Tabulation and sorting

23. The United States Representative made a reservation with respect to the tabulating machine costs estimated for the French airport system as he could not see how the highly simplified equipment assumed would be adequate to produce the tables proposed in the system, specifically the TOD Table II as shown on page 186.

Management and Planning

24. The Working Group agreed to add \$25,000 to both systems to provide for ICAO management and Planning of either scheme. The Secretary informed the Working Group that, in accordance with ICAO practice, 20% should be added to cover overhead, plus the cost of space, which might be estimated at \$5.00 per square foot. Approximately 500 square feet would be required for this supervisory staff, and the cost of depreciation of basic office equipment, at 5% per annum, was too small to appear separately in estimates of this magnitude, in view of the small number of supervisory staff contemplated.

25. The Working Group recommends that the Secretariat re-examine at an appropriate time the ICAO estimates for management and Planning of both systems, taking into account the amendments made to the cost estimates in this Report.

SUMMARIZED COST COMPARISON BETWEEN THE UNITED STATES CENTRALIZED SYSTEM AND THE FRENCH AIRPORT SYSTEM
(Based on 1951 Traffic)

UNITED STATES CENTRALIZED SYSTEM					10% SAMPLE OF COUPONS LIFTED	TOTAL COST TO	FRENCH AIRPORT SYSTEM*			
DOD/COD airlines, travel class	DOD/COD airlines	DOD/COD	DOD/SOD	DOD	COD		COD-DD	DOD	COD-DOD	
		United States Dollars				United States Dollars				
\$ 56 300	\$ 56 300	\$ 56 300	\$ 56 300	\$ 56 300	* Airlines	\$ 69 910	\$137 132	\$517 854	\$540 466	
-	-	-	-	-	Airports	\$ 19 508	\$ 44 870	\$ 48 230	\$ 54 952	
\$ 14 500	\$ 14 500	\$ 14 500	\$ 14 500	\$ 14 500	Governments	\$ 15 976	\$ 15 976	\$ 15 976	\$ 15 976	
\$343 500	\$319 900	\$283 600	\$258 300	\$170 300	ICAO, including contract work	\$ 82 180	\$145 900	\$199 712	\$212 740	
\$414 300	\$390 700	\$354 400	\$329 100	\$241 100	GRAND TOTAL	\$ 187 574	\$343 878	\$781 772	\$824 134	

Notes: The Working Group submits this Table as its collective work, summarizing the cost estimates of both plans as amended, without implying acceptance of the estimates by the Working Group as a whole, leaving the responsibility for each of the cost estimates to its own sponsors. Reference to the text of the Working Group's Report is recommended.

Statement by the United States and the IATA
Representatives on the Working Group

With respect to the Statement of the French Representative on the Working Group, appearing on the right, the representatives of the United States and IATA strongly objected to this application of the added cost concept, insisting that the work performed by airline staffs be fully reflected in the cost estimates, that is, on a fully allocated cost basis. It was their view that the added cost concept is justified only if the work being costed can be postponed for periods of time when necessary and be eliminated before additional staff must be hired because of increasing over-all total workload. Neither of these conditions exist in the airport system because airlines must submit reports within 24 hours after each flight's departure and would not be permitted to eliminate the work.

* Statement by the French Representative
on the Working Group

In connection with the cost to airlines calculated under the French airport system, the French delegation wished to record its view that these costs are theoretical calculations not necessarily corresponding to real expenditure, and that they may therefore have to be reduced, as the method currently used to fill the required traffic form at the French and German airports, for instance, if extended to the whole world, would in the extreme case, enable the costs to the airlines to be considered as nil.

ATTACHMENT 1

ATTACHMENT 2

STATISTICAL AND OTHER BASES FOR ESTIMATES OF ANNUAL COSTS
 FOR CENTRALIZED PRODUCTION OF PASSENGER TICKET STATISTICS UNDER THE U.S. PLAN

Detail to be published ^{1/}

Production step and cost item	Directional routing (DOD/COD), participating airlines, travel class (1)	Directional routing (DOD/COD), participating airlines (2)	Directional routing (DOD/COD) (3)	Directional and on-system O & D (DOD/COD) (4)	Directional O & D (5)
I COSTS TO AIRLINES					
Overhead, space and depreciation					
Postage	\$ 500	\$ 500	\$ 500	\$ 500	\$ 500
Microfilm	5 000	5 000	5 000	5 000	5 000
2/ Depreciation and maint. of microfilm machines	22 000	22 000	22 000	22 000	22 000
Direct salary expense	14 400	14 400	14 400	14 400	14 400
Overhead at 100%	14 400	14 400	14 400	14 400	14 400
Total Annual costs to airlines:	\$ 56 300	\$ 56 300	\$ 56 300	\$ 56 300	\$ 56 300
II COSTS TO GOVERNMENTS					
Salaries, overhead and other costs	\$ 12 500	\$ 12 500	\$ 12 500	\$ 12 500	\$ 12 500
Postage	2 000	2 000	2 000	2 000	2 000
Total annual costs to governments:	\$ 14 500	\$ 14 500	\$ 14 500	\$ 14 500	\$ 14 500
III COSTS TO ICAO (including contract work)					
1. Analysis (extract data from ticket)					
No. of coupons from which data to be extracted (10% of 16,600,000)	1 660 000	1 660 000	1 660 000	1 660 000	1 660 000
Rate of production per hour per employ ee (no. of coupons)	55	60	60	65	65
Pay rate per hour, including overhead space and depreciation	\$ 4.00	4.00	4.00	4.00	4.00
Estimated cost	\$ 120 700	110 700	110 700	102 500	102 800
2. Preparation (key punch and verify cards)					
No. of holes per card	24	21	21	20	20
No. of cards to be punched and verified	880 000	825 000	825 000	770 000	770 000
No. of hours at 10,000 holes per hour	4 435	3 640	3 640	3 230	3 230
Service bureau charge per hour per employee	\$ 4.00	4.00	4.00	4.00	4.00
Cost of cards	1 900	1 800	1 800	1 700	1 700
Estimated cost	\$ 19 600	16 400	16 400	14 600	14 600
3. Electronic machine processing (conversion of cards to tape, machine edit through final tabulation)					
Costs developed by a firm specializing in electronic data processing on a service basis	115 500	110 500	89 000	84 000	16 000
4. Publication					
No. of pages in each quarterly publication	3 500	3 500	2 400	1 600	350
Printing cost per page	\$ 4.00	3.75	3.75	3.75	3.75
Estimated cost	\$ 55 000	50 000	35 000	25 000	5 000
5. Management and Planning					
Salaries	\$ 25 000	25 000	25 000	25 000	25 000
20 % of salaries for overhead	\$ 5 000	5 000	5 000	5 000	5 000
Cost of space at \$5.00 per square foot	\$ 2 500	2 500	2 500	2 500	2 500
Estimated cost	\$ 32 500	32 500	32 500	32 500	32 500
6. Estimated total cost to ICAO					
	\$ 343 500	319 900	283 600	258 500	170 500

IV GRAND TOTAL \$ 414 300 \$ 390 700 \$ 354 400 \$ 329 100 \$ 241 100

1/ The cost estimates have been based on extraction from the tickets and entry into the electronic machine of at least the minimum information needed for purposes of edit, even though less detail might be published. Such minimum information would be those cities in the routing constituting the directional and on-system origin and destination (DOD/COD) plus the participating airlines.

2/ Based on an estimated initial cost of \$500, plus 25% for duty, the total capital investment for 165 airlines would amount to \$198,938.

ATTACHMENT 3

DETERMINATION OF ANNUAL COST OF WORLD-WIDE ORIGIN AND DESTINATION

STATISTICS ACCORDING TO THE AIRPORT SYSTEM PROPOSED BY FRANCE

With a view to application to world-wide international passenger traffic of the observations made at French, German and Swiss Airports on the cost of OD Statistics according to four types of statistics, the traffic data for 1961 have been taken in the form in which they were published by ICAO.

WORLD-WIDE TRAFFIC 1961

(a) Scheduled Services by Scheduled Airlines

- Passengers 24.7 millions, excluding territorial services.
- Number of take-offs (1) 951,835 less 50,000 territorial, or about 900,000 increased to 1,000,000 to take account of some countries which have not supplied the required statistical data.

(b) Non-scheduled Services by scheduled and non-scheduled airlines

In 1961, the number of non-scheduled services operated by the scheduled and non-scheduled airlines was estimated at 10% of the number of scheduled movements, viz. 100,000 take-offs.

It has been estimated that passenger traffic carried by these aircraft in 1961 on non-scheduled services was 1.8 million or 7.3% of the passenger traffic carried by aircraft on scheduled services.

(c) Total

- Number of international passengers 26.5 millions.
- Number of take-offs.....1,100,000
- Number of traffic forms1,100,000

Note: (1) The extrapolation of European traffic statistics published by the ARB in terms of world traffic would give, for 1960, 937,000 take-offs.

ATTACHMENT 3

ATTACHMENT 3 (Cont'd.)

EXPLANATION

COST IN U.S. DOLLARS

I - COST TO THE AIRLINES

COD COD-DD DOD COD-DOD

1.1 Preparation of the 1,100,000 forms

- Average time for completion of one form	1'40"	3'30"	13'53"	14'30"
- Total time for the 1,100,000 forms	30,555 h	64,166 h	254,527 h	265,833
- Hourly rate of pay for agents completing the forms	\$ 1	\$ 1	\$ 1	\$ 1

1.2 Transmittal to airport authorities

- Forms are transmitted daily by the airlines; on the average, 5 forms are transmitted simultaneously to the airport authorities, making 220,000 transmittals, each one requiring 2' of the time of a junior agent paid \$0.60 per hour to deliver these forms to the appropriate office.

1.3 Overhead Costs

- The overhead costs are estimated at 100% of the salaries paid; they cover salary administration costs, office costs and the cost of supervision

1.1 Preparation of the 1,100,000 forms

Direct Salaries:

No. of hours of work x \$ 1	30,555	64,166	254,527	265,833
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1.2 Transmittal to airport authorities

220,000 x 2' = 7,333 hrs.

7,066 h x \$0.60 =	4,400	4,400	4,400	4,400
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1.3 Overhead costs

100% of salaries	34,955	68,566	258,927	270,233
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Total costs to airlines: 69,910 137,132 517,854 540,466

ATTACHMENT 3 (Cont'd.)

ATTACHMENT 3 (Cont'd.)

EXPLANATION					COSTS IN U. S. DOLLARS				
II - COST TO THE AIRPORTS									
	COD	COD-DD	DOD	COD-DOD		COD	COD-DD	DOD	COD-DOD
2.1 <u>Printing of the traffic form</u>					2.1 <u>Printing of the traffic form</u>				
- Unit cost: \$2.80 per 1,000					1,100 x 2.80 =	3,080	3,080	3,080	3,080
2.2 <u>Checking by sampling at 10%</u>					2.2 <u>Checking by sampling at 10%</u>				
- The average time required for checking a form is: This time is greater, except in the case of the TGD system (since the forms are sorted prior to checking) than the time required for completing the forms; the airlines' files must be collected and consulted by airport agents who are less experienced in keeping the files of each airline.	2'30"	5'15"	7'	8'	Salaries:				
- Total time required to check 1,100,000 forms:	4,583 h	9,625 h	12,833 h	14,666 h	No. of hours of work at \$1.	4,583	9,625	12,833	14,666
2.2A <u>Checking of Traffic Form</u>					2.2A <u>Checking of Traffic Form</u>				
- Average time required for checking coding and correct completion of forms at airport level, per form:	10"	35"	30"	35"	Salaries:				
- Total time for 1,100,000 forms:	3,055 h	10,694 h	9,166 h	10,694 h	No. of hours x \$1.00	3,055	10,694	9,166	10,694
2.3 <u>Overhead costs</u>					2.3 <u>Overhead costs</u>				
- The overhead costs are estimated at 100% of the salaries paid; they cover salary administration costs, office costs and the cost of supervision.					100% of salaries.	7,638	20,319	21,066	25,360
2.4 <u>Transmittal to national Administrations</u>					2.4 <u>Transmittal to national Administrations</u>				
- The 400 international airports at which OD statistics are to be kept will send the forms remitted to them by the airlines to their national Administrations twice a month. The mailing costs, if the forms are not sent post-free, will on the average be 12 cents per consignment.					400 airports x 24 consignments = 9,600 consignments				
					9,600 consignments x 12¢ =	1,152	1,152	1,152	1,152
					<u>TOTAL COST to airports:</u>	19,508	44,870	48,230	54,952

ATTACHMENT 3 (Cont'd.)

OLD PANEL
 FINAL REPORT
 APPENDIX 8
 2/2/65

ATTACHMENT 3 (Cont'd.)

EXPLANATION

COST IN U. S. DOLLARS

III - COST TO NATIONAL ADMINISTRATIONS

	COD	COD-DD	DOD	COD-DOD		COD	COD-DD	DOD	COD-DOD
<p>3.1 <u>Checking of Traffic Forms</u>, either at airport level or at national administration level according to the prevailing type of organisation.</p> <p>(approximately 1 hour per month per airport)</p>	5,000 h	5,000 h	5,000 h	5,000 h					
<p>3.2 <u>Overhead costs</u> (100% of salaries)</p>						5,000	5,000	5,000	5,000
<p>3.3 <u>Transmittal to ICAO</u></p> <p>- Each of the 83 Member States should send the coded forms to Montreal once per month. Each consignment, if not sent by air freight by the airlines, will cost on the average \$6. Each consignment will comprise an average of 1,100 forms weighing 3 kgs.</p> <p>- The unit cost selected corresponds to the North Atlantic rate for air freight.</p> <p>NOTE: If OD statistics were compiled in Europe instead of in Montreal, the shipping costs for the forms would be greatly reduced.</p>									
<p>3.1 <u>Checking of Traffic Forms</u></p> <p>Direct Salaries:</p> <p>Number of hours of work x \$1.00</p>						5,000	5,000	5,000	5,000
<p>3.3 <u>Transmittal to ICAO</u></p> <p>83 States x 12 consignments = 996 consignments</p> <p>996 consignments x \$6 =</p>						5,976	5,976	5,976	5,976
					<u>TOTAL COST to National Administrations:</u>	15,976	15,976	15,976	15,976

ATTACHMENT 3 (Cont'd.)

ATTACHMENT 3 (Cont'd.)

EXPLANATION

COST IN U. S. DOLLARS

IV - COST TO ICAO

	CCD	CCD-DD	DD	CCD-DDD		CCD	CCD-DD	DD	CCD-DDD
<u>4.1 Punching of the 1,100,000 forms</u>					<u>4.1 Punching of the 1,100,000 forms</u>				
- No. of punched cards per traffic form	1.46	5	7.1	8					
- Total number of cards to be punched	1,606,000	5,500,000	7,810,000	8,800,000					
- No. of holes to be punched	24,000,000	82,500,000	117,000,000	132,000,000					
- No. of hours of punching	2,400 h	8,250 h	12,700 h	13,200 h					
- To calculate the time required for punching cards, an average of 10,000 holes punched in one hour of working time has been taken: each card containing a maximum of 15 perforations, showing - take-off date, airport of departure, airport of destination, No. of passengers, (The date and airport of departure may be recorded in series or by means of constants).					Salaries:				
					No. of hours of work x \$2.	4,800	16,500	25,400	26,400
<u>4.2 Checking and correction of cards</u>					<u>4.2 Checking and correction of cards</u>				
- The time required for checking and correcting the cards exceeds 10% of the punching time.	2,640	9,075	12,870	14,520	Salaries:				
					No. of hours of work x \$2.	5,280	18,150	25,740	29,040

ATTACHMENT 3 (Cont'd.)

OAG PANEL
FINAL REPORT
APPENDIX 8
27/2/63

ATTACHMENT 3 (Cont'd.)

O&D PANEL
 FINAL REPORT
 APPENDIX A
 2/2/63

EXPLANATION

COST IN U. S. DOLLARS

IV - COST TO ICAO (continued)

	COD	COD-DD	DOD	COD-DOD		COD	COD-DD	DOD	COD-DOD
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4.3 Price of the cards

- Allowance is made for 10% wastage. The unit price of the cards is \$2. per thousand.

- No. of cards used.	1,760,000	6,050,000	8,591,000	9,680,000
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4.3 Price of the cards

No. of cards x \$2. per thousand	3,520	12,100	17,182	19,360
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4.4 Tabulation and sorting

4.4 <u>Tabulation and sorting</u>	14,000	14,000	14,000	14,000
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4.5 Overhead costs

- The overhead costs are estimated at 100% of the salaries paid: they cover salary administration costs, office costs and the cost of supervision.

4.5 Overhead costs

100% of salaries	10,080	34,650	51,140	55,440
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4.6 Publications (4 per year)

- No. of pages per publication	800	1,200	2,250	2,400
- No. of pages per year	3,200	4,800	9,000	9,600

4.6 Publications (4 per year)

Price of publications:				
No. of pages x \$3.75 =	12,000	18,000	33,750	36,000

- The cost of \$3.75 for a page of publication was suggested by the U.S. Delegation. If the publications were prepared in Europe the cost could obviously be reduced by more than 50%.

4.7 ICAO Supervision and Administration

Salaries		25,000	25,000	25,000	25,000
Overhead at 20%		5,000	5,000	5,000	5,000
Space (500 sq. feet at \$5.00)		2,500	2,500	2,500	2,500

TOTAL cost to ICAO		<u>82,180</u>	<u>145,900</u>	<u>199,712</u>	<u>212,740</u>
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REPRODUCTION OF DOCUMENTS

ATTACHMENT 3 (Cont'd.)

