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Canadian Overview of Technological and Systems Research and Development on Transportation for Disabled Persons

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A general view of existing and planned innovations in technology and systems in Canada relating to the transportation of citizens with motor, hearing, sight, speech, or cognitive impairment is presented. Treatment of urban transportation highlights various advances in technology relevant to parallel modes. For example, the award-winning design of a wheelchair-securement/passenger-restraint system is described. Developments related to interurban systems are shown to be comprehensive because they cover problems experienced by special-needs travelers within air, rail, and surface modes, both at terminals and in transit. Canada's less-extensive applications in rural settings are also discussed.

Among the many recommendations made in 1981 by a Special Parliamentary Committee on the Disabled (1), those related to transportation were seen as key factors in guaranteeing the 1 million disabled citizens in Canada the right to independence and life satisfaction. Nevertheless, few people comprehend the enormous difficulties involved in conceptualizing, designing, developing, testing, and implementing the technological and systems innovations required to accomplish the objectives for transportation-disadvantaged persons. Numerous relevant projects had been undertaken before 1981, with the Transportation Development Centre (TDC) of Transport Canada spearheading the effort. Still, the Special Committee's announcements have alerted various government bodies and others concerned with transportation research and development to the need for greater activity in areas that affect the disabled. Hence funds for these purposes have been freed up to some extent, and the move toward new and creative technological and systems approaches to problems of transportation-disadvantaged persons has gained in momentum and coordination.

An overview of the state of the art of transportation for disabled persons in Canada is presented in this paper along with the technological and systems innovations that have already been accomplished and those planned or now in progress. An overall schema of urban, interurban, and rural transportation systems is adopted, and then the various types of subsystems and relevant technological developments are discussed within these three major contexts.

URBAN SYSTEMS

Public Transit

Only one Canadian city, Victoria in British Columbia, has attempted the adaptation of public transit for use by wheelchair occupants. In spring 1979 British Columbia Transit, working with the Capital Regional District, installed wheelchair lifts in four transit buses operating on a fixed route that served an area populated by elderly people (2). Manufactured by Transi-Lift Equipment in Calgary, the lift included several features that provided safety against operator error. Nevertheless, field evaluations, conducted during an 18-month period, were disappointing: equipment breakdowns were frequent after start-up but more importantly initial heavy use of the system eventually declined to zero because of the difficulty wheelchair users experienced in reaching bus stops. As a result, Victoria removed the lifts from the buses and shifted its effort to paratransit modes. This negative experience was scarcely an encouragement to other Canadian cities that were considering integrative transport for the disabled.

Modifications that would render public transport accessible to cognitively impaired persons, ambulatory elderly, and certain other special-need groups are somewhat less formidable than are those necessary to accommodate wheelchair passengers. For example, in the case of cognitive- or speech-impaired individuals, the barrier is largely one of communication and thus can be overcome with technical aid. Cooperating with the National Research Council, TDC is addressing part of the problem in a project that deals with the design and evaluation of remedial technology for cognitively impaired persons.

Apropos of the elderly, it is well known that declining strength impedes efforts of these citizens to mount the high first step on public transit vehicles, to get in and out of seats, to stand when no seat is available, or to ambulate when the vehicle is in motion. A recent report (3) indicates that the Toronto Transit Commission has been active in installing entrance grab bars and extra stanchions on certain seats in their vehicles, and communication with transit commission representatives in Montreal, Calgary, Edmonton, and Vancouver confirms that these major Canadian cities have followed suit. Nevertheless, lowering the first step to a point of easy access by the elderly is associated with engineering difficulties, not only because the suspension is not readily accommodated under the floor of the vehicle, but also because heavy snowfalls so common in Canadian winters interfere with clearance.

