Technological Momentum, Motor Buses, and the Persistence of Canada's Street Railways to 1940

DONALD DAVIS

Résumé

À une date aussi récente que 1939, 80 p. 100 des voyageurs dans les villes canadiennes empruntaient des tramways et cela, malgré l'apparition des autobus comme concurrents, dès 1915. Cet article étudie les moyens par lesquels les tramways électriques canadiens ont résisté à la concurrence des autobus. L'auteur soutient qu'un facteur majeur de la survie des tramways est l'habileté que démontrait leur propriétaire à obtenir le contrôle du développement des autobus, puis à utiliser par la suite ces derniers pour allonger la vie des réseaux ferrés. Après la Seconde Guerre mondiale, le coût élevé du renouvellement des voies et la baisse du nombre des clients ont favorisé l'investissement dans les trolleybus ou les autobus plutôt que dans la modernisation des réseaux de tramways. Cependant, de grands véhicules desservant des routes immuables assuraient encore du service. Cette approche conservatrice du transport de la part des monopoles urbains de la traction a assuré en fin de compte le triomphe de l'automobile privée en tant que moyen de transport dominant des banlieusards.

Abstract

As recently as 1939, 80 per cent of transit passengers in Canada's cities still travelled on street railways, and this despite the introduction of motor buses as competition as early as 1915. This article examines the ways in which Canadian electric railways contained the challenge from the motor bus. It posits the view that a major factor in the survival of street railways was their owner's success in gaining control over motor bus development, then subsequently using the bus to extend the life of the rail systems. After World War II, the high cost of renewing tracks and declining patronage favoured investment in trolly coaches and/or motor buses rather than in the modernization of the street railway systems. Service was still provided, however, by large vehicles operating on inflexible routes. This conservative approach to transportation on the part of the city traction monopolies ultimately ensured the triumph of the private automobile as the dominant carrier of urban commuters.

As recently as 1939, 80 per cent of transit passengers in Canada's cities still travelled on street railways, an entire generation after the appearance of the first significant motor bus competition in 1915.[1] Compared to the almost immediate disappearance of the horsecar after electric traction began competing with it in the 1890s, the persistence of street railways in the larger Canadian cities into and beyond World War II requires some explanation. However, only for Toronto – the lone Canadian city where trams survived into the 1960s – has one been offered. It has focussed on what made the Toronto system distinctive: its compactness, its high ridership, its avoidance of unprofitable suburban routes until the mid 1950s, its use of interurban routes to cross-subsidize city service and, more generally, the superiority of its management. Oriented towards explaining Toronto's uniqueness, this research cannot explain, except by inference, the persistence of trams elsewhere in Canada.[2]

As a first step towards a more general explanation of the tram's survival into the 1940s, this article examines the ways in which Canadian electric railways contained the challenge from the motor bus. It does not offer a complete answer to the question of the electric railway's persistence; rather it focusses on the role that "technological momentum" plays in the persistence of an old technology, which street railways were in 1915. Its thesis is simple: that a major factor in the survival of Canada's street railways after 1915 was their success in gaining control over motor bus development and their subsequent use of the bus to extend the life of the rail system.

Technological Momentum

As the concept of technological momentum provides the intellectual framework for this piece, it merits brief discussion before proceeding to the analysis of street railway persistence and motor bus development before World War II. The concept derives from the work of Thomas P. Hughes on the electrification of Western society. He concluded that large technological systems "have a characteristic analogous to the inertia of motion in the physical world." They derive this conservative momentum, or power of trajectory, from – to use John Staudenmeier's terminology – the "maintenance constituency" created by the system itself as it matures, becoming "embedded in the social fabric." This constituency consists, Staudenmeier says, of,

> *all the individuals, groups, and institutions that have come to depend on the design [of the technology] and consequently have adapted to its constraints. Because they both profit from and depend upon it they maintain its momentum in society and become a primary source of its power to affect future technological and societal directions.*

The sources of system persistence include, then, not merely the "vested interests, fixed assets, and sunk costs" of concern primarily to managers of the system, but also the adaptations made by those served by the system and by those, like municipal governments, who have based their fiscal and regulatory regimes on a presumption of system durability.[3]

Self-interest generates momentum. Also important, however, are the cultural adaptations, the changes in mentality induced by the system. The most important of these, so far as street railways were concerned, was the value North Americans had come to place on the idea of the system itself. The "search for order" after 1870 had led, as Joel Tarr and others have remarked, to rejection by urban elites of the "messy decentralized and labor-intensive technologies of the preindustrial city" in favour of the order and control offered by centralized, hierarchical, capital-intensive systems. By the time the motor bus challenged electric traction, the economic benefits associated with systematization had thoroughly infused North American culture with its values and priorities, of which the most important for mass transit was its emphasis on efficiency as the appropriate test for new technologies.[4]

The ability of the practitioners of conventional technology to determine what tests a new, alternative technology must pass to qualify for societal adoption is also, as Hugh Aitken has observed for radio, an important source of technological momentum. New systems are often "judged to be less efficient than the system" they challenge because they are less developed, still incomplete, and because the "standards of performance by which the new system is appraised have been worked out in terms of the jobs that the old system has done and the criteria especially relevant to those jobs." As Edward Constant has pointed out, since alternative technologies tend to "... exhibit their greatest virtues along different dimensions – efficiency versus speed, for example," the power of old technologies to dictate performance criteria for new ones is a fundamental inertial force in any society.[5]

The Onset of Buses

With these basic notions in mind, let us examine the process by which the technological momentum of Canada's street railways empowered them to shape motor bus technology to aid their own survival. The analysis begins in 1914–15 with the onset of significant bus competition. The bus, then commonly known as a jitney (a sobriquet derived from west coast American slang for a five-cent coin), did not generally have the operating characteristics later seen as central to motor bus technology. First, the jitney was considerably smaller than subsequent transit buses; it was typically a Ford Model T touring car modified to handle between five and twelve passengers. Second, it generally operated as a hailed-ride, route taxi; in other words, it had neither a set schedule nor fixed stops. About 3800 motor vehicles with these characteristics operated as jitneys in Canada during the summer of 1915; that was one out of every 25 motor vehicles in the country.[6]

The popularity of the new technology varied considerably from one community to the next, but it generally fared best in Vancouver, Victoria, Hamilton, London and Toronto, cities with a relatively mild climate (jitneys were normally open vehicles), paved roads and an

