



Independent Ideas on Helicopters

By

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The paper attempts to underline the difficulties of determining, from the various recorded opinions, papers and performances, the possible usefulness of the helicopter and of its future. It seeks to point out some of the technical and economic difficulties which must be surmounted before it can be considered a commercial project. It suggests a different concentration of effort on present and future development work and finally concludes that not enough is yet known of the capabilities, operational or commercial, for any definite assessment of its transport use to be safely made.

Let me say straightaway that those of us in Huntings who have taken part in the preparation of this paper consider it a very great pleasure and privilege to have been asked to give our humble views to such an august body of learned opinion. I would also like to make it clear that this paper is in no way a record of my company's official attitude but is rather a collection of preliminary ideas of various individuals within the Company.

We are the more grateful for this invitation because it has compelled us to collect and summarize our hitherto somewhat random views on helicopter operation. We do not in any way profess to be technically expert on the subject, nor, on our own account, to have made any deep research into the economics of present and future helicopter operations.

This fact has immediately posed its own problem. We ourselves have no unlimited financial resources, nor can we call upon the beneficence of the Treasury to enable us to carry out research and investigation into helicopter operations. So we have had to rely upon an assessment of the pronouncements of the various experts who are in a much better position than we are to make intelligent guesses as to the future that lies in store for the helicopter. At this stage I had better say that in this paper I propose to confine my main remarks to helicopters in the competitive field of commercial transport.

Helicopters have obviously already arrived in a big way in certain spheres such as military operations, and specialised commercial operations such as geological survey, power line inspection, agricultural work, ambulance work and so on. That is, in spheres where either cost is not the principal consideration, or the helicopter already shows an economic advantage over the older traditional methods in some particular commercial or social activity.

We are, of course, interested in the application of the helicopter in all these spheres, but our main interest lies in how, when and where will the helicopter become established as a normal means of transport for passengers and cargo, even if only for special sections of that traffic in the early stages. And, what is most important to us, how and when will the independent operator enter into the helicopter transport business.

Now, the first difficulty we come up against in attempting to assess the potential of the transport helicopter is that so few of the experts seem to agree amongst themselves, and that, moreover, definitely stated conclusions by experts seem to be very prone to subsequent reversals by the same experts—sometimes after only a short time lapse.

In no spirit of criticism of individuals—because I appreciate only too well the difficulties involved—I would like to quote one or two examples.

In the first report of the Interdepartmental Helicopter Committee we were told that “they were convinced that there is no other single factor which could so effectively stifle the development of the helicopter as an acceptance of the high costs inherent in a luxury service.” Speaking to your Association two years later, Mr Peter Masefield, of British European Airways, who by that time had pioneered helicopter passenger services and were the only British authority on its commercial passenger operation, stressed that luxury standards must be available over routes already served by luxury fixed wing services. The I A T A Helicopter Symposium of this year produced general agreement that in intercity aircraft, passenger standards would approximate those of present tourist class, whilst metropolitan services could be equipped with the bench type seats of the trams and tubes.

Again, both the Interdepartmental Committee and B E A have stated that, initially at any rate, taxi services are not likely to prove practical or economical. Maybe the terrain and the difficulties of surface transport produce a more attractive picture in the States, but we see that the Aviation Department of the Port of New York Authority are predicting that the Aerocab will, as soon as such services are in existence, be carrying on its routes between Manhattan and the outlying fixed wing airports 25% of the total number of passengers who now use taxis, plus 10% of those using airport limousines. This has been totalled as an 820,000 passenger potential during the first year of Aerocab operation. Similarly, of course, the Port of New York Authority are predicting a very large movement of passengers on their proposed suburban routes. We appreciate that these initial operations are likely to lose money unless subsidised directly or indirectly, but we do not see how such a market can, at this stage, be dismissed as impractical or uneconomical for all time.

Again only two or three years ago, 100 m p h and 20 seats were the

minima declared by the experts for economic operation. Now it seems that B E A at any rate, consider those requirements should be 150 m p h with 40—70 seats. Which are we to consider ?

Just one more example—the Interdepartmental Committee considered that helicopters for scheduled services in this country must be capable of being flown by an operating crew of one. Both I A T A and B E A now agree that two pilots on certain operations will be essential. We would be interested to know if this is because the aircraft is still too complex to be operated by only one pilot, and if the Association has any comments to make on the training of cabin attendants in some of the simpler of the co-pilot's duties.