Flyer Industries has informed TDC that Toronto has obtained 10 air-conditioned buses with the

kneeling feature, whereby the driver can activate an electronic mechanism that releases air from the bellows and causes the front end of the bus to lower by 15 to 20 cm. W. McDiarmid of the Toronto Transit Commission reports that, after a month of testing on two routes where the population density of the elderly is high, no complaints from either passengers or drivers have been received about the kneeling feature. He adds that soon to be included in the tests is a door-closing delay mechanism that should allow elderly or slow-ambulating passengers to exit without fear of being caught in the door. Toronto's evaluations will determine whether the kneeling feature will be workable in other Canadian cities. Meanwhile, TDC is undertaking a comprehensive and detailed analysis of the problems that the elderly encounter with public transit so that a meaningful and holistic approach to remedially oriented systems and technological research and development can be mapped out.

Parallel Services

As is true in the United States, most cities in Canada have some type of door-to-door transit service in operation (4). In small city centers where demand is low, the service is likely to be provided through private donations from benevolent organizations. In major cities, however, the trend is for the relevant transit authority to take responsibility by either providing the service or contracting it out. Most systems require 1-day advance reservation and do not have the capability to handle on-demand scheduling. Only too familiar are the dispatch snags and snarls that occur as these many-to-many systems attempt to cope with peak loads and cancellations.

Auguring well for improvement in this respect is the success of a computerized dispatcher and driver communication system developed by Canada Systems Group and recently installed by Blue Line Taxi in Ottawa (5). On receiving keyed-in telephone taxi orders, the computer in this system allocates the order to a given district, relays the message to taxis in the area, and displays a one-line message to the driver. The message displays, as well as a small key pad used by the driver for responses, are interfaced through a digital adapter with the standard taxi radio; thus voice communication can be used in emergencies.

Another development of this kind is a TDC study being carried out by the Centre de recherche sur les transports, Université de Montréal, to construct a scheduling and routing algorithm to facilitate dispatching of transit vehicles for the disabled. To date, codified networks in Montreal, Sherbrooke, and Toronto are lacking only the 24-hr demand-responsive part of their respective algorithms. Ottawa will be included among the codified cities by the expected completion date of the project--December 1983.

Technological developments with respect to the vehicles used in these door-to-door systems usually refer to the modification of minibuses or standard vans such as the Ford Econoline or Dodge Maxivan (6). Many companies in Canada undertake modifications, and TDC has also explored the relevant technology in an early project (7). The Datsun 710 subcompact station wagon involved in this project underwent numerous adjustments, principal among them being lowering of the floor, raising of the roof, and provision of an aluminum nonslip ramp. The adapted vehicle is shown in Figure 1. Its evaluation by the Quebec Ministry of Transport revealed maneuverability to be excellent, occupancy per trip to be high, and fuel consumption to be low.

Figure 1. Datsun 710 subcompact station wagon modified by TDC for use by wheelchair passengers.

Figure 2. GSM taxi, which can carry one wheelchair passenger along with three ambulatory passengers.

Nevertheless, none of these modified vans is fully satisfactory in terms of operability, comfort, and safety. As a reaction to this reality, TDC initiated a project in coordination with the Canadian Urban Transit Association (CUTA) to fund the development of a specification and tender document for a prototype vehicle designed especially for the urban transportation of disabled persons (8). The specification guidelines for this vehicle have recently been produced (9). Critical to the concept of the prototype are the requirements that it be a heavy-duty bus with transit-type reliability, have a low floor and kneeling suspension for easy access, be able to accommodate four wheelchair and five seated passengers, be ergonomically suitable for such passengers in all respects, and be equipped with crash-tested wheelchair-securement/passenger-restraint systems.

Although expensive, the taxi does offer the disabled individual one-to-one service, which is often desirable and sometimes necessary. Yet getting the disabled person and the wheelchair in and out of the cab is burdensome for both driver and passenger. A vehicle that offers a solution is Canada's GSM (Guillon, Smith, Marquart) taxi shown in Figure 2. Designed and built by Guillon, Smith, Marquart &

Associates Ltd. with the support of TDC (10), this vehicle can adjust to accommodate either five ambulatory passengers or three ambulatory and one wheelchair passenger and, because of wide doors and a portable ramp, it is easily accessible to wheelchairs. In addition, because it has the same type of suspension, power train, and electrical parts as other automobiles built in North America, the vehicle is suitable for Canadian weather conditions.

