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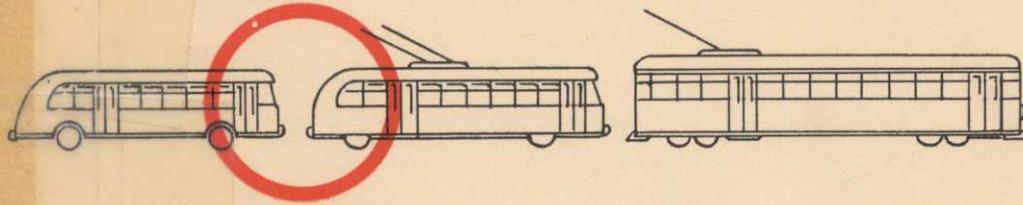
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PRINCIPLES OF URBAN TRANSPORTATION

Principles of Urban Transportation

EDITED BY FRANK HOMER MOSSMAN, PH.D.
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July 1951

FRANK MOSSMAN
East Lansing, Michigan

Table of Contents

Chapter		Page
	PART I. INTRODUCTION	
I	The History of Urban Transportation By Guy C. Hecker, Executive Manager, American Transit Association	7
	PART II. ECONOMIC ASPECTS OF URBAN TRANSIT OPERATIONS	
II	Transit and the Community By J. C. C. Cropper	11
III	Franchises and Public Regulation By Thomas Conway, Jr., Chairman Schuylkill Valley Lines, Inc., Philadelphia	21
IV	Capital Structures and the Raising of Capital Money By R. Gilman Smith, Partner, W. C. Gilman and Company, New York City	33
V	Transit Taxes and Special Imposts By David S. Letts, Attorney American Transit Association	39
VI	Fare Structures By E. B. McCaul, Chief Statistician, American Transit Association	47
VII	Organization of a Transit Company By Willits H. Sawyer Executive Engineer, New York City	77
VIII	Transit Vehicles and Their Selection By W. S. Rainville, Jr., Director of Research, American Transit Association	91
	PART III. OPERATIONAL ASPECTS OF AN URBAN TRANSIT SYSTEM	
IX	General Organization and Functions of the Transportation Department By R. H. Stier, Philadelphia Transportation Company	101
X	Equipment Maintenance By R. B. Smyth, Metropolitan Transit Authority Everett, Massachusetts	107
XI	Electric Power Department By W. T. Myers, Superintendent, Electrical Department, Philadelphia Transportation Company	111
XII	Way and Structures Department By E. J. Archambault, Engineer - Way and Structures Milwaukee Electric Railway and Transport Company	117
XIII	Transit Accounting By Frederick E. Benton, Assistant Comptroller, Philadelphia Transportation Company	121
XIV	Legal and Claims Departments By Ralph T. Powell, Manager, Claims Department, and E. J. Jones, Attorney, Capital Transit System, Washington, D. C.	129

Chapter		Page
XV	Purchases and Stores By W. E. Scott, Superintendent of Supplies and Utility, Philadelphia, Transportation Company	135
XVI	Traffic Checking and Schedule Preparation By Robert T. Pollock, Coordinator of Schedules, Cleveland Transit System	141
XVII	Street Traffic Problems By Robert A. Mitchell, Chief, Bureau of Traffic Engineering, Philadelphia	157
XVIII	Accident Prevention By Merwyn A. Kraft, Director of Personnel and Accident Prevention, American Transit Association	165
XIX	Personnel By Merwyn A. Kraft, Director of Personnel and Accident Prevention American Transit Association	173
PART IV. MANAGERIAL RESPONSIBILITIES		
XX	Transit as a Business By F. W. Doolittle, Consulting Engineer, North American Company, New York City	181
XXI	Production of an Adequate Net Operating Revenue and Return By R. Gilman Smith, Partner, W. C. Gilman and Company, New York City	185
XXII	Management- Labor Relations By George W. Anderson, Labor Relations Adviser, American Transit Association	197
XXIII	Management-Labor Relations (continued) By George W. Anderson, Labor Relations Adviser, American Transit Association	201
XXIV	Public Relations By Frank H. Mossman, Associate Professor, School of Business and Public Service Michigan State College	209
XXV	Advertising and Sales Promotion By E. Cleveland Giddings, Vice-President, Capital Transit Company, Washington, D. C.	215
XXVI	Urban Transit Research By W. S. Rainville, Jr., Director of Research American Transit Association	221
	Appendix	234

CHAPTER I

The History of Urban Transportation

ONE of the predominant characteristics of modern life in the United States has been the increasing proportion of the population concentrated in metropolitan areas. This growth of large urban centers within relatively narrow geographic areas would have been almost impossible economically without the development of urban transit systems. The movement of millions of people within a metropolitan area as a normal function of everyday business operations is the job of the transit operation. Although the first efforts of the industry were relatively crude, technology has advanced in a coordinate sense with the demands which the public has placed upon the urban transit companies.

Urban transit as discussed herein is confined to organized common carriers of passengers in cities and suburban areas operating over fixed definite routes, at regular intervals and at stated rates of fare, and utilizing electric railway, motor bus and trolley coach systems; and, in the largest cities, rapid transit subway or elevated electric railway lines. Stated less specifically, urban transit companies are engaged primarily in the local transportation of passengers, within cities and suburban areas, in electric street cars and trolley coaches and motor busses. They do not include such local and semi-local carriers of passengers as taxicabs or electrified divisions of suburban railroads, or so-called long distance, over-the-road motor coach operations connecting widely separated cities and communities.

In the following chapter there is presented a brief review of the several stages through which the industry has passed in the transition from animal power to mechanical and electric power. These are divided into the two main heads of surface operation and rapid transit.

SURFACE OPERATIONS

Horse-drawn omnibus

Urban transit in the United States had its beginning in the form of the horse-drawn omnibus in New York City (on Broadway between Bowling Green and Bleecker Street) about 1830.¹ In the following five years there were more than 100 omnibuses operating in the city and two decades later the major thoroughfares of the city were literally teeming with such vehicles. By 1885, 593 omnibuses were licensed to operate over 27 different routes in New York City.

Horsecars

Omnibus operation probably reached its peak somewhere between 1860 and 1870, but even then the horse-car began to replace it. The horse-car was an adaptation of the omnibus using flanged wheels and operating on steel rails laid in the street. A smoother surface of the rails made possible the operation of larger vehicles at higher speeds and with greater comfort to passengers.

The success of the early New York City omnibus operations led to the construction of a horse-car line by the New York and Harlem Railroad Company which started regular operations in 1832 on double tracks on the Bowery between Prince Street and Fourth Avenue at Union Place (now 14th Street), a distance of about one mile. Although this original horsecar line was moderately success-

¹Pascal, the eminent French mathematician of the 17th Century, is credited with the original conception of the Omnibus for Public Transportation. Pascal's Omnibus, carrying eight passengers was first operated in France in 1662 but failed after about one year's operation. It was not until 1829 that another omnibus line was started this time in London by George Shillibeir.

ful, no other lines were built until the middle of the century, except in New Orleans, where a line was installed in 1835. Then about 1850, horsecars were first operated in Brooklyn and within two or three years lines were placed in operation on Broadway, Second, Third, Sixth, Eighth and Ninth Avenues in Manhattan.

The first line built outside of what is now New York City -- except for the New Orleans line -- was opened by the Union Railway Company between Boston and Cambridge on March 26, 1856. This was followed by line in Philadelphia in 1858 and in the following year in several other cities including Chicago, Baltimore, St. Louis, Cincinnati, Pittsburgh, and Newark, N. J. By 1890 horsecars reached their peak of popularity, operating over more than 6,600 miles of track comprising 70 per cent of the total street railway trackage of the United States in that year, despite the fact that the electric railway car had been in existence for about four years.

Cable Cars

The first departure from horse-drawn vehicles in urban passenger transportation came with the application of mechanical power in the form of cable cars which were first operated in San Francisco in 1873. These were probably introduced first in San Francisco because of the steep grades in certain sections which precluded the possibility of city-wide horsecar operations (this latter type was limited to grades not much in excess of five per cent). Operation of cable cars was found to be entirely practicable on grades as steep as twenty per cent and their use spread to a number of cities.

Between 1877 and the middle of 1890, 48 cable railways were placed in operation, according to the United States census of 1890. It would appear that this mode of urban transport reached its zenith in about 1890; there were 5,089 passenger cars operated by cable lines at that time, with an annual volume of approximately 375,000,000 passengers. Two outstanding disadvantages to cable lines, however, led to their gradual decline. One was the relatively restricted speed of operation. The second factor was the high cost of construction, which was reported in 1890 as being an average of \$2,230,373 per mile of double track line. The number of lines has declined to the point where currently only one city, San Francisco, has cable cars in operation. Seattle was the last city outside of San Francisco to abandon cable cars.

Electric Railway Cars

Another type of urban transit vehicle, which was destined to play an exceedingly important role in the development of American cities, began to make its appearance in the eighteen eighties. This was the electric railway car. It possessed many advantages over the earlier type vehicles and its use spread rapidly throughout the country, superseding all other forms of common carrier passenger transportation with the exception of certain cable car lines in San Francisco which, because of the heavy grades encountered, continue to operate even today.

Experimental work on electrical transportation began about 1830. The first man to operate any form of vehicle by electric power was a little-known blacksmith, Thomas Davenport, in Brandon, Vermont. As a result of building a model electric railroad which was exhibited throughout the Eastern part of the country in 1834 and 1835, Davenport was granted a fundamental patent in 1837 on an electric motor using a battery as the source of power. Many other experimenters followed his footsteps and developments were so rapid that there is no entirely authentic record of the early progress of this form of urban transit.

The first commercially operated electric railway in the United States was opened in Cleveland in the Fall of 1884. This line, using a slotted center conduit (located in the street between the tracks) somewhat similar to those used today in Washington, D. C., was built by the Bentley-Knight Railway Company and operated on a line of the Cleveland Horse-Railway Company. However, great difficulty was experienced in maintaining alignment between the conduit and the track. The operations were abandoned after a year or two.

Others were working on the same problem at that time. J. C. Henry, a telegrapher in Kansas City, built experimental lines using overhead trolley wires with trolley wheels pressed against the sides of the wire and trailing the car by means of a flexible cable. The two men who were most

prominent in the early days of the industry were Charles J. Van De Poole and Frank J. Sprague; the latter has often been called the “father of the electric railway.” Van De Poole was a Belgian cabinet maker who had come to the United States and became very much interested in electricity. In 1883 he operated an experimental line in Chicago, and in 1884 and 1885, he ran street cars in Toronto between the Exposition grounds and the terminus of the city horsecar line, about one-half mile away. Although he first used a center conduit similar to the Cleveland installation, this proved unsatisfactory and he developed an overhead trolley line with an over-running trolley wheel connected to the car by a flexible cable.

After two temporary installations, one in South Bend and one in Minneapolis, Van De Poole received his first large contract to electrify the horsecar lines of Montgomery, Alabama. It was there on April 15, 1886 that he began the first commercially operated trolley line in the United States. He found the over-running trolley wheel unsatisfactory and invented an under-running trolley similar to those used today. It was the invention of this under-running trolley which gave great impetus to the expansion of electric railway systems.

Van De Poole next installed an electric line in Windsor, Ontario, which began operation on June 6, 1886. Leo Daft, an English contemporary of Van De Poole and Sprague, opened a line in Baltimore in 1885 over a distance of about two miles. He used a third rail instead of an overhead trolley and installed his motor on a “dummy” which pulled the passenger cars.

The most ambitious installation of the early days was Sprague’s Richmond, Virginia Line which was opened for service in 1888. This was the largest installation in the world at that time and is generally credited with being the first commercially successful electric street railway in the United States. Although Sprague’s Richmond ventures operated at substantial losses, they established him firmly in the traction field. His company equipped 113 of the 200 electric railways that were in operation in 1889, according to a report by the Edison General Electric Company (with which Sprague’s interests were merged).

Within two years after completion of the Richmond installation 1,262 miles of track were being operated by electric power, while 6,861 miles were still operated by animal, cable, or steam power. By 1902 electric railway mileage had approximately tripled, and electric traction had proved so successful that only 669 miles of track out of a total of 22,577 were being run by other than electric power.

Motor Busses

The next major development was the introduction of the automotive vehicle. Motor busses were first operated in urban transportation service in 1905 by the Fifth Avenue Coach Company, New York City, which imported a single 34-passenger double deck vehicle for trial use. This proved satisfactory and 14 additional busses were purchased and placed in operation on Fifth Avenue in 1907. The chassis were built in France, and the J. G. Brill Company of Philadelphia constructed the busses. One year later twenty more busses were purchased, and all of the company’s horses sold at auction.

The first recorded use of motor busses by an electric railway company was in Cleveland in 1912 when three busses were purchased by the Cleveland Railways for service in an outlying section of the city. In October of the following year, the J. G. Brill Company brought out what was probably the first motor bus catalogue picturing seven types of motor busses ranging from 16 to 34 passengers and two double deck busses seating 40 and 45 passengers.

The so-called jitney, first operated in Los Angeles in 1914, marked a somewhat different attempt to apply automotive power to the urban transit field. The jitney bus, which consisted of a crude body placed on a light truck chassis, sprang up suddenly in a number of cities as a competitor of the established electric railway systems. In many cities the jitneys were no more than private automobiles operated by their owners along established street car routes picking up passengers in competition with the existing carriers.

This type of operation was unregulated and sprang up in a period of substantial unemployment. For the next few years, jitney busses and jitney automobiles enjoyed quite a vogue as the idea of operating them spread from city to city. However, in most localities where they appeared there was eventual appreciation of the fact that the existing, established street railways operating under municipal franchises requiring them to furnish sufficient transportation to serve the entire city, could not continue in business if the jitneys were to be permitted to skim off the cream of the business and accept none of the responsibilities for giving service during all hours of the day on lean as well as heavy passenger carrying routes. Public regulation of the jitneys finally prevailed and eventually they disappeared. However, they did flare up again, briefly, in the relatively short-lived business depression of the early 1920's in some localities where they had not previously been banned.

Because the early motor busses were crude, uncomfortable, noisy, unreliable and generally unsatisfactory for continuous operation in public service, street railway companies for a number of years did not look favorably on them. Up to 1920 there were only about 60 busses in operation by ten electric railways in the entire United States.

The real period of development of the motor bus as a means of mass transportation began with the abandonment of bus bodies on truck chassis and the construction of the first wholly purposed-built busses with low floor level for city service in 1922 by F. R. and W. B. Fageol in Oakland, California. The next important change in motor bus design took place about 1928 with the development of what was known as the first transit-type bus with the engine or engines being located under seats in the center of the vehicle.

This new type bus had important advantages in improved riding characteristics, due to better weight distribution, and in operating characteristics, due to the more advantageous door locations that were possible. The new location of the engines, however, had certain disadvantages and it was not long until busses with engines located in the rear of the vehicle, or under the floor, began to make their appearance on all but the smaller vehicles; on these latter, the front engine location was retained within the body so that the external appearance of the vehicle did not differ from the rear-engine and under-floor types. Continued development and improvement have made the motor bus the practical and useful vehicle that it is today in the field of urban transit.

Trolley Coaches

Trolley coaches are rubber tired vehicles, resembling motor coaches in general body appearance, but they are operated by electric power received through sliding contacts on overhead wires.

The first electric trolley coach or trolley bus appeared in Laurel Canyon, California, in 1910. It first became part of a city transportation system in Merrill, Wisconsin, in 1913, when E. S. King (of the local power, light and transportation company) introduced the vehicle as a bus which could derive its motive power from the company's generated source of energy and could provide service into growing outlying areas without the expense of extending tracks. Further impetus was given to the development of the vehicle by scattered installations in various parts of the East and Midwest, including the Oregon Avenue line in Philadelphia in 1923. Early trolley coach operations experienced difficulties of current collection, principally due to the swiveling action required to permit the vehicle to maneuver in traffic and to draw up to the curb to load and unload. Some companies reported that it cost more per vehicle mile of operation for maintenance of the current collection device than it did for electrical energy.

The trolley coach in its modern form really began with the introduction of this type of vehicle by E. A. West in Salt Lake City, in 1928. With this and subsequent installations much developmental work was done by the manufacturers of equipment in the fields of current collection, motors, controls, braking systems, etc. The body and chassis of the vehicle also benefited from improvements of these components of the modern motor bus. Thus, transit managements generally and particularly those who either generated their own power or purchased it under favorable contracts, had available a semi-flexible electrically-propelled vehicle whose "fuel" costs were at least somewhat under the control of management (as contrasted with the motor bus and its increasing burden of gasoline taxes). The trolley coach has grown in number and in popularity with transit managements and the public during the past twenty years.

RAPID TRANSIT

Rapid transit of urban passengers has been a natural development in some of the largest and most populous metropolitan areas. In some instances the rapid transit operation has been on an elevated structure supporting railway tracks high enough above the streets to permit surface vehicles to continue their use of the streets. Another form of rapid transit service is underground and is most commonly referred to as subway operation with the railway tracks constructed below the level of the streets. At the present time there is much more subway than there is elevated operation.

Elevated Lines

In the United States the first passenger-carrying rapid transit service was an elevated line in New York City that began operation in 1868 along Greenwich Street between the Battery and Cortlandt Street. New York's elevated lines were rapidly extended. Most of them were placed in operation during the eighteen seventies. A large portion of the elevateds in New York City were removed in the late nineteen thirties and early nineteen forties following completion of construction of several new routes of the city's subway system.

The principal other elevated railway firsts in the United States were: Chicago, 1892, Boston, 1901; and Philadelphia, 1905. Elevateds were never constructed extensively outside of the United States; those at Hamburg, Germany and Liverpool, England are exceptions.

The motive power first used on the elevated lines in New York was by cable. In 1871 this was succeeded by steam power, when small, steam locomotives or "dummies" hauling passenger trailers replaced the cable cars. In 1902 the steam power was finally supplanted by electricity.

The original elevated line in Chicago - the South Side Elevated Railroad - was powered with steam engines hauling trailer cars as in New York. However, an electric motor car pulling several trailer cars comprised the trains on the Metropolitan West Side Elevated Railroad that started operations in 1895.

During the following year in the course of the electrification of the South Side property, Frank J. Sprague hit upon the idea of placing a motor and main control on each car of a train and operating all of the cars from a master control in the first car. The electrification of the cars of the South Side line was made on this basis during 1897 and 1898. This is the "multiple-unit" control system now used universally for the operation of subways, elevated railways and electrified suburban railroads.

Subway Lines

The first urban subway system was that of the Metropolitan Railway in London which began operation in 1863 with trains pulled by steam locomotives. Electricity was first used for motive power, also in London, on the City and South London Railway in 1890. Here electric locomotives hauled trailer cars.

In the United States the first urban subway was constructed in Boston. The Tremont Street subway in that city was opened in 1897 and was used by surface street cars, thereby greatly relieving the traffic congestion on that street. A similar subway had been placed in operation in Budapest, Hungary, the previous year and by this time London also had three subways and Glasgow one in which trains were operated.

Multiple-unit operation of electric cars began in Boston in 1899. New York City, which now has the largest subway system in the world, did not have its first such line in operation until 1904. Its subway trains have always been the electrically operated multiple-unit type. In addition to the above, similar subways are now in operation in Philadelphia, Chicago, Paris, Berlin, Madrid, Tokyo, Buenos Aires, Santiago and Moscow.

The foregoing traces briefly the changing character of urban transit in terms of the types of vehicles with which its services have been rendered. There are, however, a number of other facts

that are essential to a proper understanding of the development of the industry to its present status.

The early street railway lines were not city wide coordinated systems under single managements as we know them today in most cities. They were individual lines, each operated independently of the others, under separate franchises in which fares were fixed (usually at five cents) for the life of the franchise and many obligations in the form of taxes and special imposts were imposed, in the belief that the operations would be permanently profitable.

There followed a period of consolidations of those individual lines in each city into groups of larger companies. So keen was the belief that such consolidation would lead to greater profits that excessive prices often were paid for the individual lines. The next development was the consolidation of those larger companies into a single large company owning or controlling all or most of the transit operations in the same city. In many cases those consolidations were made upon the condition that the underlying companies should be guaranteed a fixed rate of return on the bonds issued in payment for their properties. Undoubtedly this practice was responsible for saddling upon the transit operations in most cities fixed charges which later could not be met. This led to many financial reorganizations under bankruptcy proceedings to scale down fixed charges and bring the funded debt, represented by bonds, into a more realistic relationship with the equity capital represented by the common stocks.

During World War I, with fares pegged at five cents in most instances, and operating costs mounting, the financial position of the transit industry deteriorated rapidly. In May, 1919, sixty-two companies, operating 5,192 miles of line, were in receivership; sixty companies had dismantled and scrapped 534 miles of electric railway line; and thirty-eight companies had abandoned 257 miles of track. Between May, 1919 and July, 1920, fifty-six additional companies with 1,908 miles of line were thrown into receivership.

So serious was the plight of the urban transit industry that President Wilson appointed the Federal Electric Railway Commission to study and report on the entire problem. The report of that Commission, dated July 28, 1920, together with the two volumes of testimony taken during the course of extended hearings are available at most libraries. Wide distribution of this report, undoubtedly brought about a better understanding of the problems of the industry on the part of regulatory authorities, municipal officials and the public generally. As a result, much progress was made in the years immediately after 1920 through financial reorganizations, fare increases, improved equipment and conversion of equipment to permit one-man operation.

It was during this period that the motor bus began to receive serious consideration by the transit industry. By 1929 there were approximately 21,000 motor busses in use in transit service. Also in these years the trolley coach began to enter the picture but by 1929 only fifty-seven were in regular operation. The depression years following the stock market crash were critical ones for the transit industry. Riding fell from nearly 17 billion passenger-miles in 1929 to a little more than 11 billion in 1933.

The credit of the operating companies was at a low ebb and it was not possible to purchase modern equipment to replace out-worn or obsolete equipment nor to rehabilitate tracks in the smaller cities. By 1932 the substitution of motor busses and trolley coaches for electric railway systems in the small cities was well under way. At the same time the use of these rubber-tired vehicles as feeder lines in larger cities had been growing. These substitutions were possible because of the relatively lower investment required for a bus or trolley coach system than for electric railway lines and the prospect that a reasonable return could be made on the investment in such systems. Frequently, for example, conversion to motor busses required no more capital investment than would be required to modernize the electric railway systems.

The gradual transition from electric railway to bus and trolley coach operation from 1926 to 1947 inclusive is shown in Table I.

TABLE I
TRENDS OF TRANSIT PASSENGER EQUIPMENT IN THE UNITED STATES
1926 to 1948

Cal-endar Year	Railway Cars			Trolley Coach	Motor Bus	Grand Total
	Surface	Subway and Elevated	Total			
1926	62,857	8,909	71,766	.....	14,400	86,166
1927	61,379	8,957	70,363	.....	18,000	88,336
1928	58,940	9,611	68,551	41	19,700	88,292
1929	56,890	9,983	66,963	57	21,100	88,120
1930	55,150	9,640	64,790	173	21,300	86,263
1931	53,120	9,638	62,758	225	20,700	83,683
1932	49,500	10,434	59,934	269	20,200	80,403
1933	47,700	10,424	58,124	310	20,200	78,634
1934	43,700	10,418	54,118	441	22,200	76,759
1935	40,050	10,416	50,466	578	23,800	74,844
1936	37,180	10,923	48,103	1,136	26,800	76,039
1937	34,180	11,032	45,212	1,655	27,500	74,367
1938	31,400	11,205	42,605	2,032	28,500	73,137
1939	29,320	11,052	40,372	2,184	32,600	75,156
1940	26,630	11,032	37,662	2,802	35,000	75,464
1941	27,092	10,578	37,670	3,029	39,300	79,999
1942	27,230	10,278	37,508	3,385	46,000	86,893
1943	27,250	10,255	37,505	3,501	47,100	88,106
1944	27,180	10,219	37,399	3,561	48,400	89,360
1945	26,680	10,217	36,897	3,716	49,670	90,283
1946	24,730	9,429	34,159	3,916	52,450	90,525
1947	21,607	9,370	30,977	4,706	56,917	92,600
1948	17,911	9,456	27,367	5,708	58,540	91,615

The trend of passenger traffic from 1922 to 1948 inclusive and the growing importance of the motor bus and the trolley coach as surface carriers are shown in Table No. II.

TABLE II

TOTAL TRANSIT PASSENGERS IN THE UNITED STATES BY TYPES OF SERVICE

1922 to 1948

Cal- endar Year	Railway			Trolley Coach	Motor Bus	Grand Total
	Surface	Subway & Elevated	Total			
	(Millions)	(Millions)	(Millions)	(Millions)	(Millions)	(Millions)
	1922	13,389	1,942	15,331	404	15,735
1923	13,569	2,081	15,650	.....	661	16,311
1924	13,105	2,207	15,312	.....	989	16,301
1925	12,903	2,264	15,167	.....	1,484	16,651
1926	12,875	2,350	15,225	.....	2,009	17,234
1927	12,450	2,451	14,901	.....	2,300	17,201
1928	12,026	2,492	14,518	3	2,468	16,989
1929	11,787	2,571	14,358	5	2,622	16,985
1930	10,513	2,559	13,072	16	2,479	15,567
1931	9,175	2,408	11,583	28	2,313	13,924
1932	7,648	2,204	9,852	37	2,136	12,025
1933	7,074	2,133	9,207	45	2,075	11,327
1934	7,394	2,206	9,600	68	2,370	12,038
1935	7,276	2,236	9,512	96	2,618	12,226
1936	7,501	2,323	9,824	143	3,179	13,146
1937	7,161	2,307	9,468	289	3,489	13,246
1938	6,545	2,236	8,781	389	3,475	12,645
1939	6,171	2,368	8,539	445	3,853	12,837
1940	5,943	2,382	8,325	534	4,239	13,098
1941	6,081	2,421	8,502	652	4,931	14,085
1942	7,290	2,566	9,856	899	7,245	18,000
1943	9,150	2,656	11,806	1,175	9,019	22,000
1944	9,516	2,621	12,137	1,234	9,646	23,017
1945	9,426	2,698	12,214	1,244	9,886	23,254
1946	9,027	2,835	11,862	1,311	10,199	23,372
1947	8,096	2,756	10,852	1,356	10,332	22,540
1948	6,506	2,606	9,112	1,528	10,728	21,368

The trend and distribution of transit operating revenues from 1926 to 1948 inclusive by types of service are shown in Table III.

TABLE III
TREND AND DISTRIBUTION OF TRANSIT OPERATING REVENUE IN THE
UNITED STATES BY TYPES OF SERVICE--1926 to 1948

Cal-endar Year	Railway			Trolley Coach (Millions)	Motor Bus (Millions)	Grand Total (Millions)
	Surface (Millions)	Subway and Elevated (Millions)	Total (Millions)			
1926	\$799.7	\$138.6	\$938.3	.....	\$119.2	\$1,057.5
1927	773.9	145.0	918.9	.....	135.3	1,054.2
1928	744.7	148.2	892.9	\$.3	146.9	1,040.1
1929	732.2	154.6	886.8	.6	165.1	1,052.5
1930	649.3	153.6	802.9	1.7	158.4	963.0
1931	548.9	144.1	693.0	2.2	146.9	842.1
1932	432.5	131.2	563.7	2.7	130.1	696.5
1933	388.9	126.4	515.3	3.0	124.1	642.4
1934	397.8	130.6	528.4	4.2	142.3	674.9
1935	388.0	131.8	519.8	5.5	156.1	681.4
1936	397.8	135.6	533.4	7.6	186.9	727.9
1937	380.7	134.8	515.5	14.2	203.8	733.5
1938	339.5	131.1	470.6	18.9	211.3	700.8
1939	332.8	132.9	465.7	21.7	233.3	720.7
1940	327.1	129.0	456.1	25.0	255.9	737.0
1941	332.9	133.6	466.5	34.5	299.3	800.3
1942	412.7	144.3	557.0	48.6	434.4	1,040.0
1943	537.0	149.0	686.0	63.7	544.3	1,294.0
1944	562.1	147.5	709.6	67.5	585.2	1,362.3
1945	558.2	151.3	709.5	68.4	602.5	1,380.4
1946	540.5	160.6	701.1	72.1	623.9	1,397.1
1947	508.3	158.7	667.0	76.8	647.0	1,390.8
1948	471.9	194.4	666.3	90.5	731.8	1,488.6

Studies of the latter two charts clearly shows the substantial gains registered by urban transit during World War II. Net earnings rose during the early years of the war when riding and revenues were increasing more rapidly than operating costs and taxes. But beginning in 1944 revenue increases were at a slower rate while cost continued to rise until in the year 1947 net earnings had fallen to a point where the credit of the industry, and thus its ability to continue with needed modernization programs, was seriously affected.

Again, as after World War I, the industry was forced to seek relief through fare increases. Most of these have been flat increases in the universally city-wide fare systems or in the relatively few zone fare systems in use. Attention is being given, however, to the provision of different grades of service with fare differentials affording riders a choice.

Transit properties in the United States for the most part are privately owned and operated, but there are some notable exceptions. In 1948 there were about 1400 transit properties. These include 36 publicly owned and operated systems.

The first publicly owned and operated transit property was the electric street railway in Monroe, Louisiana, upon which operation began in 1906. According to the 1932² Census of Electrical Industries there were 17 publicly owned and operated electric railway properties in a total of 963 for the year 1927. At least part of the decline in both of these sets of comparative figures was due to conversions to motor bus operation. In 1932 the operating revenues of the publicly owned properties amounted to 3.4% of the total for the entire industry.

Until 1947, municipally owned and operated transit properties comprised all of the publicly owned and operated systems. During that year the states of Illinois and Massachusetts created transit "authorities" to acquire and operate the principal transit systems in Chicago and Boston respectively. One of the purposes of such "authorities" is to provide for public ownership and operation of transit facilities extending out into the environs of the principal city served, which is sometimes in contrast to the municipally owned properties that may be confined to operations located entirely within the limits of any one city.

In 1948 the 36 publicly owned and operated transit systems accounted for about 25 per cent of the operating revenues of the entire transit industry.

Prior to 1940, there were four metropolitan transit systems that were completely publicly owned and operated. The entire local transit systems in Seattle and Detroit were in that category. Seattle had owned its entire transit system since 1919 and Detroit its system since 1922. The Municipal Railway of San Francisco started to operate in 1912, but the city was also served by a larger privately owned transit system. In New York the first line of the so-called Independent subway system was put into operation by the city in 1932.

In 1940 the city of New York acquired the large rapid transit systems of the Interborough Rapid Transit Company and of the Brooklyn-Manhattan Transit Corporation, including the extensive system of transit surface lines of the latter property. Also, it has extended its "Independent" division lines and has acquired some lesser surface operations. In 1942 the city of Cleveland acquired the entire local transit system in that city. The principal private transit system in San Francisco was purchased by that city and added to its own municipal operation in 1944. The "public authorities", previously mentioned, purchased the principal rapid transit and surface lines serving Chicago, Boston and their environs in 1947.

All of the other publicly owned and operated transit systems are in small cities and communities, ranging in size from Phoenix, Arizona with a population of about 65,000 down to Pass-a-Grille Beach, Florida, with less than 1,000 inhabitants.

² This was the last Federal census that segregated statistics for publicly owned and operated electric railways.

CHAPTER II

Transit and the Community

DURING the past century the chief influence on the spread of our cities has been the means and methods of local transportation. Since people and their activities make up the life of a city, it is upon the ability of those people to move easily and quickly from one place to another that the healthy growth and development of their community depends.

Travel in the early American community was determined by how far one could go by either foot, horse, or the horse and buggy. In fact, because of the definite limitations of these modes, the poorly paid workman of the 19th century often knew little of the community beyond his immediate neighborhood.

CITY SIZE AND URBAN TRANSIT SYSTEMS

Before 1880, even the biggest city - roughly circular in outline - extended no more than two miles from the center at its maximum points. It had been built without plan with new communities being added as the needs of the people demanded. Its streets and alleys were designed for the slow moving traffic of pedestrian and horse. Those same routes were to become, with little change, the streets and highways of our present day city and its tremendous traffic loads.

The years between 1880 and 1910 saw the first great period in community metamorphosis. It might properly be termed the "teen-age" of our modern complex city, presaging the full-grown manhood of the 20th Century. This transitional period, which brought much larger areas within living distance of the city central business district, was set in motion by the introduction of cable cars and early models of the electric streetcar. Together, they rolled back the perimeters of urban areas to a distance about five miles from the city center. Within a comparatively few years, cities were transformed from snug, compact little units into larger, star-shaped areas, expanding most rapidly along lines of available transportation.

During this same stage, other great forces were at work across the nation. Industrialization and heavy immigration were causing cities to grow rapidly in both population and area.¹ These factors, working in conjunction with the new and improved forms of local transportation, had far reaching effects on every city. For one thing, property values in and around the city center began a gradual but steady climb simultaneously with the expansion of business areas. The business sections were normally located at the point determined by highway, water or rail transportation connecting with neighboring towns, and were generally surrounded by the residential areas. Bit by bit, as the business area spread out to engulf nearby residential sections, a further increase in site values resulted.

The improved methods of transportation offered by the cable car and electric street car induced home owners to move farther out into newly opened suburbs to escape the encroaching business area. In large numbers, their former homes were converted into places of business. This phenomenon in the transformation of our cities is known as "decentralization". These years were also a period of inflation, and they firmly established the belief that centrally located business areas were gilt-edged investments. It was fixed so firmly, in fact, that even now it is assumed that such properties are indubitably of high value, despite depreciation and obsolescence of buildings. In many instances, these sections are still maintained as high tax-base areas.

¹Whereas in 1870 only three American cities reported populations of over 300,000, forty years later in 1910 there were 18 communities in that group.

During this middle period in urban expansion it would have been possible to extend transit lines beyond the five-mile limit from the city center. However, the time factor controlled route lengths to a major degree. People came generally to regard the five-mile distance from the city hub as synonymous with a 30-minute travel time, and also as the limit of their willingness to commute back and forth between home and the place of work. Thus, the people themselves more or less arbitrarily created the city limit.

Despite these great changes taking place through the years leading up to 1910 by and large they were only preludes to the greater transitions about to take place. Automotive ingenuity and enterprise seized the spotlight just prior to the first World War, changing the entire scheme of national existence, and leaving a searing mark deeply impressed upon the nation's urban life, while greatly stimulating city expansion.

Concepts of transportation and travel were suddenly revolutionized by the millions of motor vehicles that began to roll over streets and highways. Within a short time, an additional area was opened up to possible urban residence which rolled back the potential radii of the city from its old five mile limit to more than 15 miles from the city's center. The area available for development as urban business and residential property, like a great balloon, swelled from 75 to nearly 750 square miles a 1,000 per cent increase.

An uncontrolled and economically unwise growth of the American city resulted. It reached its greatest momentum in the late nineteen-twenties, slowed down during the depression years, and again hit full stride in the period just before World War II. Compared to it, the development instigated by the cable car and the electric street car was a minor tremor in the explosion of our cities.

As central district property costs continued to mount, automobile prices were lowered through mass production methods, and a steady flow of people were attracted to outlying, low-cost land now invitingly accessible for home sites. Still within the old city boundaries, however, great blocks of land remained undeveloped, while more and more built-up property in both business and residential sections began to deteriorate into the run-down slum and blight districts now familiar sights in this nation's cities.

At this point the situation had developed to the point where potential areas of urbanization were increased ten-fold, but the flow of population into cities was falling off.

Although cities had continued to grow rapidly from 1910 to 1930, the next ten years brought little or no rise. In 1932, and again in 1938, population shifted from urban to rural areas with a number of cities showing new losses just prior to World War II². Therefore, it now appeared sensible and logical to assume that the average city would not attain enough population to develop a substantial part of the potential 750 square miles of urban area. Nevertheless, city governments and their agencies were handed the economic puzzle of how to pay for streets, sewers, water, lighting, police and fire protection, and the greater problem of maintenance costs. Apparently, what should have been given early consideration was left, through general shortsightedness, to last.

DECENTRALIZATION

Decentralization of the city area greatly affected the local transportation industry. Demands grew loud for expanded service to the new outlying areas and also for a speeding up of service to reach further into suburban territory so as to reduce travel time. In addition, demands became numerous for connecting service between fairly distant points. Finally, there was the matter of greater and greater congestion in the central business district caused by increasing numbers of automobiles and trucks.

²Decline in rate of urban population growth is partially explained by cessation of foreign immigration limited by Federal law to about 150,000 per year - and to the falling off in the birthrate.

Transit faced the task of enlarging its operations and improving its service and equipment in the face of a situation offering small possibility for additional income. At the opening of the nineteen-forties decentralization had compelled many companies into receivership, while certain others were near bankruptcy.

Partial solution came through development of new and improved motor busses, trolley coaches and the advanced PCC streetcar, with their increased speed and comfort. However, the easier operation in congested traffic, shorter travel time, and a more efficient set of vehicles generally, have added to some extent the decentralization process and hurt the transit industry as well as the community itself.

Harland Bartholomew, eminent city planner,³ posed the theoretical problem faced by the transit industry as follows: "Is it the function of the mass transportation company to provide service to a shifting urban population, or should its facilities be conceived as a part of a comprehensive city plan designed to produce a sound, stable and orderly city structure? This would seem to be a fundamental question. Private or public ownership would not seem to be a relevant issue because over the long period of time a publicly operated system would incur the same losses in a disorganized, widely decentralized city as would the privately owned and operated company. It is merely a question of the amount of total monetary loss based upon the extent of decentralized service attempted and the degree of efficiency of the operation management, whether public or privately supported.

"To put the question another way, - if the area of urbanization is to be expanded 1,000 per cent, while total population increase is to be only 30 or 40 percent, is it possible for satisfactory transit service to be provided at a cost which is within the means of the people to pay?"

TRAFFIC CONGESTION

As previously mentioned, along with the ever-increasing number of private automobiles came the ogre of congestion. Where years before industry was simple, business leisurely and community life unhurried, in a short time the auto brought tremendous changes. The revolution of the automotive age, however, did not change the city streets. They remained basically the same except for a new covering of macadam. As more and more cars poured into the central city areas, the arteries of the older sections of the city began to atrophy.

The gridiron street pattern, imperfect even for the horse and buggy was proving to be less than adequate in the motor age. Slowly at first, but with gathering momentum, fine old residential streets became dreary alleys, driving those owners able to afford the change to the suburbs, and leaving their former homes to the ravages of a creeping decay.

In efforts to meet the situation governing officials tried various solutions. Street widening projects, designation of certain routes as main traffic arteries and the use of traffic signal systems were part of the efforts. These were only partially successful, however, in halting the deterioration of the central district. The migration to flee the noise and dangers of traffic, particularly private autos, continues today as a principal cause of our blighted areas and the falling off in tax revenues to such an extent that many cities are threatened with insolvency. The same conditions inevitably developed in the suburbs out still further, resulting in the mushroom growth of still other satellite towns.

It is evident that despite vast expenditures of public finances over a period of years for street widenings, new thoroughfares and traffic control measures, mounting traffic congestion continues to slow down the circulatory systems of our cities, with resulting costly delays in the movement of people and goods. Leslie Williams, noted city planning consultant, says of the problem: "Traf-

³Past President of American City Planning Institute and National Conference on City Planning; author of "Urban Land Uses"; Planning Director, St. Louis Regional Planning Association.

fic congestion impairs the accessibility of the downtown and is a major cause of the loss of millions of dollars of central district values. Traffic delays and conflicts are spreading out along our thoroughfares like a conflagration, searing values and inflaming the swollen blight fringing central business districts.

“Most cities suffer from a double dose of traffic congestion daily. Every morning traffic pours into urban centers and fills them to overflowing; and then in the middle of the afternoon flows out again, reaching flash flood proportions around five o’clock. Life today in our metropolitan centers has become one constant ‘daily double’ for adults - struggle in town to work in the morning and struggle out at night.”

It was William S. Knudson who observed that Americans are people who want to go places sitting down. This comment is borne out by the fact that before World War II, America’s 34,000,000 autos, trucks and busses travelled over 300 billion miles per year, or ten times the motor mileage of 1920. By 1960, experts believe motor vehicles will be driven 600 billion miles yearly.

On April 28, 1949, the U. S. Public Roads Administration reported 3,261,801 private and commercial vehicles, including trucks and busses, were added to the flood of traffic during 1948. This brought the total up to 40,662,264, an 8.7 per cent increase over 1947. In addition, 529,062 publicly owned vehicles were registered last year, making a grand total of 41,151,326, as compared with 37,841,498 in 1947. These figures do not include 492,165 motorcycles listed for 1948.

P. R. A. also estimated that in February of 1949, motor vehicles traveled 14,788,000,000 miles over rural roads. This represented increases respectively of 11.2 and 35.6 per cent over rural roads mileage recorded for the same month in 1947 and 1941.

Charles M. Nobel, New Jersey state highway engineer, in an address before the American Society of Civil Engineers, had predicted stagnation, decay, and ultimate bankruptcy for many communities because population and industry will take flight if the traffic problem is not solved. Walter H. Blucher, widely recognized as an outstanding city planning engineer and executive director of the American Society of Planning Officials, accents the problems in this statement: “Through many of the things done in our cities, we are encouraging people to use private automobiles when they ought to use some other form of locomotion. It is important, unless we are going to bankrupt our cities by trying to provide facilities which we cannot provide for every individual, that we begin to think in terms of locomotion by our feet, and second, by moving people through the second best method of transportation, which is mass transportation.

The same thought has been expertly expressed by Russell H. Riley of Harland Bartholomew and Associates: “Ever since the advent of the automobile, the larger American cities have struggled continuously with the problem of vehicular movement and parking. Yet, experience indicates that it would be impossible, both physically and financially, to widen enough streets to accommodate the normal daily movement of all persons if they traveled only by private automobiles.

“The answer manifestly is better mass transportation facilities. Transit vehicles require a much smaller amount of street space per person, and require practically no parking space. The increased use of these facilities is probably the greatest single factor in reducing congestion and in preventing the need of large public expenditures for street improvements.”

The above statements concerning the comparative efficiency in use of street space by the automobile and the transit vehicle merit a considered reflection because of the public’s stake in balancing equitably public transit with other users of our city streets. There are several methods of determining the efficiency of street space use by different types of vehicles. For example, it is possible to compare lineal street space occupied per person in an automobile and in a bus. Based on counts made in many cities there is an average of 1.7 passengers per automobile passing a given spot. This automobile is approximately 16 feet long. Dividing 16 x 1.7, it is found that the lineal space per street lane occupied by an automobile passenger is a little less than ten feet. A motor bus or trolley coach seating forty passengers is about 35 feet long. On the Basis

of a seated load only the lineal space per street lane occupied by a rider in such a bus, therefore, is approximately nine-tenths of one foot.

Thus, a forty passenger bus or trolley coach with only a seated load is about ten times as efficient in the use of street space as the average auto. The streetcar with its greater passenger carrying capacity is an even more efficient user of our streets. During rush hours, when traffic is at its peak and transit vehicles are forced to carry many standing passengers, efficiency is correspondingly greater.

Many large cities are working in cooperation with the federal Public Roads Administration in making plans for construction of express highways, (also called freeways), from the suburban areas to the downtown sections. These are designed to be links in through highway systems and will carry both intra and inter-city traffic. In planning these freeways greatest efficiency is obtained when facilities for public transportation are included. Providing for bus, trolley coach, streetcar, or if justified, rapid transit lines, consumes but a small part of the total costs of the freeway construction. If properly planned, the transit vehicle operation does not interfere with private automobile movement.

If no provision is made for public transportation on these freeways, there is no doubt that communities will find it necessary to provide additional off-street parking facilities in downtown areas at tremendous expense. The difficulty of finding such parking space is well recognized by traffic experts. They also recognize that it requires about the same space for parking cars as it does for offices or other space in which the auto owner works.

Modern office or business buildings provide an average floor area per worker of about 150 square feet. The space needed for the storage of automobiles in the most modern types of ramp or elevator garages is an average floor area of 240 square feet per car. With an average load of 1.7 passengers per car, the storage space required for the automobile is approximately 140 square feet per person. To provide this space not only is prohibitive in cost, but it is an uneconomical use of land in our already over-built downtown business sections. On the other hand, transit vehicles require no parking space.

The case for incorporating public transportation facilities in freeways has been expressed by L. Deming Tilton, Director of Planning, San Francisco Planning Commission, as follows: "Freeways have their greatest usefulness and value when they are planned and built as a multiple-purpose system. The freeway is like a huge pump. If only private motorists use it, a deluge of cars will flow into the congested areas. We must put buckets under the pumps. Moreover, we must plan the freeway for rapid transit services. The speed and safety of this modern traffic channel should not be denied the citizens willing to ride a bus. When smooth, comfortable bus service is operated on a freeway, the private automobile is left home in a garage standing on relatively cheap ground."

Operation of transit vehicles on a freeway would be simple. They would travel on the regular street system in outlying districts of a city (as they do now) but at designated points they would enter the expressway and continue downtown at high speed, stopping only at relatively few points to take on and discharge passengers. Low cost parking lots would be provided at those locations where passengers from suburban areas could park their autos and take the express lines downtown. Inexpensive stations would be incorporated in the freeway structure to facilitate transfer to and from important intersecting transit lines.

It should be pointed out that opinion is not unanimous in support of the freeway as a cure-all for traffic ills and decentralization. Walter Blucher, mentioned previously, is one who doubts the expressway's efficiency. In a recent address, Mr. Blucher declared: "I am not opposed to expressways when properly designed to serve a proper purpose. I am very much opposed, however, to attempts which have been made to force expressways down the throats of some cities without giving any real consideration to their real need, their proper location, their cost to the community, and the ultimate results. As one who helped coin the phrase 'superhighway' many years ago, and as one who helped spend \$100,000,000 for street improvements, including superhighways, I can tell you definitely that traffic and congestion increased as streets were opened and widened. That is a logical consequence of the provision of additional facilities.

“I am willing to stake my reputation on the forecast that the building of expressways will not solve the traffic and transportation problems of any community. They will, in my opinion, increase the traffic problem and the parking problem, and they will in a number of communities encourage the decentralization of the central areas.

“There has been too much thinking about the movement of automobiles rather than the movement of human beings. We could eliminate a great deal of that movement through the proper replanning of our cities. We could facilitate that movement through improving mass-transportation facilities if we give mass transportation a chance, but nowhere are we doing that. We insist upon better mass-transportation facilities, while we are at the same time spending public funds to provide competitive facilities which makes improved mass transportation impossible.

“Before you spend a lot of money building competing facilities, it is well to remember that the best way to move people is on their feet, and the next best way to move them is by mass-transportation facilities. If you want to free your city of congestion at the center, and make it a suitable place for shopping, a little less consideration for that intangible being, the private automobile, might prove helpful.”

Whatever the merit of the expressway, it is a fact that such structures do not carry more than a small fraction of the total traffic in any city. Therefore, the greater task is to utilize existing street systems to their maximum efficiency if the future needs of the city are to be met.

In the battle against traffic congestion in our city areas two recent examples of city action toward this goal are worth mentioning as illustrative of possible steps open to governing agencies. Tulsa, Oklahoma, upon recommendation of the Tulsa County Master Plan Committee policy committee and the downtown development committee, has adopted the “all rolling” plan suggested by Leslie Williams, consulting traffic engineer. In the plan, passenger cars and trucks will be prohibited from stopping, standing, or parking in certain designated downtown areas between 4:15 and 6:15 P.M. A second step, the designation of eight thoroughfares in the downtown section as one-way streets has been scheduled to take effect thirty days later.

Mr. Williams, following a study of the city’s traffic problems, also recommended: a one-hour parking rule over an area of 35 square blocks from 7 A.M. to 6 P.M.; ultimate provision of adequate and suitably located off-street parking facilities; zoning changes to require off-street parking spaces for each new building erected; eventual signalization of thirty intersections; redesigning of some intersections and the straightening of certain streets; re-routing of five bus routes; and prohibition of turns at certain intersections at certain times.

These recommendations have been designed to obtain more capacity from existing streets; save travel time, to and from downtown; by-pass through vehicles away from highly congested intersections; approach a steady flow of movement of people and goods; provide a more equitable use of available street space for all types of carriers in the peaks; and stabilize the business center by making it more accessible through a more expeditious management and direction of traffic.

At this writing, first results of the “all-rolling” plan are reported. A survey reveals that motorists who before the plan traveled at a speed of 8.2 miles per hour are now moving at a rate of 16.1 miles per hour over the same routes, or about double the former speed.

A second example of municipal alertness in trying to untie the traffic knot is offered by the city of Omaha, Nebraska. At a cost of \$50,000, the Omaha Parking Committee retained George Barton, Chicago traffic expert, to make an analysis of the community’s traffic ailments. Following an extended survey, Mr. Barton presented a 17-point program to provide more parking area and relieve traffic congestion in Omaha. His recommendations include: improvement of a limited network of major streets through the reconstruction of complex intersections, installation of modern signal systems, control of curb parking, marking of traffic lanes.

Simplified speed regulations, ranging from twenty miles per hour in the congested district to thirty on major traffic streets; modernization of the entire traffic sign system; regulation of truck deliveries in downtown areas, with delivery of various bulky cargoes prohibited during daytime; extension and modernization of the downtown signal system.

Also, 65-foot minimum length for bus stops; four curb parking zones, with time limits ranging from thirty minutes, to all day; immediate acquisition of sites for four downtown off-street parking terminals, with fees ranging from 15 cents to 25 cents; acquisition of four more such sites by 1965, and development of two and three level parking garages upon them; a joint financing program for parking areas, the municipality to furnish the land, private enterprise to construct and operate the facilities, and users to pay for this service; creation of a parking authority; installation of curb parking meters and off-street areas in neighborhood business sections; and finally, construction of parking facilities by the municipality if private enterprise fails to accept responsibility.

Another example occurred several years ago. Robert A. Mitchell, city traffic engineer of Philadelphia, became convinced that it would be necessary to abolish curb parking on the narrow streets in the downtown section of that city. Abolishment of curb parking, however, was frowned upon by downtown businessmen until Mr. Mitchell was able to show them, through the results of a careful survey, that only three or four percent of all their shoppers were curb parkers. Thereupon, the merchants heartily supported the abolition of parking. This substantially speeded up the movement of all traffic in the downtown area with benefits not only to those coming to shop but to all of those who worked in the area.

THE DEVELOPMENT OF A MASTER PLAN

The most effective solution of current city planning problems can be obtained through the adoption of a comprehensive "master plan" for the community. The "master plan" is a form of blueprint which lays out a conception and program of future land uses. It takes into consideration all of the activities of the city in relation to its use of city land. In making possible the achievement of sound, long-range community development, it also offers a safeguard to the transit company against its obvious vulnerability to changes in population, land use, employment and community communication facilities.

Harold M. Lewis, of the American Institute of Planners, in examining the importance of transit and highway development in city planning, describes the relation as follows: "The modern city is a complicated mechanism -- the product of the industrial revolution. Like a great modern factory, it must be properly planned and arranged if it is to function effectively. Just as the machines and conveyors in a factory must be arranged so that materials will move to various processing points with minimum effort and lost motion, so must a city be arranged so that the flow of traffic -- both men and materials -- will be achieved with maximum efficiency and safety. Otherwise the modern city, like a poorly planned factory, becomes inefficient in performing the functions for which it exists.

"The 'master plan' of a city, however, presents far more complexities than does the plan for a factory. For it must comprehend the needs of many industrial plants and of other types of business; and most important of all, the requirements for a satisfactory place to live, with proper housing, educational, recreational and cultural facilities -- all interrelated and coordinated into a living community. The great difference between plans for a factory and a city is that the one is designed primarily to service needs of machines whereas the other must service the needs of people without which the machines and the factories themselves are but dead and inert things.

"So the 'master plan' of a modern city must be based on the general concept that it is to provide a guide and a pattern for development of a better community in which to live and work. It must visualize the city as a dynamic mechanism, not as a mere static grouping of streets and buildings. This mechanism can function smoothly and effectively only as the daily flow of people and materials can take place with a minimum effort and delay.

“The arteries of local travel perform a function in a community similar to that of the blood streams in the human body -- all parts and activities of the community are dependent upon the flow of traffic for their life and development. Accordingly, the consideration given local travel needs determines whether the ‘master plan’ adequately comprehends the dynamic nature of a modern city.”

A representative master plan should include provisions for future changes and improvements in streets, freeways, pedestrian and vehicular bridges and tunnels; parks and parkways; public building sites; building zone districts; and routes for railroads and public utilities, including surface transit lines.

Cooperation between many groups and individuals is necessary to set up the framework for such a plan. Transit management is necessarily obligated to work with other business concerns in its formulation. In making its contribution, however, transit will be able to plan with assurance for location and development of its buildings, structures and other fixed facilities required in its operations. The industry’s management groups recognize the importance of those plans upon trends in land use, population flow and distribution, traffic, and consequently upon transit routes and services.

Proper correlation and interpretation of certain factors aid the transit operator in predetermining future transit riding, routes, vehicle selection, and development and modernization of the entire system with much more accuracy and security than if the plan did not exist. These factors include:

1. Trends and shifts in population.
2. Adjustments in the land-use pattern
3. New developments and re-development projects
4. Zoning and subdivision advancement
5. Future riding habits and volume
6. Hourly, daily and seasonal traffic fluctuations
7. Street improvement to relieve congestion
8. Business activity and public works programs
9. Type of transit service to be rendered
10. Community action and attitude.

In the city where a municipal planning commission exists, the transit company can help its own cause by making use of the information, techniques and experienced personnel available in the Commission. Finally, the working master plan will bring into proper balance the automobile, the motor truck, transit and the pedestrian, which combined make up the whole that must be considered to obtain maximum usefulness for each.

No transit company can afford to ignore potential benefits obtainable from stabilizing travel routes and traffic fluctuations, promotion of orderly growth, slowing down excessive decentralization, holding land values firm, and fusing use of the city’s land into zones or neighborhood units integrated with the chief arteries of traffic movement. Superseding all else, however, is the master plan’s aim to de-congest and revitalize central business districts, rehabilitate and redevelop slum and blighted areas, protect and preserve existing residential sections, guide and control outlying developments, and review and rationalize the tax base and financial structure of the city.

Unless a solution of these problems is found through such methods as the master plan our cities cannot remain financially solvent nor provide the job opportunities and attractions for modern living that are essential to their sound growth and development.

Transit and the city authorities are not in the fortunate position of Louis XV who readily solved the problem of accidents and congestion on the streets of Paris, caused by the fashion of that period for noblewomen to drive their own carriages. He and his ministers passed an edict forbidding every woman under thirty years of age from driving with the gratifying result that all women ceased driving since none would admit she was over thirty.

Our American cities have sprung to manhood rapidly, and little attention has been given to many of the public services. Therefore, to preserve existing residential neighborhoods and the general health of our cities, it also will be necessary to provide parks, playgrounds, schools, and other needed public facilities to retain the people now there.

It has even been suggested by some city experts that the sagacious thing to do is to tear up a few streets and plant the space to lawns and flowers. It is, they point out, the quiet, the grass and the flowers of the country which are luring desirable people from the city. Perhaps we have transformed too much of our valuable space by a covering of steel and concrete rather than topsoil. It is difficult to dispute those who believe that only as we capture some of the quiet and beauty of the countryside for the city can we make the city again a pleasant and desirable place in which to live.

CHAPTER III

Franchises and Public Regulation

DEFINITION OF A FRANCHISE

IN non-legal terminology a franchise is a contract between a governmental authority and a corporation granting to the latter the right to construct a utility plant and to operate utility service for a stated period of time. In transit properties the early franchises granted the rights to construct and maintain tracks on specified streets and to erect the overhead electric distribution system necessary for the propulsion of street cars. As street car service was converted into motorbus or trolley bus service new franchises were required which granted the company the right to operate such lines on specified streets. A comparatively small proportion of franchises were granted directly by state legislatures; in most cases the grants were made by municipalities under powers conferred by the respective legislatures.

The franchise grants in many cases were unlimited as to time or were for such long periods, for example, 999 years, as to be perpetual franchises for all intents and purposes. In the greater part of the country, however, perpetual grants are forbidden by state legislation or by the state constitutions; particularly in the Middle West and Far West. The usual franchise term is from twenty to twenty-five years.

Some argue that long-term or perpetual grants are not in the public interest, the theory being that valuable property rights are created which in the earlier history of the utility industry furnished the basis for long-term leases, mergers and consolidations. These frequently were accompanied by the issuance of securities which had face values far in excess of the actual investment. These and other abuses frequently forced companies into receiverships and bankruptcies, service was impaired and investors suffered heavy losses.

In an attempt to regulate the transit company and insure good service the municipalities often loaded the franchises with a multiplicity of provisions which proved to be harmful to both the public and the company. In many franchises the city covenanted that no other transportation utility would be granted the right to construct tracks and operate on the same streets and sometimes adjacent streets were included within a prescribed distance. Provisions were also usually inserted fixing rates of fare and prescribing standards of service. Other provisions included: regulation and control of extensions; specifications for the type of construction; requirements that the company construct and maintain the street paving of the track area; stipulations on the sale of tickets, issuance of transfers and through routing; free transportation for policemen and firemen; prohibition of unnecessary noise and vibration. Such attempts to regulate and control the companies and insure first-class service were never wholly successful; frequently they prevented the company from making changes in the facilities and in its methods of operation.

Types of Franchises

An important argument for the short-term franchise is that it enables the city to change and revise the regulatory sections of the franchise from time to time to bring it up to date. Although the short-term franchise theoretically appeared to be in the public interest, experience proved that it did not in fact insure good service. Some of the most serious defects which became glaringly apparent were: first, the service life of a large part of a street railway plant is much in excess of the period of such a franchise; and, second, the ability of the company to raise new capital through the sale of securities progressively decreased as remaining franchise-life became shorter and shorter. Investment bankers and investors would not buy securities in the last few years of the franchise-life because of the possibility that the franchise would not be renewed and then the company could operate only at the sufferance of the city.

Frequently years elapsed between the expiration of an old franchise and the grant of a new one. These years were usually filled with uncertainty and controversy which further impaired the company's credit and resulted in the serious deterioration of the company's physical property because of its inability to finance replacements of cars and other equipment. When a new short-term franchise eventually was granted, the company made efforts to rebuild and modernize its property and improve its service but within a short period of time the difficulties inherent in such a franchise again began to recur and the same dismal history usually was repeated. Gradually there was a realization that attempts to insure good service by franchise grants had not produced satisfactory results to the municipalities, the companies, or the investors. The regulation of utilities by franchises was recognized to be a fallacious procedure.

A classic illustration is afforded by the Chicago Surface Lines which owned and operated the surface electric railways in Chicago, whose franchises expired in 1932. The City made successive short-term grants of the right to operate but refused to grant a new franchise. To protect the property from ouster, Receivers were appointed by the U. S. District Court who operated the property for more than twelve years. While the Receivers, under authority of the Court, purchased some new equipment after the development of the P.C.C. car, little else was done in this long period to keep the property abreast of the development of the transportation industry and the growth of Chicago. The refusal to grant a new franchise was due to persistent and long-continued agitation for municipal ownership. Finally in 1945 the necessary legislation was passed by the State of Illinois and ordinances were passed by the City creating the Chicago Transit Authority, which on April 30, 1945, took title to and began the operation of the property of Chicago Surface Lines and at the same time took over the elevated railway properties of Chicago Rapid Transit Company, whose long-term franchises had not expired.

The Indeterminate Permit

The essential difference between a long or a short term franchise and an indeterminate permit is that the former are granted for specific periods of time while the latter is a grant to operate for such time as the municipality deems this to be in the public interest. One of the soundly conceived statutes providing for indeterminate permits was that passed by the Wisconsin state Legislature.¹ This provides that:

1. Every license, permit, or franchise thereafter granted to any street railway company shall have the effect of an indeterminate permit, and that such permit shall continue in force until the municipality in which the greater part of the street railway company's property is situated shall purchase that property. Any such municipality shall have the authority to make such a purchase, and every street railway company shall be required to sell its property to the municipality. The price to be paid for the property is to be determined by the Railroad Commission.
2. The acceptance of an indeterminate permit shall constitute a waiver on the part of the street railway company of the right to insist upon the fulfillment of any contract theretofore entered into with the municipality relating to any rate, fare, charge or service regulated by the Railroad Commission.
3. The acceptance of an indeterminate permit shall constitute consent by the company to the future purchase of its property by the municipality.

The great advance made by this particular portion of Wisconsin electric railway legislation is that it eliminates the necessity of fixing a term, either limited or perpetual, for the duration of street privileges. The street privileges continue until the property is taken over by the city. This provision eliminates those very serious objections which arise from limited term franchise. The corporation does not have to become involved in local politics and deal with the local political boss upon the expiration of the franchise. The company does not have to raise rates or skimp on the service in order to provide a sinking fund sufficient to make good the enormous losses likely

¹Cf. Chapter 578, Laws of 1907, effective July 13, 1907.

to be sustained when the franchise expires. The company does not have to face the possibility of being required to take up its tracks and sell off its expensive electric plant practically as junk at the expiration of the franchise because this does not expire until compensation is made to the company for its property. Therefore, the indeterminate permit eliminates the necessity of political activity on the part of the company; it eliminates the possibility of corrupt extortion and use of money for the renewal of the expiring privileges; and it avoids the enormous economic loss necessarily sustained from rendering it impossible to use the property of the company for street railway purposes.

There is more to an ordinary franchise than the question of how long it shall run. There are the questions of rates of fare, methods of operation, service, schedules, methods of construction, proper terminal facilities, the safeguarding or elimination of grade crossings, and publicity in relation to the company's affairs. All these matters the Wisconsin legislature very wisely eliminates from the field of negotiation between municipalities and street railway companies. No attempt is made to lay down fixed and inflexible rules dealing with all these matters as was attempted with such unfortunate results in many municipally granted franchises. All these matters are placed under the control of a Board of Railroad Commissioners which is empowered to deal with them as the necessity for action arises.

A number of states have passed statutes providing for indeterminate permits, which are similar to the legislation in Wisconsin. Many transit companies in these states have taken advantage of such acts by converting their franchises into indeterminate permits, as provided by law.

THE SERVICE AT COST FRANCHISE

The service-at-cost franchise has been evolved to overcome the very serious defects which have been experienced with the ordinary public utility franchise of the types described earlier. Such franchises have been granted by the "home rule" cities of Cincinnati and Toledo, Ohio; Kansas City, Missouri; Des Moines, Iowa; Rochester, New York and elsewhere; the constitutions or statutes of these respective states confer upon the municipalities the right to control their local transportation systems. In most of the states, however, control is vested by statute in a state public service or public utility commission and under such conditions the service-at-cost franchise rarely is employed.

While there are substantial differences in the provisions of the service-at-cost franchises because of specific situations in different cities, the following summary is representative of the general provisions found in most of them. In practically every case the service-at-cost franchise is for a limited term - frequently twenty years - with carefully drawn provisions defining the status of the parties upon the expiration of the period. As the expiration of the franchise approaches the municipalities and the utilities have usually been able to work out by negotiation such changes as the parties desired and the franchises have been renewed prior to the expiration dates.

There are other parts of the ordinance which are peculiar to this type of franchise. The application of the service-at-cost principle usually necessitates providing clauses for: rates of fare sufficient to pay the cost of operation; local, state and federal taxes; the principles of depreciation to be followed; payments of principal and interest on equipment notes; rentals of real estate and other property specified in the ordinance; annual payments of interest and sinking fund payments on the securities then issued and outstanding; subsequent issues of securities made to provide for additions and betterments in accordance with the ordinance, and specified dividends on the stock of the company. The ordinance usually specifies that the rates of fare charged shall be sufficient to produce the aggregate of the foregoing expenses and payments. In most cases it provides "ladders" or schedules of specified rates of fare, each higher than the rate immediately preceding, and carefully prescribes the conditions under which each rate may be charged from time to time.

Provision is also made for the company to credit the gross receipts to an "equalization fund" or "fare control fund" or "reserve fund", as it variously is termed - the company being required to deposit therein a specified sum. All payments and accruals are then charged against this fund.

Whenever the gross receipts for a specified period are not sufficient to provide the payments and accruals made during the period, the rates of fare then in force are then increased by the amount provided in the ordinance to the highest rung in the fare ladder. If the gross receipts resulting from the increased rates are insufficient to provide for payments and accruals, the rates are again increased. Like increases in rates of fare are continued until the gross receipts are sufficient to provide for the deficiencies in the fund. On the other hand whenever the balance in the fare control, fund exceeds a specified level the company gives public notice of this fact and must lower the rates of fare as prescribed in the fare ladder.

The fare control fund, therefore, is a barometer which provides the mechanics by which fares may promptly be increased or decreased as circumstances may require. It is important to note that in periods rapidly changing operating cost levels the readjustment of rates under service-at-cost franchises has been more promptly and easily accomplished than has been the case with those companies which are required to go to the regulatory commissions for fare changes. This relatively quick action engenders confidence on the part of investors and hence improves the credit of the companies operating under service-at-cost franchises. In this connection attention is called to the following statement made by the Committee on Public Service Securities of the Investment Bankers Association:

During the history of public regulation of utilities their net earnings (did not permit). . . except in rare instances, the accumulation of surplus and reserves adequate to tide over recurring periods of bad business or increased costs of operation. The result has been the impairment of credit of utilities, the loss to the investors of a fair return on a part of the funds devoted to public use in utility enterprises, the decreasing confidence in the integrity of the investment and assurance of unimpaired capital, and certainty of return, which is the base of all credit.¹

The service-at-cost franchise ordinance always provides for the appointment, usually by the city council, of a director of street railways or director of public utilities whose duty it is generally to supervise the operations of the company to the extent necessary to make the franchise effective. In most cases the director either prepares or checks and verifies the operating and capital requirement budgets of the company, which then are filed with the city council or the city treasurer. He also exercises general supervision and control over the service operated, and is charged with the responsibility of seeing that the company's accounts are kept in accordance with the Uniform System of Accounts prescribed by the Interstate Commerce Commission and the respective state public utility commission. He is required to check in detail all capital expenditures, the accounting for retirements of property and the disposition of funds raised through the sale of bonds, equipment trust notes and capital stock. The director also is required to investigate from time to time the company's practices with respect to the payment of tort claims arising from accidents. The director is required to submit to the city council and to the mayor reports concerning proposed changes in routes, the abandonment of railway service, the substitution of trolleybus or automotive-bus service, and other like matters. Frequently service complaints also are referred by other city officials to the director for investigation and report.

The ordinance enjoins the director to be vigilant in insuring that the administration of the fare control fund is in strict accordance with the letter and spirit of the franchise. He also is required to periodically check the company's practices and policies with respect to depreciation charges to operating expenses to protect the public from excessive charges which would make necessary a higher rate of fare; on the other hand he guards against inadequate charges which would inevitably result in the impairment of service by a company which was becoming progressively more obsolete.

In practice the effectiveness of the service-at-cost franchise depends in part upon the skill and acumen displayed by the management of the company in the operation and maintenance of the property and in part upon the experience and good judgment of the director. In a few instances

¹ See Seventh Interim Report of the Committee on Public Service Securities of the Investment Bankers Association of America.

the position of director has been filled by unqualified men who have used the office as a public forum to agitate for municipal ownership or for other changes which were not in accordance with the franchise. In such instances instead of achieving the objectives of the ordinance, the credit of the property and the service rendered both suffered because of the constant turmoil and agitation. In other cities where the position has been filled by men possessing the necessary experience and sound judgment the service-at-cost franchise has worked satisfactorily. Changes in rates of fare have been made without serious criticism; the public has realized that the rates charged must be adequate to meet the cost of service and that the director is diligent in insuring that the spirit and intent, of the ordinance are obeyed.

One difficulty which has developed in consequence of post-war inflation and heavy taxes is that the rungs in the so-called fare ladder have not been sufficient to provide for the cost of operation, taxes, interest, and dividends as specified in the ordinance. In such instances the companies have appealed for relief. For example, in Cincinnati the necessary relief has taken the form of the city temporarily relieving the company of its street paving obligations. This modification was worked out between the company and the city without any popular clamor or agitation. During the time required to effect this modification, however, the company failed to earn in full the return specified in the ordinance.

REGULATION OF PUBLIC UTILITIES

Creation of Public Utility Commissions

As early as 1907 there was a general realization that the attempt to regulate public utilities through franchise provisions had failed in large measure and that the creation of administrative bodies empowered by statute to exercise such functions was necessary to achieve these purposes. The inspiration for such commission regulation was found in the successful experiment of the regulation of the railroads by the Interstate Commerce Commission. Since 1907 the legislatures of forty-seven of the forty-eight states have passed statutes creating public utility or public service commissions, as they are variously termed, and defining their powers. The general framework of such statutes closely follows the Interstate Commerce Act and the powers and duties of the state commissions are essentially similar to those prescribed by Congress for the Interstate Commerce Commission.

While there is a general similarity in their provisions, there is no uniformity in the public utility laws passed by the several states. However, the differences relate more to details than to general principles. As deficiencies developed many of the states extensively amended their statutes which, to some degree, increased the diversity between the various acts. Some years ago the National Association of Railroad and Utilities Commissioners, an organization formed in the 1880's, created a committee to formulate a uniform public utilities act which could be followed by legislatures of the several states, if and when they revised their statutes. This "uniform act" has been utilized in preparing the succeeding analysis of the general provisions of public utility acts now in effect.

Major Provisions of Public Utility Acts

The following is a digest of the major provisions found in practically all of the public utility statutes:

1. Every rate shall be just and reasonable.
2. Every public utility shall furnish adequate, efficient, and reasonable service.
3. The utilities are required to file with the commission copies of their tariffs prescribing the rates in effect at the time the act was passed, which shall be open to the public.
4. The rates and charges made for utility service shall be those prescribed in the tariffs on file with the commission.

5. No public utility shall make or grant any unreasonable preference to any user of its service, or subject any user to any unreasonable prejudice or disadvantage. No public utility shall establish or maintain any unreasonable difference as to rates or service either as between localities or between classes of service. The commission may determine any question of fact arising with respect to these requirements.

6. Changes in the rates shall be made only after thirty days notice to the commission, which shall be accompanied by a new tariff in the form prescribed by the commission; such notice shall state plainly the changes proposed and the time when they will go into effect. The commission is empowered to require the utility to give similar notice to its patrons by public advertisement or otherwise as the commission may prescribe.

7. Whenever any change in rates is proposed the commission may hold hearings concerning the lawfulness of the proposed rates and if such action is taken before the rates would otherwise become effective, may suspend the operation of the proposed rates. The maximum periods of suspension vary as between the states; in many states the commission may suspend the rates for a period not to exceed six months and if the matter has not been concluded within that time, for a further period of three months.

During the period of suspension the utility is required to charge the rates in effect, prior to the time the new tariff was filed. If, after public hearing, the commission finds that the proposed rates are unjust, unreasonable, or unjustly discriminatory, or in any wise in violation of law, the commission shall determine the just and reasonable rate or rates to be charged, which the utility is required to establish and observe. In some states the law permits the utility or the commission to establish a sliding scale of rates, generally in accordance with the so called "London" or "Boston" sliding scale of charges. This procedure consists of establishing a standard charge and a standard rate of return, and providing that, for reductions in charges to customers, the utility may pay to its stockholders specified increases in dividends, the theory being that the desire for increased dividends will furnish a stimulus for increased skill and economy in operation.

In substantially all states the utilities and the commission are authorized by statute to establish rates for gas and electricity which shall automatically change according to increases or decreases in the prices of coal, oil, etc. The "coal clause" is generally found in the rates charged customers using substantial amounts of electric power and gas. This plan is beneficial in that it accomplishes a prompt and equitable readjustment of rates without the formality and expense of rate hearings, just as the sliding scale of rates provided in service-at-cost franchises are designed to do.

8. The commission is authorized to establish reasonable standards, classifications, regulations, and practices with respect to service, including standards for the measurement of the quantity, quality, pressure, initial voltage or other conditions pertaining to the supply of service.

9. A most important part of the statute is that empowering the commission, on hearing after reasonable notice, to ascertain and fix the value of the whole or any part of the property of any public utility. The valuation of a utility property frequently is deemed essential to the establishment of just and reasonable rates, which must be high enough to yield a fair return upon the "fair value" of the property. In many statutes the factors to be taken into consideration by the commission in fixing fair value are prescribed in the statute.

10. The commission is empowered to establish a system of accounts to be kept by public utilities of each class and to prescribe the manner in which such accounts shall be kept.

11. The commission may require public utilities to file annual reports and, where required, special reports in such form as the commission shall prescribe must be filed.

12. In the performance of its duties the commission may investigate and examine the condition and management of public utilities, or of any particular utility and in connection therewith may enter upon the property of a utility, whose officers and employees are required to cooperate with the representatives of the commission and to furnish information to them.

13. Before any extension of a route or new type of operation of a route is undertaken by a public utility it first must secure from the commission a certificate of convenience authorizing such construction or operation. In connection therewith the commission shall hold such hearings and conduct such investigation as it deems necessary.

14. In some states a municipality can purchase the property of a public utility operating thereon only after first having secured authority from the commission. The statute prescribes the procedure which must be followed by the municipality, the utility, and the commission in such cases. In some states where the commission authorizes a municipality to acquire the property of a public utility the statute frequently requires the commission to make a valuation of the property and certify its value to the municipality, which is forbidden to pay more than the price fixed by the commission.

15. The statutes prescribe in general terms the procedure to be followed with respect to hearings, the issuance of subpoenas, testimony of witnesses, and depositions.

16. The commission is authorized to inspect and examine the accounts, books, papers and documents of any public utility.

17. The commission, on its own motion, or any person having an interest in the subject matter, including any utility concerned, may complain, in writing, setting forth any action or thing done in violation of law, which the commission has jurisdiction to administer, or of any order or rule of the commission. In such cases the commission is required to schedule hearings and give notice of the time and place thereof.

18. After the conclusion of hearings the commission shall make and file its findings and order with its opinion, if any. The statute requires that its findings shall be in sufficient detail to enable an appellate court to determine the controverted questions presented by the proceedings, and whether proper weight was given to the evidence.

19. The statute invariably prescribes the procedure to be followed with respect to appeals to the prescribed appellate court from decisions of the commission.

20. The statute prescribes the penalties to be imposed for violations of the orders of the commission by any officer, agent, or employee of any public utility, or by any private citizen.

