greatly simplifies the type of propulsion control system that must be used.

Cost Project 303, being conducted under the auspices of the European Economic Community, has as its objective the technical and economic evaluation of the duo-mode trolley bus. This project will act as a focal point for the exchange of the pertinent research and studies that various country participants in the project generate. Of primary importance to the study are systems that have already developed duo-mode trolley buses (i.e., Switzerland, Germany, France, Finland, and Italy).

**SELECTED MATERIALS**

**Seattle's Love Affair With Trolleys**

George E. Benson

Public transportation is more than just a matter of getting from point A to point B. What happens in between is just as important as getting to the destination. It is a question of style, and the mode of public transportation a community prefers can reveal more about its character than dry statistics about passengers per mile or peak-hour capacity.

The people of Seattle love trolley coaches. Trolleys have been a major, if not dominant, component of Seattle's transportation system for more than 40 years. What does that say about the people of Seattle? It speaks to this community's fascination with science and technology and to its sophistication in weighing technological alternatives.

Trolleys are just one element in a city history dominated by science and engineering: the regrading of Denny Hill, creation of a modern port, a visionary public electric utility, Boeing Aircraft, and the 1962 World's Fair.

In its early history, Seattle's public transportation system evolved in much the same way as did those in other cities. Privately owned streetcar companies sprang up to meet the public's needs and produced a patchwork of routes and modes of travel. We had horse-drawn trams, counterbalance cable cars, electric interurbans, and gasoline buses.

In the late 1930s this was no longer adequate. The population and area of the city had doubled and redoubled through immigration and annexation.

In 1936 the city's Municipal Railway recommended a system of gasoline-powered buses to the public, which was vetoed by the public. Three years later a new proposal, based on recommendations of the Beeler Organization of New York, was developed for a fleet of 235 trackless trolleys operated under 100 miles of wire, plus 130 gasoline and diesel coaches. This was approved by the mayor and the City Council in August 1939.

Eighteen months later, the system was in operation. It had been built and the debt of the old system retired for $10,200,000. Obviously it did not figure in the calculations of the new Transit Commission, but the inauguration of the new system in April 1941 gave Seattle one of the country's best public transportation systems—just in time for the war effort.

During World War II, 72 additional trolleys and 10 miles of wire were added to the system. It operated in this form until 1963 without interruption.

The end, however, had almost come in 1962. That year the Transit Commission proposed cutting back the trolleys and replacing them with new diesel coaches. There was even talk of completely eliminating the trolleys. Economics had changed, and the trolley critics argued that diesels were more efficient. The press complained about the "visual pollution" of trolley wires, and the 1940s-vintage trolleys were showing their age.

Many citizens, however, fought to save the trolleys. The Committee for Modern Electric Trolleys (COMET) was organized. COMET collected enough signatures to place an initiative on the 1964 ballot to modernize the trolley system. The group lost the vote but demonstrated enough political support to dissuade the Transit Commission from dismantling the trolley system. About 77 miles of the system were saved. This nucleus became the seed for an all-new system when the voters of King County authorized Metro to establish a regional transit system in 1972.

Metro is a consortium of Seattle, King County, and suburban city governments. It was created in the 1950s to establish a regional sewer and water quality utility to clean up Lake Washington and other area waters. Starting on January 1, 1973, Metro faced a new challenge: How to create a rational public transportation system out of the crazy quilt of city and private suburban bus systems it inherited. Trolleys were assigned a major role from the outset. The economics of public transit had changed again, and there was no question that trolleys were a wise investment.

In response to a request by the City Council, Metro provided a plan that called for replacing the entire system, doubling the lineage to 55 miles, and acquiring 109 new trolleys. It proved to be a more ambitious scheme than anyone anticipated.

I took my seat on the Seattle City Council and the Metro Council in 1974, so I got to wrestle with the problems of trolley modernization firsthand. No one had tackled an installation of the size we planned for a quarter of a century. The literature was scant, and it turned out that the maintenance crews on the old system knew as much, if not more, than the experts.

We eventually succeeded, and in the process much new technology was introduced, such as the neighborhood rectifier system, new wiring systems, the Fahrlaend switch activators, and new chopper control systems on the trolleys.

Of course, new technology creates new problems, and we had our share. Lightning wreaked havoc in the first year, and the rectifiers turned the overhead wires into the world's largest radio antenna.

We have solved the lightning problem and we are working on the radio interference. One thing we had no problem with, however, was community acceptance. When my office polled 45,000 citizens along proposed trolley routes, more than 87 percent said that they wanted the service.

When the system is complete, the price tag will be about $41 million—four times the cost for a system half the size of the original.

We unveiled our Waterfront Trolleys on Memorial Day 1982. These are vintage tracked trolleys that
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 1961 it looked like the Waterfront Trolleys might have to be abandoned, area businessmen 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 though 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.

In 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 8700 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 talking occurred. The Future 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, 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 the 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 substations improvements, power distribution, line extension, and rolling stock in an 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.