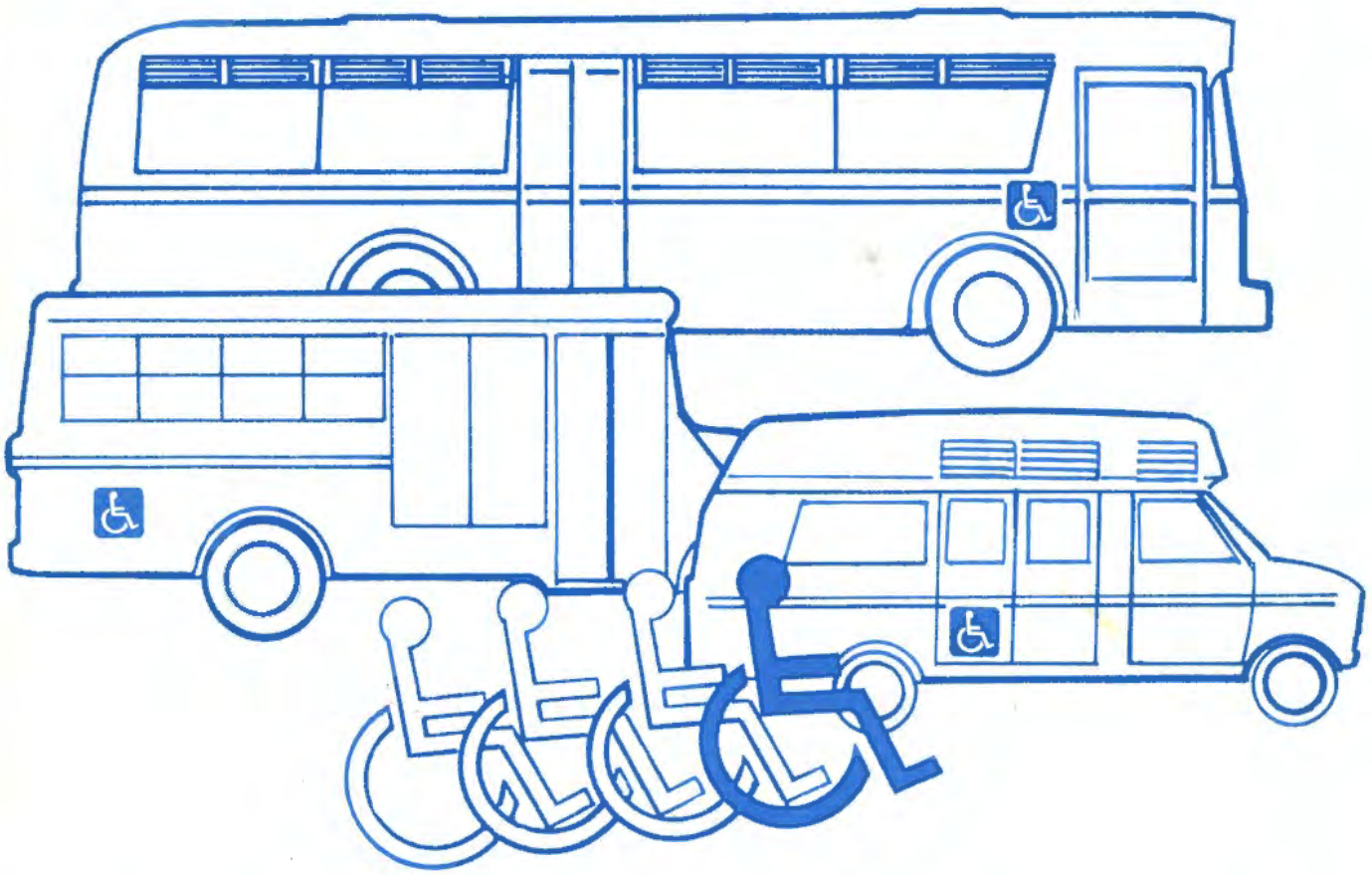
U.S. Department of Transportation

National Workshop on Bus-Wheelchair Accessibility

Proceedings

May 7-9, 1986



UMTA Technical Assistance Program

National Workshop on Bus-Wheelchair Accessibility

Proceedings
May 7-9, 1986

Prepared by
Transportation Systems Center
Research and Special Programs Administration
Cambridge, Massachusetts 02142

Prepared for
Office of Bus and Paratransit Systems
Urban Mass Transportation Administration
Washington, D.C. 20590

Distributed in Cooperation with
Technology Sharing Program
Office of the Secretary of Transportation

