COMPUTING PASSENGER MILES IN
LONDON TRANSPORT

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In a recent paper [1] Tyson develops a method of analysis for computation of bus passenger miles, based on a fare scale incorporating a *de facto* trip charge + rate per mile. The main limitations of the method were described in the article, and they are severe. With a general trend, at any rate in urban transport, towards flat or coarse fare structures, and with the growth of system passes, most operators may now require other means of ascertaining passenger mileage with sufficient accuracy. London Transport, to which a number of references were made in the article, has experienced a variety of complex fare scales for several years and, placing great importance on sound statistics of passenger miles, has developed appropriate methods for their calculation. A description of these methods may be helpful to other operators; that is the object of this short paper.

London Transport has two charging zones for graduated fares, one for journeys in Central London and one for the suburbs, both with a reduced maximum fare in the off peak; it has three types of flat fare routes—central London Red Arrow services, certain suburban services, and a small number of minibus services; and more than 16 per cent of passenger journeys are made with system passes of about a dozen varieties, all valid for different periods and for different types of travel.

The build-up to London Transport’s passenger mileage figures for each main type of fare or payment structure can be summarised thus:

A. Graduated Fare Routes

(1) A study is made of a large sample of fare tables to determine the actual distance available for every fare value in each of the two charging zones.

(2) From the routine audit of conductors’ cash total sheets, a 100 per cent distribution of ticket sales by fare value is obtained for sample weeks during each year.

(3) This has to be converted to a distribution of passenger journeys by fare value, as with the ticket machines in use higher value fares have to be recorded by means of two tickets: e.g. for a 20p fare two 10p tickets have to be issued. Surveys are made to determine the tickets held by each passenger, and the full fare equivalent of journeys made at the reduced maximum fares in off-peak periods. A typical recent survey covered a carefully chosen sample of some 200,000 passenger journeys. The surveys indicate the percentages of (for example) 5p tickets which are used singly for a 5p fare; in combination with an 8p ticket to make a 13p fare; and in

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combination with a 10p ticket to make a 15p fare. The results, when applied to the analysis of ticket sales by fare values, give a distribution of passenger journeys by fare values.

(4) The breakdown between the two charging zones is based on historic data, and the appropriate distance (from (1)) is assigned to the number of journeys made at each fare to determine the passenger mileage for the week under analysis.

(5) From the cash value of travel made in the week, a figure of passenger miles per £ of revenue can then be calculated for the graduated fare routes.

B. Flat Fare Routes

The actual distances travelled by passengers have been obtained by direct on-bus surveys. Passengers are given numbered cards on boarding, from which their boarding stops can be obtained; the cards are collected at the stops where they alight, and the distance travelled is calculated. The passenger miles travelled and the fares paid being known, a passenger miles per £ factor is calculated for these services.

C. Period Tickets purchased “off-bus”

In the survey of 200,000 passengers referred to in A (3), a record was made of journeys made by passengers who held each of the various types of tickets giving “unlimited travel within a fixed period”. Sales returns show the numbers and value of such tickets valid in the test period. A figure of passenger journeys per ticket holder per day was calculated, which could then be multiplied by an average length of ride to yield a figure of passenger miles. Comparing this figure with the value of tickets valid produces a passenger miles per £ factor for these tickets.

D. Tickets for free travel issued by Local Authorities

(1) Scholars’ tickets. Each ticket is of a point-to-point nature, and the distance travelled for a known fare is thus directly calculable.

(2) Free travel on permits issued to the elderly. As in C above, a figure is calculated of passenger journeys per permit holder per day. Free permit holders were asked, during the course of the survey, their boarding and alighting points. From this a calculation was made of the equivalent full fare payable, and hence an average distance travelled per passenger journey and the total passenger mileage.

Total passenger miles for a particular period can thus be calculated from the revenue from each source multiplied by its appropriate passenger miles per £ factor to arrive at an overall figure of passenger mileage.

The method of basing calculations of passenger mileage on fare scales, as described in A, has the drawback that it produces the statistic “passenger miles paid for” rather than “passenger miles travelled”. The difference between the two is small if the distance covered by each fare is small, but as fare scales become coarser the difference becomes significant. It can be seen that the calculations in paragraphs B, C and D are already on a passenger-miles-travelled basis, and it has recently been felt necessary to bring the passenger mileage at graduated fares to a comparable basis as far as possible. The mileage travelled by graduated fare passengers has been assessed by an “on-bus” survey of the type outlined in the flat fare section B, and
thus an average distance travelled has been determined for each fare paid. The
frequency of these calculations is determined by the incidence of increases in fares
and other major changes, but the results are re-weighted to analyses of traffic in
February, July and October each year.

It should be noted that the surveys are carried out by London Transport inspectors
as an adjunct to their normal duties, and (except in the case of card surveys) do not
take inspectors away from their day-to-day responsibilities.

REFERENCE