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AIR TRANSPORT OBSOLESCENCE*

HERBERT E. DOUGALL† AND NEWTON K. WILSON‡

III. ACCOUNTING FOR OBSOLESCENCE.

In the field of transportation, two main methods of accounting for loss in asset value (including both depreciation proper and obsolescence) have been applied. (1) In the railway field, the 1906 Amendment to the Interstate Commerce Act required the I. C. C. to prescribe a uniform system of accounts, and depreciation accounting for all or a portion of the depreciable property of each class of carriers has since been mandatory. However, management was allowed considerable discretion over rates of depreciation. The general practice, before 1931, was to include, under maintenance expense, allowances for depreciation and retirement of equipment, and when the loss was actually incurred, to charge it to retirement or depreciation reserve (in the case of equipment), or to charge the whole, at the time of retirement, to the actual plant account (in the case of way and structures). No distinction was made between depreciation proper and obsolescence. In 1931, the I. C. C. ordered the rail carriers to begin straight-line depreciation on a service-life basis.¹ Objections raised by the carriers postponed the application of this order, and the Commission has since issued a supplementary order requiring the charging of approved rates of depreciation (on equipment only) beginning January 1, 1935. No definite provision, then, is made for depreciation of way and structure, and obsolescence is included as one phase of depreciation.

(2) In the fields of air and bus transportation, depreciation and obsolescence are lumped together and spread over the life of the equipment. Practical recognition of the basic difference between obsolescence and depreciation proper has not been made in either industry, although operators are well aware of its existence.²

*Continued from the April issue, 6 JOURNAL OF AIR LAW 192-200.

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1. 177 I. C. C. 351. Order No. 15100.

2. "Obsolescence appears the most important factor to be anticipated in determining the length of earning period of a bus. Such is the majority of opinion of a group of operators who recently participated in a discussion of the factors that should be considered in determining both a rate and a method of charging off equipment." 11 Bus Transportation 162 (April, 1932).

In 1930, a uniform system of accounts for carriers by air,³ devised by the Post Office Department along the lines of the system of accounts prescribed for rail carriers by the I. C. C., was made mandatory for ail mail carriers. "The Department and the carriers reached an agreement on rates to be charged on the various classes of equipment, although no formal order covering rates was issued."⁴ In the uniform system, depreciation (to include obsolescence) calculated from cost on a service-life basis, is charged as an operating expense under maintenance, and a reserve is built up⁵ (although most of the carriers, in their reports to stockholders, show depreciation separately from other expenses).

From 1930 to 1934 the Post Office Department allowed the mail carriers to write off airplane equipment over a period of three years. If the planes were replaced before the end of this period, they were hangared and maintained for emergency uses. Thus depreciation charges could be made until the first cost was written off, and entering into operating expenses, affected the mail rates allowed the carriers.

Since the cancellation of mail contracts in February, 1934, the mail carriers have not been required to follow definite depreciation policies. There is a wide diversity in the rates at which depreciation is charged. Where cost new is the basis of aircraft depreciation, estimated service lives range either from 1½ to 4 years or from 2400 to 6000 flying hours.⁶ (Some of the larger carriers which appeared with the letting of the new mail contracts are using the estimated flying life basis). "When the service life is stated in hours, an approximation of the equivalent in years can be made upon the basis of the rate of use for the period. . . . This conversion develops a service life of airplanes ranging from 14 months to about 7 years."⁷ "When the basis of depreciation is book value as of a date subsequent to the original purchase, the same absence of uniformity exists. Many of the airplanes used in mail operations were acquired second hand in the spring and summer of 1934. Others were used by the carriers or their predecessors in

3. Uniform System of Accounts for Carriers by Air (U. S. P. O. Dept., July 1, 1930).

4. *Paul T. David*, *The Economics of Air Mail Transportation* (Brookings Inst., 1934), p. 140.

5. "The procedure in connection with the accounting for depreciation for carrier property shall be such that at all times the credit balance in the depreciation reserve accounts shall fairly reflect, as nearly as it is practicable to estimate, the depreciation that has accrued on carrier property remaining in service, or the loss in service value or in the capacity for service that has taken place in such property." Uniform System of Accounts for Carriers by Air (U. S. Post Office Department, July 1, 1930) p. 13.

6. 206 I. C. C. 705. Air Mail Docket No. 1, "Air Mail Compensation," Mar. 11, 1935.