C O S T IN U.S. DOLLARS

	COD	COD-DD	DOD	COD-DOD
<u>TOTAL COST OF ORIGIN & DESTINATION STATISTICS</u>				
<u>- AIRPORT SYSTEM -</u>				
- Total cost to airlines	69,910	137,132	517,854	540,466
- Total cost to airports	19,508	44,870	48,230	54,952
- Total cost to national administrations	15,976	15,976	15,976	15,976
- Total cost to ICAO	82,180	145,900	199,712	212,740
<u>GRAND TOTAL:</u>	187,574	343,878	781,772	824,134
- Cost per Traffic Form:				
$\frac{\text{Total cost}}{1,100,000} =$	0.17	0.31	0.71	0.75
- Cost per Passenger:				
$\frac{\text{Total cost}}{26,500,000} =$	0.009	0.013	0.030	0.031

ATTACHMENT 3 (Cont'd.)

Note: The theoretical costs above do not necessarily correspond to real expenditure, particularly with regard to the airlines. According to the method adopted by the airlines to fill in the traffic form, a reduction may have to be made in the section relating to "Costs to the airlines".

The method currently used at the French and German airports, for instance, would in the extreme case permit the costs to the airlines to be considered as zero if that method were extended to the whole of the world.

OAD PANEL,
FINAL REPORT
APPENDIX 8
27/2/65

APPENDIX A

Assumptions made by the Working Group on Costs
 in comparing the French Airport System with
 the United States Centralized System

<u>Description</u>	<u>United States Centralized System</u>	<u>French Airport System</u>
<u>TRAFFIC BASIS</u>	See page 2 of Report	See page 2 of Report
<u>I - COSTS TO AIRLINES</u>		
Number of airlines	165	n.a.
Sampling Basis	Microfilming 1 coupon out of ten (10% sample)	Full count (100% sample)
Microfilm	Reels of 4 950 photomicrographs costing U.S. \$4.90 each for U.S. and Canadian airlines. Others, add 25% for duty and tax. Reels can be cut.	n.a.
Depreciation of microfilm machines	U.S. \$100 p.a. for U.S. and Canadian airlines. Others, U.S. \$125. (Cost: U.S. \$950 plus 25% for duty or tax where applicable)	n.a.
Productivity and salary rates	Selection and microfilming, ranging between 190 and 200 coupons per hour, average 190. Direct salary rates between U.S. \$9.30 and \$2.40 per hour, but assumed to average at \$1.00 per hour plus 100% for overhead and 5% added to cover the cost of sorting out domestic coupons.	Productivity rates stated in para. 1.1 of Appendix 3. Times for completing basic traffic form varying between 1'40" for COD to 14'50" for COD-DCD. Salaries at \$1.00 per hour, plus 100% for overhead.
Maintenance of microfilm machines	1%	n.a.
Postage to governments	\$500.	n.a.
Overhead	100% of salaries	100% of salaries
<u>II - COSTS TO AIRPORTS</u>		
Number of airports	n.a.	400
Cost of printing traffic form	n.a.	\$2.50 per 1 000
Productivity: Checking Forms by 10% sampling	n.a.	Times varying from 2'30" per form to 8' depending on scope
Checking for correct completion of forms and coding	n.a.	Times varying from 10" per form for COD system to 35" per form for COD-DCD and COD-DGD systems
Direct salary rate	n.a.	\$1.00 per hour
Overhead	n.a.	100% of direct salaries
Mailing	n.a.	400 airports x 24 consignments = 9 600 x 12¢ = \$1,152.00
<u>III - COSTS TO GOVERNMENTS</u>		
Number of States (1961)	53	83
Productivity: Checking on filing requirements	1 hour per month per airline	1 hour per month per airport
On the spot check of ticket selection	2 days per airline per year	n.a.
Direct Salaries	\$1.35 per hour	\$1.00 per hour
Overhead	100% of direct salaries	100% of direct salaries
Transmittal to ICAO	\$2,000.00	83 States x 12 consignments = 996 x \$6.00 = \$5,976.

ATTACHMENT 4 (Cont'd.)

<u>IV - COSTS TO ICAO</u> <u>(Including Contract Work)</u>		
<u>Productivity:</u> Analysis	55 to 65 coupons per hour	n.a.
Preparation (Key punch and verify)	20 to 24 holes per card 770 000 to 880 000 cards 10 000 holes per hour	15 holes per card 1 606 000 to 3 430 000 cards 10 000 holes hour
Checking and correcting cards	110% of punching time	110% of punching time
Tabulation and sorting	n.a.	In most complex cases, 9 million annual cards sorted in 6 columns requiring 2 000 hours
<u>Direct salaries</u> Analysis	\$2.00 per hour	n.a.
Preparation (Key punch & verify)	\$2.00 per hour	\$2.00 per hour
Checking & correcting cards	\$2.00 per hour	\$2.00 per hour
<u>Overhead</u>	100% of direct salaries	100% of direct salaries
<u>Contract rates</u>		
Electronic machine processing	\$16,000. to \$115,500.	n.a.
Tabulation & sorting	n.a.	\$14,000.
<u>Publication</u>	From \$3.75 to \$4.00 per page From 350 to 3 500 pages in each quarterly tabulation	\$3.75 per page From 3 200 to 9 600 pages per quarterly publication
<u>ICAO Management and Planning</u>		
Salaries	\$25,000.	\$25,000.
Overhead	3,000.	3,000.
Space	2,500.	2,500.

Note: n.a. : Not applicable.

ATTACHMENT 5

In the course of its work, the Working Group on Costs made a number of amendments to the cost estimates originally presented, and appended the revised cost estimates to its report considering it undesirable to attach the full text of the papers containing the original estimates, as the two sets of figures might tend to create confusion. At the request of the Working Group, the Secretariat has collated in this attachment those parts of the original Working Papers considered by the Working Group, that are important to an understanding of its report, and that have not been superseded by subsequent work.

SUMMARY OF OD 4-WP/5
Statistical and other bases for estimates of costs
to ICAO under U.S. Centralized System

This paper, presented by Mr. W. Hord, appended a table showing the information now appearing as revised, in Attachment 2 to this Report, Section III, excluding the cost of space and overhead.

In discussing the traffic basis now shown on pages 218 and 219 of this Report, the paper pointed out that the number of passengers carried as reported to ICAO includes duplication, since some passengers are included by two or more airlines, and in some cases, perhaps more than once by the same airline. It emphasized also that no ICAO O & D program would be likely to start with 100% coverage of the traffic, and to the extent of this gap, the 10% sample would fall short of the complete sample count. Working in the other direction, however, would be future increases in international passenger traffic volume.

The paper reiterated that copies of all international flight coupons of each ticket in the sample would be submitted to ICAO, so that it would receive more coupons than the number from which data would be extracted. The rate of production calculated in para. 1 of Section III, (Analysis) recognized that all coupons received would have to be examined, but no data would be extracted from the duplicates.

EXTRACT FROM OD 4-WP/7
Report of Working Group on Cost Estimates
of French Airport System

This paper, presented by Mr. P. Rivoal, appended several tables of cost estimates now shown, as revised, in Attachment 3 to this Report (pages 225-231). The introductory material, which described in detail the methods followed by the Airport Plan Working Group, is reproduced in full in the following paragraphs:

1. "The Working Group set up by the Panel on Origin and Destination Statistics at its Third Meeting was convened in September and December 1961. Preliminary conversations were held in Paris on 21 September and a general meeting of the Group was held in Geneva on 7 and 8 December. The Group consisted of Mr. Rivoal (Rapporteur), Mr. Binet and Mr. Darras (France), Mr. Moeller (Germany), Mr. Steck (Switzerland), and Mr. Stonkmann (Representative of IATA). At the Geneva Meeting the Group was assisted by Mr. Wullschmigel (Switzerland).

2. At the First Meeting the members of the Group decided on the method to be used in order to find the cost of world-wide statistics based on an airport document.

3. On the basis of the principles and procedures agreed upon at the Meeting, the study was conducted in the following manner:

- 1) investigation of one or more airports in Germany, France and Switzerland, with a view to determining the cost of the work performed there to compile OD statistics in the form in which they are at present collected in those countries;
- 2) on the basis of this investigation, calculation of the costs that would be incurred for the compilation of OD statistics on a world-wide basis (Member States of ICAO): the cost of COD statistics and TOD statistics, or statistics combining the two systems (COD + TOD) or part thereof only (CD, TD).
- 3) the investigation covered the following points in each country:

a) Systems studied

- in Germany	CD and TD
- in Switzerland	TOD
- in France	COD

b) Airports and airlines included in the study

	<u>Airports</u>	<u>Airlines</u>
Germany	FRANKFURT DUSSELDORF STUTTGART	DLH, AF, BEA, SWR, TWA DLH, AF, PAA, BEA, KLM, SWR DLH, PAA, KLM, SWR
Switzerland	GENEVA ZURICH	20 scheduled airlines
France	ORLY LE BOURGET	All the scheduled and non-scheduled airlines.

4. The airport agents of each airline have measured the time required to fill in, on departure, the form relating to each flight according to the procedure followed at the airport in question.

In calculating the times, the time required for filling in data indispensable for ICAO OD statistics was measured separately, since the forms in use in the countries concerned provide for data corresponding to the particular needs of each country such as indications of freight traffic, mail, and items of a general or technical nature (type of flight, type of aircraft, registration, etc.)

The investigations covered the following periods:

- In the case of Germany, from 1 to 15 October
- In the case of Switzerland, from 11 to 30 October
- In the case of France, from 1 to 21 October

5. At the December meeting, the Members of the Group submitted the results they had obtained and specified the actual conditions in which the investigations were performed. Then, they agreed on the form of presentation of the results to the Working Group. They considered that it might be interesting, in order to gain an idea of the total cost, to attempt to calculate the expenses to be borne by ICAO, although this figure would be of value only as an indication.

The final presentation comprises four parts:

- (1) cost to the airlines;
- (2) costs to the airports;
- (3) costs to the national administrations, and
- (4) costs to ICAO.

Under each of these headings appear the different elements which the Group decided to take into account for calculation of the expenditure:

- personnel;
- equipment;
- overhead costs.

6. The following elements have been selected to permit extrapolation, to cover all the ICAO Member States, of the observations made at the German, French and Swiss airports on the cost of four types of OD statistics:

- for the general data (number of take-offs, passengers ...): the statistics published by ICAO;
- expenditure for personnel has been calculated from the information supplied by a certain number of European airlines, on the basis of costs incurred in 1961 at their main stops in various parts of the world. The average rate of pay selected is appreciably lower than the level of salaries paid in the United States, but higher than in Europe and considerably higher than in most countries on other continents.
- with regard to overhead costs it was agreed at the request of the IATA Observer that they represented 100% of the salaries, although this figure was considered to be a very liberal estimate by all the members of the group in view of the information received on the subject:

- it was moreover considered that the forms would be filled in at not more than 400 international airports. Enumeration of all the airports in the ICAO Member States at which the traffic has actually been recorded gave a total of 300. To take into account possible gaps it was thought wise to increase the number to 400.

7. To obtain a better appreciation of the figures selected by the group, it must be emphasized that the theoretical cost does not necessarily correspond to the actual expenditure, particularly with regard to the airlines.

It has indeed been noted that at most airports in the world, the work of the airlines' agents shows great variation in volume during the course of the day. Aircraft departures for a given airline, or for all the airlines, do not generally occur at regular intervals and the work to which these departures give rise is therefore not continuous in character.

At the same time, among these tasks, those concerned with the completion of statistical forms may vary in nature according to the organizational methods adopted by the airlines.

The work may, in the first place, be performed by the agents who are responsible for the preparation of all documents for a given flight. In that case, the work is done in the slack time which often occurs between flights or successive groups of flights. The introduction of a statistical system based on airport documents would then simply have the effect of providing more work for the agents during these slack periods and would not generally entail any need to hire extra personnel and thus involve further expenditure.

The statistical work may alternatively be entrusted to experts assigned exclusively to that work. This is, however, possible for a given airline or a group of airlines only in cases where the number of flights per day is sufficient to provide full time work for at least one agent. In all cases where the work is organized in this way, the introduction of a world-wide statistical system would oblige an airline or a group of airlines to hire additional personnel.

In order to obtain a more accurate idea of the actual expenditure involved by the introduction of one or other of the systems based on airport documents, it would be necessary to apply an overall reduction to the figures indicated for the theoretical cost.

The amount of the reduction would obviously vary according to which of the two possible types of organization predominated.*

SUMMARY OF OD 4-WP/9

Cost of Space and Overhead to ICAO under U.S. Centralized System

This paper, presented by the Secretariat, complemented OD 4-WP/5 with estimates of costs to ICAO for space, office equipment and overhead. As a result of the

deliberations of the Working Group on Costs, particularly the action reported in paragraphs 22 and 24 of its Report, the data calculated in OD 4-WP/9 have been completely superseded by the figures shown in Attachment 2, page 224, Section III.

OD 4-WP/11
Estimated Annual Costs to Governments under
U.S. Centralized System

This paper, presented by Mr. W. Hord explained the basis for calculating the costs to governments shown in Attachment 2 to this Report, page 224, Section II. The full text of this paper is considered relevant and is reproduced below. Some members of the Panel expressed surprise at the procedure providing for direct transmittal of microfilms to ICAO, when the normal channel would be through member Governments. The United States Representative explained that this procedure had been proposed merely as an illustration of those that might be adopted, and was not a compelling feature of the U.S. Centralized System.

"Because of the relatively small cost that the U.S. plan would entail for any of the governments it has not been considered either necessary or worthwhile to go to the very substantial work of developing cost estimates on a State-by-State basis with detailed consideration of the differing cost levels and other circumstances among the individual States. Instead an estimate has been made of the staff time required on the part of U.S. government, as set forth below, and this has been used as a basis for approximating the total costs to all ICAO Member State governments.

The procedures to be carried out by the United States government would be:

- A. Each participating airline would forward its microfilmed flight coupons directly to ICAO immediately after the end of the month with a transmittal letter specifying the month covered and the number of rolls and number of frames of microfilm. The airline would send a copy of the transmittal letter to the Civil Aeronautics Board.
- B. Through the transmittal letter the CAB would know that each participating airline had submitted the required microfilms to ICAO. The CAB would also keep a running record month by month for each airline of the number of microfilm frames transmitted to ICAO along with the numbers of passengers enplaned and originated as shown by the airline's traffic report (in CAB Form 41). This record would be used to check for any significant unexplained (1) variations in the number of frames from month to month or (2) differences between the number of frames and the passenger count data.
- C. CAB staff would make periodic reviews in carriers' offices of the ticket selection and microfilming operation for conformance with ICAO instructions.

The procedures in B above (including any necessary communication with the airlines) would require, it is estimated, not more than one hour per month for each

of 20 airlines, or approximately 240 man-hours annually. The periodic reviews described in C could be done in an average of no more than two days per carrier per year, or around 320 man-hours annually. The total man-hours per year, then, would be 560 for the U.S. operation.

Assuming that the total staff time required for all Member State governments will be determined primarily by the number of airlines, expansion of the foregoing man-hours based on 20 airlines to cover 165 international airlines of all Member States indicates an annual requirement of 4,620 man-hours.

Salary rates vary widely throughout the world, of course. In its estimates of cost to its member airlines under the U.S. plan, IATA used rates for direct and indirect salary expense varying between U.S. \$0.30 and U.S. \$2.40 per hour. The salary rates for the governmental operations under the U.S. plan would differ somewhat from those used in the IATA estimates, but at the maximum rate used by IATA of U.S. \$2.40 per hour, the direct and indirect salary cost to all Member State governments would be \$11,000. This would be the total without allowance for any nonparticipation. In addition, there might be some miscellaneous nonsalary expenses. However, cost to governments under the U.S. plan is clearly minor and in total for all Member States combined would probably fall within the range of \$10,000 to \$15,000 annually."

SUMMARY OF CD 4-WP/12
Estimated Annual Costs to Airlines under
U.S. Centralized System

This paper, presented by Mr. W. Hord, contained estimates of costs to airlines prepared by IATA in respect of its membership and projected to cover all international airlines of ICAO Member States. The Working Group on Costs revised these figures as reported in paragraphs 8, 11, 12 and 13 of its Report, the revised figures appearing in Attachment II, page 224, Section I. Details on the assumptions made in calculating these costs appear in Attachment 4, Section I, page 232 of this Report, in the "U.S. Centralized System" column. The following extracts from CD 4-WP/12 are relevant:

"Depreciation of microfilm machines. Based on the number of airlines and the same annual rates of depreciation used in the IATA estimates. All of the Member State international airlines have been included for purpose of this cost item even though it is not assumed that all of them would participate initially or in the early stages of an ICAO O & D program. In addition, no allowance has been made for the following possibilities: (1) airlines with a relatively small number of flight coupons to copy might find some other method more economical than the microfilm camera assumed in these cost estimates, (2) some airlines may already have microfilm cameras that could be used to copy the flight coupons, and (3) some airlines might prefer to rent rather than purchase the microfilm camera. It is also worth pointing out that copying the flight coupons would not require full-time use of the cameras by most airlines and they would undoubtedly find them useful for other purposes."

"It is realized that somewhat different results would be obtained if allowances

were made for individual non-IATA airlines as was done for IATA Members in the IATA estimates. However, this refinement hardly seemed worthwhile since the IATA estimates provide a cost basis covering about half of the international airlines and something like three-quarters of the passenger traffic involved."

NOTE ON OD 5-WP/11
Experience with EDP in the production and use of O & D Statistics
in the United States

Although reference to this paper was made in the course of deliberations of the Working Group on Costs, it was not examined in detail by the Group. The full text of this paper appears at Appendix 4 page 117.

SUMMARY OF OD 5-WP/18
Amendment to Estimated Annual Costs of
the French Airport System

This paper, presented by Mr. Rivcal, amended the estimates of cost originally prepared for the French Airport plan by deducting therefrom the cost of coding airports of origin and destination, since the basic work is already done in terms of the IATA code, and adding an item of expenditure to provide for checking of traffic forms at airports. These amendments have been fully incorporated into Attachment 3.

