CORRESPONDENCE

"INTERNATIONAL AIR TRANSPORT AND NATIONAL POLICY."

To the Editor.

Dear Sir,—I have recently read through Oliver J. Lissitzyn's book "International Air Transport and National Policy"* with considerable interest. There is a particular aspect upon which I would like to comment, namely, the high cost of air transport. The author makes the point (on several occasions) that civil air transport is primarily an instrument of national policy and that, in consequence, a Government is satisfied to defray, out of the public purse, operators' losses by means of deficit-covering subsidies (direct payments or by mail contracts)—not, indeed, to enable the operators to make high profits but in order to keep air lines alive—for military, diplomatic, political and general prestige purposes. The author also suggests that in the circumstances that exist, the commercial aspect of air transport, *i.e.*, its return to investors, appears to be secondary to its national importance. Incidentally, its service to the public would also appear to be of somewhat secondary importance, although the author does not make this point.

With all due regard to the erudition and well-balanced arguments of the author, I cannot help feeling that he may be putting the cart before the horse. In a liberal economy, such as has been practised in this country and U.S.A. for the past two centuries or more, the profit-motive is regarded as legitimate, and it certainly tends to promote enterprise and to foster initiative. But if air line operators can operate in the sure belief that if they provide only reasonably satisfactory services the Government will keep them alive, for national purposes, by means of deficit-covering subsidies, the urge towards improvement and progress is likely to disappear. Not only would competition between operators of the same nation tend to become ineffective but foreign competition could be equally disregarded. (This state of affairs, I suggest, actually obtained in Imperial Airways during the period before the Empire mail scheme was introduced.) It does not seem to forecast any bright prospect for civil air transport.

It is true that in spite of the foregoing conditions in U.S.A. the operators there seem to be very much alive, but I cannot help thinking that the principle itself, *i.e.*, of keeping them alive and nothing further, is unsatisfactory and unsound. The fact that it is adopted at all arises from the difficulty of covering costs by income in the existing state of air transport development. Even in U.S.A., where air transport progress has been greatest, one looks in vain for evidence that it pays its way on any comprehensive scale, free of Government support. Nor is there any sure evidence that it will succeed in doing so for any predictable period after the war, in spite of optimistic statements to the contrary.

If one looks back at the beginnings of civil air transport in this country, in 1920, the outlook of operators, legitimately activated by the profit-motive, was service to the public, combined with an enthusiasm that was unfortunately damped by a succession of serious losses. Not only did the Government from the outset decline to recognise any obligation or any expediency to provide subsidies until all the chief air lines had been compelled practically to close down (nor even to provide adequate ground and meteorological aids) it expressed the view that air transport must fly by itself,

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i.e., be self-supporting. When it became obvious that this was impossible the Government, somewhat grudgingly, embarked upon a limited course of subsidization. The experience was somewhat similar in other countries. It was probably at that point that our Government in common with the Governments of other countries, generated the idea that air transport might be used as an instrument of national policy. This idea appears gradually to have taken root and, as Oliver Lissitzyn claims, it now overshadows all other objectives.

Anybody who has followed the history of air transport is quite well aware that it was unable to become self-supporting because of its high working costs. It is true that first-class service was not always provided but this was often the consequence of inadequate funds, for there was at no time any inherent difficulty in providing regular and punctual services. For example, regularity and punctuality often suffered simply because the Government was indifferent about providing adequate ground facilities, not because aircraft could not do their job. The net result to operators was a choice of two alternatives, either to charge fares so high that they could not attract an adequate volume of traffic, or else to run at a loss, meantime hoping for something to turn up.

The position as regards high costs is not much different at the present day, and I think that the new crop of enthusiasts, represented to a large extent by the shipping companies and railways, might well consider whether it is wise to proclaim that they can run without subsidies until they have delved thoroughly into costs and have made traffic estimates that are reasonably conservative. Although the State provides ground facilities there is no sure evidence to show that air lines can be self-supporting, unless over exceptionally favourable routes. In other words, income cannot yet cover costs. If it can, I would be most interested to examine the evidence.

This state of affairs, I submit, enables the Government to step in and maintain an unduly strong hold over civil air transport. In exchange for subsidies it demands, not merely a reasonable degree of regulation, but control and even management, *i.e.*, we have bureaucratic control and management, we have conditions in which air transport is shackled and is not free to develop and, as Lissitzyn points out, it inevitably remains an instrument of national policy and litfle else.

