

**CORRESPONDENCE**

**VALUE OF WEIGHT SAVING IN AIR LINERS:**

*To the Editor.*

15th May, 1945.

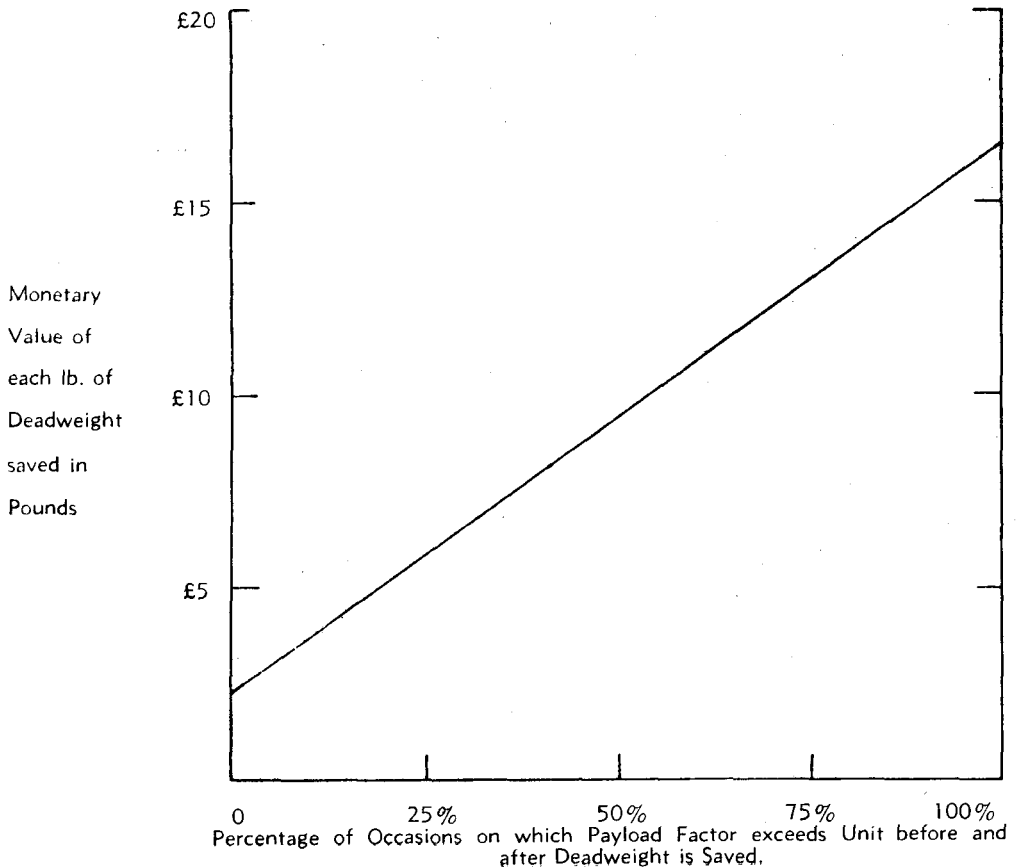
Dear Sir,—With reference to the invitation to correspond upon the above subject, contained in the "Journal of the Royal Aeronautical Society" of April, I submit the following:—

Both Major Green and previous writers on this subject appear to have omitted to recognise the fact that if the payload factor is less than 100 per cent., conversion of some of the deadweight into extra payload capacity will not result in any more payload being carried, because the payload

offered is already less than the capacity of the aircraft prior to its having been improved in design. I "fell into this trap" when making a few remarks on this subject during the R.Ae.Soc. discussion on Civil Aviation in November last.

It is only on those occasions when the payload offered exceeds the aircraft's capacity (a payload factor greater than 100 per cent.) that an increase in the plane's payload capacity through weight saving, will result in more payload being carried.

It is only on those occasions therefore that the extraordinarily high economic value of weight saved calculated by earlier writers and suitably whittled down by Major Green can in fact be achieved.



## C O R R E S P O N D E N C E

On all other occasions—when the payload factor is less than 100 per cent.—the only economy resulting from elimination of deadweight, is that of fuel saved due to flying at a lesser all-up weight than would otherwise be the case.

From calculations supplied by a colleague the value of weight saved under these circumstances is a fraction of the figure finally arrived at by Major Green, just as his result is a fraction of the American author who suggested that a pound of deadweight saved was "worth its weight in gold."

Using Major Green's figure of 3,000,000 total miles flown, and the price of fuel as 2s. per gallon, and assuming that the aircraft is never offered more payload than it could carry prior to improvement, the value of each pound of deadweight saved is then of the order of only £2 5s. 0d. per lb. There will, of course, be occasions when the payload factor exceeds 100 per cent., but I have been unable to obtain any statistics to show how frequently this occurs when the average factor is 60 per cent.

I therefore attach hereto a graph showing the value of each pound of deadweight saved, between the two extremes of the payload factor never reaching 100 per cent., and of its never being less than this desirable figure. I have used Major Green's tentative figure of £16 10s. 0d. per lb. both for the latter case and for the determining intermediate values.

It must be appreciated that the figure of £2 5s. 0d. per lb. included herewith is necessarily approximate also, as opportunity does not exist for a thorough investigation into this figure.

The foregoing is submitted in order to show the desirability of the aircraft operator attempting to forecast to the designer the percentage of occasions on which the payload factor will exceed 100 per cent. in order to give him a lead as to the economic values he has to consider when attempting reduction in deadweight.

I look forward to the pleasure of receiving some comments upon the principle on which this note is based, in due course.

Yours truly,  
E. C. GARRARD.