A SURVEY OF THE COST CONTROL METHODS USED BY MOTOR FLEET OPERATORS IN THE BOSTON AREA

by

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Cambridge, Massachusetts

May 13, 1935

Professor George W. Swett
Secretary of the Faculty
Massachusetts Institute of Technology
Cambridge, Massachusetts

Dear Sir:

In accordance with the requirements for graduation, we hereby submit a thesis entitled A Survey of the Methods of Cost Control Used by Motor Fleet Operators in the Boston Area. Grateful acknowledgement is made here for the assistance of Colonel Robert Eddy of the M. I. T. Placement Bureau, and Mr. Lewis MacBrayne of the Massachusetts Safety Council in starting us on our investigation.

Yours truly,

John Duff III

Utley W. Smith

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Title: A Survey of the Methods of Cost Control Used by Motor Fleet Operators in the Boston Area.

Purpose: The purpose of this survey is to investigate the state of the art of accounting control in the trucking industry.

The rapid rise of the trucking industry which experience teaches usually means a lag in proper accounting methods, the reticence of operators to disclose their methods, and the extension of public utility authority into the industry makes such an investigation particularly timely. It is proposed to ascertain what methods of control are used by the industry and to interpret them according to the nature of the work done by individual concerns. It is further proposed to determine what the elements of a good control system are and to what extent a uniform accounting procedure can be followed throughout the industry. It is beyond the scope of this survey to investigate actual costs.

Conclusions

I. There is a similarity among the methods of control used by all the companies visited. Various modifications appear from company to company depending on the individual requirements of each one.

II. Individual truck records are essential to the maintenance of a good control system.

III. The state of the art is such that it is feasible to obtain these records.

IV. Supplementary control records are advisable to modify and explain final control records.

V. Final control records should measure cost against a unit of operation. The unit of operation used depends on the nature of the business.

VI. Subsidiary control accounts are necessary to control particular costs.

VII. The expenses considered most necessary to control vary from one company to another but:

a. Expenses incidental to day to day operation are fundamentally easier to control them repair costs, fixed costs, and wages. Consequently these first expenses are handled similarly by all companies.

b. Repairs are controlled in one of two ways which are:

1. Do repair work whenever necessary and use the

repair records and control accounts to determine which trucks are uneconomical to keep and should be replaced.

2. Use repairs records to determine the intervals at which breakdown on any given part occurs with greatest freqnency and then repair or overhaul the parts in question before the interval has elapsed. This is known as preventative maintenance. Although the data are insufficient to justify any conclusions on the relative merits of preventative and corrective maintenance, the following hypotheses are advanced.

   (a) That preventative maintenance is costly and wasteful if applied to fleets of widely varying makes and capacities.

   (b) That preventative maintenance is more effectively applied ot fleets of large heavy trucks rather than small light trucks.

   (c) That companies in an extremely seasonal business, for example the coal companies, should not use preventative maintenance.

   (d) That the actual repair cost for a preventative maintenance system may be greater than for a corrective system, but in measuring the worth of one system against the other the saving resulting from elimination of raod breakdowns and

operation with faulty parts that results from preventative maintenance must be considered.

c. There are many variations in the methods of handling fixed charges but virtually the only ones that can be controlled to any degree are liability insurance expense and terminal expense. These can by:
   (a) The Company carrying its own insurance.
   (b) Sharing terminals.
   (c) Devising means to get rid of terminals.

d. Wages may be used to provide an indirect method of control. Workable wage incentive systems while they decrease unit wage cost also result in large savings in operating costs.

VIII. There appears to be a trend toward the use of transportation service companies and away from the individual company doing its own trucking.

Recommendations

It is recommended that:

1. An investigation be made into the relative merits of preventative and corrective maintenance.

2. An investigation be made to determine whether a trend actually exists away from individual companies operating their own trucking fleets and towards the use of pure trucking companies to provide trucking service.

Summary

The survey was carried on by arranging interviews with officials in various companies. Case studies were made of the accounting procedure and control methods used by these companies as they were explained by the men interviewed. Companies representing many different phases of the industry were chosen so that a broad representation of the industry could be obtained. Two oil companies, two coal companies, three general transportation companies, a bus line, an express company, an ice company, a grocery company, and a department store were selected.

It was found that the state of the art is such that it is feasible to obtain accounting cost records for individual trucks and that individual truck records are necessary for adequate control.

The control methods used by different companies are similar but the units chosen to measure costs against vary from company to company and are a function of the kind of trucking done by the company. Final control accounts in all cases related costs to revenue, usually indirectly through the weight or volume of merchandise handled.

It was found that subsidiary controls over separate accounts are used in addition to final control

accounts. Repairs and fuel consumption are the other control accounts. There is considerable controversy in the industry with regard to the best policy to use in controlling repairs. Some companies use preventative maintenance, and repair and service their trucks at regular intervals irrespective of whether the job could be allowed to wait for a while, and the others use corrective maintenance, repairing only when necessary. There are advantages and disadvantages for both systems and some companies for which preventative maintenance is better fitted than for others.

Wage incentive systems are used by some companies and are designed to exert an indirect control over repairs by stimulating the drivers to take better care of equipment. They are also designed to stimulate the drivers to do more than an average day's work in a day's time. This survey incidentally disclosed evidence of what may reasonably be suspected to be a trend in the industry away from the ownership of trucking fleets by merchandise companies. One company visited has liquidated most of its trucking fleet since 1929 and hires transportation companies to do its trucking. Another company has mortgaged its trucks to its drivers.

BODY OF REPORT

Historical Review Within the last twenty years the motor truck industry has grown from infancy into big business. It has been largely an industry of opportunity growing at the expense of rail and water carriers and so fast has been its growth that many truck operators have within a few years expanded their fleets from a small number of trucks to a very large number.

It is a notorious fact that cost accounting methods never have kept pace with a rapidly expanding industry. It is further true of this industry that there has been very little collaboration among trucking companies for the purpose of developing effective accounting methods.

The U. S. Department of Commerce has with great difficulty assembled cost data on some of the larger fleets operating over long routes. The department was handicapped in its survey both because of the reticence of operators to disclose their costs, probably because of fear of government regulation, and because a large number of them kept no adequate cost records.

Now competition between trucking companies is becoming more and more severe and the rate of expansion of the industry is decreasing. Federal and state legislation is placing the truck in the public utility class which means rate regulation. This is turn means that the operators must have a knowledge of their costs and

of the practices followed throughout the industry. Two oil companies, two coal companies, two public utilities, two route delivery companies, three general trucking companies, and a company which is a client of a general trucking company were chosen as representative of the industry.

All information was gathered through interviews with officials in the companies visited. In all instances save for the notable exception of the two public utilities the persons interviewed had either built up the system in use or had had a prominent part in building it. But for the aforementioned exception these men were enthusiastic about the merits of their own systems and eager to defend it against any questions which might seem to be searching for a weakness in the structure. Their personal biases undoubtedly have had some effect on the interview. The authors used their own judgement plus what they know of the general standing of the company in its field when they considered the reliability of statements made on the effectiveness of accounts used. It is granted that their bias affects this report, but since this report is more concerned with disclosing existing practices and comparing them in a general way rather than attempting to weight closely the relative merits and demerits of specific systems, it cannot have a great effect on the presenta-

by companies doing dissimilar work. The use of the different expenses for building up control records is shown throughout the report and a comparison is made of the kinds of control accounts used. Whenever they were detected, trends in the industry are discussed with respect to their relation to the cost system.

Expenses When the average person thinks of the cost of running a truck he thinks first of the operating costs, and only afterwards if at all does he think of any fixed costs other than perhaps depreciation of the initial investment. For this reason rather than because the writers feel there is any particular order in which they should be discussed, operating costs are considered first. The first group of operating costs discussed is the one the usually enters one's mind first when operating costs are mentioned namely, gas and oil consumption.

Gas and Oil Consumption The standard method for gathering data on gas and oil is either through the daily drivers' reports, garage records or a combination of both. These drivers' reports also furnish mileage records, quantities handled, and sometimes more detailed information. In all cases except the L Grocery Company which is a client of general truckers, and the E Trans-

portation Company which does not keep individual truck costs, the monthly recapitulation sheet provides a line for each truck and columns for gasoline and oil cost.

A higher than average consumption for any one truck is not in itself indicative of poor performance. Supplementary information such as a knowledge of where the truck operates, whether in heavy traffic or on the open road, must be available for correct interpretation of the records. It is common practice to include on the sheet the number of days during the month that the truck was in operation and the mileage run during the month. These modifying records are apparently completely satisfactory. The only company calculating the cost per mile for fuel is the L Grocery Company. The G Coal Company keeps the following additional records which are useful in explaining variations in gasoline consumption: total stops, pounds per stop, and total trips from the yard. Oil consumption need be compared only with the mileage record, because the frequency with which oil is replenished is low enough for abnormal consumption to be detected by inspection.

Many companies compute a monthly record of the miles per gallon of gasoline for each truck, others at not such frequent intervals. The J Company and the L Grocery Company have a column for this control record on their recapitulation sheets. Only one company, the

K Ice Company computes the miles per gallon of oil. It is difficult to see what value this figure could have because of the relatively small quantities of oil used.

The H Express Company and the D Motor Freight Company are the only companies which keep separate records for grease. The practice in the other cases was to include this item with either oil or repairs.

Maintenance And Repairs Maintenance and repair jobs are composed of three items, parts, labor, and overhead. The types of maintenance and repair are body repairs, chassis repairs, painting, and washing. Washing costs are segregated only by the J Company; all others include it in the overhead charge. Painting expense is charged off to repairs during the month in which it occurs by the majority of companies. The J Company keeps a separate account for it, but still writes it off in one month. The two utilities the I Bus Company and the H Express Agency keep a separate record for painting and pro rate the cost over one year as does the L Grocery Company. The better practice is to segregate this cost when it is appreciable and pro-rate it over its life so as not to distort the individual truck records.

It is almost universal practice to separate body repairs from chassis repairs to facilitate control

through records. Lumping them together causes confusion and is liable to create a false impression that it is the power plant which is being repaired when it may be the body. Painting is of course charged to body repairs if no separate account exists for it.

In all companies there was some means for the mechanics to record their time for each repair job. The mechanics in all cases were paid an hourly wage.

Repair shop overhead was handled in three ways. The two coal companies included it with the other overhead charges and distributed the total overhead equally among all trucks. The H Express Agency distributed its repair shop overhead among the trucks sent in for repairs on the basis of the time required to repair them. The A Oil Company and the K Ice Company established a repair shop burden rate and charged overhead to each job as it was completed. Generally speaking, those companies whose repair shops located separately from their garages kept repair overhead distinct from the total overhead and charged it to repairs. Those companies whose repair shops were in the regular truck garages usually included repair overhead with garage overhead. Most companies separated the cost of parts from the labor and overhead, although the K Ice Company lumped labor and materials together and kept overhead separate. The former prac-

tice is the more logical one to follow and it makes the final recapitulation sheet easier to interpret and analyze.

Thus far the discussion of maintenance and repairs has been confined to an exposition of the accounting technique employed in handling them. The following is a discussion of the control methods used.

There are two maintenance policies in current use. The older and more common one if to make repairs only when necessary, either after a breakdown or whenever inspection of the truck discloses a faulty condition. This is called corrective maintenance.

The theory behind the other policy which is called preventative maintenance is that an ounce of prevention is worth a pound of cure. In other words, it is in the long run less costly to repair the roof before it starts to leak. When a breakdown on the road occurs the cost of towing the truck to the repair depot, sending another truck out on the route, and the cost of the time lost should be added to the actual cost of repairing. Continued operation with faulty minor parts will often cause more expensive breakdowns. It is the aim of a preventative maintenance system to eliminate road breakdowns and to prevent large repair jobs from being caused through operation with faulty parts and also resulting

inefficiency. The A Oil Company affords an excellent illustration of the method used to establish such a system. Good and complete truck repair records over at least two years are essential for establishing a preventative maintenance system.

The A Oil Company officials at the Boston district who were interviewed were the ones responsible for the system in use there. The company adheres to it rigidly and believes it far superior to a corrective maintenance policy. On the other hand, the B Oil Company used preventative maintenance for six years and then discarded it as being too costly and wasteful.