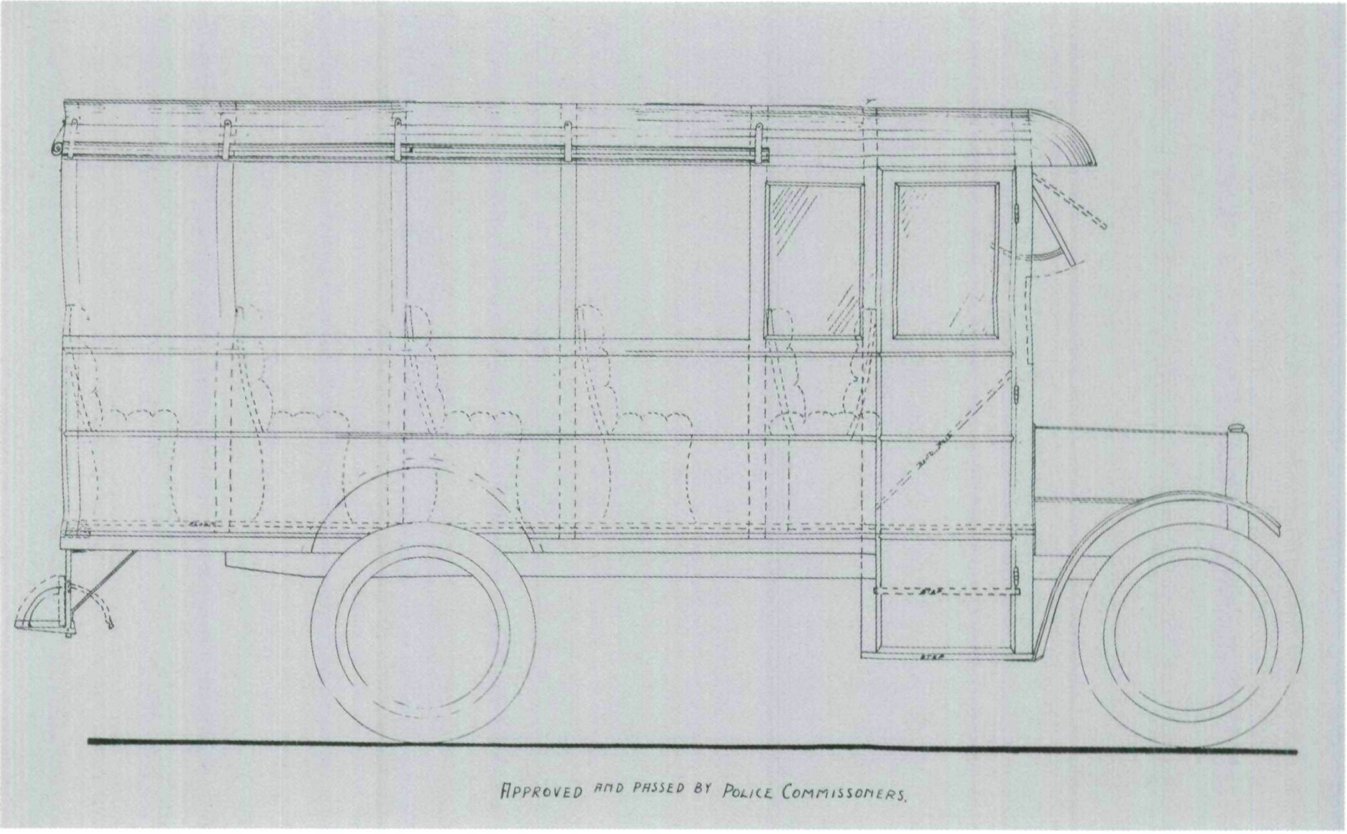

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Fig. 1
Although most jitneys were owner-operated, there were abortive attempts to organize jitney corporations. Promoters of one such venture in Toronto offered this blueprint to show that 12–16 people could fit onto a Model T Ford chassis. (City of Toronto Archives)

unpopular tram system. The number of jitneys also fluctuated with local employment conditions because the owner-operators typically came from businesses – the skilled trades or real estate sales – that were more lucrative than bus-driving in boom times. The western depression after 1913 thus helps to explain the high incidence of jitneys in frigid Winnipeg and Edmonton (see Table 1 for the breakdown by city).[7]

Wherever hard times spurred a hundred or more motorists to swarm into the trade, the jitney bus became a dangerous competitor for it could then compete with the street railway in frequency of service, at least on the principal thoroughfares, while operating at speeds 40 to 50 per cent faster than the 8.5 to 10.5 miles (14 to 17 kilometres) per hour achieved by most urban railways of the era. The fastest speeds were achieved by the smallest jitneys since the bus, as its carrying capacity grew, became more awkward in traffic and prone to longer and more frequent stops to take on and to discharge passengers.[8]

It was the small bus – the modified Ford touring car – that posed the greatest threat to electric traction for it was superior in three ways:

Table 1: Jitneys, maximum number reported by Canadian city, 1915

No. of jitneys	*Cities*		
1–25	Belleville	Berlin	Calgary
	Esquimalt	Fort William	Halifax
	London	Montreal	New Westminster
	Oakville	Oshawa	Ottawa
	Owen Sound	Quebec	Regina
	Saint John	Saskatoon	Sherbrooke
	Sudbury	Thorold	Vernon
75–100	Edmonton		
120–150	Victoria		
650–700	Hamilton	Vancouver	
>800	Toronto	Winnipeg	

Sources: John Knowles, *The Sudbury Streetcars* (Sudbury, 1983), 8; *Canadian Railway and Marine World* June 1915 – March 1916 *passim;* Archives of Ontario, Oshawa Council Minutes, 23 June 1915; *Canadian Motorist* 2 (July 1915): 216, 246; Hamilton *Times,* 10 May 1915; Vancouver *Daily Province,* 13 June 1917; Toronto *Globe,* 24 Nov. 1915; Calgary *Daily Herald,* 22 May 1915.

the fastest mode of public transit, touring cars also offered the shortest headways (the most frequent service) on the routes where they concentrated and they could be persuaded to deviate a block or two from their routes to give commuters something akin to door-to-door service. They also permitted commuters to segregate themselves according to class, race, sex and tobacco usage.[9] And all this for five cents, the standard cash fare on Canada's street railways. It is not surprising, then, that jitneys increased the riding habit (rides per capita) in the cities in which they flourished by attracting walkers, auto owners and others who had avoided the trams.[10]

Needless to say, street railway managers did not stress the importance of speed, frequency, versatility and ridership appeal in their assessment of motor bus technology. Rather, they argued that public transit had to be judged in terms of its reliability and efficiency. By both standards jitneys were substandard: notoriously unreliable, their numbers fluctuated depending on the day of the week, the season and the weather. As open cars, jitneys lost much of their appeal on blustery days and so stayed home. Muddy roads deterred them while a blizzard could keep them off the streets for two or more days since street railways typically did the only ploughing. They understandably took the opportunity to blockade their competition with snow.[11]