21. The statute prescribes in detail the organization of the commission and the methods to be employed in the conduct of its business, including the number of commissioners, the method of their appointment, their terms, whether eligible for reappointment, and other like matters.

22. Almost invariably the statute prohibits any commission, or any employee of the commission, from having any personal interest in any matter coming before the commission.

23. The commission is authorized to employ such examiners, experts, engineers, statisticians, accountants, and other employees as in its opinion are necessary to carry on its work.

24. In some states the law prescribes that the cost of operation of the commission and the regulation of the utilities shall be borne by the utilities through assessments levied by the commission thereon, arrived at by apportioning the expenses of the commission among the utilities according to the amount of time spent by its employees in connection with the regulation thereof.

25. The act prescribes the annual salary of each commissioner but leaves to the commission the establishment from time to time of the salaries of the members of its staff.

The scope of the work of the commissions involving transit companies is indicated generally by the scope of the authority conferred thereon by the state legislatures. The following summary of some of the activities common to all of the commissions may be helpful:

1. With very few exceptions, the state commissions have adjusted and prescribed for intrastate operations the Interstate Commerce Commission's "Uniform System of Accounts" for electric railway and motor carriers. Since many transit companies are engaged in both interstate and intrastate operations, this policy obviously is in the public interest.
2. General control over the methods of accounting and the keeping of accounts with particular emphasis upon accounting for depreciation; property additions, retirements and replacements; changes in the capital accounts due to property constructed or purchased or property retired or abandoned.
3. Granting of certificates of convenience.
4. Control over the consolidation, merger and sale of utility properties.
5. A widely varying measure of control over contracts between transit companies and municipal corporations.
6. A measure of control over operating expenses which, as a matter of fact, usually is exercised only to the extent of fixing allowances for operating expenses in rate cases. The courts generally have held that the commission cannot substitute its judgment for that of the Boards of Directors with respect to the operation and administration of the properties the commission's control therefore is limited to the determination of the reasonableness of the allowance for operating expenses.
7. Control over the amount of service operated. Actually, cases of this type are, comparatively rare and concern chiefly the prescription of standards of maximum loading of transit vehicles in the rush hours.
8. Passing upon applications for authority to issue securities, in the exercise of this power the commissions have considered, among other things, the capital structure of the utility, both before and after the proposed issue; the form of the proposed securities; whether the issue would create an unwieldy capital structure, and in some cases the proposed methods of sale. Frequently the commission must approve the price at which the authorized securities will be sold. As regards the larger companies, control over these matters has passed largely to the Securities and Exchange Commission, although the consent of both commissions is required with companies which are subject to the Securities and Exchange Commission.
9. Passing upon applications for the substitution of motorbuses or trolley busses for street railway lines.
10. Valuation of the properties of transit companies and the establishment of the "fair value" thereof. Such valuations rarely are made except in connection with rate-making.
11. Control over rates, fares and charges. Under this power the commission can disallow proposed rates of fare, in whole or in part, on the following, among other, grounds:
 - (a) That the rates are discriminatory as between localities or classes of traffic;
 - (b) That the annual return earned thereunder is in excess of a "fair return";
 - (c) That the proposed increased rates do not bear equitably on all classes of traffic.
12. The determination of what constitutes a "fair return" upon the "fair value" of the transit company's property used and useful in the public service.

From a review of the foregoing summary of the public utility acts and of the work of the commissions it is obvious that there is no industry which is so completely regulated and con-

trolled as the utility industry and the railroads. This control is exercised not only through formal cases instituted before the commissions but through a large number of general regulations and general and special orders issued from time to time applicable to all companies or to a particular property.

Commission Procedure in Cases Involving Hearings

In the early days of commission regulation it was the common practice to have substantially all hearings conducted by members of the commission. This is still true in the smaller states where the number of utilities and of cases involving hearings are not too great. The advantages of such a procedure are obvious. An attentive sitting commissioner gains a more intimate knowledge of the case than possibly could be obtained from reading a transcript of the testimony. However, in most states the volume of work to be handled has compelled the adoption of the plan instituted by the Interstate Commerce Commission of having cases heard by "examiners". In some cases these examiners are career men whose background frequently is preliminary training as a lawyer, supplemented by special study and experience in the field of public utility regulation.

Usually these examiners do not prepare an analysis of the testimony or of the exhibits introduced. In some states the examiner's work is concluded when the record is closed and the hearings terminated; he merely transmits the stenographic transcript of testimony and the exhibits to the secretary of the commission. The secretary assigns this record to the proper branch or department of the technical staff for study. The members of the technical staff concerned and one or more members of the legal department then prepare a recommended opinion and order for presentation to the commission.

Where such a procedure prevails it follows that generally no member of the staff or any member of the commission attends the hearing or hears the testimony; therefore, the time-honored rule that the judge must be present at a trial and hear the witnesses testify in order to evaluate the credibility of their testimony is honored by the breach rather than the observance.

In the early days of commission regulation a large proportion of the cases were argued orally by counsel before the commission. However, the volume of work has become so large that oral argument before the commission has been greatly restricted, except under unusual circumstances. Although the appellate courts have held that it is the duty of members of the commission to read the record, study the exhibits and read the briefs, this is physically impossible because of the number of cases and the thousands of pages of testimony and exhibits involved. It follows, therefore, that the administration of the duties imposed by law must be delegated to the staff. In the absence of special circumstances a large proportion of the cases are decided by the vote of the commissioners upon the statements of fact and of the law contained in the recommended report and order prepared by the technical staff and the legal department.

Procedure Before the Interstate Commerce Commission

It is interesting to compare the procedure just described with that which is employed by the Interstate Commerce Commission the volume of whose work is far in excess of that handled by any state commission from the standpoint of cases handled, the length and complexity of the records, and the number of exhibits. In order to speed up hearings, the Interstate Commerce Commission has provided by rule that witnesses introduce prepared statements of fact or expressions of opinion, together with written answers to interrogatories of counsel, which shall be copied into the record as their direct testimony. In many important cases the Commission has required that all testimony be prepared and introduced in this fashion. Copies of this prepared testimony are furnished to opposing counsel for use in cross-examination. By this method it is possible to record very quickly the lengthy testimony and exhibits which would take days in the conventional form of question and answer.

Some of the state commissions have adopted the same procedure. On the other hand many public utility commissions still adhere to the slow method of oral questions and answers.

When the record is closed, the procedure usually followed by the Interstate Commerce Commission is for the parties to file briefs containing an abstract of the supporting evidence followed by the argument with respect to the issues. Thereafter, the hearing officer prepares a proposed report containing a statement of the issues, the facts, the proposed findings, and the reasons therefore. In many cases the officer appends to his report a recommended order to be entered by the commission. Copies of this document are served upon the litigants and an opportunity is then afforded them to file written exceptions with respect to statements of fact and matters of law. If exceptions are taken to the conclusions in the report, facts supporting the exceptions must be stated. If oral argument has been requested, and if it is believed advisable by the commission, the case is set down for argument before the division in whose special field of activity the case falls. The Commission then decides the case and enters its report and order.

Many attorneys and utility executives are convinced from experience that the Interstate Commerce Commission's procedure just described is vastly superior to that commonly followed by the public utility commissions in the following respects:

1. The examiner or other officer who heard the case presents a written report outlining the issues, the facts and the findings which he proposes the Commission shall make - with or without a recommended order. Prior thereto, full opportunity is afforded to representatives of the staff of the commission to examine the record and advise with the examiner concerning the case.
2. Every case formally decided by the commission bears immediately below the caption the dates on which the case was submitted and decided. This practice should be followed by the state commissions. Nothing would be more effective in expediting the prompt disposition of cases, a point on which the record of the state commissions is not noteworthy.
3. The responsibility for decisions rests upon the commission and not upon its staff. The procedure of the state commissions of deciding cases upon recommended opinions and orders prepared by the staff which are held strictly confidential deprives the commissions and the litigant of the safeguards inherent in the Interstate Commerce Commission procedure. This protection inherently affords an opportunity to the litigants to file exceptions to errors of fact or misinterpretations of the law in the staff's report which any litigant believes to exist in the recommended report and order.
4. The procedure of the Interstate Commerce Commission brings into sharp focus the real issues in the case which must be decided by it and better affords to the commission the opposing views of counsel with respect to the vital issues and the interpretations of the facts.

Commission Procedure Too Cumbersome

From the foregoing discussion the reader should not conclude that the making of a record in formal hearings and the described subsequent procedure leading up to a decision by the commission are necessary in all cases. As a matter of fact the processes of commission regulation have become so complex and involved as to endanger the administration of justice, particularly with respect to matters involving the small companies. The pattern for commission regulation through formal hearings was established in the early litigation before the Interstate Commerce Commission and the older state railroad commissions with respect to the steam railroads where the issues involved and the complexity of facts made formal proceedings imperative. In an attempt to justify the delays and cost inherent in formal cases and the procedure employed in the regulation of the smaller utilities many commissioners have alleged that the commissions are compelled to follow this formal procedure in a large proportion of the cases by the decisions of appellate courts setting aside orders arrived at by what the courts have termed a short-cut process. In a measure this is true.

To cope with this situation the public utility statutes in many states have been amended to permit the commissions to prescribe interim rates in advance of the orderly determination of a final and definitive rate. The following comment in the report of the Committee on the Progress in the Regulation of Public Utilities of the National Association of Railroad and Utilities Commissioners, submitted at its 1949 Convention, is pertinent:

“Reference might first be made to those decisions which have discussed the question whether they possess adequate authority to grant rate increases on an interim basis pending further hearings in the same proceeding. In states where special statutory provisions permit such action, questions arising as to the proper interpretation of those statutory requirements have occupied the attention of the commissions to a degree which might lead to the inquiry whether procedural controls of such a nature serve a useful purpose. Even when the statute provides that an emergency must be found to exist before an interim rate increase may be authorized, it appears in almost all decisions analyzed to have been held by the commission that the terms of the statute are satisfied when the evidence indicates the utility has and will continue to receive an inadequate return, and final judgment with respect to reasonable definitive rates must be delayed until further evidence is received.”

In the same Committee report appears the following:

“Commissions in states that do not have such specific statutory requirements upon the subject to not appear to have found their authority inadequate to afford a utility interim relief. The Florida Railroad and Utilities Commission re Southern Bell Teleph. & Teleg. Co., November 12, 1948, first denied the company’s motion for immediate rate increases, under bond, it stating that the statutes of that state contemplate a full and complete hearing. But in a decision rendered in the following month, after further hearings, it authorized increased rates on a temporary basis, although it noted that many issues were presented which demanded further consideration.

“The Michigan Public Service Commission, re Michigan Bell Teleph. Co., June 30, 1949, and also the California Public Utilities Commission, re Pacific Teleph. & Teleg. Co., February 23, 1949, although no special statutory provision so authorized, both declared they had the power to do so when emergency conditions justified. In the California case the commission said that we find from the evidence in the proceeding that the earnings of applicant are such that it finds itself in a serious financial position, which constitutes an emergency that must be relieved!”

In this connection, attention is called to two recent decisions of the Superior Court of Pennsylvania abrogating interim increases in fares authorized by the Pennsylvania Public Utility Commission to the Philadelphia Transportation Company and the Pittsburgh Railways Company. The effect of these decisions, it is believed may make a dead letter of the provisions of the Pennsylvania Public Utility Act giving to the commission power to prescribe interim rates and will force the commission to conclude its hearings before affording relief in each case.

The elaborate and cumbersome procedure of the commissions has the following results: (1) the cost to the utility, to the municipality, and to any intervening citizens organization is very great; (2) even where the utility expedites the presentation of its case by employing the methods followed by the Interstate Commerce Commission, previously described, the time which elapses between the initiation of the proceeding and a final decision is much too long. In many cases the final decision of the Commission is not rendered until a few days before the expiration of the maximum time limit permitted by the statute - usually either six or nine months. If the case concerns an application for authority to make effective increased rates to offset increased costs, such a long delay exhausts the cash resources of the utility and compels it to reduce service to make substantial savings in car and bus-miles, car-hours, and man-hours.

The Commissions also have made inadequate allowances in valuations for working capital. In the case of transit properties, these allowances vary in sums equivalent to the operating expenses of the company for periods ranging from ten days to one month. The history of all forms of business activity shows the necessity for substantial cash balances and contains lessons concerning the serious difficulties into which many enterprises have fallen when extraordinary conditions arise because they do not have at hand large cash balances. From the investor’s viewpoint the maintenance of substantial cash balances and other convertible quick assets is absolutely essential. Well managed utility companies generally have carried cash balances and other convertible treasury assets substantially in excess of the amounts which the commissions

recognize as a part of the rate base of the company in a valuation. If the utilities had not done this, they would have found it impossible to continue satisfactory service during the period of six to nine months before increased rates could be made effective. It is imperative that the commissions recognize the practicalities with respect to working capital and generally adopt a more liberal attitude in making allowances therefor.

The necessity for a less elaborate procedure with respect to testimony and exhibits required to be submitted by small companies quite generally is recognized, at least in principle. Attention is called to the following statement made by Mr. Walter F. Roberts of the Nebraska State Railway Commission before the 1949 Annual Convention of the National Association of Railroad and Utilities Commissions:

“A discussion of regulation must involve rates. It is not my purpose to discuss the technical process of rate making, or laws and court decisions which are applicable. Most commissions, in my spot check, require the same kind of proof for small as large companies, but not in the same degree or detail. Allowances must be made because of the inability of small companies to prepare elaborate exhibits or furnish accurate plant investment figures. We must as regulatory bodies, it seems to me, tailor our concepts and procedures to fit the plight of many small companies, and adjust our rate making for them to a rational, hardheaded business basis. Rates of small companies have for a long period of years been quite generally lower than larger companies. This has resulted in many cases in capital consumption, deferred maintenance, and no accumulated surplus. The exact situation may not be clearly reflected in company reports or in facts and figures presented in a rate case.”

CHAPTER IV

Capital Structures and the Raising of Capital Money

THE consideration of a corporation's capital structure arises under a variety of circumstances. It may be from the establishment of a new enterprise. A new corporation may purchase the physical property of an existing operating system. An existing corporation may be reorganized through bankruptcy or otherwise. Or, an existing system may require additional capital funds with which to provide the facilities necessary for the extension and improvement of service (or for the replacement of equipment or other property which has become worn out or obsolete).

In the last case the magnitude of the funds needed depends on the trend of the volume of business, the particular type of operation involved and the trend of price levels. These factors will also determine to what extent such funds will be available from depreciation accruals or surplus earnings or will require the sale of securities. Outside of the problem presented during the last war by increased industrial employment and gasoline rationing there has been no great need of funds in recent years by transit companies for the sole purpose of expanding service. Since the war transit traffic is again on the decline.

The major need for capital funds in the last few years has arisen from two causes. First, there has been the economic necessity of replacing street car operation with motor bus or trackless trolley operation. This has necessitated the abandonment of much property before the end of its normal useful life and before full depreciation has been accrued for it, and the simultaneous investment in new equipment and facilities of amounts far in excess of normal renewal and replacement expenditures. Second, there have been large increases in the costs of all capital items. The replacement in kind of busses purchased ten years ago requires an approximately fifty per cent greater investment which obviously cannot be financed by the depreciation accrual on the equipment being replaced. This second cause for the need of capital funds will continue each year as properly items purchased at prewar prices have to be replaced at current price levels.

As in all other business enterprises the ability of an urban transit operation to secure capital funds by public financing depends on its capital structure and on the earnings available to service the securities which make up that capital structure.

EARLY DEVELOPMENTS

When the initial major development of urban transit operations was under way in the period from around 1900 to 1918 transit service was furnished entirely by cars operating on rails. The capital investment required consisted largely of long life property, such as paved track in city streets and street cars with service lives of from 25 to 30 years and shop, car house and substation buildings with service lives of fifty years or more. Many transit operations generated their own electric power and therefore owned electric generating plants which have a similar long service life. This predominance of long-life property was one of the factors which justified the raising of a substantial portion of the capital requirements by the sale of long term mortgage bonds. Also at that time, there were relatively few corporate securities, other than those of the steam railroads, available for the investment of private funds. The relationship between revenues and expenses was such that interest charges on these bonds appeared to be well secured, and transit securities, particularly transit bonds, enjoyed a high investment rating. The beginnings of some of the major electric utility systems of today were financed initially on the basis of the credit of affiliated transit operations.

At that time wages and material costs were at substantially lower levels and both operating conditions and the pattern of transit traffic were radically different from those existing today. These factors resulted in relationships between revenues and property and between revenues

and expenses which were also radically different from those now existing. Investment in property represented from three to four times the annual operating revenues. Net revenues represented 25% to 35% of gross revenues, or in other words an operating ratio of from 65% to 75% including operating expenses, maintenances, taxes and depreciation.

CURRENT TRENDS

Present trends in the urban transit industry have changed and are continuing to change many of these relationships. The substitution of rubber-tired vehicles, either trackless trolleys or motor busses, for street cars reduces the proportion of long life property. Investment in track has been reduced and in the case of some transit operations has disappeared entirely. With motor bus operations the investment in trolley poles and wires, feeder cables and substations also disappears. The rubber-tired vehicles themselves have a shorter normal service life than street cars. For motor busses such normal service life is ten years and for trackless trolleys about 15 years. For many transit operations the only long life property now consists of shop and garage buildings.

The initial effect of these changes in type of operation was to reduce the capital investment required per mile of line or required to furnish a given volume of service. This reduced the ratio between plant investment and annual revenues so that for a 100% motor bus operation there was about one dollar of investment per dollar of annual operating revenues.

Also commencing in 1918 and continuing with accelerated rapidity during and since World War II, the upward trend of labor rates and material costs has increased operating costs so that rates of fare have had to be raised. The resulting increases in annual revenues have been matched by the increased costs of the items making up the property and plant account, so that at the present time transit operations which are entirely or substantially motor bus or trackless trolley still show from one to two dollars of plant investment per dollar of annual operating revenues.

The increases in revenues resulting from increased rates of fare have not, however, matched the increases in operating expenses, and as a result operating ratios have increased. Instead of having from 25% to 35% of operating revenues available as net revenues for the servicing of the capital structure, a ten per cent cushion of earnings after operating expenses, maintenance, taxes and depreciation is the unusual case and operating ratios higher than ninety per cent are much more prevalent. This general situation is discussed in more detail in Chapter XX.

All of these changes in the physical and economic status of urban transit systems have had an effect on their ability to secure capital funds and on the make-up of their capital structures. While the changes outlined have been taking place over a considerable number of years, many transit operations were not able to adjust their capital structures to meet these changed conditions without resorting to financial reorganizations or recapitalizations, either voluntary or through bankruptcy proceedings. It is practically impossible to find any solvent major urban transit operations for which the present capital structures represent the structures of 35 to forty years ago modified only by changes which have been carried out as normal and orderly financial operations, and which do not reflect the effect of reorganizations or of refinancing as a result of the sale or merger of physical properties.

As pointed out in an earlier chapter, most transit operations were able to enjoy unusually good earnings during the early years of World War II. For many systems, both private and public, this provided an opportunity to stabilize or recast their financial structures.

Because of all of these influences and events it is difficult, if not impossible, to point to a proper or normal capital structure for an urban transit system as exemplified by the structures of present companies as they exist today. In this respect the transit industry is markedly different from the electric light and power industry in which the capital structure pattern is well defined by the majority of existing operating companies.

MAKE-UP OF CAPITAL STRUCTURE

This review of the changing physical and economic status of the transit industry provides a background for the conclusion that the proper capital structure for that type of enterprise must be determined by an appraisal of present and future capital requirements and earning power rather than from an analysis of the structures which exist in the industry today. While there are many transit operations today which do have sound and conservative capital structures, these have not resulted from orderly developments based on capital needs (as pointed out above) and in most cases have not as yet been sufficiently tested as foundations for supplying current and future capital requirements.

All of the physical and economic changes discussed above have applied with equal force to both privately and publicly owned transit systems. While the financing problems are the same in either case, the available financing media are somewhat different, and each will be discussed separately.

As in other enterprises, there are available to transit operations the following types of securities:

- I - For privately owned operations (corporations):
 - A - Senior or debt securities
 - 1 - Mortgage bonds
 - 2 - Unsecured bonds or debentures
 - 3 - Equipment obligations or bank loans
 - B - Junior or equity securities
 - 1 - Preferred stock
 - 2 - Common stock

- II - For publicly owned operations (municipal or public authorities)
 - A - Revenue bonds
 - B - Equipment obligations or bank loans
 - C - General obligation bonds or notes

The capital structure ratios indicated in the following paragraphs assume that the property and plant account is representative of the original cost of the presently used and useful property and contains no substantial intangibles, and that the depreciation reserve is adequate to provide for the accrued depreciation of such presently used and useful property including provisions for any property which has been abandoned but not yet written off and for any foreshortened life which may result from future property abandonments resulting from obsolescence or conversion. Senior securities are considered at their principal amounts, and equity or junior securities include preferred and common stocks at par or stated value plus earned surplus. The ratios indicated are those which are believed to be conservative and which should permit additional capital funds to be raised provided the present and prospective future earnings are adequate. If adequate earnings are not present or in immediate prospect financing will be impossible, or, at best, extremely difficult irrespective of the capital structure. This necessity for adequate earnings is discussed in Chapter XX.

Privately Owned Operations

For a privately owned transit operation the senior or fixed interest securities should not exceed fifty per cent of the total capital structure, or, in other words, should be balanced by at least an equal amount of stock including earned surplus. Some transit operations today have no debt securities. These are generally the smaller or medium sized systems. Others have debt ratios substantially in excess of fifty per cent.

Mortgage bonds are in many respects the best form of senior capital. While the interest cost is higher than for equipment obligations or bank loans, the term or years to final maturity, is much longer. The usual final maturity date for bonds is from twenty to thirty years from date of issue. Current practice requires either a sinking fund or serial maturities to gradually reduce the outstanding principal amount year by year. Frequently these are set up so that annual

retirements will leave only a nominal amount to be paid off at the final maturity date. Sometimes they are set up so that as much as fifty per cent of the original issue may remain to be paid off or refunded at the final maturity date. These sinking funds or serial maturities may start to operate six months or a year after the bonds are issued, or their operation may be deferred for a few years.

In any event because of the longer term the annual amortization requirements are less burdensome and require a lesser cash disbursement each year than a shorter term security. However, since mortgage bonds are secured by property, the amount which can be issued may be limited by the amount of bondable property. Frequently investments in motor busses and trackless trolleys cannot be utilized as bondable property because of their relatively short life. Also, mortgage bonds are normally issued only against property which is constructed and not against property to be built with the proceeds of the bonds, although under special circumstances the proceeds of such bond issues are deposited with the trustee and drawn down as property is constructed or acquired. Unsecured bonds or debentures do not seem to have any place in the capital structure of a transit operation, at least at the present time.

Equipment obligations and bank loans (other than for emergencies) have been grouped in this discussion as they are both essentially short term obligations. Equipment obligations have been and are being used quite extensively for financing the purchase of street cars, trackless trolleys and motor busses. While these obligations take various forms they are essentially all the same in that the money is loaned against the vehicles as specific security and title to the vehicles does not pass to the transit system until the obligations are all paid off. This specific lien sometimes permits this type of financing when the earnings picture precludes any other type of financing. Sometimes these obligations are nothing more than secured bank loans. Interest rates on such obligations are less than on long term bonds. The terms are usually from five to eight years on motor busses with slightly longer terms for trackless trolleys and street cars. Almost always some down payment, from ten per cent to 25 per cent of the total purchase price, is required with the balance paid off in equal annual payments over the term of the obligation.

To be acceptable for this type of financing the equipment has to be of reasonably standard design. Equipment obligations are useful for financing unusually large and non-recurring purchases of vehicles but should be used with caution as a continuing method of financing such purchases. The annual amortization payments are heavy and the issuance of successive series over a period of years will result in cumulating these annual cash payments so that they become extremely burdensome. Under certain conditions short term bank loans for temporary financing or for emergencies are justified if such loans can be negotiated.

Preferred stocks do not seem to have any place in the capital structure of a transit operation. Unless the economic aspect of such operations changes drastically the narrow margin and wide fluctuations of earnings make this type of security particularly unattractive. Common stock, as indicated above, should form at least fifty per cent of the capital structure. While the present economic picture gives little hope that transit operations can raise new capital money by the sale of common stock, this is the goal which should be aimed at. Some of the problems involved are discussed in Chapter XX.

To summarize, a privately owned transit corporation should work toward and attempt to maintain a capital structure with a modest proportion of fixed interest securities and with the minimum possible cash requirement for debt amortization. This means that as large a proportion as possible of this fixed interest debt should be long term. It should endeavor to stabilize its earnings picture so that capital funds can be raised by the sale of additional common stock.

Publicly-Owned Operations

The financing possibilities of publicly-owned transit systems depend on the nature of the public ownership. Generally speaking any municipal corporation, either a city or a public authority, can pledge the revenues of a transit operation as security for the issuance of revenue bonds. Such bonds usually can be issued with somewhat lower interest rates than can corporate mortgage

bonds with similar earnings coverages. One reason for this is that the interest on such bonds received by investors is tax exempt. Length of term and sinking fund or serial maturity provisions are generally comparable to corporate issues. One major difference is that the amount of revenue bonds which can be issued is not dependent on property as in the case of corporate issues. One major difference is that the amount of revenue bonds which can be issued is not dependent on property as in the case of corporate mortgage bonds, but on the earnings available for debt service. Since all such municipal corporations are exempt from Federal income taxes, and may enjoy other tax concessions, the earnings available are frequently sufficient to permit 100 per cent financing by such bonds.

All such public operations can, and frequently do, use equipment obligations and the comments made above with respect to the advantages and disadvantages of that type of financing are equally applicable for publicly owned systems. The same comments as above generally apply in the case of short term bank loans.

Where municipal corporations are public authorities without direct or indirect power to levy taxes, they are limited to revenue bonds, equipment obligations and bank loans as financing media. Where transit systems are owned directly by municipalities, or by public authorities with direct or indirect taxing power, the issuance of general obligations bond or notes supported by general taxes provides a further means of financing. Where the ownership takes that form and the transit operation is not self-supporting, all financing must be done by general obligation securities.

Since there can be no equity securities as such with public ownership it is obvious that the capital structure must consist only of interest bearing securities and such equity as it has been possible to build up by the reinvestment in property of surplus earnings.

CHAPTER V

Transit Taxes and Special Imposts

THE taxation of urban transit systems as a form of public utility has become well established in the laws of all levels of government. The government taxing authority may levy upon the transit properties and incomes, as well as upon the license or franchise privilege to engage in business. These taxes are not uniform and vary widely throughout the various cities and States which impose and collect taxes designed to meet the particular needs of the taxing authority. The purpose of this chapter is to group these taxes into classes which have systematic relations and to study their effects on the transit industry.

The term "tax" in this discussion will relate to those charges, especially pecuniary burdens, which are imposed by an authority: they are a forced contribution of wealth to meet the public needs of the government. "Special impost" will be used to mean a tax or obligation which applies specifically to the transit industry. The term "excise" refers to a tax upon the manufacture, sale, or consumption of commodities used by the transit industry or for a license to follow certain occupations; it is a tax upon the pursuit or following of certain trades or occupations.

In general taxes are classified as either direct or indirect. Direct taxation is that which is levied against the property, person, business, income, etc., of those who pay such taxes. Indirect taxes are levied on commodities before they reach the consumer; they are paid for by the ultimate consumer and are not paid for as taxes but as part of the market price of the commodity.

TAXES IMPOSED ON THE URBAN TRANSIT INDUSTRY

The taxes which are paid by the urban transit industry to the federal government may be outlined as follows:

1. Income tax
2. Excise taxes (indirect)
3. Capital stock tax
4. Special taxes (social security, unemployment, etc)

Although there is a very wide variety of state, county, and municipal taxes on transit operations applied in a great variety of ways, most of them can be classified under one of the following classifications:

1. Corporation tax
2. General property tax
3. Net income taxes on corporations
4. Franchise, privilege, license, occupation and other common carrier taxes
5. Gross receipts tax
6. Corporate loans tax
7. Inspection and supervision fees, etc.
8. Sale of transportation service
9. Motor vehicle registration fees
10. Gasoline and diesel fuel tax
11. Lubricating oil tax
12. Operators and chauffeurs license fees
13. Emergency relief taxes

DISTRIBUTION OF THE TRANSIT REVENUE DOLLAR FOR THE YEAR 1948¹

Total Operating Revenue	\$1,488,600,000	100.0¢
<u>Operating Expenses</u>		
Payroll	829,000,000	55.7
Material	236,446,000	15.9
Depreciation	124,744,680	8.4
General Expenses	<u>153,460,320</u>	10.3
Total Operating Expenses	\$1,343,651,000	90.3
Taxes	<u>101,210,000</u>	<u>6.8</u>
Total (Before interest, etc.)	\$1,444,861,000	97.1¢
Remainder <u>insufficient</u> to meet interest charges, rentals, etc.		2.9¢

Federal Taxation

The Federal law does not impose any special or discriminatory burdens upon the transit industry other than those which are assessed and collected under the general law affecting all corporations. Such taxes are uniform in all sections of the country and apply uniformly to all tax payers. It is true that under certain conditions administrative rulings made by the Bureau of Internal Revenue may place a peculiar burden upon a particular industry. For example, transit operations have been affected by administrative rulings relating to depreciation allowances which conflict in many cases with rulings on the same subject. Other examples might be cited but probably any industry (or any tax payer) could cite special instances in which the tax laws are not uniformly applied to it.

State and Local Taxation

In addition to federal taxation the transit industry makes contributions to the state, to the county, and to the local municipality or other taxing district. The burdens imposed upon the industry under this head may be divided into three broad classes.

1. The usual tax on real estate and personal property, paid in common with all other citizens of the state, whether individuals or corporations. In this class would also be included state income taxes, provided they are imposed upon the same basis as the taxes upon other corporate bodies. The distinguishing characteristic of this first class is that it represents the same type of burden, measured by the same standard as that imposed upon general corporations or individuals.

2. Special types of taxes not applied to the general corporation but either to utilities as a class or to the transit industry as a special type of utility. In this class may be included taxes upon so-called intangibles, and upon franchises or easements.

3. A long list of special burdens imposed upon the transportation industry and not imposed either upon private citizens, general corporations, or other utilities. To some extent these special burdens are in the form of fees, theoretically based on special privileges; for the most part, however, they consist of the requirement that the utility shall render free service either to certain groups of citizens or employees or shall perform individually at its own expense certain pieces of public work. They are not taxes in the sense that a bill is rendered which is settled in cash and a receipt given therefor under the name of tax. They are taxes in that they are expenditures which would otherwise be paid for out of public funds

¹Source: American Transit Association, 1950.

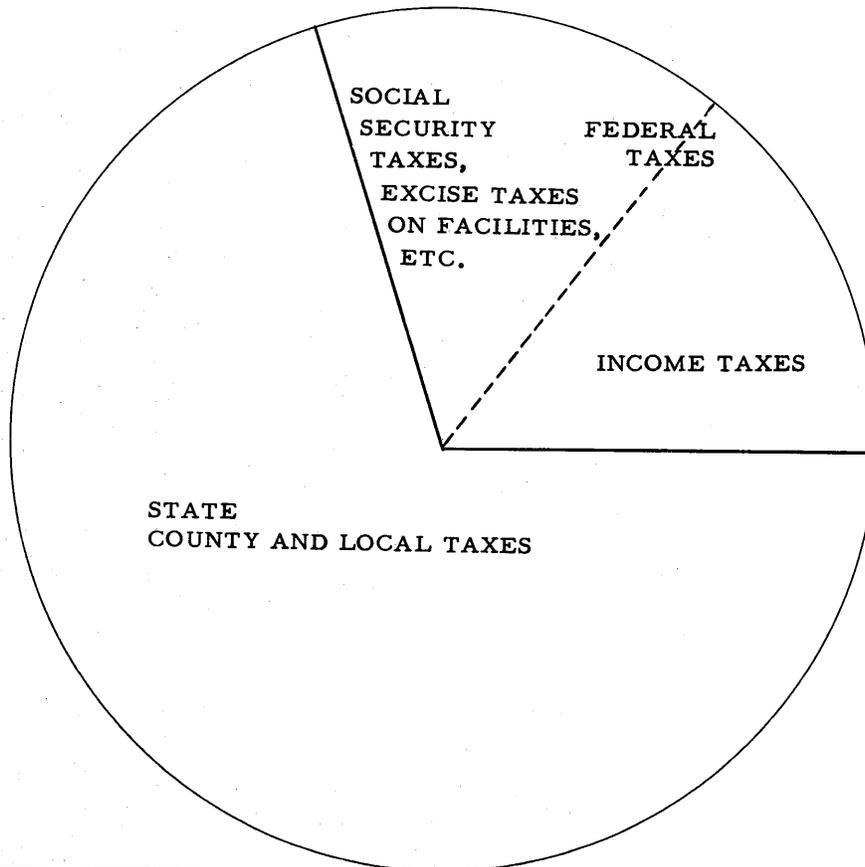
and are, therefore, to the extent of their cost, just as distinctly a tax burden as a definite rate imposed upon real estate.

No special consideration will be given here to taxes of the first class since they apply to all corporations. In considering taxes of the second group, however, it is hard to lay down any general theory of taxation based upon equitable considerations which will justify taxes of this type. There is certainly no basis for imposing upon the public utility a greater tax burden than is borne by the average normal corporation. The second class of taxes (of which the gross receipts tax and the tax on franchises, easements, or other rights to make use of public facilities in the rendering of service are the most striking examples), therefore, must be justified, if they are to be justified at all, upon either practical considerations or as an historical survival from times when they had a practical economic basis.

DISTRIBUTION OF THE 1948 TRANSIT TAX DOLLAR¹

	<u>Amount</u>	<u>% or \$ Distribution</u>
Federal Taxes	30,600,000.00	30.2 % or ¢
Income Taxes	15,190,000.00	15.0 % or ¢
Other Federal Taxes	15,410,000.00	15.1 % or ¢
State County and Local Taxes	<u>70,610,000.00</u>	<u>69.7 % or ¢</u>
Total	101,210,000.00	100.0 % or ¢

DISTRIBUTION OF THE TRANSIT TAX DOLLAR¹



¹Source: American Transit Association, 1950.

In the early days of any industry the state or the municipality might with propriety desire to foster it during its developmental period. They might propose that a gross or net receipts tax, usually the former, be substituted in place of a flat tax at the usual rate upon the real and personal property of the corporation. A flat tax would constitute a heavy burden during the developmental period. However, a gross or net receipts tax would usually be adjusted during that period so the burden would be lighter than under the flat tax upon real and personal property. In this case the city would trust to the ultimate development of gross receipts to pay a tax equal to, or in excess of, the flat property tax.

On the other hand the utility, desiring to create a public sentiment favorable to the granting of its franchise and thus exert public pressure upon the franchise-granting body, may have itself proposed a gross receipts tax in excess of the flat property tax. The utility thus would assume a future continuing burden as a real part of its franchise cost.

Although in cases where some such historical or practical justification may be present, a gross receipts tax is only substituted for the flat property tax. A possible exception occurs in those cases where the gross receipts tax is contractual in its character and partakes of the nature of a payment for the franchise.

The justification of franchise or easement taxes also demands the assumption of conditions which existed at one time in the history of the industry but are no longer present. For example, assume a street railway, which enjoyed a legal monopoly of mass transportation at a fixed rate, was able to make relatively large profits upon its invested capital. It was not illogical for the public to reason that these large profits were possible only because of certain exclusive rights in the public streets. These exclusive rights, protected by law, became valuable property which was in itself profit-producing to the owners of the utility. The public concluded, therefore, that it was not inequitable for the utility to pay for its privileges. However, if profit is limited to only a fair return upon the property owned, exclusive of the franchise rights, the justification for the franchise tax is destroyed. Instead of being a levy upon the stockholders in proportion to the value of property owned by them, it becomes merely an indirect burden upon the users of the utility for the advantage of the general public.

State and local taxation of the third category, or various burdens laid upon the utilities for the benefit of the general public, can be considered best on the basis of whether the tax in question was or was not originally justified.

The nature of this classification will be clearer perhaps if one considers the distinction between a true operating or construction charge and a public burden. If it is desired to extend a street railway system to some outlying settlement over a street already improved with a high-grade, modern pavement, the cost of cutting through this pavement and restoring the street to its original condition is a proper construction cost. It is a portion of the initial expense of providing service for the settlement in question. As such it is properly chargeable to the users of the streetcar service, either as an immediate cost or as a capitalized sum on which interest and depreciation shall be set up. Occasionally it becomes necessary to open the pavement at certain points. The cost of such opening, together with the cost of restoring the pavement to its original condition, is also a true operating charge made solely as an incident of operation and properly chargeable to the users of the utility.

There are many charges which are paid by the utility that might more properly be charged to the municipality. In the case cited above the streetcar or bus line may precede the pavement, operating over an ordinary road which the municipality later decides to improve with modern pavement; or the pavement may finally wear out under ordinary traffic conditions. If it becomes necessary to pave, such new pavement, or repavement, laid with the tracks already in place, adds nothing whatever to the facility of railway operation. This is not necessitated by the transit operation and cannot properly be charged against the utility as either

a construction or an operation expense and should, therefore, be paid for by the public. However, if the presence of the track or motor-bus operation increases the construction or maintenance cost of the pavement, the excess may properly be charged to the utility. If more than this is charged, it becomes merely a burden upon the users of the utility service for the benefit of the general community.

Sometimes a transit company finds it necessary to remove a snowfall of several inches from the streets in order to facilitate the actual movement of its cars and busses; this is an incident of operation and properly an operating cost. In so doing, if it blocks the roadway by the side of the track or the footway crossing, it may be required to level the former or to clear off the latter and to treat this as an operating expense. The cost of the labor is essentially a direct expense of maintaining service or an indirect expense due to repairing incidental damage to the rights of others resulting from the service.

The municipality may go beyond this and require the transit company either to clean from curb to curb or to furnish vehicles for the transportation of the snow upon the general street system of the city. This becomes a general tax burden laid upon the users of the utility for the direct benefit of the general public.

The most important item in the third class of public burdens, imposed especially on transit operations and historically justified at the time of first imposition, is the matter of paving construction and repair. In the horsecar days the transportation companies found paving essential and were, in turn, one of the heaviest users, or consumers, of paving surface. To this extent it was logical to require the companies to construct and to maintain the paving within the track space.

But even in these early days the other side of the situation seems to have been entirely overlooked. The street paving at that time was not the hard, smooth surface with which we are now familiar but was more frequently granite block or even cobblestone. Under these conditions the tram rail, particularly when laid of standard wagon gauge, proved an almost irresistible magnet for other horse drawn vehicles. The street railway track concentrated upon its area not merely the other vehicular traffic of that particular street, but also the vehicular traffic which would have taken other parallel streets. The streetcar track was apt to be the most convenient and direct route with the easiest grade between industrial and population centers within the metropolitan area.

Therefore, while it was true that the street railway traffic did wear out pavement and should, therefore, be charged with renewal costs as an operating expense, it is also true that other vehicular traffic, attracted to the rail as an iron tramway, assisted in the wearing out of the railway rail, acted as an interference with railway traffic, and contributed perhaps even more than the railways themselves to the wear of the pavement within the track space. It would seem logical that the street railways should have claimed a credit for public service rendered out of the general tax levy as an offset against the admittedly logical charge for outworn pavement.

Today with the almost complete passing of the horsecar and the practically universal use of electric cars and motor busses, there is no longer any logical basis for any pavement cost whatever, except that purely incidental to and resulting from the operation of the cars over the tracks and motor busses on the pavement adjacent to bus stops. As it stands today the transit rider is not only paying for the cost of his own transportation, but is paying a portion of the expense of providing a smooth pathway for all other types of urban traffic.

There are also some public burdens assigned specifically to transit companies which were never logically justified by any relation to operating cost. For example, there appears to be no logical reason why the users of the transit system should pay for the transportation of the public police. It is desirable that the police be transported expeditiously from point to point, but this should be done at public expense rather than at the expense of any one group of citizens.

All of the public burdens of this type originally found their "justification" in purely practical considerations. The transit systems were operating under fixed rates of fare determined by charter or by act of the state legislature. They were believed by the public to be extremely profitable businesses. As a result, in many cases additional burdens which could be loaded upon them, either with or without their consent, represented a transfer from the pockets of the stockholders to the public coffers; it was reasoned that this decreased the general tax rate and the burden upon the general public.

The entire situation changed, however, with the development of commission regulation. Transit companies no longer operated upon a fixed charter or legislative rate, but under a rate subject to constant modification by a commission acting on the theory of allowing only a fair return on fair value. The fair return was in addition to all operating costs, including both direct and indirect taxes.

In consequence of this changed theory of operation there was an immediate transfer of the public burden from the shoulders of the stockholders in the property to the shoulders of the users of the utility service. The more perfect and automatic commission regulation becomes, and the more frequent the rate adjustments, the more complete is the transfer of the burden. Today in many states the transit systems, instead of being genuine taxpayers, have become merely an instrument by which some of the burden of public administration and public protection, under the guise of a charge for service, is placed upon the users of utility service to the benefit of the people as a whole.

The inequity of this condition has been heightened still further by the development of transportation facilities other than the electric railway. For example, in one of the larger cities the entire burden of construction and development of a long chain of parks with scores, if not hundreds, of miles of boulevards intended for pleasure driving, was supported by the users of transit service, while many of the automobile users of these park driveways rarely enter a transit vehicle.

Therefore, it seems evident that all taxation or public burden superimposed upon a transportation system, beyond the taxes imposed upon other corporations, is inequitable to the users of the service. It is also injurious to the transit system as it introduces an unnecessary cost to the operation of the transit system and increases the difficulty of developing proper public relations.

SO-CALLED "OPPRESSIVE TAXES"

The excessive tax burden imposed upon public transit has been recognized for many years by leading business organizations. In 1920 the United States Chamber of Commerce in Referendum No. 33 condemned the practice of burdening the industry with excessive tax burdens as follows:

"All burdens unrelated to the service performed should be removed from street railways."

In 1932 the Chamber reaffirmed this principle in Referendum No. 161:

"Recent conditions emphasize the urgent need of local mass transportation agencies for relief from oppressive special taxes, paving requirements and other unfair burdens."

The Chamber's committee on City Passenger Transportation reported:

"Both street railway and bus companies in many cities are subject to heavy burdens in the way of special obligations and taxes, all of which are necessarily passed to the passenger. One of the most irksome of the street railway company burdens is the responsibility for pavement between car tracks.

The committee continued:

“While responsibility for pavement maintenance is one of the most serious unfair burdens still imposed upon many street railway companies, there are many others. Some cities require the company to provide traffic officers or make substantial contributions to their salaries. Some require public employees to be transported free of charge. Additional burdens sometimes imposed are: street cleaning and sprinkling, street lighting and snow removal from curb to curb. In addition to general taxes imposed on all corporations, street railway companies in various cities are subject to a variety of special taxes, including franchise taxes, taxes on gross earnings and others which were levied in the first instance when the company was a protected monopoly and which no longer have a proper place and constitute an unfair burden on public transportation and its users.”

In 1919 the President of the United States appointed a Federal Electric Railways commission at the suggestion of two cabinet members, the Secretary of Commerce and the Secretary of Labor, to investigate the condition of the electric railway industry. In its report to the President the Commission announced the following conclusions and recommendations:

“IX - Effective public cooperation should be exercised by eliminating in so far as it is practicable special assessments for sprinkling, paving, and for the construction and maintenance of bridges which are used by the public for highway purposes.

“ X - Extensions into new territory resulting in special benefits to the property in that vicinity should be paid for by assessments on such property in proportion to the benefits received and the amount of such assessment should not be added to the physical value of the corporate property.”

As one of the factors which contributed to the serious plight of the electric-railway industry, the Commission pointed out the following:

“ . . . Special taxation and franchise obligations, having particular reference to street paving, street sprinkling, construction and maintenance of bridges used by the general public, general taxation, etc.”

The American Electric Railway Association introduced a chart which showed that the total amount of taxes levied against the properties in 1917 amounted to \$45,756,695 - representing 10.11 per cent of the operating expenses -

Taxes on real and personal property	\$21,804,619.
Taxes on, earnings, capital, and other taxes	<u>23,952,076.</u>
	\$45,756,695.

In 1902 the ratio of taxes to operating expenses was 9.19 per cent.

The heavy taxation to which the companies are now subject came into being during the period of their prosperity and at a time when they were still essentially private concerns, relatively free from regulation. It was natural that their properties should be taxed in no less degree than the properties of other private corporations.

When a company comes to subject itself to such a comprehensive regulation as renders its property in effect a public instrumentality, then tax exemption begins to be in order. To the extent that it may become possible in any community to exempt street railway property from taxation, the rider's carfare will come more nearly to represent the actual cost of rendering the service of transportation which is in itself a desirable result. But it would seem that the status of the company as a public agency should be well assured before such an exemption should be attempted.

Transit industry taxes reached a peak in 1944 with the payment of taxes amounting to more than 189 million dollars, representing 15.1 cents out of each revenue dollar. It appears that the matter of relief from oppressive taxation must be brought about by a change in the political philosophy of the various agencies of the government away from the theory of heavy taxation and liberal spending to a more conservative viewpoint. The elimination of taxes brought about by war and emergency conditions would also contribute substantially to tax relief. Local tax inequalities may be adjusted through a change in public opinion as the plight of the transit utility becomes known to the users of the service.

CHAPTER VI

Fare Structures

EARLY HISTORY OF FARES

FARE structures of transit companies, as they exist today, had their beginning in the period immediately following World War I. Prior to that time five cents was the accepted standard fare for a street car ride. This fare generally included city-wide transfer privileges without additional charge. The five cent fare dates from the early days of horsecars and prevailed throughout the local transit industry until shortly after 1917.

During the five cent era a few companies established reduced ticket rates under political compulsion or with the hope of stimulating additional riding. These reductions were generally offered in the form of special rates for workmen, and their use was frequently restricted to certain hours of the day. The most common reduced rate was six rides for 25 cents; however, seven and eight rides for this amount also were in effect. It is unprofitable to discuss at length the reasons which led to the almost universal adoption of the nickel fare in this era. It is perfectly clear that it bore little relation to the cost of service, for as wages and cost of material varied in the different communities and sections of the country, so also did operating conditions. The length of the haul, the density of traffic and other fundamental factors were never the same and so must the cost of performing the service differ.

The five cent fare came into being when horsecars first made their appearance on the American scene and at a time when the performance of this service was a matter of bargaining between the community and the company and there was no very exact knowledge on the part of either party to the contract as to the cost of performing the service. In general, companies believed they would be able to secure sufficient profits at the five cent fare and the communities were satisfied with a charge covered by the smallest non-copper coin minted by the United States Government. Whatever the reason, the companies readily accepted the five cent unit of fare as standard, either embodied in a franchise or enacted into law by State Legislature. With few exceptions, the traction companies in this earlier period operated profitably on a nickel fare.

At the turn of the century, first Massachusetts, then Wisconsin, New York and many other states, concluded that control of Public Utilities was a state and not a local function and by enactment of Public Service Commission laws assumed the task of regulating service, fares and rate of return. In the minds of those who drafted the laws, there appears to have been little apprehension that the Commissions would ever be called upon to put higher fares into effect. Revision of fares meant, to most of the members of commissions, revision downward. In consequence many of the provisions of the early Public Service Commissions' laws were so ambiguous that difficulty was experienced in obtaining interpretations when higher fares became essential.

Inflexible fares, coupled with rapidly increasing costs were found inadequate even in the years immediately preceding World War I, but the war precipitated a crisis. During this period the financial condition of the industry was so depressed that more than a third of it was bankrupt by 1919. So grave did the situation become that the President of the United States appointed the Federal Electric Railway Commission to investigate the transit industry's franchises and operating conditions in relation to rates, taxation and imposts. To some extent this Commission succeeded in bringing to the attention of the general public and the various regulatory and municipal officials the serious financial condition which the almost irrevocable five cent fare had brought down upon the industry. Public Service Commissions assumed, with reluctance, the authority of increasing fares in view of the earlier implications as to their duties. Great were the difficulties which beset companies seeking to break away from the nickel fare, bulwarked as that rate was by custom, by the stipulations of franchise, by enactments of state legislatures and by politicians who were frequently elected to office on the fare issue alone.

Public Service Commission delays and court litigation in fare increase proceedings helped to destroy the equity of the stockholders in many of the traction companies with the result that all too frequently the properties passed into the hands of new owners through receivership and bankruptcy proceedings.

During the period from 1917 to 1922-23 the upward trend of fares resulted largely from rapidly rising labor and material costs. Up to that time the electric street cars enjoyed an almost exclusive monopoly in the field of local public transportation. But in 1923 the private automobile began to assert itself as a competitor and to make serious inroads into the traffic of transit companies, particularly the pleasure riding on weekends and during evening hours.

Upward revisions in fares for the 1923-1930 period were made largely during a time of declining traffic, in an effort to bolster operating revenues. During this period many of the increases failed to increase total revenues and in all cases produced a loss in traffic. In consequence, the increases in rates were largely offset by further declines in passengers.

In this thirteen-year cycle from 1917 to 1930 increased rates were so widespread that few companies did not move to higher fares. In the adjustments made during this period no formula for fare increases was found that could be applied equally well to all companies and the increases in rates that were made were determined in the light of conditions and circumstances prevailing upon each company's property. As a result, by 1930, approximately 100 different combinations of fares were included in the fare structures of transit companies.

During the decade between 1930 and 1940 cash fares remained stabilized. However, "merchandising rates" came into vogue. These experimental fares included various forms of reduced rate tokens, tickets, weekly passes, shoppers' passes, off-peak rates, etc., all conceived in an effort to improve the load factor which reached its all-time low at the bottom of the depression in 1933 and recovered rather slowly in the succeeding years.

The traffic boom in transit resulting from the rearmament program starting in 1940 and the subsequent World War II improved the earning capacity of transit companies and in some scattered places resulted in Public Service Commission action reducing transit fares. During this second World War period labor and material costs again moved rapidly upward and threatened to overtake even the greatly expanded revenues of the industry. Even before the war time traffic reached its peak, many companies found it necessary to apply for increased rates.

Wage demands, which had to be met when war time wage stabilization controls were abolished, left most transit companies no alternative but to seek fare increases. These increases began as a trickle shortly after V-J Day in 1945. They increased in volume in the succeeding months and by 1949 resulted in upward adjustments in rates in practically every United States city with 1950 populations in excess of 25,000. Fare increases granted during this period covered only the current and immediate requirements. In consequence, with each succeeding round of wage increases, most companies have had to apply for additional upward adjustments in their rates with the result that many cities have experienced numerous changes in fare rates.

CHARACTERISTICS OF TRANSIT FARES

The basic characteristic of the conventional city fare is its disregard of length of ride. The inequity of a fare which exacts the same amount of money from the long and short haul rider was recognized long ago. Zone fares which attempt to relate the fare to distance travelled and hence, more nearly to costs, have been proposed from time to time without meeting with any great degree of acceptance. Every other form of transportation carrier - railroad, airline, taxicab, intercity bus, etc. - follows some version of a zone fare system. Use of the zone fare system is wide spread and successful in England and other European countries, primarily because the survival of two-man operation helps to solve the problem of fare collection.

Most of the system-wide fare increases in the 1920s were horizontal increases. Students of the subject have attributed the substantial loss in short haul riders sustained during that period

to this type of fare increase. Now that fares are moving above ten cents, interest in zone fares has been revived and many transit companies again are considering the feasibility of their introduction to avoid further horizontal increases in system-wide fares. In some instances in the past zone fares have been rejected upon the basis of political expediency, but mostly their rejection is attributed to the difficulties of fare collection. This latter reason applies particularly to the larger mass transportation companies where the area served might necessarily be divided up into three or more zones. On the medium or smaller properties, where the area served would not require more than two zones, fare collection is not to be considered as a serious problem. Companies in a number of cities in which a zone system has been installed are successfully collecting their fares on a basis of pay-enter in their first zone and pay-leave in their second zone. However, it is the companies in the medium and smaller cities that generally experience the most serious political objections to a zone system of fares.

A partial solution to the differential in fares between long and short haul riders has been found in some companies by offering the long haul rider express service at higher rates of fare. From the viewpoint of the passengers, the special express rate is the least objectional method of exacting a fare which more nearly compensates for the length of the ride taken.

In placing emphasis on the matter of increased fares for the long haul rider, sight should not be lost of the efforts of a number of transit companies in providing relatively short haul loop lines in business and shopping districts. Such service is usually provided at rates substantially below the system-wide fare. This does not imply that the service is given below cost. As a matter of experience, some properties have derived substantially higher revenue per mile from this class of riders than from their regular fare riders because of the extremely short haul involved. Factors that make this type of fare possible are not present on every transit system, and the overall effect on any system depends on the extent of diversion of full fare riders to the low fare line.

SCHOOLS OF THOUGHT ON TRANSIT FARES

While there are many kinds of fares, there are comparatively few fare systems. Those who have been responsible for the supply of urban transit service over the years have never been able to reach unanimity of opinion regarding the ideal fare structure for a transit company.

The Flat Low Rate Fare Theory

The first group may be described as comprising those who hold that the ideal fare for any community is the flat low rate fare, easy of collection and simple in theory and application. The idea is to make the cost of using the system so reasonable that price will cease to be a consideration for an individual ride and that the service may be put to its maximum use. When faced with the fact that, at least in recent years, such systems have seldom returned sufficient revenue to meet all charges including a reasonable allowance for depreciation and a reasonable return on the investment, the advocates of this theory insist that the greatest good for the greatest number, including the greatest good for the community as such, is best served by pricing the fare so low that all may ride and meeting the deficit in some way other than by a direct charge to the rider. Unless community participation in costs be possible this theory breaks down.

Necessity Rider Theory

Another group believes that the monopolistic element of local transportation service has been so greatly reduced by the wider use of private automobiles, and that the services which the latter render are now so highly competitive with busses and street railways, that the patronage left to public transit consists almost entirely of necessity riders, a group little affected by changes in fares. The advocates of this theory believe that low fares, specially priced fares, return ride privileges, etc., can do little to attract riders other than those who are actually obliged to use the service. They believe in charging a relatively high fare and one easy of collection. This, they hold, will result in maximum revenue from those actually obliged to ride, and that the entire cost of the service will be carried by these so-called necessity riders.

Merchandising Theory

There are many who believe that sufficient revenue can be obtained from a given population only by providing different types of fares for specific groups of people. Passengers have been divided into casual riders, wholesale riders, Sunday riders, off-peak riders, etc., and a great many different forms of tickets, tokens, passes, permits and the like have been, devised to bring the last obtainable bit of revenue from a given population. The opponents of this school of thought hold that the complexity of the fare system and the opportunity offered to various groups to take advantage of rates not intended for them, result in no more revenue than would be obtained by a flat fare. Unquestionably merchandising fare systems are popular with the traveling public. Usually they are productive of more passengers for a given revenue and consequently may involve greater operating expense unless accompanied by an improvement in load factor.

Total Revenue Per Capita Theory

There are some who believe that, in practice, it does not make much difference what fare or type of fare is charged and that any given fare system in a specific territory will return substantially the same amount of revenue to the operating company. That is, within reasonable limits, regardless of whether a flat fare is charged or a complicated merchandising system is employed, the total return to the company will be of much the same order.

THE FARE STRUCTURE

It seems so unmistakably evident as a first consideration that a fare structure must produce sufficient revenue to take care of the proper expenses of carrying on the business, including a reasonable return on the fair value, that it is stressed here as a fundamental consideration, lacking which quality any fare structure must sooner or later be thrown into the discard.

An operating company may seek to obtain a reasonable return in several ways; by charging a high fare to a relatively small number of people; or by charging a low fare to a relatively large number of people; or by a variety of fares to different classes of rider.

1. By Charging a High Fare to a Relatively Small Number of People

If the thought of economic gain alone controlled the industry in the formulation of a fare structure, it is conceivable that there are many properties on which upward changes of fares should be made with a view to determining the point at which the greatest amount of revenue could be procured at the least expense. This would be following a well established business practice. However, the industry is not operating under the ordinary laws of supply and demand. It is a "public utility". It is, furthermore, a regulated utility and the amount of service units which it must produce is not left wholly to the discretion of its management. It must not be assumed that, having accepted responsibility for furnishing transportation services within a community or a part thereof, a public transit company would run its business in a way materially different from what it is now doing if regulation were withdrawn.

2. By Charging a Low Fare to a Relatively Large Number of People

The second essential of the proper fare structure is that it should seek to establish a level of rates as low as possible to enable the community, as a whole, to make maximum use of the system. To accomplish this the form of rate structure should be such that the cost to various groups of patrons or prospective patrons is adjusted to the value of the service to each group.

Generally, these two objectives - a proper return to the company and the greatest community use of the service - cannot be achieved by any system of charges which contains only a single rate of fare. For if the unit is low, as in the case of the five cent fare, it cannot, in these days, meet the first condition and if it is high, as in the case of the proposed rates of twenty cents and higher, it certainly cannot meet the second.

These considerations may render necessary the sacrifice of the desirable feature of extreme simplicity which characterizes the single fare unit. But with this qualification, one of the primary requirements of a proper fare structure is that it be simple, understandable by even the

most uneducated of patrons, and easy to administer and collect. As far as can be done it should further be so designed as not to bring it into violent conflict with the other principles laid down. In other words, the fare should assess the charges for the services to various groups of patrons in some reasonable relation to the cost of serving them. There is little reason to hope, nor is it necessarily important, that the individual fare charged should reflect the cost of serving that individual. Nor can the principle of fixing fares in relation to cost be followed even for groups instead of individuals. However, the concept of cost must be constantly kept in mind as the means of checking the results achieved with any given change in the level or form of fare structure.

3. Variety of Fares to Different Classes of Riders

It seems reasonable to conclude that a sound fare structure in the local transportation industry would be one which would maintain the value to each group of users as far as possible above the fare that is charged. Determination of the value of the service to any group is a matter of forecasting from experience and checking by experiments, the result being measured by the volume of patronage. This is the starting point. It is readily apparent also that the unit cost of service to an individual or group of riders is not constant but varies with volume and distribution. For that reason cost analysis does not serve as a guide in advance for stabilizing the fare structure. But it does serve as an indispensable means for checking the results accomplished by each step in the development of an improved structure. Unless accomplished by such detailed cost analysis all experimentation of rates becomes blind and largely unintelligible.

Ideal Fare Structure A Compromise

An ideal fare structure is necessarily a compromise - the best compromise that can be made between the interests of the public which wants adequate service at the lowest price at which it can obtain it, and the interests of the operating company which must have an adequate return on the fair value of its property if it is to continue to give service. The more satisfactory the "load factor" throughout the day and the greater the "use factor" by the community the simpler does it become to reconcile these two interests. Therefore it is essential that in devising a fare structure these two considerations be kept in mind.

Characteristics of an Ideal Fare Structure

The characteristics of such an ideal fare structure may be summarized under the following heads:

- A. It should provide an adequate return to the company.
- B. It should be simple to collect and account for.
- C. It should make a popular appeal to the community by reasonably low rates that are readily understandable and simple in use.
- D. It should be sufficiently flexible to permit ready changes in rates of fares.
- E. It should aim to improve the "load factor".
- F. It should permit selective fares for various groups of riders to improve the "use factor". Groups for whom such selective rates might be applied follow:
 1. Casual riders
 2. Regular riders
 3. Wholesale riders
 4. Short distance riders
 5. Off-peak riders
 6. Sunday and holiday riders
 7. Children and student riders

Kinds of Fares

In the immediately following paragraphs numerous kinds of fares are described that at one time or another have been in the fare structures of transit companies. While this list of possible fares is a long one no claim is made that it is complete. It indicates the choice that management has in

the determination of appropriate kinds of fares for its system, and when the endless possible combinations of these fares are considered it will be realized how broad is, theoretically, the field of choice offered to those responsible for the operations of this industry. But it is recognized that a mere recital of kinds of fares, even when accompanied by a discussion of their several advantages and short-comings, will not answer the main question of how to go about discovering the kind of fare system that may be expected to give the best long time results on a particular property.

The circumstances of each individual community will determine the details of its fare structure and no universal program can be laid down. But on the care with which the task of filling in these details is approached will depend the success or failure of the fare structure set up. No haphazard guesses or applications of the rule of thumb can be expected to suffice under present conditions when public transit is subject to intense competition. Any attitude on the part of the management, that it has acquired through close association with the business over a long period of years, all the basic facts needed in adjusting fares, is fraught with danger, except perhaps on very small properties. Where the business involves the operation of a transportation system on dozens of lines, carrying hundreds of thousands, and perhaps millions of passengers, service districts of varied populations and industrial and commercial interests, the complexity of the problem and the multiplication of difficulties are readily suggested. Guesswork must give place to accurate determination; impressions must give place to knowledge; proof must be supplied to support theories; and most of all, facts must be faced and acted upon rather than ignored on the theory either that little can be done about them or that they will adjust themselves.

WHOLESALE AND REGULAR RIDER FARES

The Unlimited Weekly Pass

By far the simplest method of wholesale rides that has yet been proposed is that of the weekly pass. Under the pass the rider, at the beginning of the week, makes a payment for his rides for the entire week and thus has only one financial transaction with the company each week. A "readiness-to-serve" charge may be incorporated in the price of the weekly pass. The pass has the merit of causing the least number of irritations to the prospective customer and the least trouble to the operator of the vehicle. However, it contains no provisions for relating the price of the ride to the cost of the ride. It makes its appeal mainly to those whose necessity rides already involve an expenditure as great or greater than the price of the total rides that they take. The price of the pass has usually been fixed so as to cover the cost of two necessity rides a day, for the six working days of the week and generally a slight amount in excess of that. But under this method of pricing the weekly pass, there are a number of classes of riders such as messenger boys, traveling salesmen and collectors generally, who obtain an extremely low rate for their necessity rides. Consequently, the first group of buyers of the weekly pass are the bargain hunters who have been in the habit of paying more for their rides than the price of the pass, such as messengers, collectors, salesmen, etc. The second group of buyers are those who are just on the border line, and it is only when the pass is sold to the group which does not now pay the amount of the weekly charge for the pass, and to new riders, that this system of fares becomes financially attractive to the operating company. First of all it has to make up losses involved in supplying passes to the first two groups by means of enough induced riders of the third and succeeding groups.

The weekly pass has certain unquestionable merits. The financial transactions with the company are reduced to a minimum and the operator is relieved of a good deal of the work. Further, because it provides bargain rates for a considerable number in the community, the pass is likely to promote considerable good will. Nevertheless, there is nothing in its nature to recommend the pass as a scientific method of fare determination.

From the point of view of the operating company the great merit of this fare method to date is its simplicity. In rates for mass transportation simplicity is a highly desirable quality. Dealing with masses of people, operators have little opportunity to explain fares. When the operator has to collect fares, make change, give transfers, sell tickets or tokens, and in addition to getting his vehicle under way and maintaining schedule, watch his passengers boarding and alighting, he has little time to engage in conversation with the passengers even if this be to explain the fares

that they are to pay. The simpler the fare system the more attention can the operator give to his other essential duties.

From the point of view of the passenger, the weekly, unlimited, transferable pass is extremely simple. It tells the passenger on the face of it that he can ride anywhere he wishes on the system at any time, and as many times as he likes during the life of the pass. From the point of view of the operator this is also a simple matter since he does not need to handle the pass at all except possibly to sell it, and as soon as he identifies it as being the correct one for the week, he permits the passenger to enter the vehicle.

Almost universally those systems which employ the weekly pass have reported that it has permitted them to speed up their vehicles and facilitate loading at heavy points. Further, it permits passengers who are transferring to board the cars at other than transfer points, and thus has served to break up jams that frequently occur at transfer points.

Therefore, when the cost of the use of the weekly pass to the company is being considered full credit must be given to the economies which it permits. Definite cases are on record of the same headway being maintained by the use of one less vehicle after the installation of a fare of this kind.

Nor can there be any doubt of the public approval of this form of fare. Since it is never installed as the sole form of fare no one has to buy it unless he chooses to do so. This being the case it is purchased mainly by two groups. First of all, by those who are already paying more money to the company per week under the cash or token fare system, and second, by a group of riders who are necessity riders for the peak service, and who, at a small extra cost or possibly for no extra charge above their necessity cost, can have the freedom of the use of the system at any other time they wish.

Criticism has sometimes been made that the pass renders the price of the ride below the cost of giving it. This is undoubtedly true of some groups of users. While the average use of the pass over a number of systems is in the neighborhood of 22 rides per week, instances are on record in which the pass has been used fifty, sixty, seventy or even more times in a week. There is no economic justification for a rate so low as this implies and under the system of the weekly unlimited pass it must be admitted that there are certain highly privileged classes.

But it is questionable if the instances of intensive use of the pass are relatively of great number in any community. By far the great majority of pass holders are the regular workers of the city who go to and from their homes to their offices, factories, etc., each working day. Since they are, in the main, employed during the daytime, it is seldom possible for them to take more than one ride in each of the peak periods when the service is costliest, and only a relatively small proportion of their non-necessity rides can be taken in the daytime. Therefore it follows that other rides by the pass holder must be taken, in the main, after the rush hours in the evening at a time when transportation vehicles are notoriously underpatronized.

Until extra vehicles have to be employed in the non-rush hours to take care of new patronage induced by the pass, it can scarcely be claimed that the operating company is put to any extra cost to handle users of the pass. Furthermore if they are of the group that has been induced to pay in the price of the pass even a small amount more than that which is represented by their necessity rides, it is quite likely that a considerable proportion of the difference between what they paid for the pass and what they would have paid for necessity rides is induced business and therefore pure economic gain for the company. Even if it works out that the pass holder uses the service at a cost of three cents or even two cents per ride, it might fairly be argued that this was at least some payment for seats otherwise unoccupied.

Of course, additional riding increases the passenger accident risk to the company, and this, in turn, may cause an increase in "injuries and damages" claims. The probability of such increased expenses should be kept in mind in any consideration of this form of fare, quite apart from the cost of any increased service that may be rendered necessary by increased riding. Furthermore, since the operators may have considerable sums of money temporarily in their possession as the result of the sale of passes on vehicles, the risk of losses through holdups must not be ignored.

It has been claimed by advocates of the weekly pass that additional revenue is produced for the company by the encouragement of companion riders. It is claimed that the pass holder who uses the services in off-peak hours, especially in the evening, is probably doing so to go to a place of entertainment or visit friends, and that the pass holder quite likely will be accompanied by his wife or children or some other member of his family who then becomes the "companion" rider. Since his own fare is already paid through the possession of the weekly pass, it is argued, he is less likely to requisition the family automobile for the journey.

In theory the weekly pass holder, entitled to unlimited service himself at all times of the day or evening, should be the means of stimulating a not inconsiderable amount of this companion riding. No records are available from any company which uses this system of fares to show just how much companion riding has been induced, but a study of the revenue from evening operations of some of these companies leads to the conclusion that it is disappointingly low.

No definite rule can be laid down as to the circumstances under which an installation of the weekly pass is likely to be a success. It seems fairly certain, however, that unless the community has definite recreational points to which people are likely to ride after their business day is completed, or amusement sub-centers, little revenue advantage can even be expected under the weekly pass. One thing seems certain. It would be a mistake to assume that because the pass had been successful in one place it would therefore succeed in another. Comparisons would have to be made between the thrift characteristics of the people themselves, the nature of the industries of the community, the physical layout of the city, and the location of theaters and other amusement places, as well as the speed of the cars and the headways of the system.

Sunday, Holiday and Week-end Passes

Since the advent of the private automobile pleasure riding on public vehicles has almost entirely ceased. This has caused a vast change in the loading for Sundays and holidays and in many cities for Saturdays. There are, however, a few places where Saturday riding is still the heaviest of any day of the week. Since service has to be given on these days as well as on regular business days, though to be sure it is usually curtailed, the device has been adopted of offering bargain rates to stimulate use of the service, and thus improve the load factor.

No matter what the fare structure or rate of fare of the community where passes of this kind have been introduced, they have usually been sold at about the price of three rides at the average wholesale cost. These reductions are comparable to those made by the steam railroads for summer excursions, etc., in no case of which we are aware can a loss of revenue be attributed to the use of passes of this kind.

This type of pass illustrates the application of the principle of a wholesale rate at restricted times - in this particular instance these times constitute whole days or combinations of days. Since the traffic has almost universally fallen off on these days, the conclusion is justified that the value of the service to the community on these days is less than on other days, although the cost of supplying the service, apart from peak-hour consideration and broadened schedules, is no less. Under this system of pass no attempt is made to relate the cost of the ride to the price of the ride. The only consideration is the establishment of a price which will induce extra riding or use of the service.

Wherever it has been tried, the daily cost of a pass of this kind has been in excess of the proportional daily cost of the weekly pass. It is not believed that this system would make an appeal to the regular riders in any community, since it is based on the assumption that about three rides per day will be taken, weekdays and Sundays included. Inasmuch as the average number of net rides on weekly pass installations is in the neighborhood of 22 - an average arrived at by including those who use the pass fifty, sixty, seventy times - it follows that there must be many pass holders who do not use the pass 21 or 22 times per week. The fact that the daily pass is just as much available to a company as the weekly pass and yet has had no application except on Sundays, holidays and week-ends, indicates the view of managements generally to be that its sphere of usefulness is limited to these special days. In general, it can be said that most of the patrons of local transportation services estimate their transportation charges in terms of the weekly amount and not in terms of daily cost.

Nor has there been any success in extending the period of the pass from a week to a month. Monthly passes for transit companies have been tried in this country without success. On the one hand the amount of money necessary to be laid out at one time for a month's supply of transportation, by street cars or by busses, is probably in excess of that which most of the users of our services are willing or able to pay. On the other hand, in steam railroad commutation services, the principle or the monthly payment is well established.

Off-Peak Passes

Three principal kinds of off-peak passes have been proposed. (a) A pass good in any of the off-peak hours of a single day. These are roughly between 9:00 and 4:00 in the daytime, and from six-thirty to seven at night until the beginning of the peak-hour service about seven o'clock next morning. (b) An evening pass good for the hours of operation of the system after the peak-load in the evening and (c) A weekly pass good only in the off-peak hours.

The theory underlying all three is the same, namely the granting of reduced rates for transportation at a time when the services are not otherwise crowded. It is also to be expected that to some extent the use of this form of fare will serve to change the load factor by inducing certain people who now ride public vehicles during peak hours, to do so at off-peak times. How far any fare is capable of doing this is highly problematical. It is certain that most of the users of peak hour service ride at those times because they are obliged to and not because they choose to, for the service at such times is usually slower and the vehicles more crowded.

An investigation made on the lines of a large transit company showed that only a negligible proportion of the riders on that system could change their hours of riding no matter what the financial inducement might be. If this be true generally - and this may be so - no substantial improvement in the load factor is to be looked for by the rates provided for in these off-peak passes. That is, a company cannot expect to take many passengers from peak service and transfer them to off-peak service by this means. The hope that it holds out is that the off-peak pass will attract new riders during the off-peak hours who do not at the present time utilize the service at all. Hope for the transference of riders from the peak hours to other times of the day - a condition greatly to be desired - lies rather in the efforts of individual businesses or industries to stagger their hours in such a way as to lengthen out the time at which their workers will be arriving at their places of business, or leaving them for their homes. No stagger system will be effective unless under it the operating company is able to get double service out of the vehicles used in its peak. There is a marked contrast between the ratio of base loads to peak loads in cities that are highly commercial (with business places opening at almost the same hour) and communities where the industries are diversified. In a word, the individual has very little control over the hours at which he will ride. This is usually determined for him by his employer.

The same criticisms that apply to the regular unlimited weekly pass apply in the main to these off-peak passes. They provide a rate unreasonably low for certain privileged groups, and they involve the risk of revenue losses unless sufficient new business is obtained by their use to offset such losses.

Again, any rate or system of rates which provides a lower fare for those who are so fortunately placed as to be able to use the superior off-peak accommodations than for those who must use the inferior peak accommodations may be open to criticism both socially and politically. The peak riders are more thoroughly necessity riders than are the off-peak riders. It is difficult to persuade the peak riders that theirs is the most expensive service. They ride in cars that are filled and they easily conclude that the company is conducting a profitable service. To convey to them the economics of an off-peak rate is a difficult undertaking. There seems to be no resentment in the minds of regular telephone users to the fact that certain others who use the same kind of service at off-peak times are permitted to enjoy a lower rate. But the psychology of the two groups is not the same. Although the telephone service is much more completely a monopoly than is transit service, the "time necessity" element in the telephone service is by no means as strong as in local transportation.

Off-peak rates as exemplified by passes of the kind under discussion, probably can do little to change the load factor of the system, but, if installed at the proper rate, and properly advertised and merchandised, may induce new business and increase revenues. If, however, extra service has to be provided to take care of the patronage induced by these reduced rates, they may defeat their own ends and result in a net loss.

Another objection to off-peak passes as a ride stimulating scheme is that they require an investment in more than one ride from the very class that is likely to be casual or intermittent. For this class of patrons it is preferable that the fare should be as simple and convenient as possible. In connection with them, sight must not be lost of one operating difficulty. The peak service may not occur at the same times on different lines of a system. On one line the morning peak may be completely ended by eight o'clock and on another it may persist as late as nine-thirty. No insuperable obstacle is presented by this nor even by the necessity of setting an arbitrary time at which the off-peak rate will be applicable either by lines or for the system. A delay in the arrival of a bus, a difference in the times indicated by the watch of the operator and that of the prospective passenger may result in arguments and disagreements, and fare methods of this kind certainly impose upon the operator the necessity for the most judicious application of company rules. On the one hand, where latitude of any kind in the collection of fares is allowed to the operators of street cars or busses, a real but not an insuperable difficulty is introduced. On the other hand, most patrons have had long experience with the use of the transfer which is almost universally restricted as to the hours at which it is valid. If they can get accustomed to the limitations of a transfer, it is reasonable to expect that they can become accustomed to the limitation of an off-peak rate of fare whether it be by a pass or by any other device.

