

Vertical Separation—4



VERTICAL SEPARATION is this week's subject. I have not picked up this theme for a year* because no movement was possible until the results of the IFALPA 1967 survey on instrumental and flight technical errors were available. Even now, these studies are not complete but enough data is available to show which way things are going.

On the question of instrumental error, based on some 4,000 results, a comparison of captain and co-pilot instruments (which amounts to much the same as a comparison of two identical instruments in different aircraft) yields a 200ft error for rather more than 1/100 of cruise time (1.3×10^{-2}). This is an inferior standard, by a factor of 3, to that emerging from the IATA survey in 1965, which yielded 4×10^{-3} . It should be noted, however, that the IATA survey related to selected operators over the North Atlantic, while the IFALPA figures were gathered on a world-wide basis and thus tend to include less modern equipment—not all that less modern, however, since the survey related only to jet operations and the hoary old jet with the hoary old-fashioned altimeter does not yet exist.

Assuming the not unreasonable aim that instrumental error alone should be within 200ft on at least 99.7 per cent of cruise time, that is 3×10^{-3} probability, the indications are that it is not quite met on the North Atlantic and is a long way from being met on a world-wide basis.

Turning now to the so-called "flight technical error" (the third being static-system calibration error, which we hope to pick up later), the IFALPA survey yields a 200ft error on a world-wide basis for 6×10^{-3} of cruise time and, on a North

Atlantic basis, 4×10^{-3} . The IATA 1965 survey (North Atlantic only) yielded 1.6×10^{-3} , which is rather better. There is, however, a fair agreement here, so far as this probability game goes, and, if one leans away a little from the IFALPA NAT figure of 4min in every 1,000min spent at or beyond 200ft from assigned altitude and towards the IATA figure of 1.6 minutes per 1,000 (leaning that way because the IATA data was more numerous), one can attain the 99.7 per cent probability target (3min in 1,000) and say that, at least in relation to the North Atlantic and to simple departures from assigned flight level (i.e. ignoring for the moment instrumental and static system calibration errors), the mathematical case for a reduced vertical interval begins to look feasible.

As I have said throughout the series, I do not think that the case as a whole will hold water, but very few jet aircraft will be operating on a major route without good height-locks or in manual mode and the attainment of ± 200 ft on the needles for almost all the time is really not asking very much, at least in respect of the present generation of aircraft. It is, however, worth a note of caution here: the longer the fuselage the more it nods and bends to long-period and/or short-period oscillations. With future designs, and especially at SST altitudes, auto-stabilisation will be an essential to iron those out just as the yaw-damper irons out of the oscillations in the lateral plane. But the aerodynamics of the elevator case are more sensitive and we will be lucky if a residual hunt does not add to the present order of "flight technical error."

All of which contributes further to my theme that the industry, in looking to 1,000ft separation for its salvation to the upper-level congestion problem, is in danger of not seeing the lateral and longitudinal wood because of the vertical tree.

*For "Vertical Separation—3" see *Flight* for February 2, 1967.

EAGLE DOMESTIC GROWTH

AN increase of 40 per cent in the number of passengers carried by British Eagle on the London-Glasgow services was recorded in 1967 by comparison with 1966. The two totals were 49,000 and 34,000 respectively. On the Liverpool-Glasgow route there was an increase of 14 per cent to 30,000. Even on the London-Liverpool route—against the competition from the high-speed electrified rail service—the airline carried more than 125,000 passengers to show that traffic is being won back from the railway. Eagle's application for an increase in frequency on the London-Glasgow route is to be re-heard by the ATLB following earlier refusal, an appeal and a directive from the Board of Trade (see *Flight* for January 11, pages 43-44).

PROBLEM ISLAND—2

SINCE agreement was reached for Glos-Air to take over the Guernsey-Alderney service from March 1 (see *Flight* for February 29, page 148), leaving BUA to concentrate on the more profitable UK-Alderney routes, a further problem has arisen. In return for agreeing to continue the Guernsey-Alderney service until it is handed over to Glos-Air, the BUA subsidiary Morton Air Services has asked for the landing dues connected with the service to be waived for the six weeks to February 29. Failing this, the airline said, it could provide an inter-island service only on three days a week when a Heron came in from Gatwick.

Since a decision by Guernsey's parliament would be needed to waive the dues, and this cannot be obtained in time, Alderney's nine-man parliament has been asked to vote not

more than £600 from its "unforeseen expenses" fund to reimburse Guernsey for the unpaid dues.

Glos-Air plan to operate the service initially with two Britten-Norman Islanders, making at least two flights a day each way—or more if there is a demand. A new company is to be formed in Alderney to control Glos-Air's CI operations. Eventually the airline hopes to extend its services in the area to link Alderney to Jersey as well as Guernsey—and also, possibly, to Cherbourg, Dinard and other points on the near French coast.

Another IATA Member Caribbean-Atlantic Airlines (Caribair) became the 91st active member of IATA on January 23.

Back to Beek From January 28 NLM Dutch Airlines, the domestic subsidiary of KLM, will again be operating from Amsterdam via Eindhoven into Beek Airport, South Limburg. Services there were suspended on November 1, 1967, so that the airport could be modernised with resurfaced runways, high-intensity lighting and ILS for the main runway.

European Growth Slow-down Figures issued for its 17 members by the European Airlines Research Bureau show that in 1967 there was an increase of only 8 per cent in passenger-miles by comparison with 1966. The passenger load factor dropped from 57.0 per cent in 1966 to 54.7 per cent. Cargo ton-miles showed an overall increase of only 10 per cent—with 13 per cent on all-cargo services.