Paratransit vehicles are associated with two accessories, i.e., lifts (or ramps) and securement devices, which are of particular technical concern in Canada. Lift manufacturers in Canada must try to find materials and develop mechanisms that guarantee operability during the cold and snowy conditions of winter. One of the most satisfactory lifts is manufactured by Para Industries (1978) Ltd. of Ontario (11). The two models of this lift, the Mark II and Mark III, are adapted for installation in vans with and without steps. Both are of the electrohydraulic platform type, and both have folding handrails, fixed side wheel stops, and an automatic safety flap that also acts as a boarding ramp. The platform is stowed vertically just inside the door of the van, where collected snow has a chance to melt away.

Of the many types of securement devices in use in Canada, one represents a unique technological accomplishment in the field of passenger safety. Designed by Uwe Rutenberg of Les Designers Douglas Ball Inc. of Ste Anne de Bellevue, Quebec, and developed by TDC, this multimodal wheelchair-securement/passenger-restraint system (12) received a Design Canada award in 1982. The unit consists of four modules: a wedge-shaped base, a lower back structure, an upper back structure with adjustable headrest, and an optional seat. The wheelchair is backed into place and secured with restraining arms that pull out telescopically from the base and fasten over the wheel rims. A lap and shoulder belt restrain the passenger. The wheelchair and ambulatory use of the unit are shown in Figures 3a and b. This system emerged from a 47 km/hr barrier crash test without structural damage to either unit or chair, and without disturbance of the position of the anthropometric dummy. These results confirm that the system meets its designer's aim of providing the wheelchair passenger the same level of safety enjoyed by any other passenger riding in a vehicle.

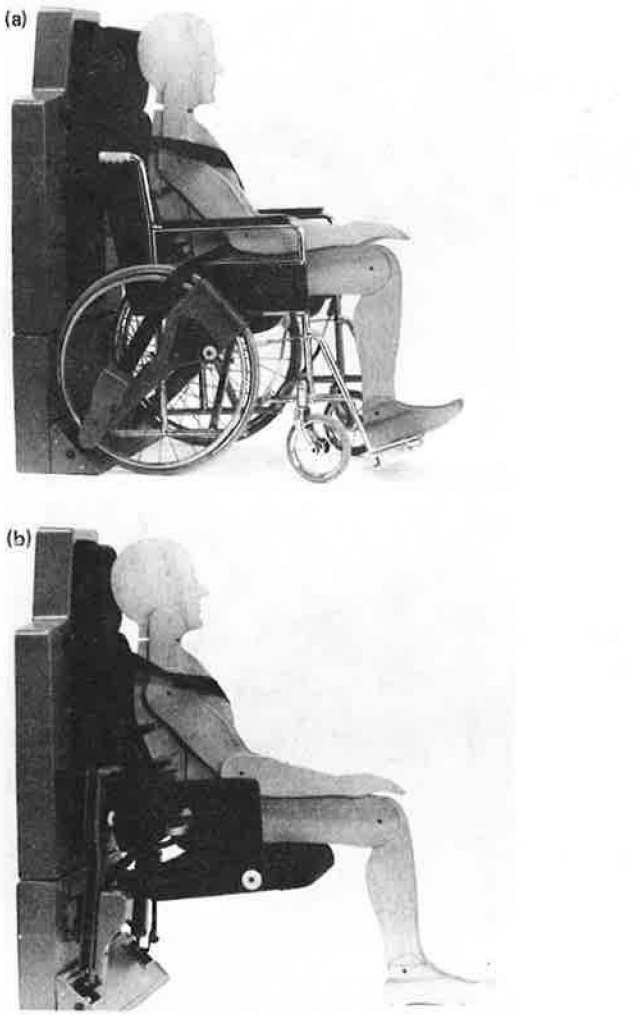
TDC's involvement in the development of the kinds of vehicles and equipment just described has enabled it to play a strong role in creating awareness of the need for relevant standards, and to become a useful representative on the Canadian Standards Association's Committee on Motor Vehicles for Transportation of Physically Disabled Persons. This committee, which is currently in the process of writing standards for relevant vehicles, is addressing issues of crash protection; interior head room; dimensions of ramps, lifts, and doors; type of lighting; and control of temperature and air quality.