The C Transportation Company, a general trucking firm, uses preventative maintenance and finds it very satisfactory. The system they have is not as rigid as that of the A Oil Company. The D Motor Freight Company uses corrective maintenance, and the president of the company believes it is useless to try to install preventative maintenance because his fleet is not large enough and because the company is constantly buying different makes of trucks. He has found that the different kinds of trucks all have certain weaknesses that require attention at different intervals, and,if a preventative maintenance system were established for his whole fleet, it would undermaintain some trucks and overmaintain others.

The C Transportation Company also uses corrective maintenance and has never considered using preventative.

The I Bus Company is strongly in favor of preventative maintenance as an excellent safeguard against service disruptions and accidents. This type of transportation company probably more than any other can but ill afford to have faulty equipment.

The coal companies use corrective maintenance. They repair and overhaul as much as possible in the summer off season and only take their trucks off the road in the peak season when it is absolutely necessary. All of the other companies which were visited used corrective maintenance.

No investigation was made into the relative merits of the two systems but it is possible to draw a few tentative hypotheses from the cases in hand. These are:

1. That preventative maintenance is costly and wasteful if applied to fleets of widely varying makes and capacities.

2. That preventative maintenance is more effectively applied to fleets of large heavy trucks rather than small light trucks.

3. That companies in an extremely seasonal business, for example the coal companies, should not use

preventative maintenance.

4. That the actual repair cost for a preventative maintenance system may be greater than for a corrective system, but in measuring the worth of one system against the other the saving resulting from elimination of road breakdowns and operation with faulty parts that results results from preventative maintenance must be considered.

Only two companies, the L Grocery Company and the K Ice Company, were found to calculate the cost per mile for repairs. It is quite possible that other companies do segregate this item, but the investigation did not disclose it in any others. The calculated cost per mile for most companies included all expenses applicable to the individual trucks, and this was usually divided into operating cost per mile and fixed cost per mile.

Wages Information about the wage systems used for paying the drivers was not secured in all cases. It was found that the majority of companies which gave information on their wage systems paid their drivers a weekly wage with special rates for overtime. Wage incentive systems are installed with the object of getting more work per dollar of wages from the drivers and to furnish

an incentive for more careful handling of the trucks. The B Oil Company has a very elaborate wage incentive system which embraces this double purpose. The drivers are stimulated to accomplish more work and to take better than ordinary care of their trucks. The same holds true of the bonus incentive system used by the C Company. The E Company pays its drivers a weekly wage, but calculates the payroll for its oil truck drivers on a gallonage basis, paying whichever is higher. All of the others pay their drivers a weekly wage. An interesting example of how wages may be used to cut operating costs was furnished by the J Company. Wages are paid on a weekly basis and a new manager raised them solely to obtain the confidence of the drivers. The consequent rerouting of delivery that occured was made possible only because the drivers had trust in the management, and this re-routing plus an increased willingness of the drivers to cooperate lowered costs appreciably.

Insufficient data was obtained to make an analysis of the worth of incentive systems for the drivers. In one instance an increase in drivers'wages decreased cost, and the two companies using incentive systems are satisfied that they are better than a straight weekly wage.

Tires Trucking companies have not settled on any standard method for handling tire expense. This item was treated differently by almost every company visited. All companies except the J Company and the two coal companies did keep some form of tire records. Usually they use the serial number stamped on the tire, keeping a record of repairs made to it and mileage run. From this they can detect tires of poor quality and secure adjustment with the manufacturer. They also help in spotting faulty equipment which wears the tires.

The I Bus Company, because of the nature of its business, was forced to keep its tires in better condition than the average company. This meant they were able to use tires for only a portion of their life. Rather than purchase tires outright they leased them from a manufacturer and paid for them on a mileage basis.

The F Coal Company, the J Company, the K Ice Company, the C Company, and the E Company charge tires off as an expense during the month they are replaced. This policy causes a distortion of the unit truck costs for the particular truck affected during that month, although it probably has little effect on the average unit truck costs. The G Coal Company includes the cost of tires on a new truck as part of the capital value of a new truck but replaced tires are depreciated at a

separate rate from the trucks. The C Motor Freight Company follows the most consistent policy for handling tires. They subtract the cost of the tires from the price of a new truck and set this latter value as the capital value of the truck. The tires are depreciated separately over the estimated mileage life of the tires. This practice prevents distortions of the truck unit costs from appearing and it is the correct accounting procedure for dealing with the tires on a new truck. The A Oil Company and the L Grocery Company also depreciate tires on a mileage basis.

Turning from a consideration of operating costs, we come to the other bread division of expense - fixed charges. The name implies that nothing can be done to control them, but there are two, namely insurance and terminal expense, that present possibilities for control. The efforts to control terminal expense have created what appears to be a trend away from company owned fleets which will be discussed later in the report.

Insurance Compulsory insurance charges cannot be avoided, but some companies post a bond with the state and carry their own liability insurance. The C Company and the K Ice Company are examples of these companies. The annual

payment in damages made by these companies are much less than the cost of premiums they would otherwise have to pay. Both companies have excellent safety records and they were taking very little risk in discarding insurance. This step is not to be recommended for companies with anything but the best of safety regulations and accomplishments.

Terminal Expense One of the heaviest expenses of a trucking company is its terminal expense - the garage for housing its trucks, or its loading and dispatching point. Many companies have several such terminals in the same or different cities and the drain from rentals and overhead can be a large percentage of total costs. Two general truckers, the D Motor Freight Company and the E Transportation Company have reduced their terminal costs by sharing all terminals except their home terminal with one or more other truckers. They all use the same pick-up truck at these points, and have one dispatcher for all companies hauling from that terminal.

The K Ice Company affords an illustration of a private company's approach to this problem. By the device of making the drivers quasi-proprietors of little individual ice businesses they have been able to get rid of some of their garages because the drivers garage their trucks in their own backyards. The sacrifice in gross margin of over forty cents per hundred

weight that the company is willing to make shows how costly it is to operate and maintain a trucking fleet in this field.

Depreciation Depreciation is in the true sense of the word a fixed cost, one that is impossible to control. Of course, poorly chosen depreciation rates will either write the truck off before its useful life is over or will carry it on the books after it should be written off. Except for the K. Ice Company, the E Transportation Company, and the I Bus Company, the practice was to write the truck off in from two to six years. Some used the same rate throughout and others varied it according to the type of truck. In many instances, the truck was used for years after it had been written off, but company officials justified high depreciation rates by saying that obsolescence was so large that it was necessary to make depreciation rates conform with it. The K Ice Company trucks are depreciated on a percentage rate down to a low scrap value. This method of depreciation retains the book value of the trucks for a longer period of time but inasmuch as the company has many trucks now in service which are more than eight years old, the basis is justified. The E Transportation Company depreciates its trucks in the same manner. This

same company rebuilds old trucks and sets a new book value for them, a practice which can easily lead to inflated equipment values.

Final Control Accounts Up to this point this report has been confined to an explanation of the accounting methods employed in the trucking industry. The consensus of those firms visited was that individual truck records must be kept if control is to be effective. As with all industries, lumping of costs causes them to lose their identities, and makes it difficult if not impossible to analyze them. The foregoing has shown that it is feasible to obtain costs for the individual trucks and to measure various grouping of these costs against performance, mileage being the unit of performance commonly chosen.

Whenever it is possible it is desirable to measure the truck costs against some unit more closely related to revenue than mileage run. By doing this one obtains a clearer concept of the relation of trucking costs to profits. Many companies find that one such control account is sufficient or that the limitation imposed by the nature of the business prevents them from having more than one. Others have drawn up several final controlling accounts, and the inter-relations

between them assist in interpreting both the accounts themselves and the costs which they in turn control. These controlling accounts are devices for measuring costs against some representative yardstick in such a manner that individual variations and the trend of the whole can be detected. It is in this sense that they control. The action taken after conditions are exposed by these accounts is up to the management.

Controlling accounts should have two common attributes. They should be easy to calculate and they should present a readily understandable concept. The accounts discussed and compared here are representative of many kinds of trucking business and provide a cross section of the practices of the industry of this section in that regard.

It has been shown that cost per mile was the only control measure applied to repairs and it is the best one that could be chosen because repairs except for those necessitated by collisions are a function of the mileage run. The cost per mile is also used as a final control figure but it has limitations as such. For a transportation company, the cost per mile of operation will not indicate when trucks are being operated inefficiently with respect to the loads carried. For example, a truck may carry a load from one city to

another and return empty. The round trip may be unprofitable because the operating cost of the return trip empty may eat up the profit made on the outward trip. But the calculation of cost per mile does not show this. Motor transportation companies also calculate a cost per ton mile which relates quantities carried and thus indirectly revenue, distance carried and costs. The D Motor Freight Company makes this calculation for both operating costs and total costs. The separation enables easier check to be made on operating statistics than can be done if operating and fixed costs are lumped together. This company also calculates several other control statistics which are the cost per ton, cost per mile (operating and total) and cost per truck. For further comparison revenue statistics are also calculated for revenue per ton mile, revenue per truck and revenue per ton. Another account, revenue per dollar of expenses, provides a direct measure of income against expense. The control accounts of this company have been discussed in detail because the president of this company has made an extended study of costs over a period of years and has an excellent reputation in the trucking world.

These control accounts are excellent if the company is doing its own hauling, but they cannot be used in instances when the company rents its trucks out

as do the C Company and the E Transportation Company with some of theirs. These companies are not concerned with economical loading and routing unless they are working under contract. They merely provide the truck and driver and it is up to the person or company hiring the service to look out for those matters. The controlling account used in these instances is the cost per mile. It is related to revenue because the terms for the hire of the truck are on a mileage and time basis. The I Bus Company uses cost per mile for a final control and compares it with revenue per mile. The final measure for the K Ice Company is also cost per mile. The A and B Oil Companies measure cost against sales by calculating the cost per gallon delivered both for the individual trucks and for the district.

The two coal companies both calculate cost per ton delivered. Where bids are made for contract delivery, the estimated cost per ton delivered is compared with the actual cost per ton records to determine whether a profit can be made on the contract. Both companies keep cost per mile records and the G Coal Company uses supplementary controls which are the pounds delivered per stop, number of trips. The cost per ton for an individual truck would mean very little because so many different kinds of delivery are made. The control

accounts mentioned above are designed to explain differences in the type of delivery made and variations in operating costs attributable to the kind of delivery a truck has been making. The L Grocery Company uses a cost per mile control but it only requires that the companies which provide its trucking service submit itemized fleet costs rather than individual costs. Because a number of trucking companies serve the L Grocery Company, comparison of the costs of one company with the others provides sufficient control. Occasionally the L Grocery Company calculates the cost per ton mile for a further check. The J Company, a department store, uses a cost per bundle control. This control is related indirectly to sales and its greatest value is that it provides a control over the routes and indicates when they need revising.

Trends In the Industry Although the following is outside of the initial scope of this investigation, it is of sufficient interest and importance to be included with the report. The L Grocery Company and the K Ice Company provide examples of what appears to be a trend away from company owned fleets toward the specialized trucking companies. The attitude that business men are beginning to take on this matter is that by maintaining

their own delivery truck fleets they are actually operating two businesses - the primary business of the company and a trucking business.

By getting rid of their trucks, the company can use the capital required for them elsewhere in the business and they can be disembarrassed of the terminal costs and administrative costs of controlling the fleet. The L Grocery Company has disposed of almost all of its trucks. The K Ice Company still owns a large fleet of trucks, but have made as complete disassociation of the ice business from the trucking business as they can. The C Company and the E Transportation Company distribute oil under contract for oil companies and the C Company also delivers for some coal companies.

Another point which was raised by the official interviewed at the A Oil Company was related to repairs. He spoke of the considerable money tied up in repair part stocks and of the costliness of providing necessary specialized tools for working on the diverse makes of trucks owned by his company. He believed that eventually the practice of each company doing its own repairs would be superseded, particularly in the metropolitan districts, by vendor maintenance. The vendor would be able to apply production methods to repairs. He would be able according to the officials, to repair more economically

than the individual company and he would release the capital tied up in stock and tools in the individual companies. The A Oil Company depends somewhat on vendor maintenance, but still carries large repair and tools stock. No evidence of a trend toward vendor maintenance was uncovered by this survey.

A P P E N D I X A

The A Oil Company

The A Oil Company

The following case is based on the accounting policies in use in the New England area of the A Oil Company. The company operates a fleet of 400 trucks of widely diverse manufacture throughout this area.