The Jitney's Economic Inefficiency

It was not the jitney's unreliability that doomed it politically, however, but its *inefficiency.* As Samuel Haber has shown for the United States, North Americans worshipped "efficiency" in the 1910s; the requirement for any new technology to be as "efficient" as the one it sought to supplant provided the street railway with most of its inertial momentum before World War II. The test of efficiency was sometimes expressed in physical terms – in the amount of energy or street space needed to transport a passenger – but usually it focussed on the bottom-line: to warrant survival, jitneys had to be as economically efficient as the tram.[12]

At first, street railways hoped to prove that the jitney was so "flagrant a violation of all economic laws" that it could not generate sufficient revenue to pay for adequate depreciation and interest on capital. However, their own research (much of it published) found that jitneying was economically viable over the long-haul. The best data came from Vancouver where B. C. Electric Railway secretly operated three Model T Fords as jitneys during the winter of 1914–15; after depreciation, interest and taxes, these had net revenues of $918 a year (prorated, see Table 2 for additional information), an average manufacturing wage.[13]

In many cities, the jitney could support an owner-operator who worked out of his own home, kept his own books, and did his own maintenance and cleaning. It could not generate sufficient revenue to pay for either a second driver or the normal overhead costs of a corporation, however. It could not, in other words, underwrite the managerial hierarchy necessary to operate it as part of a centralized, coordinated system. Traction managers, therefore, had no interest in it; to them it was a retrograde technology incompatible, not only with the persistence of their own rail networks, but with "system" itself. The managers were not alone, of course, in identifying systematic management with the corporate form: the well-publicized failure of jitney corporations in several American cities in 1915 convinced many North Americans, especially in the media, that the technology itself had failed. Certainly these bankruptcies and the underlying economic marginality of the jitney ensured that the investment community had more interest in preserving the old technology than in underwriting the new.[14]

The economic inefficiency of the jitney also assured the street railways and allied investors of the votes they needed to suppress it. A small

Table 2: Balance Sheet, Traction-operated jitneys, Vancouver, 1915

Cost per vehicle-mile	
Motive power	1.24¢
Maintenance	1.70
Running costs	2.94
Depreciation ($250/year)	0.83
Liability insurance (bond)	0.67
Taxes, license fees	0.17
Interest at 6 per cent on $500	0.10
Total costs (omitting wages)	4.71
Revenues per vehicle-mile	7.77
Net earnings per vehicle-mile available for operator's wages.	3.06¢
Operator's net earnings per year, assuming 30 000 miles (48 000 kilometres) a year	$918.00

Source: UBC, W. G. Murrin, "Report of Operating Costs of Autos in Jitney Service," 16 March 1915.[44]

bus could subsist on a five-cent fare only by limiting its service to the most profitable routes and hours, what transit companies called the "cream" of the traffic; it could not accept free transfers; and it had to charge more than a jitney for any ride of more than 2.5 miles (4 kilometres). That meant the jitney failed yet another performance test: the ability to maintain the North American tradition of a single, universal fare for the urban area.[15]

Moreover, by drawing off the "cream" of the street railways' business, the jitney also undermined the railway's ability to continue overcharging short-haul riders to subsidize the fares of riders from the middle, suburban zone. Traction companies constantly iterated that they could easily counter the jitney's threat by lowering fares within the inner zone from which the jitney drew the bulk of its ridership. However, there would then be no surplus produced for the "cross-subsidization" of outliving residents who perforce would have to pay the true, marginal cost of their longer journeys. Public transit, in other words, would have to convert to a zone fare system if bus-rail competition was allowed to continue.[16]

Traction companies asserted that Canadians would not accept zone fares, because these would raise the price of long-distance commuting, thus impeding the outward movement of the population and the attendant emptying of inner city slums. This argument had considerable appeal to those groups who benefitted most from cross-subsidization: downtown business interests, especially retailers, and suburban land developers and property owners. Graduated fares would tend to lower the value of real estate both in suburbia and in the downtown core by reducing their mutual accessibility. Although inner city homeowners would have benefitted from a reordering of property values, they lacked the economic and electoral clout of the suburban-downtown alliance. The latter also had the moral authority and zeal that came from defending existing property relations. They had made a good faith investment, they said, and simple justice demanded that government protect it.[17]

Much of the inertial momentum of traction technology thus came from the unwillingness of property holders to permit a rearrangement of real estate values. Their concern for future property values also caused residents of the "streetcar suburbs" to oppose the substitution of buses for their tram service, even when that meant no increase in fares, because they typically regarded the fixed investment in track as their assurance that transit routes were reasonably stable and fixed. As automobiles spread, property values eventually required less of an ironclad guarantee of future transit service; even so, a selling point for trackless trolleys from the 1920s to the 1940s was the investment in poles and overhead wire, for this gave "a greater impression of permanence" than did the mere designation of a motor bus route.[18]

Municipal Regulation

Pressure from downtown businesses and from suburban voters pushed municipal politicians towards strict regulation, if not suppression, of the jitney. Politicians also did not want to see the city's tax regime altered. Traction corporations had proved easy prey to municipal tax collectors: they were unpopular monopolies that needed the ongoing co-operation of city council to protect their heavy fixed investment in rail, overhead and specialized cars. Under constant threat of a municipal takeover, and knowing full well that its assets could not easily be moved to another locale, the traction corporation in each city had shared its monopoly profits with its host community through a tax on gross receipts, a tax on its cars or track, and by assuming the cost of paving and clearing snow from the streets around its tracks. In 1916 the tax on its gross earnings cost Vancouver's street railway $38 249 in Vancouver alone.[19]

Vancouver's jitneys, on the other hand, paid only $8100 in taxes that year. There, as elsewhere, jitneys could not be compelled to pay traction-like taxes, for they had no monopoly profits to share. As petty enterprises they did not constitute as politically inviting a tax target as a corporation. Their size also made them more expensive to regulate because additional license inspectors and traffic constables had to be hired. Even if government regulation could somehow have fashioned them into a corporate monopoly, the resulting firm would have been far less susceptible than electric railways to municipal pressure and political blackmail because most of its fixed assets would have consisted of motor vehicles, readily moved to a new jurisdiction if the host community became more greedy. Unwilling to accept the fiscal implications of the demise of the street railway monopoly, municipal politicians became an important part of its maintenance constituency.[20]

This line-up of forces would probably have been sufficient to ensure protective legislation for the street railway. In addition, traction had the support of elite motorists and their auto clubs, both anxious to eliminate a competitor for road space;[21] of trade unionists who stood in solidarity with beleaguered street railway employees;[22] of moral reform leagues concerned about the possibilities of undue familiarity between the sexes in the back seat of a jitney;[23] and of all those, a socially disparate group, who believed that past regulation of the trams entailed an implicit contract to preserve them (or else who feared retaliation by capital markets).