In addition, TDC is collaborating with the Roads and Transportation Association of Canada on the contracted preparation of a handbook of guidelines for taxi and paratransit vehicle technology, operation, and regulation. In Ontario legislation enforces regulations with respect to specifications for ramps, lift platforms, securement devices, and other features of paratransit vehicles, which have been set by the Program Development Branch, Transportation Regulation Division, of the Ontario Ministry of Transportation and Communications (13).

Personal Transport

Many disabled people drive their own cars and therefore do not need to avail themselves of either public or parallel transport services. Some of these drivers may, nevertheless, be aided by the hand controls shown in Figure 4. Developed by TDC (14), these controls can be installed in less than 3 min and removed in less than 1 min. This quick installation and release feature makes car rental for urban transport a much greater possibility for disabled drivers than was previously the case. An evaluation of the device, which focuses on user and installer ergonomics, is currently under way.

Figure 3. TDC modular multimodal wheelchair-securement/passenger-restraint system (designed by U. Rutenberg) (a) for the wheelchair passenger and (b) for the ambulatory passenger.



Because of the physically demanding and awkward nature of the operations of stowing the wheelchair and retrieving it from the vehicle, many wheelchair drivers would be well accommodated by a car such as the British Elswick Special Vehicle (15), which allows the individual to enter the car in the wheelchair and remain there while driving. The possibility of bringing this vehicle into Canada is being considered, but the outcome will rest on whether it complies with standards and regulations for all new vehicles in Canada, as set by the Road and Motor Vehicle Traffic Safety Branch of Transport Canada. In any case, some thought (albeit embryonic) is being given as well to the possibility of developing such a vehicle in Canada. Also in the germinal stage is consideration of the development of a car

Figure 4. TDC quick-release car hand controls.

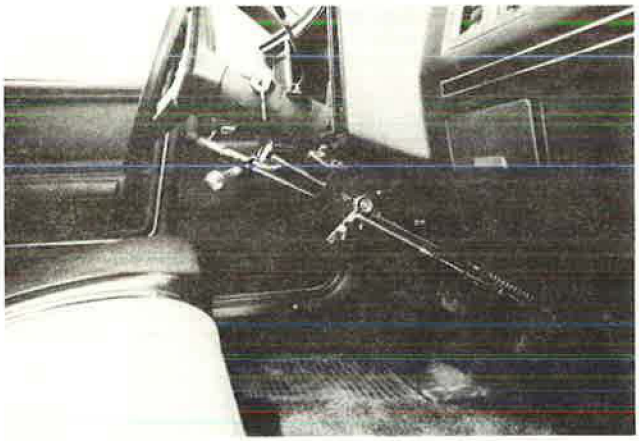
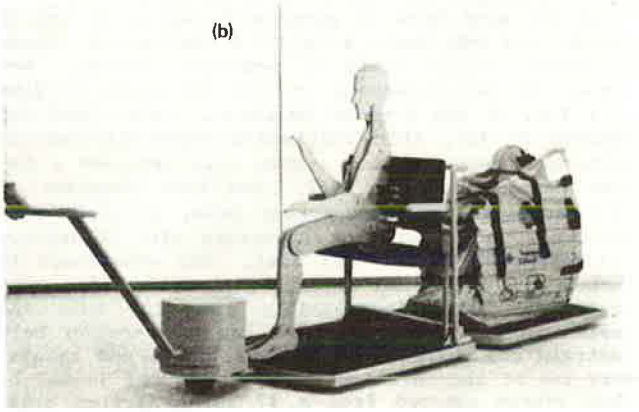


Figure 5. Curb-climbing electric wheelchair.