The division of accounts is located in the Central Office for the New England area which is in Boston; the central New England repair depot is in Cambridge and the field terminals and shops scattered throughout the area.

The central repair station is run on a non-profit basis. Repairs times are kept for each job and a standard burden rate charged. This burden rate is changed as conditions warrant. This total repair cost is sent back to the field shops and applied to the individual truck records there. At the end of the month all field shop records are turned into the central repair depot and kept there permanently. The total monthly operating accounts are compiled from the individual records and forwarded to the main office. The main office adds the monthly depreciation and other fixed charges to obtain total costs, and by comparison with sales figures the monthly cost per gallon delivered is made up.

This cost per gallon is the final control

figure that the main office is interested in, but it is in the nature of a secondary control so far as the individual trucks are concerned. Individual truck records are kept only at the district central repair shop and variations in operating cost have to be checked from there.

The maintenance policy followed in the New England area is to make repairs before the breakdown occurs. Preventative maintenance is what Mr. A who developed the system calls it. This scheme originated when Mr. A noticed that a large percentage of the trucks were in for certain repair jobs about every five thousand miles, for certain others every ten thousand miles and so on. His idea was that an ounce of prevention was worth a pound of cure, and if he could check and repair these parts that caused trouble periodically, before they broke down, it would save the lost time and expense of breakdown on the road and the wear from operating with faulty parts. He therefore compiled a list of items that should be checked, replaced, adjusted, etc. every thousand miles, another at five thousand miles and so on. The last list of operations involved the complete overhauling of the truck and occurred at sixty thousand miles. There were six of these lists in all, and as soon as a truck had run up the indicated mileage it was garaged and every thing indicated on the list

performed. Each succeeding list contained all the operations on the preceding ones in addition to those extra that might be necessary.

The maintenance plan as developed by Mr. A is not a part of the A Oil accounting system, and it is used only in the New England area. It is simply a method of control over operating costs developed by Mr. A, and it operates independently of the accounting system used by the company.

Mileage records for determining when the various operations should be performed are not kept centrally. The manager of each field repair station keeps these records, and it is his duty to see the operations are performed at the right times. The main object of this decentralized control is to reduce clerical expense. The accounting system has been kept as simple as possible.

The A Oil Company depreciates its trucks over a five-year period. The cost of the tires on the truck originally are included in the value of the truck, no effort being made to set up separate depreciation rates for the tires.

The company believes that while comparison of depreciation expense with cost of repairs merits consideration, it should not control in determining when to replace. They are more inclined to watch market condi-

tions and replace trucks at times when the salvage value is relatively high.

Their reason for not attaching very much importance to comparison of depreciation with repairs is that the depreciation rate is arbitrary, and is solely an accounting figure. The actual value of the truck may be greater or less than the value carried on the books. While in some trucking companies there apparently is a close correlation between rates of depreciation and actual value of the truck, Mr. A believes that this correlation does not exist for their fleet.

Trucks are bought in view of parts and service conveniences of the truck manufacturers. The A Oil Company believes that replacement of parts can be done more cheaply by the manufacturers' service stations. The saving results because specialization of labor and production methods can be used in large service depots which work on but one type of truck, because fewer of specialized tools have to be stocked and because less repair stock has to be carried. Mr. A feels that the trend is definitely toward vendor service and that in time all repair and maintenance work will be done by the manufacturer. For this reason, the purchase of new trucks in confined to those makes that supply vendor service in the district in which the truck is to operate.

Purchase orders for new trucks originate in

the central office in Boston but must be approved by the Cambridge repair shop to go through.

A P P E N D I X B

The B Oil Company

B Oil Company

The B Oil Company has its New England headquarters in Boston and operates 156 oil trucks throughout this area. Gasoline delivery to filling stations constitutes the bulk of deliveries, although some fuel oil is delivered during the winter months. The trucks vary in size from 600 to 4500 gallons capacity, the latter being a truck and trailer. The predominating sizes are trucks with from 1000-1500 gallons capacity. Trucks sizes are determined by the average size of customer orders on a given route and by the length and geographical peculiarities of the route.

The most important factor influencing economical operation of the trucks is the size of the load. Delivery cost per gallon is much higher if a truck goes out on its route with only a half load. Therefore careful scheduling and routing are of paramount importance. There are five main arteries leading out of Boston and the majority of the gasoline stations lie along these highways. At periodic intervals trucks are sent out to cover these stations. To facilitate routing, the location of the stations is pinned on a map and a notation made of the average size of deliveries. Contracts are drawn so that a customer will take full compartments of fuel from the truck servicing his station.

This is necessary because these trucks are not metered. Customers are induced to take as large orders as possible both to reduce the number of deliveries required and to decrease the opportunities for emergency deliveries. Deliveries of the latter type can never be eliminated but a record of customers forcing such "shot gun" deliveries is kept and when new contracts are made the persistent offenders are not encouraged to sign.

The company considered the largest single controllable cost to be drivers wages. A very elaborate incentive system has been installed to get maximum performance from the drivers. Several so-called "bogeys" are set for the drivers to shoot at. For each route it is the average number of hours required to cover the route,and for the drivers it is wages per gallon delivered, the hourly wage being fixed for each driver. For each man, there is also a gallon per hour quota based on a three months average. This quota is calculated by dividing the capacity of the truck by the average time per trip bogey. The "bogeys" are adjusted semi-annually to compensate for changes in seasonal demand.

In addition to this, the drivers are rated on a performance standing which is the ratio of the delivery quota to the actual delivery, all multiplied by five. The men are also rated on the cleanliness of their trucks,

personal appearance, customer complaints, accident record, and the quality of their reports.

Their final rating, based on all these bogeys, is called the performance standing and it places the men in one of four wage classes. Maintenance of one's standing in a certain class for a period of time is necessary before a man can jump from one class to another. Thus a very definite incentive is provided to keep the men up to standard. A record is kept posted in the garages where the drivers can see it and compare their relative standings. The foremen are compared by taking the average rating of the men under them, and the highest rating foreman over a period of time gets the first promotion. The entire incentive system has recently replaced the system of merit badges and bonuses formerly used.

All major maintenance work is done at one central repair station. Ordinary, normal repair work is cared for by five small repair stations scattered at strategic intervals throughout the territory. At one time the company followed a preventative maintenance schedule, but discarded it after six years' trial as being costly and wasteful. At present, repairs are made only when actual breakdown occurs or when inspection shows that a repair job is necessary.

When another truck is required in the terri-

tory, a requisition slip giving full specifications is made out at the central office of the district and sent to the company's main office in New York. If the requisition is O.K.'ed, it either goes to the purchasing department and the truck is purchased, or else a truck is transferred from another territory. The make of truck desired is determined by comparing the requirements for economical operation in the section in which it is to be used with performance records of various makes of trucks when operated under these conditions. Because of the widely varying topography of the territory the company operates in, any attempt to standardize on one particular make truck would be quite ill-considered.

The trucks are depreciated over four years, and the old ones are put on a retired list and used only in emergencies. The cost of a major repair shop job plus the added life the repairs will give to the truck is always measured against the cost, life, and present marketing conditions when deciding whether to buy or repair. The foreman in charge of the repair depots can authorize minor repair jobs, but major repairs have to be O.K.'ed by the district manager.

The final control figure used by this company is the cost per gallon delivered in the various territories. That is in the neighborhood of one half cent per gallon for this area. Unfortunately all these rec-

ords are maintained in the New York office which made it impossible for the interviewers to find out very much about them. We do not know the sizes of territories compared nor could we ascertain what complementary and subsidiary control accounts were used.

A P P E N D I X C

The C Company

C Company

The C Company operates a fleet of 375 Ford and Mack trucks. They are solely a service organization and provide trucking for general purposes. They also bid for municipal and state contracts for snow removal and road construction.

The company does its own repairs and maintenance work. The drivers are not allowed to repair the trucks. If there is a breakdown on the road they are required to telephone in for a mechanic who takes a company repair car to the scene. They have a well-equipped machine shop and employ a skilled body of machinists and mechanics. They service their own tires and have their own paint shop. A preventative maintenance system is used by the company, the trucks being taken off the road at stated intervals for a check up and overhauling. In addition to this, there is a daily report from the drivers and nightly inspection by the watchmen.

The company carries only compulsory insurance. In 1930 they stopped paying heavy liability insurance premiums, posted a bond with the state and now settle all claims themselves. They have been able to save a considerable sum in this way. For this system to be successful, it has been necessary to make the drivers

appreciate fully their responsibility. Every claim that is investigated automatically costs the driver involved $2.00 and he is liable for any property damage he may cause up to $100.00. There are in all sixty laws to which each driver is held and any infraction results in a penalty. These regulations have a two fold purpose; to minimize the number of claims arising from property damages, and to force the drivers to take care of their trucks. Any damage to a truck that the company claim agent finds the driver responsible for is paid for by the driver up to $100. If a driver injures a tire, he is fined a sum equal to the value of the estimated reduction in the life of the tire. There are numerous fines for other infractions of the company's rules and three men are employed full time to check up on the drivers to see that they are obeying them. A bulletin board is posted in each garage, on which a record of the month's accidents is kept. The joshing of drivers who have had accidents by their fellow drivers has been found to be a good incentive to make them try to avoid future accidents.

As an offset to the penalties the drivers are liable to incur, they are paid good wages and receive monthly bonuses for a clear accident and claim record and for making more deliveries than average. This last bonus applies more particularly to coke deliveries. At

Christmas the drivers with the best records receive gifts of clothing.

The company does all the delivering for a large coke plant and delivers coal and oil for other companies. The C Company has developed its own order system and routing for the companies they serve on contract delivery and have been able to have their systems approved by the companies served. It is another indication that business men who have formerly operated their own delivery services to carry their commodities to the consumer are now withdrawing from the trucking industry.

The Ford trucks are depreciated over two years and the Mack over four. Tires are charged off the month they are purchased. A close check is kept on tires.

There are several control records used, depending upon what type of work the truck is doing. For coke and coal it is cost per ton; for oil it is the cost per gallon; for general work and also for the first two, the cost per mile is calculated. Experience and the development of these records over a period of years have been invaluable for determining rates. Individual truck records are kept, one of which is included at the end of this case.

A P P E N D I X D

D Motor Freight Company

D Motor Freight Company

The D Motor Freight Company is a general trucking firm with terminals in Hartford, Springfield, Worcester, and Boston. The main office is in Boston. Mr. D has made an extended study of the trucking industry and has compiled statistics of costs for his own business.

The company's largest cost, and Mr. D feels that this is true of the whole industry, is its terminal expense. This includes administration, telephone, accounting, insurance (terminal), advertising, extra labor, pick-up, transfers, soliciting, and rentals (loading stations and offices).

With an eye toward keeping these costs, which vary between 35 and 50% of the expense dollar to a minimum, Mr. D made arrangements with other trucking concerns hauling through Hartford, Springfield, and Worcester to share terminals with them at these cities. One pick-up truck at each terminal and the same starters and dispatchers serve all the companies using the terminal. Mr. D found it necessary to have a private terminal in Boston, his central office, and it is his belief, founded on eighteen years of trucking experience, that one private terminal is essential to any trucking firm doing over a $100,000 a year business.

Individual monthly records are kept for each

truck. The daily hauls are recorded, the mileage, gasoline, oil, payroll, parts and repairs, grease, tires, supplies, and miscellaneous items. The tonnage, gross revenue, and transfers and advances are kept on the same sheet.

From these operating records, a recapitulation is made of the variable and fixed operating charges, the mileage, tonnage, revenue and number of trips. With this information at hand the monthly control statistics are calculated. It has been Mr. D's experience that operating costs do not vary to any great extent from one company to another, but that the trend in operating costs per mile is decidedly downward.

The calculated cost per mile is a good index to show whether costs are staying in line, but is unsatisfactory because it bears no relation to the tonnage hauled and hence the profitableness of the business. For example, a truck that carries no return load may have a comparable cost per mile with one that carries loads both ways, but the former truck is being operated inefficiently and is not producing the revenue it should. For purposes of true comparison, the variation in cost per ton mile between two such trucks would indicate the difference in operating costs.

Trucks were depreciated over a four-year period

during which time the trucks were run about 250,000 miles. The cost of the tires on a new truck were deducted from the purchase price of the truck and the depreciation rate applied to this figure. A separate depreciation was established for the tires based on an average life of approximately 30,000 miles.