With so extensive a coalition backing them, by mid 1915 street railways in most communities were able to obtain regulations that, as Ross Eckert and George Hilton have observed for the United States, imposed

> *some special burden on the jitney ... designed to negate one or more of the several aspects of its comparative advantage – that of a relatively speedy, convenient and specialized service – by so greatly raising the cost of operation that entry into the industry would cease and extant jitneys would be left with the choice of either unprofitable operation or withdrawal ... from the industry.*

Politically, it helped the foes of the jitney that street railways already faced comparable restrictions and that proscription accordingly could masquerade as "fairness." That the original regulations had been designed to constrain a monopoly did not prevent their being applied to a competitive situation – clearly a further instance of technological momentum working in traction's favour.[24]

The regulatory ordinances overburdened jitney owner-operators by requiring them to operate the same hours as the tram company; they stripped them of their flexibility by restricting them to fixed routes and by forbidding their use as taxis, delivery cars or sightseeing buses during off-peak hours; they reduced their revenue potential by imposing limits on their passenger capacity and by ordering them away from tram routes and busy downtown intersections. Finally, they dramatically raised their costs by imposing longer, through routes on them and by requiring jitneurs to pay an annual tax of \$5–\$25 per seat to compensate the municipality for reduced revenue from its street railway taxes.

Jitneurs were also required to take out an indemnity bond of \$1000 – \$5000 to insure their passengers in case of an accident. The bond was the most powerful deterrent to jitneying because it cost \$100 – \$250 a year. It was also generally difficult to procure because the old-line insurance companies were unwilling to risk their money on an untried technology in competition with an industry – traction – in which they had often invested considerable sums.[25]

By the autumn of 1915 these regulations had eliminated the bulk of Canada's jitneys; yet in early 1918, five Canadian cities still hosted between 75 and 300 jitneys each. These did provide a living (jitney incomes reported in Vancouver were net earnings, after the payment of the bond and license fee) and were not about to disappear of their own accord. To eliminate these holdouts, between 1918 and 1930, governments found it necessary to award street railways an official monopoly over urban transit. The nature of the gift varied from city to city: in Toronto, for example, the traction company simply received a veto over jitney licenses. The usual Canadian practice, however, was for the city to sign a franchise agreement with the local street railway awarding it a monopoly over public transportation in exchange for concessions on fares, routes and service. By 1930 Canadian street railways had obtained a legal monopoly over public transit in every major city. In Hamilton, Montreal, Toronto and Vancouver they also controlled most of the interurban routes entering the city.[26]

Had early bus competition been better organized and more appealing to corporate capital, the outcome might have been different. The economic marginality and political vulnerability of the jitney version of the motor bus, however, prolonged the life span of Canadian street railways by engendering government regulations that enabled electric railways to dominate bus development in major urban centres.

The Railway's Dominance

Electric railways actually used the bus to prolong their own existence. They were in no hurry to die. First, their managers understandably were emotionally committed to traction and loath to make their own skills obsolete. Second, they had no interest in proving that buses could handle the main traffic flows, because such a demonstration would lessen the value of their rail systems, making it more difficult to obtain either a fair price in the event of a municipal takeover or favourable fares in the event of rate-of-return regulation. Third, because they had not adequately amortized their rail systems, they were determined to run them as long as possible. Any premature

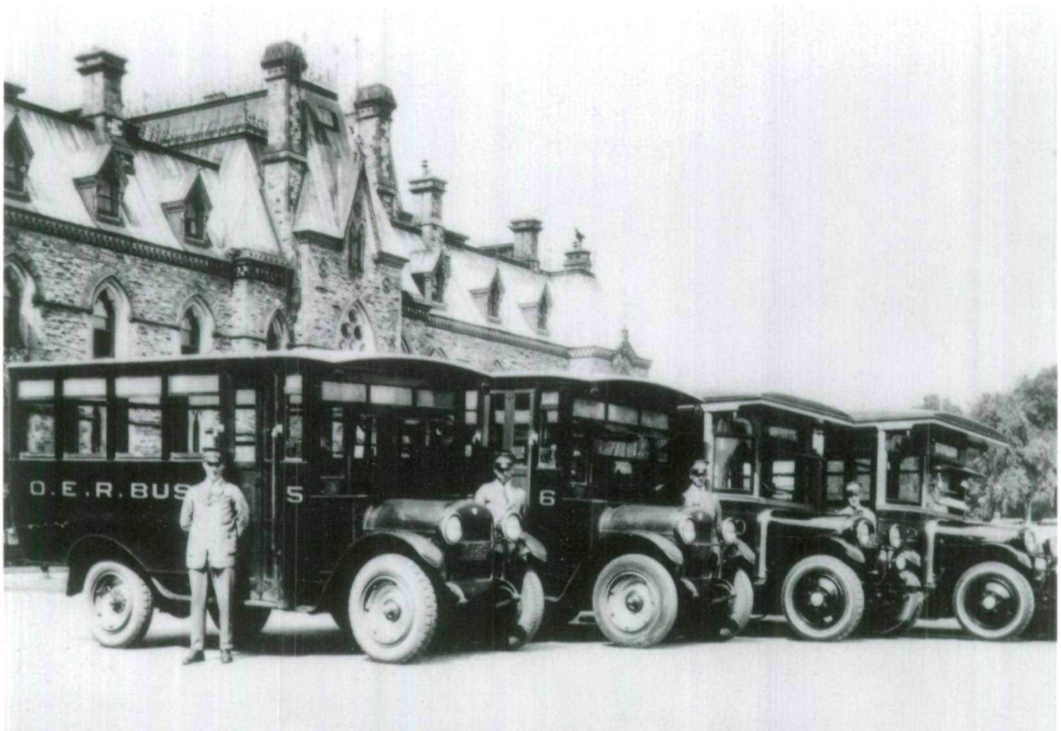

Fig. 2
By the mid 1920s, rail companies had begun to add buses to their service. These buses at first were no larger than the largest jitneys. (City of Ottawa Archives)

move towards bus conversion would have saddled the transit company with a double burden of debt – for the new equipment and for the old.[27]

Fourth and most important, streetcars had lower operating costs than buses well into the 1920s and perhaps into the 1930s. The industry's own data for 1914–16 indicate that the seat-mile costs (total costs including interest and depreciation divided by the number of seats in the vehicle and the number of miles run) of a 20–22 seat motor bus were at least 28 per cent and possibly 68 per cent higher than for the average North American streetcar. The gap in the United States remained in the 30–37 per cent range in 1923–24.[28]

By 1928, however, the gap had vanished in Canada according to the calculations of the bus committee of the Canadian Electric Railway Association. Donald Dewees, a transportation historian, has asserted that American streetcars retained their cost advantage in 1929 (though he provides no evidence for this contention). If true, they had lost it by 1936 because James St Clair's data reveal that a 33-seat motor bus then had a 20 per cent advantage in seat-mile costs over a 50–55-seat streetcar. It would appear, then, that streetcars and motor buses had comparable seat-mile costs by the 1930s.[29]