Figure 6. TDC modular transfer vehicle for use in terminals (a) for the wheelchair traveler and (b) for the ambulatory passenger, with second platform for luggage.



specially designed for elderly drivers. Easy entry and operability, in addition to expanded scanning capacity, would be desirable features of such a vehicle.

An estimated 5.6 percent of disabled people in Canada depend on the conventional wheelchair for mobility. Wheelchair occupants who use their wheelchairs to move about in small communities or in recreational areas commonly face barriers such as curbs, steep slopes, and rough terrain. An electric wheelchair, developed for TDC by Les Designers Douglas Ball, Inc. with a view to eliminating barriers of this kind, is shown in Figure 5. Notable here is the unique twin rear-axle feature, which provides the curb-climbing ability along with good traction and stability (16).

INTERURBAN SYSTEMS

Terminals

Intercity travel is often denied or made onerous for certain members of society because of various obstacles encountered at rail, air, and ferry terminals. To cover this aspect of technology and systems in its program on transportation for disabled persons, TDC has initiated a number of projects. For example, the possibility has been examined of developing communication technology that would have applications for speech-, sight-, and hearing-impaired individuals in terminals and in vehicles during transit (17). Deliberation will take account of results of a study designed to identify the human factors associated with use of various existing telecommunication aids and to generate new concepts in areas where further development is needed. Heretofore the only step toward accommodating this type of need in Canada has been the provision of safety information in Braille aboard Nordair aircraft (18). Another TDC project calls in part for preparation of terminal design guidelines to facilitate the handling of passengers with special needs (19). This work plan includes development of a conceptual design for a modular transfer vehicle for use by such travelers in various types of terminals (20). Preliminary versions of the vehicle are shown in Figures 6a and b.

The airports in Ottawa and Halifax are equipped with inclined stairway-mounted wheelchair elevating devices that overcome the problems of grade changes in transporting wheelchair travelers to the loading bridge. Two of these devices have recently been installed in the Kingston, Ontario, railway station. With cooperation from VIA Rail, TDC is now conducting ergonomic evaluations of all these lifts, the results of which will permit recommendations to be made with respect to possible use at other terminals. Apart from this effort, VIA Rail has developed an extensive program for making its major stations accessible in every way to disabled travelers (21).

Air Travel

Among the airlines in Canada, Air Canada appears to have been most active in developing and implementing technological change. W. Reeves of Air Canada reports that, in seeking a replacement for the awkward and uncomfortable Washington chair, the company has recently completed evaluation of a number of alternative passenger-loading models, namely, the Manten, Tark, Stowaway, and Wilshire Air Chair. The Wilshire Air Chair, shown in Figure 7, clearly outperformed the other models in terms of maneuverability, stowability, and other features. Its availability on request for all medium to long-range flights will aid disabled passengers because it permits them to be wheeled to the on-board washroom. According to R. Calhoun of Air Canada, the nonstowable Manten will be used for boarding to the seat.

W. Reeves also mentioned other features designed to facilitate travel by the disabled. All DC9 aircraft, for example, have removable armrests to permit easy transfer from wheelchair to seat. The airline's new Boeing 767s, six of which will be in operation by the end of 1983 and 12 by the end of 1984, will have removable armrests and special washroom facilities for disabled persons.

Air travelers in wheelchairs are frequently concerned about the condition of their chairs on arrival at destination and, if the chair is electric, about getting the wet-cell batteries transported. These concerns have been approached by TDC and some of the airlines. For example, the reusable reinforced-canvas container shown in Figure 8, which was developed by Davis Engineering under TDC sponsorship (22), was subjected to field tests by Air Canada and Canadian Pacific Air. The unique feature of this container is the light tubular stiffener ribs: on the one hand they allow easy entry and removal of the chair; more importantly, though, because the tightened sac fits snugly against all faces of the chair, the flex and spring properties of the ribs enable them to absorb shock from lateral roll maneuvers that otherwise would be transmitted to the chair.