Drivers were paid on an hourly rate rather than on a mileage basis. Mr. D has found that in this section of the country where hauls are for relatively short distances, it is impossible to calculate the payroll on a mileage basis. A cost sheet is appended to this report.

MONTH OF _____

OPERATING RECORD

MISC. ITEM	MISC. AMT.	TONNAGE	GROSS REVENUE	TRANSFERS AND ADVANCES

RECAPITULATION	
VARIABLE CHARGES	
CITY GASOLINE	
ROAD GASOLINE	
OIL	
GREASE	
TIRES	
PAYROLL	
PARTS & REPAIRS	
SUPPLIES	
MISC.	
TOTAL VARIABLE CHGS.	
FIXED CHARGES	
DEPRECIATION	
INSURANCE	
TAXES & REG.	
INTEREST	
STORAGE	
MISC.	
TOTAL FIXED CHGS.	
TOTAL OPERATING EXP.	
INDIRECT OVERHEAD	
TOTAL EXPENSE	
ROAD MILEAGE	
CITY MILEAGE	
TONNAGE	
GROSS REVENUE	
TRANSFERS & ADVANCES	
NET REVENUE	
NO. OF TRIPS	

OPERATING STATISTICS

COST PER TON MILE (OPERATING) .....

COST PER TON MILE (TOTAL) .....

COST PER TRUCK MILE (OPERATING) .....

COST PER TRUCK MILE (TOTAL) .....

COST PER TON .....

COST PER TRUCK .....

REVENUE PER TON MILE .....

REVENUE PER TRUCK .....

REVENUE PER TON .....

REVENUE PER DOLLAR OF EXPENSE .....

AVERAGE TONS PER TRIP .....

AVERAGE MILES PER TRIP .....

_____ .....

_____ .....

_____ .....

REMARKS:

MOTOR TRUCK COSTS

By IRVING MALKIN

1932

MOTOR TRUCK COSTS

By IRVING MALKIN

Published by
Malkin Motor Freight Company
106 COMMERCE STREET
BOSTON, MASS.

1925

Motor Truck Costs

AS A USER of motor trucks, whether owned or hired, you will be interested to know the trend in motor truck costs.

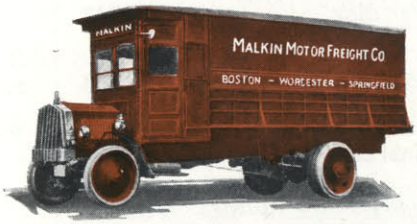
In the days of prosperity, when freight was plentiful, rates were high enough to produce profits without knowledge of the cost of services rendered.

Today however, due to keen competition and to a period of depression it becomes necessary more than ever before to operate motor trucks on a sound, economical basis, to figure costs to an exactitude, and to profit by the experience of others.

The losses sustained by the trucking concerns should be less than in the older forms of transportation, which require millions of dollars of capital and countless men before one ton of freight can be moved — for each motor truck is a complete transportation system in itself.

It is with the hope of benefiting the industry, and helping the individual truckman, that the statistics on the following pages have been gathered over a period of fifteen years.

We are able to submit to you this information after due and diligent attention to the motor truck business for fifteen years, during which time we have taken advantage of all modern equipment produced by the motor truck manufacturer that would bring the cost of motor freight down, consistent with sound economics.



1917

1917
OPERATING COST PER MILE

A — Fixed Charges		
1. Interest	.0110	
2. Insurance	.0170	
3. Garage	.0108	
4. Taxes	.0035	
Per mile		.0423
B — Chauffeur's Wages		
1. Wages	.0990	
Per mile		.0990
C — Variable Costs		
1. Depreciation	.0757	
2. Repairs	.0476	
3. Tires	.0378	
4. Fuel and Lubrication	.0718	
5. Miscellaneous	.0105	
Per mile		.2434
Total Operating Cost Per Mile		**.3847**
D — Terminal Costs		
1. Per truck mile		.1506
Total Operating and Terminal Cost Per Truck Mile		**.5353**

Yearly Truck Mileage, 18,144

Explanatory References on following pages

1925
OPERATING COST PER MILE

A — Fixed Charges		
1. Interest	.0101	
2. Insurance	.0186	
3. Garage	.0101	
4. Taxes	.0072	
Per mile		.0460
B — Chauffeur's Wages		
1. Wages	.0910	
Per mile		.0910
C — Variable Costs		
1. Depreciation	.0600	
2. Repairs	.0450	
3. Tires	.0350	
4. Fuel and Lubrication	.0570	
5. Miscellaneous	.0109	
Per mile		.2089
Total Operating Cost Per Mile		**.3459**
D — Terminal Costs		
1. Per truck mile		.1203
Total Operating and Terminal Cost Per Truck Mile		**.4662**

Yearly Truck Mileage, 21,200

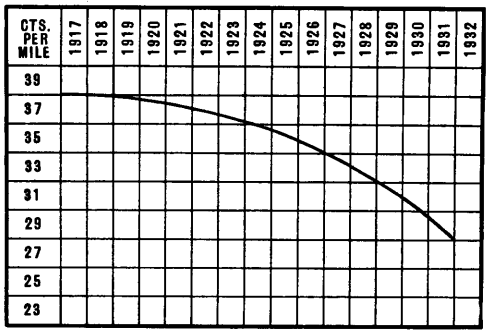
Explanatory References on following pages

1931
OPERATING COST PER MILE

A — Fixed Charges		
1. Interest	.0083	
2. Insurance	.0176	
3. Garage	.0080	
4. Taxes	.0127	
Per mile		.0466
B — Chauffeur's Wages		
1. Wages	.0679	
Per mile		.0679
C — Variable Costs		
1. Depreciation	.0500	
2. Repairs	.0350	
3. Tires	.0286	
4. Fuel and Lubrication	.0416	
5. Miscellaneous	.0100	
Per mile		.1652
Total Operating Cost Per Mile		**.2797**
D — Terminal Costs		
1. Per truck mile		.0950
Total Operating and Terminal Cost Per Truck Mile		**.3747**

Yearly Truck Mileage, 30,000

Explanatory References on following pages



CURVE OF DECREASE IN OPERATING COSTS, 1917 to 1932

EXPLANATORY REFERENCES

Interest

1917. 6%—5 year life-average 3.6%
Cost $6813 less tires.

1925. 6%—5 year life-average 3.6%
Cost $5400 less tires.

1931. 6%—4 year life-average 3.78%
Cost $6640 less tires.

Insurance — 1917, 1925, 1931.

Fire, Theft, Collision ($100 Deductible).
Liability $10,000-$25,000.
Property Damage $5,000.
Full Marine Cargo $7500 per load.
Workman's Compensation (Mass.).

Garage

Storage on trucks only.

Taxes

Registration. Gas Tax.
Excise Tax. City License.

Chauffeur's Wages

Driver's pay for line haul only.

Depreciation

1917 and 1925. 5 year life, 90,000 miles.
1931. 4 year life, 125,000 miles.
(For original cost refer to Interest.)

Repairs

All mechanical work, labor and parts, done at service stations. Body, Painting, Electrical and Spring work done at respective shops. (1931 truck repairs estimated.)

Tires

1917. Front, 36/7 solid. Rear, 40/14 solid.
Average life, 15,300 miles.
1925. Front, 38/7 pneumatic. Rear, 40/14 solid.
Average life, 18,000 miles.
1931. Front, 9.75/24. Rear, eight tires 9.75/24.
All pneumatics. Average life 30,000 miles.

Fuel and Lubrication

Percentage of average fuel dollar.
Gas less tax, 85%. Oil, 9%. Grease, 6%.
Gas variation on all models: less than 5%.
Oil consumption on 1931 model: 15% less.

Miscellaneous

Chains, Alcohol, Ropes, Canvases, etc.

Terminal Charges

The following items that have no bearing on the line haul are included in this group.

Administrative	Telephone, travel, etc.
Accounting	Insurance (Terminal)
Advertising	Pick-up transfers
Extra Labor	Soliciting
Rentals (loading stations and offices)	

The Terminal cost per mile is secured by dividing the aggregate truck miles of our own fleet and hired trucks during the peak seasons, by the total Terminal cost.

Additional copies of this book may be had by application to

MALKIN MOTOR FREIGHT CO.

106 Commerce Street

Boston, Mass.

A P P E N D I X E

E Transportation Company

E Transportation Company

The E Transportation Company operates a fleet of 55 trucks throughout the New England, but most of its business is local work. All kinds of general delivery is done as well as contract work. For general hauling - freight and sundries - a flat hourly rate for the rent of the truck plus a graded mileage rate is charged.

A rather curious accounting system is in use in this company. Practically all the cost records needed to establish a system of individual truck costs are kept and yet the company prefers to lose these individual costs by lumping them together in groups and only calculating average costs per fleet. Their reason for doing this is that there would be too much clerical work involved in keeping individual truck records, a reason which to the interviewers did not seem to be valid. Daily truck cards are kept by the drivers which include a record of all deliveries, the day's mileage, and the gas and oil consumption. The mechanics job tickets specify the trucks on which they work, the time they spend on each job, and the stockroom requisition slips show for which trucks parts have been withdrawn from stock. All these records are kept for the individual trucks, but instead of retaining them on this basis they lose their identity by lumping them into the general

expense journal. The journal is broken up into columns, each column representing a fleet of trucks. These fleets vary in size from three to fifteen trucks of White, Diamond T, Chevrolet, and Ford manufacture, and they are composed of units of comparable size. For example, there are three fleets of Fords, this number being the number of different size Ford trucks owned by the company. All the individual truck expenses are charged to the proper fleets and at the end of the month depreciation, overhead, and payrool are tacked on. It is true that by checking back the expenses of the individual truck can be found, but that involves considerable work and variations within a fleet have a tendency to balance out so that it is quite possible for the monthly fleet cost to appear to be normal while it is actually concealing a multitude of sins. For control purpose, the fleet cost and the average cost per mile for each fleet does not mean very much.

Depreciation is on a percentage basis. The small trucks are depreciated 50% the first year and 33½% of the book value each year thereafter. The large trucks are depreciated 25% the first year and 33½% each year thereafter. This method of depreciation prevents the trucks from ever being written completely off the books. This company continually rebuilds its old trucks and depreciates them from a new base. In con-

trast to the policy of writing off their trucks in from two to six years which is followed by most of the companies visited, this method carries the trucks at a higher value for a longer period of time after the first year's depreciation is charged.

A very close check is maintained on tires. They are charged off as an expense the month they are replaced, but a record is kept of each one. Each is stamped with the date it was put in service, so that the age of any tire can be determined by inspection rather than having to refer to the records. Records are kept by the serial number on each tire. The mileage, position, and repair costs kept in the records make it possible to obtain adjustments for faulty tires.

No wage incentive system is used by the company. They rely on complaints, the care of the truck, and a meter kept in each truck that registers the time in motion and the stopping time as sufficient incentive to keep the drivers on their toes.

Because of the method of payment for service, the customers are sometimes interested in the daily truck record, and the meter mentioned above supplies a log of the truck's time. There is some slight wage incentive for the drivers who deliver oil on contract. Their payroll is computed on both an hourly basis and a gallonage delivered basis, the driver being paid whichever is the highest.

A P P E N D I X F

F Coal Company

The F Coal Company

The F. Coal Company operates 140 trucks from twelve yards, all soft coal deliveries being made from one yard. The decrease in profitableness of the coal business during the last decade has focussed the attention of coal dealers on the importance of knowing costs. The coal dealer can do nothing about the cost of the coal alongside his wharf; there is little he can do about setting his selling price because he must meet his competitors price in a business that has become steadily more competitive. Therefore he must squeeze his costs and his profit into the margin between selling price and cost alongside his wharf.

The cost per ton delivered is the essential control figure in the retail coal business. Itemized costs are kept and reduced to a monthly per ton basis. This makes it possible to keep costs under surveillance. This system is used to assist the company when it makes bids for contract delivery. The length of the haul is measured, and the time required for the delivery and return determined. Any peculiarities of the building that necessitate special equipment or extra labor are carefully noted and all this information filed on a card.