7. *Idem*.

prior operations. With respect to this equipment, depreciation is accrued on an annual basis or on actual flying hours. Where the annual basis is used, the service life is estimated at from one to three years, notwithstanding that the equipment may have been from one and a half to nearly six years old when a new cycle of life was assigned to it."⁸ In most cases, airplanes are thoroughly overhauled and restored at intervals of about 3000 hours, so that instances of worn-out planes are rare in the group of mail carriers, although the prevailing practice is to depreciate to zero.

Except for a general tendency to use engines until they are worn out, depreciation of engines presents the same diversity of method. "Where engines are depreciated on the basis of cost new, their service lives are based upon the number of hours during which they may be expected to function efficiently and vary widely for different makes, ranging from 1500 to 4000 hours."⁹ "The estimated service life of some engines is based on the book value as of dates subsequent to purchase new and in such cases is determined on an annual basis or on the basis of flying hours."¹⁰ A few carriers lease their equipment, and no depreciation, as such, is charged, although the rents are largely based on depreciation of the property.

The relative significance of depreciation (including obsolescence) can be indicated by selecting data from the reports of the mail carriers to the I. C. C. From the various dates of inauguration of service in May, June, and July to October 31, 1934, the total depreciation on aircraft and engines accrued and charged amounted to \$746,788 or 7% of total operating expenses.¹¹ Maintenance and depreciation combined, amounting to \$2,288,127 was 21.5% of total operating expenses and 25.7% of total operating revenues.¹² On a per-mile of service basis, total operating expenses amounted to 52c per mile (total revenues to 43.4c) of which maintenance and depreciation combined accounted for 11.2c.¹³ The total investment of the carriers in real property and equipment was \$7,068,867, and the combined balance sheets as of October 31 revealed depreciation reserves of 46.4% of that amount.¹⁴

It is obvious that under present conditions of less-than-cost operations, any control of depreciation (and particularly of obsolescence) would have a substantial effect upon net income. With

8. *Idem.*

9. *Ibid.*, p. 706.

10. *Ibid.*, pp. 706-7.

11. *Ibid.*, 705.

12. *Ibid.*, p. 777.

13. *Ibid.*, p. 707.

14. *Ibid.*, pp. 758, 759.

all of the mail carriers showing losses for the year 1934 (as indicated by their reports to stockholders) depreciation and obsolescence take on particular significance.¹⁵

In the first installment of this article,¹⁶ the nature of obsolescence and its peculiar significance in the air transport industry was discussed. In the light of that discussion, and of the above description of the actual methods of accounting and the resultant amounts, the question "how would obsolescence be accounted for" can now be approached. The development of airplanes is progressing at such a rate that they are obsolete before they are worn out. Any standard service-life method of accounting for depreciation is rendered ineffective by the obsolescence factor. While the present depreciation accounting is also accounting for obsolescence, only rarely does physical depreciation set the limits to the effective life of equipment. Since the effective life of equipment is capable of fairly close estimate and the factor of obsolescence proper is uncertain and unstable, greater accuracy could be obtained by making separate provision for depreciation proper and for obsolescence. Accounting for depreciation proper can be made on the present basis, with a charge to depreciation expense representing the prorated consumption of the difference between cost and estimated salvage value at retirement, and a credit made to depreciation reserve. While greater uniformity in methods of calculating actual depreciation is much to be desired, in order to have comparable figures of actual cost of operations for the various companies, accounting for depreciation proper can be reasonably scientific and accurate.

Obsolescence proper can be represented in the accounts by a periodic charge to obsolescence expense for the purpose of prorating over the estimated *economic* life of the property the investment therein which will not be provided for during the same period by depreciation charges, with a credit to obsolescence reserve which would evidence, at a given time, the total extent to which provision has been made for this loss. Annual obsolescence charges can only be estimates, and will have to be charged when any event takes place to affect materially the economic life of the equipment. The total reserves for depreciation and obsolescence

15. Evidence of the significance of depreciation (including obsolescence) to particular carriers, obtained from their annual reports for 1934, is found in the per cent of total revenues allotted to depreciation by representative carriers: North Amer. Aviation, 23.4%; United Air Lines, 24.9%; American Air Lines (May 13, 1934, to Feb. 28, 1935) 35%.

16. 6 JOURNAL OF AIR LAW 192 (April, 1935).

could be regarded as the total provision of the companies to account for loss in value due to all reasons.

The benefits of separate accounting would be (1) more accurate knowledge of costs; (2) greater possibilities of control of costs and thus greater possibilities of lowering them; (3) more comparable figures which could be used for combined action on the part of the companies, and by the government in its rate-making and regulatory activities.