Combination of Weekly Pass and Reduced Fare in Second Zone

Another modification of the weekly pass is possible, permitting unlimited riding within one area and entitling the holder to a reduced rate of fare outside of that area. The principal application of this kind of fare would be in connection with the extension of existing lines, or the carrying of lines into new territory, where existing lines are already of a length to make it economically unsound to haul passengers the entire distance for one fare. It has been the almost universal experience of local transportation companies that where two full fare zones have been set up between the residence districts and the business districts, patronage has fallen off sharply. Even where the token rate is low, the charge of two full fares for each complete ride has acted as a deterrent. By the device referred to in this paragraph, recognition of the wholesale usage of the central area of the system by the pass holder is the reason for extending to him the use of the extension of the central area at a rate lower than that paid by the casual or non-wholesale user. It is possible that such a method will stimulate the use of the system by residents of the outer area since, in addition to being given a lower rate than the casual user in the area in which they live, they are given also considerable privileges of service in the central area.

Family Evening Pass With Graduated Scales

In addition to the other effects which the private automobile has had on the patronage of transit lines, it must further be recognized that the auto has come into strong competition with the public conveyance as a family vehicle. Where four or five people have to be carried from one origin to a common destination, the public vehicle cannot compete with the small private automobile even in the matter of cost, to say nothing of convenience, comfort and speed. If a man wishes to take his wife and three children out with him in the evening, use of the transit line involves two full fares and possibly three, in addition to at least another half fare or children's rate. Twice this amount represents the cost of the journey from his home and return to it.

A sharply graduated scale has been suggested to take care of family units of this kind after the evening peak has been passed. This method has some justification on the basis of cost to the industry, because the passengers would offer themselves at a time when the services were not used to capacity. It would further justify itself inasmuch as it would frequently bring business which otherwise would be lost.

It is believed that a family rate of this kind could be instituted on certain properties, with no loss in revenue, and with the possibility that business would be increased. This represents the application of the wholesale rate in a way slightly different from any that has been considered before. Previously we have considered the wholesale use of the service by an individual, but here we are considering the wholesale use of the service by the family at any one time. Of course, the transferable feature of the weekly pass itself makes a family matter out of it, but under that system only one person at a time can take advantage of the wholesale rate.

Weekly Passes With Children Carried Free

There are a number of families who are unable to travel in the evening, on Sundays or holidays without their children. This fact has been recognized by permitting the owner of an unlimited weekly pass to take two or even three children free with him on those occasions. Frequently this involves an additional fare paid by a companion rider, usually the mother of the family. This system has been tried successfully in Milwaukee where the management has provided free rides for many children without, it believes, any loss in revenue. The company in Milwaukee goes further and emphasizes its belief that in accustoming the children to ride the public conveyances a habit is being inculcated which is likely to remain with the children when they grow up.

Children are also carried free by a few companies when accompanying the holders of Sunday, holiday or week-end passes. At the outset it may seem a little far fetched to consider that the transportation of children without charge when they are of fare-paying age has any part in the scientific fare structure. But it has never been seriously suggested that this method be followed when the service is sorely taxed and when costs are high. It can have no place in peak rate service nor would there be likely to be any serious demand for it. Families as such do not travel at these times, partly because of the inconvenience of doing so, but more because one member of the family is then probably at work or going to work and the other member of the family is taking care of the duties which lie within the home.

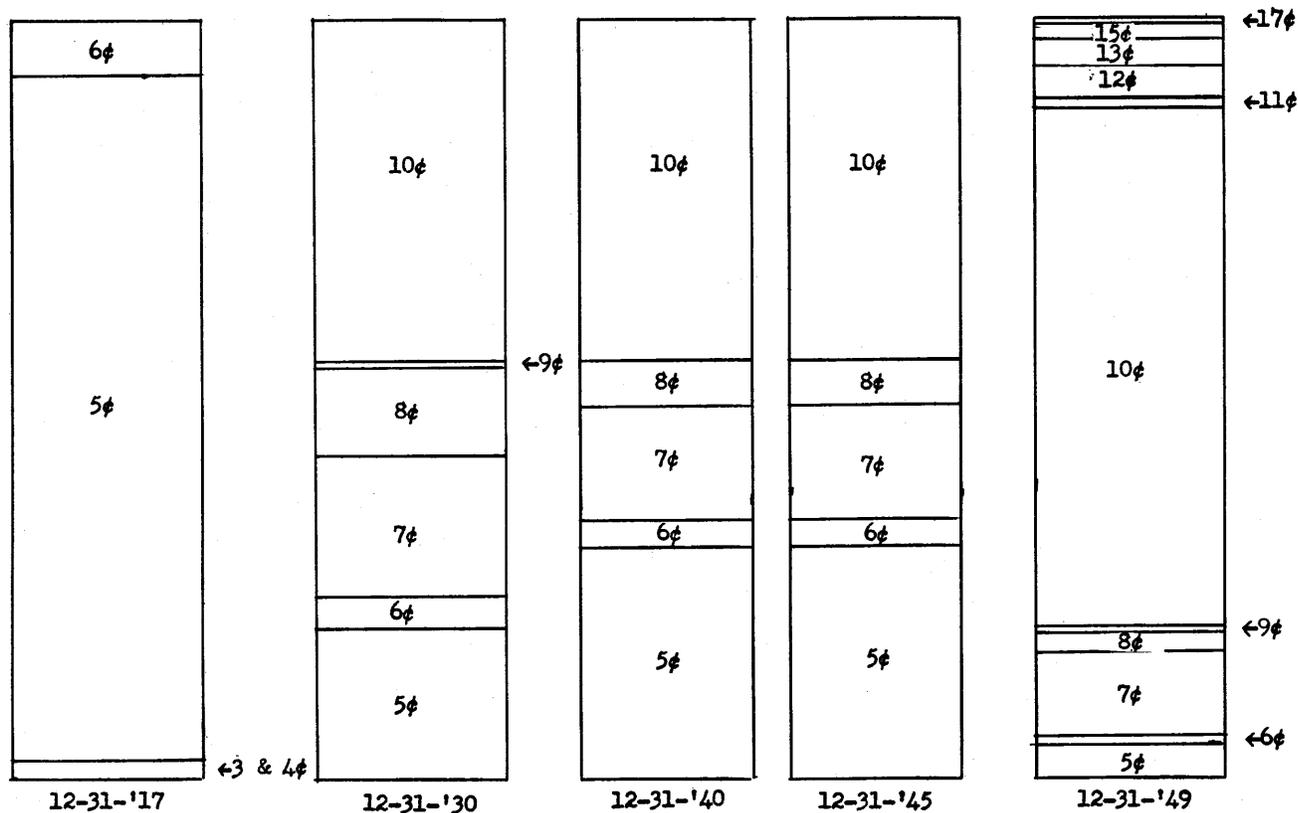
The foregoing does not by any means exhaust the possibilities of fare combinations in connection with the unlimited weekly pass. They do represent, however, the more important of them, at least some of which have been tried.

PERCENTAGE DISTRIBUTION OF CASH FARES IN EFFECT IN 412 CITIES IN THE UNITED STATES HAVING A POPULATION OF 25,000 OR MORE*

Cash Fare	12/13/17	Cumulative Percentage	12/31/30	Cumulative Percentage	12/31/40	Cumulative Percentage	12/31/45	Cumulative Percentage	12/31/49	Cumulative Percentage
17	0		0		0		0		0.24	100.00
16	0		0		0		0		0	99.76
15	0		0		0		0		1.70	99.76
14	0		0		0		0		0	98.06
13	0		0		0		0		4.13	98.06
12	0		0		0		0		4.13	93.93
11	0		0		0		0		1.21	89.80
10	0		43.61	100.00	44.06	100.00	43.77	100.00	69.18	88.59
9	0		0.31	56.39	0	55.94	0	56.23	0.24	19.41
8	0		11.53	56.08	5.94	55.94	6.11	56.23	2.91	19.17
7	0		18.69	44.55	14.85	50.00	13.20	50.12	10.92	16.26
6	5.61	100.00	4.05	25.86	3.47	35.15	3.91	36.92	0.97	5.34
5	93.46	94.39	21.81	21.81	31.68	31.68	33.01	33.01	4.37	4.37
4	0.62	0.93	0		0		0		0	
3	0.31	0.31	0		0		0		0	
Total	100.00		100.00		100.00		100.00		100.00	

*Source: American Transit Association, 1951.

DISTRIBUTION OF CASH FARES IN EFFECT IN 412 CITIES IN THE UNITED STATES HAVING A POPULATION OF 25,000 OR MORE¹



The Permit Card

Another method of providing for a wholesale rate and at the same time recognizing the readiness-to-serve charge is to be found in the permit card. Under this system the holder of a permit card is entitled to a reduction in the price of every ride taken during the life of the card. These cards, in the past, were usually issued for a week and sold for 25 cents to forty cents. The cash price of each ride then taken after the purchase of the permit card was usually five cents. Originally some efforts were made to restrict the use of the card to the original purchaser but this was subsequently abandoned in view of the difficulty and perhaps even the impossibility of identifying purchasers. When such identification proved impracticable the transferability of the card was then featured and it had all the applicability to a family as the weekly pass.

Such a system of fares is obviously more scientific than is the unlimited weekly pass. After the company receives payment for the "readiness-to-serve" it then receives a fixed amount of money for every ride taken, but the price of each ride with the readiness-to-serve charge included decreases as more rides are taken. For instance, the rider who paid 25 cents for the permit card and then rode 12 times at five cents a ride would have paid 85 cents for his total week's riding, or an average of a little more than seven cents a ride. If he took 15 rides the total cost would be \$1.00 or a little less than seven cents a ride. If he took 22 rides per week, which is about the average number of rides taken by users of the weekly unlimited pass, the total cost would be \$1.35 or an average of a little over six cents per ride. In other words, on the one hand, the more he rides the cheaper his rides become and no ride is obtained free of charge. On the other hand, the more he rides the more he contributes to the company, which is not the case with the unlimited weekly pass. The permit presents an interesting combination of the two principles of the readiness-to-serve charge and the wholesale rate.

¹Source: American Transit Association, 1951.

Quite a number of transit properties have tried the permit system in past years, and it has been found that the average number of weekly rides taken even in the days when factories and offices were operating on a six-day week schedule seldom exceeded 16. And since letter carriers, delivery boys, collection agents, and others took a great many more rides than this per week the average number of rides of regular shop and office workers under this system could not have been much in excess of 14, or about two more than their necessity rides. This contrasts with the 22 net rides so general on systems where the weekly unlimited pass is in operation.

Weekly Punch Card

In its simplest form the punch card consists of a piece of cardboard with various numbers of rides indicated on it, one of which is punched each time the card is used. The weekly punch card may or may not be transferable and the number of rides may vary. This ticket is sold at a price which is less than that which would be paid for the same number of rides at the regular rate of fare on the system.

In this form of ticket may be incorporated a readiness-to-serve charge and a wholesale rate. It is usually good for all hours of the day, although its use would be restricted to off-peak hours if so desired. Although the unit period of validity in local transportation use had usually been a week, the steam railroads have used a similar device good for a month and for even longer periods.

In the early nineteen thirties modification of it was used for some time by a mid-western property. In this case the card permitted the bearer to take 12 rides for the price of ninety cents (though this was soon increased to one dollar) but when all the rides had been used the possession of the card entitled the holder to the reduced rate of five cents per ride for every subsequent ride taken.

The theory underlying this was that the regular user paid eight and one-third cents for each ride that might be regarded as a necessity ride and his wholesale use was recognized by the five cent provision for every ride taken thereafter. In the case of this experiment purchasers of the punch card were given the privilege of offering them for redemption if the number of rides taken in any one week multiplied by the cash rate per ride for the system was less than the amount paid for the card.

In its application to its Public Service Commission to allow the discontinuance of this form of fare one company considered that the abuses of the ticket were sufficiently serious to present a list of them to the Commission. They were as follows:

The weekly commutation ticket is subject to serious abuses that result in equally serious losses in passenger revenue. Chief among these abuses are such incidents as the following, each of which has been observed:

- a. The use of tickets on which the time limit has expired.
- b. Faulty punching of tickets, involving the punching of a single ticket square on two or more separate occasions.
- c. Failure of passenger to deposit five cents in fare box at the time ticket is in temporary possession of conductor; the punching operation renders checking less thorough.
- d. Counterfeiting.
- e. The use of a single ticket by two passengers - not permitted but exceedingly difficult to prevent.
- f. The use of tickets as five cent permits prior to the time when twelve ticket rides have been consumed, and the later presentation of unused rides for redemption and refund.

Leaving aside altogether the matter of abuses of this form of ticket, experience of this company does not show that it stimulated riding or improved revenues. But it would be unfair to conclude from this one illustration that the punch card method may not be used to advantage. It is possible that a similar ticket priced for less than 12 rides, say six, eight or ten with an adequate cash fare provision, would produce better results. It can be said of it that it does recognize the regular rider as being entitled to less than the casual rider rate and it does recognize the wholesale rider as differentiated from the regular rider, as being entitled to a gradual reduction in price per ride as more rides are taken.

Cash Fares With Reduced Rates For Tokens or Tickets

Under this heading fall by far the greatest number of fare structures in the United States. The idea for a combination cash and reduced rate ticket or token fare first came into being through the establishment of special fares for workmen. There was a social feeling in various communities that wage earners should be given some concession in the way of reduced transit fares. This marked the first departure from the one fare idea and gave rise to the system of differential fares. The introduction of reduced rates in quantities provided a means whereby a workman would be granted a concession.

Later on, after the departure from the five cent fare, the industry liberalized the reduced rate plan by extending the privileges of the use of reduced rates to all who would use them. For those companies whose cash fares are fixed at the intermediate points between five, ten fifteen and twenty cents, the reduced rate token or ticket proved itself a useful device in reducing the handling of odd pennies and tended to speed up fare collection.

The average fare realized from any combination of cash and token rates is dependent upon the token differential and their availability.

The cash fare, being the rate for a single ride, is freely available to all patrons. Tokens, on the other hand, being sold in various quantity lots carry restrictions as to availability in varying degrees depending upon the investment requirement imposed. The extent of the use of the reduced rate is governed by the amount of money to be saved and the amount of investment required to realize the saving. Like any commodity offered at reduced rates the spread in the differential between the cash and cut-rate price is the prime factor in determining the extent of use of the lower rate. A secondary, but also an important factor, is the amount of advance transportation that must be purchased to obtain the reduced token rate. Most transit patrons are round-trip riders and it therefore is not surprising that those rate structures which offer tokens in quantities of two for a specified ride experience the highest token usage. If such fare structures further provide reasonable savings the cash rate almost ceases to be a factor. Illustrating this point a recent survey of a group of cities with fares of 15 cents cash and 2/25 cents token, had an average of 93 per cent of their riders using reduced rate tokens. The range of the individual companies was from 88 per cent to 97-1/2 per cent. Another group of companies whose cash rate was also 15 cents cash with a 12-1/2 cent token selling for 4/50 cents averaged only 73 per cent token usage. These figures, of course, are only indicative. The results that any company might expect to realize with any combination of cash and reduced rates can be approximated in advance of their actual introduction only by careful evaluation of the riding habits, characteristics and economics of their own community. The average fare which one company derives from a particular fare structure could vary considerably on another property if the basic factors are not substantially the same.

CLASSIFICATION OF UNITED STATES CITIES ACCORDING TO TRANSIT FARES IN EFFECT - JUNE 1, 1951
 Figures in Brackets Following City Name Indicate 1950 Preliminary Population in Thousands

<u>15¢ Cash</u>	<u>2/25¢ (12.5¢)</u>	<u>15¢ Per Zone</u>
<u>No Reduced Rate</u>	Butte, Mont. (33)	i) Lincoln Park, Mich. (29)
Baltimore, Md. (940)	e) East Chicago, Ill. (54)	
Berwyn, Ill. (51)	Evansville, Ind. (110)	<u>15¢. 4/50¢ (12.5¢) Per Zone</u>
a) Boston, Mass. (791)	Fitchburg, Mass. (43)	j) Alexandria, Va. (62)
a) Cambridge, Mass. (121)	Grand Rapids, Mich. (176)	
a) Chelsea Mass. (39)	Hammond, Ind. (87)	<u>13¢ Cash</u>
b) Chicago, Ill. (3,606)	Indianapolis, Ind. (425)	<u>24/\$3.00 (12.5¢)</u>
Cicero, Ill. (67)	Miami, Fla. (247)	Palo Alto, Cal. (25)
Cincinnati, O. (501)	Oklahoma City, Okla. (242)	
a) Everett, Mass. (46)	Rapid City, S.D. (25)	<u>4/50¢ (12.5¢)</u>
Fort Lauderdale, Fla. (36)	f) Worcester, Mass. (202)	a) Duluth, Minn. (104)
Holyoke Mass. (54)	<u>2/25¢ (12.5¢) 9/\$1.00 (11.1¢)</u>	Superior, Wis. (35)
Houston, Tex. (594)	<u>64/\$6.40 (10.0¢)</u>	
a) Malden, Mass. (60)	Pocatello, Idaho (26)	<u>2/25¢ (12.5¢)</u>
Maywood, Ill. (27)	<u>2/25¢ (12.5¢) 20/\$2.00 (10.0¢)</u>	Bellingham, Wash. (34)
a) Medford, Mass. (66)	Aliquippa, Pa. (26)	Burlington, Vt. (33)
a) Newton, Mass. (81)	Roswell, N.M. (26)	Everett, Wash. (34)
Norwood, O. (35)	San Mateo, Cal. (42)	Johnstown, Pa. (63)
Oak Park, Ill. (63)		Omaha, Neb. (247)
Reno, Nev. (32)	<u>4/45¢ (11.25¢)</u>	Tacoma, Wash. (143)
a) Somerville, Mass. (102)	g) Atlanta, Ga. (327)	Vancouver, Wash. (41)
<u>7/\$1.00 (14.29¢)</u>		
Seattle, Wash. (462)	<u>7/\$1.00 (14.29¢), \$2.00</u>	<u>10/\$1.20 (12.0¢)</u>
	<u>Weekly Pass</u>	Fayetteville, N.C. (35)
<u>7/\$1.00 (14.29¢) & 3/43¢</u>	Des Moines, Ia. (177)	
<u>(14.33¢)</u>		<u>9/\$1.00 (11.11¢)</u>
c) Dearborn, Mich. (95)		Boise, Idaho (34)
Detroit, Mich. (1,839)	<u>3/40¢ (13.33¢), \$2.00</u>	
Hamtramck, Mich. (43)	<u>Weekly Pass</u>	
Highland Park, Mich. (46)	Washington, D. C. (798)	
Royal Oak, Mich. (47)		
<u>4/55¢ (13.75¢)</u>	<u>7/90¢ (12.86¢), \$1.60</u>	
Minneapolis, Minn. (517)	<u>Weekly Pass</u>	
d) Pittsburgh, Pa. (674)	Milwaukee, Wis. (633)	<u>5/50¢ (10.0¢)</u>
St. Paul, Minn. (309)	Wauwatosa, Wis. (33)	Elyria, O. (30)
d) Wilkesburg, Pa. (31)	West Allis, Wis. (43)	
<u>3/40¢ (13.33¢)</u>		<u>4/50¢ (12.5¢), \$2.00</u>
Philadelphia, Pa. (2,065)	<u>\$1.00 Weekly Permit</u>	<u>Weekly Pass</u>
<u>4/50¢ (12.5¢)</u>	h) St. Louis, Mo. (853)	k) Cleveland, O. (906)
Gary, Ind. (132)	University City, Mo. (40)	Cleveland Hgts, O. (59)
Muskegon, Mich. (48)		East Cleveland, O. (40)
Schenectady, N.Y. (92)	<u>90¢ Weekly Permit</u>	Lakewood, O. (68)
	Kansas City, Kan. (130)	Parma, O. (29)
	Kansas City, Mo. (453)	

a) On rapid transit lines, surface line, ride with transfer and combination rapid transit-surface line ride. Fare is ten cents for single surface line ride. b) Also ten cents shuttle service in central business district during peak hours Monday-Friday on surface division of Chicago Transit Authority. On rapid transit division fare is 17 cents, and on Chicago Motor Coach Co. 13 cents. c) On Detroit Dept. of St. Rys. only. On Intertown Suburban Lines Corp. fare is 15 cents. d) On street cars and feeder busses. On through busses fare is twenty cents, 10/\$1.75. e) On lines of Chicago & Calumet Dist. Transit Co. on Gary Rys. Inc. fare is twelve cents, 3/35¢. f) Five cents additional for ride across central district. g) Includes 3% State Sales Tax. h) Also five cents downtown loop on lines of St. Louis Pub. Serv. Co. On United Service Car Co. fares are ten cents and 15 cents. i) For single zone, 5¢ additional for each additional zone. j) For single zone, two zones 15¢ cash, 5¢ additional for each additional zone. k) Also 6¢ downtown bus loop.

CLASSIFICATION OF UNITED STATES CITIES ACCORDING TO TRANSIT FARES IN EFFECT - JUNE 1, 1951 (Cont'd)

<u>15¢ Cash (Cont'd)</u>	<u>3/35¢ (11.67¢), \$1.70</u> <u>Weekly Pass</u> Youngstown, O. (168)	Flint, Mich. (163) Fort Dodge, Ia. (25) Fort Smith, Ark. (48) Fort Wayne, Ind. (133) Gadsden, Ala. (56) Galesburg, Ill. (31) Gloucester, Mass. (25) Great Falls, Mont. (39) Hamilton, O. (58) Harrisburg, Pa. (89) Hartford, Conn. (177) Jackson, Mich. (51) Jackson, Tenn. (30) Johnson City, Tenn. (28) Joplin, Mo. (39) Kannapolis, N.C. (28) Kokomo, Ind. (39) Lafayette, Ind. (36) Lima, O. (50) Lorain, O. (51) Louisville, Ky. (367)
2/25¢ (12.5¢), \$2.00 <u>Weekly Pass</u> Portland, Ore. (371)	<u>10¢ Cash</u>	
<u>13¢, 2/25¢ (12.5¢) Per Zone</u>	<u>No Reduced Rate</u>	
1) Alameda, Cal. (63) 1) Berkeley, Cal. (113) 1) Oakland, Cal. (381) 1) Richmond, Cal. (99) 1) San Leandro, Cal. (27)	Abilene, Tex. (47) Albany, N.Y. (134) Albuquerque, N.M. (97) Allentown, Pa. (106) Alliance, O. (26) Alton, Ill. (32) Altoona, Pa. (77) Amarillo, Tex. (74) p) Amsterdam, N.Y. (32) Anderson, Ind. (47) Ann Arbor, Mich. (47) Anniston, Ala. (31) Asheville, N.C. (52) Ashland, Ky. (31) Atlantic City, N.J. (62)	q) Macon, Ga. (70) Manchester, N.H. (83) Mansfield, O. (43) Marion, Ind. (30) s) McKeesport, Pa. (51) t) Melrose, Mass. (27) Meriden, Conn. (44) Miami Beach, Fla. (46) Michigan City, Ind. (28) Middletown, Conn. (30) Mishawaka, Ind. (33) Moline, Ill. (37) Muskegee, Okla. (37) Newark, O. (34) Newburgh, N.Y. (32) u) New Britain, Conn. (74) New Haven, Conn. (163) New Kensington, Pa. (25) New London, Conn. (30) v) New York, N.Y. (7,835) Northampton, Mass. (29) Norwalk, Conn. (49) Ogden, Utah (57) Ottumwa, Ia. (34) Parkersburg, W. Va. (30) Peoria, Ill. (112) Phoenix, Ariz. (105) Pomona, Cal. (35) Portland, Me. (78) Portsmouth, O. (37) Poughkeepsie, N.Y. (41) Reading, Pa. (109) Redondo Beach, Cal. (25)
13¢, 2/25¢ (12.5¢), \$2.25 <u>Weekly Pass - Per Zone</u> m) San Diego, Cal. (321)	r) Bridgeport, Conn. (159) Burbank, Cal. (78) Cedar Rapids, Ia. (72) Chattanooga, Tenn. (130) Chester, Pa. (66) Cheyenne, Wyo. (32) Colo. Springs, Colo. (45) Compton, Cal. (48) Corpus Christi, Tex. (108) Council Bluffs, Ia. (45) Cumberland, Md. (38) Davenport, Ia. (74) Dayton, O. (243) Denver, Colo. (413) East Bakersfield, Cal. (38) Easton, Pa. (34) Elkhart, Ind. (36) Erie, Pa. (130) Eugene, Ore. (36) Ferndale, Mich. (30)	
<u>12¢ Cash</u>		
<u>No Reduced Rate</u> Buffalo, N.Y. (577) Independence, Mo. (37) n) Orlando, Fla. (52)		
<u>3/35¢ (11.67¢)</u> Akron, O. (273) Norfolk, Va. (189)		
<u>4/45¢ (11.25¢)</u> Niagara Falls, N.Y. (91) Owensboro, Ky. (34) Scranton, Pa. (125)		
<u>6/65¢ (10.83¢)</u> Dallas, Tex. (433) o) Fort Worth, Tex. (277)		
<u>5/50¢ (10.0¢)</u> Chicopee, Mass. (49) Springfield, Mass. (163) West Palm Beach, Fla. (43)		
8/95¢ (11.88¢), \$1.00 <u>Weekly Permit</u> Rochester, N.Y. (331)		

l) For single zone, 10¢ per zone for multi-zone ride. m) Good for two zones, 5¢ additional for each additional zone. n) Also \$1.00 weekly work pass good for two rides on each day stipulated on pass. o) 5¢ additional beyond 6-mile radius of city center. p) On lines of Fonda, Johnstown & Gloversville R. R. Co. only. On Vollmer Motor Bus Lines fare is 12¢, 4/45¢. q) Includes 3% State Sales Tax. r) On lines of Conn. Ry. & Ltg. Co. Fares on independent operations are: Bridgeport Auto Transit and Gray Bus Lines - 10¢, 3/25¢; Trumbull Coach - 10¢, 3/25¢ per zone, 2 zone rate - 10¢, 3 zone rate - 15¢; Chestnut Hill Bus and Huntington Road - Stratford Bus - 10¢. s) On Penn Transit Co. lines only. On lines of Pittsburgh Rys. Co. fare is 15¢, 4/55¢, \$1.75 and \$2.10 weekly pass and 10¢ on certain lines. t) Also 3/25¢ short-haul fare. u) On lines of Connecticut Railway & Lighting Co. and Corbin Avenue Bus Service, Inc. On East Street Bus Line, Inc. and New Britain Transportation Co. - 10¢, 3/25¢; Mastco, Inc. and Oak Street Bus Line - 7¢; Wagner Service, Inc. - 6¢. v) On NYC Transit System and privately-owned companies except Fifth Avenue Coach Co.-12¢. Combination rapid transit-surface line ride - 15¢.

CLASSIFICATION OF UNITED STATES CITIES ACCORDING TO TRANSIT FARES IN EFFECT - JUNE 1, 1951 (Cont'd)

<u>10¢ Cash (Cont'd)</u>	<u>11/\$1.00 (9.09¢)</u>	Canton, O. (116)
<u>No Reduced Rate (Cont'd)</u>	Massillon, O. (30)	Charleston, W. Va. (74)
w) Revere, Mass. (37)	Warren, O. (50)	Charlotte, N. C. (133)
Richmond, Ind. (40)	Wichita Falls, Tex. (68)	Clarksburg, W. Va. (32)
x) Riverside, Cal. (47)	<u>5/45¢ (9.0¢)</u>	Clinton, Ia. (30)
Rock Island, Ill. (49)	Auburn, N.Y. (37)	Columbia, Mo. (32)
St. Petersburg, Fla. (96)	Charlottesville, Va. (26)	Dubuque, Ia. (50)
Salem, Ore. (43)	B) Columbus, Ga. (80)	Durham., N.C. (70)
y) San Francisco, Cal. (761)	Muncie, Ind. (58)	Evanston, Ill. (73)
Sandusky, O. (29)	Petersburg, Va. (35)	Fairmont, W. Va. (29)
Santa Ana, Cal. (46)	Saginaw, Mich. (92)	Fargo, N. D. (38)
Santa Barbara, Cal. (45)	Syracuse, N.Y. (220)	Gainesville, Fla. (27)
Shaker Heights, O. (28)	<u>8/70¢ (8.75¢)</u>	Galveston, Tex. (66)
Sioux City, Ia. (84)	Portsmouth, Va. (71)	Greensboro, N. C. (74)
Sioux Falls, S. D. (52)	<u>4/35¢ (8.75¢)</u>	Hazleton, Pa. (35)
South Bend, Ind. (116)	Lincoln, Neb. (97)	High Point, N.C. (40)
Spokane, Wash. (160)	Shreveport, La. (125)	Huntington, W. Va. (86)
Springfield, O. (78)	C) Wilkes-Barre, Pa. (77)	Jamestown, N. Y. (43)
Stamford, Conn. (74)	Wilmington, N.C. (45)	Kankakee, Ill. (26)
Terre Haute, Ind. (64)	<u>20/\$1.70 (8.5¢)</u>	Knoxville, Tenn. (124)
Toledo, O. (301)	Granite City, Ill. (29)	Lake Charles, La. (41)
Topeka, Kan. (78)	<u>10/85¢ (8.5¢)</u>	Lancaster, Pa. (64)
Torrington, Conn. (28)	Ithaca, N.Y. (29)	Lebanon, Pa. (28)
z) Troy, N.Y. (72)	<u>12/\$1.00 (8.33¢)</u>	Lewiston, Me. (41)
Tulsa, Okla. (181)	Daytona Beach, Fla. (29)	Lexington, Ky. (51)
Utica, N.Y. (101)	Enid, Okla. (36)	Lubbock, Tex. (71)
Vicksburg, Miss. (27)	Green Bay, Wis. (52)	Newport, R. I. (32)
Waltham, Mass. (47)	<u>6/50¢ (8.33¢)</u>	Paducah, Ky. (32)
A) Waterbury, Conn. (104)	Barberton, O. (28)	Pontiac, Mich. (73)
Waterloo, Ia. (64)	Cuyahoga, O. (29)	Pueblo, Colo. (64)
Waukegan, Ill. (39)	Hagerstown, Md. (36)	Rocky Mount, N. C. (28)
Wichita, Kan. (166)	Raleigh, N.C. (65)	St. Cloud, Minn. (28)
Wilmington, Del. (110)	Sheboygan, Wis. (42)	San Angelo, Tex. (52)
Wyandotte, Mich. (37)	<u>3/25¢ (8.33¢)</u>	Spartanburg, S. C. (37)
York, Pa. (60)	Bloomington, Ind. (28)	Springfield, Mo. (66)
Zanesville, O. (40)	Bristol, Conn. (36)	Texarkana, Tex.-Ark. (40)
<u>10/95¢ (9.5¢)</u>	Brownsville, Tex. (36)	Tyler, Tex. (39)
Memphis, Tenn. (394)	Burlington, Ia. (31)	Waco, Tex. (84)
<u>4/38¢ (9.5¢)</u>	<u>3/25¢ (8.33¢), 12-ride ticket \$1.00 (8.33¢)</u>	Watertown, N.Y. (34)
Mason City, Ia. (28)	E) Lockport, N.Y. (25)	D) Wheeling, W. Va. (59)
<u>8/75¢ (9.38¢)</u>	<u>3/25¢ (8.33¢), 13-ride ticket \$1.00 (7.69¢)</u>	Winston-Salem, N.C. (87)
St. Joseph, Mo. (76)	Provo, Utah (29)	
<u>6/55¢ (9.38¢)</u>	<u>3/25¢ (8.33¢), 10/75¢ (7.5¢)</u>	
Little Rock, Ark. (101)	F) Athens, Ga. (28)	
North Little Rock, Ark. (42)		

w) On Rapid Transit, Inc. lines only. On Metropolitan Transit Authority of Boston fare is 15¢ on rapid transit lines and 10¢ on surface lines. x) 5¢ additional beyond city limits on Riverside Transit Lines. On Pacific Elect. Rwy. Co. fare is 10¢. y) On Municipal Rwy. lines. On California Street Cable Railroad Fare is 15¢, 2/25¢, 9-ride ticket \$1.00. z) On United Traction Co. lines only. On Troy Fifth Avenue Bus Co. fare is 7¢, 4/25¢. A) On lines of Conn. Ry. & Ltg. Co. and Cooke Street Line, Inc. On North East Transportation Co. fare is 10¢, 3/25¢. B) Includes 3% State Sales Tax. C) On Wilkes-Barre Transit Corp. lines only. On White Transit Co., Inc. fare is 5¢. D) On Co-operative Transit Co. lines only. On Wheeling Pub. Serv. Co. fares are: 1 zone 8¢, 4/30¢; 2 zones 12¢, 5/50¢; 3 zones 15¢, 4/50¢. E) Also 10-ride family ticket \$1.00. F) Includes 3% State Sales Tax.

CLASSIFICATION OF UNITED STATES CITIES ACCORDING TO TRANSIT FARES IN EFFECT - JUNE 1, 1951 (Cont'd)

<u>10¢ Cash (Cont'd)</u>	<u>7/50¢ (7.14¢)</u>	3/25¢ (8.33¢), \$1.25
3/25¢ (8.33¢), 15/\$1.00	Fond du Lac, Wis. (30)	<u>Weekly Pass</u>
<u>(6.67¢)</u>	Jackson, Miss. (98)	Rockford, Ill. (93)
Grand Forks, N.D. (27)	Madison, Wis. (96)	Springfield, Ill. (81)
	Meridian, Miss. (42)	Washington, Pa. (26)
	Oshkosh, Wis. (41)	
	Rome, N.Y. (41)	3/25¢ (8.33¢), \$1.25
<u>10/80¢ (8.0¢)</u>		<u>Weekly Pass</u>
Lafayette, La. (33)	<u>5/35¢ (7.0¢)</u>	Appleton, Wis. (34)
	Fresno, Cal. (91)	
<u>5/40¢ (8.0¢)</u>		4/30¢ (7.5¢), \$1.25
Elmira, N.Y. (50)	<u>3/20¢ (6.67¢)</u>	<u>Weekly Pass</u>
Sacramento, Cal. (136)	Aurora, Ill. (51)	H) Williamsport, Pa. (45)
Yakima, Wash. (38)	Bloomington, Ill. (34)	
	Champaign, Ill. (39)	
	Danville, Ill. (38)	4/30¢ (7.5¢), \$1.20
	Decatur, Ill. (68)	<u>Weekly Pass</u>
	Elgin, Ill. (44)	Kenosha, Wis. (54)
	Joliet, Ill. (52)	
<u>9/70¢ (7.78¢)</u>	Montgomery, Ala. (105)	
F) Rome, Ga. (30)	Quincy, Ill. (41)	<u>\$1.75 Weekly Pass</u>
		Jacksonville, Fla. (203)
<u>4/31¢ (7.75¢)</u>		
F) Savannah, Ga. (120)	<u>4/25¢ (6.25¢)</u>	<u>\$1.50 Weekly Pass</u>
	Iowa City Ia. (27)	Austin, Tex. (132)
	Pine Bluff, Ark. (37)	I) Beverly, Mass. (29)
	Wausau, Wis. (30)	I) Brockton, Mass. (63)
<u>6/45¢ (7.5¢)</u>		I) Fall River, Mass. (112)
Kingston, N.Y. (29)		I) Lawrence, Mass. (80)
	6/55¢ (9.17¢), \$1.75	Lynchburg, Va. (48)
	<u>Weekly Pass</u>	I) Lynn, Mass. (100)
	Richmond, Va. (230)	I) Lowell, Mass. (97)
<u>4/30¢ (7.5¢)</u>		I) Quincy, Mass. (83)
Danville, Va. (35)		Roanoke, Va. (91)
Hot Springs, Ark. (29)	4/35¢ (8.75¢), \$1.40	I) Salem, Mass. (42)
Monroe, La. (38)	<u>Weekly Pass</u>	J) Taunton, Mass. (40)
Stockton, Cal. (72)	Salt Lake City, Utah (182)	
<u>2/15¢ (7.5¢)</u>		
Columbia, S.C. (86)		
Covington, Ky. (64)	6/51¢ (8.5¢), \$1.50	<u>\$1.25 Weekly Pass</u>
East St. Louis, Ill. (82)	<u>Weekly Pass</u>	Bangor, Me. (32)
El Paso, Tex. (130)	Steubenville, O. (36)	Cranston, R.I. (55)
Hattiesburg, Miss. (29)		Pawtucket, R.I. (81)
Kalamazoo, Mich. (29)		Providence R.I. (248)
Lackawanna, N.Y. (28)	6/50¢ (8.33¢), \$1.50	Warwick, R.I. (43)
Lansing, Mich. (92)	<u>Weekly Pass</u>	Woonsocket, R.I. (50)
Newport, Ky. (31)	Racine, Wis. (71)	
Salina, Kan. (26)		
	6/50¢ (8.33¢), \$1.25	
	<u>Weekly Pass</u>	
<u>14/\$1.00 (7.14¢)</u>	Beloit, Wis. (30)	
Panama City, Fla. (26)	New Castle, Pa. (49)	
G) Trenton, N.J. (128)	Sharon, Pa. (26)	

G) 14-ride weekly ticket. H) Limited to 20 rides. I) Also 3/25¢ short-haul fare; weekly pass limited to 24 rides. J) Also 3/25¢ short-haul fare; weekly pass limited to 24 rides on Eastern Mass. Street Railway Co. only. On East Taunton Bus Lines fare is 10¢, 13/\$1.00.

CLASSIFICATION OF UNITED STATES CITIES ACCORDING TO TRANSIT FARES IN EFFECT - JUNE 1, 1951 (Cont'd)

<u>10¢ Cash (Cont'd)</u>	<u>10¢, 3/25¢ (8.33¢) Per Zone</u>	<u>4/25¢ (6.25¢)</u>
	Q)Moline, Ala. (127)	Greenville, S.C. (58)
	W)Nashville, Tenn. (173)	Manitowoc, Wis. (27)
<u>60¢ Weekly Permit</u>	Pittsfield, Mass. (53)	San Jose, Cal. (95)
Eau Claire, Wis. (36)	San Antonio, Tex. (407)	
LaCrosse, Wis. (47)		
	<u>10¢, 2/15¢ (7.5¢) Per Zone</u>	<u>7¢ Per Zone</u>
	Newport News, Va. (42)	Bayonne, N.J. (77)
<u>10¢ Per Zone</u>		Z)Belleville, Ill. (33)
K)Alhambra, Cal. (51)		Belleville, N.J. (32)
L)Billings, Mont. (32)	10¢, 3/25¢ (8.33¢), \$1.25	Bloomfield, N.J. (49)
M)Haverhill, Mass. (47)	<u>Weekly Pass - Per Zone</u>	Camden, N.J. (125)
N)Huntington Park, Cal. (29)	X)New Bedford, Mass. (109)	Clifton, N.J. (65)
N)Inglewood, Cal. (46)		East Orange, N.J. (78)
N)Long Beach, Cal. (244)		Elizabeth, N.J. (113)
N)Los Angeles, Cal. (1,958)		Garfield, N.J. (28)
O)Mount Vernon, N.Y. (72)	<u>8¢ Cash</u>	Hackensack, N.J. (29)
P)New Rochelle, N.Y. (60)		Hoboken, N.J. (51)
Norristown, Pa. (38)	<u>No Reduced Rate</u>	Irvington, N.J. (59)
Oak Ridge, Tenn. (30)	Y)Hempstead, N.Y. (29)	Jersey City, N.J. (300)
Pensacola, Fla. (43)	Laredo, Tex. (52)	Kearny, N.J. (40)
N)Port Arthur, Tex. (57)	Valley Stream, N.Y. (27)	Linden, N.J. (30)
Port Huron, Mich. (36)		Montclair, N.J. (44)
N)South Gate, Cal. (51)		Newark, N.J. (438)
Q)Tampa, Fla. (124)	<u>7/50¢ (7.14¢)</u>	New Brunswick, N.J. (39)
N)Tucson, Ariz. (45)	Columbus, O. (375)	Nutley, N. J. (27)
R)Tuscaloosa, Ala. (46)		Orange, N. J. (38)
S)White Plains, N.Y. (44)		Passaic, N.J. (58)
T)Yonkers, N.Y. (153)		Paterson, N. J. (139)
	<u>4/25¢ (6.25¢)</u>	Perth Amboy, N.J. (41)
	Charleston, S. C. (68)	Plainfield, N.J. (42)
		Union City, N.J. (55)
		West New York, N.J. (38)
		West Orange, N.J. (29)
<u>10¢, 4/35¢ (8.75¢) Per Zone</u>	<u>7¢ Cash</u>	
N)Glendale, Cal. (95)		
U)Santa Monica, Cal. (71)	<u>No Reduced Rate</u>	
	Concord, N.H. (28)	
	Marion, O. (34)	
	New Albany, Ind. (29)	
	New Orleans, La. (567)	
<u>10¢, 6/50¢ (8.33¢) Per Zone</u>		
V)San Bernardino, Cal. (63)		

K)For single zone; 2 zones 15¢ on lines of Foster Transportation, Inc. only. On Pacific Elec. Ry. Co. fare is 10¢. L)For single zone; 2 zones 12¢; 3 zones 18¢. M)For single zone; 5¢ additional for each additional zone on Mass. Northeastern Transpn. Co. lines only. On Eastern Mass. Str. Ry. Co. fare is 10¢, \$1.50 weekly pass limited to 24 rides. N)For single zone; 5¢ additional for each additional zone. O)For single zone; 5¢ additional for each additional zone on Westchester Street Transpn. Co. lines only. On Westchester Surface Ways, Inc. fare is 10¢, 11/\$1.00. P)For single zone; 5¢ additional for each additional zone on Westchester Street Transpn. Co. and Westchester Elec. R.R. Co. lines only. Fare on County Transpn. Co., Inc. is 7¢ and on Yonkers Bus, Inc. 10¢. Q)For single zone; 2 zones 15¢. R)For single zone; 5¢ additional beyond 3½-mile radius of downtown district. S)For single zone; 5¢ additional for each additional zone on Westchester Street Transpn. Co. lines only. Fare on Brennan Bus, Scarsdale Bus Co., Port Chester & White Plains Bus Line, Club Transpn. Co., White Plains Bus Co., Inc. and operations of Wm. Gauthier - 10¢. T)For single zone 5¢ additional for each additional zone on Yonkers R.R. Co. lines only. Fare on Yonkers Bus, Inc. and Club Transpn. Co. is 10¢ and on Bernacchia, Bros. 10¢, 3/25. U)On Santa Monica Municipal Bus Lines only. Fare on Pacific Elec. Ry. Co. is 10¢ and on Bay Cities Transit Co. 10¢, 4/35¢ for single zone; 5¢ additional for each additional zone. V)In inner zones; 2 zones 12¢, 10/\$1.00; 3 zones 15¢ on San Bernardino Valley Transit Co. lines only. On Pacific Elec. Ry. Co. fare is single-zone rides. Y)On lines of Hempstead Bus Corp., Semke Bus Line, Inc. and Bee Line, Inc. Fare on Jerusalem Avenue Bus Lines, Inc. 7¢ and on Levittown Bus Corp. 5¢. Z)For single zone; 2 zones 10¢; 3 zones 15¢.

CLASSIFICATION OF UNITED STATES CITIES ACCORDING TO TRANSIT FARES IN EFFECT - JUNE 1, 1951 (Cont'd)

7¢.5/35¢ (7.0¢) Per Zone
aa)Pasadena, Cal. (104)

6¢ Cash

No Reduced Rate
Nashua, N.H. (35)

5¢ Cash

No Reduced Rate
Alexandria, La. (35)
Biloxi, Miss. (37)
Hutchinson, Kan. (34)
Rochester, Minn. (30)

5¢ Per Zone
Tallahassee, Fla. (27)

Fare Data Not Reported

Albany, Ga. (31)
Euclid, O. (41)
Greenville, Miss. (30)
Lakeland, Fla. (31)
Lawton, Okla. (35)
Lynwood, Cal. (26)
Middletown, O. (34)
Morgantown, W. Va. (26)
Norman, Okla. (27)
Odessa, Tex. (29)
Redwood, Cal. (25)
Santa Fe, N.M. (28)

aa)For single zone; 5¢ additional for each additional zone.

“DISTANCE” FARES

The foregoing represent the principal methods that have been used in an effort to give consideration to the factors of regularity and wholesale use in setting the amount of fare to be paid by various riders. In the next group we are to consider distance as a factor in fares.

Short Zones

This system is in vogue in the British Isles and on the continent of Europe generally. It consists in the establishment of short distances which are called zones or stages for each of which a very low rate of fare is charged, frequently corresponding to the smallest piece of metal currency in use in the particular place. Tickets are purchasable for any number of zones and the practice is almost universal of charging less per zone for a long journey than for a short one. To make this possible conductors are equipped with a series of tickets which are sometimes collected from the passenger as he alights from the vehicle and sometimes are retained by him and kept while he is on the vehicle, subject to the inspection of transportation officials. Such a system makes a second person or a conductor on the vehicle practically necessary at any time and absolutely necessary in the handling of peak crowds.

Its underlying principle is to charge a passenger according to the service rendered, measured by the distance traveled, and to apply the wholesale principle, not according to the number of times he uses the service within a given period, or the number of tokens or tickets that he purchases at one time, but according to the number of stages or zones that he uses on any one occasion. With short stages a low unit price can be charged with a consequent great encouragement of short rides.

From the social angle as well as the industrial, this system encourages the formation of sub-centers and the building up of independent shopping centers. It has, however, a tendency to restrict the outward or centrifugal movement for homes which has characterized American cities.

While some care is usually taken to make these stages reasonably uniform, other considerations than that of distance frequently determine where zones shall begin and end. There is seldom to be found any slavish adherence to distance and little attempt is seen to make the unit distance less than about half a mile.

In the strictest sense, therefore, the fares under this system are not arranged as a charge for the miles traveled. A patron who enters the car one stop before the zone limit is reached and leaves it one stop after the zone limit is passed will pay the same fare as does a person traveling completely through the two zones. But it seems to be as close an approximation to distance accuracy as can be expected in a business dealing with masses of people. Metering devices are imaginable - refinements of some which we already possess - which could carry the idea of charging by distance to a greater degree of refinement and therefore of scientific accuracy. But with almost industry-wise use of one-man vehicles in this country great difficulty in the application of the European system would result.

It can be said of this system that it does encourage short haul patronage on any given line, and a much smaller proportion of the passengers who use the vehicle during its journey from terminus to terminus will be long haul passengers than under the flat fare system.

The Two Zone System

The closest approach to the continental system of zones or stages yet described, for city-wide fares, is to be found in what may be called the two zone system. There are many illustrations on our intercity lines of the application of the English system but none in fairly large cities.

Under this system the city is divided into a downtown or business area and an outer or primarily residential. area. The fare within either zone may be ten cents but the fare across

two zones is 15 cents. The zone points are arrived at on a distance basis, (although this is not strictly adhered to) and the length of line comprising each zone is considerably greater than under the continental system.

The difficulties inherent in the proper determination of the zone points will be apparent. Pressure, political and otherwise, is often brought to bear to have them changed in the interest of a small group of people. In an eastern city there are several lines which originally started out as two zone lines but where the first zone limit was pressed outward to such an extent that it left the rest of the line so short as not to warrant the charging of a zone fare upon it, and so it, too, was ultimately included in the first zone. This gave rise to great inequalities between the zones themselves and acted as an incentive for further attacks in the interest of the extension of existing zones.

It may be argued, however, that these considerations are not necessarily inherent in the system and should not be charged up to it as weakness. Economically this is true, but practically it is not true, for as we have already seen many other factors than those which are purely economic enter into the establishment of a fare structure. Not the least of these considerations are political, although some of the important ones are predominantly social.

Downtown Zones (Only) Within the System

A modification of the two zone system is to be seen in downtown zones. Comparatively short rides at a reduced rate are possible from the business or market center for a distance generally approximating a mile but the cost of a ride on the remaining part of any one line is the full system fare. That is, a journey on the outer end of a line may cost twice as much as a similar journey on the inner end of the line. The reason for the establishment of zones of this kind was to regain some of the short haul riders who had been discouraged by the higher fare system, and the privilege of the lower rate of fare was not offered to those points where an investigation showed that the increase in patronage would not offset the loss incurred by a reduction in fares.

Sub-Center Zones

Another type of zone system is that which is known as the sub-center zone. It gives recognition to the existence within large systems of subordinate but very definite business or industrial centers whose transportation needs do not correspond exactly with those of the larger city. Many of these local sub-centers have established retail stores, sometimes a department store, churches, schools and places of amusement. While they are usually represented politically on the board or council that governs the larger community, they frequently have their own individual welfare committees that watch the specific interest of the community.

The influence of these centers is seldom felt at a distance more than about half a mile from the center of their activities but within this radius their influence is quite appreciable.

The male members of these communities will usually be found to have their business interests in the business center of the larger area, but their children receive their schooling in the so-called sub-center and find much of their amusement and recreation there. The female members of the family frequently find these sub-centers attractive shopping centers, at least for those articles which they purchase from day to day. They are also inclined to patronize them for their amusements, partly because of the ease in reaching them and also because the moving picture theaters, for instance, in these localities are usually lower priced than in the downtown areas of large cities.

All of these facts tend toward the formation of a real local "community" and encouragement is given to it, if it also enjoys a community fare as contrasted with the system-wide fare. With this in mind a reduced fare is introduced on that part of the system's service which lies in a circle whose circumference is drawn by taking a radius of half to three-quarters of a mile from the community center. The rate of fare for a ride within this zone,

is usually priced low and since the prevailing journey is to and from the center, transfers are seldom necessary except in those cases where lines passing through the circle do not themselves reach the center, but intersect others which do reach the center.

Where the lines are self-contained within this circle very few difficulties of fare collection are likely to arise, but they do arise in connection with those lines of services which continue inward toward the business center of the larger area or outward in the other direction.

Other Fares

The Flat Fare System

About one out of every four United States cities with populations in excess of 25,000 have as their fare structures one single rate of fare which applies to any journey taken under any circumstances. Exceptions are frequently made to this rule for school children and for children of a certain age or a certain height.

In the recent upward swing of fares a number of companies with fare structures consisting of a cash fare and a reduced token rate tended to obtain higher fares by the elimination of the token rate. This trend was particularly true in those cities having a ten cent cash fare. At the present time ten cents is the most common fare among flat fare cities. The next largest group of cities with flat fares are those small cities in which fares have remained at five cents. A few cities have flat cash fares at the intermediate points between five and ten cents. Eleven, twelve and fifteen cent flat fares are found among some of the cities.

High flat fares for the use of the whole or any part of the service offered by a company can usually be justified only on the grounds of financial necessity. It may be a means of persuading a number of people to walk; people who would be content to pay a smaller sum for short rides. If additional revenue obtained by these higher fares is necessary to keep the system in operation, meet its fixed obligations, pay the taxes assessed against it and maintain the property in operating condition, then it is obvious that the convenience of a few is being sacrificed to the needs of the many, if not to the community as a whole. Under other circumstances it does not appear that a single high rate of fare, as the only kind of fare, is a desirable condition since it does not take into consideration the possibility of applying those merchandising principles which have been proved sound in other businesses.

The Transfer

This device is in almost universal use on American mass transportation systems. Its intent is to provide a method by which the rider may use two or more vehicles for a continuous journey in the same general direction. There is usually a time set within which the transfer has to be used, after which it becomes invalid. As a rule, also, definite transfer points are indicated on it and it is not usable at other than those points.

In a great majority of cases these transfers are issued free of charge and sometimes transfers are issued in exchange for transfers, or the same transfer will be used for a journey on several different vehicles. Since they possess a definite value, entitling the one to whom they were issued to a ride on the local transportation vehicle, there has been considerable abuse of them and in certain places they have been collected and sold, or received by certain shop keepers and issued to their customers as an additional inducement to make their purchases there. Some companies have been driven to extreme efforts to prevent abuses of this kind.

It was partly because of this abuse that the practice of charging for transfers was inaugurated. It was believed that if the passenger actually paid money for the transfer privilege he would certainly not ask for the transfer unless he could use it, except, of course, in those rather rare cases in which he had a definite customer for it at a higher price. It was also reasonable to believe that the practice of using corner stores as clearing houses for these transfers would be abolished.

But on some systems the charge for a transfer was made with the definite object of increasing revenue or of raising the fare to a certain group of users. While it is possible to justify the charge for a transfer in order to prevent wholesale abuse there is less justification for a charge for the transfer in the interest of revenue. The idea is frequently held that the transfer is purely a privilege granted to the passenger, whereas as a matter of fact in many cases it is a device instituted in the interest of the company. To change from one vehicle to another in order to complete a journey, with its consequent delay and discomfort, especially in inclement weather, renders the journey of the one who is forced to use the transfer much less desirable than for another who can make a through journey. Whether passengers have to use transfers or whether they will be carried directly to their destination, is in a large sense an operating matter and managements endeavor to decrease rather than increase the percentage of transfers used.

It is fully recognized that in mass transportation there is no possibility of carrying all of our passengers directly to the place to which they wish to go. In this sense transit service is at distinct disadvantage compared with taxicabs. Furthermore, some cities are laid out in such way that many journeys have to be completed on a vehicle which follows a route at right angles to the original vehicle boarded. It therefore does not follow that a company with a high transfer ratio is operating, in this regard, in a way less satisfactory than is a company with a low transfer ratio. Before any comparison can be made due consideration must be given to the physical layout of the property, whether it be of the grid type or shaped like a fan; whether it possesses diagonal streets or boulevards or simply thoroughfares at right angles to one another; the location of the residential districts with relation to the business and industrial districts; the location of shopping centers or sub-centers, etc.

While it will not always be possible to reduce the transfer ratio and give more direct service to the patrons by the establishment of through routes, every management realizes that the changing centers of population and changing residential, industrial and business districts will from time to time call for rerouting which will provide more passengers with a direct instead of an indirect journey.

Many attempts have been made to simplify the transfer, both in the interest of the passengers and in the interest of the company. One large city transit company has, for many years, used a transfer which indicates pictorially and therefore more clearly to the passengers the routes available to the rider, and eliminates the vast amount of misuse of transfers to which the company was being subjected.

The Liberalized Transfer

Another simplification of the transfer was made in the city of Milwaukee, but for another purpose. The old transfer which this system used contained all the customary prohibitions against its use for any other than a journey in the direction originally begun. The time limits were also set so as normally to prevent a passenger from using it for any other purpose than for the continuation of a journey and not for a stopover.

The company liberalized this transfer in a way that is believed to have been original in American transportation systems by eliminating all restrictions upon direction, even to a return journey upon the original line, and also by making the transfer valid for any journey taken within a minimum of an hour and a maximum of an hour and a half from the time the transfer was issued. As a matter of practice the passenger could ride as many times as he pleased before the expiration of the transfer time and thus it will be seen that this type of transfer serves in a practical way as an hourly pass.

It was the belief of the company that some riding would be stimulated among those who would not pay two fares from their home to the place at which they contemplated transacting a small amount of business, such as the purchase of groceries, but would pay one fare. An investigation by the company lead to the conclusion that only about six per cent of the transfers issued are used for return journeys upon the line originally used, and that the remaining use of the transfer was for short journeys mainly within the business area.

Quite obviously this form of transfer makes possible a much greater amount of short riding for the person who has already taken a short ride originally than for one whose original ride was of considerable length, for the validity of the transfer is determined by the time at which the passenger pays his first fare. It seems reasonably just, therefore, that a passenger who has paid a full fare for a short ride should be given greater privileges in the use of the hourly transfer than one who has already benefited by the longer time use of the line.

The introduction of this form of a transfer in the city of Milwaukee was greatly facilitated by the fact that it was already using the unlimited weekly pass as part of its fare structure. As more than fifty per cent of the revenue rides were taken on weekly passes, which in themselves granted the privilege of riding as often as the pass holder desired, the transfer could only be called for by less than fifty per cent of the passengers, and a fair percentage of these would normally be making journeys that were completed on one vehicle and hence would have no need for the transfer.

After the system had been in operation for some time the company, which was at first naturally apprehensive lest revenue losses should be incurred because of it, reached the conclusion that neither revenue losses nor gains were to be attributed to the introduction of this new form of transfer. However, in August of 1939; the company placed restrictions on the use of the transfer privileges. Under the new ruling the stop-over and return trip privileges were abolished on any one line and the transfer was honored only at regular transfer intersections. This did not entirely abolish the stop-over and return trip privileges, as patrons were permitted to go to their destination on one line and return on another.

The Re-ride Check

A novel fare device in the form of a ticket under the above name has been suggested. Books of such tickets would be in the hands of the operators for sale upon the cars, and their use may be made general in the sense of being valid for any time of the day or may be restricted to cover any hours desired.

The ticket consists originally of three parts, two of which are torn off and given to the passenger, while the remaining part, a small stub for recording and accounting purposes, is kept by the operator. One portion of the ticket which the passenger receives is immediately surrendered either by placing it in a box or by handing it back to the operator. The second part of the ticket remains in the possession of the passenger and is in itself payment for a ride, or if retained, gives the passenger the privileges of taking any number of rides during the course of that day at a reduced rate.

It is suggested, as an example, that where the cash fare is ten cents the re-ride check be sold for 15 cents, and each ride taken with the passenger's part of the ticket as a permit, to be paid for at the rate of 5 cents.

The advantages claimed for this form of fare are that it collects the return fare initially; it insures payment for at least two fares; it encourages additional riding even though at a lower rate of fare; it collects revenue for additional rides; and it insures that the holder of the ticket will use the service in both directions of a trip.

This last consideration may seem of small consequence but it may be of more importance than is suggested at first thought. In a survey made in an eastern city it was discovered that there were more riders out of the city than into it by six or seven per cent. This may be due to the fact that quite a number of people thumb rides on their way to work or are picked up by neighbors, whereas, because of the location of their offices or places of business, their chances of getting the same kind of a ride home are less. Perhaps it is due also to the fact that people are not so ready to walk at the end of a day's work as they are at the beginning. Whatever are the causes, there are a number of cities which relate the same experience. From its nature the re-ride check should help, if only very slightly to correct this tendency.

Certain disadvantages in connection with it should be pointed out here, the first of which is that it might necessitate the addition of some kind of a box to the present existing method of

fare collection, if proper precautions are to be taken to prevent the possibility of these tickets being re-issued by the operators of the vehicles or distributed to the advantage of their friends. But this is a fare collection matter which managements could be expected to overcome if the system appealed to them. The second difficulty lies in the possibility of the generation of ill feeling on the part of those customers, who if the re-ride check is limited as to time, find themselves at the end of the day with something that they have purchased and which has lost its validity. The situation might arise, for instance, in the case of a person who had purchased a re-ride check in the morning and had used it as a pass on the way home at night, paying a nickel fare, in the belief that he or she intended to make another journey in the evening but was prevented from doing so. It is not believed that this difficulty would be a serious one or that it would take very long for the car riders of a community to become quite accustomed to the conditions under which it might be used. Obviously, the correction for a difficulty of this kind would be to allow the privilege of redemption for the unused part of the ticket but this would be practically impossible unless records were kept by punch marks or otherwise of the number of separate journeys that had been made using it as a pass.

It appears that Shreveport, Louisiana is the only City that has adopted this type of fare and in their case they have placed a limit on it restricting its use to their inner zone. The installation of this fare in Shreveport was made in 1934. It consisted of a zone rate which allowed a person to make a round trip within about a mile and a half of the downtown section, for ten cents. In 1935 the limits of this zone were extended to about two and a quarter miles.

The company depends almost entirely on protection against abuse of this rate on the theory that persons who use this rate, in a great majority of cases, will use their return ticket to get back to their point of origin. In the opinion of this company, the fare has greatly aided them in retaining their short haul riders and they now have under consideration a proposal to establish a similar type of fare in their outer zone.

Flat Off-Peak Fare

We have previously considered the possibility of using tokens or passes or other devices for patrons who use the services in the off-peak times whether during the day or after the evening peak, but it is conceivable that on any system two definite and distinct rates might be established, one for the peak service and one for the off-peak service. The political, social and psychological difficulties have already been dealt with in sufficient detail; the danger of charges of discrimination if the arrangement is not universal over the system but only applied to certain lines has been referred to, as well as the inherent difficulties of the task of determining the effect of such a fare structure upon revenue. On the basis of studies already made on various properties, warning must be given against the introduction of any such system until after a satisfactory determination has been made of the revenues and costs of off-peak times as well as those in peak hours. Disappointment may result if a change in the rate of fare for off-peak hours is made without adequate preliminary study. A reduction in fares of any kind will almost certainly produce increased riding, but this increase may not be enough to compensate for the loss in revenue, represented by the decrease.

On the other hand, any step which definitely tends to improve off-peak riding is an advance toward the achievement of a better load factor, and that must be considered as one of the fundamental over-all objectives in all fare changes and all adjustments of fare structures. Furthermore, in cases where there is a popular demand for flat fare reductions, off-peak concessions might be found acceptable to the community, and while tending to improve the load factor would do less injury to the company's revenues than a reduction which applied also to peak riders. Indeed, the use of an off-peak rate might well serve to procure a higher and more adequate rate for peak riders.

"Opposite" Direction Fares

In most of our urban transportation systems there is a very definite flow of traffic inward toward the business section during the early hours of the morning, with comparatively light traffic in the opposite direction, and with a corresponding heavy traffic from business places to

homes during the evening peak and with light traffic toward the business center. It is this traffic in the direction opposed to the main trend of riding that we here refer to by the term, admittedly unsatisfactory, of "opposite".

From a cost standpoint a rate lower for the opposite direction than that for the main direction is perhaps justifiable. The vehicles which bring the loads into the downtown area and then return lightly loaded for more passengers can be regarded as having performed their function when they have delivered their load into the city, and the return journey can be regarded as chargeable against the next incoming load. How much of the cost of that outward journey to pick up a load is chargeable against the next incoming load is a matter upon which opinions will differ. For the same length of journey at the same rate of speed the utility of the two rides to the customer will probably not vary. Obviously the "opposite" ride will usually be the more comfortable one because the vehicles are not crowded. But if the object of the outward journey is to pick up a paying load, and seats are vacant and available on the car at that time, it would suggest itself as good merchandising to offer transportation at a lower rate for that journey. We revert back to the general argument frequently stated that since the industry supplies a commodity which is highly perishable in its nature and whose use or value or utility is promptly lost or dissipated, it is better to fill the seats at any price than allow the cars to run empty. Suppliers of other perishable goods, such as fruits and vegetables, do not hesitate in their merchandising practice to maintain the price just as long as they can, and then to bring it down even in the most rapid gradations rather than have a surplus or unsaleable stock left on their hands. There are a number of people who wait for these bargain times, and it is probably true that there are many cases where a higher gross would be obtained by maintaining the price level and sacrificing the surplus rather than by encouraging the idea that there would be a surplus which could be obtained at bargain rates.

The difficulties of applying merchandising principles of this kind in the transportation industry lie much deeper than this. First of all it would be hard to sell the idea to the travelling public that the passenger crowded in a public vehicle with frequent stops to pick up passengers should pay more than does the one traveling in an uncrowded vehicle with infrequent stops simply because of the fact that he is going against the tide of traffic. Then, too, while some lines have a traffic direction and an "opposite" direction well defined, there are other lines on almost every system where this distinction is by no means so clearly made. Some lines, in other words, have a double morning or evening peak made up in one direction of workers going to their offices or places of business, and in the other by servants or domestics going out to the homes where they are employed, or artisans going out to their work on building projects. What proportion of outbound to inbound passengers would justify the establishment of the line as one upon which this fare system could be put into operation would have to be determined.

Desirable as it is to fill up empty seats that exist at these times, it is obvious that there are practical difficulties in installing such a system.

Express Bus Fares

Some recognition has been given by local transportation companies to the existence of a market for express bus service offered at premium rates. The Cleveland Transit System has been making use of such a plan on half a dozen lines and intends to add still further to the number of their express lines. The management of the Cleveland Transit System has described their experience with this type of operation as follows:

"In substance, what we are doing in Cleveland is to divide our longer lines into two lines. The inner portion of the former line - that is, the portion closer to the downtown area - provides local service. The express whizzes through this local area, stopping only at transfer intersections, and any passenger riding within this area pays the express premium fare. Beyond the outer terminal of the local line, the express makes local stops, and a passenger riding only in the local zone of the express line pays a local fare.

“By permitting a free transfer between the two services at the outer terminal of the local line, passengers living in the local zone at the outer end of the express route still can ride to the central business area without paying the premium fare. This transfer arrangement is an important consideration in that persons to whom the rate of fare is more important than savings in time can still make the entire trip at a local rate of fare. The premium fare, therefore, is not compulsory. The rider makes the decision. You might conclude that this provision for a long-haul ride at a local fare is not in conformity with the idea of relating fares to length of ride, and logically that is true. Our experience, however, has been that few riders exercise this option so that the introduction of an express fare at a premium rate has in effect increased the fare paid by almost all of the long-haul riders.”

De Luxe Service Fares

Washington, D. C., Pittsburgh, Pennsylvania and a few other cities including communities served by the Public Service Coordinated Transport have experimented with de luxe bus service. Greater attention is given to the seating comfort of the passenger, no standees are permitted as a rule and the vehicles accomplish the journey in very little more time than would be required if the journey were to be made by private automobile.

The success or failure of de luxe service at a high rate of fare will depend upon a great number of factors prominent among which are the rates for comparable journeys by taxicabs; to the existence of downtown parking facilities and the cost of same; the annual or weekly earnings of the residents of the district served and to the nature of the other transportation facilities, if any, which serve the district.

It is not believed that there are many localities that would support the operation of de luxe transportation at a rate of fare sufficiently high to make it economically attractive to transit operators but it appears to us to be the business of management to conduct such a survey of the communities they serve so as to determine whether or not these places exist, what traffic is to be expected, and what rate of fare should be applied.

Students' Fares

The practice of allowing school children to travel at specially reduced rates on local transportation systems is very common, though not universal. While on many transit systems the rough and ready method of charging half the regular adult rate for students is followed, there have been a number of occasions when lower rates than those have been instituted by order of the regulatory bodies.

School fares are quite frequently restricted to certain hours of the day and days of the week. The regulations as to hours at which students' tickets are valid are by no means uniform. In some cases they are limited to those hours and days during which pupils and students will normally be traveling to and from their schools.

Obvious difficulties arise in connection with the proper determination of the hours for the validity of these special rates, and there is a disposition on some properties to omit restrictions of any kind. The wisest course, however, seems to be to apply such regulation as will, as far as possible, prevent the use of the special privileges during the peak hours. It is recognized that very little can be done in this direction as far as the morning peak is concerned, but much more can be done to restrict their use during the evening peak hours.

School fares can be justified on the basis of sentiment and tradition but not by the application of any law of economics. The cost of carrying a child of school age is not materially different from that of carrying an adult. Except where they occupy special and separate vehicles, they

take up the same amount of space or occupy the same number of seats as would adults. The operating costs involved in stopping and starting for them are the same as for adults. A very considerable portion of them use the morning peak services often involving an additional cost for extra vehicles. On the assumption that the fare charged on a particular property is a just one, then the same fare should be charged to students. Reduced fares for students amount to nothing more than a subsidy by the operating company to the education of the growing youth of the community. No similar contribution is asked from any of the other public utilities except in very rare cases. Where students' rates are desirable, some method should be developed whereby the burden of their cost would be borne by the community and not by the operating company.

Children's Fares

It is a common practice to allow special rates for children. When they are below the age of five years they are usually carried free, between the age of five and twelve at half rate, and above twelve years of age they pay full fares, except where the above mentioned students' rates apply. Sometimes height and not age is the determining factor. Several companies use a measuring device on which 33,34,35 or 36 inches are shown as the standards for free transportation or half fares. Frequently these special concessions do not entitle the child to a seat except "when seated on a passenger's lap".

There is much more economic justification for these fares than for those considered under the heading of students' rates. These children as a rule travel with an adult, they are definitely of the juvenile age, their privileges are frequently restricted, and they do represent the "family" use of the transportation system. The reduction in fare for the child provides an incentive to the use of the public transportation system by the housewife who frequently has no one to remain at home to take care of children of these ages. Furthermore, the great majority of them travel in off-peak hours at times when the services are not otherwise crowded. Special consideration for them in a fare structure is justified.

Combined Transportation and Entertainment Fares

Many transit companies have themselves been in the entertainment business through the ownership of amusement parks and other recreation centers for which they supplied the transportation facilities. In cases where a fee was charged for entering the grounds it was sometimes combined with the fare. Usually, however, the two were kept distinct. The number of amusement places of this order that are now owned and operated by transportation companies is very small and the proportion of their patronage that reaches them by means of public conveyances is each year becoming less. In the majority of cases where amusement parks are owned by the transportation company they are leased to others who operate them.

Whether there be any financial connections or not between amusement places and local transportation systems there exists an opportunity for merchandising in connection with many of the public, amusement or other functions. Some companies have sold a combination ticket permitting a return journey by transit vehicle and admission into football or baseball games, etc. Price concessions are usually made both by the transportation company and the amusement company.

The principle has also been applied to theaters and moving picture houses. In one city the holder of a weekly pass could purchase two tickets for admission at slightly more than the price of one. From the transportation standpoint this encouraged the use of the weekly pass by a regular holder at a time when he had a companion rider to take with him.

Obviously such rates must represent concessions from the ordinary established rate for there is little prospect of their being sold in any numbers on the basis of mere convenience. They must be used with discretion so as not to jeopardize the revenues already received or contemplated from those who would normally be the patrons of these places of amusement or entertainment. They do represent, however, a field for careful merchandising in which the alertness and imagination of the operators of local transportation systems may profitably be exercised.

Workmen's Fares

There are very few examples remaining in the United States of reduced rates for workmen although the system is fairly popular in Europe and is to be found in some of the cities of Canada. Where they exist, workmen's rates are usually granted at a considerable reduction, frequently half of the regular rates, and they are usually confined to the use of the service during definite hours. Such rates are thoroughly uneconomic and are in large measure unso- cial. They are distinctly discriminatory. Where they are used it is frequently found that the rate of wages both on an hourly and weekly basis of those who are classified as workmen and therefore entitled to use this form of fare, is considerably higher than for that enormous mass of people in their own social group, but whose work differs from the others to the extent that they cannot be classified as workmen. In so far as the fares paid by this group are not com- pensatory to the company the deficit must be paid by their fellow users of the transportation system or by the transportation company itself. If there is a social or community necessity for subsidizing the particular group in the community known as workmen, it should be the community itself and not that part of it which rides the vehicles, and certainly not the operat- ing company that should stand the cost of this concession.

"Owl" Fares

A few transit companies have experimented with a night time fare substantially higher than the fare rate applicable to the day time schedule. This special rate is generally applied to hours after midnight or one A. M. and remains in effect until some specified hour in the early morning or until service is suspended for the night.

Years ago this type of a fare was much more prevalent than it is today. With increased rates during the nineteen twenties they were, for the most part, discontinued, except in a few scattered locations. There was some revival of interest in these "owl" rates recently with their introduction in Boston and Montreal.

Because of the generally lighter load factor "owl" service rarely compensates the company for its out-of-pocket cost, if it is not actually operated at a loss. Higher fares can almost al- ways be justified on the basis of extra cost per passenger for performing this service. How- ever, many of the riders in these early morning hours are night shift workers and it is diffi- cult in most communities to obtain approval of higher rates for this class of patrons.

CHAPTER VII

Organization of a Transit Company

THERE are certain basic principles in the organization of any company which will contribute toward the success or failure of the enterprise. Harold V. Coes¹ states these concisely in the following manner:

1. Separation of the functions of the business.
2. Setting these line functions up with their logical subdivisions so that there is no overlapping or conflict and so that no individual receives direct orders from more than one individual - his immediate superior. He may, however, receive aid and advice from staff officers or assistants.
3. Clean-cut distinction between line and staff functions and functional control.
4. Clean-cut specification of each management job in the entire management sequence at the several management levels, to avoid divided responsibility.
5. Suitable and adequate delegation of authority and responsibility for each member on the management sequence varies in accordance with the management level.
6. Selection for each position in the management sequence for each management level of the most suitable and competent individual without fear, favor, or political influence.

With the above objectives in mind it is the purpose of this chapter to give some representative examples to show how these functions are organized in urban transit companies.

Small All-Bus Company

For the small independent company operating only motor busses and serving a population of not over 75,000 Chart I illustrates a simple form of organization structure. In effect a company of this size is primarily operated by one man, the president; frequently on properties of this size the head official is designated as the president and general manager. He may also act as the company's Claim Agent or Purchasing Agent, or may even direct the transportation and maintenance departments. In many cases there is an assistant general manager to whom some of the responsibilities of the president and general manager may be delegated and who has the necessary qualifications to succeed the general manager. Sometimes the assistant general manager is given the title of vice-president. This is particularly desirable in the larger companies in this group.

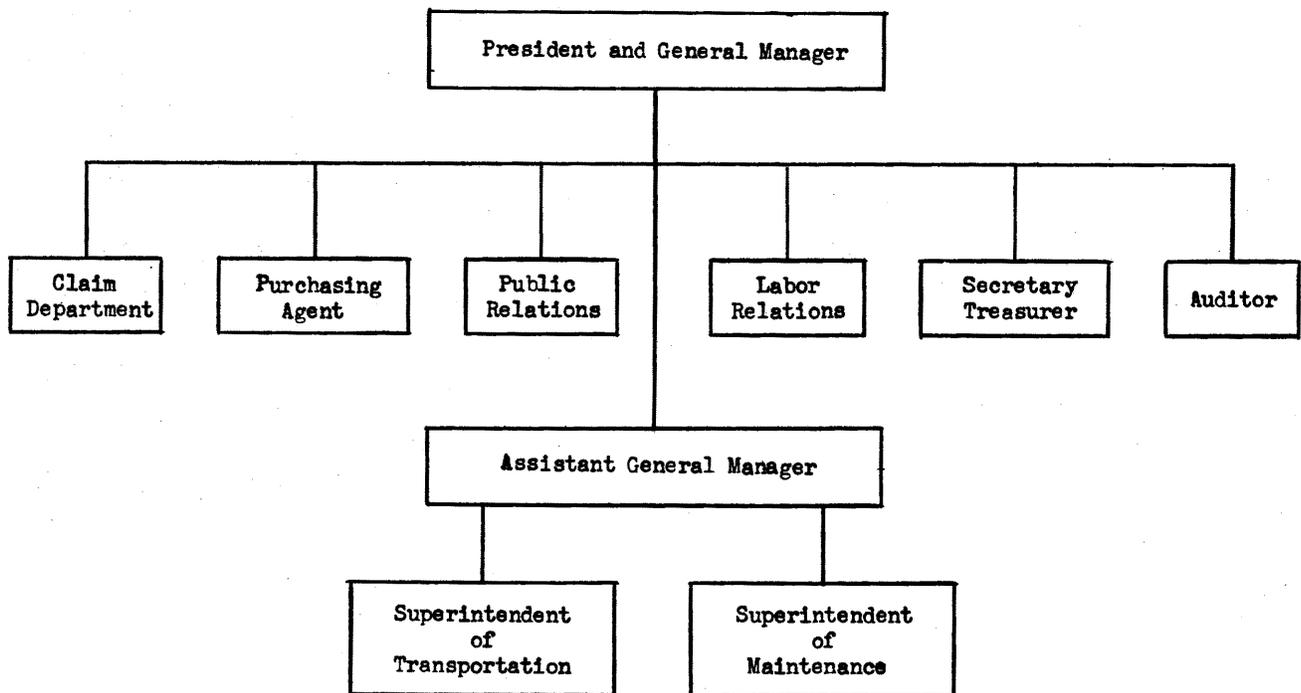
There are, of course, a secretary and a treasurer, although in many instances these duties are combined in one individual under the title of secretary-treasurer. In addition, there is usually an auditor, who is in charge of the company's books of account. Either the auditor or the secretary-treasurer usually has the responsibility of making out tax returns and necessary reports to regulatory commissions.