The standard net cost per ton delivered for the job is calculated by adding the cost of trucking, which is obtained by multipling the cost per mile by the number of miles, to the cost of housing the coal. Additional charges for labor used for put-in jobs are subtracted from this total to give the net cost. This information besides being necessary for submitting a bid is also compared with an average cost per ton. This comparison shows whether the actual cost per ton will be higher than normal. Since competitive conditions keep bids within a narrow range, the comparison shows whether the customer will be profitable. Some customers are carried at a loss on particular jobs because they are profitable on other jobs. This use of cost records in drawing up bids is a very valuable and necessary function of the accounting department. Of course it is impossible to do this on individual orders, such as most of the anthracite orders. These have to be taken as they come, and the only way to cut costs for this type of delivery is to speed up the time of delivery.

The time of delivery is kept on the daily truck records. The record of deliveries, kind and amount of coal, and the time for each delivery are kept on this sheet. From the time, the wages of the drivers and helper for each delivery are calculated and from

this the labor cost per ton delivered is obtained. In the case of contract delivery, this cost is compared to the standard labor cost and time allowed for delivery. The daily mileage, gas, oil, and the hours for the start of the first delivery and return from the last delivery, or, if the truck is being repaired, the hours in the shop are also recorded on the daily record. Daily truck operating costs are not kept as they are of no value for a one-day period. Variations from the standard labor cost for the job if it is a soft coal delivery are watched closely and a very close check is kept on the delivery time.

It was found that the most important place to watch for lost time was in the yard itself. Appreciation of the magnitude of this cost was only gained after cost records were installed which traced out each cost item. After this was discovered, every effort was made to cut the time between entering and leaving the yard to a minimum.

On some of the larger trucks, the F Coal Company has installed aluminum bodies which increase the pay loads as much as two tons on the largest trucks. They have not found it profitable to use these bodies on small trucks because the small pay load increase does not justify the difference in initial cost between the aluminum and steel bodies.

No burden distribution is made, the garage and superintendence costs being kept separate from delivery costs. Maintenance is done whenever breakdowns occur or inspection indicates it is necessary. No attempt is made to do preventative maintenance. A system of preventative maintenance would interfere with deliveries during the peak season when every available truck is on the road. Overhauling is done in slack times whenever possible, and the trucks with heaviest operating costs, depreciation excluded, are laid up during such times. Depreciation is on a monthly basis and the truck is charged off over a period of four years. Tires and repairs are charged to the month during which the truck is retired or repaired. It is the policy of the company to modernize its equipment as rapidly as possible. Mr. F. believes that the lower operating costs of new equipment justify the larger capital investment required than if the older more obsolescent trucks were made to do.

ADDRESS:

DATE

NAME:

TONS | KIND

CHARGED TO:

DEL'D FROM

MILEAGE, ONE WAY

RUNNING TIME

COST PER TON

DESCRIPTION OF JOB, ETC.

TRUCKING $

HOUSING

TOTAL $

LESS LABOR

NET COST $

CAP. OF BIN:

TRIMMING:

EQUIPMENT:

A P P E N D I X G

G Coal Company

G Coal Company

The G Coal Company operates about 120 trucks of sizes varying from two to twelve tons capacity out of nine coal yards in and around Boston.

The same conditions affecting the F Coal Company - the decrease in the volumes of business and increase in competition - have also made The G Coal Company cost conscious.

The cost alongside the wharf cannot be controlled and the retail price is kept down by competition forcing the company to squeeze its cost and profit margin in between the two prices. The G Coal Company handles its problems in much the same manner as does the F Coal Company. Standard costs for contract delivery are established in the same manner as with the latter company, and these are compared with the actual costs. The important control figure is the cost per ton, but in order to give a true picture of conditions supplementary controls are used. This is necessary because of the variety of services performed. Some trucks make few, long hauls, others many short ones, others carry double orders, some make several trips to one customer, and others deliver at random. Consequently there is often considerable variation in the cost per ton for different trucks. These supplementary accounts which are total mileage,

total stops, pounds per stop, total trips and average pounds per day provide the accounting department with the necessary statistics to make useful comparisons and analyses of cost per ton variations. It goes without saying that only trucks of the same capacities can be compared. A close time check on each job is another and extremely effective method of control.

The company is definitely committed to the policy of replacing steel bodies by aluminum bodies. This is being done as rapidly as possible, the limiting factor being that the delivery department must live within its budget. In addition to increasing the pay load the trucks can carry, a saving results through a decrease in running expenses because of the greatly lessened weight of the truck when running light. The relatively high scrap value of aluminum must be taken into consideration. The experience of the company indicates that the bodies stand up very well over a period of years. The company feels that the greater investment required for the aluminum bodies is more than justified, and have carried these body types down even to their smaller trucks. This company follows a minority policy in this regard, every other trucking firm questioned on this subject being much less enthusiastic over the efficacy of aluminum bodies.

The depreciation period varies depending on

the size and make. Generally speaking, the small trucks are depreciated over three years, the medium sized over four years, and the larger ones over six years. The cost of the tires originally on the truck are included in the capital value of the vehicle. Replaced tires are depreciated on a mileage basis, somewhat of a conflict in policy.

In slack times the fully depreciated trucks are laid up, because the company prefers to have those trucks still being charged with depreciation to pay their way during their booklife. An objection to this practice arises in that depreciation charges are an arbitrary accounting procedure and that some fully depreciated trucks may have smaller running costs than others that are still being depreciated.

No proportionate allocation of burden is made. Each truck shares equally the cost of maintaining the garage and repair shop.

The importance of keeping delivery time at a minimum cannot be emphasized too strongly. This holds for the slack season as well as during the peak times. When business is dull the drivers are laid off as soon as the day's orders are delivered. Efficiency of delivery means lower costs because the drivers are paid on an hourly basis. The N.R.A. has made efficient delivery less effective as a means to pare costs when business is quiet, but the high overtime rates imposed by the

code places a premium on quick delivery during the peak season. Loading time is an item that all coal dealers strive to reduce. The G Coal Company has handled this problem very well by installing a hopper which automatically weighs the coal as it is loaded into the truck thus eliminating weighing on the scales and trimming of the load to make correct weight. Only the two fastest selling sizes of coal are weighed out of this hopper because of its low capacity.

TRUCK NO. ..... **DAILY TRUCK REPORT** DATE .....

DRIVER	REG. HOURS	OVERTIME	HELPERS	REG. HOURS	
Total Time					
Number Stops			Telephone Calls		
Tons Per Stop			Tons Coal		
Tons Per Hour			Tons Coke		
Tons Labor			Total Tons		
Gals. Gas		Qts. Oil		Mileage	

REMARKS :

A P P E N D I X H

H Express Agency

H Express Agency

The H Express Agency is a corporation whose operations are of national scope and it uses a highly centralized accounting procedure. Consequently, the interviewers were unable to obtain very much information concerning the type of control records kept in the central New York office, or how they were used. They did obtain considerable information about the maintenance and repair system used in Boston. The corporation is doubly handicapped in that it must comply with all of the Interstate Commerce Commission regulations and accounting procedure which often impose a burden on the company forced to use them, and they must also keep a very close check over an enormous territory to stop the leakages that inevitably creep into a very large and scattered organization. It is a fair question whether the system of elaborate checks that is employed is not more costly than the losses that would be incurred without it. .

The Boston branch of this company operates 170 trucks of from 1½ to 5 tons capacity. One hundred of these are electric and the remaining seventy, gasoline. The electric truck predominate because the company has found that they are more economical to operate than gasoline trucks in the heavy traffic of the busi-

ness section. The trucks are operated almost exclusively in this section, the maximum run being about five miles. For distances greater than this the railroads are used. The operating cost per month is about one third less for the electrics,but they do not run as much daily mileage as the gasoline trucks. The real saving lies in the longer life and lower maintenance cost of the former.

The drivers hand in daily truck reports of the time out on the road and make a notation of parts requiring attention. Each night a cursory inspection is made of all the trucks and particular attention is paid to the drivers' reports of trouble. Repair jobs costing less than $25.00 can be authorized by the foreman. If the cost is estimated between $25.00 and $50.00, a petty expenditure authorization is made out by the foreman and must be approved by the Boston manager before work can proceed. On more than $50.00, the request for authorization must go to the New York office for approval, a very time-consuming procedure.

The mechanics are paid an hourly wage and must turn in a daily time card stamped with the time spent on each job. At the end of the month, the repair department overhead is apportioned to the individual trucks in accordance with the time spent in repairing them. Garage overhead is split evenly among all the trucks.

The individual repairs records are kept separ-

ate from the operating records until the monthly recapitulation is made. The daily operating record for each vehicle includes, mileage, time, gasoline consumption, oil consumption and grease. A notation of weather conditions is also made.

Drivers are paid a weekly wage. No wage incentive system is used. As it is, the minimum drivers service is fifteen years.

The Boston office is given a complete card file property record of every vehicle in its territory, but all depreciation is handled in New York. The Boston office keeps a record of all the tires on its vehicles.

[redacted] INCORPORATED

(3201 12-33) (Printed in U.S.A.)

MOTOR VEHICLE REPORT CARD.

INSTRUCTIONS: Driver must fill out this card for each vehicle driven by him and deposit in designated place.

He must report all defects or trouble encountered and if none, so state.

Truck No.	Time Out	
Date	Time In	
Elapsed Time	(Hours)	

By _____ (Driver)

STATE BELOW PARTS REQUIRING ATTENTION:

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____

8 _____

9 _____

Received by _____ Time _____

Repaired by _____

Examined by _____

Date _____ 193__ Time _____

[redacted]
INCORPORATED

(3211)
10-30
(Printed in U.S.A.)

SHOP ORDER—MOTOR VEHICLE REPAIR SHOP.

No._____

To_____ Date_____ 19 __

Quantity	ITEM

Date Complete_____ 19 __ Foreman_____

Date Received_____ 19 __ Stock Inspector_____

Date Shipped_____ 19 __ Approved_____
Superintendent.

[redacted]
INCORPORATED

(3212)
4-33
(Printed in U.S.A.)

SHOP JOB ORDER—MOTOR VEHICLE REPAIR SHOP

Job No._____

To_____ Date_____ 19____

QUANTITY	ITEM

CHARGE TO I. C. C. ACCOUNT No._____

Date Complete_____ Date Shipped_____ Approved_____ Supt.

MONTH AND YEAR	DETAIL OF WORK	MATERIAL	LABOR AND OVERHEAD	TOTAL
	CHASSIS REPAIRS			
	BODY REPAIRS			
	PAINTING			
	TIRES			
	BATTERIES			
	CHASSIS REPAIRS			
	BODY REPAIRS			
	PAINTING			
	TIRES			
	BATTERIES			
	CHASSIS REPAIRS			
	BODY REPAIRS			
	PAINTING			
	TIRES			
	BATTERIES			
	TOTAL COST—CHASSIS REPAIRS			
	" " BODY REPAIRS			
	" " PAINTING			
	" " TIRES			
	" " BATTERIES			

[redacted]
INCORPORATED

(1246 8-29) (Printed in U.S.A.)

Petty Expenditure Authority

_____ 19___

INSTRUCTIONS:

The original copy of this authority, after proper approvals are secured, should be returned to the party who originated the application in order that it may be attached to the bill or voucher covering the authorized expense.

This is not a substitute for Form No. 1101, "Authority for Expenditure" or Form No. 533, "Estimate for Wagon and Sleigh Repairs."

Mr._____

_____

Application is hereby made for authority to expend_____dollars for purpose as follows:

_____

_____

_____

_____

_____

_____

_____

Signed: Approved:

_____ _____

Agent. (Title)

Approved: Approved:

_____ _____

Supt. (Title)

Approved: Approved:

_____ _____

Gen. Mgr. (Title)

Approved: Approved:

_____ _____

Vice President. (Title)

(Printed in U.S.A.) (1202 3-29)

[redacted]
INCORPORATED

INVENTORY OF MATERIAL AND SUPPLIES ON HAND AS OF..19..........

At..(City and State)

Sheet No.

Supply Department or...Shop
(Indicate character of Shop)

INSTRUCTIONS: Enter items below, grouped by classes. Use separate line for quantity on hand at each ice. For material in work, unit prices will consist of cost of material, labor and proportion of overhead expense.