A number of alternatives for handling wet-cell batteries were considered recently by TDC, the aim being to arrive at a packaging system that would not limit electric wheelchair occupants to riding only in the larger planes, which can accommodate the Air Transport Association's regulation that the chair be loaded upright in the cargo hold with the depowered battery secured to the battery tray. The packaging kit shown in Figure 9, developed by Air Canada (23) and approved by Transport Canada, will likely provide the solution for transporting wet-cell batteries for all airlines.

Rail Travel

Much has been accomplished in Canada through TDC's cooperative relationship with VIA Rail, which at an early date had indicated its interest in making its services and facilities available to transportation-disadvantaged persons. The testing of the stairway-mounted wheelchair lift has already been mentioned.

An earlier project involved the design of a coach to be included in the makeup of VIA's new LRC (light, rapid, comfortable) train and to be suitable in all respects for wheelchair passengers (24). This coach currently contains a widened entry space, an accessible washroom with well-placed grab bars, a wheelchair station, and a passenger chair with removable armrest for easy transfer from wheelchairs. The wheelchair station was designed to house a restraint system that was developed by TDC and is, actually, the forerunner of the multimodal model (25). When installed against the bulkhead and fas-

Figure 8. Reusable reinforced-canvas wheelchair container.

Figure 7. Wilshire Air Chair used by Air Canada on medium- to long-range flights.

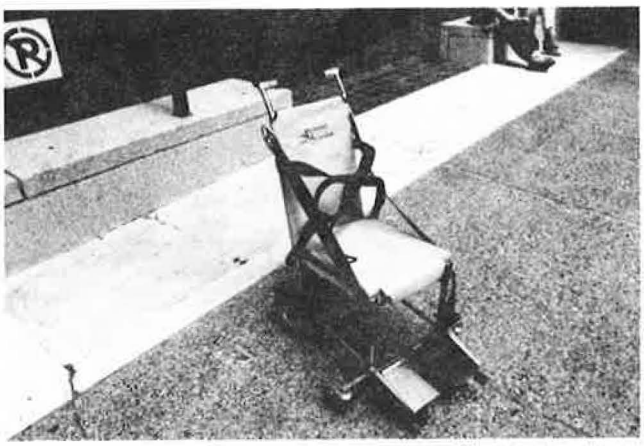
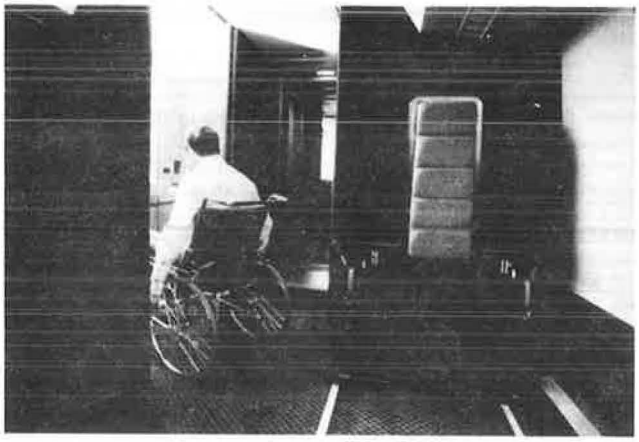


Figure 9. Air Canada wet-cell battery packaging kit.

Figure 10. TDC rail wheelchair securement system and accessible washroom on VIA Rail's LRC train.



tened to the floor, the unit secures the wheelchair by means of telescoping arms that pull out at an angle of 45° to the floor. Ergonomic evaluation proved the system to be fully operable by paraplegics. A view of the VIA Rail installations is shown in Figure 10.

Intercity Bus Travel

Recognizing that the intercity bus could represent an inexpensive and pleasurable means of travel for many Canadians in wheelchairs, the Special Parliamentary Committee on the Disabled recommended in 1981 that bus services under federal jurisdiction make their vehicles accessible to wheelchair passengers. Only one service is under federal jurisdiction--the Newfoundland CN Roadcruiser service; it objected to the recommended action on cost/benefit grounds.