¹Coes, Harold V., "Mechanical Engineering", vol. 65, as quoted in Alford, L.P. and Bangs, John R., Production Handbook, The Ronald Press Company 1947, p. 8.

The president is responsible for general policy matters, including labor relations, public relations and fare adjustments. In some instances he is a part-owner in the undertaking and may not be a transportation-trained man, in which case the vice-president is frequently general manager as well and is directly responsible for the management of the transportation and maintenance departments.

Although the larger companies in this group of properties, serving up to approximately 150,000 population, find it necessary to have a more extensive organization than the one shown in Chart I, they do not make it as elaborate as that illustrated in Chart II for the next larger size group of companies.

CHART I



Medium Sized All-Rubber-Tired Company

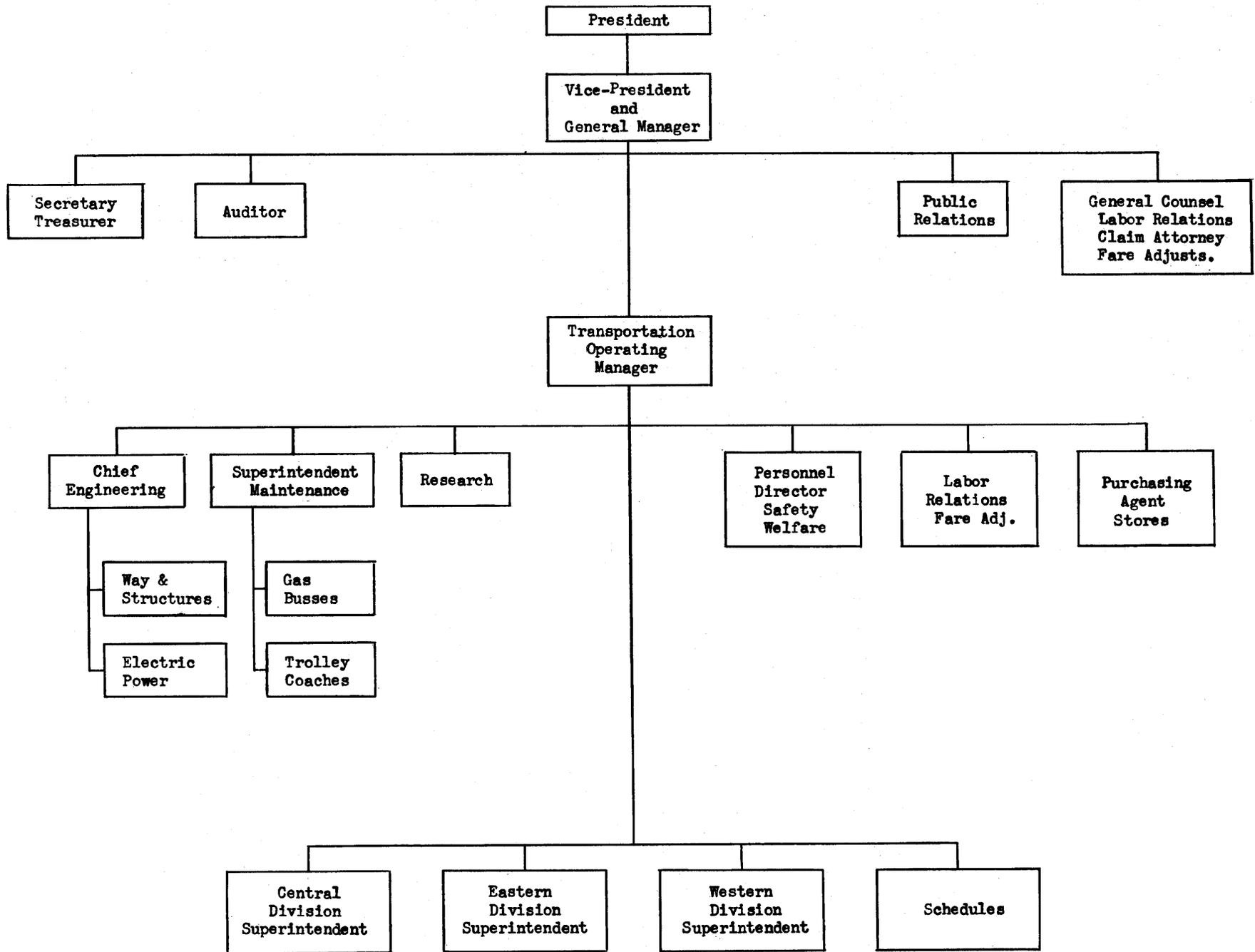
For the medium sized properties Chart II primarily illustrates a property serving a population of about 250,000 but is intended to cover the field between about 150,000 population and about 300,000 population.¹ The president of this size property normally has an organization that can function reasonably well in his absence. In other words, he delegates under his direct supervision much of his responsibilities. This means that the heads of the five departments shown on Chart II are all strong men capable of carrying real responsibility. At least one (and usually more) of these men is a vice president. The secretary-treasurer is responsible for general corporate records, financial and tax matters and insurance. The auditor is responsible for the financial and statistical data including the monthly reports and the data usually presented to regulatory commissions.

The public relations director is often a vice-president as he is a very important aide to the president. It is his job to keep posted on all company activities so that he can give the public a true and clear picture of the reasons for all company policies; he also has charge of all advertising and publicity. The general counsel is responsible for all company legal matters including injury and damage claims, fare adjustments, and labor arbitrations, but on practically every phase of his activities he is guided by the president and cooperates closely with the secretary-treasurer, auditor, general manager and their assistants.

The vice-president and general manager is responsible for the operation of the entire property including transportation, maintenance, engineering and purchasing. In Chart II the main sub-heads reporting directly to the general manager are sufficiently explanatory except for the research and personnel directors. Either of these two comparatively small departments often report to some sub-department head who reports to the general manager. However, best results are usually obtained from these two departments when they report directly to the general manager. The research department often makes the schedules but this function is shown in Chart II as a responsibility of the transportation manager. The research engineer checks transportation, maintenance and engineering so as to make recommendations for improved efficiency of operation. The personnel director often reports to the transportation manager, who has by far the largest number of employees of any department, but the same fundamentals apply to the personnel of all company employees. The superintendent of maintenance also often reports to the transportation manager but in a moderate sized property the general manager handles maintenance directly rather than through the transportation manager.

¹The organization assumes no street car operation but there may be electric trolley coaches as well as gas or diesel busses.

CHART II



Larger Sized Company

There is no single general chart covering "the larger sized company" group and the following discussion of this group is primarily based on a composite city of about 1,000,000 population. Charts will be presented later showing actual organization for five cities in this group.

Although it is not normally customary, some cities in this group have a chairman of the board of directors who technically outranks the president but does not have direct operating responsibilities. The executive committee of the board of directors, acting for the board between the regular meetings, is an essential committee in this group. In Chart II one vice-president was shown; for larger sized companies there are more than one and up to four "are not amiss".

In this group the president delegates more responsibility than in Group II. There is often a comptroller to whom both the secretary-treasurer and auditor can report; he may be on the vice-presidential level as his office is responsible for all financial matters, auditing, taxes, statistics, insurance, regulatory commission reports and corporate records.

A typical chart for larger companies would largely follow the fundamentals of Chart II except that there would be several more assistants with real authority such as an assistant general manager. A number of companies in Group III would operate P. C. C. cars which would entail a separate maintenance department.

Baltimore Transit Company

Chart III is an organization chart for the Baltimore Transit Company. The previous discussion on an organization chart for larger companies assumed a typical organization and does not reflect personalities. Chart III reflects a thorough study by the Baltimore group to adjust functions and personalities to fit their own local picture as they envisioned it. It is a sensible chart for Baltimore but no actual single company chart can be regarded as typical for the larger companies due to the difference in local conditions and personalities. This company underwent a reorganization in 1949-50. Comments of Mr. Phillip C. Askey, General Personnel Manager of the Baltimore Transit Company, follow:

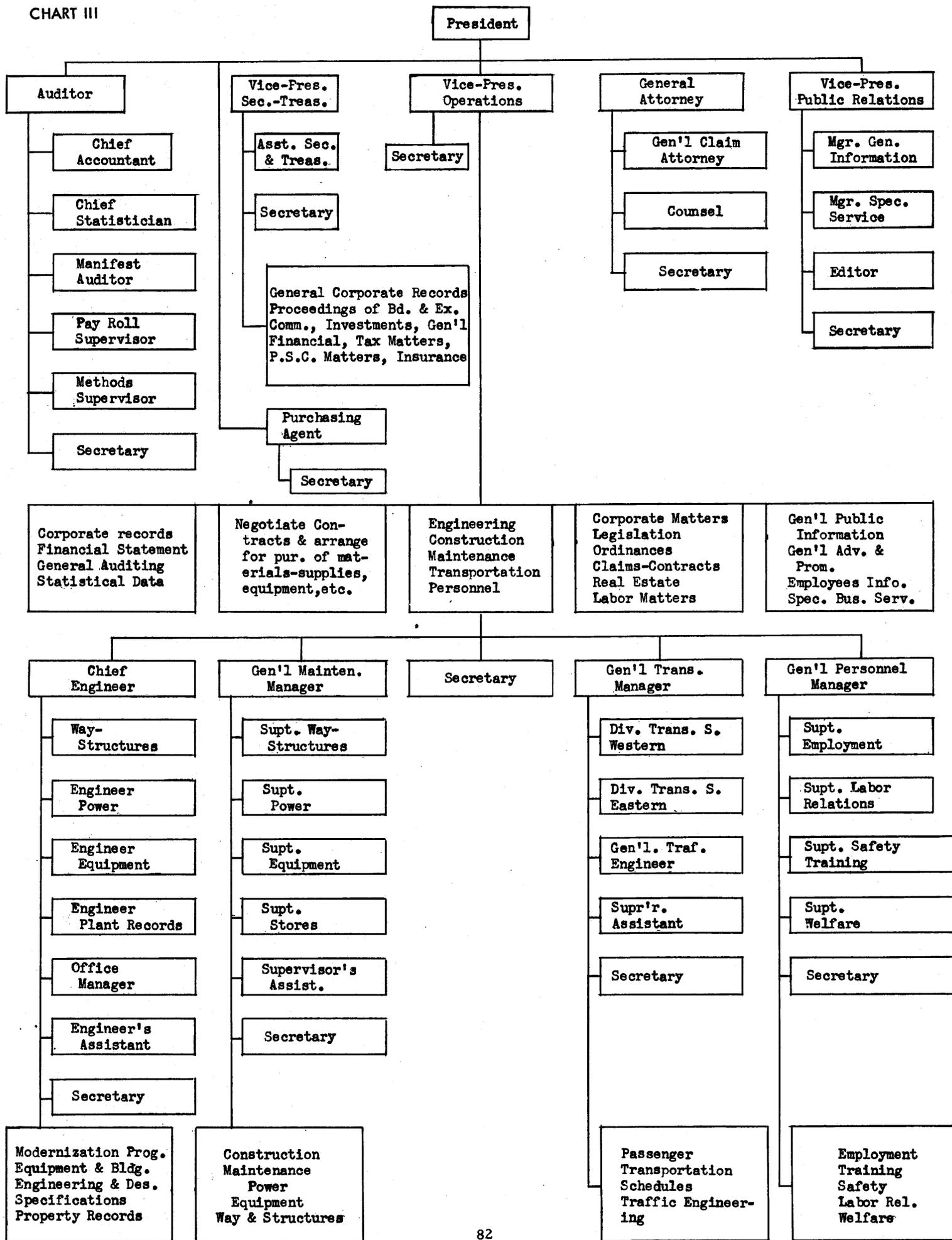
There are no material changes in the organization chart as regards the establishment and functions of the basic Departments. There have been changes, however, in sections of the Operating Department which are rather significant. Stores, which had previously been a function coming under the General Maintenance Manager has been transferred to the Purchasing Department. Also another change under the General Maintenance Manager has been to remove the responsibility for maintenance at the outlying car stations and bus garages, transferring that function to the Transportation Section.

The position of Superintendent of Equipment, reporting to the General Maintenance Manager has been eliminated and the Superintendent of General Rail and Superintendent of General Bus Shops report directly to the General Maintenance Manager.

Another significant change in the Operating Department is involved in the Transportation Section with the elimination of the Eastern and Western Divisions. Each outlying Base Manager reports directly to the General Transportation Manager. Each Base Manager now functions as much as possible as an autonomous unit, being responsible for running maintenance at his location as well as the Transportation operation.

There are few, if any, of the other transit companies that have control of their maintenance on the outlying car stations and bus garages separate from their general maintenance operation. One of the advantages of this type of organization, is to place the responsibility and authority directly in the hands of the Manager of the outlying bases, so that there is no opportunity for them to pass the responsibility of equipment failures on to someone in another Department. This plan has been in effect since June, 1949 and apparently is functioning quite satisfactorily.

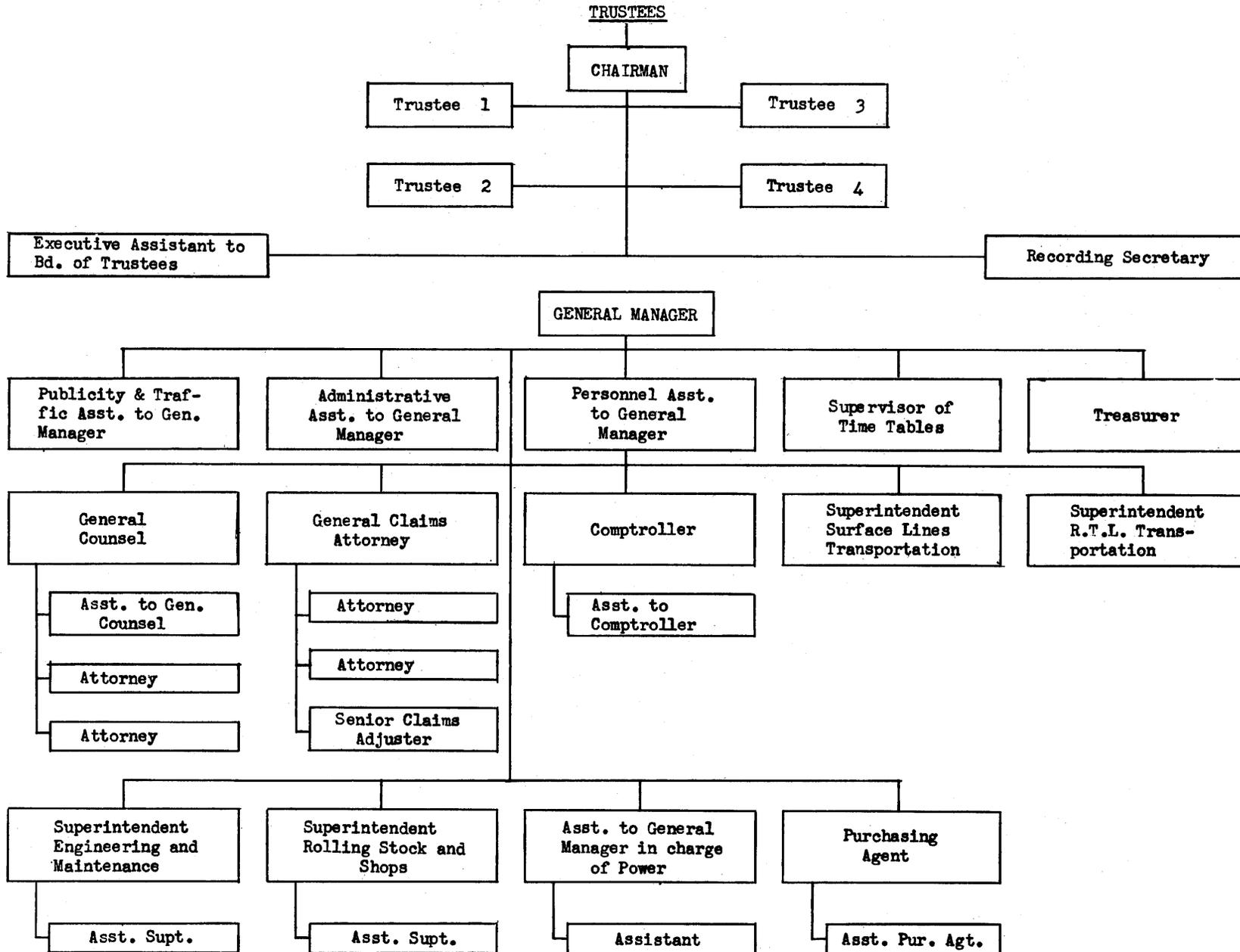
CHART III



Boston Transit Company

Boston also belongs in the large company group but is publicly owned. Its organization is shown in Chart IV. It may be assumed that the full-time chairman of the trustees is comparable to an active chairman of the board of directors and that the general manager combines largely the duties of the president and general manager. A publicly owned property, of course, has no president or vice-president but does have officials who carry the responsibilities of these officers. Chart IV is actually for Boston as of September, 1948, and again illustrates how widely different company charts vary in the same population class. The Baltimore chart shows six different departments reporting to the president and four to the vice-president-operations. The Boston chart shows fourteen departments reporting to the general manager. It should always be kept in mind that no organization chart is complete unless accompanied by a manual which defines procedures and responsibilities. Such a manual often changes the original concept of the chart as it more clearly defines responsibilities and the liaison between different departments. All charts and manuals of all companies are in a state of flux and constant change.

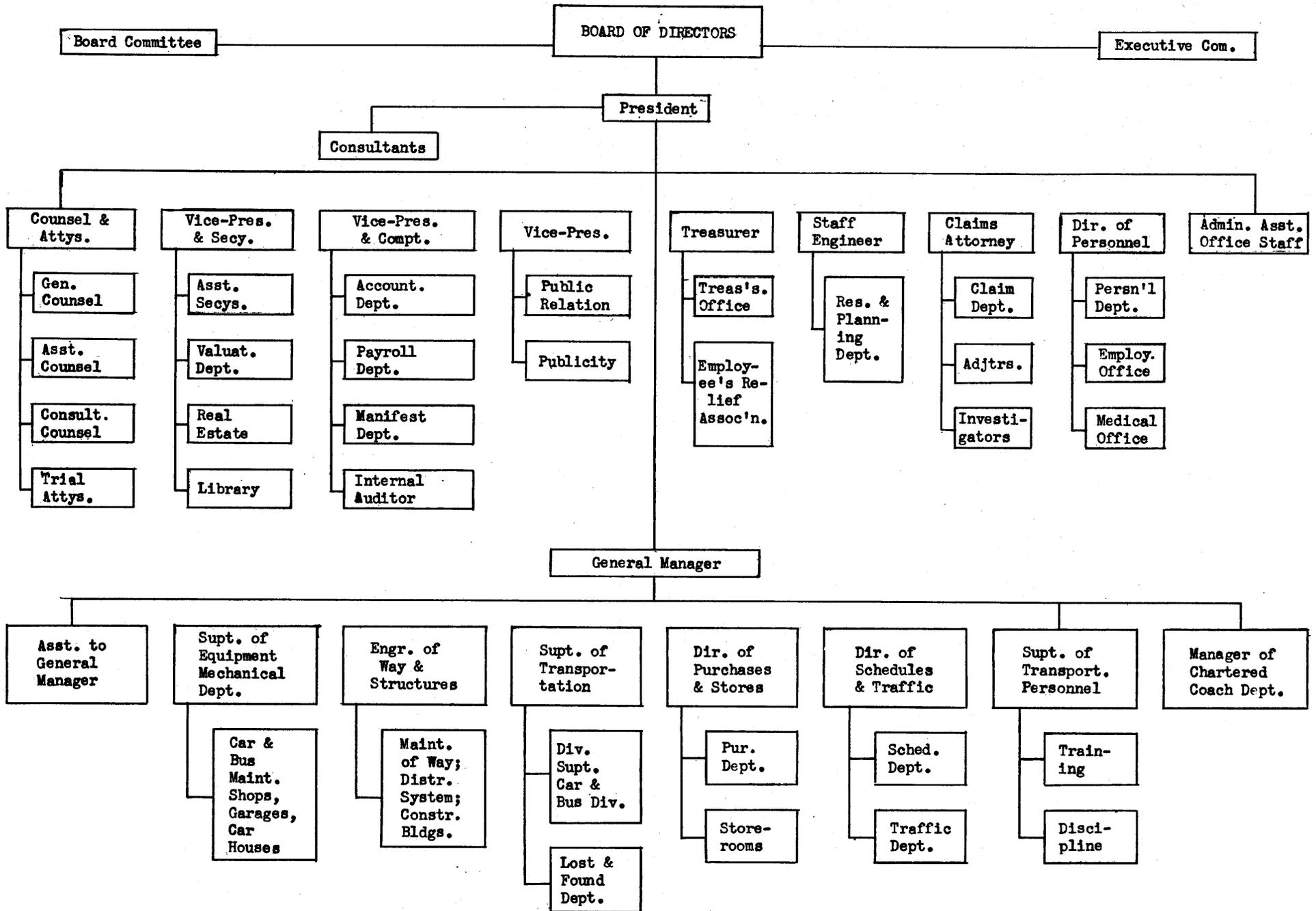
CHART IV



Washington - The Capital Transit Company

Chart V is an actual chart for the Capital Transit Company, Washington, D. C. In this chart there are ten department heads reporting to the President and eight reporting to the General Manager. If it were not for personalities there might well be less than ten separate departments reporting to the president, but the only change would be to consolidate departments, so that there would be less than ten men reporting to the president. There are three vice-presidents, and the chart is reasonably close to what has been called "typical".

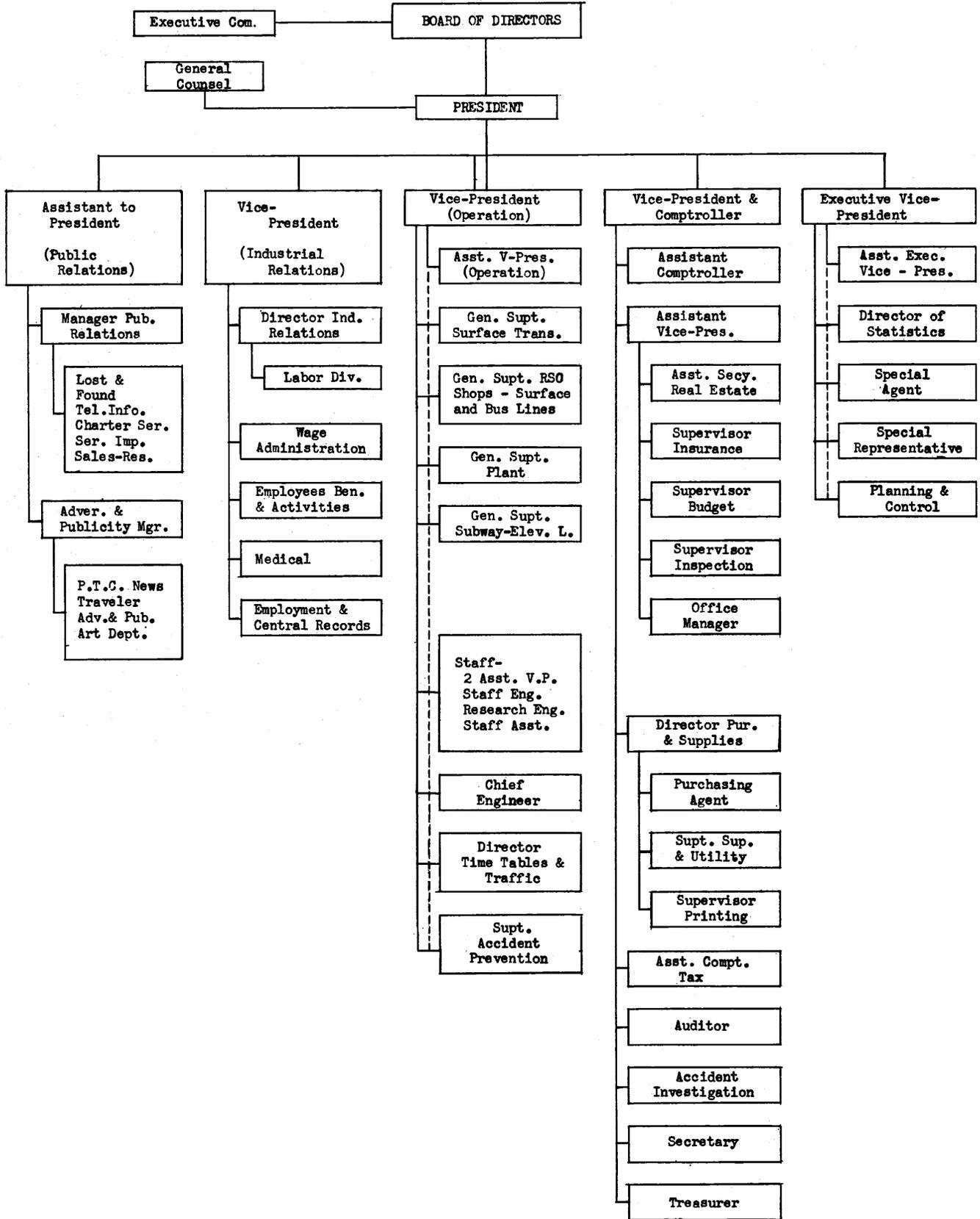
CHART V



Philadelphia Transportation Company

There is no general chart for the large companies of over 1,000,000 population but Chart VI is actual for the Philadelphia Transportation Company as of September, 1948. It will be noted that there is a chairman of the executive committee as well as a chairman of the board of directors. The president has reporting to him four vice-presidents and one assistant to the president, which illustrates the delegation of power necessary in the larger company. The responsibilities of the various vice-presidents do not vary widely (on the chart) from other officials in a small company, but, if this chart were extended to show minor officials, the difference would become more apparent.

CHART VI

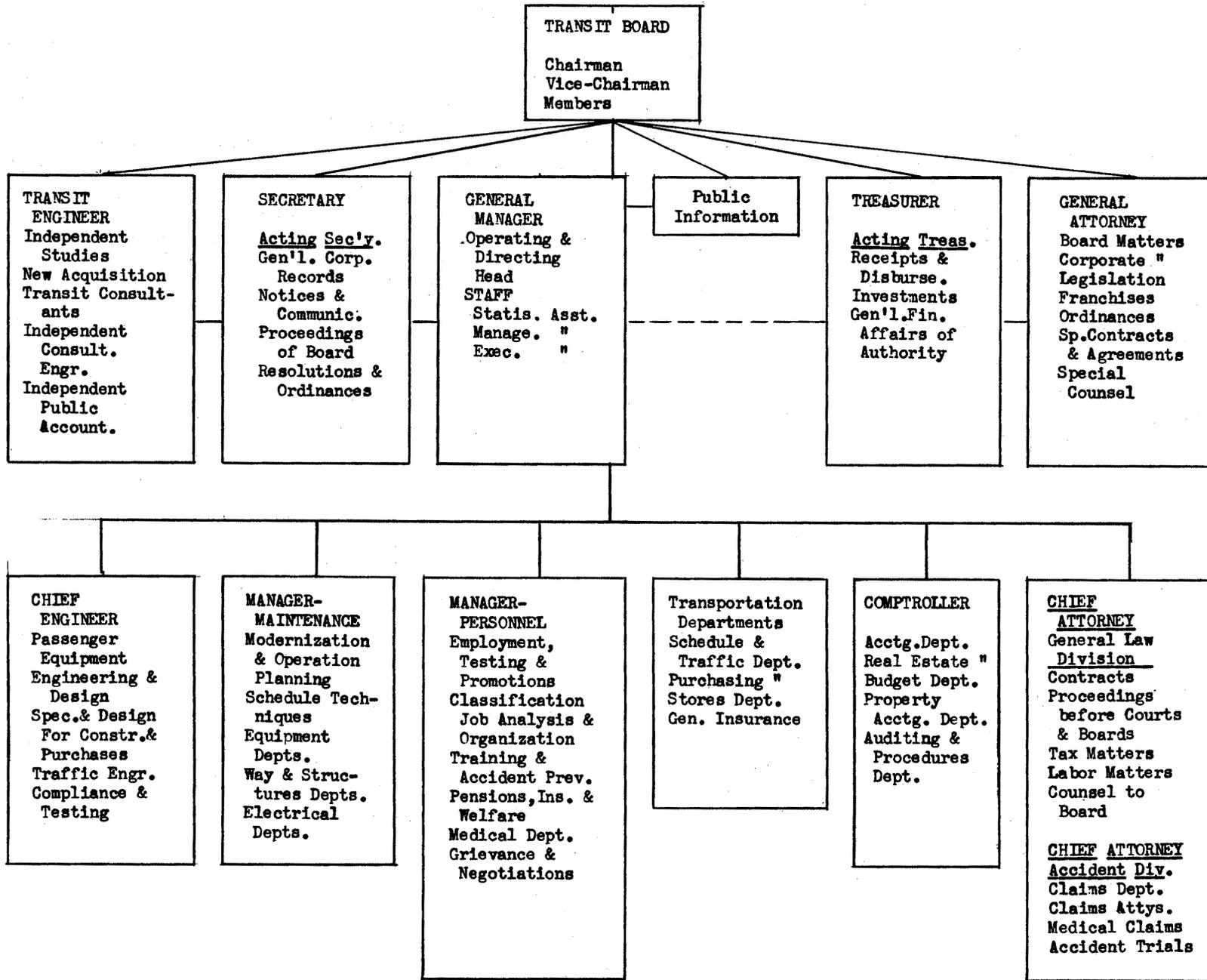


Chicago Transit Authority

Chart VII is a good illustration of a publicly owned property in one of our largest cities as it is an actual chart of the organization of the Chicago Transit Authority but should be regarded as tentative as this is a newly organized body and will probably experience change during the succeeding years.

All of the charts presented here were “actual” in 1948, but it should be remembered that such charts are largely adjusted to fit the needs of the personalities in the organization. As such they are constantly in a state of flux subject to at least minor changes with experience and change in local personnel or conditions.

CHART VII



CHAPTER VIII

Transit Vehicles and Their Selection

DURING the past twenty or twenty-five years transit companies have been carrying on extensive programs for the modernization of their equipment and facilities, making use of the modern streamlined streetcar, the trolley coach, and the motor bus in its various forms. The extent of progress of these modernization programs may perhaps be measured best by the following comparative statistics:¹

	Year 1927		Year 1947	
	Number of Vehicles	Percent of Total	Number of Vehicles	Percent of Total
Rapid Transit Cars	8,957	10.14	9,174	9.94
Surface Vehicles				
P.C.C. Streetcars	-	-	3,860	4.18
Other Streetcars	61,379	69.46	17,747	19.22
 Total Rail Borne	61,379	69.46	21,607	23.40
 Trolley Coaches	29	0.03	4,632	5.01
Motor Busses	18,000	20.37	56,917	61.65
Total Rubber Borne	18,029	20.40	61,549	66.66
 Total Surface Vehicles	79,408	89.86	83,156	90.06
 Total Transit Vehicles	88,365	100.00	92,330	100.00

Urban transit managements have available today an imposing choice of vehicles of all sizes and types for their use. There is, of course, the P.C.C. "streamlined" streetcar, the trolley-coach in several sizes as built by at least four vehicle manufacturers, and the motor bus in many makes, sizes and types. The motor bus may be obtained with either a gasoline or Diesel internal combustion engine, and with mechanical, hydraulic or electrical transmissions, and with a size-range from the very smallest unit up to those seating from 55 to 58 passengers -- equal to "streetcar" seating capacities.

This great variety of transit vehicles, along with the variation in the nature of the problem to be solved in each individual community, imposes upon managements of operating companies a grave responsibility in the matter of selecting the proper vehicle to use in a given transit service. While in some instances the choice of vehicle is limited by physical conditions, political expediency, or the need for a vehicle with definite characteristics of physical performance, the problem of transit vehicle selection is in the main an economic one. The selection of transit vehicles will, therefore, be discussed from the economic point of view in this chapter.

Some Economic Aspects of Urban Transit Operations

With some exceptions the typical American community is served by a single transit company operating under a local franchise, a state regulatory body, or both. Service is operated from 18 to 24 hours per day and is characterized by two sharp peaks, one in the morning at the time when

¹Figures provided by American Transit Association.

workers are moving from their homes to their places of employment, and one in the afternoon when workers return home. It is, therefore, necessary for the transit company in the typical American city to have an investment in vehicular facilities which are useful in the public service for just a few short hours of the day. Once the investment in equipment is made, the company must pay interest for the use of the money invested. It must also provide for some form of adequate renewals and replacements reserve to take care of the replacement of these vehicles when they have come to the end of their useful physical lives or when they become obsolete. In addition to these burdens the mere ownership of these vehicles carries with it the necessity of paying certain types of taxes, ranging from ad valorem "property" taxes to seat taxes and license taxes of various sorts.

The items of taxes, renewals and replacements, and interest are commonly referred to as "fixed charges" and they go on for 24 hours a day even though the individual vehicle may see active service for only four hours a day. This influence of fixed charges upon the successful operating performance of transit systems is a fundamental one in transit economics. If there were some way, through the application of "staggered hours", the use of promotional off-peak fares, or otherwise, to "flatten" these two peaks so that a relatively few vehicles could be utilized all day long, the economic problem of the transit industry would largely be solved. Promotional fares have, however, produced only insignificant shifts in the hourly riding habit of transit passengers.

It took the disasters of World War II and a catastrophic shortage of rubber for tires to bring about the successful application of the staggered hours principle. The American people and American business do not normally under peacetime conditions, care to modify their living and working habits to suit the economic convenience of the nation's transit systems. Therefore, transit is faced with these peaks and valleys and the fixed charges associated with the investment in maximum vehicles required to handle peak hour travel.

This basic problem is intensified further by the following facts: (1) transit fares are regulated by public regulatory bodies; (2) the transit industry has a most formidable competitor in private transportation as furnished by the family passenger automobile; and (3) mounting costs of all classes of expense have narrowed the margin between financial success and failure of transit operations.

In the case of street car operations the influence of fixed charges is even more pronounced than it is in the case of motor busses. An extensive and expensive system of track, paving and electric distribution facilities must be provided and maintained in order to permit operation of the railbound vehicle. This point may be illustrated by the following tabulation. The figures in this tabulation are only examples, taken from a single route study, and they should not be considered as having broad general significance in the transit industry.

<u>Type of Vehicle</u>	<u>Investment per Maximum Scheduled Vehicle</u>		
	<u>Vehicle and 10% Space Only</u>	<u>Adjunct Facilities</u>	<u>Total</u>
Streetcar (Old Type)	\$12,000	\$59,500	\$71,500
Streetcar (PCC Type)	27,500	59,500	87,000
Trolley Coach	19,800	12,100	31,900
Motor Bus	16,500	4,200	20,700

It is apparent that the streetcar with its heavy fixed investment in tracks and other adjunct facilities involves the greatest investment per vehicle.

Because of the influence of fixed costs the transit industry has found it desirable to give the closest possible attention to the various items of operating expenses "before" fixed charges, e.g., roadway and electric distribution maintenance and operation, equipment maintenance and operation, platform labor, fuel or power, and general expenses. The industry has had to develop a "cost consciousness" in its efforts to keep operating expenses at a minimum without impairing the quality of the service rendered to the public.

This persistence of the cost aspect of transit operation clearly necessitates long range future planning for the system. This is especially true in deciding upon the direction to be taken in the modernization of facilities, in deciding upon the size and type of equipment to be purchased when a large expenditure for equipment is required; or in the case of a rail property, when expenditures are faced by the company for track and paving renewals and replacements, or when large costs for track and paving reconstruction are forced upon it due to civic improvement projects. In fact, such studies usually become important when one or more of the following conditions is present:

1. When a periodic check-up of operating performance is needed, perhaps at intervals not greater than once in five years.
2. When a company is seeking greater operating economies in an effort to off-set increasing or sustained high costs of labor and materials.
3. When a company is planning programs of modernization in order to keep the property abreast of the times.
4. Before the expenditure of large sums of money for the purchase of new equipment, whether for use as replacement vehicles, additions to the fleet, or in substitution for other sizes and types of vehicles.
5. When a company operating rail lines is faced with a large expenditure of funds due to civic improvement projects, or as the result of the need for extensive rehabilitation of track and roadway.
6. When demands are made on a company for extensions or new routes which may or may not be self-supporting.
7. When a management is seeking to convince its own board of directors, its regulatory body, or the general public of the soundness of its operating policy, or of the need for a contemplated change in vehicle size or type.

At such times it becomes important that the individual routes of the system be examined as to their operating performance, their net earning capacities, and their individual contributions to the earning power of the system as a whole. Here the ordinary records and statements of the company fail to suffice for the necessary analysis of individual route performance, and special study is required in order to develop the picture which management should have in mind before making its decision as to the long range future plan. Such a study is called a "route cost analysis".

Route Cost Analysis

The factors which must of necessity be thoroughly studied in a route cost analysis include:

1. The proper adjustment of service to the volume of traffic to be carried.
2. Individual items of maintenance and operating expense.
3. The various items of taxation.
4. The investment in physical facilities.
5. The fixed charges on investment, such as appropriations to the renewals and replacements reserve, and interest.
6. The selection of the proper size and type of transit vehicle for the route.

¹These figures are hypothetical and may vary considerably with schedule frequency.

If properly conducted in all their details, route cost analysis points the way towards a re-examination of the costs of the various functional activities associated with transit operations, such as: cleaning, greasing, inspection, maintenance, overhaul, painting, accounting, scheduling, purchasing, storekeeping, settling claims, etc.

In a properly conducted route cost analysis, everyone on the system who is drawn into the study becomes "cost conscious". Specific items of operating expense, when isolated for study, often become the objects of "suspicion" on the part of the investigating group, thereby leading to "by-product" investigations as to the "whys and wherefores" of high unit costs which may be pursued to considerable advantage and result in substantial savings.

Studies of this general type are useful to those companies which still have rail operations (approximately 80 in number) as they serve as guides to managerial decisions regarding the retention or abandonment of streetcar lines and to the selection of proper substitute vehicles. These studies also are useful to the much larger number of companies operating only rubber-tired vehicles. The relatively shorter physical lives of the trolley coach and motor bus make it necessary to face decisions regarding sizes and types of replacement equipment more often than with streetcars.

The need for such an analysis stems largely from the fact that certain elements of cost have a tendency to remain "fixed" regardless of changes in routing, service, or the volume of business, while other items of operating cost tend to "vary" with the type and volume of service given. Before a managerial decision is made with respect to any projected modernization plan, careful attention must be given to the effect which the proposed plan will have upon each of the elements of cost, including both operating expenses and "fixed charges".

One of the common errors which occurs in vehicle selection studies is to base a calculation upon a certain behavior for a given element of cost when the particular element of cost does not actually behave in the assumed manner. For example, "superintendence" is sometimes erroneously included in the unit maintenance cost in cents per mile along with the specific maintenance cost of a certain type of vehicle. If such a figure is multiplied by the various mileage figures characteristic of certain sizes of vehicles, the student will unconsciously "save" on the cost of superintendence in the case of large (lower mileage) vehicles, which certainly would not be true unless there were actually a reduction in the supervisory forces or in the supervisors' salaries along with the proposed change in vehicle size.

It should also be pointed out that there is no infallible rule as to what constitutes fixed variable items of expense. Many elements of cost fall into one or the other classification and stay there. Others may, however, change in classification due to special circumstances. In any case, therefore, a thorough analysis of the elements of specific cost to be included in any individual problem should be made before gathering figures for the study.

A complete route cost analysis involves the following steps:

1. A determination of the investment in the individual routes of the system.
2. A determination of the revenue performance and operating expenses of the individual routes of the system for "normal" or representative year, including taxes and appropriations to the renewals and replacements reserve.
3. In the case of street rail lines, a determination of the estimated potential expenditures for renewals and replacements of tract and pavings for a long-range period into the future.
4. The preparation of a final summary sheet which sets forth by individual routes the following basic information for the "normal" year:
 - a. Gross revenue
 - b. Operating expenses
 - c. Balance before taxes

- d. Taxes
 - e. Balance before renewals and replacements
 - f. Renewals and replacements
 - g. Available for return
 - h. Value of investment
5. A study of the data for the specific route (or routes) in question, with conclusions as to the wisdom of continuing the present vehicle in operation.

If it appears from such an analysis that a change in vehicle size or type is in order, the next question to be answered is, "What size and type of vehicle should be substituted for the present one?" The answer to this question involves a "vehicle selection study".

Selection of Transit Vehicles

A tabulation has previously been given which shows that the investment per maximum scheduled vehicle and, therefore, in some degree, the fixed charges per maximum scheduled vehicle varies with the type of vehicle used. The experience of long years indicates that there are conditions of traffic flow in terms of the volume of passenger business in which the streetcar with its size and performance characteristics, is required in order to render the most effective transit service. Similarly, there are fields of vehicle application in which the trolley coach and the motor bus, respectively, best meet the need. The selection of the proper vehicle is not, however, sufficiently simple to permit a line of demarcation based upon the volume of business alone. Attempts to produce formulae, or to generally define limits of the fields of application, for the three types of vehicles have been interesting academically, but in general have proven to be useless tools from a practical standpoint.

In each individual case of vehicle application, a study must be made by experienced transit personnel familiar with the background data and conditions underlying the specific transit operation. The application of transit vehicles is affected by several factors. Some of these include: the incidence of general and special taxation, the organization structure, wage and salary rates, the amount of investment in existing physical property and that required for proposed substitute facilities, the expected vehicle life, and the maintenance and operating costs which are most likely to accrue for the specific operation. For this reason, it is generally acknowledged that the selection of transit vehicles is a problem of the individual company and route.

TABLE IV

OPERATING PERFORMANCE OF TRANSIT SYSTEM BY LINES YEAR 1940

(Revenue on Total Passenger Basis. Lines Arranged in Decreasing Order of Per Cent Return on Investment.)

Lines	Gross Revenue On Total Passenger Basis	Operating Expenses	Balance Before Taxes	Taxes	Balance before Renewals and Replacements	Renewals and Replacements	Available For Return	Value of Investment	% Return on Investment
STREET CARS									
AA	393,045	188,724	204,321	34,452	169,869	35,375	134,494	922,345	14.582
DD	252,216	167,956	84,260	27,213	57,047	29,577	27,470	769,036	3.572
FF	198,981	124,814	74,167	24,457	49,710	27,919	21,791	723,067	3.014
EE	242,954	148,241	94,713	32,658	62,055	38,986	23,069	1,002,201	2.302
BB	113,689	74,206	39,483	18,179	21,304	22,271	967	576,040	0.168
CC	130,484	94,848	35,636	19,549	16,087	20,952	4,865	544,489	0.893
Total Street Car Lines	1,331,369	798,789	532,580	156,508	376,072	175,080	200,992	4,537,178	4.430
MOTOR BUS									
II	150,622	105,358	45,264	29,157	16,107	15,806	301	198,576	0.152
GG	152,313	103,675	48,638	32,335	16,303	19,207	2,904	237,456	1.223
HH	106,708	76,626	30,082	22,204	7,878	13,573	5,695	169,531	3.359
JJ	192,235	150,003	42,232	43,824	1,592	29,038	30,630	358,706	8.539
KK	33,353	32,149	1,204	8,572	7,368	3,635	11,003	46,853	23.484
Total Motor Bus Lines	635,231	467,811	167,420	136,092	31,328	81,259	49,931	1,011,122	4.938
GRAND TOTAL	1,966,600	1,266,600	700,000	292,600	407,400	256,339	151,061	5,548,300	2.723

 denotes red figures

TABLE V

PREPARED		
CHECKED		
TYPED		
COMPARED AND FOOTED		

STREET CAR LINE "EE"
COMPARATIVE STUDY OF VEHICLE SIZES AND TYPES
SCHEDULE DATA

	Present Street Car	Modern Street Car	Trolley Coach	Motor Bus	Motor Bus
<u>Seating Capacity</u>	50	52	44	44	35
<u>Round Trip Distance, Miles</u>	9.50	9.50	9.50	9.50	9.50
<u>Units Operated (Weekday)</u>					
A M Peak	13	11	15	16	19
Base	7	6	7	7	8
P M Peak	14	12	16	17	21
<u>Headway (Minutes)</u>					
A. M. Peak	5	5-51/2	3 1/2-4	3 1/2-4	3
Base	8 1/2-9	9	7 1/2	7 1/2-8	6 1/2-7
P. M. Peak	4 1/2-5	4 1/2-5	3 1/2	3 1/2	2 1/2-3
<u>Daily Statistics</u>					
Vehicle Hours	172.0	152.2	180.7	190.6	222.0
Vehicle Miles	1,590	1,602	1,972	2,006	2,406
Platform Labor Cost	\$123.40	\$108.50	\$131.50	\$137.70	\$166.00
<u>Annual Statistics</u>					
Vehicle Hours	61,000	53,700	64,000	67,200	78,300
Vehicle Miles	568,000	573,000	701,000	715,000	855,000
Platform Labor Cost	\$45,800	\$39,900	\$47,600	\$49,900	\$59,800

TABLE VI

Form 96 B 415 7-42		
PREPARED		
CHECKED		
TYPED		
COMPARED AND FOOTED		

STREET CAR LINE "EE"
COMPARATIVE STUDY OF VARIOUS VEHICLE SIZES AND TYPES
SUMMARY STATEMENT
"FULL COST" BASIS

	Present Street Car	Present Street Car Track Rebuilt	Modern Street Car Track Rebuilt	44-Passenger Trolley Coach	44-Passenger Motor Bus	35-Passenger Motor Bus
OPERATING EXPENSES						
Roadway	\$11,689	\$11,689	\$11,689	-	-	-
Electric	3,055	3,055	3,055	\$ 4,521	-	-
Equipment	17,104	17,104	20,484	25,491	\$37,730	\$41,884
Transportation	64,873	66,270	60,370	68,070	70,370	80,270
Power	19,969	19,969	23,860	19,418	19,183	20,246
General Expense	31,551	31,551	31,551	31,551	31,551	31,551
Total	148,241	149,638	151,009	149,051	158,834	173,951
TAXES						
City	18,780	19,578	21,994	16,365	19,286	19,300
State	12,764	13,405	15,229	10,231	26,917	27,624
Federal	1,114	1,132	1,135	1,240	4,896	5,219
Total	32,658	34,115	38,358	27,836	51,099	52,143
OPERATING EXPENSES AND TAXES	180,899	183,753	189,367	176,887	209,933	226,094
Renewals and Replacements	38,986	42,950	46,516	23,427	23,974	23,974
GRAND TOTAL EXPENSES	219,885	226,703	235,883	200,314	233,907	250,068
GROSS REVENUE (On Total Passenger Basis)	242,954	242,954	242,954	242,954	242,954	242,954
AVAILABLE FOR RETURN	23,069	16,251	7,071	42,640	9,047	(7,114)
Value of Investment	1,002,201	1,101,283	1,190,451	416,129	275,264	275,264
PER CENT RETURN ON INVESTMENT	2.302	1.476	0.594	10.247	3.287	(2.584)
CONSTRUCTION BUDGET DATA:						
Gross Property Addition	-	494,971	752,571	300,818	235,800	235,800
Property Retirements	-	395,889	564,321	886,890	962,737	962,737
Removal Cost	-	5,601	5,601	99,117	100,542	100,542
Salvage	-	2,298	3,898	4,625	6,200	6,200
Capital	-	99,082	188,250	(586,072)	(726,937)	(726,937)
R. & R.	-	399,192	566,024	981,382	1,057,079	1,057,079
Total Cost of Project	-	\$498,274	\$754,274	\$395,310	\$330,142	330,142

() Figures in parenthesis are "minus" or "red" figures.

In the final analysis that vehicle is usually selected which will render the greatest convenience to the riding public consistent with sound economics and with the operations of the company. The management may be helpfully guided in arriving at its choice in these regards by the "vehicle selection study". This is a comparison of the estimated operating performance of several sizes and types of vehicles on a given route.

A brief outline of the steps involved in the vehicle selection study is given below. It consists essentially of the following basic estimates:

1. The basic unit costs for each size and type of vehicle included in the study;
2. Pertinent schedule data for each of the vehicle sizes and types covered by the comparison, as prepared by the schedule department from schedules actually constructed;
3. An analysis of the projects from the standpoint of the company's construction budget and the effects of the various proposals upon its balance sheet items (cash, renewal and replacement reserve, capital investment, etc.);
4. The value of investment in specific property items required under each proposal;
5. The annual specific operating expenses incurred through the utilization of each vehicle size and type;
6. The annual specific taxes associated with the use of each vehicle size and type;
7. The annual appropriations to the renewals and replacements reserve associated with each vehicle size and type;
8. The interest on the specific investment required with each vehicle size and type;
9. A total of all specific costs of operation with each size and type of vehicle, including operating expenses, taxes, renewals and replacements, and interest on investment;
10. A summary statement which combines on one sheet of paper all of the foregoing factors.

The final step in the study is the exercise of managerial judgment in the final selection of the vehicle, keeping in mind transit's responsibility as a business to the riding public, to its employees, and to its investors.

This last point is extremely important. In the final analysis, the figures resulting from the route cost analysis and the vehicle selection study may not of themselves constitute "the" answer. They are no substitute for managerial judgment or experience. But they do furnish a guide to the answer which is obtainable in no other way and which serves as an aid to the management in reaching its final decision. The presence of other factors and considerations in any local situation, many of them civic or political in nature, is recognized. It is incumbent upon the individual management to reach the most practical decision possible, consistent with the economic picture resulting from its detailed vehicle selection studies.

CHAPTER IX

General Organization and Functions of the Transportation Department

TRANSIT is a service industry and responsibility for actual performance of this service is delegated to the transportation department in the average transit company. The transportation department is thus responsible for operation, of the vehicles and collection of the fares that make the service possible. This is a 24 hour a day, seven day a week job.

The organization required to perform the job varies with size of the company, kind of transit service furnished and many other factors, not the least of which is the philosophy of the executive who controls the operation.

The primary responsibilities of the Transportation Department are to:

1. Provide manpower to operate planned service.
2. Collect fares from passengers and account for these revenues.
3. Supervise operation of the vehicles to maintain scheduled service.
4. Adjust scheduled service to meet special day to day passenger traffic requirements.
5. Provide the facilities and organization to handle emergencies and other abnormal situations that arise in the conduct of the business.
6. Improve job performance of employees through supervision, training and motivation.
7. Analyze operations and plan for future improvement of transportation operations. This may include forecasting the amount of passenger traffic that will be carried and scheduling service to meet the forecast where a separate Schedule Department at staff level is not responsible for traffic checking and schedule preparation.

The actual work of schedule planning and preparation is described in detail in Chapter XVI, "Traffic Checking and Schedule Preparation".

Manpower and Organization

The responsibility for providing the manpower and organization to operate the service scheduled is met in a variety of ways by the operating companies. Vehicles are housed and assigned to one or more garages or carhouses. These locations are called depots, sheds, stations, bases and other names in different cities. In a small organization, operating only one or two depots, the Superintendent of Transportation may manage the locations himself. In the larger organizations a superintendent is usually in charge of each depot, although one superintendent may handle two or more smaller depots. The primary problems involved in the operation of a depot are the assignment of work to employees, the disciplinary control of the employees, and the motivation of employees to improve job performance.

Work is assigned to employees by runs, which are scheduled on the time table for each line or route. Each run is a combination of trips over one or more routes so scheduled that the

combination of runs making up the time table for a route provides the required service. These runs are of two kinds - straight runs and swing runs. The straight run is usually preferred by the employee, because it provides continuous work hours with the exception, in some instances, of time off for a meal. The swing run consists of two or more separate pieces of work with un-worked intervening time between the pieces for which no pay is allowed. Swing runs are necessary in most operations because of the peak loads in the early morning and late afternoon when passengers are riding to and from work. The overall spreads of these traffic peaks are usually from 12 to 13 hours, which means that swing runs customarily have spreads of from ten to more than 13 hours.

Due to the undesirable features of swing runs, employees through collective bargaining have imposed many penalties and limitations upon the individual companies in an effort to get improved working conditions. These limitations are of two kinds:

- (1) Payment of a bonus or premium to the employee required to operate a swing run or,
- (2) Specific limitations on the number and characteristics of swing runs that can be scheduled.

Each run differs from every other run. These differences are due to dissimilarities in routes operated, hours of the day, hours of work and other conditions and have led to the long-existing practice of permitting transportation employees to select or pick their work assignments. Periodic selections are held at which all of the employees, in the order of their seniority (date of employment), choose the run or runs they will work for the period the schedule is to be effective, or until another selection date is required under terms of the labor contract.

In addition to scheduled runs, it is necessary to frequently operate extra service. Such service is required for short periods during the peak, to handle special events, or for other non-repetitive situations. These extra pieces of work are usually called "trippers". Trippers frequently carry some special pay bonus, which is paid either at the rate of time and one-half or on the basis of a minimum guarantee or by both. This work is customarily performed by the extra list which usually comprises the youngest employees who do not have enough seniority to pick regular runs. These extras serve as reliefs for regular men on days off and replace absentees as well as working extra service. Work is assigned to these extra employees on a rotating basis each day in accordance with certain specialized rules and regulations. In many companies today these extra employees are guaranteed minimum earnings because of the uncertainty and irregularity of the work.

The assignment of work has become greatly complicated in recent years by the introduction of guaranteed pay for extra men, payment of overtime under many varied conditions and payment for waiting time. Economic assignment of work requires appraisal of daily needs if minimum costs are to be incurred. The work assignment is further limited by many other labor contract restrictions.

The key man in handling assignment of work is the depot dispatcher. Depot dispatchers work in eight hour shifts, over the 24 hours of the day and are usually responsible for the assignment of work. In most companies regular trainmen are required to report ahead of scheduled departure time for their run and make such report to the depot dispatcher. If they do not report on time, an extra man, who is held for that purpose, is assigned the run which has been "missed" by the regular employee. When "missed" men report, they are usually placed at the bottom of the extra list and are held for work assignment on that day.

The major responsibility of the superintendent in charge of the depot or location is the job performance of his employees. In a small company he may directly observe job performance of the trainmen or busmen by actually going out on the street and looking over the operations. In a larger company street supervisors will handle the operation of the lines and observe job performance of employees. Instructors are also assigned to follow up newer employees after they have finished training. Therefore, the superintendent is dependent upon written or verbal reports regarding performance of his employees. It is his job to maintain good morale, ad-

minister discipline effectively, and provide the kind of inspirational leadership that is essential to good performance by large groups of men who work relatively unsupervised.

The depot superintendent also has as a major responsibility accident prevention work among the employees. Staff groups are frequently used in larger organizations to provide the superintendent with the ammunition to carry on effective and continuous accident reduction work. However, the superintendent is the key figure in the safety training program.

Collection of Fares

Responsibility for collection of fares from passengers is assigned to the transportation department. Fare collection may be classified into two general types - hand collection and fare box collection. Under hand collection systems, the operator or conductor takes the fare from the passengers by hand and then records it on one of the various kinds of registering devices in common use. This type of collection is generally in use on properties with complex ticket and fare structures. The basic types of fare boxes include: the registering box, the lock box, and the turnstile or passimeter, which is essentially a type of fare box. The registering type box is a device in which the passenger deposits the correct fare into a closed receptacle and the fare is registered by the coins or tokens as they pass through the device. Coins or tokens drop into an open box and are recovered by the operator or conductor for re-use. The lock type box requires the passenger to deposit his fare into a receptacle; it drops into a compartment which is inaccessible to the operator and is locked automatically when removed.

The turnstile, or passimeter, records the passenger as he moves through the device, since he is required to rotate one of the arms of the turnstile to gain admittance into the paid area. Turnstiles can either be used in connection with hand collection or a lock type of collection box, which requires the passenger to deposit the fare in a slot in order to release the turnstile and permit entrance of the passengers.

The problem of handling fare collection, of course, is affected by type of device used. When hand collection or an open type of collection device is used, the operator makes up a statement of the day's receipts showing the register statements for the various classes of fares collected and the amount of receipts turned in. He is required to balance and turn in these receipts with the waybill to a receiver in the depot at the end of his run. He is charged with any shortages that may be found when his waybill is audited. When a type of lock box is used, his turn-in is "blind" as he does not account for fares collected.

Under any system it is necessary to have frequent secret inspections of fare transactions to prevent irregularities and resultant revenue loss. It is customary to provide for irregular but periodic inspection of all employees collecting fares to observe their performance. Registration or collection records are maintained usually over the entire term of employment and from time to time it becomes necessary to drop or discharge employees because of poor registration records.

Fare irregularities may result either from carelessness in recording or carelessness in the actual collection of fares. There are also many ingenious ways that have been found by a few individual employees to divert to their own use revenue properly belonging to the Company. Constant check must be made of registration statements, fare collection practices and revenue statistics in order to promptly detect any hidden losses which can amount to sizeable proportions. Although the transportation department is usually responsible for the collection and accounting for the fares, in many of the larger companies a financial department is assigned responsibility for analysis of registration statistics, accounting and auditing of fares and other work in connection with the actual handling of money.

Supervising Operations

Transportation employees operate vehicles seven days a week and 24 hours a day throughout the city or territory served. It is necessary to observe the performance of these employees and the operation of these vehicles in order to provide a satisfactory service to the public. The problem of street supervision is a most difficult one because vehicles in service can be observed only a small, fractional part of the time they are on the street. In most companies one or more service supervisors are assigned to the job of directly supervising the operation of vehicles on the street.

In the small company, supervisors who may be called route foreman, service supervisors, service inspectors, or by other titles, report directly to the transportation superintendent. In the larger companies these men may report to the depot superintendents or may be assigned to a separate and independent division of the transportation department. The present tendency is to functionalize the larger companies' street supervision and set it up as an independent activity separate and apart from the depot dispatcher and the depot superintendent while in the depot.

There are three kinds of street supervision in use on the larger transit systems, although most of the larger companies use some combination of all three. These three kinds are designated as point supervision, line supervision and roving supervision. Point supervision stations a supervisor at a fixed spot from which he observes the operation of vehicles and the performance of employees. This type of supervision is usually used on rail systems where several lines intersect or where a number of lines converge at the entrance to a business district or through some other natural throat. Line supervision assigns a supervisor to one or more individual routes or lines and the supervisor is given responsibility for these lines. Roving supervision assigns a supervisor to a district or territory and he is responsible for operation of the lines within that district or territory.

On a large system it is usual practice to employ point, line and roving supervision so combined as to give most effective control of operations. The real problem confronting the supervisor is to get information as to what is happening so that he can find out how to maintain scheduled service and how to insure good job performance by his employees.

Supervisors are usually uniformed and not only observe and direct the operation of vehicles and employees, but also serve as contacts with the public. The supervisor is held responsible for the "on time" operation of his line or lines and for anticipating changes in passenger traffic requiring adjustments of service on a day to day basis. This day to day service adjustment is distinct from the longer range adjustment of service which is the responsibility of the traffic and time table organization, although it is expected the supervisor will cooperate by keeping the staff organization informed of service conditions.

Adjustments to Scheduled Service

There are certain repetitive adjustments to service which must be made in most cities on certain days of the week. For example, stores may not open until noontime on Wednesdays and remain open until nine o'clock at night. On Sundays routes which serve amusement parks, swimming pools, etc., may require large additions to service, depending on the time of the year and weather. It is the general practice to prepare two or more schedules which may be alternately operated to meet these changes. These conditions are known far enough in advance so that alternate schedules are prepared and generally selected by the employees at time of picking runs.

The timetables, indicating the number of trips required for each route, are often prepared a month or more in advance of the time they are made effective. Since timetables are based on a forecast of probable passenger traffic, it is obvious that shifts may occur in the time of maximum passenger movement on a particular route or employment may decrease, or increase from the time forecast was made to time of operating the new timetable. Consequently, it is necessary that adjustments be made on a day to day, or week to week basis, in order to provide adequate service. Additions to service are made by operating one or more trippers during the period

required, which is usually the morning or evening rush hours, or at times when children are going to and from school. When it is necessary to decrease schedules, this can often be accomplished by removing scheduled trippers. Decreasing runs on a schedule, for most transit companies, requires the preparation of a new schedule and permits the men holding runs on the schedule to re-select their runs.

It is the responsibility of a street supervisor to constantly observe the lines to which he is assigned for adequacy of service. He not only makes this "load" check, but also periodically checks the industrial plants served in his territory for changes in employment or changes in shifts in order that required adjustments in service can be anticipated.

One of the major problems in adjusting service is in providing service to large special events, such as football and baseball games, race tracks, circuses, etc. Service for special events requires the movement of a large number of passengers to and from a single point in a very short period of time. Consequently, it is necessary to operate a large number of trippers as extra service. In most instances, trippers to provide increased service are operated by the extra men. However, it is often necessary for a regular man to work a tripper in addition to his regular run. For example, a regular man holding an early straight run will often work a tripper during the evening rush period. A well trained depot dispatcher anticipates the problems involved in obtaining men to work trippers for special events when an unusual number are necessary. It is necessary in these cases to have men come in on the regular day off for which they are paid a premium. Adjustments to service may also result from detours, blockades, weather and complaints on a day to day basis.

Handling Emergencies

Since transit companies are providing an essential service, the operation of vehicles must continue in spite of bad weather, breakdowns, fires, parades, power interruptions, and all the other things that interfere with maintaining proper spacing of vehicles. It is common practice to handle emergencies through a central dispatching organization. Personnel composing this group are called emergency dispatchers and usually report directly to the head of the transportation department since they issue orders to and coordinate with the various other departments and divisions of the company. It is their responsibility to report all interruptions to service with probable cause. These men receive calls of trouble from the street by trainmen or bus operators, street supervisors, or police and emergency crews, bus wreckers, and street supervisors may be dispatched to the scene of the trouble. Assistance is often requested from the police and fire departments. Also, it is part of their job to arrange for detours in the case of fires, broken water mains, street cave-ins, etc. In small companies trouble calls are made directly to the operating carhouse or garage and handled by the foreman or superintendent who may have charge of both the transportation and maintenance functions of the location. Plans are then made to handle the situation whether it be an interruption due to a disabled vehicle or a detour required due to a fire.

During recent years radio has been used very successfully by a number of transit properties. Street supervisors have been provided with automobiles and these, with other emergency and repair trucks, have been equipped with two-way radio equipment in order that they may have instant communication with the emergency dispatcher. This has tended to reduce the duration of service delays and maintain better control and use of street supervision and emergency crews.

A few companies have equipped trolley car and trackless trolley lines with headway recorders which measure the frequency of car movements passing a given point. One type of headway recorder is operated by the current collector passing under an overhead contactor which energizes a telephone line to the dispatcher's office. In the dispatcher's office it is connected to an Esterline recording meter and each car movement is recorded on the meter chart. Some installations also have an electric timer which can be set to give an audible alarm and illuminate a red signal if a car does not pass the location of the overhead contactor in a predetermined time. Headway recorders are used to detect gaps in service on a route or possibility of a blockade. Roving supervisors can be dispatched by radio to look for the trouble and clear it up or readjust service by short routing certain cars.

Improved Job Performance

Increasing attention is being given to improving employee job performance through better supervision, training, and motivation. It is generally agreed that supervision is the most important factor in controlling the job performance of the rank and file employee. Most companies have developed training programs for street supervisors, depot dispatchers, depot or station superintendents, which include training in the interviewing of employees, handling of day to day contacts, policies on discipline, measurement of employee's performance, supervisory personnel responsibilities, and other factors which improve supervision. Some training programs are carried on entirely by a staff organization. Others are administered on a departmental basis with line personnel doing the necessary instruction.

A progressive transportation department maintains comprehensive records for each employee, which include absenteeism, rule infractions, public complaints, accidents, efficiency of fare collection, results of interviews, and other information that collectively measures job performance. Records may be maintained at a central location or at the location from which the individual works. Location of records is dependent on type of disciplinary control used by the particular company, that is, whether discipline is centrally controlled and administered, or handled on an individual location basis. These records make it possible to determine the shortcomings of each individual employee and plan with him a program for correction of his weaknesses. In cases of poor employee job performance that result in ultimate discharge the record of an employee, if maintained properly, will show that his discharge was without prejudice and can be supported with the union or in arbitration. It is essential that acceptable standards of job performance be established. Such standards must be understood by depot superintendents and street supervisors. When standards are not established, acceptable performance will differ from supervisor to supervisor.

Analysis of Operation and Future Planning

Measurement of results are necessary to determine trends in quality of service furnished and cost of furnishing such service. The usual records, reports, and analyses that are employed to measure transportation efficiency include:

1. Daily log recording major happenings of the day. This log will include interruptions to service, runs that were not dispatched, vehicles disabled, other plant failures, etc.
2. Daily, weekly and monthly analyses of accidents, public complaints, rule infractions, absenteeism, fare collection, and other indices of employee performance.
3. Cost of operation, including analyses of extra service, overtime pay, guarantee pay, and other than platform expense.
4. Analysis of service operated. Load checks and analysis of passenger revenue data are required regularly to determine adequacy of service and need for service.

From these and similar analyses of measurements of performance, the transportation department plans for future improvement of service and increased efficiency of operation. The greatest problem is the difficulty of fixing responsibility for performance upon the individual members of the supervisory and management organization within the department. It is only through such fixing of responsibility that real progress can be made in obtaining improved results.

CHAPTER X

Equipment Maintenance

The Function of the Equipment Department

THE vehicles which urban transit companies use for the transportation of passengers are under the jurisdiction of the transportation department while being used in the conduct of the business and come under the jurisdiction of the equipment department at all other times. The efficiency with which the latter carries out its duties affects directly the efforts of management to provide fast, reliable and safe service in clean, attractive vehicles. Thus, the equipment department is the custodian of the major part of the company's fixed investment, particularly on any property which is largely bus operation. Since proper maintenance tends to maintain the value of this fixed investment and improper maintenance tends to decrease its value, the equipment department's work directly affects the physical value of the company's property.

Any piece of rolling stock in initially good condition will operate for a period without maintenance by using up the normal reserve of service which it possesses. Insufficient maintenance will result in drawing on this reserve to the point where, if the practice is continued a complete collapse of reliability and excessive cost for major repairs will result. Excessive maintenance, in an attempt to overbalance this depletion of reserve, unnecessarily increases the expense of operation. Since the major objective of the company as a whole is to transport passengers rather than to run a repair shop for broken down equipment or to keep the equipment in the highest attainable state of repair, the optimum point of efficiency in the equipment department is reached when the delays to passengers and service due to equipment failures are sufficiently infrequent not to cause passenger dissatisfaction and a further reduction in number of delays can only be obtained at excessive cost.

This optimum point is much easier to define than to achieve. A manufacturer, knowing what has come into his plant in the way of raw material and what he has added to it in the way of labor as compared with what he has shipped out of his plant, has an effective yardstick with which to measure his efficiency and productivity. The man at the head of a transit equipment department has no similar measure. The work which he is doing might be compared to water being poured into a reservoir from which at the same time, water is constantly being withdrawn. Maintenance work stores up service in the vehicle and is withdrawn by the transportation department in the operation of the vehicle. The problem is to keep the input (of maintenance) and output (of wear) balanced so that the reservoir stays at a constant level. The solution of this problem requires good judgment and an intimate knowledge of the condition of the vehicles.

The Effect of Company Size on the Equipment Department

If the operation is a small one, and the man in charge of equipment has only a few vehicles with which he is personally familiar and with which he is in contact constantly, the minimum of records, reports and formal work procedures is required and the superintendent makes decisions based on his own observations. As the size of an operation increases and the man who has to make decisions becomes further and further removed from actual contact with the vehicles, more and more reliance has to be placed on records or the observation and judgment of subordinates to furnish the basis for decision. The size of an operation has, therefore, an important bearing on the character of the organization. In a large city property, the subdivisions of the maintenance organization represents the functions of the department. On a smaller property, these same functions exist, but they are combined to result in a smaller and simpler organization.

Operation of the Equipment Department

The operations of an equipment department may be broken down into two major activities: those which are carried on at scattered shops, carhouses, or garages from which vehicles oper-

ate and at which they are cleaned and inspected and stored when not in passenger service, and those which are carried on at a central repair shop. Such activities as light repair work are done at the operating locations. Major unit repairs, major body repairs and painting are done at the central shop.

Since adequate inspection is the foundation of any preventive maintenance system, a word of explanation is in order as to what is meant by inspection. All transportation companies periodically bring vehicles into a shop and examine all parts of the vehicle and its equipment. This examination, or inspection, must be made at sufficiently frequent intervals to assure reliable service and to prevent the development of costly breakdowns. The interval between inspections should be measured in the way which most accurately measures the needs of the particular vehicle in the particular service concerned. Some of the more generally used bases for inspection are time, mileage and kilowatt hours in the case of electric vehicles and gas or oil consumption, engine hours, route hours, and miles in the case of gasoline or diesel busses.

Each basis of inspection has its own advocates and each may be the right basis for a given set of conditions. More than one basis on a single operation can be perfectly justifiable, if there is a wide difference in the character of service supplied. A gas bus operating in intercity service or in suburban service with infrequent stops is a rather different problem from the same gas bus operating in heavy city stop-and-start service where idling time of the engine may exceed the useful work time and where the bus, even when it is doing useful work, is running in first or second gear, a large percentage of the time. A vehicle used for tripper service which operates only a limited number of miles during the morning and evening rush hour may warrant special consideration. If inspected on a mileage basis, mileage accumulates so slowly that an unreasonable amount of time would elapse between inspections if that were the sole consideration.

The most frequent inspection is commonly called a light inspection. A light inspection usually includes oiling or greasing and at least a visual examination of those parts which are most apt to give trouble. It is not usually necessary on light inspections to change any unit parts of equipment or to make any major adjustments. Its basic purpose is to ascertain that no trouble is developing or that no unsafe condition exists. Often more than one light inspection is made before a heavier inspection is needed.

After one or more light inspections, the vehicle is usually brought into the operating station or central shop for a heavier inspection. This inspection usually covers all items covered on the light inspection but usually more thoroughly than was covered on the light inspection, and in addition covers the inspection of other items. On this inspection the standard practice may be to change certain unit parts or to make adjustments of parts, the operation of which was merely observed on the light inspection. Several inspections of this character may be made before it is necessary to bring the vehicle in for a still heavier inspection, which usually covers all items covered by the previous two inspections and additional items.

Practices vary between companies. Some companies work toward very infrequent heavy inspection or overhaul periods at which times a large amount of work is done, and some companies split up the major jobs into small parts and wherever possible do some parts of the heavier job on a number of the lighter inspections. For example, some companies may take off all the wheels and examine and recheck the wheel bearings on a heavy inspection; other companies will do one wheel at a time on four light inspections. The advantage of this latter procedure is that it ties up the vehicle for a shorter period of time and makes it easier to get the work done between rush hours when the maximum number of vehicles are needed for service. The disadvantage is that it requires more elaborate records in order to assure that all necessary work is adequately covered.

Practices vary among properties as to whether all inspection work is done at operating locations or whether the heavy inspections are concentrated at one location. The advantages of centralizing heavy inspection work include the following: it makes much easier assurance of uniform inspection of all vehicles; it allows much greater specialization of jobs among workmen; it decreases the investment necessary in tools and appliances for checking units and parts; and it may allow the introduction of some line production methods. There are some serious disadvantages; if a company's operations are spread over a wide area, the cost of bringing the vehicles

into a central shop for inspection becomes a serious item; it also divides responsibility by taking from the foreman at the operating garage the responsibility for a considerable portion of the work done on the vehicle. In emergencies, such as war periods or periods when the obtaining of material or supplies is difficult, the centralized system is much more apt to bog down than is a system where each operating location is responsible for keeping its vehicles on the road.

Another consideration is that enough men must be kept at the operating locations to take care of unusual conditions of emergencies. For instance, in the northern parts of the country it is difficult to predict when there will be the necessity of installing tire chains as quickly as possible on an entire fleet; then men must be available who can be pressed into service for this type of work. Winter conditions produce other extra jobs which must be covered and it is often more economical to do some work at outlying locations which might possibly be more economically done at a central location in order to have the manpower available at the outlying location when it is needed. Each operation must decide, after all factors are considered, the degree to which centralization can be best carried out.

Even on larger properties the majority of the actual repair work, as well as certain of the heaviest inspections are concentrated at the central shop location. Many of the central shop activities cannot be scheduled as accurately as can inspection procedures at the outside locations. While it would be possible to replace major units of a vehicle on a scheduled average life basis, this procedure is usually not economical to follow. The average life is often the mean between rather widely varying maximums and minimums and to overhaul on the basis of averages rather than the condition of the individual piece of equipment is often inefficient. Therefore, these units are usually changed when the need for change is determined by their individual condition.

Major repair of units cannot always be scheduled too far in advance. This also holds true of general body repairs and painting. When a vehicle is brought into the central shop to repair accident damage, sometimes it is preferable to give it a general overhaul. This frequently avoids the necessity of bringing the same vehicle back to the shop at an early date. Frequently there is also the advisability of making body repairs and painting when vehicles come into the central shop due to the need for equipment changes. The work done on a vehicle also depends on what the central shop work load is at the time the vehicle is brought in for repairs.