Yet streetcars had a far superior overload capacity, hence potential earning power. As of 1928, a 33–seat motor bus could only accommodate seven standees, whereas a 42–seat tram could handle as many as 68. Fully overloaded, the tram's operating costs per passenger-mile were less than half those of the bus. It was, consequently, the appropriate vehicle for rush-hour duty and transit companies, then as now, made their equipment decisions with peak service in mind. Although they considered operating different-sized vehicles at different hours to reduce the number of empty seats during the off-peak, they calculated that it was too expensive to keep drivers and equipment in reserve solely for peak service. To keep their costs down at rush hour, especially their wage bill, they operated large-capacity vehicles all day; to fill some of the empty places during off-peak hours, they reduced headways (frequency of service) to the minimum that custom and law permitted. This practice tended to drive away transit customers, but it did prolong the life of street railways.[30]

Deluxe Service and Feeder Routes

The traction companies considered that the motor bus should protect rather than replace the street railway. In the 1920s, they agreed on the following limited use for buses: to provide a deluxe, extra-fare, guaranteed-seating, express service between downtown and certain elite residential districts. Designed to entice the wealthy out of their automobiles, extra-fare or deluxe buses operated in at least nine Canadian cities in the mid 1920s and 1930s. While marginal operations were limited to just one or two routes in each locale, these extra fare buses served the street railways politically by "proving" that even superior service could not entice a sufficient number of automobile owners out of their cars. This conclusion made it psychologically easier for both the transit provider and the host community to accept a stagnant or declining riding habit, thus easing the pressure on transit companies to expand their ridership through more radical innovations such as microbuses with frequent headways.[31]

Deluxe buses also proved the street railways' contention that a responsible transportation corporation could not afford to offer its riders a jitney-like service for the standard transit fare. These extra-fare jitneys for the rich barely broke even, thus appearing to substantiate the railways' claim that jitneying was economically unsound, of interest only to the economically illiterate.

Only a minority of Canada's street railways experimented with deluxe buses; virtually all of them, however, made use of so-called feeder buses to satisfy the demand for increased service in low-density suburban neighbourhoods as cheaply as possible. This demand, if unmet, was liable to spawn new, independent bus companies armed either with a municipal franchise or a certificate of "convenience and necessity" from the provincial government. If these independents procured the right to operate an interurban service between their home base and the central business district of their region, then they could do real damage to a street railway, either quasi-legally by situating their interurban terminal on the boundary of the railway's monopoly zone, or quite illegally by having their interurban buses pick up and discharge riders while travelling through that zone.[32]

Feeder buses were the cheapest method of preventing this type of debilitating competition. Because the territories in question had small populations spread out in single-family dwellings, feeder buses typically lost money, but considerably less than a new street railway would have lost, inasmuch as the latter's cost advantage per seat-mile disappeared at low traffic densities (the point at which most of the seats went unfilled). Feeder buses thus reduced the cost of protecting the street railway's monopoly.[33]

An added benefit of feeder bus operations was their unprofitability. Because most urban buses were being used on these money-losing routes (often with the express purpose of proving these to be unviable), it was easy for transit managers to identify the bus with red ink, and thus to remain loyal to the tram. Throughout the 1920s and 1930s, their trade journals and learned papers at conferences assembled data from across North America to "prove" that the tram had higher net earnings per seat-mile than the bus, even after its initial cost advantage had disappeared. Although the statistics occasionally contained the caveat that street railways served more densely populated areas with a higher riding habit, they nonetheless left the general impression that buses were useful for cutting losses and street cars for making profits.[34]

Feeder buses had one final virtue: they reduced the public's enthusiasm for motor buses. There is clear evidence that the public originally preferred to ride buses, and express buses were especially popular with the residents of outlying districts. Street railways rarely provided this type of service before World War II because it would lure away passengers needed to keep their rail lines solvent. Instead, their feeder operations required a transfer to the rail system for trips of more than a mile or two (1.5–3 kilometres). Commuters – then as now preferring a continuous, uninterrupted journey – usually reacted by demanding rail service, the denial of which left them griping about the inadequacy of the bus.[35]

Bigger, Slower Buses

The motor bus was, in any case, gradually becoming larger and consequently less popular. By June 1939, the average bus in the four largest Canadian systems had more than 28 seats, four times the seating capacity of a standard jitney.[36] More cumbersome in traffic, forced to make more frequent and lengthier stops to take on and discharge passengers, the larger buses were slower buses. By the late 1930s, they had lost their speed advantage over trams. At scheduled speeds of 10–11 miles (16–18 kilometres) per hour, the latter even may have become the speedier mode (transportation experts disagree on this matter), as they had marginally improved their performance since 1915 despite worsened traffic congestion.[37]

Street railways, awakened by the jitney to the public's latent demand for speedy transit, had changed their operating procedures (less coasting, fewer trailers and designated stops) and had purchased a new generation of smaller, one-person cars with improved acceleration, braking and gates for egress and ingress.[38]

Buses, on the other hand, had become slower as they had grown more elephantine – jitneys, it will be recalled, had scheduled speeds of 14–15 miles (22–24 kilometres) per hour. Slower buses were less popular buses: by the late 1930s, some passenger surveys revealed for the first time a preference for riding on streetcars, provided they were of modern design. As options altered, the tram's long-term prospects improved.[39]

It was not, of course, out of a perverse desire to make buses less popular that street railway companies asked bus manufacturers to make them bigger. Their behaviour is easily explained in terms of the economic theory of regulated monopoly. As Harvey Averch and Leland Johnson noted in 1962, the sort of "rate-of-return regulation" that governed transit after the suppression of the jitney creates a bias towards capital-intensive technology (the Averch-Johnson effect), since the fares authorized by the regulators – hence the utility's profit or rate-of-return – depends on the latter's sunk costs. Transit monopolies thus had a financial incentive to maximize their capital costs and to minimize their variable or labour costs, hence the decision to run fewer, bigger buses. Moreover, as Gabriel Roth and Anthony Shephard have observed, as monopolies they did not have to "bear the waiting time of [their] customers." Researchers have found that entrepreneurs in more competitive situations (as in the early jitney era), have opted for smaller buses and more labour-intensive practices.[40]