APPENDIX 9

SUGGESTED QUESTIONNAIRE (PART I)

1. Are at present Origin and Destination statistics for international air travel collected in your country? Are similar statistics for surface travel collected?
2. If O&D statistics for air transport are being collected, please indicate their nature, scope, time for collecting, etc. (to illustrate the answer to this question, please furnish also sample copies of the reporting forms or questionnaires used, copies of tables or publications made and similar relevant material).
3. Please report the potential uses and needs for O&D statistics in your country on the attached questionnaire. (Governments may wish to send the form to all potential users such as airlines, aircraft manufacturers, research institutions, universities, transport organizations, etc. It is important that ICAO receive the government's own opinion on the questions raised in the form. If a government desires, it could also send to ICAO a summarized report of the result of its investigation.)
4. If ICAO were to collect O&D statistics, would you then be willing to discontinue or modify present practices of collecting O&D information in your country (whether collected from airlines, airports or by some other means) if those practices were based on a different method but similar information were made available by means of a system adopted by ICAO?
5. If an ICAO collection of O&D statistics were adopted, which would in your opinion be the requirements with regard to such standards as quality, timeliness, completeness? (reference should be made to PART V of the Panel's Report).
6. If an ICAO collection of O&D statistics were introduced, would you prefer:
 - a) monthly, quarterly or yearly publication?
 - b) this ICAO publication to contain the maximum scope of information commensurate with practicability to publish (would you then wish that additional information should be made available to you for your own needs at cost?)
 - c) no ICAO publication at all, but material be made available to you according to your specifications at cost?
7. Do you have any observations (e.g., dealing with technical, administrative, legal or other aspects prevailing in your country and having a bearing on your participation in any system of ICAO collecting O&D statistics), suggestions or ideas which you think could be of assistance to the Air Transport Committee and Council to reach conclusions on this matter?

To be used by governments 1) when seeking the needs among potential users in their country such as airports, airlines, aircraft manufacturers, research institutions, tourist agencies etc.
2) when reporting the government's position to ICAO after completed internal investigation (See PAK 1, question 3)

COO Common Origin and Destination
The point of embarkation and the point of disembarkation covered by one flight coupon.

SOD On States Origin and Destination
The points at which a passenger enters and leaves the system of an airline on a one-way trip or on each of the two directional parts of a "round-trip", "circle-trip", "open-jaw trip" or "round the world trip" ticket.

DOD Directional Origin and Destination
The first and last points on a one-way ticket and the first and last points on each of the two directional parts of a "round-trip", "circle-trip", "open-jaw trip" or "round the world trip" ticket.

Routing
A listing in sequence of cities of two or more COOs appearing in a single ticket.

Possible needs served	Do you need passenger O/D statistics for purpose stated in Column (a)? If YES, put 3, 2 or 1 below according to degree of need 3 = extremely useful 2 = useful 1 = little use If NO, put 0	If '3', '2' or '1' to Column (b) indicate with 'x'												Indicate in this Column in relation to each purpose mentioned whether you would require any other detail or if you would prefer another basis than Column (c) - (g)		
		Scope of information required for each individual need marked in column (b)					Do you need statistics dealing with:			Would you use O/D statistics					Would you also require O/D statistics relating to non-scheduled operations?	
		COO alone	DOD alone	DOD and component SOD's in succession	DOD with routing	Airline names	All airlines; all routes	All airlines serving your country	Other group of airlines (describe)	On a continuous basis			On an occasional basis			
										Monthly	Quarterly	Annually				
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	
1. Route planning and development																
2. Planning air services																
3. Developing and administering sales program, including travel promotion																
4. Developing new aircraft or aircraft engine designs																
5. Airport planning																
6. Airways planning																
7. Investment analysis																
8. General economic analysis in air transportation, including forecasting																
9. Data for studies of tourism, travel and migration																
10. Data for statistical studies of general economic activity																
11. Other needs																
12. Data for use in bilateral negotiations																
13. Information relating to the implementation of the terms of bilateral agreements																
14. Data for studies of various forms of multilateralism in the exchange of commercial rights																

SUGGESTED QUESTIONNAIRE (PART II)

APPENDIX 10

REPORT ON SAMPLING

(Presented by Mr. Hord and Dr. Kuiler)

The motivating purpose of statistical sampling is to gain maximum knowledge at minimum cost. This is true whether the application involves such broad economic factors as gross world or national product, the rate of consumer spending or more specific uses such as quality control in manufacturing processes or the settlement of interline balances as is done by some members of both IATA and ATA in the United States on a voluntary basis. Another good example of successful sampling is the use of a continuous sample in the measurement of the volume of goods transported by road in European countries. The greater the diversity of knowledge sought and the larger the populations to be examined the greater is the economy of a sample over a full census count, depending on the accuracy desired.

Many different types of samples may be selected as determined in part by elements of convenience and cost and in part by technical elements effecting accuracy and representativeness in relation to the particular purpose for which used. The cross section or bunch sample involves a 100% count for a given time period or at recurrent intervals such as a day, week, or month. Conversely the continuous sample involves counting a certain percent of the subject population on either a random basis or defined systematic basis such as specified serial numbers in multiples of 5, 10, 20, etc., which give a known frequency or recurrence. Continuous samples are usually more representative and less subject to sampling bias than bunch samples. The high reliability of the continuous sample has been mathematically proven in the case of the road transport of goods in Europe cited above. Where different degrees of accuracy are required for different elements or characteristics of the population being sampled, adaptations can usually be made in the sample through various types of stratification which greatly improve the quality of the sample for any given purpose. Stratification may also be desirable if for all different elements the same accuracy is required and the population of these different elements vary widely in magnitude. Such adaptation will, of course, add to the complexity of the sample.

The accuracy of any sample will tend to vary with the size of the sample and of the population to which applied. In situations where the population varies with time, as would be true in the case of air traffic, the accuracy of a sample of any given percentage would vary directly in relation to the period of time covered. Thus, a sample taken for a single day could not be relied upon except for those very high density markets which would have a large daily population. The accuracy of the sample in relation to the low density markets, however, would increase directly by extension of the time period from a day to a week, to a month, to a quarter, or to a year by reason of the expanding populations to which the sample would be applied. Stated another way, a sample of a given percentage when applied to varying rates of output per unit of time becomes reliable in

a shorter period of time for a large rate of output than for a small rate of output.

Accordingly, the relative accuracy for a given statistical sample as between a large and small market may be significantly improved by a process which, for want of a better name, is described as time stratification. This simply means that the sample would be collected for a sufficiently long period to give acceptable accuracy before the statistics would be used in relation to a given market. For example, if the volume of traffic between A and B were twelve times as great as the volume of traffic between X and Y, it would follow that a fixed percentage sample would give the same accuracy for the A-B market for a period of one month as would be attained for the X-Y market for a period of a year. Since the economic impact which could be produced by the large market in one month is approximately equal to that which could be produced by the small market in 12 months, it follows that there is more urgent need for reliable current information on the large than on the small market. Hence, user needs may be as well served by annual statistics, in the case of the small market, as by monthly statistics in the case of the large market. Time stratification may, therefore, be readily applied in improving the accuracy of statistics as between small and large markets under a fixed percentage sample, whereas an actual stratification of the sample to provide similar accuracy for the same period of time might be wholly impracticable.

The impact of the size of the sample and of time period stratification on the accuracy of statistics is illustrated in the attached table. This table reflects the actual computed maximum probable error for the United States Domestic Origin and Destination Survey for the third quarter and full calendar year of 1961. Reference to this table will show that the accuracy of the ten percent sample depends entirely upon the size of the population sampled. The population varies with the size of the market and length of time period. It will be noted from columns (3) and (6) that the probable maximum error in the quarterly sample based on a market of 100 population is 59.0%, whereas for a market of 50,000 population, the error declines to 2.6%. However, if these same markets are sampled on an annual basis (columns (4) and (7) in table), the 100 passenger market becomes 400, and the probable error declines from 59.0% to 29.5%, whereas the 50,000 passenger market becomes 200,000 and the probable error declines from 2.6% to 1.3%. This range of accuracy would be greatly increased if monthly periods were compared with annual periods, or if quarterly periods were compared with periods of two or more years. Furthermore, it is evident from this table that any market with a sample frequency of 400 or more has a maximum probable error of less than 10%.

Another approach to overcoming the shortcomings of a small sample is through use of regional stratification. Under this approach a number of small markets in one region having a broad community of interests may be grouped together and paired with a large market to form a high density traffic movement which would be accurately measured by the sample. Since many small markets are served in regional clusters which are paired with large markets, this procedure is adapted to rather frequent application. Moreover, where the small markets in the region are of such homogenous nature as to provide a common basis for generating traffic with the large market, the breakdown of the traffic by individual markets, even though accurate, would add little value to the statistics. Regional stratification, like time stratification, is a technique in the use of statistics and does not in any way impose a burden on their collection.

In preparing for the institution of any sample procedure, full review of similar sampling experience by others in the same or similar fields or for similar use applications would be desirable. In the case of ICAO, for example, many of the experiences of the United Nations or of Member States and both public and private research organizations might be of great value in helping to design the best initial sampling procedure.

Every new sampling procedure and every new application of old procedures is essentially experimental and developmental in some degree. Hence provision should always be made for full re-evaluation and modification after a representative initial period of experience in both the collection and use of the statistics. In fact the science of sampling as well as the techniques of application for particular purposes and in special circumstances are still highly dynamic. Moreover, any population so diverse and widespread as international air transportation will itself be in process of constant and often rapid change of such nature and magnitude as to require frequent review and reevaluation of any sampling procedure used in this field.

For the sampling of passenger flows in civil air transportation a one or two stage sample could be chosen. In the first case the coupon is the object to be sampled. In the second case the flights might be sampled in the first stage and the coupons in the second one. Carrier sampling which is for example used in some cases for surface transport has proven not to be suitable for the sampling of the passenger flows in air transportation. The same is true for what can be called "plane sampling". The U.S. proposal for a centralized system is based on "coupon sampling". A proposal for "flight sampling" has been discussed but has not been developed to the stage of a satisfactory procedure by the Panel.

RELATIVE ACCURACY OF 10-PERCENT SAMPLE FOR VARYING
 POPULATION SIZES AND QUARTERLY AND ANNUAL TIME PERIODS

<u>Number of passengers in the sample for a given traffic movement</u>		<u>Estimated total number of passengers in the traffic movement sampled (sample X 10)</u>		<u>Probable maximum (plus or minus) sampling error as a percentage of the estimated total number of passengers</u>		
<u>Quarter</u> (1)	<u>Year</u> (2)	<u>Quarter</u> (3)	<u>Year</u> (4)	<u>Average per day</u> (5)	<u>Quarter</u> (6)	<u>Year</u> (7)
100,000	400,000	1,000,000	4,000,000	10,958.8	0.6	0.3
50,000	200,000	500,000	2,000,000	5,479.4	0.8	0.4
10,000	40,000	100,000	400,000	1,095.9	1.9	0.9
5,000	20,000	50,000	200,000	547.9	2.6	1.3
1,000	4,000	10,000	40,000	109.6	5.9	2.9
500	2,000	5,000	20,000	54.8	8.3	4.2
100	400	1,000	4,000	11.0	18.6	9.3
50	200	500	2,000	5.5	26.4	13.2
10	40	100	400	1.1	59.0	29.5

Formula used to compute sampling error:

$$1.96 \sqrt{\frac{1-f}{f^2} \left[\sum_{i=1}^n x_i^2 - \frac{1}{n} \left(\sum_{i=1}^n x_i \right)^2 \right]}$$

Where n = total number of tickets in the sample

f = sampling rate

x_i = number of passengers represented by the i^{th} ticket in the sample.

Basis of computations

The computations in this table are based upon the practices in the U.S. domestic survey and relate to the data for the third quarter and the full calendar year of 1961. Based on these computations, the mathematical probabilities are that 95 times out of 100 the actual percentage of error will be less than the percentage shown in the table.

APPENDIX 11

Description
of air passenger statistics in the Federal Republic of Germany
and Examination
of the usability of this method for international
Origin and Destination Statistics of ICAO

Presented by P. Schmidt

1. Introduction
2. Civil Aviation traffic statistics in the Federal Republic of Germany
 - 2.1 The territorial concept in civil aviation traffic statistics
 - 2.2 The technique of collecting statistics
 - 2.2.1 Contents of flight reports
 - 2.2.1.1 Information on aircraft
 - 2.2.1.2 Information on the date and nature of the flight
 - 2.2.1.3 Information on passengers and load
 - 2.2.1.4 Information on the destination of embarking passengers
 - 2.2.2 Sources of the information in the flight reports
 - 2.2.2.1 Aircraft, flight, number of passengers and weight of freight
 - 2.2.2.2 Destination of passengers
 - 2.3 Processing of statistics; overall processing
 - 2.3.1 Mechanical processing
 - 2.3.2 Overall processing
 - 2.4 Presentation of the returns
 - 2.4.1 General observations on the presentation of the returns of civil aviation traffic statistics
 - 2.4.2 Presentation of passenger traffic according to destination
 - 2.5 Timing of civil aviation traffic statistics
 - 2.6 Confidential character of certain results of civil aviation traffic statistics
 - 2.7 Civil aviation traffic statistics as part of the system of German traffic statistics
3. Usability of the method of German civil aviation traffic statistics for the establishment of international Origin and Destination statistics
 - 3.1 National and territorial concept
 - 3.1.1 Different ways of collecting data
 - 3.1.2 Usability of incomplete returns
 - 3.2 Collection of data for international Origin and Destination Statistics on a territorial basis

- 3.2.1 Scope of data in the case of all countries participating
 - 3.2.1.1 Report by the airport of the first take-off
 - 3.2.1.2 Report by the airport of the last landing
 - 3.2.2 Scope of data in the case of only part of the countries participating
4. Advantages and disadvantages of the system developed in European countries for international Origin and Destination statistics on the basis of the territorial concept
- 4.1 Coordination of the collection of statistical data
 - 4.2 Coordination of the reporting to ICAO
 - 4.3 Prospects of completeness for the presentation of the international passenger flows
 - 4.4 Combination with Origin and Destination statistics of passengers in inland air transport
 - 4.5 Combination of Origin and Destination statistics on a territorial concept with other civil aviation traffic statistics and with other traffic statistics
 - 4.5.1 Combination with other civil aviation traffic statistics
 - 4.5.2 Combination with other general transport statistics
 - 4.6 Limited use of data from flight tickets for international Origin and Destination statistics; additional information
 - 4.7 Application of sample methods
 - 4.8 Timing of the presentation of the results of the international Origin and Destination statistics
 - 4.9 Costs of production of world-wide Origin and Destination statistics on a territorial basis
5. Summary

1. Introduction

As a basis for further consideration by the ICAO Panel on Origin and Destination Statistics, a report is submitted in the following on the method, on which civil aviation traffic statistics carried out in the Federal Republic of Germany are presently based.(1)

The presentation of the method developed in the Federal Republic of Germany - with due regard to the tasks of the Panel on Origin and Destination Statistics - deals, above all, with statistics on passenger traffic. However, it appears to be necessary and appropriate to give also a brief illustration of how within the framework of German statistics the listing and presentation of aircraft movements as well as the transportation of freight and mail are dealt with, as in the eyes of German statisticians the decisive advantage of their method lies in the simultaneous and joint listing in one statistical system of all important occurrences in air traffic and air transportation. It will be seen also that some disadvantage will have to be taken into the bargain.

Since German civil aviation traffic statistics are based on experience made in the course of several decades with the production of other transport statistics, an occasional reference to these statistics may be permitted.

The ideas developed at the end of this paper on the application of the territorial concept for the production of world-wide Origin and Destination Statistics are based on the experience gained by the international governmental organizations with the statistical exploitation of other facts. Special reference is made to the methods applied by the Statistical Office of the United Nations - based on the statistical work of the League of Nations - in compiling the statistics on world trade.

The second part of this paper will try to establish, whether - possibly after certain amendments - the method developed in the Federal Republic of Germany and similarly also in some other European countries could serve as a starting-point for world-wide ICAO Origin and Destination Statistics. In these considerations reference is often made to the method presented in a paper of the U.S. Panel Member for the production of world-wide Origin and Destination Statistics.(2)

2. Statistics in the Federal Republic of Germany

2.1 The territorial concept in civil aviation traffic statistics

The Federal Office of Statistics, the central office for statistics of the Federal Republic of Germany, by virtue of a decree enacted by the legislative bodies, compiles statistics in cooperation with the administrations of aerodromes and other civil aircraft landing grounds and in cooperation with the local offices of the airlines and with other companies and persons engaged in air transport

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- (1) An oral presentation was given by the German expert already during the Panel meeting from May 24 to June 1, 1960.
 - (2) Appendix 1 "Plan for centralized production of world-wide passenger ticket air travel statistics" presented by United States Member to the Panel on Origin and Destination Statistics ICAO.

These statistics list all movements of civil aircraft on German aerodromes and landing grounds, with the exception of glider movements, whether national or international. The obligation to supply information for these statistics applies equally to all German and foreign aircraft taking off or landing on the territory of the Federal Republic of Germany, inclusive of intermediate landings.

2.2 The technique of collecting statistics

The data for the civil aviation traffic statistics are furnished by the permanent agents of the airline stationed at the airport, who must complete a flight report for each flight (see attachment 1).(3).The flight reports are collected by the airport administrations, who are obliged to see to it that for each take-off, landing and intermediate landing a fully completed flight report is filed, containing all the information required (control of completeness).