The central shop employs men of different crafts and the scheduling of work on a time or mileage basis without regard to the work load imposed on the individual crafts would be inefficient. For example, a number of serious collision damage jobs will load the men doing sheet metal and structural body work without supplying enough work to keep the men of other crafts busy. To balance the overall work load it is necessary to bring in for general overhaul some vehicles which do not require much body work but do require the services of men of other crafts.

A vehicle arriving at the central shop goes into the body repair section. Here equipment units which are to be overhauled are removed. If the vehicle is a streetcar or rapid transit car, the body is removed from the trucks and the trucks are sent into the truck repair section. After the sheet metal workers, carpenters, electricians, pipers and other crafts have made the body repairs necessary, overhauled equipment is installed to replace the equipment which has been removed, and the car body is set down on overhauled trucks. The vehicle is then moved into the paint shop where it is painted, trimmed, and sent to the test track or roadway where it is tested before being returned to its operating location.

The various units which are removed from the vehicle go to the salvage department. Here they are made up into job lots of similar pieces and job orders are issued for cost records. They are then shipped to the appropriate division of the shop for overhaul and repair and the reconditioned equipment or material is sent to the storeroom for disbursement. Units and parts removed at the operating locations come into the general shop and are treated in the same manner.

In general, the larger the organization, the more completely it does all of its own work because volume justifies the purchase of the necessary specialized machines and the employment and training of men with specialized skills.

However, there is always a temptation to utilize this personnel and equipment in the manufacture of parts used in carrying on maintenance. If this practice is to be followed, a very complete cost system is necessary to know accurately the shop expenses. It is necessary to keep constantly in mind that the major business of the company is transportation and not repairing or manufacturing. Otherwise, too much supervising attention and ingenuity will be diverted.

CHAPTER XI

Electric Power Department

AN important operating department in a transit system utilizing electrically propelled vehicles is the electric power department. While it may not be numerically large in comparison with other departments, it might be termed the “blood stream” of the system. If the electricity fails to flow to any part of the system, that part becomes inoperative. In this chapter the nature of electric power supply systems will be described and these operational characteristics will be related to the department’s place in the organization pattern.

The Nature of Transit Electric Power Systems

Urban transportation vehicles utilizing electric power involve three types: trolley cars, trolley coaches (trackless trolleys) and subway or elevated lines. In all three classes of service it is necessary to provide direct current electricity to a contact system which extends over the entire route and from which, by means of a sliding contactor on the vehicle, the current is collected to be delivered to the motors and then returned to the station over the return or negative system.

On a trolley car system the overhead contact wire is a bare copper or bronze wire and the current collector on the car is a bronze wheel or shoe. The negative side of the car motors is connected to the truck frames and the negative current is carried from the car wheels to the rails which are part of the return circuit system.

On some trolley car systems underground contact rails are used for both the positive and negative systems and the current collectors on the vehicles extend down through a slot in the roadbed. This type of construction is very expensive; therefore its use is extremely limited.

On a trolley coach system there are no rails for the return circuit so that in addition to the positive contact wire an additional contact wire must be provided for the negative side of the circuit. Subway or elevated systems, due to the greater amount of current used, usually utilize a third rail for the contact system. This is a special steel rail with a lower resistance than the running rail and it may be for either an over or under running contact. The car wheels and the running rails are used for the return circuit system and the current collector on these vehicles is a steel shoe.

Most electrified urban railways use alternating current with a contact wire similar to the ordinary trolley wire but usually of a larger size; due to the higher speeds, a sliding contact on a pantograph is used. This type of collector cannot be used satisfactorily on trolley car or trolley coach lines due to the special overhead work. Thus there are some differences in furnishing power to the three types of electrically propelled vehicles.

The power system itself necessitates generating stations for the generation of primary power; a transmission system for the transmission of this power. If it is alternating current, substations for the changing of the potential or voltage and converting equipment to change the power to direct current and a distribution system, both positive and negative, to distribute power to the contact system and return it to the station. The contact and distribution systems require pole lines and if underground cables are used, an underground conduit system with manholes is necessary.

Generating Stations

The first electrification of streetcars was in the early 1880's or 1890's and at first all di-

rect current was used at 500 to 550 volts, generated by engine driven units. These power stations were extremely expensive and the areas that could be economically and conveniently fed were somewhat limited. Thus it became necessary for the longer lines to be helped by booster sets. These were generally motor generator sets with a 500 or 550 volt motor and a series generator to boost or add 100, 200, or 250 volts, or higher in some cases, as the requirements demanded. Otherwise the voltage at the end of extremely long lines would have been so low that trolley cars would have moved very slowly, if at all.

In some cases storage battery stations were installed two or three miles from the generating station. These storage battery stations were charged during the lightly loaded period and discharged during the heavily loaded period, thereby increasing the line voltage.

Around the beginning of the present century there were substantial advancements in the manufacturing of electric generating equipment and in electrical distribution methods. These led to the introduction of generating alternating current electricity at high potentials. It also became possible to transmit large blocks of power to substations over comparatively small wires; in the substations, by means of transformers and converting equipment, the alternating current was changed to the proper potential direct current and then distributed to the contact systems.

Power generation at the present time is in two main classes: hydro-electric and steam generation. In the hydro-electric plants the generation is usually at a reasonably low a.c. voltage on account of speed and other design features, and power is then stepped up through transformers to the higher transmission voltage. In all modern steam power plants of any size, except in special industries, turbines are used and are directly connected to the a.c. generators. Reasonably high a.c. voltage, at least up to 15,000 may be generated directly, but if higher line voltages are required step-up transformers may be used for this purpose.

In the early days, while quite a number of electric railways were operated as one branch of a combined railway, light and power organization, a few had their own generating stations. However, the electric railway load is not uniform throughout the entire day, varying from extremely light loads during the early morning hours to heavy peak loads during the morning and afternoon rush hours, which are generally between two and three times as great as the load during the day between the peak loads. Since generating equipment must be provided for the maximum or peak loads, it has been found that it was not economically sound to have generating equipment which could only be used for railway purposes. Therefore, in almost all cases the electric railway companies abandoned or disposed of their generating stations and now purchase all or the major part of their primary power from the local power company.

When the primary power is purchased from the power company, the power company's standard tariffs are generally not applicable and a special contract is negotiated. These contracts are usually somewhat complicated and while many factors must be taken into consideration, the primary factor is the size and nature of the load.

As stated previously, generating equipment naturally must be provided for the maximum peak loads and the higher the off-peak value the better the load factor becomes. The power companies naturally seek to have a high load factor guarantee so as to use their machinery to the best advantage; therefore, the higher the load factor, potentially the better rates the railway company is able to obtain. In these power contracts there is generally a primary or demand charge, an energy charge, and sometimes a charge to cover the use of switching equipment, cables and conduits owned by the power company but used exclusively to furnish power to the railway company.

The demand charge is a definite cost per month for each kilowatt of the maximum demand. The method of determining this demand varies in different contracts; in some it is the highest clock hour load in any month, while in others it is the average of the three highest clock hour loads in the month. In some contracts there is a guaranteed maximum demand, either for the life of the contract or depending on the maximum demand established in the previous twelve months. Some contracts include both guarantees. The demand charge is supposed to reimburse the power company for the equipment which is necessary to furnish power to the railway company. The energy charge applies to the actual kilowatt hours consumed and provision is sometimes made in the

contract for adjustments in the energy cost due to fluctuations in the price of coal. The charge for switching equipment, cables and conduits used exclusively for the railway company is really a rental charge. In some instances the power companies also operate the substations and in these cases there are additional charges.

Substations

Substation equipment usually consists of an a.c. cable and switching compartment, transformers for stepping down the voltage, converting equipment for changing the current to direct current, and d.c. switching equipment or switchboards for distributing the current.

The converting equipment in the substations of the early electric transportation systems was either motor generator sets or slow speed rotary converters. Since this type of equipment had not been fully proven for transportation service and generally needed a great deal of attention, all substations were manually operated.

With advancement in the electrical industry the use of the old motor generator sets was almost completely abandoned and high speed rotary converters were introduced. This not only considerably reduced the size of the machine but also resulted in a reduction in the size of the substation building. During the past twenty years many improvements have been made in the mercury arc rectifiers and they have gained considerable acceptance for railway services. Automatic devices for operating the substations have also been designed and improved to such an extent that they too have been accepted by most companies and are used in most places where they can be economically justified.

At the present time the following types of substations are in operation:

1. Manually operated - either old or large stations where the cost of converting to automatic operation would be so great that it could not be justified.
2. Semi-automatic - where operators are required to operate control switches and all other operations are done automatically. The use of this type of substation is somewhat limited but it is extremely efficient in large substations where the load varies considerably.
3. Automatic - where all operation is fully automatic and the machines go in and out of service depending on the load; all switches open and close automatically.
4. Supervisory Control - similar to a semi-automatic station except that the control switches are connected to a central headquarters by means of control wires and relays. Their actuating devices and one or more of these stations can be operated from a location some distance away from the station.

Substations with automatic apparatus, especially those with supervisory control, are safer and switching operations are quicker than in manually operated substations. This is because there can be only one sequence of operation and if the setup is not correct the operation cannot be made. This is not true with manual substations. At substations where the primary power is delivered at a high potential (66,000 volts) because of the large size of the transformers and the heavy insulation required, the general practice is to have outdoor transformers and switching devices.

The geographic layout of substation locations to be served with power for electric railways is determined by the economical radius of distribution; the number of substations and the size of units will be determined in turn by the number of cars or the amount of power required. It is now fairly well recognized that the economical limit for trolley distribution of 600 volts is approximately one and one-half to two miles from the substation and if power is transmitted beyond this point there is an undesirable drop in voltage which can only be overcome by a very uneconomical use of exceedingly heavy copper feeder cables.

Cables

Cables are generally copper, although on some overhead lines aluminum is used. Transmission cables or lines are required to transmit the alternating current at a high potential from the generating station to the substations. These may be either overhead lines or underground cables.

In general, overhead cables are considerably cheaper than underground cables. The choice depends primarily on whether there are any city ordinances which prevent the use of overhead cables, as well as the number of cables to be installed. On streets where only a comparatively small number of cables are installed, overhead cables are generally used. However, on streets where there are numerous cables, especially near large substations, the use of underground cables is almost imperative.

Poles

In the early days of electrification of street railways practically all companies used wood poles. Those using metallic poles were extremely few. However, due to increases in price and the increased difficulty in securing good wood poles, present day practice is to use steel poles. As these poles have a rather small diameter at the base it is necessary to set them in concrete in order to prevent their being pulled over by the strain from the contact system. It is also possible to obtain steel poles which are set on concrete foundations, thereby eliminating considerable ground line corrosion.

Conduits

When underground cables are used, in order to facilitate their installation, renewal and removal, it is necessary to have an underground conduit system. These conduits may be owned by the transit company, jointly owned with another utility company, or rented from another utility. In some cases the conduits are owned by the city and all utility companies must rent from them. The ducts are usually 3" to 4-1/2" in diameter and are installed in banks of two or more, varying in number, depending on the number of cables to be installed, with an allowance of spare ducts for future use. Long lengths of large size cables cannot be handled or pulled in efficiently; therefore, manholes must be installed at intervals to facilitate the pulling in of the cables, as well as to provide splicing chambers. In these manholes the cables must be properly supported in order to properly distribute the weight and to prevent breaks in the lead sheathers.

Personnel in the Department

The electrical department in a transit system is usually numerically smaller but probably has a higher percentage of highly skilled employees than any other department. Electrical departments are often referred to as the "blood stream" of the system for as in the human body, when the blood ceases to flow to any part of the body, that part soon loses its ability to function properly. In the same manner if the electricity fails to flow to any part of the system, that part becomes inoperative.

In manual and semi-automatic substations operators must be provided usually for twenty-four hours a day, seven days a week. The operators must be highly skilled and trained and must be thoroughly familiar with their substation equipment and circuits. They are not only required to operate the station, but, in case of trouble, must be able to diagnose the trouble properly and return the station to service as quickly as possible. The operators are also used for minor maintenance work and are held responsible for keeping the substation and equipment clean and in good operating condition. In large substations helpers or junior operators are provided to assist the operators in their duties.

For automatic and remote control substations it is necessary to have electricians (commonly called inspectors) make inspections at certain designated intervals to clean, repair and make necessary adjustments. These men are also used in case of trouble to make necessary emergency repairs and adjustments so that the station can be returned to service in the shortest possible time.

sible time. In these stations the control circuits are generally very complicated as each station has its own characteristics; it is not uncommon for the equipment to be manufactured by different companies or by the same company at different times. Therefore, these inspectors, who work in many different stations, must be very highly skilled.

For the contact systems it is necessary to have overhead repair crews; when systems using underground cables are used it is necessary to have cable gangs. Cable splicers are also necessary, a class of workman always considered among the highest skilled men.

In addition to these, many systems have structures, other than those mentioned earlier, that are installed and maintained by the electrical department. Among these are the overhead contactors and circuit changers for electrically operated track switches, overhead contactors and signals for single track operation or operations on private right-of-way, overhead lines signals and lighting systems, and privately owned and operated telephone systems.

Also now that many properties are operating their own radio systems, the installation, testing and adjusting of the fixed and mobile radio equipment is likewise a responsibility of the electrical department. All of the above equipment requires the attention of very highly skilled and trained mechanics.

CHAPTER XII

Way and Structures Department

THE duties of the way and structures department of a modern urban transportation system usually include the design, construction and maintenance of tracks, special track work, roadway pavements, buildings, bridges and other structures needed for the servicing, maintenance and operation of local public transportation vehicles. On a few of the operating properties, depending upon local conditions, the design of overhead electrical structures and the erection and maintenance of trolley poles, overhead wires and feeder cable facilities are included in the duties of this department.

Departmental Divisions

The organization of the way and structures department is generally subdivided to include:

- Engineering and office forces
- Track construction division
- Way maintenance division
- Welding and grinding division
- Material stores division
- Utility division
- Equipment division
- Building, construction & maintenance division

It is the usual practice of this department to maintain a corps of engineers including civil, electrical and mechanical experts to perform all necessary engineering work such as surveying, design and preparation of plans and estimates, that may be required by the utility. The department has under its jurisdiction a general office force which includes material clerks, time-keepers and other clerical help incident to the operation of the department.

The track construction division performs all major track construction, reconstruction and roadway pavement work under the direct supervision of a track superintendent. The forces in this division during winter months in northerly cities are required to assist in the removal of snow and keeping transportation lines open for traffic.

The way maintenance division makes all ordinary repairs to track and pavement such as replacing broken rails, ties, resurfacing track, placing track bonds, repairing defective track joints, pavement, right of way fences, crossings, cattle guards, signs, removal of snow and ice, and the distribution of sand or other abrasive material on rubber tired transportation routes at bus and trolley coach stopping places and on hills. This last item is a very important factor for safeguarding the continuous operation of these vehicles in the northern cities.

In track maintenance probably no detailed method of repair has been more productive of economy than the judicious use of electric and Thermit welding of car tracks. Prolonging the life of expensive track special work by welding has been carried on safely for many years; broken steel parts are replaced with welded repair parts where track foundations are adequate, and thus this method is used to the full economic limit. Properly supervised employment of special grinders for the smoothing of rail corrugation greatly prolongs the useful life of track and gives the finishing touch to welded repair work.

The utility division handles and delivers material to service all the various construction and maintenance operations of the department. The handling and hauling of this material on the larger properties is performed by utility train service consisting of electric locomotives, motor

cars, automatic dump cars, flat cars, industrial cranes and derrick cars. This division also handles and delivers material by trucks for the disbursement of stock material, hauling and disposal of debris from track and pavement construction work, and the delivery of other miscellaneous material required in the operation of the railway utility.

The material stores division is responsible for the storage of materials and accounting for all receipts and disbursements of materials normally used by the way and structures department. This includes rail, rail fastenings and joints, track special work, ties, track ballast material, track signal devices, building material, and all the miscellaneous material generally required for the proper maintenance and servicing of railway structures. On some of the properties it also includes the handling, storage, and disbursing of overhead lines material for street car and trolley coach facilities, such as poles, trolley wire, feeder cables and all of the hardware required for the construction and maintenance of these lines.

The equipment division is generally recognized as that part of the way and structures department which has the responsibility for maintaining, servicing, and operating miscellaneous equipment used by the construction and maintenance divisions of the department. This includes drills, concrete breakers, pile driving equipment, hydraulically operated sand spreaders and snow plows, portable pumps, and other miscellaneous minor equipment used by the department. On the larger properties this division may also maintain a blacksmith shop for the repair and sharpening of small tools such as drills, picks, shovels, etc.

The way and structures department is also generally required to maintain all housing facilities for the transportation utility including office structures, car stations, shops, miscellaneous way buildings, bridges, station layouts, tunnels, subways, trestles, culverts, and other right of way structures. In the larger cities the forces of the department include certain craftsmen such as carpenters, masons, and painters to perform all the necessary building maintenance work. In the smaller properties work of this nature is generally done under contract.

Street Railway Tracks

The street railway tracks are generally classified as tracks in paved streets, tracks in subways, open track construction on private rights of way, and tracks in shops, car stations and yards. The tracks in improved streets are normally paved with the same material as the sides of the street unless, by franchise requirements or by stipulation, a special type of pavement is permitted in the track zone by the municipalities. The track zone is generally recognized as the complete area occupied by street car tracks and to lines one foot to two feet outside of the outside rails depending upon franchise requirements.

The methods employed in the construction of modern tracks depend to a great extent upon the importance of the thoroughfares as traffic arteries, the business development along the streets and the plan agreed upon with city authorities for carrying on the work. These considerations become greater problems each year as street traffic density continues to increase. To prosecute the work efficiently with a minimum of interference to the public it is always desirable to secure the close cooperation of the city department of public works.

It is also good practice on major projects to inform the public in advance about the work that is to be done. The erection of street signboards to indicate the expense involved expressed in car fares or other facts relating to the work are helpful in maintaining good public relations. Such work should also be planned and executed so as to be completed within the shortest possible time.

Track Special Work

On street car lines other than along tangent track, where intersecting lines or special track layouts involve connecting curves, turnouts and switches, such layouts are technically referred to as track special work. This includes switch, mate and frog castings and connecting curved rails of various design needed to meet the requirements for routing street cars from one track to another or to intersecting car tracks at various locations on the transportation system.

Curves whether single units or included in involved special work layouts are usually spiraled on both ends to permit easy transition from tangent track operation into and out of the central part of the curve. Spirals for this purpose have been developed and standardized by the American Transit Association and have been generally accepted by street railway companies throughout the country. In the development of double track special work the curves are usually designed to provide car clearance so that cars passing through the special work in opposite directions may do so without interference. Switches and mates used in special work layouts have been standardized as to radii and the curve spirals have been modified to permit the introduction of these standard switches into the layouts without change in alignment.

Usually different rail sections are employed in the building of track special work so that a suitable integral guard will be provided. Except for the longer radii the curves are usually double guarded, i.e., a guard rail is provided on both the inside and outside rail of the curve.

Special work parts, switches, mates and frogs are built of several types of construction, from the cheaper plain bolted type to the more expensive solid cast type with intermediate designs including rail bound, hardened center iron bound, Thermit welded construction, etc. It would be well to consult street railway special work manufacturers' catalogs for the details of various types of special work construction.

Crossings of one electric line over another are usually made of the same type of construction as the special work parts described above. However, when the electric lines cross over steam railroad tracks the construction is usually modified to provide through rails on the steam road line with deeper throatways to compensate for the difference in the flange depth of electric railway and steam road wheels.

Included in special work are many miscellaneous items such as electric switch throws, bridge brake castings, track drains, expansion joints, etc.

Roadway Pavements

It has been the general practice in the past to pave the track zone area with concrete paving base with a wearing surface of brick, granite blocks, or sheet asphalt. During the later years following improvements in the mixing and placing of concrete, many street car tracks have been paved with concrete because of its economy, endurance, smooth wearing surface, and pleasing appearance. Track special work, however, is generally paved with granite blocks so as to more readily permit the repair of the special parts and for the convenience of restoring the pavement area resulting from such repairs. Throughout the country the placing of concrete pavement in the track zone as a wearing surface on tangent track has been the generally accepted practice. This is done because of the resulting economies, reinforcements of the track structure, and provision of a smooth wearing surface for roadway vehicles.

Overhead Trolley and Feeder Cables

On some properties the maintenance and construction of overhead trolley facilities comes under the jurisdiction of the way and structures department since the erection and maintenance of this part of the property readily goes along with the other work of the department. However, on many properties the responsibility for the construction and maintenance of these facilities comes under the jurisdiction of a chief electrical engineer or a superintendent of power. The responsibility of this division includes the necessary patrol, inspection and maintenance service or railway overhead trolley lines, feeder cables, poles, and the maintenance and construction of signal facilities.

Economics of Maintaining Street Car Tracks

During the past two decades, as discussed earlier, there has been quite a rapid transition from street cars to rubber tired vehicles. Most of the smaller cities have completely abandoned street railway operation and have substituted gasoline busses. There has been a like transition in many of the larger properties. In such properties it has been necessary to give

careful consideration to each specific location, method and manner of reconstructing tracks in the city streets. Obviously, a section of track that must be rehabilitated due to street improvements and which cannot be abandoned for street railway operation at an early date must be treated in a manner suitable to meet city requirements. However, the cost must be limited in expense to the anticipated future life and economic needs of the streetcar operation. During this transition period all street railway properties have been forced to exercise every economy in the construction and maintenance of its tracks.

This situation has caused engineers to initiate new ways and means in the building and maintenance of street car tracks to prolong their lines temporarily without sacrificing quality, workmanship, or safety of operation. Most transportation properties have been confronted with financial limitations which have spurred them on to an acceptance of what is believed to be sound but previously untried methods. This has resulted in new ideas that have promoted successful changes from past practices and have accomplished remarkable results at reduced costs over formerly accepted standards. Many companies have adopted the use of modified forms of track construction as it would be obviously imprudent to reconstruct tracks for a period of say thirty years where there would be considerable question as to the continued use of street railway operation.¹

Maintaining street railway tracks is still an important factor in local transit operation in the larger cities of the country. The need for maintaining these car tracks is influenced, of course, by the volume of traffic to be carried over a given line in the congested sections of the larger cities.

The construction of rapid transit lines on private rights of way, or in subways, will no doubt show progressive development in the larger cities, for carrying heavy rush hour traffic. The desirability of complete separation of high-speed street railway service from city street levels is well recognized. The financing of such projects, however, forms the greatest obstacle to their early realization. Where such projects now exist they are generally owned and constructed by the municipality and may be operated by a city transit authority or leased to a private operating company.

¹Cf. Proceedings of the Annual Conference, American Transit Association, New York City, 1934, pp. 421-455.

CHAPTER XIII

Transit Accounting

THE function of the transit accountant is to record and check the internal and external business transactions of the company and to prepare financial reports so that all interested groups may have access to the information. Such data must be available for the proper preparation of schedules and fare structures, the operation of vehicles and their maintenance, personnel direction, relations with the public and regulatory authorities, and many other operational phases of a transit company's operations. Thus, systems of transit accounting must necessarily be complex to reflect the different types of activity carried on by a transit company.

The Accounting Cadet

Even the trained accountant who becomes a member of the accounting and financial staff of a transit company may find much that is new to him and for which his previous experience has not equipped him. He must not only learn how to cope with the specialized problems of transit accounting, he must also know the relationships of the accounting and operating departments and the framework of regulatory procedure within which these departments must function.

For these reasons, transit companies as a rule train their own accountants. The managements of many companies now follow the practice of employing "cadets" in the accounting as well as in the engineering field. A typical accounting cadet is in his early twenties, a college graduate with a major in accounting. He may have a background of practical experience in industry or as a public accountant. At present he is more likely to have been in the armed services and to be without business experience. The course of training to which he is subjected lasts about two years and is intended to give him a general familiarity with all of the functions of the financial and accounting departments. Perhaps the best way to introduce the student of urban transportation to the role of transit accounting is to follow a cadet through part of his training course.

The cadet is first given a chart showing the organization of the company so that he may get his first impression of the numerous activities which comprise a transit business. From this chart he begins to visualize the interrelationship of the various departments, e.g. real estate and insurance with plant and buildings, and of budgets with transportation and maintenance. His training naturally will be centered in those departments reporting to the vice-president -- finance, or to the comptroller.

These titles may be held by two persons, or one person may hold both, exercising control through one or more assistants and aided by specialists on his personal staff.

Before the cadet begins to work in any of the departments directed by the Vice-president of Finance, he learns in a general way the responsibilities of that officer. These comprise responsibility for the integrity of the company's accounts and for the reports made to stockholders and to governmental agencies. Management must be furnished statements of the company's financial position showing the results of its past and present operations, upon which sound decisions for future financial and operating policies can be based.

Estimates must be made of the company's cash position for both short and long-term periods. In general then, he must present, in the form of figures, the past history and the probable immediate future of the company's operations. In order to do this he must have an intimate knowledge of those operations, including the workings of departments reporting to other members of management.

After absorbing this general information, the cadet begins to work in the various financial departments. The functions of the tax, purchasing, supplies and stores, and accident investigation or claims departments are developed in other chapters and their accounting entails few unusual practices. However, the potential liability for claims arising out of accidents is so great that it cannot be treated as contingent, as is ordinarily done. If such claims are not covered by insurance, it is the usual practice to multiply the number of each type of unsettled claim by the average past cost and to record the total as a liability, together with an estimate of the liability for accidents not yet reported. The average past cost may cover a period of years and be weighed for changes in the level of wages paid in the community, present range of damages awarded by juries, etc.

In certain other departments both the accounting procedures and interdepartmental relationships are similar to those of ordinary industry. Such departments are those of the secretary, treasurer, or cashier, office management and real estate and insurance. The real estate department handles all of the details of leases, concessions, rentals, and car-card advertising.

In studying the preparation of the budget and the constant adjustments necessary to reflect changes in operating conditions, the cadet becomes acquainted with the functions and supervising personnel of every department in the company. In the statistical department, he learns how the estimate of revenue is made for each day of the coming year. Past experience is adjusted for upward or downward trends in riding habits and for special factors, such as generally increased vacation allowances, Saturday closing of banks, scheduled conventions or athletic contests, and other special events.

In the rolling stock department are weighed such questions as the cost of maintaining such a complicated new vehicle as a P.C.C. versus that of an old car or another model, increasing safely the mileage between periodical vehicle overhauls, and similar questions. Each decision must be translated into dollars and reflected in the budget.

The cadet learns the effect of an increase of a few cents in the cost of a pound of paper on the estimated costs of printing transfers. He finds that the program of track renewal must be correlated with the plans of the city for repaving of streets. Other departments with an increase in work consider whether it is advisable to add to the labor complement, work the present force overtime, or "farm out" the work to outside contractors.

He finds that the trend of wage contracts to grant longer vacations presents a host of problems to those preparing the budget. Does a certain man have to be replaced? Will it be necessary to hire a temporary employee or can the department schedule a series of "back fills" which will allow the most necessary work to be done?

The cadet who has already worked in the budget and cost sections of a manufacturing plant, for example, soon learns that the budget of a transit company must be much more flexible and more constantly revised. The manufacturer can estimate the number of units to be produced and his costs will bear a close relationship to his original estimates for labor and material per unit, though the number produced varies from the original proposal. In furnishing transportation, however, a five percent drop in passengers does not allow a five percent drop in the costs of furnishing transportation and may have no effect at all on other costs of the company.

The accounting procedures by which the finally established budget is revised, compared with actual expenditures and the deviations analyzed, would require pages of explanation. It is the duty of the comptroller to see that such reports are presented to those members of management who are responsible for the departments exceeding their budgets. The question of work performance, i.e., whether the budgeted amount of work has been done for the budgeted number of dollars, forms a part of the comparison of budget with actual expenditures.

Divisions of the Accounting Department

Auditing Department

The greatest part of the cadet's training period will be spent in the divisions making up this department. In the typical large urban property we are studying, he might find the following functions being performed:

- General bookkeeping
- Accounts payable and receivable
- Internal auditing
- Passenger receipts
- Payroll
- Plant accounting
- General statistics
- Accident and claim statistics

From this list, the student can form a general idea of the work the cadet will perform in each division. In this chapter only the effect of regulation on the general books and property accounts, the peculiarities of accounting for transportation payroll and passenger receipts and monthly statistical reports will be discussed.

Regulatory Accounting

While the accounting procedures discussed in this chapter deal with the accounts of a privately owned and operated transportation company, those of a municipally owned property or one owned by a "public authority" are not markedly different. In the case of a publicly owned property the accounts to be kept and the form of its financial statements are determined by the public body or by the legislation which gave it the power to operate a transit system. For the most part, the accounting procedures adopted are the same as those prescribed for a privately owned company by the regulatory body having jurisdiction over its accounts.

Almost every privately owned company is subject to the regulation of a state Public Utility Commission, or to the Interstate Commerce Commission, or both. A few are regulated only by the political entities in which they have franchise rights. A typical example of legislative control of utility accounting is the following extract from the Pennsylvania Public Utility Law:

The Commission may, after reasonable notice and hearing, establish systems of accounts (including cost finding procedures) to be kept by public utilities and prescribe the manner and form in which such accounts shall be kept. Every public utility shall establish such systems of accounting, and shall keep such accounts in the manner and form required by the commission.

Fortunately, there is a measure of consistency in regulatory accounting requirements for the transit industry, since almost every regulatory body has adopted the systems prescribed by the Interstate Commerce Commission. These are the "Uniform System of Accounts for Electric Railways, Issue of 1947" for electric street car subway-elevated trackless trolley operations; and "Uniform System of Accounts for Class I Common and Contract Motor Carriers of Passengers, Issue of 1937" for bus operation. Separate regulations deal with the preservation and destruction of records for electric and for bus operations, and additional regulations dealing with other accounting requirements are generally issued by the regulatory body.

The accounting cadet who is, given these systems of accounts and regulations to study is impressed with the extent of controls over the utility which is given by this right to prescribe accounts and accounting procedures. The regulatory body considers three things in determining the rates that a utility may charge:

1. The value of the utility's property.
2. The rate of return to be allowed on that value.
3. The expenses to be allowed in addition to the return to the owners.

Two of these three factors are largely determined by the books of account. The cadet sees that in the general books of account and in the subsidiary plant records, the utility follows the prescribed methods of accounting for the acquisition and disposal of property and for providing for depreciation on it. He finds that the amount paid for property is not always recorded as its cost, but that the utility may have to write off part of the purchase price against future income or against surplus. The provision for depreciation may be increased or decreased as far as the value of the property or allowable expenses are concerned. The commission determines whether expenses are recurring or non-recurring and whether they shall be borne by the rate-payers or stockholders, regardless of their being both actual and normal.

The various "Systems of Accounts" provide that supplementary accounts may be maintained. The cadet learns how important that provision is if the systems prescribed are to be made flexible enough to yield the information necessary to management for day-to-day control of the company's operations. To the commission, accounting is a tool of regulation and it is chiefly interested in the accounts as history. Management, however, must depend on the same books of account to provide it with living information.

Tax laws and Securities and Exchange Commission regulations, as well as Interstate Commerce Commission rules, contain provisions which seem contrary to sound accounting principles as applied to private business. In some cases, the regulations conflict. There has not yet been final legal determination as to the supremacy of any. The two accounting systems prescribed by the Interstate Commerce Commission conflict in their treatment of the reserve for depreciation. Since many times the determining factor in a finding of "fair value" is the cost of property less the depreciation recorded on the books, these differing concepts of the proper method of recording depreciation can result in different valuations, depending on whether the property is bus or rail.

Transportation Payroll

Relatively few payrolls are more complicated than that of an urban transit company. In the maintenance departments the payroll must be distributed to various expense and capital construction accounts, as well as classified according to the type of operation, bus or rail. Labor costs may also be kept according to the type of bus worked on, i.e., 44-passenger Macks or 27-passenger Fords. A further distribution may be by the nature of the work done, such as inspection, service or overhaul. Some part of this distribution is required by the system of accounts, the rest is dealt with in subsidiary accounts for the information of management and for budgetary controls.

However, once the methods of distribution have been determined, the week-by-week calculation of this part of the payroll is relatively simple. The transportation payroll is another story.

The entire payroll, of course, is governed by the provisions of the labor contract and even the shop payroll requires the determination of daily and weekly overtime, night-shift differential, and other variations. The contract provisions of the car and bus operators' payroll contain a multitude of items found only in transit or railroad agreements. The amount of pay is determined by multiplying the number of "pay hours" by the stipulated hourly rate; however, pay hours allowed may be forty percent or more in excess of the hours actually worked. This is occasioned by the addition of pay hours as so-called "fringe" allowances. In an urban company, these allowances will include all or most of the following:

1. Lay-over time at the terminals of a trip.
2. Travel time.
3. Lunch time.
4. Waiting time between the parts of a "split-run".
5. Night shift premium.
6. Report and turn-in time.
7. Accident report time.
8. Working on scheduled day off.

9. Working on a second run (wildcat or tripper).
10. Overtime on hours in excess of eight in one day.
11. Overtime on hours in excess of forty in one week.
12. Guaranteed minimum weekly pay.
13. Minimum day allowance.

As a result of these allowances, the number of pay hours required to be paid is determined for each "run" scheduled by the timetable and traffic department. The scheduled pay-hours are subject to deviation for delay, change in operator on a split-run, or factors involving additional overtime, such as work on a scheduled day off. Different schedules for weekdays, Sundays, and holidays involve new calculations of scheduled pay hours. Special trips for shoppers, excursions and athletic contests ordinarily are not scheduled but are recorded as extra work.

A number of large transit operations have adopted a specialized accounting procedure to meet this payroll situation. It involves the calculation of separate pay for each piece of work done by an operator during the week and the use of tabulating machines. Cards are prepared in advance for the pay-hours for each run on each schedule. Next, "deviation" cards are made up for any additional allowances reported by the depot dispatcher as a result of the performance of the run. A third card then is produced which gives the actual pay hours multiplied out at the operator's rate of pay. These cards are then assembled and for each operator the weekly overtime added and deductions made for union dues, bond purchases, and federal taxes. The speed with which these calculations are made and the ingenuity of the equipment are made possible by the development of electronic devices, unknown until recent years.

The use of such modern equipment makes it possible for the accounting department to furnish management with exceedingly valuable "by-products" of its payroll system. For instance, the average pay of ten thousand employees can be given to the statistical department in a few minutes. The deviation cards mentioned above, when listed and classified, furnish a valuable control to the transportation department. The reason for the payment of every pay-hour in excess of these scheduled is shown and forms the basis for checking on depot or street supervision.

The scheduled pay-hours also are analyzed so that the vice-president -- industrial relations knows the cost of every one of the allowances made in the wage contract and the accounting department is able to estimate accurately the cost of new allowances proposed. This is particularly important when the wage contract applies adjustments retroactively, often for months. Again, accurate knowledge of the hourly costs of fringe allowances is important in arbitration cases, since a basic rate of \$1.40 an hour may well become \$1.85 when the cost of these allowances is taken into consideration.

Passenger Receipts Accounting

Another example of the inter-relationship of the accounting and transportation departments is in the development of procedures for the handling and auditing of cash receipts. These procedures must be able to be performed initially by the operators without unreasonable burden, yet the system must be designed to record passenger revenue accurately.

The cadet is made aware of the physical effort and the volume of paper work necessary to handle the collection of millions of dollars, paid in pennies, nickels, dimes and tokens. With the total revenues of the transit industry in excess of \$1,300,000,000 annually, the processing of fares is on a mass production basis. The cadet early learns that the smallness of the coin does not justify careless accounting and that the loss of ten or twenty a day, repeated by many persons, adds up to staggering sums. Perhaps he is told some of the stories current in the industry, such as that of the conductor, observed "knocking down" fares, who argued seriously that it would be a mistake to fire him since his house was almost paid for.

The value of the end-product of any accounting procedure is limited by the trustworthiness of the original entry. Accounting for passenger receipts is an example. It should start when the passenger hands the operator a coin or token. If it does not start then, it never starts as far as that particular coin is concerned.

Companies use many different ways to insure that the transaction is recorded. Some use meters. The alertness of the passenger to see that this is done is supplemented by periodic inspections. Others use types of locked boxes in which the passenger drops the fare, or hand meters in which he inserts the coin. There is a constant race to invent a device which is certain to foil the ingenuity of the occasional operator or passenger who considers it no wrong "to beat the transit company". An early type of locked box was followed by an improved model with projecting prongs to rip the hair nets which, some operators had inserted to catch their share of the coins. Another operator, who lived in an isolated house at the end of his line, owned a fare box of his own with which he made several trips a day.

It is the joint responsibility of the accounting and operating officials to investigate all new machines or methods which encourage the initial complete and accurate recording of fares. The problem is not a minor one. On routes on which a new collecting device is installed, there is often a marked, but sometimes temporary, increase in revenue.

One system currently in use utilized the overhead meter as a recording device, with separate meters for each important type of fare. For instance, where the fare was either a 12-1/2 cent token or 13 cents cash, it was found that the cost of additional meters would be more than met by providing a means by which the two fares could be distinguished. Under this system, the operator records the initial reading on each register on a "way-bill" as he commences work, and the ending readings as he leaves the vehicle.

The differences for each type of fare are also recorded, multiplied by the rate of fare, and the products added to arrive at the amount he calculates he should "turn-in". This simple explanation omits the handling of school tickets, transfers, token allotments, etc.

At the car barn or depot, the operator hands the way-bill and collections to the receiver, who scans the mathematical extensions and additions. At the same time the collections are put through a money-counter. The receiver collects any shortage which is apparent on this inspection, but does not verify the register reading subtraction. The receiver then records the summary of each way-bill on a "line-sheet" on which the collections of each route are entered, by run number. Next, the line-sheets for each route and for the depot are balanced and the bank deposit prepared.

In the particular property described in this chapter, the deposit is made in a bank convenient to each depot. The deposit ticket is sent to the treasurer's department to be handled as if the deposit has been prepared there. This department handles physically the receipts of the subway and elevated lines alone, by means of the "indirect turn-in". Here, the night revenue train picks up the collections at each station in locked pouches containing the money and a way-bill. The way-bill contains the opening and closing readings of the turnstiles, but the money has not been counted. This is done by bill, coin and token-counting machines in the treasurer's office. Counterfeits, slugs and foreign tokens are removed, and the coins wrapped or bagged ready for deposit. In this method there must be confidence by the subway-elevated cashiers in the honesty of the treasury employees and in the accounting procedures, since the cashiers have no way of checking the justness of charge-backs for shortages.

Following the balancing of collections with way-bills, all way-bills go to the accounting department for audit, together with copies of the line-sheets and the daily summary of passenger receipts by routes. The receipts auditing division prepares daily register statements, on which

are recorded the number of each meter or turnstile, the beginning reading (taken from the sheet of the previous day) and the ending reading reported on the current way-bill. The difference is calculated and compared with the difference recorded on the way-bill itself. Any discrepancies are investigated and necessary charge-backs made for shortages.

Monthly Statistical Reports

As a result of preparation of the payroll and accounting for passenger revenue, the accounting department is able to include many valuable tables of statistics in the monthly financial reports. The basic data for each type of transportation service and for each route operated, is the following:

- Passenger revenue
- Number of passengers
- Equipment units operated
- Pay hours (and Work hours)
- Round trips
- Miles operated

From these such relationships as the following are established:

- Revenue passengers to transfer passengers
- Passengers per mile and per pay-hour
- Revenue per mile and per pay hour
- Passengers per trip

These statistics are used by the timetable department in determining average speed and in setting new schedules. They give the transportation department a check as to the adequacy of service. While the figures for any particular period may not be conclusive, the fluctuations from period to period point to the places where traffic checks are indicated or where additional supervisory effort is needed.

Accounting department statistics are also the basis for annual reports made by the American Transit Association and such publications as the "Transit Fact Book". For this reason and in order that companies may make accurate comparison of operating results, continued effort is necessary to insure a common nomenclature.

CHAPTER XIV

Legal and Claims Departments

THE legal problems with which all transit companies are confronted fall into five broad general classifications:

1. Matters under the jurisdiction of the Public Service Commission of the State in which the company operates;
2. Claims for injuries and damages and the trial of cases arising therefrom;
3. Labor;
4. Taxes;
5. Miscellaneous.

There is no uniformity in the manner in which the many transit companies handle these matters. Certainly as to the larger companies it can be said that there are almost as many methods as there are companies. Some companies have their own legal departments, staffed by full time employees, who are capable of handling all of the above work; others have a general counsel who is a partner in a large law firm and all of the company's legal work is handled by the general counsel and the members of his firm. These two methods may be characterized as the two extremes and between them are countless numbers of variations.

Functions of the Legal Department

A description of how one of the larger companies handles its legal business will illustrate one of the many variations from the two methods above set forth. It will also give some conception of the types of legal problems which must be dealt with by a transit company.

This particular company has a general counsel whose duties are to supervise and coordinate all of the legal business of the company. The general counsel handles the legal matters relating to the corporate powers and internal management of the company. He also handles all of the legal questions which arise from day to day and which are not assigned to special counsel, such as the drafting or approval of all contracts of the company; the drafting or approval of all documents in connection with the acquisition, sale or leasing of property; rendering opinions arising under the indenture of mortgage securing the bonds of the company, as well as the preparation and filing of opinions with the trustee under said mortgage; all questions relating to the capital affairs of the company, and advising with the officers of the company with respect to its labor matters. The general counsel also advises with the head of the claim department and the trial attorneys with reference to the company's litigation. It is difficult to enumerate the varied and numerous problems which are referred to the general counsel, but in a large company hardly a day goes by that some new problem does not arise.

As a transit company has at least a partial monopoly in the jurisdiction in which it operates, it is subject to public regulation. The regulatory body is usually the Public Service Commission in the state in which the company does business. By reason of the importance of regulatory matters the company retains a firm of attorneys to handle all of its matters before the commission and in addition all matters before other administrative bodies. This firm also acts as legislative counsel for the company. In this connection they advise the company with respect to all pending bills affecting the company and in appropriate cases appear before committees of the legislature.

The company also retains a firm of attorneys charged with the responsibility of trying all cases in the superior court. The superior court in this particular jurisdiction has jurisdiction over all cases in the superior court. The large companies, because of the many millions of miles they operate in a year, of necessity, have numerous accidents. Among the larger companies the number of accidents will run from approximately 7,500 to 12,000 a year. These range all the way from such trivial occurrences as the snagging of a stocking or the soiling of clothing to those involving death or serious and permanent injury. Most companies provide for their injuries and damages by setting aside for this purpose a certain percentage of their gross revenue. This percentage varies from approximately three per cent to ten per cent with an average of probably five per cent. Assume that a company has a gross revenue of \$30,000,000 and utilizes 5 per cent of its gross for the disposition of its claims for injuries and damages, it will be seen that the cost of this item alone amounts to \$1,500,000 per year. It is obvious, therefore, that the skillful and proper handling of these matters is of the utmost importance to the company.

Many of the claims are settled directly by the claim department but there is also a large volume of suits. As has been pointed out, the general counsel confers with the head of the claim department and the trial attorneys with reference to these suits. In these conferences it is determined which suits will be tried and which will be settled as well as the amount the company will pay in those cases which it is determined should be settled. In addition to suits filed in the courts, the general counsel also confers with the head of the claim department and with the trial attorneys with respect to claims which are considered to be of a serious nature.

The company employs another attorney to handle all coroner's inquests and to defend its operators in negligent homicide and other criminal cases arising therefrom. Another attorney is employed to handle all traffic violations by operators such as speeding, running through red lights and other like matters. This attorney also handles all civil cases in the inferior court which involve more than \$500 but not more than \$3,000, which is the limit of the jurisdiction of the inferior court.

Since more than 50 per cent of the transit revenue dollar is required for the payment of labor, the labor problems of a transit company are of the greatest importance. The general counsel of the company advises with management in respect to negotiations and participates in the drafting of any changes in its labor contracts. Labor contracts are usually for the term of one year and when agreement cannot be reached with the union involved, the matter of the new contract is often submitted to a board of arbitration. Such an arbitration usually consumes about one month and a great mass of statistical and economic data is submitted to a board. The company involved usually handles an organization specializing in transit labor matters to handle this type of case.

Most labor contracts contain a provision that disputes arising under the contract will be submitted to arbitration at the request of either party. This gives rise to numerous arbitrations growing out of discharges and disciplinary action taken by the company against its employees. The union involved often contends that the discharge of disciplinary action taken by the company was without just cause and demands arbitration. In these cases, the general counsel sits as a member of the board of arbitration and one of the attorneys employed to handle the cases in the superior court presents the evidence.

There are few moves that a business organization can make without giving consideration to the tax question involved. It is, therefore, of the greatest importance that a transit company have expert tax advice. This company retains no special tax counsel and tax questions are usually passed on by the general counsel or the firm handling work before the Public Service Commission and other administrative bodies. Both this firm and the general counsel have tax specialists in their organizations. However, many of the larger companies do retain special tax counsel to advise them on all tax matters, both state and federal.

The legal problems of the company we have used for the purpose of illustration are not substantially different from those of any other company. In the larger companies the volume of work and its diversity in many specialized fields is such that no one lawyer could handle all of

it and this accounts for the many different methods utilized by transit companies in the handling of their legal work.

The Claims Department

As the functions and duties of the claim department of a transit company are so closely related to those of the legal department, the picture would be incomplete without also setting forth the organization and manner in which a claim department operates. Mass transportation companies generally handle claims for damages arising from the operation of their vehicles in one of three ways: first, by the assumption of the entire risk; second, by assumption of the risk up to a given point with excess insurance to cover costs above that point: or, third, by insuring the entire risk with an insurance company.

The first method is utilized by some of the largest companies; they consider it more practical to carry their own risks as this can be done just about as economically by their own organization as it can be by insurance and makes it possible to save what the insurance company would take as a profit on the business. The second method is also used by some large companies who desire the insurance company to bear the risk against catastrophies, as opposed to regularly recurring accidents. The third method is usually utilized by the smaller operators who desire to shift the entire burden to an insurance company.

In addition to the department head and his assistant there should be adjusters, investigators, clerks, stenographers, estimators and photographers. The latter two may seem superfluous, but a good estimator can save several times his salary on automobile damage estimates. Any trial attorney will readily agree that a good picture is the most convincing form of evidence.

Some companies make a sharp distinction between, investigators and adjusters. All of their investigating work is done by the investigators and all contacts with claimants and attorneys representing claimants are made by adjusters. In other companies the line is not so sharply drawn and a man may be assigned cases on which he will do both the investigating and the adjusting. This is the general method followed by insurance companies. It should be borne in mind that there are men who are excellent investigators but who, because of temperament or some other reason, would never make good adjusters. It is also argued that the use of a good adjuster for investigating work is a waste of valuable talent.

The functions of the claim department are generally threefold:

1. It processes and disposes of claims presented against the company by persons seeking damages;
2. It handles claims of injured company employees under the workmen's compensation laws of the state in which the company operates;
3. It prosecutes the company's claims against others for damages to company property.

The first item constitutes the department's biggest activity. Each morning there come to the claim department, from all over the system, the accident reports for the previous day. The question immediately arises of which to assign for investigation, which to file away, which of the injured persons to call upon, and which to leave alone. On the question of whether to call upon the injured person or to sit tight there are two distinct schools of thought. In most companies it is the practice to send an adjuster to see the injured persons in cases where the accident report indicates liability, or a reasonable possibility of it, on the part of the company. By this practice they unquestionably invite a few claims which they would not get if the calls were not made.

However, there are several advantages in an early interview with a claimant. The adjuster usually is able to get a signed statement of how the accident occurred. These statements, in many instances, indicate a lack of liability on the part of the company. He also has an opportu-

nity to size up the claimant and see for himself the nature and extent of the injuries, thus diminishing to some extent the possibility of having the injuries built up by an unscrupulous claimant. On the other hand, there are companies in which the claim departments operate, apparently with considerable success, upon an entirely different theory. They make no calls upon anyone until a claim is presented. The method of procedure in this respect is a matter of choice but experience has undoubtedly proven that it pays to settle liability cases as soon as possible after the injury occurs.

In investigating claims it should be borne in mind that each claim is a potential law suit and for that reason the investigation should be fully and completely made. Signed statements should be obtained from all witnesses, if possible, whether they indicate that they saw the accident or not. Witnesses sometimes change their minds after originally saying that they saw nothing. An investigator should endeavor to anticipate the various contentions that the claimant may make and cover these possibilities thoroughly in his investigation. Not only should he include statements from witnesses whose names appear on the accident report, but a careful canvas should be made of the vicinity of the accident for additional witnesses, interviews with police officers, measurements, pictures and other pertinent information. There is no substitute for proper preparation and nothing should ever be taken for granted.

When the investigation is completed, the question arises of what to do with the claim. The cases will usually fall into one of three categories: cases in which there is no question about the company's liability; cases in which there is absolutely no liability on the part of the company; and, cases in which the liability is doubtful.

The claims falling in the first class should be settled as soon as possible after it has been determined that the injury or damage resulted from the negligence of the company or its employees. If the claim is for property damage only, the amount is easily determined. The difficulty arises in fixing the amount to be paid in claims for personal injuries. In this connection consideration should be given to the expenses, including loss of earnings, incurred by the claimant as a result of the injury and to the nature and extent of the injury. The claimant is entitled to be reimbursed for the expenses plus a fair and reasonable amount for the pain and suffering resulting from the injury.

Claims in which there is no liability should not be paid. This rule should be followed even if suits are filed and settlements can thereafter be made for small amounts. The practice of settling no liability cases after the filing of suits only leads to more and more litigation and eventually leads to increased costs.

In the third class of cases where there is serious question about the liability, it is usually wise to make a compromise settlement if this can be done for a reasonable figure. As between the individual plaintiff and the corporate defendant a jury will, in the majority of such cases, find for the plaintiff, and the amount of the verdict, plus attorney's fees and court costs is apt to be greater than the amount for which the case could have been compromised. It should be continuously borne in mind that the ultimate object of the claim department is to hold the injuries and damages reserve to the smallest possible percentage of the company's revenue and at the same time to build up a reputation for fair dealing with the public.

It is the practice in some companies to remove the case, as soon as a suit is filed, from the control of the claim department and turn it over to the legal department. This practice only encourages litigation. Whenever settlements appear desirable in cases which are in suit, they should be made by the claim department. Attorneys representing claimants are less liable to file suits if they realize that even after doing so they will still have to discuss settlement with the same adjuster.

The handling of claims of injured employees under workmen's compensation laws presents no great problem for the claim department. It is largely a clerical matter since few of the cases require any investigation into the facts. In cases which are disputed there is little chance for the employer to prevail. All doubts are usually resolved in favor of the employee. In fact, a statutory provision to that effect is not unusual.

Where accident reports indicate that the company property has been damaged through the sole negligence of other persons, claims should be presented for that damage. If care is used in selecting the cases in which to make claims, the effort will be successful in a great majority of instances with considerable benefit to the company. It is a useless waste of time and makes for poor public relations to present a lot of claims in cases where the liability is doubtful.

There should be close cooperation and a policy of mutual helpfulness between the claim department and other departments. The claim department can and should supply to other departments a great deal of information which can be used to reduce the number of accidents. On the other hand the other departments can, by securing witnesses, making accurate and timely reports on equipment conditions, and in many other ways, be helpful to the claim department in its efforts to hold down claim costs.

CHAPTER XV

Purchases and Stores

THE operation of a purchases and stores department in urban transportation is based upon two fundamental facts. First, material expenditures represent a relatively large percentage of the annual operating budget. Second, the orderly flow of these materials into the operating department is necessary to the efficient and continuous operation of the transit system. The purpose of this chapter is to describe the departmental organization, its function, and its procedural methodology.

Organization of the Purchases and Stores Department

Since material expenditures in the urban transit field are second only to labor expenditures and the material requirements concern every branch of operation, the administrator of this department usually reports directly to the chief executive.

In the average large company the personnel required for material control should include an administrator and the following assistants:

Purchasing Agent	Inspectors	Machine operators
Buyers	Expeditors	Stores auditor
Invoice clerks	Clerical workers	Field auditors
Order clerks	Receivers	Inventory clerks
Clerical workers	Stock clerks	Comptometer operators
General storekeepers	Laborers	Clerical workers
Storekeepers	Drivers	

However, very often more than one classification can be assigned as the duties of one person, dependent on the size and type of transit operation. A large property may operate high speed cars, surface cars, trackless trolleys, gasoline busses and diesel busses. The material requirements are diversified and many. Some properties stock as many as sixty thousand individual items, comprising a wide variety of materials, which afford an interesting study in contracts such as: pins, salt, flour, silver, rail, silk, sand, pig iron.

Materials are secured from practically every major production industry in the United States and from many foreign countries. Lumber for ties is produced in Washington, Arizona, Florida, Georgia, and West Virginia; tin in China and India; rubber from South America. Other unusual sources of supply are:

mica	India and Canada
asbestos	Canada
sponges	Florida
granite block	Maine and North Carolina
rattan	India
shellac	Yucatan
manila or sisal	Black Sea, Argentina, Northwest U. S. A.
linseed oil	Japan

All are required for consumption in the ultimate production of satisfactory transit service.

Economics of Material Control

Sound economics entail the proper administration of wealth whether that wealth is represented by dollars, property, equipment, or materials) and when those vested with material control responsibilities are not equal to the whole task, the economics of the corporation is disturbed.

The purchases and stores organization must be cognizant of its principal functions from which properly developed sound economic practices can emerge, including:

1. Requirements
2. Investment
3. Material classification
4. Forward commitments
5. Storeroom facilities
6. Material handling machinery

Requirements

To insure uninterrupted vehicle service, regular demands must be protected, increased consumption must be watched, and the reason therefore carefully analyzed. Increases can be caused by any one of many factors: legitimate demand, inferior materials, improper application, operator abuse, and improper operating service for vehicles assigned. Future requirements can never be confined solely to current usage; all elements of projected changes must be studied and considered, and unless these factors are given consideration, confusion and poor operation will result.

It is most important that surveys are undertaken to determine supplier's production lead time; in normal or pre-World War II days the lead time required from all sources of supply varied from one day to six months. However, from World War II to the present, the lead time required now varies from one day to eighteen months. The requirement from even a single supplier does not remain constant and it is not unusual for these lead times to change suddenly from twelve weeks to twenty-four weeks.

Parts vital to operation, not in regular demand but necessary for immediate availability, must also be stocked. Materials included in this category are those materials not subject to normal wear or tear but which fail in service outside the control cycle of maintenance. These items are predetermined by kinds and quantities through consultation and mutual agreement between the service and the stores divisions.

Material demands are never predetermined with exactitude. However, mileage does indicate material life spans and the knowledge of schedules and proposed increases or decreases to schedules are definite factors for applications to material procurement cycles. Thousands of dollars can be lost in inadequate material service and by material abuse. Those charged with material procurement authority must be on their guard at all times to assure having the right kinds of parts in the right quantities available to meet operational needs. Consideration will now be directed towards accomplishing that perfection with the smallest possible investment.

The investment of material must be determined by past usage, potential future consumption, current market conditions, and "lead time" required for delivery. There must also be continued studies towards simplification of stocks. A reduction in the variety of materials may often be accomplished without handicap to the original equipment requirement and very often one article can interchange between two or more differently manufactured units. The necessity for conservation of manufactured materials in World War II emphasized the importance of this simplification requisite.

Accompanying the simplification program should be the development of the required specifications. The company need not engineer individual specifications but advantage should be taken of all the developments in materials by manufacturers, technical societies, governmental agencies, etc.

To protect against over-purchasing and yet to have enough supplies on hand to assure the safe operation of the property the required base investment in materials should be determined. The larger companies find that it is advantageous to assign the many diversified items to control ma-

terial classification groups. In this manner, material within each of these groups, through their similarities, can be purchased more or less from the same general source of supply.

Although no hard and fast rule can be established for a supply in each of these groups as a standard measure for all the urban transit companies throughout the country, generally the average supply in the different control groups might be as follows:

<u>Production of</u>	<u>Supply</u>
Ties, rail and special work	200 days
Cable, telephone and signal supplies	175 days
Castings, forgings and friction bearings	150 days
All other materials	100 days

No investment can be controlled unless the delivery of purchases is regular, and therefore, there should be established a required delivery date for each item purchased. It must be borne in mind that every dollar invested in stock, which is not offset by sufficient demand for materials, represents a proportionate monetary loss. Material delivered, not controlled by time dates specified, can easily result in material availability out of proportion to requirements.

Material Classification

The classification of material resolves itself to a uniformity in the physical grouping of stock and provides economies in operation. It also makes possible a basis for statistics in the control of the investment and for simplified accounting. When one considers that the average company stocks a minimum of ten thousand items and the larger properties stock sixty thousand or more, it is rather difficult to determine any irregularities without such groupings.

The first step is to segregate similar materials into master groups. Each master group thus contains hundreds of items, the materials contained therein are represented "dollar wise" by one figure, and a source of information is available that is most important in material control. These individual items can establish a basic control not to exceed ninety classes and most properties require less than fifty classes.

The complete material control operation would then present receipts, disbursements and balances, in dollar amounts, for each group and would make possible the determination of weaknesses in the investment in materials. Investigation for cause would be limited to those groups requiring special policing. These statistics can also be used as a determining basis for engineering special policing, for improvement in equipment methods, standardization, simplification in material use, and a definite check on material costs by the operating department. Material classification also aids in simplifying the financial statements for executive consideration.

Forward Commitments

The placing of forward commitments involves provision for adequate "lead time", i.e., placing the order with the manufacturer a specified period of time prior to actual delivery. The length of this period has been extended considerably in the years since World War II compared to the requirements of the nineteen thirties. Production lines have often been irregular through labor disputes, delays in freight shipments and many other disturbing factors. This added complexity to the function has demanded keen analysis of all requirements and has imposed a continuing existing necessity for long range "lead times" in the procurement of a transit system's material needs.

It is not unusual for manufacturers in some lines to require orders eighteen months in advance of delivery; many materials have four months of lead time as a routine matter. Therefore, the dollar value of orders of record represents a fairly sizeable obligation of a transit company. Analysis of these obligations should be currently available by classes or groups and must be continually reconciled with the present and future needs. For example, there must be

a constant finger on the pulse for any changes in operation or standards, in order that immediate steps can be taken to avoid completion of material requirements not required through change in operation or potential obsolescence.

Storeroom Facilities

The purpose of a storeroom is to properly house materials, stocked in such a manner that their identity is complete; the grouping should lend itself to a minimum of effort on the part of the personnel in locating specific items. Since material housed without regard to similarity in purpose results in confusion and work time losses, great care must be exercised in placing materials in their designated places.

Individual circumstances will largely govern the amount of space necessary and space requirements will frequently determine the location. The larger urban transit properties will require open storage and shed storage, as well as adequate housing for equipment parts. Rails, ties, special work, line poles, brake shoes, sand, gravel and stone are handled and stored more effectively in open storage. Protection from the elements only is necessary in storing rail fastenings, special work parts, cement, salt, lumber, structure castings, boiler parts, cable, trolley wire, car wheels, brake shoes, springs, and iron and steel bars.

Housing or storage for all other materials must be well planned and placed in the proper location. Well selected locations can save much physical effort and aid in keeping down overall costs. Lost time motion must be considered within the storeroom and extend to the workers that the storeroom serves.

Since conditions in urban transit properties vary greatly and each one needs close study, no set rules can be laid down. Perhaps for a given company the most practical and economical plan would be one control storeroom furnishing supplies to each division by means of conveyance. Another company might be served best by the establishment of separate divisional storerooms with some form of central control.

In all companies the apportionment of space for storage purposes is a matter of importance. The ideal condition would be to have no vacant space and at the same time to have no congestion or overcrowding. This condition is almost impossible to realize but every effort should be made to get as near to it as possible. Vacant storage space is a dead loss, yet nearly every storeroom has some and always when stocks are low or at the minimum.

The capital outlay on a storeroom includes an investment in equipment. This equipment will be varied in type and will be principally governed by the character of the materials stored. Considerable improvement has been effected in the construction of equipment now obtainable. For example, adjustable steel bins can be had in many forms and the use of the proper types can easily effect savings up to thirty per cent in usable storage space possible with the fixed type of bin.

Material travel in the storeroom operation is also important. The receiving and unpacking rooms must be adequate and placed at the point of suppliers' normal delivery. The bin section should be of a length that limits the travel to a minimum and finally, the principal aisle or aisles should be broad enough for free traffic flow at all times. In the larger companies large sums are constantly expended in developing and perfecting machinery, tools, and units for obtaining quicker and better results. This policy also must extend to storerooms with its facilities. Material loosely kept and poorly arranged results in damage, deterioration, disorder, slackness and low efficiency.

Prompt handling of material when it arrives at the storerooms is an essential feature of successful storekeeping. Too often materials are permitted to lay around after delivery, for a so-called more favorable checking time. This often results in losses which cannot later be identified or corrected. It would be manifestly impossible to cover every handling device that could be used but no discussion of stores' problems would be complete without emphasizing the necessity of modern equipment in the storeroom. Large amounts are expended in the

perfection and improvement of tools and much has been done in motion studies to achieve improvements. The final cost in the application of any material starts with its purchase and continues through all the motions of material travel, including those same motions and material travel through the storeroom.

Storerooms which need tow trucks or conveyors and do not have them are wasting motion and spending unnecessary dollars. All store rooms do not need counting machine scales, even though they require common scales, but those which have the requirement and have the counters know that their savings justify the cost.

Not so long ago physical prowess was considered essential for men engaged in handling and storing material, but this human physical strength has largely been equalized by the many developments in mechanical appliances and aids for doing storeroom work. The utilization of mechanical appliances gives employees the opportunity to devote their mentality to further improvements and to prepare themselves for advancement. Progress in handling materials efficiently can be accelerated by the development of the correct point of view, by an understanding of good handling principles, and the knowledge of successful as well as unsuccessful equipment and handling methods. Those engaged in a material handling operation can save time, effort and money through the study of the fundamental principles of material handling and of practices which have been proven successful.

The purchases and stores department is necessary in an urban transit system because of the large percentage of revenue devoted to material expense and because the orderly flow of supplies is necessary to efficient and continuous operation of the system. The department head usually reports directly to the chief executive.

The functions of the department may be divided as follows: estimating requirements, determining and protecting the investments in materials, material classification, forward commitments, maintenance and operation of storeroom facilities, and the utilization of material handling machinery. It is the department's job to develop sound economic practices in the pursuance of the above functions.

CHAPTER XVI

Traffic Checking and Schedule Preparation

AS a public utility subject to control by municipal or state regulatory bodies¹ urban transportation is faced with competition which is not usually experienced by the other types of utilities, such as the water, light, and telephone companies. The advent of the low-priced automobile long ago shattered local transit monopolies upon the mass transportation of urban riders in most cities. Even though most transit properties normally are compelled to compete with the private automobile for a share of the local transportation, their rates, routes, and sometimes service are established by regulatory bodies.

Not very much is left then for transit companies to control, except the quality of service. Even here those surface lines which share the streets with other traffic are sometimes subject to delays over which local transit has little control. On such lines dependability of service may sometimes suffer by comparison with the dependability with which water flows from the faucet or electricity performs its various household tasks. In addition, the transit rider comes in contact with local transit employees more frequently and though this contact may permit more opportunity for salesmanship, it also permits more chance for grievances to occur.

From the viewpoint of the community, however, an important advantage in the utilization of a local transit service is that it aids in the reduction of traffic congestion. This is self-evident in that a far greater number of people can be carried in one transit vehicle than in an automobile. Surveys by the American Transit Association have shown that approximately 1.67 persons ride in each private automobile. Thus, one forty-four passenger bus with a seated load could carry as many persons as would twenty-six automobiles. If more people were to use a local transit service, traffic congestion would be drastically reduced, traffic probably would move much faster, and the number of traffic accidents and fatalities might be greatly reduced.

In attaining this end, the subject of schedules emerges and assumes a place of major importance in local transit planning and operation. The amount of service and running time as set forth in a schedule are each a source of possible complaint from some rider who may be on the verge of driving an automobile instead of using local transit.

Some Factors Affecting Transit Schedules

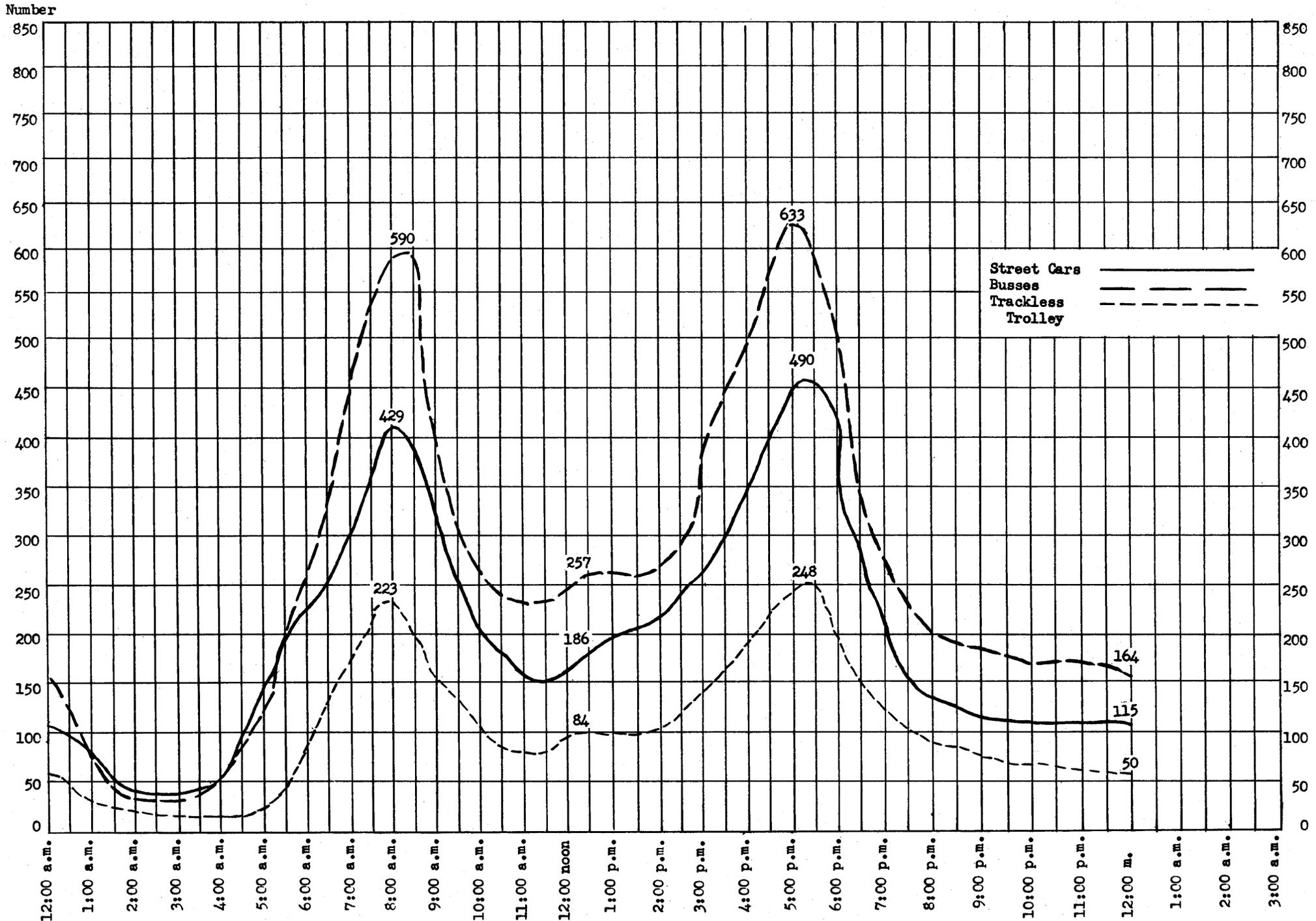
The number of persons utilizing a transit service varies considerably throughout each hour of the day, each day of the week, and each season of the year. The variation in the amount of equipment required for a twenty-four hour period of one weekday as portrayed in Figure 1 indicates that the amount of riding on the Cleveland Transit System changes materially at frequent intervals throughout the day. Maximum riding occurs during the rush hour periods with a considerable reduction during the other periods of the day. This results in much equipment standing idle throughout most of each weekday. In many cases some vehicles cannot be used productively on Saturdays or Sundays because the number of vehicles required is considerably lower than for a weekday operation.

Thus, the amount of service operated by the local transit property depends, in a large measure, upon the riding habits of the community. For example, changes in the time that stores or factories open and close, or in the number of working days per week, may have a pronounced effect upon the amount of service scheduled. Again, schedules for special events such as sport-

¹For a full discussion of public regulation of the urban transportation, see Chapter III.

FIGURE 1

VEHICLES SCHEDULED PER EACH WEEKDAY BY SAMPLE COMPANY



ing events, conventions, or exhibitions may be built to provide special service for an event lasting only a few days. If Tuesday is a visiting day at a hospital served by a local transit route, sometimes a “Tuesday only” schedule may be required to provide service for this added load once a week. The variation of riding with seasons of the year often leads to summer and winter schedules, and sometimes spring and fall schedules. These are some of the many factors affecting service, and in order that a transit company may maintain an adequate and efficient service to the public, it is important to know the extent of these factors.

Passenger and Traffic Studies

Various passenger and traffic surveys have been devised to aid transit companies in determining the correct amount of service to be scheduled, the amount of time to be allowed a vehicle to travel a given distance, the route to be used, and the type of equipment to be operated. Some of the factors checked in those surveys include:

1. Passenger loads.
2. Running times.
3. Boarding and alighting time characteristics.
4. Length of passenger's ride or trip.
5. Transit vehicle passenger stops.
6. Origin and destination of both transit and automobile traffic.
7. Density of business and industrial employment.
8. Density of resident population.
9. Public opinion.

A description of these types of studies can be found in the Manual of Transit and Traffic Studies prepared by the American Transit Association in 1947.

The passenger load and the running time counts are the two basic surveys used most frequently. Because of their importance in the scheduling of proper service an analysis of each will be made.

Passenger Load Counts

It is generally agreed throughout the transit industry that the most important information necessary in preparing a schedule is the number of passengers riding on a given line. Thus, it has become the general practice to determine the volume of business which must be handled. Such checks are commonly referred to as passenger load checks. They are essentially a method used to obtain the number of passengers for a given period of time at the “maximum load point” or any other special point on a given line.

In addition, it is helpful for a schedule department to know as much as possible about the riding characteristics of each line. One method for determining this characteristic is the “on and off” passenger count. Such a check consists in recording the number of passengers boarding and alighting at each street intersection for each vehicle as it travels the route from one end to the other. This information enables the load on any one vehicle to be determined by accumulating the differences between the number of passengers boarding and the number of passengers alighting at each intersection.

The process of computing the load on a number of vehicles at each intersection reveals that point along the route at which the load on the vehicles is the greatest. This point is known as the “maximum load point”. Some lines may have two or more points where maximum load conditions are encountered. This point is significant because it is the control point for making future observations as to the volume of business.

Thus, a passenger load count can be made to determine when and how service should be added to or cut from a schedule of an existing line to increase the efficiency of a line. It can also be used to check the adequacy of a new schedule or to check on irregularities in service reported by the public. A constant check on the passenger volume may be necessary in times of

marked changes in riding habits, in the establishment of new routes, and in the scheduling of different equipment to routes. In fact, this type of survey should be made as often as conditions warrant and whenever seasonal variations in riding occur.

To accomplish those purposes transit patrons in each vehicle are counted at specified points by an observer, generally referred to as a traffic checker. He is stationed at a point within the area of maximum load where he can see the approaching transit vehicle from one or both directions being checked, as well as the passengers on the vehicles. The general practice is to count the individual passengers on the vehicle if there is less than a seated load or to count the standees only if there is more than a seated load. In order that a traffic checker may record the total load by counting only standees in a full vehicle, he must be thoroughly familiar with the seating capacity of each type of transit equipment being used on the line being checked. There are other sources than traffic checkers for getting this same information. Transportation inspectors and supervisors occasionally may be called upon to check for very short periods of time. On some transit properties it is customary for the trainman or operator to make the count as the vehicle passes a given location.

A form used in securing a passenger load count is displayed in Figure 2. At the top of the form the traffic checker lists the name of the line being checked, the location, the observer, the date, and the day. The next portion of the form is divided into two sections so that vehicles going in either direction can be listed separately. Each section includes vertical columns for the block or run number, the vehicle number, the scheduled time, the actual time, the arriving load, and the leaving load. The block and run numbers are identification markings of a vehicle or a crew as used in a schedule. In the absence of these numbers on a vehicle, the number of the vehicle is listed. The actual time the vehicle arrives or leaves is noted at the point being checked, and this time is compared with the scheduled time. The number of passengers on the vehicle as it arrives at the given point constitutes the arriving load and conversely, the number of passengers on the vehicle when it leaves the given point constitutes the leaving load. Pertinent information regarding the operation of the lines, such as the weather and traffic delays, is noted at the bottom of the form.