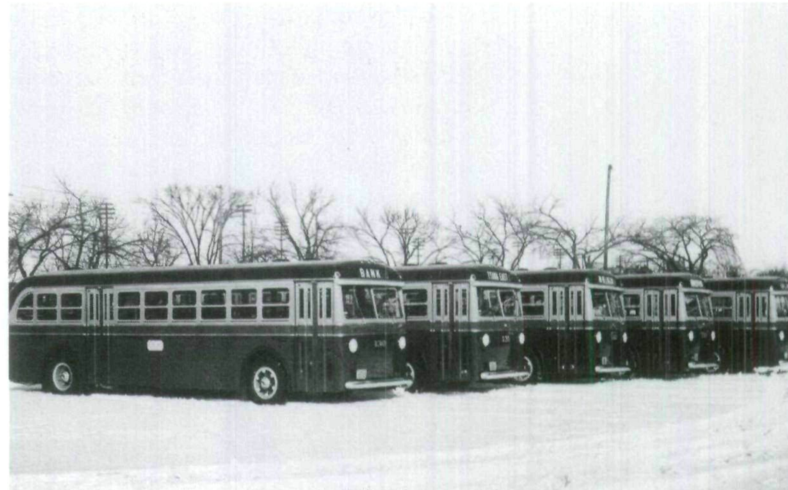

Fig. 3
By 1941, the "street-railway type" bus had been developed: the engine moved to the rear and seating capacity almost doubled.
(City of Ottawa Archives)

The End of Street Railways

Canada's transit monopolies in the 1930s set as their goal the "street railway-type bus," that is, a large one with the operating characteristics (for example, inflexible routes) and cost profile of a tram – a streetcar "operating on pavements instead of on rails," as one transit journal expressed it.[41] Once they had obtained a "street railway-type bus," the streetcar's days were numbered. However, what really ended the traction era in Canada was the obsolescence of the continent's track, thanks to the passage of time and the development of heavier, more powerful streetcars. Canada's electric

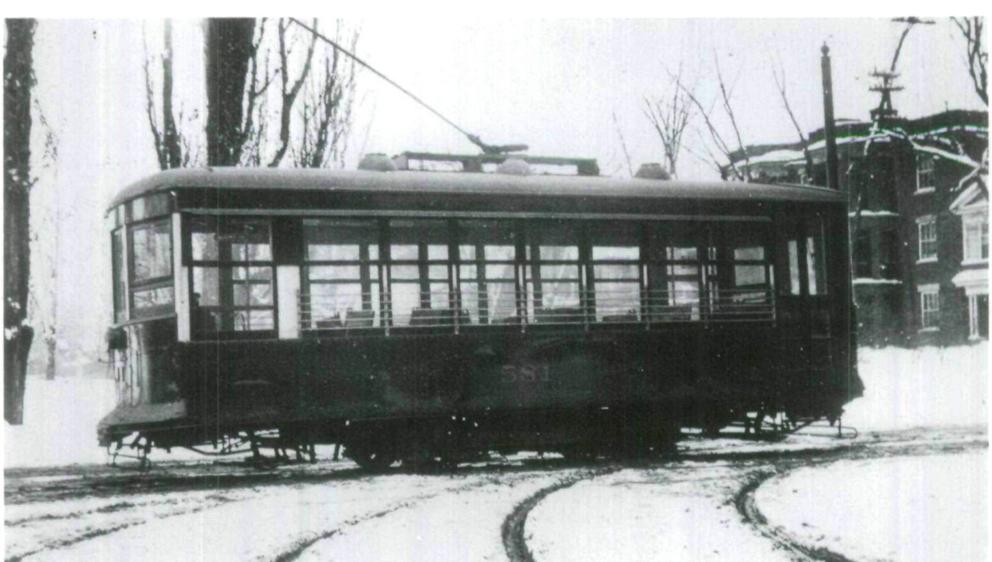

Fig. 4
Meanwhile, railways had experimented with smaller, one-truck streetcars of the "Burney" type in an attempt to give to traction the speed and loading times being gradually taken from the motor bus. The cars, however, gave too rough a ride to be popular.
(City of Ottawa Archives)

railways had initially laid their track more or less simultaneously between 1890 and 1910. After it had reached the end of its 40–50 year life-span, they pulled it up more or less simultaneously to switch to motor bus or trolley coach operation.[42]

Higher standards and thicker pavements (both a response to the automobile) meant that any new track would be much more expensive, even allowing for inflation, than the track it replaced. Because the seat-mile costs of both the motor bus and the trolley coach were already lower than those of the tram by 1945 (respectively by 14 and 40 per cent, according to James St Clair's calculations for the United States), concern for the bottom-line decreed rail abandonment. To be sure, streetcars retained a superior revenue potential thanks to their overload capacity, but transit executives correctly anticipated a decline in patronage after the war, and they were more intent on reducing their risk than in expanding their capabilities. The overall trend in transit ridership had been downward since the 1920s; it did not make economic sense, then, to make an investment in track and a new roadbed that would take 40 to 50 years to amortize. The remarkable persistence of Canada's street railways thus came to an end in the 1950s. Toronto's heavy investment in new tracks after the municipalization of its lines in 1921, plus its purchase of a fleet of ultra-modern PCC streetcars in the 1930s, would appear to account best for its exception to this rule in the 1960s.[43]

Elsewhere, technological momentum was insufficient to save Canada's street railways. Yet, for decades, it had enabled them to shape the development of the motor bus to ensure that the traction industry's approach to public transit would endure in the form of the "street railway-type" bus running on an inflexible route, one often dating from the horsecar era. In the meantime, whatever possibilities the motor vehicle ever had for revolutionizing North American public transit and for attracting new capital to it had been expended on the lost cause of preserving the trams. Ironically, the conservatism of Canada's approach to public transit ensured the triumph of the private automobile and the eventual radical restructuring of the nation's cities around its use.

NOTES

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3. Thomas P. Hughes, "The Evolution of Large Technological Systems," *The Social Construction of Technological Systems,* Wiebe Bijker and Trevor Pinch, eds. (Cambridge, Ma., 1987); Hughes, *American Genesis: A Century of Invention and Technological Enthusiasm, 1870–1970* (New York, 1989), 460–461, 470; John Staudenmeier, *Technology's Storytellers* (Cambridge, Ma., 1985), 195–196.
4. Joel A. Tarr, "Sewerage and the Development of the Networked City in the United States, 1850–1930," *Technology and the Rise of the Networked City in Europe and America,* Joel A. Tarr and Gabriel Dupuy, eds. (Philadelphia, 1988), 159.
5. Hugh G. J. Aitken, *The Continuous Wave* (Princeton, N.J., 1985), 10–11; Edward W. Constant II, *The Origins of the Turbojet Revolution* (Baltimore, 1980), 18–22.
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Electric Railway Company (North Vancouver, 1986), 127; *Electric Railway Journal* (hereafter *ERJ*) 45 (27 March 1915): 110; The Fidelity Trust Co. (Baltimore), *The Evolution of the Jitney Bus* (10 May 1915), 5; University of British Columbia, The Library, Special Collections, M75, B.C. Electric Papers, Box 38, File 1545 (hereafter *UBC*), G. Kidd to M. Urwin, 27 Nov. 1914; City of Vancouver Archives, Matthews Topical Files, Add. Mss. 54, J. S. Matthews, "The Introduction of Jitneys," (10 Jan. 1945).

