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# CHANGE OF AIRCRAFT ON INTERNATIONAL AIR TRANSPORT ROUTES

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AWARENESS of the growing magnitude and complexity of international air transport services has led the negotiators of certain international agreements to provide for a practice which, though not yet widely adopted, may in many instances contribute to the economy and efficiency of operation. This practice has not been described by any single and unambiguous term, although certain of its varieties have been called "change of gauge," "transshipment," and "change of aircraft." The latter term, for want of a better one, is used here generically as including "change of gauge." "Change of gauge" chronologically came first. It was defined in the Bermuda Air Services Agreement of February 11, 1946, between the United States and the United Kingdom,<sup>1</sup> as "the onward carriage of traffic by an aircraft of different size from that employed on the earlier stage of the same route" (Article V (a) of the Annex to the Air Services Agreement). The somewhat broader term "transshipment" was used in the Paris Agreement between France and the United States, March 27, 1946,<sup>2</sup> and in the agreement between Belgium and the United States of April 5, 1946,<sup>3</sup> in both of which it is defined as "the transportation by the same carrier of traffic beyond a certain point on a given route by different aircraft from those employed on the earlier stages of the same route" (Section VI (a) of the Annex).<sup>4</sup> It will be noted that the term "transshipment" is broader than "change of gauge," since the latter refers to aircraft of "different size" while "transshipment" refers to "different aircraft." "Change of gauge" is thus only one type, though doubtless the most important in practice, of "transshipment." The United States-Brazilian Agreement of September 6, 1946,<sup>5</sup> is virtually identical with the Bermuda Agreement with respect to "change of gauge" and related matters. The agreement between the United States

<sup>1</sup> *Treaties and Other International Acts Series*, No. 1507. For texts of the relevant provisions, in this and other agreements, see Appendix *infra*.

<sup>2</sup> U.S. Department of State, Press Release No. 196, March 26, 1946.

<sup>3</sup> *Ibid.*, No. 231, April 8, 1946.

<sup>4</sup> The use of "transshipment" in this sense creates danger of confusion, since in the Warsaw Convention for the Unification of Certain Rules Relating to International Transportation by Air (*U.S. Treaty Series*, No. 876) the term (*transbordement* in the French text) has a broader meaning.

<sup>5</sup> U.S. Department of State, Press Release No. 636, September 12, 1946. The "change of gauge" provision is contained in Section VI of the Annex.

and India of November 14, 1946,<sup>6</sup> avoids the use of either term, but refers to "change of aircraft" when "different aircraft are used on different sections of a specified air route, with the point of change in the territory of one of the Contracting Parties" (Article V). As thus defined, "change of aircraft" is identical with "transshipment" as used in the French and Belgian agreements, since there is no reference to "different size."

#### LEGAL ASPECTS

The practices of "transshipment," "change of gauge," and "change of aircraft" as described in the various agreements of the United States, are permitted subject to the conditions specified in the agreements. These conditions are more restrictive in the Bermuda Agreement with the United Kingdom and in the agreement with India than in the agreements with France and Belgium. Below is an analysis of the conditions common to all of the agreements followed by an analysis of the further restrictions contained in the Bermuda Agreement and in the agreement with India.

#### *Common Conditions:*

1. *Justification by Economy of Operation.* This condition is implied in the following terms in the Bermuda Agreement: "where . . . (the change of gauge) is justified by reason of economy of operation, such change of gauge at a point in the territory of the United Kingdom or the territory of the United States, shall not be made in violation of the principles . . ." (Article V (a) of the Annex). In the French and Belgian agreements, the condition is laid down in affirmative terms: "Transshipment when justified by economy of operation shall be permitted at all points mentioned in the attached schedules in territory of the two contracting parties" (Section VI (b) of the Annex). In the agreement with India the same condition is implied by the following language: "When, for the purpose of economy of onward carriage of through traffic, different aircraft are used . . ." (Article V). It will be noted that the Bermuda and Indian agreements, unlike the French and Belgian, do not express the condition of economy of operation in affirmative terms. It is not believed, however, that it was the intention of the parties to any of the agreements to permit the practices here discussed when they are *not* justified by economy of operation. A contrary interpretation, based on a literal reading of the language employed, would lead to the conclusion that the practice, when *not* so justified, would be permitted on more liberal terms than when it is so justified, since it would not be expressly subject to the limitations described below. Such a conclusion would be contrary to the general purpose and meaning of the agreements.