FIGURE 2

PASSENGER COUNT									
Sheet	<u>3</u>				Line	<u>FAIRFIELD</u>			
Date	<u>May 18, 1949</u>				Checked at	<u>WEST 24 - LORAIN</u>			
Day	<u>WEDNESDAY</u>				Checked by	<u>Robert Linn</u>			
IN BOUND					OUT BOUND				
Run	Time		Arr Pass	Lv Pass	Run	Time		Arr Pass	Lv Pass
	Sched P.M.	Actual P.M.				Sched P.M.	Actual P.M.		
2	3:02	3:02 ^z	10	7	11	3:02	3:01 ^z	33	36
3	3:08	3:08 ^z	32	26	12	3:08	3:07 ^z	36	41
4	3:14	3:13 ^z	17	14	2	3:14	3:15	34	42
1	3:20	3:21	36	32	3	3:20	3:24	43	51
11	3:26	3:25	13	10	4	3:27	3:26	29	33
12	3:31	3:30	15	14	1	3:33	3:32	37	43
13	3:34	3:34 ^z	10	8	11	3:39	3:37 ^z	40	46
2	3:39	3:37	18	15	12	3:44	3:43 ^z	39	49
3	3:44	3:44	37	32	13	3:49	3:48 ^z	42	46
14	3:48	3:48	10	5	2	3:54	3:53	40	45
4	3:52	3:51	11	8	3	3:59	4:00	57	64
1	3:56	3:56 ^z	12	11	14	4:03	4:02 ^z	28	31
15	4:00	3:59	13	12	4	4:07	4:06	34	39
11	4:04	4:05 ^z	12	10	1	4:11	4:10	30	36
12	4:08	4:07 ^z	14	8	15	4:15	4:14 ^z	39	41
13	4:12	4:11 ^z	14	9	11	4:19	4:20 ^z	54	62
16	4:16	4:16	19	13	12	4:23	4:22 ^z	52	57
2	4:20	4:18 ^z	8	8	13	4:27	4:26 ^z	41	46
3	4:24	4:25 ^z	27	23	16	4:31	4:30 ^z	40	48
14	4:28	4:27 ^z	3	3	2	4:35	4:34 ^z	56	59
4	4:32	4:31 ^z	4	3	3	4:39	4:39 ^z	52	57
1	4:36	4:36 ^z	21	17	14	4:43	4:42 ^z	47	54
15	4:40	4:40	32	27	4	4:47	4:47 ^z	52	65
11	4:44	4:43 ^z	19	15	1	4:51	4:52	55	61
12	4:48	4:47	33	30	15	4:55	4:55	50	55
13	4:52	4:52	34	32	11	4:59	4:58	53	59
16	4:56	4:54 ^z	12	11	12	5:03	5:03	52	57
2	5:00	4:59	21	19	13	5:07	5:08	58	61
3	5:04	5:03	9	6	16	5:11	5:12	49	54
14	5:08	5:07	23	20	2	5:15	5:16 ^z	50	56
Remarks <u>Weather - Cool and Cloudy</u>									

Generally, a check is made from about 6:00 a.m. to 12:00. p.m. but sometimes only the morning and afternoon peak periods are checked. Usually a single one-day check is adequate, providing it can be compared with previous checks. However, a two or three-day check may be necessary to obtain an average count that can be considered typical of normal conditions.

A form has been developed to be used in summarizing passenger load data, Figure 3, so that the result of several checks may be studied simultaneously. After the checks are entered on the summary sheet, the assembled data for several load checks will show readily the efficiency of the schedule in effect. It will also provide the basis for the construction of new schedules at some future date.

Running Time Counts

The running time count furnishes a means by which the schedule department can evaluate the running time of a given vehicle when operated under actual traffic conditions in the public streets. Transit vehicles are subject to various kinds of delays which lead to slower operation, especially during the peak hours. For example, during those hours there are a great number of automobiles, taxicabs, trucks, and transit vehicles vying for street space which contribute to traffic congestion. During those same hours, large numbers of people use the transit lines. This means that the loads on transit vehicles are greater, that more passengers board and alight at each stop, that stops are more frequent and of longer duration, and that more time is consumed by passengers in moving through the crowded aisles of vehicles to or from the doors.

All of these conditions result in delay and longer running time. In the non-rush periods of the day, passenger loads are relatively lighter, stops are less frequent, and transit vehicles are able to move faster over the streets because of less traffic congestion. Thus a shorter running time can be scheduled during the non-rush periods of the day. All in all, running time should be changed as frequently as necessary to obtain maximum schedule efficiency. The importance of this study cannot be over-emphasized. It should be made for one or more of the following reasons:

1. To establish peak-hour and off-peak hour running time for purposes of schedule making.
2. To indicate those spots where delays are excessive and where remedial measures are necessary.
3. To check the performance of individual operators.
4. To estimate how much running time can be shortened if congestion at specific spots is reduced.
5. To check complaints from the public about transit speeds.

Two methods used for taking a running time count are as follows. In one method the observers ride the vehicles from one end of the line to the other and record the time at certain points along the line, and in the other method the observers stand at designated points along a line and clock the vehicles as they pass. It is very important to know how the operator handles his vehicle, i.e., if he wastes time in slow starts or slow stops, if he deliberately misses traffic lights, and if he loafs along to "kill" time. As a result, the latter method can be very inaccurate due possibly to the operator's slowing down between the points being checked and then speeding up prior to arrival at the next point being checked. A typical riding running time count is shown in Figure 4. It should be noted that the time is recorded to the closest quarter of a minute.

Before a new running time can be set up for a line, it is necessary to determine the average time required by the average operator or crew in operating a vehicle from one end of the line to the other under actual traffic conditions. This can be accomplished by summarizing all running time in time sequence. This data will show how well the existing running time is adapted to the actual conditions of operation and provides the basis for necessary changes in running time.

It should be remembered that the running time to be used on a given line depends on five factors:

1. The load to be carried.
2. The street traffic conditions.

FIGURE 3

SUMMARY OF PASSENGER COUNTS

STREET CAR BUS ✓ T. T.
 SCHEDULED SEATING CAPACITY 44
 DIRECTION WEST

LINE FAIRFIELD ROUTE NO. 74
 SCHEDULE NO. 7927A(WK) SAT., SUN.
 MONTH APRIL YEAR 1949

TIME APPLIES AT	OBSERVED AT <u>W. 24-LORAIN (7927-APRIL 18)</u>																				MONTHLY AVERAGES	COMMENTS																	
	DAY <u>WEDNESDAY</u> DATE					DAY <u>FRIDAY</u> DATE <u>22</u>					DAY					DATE																							
	WEATHER <u>AM CLOUDY PM RAIN</u>					WEATHER <u>AM RAIN PM CLEAR</u>					WEATHER					WEATHER																							
OBSERVED BY <u>MURPHY-ROGER</u>										OBSERVED BY <u>VETONSKIE-BALAZS</u>										OBSERVED BY										OBSERVED BY									
PERIOD BEG.	UNITS SCH	SEATS SCH	PASS	UNITS OPER	AVER PASS PER UNIT	UNITS SCH	SEATS SCH	PASS	UNITS OPER	AVER PASS PER UNIT	UNITS SCH	SEATS SCH	PASS	UNITS OPER	AVER PASS PER UNIT	UNITS SCH	SEATS SCH	PASS	UNITS OPER	AVER PASS PER UNIT	UNITS SCH	SEATS SCH	PASS	UNITS OPER	AVER PASS PER UNIT														
5:00																																							
5:15																																							
5:30																																							
5:45																																							
6:00	2	88	25	2	13	2	88	21	2	11						2	88	23	2	12																			
6:15	3	132	36	3	12	3	132	34	3	11						3	132	35	3	12																			
6:30	3	132	6	1	6	3	132	11	2	6						3	132	9	1.5	6																			
6:45	3	132	64	4	16	3	132	62	4	16						3	132	63	4	16																			
7:00	3	132	36	3	12	3	132	39	2	20						3	132	38	2.5	15																			
7:15	3	132	49	3	16	3	132	89	4	22						3	132	68	3.5	19																			
7:30	5	220	53	4	13	5	220	87	4	22						5	220	70	4	18																			
7:45	4	176	42	4	11	4	176	65	4	16						4	176	54	4	14																			
8:00	3	132	64	3	21	3	132	56	3	18						3	132	60	3	20																			
8:15	2	88	35	3	12	2	88	23	3	8						2	88	29	3	10																			
8:30	2	88	16	1	16	2	88	27	1	27						2	88	22	1	22																			
8:45	2	88	31	2	16	2	88	40	2	20						2	88	36	2	18																			
9:00	2	88	20	2	10	2	88	42	2	21						2	88	31	2	16																			
9:15	2	88	12	2	6	2	88	20	2	10						2	88	16	2	8																			
TOTAL	39	1716	489	37	13	39	1716	614	38	16						39	1716	552	37.5	15																			
9:30		RELIEF						RELIEF						RELIEF						RELIEF																			
10:00	3	132	37	4	9	3	132	35	2	18						3	132	36	3	12																			
10:30	4	176	46	3	15	4	176	128	4	32						4	176	87	3.5	25																			
11:00	3	132	45	3	15	3	132	107	3	36						3	132	76	3	25																			
11:30	3	132	67	3	22	3	132	123	4	31						3	132	95	3.5	27																			
12:00	4	176	77	4	19	4	176	84	3	28						4	176	81	3.5	23																			
12:30	4	176	80	4	20	4	176	120	3	40						4	176	100	3.5	29																			
1:00	4	176	69	4	17	4	176	160	5	32						4	176	115	4.5	26																			
1:30	4	176	129	4	32	4	176	153	4	38						4	176	191	4	48																			
2:00	5	220	131	5	26	5	220	137	4	34						5	220	134	4.5	30																			
2:30	5	220	150	5	30	5	220	166	6	28						5	220	158	4.5	29																			
TOTAL	39	1716	831	39	21	39	1716	1213	38	32						39	1716	1022	38.5	27																			
3:00	3	132	63	2	32	3	132	63	2	32						3	132	63	2	32																			
3:15	2	88	127	3	42	2	88	107	3	36						2	88	117	3	39																			
3:30	3	132	73	2	47	3	132	59	2	30						3	132	76	2	38																			
3:45	3	132	237	4	59	3	132	171	4	43						3	132	204	4	51																			
4:00	3	132	123	3	41	3	132	111	3	37						3	132	114	3	39																			
4:15	4	176	177	4	44	4	176	156	4	39						4	176	167	4	42																			
4:30	4	176	149	3	50	4	176	155	4	39						4	176	152	3.5	43																			
4:45	4	176	199	4	50	4	176	136	3	45						4	176	168	3.5	48																			
5:00	3	132	197	4	49	3	132	251	4	63						3	132	224	4	56																			
5:15	4	176	216	4	54	4	176	195	4	49						4	176	206	4	52																			
5:30	4	176	215	4	54	4	176	242	4	61						4	176	214	4	54																			
5:45	3	132	140	3	47	3	132	225	4	56						3	132	183	3.5	52																			
6:00	2	88	81	2	41	2	88	102	3	34						2	88	92	2.5	37																			
6:15	3	132	96	3	32	3	132	101	2	51						3	132	99	2.5	40																			
TOTAL	45	1980	2113	45	47	45	1980	2074	46	45						45	1980	2044	45.5	46																			
6:30		RELIEF						TEMPORARY PATCH FOR 4-22 ONLY						RELIEF						RELIEF																			
7:00	4	176	109	4	27	5	220	177	4	44						4.5	198	143	4	46																			
7:30	3	132	85	3	28	5	220	252	6	42						4	176	169	4.5	38																			
8:00	3	132	70	3	23	5	220	129	4	32						4	176	100	3.5	29																			
8:30	2	88	57	2	29	5	220	157	5	31						3.5	154	107	3.5	31																			
9:00	3	132	77	3	26	5	220	170	5	34						4	176	124	4	31																			
9:30	2	88	68	2	34	5	220	150	6	25						3.5	154	109	4	27																			
10:00																																							
10:30																																							
11:00																																							
11:30																																							
12:00																																							
TOTAL	17	748	466	17	28	30	1320	1035	30	35						23.5	1034	751	23.5	32																			
GRAND TOTAL	140	6160	3899	138	28	153	6732	4936	152	32						141.5	6446	4418	145	30																			
TAB. BY	LENTZAS DATE 4/13					TAB. BY	M. WEBBER DATE 4/25					TAB. BY						TAB. BY	SCHWARTZ DATE 5/25																				

RUNNING TIME CHECK

Date 2-19-49 Route No. 74 Line Fairfield
 Day SAT. From W-7 Starkweather To Ontario-Prospect
 Vehicle No. 3950 Block No. 2 Operation No. 10-221
 Weather Clear - Warm Observer Chet Werstak

	From	Time	To	Time	Time Used	Slow Start	Slow Stop	Slow Down	Total Stops
Notes	W. 7 and Stark.	605 A	W14-Fairfield	609 A	4	1		1	5
	Traffic Lt	W-7-Professor							MAX PASS
	Delay at								14
	Seconds Delay	1 25 sec.							
Notes	W14-FAIRFIELD	609 A	W24-Lorain	613 A	4	1	1	1	3
	Traffic Lt	W14-Fair.							MAX PASS
	Delay at								21
	Seconds Delay	1 40 sec.							
Notes	W24-LORAIN	613 A	LORAIN-ONT.	615 ² A	2 ²				3
	Traffic Lt								MAX PASS
	Delay at								15
	Seconds Delay	NONE							
Notes	LORAIN-ONT.	615 ² A	Ont-Pros.	620 A	4 ²	2	2	2	6
	Traffic Lt	LOR-ONT.							MAX PASS
	Delay at	EAGLE-Wood							
	Seconds Delay	2 40 sec.							
Notes									
	Traffic Lt								
	Delay at								
	Seconds Delay								
Notes									
	Traffic Lt								
	Delay at								
	Seconds Delay								

Remarks Time to Show W14-FAIR. to W24-LORAIN

3. The methods of operation.
4. The equipment.
5. The operators.

A summary of running time counts aid the schedule department in determining the effect of each factor so that a proper amount of time may be scheduled for each vehicle.

Furthermore, in setting up a running time which will not result in an excessive speed, the scheduled speed is computed on a miles-per-hour basis. This can be calculated by first multiplying the distance by 60 and then dividing that product by the required time in minutes to travel from one point to another. This formula can be used when applying the known factors:

$$\text{Speed} = \frac{\text{distance}}{\text{time}} \text{ or Speed (in M.P.H.)} = \frac{\text{distance (in miles)} \times 60}{\text{time (in minutes)}}$$

- Known quantities:
- a. 2.50 miles (distance)
 - b. 12 minutes (running time)

$$\text{Speed} = \frac{2.50 \times 60}{12} = 12.50 \text{ miles per hour}$$

It is generally agreed that the adoption and application of the running time study is a prerequisite to the establishment of a good transit operation. Its importance has become increasingly evident to transit companies as the need has grown for maintaining faster scheduled speeds.

Schedule Specifications

Prior to establishing a schedule specification all essential information about a line is considered and weighed before the actual steps of schedule preparation are begun. The specification states the amount of service to be operated during the various periods of the day. Therefore, it is the key to the efficient expenditure of the labor dollar for operations. It also serves as an instruction sheet for the schedule maker in the building of the schedule.

“The schedule specifications may be likened to a doctor's prescription. It prescribes, in the case of lines that are slightly abnormal, definite instructions for putting those lines back into a 'healthy' condition. In the case of the lines that are unprofitable, it can only alleviate to a certain extent the losses that are being incurred. In the latter cases a 'major operation' may be indicated, such as the abandonment of services, their substitution with another vehicle size or type, short-turning, or re-routing, in order to correct the unfavorable conditions which exist.”²

In building the schedule specification for a transit line it is necessary that the proper amount of running time for the new schedule be known or established. In addition to the running time, a sufficient number of passenger load counts are used which usually are summarized on the passenger load summary sheet.

From these two sources come the primary data required for the schedule building. However, there are other valuable sources of information which may be used in determining whether or not the schedule in effect is sound from an operating or economical standpoint. Such secondary information includes the following:

1. Trend charts pertaining to revenue and passengers.
2. Turn-back or switching reports.
3. Company policy.

Before prescribing service for any line it is necessary to know the seating capacity of the type or types of vehicles to be used or assigned on the specific line. With that information it is possible to build a schedule using the vehicles assigned in such a manner that uncomfortable overloads may

²Traffic Checking and Schedule Preparation Manual by Walter S. Rainville, Jr., Director of Research, American Transit Association, 1947.

be avoided, while at the same time using a minimum number of vehicles in the interest of economy, The loading standards for the vehicles are generally based upon 100 percent of the seating capacity for off-peak or base hour service and about 150 percent of the seating capacity for peak or rush hour service. However, in most instances they will depend upon the size of the vehicle to be used.

A layover period on some properties is required at the end of a round trip in accordance with the labor contract. This time is built into the schedule as a "cushion" to take care of minor delays and interferences which may occur along the line. This permits the operator to leave the terminal on time as set forth in the schedule. The layover time also provides an opportunity for the operator or crew to relax or avail themselves of the restroom facilities.

With all this information assembled the preparation of the specifications can begin. The headway (time interval between vehicles going in the same direction) and the number of vehicles required at different times of the day are determined through an examination of the loads to be handled in a given time interval is determined from the passenger summary sheet. It is then divided by the loading standard to determine the number of vehicles required to handle the passenger load. The headway can then be determined by dividing the round-trip running time plus the amount of layover required by the number of vehicles to be used. Thus, the formula for determining headway is:

$$\frac{\text{running time} + \text{layover}}{\text{number of vehicles}} = \text{headway}$$

This formula applied to a specific problem results in the following computations:

- Known quantities:
- a. off-peak hour service
 - b. seating capacity of vehicle - 40
 - c. number of passengers per period - 440
 - d. running time in minutes - 50
 - e. minimum layover in minutes - 5

Step 1: Divide the seating capacity of the vehicle into the number of passengers to determine the number of vehicles required.

$$\text{EXAMPLE: } 440 \div 40 = 11 \text{ vehicles required}$$

Step 2: Apply the formula for determining headway.

$$\text{EXAMPLE: } \frac{(\text{running time}) 50 + (\text{layover}) 5}{(\text{number of vehicles}) 11}$$

$$\text{equals } \frac{55}{11} \text{ or a 5 minute headway}$$

Frequently it may be necessary to increase the layover time to an amount which, when coupled with the running time, is evenly divisible by the number of vehicles required. An illustration may help to clarify the foregoing. The known quantities are these:

- a. Off-peak hour service;
- b. Seating capacity of vehicle - 40;
- c. Number of passengers per period - 440;
- d. Running time in minutes - 58;
- e. Minimum layover in minutes - 5.

Step 1: Same as previous illustration.

Step 2: Apply the formula for determining headway.

$$\frac{58 + 5}{11} = \frac{63}{11} \text{ (Which is not evenly divisible)}$$

Step 3: Apply the same formula as in Step 2 but increase the amount of the layover so that when coupled with the running time and divided by the number of vehicles the result will be a whole integer.

EXAMPLE: $\frac{58 + (5 + 3)}{11} = \frac{66}{11} = 6 \text{ minute headway}$

This formula can only be used when the headway is to be uniform. Frequently the headway is staggered, not uniform, which necessitates the use of a much more complicated process. However, the same fundamentals which have been explained can be applied to the more difficult headway.

After the headway has been determined at the maximum load point for a complete day of operation it is laid out on a headway or timetable form similar to Figure 5. Space is provided on this form for the listing of the important terminal points along a line. Generally, the following terminals are shown horizontally on the sheet in the following sequence: outer terminal, midway terminal, inner terminal, midway terminal, and outer terminal. Thus, a complete trip can be shown from start to finish. If the maximum load point were the inner terminal, for example, the headway as set forth in the specifications sheet would be listed vertically in a chronological order under the caption of inner terminal. Then the time applying at each of the other terminals is filled in according to the amount of running time set forth on the running time sheet. The next step is the coupling of the trips on the headway in accordance with the layover provisions, if any, so as to determine which vehicles make which trips. This explanation covers only one procedure. However, there are many variations of it in actual practice.

With this process accomplished the headway or timetable form then serves as a guide to the transportation department's street supervisors in their responsibility to see that service is operated in accordance with the schedule. Along with the running time sheet, it tells them when each vehicle is scheduled to arrive at each terminal, including those not listed on the headway sheet. It also enables the supervisors to determine whether or not the service is being operated properly, and provides a basis for recommendations to the schedule department for an investigation of needed schedule changes. Furthermore, it furnishes the supervisors with the information necessary in spacing or short-turning vehicles in the event of delays.

The headway sheet can be used also for furnishing schedule information to the public. Sometimes a printed timetable will be provided patrons using a transit service which has a wide headway. This is a convenience to those patrons because a great amount of time would otherwise be wasted in waiting for a transit vehicle to come along.

Schedule Table

Whereas the headway sheet lists the service in terms of headway at various terminals, the schedule table shows the service in terms of what each individual vehicle does. On many transit properties it is customary to list the service in block form on the table. This appears as a double row of numbers, one row beneath the other. The top row usually lists the leaving times at one terminal, and the bottom row lists the leaving times at the opposite terminal.

Certain information is shown on the table for each vehicle which is designated by a block number. That information includes the leaving times of each half-trip, from one terminal to the opposite terminal, which are shown on the headway and also certain other information that is not on the headway. In those cases where the station is not located on the line, the time is shown on the table at which the vehicle must leave the station in order to leave on schedule at the first terminal point shown on the headway. It also shows the time at which the vehicle arrives at the station on its pull-in trip. The table will usually show the reporting time of the operator or crew which pulls out the vehicle from the station, and conversely the table shows the turn-in time at the station for each operator or crew. Figure 6 illustrates a sample schedule table.

FIGURE 5

Schedule No. <u>7927</u>		HEADWAY					Line <u>FAIRFIELD</u>	
Date <u>APRIL 18, 1949</u>							Day <u>WEEKDAY</u>	
	WEST 7- STARK.	WEST- 24 LORAIN	PROS.- ONT.		WEST- 24 LORAIN	WEST 7- STARK.		NEXT TRIP
	(OUTER TERMINAL)	(MIDWAY TERMINAL)	(INNER TERMINAL)		(MIDWAY TERMINAL)	(OUTER TERMINAL)		
#1								#1
	219	226	233		238	245		255
	225	232	239		244	251		301
	231	238	245		250	257		307
	237	244	251		256	303		313
	243	250	257		302	309		319
	249	256	303		308	315		324
	255	302	309		314	321		331
	301	308	315		320	327		336
	307	314	321		327	335		344 #2
	313	320	327		333	341		348
	319	326	333		339	347		356
	324	331	338		344	352		400
#2 *	326	334	343		349	357		404
	331	339	348		354	402		408
	336	344	353		359	407		412
*	340	348	357		403	411		416
	344	352	401		407	415		420
	348	356	405		411	419		424
*	352	400	409		415	423		428
	356	404	413		419	427		432
	400	408	417		423	431		436
	404	412	421		427	435		440
	408	416	425		431	439		444
	412	420	429		435	443		448
	416	424	433		439	447		452
	420	428	437		443	451		456
	424	432	441		447	455		500
	428	436	445		451	459		504
	432	440	449		455	503		508
	436	444	453		459	507		512
	440	448	457		503	511		516
	444	452	501		507	515		520
	448	456	505		511	519		524
	452	500	509		515	523		529
	456	504	513		519	527		535

Consideration will be given next to the process of 'cutting' or splitting' the schedule table or headway, as the case may be, into runs (listing of work time) for the operating personnel.

Run Cutting

The run cutting procedure is essentially a process for the cutting or piecing together of work on the schedule table or headway into runs for the operators and trainmen. Naturally, it is of the utmost importance to the operators. The results of this process prescribe the working hours for each operator and furnish the basis upon which they select their work in accordance with their seniority. Thus, it is imperative that the runs established on the run sheet conform to the company's working agreement with its operating personnel.

This process is also very important to the management of a transit company because the amount of scheduled pay time which the company must pay for in operating a given transit service can be substantially increased by unskilled cutting. It should involve the balancing of the various cost elements of a schedule against each other in an effort to produce the most economical results within the limitations of the working agreement. The schedule maker, in preparing a schedule, must be governed not only by the conditions set forth in the working agreement but must apply those conditions in such a manner as to be equitable both to management and labor.

Prior to starting a run cut the schedule maker does not know how many runs of each type he will have. There are many classifications of runs and they frequently differ from company to company. However, the following run descriptions are generally accepted by many transit systems. When the total scheduled pay time for a run amounts to 8 hours or more, it is classified as a regular run. On the other hand, any run paying less than 8 hours is classified as a tripper or short run. A further distinction can be made in that a run may be either a day or late run, and it may be either a straight or swing run. Runs scheduled to be completed on or before 8:30 p.m., for example, may be classified as day runs. Accordingly, runs scheduled to be completed after 8:30 p.m., may be classified as late runs. A straight run can be distinguished from a swing run in that a straight run has no unpaid interval of time within the scheduled spread of the run. A swing run may have one or more unpaid intervals of time.

In making a run cut it is customary to make as many regular runs as possible at a reasonable cost with all remaining pieces of work to be either set up separately on the run sheet or coupled together to form tripper or short runs. The application of the latter condition would depend upon the provisions in the working agreement concerning the construction of runs. Figure 7 is an illustration of a sample run sheet.

All runs cannot be straight runs because a greater number of vehicles are required during the rush hours than during the non-rush hours (see Figure 1). According to the number of vehicles required on most schedules, there are two very acute peaks and a considerable reduction in the number of vehicles required between those peaks. One peak occurs about eight a.m. and the other about five p.m. This condition necessitates the making of swing runs because there is not a sufficient amount of work time in and between the two peaks to schedule eight hours of continuous work.

In addition, it is not possible, except with the payment of bonus time, to schedule all regular runs exactly for eight hours of pay time. This stems from the fact that reliefs, a point at which operators are scheduled to begin or terminate the whole or some part of their runs, made by the operators are usually made at only one location along a route. When cutting runs under such a condition, they are cut as close to eight hours of pay time as possible and are usually either over or under the eight hours. A run paying exactly eight hours, excluding the payment of bonus time, is the exception rather than the rule.

Nonetheless, it would be possible to schedule some runs to exactly eight hours, providing a relief could be made at any point along the route. Such a policy would not be practical, however, and would result in an inconvenience to operators. The only practical alternative is to establish one, or at the very most two, relief points for a given line and to cut the runs at that point when the total work time amounts to approximately eight hours. If the total work time amounted to more than eight hours, time and one-half would be paid in most instances for the time beyond

RUN SHEET

FIGURE 7

#83 West 130th
Weekday

SCHEDULE NO. 7974

EFFECTIVE April 18, 1949

MADISON STATION

BLOCK NUMBERS	RUN NOS.	ON	OFF	ON	OFF	ON	OFF	ON	OFF															WORK WEEK TIME	TOTAL TIME PAID		
										VEH. HRS.	IN & OUT	1/2 SHR.	1/2 SPR.	BONUS	TO 6 8 HRS.	TOTAL ALLOW	TIME PAID	VEH. HRS.	IN & OUT	1/2 SHR.	1/2 SPR.	BONUS	TO 6 8 HRS.			TOTAL ALLOW	TIME PAID
1	111	452	908	M.A. 942	1233					647	20			34	19	113	800									741	800
6-8	112					1125	M.A. 132	158	718	647	40			26	7	113	800									753	800
2-7	113	512	953					230	553	724	40	2	51			133	857									800	857
W140 4-33-9	114	619	906			W.140 212	322	322	701	556	30		51		24	145	741	100	10	West 140th			10	110	736	851	
5	119						M.A. 1200	209	229	816	746	10	8	20		38	824									800	824
10	120					514	742	805	146	749	20	16		23		59	848									800	848

Page No. 1 (1) pages

Vehicle Hours 43:29
Total No. of Men 6

#7974

#83 West 130th
Weekday
April 18, 1949

MU

eight hours. Accordingly, if the time amounted to less than eight hours, bonus time would be added to the work time of a run so that it would pay eight hours. On most transit properties this is the accepted practice.

On some properties a spread time penalty is paid over and above the eight hour minimum requirement for regular runs. The same is true for tripper or short runs. Hence, all swing runs requiring a spread time payment would automatically result in those runs paying more than the required minimum.

The conditions as described in the foregoing paragraphs are some of the major and complex contract provisions which a schedule maker must consider in making a run cut. There are numerous other provisions set forth in various transit contracts which further complicate the process of run cutting. For example, meal period limitations, meal period payments, spread time limitations, spread time payments, overtime payments, and special bonus payments must be thoroughly considered and efficiently applied by the schedule maker in building schedules acceptable to both management and labor. This briefly constitutes the process of run cutting. At the completion of this step, the construction of a schedule has been concluded.

Perhaps a definition of a schedule should be made at this point in that it summarizes the steps of the schedule process already outlined. A schedule is the written information in which is specified the route to be used; the type and number of vehicles to be operated throughout the day; the location at which these vehicles are to be stored when not in use; the time at which they should depart from and return to the point of storage; the time they should arrive at and leave some specified point on the route; the time they should arrive at and depart from each terminal on each trip; the time and place each operator is to start and complete each day's work; and the total time plus fringe allowances for which the operator is paid.

Schedule Efficiency

Various methods have been devised and used to measure the efficiency of a schedule. Nonetheless, this phase of traffic checking and schedule preparation furnishes a fertile field for research in that so little is known about it from a theoretical standpoint. There are some tests of a good schedule, however, which are evident. For instance, the average load on each vehicle should check closely with the loading standard prescribed for the headway. The running time should be precise enough to result in vehicles closely adhering to the schedule.

Many transit passengers consider a good schedule as being one which would provide a seat for every passenger throughout the day. This, however, would not be considered good from the standpoint of management in that it is economically impossible to provide a seat for every passenger during the rush hours. Many additional pieces of equipment would have to be acquired and their cost would be prohibitive.

The operating personnel judges a schedule on a somewhat different basis. A large number of regular eight hour runs, a high percentage of straight runs, a slow running time, a long layover on each trip, and a long meal allowance period would probably be the determining factors considered essential for a good schedule by the operators.

On the other hand, transit management generally considers the efficiency of a schedule from the standpoint of cost of operation. In attaining this end, though, it is not always realized by management that a cut in mileage during a period of fall-off in revenue will result in a reduction in patronage much beyond the normal or average fall-off.

In the long run, the real test of a schedule depends upon whether or not the volume of patronage is being carried at a minimum cost which is consistent with an attractive service to the public and adequate compensation and working conditions for operating personnel.

CHAPTER XVII

Street Traffic Problems

THE major portion of public transit mileage is made in urban areas. Since the degree of efficiency of transit vehicle operation depends upon the efficiency of the movement of all street traffic, street traffic problems are of real concern to transit companies. The control of this traffic is the responsibility of the municipal government through its officials. Consequently, the degree of efficiency depends upon the interest and knowledge of the officials charged with this duty, the amount of support they receive from other municipal officers, the amount of money allocated to traffic regulatory equipment, and street improvements. Most street traffic regulations have been and are based upon the control of motor vehicle traffic and not that of transit vehicles.

Traffic Movement

Most cities in America with public systems have the gridiron type of street system with block lengths varying from 300 feet up. The movement of traffic is immediately reduced at least 50 percent by such a street system because of the time that would be proportioned to cross traffic. This percentage is further reduced where more than one street crosses the main street at an intersection. Research by the Public Works Administration indicates that streets of this type in urban areas can accommodate a maximum of approximately 600 cars per lane per hour, under good traffic control measures.

The efficiency of traffic movement on existing urban streets is further impeded by pedestrians' actions, the driving ability of motorists, curb parking, turning vehicles, transit and commercial vehicle loading or unloading, inefficient traffic signal operation, street repairs, and other incidents. These impediments can be mitigated to a large extent by municipal authorities through the use of well known and tried methods. Any changes in the existing street system, however, is an expensive and extensive program of city planning and highway construction involving in most cases federal and state financial aid and assistance.

Delays to Movement

Pedestrian Actions

In the business districts of cities, where traffic congestion is prevalent, pedestrians are extremely numerous and present a definite deterrent to vehicular movement. Pedestrians crossing in the middle of a block are an accident hazard and often confuse motorists, thereby interfering with traffic movement. More serious interference, however, is caused by pedestrians who stand in the roadway at intersections instead of on the sidewalk often preventing the use of one or two lanes by moving traffic.

Drivers' Ability

The ability and attitude of motor vehicle operators have a bearing on the movement of traffic. There is the driver who insists on taking up part of two lanes of the street, and the fellow who is day dreaming at the intersection stop and finally wakes up after the green traffic light has been on for ten seconds; or the timid motorist who fears to drive across an intersection until he can see no cars approaching on the cross street for at least one block in each direction. These selfish and dilatory actions of drivers cause only a slight misuse of street space and small time losses but since traffic movement is reckoned in seconds, quite often the momentary loss of a lane of street space, or a few minutes tie-up, can mean the difference between congestion and smooth flow.

Curb Parking

Parking of motor vehicles at the curb has a very important bearing on the movement of traffic. Parked cars usurp street space that could be used for moving traffic and motorists maneuvering in and out of parking spaces delay moving traffic. The parking of cars diagonal to the curb is a particularly bad practice in traffic control since cars so parked usurp more than their share of street space and motorists backing out of such spaces block an additional lane of traffic and create an accident hazard.

Double parking is a cause of congestion that is out of all proportion to the people it benefits. One car or truck double parked creates delay for hundreds of street users. There is no excuse for double parking and wherever it is prevalent there is something wrong with curb parking practices and a study should be made to determine the trouble.

Turning Vehicles

Turning vehicles present a real problem in expediting the movement of traffic. On two-way streets, left-turning vehicles are responsible for considerable delay since they must cross the lanes of opposing traffic. In fact where such left turning movements are heavy, a separate interval should be provided in traffic signal timing. Right-turning vehicles are a cause of delay when the vehicles themselves are delayed by a number of pedestrians crossing or when there is a particularly heavy volume of cars desiring to make the turn. Busses loading at or near the side bus stops also interfere with the right-turning vehicles and cause them to delay the movement of through traffic.

It is common practice for motorists to reverse the direction of their cars, i.e., make a "U" turn in most any part of the block on a two-way street. This is a very bad practice which leads to accidents and creates confusion that delays vehicular traffic.

Loading and Unloading Commercial Vehicles

The distribution of goods and commodities by commercial vehicles is absolutely necessary for the economic life of every community. Since very few stores, factories, or other commercial establishments have loading areas off-the-street, practically all loading and unloading of commercial vehicles must be done at the curb. This poses a very serious problem of traffic control since it is almost impossible to satisfy both parking, and loading and unloading demands at the curb. Commercial vehicle operators are often forced to double park their vehicles, a most serious form of traffic delay.

Loading and Unloading Transit Vehicles

Transit vehicles must stop at practically every block in urban areas to take on or let off passengers in order to give the type of service the public demands. In the majority of cases these stops are made near the intersection but there are a few examples of street car stops in the middle of the block, and several cases of mid-block bus stops.

The rule for most street car and trolley coach stops, at intersections, is that they shall be at the near side. Bus stops, however, are found at both the near and far sides of intersections. There has been a great deal of discussion and some study given the advantages and disadvantages of near and far side stops, but to date there is no clear-cut and accurate measure of which is the more effective for proper traffic control.

Traffic Signals

The traffic signal is the most restrictive type of traffic control equipment, therefore traffic signals which are improperly timed actually delay the movement of highway traffic. Unfortunately, most people consider that the primary function of a traffic signal is to prevent traffic accidents and in too many instances public officials have installed signals from this point-of-view.

As a matter of fact it has been conclusively proven that traffic signals do not prevent accidents unless installed where warranted and that their real effective use is in the control of highway traffic, normally at intersections. The chief purpose of traffic signals is to regulate traffic and assign right-of-way so it may flow in an orderly manner at intersections without jamming and with a speed consistent with safety. Signals should be synchronized, if possible, so traffic may flow at reasonable speed for prolonged distances without stopping.

Street Repairs

One of the most aggravating things that can happen to moving traffic is to suddenly find an accustomed route blocked or congested by a repair job on the street. This is a common experience in cities where little attention is given to the coordination of public utilities and municipal bureaus in the opening or repairing of streets. Such conditions can easily be avoided by a central agency to schedule street openings and repairs, to arrange proper detours and to inform the public so blocked streets can be avoided.

Corrective Measures

Pedestrian Actions

Most state and city traffic regulations define the pedestrians as part of traffic and cover them by the same restrictions that apply to motorists in obedience to traffic control equipment. Except in a relatively small number of cities, however, public opinion reacts against the enforcement of these requirements. Pedestrians are prone not to pay much attention to traffic signals and thus interfere with the vehicular traffic stream. In an endeavor to influence better observance, traffic authorities use special pedestrian signals such as the word "WALK" in a regular traffic signal lens or with neon lights in a special type of signal. Generally this use of a spelled-out message has not been too effective without enforcement. On wide streets islands should be built in the middle as a pedestrian refuge, since pedestrians should not be required to cross more than four lanes of traffic at one time.

It appears that the only successful way to control pedestrian traffic is by the adoption and strict enforcement of special pedestrian regulations patterned after the Model Traffic Ordinances developed by the National Committee on Uniform Traffic Laws and Ordinances. The public has been educated to accept such control in some cities and the sooner other cities adopt pedestrian control the sooner these cities will improve traffic movement and reduce the number of traffic accidents.

Drivers' Ability

The center and lane lining of streets form the basis of any attempt to correct the delays caused by the illegal turning movements practiced by some drivers. This, however, must be followed with good enforcement and a public information campaign. Drivers must be continually impressed with the rules that a right turn should only be made from the right lane and a left turn from the lane nearest the center of the street or on the left side of one-way streets. The delaying tactics of drivers who go to sleep when the traffic light turns green can only be corrected by education, but enforcement is also needed to make drivers realize that they should drive in a single lane of traffic.

Curb Parking

Parking a car at the curb is a privilege and not a right. Streets are dedicated as public ways for the movement of traffic; theoretically they should rightfully be used for parking or for conducting private business only when such do not unduly interfere with or delay moving traffic. From a practical standpoint, however, the effect of parking on business must be given careful consideration.

Since curb parking is a universal practice and permitted on the majority of streets in most cities, its elimination provides the most effective way of obtaining additional street space to re-

duce congestion on existing highways. The first step, therefore, to be taken in any program to relieve congestion is to make factual studies to determine the seriousness of the congestion, whether it is economical to eliminate curb parking, and if so, where to open additional street space for the movement of traffic.

Three basic surveys can give a satisfactory answer to the wisdom of eliminating curb parking:

1. A cordon count of the area to be surveyed to determine the volume of traffic, how the streets are being used by the public and what percentage use each type of transportation;
2. A curb parking check to determine the parking demand at the curb and the business and habits of the people who drive the vehicles;
3. A survey of the shoppers' modes of transportation to determine the type of transportation used by the shoppers.

If there is any doubt that there is congestion, speed and delay checks should be made of the traffic on the streets. These surveys will also show up parking violations, such as double parking. This data, if taken seriously, can be of considerable help in relieving congestion through strict enforcement of existing regulations.

Turning Vehicles

The correction of delays due to turning vehicles involves several methods the most drastic of which is the prohibition of turns when and where they create a major interference. This is not recommended, however, until after a careful study because such a restriction at some intersections increases the traffic control problems at adjacent corners.

Right-turning vehicles normally do not delay traffic except where they cross a heavy volume of pedestrians or are entering a cross street already filled with vehicles. Both of these conditions can be handled expeditiously by police supervision at intersections when there is a conflict between turning vehicles and pedestrians. A trained policeman can assign periods for the free crossing of each class, or prohibit the turning movement when necessary. This latter maneuver would also be used when traffic congestion on the cross street leaves no space for right-turning vehicles.

Right turns on streets outside of the business districts where pedestrian volume is light can be materially expedited by increasing the curb radius at the corner or by building a special right turn lane back from the corner.

Left-turning vehicles present an accident hazard as well as a traffic delay on two-way streets because they cut across the path of oncoming vehicles and block a lane of traffic while waiting to make the turn. These conditions are alleviated on one-way streets. Several methods are used to eliminate or reduce this interference on heavily traveled two-way streets. One is to prohibit all left turns during peak traffic hours, the other is to provide a separate left turn interval in the traffic signal timing. The first method is far superior for obtaining good traffic movement on the main street but it penalizes and inconveniences those motorists who would like to use the street but whose destination requires a left turn along the way. The second method should only be used where sufficient street space is available or made available to provide storage space for the left-turning vehicles without interfering with the straight through traffic.

“U” turns must be prohibited except at the near side of intersections and then only when traffic is controlled by a police officer or traffic signal. The street must be well marked with a limit line back of which the straight through traffic should stop when so signaled and a lane provided for the use of vehicles making the “U” turn. The “U” turn should be made on the stop signal for through traffic. During peak traffic hours all “U” turns should be prohibited.

Loading and Unloading Commercial Vehicles

Several methods are practiced to provide curb space for loading and unloading. One way is to

set aside space at the curb by prohibiting parking, usually in the center of the block, where two or three commercial vehicles can be parked. Another method is to require commercial establishments to apply for loading zones in front of their properties. Some cities have prohibited all daytime parking on many streets where commercial vehicles can be left while being loaded or unloaded. Setting aside a special loading zone area, whether it be in the middle or at the ends of blocks has never proven very satisfactory because such zones rarely satisfy the demand. It is practically impossible to make delivery men carry, wheel, or roll the load they are receiving or delivering any great distance. If they can't park their truck at the curb in front of their destination, they will double park at that location.

The second method provides a much more satisfactory way because it provides free curb space at locations where there is a demand for loading and unloading. A nominal charge should be made for installing and maintaining the signs to combat promiscuous and illegal use of the zones and the signs.

Coupled with the elimination of curb parking to provide additional lanes for moving traffic there is sometimes a ban on commercial vehicles stopping at the curb, either at all times or during peak traffic hours. It is questionable whether such drastic restrictions on commercial vehicle parking is economically sound since extra pay for night work or overtime, and time wasted by long distance haulers increase the cost of delivery service. The answer must come from studies made to compare these costs with the cost of delays to general traffic and their effect on the future status of the community.

The ultimate solution to this problem is off-street loading bays or areas in or adjacent to the commercial establishments, recreational facilities, stores, and other buildings where the loading and unloading of commercial vehicles is required. Theoretically, private enterprise has no more right to conduct its business on the main arteries of public travel in a city than on the main lines of a railroad. From a practical standpoint it will take years to bring about such a drastic change in our present method but now is the time to start. Some cities already have laws requiring off-street loading bays or areas in all new or altered buildings that are generators of traffic.

Loading and Unloading Transit Vehicles

It is fairly well recognized that busses and trolley coaches, capable of maneuvering with the vehicular traffic stream, are conducive to better overall traffic flow than trolley cars which must follow a set course on tracks. This reason, together with the alleged economies of extending service, largely account for the trend in the industry towards the substitution of busses and trolley coaches for trolley cars. Trolley cars have completely disappeared from many cities.

Trolley car stops do present a delay to traffic movement, but where the roadway is wide enough this delay can be minimized by setting aside protected loading zone areas where passengers may wait in safety from moving vehicular traffic. Under this arrangement such traffic is not required to stop every time a trolley car stops. The passengers may cross to and from the sidewalk when all vehicular traffic is normally stopped for cross traffic. These loading islands or zones can only be installed, however, when room is provided for at least one lane of traffic to pass between the edge of the island and the street curb. When the roadway is wide enough to provide two or more lanes by the loading island, vehicular traffic may be prohibited from using the car track area thus improving trolley car operation. The most satisfactory and safer type of loading island is a raised wood, or preferably a concrete or metal, island with a prow or other type of protection well marked and lighted at the approach end. There are only a few cases of mid-block trolley stops. Their advantage is questionable but the same corrective measures should be made here as at intersection stops.

Busses and trolley coaches can be placed alongside and parallel with the curb when stopped, permitting passengers to board or leave without interfering with the flow of vehicular traffic. In all cases, however, sufficient curb space must be kept clear of parked automobiles to permit transit vehicles to maneuver easily to the curb. The distance required can easily be determined. No such zone should be less than 60 feet, whereas 80 feet is preferable, and at least 100 feet should be provided where it is common for more than one transit vehicle to stop at a time.

Near side stops are more prevalent, probably because of custom and the advantages such stops have over other locations. From a traffic control standpoint each location has certain advantages and disadvantages with no clear advantage in favor of either one. Near side stops require the vehicles to stop only once at an intersection and provide more distance for them to merge with other traffic when leaving. On the other hand, transit vehicles using a near side stop usurp the lane normally used by right-turning vehicles and in leaving are in conflict with right-turning vehicles. Also, a near side stop together with a near side trolley stop concentrates too much transit activity at one location and delays traffic. Far side stops require transit vehicles to make two stops at an intersection if the traffic signal is red and vehicles leaving the stop must turn directly into moving traffic. However, it does ease up the corner for right-turning vehicles. Another disadvantage is that too many transit vehicles trying to get in the stop at one time will block traffic on the cross street or encourage double parking of transit vehicles. Mid-block transit stops will not adversely affect traffic movement as long as the vehicles stop close and parallel to the curb. On the other hand, it takes considerably more curb space for a mid-block stop than for an intersectional one.

Traffic Signals

Traffic signals to be effective should only be installed where warranted and timed in accordance with recognized standards. The type, number, and location of traffic signals, as well as the characteristics of the controller, are important. This information is available in the Manual on Uniform Traffic Control Devices which is published by the Public Roads Administration.

Traffic signals must be properly coordinated to provide a smooth flow of vehicular traffic. Since the majority of signals are at intersections where they are operated independently of each other, most cities have a real opportunity to improve traffic movement. The basis of traffic signal timing is the volume of traffic crossing the intersection in every direction so that the correct proportion of the green interval is provided for each direction of traffic. Since vehicles move more efficiently in small groups, the signal cycle should be relatively short; normally forty, but not more than fifty seconds at two-way intersections.

A majority of the traffic signal controllers in use and manufactured today are activated by synchronous motors, similar to those used in electric clocks, whose rate of movement is controlled by impulses sent out from the central power plants which supply current to all sections of the country. Theoretically, controllers with these motors should "keep-in-step". In practice, however, it requires manual supervision to maintain proper coordination between controllers.

A traffic signal system, where a number of signal installations on the same street are coordinated to provide a continuous movement of traffic, is the most efficient form of traffic signal control. This coordination may be obtained by proper timing of the controllers at each intersection. Best results are obtained, however, by interconnecting the isolated controllers with cable and supervising the movement of the controllers with a master controller. This method keeps the isolated controller "in step" and makes it possible to automatically change the timing and action of the controllers in conformance with the change in traffic characteristics during the day.

In addition to the above fixed-time type of traffic signal there is the traffic actuated type in which the signal intervals conform to the demands of traffic through the use of specially designed controllers, detectors, and push buttons. Traffic actuated signals are more expensive to install than the fixed-time type but their operations are more in keeping with traffic demand and they provide the most efficient form of traffic signal control.

Other Traffic Control Measures

One-Way Streets

Under certain conditions requiring traffic to move in one direction on a street is a favorite and satisfactory method of improving traffic movement. The most important consideration is that there are two parallel streets adjacent or reasonably close to each other and of about the same length. It is also important that transit vehicles move with traffic. One-way movement is applic-

able to most any width of street, although the limit in practice today is a street accommodating four lanes of moving traffic.

There has been some use of reversible one-way streets, that is, inbound in the morning and outbound in the afternoon with two-way traffic at other times of the day. This practice has apparently proven very satisfactory in Washington, D. C. It has been proven that one-way streets will carry more traffic at a higher average speed and with less accidents than if used for two-way traffic. One-way movement materially reduces the delay due to turning vehicles, eliminates head-on collisions, and permits perfect coordination of traffic signals.

Through Streets

Traffic conditions may also be improved by making the heavier traffic arteries through streets. This is done by requiring all traffic on minor streets to come to a complete stop before entering or crossing the main street and signaling the intersections of all main cross arteries. Further measures are to permit only right turns from minor cross streets or close them and prohibit all left turns during peak traffic hours on through streets.

Channelization

Delays to traffic movement caused by the confusion of motorists at complicated intersections can often be corrected by channelizing traffic into the proper lanes. This is commonly done by the use of raised concrete islands, known as "channelization islands", although paint markings, metal markers, sand bags and signs on stanchions are sometimes used as barriers. Naturally, whatever type of barrier is used it must be adequately lighted for night visibility. In many cases the proper channelization of traffic is more effective in expediting traffic movement and reducing accidents than traffic signal control.

This chapter does not cover all of the problems of street traffic but it does discuss briefly those which are found to bother transit operators in practically every urban community. Transit officials should have a good knowledge of these conditions because the movement of transit vehicles is affected by the movement of street traffic. Because of this relationship transit officials should maintain a close contact with the city official or officials responsible for traffic control and city planning. Through such liaison there is the possibility of decisions in the direction of improving traffic conditions and transit operations.

CHAPTER XVIII

Accident Prevention

LIKE other industries, the transit industry is faced with a real problem of accidents, to its employees, but unlike most other industries, it also has the serious problem of accidents involving employees, vehicles, and passengers while operating vehicles on public thoroughfares. It is with this latter problem that this chapter is concerned because it is by far the more serious and also because approaches to the problem of employee accidents already are well covered in other publications such as those of the National Safety Council.

Operating Accidents

Among operating accidents there is an important segregation as between traffic accidents and passenger accidents. "Traffic" accidents are those involving company vehicles in collision with pedestrians, other company vehicles, other motor vehicles, fixed objects and miscellaneous objects such as bicycles, wagons, trains, etc. "Passenger" accidents include those occurring while persons are boarding, alighting or riding in the transit vehicles.

The transit companies have an exceptionally good safety record as measured by the passenger death rate, which was only one passenger fatality for each 870 million passenger miles.¹ It was lower for 1948 than that of any other form of transportation. Less serious traffic and passenger accidents are of grave concern, however, because of the constant exposure of transit vehicles in the street traffic of city and suburban areas and generally on the most heavily travelled traffic routes. The problem also is intensified by the necessity for transit vehicles to make frequent stops along their routes to load and discharge passengers.

Numerically, traffic accidents account for approximately 70 per cent of all operating accidents, and accidents to passengers while boarding, alighting, or on board make up the other 30 per cent. Because of the greater responsibility for the safety of passengers approximately 40 per cent of all amounts paid out are on this type of accident. From an economic viewpoint a passenger accident is more serious than a traffic accident.

More than 90 per cent of all traffic accidents are collisions between the transit vehicle and a motor vehicle, with approximately one-half of these occurring as the result of one of these vehicles attempting to overtake and pass the other. Thirty to 35 per cent occur as rear-end collisions while only about 15 per cent occur as the two vehicles approach each other from an angle usually at an intersection. Pedestrian collisions are a serious problem only in the very large cities.

Approximately one-half of all accidents involving passengers occur while the passenger is inside, or on board, the transit vehicle. These result largely from the starting and stopping motions of the vehicles both at regular stop locations and because of numerous and quite often unexpected traffic interferences. The other half of the passenger accidents are distributed about equally between passengers in the act of boarding and those in the act of alighting. Most of these result from slips, trips, and stumbles while the transit vehicle is standing at a stop. Nearly eighty per cent of all passenger accidents involve women, the majority of whom are of an age over 45.

The direct economic loss to the industry as the result of both employee and operating accidents is estimated at approximately four and one quarter per cent of gross revenue, with costs for individual companies ranging from less than one per cent to as high as ten per cent. With an industry

¹Based on estimates of the American Transit Association

operating revenue of nearly one and a half billion dollars in 1948 the accident costs amount to more than 63 million dollars.

Safety Organization

While safety is an established and understood part of every employee's job and while it is a definite responsibility for all supervisory and management personnel, industrial experience has demonstrated that little progress is made unless at least some responsibility for a company-wide or departmental safety program are delegated to a staff man. This apparently has been recognized generally within the transit industry only within the past decade since prior to this period only a limited number of companies, and then only the very largest ones, had staff safety specialists.

Today nearly all medium and large size companies, and many of the smaller companies, have a safety or accident prevention activity set up on a staff basis with a safety engineer, director, or counselor in charge. In most companies these men report to the operating head of the company. In others they may be within the transportation department and their activities limited primarily to the handling of operating accident problems. When this is the case, employee accident problems of shops, garages, and other departments are handled by department heads and their subordinate line organizations. Staff safety specialists function mainly as analysts, planners, and counselors. The actual corrective or remedial work still remains a function or responsibility of the line organization.

Accident Prevention Methods

For many years the accident problem in transit and in many other industries as well was approached solely through emotional appeals -- posters on bulletin boards, mass meetings, bulletins, contests. All exhorted the employees to prevent accidents. When an employee had an accident he was called in and reprimanded, suspended, or perhaps even discharged. Little attention was given to a careful analysis of underlying causes and contributing factors, Methods were not too constructive and, in most cases, not too effective except for short periods of time.

Emotional appeals through posters, meetings, contests and awards have a very definite place in a program of accident prevention but it has been found that complete reliance cannot be placed upon them. They must serve as supplements to a more constructive approach aimed toward determining underlying causes through a factual, more scientific analysis of accident experience, human characteristics, equipment factors, and operating conditions.

Accident Reporting and Analysis

Accident prevention starts with a knowledge of the problem. This knowledge can come, for any given company, only from a review of the accident records of that particular company and such review will be only as productive as the records are correct and complete. In other words, a good accident reporting and record system is the first essential to an effective long-range safety program.

The basic elements of such a system are:

1. Complete and accurate reporting of all accidents and incidents by employees on forms designed to permit ready explanation of all pertinent details.
2. The classification of all accidents in sufficient detail to enable easy identification of predominant types and prevalent circumstances.
3. A set of files or record cards which will permit a quick and convenient review of accident experience according to such factors as individual employee, class of accident, street location, route or line, class of equipment or individual equipment, time of day, length of service, street and weather conditions, and similar items.

Full details on this subject are available from the American Transit Association and the National Safety Council, both of which have developed forms, classifications, and record systems for use by transit companies.

Careful, complete, and continuous review of accident experience is necessary if there is to be intelligent and constructive planning of all phases of the safety program to be discussed later. For example, accident experience should dictate the emphasis placed upon different operating practices during the training period; it should indicate the form and subject matter for posters and meetings; it should influence action taken as to design characteristics for new equipment; in essence, it should serve as a guide to all actions which might have some bearing on the accident problem. To illustrate these uses of accident experience, several cases are cited.

Case No. 1

A disproportionate number of accidents involving passengers falling while alighting prompted an analysis of the problem according to make and model of equipment involved. This showed that one make of motor bus was having four times the frequency of three other makes. Subsequent study and experimentation prompted the redesign and rearrangement of grab handle supports with the result that this particular make of motor bus became the safest of all.

Case No. 2

Accident tabulations indicated an exceptionally high frequency of accidents where passengers were struck by treadle-operated center exit doors while alighting from motor busses and trolley coaches. Investigation indicated a wide variation in closing time for center exit doors among individual equipment units, a prevalence of times much faster than the established standard and no uniformity in method of readjustment of time to the standard. To correct this problem, a definite procedure for checking door timing was inaugurated and all employees charged with responsibility for readjustment of timing were provided with a timing device that would assure uniformity. As a result the frequency of this particular type of accident was reduced by 50 per cent.

Case No. 3

Records showed five collision accidents at a single intersection during a six week period, all involving busses trying to make a left turn after loading passengers at a near-side stop zone. As a remedy the bus stop was moved 100 feet back from the corner in order that the bus could easily pull out into traffic before the turn. No further accidents of this character occurred.

Case No. 4

Personnel files indicated that one bus operator had been involved in a series of accidents over a very short period of time where his bus scraped poles and trees when pulling into curb loading zones. Investigation prompted a check-up on his vision and he was found to have double-vision, a condition which prevented proper judgment of clearances. Treatment corrected the difficulty and the operator's record returned to normal.

Safety Promotional Techniques

A well-rounded program of accident prevention within a transit company requires more than a thorough knowledge of the problem and an analysis of its many elements. Techniques which stimulate and maintain an interest in safety by employees are necessary supplements. These include the use of posters, the use of meetings and other media which can carry suitable messages to the employees and, by so doing, motivate the employees to do their work in the safest manner.

There are many ways in which these tools of safety can be and are being used. Consequently rather than describe the many variations in use, a pattern for one company will be cited. This pattern was used when an entirely new program was inaugurated and it included most of the pro-

motional techniques of proven value. This explanation is based upon a talk given by the company's safety counselor before a meeting of the American Transit Association.

To inaugurate a safety program all of the facts relating to the unsatisfactory accident picture were presented to union representatives and unanimous approval to cooperate in a program was obtained from the union membership. A safety committee was then organized and a schedule of meetings every Monday morning throughout the year was established. The committee was composed of all operating department heads, the vice president and general manager, the president, vice president and business agent of the union, a supervisor, and three operators. The business agent of the union was chosen as chairman and the company's safety counselor as executive secretary. The operators serve only one month at a time and are then replaced by three others, all chosen on the basis of seniority and freedom from preventable accidents. The committee inquires into and considers means of preventing accidents and further acts as an advisory council on all safety matters.

This safety committee sponsors a monthly employees' safety meeting, held on the second Tuesday of each month with the same program being presented for one hour each in the morning, afternoon, and evening, so that the maximum number of employees will have an opportunity to attend. Attendance is voluntary and no one is paid for time spent at the meeting. However, fifty dollars is given in door prizes at each session with post card notices being sent to each employee at his home before each meeting. A Certificate of Safety Education is given to each employee attending for one year and an attendance badge is awarded with this certificate.

The programs for these meetings are varied in an effort to maintain interest. Films, slides, charts, and other visual aids are used whenever possible but there are certain features that are the same on every program. These are:

1. Presentation of company and union officials so as to demonstrate their interest in and support of the program.
2. A talk by the company's safety counselor.
3. A short period of ten minutes or less for suggestions, questions, or complaints from those in attendance.

At the meetings there are no restrictions on what any employee can say but he must give his name and where he works. In addition to this, questions and suggestions are written on attendance cards. These are recorded and submitted after the meetings to the appropriate department head for answer or comment. The answers are collected by the safety counselor and both questions and answers are mimeographed and furnished to every employee prior to the next meeting. Thus, not only does the employee receive a written and considered answer to his question but also every employee receives the answers to all questions brought up at these meetings whether or not he actually attended them. This results in all employees being much better informed than they might otherwise be.

Charts are displayed at each meeting showing graphically current trends in accident experience. The discussion then brings out specific problems with special emphasis on human failures which have contributed most to the record. Meetings also afford an opportunity to recognize superior performance, to explain changes in procedures and policies, to clear up many items which might otherwise prompt grievances and to give additional training to operators by exposing, them at least briefly, to the combined experience of others.

As an indication of what the employees like about these meetings, they have repeatedly asked for more facts, particularly more specific statements of their observed faults. The employees apparently do not resent criticism. They like pictures and visual aids and have little interest in stories, jokes, or entertainment. Safety is never treated in other than a serious vein and the employees appear to take it seriously.

In addition to these meetings safety messages are given to all employees by the use of payroll inserts which reach them 26 times each year. Six times a year the safety counselor sends a special letter to each employee at his home, and each month the company's employee magazine, containing articles and news about the safety program, goes to each employee's home.

Safety posters are mounted on bulletin boards in every department, these posters being changed weekly. A spot map showing locations of accidents also is posted at each division once a month in order that all operators may know just where the accident difficulties are occurring.

Messages on the importance of safety and the means by which accidents may be avoided are given to employees in many different ways, the principal ones being summarized as follows:

- 52 times a year in weekly safety committee meetings.
- 12 times a year in monthly employee safety meetings.
- 12 times a year in question and answer lists.
- 12 times a year in monthly employee magazine,
- 26 times a year in pay roll inserts,
- 6 times a year in safety counselor letters,
- 156 times a year with safety posters,
- 12 times a year with monthly accident spot maps,
- 365 times a year with daily supervisor's messages,
- 52 times a year with weekly training school classes, and
- 24 times a year with "Take One" folders on vehicles.

Naturally there are many variations in the manner in which the foregoing promotional media are used. There are also many differences in the extent to which they are used by individual companies. However, they are representative of the most common techniques used for safety promotion.

Safety Incentive Plans

Still another approach to the accident problem is through the use of safety incentive plans. While there are many variations in the plans that are used quite widely by transit companies, these plans in general have been of two types; those designed to appeal to an individual acting as part of a group or team; and those designed to appeal solely to the employee as an individual. In other words some plans provide for incentives or awards to a winning group, while other plans provide awards to the individual himself based upon his successful conformance to some given set of conditions such as driving a vehicle without an accident for a given period of time or for a given number of miles.

As an indication of the extent to which incentive plans are utilized by transit companies and the character of the plans used, reference may be made to a survey among its members by the American Transit Association in 1947. Replies were received from 102 separate operating companies and it was found that all but 36 had some type of an award. Only six used a group incentive plan alone. Forty-eight companies used an individual award exclusively, while 12 companies used both individual and group awards. A careful review of this survey brings forth the conclusion that an individual award is the main dependence of these companies as a means of stimulating interest in safety.

As to the type of individual award used the survey revealed that there was an almost even division between those companies offering merely a token award and those offering an award of some appreciable value. Approximately half of the companies offered only a pin or emblem, a certificate or a banquet combined with a token award. The other half offered some form of a cash bonus, a uniform, or merchandise. There appears to be no decided preference for any particular award plan although there is growing interest in and use of the Safe Driver Award Plan conducted by the National Safety Council, a plan which has received widespread acceptance, particularly among commercial fleet operation other than transit.

While incentive plans are used quite widely in the promotion of safety, evidence as to the results being obtained is quite meager. Favorable opinions are expressed for the most part but there is not sufficient evidence available to show that incentive plans have produced tangible results. This perhaps is due largely to a lack of accident records which lend themselves to appropriate evaluation. There also is little information from which one can determine the relative merits of the various types of incentive or award plans.

While award plans would appear to be a worth while part of an accident prevention program, there are no grounds for the feeling that an award plan will in itself solve the accident problem. Safety cannot be bought by incentives. Nor is it true that a mere increase in the monetary value of an award will necessarily make it more attractive to employees, or cause them to work harder for a clear accident record. Thus, experience seems to indicate that safety incentive plans can be helpful in improving the accident records of operating transit companies but they still must be considered effective only as an adjunct to other means of promoting safety.

Participation in Community Traffic and Safety Activities

Transit vehicles share the use of city streets with many other vehicles, private automobiles, trucks, motorcycles, and also with pedestrians. Moreover, both transit safety and traffic safety generally are related quite directly to the freedom with which all traffic can move. Consequently, transit companies have a very real interest in the degree to which street traffic is controlled and facilitated by public agencies and officials charged with that responsibility. It is to their advantage to cooperate closely with police, traffic engineers, city planners, school authorities, other city officials, local safety councils, chambers of commerce, and the several other groups active in efforts to relieve street traffic congestion and reduce traffic accidents.

To emphasize the importance of transit participation in community traffic and safety activities reference may be made to reports by the Committee on Transit Operations, Institute of Traffic Engineers, from the 1945 and 1946 Proceedings of that organization.

In 1945 the Committee stated:

Universally it is recognized that the primary function of a city street is to provide for the movement of people and goods. A secondary function of a street is to provide access to property. . . . To meet the enlarged post-war urban transportation demand, the traffic capacities of the existing streets must be greatly expanded. This means that every city will be forced to adopt specific measures to increase the transportation capacity of its major thoroughfares as compared with pre-war values. Transit as an efficient user of street space is expected to carry its portion of the expanding post-war movement of people. To best serve the community and to do its share in helping to take care of the increased transportation demands placed upon the street system, transit vehicles must move more expeditiously than ever before.

The report then continues and cites specific measures helpful to reduce conflicts. These include: improved signal timing, intelligent application of one-way streets, control of commercial trucks in loading and unloading during rush hours, elimination of left turns in heavily congested areas, greater use of pavement marks, medial strips and channelization, elimination of curb parking in congested areas during rush-hour periods and consideration of all factors involved in selection and design of transit stop zones.

Still further indication of the character of traffic movements which influence both the freedom of flow and the safety of transit operations can be found in the 1946 report where specific examples are cited. These include:

Downtown parking ban speeds traffic, reduces accidents (Philadelphia, Pa.);
Change in type of parking improves transit and automobile movement (Macon, Ga.);
Selective signal for street car movement (Washington, D.C.);
Shorter cycles and progressive coordination improves transit service (Atlantic, Ga.);
Lengthening loading zones speeds transit (Los Angeles, California);
Re-location of street car stop cuts accidents (Pittsburgh, Pa.);
Right turn prohibition eliminates accidents and delay (San Antonio, Texas); and
Pedestrian barrier and signal arrows reduce accidents at heavy transit loading facilities (Richmond, Va.)

In addition to specific, direct activity with city officials many transit companies have included in their safety programs extensive work in the promotion of traffic safety in the schools and frequently have been among the strongest supporters of local safety councils or safety activities in organizations such as the chambers of commerce. Because of the close relationship between transit safety and community traffic safety, this cooperative activity is of real importance.

Control of Human Factors

Most analyses of the causes of traffic accidents point out that human factors such as bad habits, ignorance, lack of skill, psychophysical disabilities, wrong attitudes, and other personal limitations account for the majority of accidents. It also is probable that these same human factors account for the majority of transit accidents. Thus, while accident analysis, traffic engineering, education, traffic law enforcement, and other such tools are important, they will be effective only to the degree to which they properly influence the behavior of drivers, pedestrians, and more specifically operators of transit vehicles.

There are many ways in which transit companies endeavor to exercise control over the human factors which cause their operating personnel to become involved in accidents. First, there is the initial selection and employment of employees, where efforts are made to employ only those who will prove truly competent. Then there is the indoctrination and initial training of new employees in all phases of their jobs. Supervision, follow-up and retraining where necessary also play an important part in producing acceptable safety of transit operations. Finally, the administration of discipline has been found to be one of the most important keys to success or failure of transit safety activities.

The control of human factors through the means just mentioned must be included in a coordinated program of accident prevention if it is to be successful. These means also fall under the heading of "personnel administration" within most organizations. Therefore, in order that these may be given a fuller discussion the next chapter is devoted to them.

Successful Transit Safety Programs

While the foregoing has outlined methods which have proven successful in the reduction of transit accidents, commendable safety records have been achieved with many variations in the applications of these methods. Actually not all of these approaches have met with the same degree of success. This leads to a conclusion that perhaps the success of a program depends not only on what method is used but also on how the method is applied.

Several specific cases have been cited to illustrate results obtained from specific methods. A similar citation of cases whereby individual companies have attained considerable success might likewise be helpful. Among these companies are: Capital Transit of Washington, D. C., St. Louis Public Service Company of St. Louis, Georgia Power Company of Atlanta, Ga., New Orleans Public Service Inc., Seattle Transit System, Evansville (Indiana) City Coach Lines, Inc., South Carolina Gas & Electric Co. of Columbia, S. C., Hamilton (Ohio) City Lines, Lima (Ohio) City Lines, and Springfield (Ohio) City Lines. All of these companies have achieved top honors in the annual American Transit Safety Award Competition sponsored by the American Transit Association.

Capital Transit Company of Washington, D. C., attributes a great deal of its success to careful initial selection and training, and also to strict control of operating personnel through a coordinated disciplinary control procedure. St. Louis Public Service Company has accomplished much from careful selection and training, from safety meetings and refresher training courses, and from discussions of accidents with small groups of operators.

New Orleans Public Service Incorporated made exceptional reductions in accident rates over a recent period through intensive retraining of all operating personnel, through continuous follow-up and through constructive treatment of individual employees by the supervisory group. New Orleans also has made excellent use of contests and award plans.

To summarize, there are many approaches to the accident problem of the transit industry and much can be accomplished by the careful and coordinated application of them. The extent of success for any given program will depend upon the amount of administrative team work. Top management must believe in accident prevention and continually and consistently make this belief known to every member of the organization; the safety counselor or staff man must have initiative and imagination and must command the respect of both top management and the entire line organization; the line organization must have confidence in its abilities, must be willing to take the initiative, and must aggressively carry out any agreed upon coordinated program.

CHAPTER XIX

Personnel

The Personnel Function

DURING the past twenty-five years industrial managements have increasingly recognized the necessity of centering greater attention upon the effectiveness with which human labor is applied. This has resulted in a new focus in administration to the human element -- the individual worker himself and workers in groups. From this has grown the field of personnel administration in the transit industry as well as in industry generally.

Personnel administration in transit is comparable to that in most other industries except for differences created by the character of work performed by individual employees and by the distribution of its manpower among the several job activities. To illustrate, there are many office workers, mechanics, machinists, electricians and others with jobs comparable to those in manufacturing industries to be found among the 253,000 transit employees in the United States.¹ However, these represent a proportionately low percentage of the total, for nearly 60 per cent of the industry's employees are engaged in the actual operation of vehicles, either street cars, motor busses, trolley coaches or rapid transit trains. Then, too, there is still another group working on the maintenance of way and in the construction and maintenance of overhead, underground or third-rail power lines.

Emphasis is placed upon the character of work performed by the majority of transit employees because it dictates the character of supervision that can be provided. This in turn creates differences in the problems of personnel administration when compared to those in most other industries.

The great bulk of transit workers must perform their work on an individual basis with only very limited and intermittent supervision. Moreover, since failure to maintain established schedules, discourtesies to the public, and involvement in accidents will disrupt the functioning of any transportation system, the efficiency of employee performance is perhaps of greater importance to the economic well-being of a transit system than it is to many other industrial enterprises. This efficiency must be obtained under conditions which make close, direct supervision an impossibility.

Still another factor influencing personnel administration in the transit industry is that of labor turnover. Between World War I and World War II the transit industry had labor turnover rates that were among the lowest in all industries, due largely to stability of employment - 52 weeks of work a year - and assurance of a job for life with increasingly good working conditions if reasonable standards of performance were met. Naturally this condition did not prevail during World War II when labor turnover almost universally rose beyond all bounds but it again has dropped generally to pre-war levels with the relative stabilization of the post-war labor market.

Personnel administration customarily covers many functions which can be divided into such activities as employment, health and safety, training, employee services, and labor contract negotiation and interpretation, and the appropriate research relating to these functions. Some of these functions have been treated in other chapters, accident prevention in Chapter 18 and labor relations in Chapter 22. Other functions are handled in ways similar to those used by other industries and therefore need not be discussed since much already is available on them. Among such normal personnel functions are job analysis, job classification, job evaluation, pension plans, group insurance, recreational activities and the like. Therefore, this chapter will deal primarily with personnel functions that are handled in a manner somewhat peculiar to the transit industry,

¹Estimate for 1949 by American Transit Association.

including: selection and employment; employee training, both initial and in-service; and supervisory control.

Organization For Personnel Administration

For many years personnel functions in the transit industry were handled on a departmental, decentralized basis. If there was need for a new employee, then the department head authorized and arranged for his selection and employment. The department handled all initial training as well as all follow-up and retraining. Where there was need for new supervisory personnel, this too was handled almost entirely within that particular department. Even personnel records were kept decentralized.

More recently, however, there has been a growing trend to centralize many of the personnel functions in a staff department. Initially this frequently was limited to the centralization of personnel records but later other functions were absorbed, particularly the one of selection and employment.

While more and more companies now have staff personnel departments which serve the entire company, there are wide variations in the functions performed. Some are personnel departments in a complete sense while others remain little more than employment offices even though operating under the term of personnel department. Also, there still are wide variations between the large and small companies with perhaps the majority of small companies still keeping most personnel functions under departmental authority and responsibility.

While the transit industry can be credited with modernizing its organization for personnel administration, one weakness common to many industries has crept in on occasion. This is where management, in its desire to have a separate staff set up for the handling of personnel matters and in its anxiety to do something quickly, has permitted the wrong people to be placed in charge of personnel work. In such instances many of the advantages of centralized personnel administration have been lost, at least until such time as top management was able to make necessary changes and replacements. Fortunately, however, most of these original mistakes have been corrected. Present personnel administration in the transit industry is on a par with most industries.

Selection and Employment

As in all industry the selection and employment of competent employees is an integral part of any formula for successful operation. In the transit industry this is particularly true since the majority of personnel are those who operate vehicles on city streets and highways and who also collect fares, handle passengers and come in contact with the general public. It is from these employees that most people in any community get their impression of a transit company. Consequently, mistakes in the selection of transit operators can seriously affect the success of the operation even more so than comparable mistakes in the selection of employees in most other industries.

In view of these responsibilities of operating personnel most transit employees must possess a rather intricate combination of abilities or attributes. The operator of a transit vehicle must be mentally alert and able to give attention to a diversity of things at the same time without neglecting any single one of them. He must have good muscular and nerve coordination and possess qualities of patience and honesty; he must have a personality which permits him to get along with the public as well as with his fellow employees; and he must be willing to work well under frequently inadequate supervision and in many instances with irregular or unattractive hours. To get such a person as an employee today requires the careful attention of well-trained people.

Many years ago the need for selecting and employing persons with the foregoing abilities was not accepted too widely. Many companies were satisfied to take almost anyone who applied and gave a good initial impression. On the other hand, there were several notable exceptions. As long as 25 to 30 years ago intensive study was given to methods, particularly those involving the use of psychological tests, which would assure that only the most competent persons were em-

ployed. This started in Boston and subsequently continued and expanded in Milwaukee, Cleveland, Pittsburgh and Washington, D. C. While this research and development work was quite successful, the results from it were not generally accepted until the problems of selection became most acute as the result of manpower shortages in World War II. Then the procedures which had proved to be most effective were consolidated through activities of the industry's trade association, the American Transit Association, and made available in organized form. Since most of its features have found wide acceptance within the industry, it can be considered as being reasonably representative of current practice.

This above-mentioned procedure is covered completely in available publication. Therefore, consideration will be given only to a few of the more basic elements involved in selecting a suitable employee. First, specific requirements of each job must be established for the benefits of those responsible for employment. These people must have full knowledge as to what each employee must do and what he must know if he is to prove competent. This preferably should be set down in writing. Second, considering these job requirements, someone must establish the personal characteristics, qualities or traits that are needed by a person who takes any given job. In other words, there is no single, personal quality that can be labeled "good bus operator" or "good mechanic." Each of these persons is a combination of many different personal characteristics and those who have the responsibility for hiring must know the personal qualities and the combination thereof needed for each job to be filled.

The third element in employment is to find the person who has the qualities that are wanted, to the degree necessary. This is done by checking all applicants against these so-called quality standards. That is what a selection procedure really is, merely a series of steps by which it is determined whether an applicant possesses the skills, aptitudes and personality traits that have been agreed upon as being wanted on the job. This is done normally through the use of several tools, namely, application blanks, history and record forms, credit investigations, reference to police records and to previous employers, psychological tests, skill tests, medical examinations and finally, one or more interviews. Every step is a source of information and if any step does not add to the knowledge about a person with respect to the specific things for which one is looking, then it is useless and need not be used.

There are four areas in which tests are used in the selection of transit operating personnel. First, there are tests in the field of mental ability - general intelligence - to measure the ability to learn or acquire knowledge. Second, there are tests of motor ability - eye-hand-foot coordination - mechanical aptitude - to measure physical aptitudes as related to the job. Third, there are visual skills tests - visual acuity, depth perception, color perception - to measure the visual skills that may be needed. Finally, there are tests in the field of personality to measure characteristics commonly referred to as temperament, attitudes, and/or emotional stability.

A mental ability test used most widely is the Standard Examination for Transit Employees, a 60-question pencil and paper test distributed by the American Transit Association. It is comparable to several of the well known mental ability tests but the questions are couched in transit terminology and therefore the test appears to be related more directly to the job for which the man is applying. It has been found to be a most satisfactory source of information on the abilities of applicants to absorb instruction.