DOT-I-87-11

PREFACE

During the latter part of the 1970s, federal regulations, executive orders, and guidelines regarding fully accessible public transit pursuant to 1973's Section 504 of the National Rehabilitation Act greatly increased. In May, 1979, with the issuance of the DOT final rule, all new public transit coaches, for which a solictation was issued by July 2, 1980 and using federal subsidy, were required to be accessible to handicapped passengers, including wheelchair users. This requirement remained effective for two years until a U.S. Court of Appeals decision ruled that there was insufficent legislative justification for the DOT rule. Subsequently, DOT issued new regulations that allow local communities to decide the best way to serve the handicapped, either through accessible, fixed-route service, or specialized, demand-responsive service, using lift-equipped vehicles, or some combination of both. Although full accessiblity is no longer federally mandated, accessible, fixed-route service remains a requirement in some states (by state law) and a viable option in others as a means of meeting the transportation needs of the handicapped.

The Urban Mass Transportation Administration, Office of Bus and Paratransit Systems initiated a preliminary investigation to assess the scope of transit bus wheelchair lift problems. It was determined that there was a need to convene representatives of various groups to discuss and develop solutions to existing wheelchair lift and related problems. With the support of Ralph Stanley, Administrator of the Urban Mass Transportation Administration, plans were made for a meeting of such a group with the Administration to discuss the ongoing controversy within the bus transit industry concerning operation and maintenance of wheelchair lift systems on fixed-route and paratransit buses. Representatives of various concerned groups including wheelchair lift manufacturers, bus manufacturers, transit agencies, rehabilitation engineering consultants, and elderly and handicapped organizations, were included in the meeting which was held on September 17, 1985. From this representative group, a nucleus was formed for the UMTA Advisory Panel that was charged with the planning for the National Workshop.

The National Workshop on Bus Wheelchair was held on May 7-9, 1986 in Seattle, Washington. The workshop's goal was to provide a forum of discussion to establish greater awareness and understanding of the current accessibility issues, to identify and resolve the key problems experienced in providing accessible service, as well as to develop a workable set of industry guidelines for wheelchair lifts, securement devices and ramps. To this end, the workshop was extremely successful in discussing such issues as safety, operation, reliability, maintainability and costs of wheelchair lift systems.

The chairperson of the workshop was Vincent DeMarco, Office of Bus and Paratransit Systems, Bus Subsystems Technology Division, who was ably assisted by George Izumi of that Division. Planning and coordination were performed by Christina Chang, Project Engineer, Transportation Systems Center, with assistance from E. Witt Associates. Battelle Columbus Laboratory developed a four-volume set of equipment performance guidelines for discussion at the workshop.

Our special thanks to Seattle METRO for being our gracious host and providing logistic support.

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont.)

TABLE OF CONTENTS (Cont.)

LIST OF FIGURES

LIST OF TABLES

U.S. Department of Transportation
Urban Mass Transportation Administration

The Administrator

400 Seventh St., S.W.
Washington, D.C. 20590

Workshop Participants:

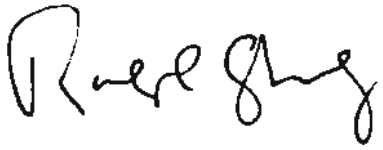
I would like to welcome everyone to the Bus Wheelchair Accessibility Workshop. I am sorry that I cannot be with you, but our Senate Transportation Appropriations Hearings are being held at the same time as the workshop.

In the three years that I have been with the Urban Mass Transportation Administration (UMTA), I have received a number of concerns from various interest groups regarding transit bus accessibility issues. I thought it was necessary to have a national workshop that could bring together a broad-based group that would address these issues. By working together and understanding each other's concerns, we can help to resolve these issues and seek ways to improve transit bus wheelchair accessibility. I am open to your suggestions on how UMTA can help.

Each of us is concerned with improving transit service and mobility for the wheelchair users. Working together we can better ensure that such service is provided in a safe and effective manner. I charge this workshop with the task of working in concert toward the goal of resolving the problems we are experiencing with providing transit bus wheelchair accessibility, and with producing and adopting a workable set of guidelines for the implementation of an accessible transit bus service.

I would like to thank all the workshop attendees for their participation in the workshop and particularly the Seattle Metro for its support in organizing and hosting this workshop.

Sincerely,



Ralph L. Stanley

1. WELCOME AND KEYNOTE ADDRESS

The National Workshop on Bus Wheelchair Accessibility was opened by Aubrey Davis, Urban Mass Transportation Administration (UMTA) Regional Administrator. Mr. Davis delivered the welcome address by Ralph Stanley, UMTA Administrator, who emphasized the need for a national workshop that would answer the many and broadly-based issues facing elderly and handicapped-serving transportation services. He stressed that the workshop's goal was to arrive at a set of guidelines for the implementation of an accessible transit service.