The airport administrations send these flight reports to the Federal Office of Statistics for statistical processing. The airport administrations are under legal obligation to treat the contents of the flight reports confidentially. The legislation contains penal provisions for cases where the reports of an agent are incomplete or inaccurate or where an airport administration does not observe the security classification.(4)

2.2.1 Contents of flight reports

2.2.1.1 Data on the aircraft

In the flight report (see attachment) under items 2 and 4 to 6 information is requested on the operating company, the type of aircraft used and the capacity of the aircraft on that particular flight, i.e. on landing or on taking off from the reporting airport. In most cases the companies indicate the individual capacities for the routes in question. The three o.m. data constitute the basis for determining the degree of utilization of the air fleets operating over and into the territory of the Federal Republic of Germany and of the aircraft used by them. For this purpose the normal capacities of the various aircraft types employed on the individual routes are used.

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- (3) There are special provisions for business flights, charter flights, sightseeing flights and flights of minor economic importance. For such flights sometimes less information is required and collective reports for a whole month are accepted. This paper deals only with the technique of listing regular traffic, this alone being of interest to the Panel on Origin and Destination Statistics.
- (4) Regulations of this kind exist for all official statistics of the Federal Republic and as far as the keeping secret of the individual data is concerned, they also apply to the personnel employed in the statistics offices.

2.2.1.2 Information on the date and nature of the flight

The information under items 3, 7, and 8 of the flight report permits to classify the flight according to the date and to its economic character. The routing of the flight becomes visible in all its details. The kms, seat-kms and payload-kms offered can be calculated and assigned to the different routings wholly or in part. For the time being only the flights covered under 8 A 1 - and these only as far as they are international - are of interest to the Panel.

2.2.1.3 Information on the number of passengers and the weight of the load

Under item 9 of the flight report complete summary data on the utilization of the aircraft are entered. On Landing, the number of passengers as well as the weight of the freight and mail carried must be stated. On take-off, corresponding information is required on the embarking passengers and on freight and mail taken on board the aircraft. In the case of intermediary stops, passengers in transit as well as the volume of freight and mail in transit have to be reported. Passengers stopping over or transferring to another aircraft are, in this case, treated as embarking and disembarking. Information as to the seat categories used by passengers or excess luggage and the different categories of mail is not requested at present.(5)

2.2.1.4 Information on the destination of embarking passengers

Since the beginning of 1959 information on the destination of embarking passengers has been requested separately under item 10; this is of special interest with regard to the discussions of the ICAO Panel on Origin and Destination Statistics. Information must be supplied as to the airport of the next transfer and to the airport of final destination of the passenger. Summary information is accepted for passengers travelling along the same route. The Federal Government and other agencies in Germany using these statistics feel that for the moment this information on the destination of passengers is satisfactory. More complete information on the stages flown by the passengers could be contemplated, if necessary.

(5) Separate information for air transport statistics on the nature of goods shipped in international transport is taken from the manifests to be presented for customs-clearance. The information obtained permits to establish Origin and Destination Statistics for air freight traffic with foreign countries. This procedure is not dealt with here.

* Since 1962 additional information is collected on arriving passengers. For them the airport of embarkation in the arriving aircraft is reported (COD). This offers additional possibilities for international statistical purposes (see 2.2.2)

At present the following is ascertained: (6)

- a) for all passengers beginning their flight from a German airport:

C O D and D O D

COD and TOD are often identical.

- b) for all passengers interrupting their flight at a German airport or transferring at a German airport to another airline:

C O D and D O D, both as from the German airport of departure or transfer respectively.

- c) Moreover, the domestic German routes in all their stages are covered for all passengers, unless the passenger remains on board:

C O D and D O D within Germany. (7)

2.2.2 Sources of the information in the flight reports

2.2.2.1 Aircraft, flight, number of passengers and weight of freight

Each local agency of an airline is in possession of the information mentioned under 2.2.1. It accrues to them when clearing the aircraft for take-off, landing or intermediate stop. (8)

2.2.2.2 Destination of passengers

The information on the destination of passengers requested in the flight report is collected by the local offices of the airlines from the coupons accruing there.

It would not raise any difficulties to collect from the coupons for all passengers boarding the aircraft information for an expanded flight report on all flight stages and on the companies concerned, if the extra work to the offices would be warranted by stronger evidence of the statistics as a result.

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- (6) It will be shown later that, in general, only the data listed under a) are of interest to international statistics.
- (7) COD = Coupon Origin and Destination; DOD = Directional Origin and Destination, see OD 1-WP/10, 12/11/59, footnote on pages 2 and 3.
- (8) Their collection, if the head offices of the airlines were to report to ICAO, would presuppose corresponding reporting to these head offices by the local organizations in the same order.

On the other hand, coupons do not accrue with passenger arrivals. Therefore, a statistical coverage of the origin of incoming passengers is at present dispensed with in German air transport statistics. In the case of transferring passengers and of passengers continuing their flight after a stop-over, the origin could, it is true, be taken from the coupons. However, it does not seem to be worthwhile to obtain information on the destination of this smaller portion of passenger traffic.(9)

2.3 Processing of statistics; overall processing

2.3.1 Mechanical processing **

The official aviation statistics are processed mechanically by the Federal Office of Statistics. The data is transferred from the flight reports to the punch cards. Separate punch cards are produced for every flight as well as for every single passenger, or for every passenger group travelling on the same route respectively. The correlation between the punch card covering a flight and the punch card covering all passengers embarked is guaranteed. Summary cards are used for tabulation.

2.3.2 Overall Processing

The method used in collecting civil aviation traffic statistics is a total one; and the processing includes all flight reports. It has been examined whether the sampling method should be used either in the collecting or in the processing of the material. This examination has revealed that the necessarily extensive breakdown of the results, especially in the statistical presentation of passenger traffic according to the destination of passengers, renders it impossible to apply the sampling method to the civil aviation traffic statistics of the Federal Republic of Germany. It should be pointed out here that in December 1959 less than one thousand passengers have left from all German airports for 43 countries. With a sample evaluation the larger part of the results would be entirely inaccurate. With a breakdown by airports or - what could be more important for international negotiations - by airlines, the errors would become so substantial that hardly any figure would be useful.

(9) It would be possible, however, to examine, whether and in what way the statistics on the destination of passengers could be supplemented by statistics of their origin.

*** Since 1962 the statistics are made by electronic data processing.

2.4 Presentation of Returns

2.4.1 General observations on the presentation of returns of civil aviation traffic statistics

The information in the flight reports and the data transferred to the punch cards permit tabulations for every important period and in every important combination of all data collected. Indeed, it will be necessary from time to time to actually produce most of the tabulations that are technically possible, covering aircraft movements as well as the transportation of passengers, freight or mail. However, a relatively limited tabulation programme will suffice for a current information of the government, airlines, airports, trade, industry science and other interested agencies. This, in particular applies to the short-term monthly information. The scope of statistical information published monthly in the Federal Republic of Germany can be gathered from the booklet published by the Federal Office of Statistics and entitled: "Der Verkehr in der Bundesrepublik Deutschland, Reihe 2, Luftverkehr, Dezember 1959 W. Kohlhammer Verlag" (Traffic in the Federal Republic of Germany, series 2, civil aviation, December 1959). (10)

2.4.2 Presentation of passenger traffic by destination

The tables for the passenger traffic by directions on pages 22 to 31, especially page 23 and the following, will be of interest to the ICAO Panel on Origin and Destination Statistics. They illustrate how many passengers (with the exception of those remaining on board) have taken off from German aerodromes, airports and heliports for foreign parts and in what country the remotest airport reached by the passengers was located. The last German aerodrome from which the passenger left the Federal Republic of Germany for his trip abroad figures as aerodrome of departure. If the passenger started his flight already from another German airport (or heliport) this is also shown. Double counts are effectively avoided. A recording of the passenger traffic with the nearest airport of transfer (if a transfer is made) or of the country where the nearest airport is located is also possible, as well as an ascertainment of the airports of transfer, over which more remote destinations were reached. Moreover, already today flight reports and punch cards contain information on the airline which has carried out the flight to the first airport of transfer. Appropriate tabulations are possible and are made if required (see, however, chapter 2.6, confidential character).

If the statistics were to cover also the entire flight route of the passenger and of the airline participating, an amendment of the flight report would be required (see item 2.2.1.4)

(10) Only a limited number of copies of the booklet are available for distribution to Panel Members. A translation of the entire contents of the booklet did not seem to be essential. However, a translation of the "Introduction" (p. 4 and 5) and of the headings and footnotes on pages 22 and 23 is given in Attachment II (pages 271-274).

2.5 Timing of civil aviation traffic statistics

The flight reports are submitted daily by the airlines to the airport administrations who, after checking the completeness of data, immediately pass them on to the Federal Office of Statistics. This enables the Federal Office of Statistics to prepare the major part of the punch cards already during the reporting month. The reporting month and the month of the event coincide.

The main results are available to the Federal Office of Statistics and the Federal Ministry of Transport already four to eight weeks after the reporting month and the monthly publications are presently issued two to three months after the reporting month. These periods will be cut further.

2.6 Confidential character of certain results of civil aviation traffic statistics

For all official statistics collected in the Federal Republic of Germany the legal provision applies that no results may be published which reveal information on individuals or on individual companies. This provision entails that the Federal Office of Statistics must not publish or in any other way pass on to third parties any returns of aviation traffic statistics, which reveal data in respect of individual passengers or individual airlines.

An exception to this rule is envisaged by the legal provisions in that the Federal government is entitled to obtain these returns upon request. The Federal government will avail itself of this privilege if necessary. If so, however, it is bound - also by legal provision - to use such data for official purposes only and not to pass them on to individual airlines or air transport associations.

It is, of course, permitted to supply the reporting companies with their own data statistically processed. The companies can thus save work on statistics of their own. Even today the Federal Office of Statistics produces separate tabulations of the returns of numerous airlines to be delivered to them.

2.7 Civil aviation traffic statistics as part of the system of German traffic statistics

Similar to the aviation traffic statistics dealing with aircraft movements and the transportation of passengers, freight and mail also other statistics are collected in the Federal Republic of Germany for sea shipping, IWT, railways and road transport (except short-haul transport of goods). All these statistics are exclusively based on the territorial concept. In general, their collection is carried out in such a way that at the beginning and/or end of the trip or haulage or during the journey at border crossings a completed copy of the official reporting form is delivered by the transport officer to the reporting office (port etc.). Thus, comparable traffic statistics for the various modes of transport, especially in respect of goods transport, are arrived at in the Federal Republic of Germany. As to passenger traffic, statistics on the destination (as well as origin) of passengers have been developed also for maritime transport in addition to air transport.

3. Usability of the method of German civil aviation traffic statistics for the establishment of international Origin and Destination Statistics

3.1 National and territorial concept

3.1.1 Different ways of collecting data

The system for Origin and Destination Statistics of passengers in international transport (11) proposed by the US experts to the Panel on Origin and Destination Statistics during its meeting from May 24 to June 3, 1960, starts from a national concept: every government is to request its national airlines engaged in international air services, to supply ICAO with data on the transportation of passengers on those services. The basis for these statistics are the coupons of the international tickets to be taken from the booklets at the departure of passengers. These coupons will then be microfilmed at the head office of the airlines and sent to the Statistics Section of ICAO for the preparation of international Origin and Destination Statistics. A 10% sample is contemplated.

The aviation traffic statistics produced in a number of European countries either by their governments or by agencies on their behalf, are based on a territorial concept, since the coupons collected at the airports of a country or the data taken from them are not forwarded to the head offices of the airlines but to the governmental or other designated agencies of the country where the airport is located. These governmental or other agencies would be in a position to forward to ICAO either separate or compiled data from the coupons.

With the national concept, ICAO would obtain the statistical data arranged by airlines; with the territorial concept the data are arranged by areas.(12)

3.1.2 Usability of incomplete returns

With complete reporting the result would be homogeneous, regardless of whether they are based on the national or on the territorial concept. Complete reporting, however, cannot be anticipated for a long time.

(11) see footnote 2 on page 249.

(12) Since, according to the proposal of the US expert, the coupons are to be collected at the airports, his method virtually does not differ very much from the system applied by the Federal Republic and by other European countries in that both are airport statistics. Only the routing of the reports is different, i.e. via the head offices of the airlines or via the airport administrations and the national statistics offices.

The essential and basic difference between the two systems for ICAO's Origin and Destination Statistics would, however, become evident in case not all the parties engaged in international civil aviation would be reporting. It can be assumed with a sufficient degree of certainty that airlines (with the national concept) as well as governments (with the territorial concept) will either report fully or not at all.

Now, if with the national concept as a basis, one or more ICAO airlines do not supply any data, then for all routes on which these non-reporting airlines operate and for all airports which they serve as well as for all countries in which these airports are located, the information will be incomplete, i.e. useless. The degree of this incompleteness can neither be determined nor estimated with certainty. If, on the other hand, with the territorial concept as a basis, one or more countries should not be prepared to cooperate in ICAO's Origin and Destination Statistics, complete returns nevertheless may be expected

for all participating countries, and
for all airports located in them, as well as
for all air services connecting such countries, and even
for all air services from reporting to non-reporting countries.

It would also be possible with an appropriate expansion of the questionnaire to fully cover the origin by ports of departure for routes touching reporting countries. On the other hand, the returns for all air services connecting two or more non-reporting countries, would be missing entirely. It is assumed that in countries deciding to adopt territorial reporting, complete reporting on national airports can be achieved.

3.2 Collection of data for international Origin and Destination Statistics on the basis of the territorial concept

3.2.1 Scope of data in the case of all countries participating

For the establishment of complete international Origin and Destination Statistics of passengers in international air transport on a territorial basis it is, in principle, necessary that all countries supply data on the flights of all passengers starting on their journey from one of the aerodromes on their territory (Report by the aerodrome of the first take-off). It would likewise be possible to establish such statistics if all countries supplied data on the flights of all passengers ending their journey at one of the aerodromes on their territory (Report by the aerodrome of the last landing), since the total of the data for all international trips started and the total of the data for all international trips terminated will each give in itself, a complete picture of the international passenger air travel, if all countries participate in the reporting. However, both ways of collecting entail certain difficulties.

3.2.1.1 Report by the aerodrome of the first take-off

If, when trying to cover the passenger traffic, one starts from the first take-off for an air trip, there is certainty only for direct flights between two aerodromes that the data collected are completely accurate and that the flight will be attributed to the day on which it took place. (13)

In the case of flights with intermediate landing and stop-overs, however, it is always possible that the passenger will interrupt his flight or change his itinerary. Moreover, long flights are often interrupted by stop-overs. In these cases those flight stages following the first flight stage - in the light of the report of the aerodrome of the first take-off - will be wrongly attributed as to their date. The effect of these errors, the importance of which should not be over-estimated, could be considerably reduced if outbound flights and return flights were covered separately, i.e. if the country of the first take-off would supply data only as far as to the farthest aerodrome contemplated on the trip and the country of the farthest aerodrome would make available the data on the continuation of the flight (return flight). The incorrect information on the flight route and date would perhaps not be eliminated altogether, but its scope could be reduced to a minor degree. The most important difficulty remaining would then be to determine unambiguously which aerodrome should be considered as "farthest" and thus which would be the second agency to report in the case of outbound and return trips, round trips, round-the-world trips and of trips where initial and terminal airports are closer to each other than the airport farthest from the initial airport.

3.2.1.2 Report by the aerodrome of the last landing

The experience made by the League of Nations and the United Nations in collecting the returns of national foreign trade statistics for the establishment of world trade statistics has only corroborated the general experience that statistics covering movements are less subject to errors if these movements are recorded for statistics only after they have come to an end. For this reason world trade statistics are exclusively based on the import figures of all countries and not on the export figures. (14)

(13) Deviations and aircraft accidents are disregarded in these considerations.

(14) The sum of exports and the sum of imports of all countries in the world (apart from the costs of transportation) are equal.

Obviously, origin and destination statistics of international passenger traffic should not be based on the reports of the airport of departure but on the data supplied by the airport of the last landing (or of the farthest airport respectively). It would then be theoretically possible to eliminate from the statistics errors resulting from changes of the itinerary. It would also be possible to subsequently achieve a correct dating of all flight stages. Such a procedure, however, would require that upon arrival at an airport every passenger, when he leaves the waiting room, would have to be questioned whether he intends to continue his flight and, if not, to ask him what course his trip has taken. Since, however, the group of experts have decided already that the passengers are not to be questioned, but that tickets, coupons from the tickets or passenger manifests are to be used for statistics, the possibility of questioning is eliminated. So far it has not been the custom to deliver tickets or coupons upon termination of the flight, therefore, they are not available at the airports. Passenger manifests, the last possible source for recording at the airports of landing, are not always available, do not always contain all the necessary data and can never reveal whether the passenger decides to discontinue a flight originally booked for a longer distance.

A passenger's flight of the last mentioned kind with all its sections would then be lost to the statistics.

3.2.2 Scope of data in the case of only part of the countries participating

In carrying out international Origin and Destination Statistics of passengers on the basis of reports by airports of take-off, the traffic between all reporting countries will always be completely covered. In addition complete data on all flights from reporting countries to non-reporting countries will accrue in the reporting countries.

Finally and in most cases it would also be possible without great difficulty to record data regarding the course of the preceding part of the trip from data available at airports of take-off for passengers transferring to another aircraft (also after interruption of flight). In this way information could be obtained in regard of passengers from a country not participating in the international Origin and Destination statistics.

A last step towards complete statistical results could be effected if, in addition, also passengers from a non-reporting country who terminate their flight on an aerodrome of a reporting country, would deliver the last coupon of their travel voucher at the airport of the last landing.