2. *Consistency with the principles and standards set forth elsewhere in the agreements.* In the Bermuda Agreement, it is provided that change of gauge "shall not be made in violation of the principles

<sup>6</sup> *Ibid.*, No. 810, November 13, 1946.

set forth in the Final Act of the Conference on Civil Aviation held at Bermuda from January 15th to February 11, 1946, and, in particular, shall be subject to there being an adequate volume of through traffic." (Article V (a) of the Annex.) It is added that the arrangements for change of gauge "shall be governed by and in no way restrictive of the standards set forth in paragraph six of the Final Act." (Article V (c) of the Annex.) In the French and Belgian agreements it is laid down that "no transshipment will be made in the territory of either contracting party which would alter the long-range characteristics of the operation or which would be inconsistent with the standards set forth in this agreement and its annex and particularly Section IV of this Annex." (Section VI (c) of the Annex.) In the agreement with India it is stated that "such change of aircraft shall not affect the provisions of this Agreement relating to the capacity of the air service and the carriage of traffic." (Article V.)

An examination of the principles and standards referred to indicates that they are virtually identical in all the agreements, with the possible exception of the agreement with India. The salient features are these:

(a) While there is no specific limitation on capacity, it is agreed that the air transport services offered by the carriers of the parties should be closely related to the requirements of the public.

(b) The services to be provided should retain as their primary objective the provision of capacity adequate to the traffic demands between the country of which the airline is a national and the country of ultimate destination of the traffic.

(c) "Fifth Freedom" traffic is permitted subject to the principle that capacity shall be related:

(1) To traffic requirements between the country of origin and the countries of destination,

(2) To the requirements of through airline operation, and

(3) To the traffic requirements of the area through which the airline passes after taking account of local and regional services.

The application of these principles and standards is evidently necessary to prevent "change of gauge" or "transshipment" from being used primarily to divert local international traffic from local airlines rather than to facilitate the economical operation of long-range through services.

In the agreement with India the permission of "Fifth Freedom" traffic is subject to the principle that capacity shall be related:

(1) To traffic requirements between the country of origin of the air service and *destinations on specified air routes*;

(2) To requirements of through airline operation *for fill-up traffic*;

(3) To traffic requirements of the area through which the airline passes after taking account of other air transport services *established by airlines of the states concerned*.

The precise meaning of these limitations, as distinguished from the corresponding limitations in the other agreements, is not too clear, but the general effect seems to be restrictive. In particular, the wording of limitation (2) might be asserted to exclude from "the requirements of through airline operation" such technical factors of importance as the size and type of aircraft most suitable for through airline operation at high standards of safety, comfort, and speed. The possible significance of such an assertion will be seen below in the discussion of the clusterlike service pattern.

3. *Place of change of aircraft.* All the agreements speak of the change as being made in the territory of one of the contracting parties. Change in the territory of a third state is not covered. A literal interpretation of the language used in the agreements with France, Belgium, and India might lead to the conclusion that change by an air carrier within the territory of its *own* state would be expressly subject to the conditions on which the change is permitted by the agreement, but this construction, which in effect would mean a restriction on cabotage traffic carried by an airline within the territory of its own state, as well as on traffic carried between the airline's own state and a third state if the route extends to the territory of the other party to the agreement, is in part negatived by paragraph (b) of Section V of the Annex to the Bermuda Agreement, and is in any case hardly admissible in view of the general scope and purpose of the agreements.