The chief remedy, so far as I can see, lies in reduction of costs, which can be gradually brought about by technological advances, by improvements in operational and maintenance technique, and by developing new uses for air transport (freight, for example), which has been comparatively neglected). Once a point has been reached by these means, that will enable air transport to pay its way, although it may still remain an instrument of national policy it will have freed itself from financial reliance upon the State and will have greater opportunities of operating commercially, like any other form of desirable private enterprise.

This objective is much to be desired and we must look to our technicians, our operators, and our traffic specialists gradually to free air transport to enable it to take its proper place alongside other progressive commercial developments. So long as its economic losses, and even the dividends it pays to investors, are a burden upon the public, air transport is likely to remain in an unhealthy and artificial condition.

Yours faithfully,

PHILIP G. MARR.

12th May, 1945.

To the Editor.

8th June, 1945.

Dear Sir,—I have read with interest Mr. Wright's paper on " Wheels and Brakes " and the discussion that arose from it. I noted that several speakers mentioned the type of operation and that Mr. Wright would welcome some pilots' views on this point.

It is interesting to note that I was asked this very question by B.A.L.P.A. a few months ago when they were compiling a concensus of opinion on general points of cockpit layout. It also happens that my personal views coincide almost exactly with their final report which they compiled from some 200 British air line pilots stationed throughout the world.

I have tried during the past few years most of the normal types of brakes, and in particular recently the British pneumatic type and the American toe-operated hydraulic type. There is no doubt in my mind that the power-driven toe-operated brake is the best for the very reasons given by Group Captain Scroggs and Mr. Parker in the discussion, namely, ease and quickness of control, positive action and ability to lock the flying controls—a particularly useful point in large aircraft where control surfaces can take charge in strong cross or down wind manœuvres.

My experience of present installations favours hydraulic power, as with this system there seems less likelihood of losing all pressure after a long ground movement than with the present pneumatic installations. In general it is very noticeable when garnering information from pilots that they are a very conservative body and unless they have tried several schemes they are liable to back the one they know rather than one they do not, regardless of the possibilities of the latter.

I hope these few remarks cover some of the points raised by Mr. Wright in his question.

Yours faithfully,

VERNON A. M. HUNT, A.F.R.Ae.S.,
Captain, B.O.A.C.

Whitchurch Airport, Bristol.

To the Editor.

24th May, 1945.

Dear Sir,—Major Green's article in the Journal for April, assumes that the weight saved will be used to increase the size of the aircraft. This is unlikely as the air liner will be designed to carry a certain number of passengers and load of freight. Any saving in weight will probably be used merely to reduce operating costs or in certain cases increase the freight load.

It is also taken that lightening the components will increase the cost of the aircraft. This is possibly true of machined fittings and lightening holes, but the reverse is the case when weight is saved by the use of lighter gauges, etc. On the whole the difference in cost will probably not be appreciable.

Another approach to the problem is to translate the weight saved into terms of drag and operating costs directly.

Consider a typical air liner cruising at a constant L/D of 14 at a height of 10,000 ft. At the beginning of flight the speed would be 210 m.p.h. T.A.S.; after 1,000 miles 200 m.p.h. T.A.S.; after 2,000 miles 190 m.p.h. T.A.S.; and at the end of 3,000 miles 180 m.p.h. T.A.S.

Each pound of weight saved is equivalent to saving 0.0715 lb. of drag, which for a mean speed of 205 m.p.h. for 1,000 miles range is equivalent to

$$(0.0715 \times 300)/(0.8 \times 550) = 0.0488 \text{ b.h.p.},$$

assuming a propeller efficiency of 0.8.

With a specific fuel consumption of 0.5 pts./b.h.p./hr. and using Major Green's figures of 3,000 flying hours per year for five years (although the flying hours are conservative for what it is hoped to obtain in post-war air line operation) the fuel saved during the life of the aircraft from a saving in weight of

$$1 \text{ lb.} = (0.0488 \times 0.5 \times 3{,}000 \times 5)/8$$
$$= 45.8 \text{ gallons.}$$

Assuming fuel to cost the airline operator 1s. 6d. per gallon, the value of the pound of weight saved is thus approx. £3 9s. 0d. As the range increases and the mean cruising speed is decreased the value decreases slightly, but if the speed is kept constant

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at 210 m.p.h. T.A.S. throughout the range the value will increase somewhat.