4. Advantages and disadvantages of the system developed in European countries for international Origin and Destination Statistics on the basis of the territorial concept

4.1 Coordination of the collection of statistical data

If the territorial concept on the basis of flight reports is applied, coordination of the collecting of data for international Origin and Destination Statistics is doubtlessly more difficult and time-consuming than with a central recording of air passenger movements using microfilms of coupons. Arrangements will have to be made for the flight reports used in all participating countries to include all the necessary questions on the destination (possibly also the origin) of the passengers in international air travel taking off from their airports. It also has to be disclosed whether the flight journey (outbound or return) actually begins at an aerodrome of the reporting country or whether it is the continuation of a journey started in another country. Moreover, the course of the flight and possibly the airlines, participating in the operation of the flight; must be disclosed. Although the difficulties of such a coordination are considerable, they should not be overestimated.

There is, however, one source of error which, practically, cannot be eliminated if flight reports are used as a basis for Origin and Destination Statistics. In the case of a flight journey with several stages it will not be possible to ascertain whether the journey was prematurely discontinued on the outbound or on the return trip. Flight alterations for which a new ticket is issued will appear as independent flights. With the central collection on the basis of coupons such short-comings can theoretically be eliminated later in the statistical processing of the accruing material. However, the carrying-out of such controls, even when with electronic machines, is so time-consuming and expensive that it is, practically, unjustifiable. It is even completely impossible if the new ticket carries a different number and if it is used after the recording period.

It would have to be investigated whether statistics on all initiated international outbound and return trips according to their planned itinerary would answer the practical needs of international Origin and Destination Statistics.

4.2 Coordination of the reporting to ICAO

The simplest form of reporting to ICAO could be achieved if the participating nations would supply ICAO's Statistics Section with duplicates of summary cards together with all the data required for international Origin and Destination Statistics. This procedure has proved successful already with the establishment of world trade statistics by the Bureau of Statistics of the United Nations. Above all, it should be made clear for which flights duplicates of punch cards should be delivered to ICAO, so that the reporting is complete and double counts are avoided. (See comments in section 3).

4.3 Prospects of completeness for the presentation of international passenger flows

In adopting one of the two systems for international Origin and Destination Statistics under discussion, it cannot be expected - at least not for many years to come - that all airlines or all countries respectively, will take up reporting immediately. It should be examined whether the resulting disadvantages are more serious in the case of the national or of the territorial concept.

In the absence of information from certain airlines - and there may be important ones among them - all relations served only by those airlines will completely fail to be recorded statistically. Moreover - and this seems to be more critical with regard to the purpose of the statistics - the recording of the passenger flow on routes on which the non-reporting airlines also operate, would be incomplete. The degree of this incompleteness would always remain unknown (see also item 302).

In the absence of information from certain countries - with the territorial concept, these would mostly be countries with a minor volume of passengers - the errors in the national Origin and Destination Statistics would probably not be any greater and, above all, less dangerous to the evidence of the statistics.

The direct air traffic between non-reporting countries would remain absolutely unknown until those countries decided to report. Passenger traffic on all services between participating countries would always be covered completely in both directions - inbound and outbound. Moreover, passenger traffic would be completely covered on all services starting in reporting countries and terminating in non-reporting countries. The opposite direction would not be covered completely, at least not as far as the flights terminate already at the first airport located in a reporting country. It would have to be investigated whether the presentation of only incompletely covered passenger-flows is justifiable or whether arrangements should be made to close these gaps (see paragraph 4.1).

4.4 Combination with Origin and Destination Statistics of passengers in inland air transport

Many governments will find it advantageous that origin and destination statistics of passengers in inland transport (or in domestic transport) can be added without any difficulties to the statistics of international passenger travel. This fact might, some day, be of advantage also to the further development of origin and destination statistics of passengers in world air travel.

An objective examination of the presentations of international civil aviation traffic - even more so than an analysis of other international statistics - will show that for supranational considerations, e.g. for the technique of ATC the national frontiers seem to be rather arbitrary. Owing to the extremely varying size of the different countries, too many details in the international presentation of the operations covered accrue for some

parts of the globe, while for countries with large territories the data on their international air traffic which are supplied to international statistics cover only a relatively small section of their air traffic.

As a result of observations made in another field of transport statistics, viz. the coal and iron transport statistics compiled by the European Coal and Steel community on the basis of national data, it was decided to subdivide the major European countries into traffic areas. In maritime transport statistics of the Federal Republic of Germany for the same reasons the examination of overseas transport is carried out in such a way that short coasts of several smaller neighbouring countries are combined into one traffic area while, e.g. in the case of the United States of America, a difference is made between the Atlantic Coast, the Gulf Coast and the Pacific Coast.

It will have to be examined later whether similar aspects might also be of importance to world statistics on aviation traffic. Amendments of the international Origin and Destination Statistics with a view to combining or dividing national territories could be introduced if the territorial concept and all desirable subdivisions could be carried out relatively easily and also if the domestic traffic between the national airports were recorded.

4.5 Combination of Origin and Destination Statistics on the territorial concept with other air transport statistics and with other general transport statistics

4.5.1 Combination with other civil aviation traffic statistics

As may be gathered from the presentation of aviation traffic statistics in the Federal Republic of Germany, in section 2 of this report, the use of flight reports for aviation traffic statistics offers the possibility to obtain from one source all data which governments may need for any desired presentation by the territorial concept of the transportation of passengers freight and mail, of aircraft movements and of the utilization of fleets, aerodromes and airfields. The government of the Federal Republic of Germany has recognized the usefulness for its aviation policy of the fact that all statistical data presently needed are obtained from a single enquiry and are comparable and can be utilized together. Governments of other European countries, too, use an identical or a similar system for their aviation statistics.

4.5.2 Combination with other general transport statistics

A further reason which has induced the government of the Federal Republic of Germany to give preference to the territorial concept in carrying out German civil aviation traffic statistics is that for all other transport statistics - also international transport - only the territorial, but not the national concept can be realized in practice.

This, e.g., applies in part to the statistics on seaborne travel of the Federal Republic of Germany. It covers all passengers departing for or arriving from the different parts of the world via German seaports on ships of all flags.

To the Federal Government as well as to the port administrations, shipping companies and all agencies dealing with tourism, the knowledge of these figures is more important than the exact knowledge of the passenger traffic on German ships between the ports of foreign countries. Granted that the government and the German shipping companies also have a strong interest in figures on these movements. This interest, however, is only satisfactorily met, if the figures on passenger traffic between these ports in foreign countries are known not only for the German flag but also for all other flags serving these relations. For this purpose the statistics of other countries or other ports, based on the territorial concept, provide more information than could ever be had from domestic statistics based on the national concept. This applies also to goods transport statistics, especially to overseas goods transport.

4.6 Limited use of data from tickets for international Origin and Destination Statistics; additional information

During the Panel's discussions and study of the system developed by the US experts, certain countries and also in particular the representatives of IATA expressed their misgivings with regard to the fact that if microfilms of all coupons from the tickets were to be delivered, ICAO would obtain a complete (or at least a 10 per cent) insight into all details of their passenger traffic as far as to the name of the passenger. It would be possible, it is true, to cover up the names of the passengers when making the microfilms. The relationship between the flows of passenger air travel and the participating airlines however will, at any rate, be brought to the knowledge of ICAO if the airlines deliver the microfilms. This fact will certainly cause a number of airlines - among them some important ones - to take part in the production of these statistics either very reluctantly or not at all.

In utilizing flight reports for collecting data for these statistics and in observing the territorial concept, such difficulties can be avoided.

In no case will the names of passengers be entered in the flight reports. It would also be absolutely possible to eliminate the names of the airlines from the flight reports or from the reports to ICAO. Also other data which might be indispensable for the Origin and Destination Statistics of individual countries, but which are useless for international Origin and Destination Statistics, could be left out from the duplicates of punch cards or reports for ICAO. This might apply, e.g., to the routing within the countries. On the other hand, additional information on the passenger's trip could be made available to ICAO from the flight reports information which either cannot be taken from the tickets at all or with difficulties only. In this connection data on the use of jet aircraft or at a later date even of supersonic aircraft could be considered, ICAO committees having frequently expressed their interest in these matters.

4.7 Application of sample methods

The USA plan for international Origin and Destination Statistics contemplates the evaluation of the accruing coupons on the basis of a 10% sample. The main function of the statistics, viz. to present the large passenger flows in international world air transport, can certainly be carried out successfully with this method. This does, however, not apply to the special evaluations, also contemplated by the plan, for individual national requirements or for individual airports. The number of passengers originating in many smaller countries, particularly European ones, and also at most non-American international airports is too small to yield figures for which - when applying a 10% sample - the desired breakdown of the results would be meaningful. The accuracy of these figures would not be sufficiently guaranteed. For many areas and airports a 20, 33 or even a 100% processing will be necessary to meet the requirements of the users of the statistics (see item 2.3.2). This, however, does not concern ICAO's requirements but those of certain governments only.

With the application of the territorial method, it would be possible for individual governments without any major difficulties to have Origin and Destination Statistics - combined with additional data from air traffic if desired - carried out in their countries in total or on a 50, 33, 25, 20 or even 10% sample basis. Duplicates of the punch cards could then be forwarded to the ICAO Statistics Section on a 10% or on a more complete basis.

It is true that theoretically it seems to be possible also with the system suggested by the USA experts, to contemplate a processing with different sample quotas for different areas.

4.8 Timing of the presentation of the results of the international Origin and Destination Statistics

As mentioned in chapter 25, the more important returns of air transport statistics are presently available and published in the Federal Republic of Germany about two to three months after the reporting month. ICAO's Statistics Section could be supplied with duplicates of the summary cards at about the same time. The date of publication of the returns by ICAO is determined by the date of receipt of the punch cards or tabulations of the last country, the reports of which are to be awaited for completion of the statistics.

A further clue for the date limit to be expected may be obtained from the experience made with the publication of world trade statistics by the United Nations. According to the latest experience these statistics appear with preliminary monthly figures for the European countries two to three months and for non-European countries four to five months after the reporting month. Presentations of the world trade and of the foreign trade of the individual countries in partial annual sums (first quarter, first half year, whole year) are issued about three quarters of a year after the reporting period. Final and complete annual returns appear one to one and a half years after the year to which they refer. In drawing conclusions

for a possible timing of international Origin and Destination Statistics of ICAO, it should not be overlooked however that in establishing foreign trade statistics, the methodical and technical difficulties to be overcome were much larger than with passenger traffic statistics.

4.9 Costs of production of world-wide Origin and Destination Statistics on a territorial basis

It cannot be the aim of this paper to determine the costs of world-wide Origin and Destination Statistics. If required, such a calculation will have to be established by international collaboration at a later stage of the Panel's activities.

It may be useful, however, to point out the following:

- a) By the filling in of flight reports (see chapter 2.1) more work is caused to the airlines than by the delivery of microfilmed coupons. This, however, applies only to those countries where the delivery of flight reports is not already provided for. For flights originating in such countries, the preparation of microfilms constitutes extra work.
- b) The national Offices of Statistics incur but minor additional costs by supplying duplicates of punch cards. It remains to be seen whether and to what extent the requirements of ICAO's international Origin and Destination Statistics will exceed the present programmes of national civil aviation traffic statistics as already carried out on a territorial basis.
- c) The costs incurring to ICAO's Statistics Section will not in any case be higher than with the Origin and Destination Statistics developed by the US experts on the basis of the national concept. In introducing summary cards for government reporting to ICAO, even substantial savings could be achieved.

5. Summary

The application of the territorial concept in building up world-wide ICAO Origin and Destination Statistics offers many advantages, since

1. It is based on the tickets and their coupons. The advantages of this source of data have already been presented in a convincing and exhaustive manner in the proposal formulated by the US delegation (Appendix 1).
2. It offers the possibility to build up international statistics slowly and in steps. During the initial period, moreover, partial results will be achieved which are already fully usable. This advantage is not offered by statistics established on the basis of the national concept.
3. By virtue of one enquiry only, it can at the same time satisfy the - frequently different - requirements of the international organization as well as of the governments and, in addition, those of all airlines serving a certain area.

4. National requirements can be fully met at an early date; governments need not wait until ICAO is in a position to complete its work on world-wide statistics after the last date still required is received from the airlines.
5. It permits the harmonized establishment of national and also international passenger, freight and mail transportation statistics as well as statistics on the movements of aircraft and the capacity of airports.
6. As to methods used it is reconciled with most of the other world-wide statistics

Ideal as the application of the national concept may appear to be at first sight for the establishment of world-wide Origin and Destination Statistics, a careful examination will reveal that, for practical reasons, the territorial concept should, by all means, be given preference.

ATTACHMENT I

FLIGHT RECORD

Instructions overleaf

Federal Bureau of Statistics

1. Reporting airport.....

2. Owner or operator.....

3. Date of landing and take-off.....

4. Type and reg. mark of a/o.....

5. Seats available.....

6. Load capacity available (kg).....

7. Routing (IATA-Code)

reporting airport

8. Type of operation

A. Commercial air transport

1. Airline operations

a) Sched.Flight no.

b) ExtraFlight no.

2. Irregular air traffic

a) Tourism.....

b) Transport and taxi.....

c) Local sightseeing.....

d) Medical flights.....

e) Aerial photography.....

f) Advertising.....

g) Spraying.....

h) Other flights (e.g. to sea- test flight, etc.).....

B. Owner's business flights.....

C. Ferry flights.....

(Please mark with a cross)

9. Passengers and load

On board, off	Pass.	Cargo kg	Mail kg	For off. use
Through, on				
a) Total on board at landing				
b) Disembarked				
Unladen-foreign				
c) Transit				
d) Embarked domestic				
Yadon - foreign				
e) Total on board at take-off				

10. Airports of transfer and destination of embarking passengers

For off. use	Coupon destin.	Directional destin.	Passengers
	IATA-Code	Number	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
Total			

11. Remarks (e.g. reasons for deviations from flight plan, etc.)

certified to be correct

..... date signature

INSTRUCTIONS TO FLIGHT RECORD

General

Aviation statistics of the Federal Republic of Germany are based on the "Regulations for the Compilation of Aviation Statistics" of 12 March 1959 (Federal Journal No. 52 dated 17 March 1959).

The form ("Flight Record") is addressed to airline agencies at airports, i.e., aerodromes and, in the absence of agencies, to aircraft pilots. This form is intended for information concerning take-offs and landings by aircraft engaged in commercial transport and owners' business flights including ferry flights.

The form should be delivered at the latest on the day following landing or take-off to the airport operation, i.e., aerodrome management for transmittal to the

Federal Office of Statistics
Wiesbaden
Gustav-Stresemann-Ring 11

All entries, particularly figures, should be in printed letters or typed, if possible.

Printed forms are available at aerodromes from aerodrome operators, and at airports, from officials in charge of flight operations.

Instructions concerning separate items

- Item 1: Where not printed on the form, enter name of aerodrome, i.e., airport of take-off and/or landing.
- Item 2: Enter name of airline (including 2-letter code abbreviation), or name of operator.
- Item 3: Enter date of take-off and landing at the reporting aerodrome or airport. Where take-off and landing are not effected on the same day, enter both dates.
- Item 4: Enter type and registration mark of aircraft (e.g. CV 440 D-ACIB). If, for technical or organizational reasons, aircraft are changed in airline operations and touring flights, enter type and registration marks of both aircraft.
- Item 5: Enter number of permanently built-in seats available for the carriage of persons by the flight concerned.
- Item 6: Enter load capacity in kgs of aircraft, as indicated on the Load Sheet, for the flight concerned. (The following are not included: weight of crew, and fuel and lubricants, ballast for trimming purposes, etc.). Load capacity available may therefore vary for the same aircraft on different flights.

Item 7: In accordance with the IATA Code, enter aerodromes, i.e., airports in routing sequence, indicating the reporting aerodrome or airport in the box in the centre outlined by a heavy black line.

Item 8: Type of operation:

A. Commercial air transport

1. Airline operations

- a) Scheduled Flight - flight conducted according to schedule.
- b) Extra Flight - additional scheduled flight, comprising in particular extra sections on routes flown by scheduled flights, unscheduled stop-overs on scheduled flights or extra sections, and special flights (e.g. test flights).

Enter flight number and airline identification for scheduled flights and extra flights (e.g. LH 120).

2. Non-scheduled air transport

- a) Tourism, comprising all flights conducted under the inclusive tour scheme.
- b) Tramp and taxi flights - all flights not conducted on a scheduled basis in accordance with the rates applicable to airline operations or under the inclusive tour scheme.

B. Owner's business flights, comprising all flights conducted solely for the owner's purposes by aircraft owned by his business, rather than on behalf and on account of a third party.

C. Ferry flights - enter positioning flight and return flight to home aerodrome.

Item 9: The sum total of the figures corresponding to "disembarked, i.e., unladen" and "transit" must equal the entry corresponding to "on board at landing". Similarly, the sum total of the figures corresponding to "transit" and "embarked, i.e., laden" must be equal to the entry for "on board at take-off".

Item 10: Enter the number of passengers embarked according to airports of destination as well as airports of transit. Enter airports of destination and airports of transit, as indicated on the ticket coupon, by using the IATA Code. The sum total of passengers embarked under item, bottom right, should correspond to the sum total of passengers embarked under Item 9.

Items 9 and 10: Passengers - enter all paying and non-paying passengers, with the exception of children under 2.
Freight - enter freight weight (in kgs). Freight also includes excess baggage, diplomatic bag and goods carried for the airline's own use, such as spare parts, etc.; baggage allowance does not count as freight.
Mail - enter airmail weight (in kgs).

Item 11: Remarks - enter all exceptional circumstances connected with the take-off or landing concerned, i.e., particularly, reasons for emergency landings, overflights, return to point of departure, flight plan changes.

Pursuant to para. 12, sub-para. 2 of the Law on statistics for Federal purposes, dated 3 September 1953 (Law on Statistics Federal Law Journal S I, page 1314), it is possible, upon request, to transmit separate aviation statistics reports through official channels to the highest competent Federal and State (Land) Authorities in charge of aviation.