For the subsequent inquiry held by the Canadian Transport Commission, TDC was asked by Transport Canada to provide a design for an accessible Roadcruiser bus. The resulting TDC project included consideration of general, technical, and safety requirements, particularly those related to lift and securement devices (26). Installation layouts and drawings clearly demonstrated the feasibility of modifications that would render the CN Roadcruiser fully accessible to passengers in wheelchairs. Nevertheless, the Canadian Transport Commission's ruling was that the implementation of the Parliamentary Committee's recommendation for an accessible fixed-route bus was unwarranted at this time because of the lack not only of accessible feeder services but also of flexibility of fixed-route services of the kind needed to accommodate the disabled (27). The Commission recommended (a) the use of smaller buses on a flexible schedule and route, phased in to correspond with market build-up; and (b) interim subsidies, amounting to the difference between bus and air fare, for wheelchair travelers making cross-island trips.

Other Intercity Travel Modes

It is true that the vehicles mentioned in the section on urban systems--the CUTA vehicle, the GSM taxi, and personal cars--also can be used for interurban transportation of disabled persons. A type of vehicle whose application is more distinctly for intercity travel is one conceived of as suitable for people living in institutions, or for others for whom outings are likely to be in groups and of a longer-haul recreational nature. Typical trips might be educational jaunts, camping excursions, shrine visits, and so on. As the travelers in these cases may be severely disabled, with some perhaps on stretchers, a suitable vehicle would require special loading, suspension, housing, and other features.

Somewhat similar in concept are the Van Hool articulated bus, which accommodates 12 stretchers along with seated passengers, and the Swedish Volvo mobile hospital vehicle. The aim of a current TDC project is to arrive at a full set of technological specifications for a vehicle of this genre that would be suitable for Canadian use; subsequently, and depending on the feasibility, prototype development may be undertaken.

Informational Requisites

The Canadian thrust toward technological and systems development with respect to interurban travel has not been without recognition of the need for complementary information by those either providing or receiving services. Transport Canada, for example, has published a resource handbook instructing transportation personnel on recognizing, understanding, and assisting travelers with disabilities (28). Moreover, responding to the need for attitudinal and procedural change, airlines such as Air Canada, Nordair, and Canadian Pacific Air either have or are considering audiovisual and practical training programs for their personnel (29). VIA Rail also has such a program in place.

For the travelers, TDC has prepared a national transportation guide that not only includes the floor plans of major Canadian terminals but also describes facilities, policies, and procedures of the railway, airlines, ferry operators, and bus companies (30). To date 10,000 copies of the guide have been distributed, the recipients comprising providers of service as well as disabled travelers. To complement this effort, TDC is currently compiling a compendium of boarding and on-board equipment for the disabled at air terminals around the world.

RURAL AND SMALL-CITY SYSTEMS

Taxi-Bus Concept

In Canada questions regarding special technology and systems for rural transportation of disabled persons have been given less attention than have those posed with similar orientation in urban and interurban contexts. Yet transportation problems exist in rural areas for all citizens, not just disabled persons. Travel within a small community is restricted because fixed-route bus systems are likely to be either absent or inadequate, thus forcing individuals to depend on either taxis or personal cars. A partial solution may lie in the taxi-bus concept implemented in the Battlefords, Saskatchewan (31).

Mobility-Club Concept

An intracommunity transportation alternative for the disabled is the mobility club, the concept for which calls for enlistment of services of volunteer drivers with access to private cars and, through centralized coordination, matching of driver trips with potential users. An exploratory mobility-club project was initiated in 1978 in Huron County, Ontario, with the aim of developing and testing the rural application of the concept (32).