While estimates of the degree to which obsolescence has decreased the value of equipment can never be precise, some method of determining when equipment is obsolete and when replacements are desirable is necessary, even when it is recognized that replacements must often be made quite suddenly as a result of the forces of competition, regulation, or public demand discussed in the first installment. The purchase of replacement equipment is guided by executives' estimates of the new equipment's ability to replace the original investment and earn a return on capital invested, although, as we have seen, competitive forces may require replacements which may only serve to prevent a greater loss, and are not expected to be a paying investment in the strict sense. Equipment may be obsolete or inferior in the narrow sense in that it will not repay the original investment, and in a broader sense if it is found that new equipment will not only repay capital investment but produce a larger return on capital than the old.

Assuming, for the time being, that management has some choice as to the desirability of replacements (and is not entirely forced to replace to "keep in the swim") can any tests be applied to determine whether or not proposed equipment is sufficiently superior to warrant replacements? How long will it take for the new equipment to pay for itself? And what will be the return on the investment? These questions can be answered by calculations designed to show: (1) the ability of the present equipment to repay its original cost and a rate of return thereon, (2) the ability of the proposed equipment to return its original investment plus the capital loss of the old equipment due to the replacement, and a return on the investment written off as well as on the new investment. Suppose, for example, that an air transport company is considering the replacement of two planes which originally cost \$45,000 each, and have been in use for two years. Two-thirds of their value has been charged off through depreciation. A net income of \$10,000 after cash expenses of \$80,000 and depreciation of \$30,000 would be 11% on original investment and 33 $\frac{1}{3}$ % on

book value. To justify the investment in the proposed planes, which will cost \$60,000 each, and in the judgment of the management, will have to pay for themselves in two years, their first year of operation would have to produce an increase in revenues of \$70,000 to "break even" (assuming no change in cash expenses) for after deducting \$80,000 cash expenses, \$60,000 depreciation, \$30,000 capital loss on old equipment (assuming no salvage value) \$20,000 would be left, or $33\frac{1}{3}\%$ on the book value of the new equipment at the end of the first year.¹⁷ Of course, the extent to which expenses can be decreased, and some salvage value obtained on the replaced equipment, will change the results.

It must be kept in mind, of course, that the presence of very active competition, such as characterizes the air transport industry, often causes replacement of equipment, regardless of the fact that earning power will be lowered and a loss of capital incurred. It may pay the management of a company to take the lesser loss arising out of replacement than to assume the greater loss which would result from the loss of business to the aggressive competitor. This is the situation which the present competition in the air transport industry presents, and which is aggravated by the unusual significance of obsolescence in a rapidly progressing and technical field.

IV. DEALING WITH THE PROBLEM OF OBSOLESCENCE.

Enough has been said to indicate the nature and significance of obsolescence in the air transport industry. There remains the more difficult question: "What should be done about it?" Tentative suggestions by way of answer to this question may be divided into two groups. (1) suggestions *re* handling of air transport accounting in general and of obsolescence in particular; (2) suggestions *re* broader problems of earning power and regulation.

(1) It has already been suggested that certain changes might well be made in the individual and general handling of accounts. These may be repeated at this point, and other observations added. First of all, there is need for a uniform accounting system for *air* carriers—one of which is adapted to their nature and problems, and not simply patterned after the railway classification of ac-

17. Several studies in the field of industrial equipment, designed to answer the problems involved in the question of equipment replacement, have been made. Here the reader will find more refined tests and tabulations: *J. J. Berliner*, "To Scrap or Not to Scrap—Cost Figures That Determine Dollars and Cents of Obsolete Equipment," 75 *Factory and Industrial Management*, pp. 784-6 (April, 1928); *Carl Endlein, Jr.*, "Should I Buy Special Machines?" 92 *Factory Management and Maintenance*, pp. 200-201 (May, 1934); *Paul T. Norton, Jr.*, "The

counts.¹⁸ Besides fulfilling the essential function of accounts and the revealing of true financial condition, the adoption of a revamped uniform classification would lead to the dissemination of information of value to all participants in the industry and to the regulatory bodies. No great progress can be made in cooperative or regulatory efforts until the diversity of methods of handling maintenance, depreciation proper and obsolescence is eliminated. The more particular question of separation of depreciation and obsolescence accounting has already been dealt with in previous pages.