ARTICLE	Grade, Size or Number	QUANTITY	PRICE		Total Cost
			AT	PER	

DESCRIPTION OF GASOLINE TRUCKS

Company's No. _____ Location _____

Make _____ Date in Service _____

Tonnage _____ Body mnf'd by _____

Chassis No. _____ Style _____ Length Inside _____ Width Inside _____

Model _____ Wheelbase _____ Cab mnf'd by _____

Drive (Rear Axle) _____ Tires Front Rear

Gear Ratio _____ Size _____

Length of Frame back of Seat _____ Kind _____

Length overall with body _____ COST:

Motor Make _____ Chassis _____

Motor No. _____ H. P. _____ Body _____

Cyl Stroke _____ Cyl. Bore _____ Fire Extinguisher & Box _____

Weight Chassis _____ Shop Charge _____

" Body _____ Shipping _____

" Total _____ Freight _____

Order No. _____ Wheel Carrier _____

Voucher No. _____ _____

" _____ _____

" _____ _____

" _____ Total Cost: _____

A P P E N D I X I

I Bus Company

I Bus Company

The I Bus Company is a subsidary of the I Railroad, and it operates 116 busses over suburban and inter city routes. Many of these bus lines are operated at a loss because the company is a public utility and is regulated, so that more often than not it is impossible for it to eliminate unprofitable bus lines. However, the loss involved in operating these unprofitable lines is but a small fraction of the loss that would result from operating railroad trains along the bus routes. In fact the sole reason for the existence of this company is to cut the deficit accruing from operating unprofitable train service through various districts. The company is further unable to effect savings by making old but perfectly serviceable equipment last because the constant replacement and modernization of the equipment by the large bus lines makes the I Bus Company's busses suffer by comparison and means a loss in patronage unless they modernize their equipment also. Another serious drain on the company's revenues results from the lack of protection afforded it by the Utility Com - mission.

For example, at regular intervals competing jitney lines are started up along the I Bus Company routes, and although the majority of these small com-

petitors operate at a loss, they build up a sufficient nuisance value to force the I Bus Company to buy them out at a price much in excess of their worth.

It is obvious that this company is operating under such difficulties that a year in which it breaks even is a year to be remembered. Good analysis and close supervision of costs is extremely important so that iron clad arguments can be presented to the Utilities Commission for modification of routes and changes in rates.

The company has developed a system of accounts based on the Interstate Commerce Commission classification. A summary operating statement divided into columns for the separate bus lines is appended to this case.

Maintenance and repair work is done by the company at its Cambridge garage. A system of preventative maintenance is used. The busses are taken off the road after a certain mileage and partially or completely overhauled, depending on how much mileage has been run. The system is cumulative, each succeeding maintenance job including the preceding ones until a complete overhauling is done and the cycle begins anew.

The busses are depreciated $4\frac{1}{2}¢$ per mile. A corallary of this is that the company must keep its

busses constantly in operation, otherwise obsolescense will increase faster than depreciation. The tires are leased, the company paying for them on a mileage rate. The reason for this is that the company cannot be too careful to avoid accidents and delays caused by tire trouble. Therefore they only use the tires for a small part of their useful life. Rather than being left with a large stock of old tires to be disposed of, the company, by leasing them, can return them after use to the tire manufacturer who can dispose of them to second hand dealers.

An average cost per mile is calculated monthly for each bus line and it is compared with the monthly revenue per mile for each line. This does not serve any control purpose because the cost per mile for each line cannot be used to show which bus is inefficient to operate. As stated before there is practically nothing that can be done with the unprofitable lines. Higher operating expenses of one line over another invariably have resulted from adverse operating conditions rather than inefficient busses.

The company does not keep individual bus records because they believe their preventative maintenance system and the competitive necessity for modernizing their fleet frequently serve to keep inefficient busses from being operated. They believe individual bus costs would be superfluous.

BOSTON AND MAINE TRANSPORTATION COMPANY

CLASSIFICATION OF ACCOUNTS FOR MOTOR BUSES AND FREIGHT TRUCKS

Boston, Massachusetts
January 4, 1927

GENERAL INSTRUCTIONS.

This classification of accounts for use in the operation and maintenance of Motor Buses and Freight Trucks, while in tentative form, is intended to provide the proper classification of all revenues and expenses incident to the maintenance and operation of motor transportation. It is realized that necessity will, from time to time, warrant changes and supplemental instructions, and for this reason the accounts have not been prepared in consecutive numerical order. The unused numbers will be assigned to such additional accounts as experience may warrant at a later date.

While the classification is primarily for the use of the General Offices in Boston, where the bulk of the accounting will be done, it is nevertheless imperative that those in charge of Motor operation carefully study this classification and familiarize themselves with the accounts, so that the basic reports prepared by them may clearly reflect all necessary data from which those in the General Offices may properly classify to the accounts intended.

DAILY TIME RETURN.

All labor applicable to Buses and Freight Trucks must be detailed on forms B&MT-7 & 7B. As all charges are to be accounted for by individual Buses and Trucks, care should be taken to show the vehicle number in each instance.

Pay rolls are to be prepared from these time returns in Boston.

REPORT OF MATERIAL ISSUED FROM STOCK AND USED FOR REPAIRS TO MOTOR BUSES AND FREIGHT TRUCKS.

All material issued to Buses and Trucks must be detailed on form B&MT-8A. The money value of stock and unit prices are to be maintained in Boston. Care should therefore be exercised in preparing form to show proper quantities, units and full description of material, so that unit prices may be applied in Boston.

REPORT OF GASOLINE ISSUED.

All gasoline issued should be reported on form B&MT-6.

REPORT OF LUBRICATING OIL ISSUED.

All lubricating oil issued must be reported on form B&MT-5. Separate report should be made for each grade of lubricating oil to permit proper chargeout, as the price for various grades differ.

MILEAGE.

All costs are figured on a mileage basis. It is therefore important that the mileage be kept correctly and checked closely at all times. Mileage is to be computed from speedometer readings as reported on form B&MT-11. Speedometers should be watched and when found registering incorrectly should be removed and repaired at once. Those in charge of Motor Bus operation should have a record of the mileage one way and round trip for

each route, so that they will be in a position to know that the mileage reported by bus drivers on form B&MT-11 corresponds to the number of trips made times this mileage.

TIRES.

Practically all buses are equipped with Fiske tires which are paid for on the mileage basis. Forms for reporting tire changes, returning tires, etc. have been left with the various superintendents, their use has been explained and appears to be understood by all. Any questions as to the proper handling of tires, purchased under the mileage basis, must be taken up with the General Manager.

On the few buses that are equipped with tires not furnished under the mileage payment plan, a complete and accurate record must be kept, and also on all such tires on hand in Stock Room. Unit cards form B&MT-12 will be furnished for this purpose. Whenever a tire is issued from the Stock Room advice should be furnished on form B&MT-8, showing the Bus or Truck number to which it was issued, kind of tire, serial number, and size.

The value of tires issued will be charged in the General Offices to Account "Tire Renewal Fund".

GARAGE EQUIPMENT AND TOOLS

Whenever special equipment and large tools, such as Garage jacks, sets of wrenches, alemite guns, valve grinding machines, etc. costing seventy-five ($75.) dollars or over are required, special authority should be secured before purchase is made.

GENERAL OVERHAULING OF BUSES

Whenever a Bus is withdrawn from service for a complete overhauling notice should be sent to this office, stating all facts and Bus number that is performing substitute service, upon receipt of which a work order authority assigning special work number will be forwarded, so that all labor and material expended in the rehabilitation may be properly accounted for under the number so assigned.

Comptroller.

CLASSIFICATION OF ACCOUNTS FOR BUSES.

OPERATING REVENUE

Revenue from Transportation

101 - Freight Revenue

This account shall include amounts earned from transportation of freight on trucks assigned to freight service.

102 - Passenger Revenue

This account shall include amounts earned from transportation of passengers on regular passenger buses. To this account shall be charged amounts paid for fares refunded and for tickets and transfers redeemed.

103 - Special Bus Revenue

This account shall include amounts earned for transportation of passengers on special passenger buses.

104 - Mail Revenue

This account shall include amounts earned from the transportation of mail, from the use of special mail facilities and from bonuses for special mail transportation.

From this account shall be deducted fines and penalties imposed by the government.

109 - Other Transportation Revenue.

This account shall include revenue derived from transportation operations not includable in any of the foregoing revenue accounts.

Operating Revenue Other Than From Transportation.

110 - Station and Bus Privileges

This account shall include revenue from weighing, vending and other automatic machines located at stations, advertising in station and on buses, news stands, and other similar concessions.

116 - Rent of Equipment, Buildings, and Other Property.

This account shall include amounts received as rent for use of equipment rented to others, also rents received from others for buildings, land and other property rented to them when such property is used in connection with operations.

119 - Miscellaneous.

This account shall include all revenues derived from operations other than transportation and not includable in the foregoing revenue accounts.

OPERATING EXPENSES

Way & Structures

1 - Superintendence

This account shall include salaries and office, traveling and other expenses of those in charge of plant equipment. Amounts paid Engineers and their Assistants, Roadmasters, Office and Field Forces, while engaged in preparing road maps and laying out routes, etc.

12 - Removal of Snow and Ice

This account shall include the cost of labor and material used in the removal of snow and ice, whether done by the Company or otherwise, including cost of tools, wages of men operating plows, sweepers, scrapers, etc., and other supplies and expenses incident to the work.

This account shall also include the wages of employees operating motor cars solely for the purpose of keeping roadway open.

Note: Repairs of snow plows, sweepers, scrapers and miscellaneous snow equipment used in connection with this work shall be charged to acct. #32 "Service Equipment."

16 - Crossings, Fences and Signs

This account shall include the cost of labor and material used in repairing and placing of crossing signals and other roadway signs, including signs and markers indicating routes, mile, section, warnings, etc.

18 - Maintenance of Telephone Lines

This account shall include the cost of labor and

material used in maintaining telegraph and telephone lines when such are maintained and operated by and at the expense of the bus department.

24 - Buildings, Fixtures and Grounds

This account shall include the cost of labor and material used in repairing Garages, Shops, Stations, Waiting rooms, platforms and other buildings and structures, and repairs to buildings and structures, held on long term lease.

25 - Depreciation of Structures

This account shall include charges covering the current loss from depreciation of Way & Structures.

Maintenance of Bus Equipment

29 - Superintendence of Equipment

This account shall include salaries and office, traveling and other expenses of those directly in charge of maintenance of equipment. It will include an equitable proportion of salaries and expenses of shop superintendent, or master mechanic whose time is divided between maintenance of buses and cars. No proportion of the salaries of general officers nor expenses of general office shall be charged to this account.

30 - Passenger Motor Buses and Freight Truck

This account shall include the cost of labor and material used in repairing passenger motor buses as follows:

A - Painting and Varnishing

This account shall include all labor and material

of whatsoever nature used, whether at regular painting period or touching up renewed parts.

B - Bodies

This account shall include all repairs to the body, including labor and material such as glass, doors, roofs, side sheathings, heaters, window cleaners, mirrors, windshield, farebox, register, steps, spare tire carrier, curtains, destination signs, lighting wire and lamp fixtures (body lights) and all interior repairs to seats and floors.

C - Chassis

This account shall include labor and material used in repairs to the chassis, which consists of the frame on which the body and motors are mounted, including springs, brakes, drive shafts, propeller shafts, gas tank, gas line, vacuum tank, fenders, mud guards, bumpers, horn, hubedometers, headlights, tail lights, headlight brackets, shock absorbers, truss air springs and air brake equipment, repairs to wheels, brake drums, axles, (front and rear) brake shoes, brake lining, ball bearings, roller bearings, differentials, steering knuckles, tension rods, tie rods and equalizers, also hood, speedometer clock, dashlight, ameter and radiator.

D - Tires and Tubes

This account shall include the cost of all repairs to tires. The charges covering depreciation of tires, and purchase of tires under contract, also renewals and repairs to tubes, to be sub-divided as follows:

D-1 Tires

Charge to this account repairs to tires only.

(Further charges to this account covering monthly depreciation and tires purchased under contract will be handled in the Auditor of Disbursements Office. See general instruction.)

D-2 Tubes

This account to cover the cost of renewals and repairs to tubes.

Note 1. Labor of changing tires on the road and in garages shall be charged to Account 70 - Garage Employees.

E - Engine

This account shall include all repairs, labor and material used in repairing engines, including all parts thereof together with transmission system, ignition system including magnets and generator, carburetor, manifold, fan and belts, and all oiling devices, water pumps, etc.

F - Storage Batteries

This account shall include all repairs and renewals to storage batteries.