Having thus considerably confused and frightened ourselves by trying to line up these apparently conflicting statements we came to the conclusion that the experts who have for so long been in very close touch with helicopter development, and have made a very wide study of the potential traffic for helicopters at various fare levels, must have “something up their sleeve” which at this time they are not free to talk about. We know that various companies are working on quite revolutionary types, and that one always comes up against a “wall of silence” if any discreet (or indiscreet) question is posed.

For the benefit of the backroom boys, and at the risk of making obvious, and perhaps foolish, statements I would like to mention a few points that seem to us fundamental in tackling the question of cost of operations. First, a few comments on traffic potential. If one accepts that on most routes helicopter fares must be considerably higher than surface transport fares, and probably higher than most fixed wing fares, then the volume of potential traffic may be very small indeed. In our view, the market which will be prepared to pay a premium for a certain amount of time saving may be much smaller than many optimists think. This may be particularly so when the passengers concerned would for a number of years be regarded as “guinea-pigs”¹. If the passengers could be guaranteed almost 100% regularity and time-keeping, with a good frequency of operations, and timetables fitted into the passengers' needs (i.e., night as well as day services) then there might be sufficient traffic over a limited number of routes to keep a *few* helicopters occupied.

It seems clear, therefore, that one is up against the old problem of setting in motion the “chain reaction” of “decreased costs—more traffic—further decreased costs—still more traffic—and so on.” But *unless* one can foresee a helicopter becoming available in the reasonably near future which will definitely attract sufficient traffic to absorb a sufficient number of helicopters to make them available at a reasonable capital cost, then the future of the transport helicopter is obscure indeed. As I see it the alternatives are clear. Either a helicopter will be produced with much lower operating costs that at present seems possible—or the “chain reaction” can only be set going by heavy subsidies to operators.

Let us consider the first alternative. As I said earlier, we are not in any way technical experts on helicopters, but it seems to us that the most important factors to be tackled in reducing total operating costs are

- Reducing the complexity,
- Improving and simplifying the control systems,
- Improving the reliability

B E A has described the helicopter as “ a basically complex and expensive vehicle ” That we think adequately concertinas the above three points Complexity not only has a direct bearing upon reliability because it introduces more opportunities for primary failures, but it also involves more maintenance and inspection work This in turn not only directly increases maintenance costs, which appear to be a very heavy item in presently conceived machines, but also means less time available in the air—and high utilisation is the best way to reduce total unit operating costs of any vehicle

This leads to the second point of control systems and behaviour If the helicopter is going to attract traffic, particularly high cost traffic, it must be able to fly night and day, in all weathers, and to schedule If it does this, not only will its utilisation be vastly increased, but its use will be popularized—an important target for any new enterprise ¹

The third point, reliability, is all important This brackets mechanical reliability with reliable operating techniques Possibly the elimination of complex mechanisms would in itself lead to greater mechanical reliability, it is certainly necessary to avoid paying too high a price for reliability in the shape of loss of payload, increased complexity, or impossibly high capital cost But have reliable operating techniques yet been worked out, or is the equipment even available for their successful solution ² Claims have been made that ground organisation and provision of navigational aids would cost less than those for fixed wing requirements but has this really proved so ² Has specialised attention been paid by Air Traffic Control Authorities to the problems of control of helicopter operations with a clear-cut directive to forget all previously conceived ideas based on fixed wing requirements ²

Another factor that must be tackled is that of noise but we feel that it cannot be reduced by decreasing efficiency or by increasing the cost of erection of heliports, either or both of which would increase costs of operation The problem of the noise is fundamental and may be a limiting consideration in the siting of heliports but we must ensure that its successful reduction does not at the same time successfully reduce the surplus of revenue over expenditure—if any ¹ We would like to feel assured that intensive research is being directed to its reduction by an investigation of pitch and tone and frequency, and that the effect of variations of rotor loading are being explored In short, we know the noise problem exists, but don't let us try to solve it by any method that increases operating costs

We are also concerned about the level of vibration both from the point of view of its effect upon maintenance problems and also for its effect upon passenger comfort It does seem to us that some form of rotor head must be devised so that out of balance forces will produce displacement of the head in such a way as to retain equilibrium in the rotor Also, we feel that some automatic safety device should safeguard rotor speed immediately following total or partial power failure

We would also like to feel assured that icing problems have been or are being thoroughly investigated

With regard to targets which we feel must be aimed at for “ all-in ” operating costs we ourselves are sceptical over the possibility of developing any substantial traffic at higher than present fixed wing rates—particularly remembering that there is till a downward trend in fixed wing costs, and

surface transport may “come back” shortly with lower fares and better facilities. Internal U.K. air fares are at present generally within the 4 0d to 6 0d per passenger mile bracket, to which has to be added coach fares at each end. We very much doubt that *many* passengers would be prepared to pay as much as 9 5d per passenger mile which is a figure we have seen quoted for the developed Bristol 173. With the extension of tourist fares in Europe, and all the variations of cheap night fares and so on, the European inter-city structure with fixed wing aircraft will probably also be in the 4 0d to 6 0d per passenger mile bracket.