O&D PANEL
FINAL REPORT
27/2/63

- 270 -

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A T T A C H M E N T I I

Translation of part of
Der Verkehr in der Bundesrepublik Deutschland,
Reihe 2, Luftverkehr, Dezember 1959

Page 4

Introductory Note

I. General

Aviation statistics are based on the "Verordnung zur Durchführung einer Luftfahrtstatistik" (Directives for the Establishment of Aviation Statistics) of 12 March, 1959 (Bundesanzeiger Nr. 52 of 17.3.1959). According to these directives, the official survey should cover all civil aviation traffic by aircraft (except gliders), helicopters and airships serving the commercial or other airports of the Federal Republic of Germany and West-Berlin. The statements on commercial traffic and business flights (non-commercial) are based on the "Flugberichte" (flight reports) and the "Frachtmanifeste" (cargo manifests) and the statements on other non-commercial aviation are based on monthly collective reports (copies of the new reporting forms are to be found in the April issue 1959, p.6-8).

II. Categories of Traffic

a) Passenger Traffic

From April 1959 on, the statistics on international civil aviation traffic cover not only the route terminals but also the airports of transfer to another route and the terminals as indicated on the ticket. According to this new method the passengers departing from an airport are subdivided as follows:

1. Embarking passengers with inland destination;
2. Passengers embarking for the inland, but transferring at another inland airport with final destination abroad;
3. Passengers embarking for abroad having transferred from aircrafts of national feeder services;
4. Passengers embarking for abroad who start their journey at the reporting airport;
5. Transit passengers remaining on board the aircraft during an intermediary landing on a through-service.

As tickets are not delivered upon arrival, a similar breakdown for arriving air passengers is not possible.

Page 5

b) Freight Traffic

The figures on the handling of goods at airports are based on the statements in the flight reports. As these statements are derived from the load sheet of the aircraft for the individual flight stages, i.e. as they refer to the individual means of communication, the figures on the handling at airports include double or possibly even multiple registrations, resulting from trans-shipment.

The presentation of the international goods traffic by air according to categories of goods and traffic relations - based on the evaluation of the manifests - shows shipment and receipt of goods by the countries where the transportation of the goods by air originated or terminated; for statistical purposes the traffic flow is considered as not having been interrupted by trans-shipment from one aircraft to another (p. 32 - 43); cf. also introductory note and text in "Der Verkehr in der Bundesrepublik Deutschland, Reihe 3, Luftverkehr, Jahr 1958, Teil II" (Traffic in the Federal Republic of Germany, series Nr. 3, civil aviation, 1958, part II).

c) Mail Traffic

The data concerning the handling of mail at the airports are based on the statements in the flight reports.

The figures shown on the shipment of air mail are determined by the Bundesministerium für das Post - und Fernmeldewesen (Federal Ministry of Posts and Telecommunication) from the international delivery bill (AV 7). Country of destination is the country where air transport ends; possible trans-shipment from one aircraft to another in inland or abroad is disregarded. Furthermore, the total shipment of mail with inland destination is listed for each airport.

III. Traffic performed in pkm and tkm

The computation of the traffic performed in pkm and tkm and the establishment of the utilization factor of the aircraft on the flight stages are based on the kilometres flown either "to the frontier" or "to foreign parts". The kilometres flown "to the frontier" include any distance covered over the territory of the Federal Republic of Germany (West Berlin included) as well as between the Federal Republic and West-Berlin, calculated on the basis of great circle distances. The kilometres flown "to foreign parts" include in addition the distance from the frontier of the territory of the Federal Republic of Germany to the nearest foreign airport approached and vice versa.

C. Passenger and Goods Traffic by Traffic Relations

1. Passenger Traffic in December, 1959

a) Inland Traffic

from \ to	HAM	HAN	BRE	DUS	CGN	FRA	STR	NUE	MUC	BER	S.F. und H.P. 2)	Together
Total (including transferring passengers) ¹⁾												
Hamburg												
Hannover												
Bremen												
Düsseldorf												
Köln/Bonn												
Frankfurt												
Stuttgart												
Nürnberg												
München												
Berlin												
Sonst. Flugplätze												
Hubschr.-Plätze												
together												
Inland passengers with inland destination of air journey												
Hamburg												
↓												
together												
Transferring passengers with destination abroad												
Hamburg												
↓												
together												

(Footnotes) 1) At the inland airport of transfer, passengers transferring to foreign countries are classed as embarking or disembarking. Consequently, for the inland airport of origin or destination such passengers are listed as inland air passengers.

2) SF= Sonstige Flugplätze = other airports
HP= Hubschrauberplätze = heliports: City of Cologne, City of Bonn, Duisburg, Dortmund

C. Personen- und Güterverkehr nach Verkehrsbeziehungen

1. Personenverkehr im Dezember 1959

a) Inlandsverkehr

von \ nach	HAN	HAN	BRE	DUS	CGN	FRA	STR	NUE	MUC	BER	S.F. und H.P.	Zusammen
Insgesamt (einschl. Umsteiger) 1)												
Hamburg	154	39	128	2 651	377	3 370	187	2	311	8 343	-	15 562
Hannover	41	3	81	214	56	437	69	19	-	11 941	6	12 867
Bremen	91	46	26	340	-	108	-	11	-	-	-	622
Düsseldorf	2 735	53	346	30	15	1 452	348	282	1 883	4 169	-	11 313
Köln/Bonn	240	59	-	2	1	455	-	5	38	2 652	-	3 462
Frankfurt	3 335	729	156	2 042	464	-	1 801	1 070	2 372	10 327	-	22 296
Stuttgart	191	72	-	309	74	1 520	85	-	97	1 408	6	3 762
Nürnberg	-	-	-	388	17	1 041	-	75	61	774	-	2 356
München	402	-	-	1 619	33	2 639	103	111	44	3 477	-	8 428
Berlin	8 117	13 131	-	3 712	2 293	11 531	1 224	884	3 590	-	-	44 482
Sonst. Flugplätze	-	6	-	-	-	-	4	-	-	-	36	46
Hubschr.-Plätze	-	-	-	-	2	-	-	-	-	-	17	19
zusammen	15 306	14 138	737	11 307	3 332	22 553	3 821	2 459	8 396	43 101	65	125 215
Inlandsfluggäste mit Ziel der Luftreise im Inland												
Hamburg	154	39	122	2 234	369	2 689	183	2	297	8 343	-	14 432
Hannover	32	3	81	153	56	275	68	19	-	11 941	6	12 634
Bremen	89	43	26	198	-	97	-	11	-	-	-	464
Düsseldorf	2 701	53	346	30	15	1 036	348	282	1 801	4 169	-	10 781
Köln/Bonn	231	59	-	-	1	255	-	-	38	2 652	-	3 246
Frankfurt	3 269	729	156	2 009	463	-	1 798	1 067	2 365	10 327	-	22 183
Stuttgart	157	72	-	249	67	891	85	-	96	1 408	6	3 031
Nürnberg	-	-	-	268	7	650	-	75	33	774	-	1 807
München	347	-	-	1 435	32	2 108	101	88	44	3 477	-	7 632
Berlin	7 506	13 120	-	3 572	2 279	10 174	1 198	881	3 457	-	-	42 187
Sonst. Flugplätze	-	6	-	-	-	-	4	-	-	-	36	46
Hubschr.-Plätze	-	-	-	-	2	-	-	-	-	-	17	19
zusammen	14 486	14 124	731	10 148	3 291	18 175	3 785	2 425	8 131	43 101	65	118 462
Umsteiger in Richtung nach dem Ausland												
Hamburg	-	-	6	417	8	681	4	-	14	-	-	1 130
Hannover	9	-	-	61	-	162	1	-	-	-	-	233
Bremen	2	3	-	142	-	11	-	-	-	-	-	158
Düsseldorf	34	-	-	-	-	416	-	-	82	-	-	532
Köln/Bonn	9	-	-	2	-	200	-	5	-	-	-	216
Frankfurt	66	-	-	33	1	-	3	3	7	-	-	113
Stuttgart	34	-	-	60	7	629	-	-	1	-	-	731
Nürnberg	-	-	-	120	10	391	-	-	28	-	-	549
München	55	-	-	184	1	531	2	23	-	-	-	796
Berlin	611	11	-	140	14	1 357	26	3	133	-	-	2 295
Sonst. Flugplätze	-	-	-	-	-	-	-	-	-	-	-	-
Hubschr.-Plätze	-	-	-	-	-	-	-	-	-	-	-	-
zusammen	820	14	6	1 159	41	4 378	36	34	265	-	-	6 753

1) Umsteiger im Verkehr mit dem Ausland sind auf dem inländischen Umsteigehafen als Aus- bzw. Einsteiger gezählt. Dementsprechend werden diese Umsteiger für den inländischen Herkunftshafen bzw. Zielhafen als Inlandsfluggäste ausgewiesen.

2) SF = Sonstige Flugplätze; HP = Hubschrauberplätze; Köln/Stadt, Bonn/Stadt, Duisburg, Dortmund.

noch: C. Personen- und Güterverkehr nach Verkehrsbeziehungen

noch: 1. Personenverkehr im Dezember 1959

b) Auslandsverkehr

Zielland	Herkunftshafen der Umsteiger	Abgangshafen										zusammen
		HAN	HAN	BRE	DUS	CGN	FRA	STR	NUE	MUC	BER	
Europa		7 564	897	615	12 189	1 054	15 670	1 738	309	4 748	698	45 482
darunter:												
Belgien		289	5	16	419	16	663	95	16	164	-	1 683
	darunter von:											
	Hamburg				18		1					19
	Hannover						1					1
	Bremen				1							1
	Frankfurt				5				2			7
	Stuttgart	1			7		2					10
	Nürnberg						36					36
	München						5	1				6
	Berlin	5			29	1	63			1		99
Dänemark		1 275	26	80	648	54	528	78	2	161	-	2 852
	darunter von:											
	Hamburg				1		3					4
	Hannover	3										3
	Düsseldorf	26										26
	Köln/Bonn	2										2
	Frankfurt	11			5				1			17
	Stuttgart	1			19		2					22
	Nürnberg						54					54
	München	18			8		6	1				33
	Berlin	163	2				1			1		167
Finnland		392	2	-	5	38	106	54	-	11	-	608
	darunter von:											
	Hamburg				1		2					3
	Hannover	2										2
	Düsseldorf	4										4
	Köln/Bonn	1										1
	Frankfurt	10										10
	Stuttgart				1							1
	München	1					7					8
	Berlin	36										36
Frankreich		519	9	43	1 035	25	1 873	241	81	395	331	4 552
	darunter von:											
	Hamburg				70		17			1		88
	Hannover				12		3					15
	Düsseldorf						16					16
	Köln/Bonn				1		2					3
	Frankfurt							2		1		3
	Stuttgart				1		69					70
	Nürnberg					3	44					47
	München	1			2		32		1			36
	Berlin	6			16	1	110			6		139
Griechenland		13	-	-	45	4	473	20	-	197	-	752
	darunter von:											
	Hamburg				3		19					22
	Hannover						1					1

APPENDIX 12

The Area Concept for Statistics on Origin and Destination in Civil Aviation

(Presented by Dr. H. Kuiler)

1. In the Panel on Origin and Destination Statistics so far two methods for the collection of data have been discussed, namely on the one hand the so-called Centralized System, on the other the collection of data via airports. For the Centralized System the sampling method is applied, while for the airport statistics this may be the case but it is not essential. However, the results of the two systems have in common that data are obtained for all relations of passengers between the different airports (from airport to airport).

2. One may wonder whether statistics of all relations between all airports open to international traffic will be of any use, since there are some objections to such statistics:

- a. When the sampling method is used both systems will produce results for the not frequently used relations, which only indicate that there is little traffic on the relation in question (there is a big variance).
- b. Even in case of a complete recording for each relation the results are unsatisfactory, since from year to year and from month to month large absolute differences per relatively not frequently used relation may occur, which are due to accidental circumstances (they are not significant).
- c. Transport on the little utilized relations often depends to a high degree on purely local circumstances.
- d. Insight into Origin and Destination on little utilized relations is often of little importance for worldwide statistics; sometimes there is little or no competition on such a relation and for a forecast the chance factors play too great a part.

3. The real value of Origin and Destination statistics has therefore to be confined to the relations with a continuous and rather considerable traffic flow. Only such an insight - free from all elements which might affect the clearness and which already by the small size of the number may be misleading - may be a valuable contribution to a better understanding of the role of aviation in the economic and social process.

4. To obtain such a useful insight into the structure of aviation traffic, two solutions may be possible:

- a) selecting routes beforehand on the basis of the volume of traffic (for instance by means of the Traffic Flow Statistics).
- b) dividing the world into a number of traffic areas whether or not stating separately a number of important airports.

In the former case Origin and Destination statistics are obtained for the trunk routes from airport to airport; in the latter case one gets a better insight, since the airports from which the passengers can make a choice, have been combined into smaller or larger groups (O. and D. according to area concept).

5. Both systems have their advantages and their disadvantages. To determine the most important routes is rather simple, since this can be done by means of the Traffic Flow Statistics collected by I.C.A.O. However, the difficulty is that the selected trunk routes need not reflect the important feeder routes, while these very feeder routes are also of much importance for regional traffic. There is no such difficulty with regard to the second method. However, the objection to this method is that the selection of areas will always imply a certain chance element. A distinct preference for one of the two methods can therefore not be given.

The selection will, to a considerable degree, depend on the way in which the required basic data are collected. For a sample based on the flights preference will be given to the selection of particular flights, the Centralized System and the System based on airport statistics are, because of their overall character, more suitable for combination of the results for special areas.

6. The great advantage of the Area Concept to the airport concept as it occurs in for instance the Centralized System, is that it eliminates the chance elements which in the latter play an important part. Whether a passenger flies for instance from Rotterdam via Amsterdam, or via Brussels to New York depends entirely on the circumstances (timetable, business, family relations, ground connections, etc.) Not the airport of departure and arrival respectively is therefore relevant, but the area of departure and arrival. True origin and destination statistics should consequently be related to an area and not to the airports in that area.

7. A serious objection to giving statistics on origin and destination from airport to airport is that the bulky publications will be intelligible and will lead to confusion and wrong conclusions. This could be avoided by drawing up summarized tables, but there is still the difficulty that all unimportant relations (fluctuating traffic, lack of significance, etc.) are incorporated in the process. Therefore a system should be designed that copes with this objection.

8. The problem is in the first place to get an insight in the large traffic flows by air as determined by geography and economic circumstances. This problem was already recognized in 1944 by the American writer J. Parker van Zandt in his work: "The geography of world airtransport" which is published in the series "America Faces the Air Age" of the Brookings Institution. On page 43 he writes: "World air transport holds out a prospect more alluring in terms of human welfare than any before in history. Yet the difficulties in the way of realizing its rich promise are admittedly great. As a first step, we need to understand as thoroughly as possible the basic elements of the problem. These basic elements are the geographic structure of the earth's area and the economic importance of each of the component parts. The frontiers of separate states are of little importance in a period where travel is measured in minutes rather than in miles. Suppose, then, we disregard the crazy-quilt pattern of some 70 prewar more or less sovereign states and consider the problem on a regional basis. It is surprising how different the world looks when viewed from this broader perspective" (page 9).

9. It is this broader concept that should be the starting-point for a meaningful compilation of O. and D statistics. Here again two courses can be taken. The regional basis advanced by Parker van Zandt may be taken in a wide and in a narrow sense.

Parker van Zandt starts from the broad concept. He distinguishes:

1. Greater Europe
2. North America
3. U.S.S.R.
4. Asia
5. Others
 - a. Africa
 - b. Middle America
 - c. South America
 - d. Oceania

No doubt this division is on the one hand to be considered as obsolete, while on the other it is too restricted, so that for O. and D. statistics the concept is unacceptable.

10. In view of the objections referred to under 7 an attempt has been made to find a more acceptable division. It should be added at once that this attempt is meant only as an illustration of the way in which the area concept can be introduced in O. and D. statistics. The division consists of two stages. In the first place a number of large areas have been formed along the system of Parker van Zandt, but taking into consideration modern development in the field of general politics and of aviation. The broad division would read as follows:

1. The United States and Canada to the east of the 100th degree of latitude, which corresponds roughly with a time zone.
2. The United States and Canada to the west of the 100th degree of latitude.
3. Middle America from Mexico up to and including Panama and of South America: Columbia, Venezuela (and if required Brazil).
4. Rest of South America (if required Brazil).
5. Northern Europe, viz Norway, Sweden, Finland and Denmark, England, the Netherlands, Belgium, West and East Germany and Czechoslovakia.
6. Southern Europe, viz France, Spain, Italy, Switzerland, Austria, Yugoslavia, Bulgaria, Roumania, Greece and Turkey.
7. North Africa, which means all countries to the north of Gabon, Congo, Uganda and Kenya.
8. South Africa: Gabon, Congo, Uganda and Kenya and the countries to the south of these countries.
9. Middle East viz Syria, Israel, Iraq, Jordania, Saoudia Arabia, Persia.
10. South East Asia, viz Pakistan, India, Thailand, Burma, Malacca.
11. East Asia, viz Japan, Formosa, Philippines.
12. Australia and Oceania.

11. In this way areas can be formed which will give a good insight into the important traffic flows in the air. In any case they should show clearly the principal areas of aviation, just as the principal areas of destination. Also in cases other than the United States and Canada it would be advisable to divide an area according to a degree of latitude, or longitude if by doing so certain base areas or areas of destination would be shown more clearly. In the present case the 100th degree of latitude has been chosen as the limit, since it is at the same time a time zone.

12. A next step may be to reduce the size of the selected area. As an example Northern Europe could be chosen. The following division could be made:

5. Northern Europe
 - (1) Scandinavia.
 - (2) United Kingdom, Netherlands, Belgium, Luxemburg, West Germany.
 - (3) East Germany, Poland, Czechoslovakia.