(2) More fundamental changes than mere accounting changes are necessary, however, if the heavy costs of obsolescence are to be satisfactorily dealt with. Obviously, operating revenues will have to increase greatly, or expense decrease greatly, if the industry is to survive under private management. The I. C. C. found that for the period from the inauguration of service in May, June, and July to October 31, 1934, *total* revenues of the air mail carriers amounted to \$8,902,846, or an average of 43.4c per mile, while total operating expenses were \$10,660,839, or an average of 52c per mile. The combined net loss from operations, after taxes, amounted to \$1,818,075. For individual routes, the results of operations ranged from a net loss of 43.8c per mile to a net income of 3.5c.¹⁹

Annual reports of individual companies for the year 1934 indicate a continuation of deficit operation, in spite of increased passenger and express traffic. While increases in passenger and express revenues are likely to continue due to improvements in service, promotional activities, and rate reductions, the recurrent changes in load offer a favorable opportunity to test the public's reaction to lower or special rates, as railway management is endeavoring to do. Such experiment would need close cooperation

Selection and Replacement of Equipment," 56 *Mechanical Engineering*, pp. 589-592 (October, 1934); J. W. Roe, "Machine Replacement Factor Determined by Formulae," 87 *Steel* pp. 89-90 (July 3, 1930).

18. For criticisms of the existing system of prescribed accounts, see Paul T. David, *op. cit.*, pp. 141-2, 213, and Lawson L. Putnam and Franklin D. Myers, "Accounting for Air Carriers," 31 *Aviation*, pp. 72-75 (Feb., 1932).

19. 206 I. C. C. 707. On a mileage basis, average results of operations in more detail were as follows (p. 778):

Operating Revenues:

Air-mail passenger 27.6c.
 Scheduled exclusive passenger 29.7c.
 Express and freight 2.1c.
 Mail 24.5c.
 Other 1.3c.
 Total 43.3c.

Expenses:

Maintenance and depreciation 11.14c.
 Conducting transportation 32.9c.
 Traffic and advertising 4.7.
 General and administrative 2.7c.
 Total 51.8c.
 Net Loss from operations 8.6c.

by the entire industry in order to avoid further disastrous competition. Even so, it is likely that the public's use of the air will increase at a rather slow secular rate.

Of obviously greater significance is an increase in mail revenues, which depend entirely upon the attitude of the federal government towards the industry. The present rates are clearly less than cost rates. Mr. Harlee Branch, second assistant postmaster general, testified in the hearings to amend the Air Mail Act that an increase of 15.976c per mile would have been necessary to avoid a deficit of total operations of the contracting companies during the period July 1, 1934, and November 30, 1934.²⁰ The evidence brought out in these hearings and in the evidence presented to the I. C. C. in its inquiry²¹ indicate clearly the necessity of increased air mail rates, as well as a change in the method of calculating the rates. In the words of the Commission, "(1) Fair and reasonable rates for the transportation of air mail by airplane and the service connected therewith over each air mail route should be ascertained upon the weight of the mail, computed at the end of each calendar month on the basis of the average mail load carried per mile over the route during such month; and (2) for each route designated below, the fair and reasonable rates will not exceed, for each airplane mile actually flown with mail, the rates for 300 pounds or less determined in accordance with the following table": (table follows, indicating the bases per airplane mile for each of the 32 routes, ranging from 25c to the maximum of 33 $\frac{1}{3}$ c).²² In connection with the needed revision of air mail rates, it is recognized that equitable adjustment of the rates requires that the I. C. C. (or an air commerce commission, as suggested by the Federal Aviation Commission in its recent report) be fully empowered to determine the rates.²³

20. Hearings on Bills to Amend the Air Mail Act of 1934 (S. 2420, S. 2454 and H. R. 6511) 74th Congress, 1st Session, p. 33.

21. 206 I. C. C. 675.

22. 206 I. C. C. 724-5.

23. It is not within the scope of this paper to enter into a discussion of air mail rates, air transport regulation, and other broad and controversial questions concerning the industry. The reader is referred to the following sources for recommendations of changes which have been suggested as necessary for the industry and for the public service it renders:

(1) *H. G. Moulton and Associates*, *The American Transportation Problem* (Brookings Inst., 1933) Ch. XXX. This comprehensive survey of contemporary transportation problems suggests that jurisdiction of all but matters of safety be conferred upon the I. C. C., and that eventually air transport should be placed upon a completely self-supporting basis.

(2) *Paul T. David*, *The Economics of Air Mail Transportation* (Brookings Inst., 1934). This comprehensive history and economic appraisal of the air mail service concludes with a series of recommendations with reference to public policy.