*Special Conditions:*

Apparently as a further safeguard for the local airlines, the Bermuda Agreement specifically provides (Article V (b) of the Annex): "The small aircraft will operate only in connection with the larger aircraft arriving at the point of change, so as to provide a connecting service which will thus normally wait on the arrival of the larger aircraft, for the primary purpose of carrying onward those passengers who have traveled to United Kingdom or United States territory in the larger aircraft to their ultimate destination in the smaller aircraft." It will be noted that there is no requirement for the *larger* aircraft to wait for the arrival of the *smaller*, in the reverse direction. Not very clear is the meaning of the word "normally." Would the smaller aircraft be permitted to depart on schedule if the larger aircraft failed to arrive on time owing to delay on route? It is further stated that if "there are vacancies in the smaller aircraft such vacancies may be filled with passengers from United Kingdom or United States territory respectively," but that it is understood "that the capacity of the smaller aircraft shall be determined with primary reference to the traffic traveling in the larger aircraft normally requiring to be carried onward." It is believed that the latter statement is implicit in the general principles common to the Bermuda Agreement and the Paris Agreement, and thus does not really constitute an additional condition peculiar to the Bermuda Agreement. The agreement with India concisely

provides that "the second aircraft shall be scheduled to provide a connecting service with the first aircraft, and shall normally await its arrival." The reference to the "second" and the "first" aircraft might be asserted to constitute a limitation on the *number* of the smaller aircraft providing connections with the larger aircraft; it might be asserted that this language excludes the clusterlike service pattern discussed below. No reference to "first" or "second" aircraft appears in the other agreements, and the term "aircraft" may be understood to be used in the plural or in the singular, as the sense requires. The French and Belgian agreements clearly use "aircraft" in the plural, referring to "different aircraft from those employed . . . ." The language of the Bermuda agreement does not indicate that the term "aircraft" is necessarily used in the singular, and it has been generally assumed in air transport circles that the clusterlike pattern is permitted by the agreement. It seems not unreasonable to maintain, in the absence of other evidence of the common design of the parties to the agreement with India, that the words "first" and "second" are merely used by way of illustration and description of a time sequence, rather than by way of limitation on the number of aircraft involved in the change.

*Other U. S. Bilateral Agreements:*

Only the Bermuda Agreement and the agreements of the United States with France, Belgium, Brazil, and India contain express provisions on "change of gauge," "transshipment," or "change of aircraft." It is possible to argue that all the other bilateral agreements of the United States which provide for the carriage of international traffic (including "Fifth Freedom" traffic) imply similar permission. In the absence of explicit evidence as to the common design of the parties, however, it is impossible to demonstrate that the contrary interpretation is wrong. It is advisable, therefore, for the United States to insist on the insertion of express permission for such practice in its future bilateral agreements, if it should appear that there may be occasion to utilize such permission.

*Practical Construction:*

It must be realized, of course, that the principles and standards set forth in the agreements leave room for wide divergencies in interpretation and application. Conditions peculiar to each particular route may eventually give rise to accepted variations in the practical construction of these and similar provisions.

#### TECHNOLOGICAL ASPECTS

"Change of gauge" may be necessitated by lack of adequate airport facilities for the larger planes at some of the points served. It may be technologically necessary to utilize smaller planes on some of the legs of the route. For instance, Boeing aircraft, or even larger future types, may be able to fly between New York and London, but not find adequate runways at say Helsinki or Warsaw. In such a case "change

of gauge" would be the obvious method of providing through service from New York via London to Helsinki or Warsaw.

On very long routes, change of aircraft may be advisable to permit proper inspection and maintenance.

#### ECONOMIC FACTORS

The economic aspect of change of aircraft can be broken down into a number of factors, the interplay of which determines in a particular case whether the practice is profitable. These factors include the following:

1. Geographical characteristics of the route or routes operated.
2. Volume of traffic on each segment of the route.
3. Origin of traffic on each segment of the route.
4. Capacity, size and speed of available aircraft.
5. Unit costs of operation of the various types of aircraft which may be used on the route.
6. Traffic-depressing effects, if any, of the transfer of passengers from one type of aircraft to another.
7. Traffic-depressing effect, if any, of a decrease in frequency of flights.
8. Ground costs incidental to transshipment (*i.e.*, unloading and reloading of mail, express and baggage, maintenance of local base facilities, etc.).
9. Degree of regularity of operation on the various segments of the routes.
10. Character of available or potential competing services.