By increasing the aerodynamic cleanliness of the aircraft and thus increasing the ratio L/D the value of each pound of weight will also be somewhat reduced.

This treatment no doubt simplifies the problem of cost to some extent in so far as the variation in original cost is neglected, but as already stated it is doubtful if this has any important bearing on the value.

If the weight saved is used to increase the freight load, which implies operating always at full load (a most desirable but unlikely state of affairs) the value of each pound saved is simply equal to the cost per pound of freight over the number of miles covered in the " life " of the aircraft, that is approximately

$$3{,}000 \times 5 \times 200 = 3{,}000{,}000 \text{ miles.}$$

Again, taking Major Green's figures of 3d. per passenger mile (with a passenger plus baggage weighing 220 lb.) or

0.01365d./lb./mile,

the value of each pound saved would be approximately £170, similar to the American figure quoted by Major Green. This is correct if full loads could always be assured, but as this is most improbable, the former estimate gives the more reasonable value.

Yours faithfully,

EDWARD LOVELETT.

To the Editor.

11th May, 1945.

Dear Sir,—Major Green's paper on weight saving is very interesting and opportune. We must increase the efficiency of our new aircraft as much as possible if we are to compete successfully in the international market. It is hoped that the many production engineers who have come into the industry during the war period will read the paper.

The majority of people in the aircraft industry or even in the design offices, do not believe that weight saving is so important. It should also be emphasised that it is against the immediate interests of the majority of people in the industry to reduce weight. The draughtsman must reduce his clearances and thus risk fouls. The detail stressman runs more risk of someone else finding the part weak and his work will be increased many times. The works are faced with profiling instead of straight cuts, manipulating thin material, using high grade materials which require extra heat treatments and are more difficult to machine. Inspection departments are faced with more inspection operations and the necessity for scrapping a much larger proportion of work.

Managements and directors are faced with delay: delay in getting drawings out; delay while methods of manufacturing the fragile parts are worked out; delay due to scrap. The maintenance engineer is faced with an aircraft with reduced accessibility and with the necessity of providing and using much more equipment. All these individuals are against weight saving and they are continually bombarding the designer. They say " we are cutting it too fine," " a casting will be easier," " can't we have a straight cut here," " the thing is too fragile it will get damaged in the stores," " we can't weld this it is too thin, we must have allowance for over-size bolts," etc., etc., and perhaps the most dangerous cry of all from the efficiency point of view, " we must get the drawings out " (one can add " somehow " or " anyhow " under one's breath). The fact is that because weight saving is so important these common sense statements must be largely ignored. The aircraft must be unsatisfactory on the ground, to a certain extent, in order to achieve efficiency in the air.

The criterion of a guinea per oz. should be applied to the aircraft from the very beginning, especially by those who write the specifications. A large number of small items such as special slinging and jacking

points, the splitting up of aircraft into small pieces for ease of transport and manufacture, the provision of large doors for ease of maintenance, and of cowls sufficiently robust to stand jumping on, the provision of unnecessary flooring (especially on wing surfaces), the specification of margins in fuel and oil and water, etc., all these things and many more (especially in the case of the Fleet Air Arm) reduce the efficiency of the aircraft before it is begun. Maintenance engineers must also be educated to the idea that the aircraft they are servicing is worth a (marginal) guinea an oz. They should never tread on the aircraft anywhere if the work can be done without doing so. A great deal more money should be spent on staging and ground equipment generally to avoid adding a few ozs. to the aircraft. It is suggested that a bonus on weight saving could be given to the design offices as well as to outside equipment manufacturers. Junior draughtsmen must be trained to make every dimension on their drawings as small as they reasonably can.

Before dimensional tolerances can be reduced a great deal of tightening up will have to be done first of all to ensure that the article produced really is to drawing tolerances.

In short an improvement in our standards of workmanship in the shops and the drawing office is necessary and it must take place quickly.

If this paper of Major Green's helps to convince some of those who are in power in the aircraft industry that weight saving is worth money to them, it will have served a very useful purpose.

Yours faithfully,

A. H. CRAWSHAW, A.F.R.Ae.S.

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