8. Henry W. Blake and Walter Jackson, *Electric Railway Transportation* (New York, 1924): 63–65; Vancouver *Province*, 16 Feb. 1915.
9. *Canadian Railway and Marine World* (hereafter *CRM*), Sept. 1915: 353; Toronto Police Museum, Minutes, Board of Police Commissioners, 21 Sept. 1915; *Saturday Night* (Toronto), 3 July 1915: 10; Carlos A. Schwantes, "The West Adopts the Automobile: Technology, Unemployment, and the Jitney Phenomenon of 1914–1917," *Western Historical Quarterly* 16 (1985): 319; *Canadian Motorist* (hereafter *CM*), 2 (July 1915): 216; 2 (Aug. 1915): 322; *CRM*, December 1913: 594; May 1915: 189; September 1924: 471; April 1926: 209; *UBC* letter, G. Kidd to M. Urwin, 16 Jan. 1915.
10. *CERA*, 21–22 June 1915: 111, 115; *Jitney Bus* 1 (May 1915): 48; Ross Eckert and George W. Hilton, "The Jitneys," *The Journal of Law and Economics* 15 (Oct. 1972): 296; J. C. Thirwall, "The Jitney Problem – I," *Scientific American*, Supplement No. 2069, 90 (28 Aug. 1915): 143; Provincial Archives and Records Service, British Columbia, B.C. Electric Papers, Add. Mss. 494 (hereafter *BCE*), "Statements Presented in Favor of the Jitney Service," 2 Aug. 1917; *CRM*, October 1926: 552; Wilcox, *Analysis of the Electric Railway Problem* (New York, 1921), 668.
11. *ERJ* 46 (4 Sept. 1915): 399; 47 (11 March 1916): 512.
12. Samuel Haber, *Efficiency and Uplift: Scientific Management in the Progressive Era* (Chicago, 1964), Intro.; L. R. Nash, *The Economics of Public Utilities* (New York, 1925), 387; *The Financial Post of Canada*, 15 May 1915.
13. *UBC*, W. G. Murrin, "Report of Operating Costs of Autos in Jitney Service," 16 March 1915; Craig Heron, *Working in Steel* (Toronto, 1988), 92. Other Canadian cities reported 10 per cent lower revenues: *CERA*, 21–22 June 1915: 107–117; Toronto *World*, 25 June 1920; *Manitoba Free Press*, 29 March 1915; City of Toronto Archives, RG 2 B3, Board of Control Records, Toronto Jitney Assoc. to City Editor, Globe Printing Co., 21 June 1915; Hamilton Times, 28 May 1915; *The Christian Guardian* 86 (14 April 1915), 4.
14. The necessity of corporate organization of public transit was especially stressed by the Shortt inquiry into British Columbia's transit situation in 1917: see National Archives of Canada, MG 39, D101, Adam Shortt Papers, Vancouver *Daily Province*, 26 Nov. 1917, *Industrial Progress*, December 1917, Vancouver *Daily Sun*, 10 Dec. 1917; Vancouver *World*, 26 Dec. 1917.
15. *ERJ* 45 (17 March 1915): 612; 46 (10 July 1915): 82; 47 (24 June 1916): 1184; *CRM*, October 1922: 533; Doolittle, "Economics of Jitney," 686.
16. *Transportation Journal* 81 (15 Sept. 1937): 346–347; *ERJ* 45 (20 Feb. 1915): 397; 45 (8 May 1915): 910; 47 (27 May 1916): 1019; 47 (24 June 1916): 1185; *Financial Post*, 15 May 1915; George Hilton, "The Rise and Fall of Monopolized Transit," *Urban Transit: The Private Challenge to Public Transportation*, Charles Lave, ed. (Cambridge, Ma., 1985), 35.
17. *CRM*, June 1915: 230; *CERA*, 21–22 June 1915: 113; 6–8 June 1928: 96; City of Toronto Archives, Financial Statement of Toronto Transportation Commission, 31 Dec. 1922, 7; Vancouver *Daily Province*, 20 June 1917; Ottawa *Morning Journal*, 9 Sept. 1924.
18. *CERA*, 21–22 June 1915: 113–114; *CRM*, November 1926: 595, July 1938: 356; R. D. McKenzie, *The Metropolitan Community* (New York, 1933), 286–287.
19. *CRM*, July 1915: 272, Dec. 1916: 501; *ERJ* 45 (3 April 1915): 692; *UBC*, "Notes for City Council Enquiry Re Jitney Regulations," 11 Nov. 1916.
20. *UBC*, "Notes for City Council Enquiry Re Jitney Regulations," 11 Nov. 1916; Hamilton *Times*, 28 May 1915. Jitneys also increased the cost of pavement maintenance: see *CRM*, December 1916: 501; City of Toronto Archives, RG2 B3, Box 98, Board of Control Records, letter, Chief Constable to City Clerk, 4 May 1915.
21. *UBC*, W. G. Murrin to G. Kidd, 4 Jan. 1915; CAA–Toronto Archives, Minutes, Board of Directors, Ontario Motor League, 22 April 1915; City of Toronto Archives, RG2 B3, Box 98, Board of Control Records, W. G. Robertson to G. Gregory, 27 April 1915; Minutes, Toronto Board of Control, 4 May 1915, #1318; *CM* 4 (Aug. 1917): 426; 9 (Jan. 1922): 20; *Canadian Municipal Journal* 13 (June 1917: 294.
22. *Canadian Municipal Journal* 11 (March 1915: 96; *CM* 2 (July 1915): 216; *The British Columbia Federationist*, 5 Feb. 1915: 3.
23. *UBC*, "*Jitney Competition*. Notes of Meeting at City Hall with Fire and Police Committee," 20 Nov. 1916; *Manitoba Free Press*, 9 Feb. 1918; *CRM*, September 1915: 353; *Le Devoir* (Montreal), 15 April 1915; Hamilton *Times*, 30 April, 25 June 1915; Saskatoon *Phoenix*, 12 July 1915.
24. Eckert and Hilton, "Jitneys," 309–320; *UBC*, R. Horne-Payne to R. McBride, 20 May 1915, "Notes for City Council Enquiry Re Jitney Regulations," 11 Nov. 1916; *CERA*, 21–22 June 1915: 111, 116; *CRM*, December 1925: 627.
25. Davis, "Competition's Moment," 110.
26. *CRM*, July 1928: 437; *ERJ* 62 (3 Nov. 1923): 790.
27. *CRM*, July 1938: 356; *ERJ* 47 (8 Jan. 1916):

75–76; Wilson, "Some Problems," 117; *CERA*, 6–8 June 1928: 100.