The geographical route pattern will determine the practicability of change of aircraft and its effect on traffic. Two general types of route patterns may be distinguished: the linear and the clusterlike. In the linear pattern the route may be represented by a single line on the surface of the globe, either straight (great circle) or broken. Thus the route New York-Stockholm-Moscow is a great circle linear route, since it coincides very closely with a great circle. The route New York-Stockholm-Berlin, on the other hand, may be called a broken linear route, since the Stockholm-Berlin segment does not lie on the same great circle as the New York-Stockholm segment. The clusterlike pattern may be illustrated by a system of routes passing through London:

New York-London-Stockholm  
New York-London-Berlin  
New York-London-Paris

It will be seen that this pattern can also be represented by a single route New York-London with branches from London to Stockholm, to Berlin, and to Paris. The pattern just described may be called the simple clusterlike pattern. A variation may be imagined with branches from London going, say, to Copenhagen-Stockholm-Moscow, to Amsterdam-Berlin-Moscow, and to Paris-Frankfort-Berlin. Each of these

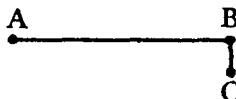
branches is of a linear route pattern. The entire system, in such a case, may be called a complex clusterlike pattern.

*Diagram of typical route patterns:*

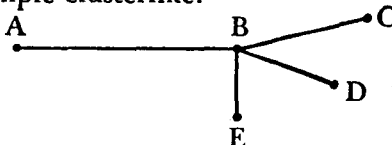
I. Great circle linear:



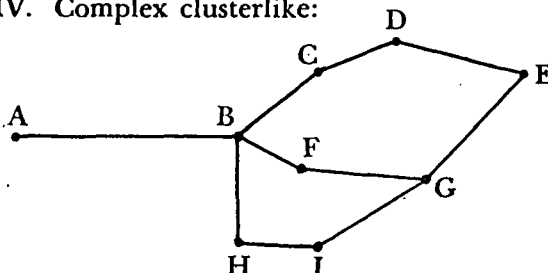
II. Broken linear:



III. Simple clusterlike:



IV. Complex clusterlike:



Assume that point A is located in the home territory of the airline, and that all other points are in foreign countries.

Taking *pattern I* as the simplest, we may note three possibilities:

(1) Volume of traffic on segment BC is substantially equal to volume of traffic on segment AB. In this case, there would be no need for "change of aircraft" unless there is available, for operation on segment BC, aircraft of substantially the same capacity but with lower operating costs than the aircraft suitable for operation on segment AB. If such aircraft is available, the change would be economically justifiable. Since the BC aircraft would probably be smaller than the AB aircraft in terms of gross tonnage and perhaps would have fewer engines, it could be maintained that such aircraft is of "different size" and thus within the definition of "change of gauge" despite substantially identical payload capacity of the two types.

(2) Volume of traffic on segment BC is substantially smaller than the volume of traffic on segment AB. In this case, unprofitably low load factors on segment BC could be avoided by the use of smaller aircraft on segment BC as compared with segment AB, or by having lower frequencies on segment BC than on segment AB (in other words, by terminating some flights at B), or by a combination of both devices. Low frequencies often have a traffic-depressing effect. This effect must be weighed against the extra expenses connected with



change of gauge and the possibly lower unit costs of aircraft suitable for BC operation.

(3) Volume of traffic on segment BC is substantially greater than on segment AB. In the absence of legal limitations on change of aircraft, this case would be the reverse of case (2) just discussed, and the same considerations would apply in reverse. Under the limitations laid down in the agreements, this case would be similar in effect to case (1) (equal volume of traffic on both segments), with the possible exception of a situation in which local airlines fail to provide adequate service between B and C.