32 - SERVICE EQUIPMENT

This account shall include the cost of labor and material used in repairing Service Equipment, including sprinklers, snow plows, etc. and may be sub-divided the same as Account 30.

Note: Cost of repairing emergency repair automobiles and trucks should be charged to Account 38 "Service Vehicles".

36 - Shop Equipment

This account shall include all labor and material used

in repairs to power driven tools, such as air pumps, battery charging equipment, lathes, etc.

37 - Shop Expenses

This account shall include all repairs and renewals of small hand tools, oil for air compressor, gasoline for shop use, waste, etc. also the expense of keeping the shop clean.

38 - Service Vehicles

This account shall include the labor and material used in repairing emergency repair, and other Service trucks and automobiles.

39 - Miscellaneous Equipment Expenses

This account shall include all expensesin connection with maintenance of equipment which are not properly chargeable to other equipment accounts.

40 - Depreciation of Equipment

This account shall include uniform monthly charges, representing depreciation of equipment and should be sub-divided as follows:

A - Buses

This account to include uniform monthly charges representing depreciation of buses.

B - Freight Trucks

This account to include uniform monthly charges representing depreciation of freight trucks.

C - Miscellaneous

This account to include uniform monthly charges representing depreciation on Service Vehicles, miscellaneous equipment including power driven tools, such as air pumps, battery charging equipment, lathes, etc.

41 - Equipment Retired

This account shall include the original cost (estimated if not known) or record value of equipment abandoned, destroyed, sold or otherwise retired from service, less salvage and less Reserve for Depreciation on such equipment to date of retirement, and should be sub-divided as follows:

A - Buses

To include retirement of buses.

B - Freight Trucks

To include retirement of Freight Trucks.

C - Miscellaneous

To include the retirement of Service Vehicles, miscellaneous equipment including power driven tools, such as air pumps, battery charging equipment, lathes, etc.

POWER

53 - Fuel for Power

This account shall include the cost of gasoline and other fuel used for generating power.

TRANSPORTATION

63 - Superintendence of Transportation

This account shall include the salaries, and the office traveling and other expenses of those directly in charge of transportation, such as superintendent of transportation, and their assistants, starters, inspectors, instructures, etc., and cost of checking traffic for schedule purposes. No proportion of general office should be charged to this account.

Note: When employees enumerated above also have supervision over other departments, their salaries and expenses should be properly apportioned in accordance with service rendered the various departments.

64 - Motor Bus Operators and Freight Truck Drivers

This account shall include the wages of bus operators, truck divers and others engaged in Pass. and Frt. service, including wages paid for time during which they are required to be on duty and to hold themselves in readiness for active service.

66 - Miscellaneous Bus Service Employees.

This account shall include wages of employees engaged in operation when not provided for elsewhere.

67 - Miscellaneous Bus Service Expenses.

This account shall include all oils and greases of whatsoever nature used in the lubrication of buses and trucks and should be sub-divided as follows:

A-1 Lubrication (Engine Oil)

Charge to this account value of oil used for lubrication of engines only. (Engine Oil)

A-2 Lubrication

Charge to this account value of all oils and greases, except Engine Oil, used in lubrication of buses.

Note: Labor charges for oiling and greasing buses should be charged to Account 70 - "Garage Employees".

B - Miscellaneous

This account shall include lamps used in illumination of buses and trucks; all material used in cleaning buses and trucks such as brooms, fountain brushes, floor brushes, whisk brooms, pumicstone, bon-ami, alcohol, non-freeze compound for raditor, skid chains and repairs thereto. Also the cost of

secret service inspection, operators books and punch, badges, cost of refilling fire extinguishers, portable signs on buses for guidance of Passengers, meals furnished operators and other bus and truck service supplies and expenses.

70 - Garage Employees

This account shall include the wages of garage employees, including wages of watchmen, and time in taking monthly inventory of tires, changing tires on the road, and in garages, in oiling, greasing, washing, cleaning, placing and inspecting buses and trucks. If garage employees repair equipment in addition to other duties, segregation shall be made so that proper proportion of wages paid shall be charged to the respective maintenance accounts.

Note: Repairs made at time of inspection should be charged to the proper maintenance account.

71 - Garage Expenses

This account shall include the cost of fuel, light, water, ice, and other garage supplies and expenses.

73 - Operation of Telephone Lines

This account shall include the wages and expenses of employees engaged in the operation of telephone lines used in the dispatching of buses and trucks.

Note: Repairs to telephone lines should be charged to account 18 "Maintenance of telephone lines".

78 - Other Transportation Expenses

This account shall include wages of crews on emergency vehicles, cost of removing wreckage, cost of towing disabled buses and trucks and other expenses not properly chargeable to other accounts.

TRAFFIC

79 - Superintendence and Solicitation

This account shall include the salaries, supplies and expenses of those engaged in the superintendence of traffic and shall include office rent and supplies as well as traveling and hotel expenses.

80 - Advertising

This account shall include the salaries and expenses of advertising agents, cost of printing, publishing and distributing time tables, folders, etc., advertising in newspapers and periodicals, signs in buses, advertising special events and like expenses.

GENERAL AND MISCELLANEOUS

83 - Salaries and Expenses of General Officers

This account shall include the salaries and traveling and other expenses of the chairman of the board, president, vice-president, treasurer, secretary, comptroller, auditor, general manager, assistant general manager, chief engineer, general superintendent, purchasing agent, and all other officers whose jurisdiction extends over the entire system or all departments; also receiver's fees, and payments to

engineering corporations for supervision and managing operations of the company.

84 - Salaries and Expenses of General Office Clerks

This account shall include the salaries, traveling and other expenses of traveling Auditors, bookkeepers, cashiers, paymasters, stenographers, clerks employed in counting cash, tickets and transfers, and all other clerks employed in the General Office.

85 - General Office Supplies and Expenses

This account shall include the cost of office supplies, repairs of office furniture and of mechanical calculators, typewriters, duplicating machines, etc., wages of janitors, porters and messengers; rent and cost of repairing rented offices; and miscellaneous expenses of General Office.

Note. Office expenses of departmental officers shall be charged to the accounts to which their salaries are charged.

86 - Law Expenses

This account shall include all law expenses, exclusive of that incurred in connection with the settlement of injuries and damages.

89 - Miscellaneous General Expenses

This account shall include miscellaneous expenses connected with the general management not provided for elsewhere, such as cost of telephone service and telegram, cost

of "Safety First" or "Prevention of Accidents" campaigns, subscriptions to news papers and periodicals, books for company library, fees and expenses paid to directors and trustees, dues and fees for bus associations, cost of free entertainments for employees, and expenses of a like nature which are not properly chargeable to another account.

92 - Injuries and Damages

This account shall include expenditures on account of persons killed or injured and property damage; salaries and expenses of claim agents and others engaged in investigating, adjusting, or settling claims; medical or surgical expenses; fees for witnesses and others; and all other expenses in connection with the settlement of claims for injuries and damages.

93 - Insurance

This account shall include premiums paid for fire boiler, casualty, burglary, workmen's compensation, and other insurance; also amounts set aside as an insurance reserve by a Company carrying its own insurance in whole or in part.

94 - Stationery and Printing

This account shall include expenditures for stationery, printing postage and stationery supplies, except as provided for elsewhere.

95 - Store Expenses

This account shall include the salaries and expenses in connection with storeroom, including cost of sending material and supplies from general storerooms to branch store-

rooms, and cost of handling scrap material in store.

96 - Miscellaneous Service Equipment Expenses.

This account shall include the cost of gasoline and oil used in service vehicles only.

98 - Rent of Equipment

This account shall include payments made to others for rent or use of their equipment.

A P P E N D I X J

The J Company

The J Company

The J Company, a large department store, operates a fleet of one hundred delivery trucks throughout greater Boston. This delivery service is a necessary adjunct to the store and the cost of the service can easily become very large unless it is strictly controlled. The delivery department has in recent years been budgeted at about 1.5% of sales and Mr. X, the man who devised the system in use there, has had remarkable success in staying within his budget.

The mechanical set-up of the truck accounting department has been kept as simple as possible. Printed job tickets for the repair men were tried and discarded as being too much bother and unnecessary. The mechanics simply write out on a plain white card the number of the truck they have been working on and make a list of the parts used and the time spent on the job. With regard to the job time, formerly kept on printed tickets, Mr. X found that this item was of no use because the mechanics were always careful that their time tickets added to eight hours each day. Daily gas and oil reports are essential, however, and these are kept by the drivers who hand them in with their daily delivery record.

Daily operating cost records for each truck are kept. The items recorded are gas, oil, body repairs

parts, chassis repair parts, labor, painting and washing, tires and sundries. A day by day mileage record is kept and a record of days used. Tires are written off the same month the replacement occurs. No attempt is made to depreciate them over a period of several months, because Mr. Riley believes it would serve no useful purpose to do so. Records of the individual tires are not kept because the expense of keeping such records is much greater than the value of the records. For obvious reasons, the tires used are the ones sold by the company in the main store.

At the close of the month, the separate daily truck records are totalled and closed out into a large monthly summary sheet. To the expenses already costed are added the fixed charges, depreciation, insurance, license and taxes. Rent and interest are the remaining items which make up the total monthly cost. Rental cost is split equally among all trucks and this cost is composed of the fixed and operating expenses applicable to maintaining the garage. The trucks are depreciated over a four-year period and the monthly depreciation charge is taken from separate property records maintained for the individual trucks. These property records not only show the book value of the truck, but also the date and cost of repairs made. All repairs are written off the month they are made and, no matter how large they are,

are never capitalized. The original cost of the truck is depreciated in a straight line and as a general rule Mr. X replaces trucks when repairs become greater than depreciation, allowance being made for special circumstances. These property records have been especially useful in showing which makes of trucks stand up best and are a guide for future purchases.

The monthly mileage and the days in operation are included in the monthly cost sheet and the miles per gallon and cost per mile for each truck.

Mr. X found that these records did not furnish him with adequate control over costs although they were very useful. He managed to reduce delivery costs further by his human management skill and by the use of a "cost per bundle" control.

The manner in which Mr. X set about reducing costs is rather interesting. Almost the first thing he did when he took over his job was to obtain an increase in pay for the drivers. As a method for winning the confidence and loyalty of his men, this scheme proved effective. After he had thus won favor with the men, he talked their routes over with them and obtained from the drivers first hand the information that he needed to change the routes for more efficient and inexpensive delivery. He succeeded in rearranging the routes so that the average number of bundles delivered per day per

truck went from about 160 to above 200. He has maintained close personal contact with his drivers, and is able to change delivery routes as soon as conditions which warrant such changes are noticed by the men. Without this skillful management of personnel, the efficacy of the accounting control would be greatly lessened.

The cost-per-bundle control is used in the following way. All trucks are sent out on the routes as completely loaded as possible, and a record of the number of bundles on each trip is kept. This record is necessary to check missing packages, and so there is no extra clerical work involved in obtaining these control data. Experience has shown that there is an average size of bundle delivered, so no allowance has to be made for variation in bulk. The monthly cost per bundle is obtained by dividing the total cost of operating the truck for the period by the number of bundles delivered. If this figure gets out of line, it is an indication that the route needs readjusting, and a signal for Mr. X to talk things over with the driver. It is a more sensitive barometer than cost per stop, although this is also calculated, because the cost per bundle has a more direct connection with the amount of merchandise delivered than does the cost per stop. This control demonstrated that it was too costly to deliver merchandise distances greater than forty miles. Above this

distance the express agencies could handle it more economically. The cost of the drivers wages is not included in the monthly truck cost record and hence does not appear in the calculated cost per bundle. However, payroll is calculated when the budget is made and is one of the items making up the budgeted 1.5% of sales for which figure Mr. X was held accountable.

An interesting but perhaps irrelevant side issue pertains to the cost of breaking in new men during the rush season. It is an insurance company regulation that no riders be allowed on the trucks. While the company officially upholds this rule, they know very well that it is frequently violated. However, they have found that many young men taken on during the rush seasons need no training and are able to drive the routes as well as the regular drivers solely because they had learned the ropes as kids riding with the drivers. Mr. X did not say whether the company had yet been forced to cope with a suit arising from an accident with a rider on the truck.