In the area of motor ability some use has been made of simple eye-hand and eye-foot reaction devices but the results have not been too satisfactory. The test - an apparatus test - found to be most valid and useful is one referred to as the American Transit Motor Ability Test, developed by the American Transit Association. From the use of this test it has been found possible to predict more accurately whether a candidate can qualify in training and also whether his chances are good for being an operator with a better-than-average accident record.

The measurement of visual skills is considered to be a most important item and careful attention is given to it. Not only is visual acuity measured and a high standard of performance required but other aspects of vision such as depth perception, muscular balance, color perception, field of vision, and night vision are checked by many companies. For this purpose commercially available apparatus usually is employed although some companies have found it practical to construct their own test apparatus.

Although nearly all transit managements agree that personality characteristics are of major importance, largely because operators deal with passengers and the general public under limited supervision, comparatively little use has been made of tests in this field. This is due perhaps to the fact that most personality tests have not been validated to an acceptable degree and have proved useful mainly in clinical application. Some companies, however, have found such tests helpful to interviewers in the final evaluation interview since they can provide clues as to possible weaknesses, thereby indicating lines of inquiry that may be pursued profitably. Of such available tests, the one most widely used is an experimental one known as the Personal Reaction Test for Transit Employees distributed through the American Transit Association.

The final and perhaps the most important element in a successful procedure for selection and employment as used in the transit industry is an interview, sometimes referred to as the Placement or Evaluative Interview. It is here that a trained interviewer reviews all information available relative to any given applicant and then follows this with a pattern of questions dealing with work experience, the applicant's schooling and childhood, and other aspects of his personal history. The development of improved interviewing at this stage of the procedure has been extremely productive.

Before leaving the subject of selection and employment, a major difference between the procedures applicable to the large and medium-sized companies and those used by the smaller companies should be noted. In the case of the medium and large-sized properties the main emphasis is on selecting a person with sufficient basic aptitudes so that he can be given intensive training and then qualified as a competent vehicle operator. In contrast, the smaller properties are anxious to select a person who already has the ability to drive a heavy vehicle. They are interested in employing a skilled bus operator, rather than one who can be made into a skilled operator through training.

The employment of personnel for departments other than transportation is a somewhat different problem. Generally speaking, positions requiring skilled help customarily are filled by up-grading and replacements are hired only in the lowest job classification. This practice, however, still requires care in selection since those employed for the lower classifications must have inherent aptitudes and abilities that will permit successful subsequent up-grading.

Employee Training

As in the case of selection and employment, the bulk of the training problem relates to operating personnel. Consequently, major emphasis is given to methods used with that group.

Initial Training

Following acceptance for training as a vehicle operator the new employee or student trainee normally is sent to the company's "Training School" where he is in the hands of one or more staff instructors. While there the trainee receives two types of instructions - classroom and road. Also, while he is being given his initial training and for a period of from sixty to ninety days thereafter, he is on probation. During this period all questions of competence and acceptability as a permanent employee remain with management and are not subject to any terms of a labor contract.

Following classroom and road instruction by staff instructors, the trainee is turned over to a "line" instructor, an operator in regular passenger-carrying service, under whom he receives additional instruction or practice. The trainee usually will serve under several different line instructors, one for each route or line with which he must become familiar. While out receiving line instruction, each trainee will be checked periodically by staff instructors and, after covering all lines, will return to the training school for a final review or written examination and a final road check by a staff instructor.

Classroom instruction will cover many different subjects, including: first, an orientation or explanation as to the job itself, the company - its organization and operation, the importance of transit to the community, etc.; second, an explanation of the vehicle and its characteristics - transmission, clutch, engine operation, brakes, cooling system, tires, door operation, etc.; third,

safety - passenger, pedestrian, motorist and employee; fourth, courtesy - to passengers and others; fifth, operating rules - to be found in rule books; sixth, fare structures, handling of transfers, tickets, tokens, and fare registration; seventh, clerical duties - complaint cards, mileage reports, trip sheets, time slips, etc.; eighth, how to make out accident reports; and ninth, reporting for work and getting assignments.

Most classroom instruction is presented in lecture form with considerable variation in the amount of actual discussion permitted. Wide variance is also found in the use made of visual aids, such as charts, diagrams, models, slide films and motion pictures. Many companies do use, however, the three United States Office of Education films on "The Operator and His Job," "The Operator and His Passengers," and "The Operator and Safety." Some companies also make good use of the film "By Jupiter" to demonstrate the value of courtesy.

Road instruction has two phases: first, instruction on a bus not in passenger-carrying, revenue service by a staff instructor; and second, instruction or practice on a bus in passenger-carrying, revenue service by a regular operator selected as a "line" instructor. Instruction on the training bus, not in revenue service, may be given by a staff instructor to only a single trainee but normally there are several trainees and sometimes as many as eight or ten in a single group. Instruction covers: first, the checking of the bus - lights, doors, windshield wipers, air pressure, buzzer, etc.; second, starting the engine; third, shifting of gears and use of clutch; fourth, proper braking; fifth, making left and right turns; sixth, following other traffic; seventh, pulling into and out from bus stop zones; eighth, observance of traffic controls; ninth, operation at grade crossings; tenth, use of mirrors and checking of clearances; eleventh, overtaking and passing; and other miscellaneous aspects in the handling of the bus.

For this initial mastering of bus operation a few companies have off-street practice roadways with a standardized layout. Still others have reasonable standardization of practice facilities on little-used side streets. The majority, however, merely make use of nearby city streets with no attempt at standardization. Some make little attempt to keep away from normal city traffic.

So-called "line instruction" is not really instruction at all. It customarily is nothing more than practice under observation with its objective being to permit the trainee to become familiar with the layout of the different lines, transfer points, schedules and other general characteristics. Sometimes "line instructors" are specially selected and trained for this work but usually they are given the assignment because they have had years of experience and have a good operating record. The difference between them and regular operators is apt to be nothing more than the 10¢ per hour or \$1.00 per day extra that they receive in pay.

The amount of time spent on these two phases of road instruction varies widely from company to company. Instruction on an empty bus may be as little as one day and as much as three days with the time remaining constant regardless of the number of trainees in a group. Practice in revenue service also varies but usually is governed by the number of routes or lines with which a new operator must be familiar. However, as little as half a day may be spent on some lines and as much as 5 days on others.

These comments on the training of transit operators refer for the most part to the practices of medium to large-size properties. In the case of the relatively small transit company the selection and employment procedure provides the transportation department with a person who has not only the basic ability but also the developed skill to operate a heavy vehicle. Consequently, the "training" given to the new man is little more than providing him with an opportunity to familiarize himself with minor differences in the operating characteristics of the vehicle itself and with the characteristics of the routes covered. Fare collection, transfer practices and other routine details likewise need to be covered. All of this usually requires little more than a day or two on a small property and the new employee then is assigned on his own to operation in passenger-carrying service.

While for operators most companies have specially-trained instructors to handle the initial phases of training for the job, the situation is somewhat different for maintenance personnel. In most companies there are no staff instructors to handle maintenance training. Instruction,

indoctrination, and training are handled by members of the line organization, by the foreman, or the employee's immediate supervisor, whatever his title may be. This is quite generally true although there are a few companies that have regular apprentice-training programs in operation. Then, too, since most new employees in departments other than transportation are in the lower job classifications, the problem of initial training is less acute and critical.

In-Service Training

When a new operating employee of a transit company has been designated as "qualified" and is permitted to take a vehicle out on his own in regular passenger-carrying service, he has demonstrated an acceptable ability. This rarely means that he is as competent as an operator can be. That can come only after a considerable period of actual experience, as indicated by the relative high incidence of accidents among new employees which gradually improves until it levels off after five or six years on the job.

Since it is impossible to expose the student trainee to all situations with which he will be confronted before he is put on his own, follow-up and retraining is of very great importance to the development of competent employees. With most companies this is quite intensive at the very beginning and then gradually diminishes as it appears that the employee is getting along satisfactorily. Staff instructors customarily handle most of this, which consists mainly of ride checks, but much help also comes from observations by street supervisors.

Initially, follow-up training is given to all employees but later this is limited usually only to those whose performance is found to be below-standard on the basis of records relative to accidents, complaints, schedule maintenance, handling of fares, etc. When such records indicate possible weaknesses, special follow-up and retraining is arranged for on an individual basis. Recently, too, some companies have found so-called "refresher training" to be a valuable method for improving over-all employee performance. This normally consists of bringing all employees back to the "training school" in small groups for a review of good operating practices and a discussion of operating problems. Again it should be pointed out that a continuous program of special in-service training is an important essential of good personnel administration in the transit industry because of the inability to maintain very close supervision over most employees while they are performing on the job.

Supervisory Control

One of the real problems of personnel administration in the transit industry relates to supervisory control and stems from the lack of close, direct contact between most employees and their immediate supervisors. This is particularly true for operating personnel and is true to only a slightly lesser degree for many servicing and inspection activities in the maintenance work.

In Chapter 9 on the general organization and functions of the transportation department the importance of street supervision to the maintenance of satisfactory service is pointed out. The point also was made that since street supervisors are in contact with individual operating employees at relatively infrequent intervals, it is impossible for them to be personally aware of all aspects of performance on the job. Most information on performance must come from verbal or written reports by the employees themselves. For example, a supervisor rarely sees an accident happen. Details of such an occurrence, including improper performance of an employee, must be obtained from secondary sources and in many instances almost entirely from the employee himself. This condition poses many problems in connection with the effective administration of corrective disciplinary measures.

Still another problem arises as the result of the varying authorities vested by managements in street supervisors. For the most part the main emphasis is on the supervisor's responsibility to see that schedules are maintained and that irregularities in service are corrected as efficiently as possible. In fact many supervisors consider that to be almost their only function. On all other matters relating to employee performance the street supervisor's responsibility, at least by custom, is merely to make note of such performance and then report it to the next higher level of supervision for appropriate action. On the smaller properties this would be to the superin-

tendent and on the larger properties to a divisional superintendent. Moreover, in some instances on large properties it has been considered advisable to restrict the authority of even divisional superintendents and to centralize many aspects of disciplinary control at a still higher supervisory level. When this has been done, it usually was to attain greater uniformity and consistency in disciplinary action.

The nature of the relationship between supervision and the operating employee has put a premium on correction. Unfortunately but perhaps out of necessity, contact by an employee with the authoritative supervisory level customarily takes place only when something has gone wrong - when there has been an accident or a complaint or when the employee has failed to measure up to performance standards in some other respect. Rarely does an employee see a superintendent individually on any other basis except in relatively small organizations. This, of course, constitutes a serious handicap to management in its efforts to obtain acceptable employee performance by means of inspirational and commendatory measures.

Efforts to compensate for this lack of personal contact are not too wide-spread. However, a few companies do so by using instructional staffs to ride with every employee at regular intervals. This permits them to commend the good employees for satisfactory performance as well as to correct the poorly performing employee. A few others use rating systems which provide for periodic notification as to performance to each employee.

In handling discipline the procedures of most transit companies call for an interview between the employee and a management representative whenever an infraction, complaint, or accident is reported. As the result of this interview the responsibility of the employee is determined and a decision reached as to the form of penalty or punishment to be used. The most common forms are reprimands, suspensions without pay, and discharges. While this is standard routine for specific failures, many companies also have procedures whereby special review is given whenever the overall record, or perhaps the accident record alone, reaches a point arbitrarily set as being unsatisfactory. For example, such a point might be five accidents in less than six months. Considerable success in obtaining improved performance has been attained with these special reviews, particularly when they are conducted along constructive, instructional lines and when the interview pattern has been reasonably well standardized.¹

For other than operating employees, supervisory control is less of a problem since the relationship between employees and their immediate supervisors is reasonably direct and quite constant. Here the problems and methods are much like those to be found in most manufacturing industries. One special difficulty, however, can be cited. This is the lack of written notation of most minor infractions or instances of below-standard performance. Most cases of that kind are handled verbally and only in the event of a serious offense is a record made. As a result the lack of a really complete written performance record may make the administration of effective discipline quite difficult at times.

Other aspects of supervisory control deserving attention are those of selection, training and development of supervisory personnel. Comparatively little has been done to change or improve upon methods in vogue for many years. Some exceptions can be found among the larger companies and considerable experimental work has taken place through the work of the American Transit Association with its supervisory development program. However, much still needs to be done to raise the level of these phases of personnel administration to those found in many other industries.

¹An example of a standardized procedure can be found in the Case Interview Plan for Administration of Discipline developed by the American Transit Association.

CHAPTER XX

Transit as a Business

THE business of rendering urban transportation service is that of a public utility, but it differs in a number of ways and to a considerable extent from that of electric, gas, and telephone utilities.

The English Common Law recognized certain occupations as being affected with a public use and imposed conditions for their conduct different from the conditions under which ordinary competitive businesses were operated. The background of these special rules reflected the belief that the traveler was in the nature of things unable to conduct his dealings with the innkeeper and the ferry man on an equal or arm's length basis. Those businesses were, therefore, required to serve all comers and to serve them at reasonable rates.

In modern times it has been recognized that urban transportation and other utilities were natural monopolies and that as such duplication of their facilities resulted in an unwarranted economic burden on the community. Regulatory legislation, therefore, attempted to preserve the low costs of rendering non-competitive service and at the same time to govern standards of service and charges for service in order that the preferred position of the natural monopoly should not be used to the disadvantage of the user of the service. The earlier forms of regulation in this country prescribed the conditions of operation through which were granted the right to use the streets and the areas above and below them. However, early in this century the states began to set up commissions for the purpose of regulating public utilities on a continuing basis, supplanting by such means the earlier regulations through franchise ordinances.

There are a number of important differences between the several types of public utilities. No one of them is free of competition, although for the vast majority of customers there is no practical substitute for gas, electric, telephone, and water service. In the case of urban transportation the development of economical individual transportation units has in a great many situations permitted the individual a competitive form of transportation. This is especially true if the individual considers all of the fixed charges of his automobile as a part of the cost of his general welfare and social standing and thinks of the use of his car for business purposes as costing merely the additional running expenses of the mileage involved.

Several additional factors differentiate urban transportation from other utilities. First, and perhaps most important, is the fact that those individuals in any community who most need the service are often those least able to pay its cost. Second, it is quite as important for the employer or the storekeeper that people have access to this place of business as it is for the employee and customer transportation users themselves. Third, the user of urban transportation is typically an ultimate consumer, whereas a large part of the revenue of electric, gas, and telephone utilities comes from those to whom the costs of these services are usually a relatively small part of the cost of doing business and are to be passed on to the consumer as a part of the cost of the commodity or service sold.

There are other less important differences. The users of urban transportation service make many cash payments each month, as contrasted with monthly payments for other utilities, and are constantly reminded of the cost of the service. Transportation of any kind must justify itself on the value of "place utility", a concept which is not always fully understood by the consumer. Finally, urban transportation involves the transporting of persons as distinct from commodities and all too often, due to the custom in urban centers of mass migration confined to short periods of time, this takes place under unfavorable conditions annoying to the individual who is paying for the service.

Despite these differences and handicaps, urban transportation is rendering a vitally necessary service and its costs must be met either through the fares collected, or in part from fares and in part from community contributions. It is at this point that the economics of transportation and the social and political factors of public ownership converge. If the cost of a necessary service is more than its users are willing and able to pay, these costs must be met from other sources.

The believers in private enterprise would retain the efficiencies of private ownership, render adequate service, and charge compensatory fares. They would look for relief where necessary through a better coordination of the use of streets, relief from collateral burdens such as paving costs, changes in street grades and alignment, and certain taxes, together with cooperation in spreading traffic flow.

This program, involving joint action by public authorities and corporate officers, appeals to the public ownership advocates as a palliative at best and as involving some measure of subsidy to private enterprise. They point out that the quality and extent of urban transportation is often a major factor in land values and in the profits to be derived from real estate developments. When service to remote developments results in transportation losses but increases real estate values, one does not offset the other if they accrue to different owners. In the case of the municipally owned transit system, a city has an offset to such operating loss to the extent that greater real estate values result in greater taxes. Some therefore advocate that the municipality take over and operate the urban transportation facilities, making operations as nearly self sustaining as possible and balancing accounts either by carrying some costs in other departments of the city government, or by contributions from the general tax funds, or by both methods.

In the following paragraphs reference is made to a typical transportation system in order that two things may be achieved: first, examination of the factors which contribute to the cost of the service, and second, observations as to the possibility of combining the effectiveness of private ownership with contributions by the community at large. The latter may be justified, if at all, solely by the social values inherent in the service.

Assume an urban transportation system is rendering service with 550 cars and 1,200 busses, the former operating on 300 miles of single track. Such a system would probably cost \$75,000,000 at the present time, assuming it to purchase its power; but, since a considerable part of the property was put into operation when prices were lower, it stands on the company's books at perhaps \$50,000,000. Disregarding working capital and reserves, we may further assume \$25,000,000 of four and one half per cent bonds to be outstanding with an equity of equal amount represented by common stock and surplus. The operating expenses of such a property may be assumed to be approximately \$25,000,000 with taxes of \$2,500,000 and depreciation of \$3,000,000.

Such a property should carry from 350 to 400 million revenue passengers a year. The above operating expenses, taxes, and depreciation, amount to between 7.5 and 9 cents per passenger before any return on the property devoted to the business or the investment it represents. Seven per cent on cost of plant would add one cent to costs and after interest on bonds show 9.5 per cent on the owner's equity which is probably not more than essential to keep the company's credit sound.

Certain operating expenses, such as cleaning streets of snow and ice and maintenance of paving, might be below the sum of the existing costs to the city and company proceeding independently because of a greater degree of cooperation which would be expected if the property were municipally owned. Expenses of regulation, together with general legal expenses and the cost of injuries and damages, might also be susceptible to decrease if the interests of the city law and police departments could be more effectively coordinated with those of the transit operation. Out of \$25,000,000 operating expenses, it is estimated that savings between \$500,000 and \$1,000,000 per year could result. Out of \$2,500,000 taxes, at least \$2,000,000 could be saved to the transit operation although obviously they would have to be collected from other sources.

Cost of capital varies substantially from time to time and from enterprise to enterprise but it is not unlikely that a municipality could secure all its capital at four per cent on income transit bonds in a market that would rate mortgage transit bonds for half the capital at four per cent or better and equity capital for the remaining half to earn ten per cent and pay seven per cent. The difference of three per cent between cost of capital to municipality and to company amounts to \$1,500,000 per year on the \$50,000,000 capitalization considered above. This saving together with others indicated make, in the aggregate, a reduction in costs of perhaps 15 per cent or one cent per passenger.

Of the remaining operating expenses, that is, those in which there is no substantial municipal interest, pay rolls might represent approximately \$15,000,000. A municipality operates under some handicaps in the effective use of personnel due to changing administrations, salary limitations, civil service requirements and other complications which suggest the possibility of reduction in efficiency or increase in wages. These would be an offset to the savings in taxes and cost of capital indicated above.

In another chapter there will be found critical analyses of operating expenses indicating those which vary with specific units of service, such as, miles of track, number of vehicles, vehicle miles, or vehicle hours, together with the effect on costs of the adverse load factor inherent in the habits of most communities under which 50 per cent of the riding occurs in four hours, two in the morning and two in the afternoon, and usually in one direction only at the point of maximum load. It will be noted that a considerable part, usually more than 50 per cent of the rolling stock is in service for not over four or five hours a day and that for only five days a week. Obviously the hourly costs of operating these vehicles, considering the guaranteed minimum wages and fixed charges involved, are substantial.

If the index of concentration of service and an index of traffic derived from a Lorenz curve are compared for a typical system and costs of operation are calculated on various assumptions for the different degrees of concentration, the possible reduction in cost that should be effected by introducing staggered hours of work in stores, factories and offices becomes apparent. This is another field in which municipal operation might be more effective than private operation, though to date it has not proven to be so.

In concluding this brief discussion of urban transportation as a business and taking up in greater detail the problems of management under modern conditions in succeeding chapters, it may be of value to recall certain historical developments that are not without interest to the economist.

The earliest urban transportation was an adaptation of the intercity stage coach to city requirements. Little is known of the financial results of such operations, but with the advent of horse-drawn cars, operating on rails laid in the streets, franchise regulations and corporate ownership became customary, and accounting records were maintained. It was many years before there was much uniformity in accounting and the use of reserved accounts for accruing.

With the inauguration of electric traction a rapid obsolescence began and while the anticipated economies of the new facilities were expected to exceed the values lost in the foreshortened life of the old, they were in part not realized and in part accrued to parallel and competing lines. The merger of several systems into one was at times accomplished through purchase at prices thought to be justified by expected economies which were often, but not always realized. These prices tended to reflect the amounts still appearing in the seller's accounts for antecedent horse and cable lines that were not protected by depreciation or obsolescence reserves.

Offsetting the inclusion of property no longer used or useful, there were many cases where acquisition was made of bankrupt lines at prices below the sound historical cost of the property. Under the rudimentary accounting practices of the day the accounts of the emerging company reflected not the plant and property acquired, but the price paid for the securities of the company formerly owning it. When it is considered that the price paid sometimes represented not cash, but unseasoned securities of the purchaser, the difficulty of determining historical cost is evident.

Unification of service with the introduction of city-wide transfers did, of course, add greatly

to the value of the service. This could not have been accomplished without the long series of acquisitions and mergers necessitated in so many cities by the large number of franchises granted by municipal authorities to promote competition, to speed development of vacant land, and for other reasons.

One point of economic significance growing out of unification of urban transit is the pricing dilemma. As cities grow in area, the cost of the average ride outstripped the value of a short ride and the loss of this business further raised the cost of the average ride. The field of fare systems and fare collection is complicated with mechanical and psychological difficulties. This brief resume of pre-regulation developments suggests some of the problems with which the early regulatory bodies had to deal when the equities of value became legal criteria.

CHAPTER XXI

Production of Adequate Net Operating Revenue and Return

THE continued production of adequate net operating revenues is essential in any industry to provide financial stability. The accounting definition of net operating revenue is the balance of operating revenues remaining after all operating expenses, maintenance, depreciation and taxes, including income taxes, have been provided for. It represents the earnings available for return on the investment in operating property.

Employees would rather work for an enterprise which is financially stable since working conditions are usually better and the tools and other working facilities are more modern and better maintained. Investors would also rather invest their money in an enterprise which is financially stable. They are usually willing to accept a lower interest or dividend return on such investments than is required to attract investors to enterprises with inadequate earnings or uncertain prospects for the future.

Urban transit is no exception to this general rule. Unfortunately, however, for the last thirty years transit operations generally have not enjoyed financial stability and the most pressing managerial problem has been and still is that of producing adequate net operating revenues.

Net Revenue History of the Industry

As indicative of this earnings picture, there is shown below the relationship of net operating revenues to operating revenues for the transit industry, as compiled by the American Transit Association. For each of the years 1937-1947 two columns of percentages are shown - the percentage of operating revenues remaining for net revenues after operating expenses, maintenance, depreciation and all taxes; and the operating ratios, the percentage of operating revenues absorbed by the expenses, of operation just enumerated. For comparative purposes the operating ratio percentages for the electric light and power industry are also shown, computed on a comparable basis.

During the eleven year period shown on the following table, the net operating revenue of the electric industry has declined from 33 percent of gross revenues to about 21 per cent. In other words, the operating ratio of that industry has increased from 67 per cent to 79 per cent. For the transit industry, however, the 1947 figures indicate that only 3.4 per cent of gross revenues were brought through to net operating income and that even during the period of extremely heavy traffic in the war years, the maximum which the transit industry brought through to net operating revenue was only 13.7 per cent of gross revenues. On an industry basis these represent the percentages of operating revenues available for return on the capital structure of the industry, that is, available for debt service, dividends and balances to be carried to earned surplus.

Table A - Transit Industry Operating Revenue 1937 - 1947

Year	Transit Industry		Electric Light and Power Industry	
	Net Operating Revenue as % of Operating Revenue	Operating Ratio	Net Operating Revenue as % of Operating Revenue	Operating Ratio
1937	11.0%	89.0	33.3%	66.7%
1938	7.9	92.1	32.4	67.6
1939	9.2	90.8	32.4	67.6
1940	10.4	89.6	31.0	69.0
1941	11.1	88.9	27.4	72.6
1942	13.7	86.3	24.7	75.3
1943	13.5	86.5	23.4	76.6
1944	11.8	88.2	23.3	76.7
1945	10.8	89.2	24.2	75.8
1946	9.9	90.1	23.3	76.7
1947	3.4	96.6	20.8	79.2

Some Reasons for This Situation

In the earlier days of the transit industry wages were low, working hours were long, and both the average and maximum possible length of ride was short. Competition was limited to walking and to horse-drawn buggies, the effectiveness of both being limited to the extent and quality of sidewalks and street paving then extant. Even with those advantages all early transit operations were not financial successes. Most of the financial difficulties resulted from uncontrolled optimism.

The present difficulties of transit properties began to take shape about 25 years ago. Wage rates and other operating costs increased and the length of ride also increased as cities expanded and transit lines were extended. Both increases occurred somewhat concurrently and acted to increase the cost of service. The automobile also became an active competitor and the continued increase in the private ownership of such vehicles resulted in serious declines in the volumes of transit traffic until this trend was slowed down in urban centers by traffic congestion and lack of parking space. Despite the introduction of operating economies, such as one-man operation, most transit operations found it necessary to increase fares above the then almost universal rate of five cents in order to stem the decline in net revenue.

Increases in transit fares have always been and still are unpopular. They are resented by the public and have usually been resisted by public authorities or governmental agencies which, by statute or otherwise, have direct or indirect regulatory power over these fares. Unquestionably, as rates of fare have been gradually increased a certain number of persons formerly riding transit vehicles have ceased to do so and have walked or used other forms of transportation.

The direct and indirect effect of public pressure and regulation, coupled with the fear on the part of the transit companies themselves of causing or accelerating a loss of traffic, has resulted generally in continuing levels of fares which have produced inadequate net earnings, except for the short period toward the end of, and immediately after the close of, the last war when unusually large traffic volumes were being handled with inadequate facilities. This rather general failure of rates of fare in the transit industry to keep in line with the cost of service, including an adequate return, has resulted in the continuing high ratio between operating expenses and operating revenues for transit operations generally. In other words, it means a high operating ratio with net earnings representing a much smaller percentage of total revenues than in the case of other utilities.

This history of inadequate earnings and financial uncertainty for the future has had an adverse effect on transit service. Over the last 20 year period the improvements in the private automobile

and its extended usage, the increasing traffic congestion in urban centers, and increasing construction costs have been making it more and more evident that the street car operating on rails is outmoded as a surface transit vehicle, except under certain special conditions of operation. Lack of funds, either from earnings themselves or inability to attract new capital, has forced many transit properties to continue outmoded and obsolete vehicles and other facilities in operation when new equipment would have permitted more attractive and, in many cases, more economical service.

Economic Peculiarities of the Industry

There is another aspect of the transit industry which makes it entirely different from the electric, gas, water and telephone utilities. All of these other types of utilities have their product or service available and on tap so that the user can secure service by throwing a switch, opening a valve, or lifting a receiver, and some minimum payment per month is made by every customer whether the service is used or not.

When a transit vehicle starts on a trip there is no guarantee that the service will be used. The cost of operating the vehicle is substantially the same whether it carries a full load, a half load, or no load at all. When the trip has been completed the cost has been incurred, the service has been furnished, and if it has not been used at that time it cannot be used at some later time. For this reason, transit service has frequently been called a most perishable commodity. Since the use of such service varies continually and depends on the weather, activities and desires of the community, etc., it is inevitable that at times substantial amounts of service are furnished which are not fully utilized, while at other times the service is inadequate. There is a limit because of headway requirements beyond which the unused service cannot be reduced; therefore, some service must always be operated at a loss. The extent and periods of duration of inadequate service can be reduced to a minimum only by a generous revenue structure.

Bases of Regulation

As mentioned above the rates of fare charged by transit systems are subject to approval by regulatory authorities. For privately owned operations this regulation is by the state through a regulatory commission or department, or by the municipality through franchise or ordinance. In a few jurisdictions rate changes must be approved by both state and municipal action. In any event, the municipality is usually an interested and active participant in any rate proceedings. The regulatory proceedings differ somewhat in different states and cities. In general, however, the determination of the rate of fare is based on associating the estimated net revenue with a property or capitalization figure to ascertain the rate of return which the proposed fare will yield.¹ Recently certain regulatory authorities have been considering the operating ratio as a criterion for the necessity or reasonableness of proposed rates of fare.

Irrespective of the regulatory techniques in vogue in any particular locality the problem of management is to impress on the regulatory authority the importance of approval of rates of fare which will produce adequate net revenues. One of the functions of regulation is to protect and maintain insofar as economically possible the value of investments prudently made in used and useful transit operations. At the same time it is the responsibility of management to see that every dollar it spends for operation or property produces the maximum in quantity, usefulness, and convenience of transit service. If management fails in its responsibility, it can expect to be criticized by both the public and the regulatory authorities.

¹A more detailed discussion of the practices and customs of regulatory bodies with respect to depreciation accruals and the determination of property value or rate base is set forth in Chapter III.

It is the almost universal experience that rate of fare adjustments for privately owned systems require long periods of time, frequently from three or four months to nearly a year - while some of the publicly owned systems have been able to make fare increases effective within a few days.

Definition of an Adequate Return

One measure of the return required by a privately owned transit operation is the investor appraisal of outstanding transit securities, namely:

1. Yield to maturity on transit bonds;
2. Earnings - price ratios of dividend paying transit common stocks;
3. Gross income - capitalization ratios.

These are discussed individually below and in each case comparative data is given for electric light and power utilities. The data is also shown graphically in three charts.

Yield on Bonds

A measure of investor appraisal of bonds of a company and of the cost of obtaining debt capital is obtained by calculating the yield to maturity on its outstanding bonds. Bonds with high yields ordinarily indicate substantial risks while bonds with low yields ordinarily indicate minimum risks.

Figure 1 shows the median yield to maturity for all of the transit company bonds for which market quotations are available by years from 1937 through 1947, with the latest point on the chart based on market quotations as of May 31, 1948. Currently, the bonds of twelve transit companies are included in the group. In earlier years, the number of companies has ranged from 14 to 19. If any company had outstanding more than one issue of bonds, only the senior issue has been included in this study.

The median yield to maturity has ranged from 10.03 per cent in 1937 to a high of 10.28 per cent in 1938 and from that high point to a low of 4.02 per cent in 1946. From that low point, the yield has since increased to 4.96 per cent for 1947 and then to 5.14 per cent based on May 31, 1948 prices. Except for these latest prices, all of the yields are based on year-end prices.

The comparable trend of yields on electric utility bonds has been from 4.03 per cent in 1937 to a low of 2.77 per cent in 1946 with a rise to 2.95 per cent based on May 31, 1948 prices. The yields on electric utility bonds shown in Figure 1 represent the year-end composite average yield of bonds used in the public utility bond yield averages as computed by Moody's Investors Service, consisting of 40 bonds representing ten bonds in each of the first four rating classifications (Aaa, Aa, A, Baa).

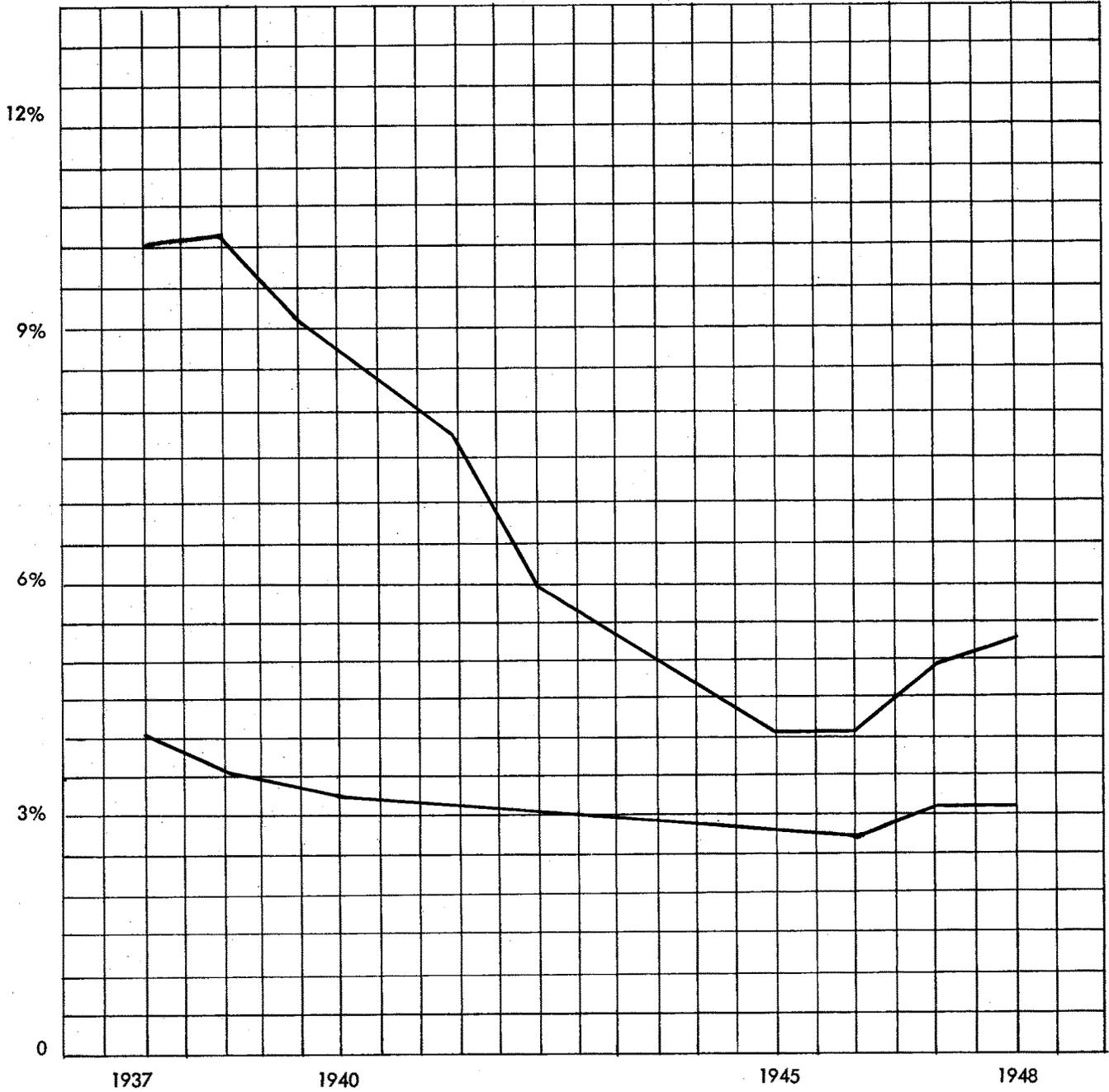
It is readily apparent from Figure 1 that transit company bonds in the minds of investors are not in the same class as electric company bonds. They are considered (as a class) much more speculative securities, and as a consequence, investors demand a high yield before they will buy them.

Procedures for the adjustment of fares by publicly owned systems vary widely depending on the local situation. For systems owned directly by municipalities the governing body of the city usually has the final word although in some situations a referendum is required. Certain transit authorities are completely autonomous and require no approval other than that of their own board. Responsibilities of the managements of publicly owned systems are the same as those outlined above for privately owned systems. In addition, if revenue bonds are outstanding, there are usually indenture covenants that revenues shall be sufficient to cover all costs including full debt service.

FIGURE 1

Yields to Maturity on Bonds of
Transit Companies and Electric
Utility Companies

1937-1948 (Year End Prices)



Earnings-Price Ratios of Common Stocks

Figure 2 shows the median earnings-price ratio for dividend paying common stocks of transit companies with earnings per share expressed as a percentage of market price per share. The earnings-price ratio represents and is influenced by all the numerous factors which investors as a class take into account, including the character and stability of the company's market, the character of its management, the degree of competition which it faces, its future prospects, and the current levels of money rates.

In 1937 there were four such common stocks, in 1946 there were 24, and as of May 31, 1948 there were 12. Several of these 12 recently have announced reductions in the rates at which dividends were paid in 1947. These earnings-price ratios have moved from 9.5 per cent in 1937, to a high of 31.4 per cent in 1942, back to a low of 11.6 per cent in 1947, and on the basis of May 31, 1948, prices are 13.6 per cent. For a group of 25 electric utilities, representing a good cross-section of that industry with respect to size and quality, the corresponding trend has been from 6.30 per cent in 1937 to 9.00 per cent in 1942, then to a low of 5.64 per cent in 1945, and currently at 7.10 per cent on the basis of May 31, 1948 prices.

It seems clearly demonstrated from Figure 2 that, as a class, investors regard for the common stocks of transit companies is a great deal less than it is for the common stock of electric companies. In fact, on the basis of May 31, 1948 prices and 1947 earnings, it appears that investors on the average were willing to pay only about seven times the earnings of dividend-paying common stocks of transit companies while they were willing to pay about 14 times the earnings of electric companies.

Median Earnings-Price Ratios of Dividend Paying
Common Stocks of Transit Companies
and Electric Utility Companies

Basis: $\frac{\text{Earnings per Share of Common for Year}}{\text{Average of Monthly Prices for Common}} \times 100\%$

Years 1937 - 1947 and Current

32%
28%
24%
20%
16%
12%
8%
4%
0

Transit
Companies

Electric Utility
Companies

* May 31, 1948 prices

1937

1940

1941

1945

1948*

Gross Income-Capitalization Ratios

Figure 3 shows the median gross income-capitalization ratio, that is, the percentage relationship between gross corporate income and the aggregate market value of all outstanding securities. In determining the market value of the outstanding securities, the following method has been used:

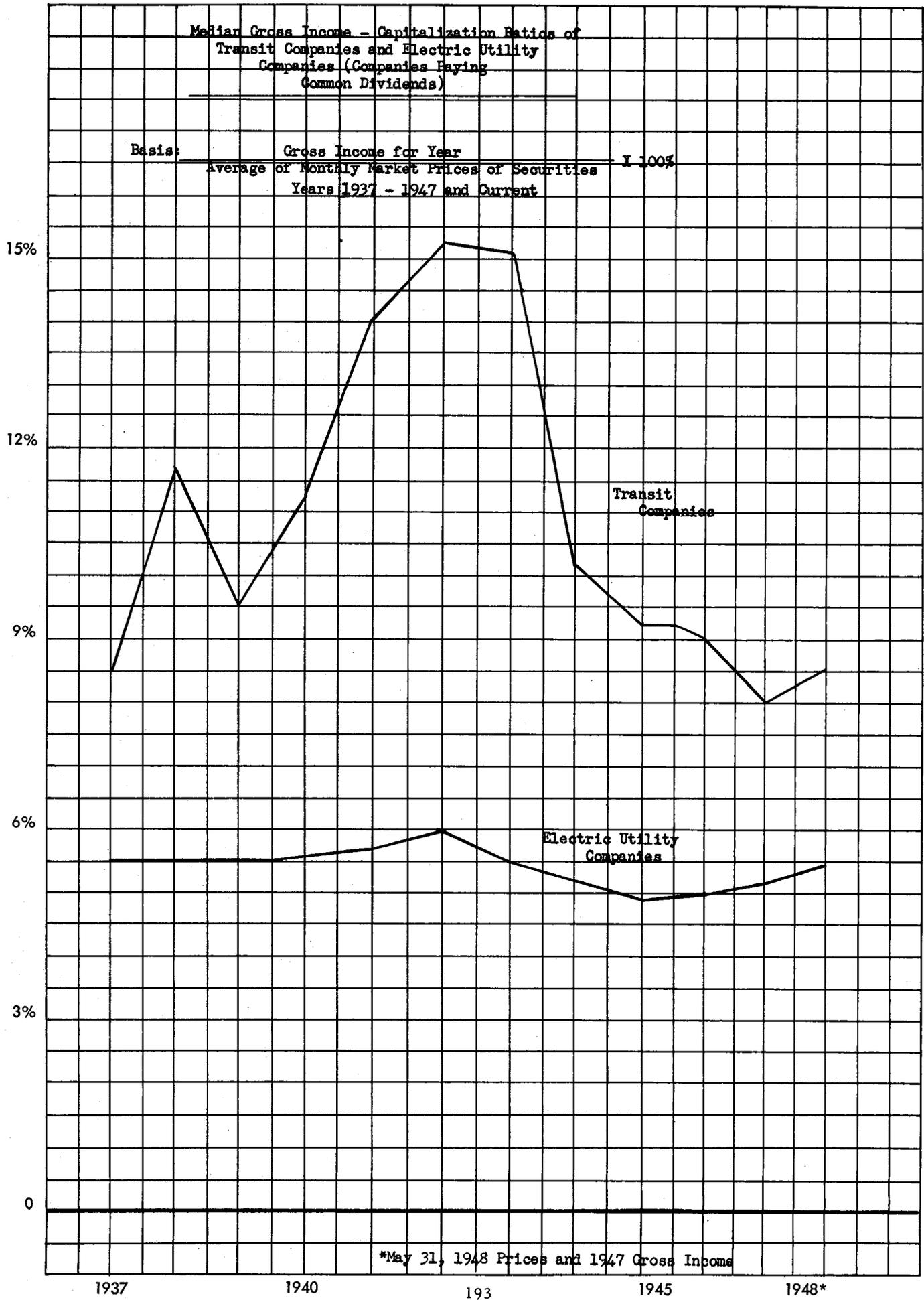
For long-term debt and preferred stock the average of the annual high and low prices is applied to the principal amount or par value of securities outstanding at the end of the year.

For common stock the number of shares outstanding at the end of the year is multiplied by the average of the monthly high and low prices during the year, if the stock was listed on a national securities exchange; if the stock was unlisted and traded over the counter, the average of the monthly closing bid price is used.

The sum of the market value of the bonds, preferred stocks, and common stocks gives the market value of the total capitalization.

The gross income capitalization ratio gives the investor an appraisal of the earnings of a particular company. A gross income capitalization ratio of 5 per cent means that investors as a group (bondholders and stockholders) are willing to pay for all the securities of the company 20 times the earnings available. A gross income-capitalization ratio of 10 per cent means that investors are willing to pay ten times the available earnings.

For transit companies, the curve on Figure 3 is based on, and the ratio in each year is restricted to, companies with dividend paying common stocks. This rate of return earned on the aggregate market value of all outstanding securities has varied from 8.47 per cent in 1937 to 14.74 per cent in 1942, then to a low of 8.09 per cent in 1947, and a current return of 8.71 per cent based on May 31, 1948 prices. For the same period, the gross income-capitalization ratios for the same 25 electric utilities used in Figure 2 have varied from 5.44 per cent in 1937 to a high of 6.04 per cent in 1942, a low of 4.89 per cent in 1945 and a rate of 5.43 per cent based on May 31, 1948 prices .



It is clear from this study, which covers a substantial number of transit companies, that investors are willing to pay a great deal less for a given dollar of earnings in transit situations than they are for a dollar of earnings in electric situations. The three charts show the wide fluctuations which have occurred in transit company securities during the past ten years and the wide disparity in quality between securities of transit companies and the securities of electric utility companies.

For neither group of companies do the ratios or yields represent a basis on which new money could be raised. New securities must be offered to the public on a basis somewhat more attractive than that at which outstanding securities can be purchased in the open market. Underwriting discounts and financing costs must also be absorbed by the issuing company and serve to increase still further the cost of new money as compared with the yields and ratios based on issues that are outstanding.

However, these curves do present a picture of what has been happening in the transit industry in the past ten years. Beginning in 1938 the volume of transit riding started to increase. During the war years this riding volume showed a phenomenal increase. This increased riding resulted in improved earnings. In the case of most transit companies these improved earnings were used to acquire outstanding bonds at substantial discounts. These bond retirements by purchases in the market and the resulting improvement in the debt ratios of the companies, coupled with the general improvement in the bond market itself, strengthened the prices of transit bonds and reduced the yield during the period from 1938 to 1945 as shown in Figure 1. The situation improved so materially that ten major transit companies refunded their reduced debt obligations in 1944, 1945 and 1946. The cumulative effect of the improvement in the debt structure and wartime earnings improved the stock ratios from 1942 to 1946.

In the past two years the situation has been reversed. Riding has begun to decline and large increases in costs have been experienced. Transit company earnings have seriously declined and transit company financing has been difficult, if not impossible. This acute situation which makes it increasingly difficult for transit companies to continue their modernization and equipment replacement programs and to continue to furnish adequate service, results from the fact that expenses are increasing more rapidly than revenues can be increased.

In summary, it appears from Figure 3 that a transit operation needs a return of approximately 10 per cent, based on the market value of its outstanding securities, in order to make these securities sufficiently attractive market-wise to permit the raising of new money by the public sale of additional securities. The reasons why transit securities are looked upon by bankers and investors less favorably than are other types of utility securities are as follows:

1. As shown earlier, transit operations generally have a high operating ratio. This means that a small percentage of total revenues remains for net earnings after operating expenses, maintenance, taxes and depreciation. For the transit industry as a whole in 1947 net earnings were only 3.4 per cent of total revenues, and during the last ten years the maximum which the industry as a whole has brought through to net earnings has been 13.7 per cent.
2. Operating payroll, or wages, is the largest single item of expense and is now aggregating from 60 per cent to 70 per cent of total revenues.
3. These two factors, namely high operating ratio and a large wage component in operating expenses, mean that a relatively small decrease in revenues or increase in wages will jeopardize or entirely wipe out net earnings.
4. Changes in revenues, produced by changes in traffic volume, and particularly changes in expenses, because

of increased wages, come suddenly. It is exceedingly difficult because of the regulatory procedures involved, to adjust fares promptly enough to avoid a period of operation either with a deficit or with seriously inadequate net earnings.

As indicated earlier certain regulatory authorities are giving consideration to the operating ratio as a measure of the reasonableness of prospective earnings. There is much merit in this where the investment in property is low as compared to annual revenues. A system with one dollar of property for one dollar of annual revenues would have an operating ratio of 95 per cent if earning 5 per cent on its property, and 90 per cent if earning ten per cent on its property.

Based on the data reviewed above it now requires approximately a ten per cent overall return on transit securities, bonds and stocks combined, to interest investors. If transit fares had been, and in the future could be, kept at higher levels compared to the cost of service, transit net earnings would not be jeopardized by relatively small percentage changes in revenues or expenses. Investors would then look more favorably on transit securities as the additional earnings cushion would protect their investments during the frequently long periods required to obtain revenue relief through regulatory channels. If this condition could be realized - namely more stable and adequate present and prospective future earnings - probably a lower rate of return would satisfy investors. Under these conditions it is probable that an eight per cent return on an 85 per cent to 90 per cent operating ratio, whichever produced the largest dollar cushion would provide adequate net earnings.

The determination of the amount of return which a regulated public transit operation should be permitted to earn should not be influenced in any way by the manner in which the securities of the enterprise are owned. It should be affected to a relatively minor degree by the form of the capital structure of the enterprise.

Such dollar cushion or amount of return should bear an equitable relationship to the amount of capital invested as represented by the property currently used and useful in the enterprise, assuming that such capital was invested prudently and with the exercise of business judgment which was reasonable in the light of conditions existing at the time of making such investment. This is generally acknowledged when the capital has been invested directly by hundreds or thousands of individuals who have purchased and own the bonds and stock of the enterprise. Sometimes this is not so generally recognized when the securities of an enterprise are all held by a single owner, either an individual or a corporation. In the latter case, it means only that widespread public investment participation in the enterprise in question is simply one step removed but it is no less real. The capital for the second corporation must have come from some source. If the second corporation also owns other securities or property which may happen to be producing income, income from such sources should not be taken as a basis for depriving the security holders of the second corporation of a return on that portion of their investment represented by the securities of the wholly-owned subsidiary in question. Regulation should permit a utility to establish and maintain rates which, insofar as economically practicable, will produce net earnings sufficient to protect the value of the prudently made and efficiently used investment, irrespective of the ownership of that investment.

The relationship between the amount of such return and the value of the currently used and useful property should be influenced by the form in which the invested capital has been supplied only to the extent that the form of such financing affects the composite investment worth of such capital. The presence or absence of fixed payments, such as interest charges or preferred dividends for the hire of capital, or the aggregate annual amounts of such payments, should not be controlling factors.

CHAPTER XXII

Management - Labor Relations

TRANSIT managements have been subject to less regulations in their relationships with their employees than they have in such other matters as investments, rates, and service. Despite this relative freedom from restrictions concerning wages and working conditions the companies have generally been unable to take advantage of these legal rights; transit companies are usually under compulsion from regulatory authorities to maintain continuous service. In effect this compulsion acts as an indirect restriction on managements in their bargaining relationships with employees. The only restriction upon labor is the moral obligation to continue to render service to the public and this can vary with the circumstances. The obligation does not have nearly the same binding effect as it does in the case of management; the latter has a charter or franchise privilege at stake, an ever-present thought in urban transit labor-management relationship.

It is the purpose of this chapter to study the nature of these relationships in order that all interested groups may have some understanding of the principles involved. The presentation includes: the importance of wage costs to a transit system, some basic conditions affecting transit employment, collective bargaining in the industry, and the terms usually included in labor agreements.¹

Importance of Total Wage Costs

Direct wages and salaries in the transit industry have always represented a high percentage of total operating revenues. In 1947 these costs for the transit industry constituted 55.7 per cent of total operating revenues, the second highest figure for the seventeen-year period for which reliable data are available. This figure is higher than for any other industry except telegraph companies and may be contrasted with percentages as low as ten to twenty per cent found in many manufacturing industries.

Some Basic Conditions Affecting Transit Employment

There are fundamental differences which distinguish transit employment from labor practices in most other industries. The following are some of the more important:

Regularity of Employment - Transit companies usually offer greater regularity of employment and stability of income than is generally experienced in other industries. Although there may be some seasonal variation in the demand for transit service, a very substantial minimum of employment is available at all times and at least eighty per cent of all employees can enjoy almost complete regularity of employment.

The remaining twenty percent of the employees consists of "extra men" who have regular employment but whose daily work assignments are irregular; they substitute for regular operators who are temporarily absent or perform short pieces of work during the morning and evening rush periods. However, these "extra men" are often guaranteed a minimum amount of work or pay on a daily, weekly, or monthly basis.

¹This chapter does not include a treatment of the techniques available in the general field of collective bargaining. Such data are not deemed proper for inclusion within the framework of this book. For the student desiring a more detailed discussion of collective bargaining cf. Hoebrecky, O.S., Management Handbook for Collective Bargaining, Commerce Clearing House, Inc., Chicago 1947.

Regulation by Government - The earning power of transit companies, like other public utility companies, is limited by regulatory authorities and, unless managements can obtain permission to increase their rates of fare, wage levels either cannot be increased or they can increase only through the sacrifice of other categories of expense.

Most transit companies have recently obtained some relief through fare increases, but there is a definite limit to the extent to which additional revenues can be obtained through fare increases. A continuing series of such increases may only intensify the competition of taxicabs and private automobiles and result in the loss of most of the company's short-haul riders. Therefore, at some point the law of diminishing returns begins to operate. A proper application must be made of the dependence of transit wage levels on what is a fair price to patrons and a fair return to the other elements of a going concern.

The Public Relations Element - Since transit vehicles are generally operated upon the public streets, they are subject to public inspection and criticism and the public relations element thus becomes a very important one.

It is also one of the peculiar characteristics of the transit operator's job that it must be performed largely without immediate supervision. This is what is sometimes referred to in the slogan, "To the public you are the company." These considerations make it necessary that labor in the transit industry be well disciplined and cooperative.

Continuity of Service - A large measure of public interest attaches to the need for continuous transit service which, like other public utility services, has become an indispensable convenience or necessity, especially in the larger cities. As a result the working hours of the majority of transit employees, namely the operators of transit vehicles, must be fitted into the riding habits of the public which vary considerably with the different periods of the day, week, and year. This requires a great concentration of the operating force during the comparatively short morning and evening periods when riding is at its peak, but much equipment and manpower remains idle a large part of the day. However, the company must endeavor to provide as many full days of work for its men as possible since its regular operators are generally guaranteed a minimum of eight hours of pay each day.

Operators must generally be available to work the following types of trips or runs:

1. The Straight Run - This is an established regular day's work or a series of days' work consisting of a number of regularly scheduled trips starting from and returning to the station or other points of departure assigned to the operator. Except for brief periods of recovery or layover time at the ends of the line and short paid or unpaid periods allowed for meal purposes, the operator remains on duty continuously for a period of about eight hours or more.
2. The Swing or Split Run - This is also an established regular day's work assigned to an operator but which has one or more unpaid breaks or periods of time during which the operator is not on duty. Although a swing run will have approximately the same number of pay hours as a straight run, its total spread, or entire period from the time the operator reports for duty until he completes his day's assignment, may be as much as 12 to 14 hours.
3. Trippers - These are short pieces of work which may or may not be regularly scheduled and which are not of sufficient length to constitute a regular run or to be paid any minimum guarantee applicable to a regular straight or swing run. It is often necessary to regularly schedule trippers on certain lines to meet the peak demands of school children, factory workers, or the general public during the rush hours. On special occasions, extra service in the form of trippers must be operated to handle increased traffic created by athletic contests, concerts and other special events.

The percentage of all regular runs, which are straight runs varies on individual properties in accordance with the ratio of the number of vehicles operated during the rush hours to the number of vehicles operated during the off-peak or busy periods. This ratio is also affected by the type and size of the vehicles operated since peak loads can be handled with fewer streetcars or busses

of large capacity than with vehicles of small capacity. On Sundays and holidays, and in many cases on Saturdays, the absence of high peak demands for service generally permit the scheduling of a higher percentage of straight runs than on weekdays.

On many transit properties fifty per cent or more of the regular runs are straight runs but this percentage, which is often specified in the labor agreement may vary from ten to 100 per cent depending upon local conditions. Thus it will be seen that a large percentage of operators may be required to work swing runs generally consisting of two work periods separated by an unpaid period of from one to five hours during which the operator is off duty.

Trippers represent a small part of the total service on most transit properties but do present a problem since they alone do not constitute a full day's work of eight hours for an operator. If these short pieces of work are performed by a regular operator before or after he works a regular run, he is generally paid time and one-half for this additional work. In addition most transit companies provide a minimum guarantee of from one to six hour's pay for any tripper work.

Although the Wagner Act gave some impetus to the extension of unionism after its enactment in 1935, the transit industry has had a long history in collective bargaining. The dominant union, the Amalgamated Association of Street, Electric Railway, and Motor Coach Employees of America, was founded in 1892 and represents more than 50 per cent of the organized employees in the industry. It is an industrial rather than a trade union, according to its official jurisdiction; however, the group has hesitated to call itself an industrial union, since in actual practice it is a hybrid. In some cities it comprises all classes of employees while in other cities it is an amalgamation of numerous trades.

The Transport Workers Union (CIO) represents about 15 per cent of the organized transit workers and is the second largest group. The Railroad brotherhoods represent the third largest group of organized transit employees. Numerous other unions, including the Teamsters, International Association of Machinists, and International Brotherhood of Electrical Workers, represent smaller groups of employees. Approximately three thousand employees are members of independent unions not affiliated with a national or international organization.

Negotiations

Collective bargaining implies organizations of the employers and employees and involves negotiations by their representatives. The Labor-Management Relations Act of 1947 makes it the duty of the participants to bargain in good faith on many issues, including wages, hours, other working conditions and benefits. The granting of concessions is not obligatory but it is required that the issues at least be discussed. The union bargaining committee consists of a group of employees from the various departments of the company who are elected by their fellow employees, and the management bargaining committee consists of one or more delegates designated by the employer.

The written contracts or labor agreements which are an essential part of the collective bargaining process generally extend for a period of one year, although some contracts extend for two years. Others run continuously with no definite expiration date being specified, but either side usually can ask that the contract be reopened for discussion at intervals.

Most transit contracts specify a date, generally sixty days prior to the expiration date of the contract, as the end of the period during which either labor or management can submit their proposals for changes in the provisions of the succeeding contract. The first meeting of the parties is generally arranged soon after the demands of each side have been submitted and negotiations continue until a new agreement has been reached or until further negotiations appear to be of no avail. Some unions, particularly the Amalgamated Association, have developed a strict control over the methods of negotiation and frequently an International officer or an attorney is present during some phase of the negotiations. This is especially true in case of negotiations involving large or key companies.

Conciliation and Mediation

If negotiations finally break down and the contract expires or is about to expire, a strike may be averted through the intervention of a mediator or a conciliator. Under the Labor-Management Relations Act of 1947, the parties are required to notify the Federal Mediation and Conciliation Service if an agreement as to the terms of a new contract has not been reached thirty days prior to the expiration of the old contract. The labor-management relations laws of many states require similar notice to state authorities in order that they may intervene in an effort to avoid strikes by assisting the parties to reconcile their differences.

Conciliators or mediators generally have no authority to require the parties to arbitrate or to pursue any other course of action, however, they have occasionally proven helpful in avoiding interruptions of service to the public. This may be accomplished by causing one of the parties to reconsider the last offer made by the other party, or by having the parties agree to refer their dispute to arbitration.

Arbitration

Although many transit companies are committed by contract to the use of arbitration for the settlement of disputes involving grievances or matters of interpretation of the terms of an existing contract, only about 25 per cent of the transit companies have contract provisions which provide for arbitration of the terms of a succeeding contract. A limited number of companies operate in states having statutes which require the use of arbitration when disputes as to the terms of a succeeding contract threaten to cause interruptions of service. Sometimes companies are occasionally forced to resort to arbitration under extreme conditions which may develop during a strike.

The Amalgamated Association has always favored the arbitration of all disputes. Its constitution provides that the executive board of the International shall refuse to approve the action of any division in calling a strike unless an offer to arbitrate has been made by the division and refused by management. In fact the International officers of the Amalgamated have felt obliged to defend the principle of voluntary arbitration against the rank and file of union membership at almost every international convention. Despite its confidence in voluntary arbitration, the Amalgamated has generally vigorously opposed compulsory arbitration.

The Transport Workers Union (CIO) which is a much younger union, has occasionally resorted to arbitration but has generally opposed the inclusion in a labor contract of a clause providing for arbitration of the terms of the succeeding contract. Other unions representing smaller groups of transit employees generally do not insist on contract provisions providing for arbitration of the terms of a new contract.

While the experience of transit managements with arbitration during the term of a contract has been generally satisfactory, their recent experience with arbitration of the terms of future agreements has been unsatisfactory.

Some companies have successfully eliminated provisions for the arbitration of a succeeding contract from their labor agreements. It is felt that the following defects make present arbitration procedure inequitable:

1. The existence of an "all disputes" clause in many labor agreements and frequent resort to arbitration by other companies has tended to accord arbitration, rather than negotiation, the primary role in the collective bargaining process. It has encouraged the arbitration of a multitude of issues, including those of a petty nature. Thus an arbitration board is often confronted with a confusing situation which makes it difficult to dispose of each issue in a fair and just manner.
2. Under the usual tripartite arbitration procedure, a majority award is required and executive sessions of the board become an auction with the "sale" going to the highest bidder. Thus, the union and company members become advocates and there is too little consideration of the real merits of the case.
3. Arbitrations are generally entered into without the parties providing the board with rules of conduct and objective standards to guide and control its decisions. As a result, the power which is vested in the board is tremendous and its decisions can have serious and far-reaching effects.

CHAPTER XXIII

Management - Labor Relations (Continued)

The Labor Agreement

LABOR agreements vary greatly as to length and content; some are no more than a few typewritten pages; others are much longer. In them, the rights and duties of the workers and the company are stipulated, methods of resolving differences are specified, and penalties for infractions are provided. Such matters as recognition of the union, wages, hours, run provisions, overtime, benefits, grievance procedures, and seniority are also generally included. The following is a discussion of only the more important provisions of labor contracts.

Wages - Since operating employees comprise more than sixty per cent of the total employees of most transit companies, their representatives exert great influence in collective bargaining. Historically, the operator's wage rate has been used as the key rate for bargaining purposes.

The wage rates of other employees have generally been set by maintaining historical differentials between the operator's rate and the rates of all other employees by granting flat wage increases on an "across-the-board" basis. This means that if operators' wage rates are increased by ten cents per hour the wages of other employees of higher or lower skills are adjusted by the same amount. As a result unskilled employees receive higher percentage increases than those received by the highly skilled workers. Since the unskilled workers generally out-number the skilled ones, the unions generally insist on this practice.

The average hourly earnings of all transit workers remained consistently higher than the average of all manufacturing employees from 1927 until December, 1941, according to figures published by the United States Bureau of Labor Statistics. During World War II when the work week of most factory workers was about 48 hours with overtime for work after forty hours, the average hourly earnings of all manufacturing employees increased to a point about ten per cent above those of transit workers.

However, after V-J Day when the work week of most factory workers was reduced to about 40 hours, the average hourly earnings of transit workers increased faster than those of factory workers. Since the middle of 1947 the average hourly earnings of transit employees have remained higher than those of the average factory workers.

Average weekly earnings of transit employees have remained consistently higher than those of all manufacturing employees since 1927. This is partially accounted for by the fact that transit employees, who are exempt from both the maximum hour and minimum wage provisions of the Fair Labor Standard Act of 1938, have worked an average of six or seven hours per week more than the average factory worker.

The Bureau of Labor Statistics reports the following hours and earnings statistics for transit workers:

	January, 1949		
	<u>Average Hourly Earnings</u>	<u>Average Weekly Hours</u>	<u>Average Weekly Earnings</u>
Transit Workers	\$1.416	45.4	\$62.91
All Manufacturing Employees	1.381	39.4	54.41

Studies by the National War Labor Board during World War II showed that the wage rates of transit operators varied according to the population of the city or area served by a company and according to the economic character of the region in which the company operated. This indicates that differences in population density, levels of business activity, and other factors largely account for the long established differences in the wage rates of large and small companies in the same region and of companies of the same approximate size located in different regions.

The National War Labor Board gave recognition to these facts when it established special wage brackets for the transit industry. It is also interesting to note that both the regional differences and the differentials between the wage rates of the large and the small companies in each region have generally remained unchanged since the end of the war.

The wage rates of skilled craftsmen, such as carpenters, electricians, and machinists, employed by transit companies are still slightly less than those generally paid to like employees of non-transit companies. This is largely offset by the fact that transit employment provides greater stability and continuity than that generally provided elsewhere.

Hours and Overtime

As discussed earlier it is difficult or perhaps impossible to standardize the work day or work week of transit operators. Union officials recognized this fact when they joined with transit managements in asking that transit employees be exempt from the forty hour overtime provisions of the Fair Labor Standards Act of 1938. Labor also gave recognition to this fact during the days of the National Recovery Administration when they also joined with management in formulating a code of hours which provided considerable flexibility as to the maximum hours of operators and certain classes of non-operating employees.

Prior to World War II most transit employees worked a six day week of eight hours or more each day. When overtime was paid, it was generally only for work after the employee's regular run or regular work assignment. During the war, the question of overtime in the transit industry was made the subject of hearings before the National War Labor Board and a survey made by the American Transit Association in 1945 showed that no transit company paid overtime to operating employees for work below 48 hours per week prior to 1943.

In 1943 a few companies agreed to pay overtime to operators for work after 40 or 44 hours per week, although the manpower situation at that time did not permit a reduction of the work week below 48 hours. Therefore, improved overtime practices adopted during the War were merely a device to circumvent the wage stabilization program then in effect.

After V-J Day when sufficient manpower was available to permit a reduction of the work week of transit operators to as close to forty hours as the nature of the business permitted some additional companies adopted the practice of paying overtime to operators after forty hours per week. However, there have been few serious demands for a forty hour week for operators during the last few years when sufficient manpower has been available to permit a reduction of the work week to a five day basis.

It has already been explained that many transit companies guarantee regular operators a minimum of eight hours pay per day. However, it is rarely possible to cut more than one or two per cent of the total runs on a property to exactly eight hours. Therefore, if overtime after eight hours per day and a minimum guarantee of eight hours must both be paid, the company will be forced to pay a premium or a penalty on 98 or 99 per cent of all its runs.

The unions were making some effort to have the Eighty-first Congress eliminate the present exemption covering transit employees which is found in the Fair Labor Standards Act of 1938. Management has taken the position that collective bargaining has recently resulted in much progress toward the 40-hour week and that minimum wages and maximum hours should continue to be worked out in the light of local conditions and the desires of the workers on each property rather than by legislative action.

The problem of spread of hours has also been previously mentioned. It was explained that there must often be two or more times as many vehicles operated during the two short morning and evening rush periods --- from about 6:30 a.m. to 9:30 a.m. and from about 4 p.m. to 7 p.m. -- as during other periods of the day. This fact makes it necessary to work some operators only during the peak periods with the result that the total elapsed time from the beginning of their first piece of work to the end of their second or last piece of work is often 12 hours or more.

The unions have insisted that, if a penalty overtime payment were required for spread in excess of ten or more hours, companies would be provided with a sufficient incentive to cause them to reduce the spread of runs accordingly. Some companies now follow the practice of paying overtime at the rate of time and one-half for spread in excess of from ten to twelve hours. However, it is impossible to eliminate all spread and the extent to which it can be reduced below a specified limit depends upon local conditions.

Some companies pay a spread premium in a slightly different form, that is, by paying for all breaks, or those beyond a specified amount such as one or two hours, at one-half the regular rate. The unions fail to give acknowledgement to the fact that local conditions determine a company's ability to avoid spread of hours. The Amalgamated Associates often demand that overtime be paid for all spread in excess of ten hours and have occasionally demanded that all breaks between pieces of work in a run be paid at one-half the rate for the regular run.

Other Working Conditions and Benefits

The nature of the transit business is such as to give rise to many other union demands in addition to those already mentioned. The total penalties, allowances, and benefits paid by many transit companies amount to a considerable item of expense and, in the case of some companies, add from thirty to fifty cents of labor cost for each hour that the vehicles of the company are in service on the streets.

The following are some of the more important of such practices which are now provided for in some transit contracts or which are currently being demanded:

1. Pensions -- Most transit companies which now have no pension plan are periodically confronted with requests which involve old age benefits beginning after twenty or twenty-five years of service and the attainment of the age of sixty or sixty-five. These demands generally involve benefits of fifty dollars per month or more, exclusive of social security benefits, and the unions generally insist that the employees should not be required to contribute toward the cost of the plan. Similar benefits are generally requested for employees who are permanently disabled in the line of duty without regard to their term of service and for employees disabled for any reason after fifteen years of service. Unions often request that the pension plan be incorporated in the labor agreement so that it can be made the subject of annual or periodic bargaining.

Many transit companies have long established pension plans and, although the courts have only recently held that the Labor-Management Relations Act of 1947 requires companies to bargain with unions concerning pensions, some transit companies have made pensions the subject of bargaining for many years. In addition, pension demands have sometimes been made the subject of arbitration procedure in the transit industry.

2. Sick Leave -- Paid sick leave to hourly rated employees is a growing practice in the transit industry and is one of the important current objectives of the unions. The general request is for two weeks of sick leave pay per year with the employee receiving his regular pay each day after one year of service. The request usually includes a provision that unused sick leave may be accumulated over a period of several years. The practice of paying sick leave is more prevalent in the Midwest and Pacific Coast areas than in some other sections of the country but is still far from the prevailing practice.

3. Vacations -- During World War II many improvements were made in vacation allowances and a maximum of two weeks' vacation with pay after from one to five years of service became rather standard practice. Beginning in 1946 the older employees of several companies in the

New York- Philadelphia areas were granted or awarded three weeks of vacation with pay after periods of service ranging from fifteen to twenty-five years. At present thirty or more transit companies grant three weeks of vacation to their employees.

Holiday Pay -- The question of holiday pay has been a live issue since the days of the War Labor Board during World War II. Although many manufacturing companies pay for six holidays not worked with double time to those employees who do work, it is still not prevailing practice for transit companies to pay overtime for work performed on holidays or to pay employees for holidays not worked.

The corollary to pay for holidays not worked is overtime pay for work performed on holidays. Less than one-half of the large transit companies pay time and one-half or double time to all or certain classes of non-operating personnel for work on certain specified holidays, but since few maintenance employees work on these holidays, the penalty is not very severe. The number of holidays on which overtime is paid to non-operating employees varies from two to eleven, with six being the most common figure. Only about fifteen of the large transit companies pay overtime to operators for work on specified holidays.

Some transit labor agreements contain clauses providing for many other working conditions and benefits, and it is not unusual for the Amalgamated and other unions to present demands relating to fifty or more issues.

Some of the more important of these demands are as follows: non-contributory life, health and accident insurance; a higher percentage of straight runs; overtime for work on Saturdays and Sundays when these days are part of the employees' regular work week; increased guarantees to extra men; increased guarantees for working trippers; paid meal relief to operators of straight runs; increased allowances to operators for time spent in making the vehicle ready and pulling it out of the station; increased allowances for time spent in pulling vehicle into station and turning in the day's receipts; increased allowances for travel between the station and the point on a line where an operator relieves another operator or is relieved by him; time allowance for filling out accident reports; night shift differentials; free driver's licenses; free uniforms; free transportation for employees' families; free hand tools; wash-up time allowance; minimum guarantee for calls and severance pay.

Job Control Provisions

In addition to some of the provisions previously mentioned, the following are some of the provisions of transit contracts which relate to job control and which may differ to some extent from corresponding provisions found in union agreements in other industries.

1. Union Security Provisions -- Union contracts in the transit industry generally provide either for a so-called "union shop" or a "maintenance of membership" clause. Under the former an employee must become and remain a member of the union after a specified period. The latter provides that an employee is not required to join the union, but, if he does so, he must remain a member in good standing at least during the term of the agreement. Some contracts provide for an "open shop" under which an employee has the choice of becoming and remaining a union member. There is no record of a transit contract which provides for a "closed shop" under which the company is permitted to hire only persons who are already members of the union.

A clause providing that the company will check-off the dues of union members is also a provision of most union contracts in the transit industry. This provision also often includes the checking-off of union fines and assessments as well as dues.

2. Seniority -- This is a system under which operators pick their runs and vacation periods. Operators with high seniority have a choice of picking either regular, straight or swing runs; those operating employees without sufficient seniority to entitle them to pick a regular run must work on the extra board. The extra board is generally operated on a rotating basis but the practice on a few transit properties is to permit the extra man with the highest seniority to have first choice of open work assignments each day. Operator's seniority may be based on his term of service on the system, car barn or garage, or line.

Non-operating employees generally can use their seniority to select a vacation period or to choose whether to work either a day or a night shift. Under the provisions of many transit agreements the man with the greatest seniority must be given preference in the promotion to higher job classifications, provided he is qualified. The seniority of non-operating transit employees is generally determined on a departmental basis.

Seniority, as defined in many transit contracts, also means that employees will be laid off in inverse order of their seniority. This means that the man with the lowest seniority will be laid off first. Conversely, these employees would be taken back according to their seniority, with the man with the highest seniority being the first to return to work.

Probationary and Temporary Employees

Most transit contracts containing a union shop clause also include a provision specifying the maximum period during which a new employee can work without becoming a member of the union. This is a qualifying period during which the new employee is in effect on trial and it generally ranges from thirty to ninety days. During this period the employee is not a part of the bargaining unit and the union has no right to represent him.

Many transit contracts also contain a clause limiting the period during which workers may be employed on jobs of a temporary nature without becoming a part of the bargaining unit which the union represents. For example, the company may be permitted to hire additional employees to perform construction work during a period of from three to six months without the necessity of such employees becoming members of the union.

Mutual Consent Clauses

Although relatively few transit agreements contain clauses of this type, unions in their efforts to constantly narrow the field of management's prerogatives occasionally make demands that the following actions be taken only with their consent:

- Changes in runs or schedules
- Disciplinary action against employees
- Changes in routing or the abandonment of service
- Services to be performed by outside agencies
- Changes in company rules
- Changes in type or size of equipment
- Changes in types of fare collection
- Transfer of employees between departments
- Promotions to supervisory positions

Labor Legislation Affecting Transit Companies

If the parties are unable to resolve their disputes through the use of the collective bargaining procedures discussed in the preceding sections, costly and inconvenient interruptions of service to the public may result. Since there is generally no alternative form of service, this aspect of the labor problem assumes such importance that it inevitably leads to some governmental interference. The constitutional rights of both labor and management are recognized but it is usually felt necessary to protect the public interest in continuous service and to preserve the public peace.

Governmental efforts have consisted either of a policy of conciliation with the parties being left to reach their own terms with the help of a conciliator or of a policy of placing certain restrictions on the freedom of action of the parties in their bargaining relationships.

Conciliation and Mediation -- Legislation providing for conciliation and mediation is still the most widely used method for dealing with the labor problem of transit companies and other public utilities. Recently enacted state law, as well as the Taft-Hartley law, provide for a "cooling off"

period prior to the calling of a strike. It is during this period that the conciliators attempt to assist the parties in reaching an agreement. When conciliation or mediation efforts fail, it is often suggested that the parties submit their differences to voluntary arbitration.

Anti-Strike Laws -- In 1915 Colorado enacted a law which empowered the state's Industrial Commission to compel an investigation of industrial disputes and to make a non-mandatory or advisory award. This act was similar to an earlier Canadian law and was based on the theory that the pressure of public opinion can be brought to bear on the parties by publishing a report covering the causes of the dispute and suggesting the basis for a possible settlement. However, the parties were not required to accept the suggested basis for settlement as in the case of compulsory arbitration. The present Minnesota law provides a similar procedure in certain cases involving industries affecting the public interest.

In 1920 Kansas passed a law which declared all public utilities and common carriers, as well as certain other basic industries such as mining, to be affected with a public interest. They were declared to be subject to state supervision "for the purpose of protecting public health, preventing industrial strife, disorder and waste and securing regular and orderly conduct of the business directly affecting the living conditions of the people." The state's Public Service Commission was abolished and the Kansas Court of Industrial Relations was created.

This law guaranteed employees the right to bargain collectively and, although it guaranteed their right to quit individually, strikes as well as picketing and boycotts were outlawed. In fixing the right of public utilities and the wages of employees the court was required to take into account a fair return on capital but wages and working conditions were also to be fair at all times.

The court was empowered to operate these industries in times of emergencies. Provision was also made for appealing its orders to a higher court but in such proceedings these orders were considered as prima facie reasonable.