In *pattern II*, there is the additional alternative, subject to technological limitations, of operating direct AC flights. Whether or not "change of gauge" at B seems to be indicated by lower traffic volume on the BC segment, the operator has to weigh the advantages of direct AC service (traffic stimulating effect of more direct and therefore shorter trips, faster turnabout of aircraft) against the disadvantages (traffic-depressing effect of lower frequencies, possibly higher unit costs due to longer nonstop hops). If direct AC service is not practicable or profitable, the analysis of pattern B is similar to that of pattern A.

In patterns I and II it is necessary to take into account the respective characteristics of the various available types of equipment in order to determine the practicability of "change of gauge." Suppose, for example, that the available types are 50-seat and 21-seat aircraft. Suppose, also, that the average plane load at a given frequency between A and B is 35 passengers, and between B and C — 25 passengers, of whom 15 are through AC passengers and 10 are BC passengers. It is evident that the total traffic between B and C cannot be adequately taken care of by a "change of gauge" from 50-seat to 21-seat aircraft operating on the same frequency. Such "change of gauge," however, will take care of the through AC passengers. The following alternatives are open:

(1) Fly 50-seat aircraft on the entire route AC at the same frequency. This will result in an average load factor of 70% between A and B and of 50% between B and C. Assuming that a no-loss operation requires a load factor of at least 65%, the operation will be profitable on AB but unprofitable on BC. The overall profitableness will in part depend on the ratio of the distance AB to distance BC.

(2) Fly 50-seat aircraft on the entire route, but with every alternate flight turning about at B (*i.e.*, BC frequency =  $\frac{1}{2}$  AB frequency). The traffic-depressing effect of this device may vary in part with the relation between the length of the trip and the number of frequencies. Thus, if the total elapsed time for a flight between A and C is 48 hours, a reduction in frequency between B and C from one flight per hour to one flight per two hours is likely to have less of a traffic-depressing effect than a reduction from one flight per twelve hours to one flight per twenty-four hours. The actual BC load factor will depend

on the precise traffic-depressing effect of a reduction in BC frequency in each concrete case, and also on available competing services.

(3) Change gauge at B from 50-seat to 21-seat aircraft maintaining the same frequency on AB and BC. This, as already stated, will take care of the *through* AC passengers, but not of all the available BC traffic.

It is evident that the choice of any one alternative in a given case will depend on the concrete characteristics of the route (total length and length of each hop), traffic volume, and available types of aircraft. Difficulty may also arise in arranging for connections at B because aircraft operating on segments AB and BC respectively will be flying different distances at different speeds. On one of the segments the rate of utilization may be excessively low because of the necessity of waiting for the arrival of aircraft operating on the other segment.

*Pattern III*, which may also be envisaged as a system of partly coinciding routes of patterns I and II, appears to present added opportunities for the utilization of the change-of-gauge device. Assume, for instance, that on each flight departing from A there is a total of 50 passengers, of whom 25 are bound for B, 10 for C, 10 for D, and 5 for E. There is, however, a traffic potential, at the same frequency, of 35 from B to C, 10 from B to D, and 15 from B to E. On these assumptions, it may be economical to operate 60-seat aircraft on the route ABC, and 25-seat aircraft on connecting flights on routes BD and BE. The question might arise, however, whether such an operation would be within the limiting principles of the agreements. It will be recalled that one of these principles is that capacity should be related primarily to the traffic demands between the country of which the airline is a national and the country of ultimate destination of the traffic. In the Bermuda Agreement, this principle is reiterated expressly with reference to "change of gauge." The government of the country in which B is located could argue that, if local and regional services are in the position to carry BC, BD, and BE traffic, the aircraft operated by the A airline on the routes BC, BD, and BE should only be large enough to take care of AC, AD, and AE traffic; and that, even with a reasonable allowance, the capacity of such aircraft should not be greater than 14 to 18 seats. The soundness of this argument might well depend on the availability of aircraft of such limited capacity suitable for operation at reasonable contemporary standards of comfort, safety and economy. It would not be unreasonable to maintain that the standards of operation of international services should be at least equal to those of regular domestic services in the countries with the most advanced air transport systems and that the use of small aircraft would make that impossible. It could also be pointed out that the available materials do not clearly indicate whether "change of gauge" was intended to be obligatory or optional with the operator, although such an intent may be deduced from the general principle stated above. The hypothetical controversy just suggested is an illustration of the vagueness of the