A P P E N D I X K

K Ice Company

The K Ice Company

The K Ice Company is a subsidiary of the Y Ice Company which operates in New York, Philadelphia, Boston, Washington, and Baltimore. The K Ice Company has two subsidiaries itself and the three companies combined operate 336 vehicles. The vehicles are divided into two classes, ice delivery trucks, and the company automobiles, but the accounting procedure for handling both classes is the same.

One central repair shop is maintained in a rented garage on Commonwealth Avenue. In all respects the repair department is treated as if it were an entirely separate company doing repair work for the K Ice Company on a non-profit basis. By doing this the costs of repairs are completely segregated from all other costs and it enables the management to keep them under scrutiny without having to pick them out from other costs.

Seven or eight thousand dollars of common replacement parts are stocked at the garage and as they are withdrawn from stock the requisition slips are stamped with the job number and sent to the main office where the number and cost of the part is entered in the stock record for which a perpetual inventory is kept. A truck ledger is also kept and the cost of the part is charged to the proper truck. Mechanics are paid an

hourly rate and their job cards are stamped with the time spent on each job by the shop foreman. The time for the job multiplied by the hourly rate gives the direct labor cost for the job and this figure is also posted in the truck ledger. The overhead charged to each repair job is 60% of the sum of the direct labor cost and the cost of the replacement parts. The monthly analysis of the repair costs consists of the following records: monthly mileage, number of days operated, material, overhead, and body repairs. The mechanics payroll is included with materials and body repairs are kept separate from the more common chassis repairs. A cost per mile by type of car is calculated from the material, overhead, and body repair cost.

A record of gasoline and oil consumption is kept for individual trucks and the miles per gallon for both gas and oil is calculated. The cost per mile for gas and oil for each truck is also calculated for each month.

The company at one time maintained five depots for garaging their trucks and cars. They have recently embarked on a unique scheme for eliminating the overhead cost of these terminals. They have in effect set up their delivery men in business for themselves. This was done by mortgaging the trucks to the drivers for a period of three years in return for which the driver

contracted to buy all of his ice from the K Ice Company. Most of the drivers were able to garage the vehicles in their own back yards and this enabled the company to get rid of two of its five depots. More will probably be abolished when the plan takes full effect. The driver pays for the maintenance and repairs to his truck as well as the operating expense out of the margin between the cost of ice to him and his price to the consumer. There are many implications that may be drawn from this policy. Apparently the company feels that the elimination of garage costs and the cutting down of administrative expenses more than compensate for the decrease in gross margin which was more than 40¢ per hundred pounds of ice. It is an example of a new idea that is beginning to take hold among businesses that deliver to the consumer. The officials of these companies are coming to realize that they are in reality operating two enterprises, they are selling their commodities and also running a trucking business to deliver them. Now they are experimenting to find whether or not it will not pay them to get out of the trucking business insofar as it is possible and concentrate on what is really their business. It must be remembered that the company keeps the same cost records for the trucks that they did before this new policy was installed and they watch these records just as they did before. Of course there is

every reason that they should do so if they are to insure the success of this plan.

At the close of each year, the Y Ice Company computes comparative statistics for each of the cities in which they have subsidiaries. These statistics show the average cost per mile for mechanical repairs, and the average cost per mile for tires in each of the cities for trucks and cars together,and for each separately.

The K Ice Company does not calculate a monthly cost per mile for tires for each truck because it is its policy to treat new tires as an expense rather than depreciating them over a period. This makes such a calculation useless for an individual truck becuase it varies greatly from month to month as new tires are bought.

The company carries its own liability insurance, paying only the compulsory rates.

A P P E N D I X L

L Grocery Company

The L Grocery Company

Almost all of the trucks used by this company are hired from trucking agencies, although formerly they owned and operated their own trucking fleet. There are two principal reasons for the change in policy. The first is that the company did not wish to be in both the grocery and the trucking business, and the second is that it desired to eliminate the large capital investment required to own a fleet of trucks. A few small G.M.C. trucks bought in 1929 are all that is left of the old company fleet.

Trucking contracts are let to agencies on a cost plus basis and the company provides a uniform cost sheet and an accounting procedure for all to follow. It is practically identical with the cost sheet used when the L Grocery Company did its own trucking. Reports are received at weekly intervals and the comptroller examines all accounts with the representatives of the various truck concerns.

About 5000 trucks ranging in size from $2\frac{1}{2}$ to 10 tons are in use in the New England area. The length and type of the routes are widely varied. For one route the average weekly mileage is 2000 miles while the other extreme is intra city hauls of the small trucks.

Costs are separated into three groups, mileage

costs, fixed costs, and labor costs. The mileage costs include gas, oil, repair wages,repair materials, etc. These are the expenses incidental to operation of the trucks. Truck and tire depreciation is included with this group and both are set up on a mileage basis. Because the trucks are for the most part operated on fixed routes, this method of depreciation works out very well and particularly for the tires it affords a basis for comparison of costs that cannot exist if tire expense is charged wholly to the week in which replacement occurs. Trucks are painted and varnished in alternate years and the cost of the job prorated over a year's time. Complete overhaul jobs are also charged off in this manner.

Fixed charges include insurance, registration, taxes, and administrative expense.

The labor cost includes the compensation insurance, drivers, and helpers and loaders wages. Wages are paid on an hourly rate, and are uniform for each class, no incentive system being used. Daily truck records are kept by the drivers which account for the total time the truck is out. This record is broken down so that running time and loading time is available at a glance. Total mileage for the trip is recorded and a report on the reasons for any delay must be made on the ticket.

The control statistics compiled on the cost sheets are: number of trucks operating; total truck -

hours, tons handled, trips, mileage, average tons per trip; hours, tons, trips, miles-per week per truck. The itemized costs for the fleets are broken down into cost per week per truck, and cost per mile. At first thought these fleet unit costs may not appear to furnish adequate control because of the different sizes and types of trucks performing different work that are in each fleet. However, these figures are supplemented by the control accounts first mentioned, and because they are worked up at frequent intervals and can be compared with the costs of other fleets and weeks, it has been unnecessary for the L Grocery Company to analyze a great mass of individual truck records. Periodically as a final check the company calculates the cost per ton mile. This figure which averages around 15¢ per ton mile receives the greatest consideration when the company draws up its contracts.

Maintenance and operation of the trucks is left pretty much to the individual truckers. In general the truckers have a policy of monthly inspection of trucks.

When the interviewers asked Mr. L his opinion of a preventative maintenance policy, he stated that he believed it was dying out because in most instances it has been found costly and unnecessary.

Daily Truck Report

Trip No._____ Date _____

Route No. _____ Territory_____

Truckman_____

Truck No._____

Type of Work_____

Driver's Name _____

Helper's Name _____

Time Truck Left Garage _____

Arrived at Whse _____

Started Loading_____

Finished Loading_____

Arrived First Stop_____

Arrived Last Stop_____

Returned to Whse _____

Returned to Garage _____

Speedometer Reading:-
Start_____ Last Stop_____ Finish_____

Trip Mileage _____

Report on back reason for any delays. Fill in report accurately and return to Shipping Office after each trip.

Cost Analysis of _____ at _____ Wha
Trans. Co.

Month of _____ from _____ to _____

A. No. Trucks Operating _____
B. Total Truck Hours _____
C. " Tons Handled _____
D. " Trips _____
E. " Mileage _____

F. Avg. Tons per Trip _____
G. Hrs. per Week per Truck _____
H. Tons " " " " _____
J. Trips " " " " _____
K. Miles " " " " _____

Item	Total Fleet Cost	Cost per Wk. per Truck	Cos Per M	Remarks
Mileage Cost				
Gasoline (Gals.) (M.P.Gal.)				
Oil and Grease				
Total (1 ' 2)				
Mechanics' Wages (Hrs.)				
" Compensation Ins.				
Repair Material & Parts				
Paint Jobs or complete overhaul				
Total Repairs (4 7 inc.)				
Tire Depres.(rate) & Repairs				
Truck Depres.(rate)				
Total Mileage cost (3/5/9/10)				
Fixed Cost				
Ins.-Cargo-Coll.P.L.-P.D.-F.&T.				
License, Code & P.U. plates				
Truck Taxes (Rate)				
Rent, Heat, Light & Power				
Office Wages				
" Expense				
Other Unclassified Expense				
Supervision				
Total Fixed Cost (12-19 inc.)				
Platform (rate)				
24. Compensation Ins. (rate)				
25. Total Truck Wages (21-24 inc.)				
26. Total Cost (11/20/25)				
27. Total [redacted] Revenue				
28. Total outside Revenue				
29. Total Revenue (27/28)				
30. Return (29 26)				

Item 7 - Do not include entire job in one month; write off over 12 m estimated

Item 12 - 13 - 14 - 15 to be distributed over 12 months

Item 17 and 18 - explain if unusually high

A P P E N D I X O

Bibliography

Bibliography

The U. S. Department of Commerce

Bulletin . . . March, 1932

MONTHLY COST SHEET

A 1550

MONTH______________________193___

CAR NO.	MAKE	GAS	OIL	REPAIR PARTS	BODY REPAIRS	LABOR	PAINTING AND WASHING	TIRES	BAT- ERY	SUN-DRIES	RENT	INT-EREST	FIXED CHARGES				TOTAL MONTHLY COST	MILEAGE	MILES PER GALLON	DAYS USED	COST PER MILE
													DEPREC-IATION	INSU-RANCE	LICENSE	TAXES					
	TOTAL																				

DAILY GARAGE RECORD OF OPERATIONS OF MOTOR VEHICLES _____ 19__

WEATHER { A. M. _____ / P. M. _____

(3220) 3-29 (Printed in U.S.A.)

VEHICLE NOS.	DRIVERS A. M. AND P. M.	ODOMETER		TIME		GASOLENE		CYLINDER OIL		TRANSMISSION OIL		KEROSENE OIL		GREASE		REMARKS
		OUT	IN	OUT	IN	GALS.	QTS.	QTS.	PTS.	QTS.	PTS.	QTS.	PTS	LBS.	OZ.	
	BROUGHT FORWARD															
	CARRIED FORWARD															

[redacted]

RESULT OF OPERATIONS FOR MONTH OF_____

DIVISION.....									TOTAL
OPERATING REVENUE									
Transportation Revenue:									
101 Freight Revenue									
102 Passenger "									
103 Special Bus Revenue									
104 Mail Revenue									
109 Other Transportation Revenue									
Total Transportation Revenue									
Incidental Revenue:									
110 Station and Bus Privileges									
116 Rent from Equipment-Bldgs. etc.									
Total Operating Revenue									
OPERATING EXPENSES									
Maintenance of Way and Structures									
12 Removal of Snow and Ice									
24 Buildings, Fixtures and Grounds									
Total Maintenance of Way and Structures									
Maintenance of Bus Equipment									
29 Superintendence									
30 Passenger Motor Buses and Freight Trucks									
A Painting and Varnishing									
B Bodies									
C Chassis									
D-1 Tires									
D-2 Tubes									
E Engine									
F Storage Batteries									
32 Service Equipment									
36 Shop Equipment									
37 Shop Expenses									
39 Miscellaneous Equipment Expenses									
40 A Depreciation of Buses									
B " Trucks									
C " Miscellaneous									
Total Maintenance of Equipment									
Power									
53 Fuel for Power—Gasoline									
Transportation									
63 Superintendence									
64 Motor Bus Operators									
65 Station and Freight House Employees									
67 A-1 Lubrication—Engine Oil									
B Miscellaneous									
C Garage Rental									
70 Garage Employees									
71 " Expenses									
78 Other Transportation Expenses									
Total Transportation Expenses									
Traffic									
79 Superintendence and Solicitation									
80 Advertising									
Total Traffic									
General and Miscellaneous									
83 Salaries and Expenses of General Officers									
84 Salaries and Expenses of General Office Clerks									
85 General Office Supplies and Expenses									
86 Law Expenses									
89 Miscellaneous General Expenses									
Injuries and Damages									
93 Insurance									
94 Stationery and Printing									
95 Store Expenses									
96 Miscellaneous Service Equipment Expenses									
98 Rent of Equipment									
Total General and Miscellaneous									
Total Operating Expenses									
Net Operating Revenue									
532 Tax Accruals									
515 Income from Unfunded Securities and Accts.									
Net Income									
Revenue Passengers Carried									
Mileage for Month— Revenue									
Non Revenue									
Special Service									
Total									
Net Income January									
February									
March									
April									
May									
June									
July									
August									
September									
October									
November									
December									