Before leaving this question of operating costs there are two main items of cost I must mention which are not directly the concern of the helicopter designers. We operators like to blame all our high costs on the aircraft manufacturers but we cannot blame them for these—although by using their great influence they can affect them! I refer to “oncosts” or “overheads,” and fuel prices.

Mr Masefield, in his talk on 7th November, 1952, said that for the ‘Pionair,’ B.E.A.’s total costs represent 200% of the aircraft type costs, and for the Helicopter BEAline Bus they estimate it will be about 170%, *i.e.*, the overheads are respectively 100% and 70% of the aircraft operating costs. In our view that reflects a defeatist attitude, and the “on-cost” element of most of the big operators represents the field in which the greatest economies should and could be sought. There is no point in a manufacturer producing a reasonably economic aircraft if it is going to be competitively useless because of the operating company’s overheads. In our view this overhead element can be drastically reduced if a truly commercial view is taken of air transport, and economies are effected wherever possible irrespective of prestige, politics, flag-flying, and other most expensive “bees in the bonnet”! However, this is getting into dangerous and “blood pressurisation” ground—but I would nevertheless like to leave the thought with you.

On fuel costs, we all know that this represents by far the single highest item of cost in fixed wing aircraft as well as, I imagine, in helicopters. Much effort is concentrated on reducing consumption, but I wonder how much is concentrated on reducing the price of fuel. I strongly suspect that if engine and aircraft manufacturers, and operators, really tackled all the fuel companies as a body some quite astounding results might be achieved. The oil companies are businesses, and I believe all is not going quite their way at the moment, so they might be receptive to such an approach, or at least put their cards, if not their costs, on the table. By a substantial reduction in the cost of fuel they could open the way to greatly increased traffic, more total fuel consumed—and so help get the chain reaction going. And if the Government would really be practical and take off the fuel tax for internal flying—how pleased would B.E.A. and ourselves, and the helicopter enthusiasts be! We take it for granted that engine designers, particularly of gas turbines, are really making sure that they design around a standard fuel specification.

On helicopter development in general the U.S.A. seems to be far ahead of us in this country. They seem to have taken the policy decision—presumably mainly on strategical grounds—to pour huge sums into helicopter research. And they have quite rightly come to the conclusion that the helicopter will only prove its worth—or otherwise—in intensive operations.

Thus they have decided to pay enormous subsidies to certain helicopter operating companies. I saw quoted the other day that one U.S. company was receiving a subsidy of nearly \$7 per ton mile and still making a loss. In this country the Government appears to have taken a similar decision—but in a much more reserved way. It is presumably paying out substantial sums to manufacturers for development projects, and has given B.E.A. the “go-ahead” on experimental helicopter operations. Now our view is that neither of the Corporations should be saddled with the responsibility of absorbing this sort of cost into their accounts. If the Corporations do legitimate experimental work which is going to be of benefit to the Services, to the manufacturers, to the export trade, to other foreign and British operators, and so on, then there should be some direct payment for this work. How that cost is subsequently recovered—if it has to be—becomes a Government matter. This would avoid loading the Corporation accounts with costs not directly concerned with their business—and also would not give the Corporations any opportunity to blame deficits on this sort of extraneous, and hard to segregate, expense.¹ But if this is done, then *all* British operators should have the chance to partake in this development and experimental work—and I hope I will be forgiven for expressing the view that it might be done more cheaply, and perhaps result in the eye being kept more firmly on the ball, than under the present system. In other words, some competitor in the field might be a stimulant.¹

CONCLUSION

By and large, therefore, we cannot count ourselves as helicopter enthusiasts—but merely because in our view not enough is yet known about the helicopter's economics, maintenance problems and operating techniques to assess whether in the reasonably near future it will be a commercial transport unit. Quite possibly there is a great deal of secret data which, if available to us, would make us at once change our ideas. We sincerely hope there is