28. *Proceedings*, American Electric Railway Assoc., 10–12 October 1916: 234–241; *ERJ* 46 (24 July 1915): 151; 47 (24 June 1916): 1184; 58 (29 Oct. 1921): 770; 62 (25 Aug. 1923): 289; *CM* 3 (July 1916): 245; Murray W. Latimer, "The Motor Bus Situation in 1925," *Harvard Business Review* 10 (January 1926): 167–168.
29. *CERA*, 6–8 June 1928: 60–61; 9–10 June 1932: 38–42; London City Hall, Minutes, Special Committee on Bus Transportation, Appendix "A," Report of White Co., 30 Oct. 1928; Wilson, "Some Problems," 94; Donald N. Dewees, "The Decline of the American Street Railways," *Traffic Quarterly* 24 (October 1970): 570; David J. St. Clair, *The Motorization of American Cities* (New York, 1986), 41, 49.
30. *CERA*, 6–8 June 1928: 65–66; 17–19 September 1930: 40–41; 9–10 June 1932: 48; 8–9 June 1933: 40; Blake and Jackson, *Railway Transportation*, 56–57; C. Woody Thompson and Wendell R. Smith, *Public Utility Economics* (New York, 1941), 543; *Transportation Journal* 82 (July 1938), 258–259.
31. *ERJ* 45 (17 April 1915): 796; 56 (24 July 1920): 161; 62 (13 Oct. 1923): 615; 64 (26 July 1924): 112; 75 (Jan. 1931): 35; *CERA*, 2–4 June 1926: 53–55; *CRM*, July 1926: 381; March 1928: 163; April 1930: 241–243; June 1931: 405; *CM* 13 (August 1926): 335–336; *Bus Transportation* 4 (April 1925): 204; 11 (Nov. 1932): 467. Cities with extra fare (in zones where trams charged the standard fare) or deluxe buses included Calgary, Hamilton, Montreal, Moose Jaw, Sherbrooke, Toronto, Vancouver, Windsor, Winnipeg.
32. *CRM*, April 1922: 202; April 1924: 188; October 1924: 514; December 1931: 781; July 1935: 318; Ottawa *Citizen*, 11 Aug. 1923; London City Hall, Minutes, Special Committee on Street Railway Matters, 20 Sept. 1928, E.29.
33. *CRM*, September 1927: 552; November 1929: 718; February 1934: 74; March 1936: 119.
34. Walter Jackson, "The Motor-Coach De Luxe in City and Country Use," *National Municipal Review* 15 (April 1926): 191.
35. Samuel Wyer, *Fundamentals of Transportation Problems* (Columbus, Oh., 1928), 46, 52; *CRM*, February 1926: 92; April 1926: 207; July 1928: 438; London City Hall, Minutes, Special Committee on Bus Transportation, 12 July 1928; Gerald Alfred Onn, "The History of the London Street Railway Company (1873–1951)," M.A. Thesis, University of Western Ontario, 127–134; J. M. Mills, *Cataract Traction: The Railways of Hamilton* (Toronto, 1971), 42; *CM*, September 1920: 754; October 1926: 421; *CERA*, 27–30 June 1923: 119, 6–8 June 1928: 61; *ERJ* 56 (16 Oct. 1920): 792–793, 795; Colin Hatcher, *Stampede City Streetcars: The Story of the Calgary Municipal Railway* (Montreal, 1975), 224; Vancouver Town Planning Commission, *A Preliminary Report upon Transit* (29 June 1945), 15.
36. *CRM*, March 1938: 137; June 1939: 305–310.
37. Francis Thompson, *Electric Transportation* (Scranton, Pa., 1940), 43–44; *CRM*, February 1934: 74; *Transportation Journal* 81 (15 Sept. 1937): 346–347, 484.
38. *ERJ* 54 (11 Oct. 1919): 35–36; 74 (14 June 1930): 361; 75 (January 1931): 34–38; Jackson, "Motor-Coach De Luxe," 191. The improvements made street railways more profitable as faster route speeds lowered their passenger-mile costs. See *ERJ* 56 (2 Oct. 1920): 660–661.
39. For the unpopularity of buses by the late 1930s see St. Clair, *Motorization*, 171; Glenn Yago, *The Decline of Transit: Urban Transportation in German and U.S. Cities 1900–1970* (Cambridge, Eng., 1984), 64; Thompson and Smith, *Utility Economics*, 532.
40. Gabriel Roth and Anthony Shephard, *Wheels Within Wheels: Private Alternatives to Public Transport* (London, 1984), 39; David A. Hensher, "Productive Efficiency and Ownership of Urban Bus Service," *Transportation* 14 (1987), 209–225. On Averch-Johnson see their "Behaviour of the Firm under Regulatory Constraint," *American Economic Review* 52 (1962), 1052–1069; and Fred Westfield, "Innovation and Monopoly Regulation," *Technological Change in Regulated Industries* William M. Capron, ed. (Washington, 1971), ch. 2.
41. For the traction industry's efforts to build a "street railway-type" bus and the influence of the electric rail paradigm on bus development see *CRM*, December 1925: 628; January 1928: 42; July 1937: 359–360; Thompson, *Electric Transportation*, 24–25; *CERA*, 6–8 June 1928: 60, 150.
42. Dewees, "Decline of Street Railways," 571–572, 575–576; Colin K. Hatcher, *Saskatchewan's Pioneer Streetcars: The Story of the Regina Municipal Railway* (Montreal, 1971): 44–48; Norman D. Wilson, *Report on Halifax Transit* (5 Sept. 1946), 4–6; John E. Baker, *Winnipeg's Electric Transit: The Story of Winnipeg's Streetcars and Trolley Busses* (Toronto, 1982), 83, 87.
43. Paul Barrett, *The Automobile and Urban Transit: The Formation of Public Policy in Chicago, 1900–1930* (Philadelphia, 1983), 212; Dewees, "Decline of Street Railways," 572; St. Clair, *Motorization*, 49; Davis, "Private Ownership," 64–65; John Bromley and Jack May, *Fifty Years of Progressive Transit* (New York, 1973), ch. 4–5.
44. The experiment lasted only two winter months. These calculations assume, conservatively, that revenues and expenses would have been the same during the more favourable spring and summer months and that the Vancouver jitneys' annual charges of $50 in license fees and taxes and $200 for liability insurance (a high estimate) would have been distributed over 30 000 miles (48 000 kilometres) (jitneys in Canada running an average of 100 miles [160 kilometres] a day, 300 days a year). Depreciation assumes a $500 purchase price and a two-year life for the vehicle.