Analogically also the other areas could be subdivided, account being taken of the development of the large trunk routes in aviation by separating the areas at east and west coast, as has been done in North America.

13. What are the consequences of all this for the O. and D. statistics? a few examples will illustrate this.

- a) A passenger with T.O.D. London-New York is recorded in the statistics under the relation 5(2)-1.
- b) A passenger with T.O.D. Stockholm-London-New York is recorded in the statistics under the relation 5(1)-1 or if the routing is recorded under 5(1)-(2)-1.
- c) A passenger Rome-Paris-London-Mexico City is listed under the relation 6-3 or with complete routing 6-6-5(2)-3.
- d) A passenger Rome-Madrid is listed under the relation 6-6.

14. Even for T.O.D. with complete routing the statistical data thus obtained will be much simpler than when all airports of the areas in question are included. The advantage is that the statistics are arranged more conveniently and more readable. Yet no essential data get lost. It has been shown that the choice of a particular airport is often made fortuitous. This in a lesser degree applies to the area as such. Take for example the passengers visiting Europe. Whether the destination of their air trip is Rome or Paris is immaterial. Essential is that their destination is Southern Europe. More examples could be given.

In this system no account has been taken of the recording of carriers having participated in a specific traffic. In the first place since this would affect the readability of the data and in the second place since the recording of carriers in many cases would be of no use because of the fact that the relation with a particular airport or a particular country does no longer exist.

15. With the 12 areas selected more or less at random for T.O.D. only $12 \times 12 = 144$ relations result, from which the traffic flows can be easily read at once, even if the number of areas is doubled or trebled. If the routing is added the matter is already rather complicated with 36 areas. In addition to the $36 \times 36 = 1,296$ direct relations there exist also all possible intermediate combinations and already soon 2 or 3 directly possible routings will be obtained for one relation. Under these circumstances much of the readability - which should be peculiar to statistics - get lost. This simple example shows that T.O.D. statistics on airport base is hardly to be consulted.

16. With the Area Concept System the way of recording does not present special difficulties. If the transport figures are statistically processed by the first carrier, the next carriers need not do this. Whether or not a particular carrier has to record a journey can easily be read from the coupons of the ticket. For determining the relation the stop-over is of course a great problem. However, this difficulty exists for each other system.

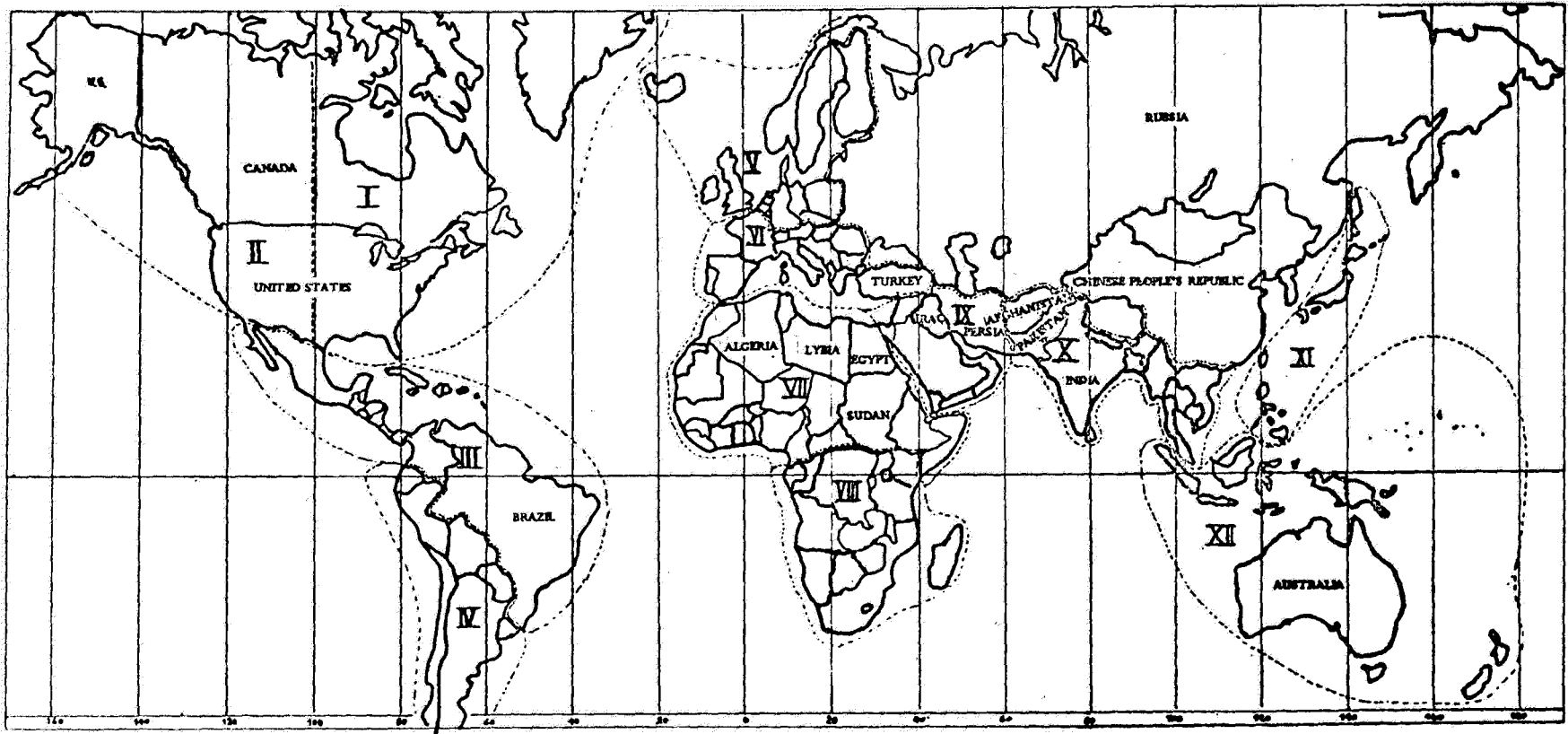
17. One may wonder what use can be made of such statistics. It should be remembered that T.O.D. statistics with complete routing on area base together with the Traffic-flow statistics of I.C.A.O. will appear to be useful for all kinds of surveys into details. In this connection reference is made to the objectives stated in the American questionnaire for O. and D. statistics.

18. The introduction of the area concept in the statistical processing cannot present any difficulties for the Centralized System. Nor will this be the case with the airport-concept, since in the punch cards the areas instead of the airports will be punched.

19. Finally, reference should be made of the fact that this system, which is based on the recording of carriers, will immediately be of world-wide importance, even if only the large carriers are willing to co-operate. There is a better chance of getting an insight into the traffic flows of important parts of the world than when recording the traffic flows by airports. On the other hand it meets the objections to the too complicated Centralized system.

20. In view of the above the Panel will probably consider this system as a kind of compromise between the two systems dealt with so far.

concept traffic areas for civil aviation



SUMMARIES WHICH MIGHT BE ADDED TO THE PUBLICATION
PROPOSALS PRESENTED IN APPENDICES 1, 2 AND 6

(Presented by Dr. H. Kuiler)

1. Under point VII of the terms of reference of the O&D Panel the following reference is made to the publications of O&D statistics:

- the advantages and disadvantages of various methods of processing and publication and make recommendations as to the most feasible method.

In connection with this it is understandable that during its work the Panel devoted attention to the presentation and publication of this form of statistics in the following working papers:

Appendix 1 of the Final Report in relation with the (U.S.) Centralized System,

Appendix 6 of the Final Report in relation with the French airport system,

Appendix 12 of the Final Report in which the so-called area concept was developed. (Netherlands)

2. Since travel by its nature moves between different geographical points it was thought desirable to develop summarizations by geographical groupings. The geographical concept has been introduced for two reasons. In the first place it might be necessary to combine smaller airports with bigger ones when sampling methods are used for the collection of the figures (see Appendix 10 of the Final Report on sampling regarding regional stratification). In the second place it might be desirable in special cases to work with bigger units than countries if one wants to get an insight on major world traffic flow a more detailed explanation is given in a working paper which was presented to the Panel (OD 4/WP 8). In this paper an example was also given of a breakdown of the world into regions. The most appropriate grouping for this purpose should be related to the particular purpose to be served.

3. A convenient geographical grouping for summarization of O&D traffic volumes would be:

- a) Regions
- b) Countries
- c) Airports or Cities

The traffic volumes between geographical pairs with varying degrees of intermediate routings would be indicated by:

- a) COD
- b) DOD
- c) DOD with complete COD routing.

4. A summarisation of the O&D statistics by geographical groupings could be accomplished by two different formats.

4.1 Traffic volumes between geographical pairs without intermediate routings.

- a) By regions
- b) By countries
- c) By airports or cities

Format 1

	DOD	COD
Regions	x	x
Countries	x	x
Airports or Cities	x	x

TABLE I
INTERNATIONAL PASSENGER TRAFFIC BY REGIONS (DOD)

Departure region	Arrival Region										
	1	2	3	4	5	6	7	8	9	10	Total
	Passengers Carried										
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
(20 to 30 regions)											
Total											

Table 2
International passenger traffic by countries (DOD)
Table 3a
International passenger traffic by airports (DOD)
Table 3b
International passenger traffic by airports (COD)

4.2 Traffic volumes between geographical pairs with varying degrees of intermediate routings.

- a) By regions
- b) By countries
- c) By airports or cities

Format 2

	DOD & Routing	Classes of service	Any other detail on ticket
Regions	x	x	x
Countries	x	x	x
Airports or Cities	x	x	x

LIST 1

INTERNATIONAL PASSENGER TRAFFIC
 BY REGIONS WITH REGION ROUTING

Base region	Region routing	Reference region	Number of passengers
List 2 International passenger traffic by countries with country routing			
Base country	Country routing	Reference country	Number of passengers
List 3 International passenger traffic by airports with COD-routing			
Base airport	COD - routing	Reference airport	Number of passengers

5. The totals of the DOD tables will give the total number of passengers transported, the total of the COD tables will give the total number of trips or stages.

In addition to the tables and listings developed the following indication might be useful:

- a) In the table on regions DOD in the cells connecting the same regions the international regional traffic must be taken into account
- b) In the tables of the countries DOD in the cells connecting the same countries only the territorial traffic will have to be indicated. In all other cases these cells remain blank.

O&D PANEL
FINAL REPORT
27/2/63

- 288 -

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APPENDIX 14

REVIEW OF WORKING PAPERS PRESENTED TO THE PANEL ON
ORIGIN AND DESTINATION STATISTICS

(Presented by Mr. K. Gizbert and Dr. E.W. Steck)

1. INTRODUCTION: SCOPE OF THIS REVIEW

A number of working papers has been presented to the Panel on Origin and Destination Statistics. Some of these papers dealt in the particular points which at that time the Panel was considering and were of limited and temporary interest only. Some working papers elaborated more fully certain aspects of the Panel's work and are included in the final report as appendices. A number of working papers was also presented which were of a descriptive or technical nature and which were used as background material for the Panel's work. It is believed that some of them may be of interest to specialized users outside of the Panel membership. Because of the limited and specialized interest in this material, the inclusion of these working papers as further appendices to the Panel's report would not be justified; however, in order to facilitate the access to this material by would be users the review of the selected working papers is presented hereunder.

2. DESCRIPTIVE PAPERS

A number of working papers was presented dealing with problems of collection and analysis of O&D Statistics in different member states.

AUSTRALIA - STA III - WP/26, 18 November 1958, 2pp.

Reproduced as "Attachment" to OD 3-WP/5 "Views of the Argentine Government on Origin and Destination Statistics" (pp. 3-4). The system was based on airport examination of passenger tickets.

BRAZIL - OD 2-WP/1, 1 February 1960, presented by Col. J.C. Miranda Correa, 8 pp.

The described system was based on O&D collection by Brazilian air carriers. Tickets collected during 6 sample months were used as the source of information. Facsimile of Statistical forms are included.

CANADA - "Origin & Destination Traffic Flow Statistics in Canada" OD 2-WP/7, 14 March 1960, presented by Mr. H.J. Darling, 24 pp.

Sample reporting forms. OD 3-WP/7 (Appendix) pp. 9 and sample reporting forms.

The described system is based on airline reporting 10% and 20%. Sample of tickets lifted is used. The paper contains a brief history and description of collection method and uses. Revisions to the system are described in OD 3-WP/7 (Appendix) pp. 3-12.

GERMANY - OD 2-WP/17; OD 3-WP/4, (Appendix 11, Final Report), 12 December 1960.

"Description of air passenger statistics in the Federal Republic of Germany and Examination of the Usability of this Method for international Origin and Destination Statistics of ICAO". Presented by Mr. P. Schmidt, pp. 20 and 9. Attachments. Reporting Terms, instructions and sample tabulations. Reproduced as an appendix to the Report of the Panel.

SPAIN - OD 2-WP/9, 7 April 1960, presented by Mr. Chamorro, pp. 6. Sample forms. The system is based on airport collection. The source document is the General Declaration.

SWITZERLAND - OD 2-WP/5, 29 February 1960, presented by Dr. Steck, 3 pp.

Sample reporting form OD 2-WP/16, 1 June 1960, reproduced the reporting form into instructions. The described system is based on airport collection. The system involves 100% analysis of flight coupons of departing passengers, to obtain "true" origin and destination statistics.

UNITED KINGDOM - OD 2-WP/10, 11 April 1960. Presented by Mr. A.K. Watson.
1 page sample forms.

O&D Statistics are collected by U.K. airports. The most common method of reporting was by means of a Ministry of Aviation form. "On flight" O&D or COD information was collected on passenger traffic. U.K. airlines collected O&D information for their own purposes.

UNITED STATES OF AMERICA - OD 2-WP/3, February 1960. Presented by United States Representative on Panel (Mr. Hord). 11 pages, exhibits A-H. OD 2-WP/4, 22 February 1960 "Manual of Instructions for Origin and Destination Surveys".

The described system was based on collection (O&D) by U.S. carriers. The paper contains a short historical outline of the surveys, description of collection methods, basic uses of the data and tabulation.

(Appendix 4, Final Report)-11 February 1963. Presented by the United States of America, pp. 7 "Experience into Electronic Data Processing in the Production of Air Passenger Origin-Destination Statistics in the United States".

3. MISCELLANEOUS PAPERS

Sampling - OD 4-WP/8

"Advantages and disadvantages of plane and flight sampling for Origin and Destination Statistics", presented by Dr. H. Kuiler, 26 January 1962, pp. 12.

Contain a mathematical appendix on "Sampling in Time and Space" by F.W.E. Vos of Netherlands Central Statistical Office.

Area Concept - Appendix 12, Final Report.

"The Area concept for statistics on Origin and Destination" by Dr. H. Kuiler, 15 January 1962, pp. 5.

Combination of Airport & Airline Systems - OD 3-WP/3

"Alternative Systems for the Collection of International O&D Statistics". A Discussion Paper presented by Mr. H.J. Darling supplemented by OD 3-WP/7.

4. INTERIM PANEL REPORTS

Four interim Panel Reports were issued (OD 1-WP/10; OD 2-WP/18; OD 3-WP/31; OD 4-WP/36) and may be consulted for the purpose of tracing of the development of the Panel's work.

