

link Pioneer Square on the south end of the central waterfront with Pier 70 on the north.

Getting these going proved to be almost as difficult as were the trackless trolleys, but again there was no shortage of support. When, in 1981, it looked like the Waterfront Trolleys might have to be abandoned, area businesspeople volunteered to tax themselves to finish the project.

Metro's plans for the end of this decade call for adding half again as many trolley routes to the city. Even as the regional power situation darkens, trolleys that today require less than 0.1 of 1 percent of the city's total electrical load are still a wise investment for the future.

Seattle's trolleys are going to be around for a long time to come. But it is not just a matter of efficiency or economics. In Seattle, people love their trolleys. They would no more part with them than they would with the Pike Place Market or Mt. Rainier. Trolleys are not just a part of Seattle's public transit system, trolleys are part of the soul of the city.

## The Dayton Experience

Fred C. Dyer

Dayton's first trolley coach route was placed in operation in 1933 as a replacement for streetcar service. During the period before World War II, several additional routes were converted to trolley. Unlike most cities the trolley routes were operated not by just one company but by five. This situation continued until 1941 when a 15-year process of merging all companies into a single unit was begun. In 1947 the last two streetcar lines were converted and Dayton was completely served by trolleys. Approximately 200 trolley coaches were operating on 10 routes after the last conversion was made. The system's route structure became stable at this point and did not decline as was the case in other cities. In fact, during the 1960s the reverse was true and extensions were made to keep pace with the city's outward growth.

Between 1962 and 1970, seven additions were placed in operation. Some of these additions required extensive lobbying on the company's behalf to overcome the objections that outlying communities had with overhead lines. Only one major withdrawal of service occurred and that was necessitated by freeway construction.

The rehabilitation and growth of Dayton's trolley coach system can be directly attributed to two situations.

First, City Transit, the system operator, had firmly embraced the trolley, and through the efforts of its president, W.W. Owen, resisted various pressures to abandon it. For example, when the city put in a one-way grid system there was pressure to take down the wire rather than put it up on additional streets. Second, City Transit was able to turn the trolley's national decline to its benefit. Vehicles and hardware systems were purchased for a fraction of the original cost from systems that were phasing out. City Transit was able to replace its older coaches and extend service for much less than the cost of a new diesel fleet.

The general decline in transit use in the late 1960s forced City Transit into the familiar pattern of raising fares and cutting service. In spite of financial problems, and to prove that trolleys could

still be made, the company ordered one Flyer E700 and had the Toronto Transit Commission install electrical equipment from a retired coach. It arrived in 1971 and was dubbed the "1971 Trolley Bus."

As the decline continued, the inevitable public takeover occurred with the formation of the Miami Valley Regional Transit Authority (RTA), which assumed control in November 1972. Before the takeover there was a controversy over the new RTA's position on the future of trolley coaches. Newspaper articles stated that a decision for diesel had been made but the authority refused to either confirm or deny this. Whether the articles were correct or simply a maneuver to lower the cost of purchasing the system is not known. Clearly, if diesels were to be used, the trolleys would be worth little more than scrap value.

Regardless of the reasons for the controversy, several citizen groups came out in favor of retention. RTA moved quickly to resolve the trolley versus motorcoach question.

A public hearing was held during March 1973 with overwhelming support in favor of trolleys. In April, RTA decided to purchase 25 new trolleys. The energy crisis intervened and the number was increased to 64.

However, the dilemma was not over; when the single bid from Flyer Industries was opened in late 1974, the asking price was 75 percent higher than RTA's estimate: \$104,961 versus \$60,000. The Authority then attempted to order only 40, but UMTA insisted that would require new bids and offered to increase the federal grant to cover 80 percent of Flyer's quote for the 64 vehicles. Resoliciting the bids would have delayed the arrival of new buses for several years. Wishing to avoid any further delay, Flyer's bid was accepted and two years later the new buses began arriving in Dayton.

In 1979 the Board of Trustees determined that the RTA should truly live up to its name and start on an ambitious expansion program. The scope included doubling the miles operated, fleet size, employees, and new riders. Most of the expansion was to be accomplished within 3 months after the election and the remainder 6 months later.

The acquisition of equipment, hiring and training new employees, and hundreds of attendant tasks placed a tremendous burden on our staff. Obviously, in order to meet the time limits, the expansion was totally motor coach.

Clearly, just the hardware requirements precluded any use of trolleys within the expansion time limits. There are significant implications in that. Before expansion the proportion of vehicles was 65 percent trolley; after expansion it reversed to 65 percent diesel. The nature of the system changed dramatically as well--from a predominantly urban to a 50 percent suburban and rural system.

I believe that going regional has given us a unique opportunity to make major and long-lasting trolley system improvements. We are currently studying substation improvements, power distribution, line extension, and rolling stock in a new environment that has removed the boundary limits and minimized the financial constraints that had previously hampered significant improvements.

From the standpoint of trolley system capital improvement, it is evident that going regional is having a positive impact. From a ridership standpoint, again there has been a positive effect. The previous urban riders have found additional job, shopping, and educational opportunities in suburbs, whereas the new suburban riders use the urban trolley system for trip completion as well as for some ancillary trips.