After a few years, a meat-packing company succeeded in having the United States Supreme Court hold the law void, although it would probably have been held to apply to public utility companies if that question had been brought to court.¹

Following World War II public reaction to hardships imposed by strikes involving public utilities resulted in enactment of a number of anti-strike statutes, despite the steadfast opposition of labor and the general resistance of management. The first of the statutes banning strikes in this industry became effective in New Jersey in 1946 and was later amended several times. Less than a year later, Virginia followed with a similar statute and with a provision for substantial penalties for its violation.

Since 1947, Florida, Indiana, Missouri, Nebraska and Wisconsin have enacted laws banning all public utility strikes and providing procedures for the settlement of labor disputes in these industries. An eighth state, Texas, has enacted a law which makes it a felony to picket a public utility or to sabotage its property or equipment. Pennsylvania and Massachusetts recently enacted similar laws affecting public utilities but transit service is not included in the definition of a public utility. A similar law affecting transit and other public utilities was recently enacted in Michigan but was declared void because it violated the constitution by conferring administrative and non-judicial powers on circuit judges.

The New Jersey, Virginia, Missouri and Massachusetts laws provide for ultimate seizure and operation of the public utility by the state when a labor dispute cannot be peacefully settled. Most of these laws provide for the giving of notice to a governmental agency prior to a strike and also for compulsory arbitration before a board whose decision is final and binding upon the parties. It is interesting to note that the Florida, Indiana, Nebraska and Wisconsin laws provide some criteria for the guidance of the board in fixing wage rates and working conditions.

¹Cf. Wolff Packing Company cases (1923) 262 U. S. 522, (1925) 267 U. S. 522.

The states of Michigan, Missouri, Nebraska, New York, Ohio, Pennsylvania, Texas, and Washington have also recently enacted laws designed to prevent strikes by public employees. These laws would be applicable to work stoppages by the employees of any publicly owned or operated transit systems in those states.

Wage and Hour Laws -- The circumstances surrounding the present exemption of transit employees from both the minimum wage and maximum hour provisions of the Fair Labor Standards Act of 1938 has been previously explained. However, many of the states have wage and hour laws which affect transit employees and many unsuccessful efforts to pass similar laws were made during the sessions of the state legislatures in 1949.

Labor-Management Relations Laws -- Since 1935 many transit companies, like other companies whose operations are held to "affect commerce", have been subject to the provisions of the National Labor Relations Act (Wagner Act) and the succeeding Labor-Management Relations Act, 1947 (Taft-Hartley Law). Many of the states also have enacted laws patterned after these federal statutes; so many transit companies whose operations do not affect interstate or foreign commerce have been subject to similar regulation.

It is assumed that the student has some general knowledge of the rights and responsibilities of labor and management under these laws and, since they affect the transit industry in about the same way as other industries, no further discussion of these laws should be necessary. However, it should be noted that there has been an increasing tendency on the part of the National Labor Relations Board to interpret the term "affecting commerce" in such a way as to make practically any transit company subject to the Labor-Management Relations Act, 1947.

Other Labor Laws -- Most transit workers are covered by state and federal laws providing for workmen's compensation, old age benefits, unemployment insurance, health insurance, and protection against discriminatory employment practices. However, approximately 55,000 transit workers are employed by publicly owned or operated transit systems and would not be provided with coverage under some of these laws, including the federal social security law. Since the coverage afforded most transit employees under these laws is no different than that provided for the employees of most other industries, no further space will be devoted to a discussion of them.

The chapter has described why labor relations have always been one of the most important problems facing the management of most transit companies. It was shown that direct labor costs in the transit industry represent almost 57 per cent of operating revenues, a higher figure than for any other industry except the telegraph industry. This means that any wage increase granted to transit workers has a much greater effect upon total wage costs than a wage increase of the same amount granted to the employees of many manufacturing companies whose direct wage costs represent only ten per cent or twenty per cent of the cost of their product.

It was also shown that it was necessary for transit companies to operate widely varying amounts of service during total periods of from 18 to 24 hours per day and for 365 days each year. Since this service is of a non-storable nature, its operation requires a great concentration of the operating forces and vehicles during two comparatively short peak periods each day. These conditions not only add to labor and other costs but make it impossible or extremely costly to provide a full day's work to all employees, particularly to those operating the vehicles.

These conditions also give rise to a multiplicity of demands by the unions which are designed to accomplish the impossible task of placing the workday and workweek of transit employees on the same basis of regularity as those of factory and office workers. Although union pressure along these lines has resulted in many improvements in working conditions, it remains generally impossible to standardize hours and to avoid the problem spread of hours in runs. The granting of many of these demands makes it necessary, therefore, for the company to pay certain employees for time not worked and greatly adds to the cost of furnishing the service.

Despite the difficulties referred to above, it was shown that the earnings of transit employees compare most favorably with those of the average factory worker and that the stability and continuity of transit employment was greater than that found in most other industries.

The fact that transit vehicles are generally operated on the public streets where they are subject to public inspection and criticism, while the operator of the vehicle remains out of touch with immediate supervision, also tends to increase costs and presents difficult problems of training and discipline which are discussed in some detail in another chapter.

It is probable that more transit labor agreements contain provisions for the resort to arbitration in the case of disputes as to the terms of a succeeding contract than is the case in any other industry. This is due to the element of compulsion which rests on transit companies to furnish continuous service and the fact that the leadership of the dominant and long established union in the industry has always advocated the use of voluntary arbitration.

This chapter has explained some of the evils of the arbitration procedures now used in the industry which have caused many transit executives to view them as a most inequitable process which, unless changed, should be avoided at almost any cost. However, public reaction to the hardships and inconvenience growing out of transit and other public utility strikes has resulted in the recent enactment in some states of anti-strike laws which generally provide for compulsory arbitration.

Labor costs assume even greater importance in the transit industry than in most other industries since the earning power of the companies as well as the amount of service which they must operate are closely regulated by state or municipal agencies. This means that additional revenues can only be obtained through fare increases, the approvals of which are often difficult to obtain and subject to long delays. In addition a series of such increases may serve to intensify competition of taxicabs and private automobiles, or encourage people to walk rather than to ride for short distances. Therefore, at some point the law of diminishing returns begins to operate.

Thus, most transit companies are caught between the upper millstone of revenues which are closely regulated by one agency and are often inadequate, and the lower millstone of rapidly rising labor and other costs which may be fixed by another agency - an arbitration board - without regard for the company's financial position.

CHAPTER XXIV

Public Relations

THE function of public relations is a self-defining term about which there should be nothing mysterious. By whatever standard one judges the operation of an enterprise, one of the most effective is the customer's opinions about the particular concern. In the creation of a satisfied clientele the transit system, even more than the retailer, must concern itself with what all segments of the public think and feel. The very nature of transit operation--operation under a public franchise--makes this concern for public opinion vital.

The Meaning of Good Public Relations

There are many reasons why customer opinion is important but there are two phases which peculiarly apply to the transit utility. First, many industries directly serving the public necessitate technological knowledge which the general public does not possess; in a transit system, however, the customer generally has some background enabling him to at least think he knows the reason for unsatisfactory performance. For example, if there is insufficient service at some particular point, it is at once apparent to the customer that the cause is simply that not enough conveyances are being operated. When there is no heat in the vehicle, the reason (to the customer) is simple--someone forgot to make the necessary provision for heating equipment. Probably the reason for much of this is that people in the United States have used mechanical devices so much that they feel immediately able to diagnose superficially the reason for many transit deficiencies.

Second, and closely allied to this familiarity with certain mechanical processes, is the customary acceptance of good service by the public. The service industries have accustomed the public to expect benefits and any absence of them becomes an immediate source of irritation. For example, the public does not appreciate the mysteries of scheduling and is aware only of the carrier's performance at the point of contact--operation.

Therefore it behooves any transit utility to overcome such difficulties through a program of good public relations to promote its own welfare and strength in the community. If the subject under consideration has to do with how the public, or any segment of the public, feels about the transit system--it is public relations. When a driver forces private automobiles aside or is discourteous in any way, that is bad public relations. A well-conceived, completely sincere and truthful advertisement that gives a credible acceptable reason why such conditions prevail, and what is being done to correct the situation, is good public relations, provided that the promise is followed by fulfillment.

The importance of public relations cannot be overemphasized. One firm engaged in intercity transportation maintains a mailing list of over 100,000 names to which it directs queries regarding public reaction to the firm's general policies. The results are tabulated to denote trends in public thought as they affect the company, and if the public approves of a proposed policy, the company then goes ahead with operational plans; if the public disapproves, the proposed plan is dropped. While the expense of such a list is high, the firm feels the results save money in the long run.

In furthering the understanding of what constitutes public relations there is often the feeling that it constitutes only what a group or individual writes about the company. Many firms enjoy excellent public relations without any advertising or newspaper stories. These companies achieve good public reaction by simply doing the job in the best way possible and letting the customer discover the facts for himself.

It is a laudable and necessary part of the picture but certainly should not be considered the end of the plan. There must be some effort made towards letting these achievements be known. The hiding of one's light "under a bushel" may be very fine from the standpoint of modesty but it will take a considerable period of time for this virtue to become its own reward. In the dynamics of modern society it behooves management to utilize all the tools at its disposal in its duties for creating and preserving capital within relatively short periods of time. One of these tools is good public relations, which will create an atmosphere favorable to such capital extensions.

If the achievements and problems of the company are to be made known to the public, there is one caution in the speaking and writing phase. No intimation should ever be made that things are roseate when conditions are actually the reverse. In other words, do not make claims that cannot be justified. The riding public is in the most intimate contact with the operational phase of the business and that part of the company is generally all that interests the customer. Any unjustified claims will bring a distinctly adverse reaction that should be avoided at all costs.

Good public relations includes not only the company's customers. It also involves the employee group within the company. Recognition that an employee can be both loyal and friendly, and on occasion still maintain a highly objective and critical regard for the company, will create a practical attitude in management's relations with the group. Many changes have taken place in the past generation with regard to employee relations. To regard the employees as a big happy family may be a "homey" and comforting thought but it is not very practical.

Therefore, to consider employee relations in many respects as a part of public relations is correct. One should be just as prompt, explicit, and frank in interpreting the facts which affect the employee group as in doing this for those facts of interest to riders. For years some of the larger airline companies have maintained that the biggest boosters of air travel have been company employees who are convinced that this is the only way to make long distance journeys. For example, Pan-American Airways a few years ago started to boost its volume of business by first convincing employees that the company was a good place to work and that to travel by air was to travel via Pan-American Airways. Much travel was generated for the company through this method.

Good public relations also includes a sound, friendly, cooperative understanding with governmental officials and departments. In many instances city and state traffic departments should take some plan of action which would make things easier for the transit company. It is clear that here is an area where a proper mutual understanding of each other's problems might make startling improvements in bad traffic situations. The riding public would benefit through speedier and more reliable schedules and the company would in the end have better relations with its customers.

Public relations also include other groups which should constantly be kept in mind. The children of the community will learn to use public transportation as a matter of course or come to shun it whenever possible--depending largely on how well these future customers are sold while still in school. There are the merchant and amusement groups who are affected directly by good or bad public transportation, particularly in the downtown areas where access from the suburban areas will directly affect the sales of retailers and transit operator alike. There are the company's own stock owners, the educational institutions of the community, the churches, the clubs, and manufacturers, and many more groups who deserve to know pertinent information where transit matters are concerned.

The Public Relations Department

It is apparent that there are a number of diverse groups with which the transit utility must concern itself if it is to have good public relations. How is all this public relations work to be done? Establishing and maintaining a good public relations is everybody's job. There is no substitute for good operators, clean and mechanically able vehicles or for routes and schedules that painstakingly reflect current public needs. However it is the duty of other departments to see that these come to pass and for the moment it is assumed that these operational matters are largely under control.

Then, whose job does public relations become? In the very large company there is almost always a fully organized department under the leadership of a trained full-time specialist. The medium-sized companies of the country seem to be rapidly approaching the fortunate state wherein most of them now have full-time specialists. Actually, even relatively small transit companies could have such a man by concentrating advertising, press and radio relations, the handling of complaints, and even employee training in the hands of a single man who has the knack of getting along with people. In expressing the company's public relations activities he must have extreme capabilities for getting along with others.

The job should definitely be placed on the management level since its importance has already been demonstrated. Transit management may have been able many years ago to operate under a "public be damned" attitude but the position has definitely been reversed under contemporary circumstances. A favorable public reaction should be just as important to transit management today as is a well operated transportation department.

Before mentioning the specific ways in which public relations may influence some of the groups mentioned earlier a cautioning word should be advanced. Once an individual has been given the responsibility for public relations there is a general tendency for everyone to breathe a sigh of relief and drop all further participation. This is fatal.

The way in which everybody in a transit company performs his or her job has a bearing on the public relations of the company. Every key staff member should belong to some type of service club, become active in it, and make it a point to represent the company's viewpoint on every occasion. Every official, above or below the public relations man in rank, should take the greatest care to check with the latter individual before making public utterances to the radio or press. The most sincere and well-meant expression of views may seemingly conflict with the equally sincere efforts of the public relations man and put the company in a bad light.

Likewise, nothing is calculated to hurt the company's public relations more than to have the man in charge of them poorly informed. If there is any doubt as to whether any matter would be of interest and importance to him, the rule is to tell him and let him decide for himself.

There are several attributes necessary for the successful public relations executive. As mentioned above he should be a sort of person who naturally gets on well with other people, has a level head and an even temper. He must be able to approach his duties, not with the idea of hoodwinking the public or "managing" its thinking, but with the intention of presenting the company's legitimate story in the most favorable manner, whether he is handling an individual complaint or issuing a statement to the press in the middle of a strike.

Suggestions for Improving a Company's Public Relations

Where should one look for opportunities to promote good public relations? What should one do about them when they have been located? In the following pages are indicated several points where the public relations executive may successfully develop a department capable of achieving the objectives outlined earlier. The list is by no means exhaustive but contains some practical suggestions within certain areas.

Relations with the Press

Public relations personnel should carefully cultivate the friendship of as many staff members as possible on the community's daily and/or weekly papers. It is worth noting that the department should avoid asking favors but it is always easier to work with friends than it is with strangers. There is less likelihood that the company point of view will be distorted if the press is friendly to the company.

The cooperation must necessarily originate with the transit company due to the very nature of reportorial procedure. Editors and reporters cannot know all of the sources of news and will generally appreciate any suggestions on stories having legitimate community interest. Call the

newspaper and find out whether they can use the story and whether they prefer your story or prefer to cover it themselves. Sometimes prepared stories are distributed to the press. In such cases these should be kept brief and accompanied by properly labeled photographs. Otherwise any prepared items may simply be thrown into the editorial waste basket.

Avoid the pressuring of editors into a favorable story merely because the company maintains a heavy advertising appropriation with the papers. Such efforts may bring an occasional news item but conscientious editors will strongly resent any pressure for news interpretation. It is more than probable that the use of such tactics will boomerang against the instigator.

Be fair to competitive newspapers in the same community in releasing newsworthy stories. It is not enough to simply release all stories simultaneously. Morning and evening newspapers must each receive their fair share of releases and the public relations department can be of use in making these decisions. The division should also be equal as to "big" stories and those that are routine. For example, items of big interest would be rate or schedule changes, new equipment, plans for improvement, etc. Routine items would include: reports on safety, company sports news, staff promotions, etc.

Radio Relations

If the public relations department is to be fully aware of its opportunities, the head of the department must also be on friendly terms with the key personnel in all radio stations in the community. Items of interest should be included in newscasts. In addition there are educational programs on which company officials may appear in connection with transit affairs. Quiz programs represent another possibility.

It is also important that good radio relations be maintained for announcing news of an emergency nature such as changes in bus routes during storms, fires, floods, or other serious emergencies.

Employee Relations

There are several things which may be done in this area. The extent of the public relations department's participation will depend in large degree upon the nature of the personnel department's program. There should not be any overlapping with other departmental functions and to do this it will be the job of the public relations personnel to cooperate very closely with all other groups dealing with the employees.

There are several good books written on employees relations; it is the purpose here to only mention some of the things meriting consideration.

1. Employee publications--this medium can be of great value but should not become merely a journal justifying management decisions. If it is to be for employees, it should actually be for and not to them.
2. Training and inspirational literature--These are available from several trade publications and are fairly reasonable in costs.
3. Employee group meetings.
4. Safety award systems.
5. Service button awards.
6. Condensed versions of annual statement for employees.
7. Special citations for good maintenance, good safety records, etc.
8. Sales training--Few operators think of themselves as salesmen.

Yet it is only through them that most of the riding public know the transit company and a sales training program can help to show operating personnel its importance to their own personal future security. The American Transit Association has some excellent booklets on training programs.

9. A carefully prepared booklet to tell the new employee about the company, its objectives, its rules, its opportunities.
10. Suggestion systems.

Stockholder Relations

Stockholders and management today are often widely separated geographically and in many cases voting control may be held by a minority group. Due to these and other factors the contacts between the two groups are almost always in written form. It is mandatory, therefore, that management do a good public relations job in whatever reports it sends out to stockholders. Several specific devices are presented in keeping stockholders well informed.

1. The Annual Report - There is a trend in recent years to present as complete a picture as possible in the annual report. It can be either simple or elaborate but it is well not to make it too elaborate, especially if the utility is operating at a deficit. Clarity is a cardinal principle. One picture is worth a thousand words. Simple charts, graphs, pictures of new buildings, new vehicles, reproductions of awards, maps of routes, etc., are some of the devices that may be used to make the annual report more palatable.

2. Dividend Enclosure Folders - These may be used to give a short resume of operations during the past period and prospects for the future. These are an inexpensive way of showing your interest in the stockholder.

3. Stockholder Meetings - Only a few companies attempt to have meetings of their stockholders other than the meeting of the board of directors. However, it pays to have some open meetings if there are enough stockholders at one central spot. Benefits can be derived from allowing individuals to express themselves on management policy, even though such utterances may not have a direct bearing on actual determination of such policy.

4. Mailing Letters to New Stock Owners - These letters, signed by the president, make the new stock owner feel welcome as an owner. They are a tried and proven technique.

5. Press Releases - The prompt release of any financial information to the newspapers will help prevent misinformative reports concerning company finances and policies. Newspaper financial editors will also usually be anxious to receive such reports. This is a particularly necessary step for companies whose stock may be listed on an exchange.

School Relations

A partial list of things which may be done in this area include: excursions to special points of interest; assembly talks; showing of safety films; essay contests; distribution of special literature in the schools; and cooperation with P.T.A. groups.

Relations with Legislative, Administrative, and Regulatory Officials

All too often the relations between the various departments of government and a company operating under a public franchise are strained because the latter fails to keep its current situation, problems, aims and objective sufficiently well presented to the governmental officials concerned. Nearly always the public servants are men of some stature and importance. It is therefore vitally necessary that the chief officials of the transit company should be the ones to maintain these contacts because only these executives can speak with the proper authority for the company.

The American Transit Association makes these suggestions:¹

1. Compile a list of the key persons in the category discussed above.
2. Mail proofs or clippings of your advertisements to them.
3. When a company spokesman issues a release, when a company official gives a talk, when a business paper story about your company is published, or when a story is prepared for the press, check the list to see who on it might appreciate a copy.
4. Send your annual report and other company publications to the persons on the list.

¹Transit Public Relations, American Transit Association pp. 17-18

5. Many public officials would appreciate being kept current on industry developments. This can be accomplished by arranging to have them receive Passenger Transport regularly.
6. Use personal contact to keep these officials informed of company problems, particularly ones which might become controversial. If public officials know and understand these problems soon enough, many may never become controversial.
7. Invite interested public officials to company affairs, whenever possible -- not only to social gatherings but to special events such as the opening of new buildings, new equipment showings and the like.
8. Remember that public officials are human and most human beings resent individuals who show up only when they want to ask a favor. Good public relations is a matter of friendly cooperation.

It is important to note again that the initiative must come from the transit utility. A favor has been bestowed upon it through the granting of a franchise to operate. If the company is to achieve good relations with government officials, it must take the initiative since the company is the one which will benefit.

Community Relations

In the past transit utilities have traditionally allowed themselves to partially remain outside of civic affairs. This is exactly the opposite of the situation which should exist. Fortunately the trend is changing and there is an increasing number of companies who participate actively in community affairs. Some of the things which the transit company can do include: participation in and publication of such drives as the Community Chest and Red Cross; support of progressive civic enterprises such as staggered business hours; leadership in accident prevention activity; taking the lead in a solution of the traffic problem.

In summary it is necessary for the transit utility to think of itself as selling a service that requires every ability of the salesman's art. One of these arts is the field of public relations as discussed above. To attract through such measures a maximum of welfare and strength in the community is to merit patronage and represents the complete cleansing of the unwholesome viewpoint of the entrenched franchise. It indicates constant effort to constantly merchandise the product the transit industry sells--mass transportation operating under a public franchise.

CHAPTER XXV

Advertising and Sales Promotion

ADVERTISING, according to Webster's Dictionary, is "any form of public announcement intended to aid directly or indirectly in the sale of a commodity..." In his introduction to "The Handbook of Advertising," Ernest Elmo Calkins writes that: "advertising produces a favorable state of mind toward the advertiser's goods. Goods may be interpreted as goodwill, service, a public duty, whatever objective the advertiser has in mind when he sets in motion the engine of publicity. When we say advertising sells goods, we mean, in most instances, that it produces consumer acceptance--in other words, a favorable state of mind."

Couple Webster and Mr. Calkins, add a transit company's planned sales promotion effort, and advertising becomes the means to an end used for the purpose of maintaining or producing transit rides. However, to attain the specific objective successfully--more transit rides--advertising must also be directed at a still broader objective--goodwill. With public goodwill a transit company will find less resistance to its sales messages. Thus, more transit rides are sold more easily.

It has been maintained by some that a sales promotion effort is not needed by a transit company. Isn't it a monopoly? Don't people have to ride? The fallaciousness of these arguments has been explored earlier; a brief review will suffice here. A downward trend in the number of revenue passengers began in the early nineteen thirties and then became definite when the private automobile was adopted as a favorite means of transportation by the American public¹. Automobiles are again becoming plentiful. A downward trend has again set in. Statisticians agree that it will be accelerated once the competitive position of the automobile manufacturers reaches the position they occupied before World War II. Implementing this factor is the more recent higher price tag placed on a transit ride. These competitive elements create greater consumer resistance than ever before. They can be offset to some extent by the same proven sales communication methods--newspaper advertising, radio, direct mail, car cards and other mediums - used by the manufacturers of products in other competitive fields.

An effective sales promotion plan designed to sell more transit rides must have the same basic appeals that sell other merchandise. They must be "pitched" directly to the self-interest of the reader or listener. What does a transit ride offer him? What are its advantages? Will he save money by using a transit vehicle? Will he be free of traffic cares and worries? Will he be less apt to be a principal in an accident? Will he be comfortable? Will he get a speedy ride? Is it convenient? The answers to these questions have been developed and emphasized in most all effective transit sales promotion campaigns.

Perhaps a transit company has only an idea to sell. Public appreciation may be needed for a necessary fare increase or public support may be needed in a campaign to eliminate parking in the business area. While these special pleas may be local in character, the basic elements appealing to the self-interest of the reader or listener must appear in the copy. They may be direct; they may be subtle, but they must be there if you are to gain his interest in your ideas of opinion.

The tried and proved advertising mediums needed to "set in motion the engine of publicity" are available to a transit company as they are to others--at a price. The cost of any sales promotion campaign depends on the extent and frequency with which you use one of several mediums. Costs are also governed by the area in which the campaign is conducted. In large urban

¹Cf. the Transit Fact Book, American Transit Association, New York, 1948, pp. 19, 22.

areas advertising rates differ from those in suburban areas. Unit costs, however, based on the cost per thousand listeners in the case of radio or the cost per thousand of circulation in the case of newspapers, do not differ as widely as the cost per spot announcement or agate line of newspaper advertising.

Many transit companies lack outstanding merchandising "know-how." It is the hold-over result from the non-competitive pre-automobile days. Transit operators were not born to competition. Even though transit now has recognized competitors, an American Transit Association survey (August 11, 1948) shows that 39 leading transit companies in 1947 spent a total of \$1,864,712 or 0.354 per cent of their operating revenues for direct and indirect advertising. While it may be unfair to compare this expenditure percentage of gross income to the automobile or soap manufacturing industries, there is some merit in comparing the expenditures with other utilities--the gas or electric industries or railroads. In industry alone these latter groups are spending many thousands more than the 39 individual transit companies which reported to the ATA. If the individual gas, electric or railroad companies' advertising expenditures are added to their industry total, the transit industry's expenditures are minute by comparison.

Advertising in Media Controlled by Transit Companies

In addition to the advertising mediums available to anyone with something to sell, transit companies are in the unique position of controlling, directly and indirectly, car cards, take-ones and, more recently, FM transit broadcasts.

Car Cards

This is an established advertising medium consistently used by local and national advertisers. Everything from chewing gum to funeral services are merchandised either exclusively or supplementally in this medium. A transit company can also successfully use car cards to plug its own product--transit rides. Two types are available, interior and exterior car cards.

The weakness of interior car cards in a sales campaign with more rides as the objective is that they reach those who are already customers and not those who are using other means of transportation and whom you want to attract to your vehicles. While it is probably true that in any urban community every resident at some time or another in the course of a year uses public transit, the fact remains that interior car cards are not a consistently effective medium for that segment of the population at whom a "more rides" sales effort is directed. For the purposes of improving public relations, attaining an operational objective (move-to-the-rear, have-your-fare-ready, etc.), it is a recommended medium. In these instances, the sales message is exposed to those whom you want to take action.

Interior car cards are reproduced usually by lithograph, letter press or the silk screen process methods. They vary in size from 11 x 14" to 11 x 42". Most transit company car cards occupy the same random space as that occupied by paid advertisers. In some instances, transit companies have held aside a preferred space and consistently use that space for their own messages. In Washington, D. C., the Capital Transit Company has developed an 11 x 14" space just in back of the operator which they use exclusively to promote the sale of passes or the use of their lines as the most convenient and economical means of "off peak" transportation.

Exterior cards are a more direct means of sales promotion. They are meritorious new business getters. Exterior cards vary in size and display value dependent upon the location on the vehicle. Most transit companies use the space for the promotion of "spot" riding. It is a flexible medium and particularly effective in promoting riding to special one-time or limited engagement events. The largest circus in the world has successfully and consistently used exterior car cards to attract customers to its offering.

Effective exterior car cards have limited copy. It is a quick exposure to a prospective customer on the street or in another vehicle. Its sales message must be complete and provoking in a few photographic words or outstanding illustration. This is difficult to attain but well worth the effort and time spent in reaching the right combination of eye catching appeal.

One of the most recent effective sales campaign uses of exterior car cards has appeared on the vehicles of the Virginia Transit Company. "Frugal McDougal," an appealing caricatured Scotsman, has been the central character in the campaign. Expert use has been made of illustration and words in putting across the sales messages.

Most exterior cards are reproduced by the economical silk screen process, varnished, or waxed to withstand the weather. Like interior car cards, bright, profuse colors are used to focus the eye on the cards.

Take-ones

More and more transit companies are taking advantage of the sales promotional possibilities of the take-one publication. The control of this medium is directly in the hands of the transit company. The take-one can be an elaborate letter press job with a profuse use of line or half tone cuts or a simple mimeographed sheet. It can be published weekly, monthly or on occasion. In any event, it is one of the most effective--if not the most effective--mediums for sales promotion in the transit company's kit. While it has the same weaknesses as the interior car card in that it reaches the customer already on the vehicle, it has the advantages of flexibility and the opportunity for providing detailed sales copy. Tests made by transit companies have proven again and again that the pulling power of a regularly published take-one is greater than any other medium used, and better than a combination of some mediums.

The take-one is a particularly effective medium for attaining the over-all objective of maintaining and developing better public relations. Its columns also offer the chance to plug special events and special services such as express lines, information departments, transit maps and other indirect methods that are part of a sales promotion effort.

A study of take-one publications issued by various transit companies will reveal a consistent appreciation of its power to stimulate more riding and to transmit ideas. In addition to being read on the vehicles, these publications are taken home so that the exposure to the public is far reaching and extends to those who frequently or infrequently use private automobiles for transportation. Except for the very small transit property, the take-one offers an economical, as well as an effective, means of advertising. It can be prepared by a specialist or an amateur. While a specialist will turn out a better copy or make-up job, meritorious publications are coming from the pens of transit people with a flair for concise "down to earth" writing ability. While it is more desirable to publish a take-one on a regular schedule, results can be had from the occasional effort. Again, while it is better to place the take-one in its own rack within the vehicle, it is possible for the operator on a small property to distribute the publication to passengers as they board.

On the larger properties, copy, make-up and production is usually the responsibility of one person although that person may not devote his entire time to the job. Among his other duties may be responsibility for an employe publication, advertising, publicity or newspaper advertising. On occasion, transit companies have hired outside agencies to prepare copy and supervise production of a take-one. However, copy usually originates with some one within the transit organization who, in the first instance, with a little more effort, can do the complete job.

Outstanding take-ones are published by the Philadelphia Transit Company and the Los Angeles Transit Company. The Los Angeles' "Two Bells" is noted particularly for its "folksy" writing and humorous cartoons.

FM Radio

More recently there has developed a third means of communication with the public over which a transit company has direct or indirect control--FM radio transit broadcasts. In some cities installations of FM radio receivers in transit vehicles have been completed. Other cities contemplate installations. It is a new development and opens a whole field of "car" communication which can be utilized to sell more transit rides. In addition to reaching the rider already on the vehicle, FM radio transit broadcasts have the advantage of reaching the home audience which

might be tuned in on the wave length broadcasting to the special transit receivers. Primarily, FM transit receivers have been developed as an additional means of indirect revenue for the transit company. However, arrangements have been made by some companies, now using the receivers, to permit the use of unsold time for the broadcast of transit company commercials on the same basis as most car card contracts permit the use of unsold car card space. There is little doubt that FM transit radio broadcasts open a whole new horizon for sales promotion for a transit company. Case histories will surely develop as the medium gains experience. It has been expressed by some already using FM broadcasts, that the appeal and quality of music being broadcast will in itself develop more riding and better consumer acceptance of the transit company's product.

The selling techniques in FM transit radio have yet to be developed. They are in the period of experimentation. However, it has been established, in the short time it has been used, that the techniques used in AM radio are not acceptable. FM transit commercials are more conservative and factual and lack the showmanship and spectacular "ear" catching phrases used in AM broadcasts.

Newspaper Advertising

The one medium consistently used by transit companies is newspaper advertising. There is no disputing its results. Transit companies use newspapers for both direct sales messages and special pleading. Outstanding examples of both are available through the American Transit Association's advertising exchange issued periodically. The Association also, from time to time, has developed newspaper sales promotion campaigns and has offered them to its membership on a cooperative basis. A minimum cost has been charged for the newspaper matrix furnished the subscribing member. The cost is considerably less than that which he would have had to pay to an advertising agency for the professional art work and copy. This mat service has been particularly helpful to small transit properties.

Most large transit companies utilize advertising agencies to develop art work and copy for their newspaper advertising. The agencies also handle all the details of production and distribution. The use of an agency does not entail extra expense insofar as space costs or copy preparation is concerned. The agency is paid for its copy know-how from the commissions received from the newspapers in which the ad is placed. The commission is usually 15 per cent of the total space billing. These commissions are not available to the advertiser even if he placed his advertising directly with the newspaper. However, the agencies do charge the advertiser 15 per cent commission on production bills--art work, type setting, etc. A transit company committed to using newspaper columns for advertising gains no advantage in writing, preparing or placing its own advertisements. Good copy writers are high priced specialists. Agencies usually can obtain art work for less cost than can the occasional buyer. Further, agencies usually get faster and better service from type setters and engravers than can a transit company. An agency is a collective effort and the transit property, unless it were to embark on an expensive advertising program like a department store, would find it uneconomic to maintain a fully staffed advertising department.

In some areas, transit companies may not have good agencies available. In these instances, the transit property deals directly with the advertising department of the newspaper. The service given by the newspaper is similar to that of an agency but is not as expert or as able to take a personal interest.

Newspaper space advertising rates vary in almost every city and town and also within the same city and town. Circulation and local newspaper policy control the rates charged. In some cities, transit companies have the advantage of so-called local rates while in other cities, transit companies pay national advertising rates.

Radio

This medium is a popular, but comparatively costly, means of communication. Many transit companies use it. In many cities; radio broadcasting stations with the highest Hooper rating (a method for measuring listeners) have a strong signal extending into areas not served by the local

transit companies. Air time costs are based on what a station can produce in listeners. This is sometimes more than a transit company needs to buy. Yet the less costly air time on a station with a weaker signal fails to reach that segment of the population at which the sales message is directed.

Individual transit companies buy three types of "time." The most popular is "spot" commercials. These run from thirty five to as many as one hundred words and are sandwiched in with other commercials usually on a local station's sustaining programs. This type of commercial is also used on station breaks where the announcement is made before or after designated station identification time points. "Spot" announcements have the advantage of coverage which do not accrue to sponsored programs.

A second type of time buying used by transit companies is the sponsored program. It might range from sponsorship of Town Meeting of the Air to a currently popular news commentator. Usually transit companies avoid a controversial type of program because of their vulnerability to public pressure. Sponsored programs may be network affairs or may be locally produced. The St. Louis Public Service Company has been a consistent user of a locally produced program. The company has sponsored a local newscaster and has used its car cards and take-ones to build him up as a popular personality.

In some instances transit companies have developed their own local radio shows. The Baltimore Transit Company has for some years built its radio shows around the local scene. They have found this type of presentation of value as prestige and transit ride building factors. They also have the advantage of audience participation which is not possible on network shows. This type of program entails not only time costs but local production and talent costs which are comparatively high. Unless it is of an unusually good format, the local production type program is apt to be lacking in personalities.

The cost of radio sponsorship, like newspaper space rates, varies from city to city and within cities. "Spot" announcements and commercials for sponsored shows are usually written by someone on the transit company staff. However, like newspaper space, they can be handled through an agency without cost to the advertisers. The agency obtains its fee via the 15 per cent commission route and this is not always available to the advertiser dealing directly with the radio station. A transit company cannot hope to produce its own show. A staff of experts would be needed. The Baltimore Transit Company and other transit companies which have produced local shows have done so with the assistance of an established advertising agency.

Experiments have been made with industry sponsored network shows with local station breaks available for commercials. Because of the difference in local needs and tastes and the ratings of local network stations, the experiments have not met with the approval of a large enough segment of the industry to make it feasible. Network shows cost large sums to produce but purchased on a collective basis are usually more reasonable than locally produced radio presentations.

Direct Mail

This is an advertising medium which has not been used to its fullest potentialities by most transit companies. It has the faculty of bringing the "impersonal" transit company into the home of the prospective rider on a "personal" basis. It also provides the opportunity for readable salesmanship in print that will detail the merits of a particular service convenient to the individual to whom the mailing is addressed. It is an excellent outlet for selling special services and boosting riding on suburban or feeder lines. A sales message can be localized in a manner impossible in the broad coverage attained through other mediums.

The difficulty presented in a direct mail effort is the obtaining of valid names and addresses in a given area. The most common methods are the use of criss-cross telephone directories or purchased commercial lists. Even these lists are not complete and are not always restricted to the area in which a mailing might be directed. The most satisfactory lists are the customer billings of the local electric companies. Their customers are segregated by routes and the routes are usually sectionally spotted. Of course, these lists are not available commercially

but there have been instances of cooperation between the power and transit companies whereby the transit companies have had access to names and addresses on the route books in the area to be covered by direct mail.

The Public Service Company of New Jersey has done an outstanding job of direct mail promotion. They have merchandised their services through clever mailing pieces.

The cost of using this type of medium is relatively small. The cost for printing, addressing and mailing per family unit is negligible compared to other advertising mediums. Further, direct mail promotion can be handled within a transit organization with little or no specialized help. The sales letter can be written by someone on the staff and the printing, addressing, folding and mailing can be handled at small cost by organizations which specialize in this type of work. The important and most difficult problem is the obtaining of complete and valid mailing lists.

Other Advertising Mediums

More riding has been successfully stimulated by the printing and distribution of maps and booklets. Transit companies in urban areas find it profitable to prepare maps in color of their cities showing the routes of the transit lines. Some maps also detail places of interest. In some instances the companies have prepared booklets giving places of interest and how they can be reached by the transit lines.

Practically all transit companies maintain a telephone Information Department. These departments are publicized and the public educated to use the service whenever they desire to travel in an area unfamiliar to them.

One of the most important forces in a transit sales promotion plan is the employe group. This is a chapter in itself that more nearly parallels employe relations. But any complete effort should include an employe educational program which has the same basic self-interest appeal directed at the prospective transit customer.

There are many indirect efforts which are part of a sales promotion plan. Vehicles can be kept clean and neat; painted in colors which have appeal and are attractive.

The Advertising and Sales Promotion Department

These functions should not be confused with Public Relations which is a separate and distinct subject. Advertising and sales promotion sometimes function under a public relations executive but within transit companies, responsibility for public relations in its literal interpretation usually rests at top policy level. It is unusual for a transit company to maintain a complete advertising or sales promotion staff. These activities, in most instances, are the responsibility of one or a few persons who also handle newspaper publicity, edit an employes' magazine or otherwise do an all-around job. In their strictest sense the advertising and sales promotion activities of transit companies are part of an over-all effort to produce "a favorable state of mind" on the part of the public.

CHAPTER XXVI

Urban Transit Research

IN 1926 a prominent marketing counselor in New York made the following statement concerning a research department:

“A business concern can exist for a time without development or improvement, but only for a time. This fact, obvious as it is, is only beginning to be realized. Research, as the organized means for progress, must be made an integral activity in every modern enterprise. Although existing solely to serve the other factors of management, it is best regarded as a force distinct and apart from them.

“The purpose of research is to increase the efficiency and earning power of a business, or of one of its parts. Research may be applied to any of its activities or products, in fact, to anything within the range of commercial endeavor.

“It is possible to introduce improvements of one kind or another without the use of research, but research has been found the most direct and economical method. Much of the great progress made in the last country in industry came as the result of discovery, accident, and the stroke of genius. Today, however, the possibilities from such sources are limited. Organized research has supplanted them.”

Webster’s New American Dictionary defines research as (1) “Deep study or investigation”, and (2) “The quest for new information through examination of source material”. Webster’s New International Dictionary defines research as “critical and exhaustive investigation or experimentation having for its aim the discovery of new facts and their correct interpretation, the revision of accepted conclusions, theories or laws, in the light of newly discovered facts, or the practical applications of such new or revised conclusions, etc.”

The head of a prominent Midwestern research foundation has aptly pointed out that research is a “state of mind”. He says that at any given moment the particular object of a study is of less importance than the fact that something needs to be found out about it. Successful research depends upon executive understanding of these basic concepts.

It is impossible to create new facts or principles. They exist. Through “pure” research such facts and principles may be discovered, and through “applied” research they may be put to work for the betterment of mankind either singly or in combinations.

The research director referred to above has prepared a list of justifiable research motives, based upon his own experience and that of research leaders in the fields of automotive and electrical equipment manufacturing. The management of an enterprise may justifiably and profitably turn to research, according to this list, whenever it wishes to accomplish one or more of the following objectives:

1. The anticipation and prevention of troubles.
2. The cure of existing troubles or nuisances.
3. The reduction in cost of a product (or service).¹
4. An increase in the utility of a product (or service) through modification, or simply by finding new uses.

¹In the above listing the parenthetical expressions are editorial and have been added to show the parallel between justifiable research activity in industrial production and in the utilities industries, particularly urban transit.

5. A reduction in costs to consumers (or patrons).
6. The development of new processes, materials, products (or services).
7. An improvement in the quality of existing materials, products (or services).
8. An improvement in standardization.
9. The amassing of technical information leading to a better understanding of a product (or service).
10. A contribution to the common store of general technical knowledge, with the ultimate motive of increased markets (for products or services) through raised standards of living.

Competent research analysis and managements which have most successfully used research stress the value of detachment in the research function. Research must be free from any pressure to defend or advocate a situation either consciously or unconsciously. It must especially be free from pre-expressed opinions of the management. The effort called "research" is an activity designed to let all pertinent factors speak for themselves and exert their due weight when given adequate consideration by management. It is frequently necessary for companies to adopt temporary expedients in the field of studies and surveys until a research activity based upon fundamental principles can be established, but the element of detachment should be constantly kept in mind as a desirable objective to be attained as soon as conditions will permit.

There can be no question of the need for and value of research approach in the urban transit industry. A transit company is confronted at all times by one or more of the research motives listed above. It constantly has problems of a recurring and non-recurring nature which require solution - situations about which something needs to be found out, including possible remedies.

Many urban transit companies have formalized and organized their research activities and have realized considerable value from their research programs over a period of years. Other companies have more recently established facilities for research, and still others are currently engaged in setting up such departments. Such companies range in size from the largest to the smallest. Smallness in size of company should be no deterrent to formalizing the research function of management when doing so will serve a constructive purpose².

Organization and Operation of the Research Department

Most of the companies covered by the American Transit Association survey perform their research functions in a separate centralized research department. This highly desirable practice is particularly true of companies serving communities of more than 300,000 population. In general, companies serving areas of 300,000 or less employ a single research worker, or vest the responsibility for the performance of the research function in a single executive or employee having other responsibilities. Smallness of the company size has not eliminated the research function where its need and value have been demonstrated. Someone handles it.

It is a general practice among transit companies with research departments for the regular operating and staff departments to cooperate with the research department as fully as their regular duties permit, extending the use of their facilities and making specialized personnel available whenever possible. In this way the organized research department, serving as a "nucleus" for transit research activity, can draw upon the experience of others, and can meet the "peak load" of study and survey work without going outside of the organization for temporary personnel.

The Research Department and Company Policy

In some cases the transit research department plays a direct part in the formulation of company policy through representation in policy councils, or through making appropriate recommendations to management as the result of study and investigation. In most cases, however, the research department plays an indirect part in the formulation of company policy through the preparation of

²A survey of current industry practices in the field of research by urban transit companies was conducted in 1947 by the American Transit Association, which is the national trade association for such companies. Much of the material in this chapter is based upon the results of that survey.

technical reports and through discussions with executives, which include the making of appropriate recommendations on occasion. The plan under which the research department is directly represented in company policy councils is constantly under consideration by the industry, and it is expected that this plan will be more generally adopted.

Number of Employees

Individual transit research departments may employ anywhere from one part-time employee to twenty or more regular research workers. Instances are recorded where as many as 1,500 to 2,000 people (from among the company's operating personnel) have been engaged at one time on a temporary basis in the conduct of special studies or surveys.

Position of the Research Department in the Company Organization

One of the most important considerations in the successful performance of the transit research function is the correct placement of the research department in the company's organization structure. Research is a function and responsibility of management and not a function of operation. Nothing so stultifies or inhibits the research department in its work as to "tuck it away" in some obscure corner of the organization, or to place it where it will be subject to the whim and control of the operating organization.

Most of the transit companies which reported their current practices to the American Transit Association in the 1947 survey on "Urban Transit Research" indicated that the head of the research department, whatever his title, had a direct channel to and from top management through only one other management official. The usual case is to have the director of research, or his equivalent, report to a company vice-president, or general manager, who in turn reports to the president or other chief executive official of the company. In this way, research as an activity and responsibility of management takes its place in the company organization structure along with the other staff departments and the principal operating official.

The diagram in Figure 1 illustrates the feeling of most students of urban transit research as to the proper position which the research department should occupy in the company organization structure. This pattern should be made to fit the background of local conditions with which a management may be faced, but Figure 1 indicates a desirable objective towards which the company management and the head of the research department may work.

The Research Department Budget

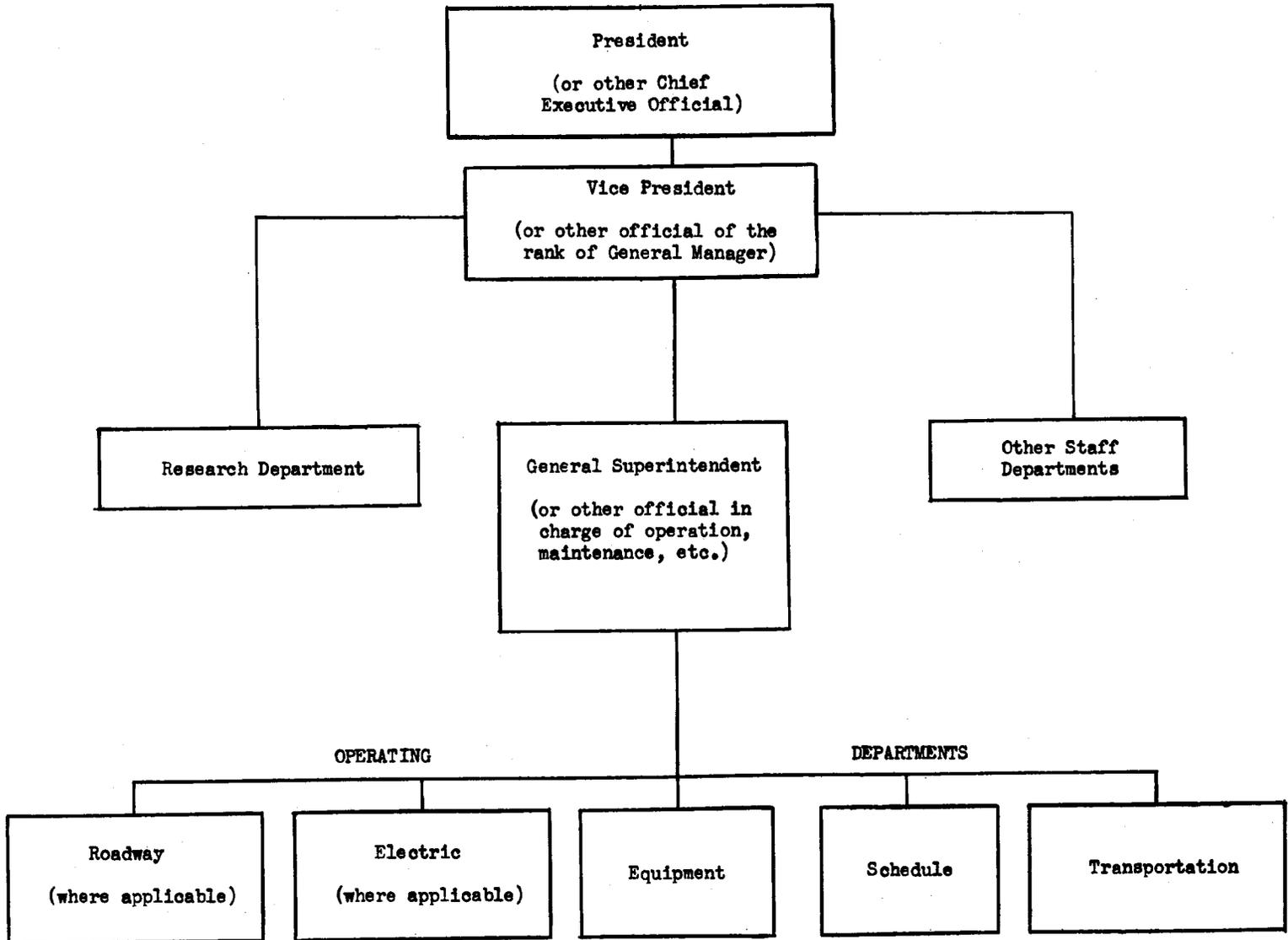
Fourteen of the companies responding to the American Transit Association's recent questionnaire indicate that they spend the following amounts annually on urban transit research, excluding outside consultants and specialists:

<u>Annual Research Budget</u>	<u>Number of Companies Reporting</u>
\$45,000 - 50,000	2 companies
40,000 - 45,000	1 company
35,000 - 40,000	2 companies
30,000 - 35,000	3 companies
10,000 - 15,000	3 companies
5,000 - 6,000	1 company
2,000 - 3,000	2 companies

Viewed in relation to the respective gross revenues of these companies, the amounts expended for research appear very small. There is, however, evidence of keen interest in research on the part of management and more companies probably will eventually adopt the research approach in the solution of urban transit problems. Those companies already using this approach will undoubtedly expand its coverage into further fields of operating and maintenance activity as they become more fully "sold" on its value and importance.

FIGURE I

DIAGRAM ILLUSTRATING A DESIRABLE POSITION FOR THE RESEARCH DEPARTMENT IN THE COMPANY ORGANIZATION



Use of Outside Consultants and Specialists

Many transit companies utilize the services of outside consultants and specialists, either regularly or occasionally, depending upon the size and talents of their own research organizations and their specific needs. In the year 1946, eleven companies which reported their practices in this regard indicated a range from \$220 to \$25,000 spent for such services. In general, the fees for outside research assistance are taken care of by special appropriations, and are not included in the budget of the research department. Outside consultants and specialists are generally hired by companies having research departments (1) because they have no specialized expert in some particular field on the staff, (2) to save time, and (3) sometimes to corroborate their own findings through an outside viewpoint and approach.

Functional Operations Performed by the Research Department

A very good indication of the functions performed by typical urban transit research departments was obtained from the 1947 American Transit Association survey. The survey indicated that research departments have relatively little to do in connection with track and paving and electric distribution system problems. In the case of transit vehicles and other vehicle equipment, research departments are called upon a little more frequently but not significantly so. Transit managements appear to rely upon the research activities of the equipment manufacturers or upon the specialized technicians in their own roadway, electric and equipment departments for the study and investigation of improved materials and practices in these fields.

Research departments in many instances do considerable work in connection with passenger traffic and schedules, with particular reference to passenger load checks, running time checks, the analysis of data, and, in some cases, the preparation of "headway" or service specifications. Frequency of service and frequency of stops are matters often given research attention. Research departments are also called upon to render service very frequently in connection with the design and preparation of route maps, system maps, the study of routings and re-routings, and investigations of the riding characteristics of individual routes. Very little demand is made upon transit research departments for studies pertaining to power or fuel.

Research departments are also called upon to a rather limited extent in connection with the problems arising from operation in the public streets. The problems in this field of transit activity are of long standing and many of them are far from being solved. It is the opinion of some transit research men that the whole level of transit operations could be "lifted" as the result of research in these fields and the practical application of its findings.

Some companies use their research departments to a considerable extent in the field of labor relations, especially in connection with the development of background statistics and the preparation of exhibit material for use in negotiations and arbitrations. In most companies, however, this function is performed by some other official or department of the company.

Up to the present transit research departments have had very little call made upon them for work in the fields of accident prevention or claims activities. These activities, which have received considerable stimulus from the national program carried on by the American Transit Association, are usually pursued by the operating departments and claims departments themselves.

Somewhat greater use has been made of transit research departments in the field of advertising and sales promotion, particularly in connection with market surveys and analyses. The departments are used very extensively by their company managements in making studies of the company's fare structures, and in the development of background statistics and the preparation and presentation of exhibit material in hearings before regulatory commissions in rate cases. Perhaps the most extensive use that has been made of transit research departments is the study of costs of operation, and the planning and development of equipment modernization programs, including long-range economic planning and vehicle selection studies.³

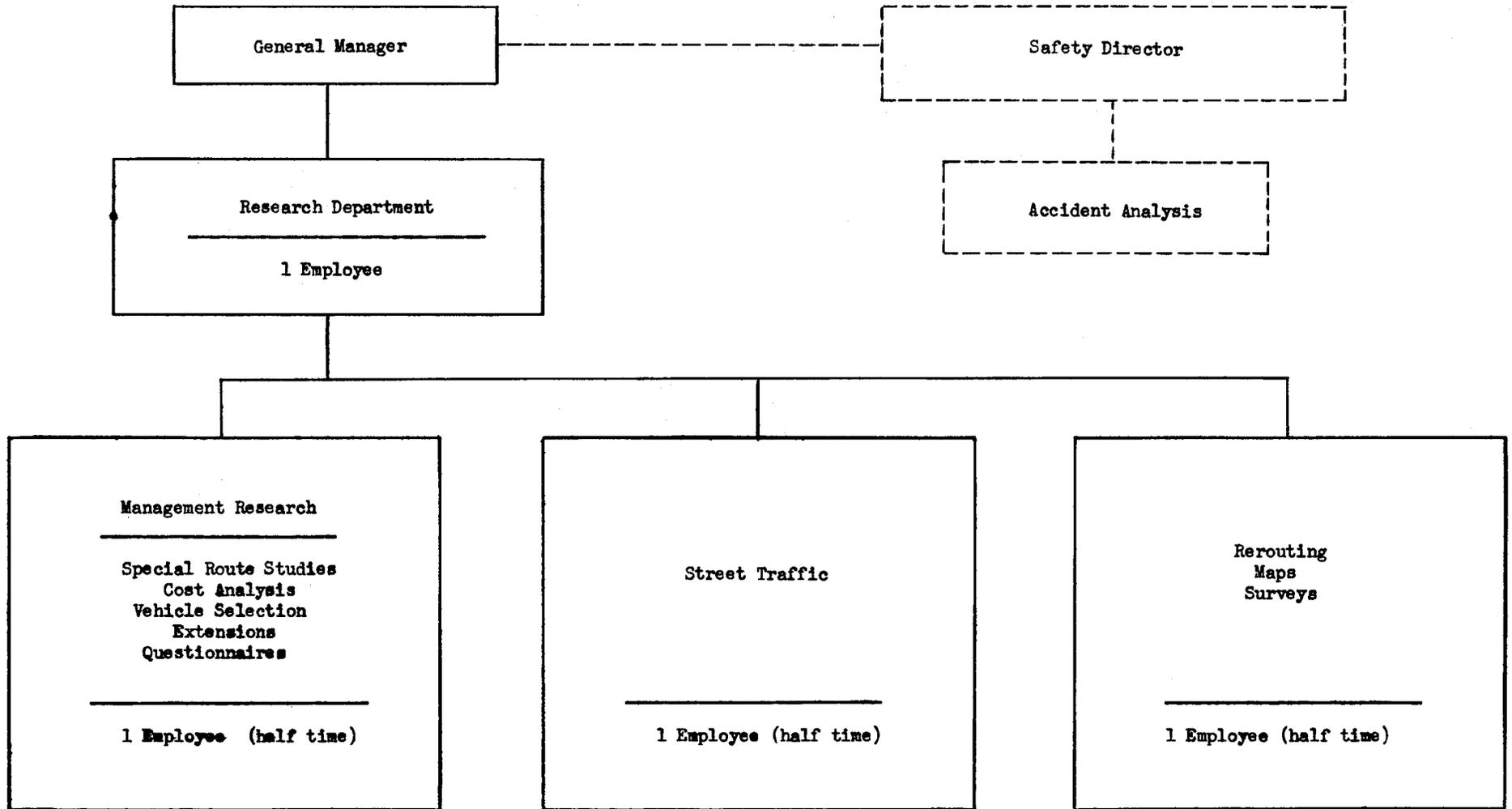
3

D Cf. Chapter VIII where transit vehicles and their selection are discussed in detail.

These departments are also called upon with great frequency for predictions and forecasts of such items as population growth, riding habits, gross revenue, operating expenses, and net revenue. They are also active in studies of such special problems as extension requests, experimental routes and services of various types, staggered hours, selected stops, and others. They are called upon relatively infrequently for studies in the fields of public relations and accounting, and perhaps a little more frequently to perform organization studies. This latter field is one in which a research department can be of considerable help, and undoubtedly in the future transit managements will conduct more extensive research into the field of company organization.

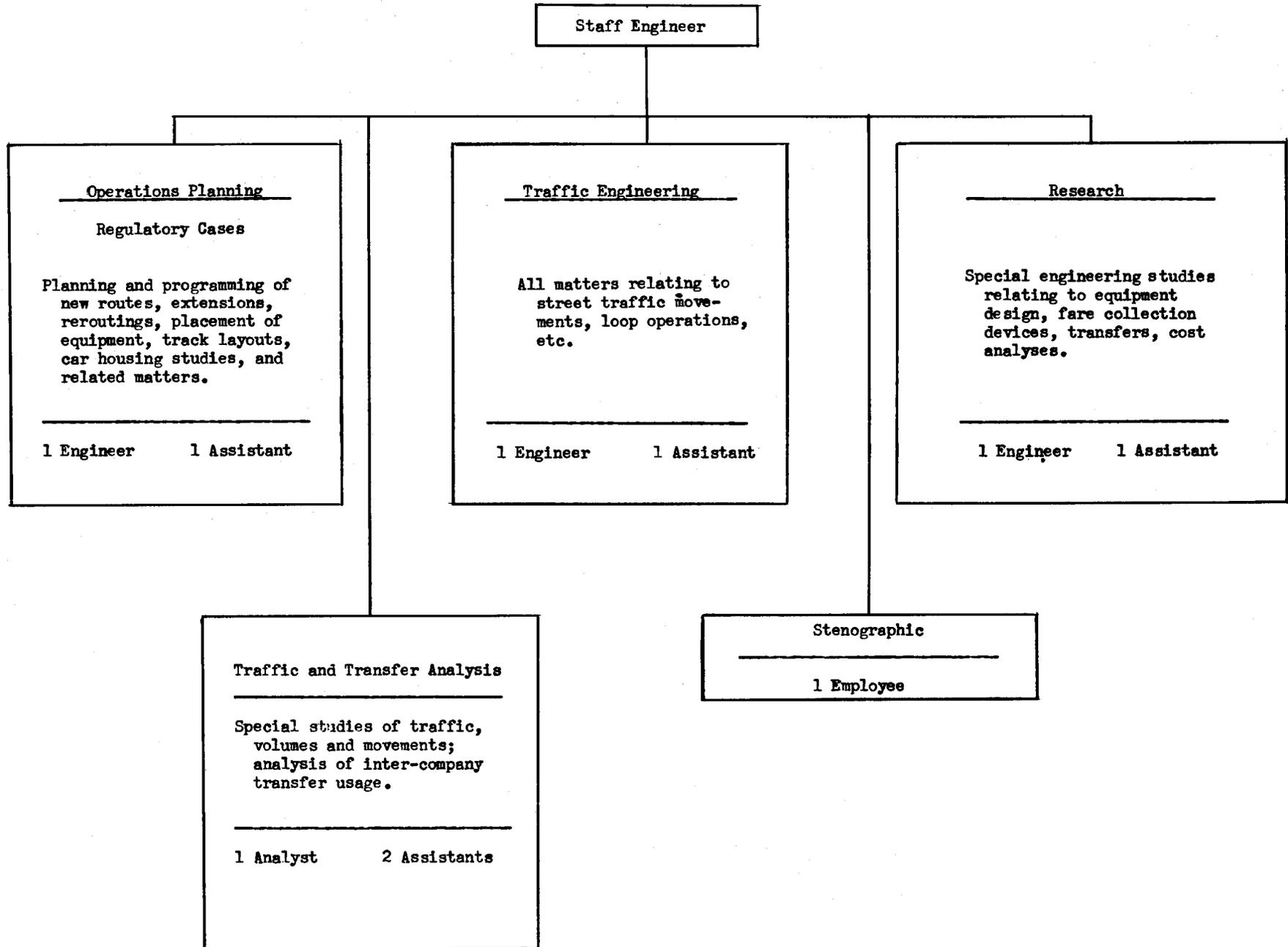
Figures II and III are diagrams showing the functional operations performed by the research departments of two selected transit companies. Figure II depicts the situation for a company serving a population of 3,500,000, while Figure III covers a transit operation in a community of 200,000. Both figures are self-explanatory.

FIGURE III - DIAGRAM OF FUNCTIONAL OPERATIONS PERFORMED BY THE RESEARCH DEPARTMENT



(Company serving a populated area of 200,000)

FIGURE II - DIAGRAM OF FUNCTIONAL OPERATIONS PERFORMED BY THE RESEARCH DEPARTMENT



(Company serving a populated area of 3,500,000)

Operating Companies' Appraisals of the Most Important
Functions performed by the Research Department.

Company respondents to the American Transit Association's 1947 survey of current industry practices in the field of research were asked to designate, in order, the three functions performed by their research departments which they considered to be most important. Disregarding the 1, 2, 3 order and dealing with the entire "spread" of answers among the "top three", it appears that the transit companies participating in the survey consider their most important functions to be in the fields of:

- | | |
|---|------------------------------|
| 1. Cost analyses (including line studies) | 4. Modernization programs |
| 2. Schedules | 5. Traffic surveys |
| 3. Labor relations | 6. Routing studies |
| | 7. Vehicle selection studies |

The term "schedules" occurs frequently in the field of research activities because of the practice of some companies of performing their scheduling and research functions within one department, or of having the research department be responsible for certain phases of schedule activity, such as the summarization and analysis of load and running time checks, and the preparation of service specifications. Students of the problem, who are experienced in urban transit research, suggest that transit managements who have not already made the change give consideration to the advisability of performing these functions within separate departments. The question is by no means academic. Several companies have recently made the change and others are currently considering the advisability of separating these activities in order to increase the value and effectiveness of the work done in each of these important fields.

Miscellaneous Considerations

It is common practice for the management of a transit company to originate most of the projects worked on by the research department. The research department itself is usually free to suggest projects for research and in some cases the other departments of the company are encouraged to suggest research projects. In most cases management approval is required for the undertaking of a specific research project, although in a few instances the head of the research department is authorized to make the selection of projects and to get them under way.

Research reports, resulting from the activities of the department, are commonly routed to top management, with copies to the departments directly or indirectly affected. In a few special instances, copies of research reports are made available to the regulatory authorities.

In most of the larger companies a regular system of "follow-up" is maintained by management or the research department to see that approved findings of the department are put into practice. Progress reports and staff conferences are frequent features of the research program.

Results Obtained

In the American Transit Association survey of 1947 the managements of reporting companies were asked to discuss the results obtained through the use of research by the company. While a few of the participating companies were able to offer a "dollars and cents" measure of the value of urban transit research to them, the common practice was to extol "qualitatively" the importance and value of the research activity, and what it had meant to the company in the solution of specific problems of importance. The great consensus of opinion of those reporting seemed to be that "the company would not like to try to get along without a research department". Coming from the transit industry, which is usually ultra-conservative in its public expression, this comment practically amounts to a hearty recommendation in favor of the research approach.

Examples of the Research Method of Approach in Studies of the
Population Distribution, the Movement of Transit Passengers,
and Related Subjects.

The thing that gives rise to the need for urban transportation, whether private or public, is the presence of people. Without a population, there would be no need for the movement of people. Therefore, as its first fundamental, the alert transit research department endeavors to learn all it can about the population of the area which it serves. First of all, this involves studies of the census data so that the numbers of people and their distribution according to race and sex, age groups, and types of occupational activity may be intimately known, as these elements all have a marked bearing upon the urban riding habit.

It is not sufficient to know the character of the population alone. The successful solution of some of the problems which confront a transit management may be reached only through a knowledge of the distribution of persons and families throughout the area served. The transit research department, therefore, spends some significant portion of its time upon surveys of population density. This usually results in the production of a map or series of maps showing the density of the population and its distribution, or the distribution of family units, according to some characteristic legend.

The presence of a distributed population does not alone stimulate the desire to move from one place to another within the area served. This desire or necessity stems from the various activities of the community, which are closely related to industrial and commercial development, the physical characteristics of the city itself, and the basic family requirements for transportation.

Why do people wish to move about or need to move about in an urban community? First, because some one or more members of the family group must move daily from home to place of earning livelihood and return. Second, because some other member of the family group must take on the responsibility for gathering together the necessities of life, such as food, clothing, and so on. Third, still other members of the family need to move from their homes to schools and other institutions of learning. Fourth, members of the family group want to move from home to church, or to places of recreational, social or cultural activity. Thus, in preparing a population density map for the guidance of students of the transit problem in a given urban community, there should be placed upon such maps, in their correct physical relationship to the residential areas, such items as important factory and industrial areas, schools, churches, parks, and museums, as well as the central business area and outlying, decentralized areas of commercial or shopping activity.

Carrying this study of the fundamentals of the riding habit of a community still further, transit research departments which are "on their toes" give serious attention to the private automobile, which is a severe competitor of the mass transportation system. Studies are made of the density and location of automobile ownership through the use of the state motor vehicle registration lists. With an analysis of this type at its disposal, the research department can show upon its map the family units in any one city square, differentiating by appropriate legend the automobile-owning families from the non-automobile-owning families. Special symbols may also be devised to show the distribution of "two-car" families. The density of automobile ownership gives a rough indication of the level of income in the various sections of the city, although it is not infallible in this respect, since many families own and operate an automobile without economic justification or a real ability to support it. Such a segregation on the map does, however, show the areas of absolute dependence upon transit as distinct from those where certain members of the family may have a choice between a public and a private means of moving about.

Before leaving the subject of population and its distribution throughout the urban area, attention should be called to the importance of studies of the "channels" or "arteries" through which transit vehicles may be operated in deciding upon initial routings or re-routings. For this reason, the background map of the city with the distribution of family units and automobile ownership depicted thereon should also show by appropriate legend the street system and the character of their surfaces.

The preparation of such a background map as that discussed in the paragraphs above may seem to be an expensive and painstaking operation. In the long run, however, it will prove to be a great time and money saver in that all types of problems involving re-routings, extensions of service, and so on, can be studied in the office immediately without the delay and expense of recurring field trips. Once the basic map of the area served has been made, all that is required is an occasional automobile trip through the growing suburban areas to keep the "fringes" of the map up to date. The basic map should, of course, be revised every census year.

All of the foregoing discussion has been devoted to a study of the population of the area served on a "static" basis. The next fundamental point of attack is for the research department to learn all that it can about the movement of people in the community generally. This involves such items as the movement of street traffic including "cordon" counts of vehicles and persons entering and leaving the central business district or other important areas by various modes of transportation. Thus, the transit research man begins to gather together information as to how many people move by various types of vehicles, the time distribution of such movements, and so on. Along with the movement of persons, is of course the question of the movement of vehicles or its opposite condition, namely, traffic congestion. This suggests the desirability of frequent studies of street parking and other conditions which affect the movement of those vehicles through the public streets. Such surveys and the reports growing out of them enable alert transit managements to effectively present the company's side of the picture to the city, police, and state authorities.

Under the general heading of "movements of people" in an urban community the pedestrian should not be ignored. Surveys of pedestrian movements by transit research departments may reveal concentrated streams of traffic flow which might possibly be served by some form of transit operation (perhaps not in an orthodox way) to the convenience of the people involved, and with profit to the company. At the very least, this phase of the movement of people in an urban community should be carefully studied before a decision is reached to ignore it.

Leaving the subject of the movement of people in the community generally, the next fundamental which needs full investigation by the research department is that of the riding habits of the company's own passengers. Studies in this field range all the way from the regular passenger load counts made for routine schedule-making purposes to the more elaborate types of "origin-destination" surveys. Since the business of a transit company is to move its passengers from one place to another within the urban area, it goes without saying that such companies should learn all that they can about the movements of their passengers.

To illustrate the lengths to which it is sometimes necessary and desirable to go in order to obtain complete information about the travel habits of transit passengers, the case history of company "X" will be briefly reviewed at this point.

When company X first established its research department, the group went to work on studies of the travel habits of its passengers. Investigation revealed that the only information of this sort available was that obtained from the regular passenger load counts made for routine schedule purposes. The research department immediately inaugurated the use of "on and off" riding checks, which gave considerably more information about the riding characteristics of the company's various routes than had ever before been known. These data, when properly tabulated, charted and mapped, aided in the solution of many problems during the early stages of the company's modernization program. They provided information about the passenger from the time he boarded a given line until he left that line, but, of course, yielded nothing about his behavior prior to reaching the boarding point on that line, or his behavior after leaving at the alighting point on that line.

As the modernization program progressed, the company also modernized its transfer system, and installed a rather unusual type of transfer which consisted of a number of detachable serially-numbered coupons attached to the body of the transfer. A technique was developed whereby, with some effort, a transfer received on a line of the system on a typical day could be identified and "matched together" by serial number so as to "reconstruct" the ride taken by

a transfer passenger over a series of lines. This special transfer survey, in combination with the "on and off" riding check, widened by a considerable margin the company's knowledge of the travel habits of its patrons. This information, however, was not enough. Frequently the company found itself handicapped by the fact that it did not know specifically where in the city the passenger originated, and specifically where, after leaving the line of final ride, he terminated his journey. Information of this type being vitally necessary to the solution of many re-routing problems with which the company was confronted, the research department developed a type of origin-destination survey through the use of cards which were handed to passengers as they boarded the vehicle and taken up as they left the vehicle. The passenger filled in on this card his exact point of starting, his exact point of destination, his race and sex, and type of fare which he paid, the line or lines which he had ridden prior to reaching the "survey" route, and the line or lines which he planned to ride after leaving the survey route. Such information, when properly tabulated, charted and mapped, furnished a background against which many complex re-routing problems, some of which had plagued the company for many years, were readily solved.

Observation of progress in research throughout the transit industry reveals the fact that transit research departments are continuing to improve and refine the methods by which they study the travel habits of their passengers. One of the most recent "origin-destination" studies on a transit line was conducted through the use of McBee Keysort cards, which required of the passenger no more effort than that of accepting a card as he boarded the vehicle, and turning it in when he left the vehicle. Yet by appropriated marginal punchings made by the observer on the vehicle, it was possible to very quickly set up the summary sheet covering the origin and destination of passengers on the test line.

The Research Program of the American Transit Association

One of the objects of the American Transit Association, as stated in its constitution, is as follows:

"To promote research and investigation to
the end of improving public transportation."

In keeping with this statement, the central objective of the A. T. A. Research Program, which was inaugurated in December, 1945, is to assist the transit industry in the solution of its problems of order that it may provide an attractive service to the public at reasonable rates with adequate compensation for employees and with reasonable profit to investors.

This program of special management research has been undertaken gradually in order that its value to the transit industry may be demonstrated before beginning operations on a "full-scale" basis. It is hoped that the central objective of the program may ultimately be achieved by:

1. Undertaking the direction and conduct of major research projects covering broad phases of the industry's activities in the fields of management, operation and maintenance.
2. Undertaking the conduct of research projects covering specific industry problems in which there is broad general interest.
3. Promotion of individual company research because of its importance to the industry as a whole as well as to the individual operating units.
4. Development of techniques for the guidance of individual member companies in their research activities, thereby providing for uniformity of approach.

5. Collection and dissemination of research material and the exchange of methods, procedures, results and conclusions among the individual companies.
6. Maintaining an interest in and contact with the research activities of other trade associations and groups in related fields of endeavor.
7. Development of information as to the research facilities available both within and without the transit industry.

In its three-year period of special research activity, the Association has undertaken the following projects:

- A general study of franchises,
- Route cost analysis and selection of transit vehicles,
- Transit riding, revenue and fare structures,
- Function and operation of transit research departments,
- Traffic checking and schedule preparation.

* * * * *

Appendix

Fields of Research in Urban Transportation

The following list of the fields of research in urban transit is included for the general information of the student of urban transportation.

- A. Track and Paving
 - 1. Design and Engineering
 - 2. Material Specifications
 - 3. Construction Methods
 - 4. Maintenance Methods
 - 5. Cost Estimates

- B. Distribution System
 - 1. Design and Engineering
 - 2. Material Specifications
 - 3. Construction Methods
 - 4. Maintenance Methods
 - 5. Cost Estimates
 - 6. Current Collection Devices

- C. Equipment
 - 1. Design and Engineering
 - 2. Vehicle Specifications
 - 3. Materials, Parts, Supplies
 - 4. Maintenance Methods
 - 5. Maintenance Procedures

- D. Schedules
 - 1. Passenger Load Checks
 - 2. Running Time Checks
 - 3. Analysis of Data
 - 4. Headway Specification
 - 5. Preparation of Timetables
 - 6. Cutting of Runs
 - 7. Publication and Distribution
 - 8. Frequency of Service
 - 9. Frequency of Stops
 - 10. Schedule Speeds
 - 11. Route Maps
 - 12. System Maps
 - 13. Routings
 - 14. Re-routings
 - 15. Line Riding Characteristics

- E. Power or Fuel
 - 1. Energy Consumption and Costs
 - 2. Fuel Consumption and Costs
 - 3. Fuel Tests and Specifications

- F. Operation in Streets
 - 1. Supervision
 - 2. Communication
 - 3. Dispatching
 - 4. Delays and Road Failures
 - 5. Regularity of Service

6. Quality of Service
7. Dependability of Service
8. Loading and Unloading
9. Racial Problems
10. Fare Collection
11. Change Making
12. Transfer Issuance

G. Street Traffic

1. Traffic Movement
2. Street Parking
3. Traffic Regulation
4. Traffic Surveys
5. Parking Surveys
6. Cordon Counts
7. Improved Use of Streets

H. Labor Relations

1. Increasing Labor Demands
2. Labor Cost Studies
3. Wages and Working Conditions
4. Contract Provisions
5. Retirement Plans
6. Labor Negotiations
7. Arbitration Cases
8. Job Description and Analysis
9. Selection of Personnel
10. Training of Personnel

I. Accident Prevention

1. Accident Analysis
2. Preventive Measures
3. Reduction of Costs

J. Claims Activities

1. Organization
2. Procedures
3. Claims Costs

K. Regulatory Cases

1. Extensions
2. Service
3. Equipment
4. Fares
5. Competitive Operations
6. Valuation and Return

L. Advertising and Sales Promotion

1. Market Surveys and Analyses
2. Selection of Media
3. Meeting Auto Competition
4. Maintaining Level of Riding
5. Increasing Passenger Revenues
6. Promotional Fares and Services

M. Fare Structures

1. Rates of Fare
2. Average Level of Fares
3. Form of Fare Structure

4. Fares vs. Operating Costs
5. Transfer Privileges
6. Transfer Design

N. Costs of Operation

1. Economic Studies
2. Cost Records and Analyses
3. Route Cost Analyses
4. Operating Cost Estimates
5. Reduction of Costs
6. Increased Efficiency
7. Unit Cost Data
8. Cost with Various Vehicles
9. Obtaining Greater "Net"

O. Modernization Programs

1. Long-range planning
2. Abandonment of Rail Lines
3. Rubber-tired Substitutions
4. Selection of Vehicle Types
5. Selection of Vehicle Sizes
6. Financing New Equipment

P. Accounting Practices

1. Fare Collection and Accounting
2. Methods and Systems
3. Surveys and Forms and Records
4. Maintenance of Statistics
5. Budget Preparation

Q. Predictions and Forecasts

1. Population Growth
2. Riding Habit
3. Gross Revenues
4. Operating Expenses
5. Net Revenues

R. Organization

1. Company Organization
2. Of Research Department
3. Of Other Departments
4. Charts, Personnel, Methods