Bermuda principles — and an argument against their generalization through a multilateral convention. Vagueness that may not be fatal to adjustment and understanding between *two* nations may give rise to endless confusion in the complex relations of a score or more of states.

In *pattern IV*, which may be visualized as a combination of patterns I, II and III, the considerations involved are fundamentally identical with those in the other patterns, but the total number of possible alternatives is greater, and the possible operating patterns more flexible. In particular, there are opportunities for the operation of circular flights (*e.g.*, ABCDEFGFBA).

In conclusion, it may be stated that the question of the *economic* justification of change of aircraft can be answered only by a study of the particular characteristics of each concrete operating situation.

Since economic factors, including "economy of operation," form the main content of the *legal* principles which qualify, in international agreements, the permission to employ change of aircraft, the question whether, in a particular instance, change of aircraft is permissible under the agreements, can normally also be answered only after consideration of the concrete operating conditions of the given service.

#### APPENDIX

Typical provisions on change of aircraft in international agreements:

A. Annex to Bermuda Air Services Agreement between the United States and the United Kingdom, February 11, 1946.

V

"(a) Where the onward carriage of traffic by an aircraft of different size from that employed on the earlier stage of the same route (hereinafter referred to as 'change of gauge') is justified by reason of economy of operation, such change of gauge at a point in the territory of the United Kingdom or the territory of the United States shall not be made in violation of the principles set forth in the Final Act of the Conference on Civil Aviation held at Bermuda from January 15 to February 11, 1946 and, in particular, shall be subject to there being an adequate volume of through traffic.

"(b) Where a change of gauge is made at a point in the territory of the United Kingdom or in the territory of the United States, the smaller aircraft will operate only in connection with the larger aircraft arriving at the point of change, so as to provide a connecting service which will thus normally wait on the arrival of the larger aircraft, for the primary purpose of carrying onward those passengers who have travelled to United Kingdom or United States territory in the larger aircraft to their ultimate destination in the smaller aircraft. Where there are vacancies in the smaller aircraft such vacancies may be filled with passengers from United Kingdom or United States territory respectively. It is understood however that the capacity of the smaller aircraft shall be determined with primary reference to the traffic travelling in the larger aircraft normally requiring to be carried onward.

"(c) It is agreed that the arrangements under any part of the preceding paragraphs (a) and (b) shall be governed by and in no way restrictive of the standards set forth in paragraph (6) of the Final Act."

**B. Annex to the Paris Air Transport Agreement between the United States and France, March 27, 1946.**

SECTION VI

"(a) For the purpose of the present section, the term 'transshipment' shall mean the transportation by the same carrier of traffic beyond a certain point on a given route by different aircraft from those employed on the earlier stages of the same route.

"(b) Transshipment when justified by economy of operation will be permitted at all points mentioned in the attached schedules in territory of the two contracting parties.

"(c) However, no transshipment will be made in the territory of either contracting party which would alter the long-range characteristics of the operation or which would be inconsistent with the standards set forth in this agreement and its annex and particularly Section IV of this annex."

**C. Air Transport Agreement between the United States and India, November 14, 1946.**

ARTICLE V

"When, for the purpose of economy of onward carriage of through traffic, different aircraft are used on different sections of a specified air route, with the point of change in the territory of one of the Contracting Parties, such change of aircraft shall not affect the provisions of this Agreement relating to the capacity of the air service and the carriage of traffic. In such cases the second aircraft shall be scheduled to provide a connecting service with the first aircraft, and shall normally await its arrival."