On the negative side, there have been and will continue to be productivity inefficiencies until the two distinctly separate requirements of the motor coach suburban and trolley coach urban systems unite in a balanced, integrated transit system. Again, knowledgeable transit people recognize that it takes more than just 2 years for that to occur.

What happens when the power goes off has been the most significant effectiveness problem for our industry. In cooperation with UMTA and the Garrett Corporation, we recently completed a test of off-wire propulsion through the use of batteries. The test results are promising.

RTA is also looking forward to a demonstration project in cooperation with UMTA and Renault/Mack Truck to test the feasibility of dual-mode battery trolley.

As I mentioned earlier, we are looking to an expansion of our trolley system as well as some efficiency modifications that require costly overhead work.

If the off-wire capability can approximate standard operating speeds at reasonable operating costs, the technology can allow the trolley to better emulate the flexibility that motor buses enjoy.

Another technological change we are investigating is solid-state substations.

RTA is in the process of acquiring about 14 miles of railroad right-of-way from Penn Central and Conrail. It extends from the southeast corner of the county to the Dayton central business district through the most traveled traffic corridor in the region. It may become an exclusive right-of-way for a trolley rapid transit system--if not on a permanent basis, at least as an interim step toward light rail.

I also envision that technological advances will soon give us off-wire flexibility at full operating level, which can significantly reduce construction and maintenance costs on the catenary system while increasing on-street schedule dependability.

## Vancouver and the Trolley Bus

Tom E. Parkinson

Transit in British Columbia and Vancouver is unusual in that the city and other municipalities have never been involved. It started out with B.C. Electric Railway Company running streetcars and generating power. Power became the bigger part of the operation and this private company elected to convert from streetcars to a trolley bus system in the late 1940s. The company did this with no public funds partly because the streetcar system had few new vehicles and needed major capital improvements. Vancouver has a large trolley bus system and has never had any route cutbacks. The province purchased B.C. Electric in 1964, and transit and the then freight rail operation came with it into the transportation division of B.C. Hydro and Power Authority. B.C. Hydro never wanted transit, but it was 15 years before it was able to hand it over to a newly created provincewide transit authority. Transit never extended into the suburbs under B.C. Hydro. Only in 1972 did a new agency, the Bureau of Transit, instruct B.C. Hydro to start serving the neighboring municipalities, leading to the present system.

The Bureau of Transit initiated serious thoughts

on the retention and expansion of the trolley bus system by purchasing 50 new Flyers in 1976 using re-conditioned electrical equipment. The Bureau of Transit became the Urban Transit Authority in 1979, with a subsequent name change in 1982 to BC Transit (BCT). BCT is a provincial crown corporation. It owns and purchases all transit assets in the Province of British Columbia and contracts out for the operation of service in a tripartite agreement between the regional district or the municipality and an operator. BCT has 27 transit systems under its jurisdiction. In Vancouver the system is too big to put out to public tender; another crown corporation, Metro Transit Operating Company, was created solely to operate transit in Vancouver and Victoria.

Under the auspices of the Urban Transit Authority, economic studies were done with B.C. Hydro Transportation Division in 1978 and 1979 to determine the future of trolley buses in Vancouver.

There are three main indices that affect a decision to retain trolley buses or to introduce trolley buses and all of them have significant hazards. There have been enough recent bids to know the price of vehicles, substations, and overheads. Five years ago this was not the case. The price of diesel fuel and electricity throughout the future life of the coach is difficult to project. The most significant factor and important advantage of the trolley bus is the maintenance cost. The trolley is (and in Vancouver has proven to have much lower maintenance cost than diesels) fully offsetting any differentials in fuel and cost of maintaining and renewing the overhead and the substations. There have been much conflicting data on the relatively different maintenance cost of electric vehicles versus diesel vehicles. In Vancouver we were fortunate in having diesel and trolley buses of the same make, model, and vintage running out of the same garage to allow a reasonably accurate comparison.

The BCT analysis demonstrated that with modern electrical equipment on a trolley bus, a maintenance savings of 30 to 40 percent below that of a diesel coach could be achieved. When the decision was made to renew the trolley bus fleet in 1980, procurement of a new fleet was started using a two-stage process. Vancouver was at a turning point between old but reliable electrical equipment being retrofitted in diesel coaches and the new generation of trolley buses using 1980 electronics.

BCT tried to take a fresh look at the need of drivers and passengers to evolve an urban transit vehicle for heavy-duty service, not for use on suburban routes. BCT wanted to retain the double front doors not available on buses in North America since 1955. This was the biggest battle. It is regrettable that manufacturers have resisted the desires of transit authorities (and authorities with much higher density routes than Vancouver) by insisting that a double front door bus was not necessary or possible. BCT fought hard and now has the first two-axle North American double front door bus in 15 years. This is an urban bus; it has two-one seating with stanchions on every seat, double exit doors, and windows that open.

In the two-stage procurement BCT was prepared, given the resistance of the North American suppliers to provide double front doors, to go to a European vehicle. A technical specification was widely circulated to solicit the world for responses and opinions. BCT was prepared to change specifications in order to open the bidding process. There was extensive feedback with visits to 11 electrical manufacturers, indicating a view that the trolley coach or the dual-mode coach is here to stay and may even increase in numbers.

BCT had 19 bids, probably the largest and most