During the 17-month project period attempts to create a centralized operation were unsuccessful. Nevertheless, about five individual mobility clubs related to specific local activities were spontaneously organized by small groups. Thus, although in one sense the project failed, it did provide an excellent opportunity to draw conclusions on the nature of transportation problems in rural areas, as well as on the potential of volunteer driver systems for meeting transportation requirements. The lesson learned is that the rural development process is one that is slow and strongly resistant to efforts of an external agent to impose schedules and deadlines for a demonstration project; moreover, to be workable the concept must be applied with an activity- or group-specific orientation rather than with one that uses a centralized dispatching agency.

External Travel

Options for travel outside small Canadian communities have been reduced because, for economic reasons, VIA Rail has withdrawn its services from such areas (33), thus leaving residents wholly dependent on buses. Although an appropriate lift represents a solution for wheelchair passengers in those cases in which both origin and destination have terminals, such is not the case when the town or village bus stop is merely some point on the highway. This difficulty appears to be beyond the range of means available to the transportation technologist and is instead within the realm of social application.

SUMMARY

On balance, Canada has taken many creative approaches to the multifaceted issue of how the rights of its disabled citizens to full transportation service can be satisfied through changes in technology and systems. As a consequence, numerous innovative devices and concepts have been developed and implemented within urban, interurban, and rural and small-city systems throughout the country. Moreover, the Special Parliamentary Committee's 1981 recommendations have produced an upsurge in relevant research and development.

Supplementing these efforts are various other efforts meant to address the informational needs of both transportation personnel and disabled travelers. In the first case, the aim has been to recognize the need for attitudinal and procedural changes; in the second, it has been to broaden the traveling scope of disabled persons through knowledge of the policies and procedures adopted by the various carriers, and of the facilities available to disabled persons.

While taking pride in these endeavours and achievements, Canada remains aware of the extent of work to be done before disabled persons can enjoy all the advantages that innovative transportation technology and systems can afford them.

ACKNOWLEDGMENT

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Transportation Service for the Physically Handicapped in Toronto—Its Structure and the Integration of Computer Aids

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The structure of Wheel-Trans—the Metropolitan Toronto transportation system for the physically handicapped—and the future operating options under consideration for Toronto are discussed, and the design and implementation process of a computer-aided reservation, scheduling, and dispatching system is reviewed. The growth of the service from 8 vehicles to 53 vans and 21 taxis during the past 7 years has created changes in the current operation to accommodate an increasing demand for service. Examples of these changes are the takeover by the Toronto Transit Commission of the reservation, scheduling, and dispatching functions from a private contractor; the investigation of new procedures such as demand-responsive systems; and the use of smaller vehicles. The increasing demand for service has resulted in a growing number of trip requests that need to be processed and an increased number of opportunities for misplacement of orders and generation of errors. The computer system is being implemented to improve the efficiency of control-office tasks and to provide a high level of service to the users.

In fall 1972 the Council of Metropolitan Toronto adopted a recommendation to establish a Technical Committee on Transportation of the Physically Handicapped to plan and implement a system to provide public transportation for the handicapped, who as a group was estimated at that time to constitute about 7 percent of the municipality's population of more than 2 million people spread over an area of 244 miles^2. About 20 percent of the handicapped were estimated to fulfill the eligibility criteria for the system.

The subsequent implementation of a pilot project was preceded by considerable controversy and debate on the type of public transportation that should be provided to the physically handicapped community of Metropolitan Toronto. Following this debate, the governments of the province of Ontario and Metropolitan Toronto and the Toronto Transit Commission (TTC) decided to support a parallel paratransit system rather than a fully accessible public transit system.

The commitment to such a policy was recently reinforced by two major events: (a) the rejection by the TTC of a proposal to provide fully accessible stations in the newest section of Toronto's rapid transit system (an intermediate capacity transit system operating on a 4.4-mile elevated guideway), and (b) the Metropolitan Council's decision to accept the TTC recommendation to take over the reservation, scheduling, and dispatching functions of Wheel-Trans from a private operator to improve the reliability of the service.

SERVICE HISTORY

On February 3, 1975, Wheel-Trans phase 1 was initiated in Metropolitan Toronto; it provided 46 users with a transportation service for work-oriented trips. The 2-year pilot project consisted of eight