O&D PANEL
FINAL REPORT
27/2/63

-- 292 --

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PANEL SESSION	WORKING PAPER	PRESENTED BY:	DESCRIPTION	NOTES
OD-1	1	-	Terms of reference of the Panel	-
	2	-	Provisional Agenda	Approved in OD 1-WP/5
	3	S.	Resume of STA III working papers	-
	4	S.	Suggestions concerning the method of work of the Panel	-
	5	-	Agenda	Previous draft: OD 1-WP/2
	6	S.	First draft for Provisional Agenda for Second Session	Next draft: OD 1-WP/8
	7	S.	First draft for First Interim Report	Approved in OD 1-WP/10
	8	Drafting Group	Second draft for Provisional Agenda for Second Session	Previous draft: OD 1-WP/6 Approved in OD 1-WP/9
	9	S.	Final draft for Provisional Agenda for Second Session	Previous drafts: OD 1-WP/6 & 8
	10	-	FIRST INTERIM REPORT OF THE PANEL	-

OD-2	1 and Supp.	Col.J.C.Miranda Correa	Studies concerning the methods for implementation in Brazil of statistical procedures for the determination of the true origin and destination of traffic	-
	2	Mr. X.F. de la Renaudiere	Questionnaire concerning sources of air transport available at European airports	

LIST OF WORKING PAPERS OF THE PANEL
ON ORIGIN AND DESTINATION STATISTICS

PANEL SESSION	WORKING PAPER	PRESENTED BY:	DESCRIPTION	NOTES
OD-2 Cont'd	3	U.S.	Description of the air passenger Origin and Destination statistics of the U.S.	-
	4	U.S.	Manual of instructions for Origin and Destination surveys of airline passenger traffic and international station to station airline traffic survey of revenue traffic by classes	-
	5	Switzerland	Method of collection of Origin and Destination statistics in Switzerland	-
	6 and supp.	U.S.	Plan for centralized production of world-wide passenger ticket air travel statistics	Final Report, Appendix 1
	7	Canada	Origin and Destination traffic flow statistics in Canada	See addenda OD 3-WP/7
	8	Canada	Manual of instructions for Origin and Destination surveys of airline passenger traffic	-
	9	Mr. Chamorro	Statistics of Origin and Destination in Spain	-
	10 and add. No. 1	Mr. A.H. Watson (U.K.)	Origin and Destination statistics compiled in U.K.	-
	11	Mr. O. Cardoso	Comments on Origin and Destination statistics in Argentina	-
	12	-	First draft of Second Interim Report of the Panel (Part I)	Second & third parts see: OD 2-WP/13 & 15, Final Report OD 2-WP/18

O&D PANEL
 FINAL REPORT
 APPENDIX 15
 2/2/63

PANEL SESSION	WORKING PAPER	PRESENTED BY:	DESCRIPTION	NOTES
OD-2 Cont'd	13	-	First draft of Second Interim Report of the Panel (Part II)	See also OD 2-WP/12-15 and 18
	14	-	Suggestions for planning the future work of the Panel and Draft Provisional Agenda for the Third Meeting	-
	15	-	First draft of Second Interim Report of the Panel (Part III)	See also: OD 2-WP/12-13 and 18
	16	Switzerland	Origin and Destination statistics in Switzerland	Previous working paper - OD 2-WP/5
	17	Germany	Origin and Destination statistics in the Federal Republic of Germany	-
	18	-	SECOND INTERIM REPORT OF THE PANEL	

OD-3	1	-	Agenda	-
	2	-	Legal aspects of collecting and publishing ticket data	See documents OD 3-WP/9 and OD 3-WP/30, para. 5-9 incl.
	3	Canada	Systems for the collection of international Origin and Destination statistics	See addenda OD 3-WP/7 and summary of discussions on OD 3-WP/15 & 20
	4	Mr. P. Schmidt	Description of air passenger statistics in the Fed. Republic of Germany and examination of the useability of this method for international Origin and Destination statistics	See summary of discussions on OD 3-WP/10 & 11 --Final Report, Appendix 11

PANEL SESSION	WORKING PAPER	PRESENTED BY:	DESCRIPTION	NOTES
OD-3 Cont'd	5	Mr. H.R. Settis	Argentina's views on Origin and Destinations	-
	6	Mr. P. Rivoal	Plan for the collection of Origin and Destination statistics and for their publication through ICAO	See summary of discussions in OD 3-WP/12 to 15 incl. - Final Report, Appendix 6
	7	Mr. H.J. Darling	New plan for the collection and presentation of Origin and Destination statistics adopted by Canada since January 1, 1961	Addenda to working papers OD 2-WP/7, OD 3-WP/3
	8		Effects of variations in routing detail under the United States plan for production of Origin and Destination statistics	See introduction and discussion on this note in OD 3-WP/23 & 24. Attachment 2 of this paper - Final Report, Appendix 2
	9	-	Draft for report on possible legal difficulties in collecting and publishing Origin and Destination statistics	See preceding document OD 3-WP/2 and following document OD 3-WP/30, paras. 5-9 incl.
	10	-	Examination of the note submitted by the German Delegation	See German note on OD 3-WP/4
	11	-	Examination of the note submitted by the German Delegation	See German note on OD 3-WP/4
	12	-	Examination of the note submitted by the French Delegation	See French note on OD 3-WP/6
	13	-	Examination of the note submitted by the French Delegation	See French note on OD 3-WP/6
	14	4	Examination of the note submitted by the French Delegation	See French note on OD 3-WP/6

OGD PANEL
 FINAL REPORT
 APPENDIX 15
 27/2/63

PANEL SESSION	WORKING PAPER	PRESENTED BY:	DESCRIPTION	NOTES
OD-3 Cont'd	15	-	Completion of examination of French note and the examination of the note submitted by the Canadian Delegation	See French note on OD 3-WP/6 and Canadian note on OD 3-WP/3
	16	-	Report of the Working Group on Cost Estimating	-
	17	-	Questionnaire on Origin and Destination statistics in relation to International Air Transport	See also OD 3-WP/26
	18	S.	Main points to be studied for possible ICAO and Origin and Destination statistics systems	-
	19	-	Resume of matters to be further examined by the Third Session	-
	20	-	Summary of discussions of Canadian paper	See Canadian note on OD 3-WP/3
	21	Mr. M.P. Schmidt	Cost incurred by airlines for the filling in of Air Traffic Statistical Forms	-
	22	S.	Discussion paper on arrangements for concluding the work of the Panel	-
	23	-	Introduction of the United States paper on Detail of Costs for an Airline Reporting system	See American note on OD 3-WP/8
	24	-	Summary of discussions of the United States paper	See American note on OD 3-WP/8
	25	-	Discussion of the study of the Airport System	See OD 3-WP/16

PANEL SESSION	WORKING PAPER	PRESENTED BY:	DESCRIPTION	NOTES
OD-3 Cont'd	26	-	Discussion of a possible distribution of a questionnaire to States on uses of Origin and Destination statistics	-
	27	-	First draft Third Interim Report of the Panel	See following documents OD 3-WP/29, 30 & 31
	28	-	Amendments to daily summaries of discussions	See preceding documents OD 3-WP/9, 10, 14, 15 & 23
	29 & 30	-	Second draft Third Interim Report of the Panel	See preceding document OD 3-WP/27 and following document OD 3-WP/31
	31	-	THIRD INTERIM REPORT OF THE PANEL	-
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OD-4	1	U.S.	Summary of responses to Questionnaire on needs for travel statistics from the airline passenger ticket	Following document OD 4-WP/2 -Final Report, Appendix 5
	2 & add.	Working Group on Questionnaire	Report on Questionnaire	Preceding document OD 4-WP/1
	3	S.	Discussion on possible uses of Origin and Destination statistics	-
	4	Dr. H. Kuiler	The Area Concept for statistics on Origin and Destination	-Final Report, Appendix 12
	5	Mr. W. Hord	Annual cost estimation to ICAO for centralized production under the U.S. plan	See also OD 4-WP/9 -Final Report, Appendix 8

PANEL SESSION	WORKING PAPER	PRESENTED BY:	DESCRIPTION	NOTES
CD-4 Cont'd	6 & add.	S.	The meaning of Origin and Destination	-
	7	Mr. P. Rivoal	Report of the Working Group on cost studies of Origin and Destination statistical systems based on airport documents	-Final Report, Appendix 8
	8	Dr. H. Kuiler	Advantages and disadvantages of plane and flight sampling for Origin and Destination statistics.	-
	9	S.	ICAO Cost Estimates in connection with centralized production of statistics under the United States plan	In conjunction with OD 4-WP/5 -Final Report, Appendix 8
	10	Mr. P. Rivoal & Mr. W. Hord	Comparative description of the French and U.S. plans	See also: OD 4-WP/14
	11	Mr. W. Hord	Estimated annual costs of ICAO member States under American plan	--Final Report, Appendix 8
	12	U.S.	Estimated annual costs to Airlines under the American plan	-Final Report, Appendix 8
	13	-	Draft Agenda for Fourth Session	-
	14	U.S.	Comparative evaluation of the U.S. and French plans	See also: OD 4-WP/10
	15	Mr. W. Hord	Schematic diagram of U.S. & French systems	See also: OD 4-WP/10 & 14
	16	S.	Suggested outline for Final Report of Panel	-

PANEL SESSION	WORKING PAPER	PRESENTED BY:	DESCRIPTION	NOTES
OD-4 Cont'd	17 (appendix to OD 3-WP/6)	France	Elimination of problems resulting from duplications and from the non-participation of some airports	See also: OD 4-WP/19 -Final Report, Appendix 6
	18	Mr. W. Hord	Method of eliminating duplication and filling gaps in statistics under the U.S. plan	-Final Report, Appendix 3
	19	Mr. P. Rivoal	Method of eliminating duplication and filling of possible gaps under the French plan	See also: OD 4-WP/17 -Final Report, Appendix 7
	20	-	Extract on statistical matters from Report of the ICAO Observers on the Third Meeting of the Regional Conference of Civil Aviation (Bogota)	-
	21	-	Points to be considered in evaluating alternative Origin and Destination proposals	See OD 4-WP/16
	22	-	First Draft of Final Report of Panel Part I	-
	23	Mr. P. Rivoal	Text on Scope & Magnitude of the statistics service to be added to OD 4-WP/10	Following document OD 4-WP/28
	24	-	First Draft of Final Report of Panel Part II	Part I on OD 4-WP/22
	25 & add.	-	First Draft of Final Report of Panel Part III	Part I & II on OD 4-WP/22 & 24
	26	-	First Draft of Final Report of Panel Part IV	Part I, II & III on OD 4-WP/22, 24 & 25

OED PANEL
 FINAL REPORT
 APPENDIX 15
 21/2/65

PANEL SESSION	WORKING PAPER	PRESENTED BY:	DESCRIPTION	NOTES
OD-4 Cont'd	27	-	First Draft of Final Report of Panel Part V (Cont'd OD 4-WP/33)	Part I, II, III & IV on OD 4-WP/22, 24, 25 & 26
	28	Mr. W. Hord	Text on Scope & Magnitude of the Statistical Operation to be added to OD 4-WP/10	Preceding document OD 4-WP/23
	29	Mr. H. Söderberg	Suggested paragraph in Final Report with regard to Questionnaire to States	-
	30	Mr. H. Söderberg	Suggested Questionnaire	-
	31	-	Suggested Questionnaire	-
	32	Mr. W. Hord & Dr. H. Kuiler	Report on sampling	Cancelled by OD 5-WP/16
	33		First Draft of Final Report of Panel Part V (continuation of OD 4-WP/27)	Part I, II, III, IV on OD 4-WP/22, 24, 25 & 26
	34	-	Report of the Working Group on costs	-
	35 & add.	-	First Draft of Fourth Interim Report of the Panel	-
	36	-	FOURTH INTERIM REPORT OF THE PANEL	-
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OD-5	1	-	Draft Agenda	-
	2	-	Reproduction of OD 4-WP/24	-
	3 & add.	-	Reproduction of OD 4-WP/25 and add.	-

PANEL SESSION	WORKING PAPER	PRESENTED BY:	DESCRIPTION	NOTES
OD-5 Cont'd	4	-	Reproduction of OD 4-WP/26 and Appendix I of OD 4-WP/26	-
	5	-	Reproduction of OD 4-WP/34	-
	6	-	Reproduction of OD 4-WP/27	-
	7	-	Reproduction of OD 4-WP/33	-
	8	Canada	Note on Origin and Destination statistics presented to the Fourteenth Session of the ICAO Assembly	-
	9	-	Suggested Questionnaire Part I	Revision of OD 4-WP/30 -Final Report, Appendix 9
	10		Suggested Questionnaire Part II	Revision of OD 4-WP/31 -Final Report, Appendix 9
	11	U.S.	Experience with Electronic Data Processing in the production and use of Air Passenger Origin and Destination Statistics in the U.S.	-Final Report, Appendix 4
	12	Mr. D.N. Miller	Redraft of headings to columns (c) to (h) of Questionnaire	See OD 5-WP/10 -Final Report, Appendix 9
	13	-	Reproduction of OD 4-WP/27	-
	14	S.	Second Draft of section of Final Report - Part II - The meaning & scope of Origin and Destination statistics	See OD 5-WP/2 First draft
	15	S.	Second Draft of section of Final Report - Part III - Possible uses of Origin and Destination statistics	See OD 5-WP/3 First draft

PANEL SESSION	WORKING PAPER	PRESENTED BY:	DESCRIPTION	NOTES
OD-5 Cont'd	16	Mr. W. Hord & Dr. H. Kuiler	Report on Sampling (Cancelling OD 4-WP/32)	-Final Report, Appendix 10
	17 & corrig.	S.	Working papers connected with Final Report	-
	18	France	Estimation of Annual Cost of world-wide Origin and Destination statistics according to Airport Plan	This paper is now incorporated in the tables appended to the Cost Group Report (See Appendix 8)
	19	Nigeria	Need for Statistics of Origin and Destination	-
	20 Add. No. 1	-	List of Working Papers of the Panel on Origin and Destination Statistics	-Final Report, Appendix 15
	21 & Add. Nos. 1-6	Working Group on Description	Description of the two proposed schemes for ICAO Q&D Statistics	Redraft of OD 5-WP/4
	22	Working Group on Costs	Report of the Working Group on Costs	Preceding document OD 5-WP/5 -Final Report, Appendix 8
	23	-	Suggested Redraft to replace Para 5 & 6 of OD 4-WP/22. Covering the method by which the Panel dealt with various elements in its terms of reference.	-
	24	S.	First Draft for possible Conclusions and Recommendations	-
	25	Dr. H. Kuiler	Summaries which might be added to the publication proposals presented in Appendices 1, 2 and 6	-Final Report, Appendix 13
	26	-	Draft of section of Final Report. Evaluation of the advantages and disadvantages of the proposed schemes Part V	Continuation of OD 5-WP/13

PANEL SESSION	WORKING PAPER	PRESENTED BY:	DESCRIPTION	NOTES
OD-5 Cont'd	27	-	Suggested Questionnaire Part I	Redraft of OD 5-WP/9 -Final Report, Appendix 9
	28	Mr. K. Gizbert and Dr. E.W. Steck	Review of Working Papers presented to the Panel on Origin and Destination statistics	-Final Report, Appendix 14
	29	Dr. H. Truestedt	Remarks relating to Part VI - "Conclusions and Recommendations" of the Panel's Final Report	-
	30		Redraft of headings of columns (c) to (h) of the Questionnaire	Previous document: OD 5-WP/10 -Final Report, Appendix 9
	31	-	Paragraph to be included in the Final Report (control of disclosure of data)	See OD 3-WP/2
	32	-	Final Report (Part II) - The meaning and scope of Origin and Destination statistics	Redraft of OD 5-WP/14
	33	-	Draft of Conclusions	
	34	IATA	IATA Statement	
	35		Draft section of Report on legal obstacles	

O&D PANEL
 FINAL REPORT
 APPENDIX 15
 27/2/63

ICAO TECHNICAL PUBLICATIONS

The following summary gives the status, and also describes in general terms the contents of the various series of technical publications issued by the International Civil Aviation Organization. It does not include specialized publications that do not fall specifically within one of the series, such as the ICAO Aeronautical Chart Catalogue or the Meteorological Tables for International Air Navigation.

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES are adopted by the Council in accordance with Articles 54, 37 and 90 of the Convention on International Civil Aviation and are designated, for convenience, as Annexes to the Convention. The uniform application by Contracting States of the specifications comprised in the International Standards is recognized as necessary for the safety or regularity of international air navigation while the uniform application of the specifications in the Recommended Practices is regarded as desirable in the interest of safety, regularity or efficiency of international air navigation. Knowledge of any differences between the national regulations or practices of a State and those established by an International Standard is essential to the safety or regularity of international air navigation. In the event of non-compliance with an International Standard, a State has, in fact, an obligation, under Article 38 of the Convention, to notify the Council of any differences. Knowledge of differences from Recommended Practices may also be important for the safety of air navigation and, although the Convention does not impose any obligation with regard thereto, the Council has invited Contracting States to notify such differences in addition to those relating to International Standards.

PROCEDURES FOR AIR NAVIGATION SERVICES (PANS) are approved by the Council for worldwide application. They comprise, for the most part, operating procedures regarded as not yet having attained a sufficient degree of maturity for adoption as International Standards and Recommended Practices, as well as material of a more permanent character which is considered too detailed for incorporation in an Annex, or is susceptible to frequent amendment, for which the processes of the Convention would be too cumbersome. As in the case of Recommended Practices, the Council

has invited Contracting States to notify any differences between their national practices and the PANS when the knowledge of such differences is important for the safety of air navigation.

REGIONAL SUPPLEMENTARY PROCEDURES (SUPPS) have a status similar to that of PANS in that they are approved by the Council, but only for application in the respective regions. They are prepared in consolidated form, since certain of the procedures apply to overlapping regions or are common to two or more regions.

The following publications are prepared by authority of the Secretary General in accordance with the principles and policies approved by the Council.

ICAO FIELD MANUALS derive their status from the International Standards, Recommended Practices and PANS from which they are compiled. They are prepared primarily for the use of personnel engaged in operations in the field, as a service to those Contracting States who do not find it practicable, for various reasons, to prepare them for their own use.

TECHNICAL MANUALS provide guidance and information in amplification of the International Standards, Recommended Practices and PANS, the implementation of which they are designed to facilitate.

AIR NAVIGATION PLANS detail requirements for facilities and services for international air navigation in the respective ICAO Air Navigation Regions. They are prepared on the authority of the Secretary General on the basis of recommendations of regional air navigation meetings and of the Council action thereon. The plans are amended periodically to reflect changes in requirements and in the status of implementation of the recommended facilities and services.

ICAO CIRCULARS make available specialized information of interest to Contracting States. This includes studies on technical subjects as well as texts of Provisional Acceptable Means of Compliance.

DIGESTS OF STATISTICS*

ICAO publishes Digests of Statistics in the following six series:

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| <p>Series AT - Airport Traffic:
contains monthly and yearly statistics for airports open to international traffic.</p> <p>Series T - Traffic:
contains monthly and yearly traffic statistics for scheduled airlines. Information is also provided by countries.</p> <p>Series TF - Traffic Flow:
includes statistics on the flow of traffic carried from point to point. This material is given for selected months, March and September, of each year.</p> | <p>Series F - Financial Data:
gives balance sheets and profit and loss statements.</p> <p>Series FP - Fleet and Personnel:
provides material on the number and types of aircraft together with data on employees.</p> <p>Series R - Civil Aircraft on Register:
contains annual data of Civil Aircraft on Register. Aircraft weighing 20 000 lb (9 074 kg) and over are shown by type.</p> |
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No. 90, Series T-No. 19 Traffic, 1947-1961	\$5.50
No. 91, Series FP-No. 14 Fleet - Personnel, 1960	\$2.00
No. 92, Series TF-No. 30 Traffic Flow, September 1961	\$3.00
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No. 96, Series R-No. 1 Civil Aircraft on Register, 1961	\$1.25
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* Trilingual publications - Format 27 cm x 21 cm (11" x 8-1/2"). A complete list of Digests already published is given in the Catalogue of Salable Publications which is sent free on request.

PRICE: \$4.75 (Canadian) (Montreal)
Equivalents at date of publication:

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