(3) Report of the Federal Coordinator of Transportation, "Regulation of Transportation Agencies," 73rd Cong., 2nd Sess., Sen. Doc. 152 (Mar. 10, 1934). This very comprehensive survey of the present scope of regulation of water, motor, and air transport regulation includes bills to place regulation of all forms of interstate transportation under the jurisdiction of the I. C. C. These

V. SUMMARY.

It appears that from the point of view of public policy, the following changes are necessary to maintain the air transport industry and to offset the serious financial condition of the carriers, characterized as the industry is by the presence of unusual competition and heavy obsolescence costs:

- (1) Revision of the amount and method of determining air mail rates.
- (2) Centralized federal regulation of air transport with regard to rates, entrance into the business (through certificates of convenience and necessity) allocation and changing of routes, finance, service, accounting (especially with respect to maintenance, depreciation proper, and obsolescence).²⁴
- (3) Complete publicity of reports.
- (4) Efforts looking forward to placing the air companies on a self-supporting basis as soon as possible.

bills have been laid before the Congress, and have the support of the Administration.

(4) Report of the Federal Coordinator of Transportation, "Transportation Legislation," 74th Cong., 1st Sess., House Doc. 89 (Jan. 23, 1935). In this, his third major report, the Coordinator, among other comprehensive recommendations, suggests the lines upon which the I. C. C. should be reorganized to place it in charge of all forms of interstate commerce.

(5) Report of the Federal Aviation Commission, 74th Cong., 1st Sess., Sen. Doc. 15 (Jan. 31, 1935). This report covers the whole field of aeronautics, both commercial and non-commercial, and its provisions can hardly be summarized here. (For a summary of its recommendations, see 6 JOURNAL OF AIR LAW 163 (April, 1935). For an excellent commentary on the Report, see *Robt. Kingsley*, "The Report of the Federal Aviation Commission: A Commentary," *ibid.*, p. 177.) The Commission recommended the creation of an air commerce commission to have broad supervisory and regulatory powers over civil aeronautics. The provisions of H. R. 5174, "The Lea Bill," incorporates the civil aeronautics program recommended by the Commission. This bill (explained by *John H. Wigmore* and *Fred D. Fagg, Jr.*, in 6 JOURNAL OF AIR LAW 184 (April, 1935) and reprinted, *ibid.*, p. 219) did not receive the approval of the Administration, which favors I. C. C. jurisdiction over air transport.

(6) I. C. C. Air Mail Docket No. 1, "Air Mail Compensation," 206 I. C. C. 675 (March 11, 1935). In this report the I. C. C. reviews the financial condition of the air mail carriers and lays down what it considers fair and reasonable maximum air mail rates for each route. This is a very valuable source, and includes previously unavailable material on air company finance and operations.

(7) Hearings before a Subcommittee of the Committee on Post Office and Post Roads of the U. S. Senate, 74th Cong., 1st Sess., on S. 2420, S. 2454, and H. R. 6511, to amend the Air Mail Act of 1934. In this volume the statements of Post Office officials, chambers of commerce, air transport companies, and others, before the Subcommittee are concerned mainly with the features of the bills respecting allocation and extension of routes, and compensation for air mail carriage.

24. A witness for the Post Office Department in the I. C. C. inquiry on Air Mail Compensation "showed that some airplanes more than seven years old are still in service, and suggested that if a standard service life should be determined . . . as an element in determining rates, it should be fixed well below the maximum period during which an airplane might be kept in service; otherwise progress in the development of airplanes might be retarded by an inclination of the operators to retain equipment in service until completely depreciated." (206 I. C. C. 706.)

From the viewpoint of the operators of the carriers themselves, the following suggestions are offered:

- (1) That adequate accounting for and control of depreciation and obsolescence be made, and that the two factors be kept separate.
- (2) In so far as possible, mail and passenger expense should have separate treatment in the accounts and reports.
- (3) The carriers should take combined cooperative action with respect to drastic changes in service and equipment, through the dissemination of information, cross-licensing and patent-pooling to avoid the worst features of cut-throat competition, and the organization of a constructive-minded association to perform for the air transport industry what the National Automobile Association does for the motor industry.
- (4) All cooperative efforts should be made to attract new commercial customers for the primary purpose of improving the load factor.
- (5) Fullest cooperation should be given to regulatory agencies.

While the industry is still new, it must have the combined support and control of the public through government if it is to survive. But every move of management and government should be directed towards the goal of self-sufficiency. Not until that goal has been reached can the industry attract the capital which will be necessary for its fullest development and greatest public service.