Paul Wysocki, Supervisor of Affirmative Action/Disability Specialist for the Seattle Human Rights Department, welcomed the Workshop to the Seattle community and encouraged attendees to visit Seattle's fully accessible main-line transportation service. Seattle's system, Wysocki noted, is successful because the community as a whole is fully committed to a barrier-free environment for the disabled. This commitment to accessible transportation is complemented by accessible pedestrian connections and barrier-free activities. Wysocki expressed the hope that the Seattle example would be an inspiration to other attendees to provide similar improved services in their own communities.

The Elderly and Handicapped Transit Advisory Committee, Municipality of Metropolitan Seattle, was represented by George B. Turner, who briefly discussed issues on equipment state of the art and system efficiency. By sharing strategies and approaches for serving elderly and handicapped riders in a workshop setting, Turner felt that efficiency and effectiveness could be improved. A workshop setting could give providers some suggestions for shortening the time required to operate wheelchair lifts and to assist elderly and handicapped individuals in boarding buses and vans. The workshop, in general, provides a forum for the exchange of ideas on how to best assist passengers with different disabilities.

Finally, a Keynote Address and Status of the 504 Regulations were given by Robert Ashby, Senior Attorney Advisor, U.S. Department of Transportation, Office of the Secretary. Mr. Ashby's speech is reproduced below.

KEYNOTE ADDRESS

Good morning. On behalf of UMTA Administrator Ralph Stanley, I welcome you to UMTA's National Workshop on Bus Wheelchair Accessibility. We are particularly fortunate to be able to hold this workshop in the city with the best known and probably best developed fixed-route accessible bus system in the country. I want very much to thank our hosts from the city of Seattle and METRO, and I think we will all welcome the opportunity to get out of the hotel and see what an accessible system looks like during tomorrow afternoon's METRO tour.

Talking to this group about the importance of bus accessibility is a bit of preaching to the choir. It is a subject that many of us have been working on very hard for many years. But it is about to get more important. Very soon --I believe within the next few weeks -- the Department of Transportation will be publishing its new Final Regulation to improve Mass Transit Service for persons with disabilities. This regulation will give new and added impetus to our efforts to make Urban Mass Transportation Services accessible to disabled persons.

As Congress provided in the Surface Transportation Assistance Act of 1982, the new department rule will require the service provided to disabled persons by UMTA-assisted transit authorities to meet a series of minimum service criteria. These criteria will apply regardless of the mode of service or the type of equipment the transit authority uses to provide the service.

Where a recipient, like Seattle METRO, already has in place a well-developed system for providing service to riders with disabilities, the new regulation may not result in striking changes in the quality or quantity of service that is provided. But many systems across the country will have to provide more and better service than they now provide. Congress passed the statute requiring this new regulation because of what it believed to be widespread "deficiencies" in service for disabled persons. The statute, and this regulation, are intended to correct many of those deficiencies.

When we talk about providing more and better service for disabled transit users, we are talking, in large measure, about transportation by motor vehicle. That is so for several reasons. In most localities, service by buses or other motor vehicles is the only mass transit service that exists or is feasible. Cities with new rail systems, or older rail systems on which some retrofit of accessibility features is technically and economically feasible, may have an additional dimension of accessible service available to them. But even in a city with a new, accessible rail system, the bulk of origins and destinations within the mass transit system are served only by buses.

Talking about providing service by motor vehicle inevitably brings our focus, in the current state of technology, to lifts. Lifts are, of course, not restricted to use on standard-size transit buses, but have applications on smaller buses and paratransit vehicles as well. Sometimes the rhetoric used by partisans of one mode of service for disabled persons or another sounds as if fixed-route accessible bus service and special service come from different planets. But the two have some important things in common -- they use motor vehicles which travel on public streets and highways, and many of the vehicles will use lifts as the means by which wheelchair users board.

Parenthetically, we did a good bit of analytical work in connection with writing the final rule, which has some interesting implications for the choices localties make about the mode of service they provide. In many localities, especially smaller cities, fixed-route accessible bus will be the least expensive method of meeting of the service criteria. However, it appears that even a good fixed-route accessible bus system, like Seattle METRO's, will generate substantially fewer trips than a special service system meeting, or perhaps even falling somewhat short of meeting, the criteria. A transit authority-operated paratransit system will likely cost much more than a fixed-route accessible bus system. Even so, it may prove more cost effective on a cost-per-trip basis, because of the larger number of trips generated.

So how do you get the cost effectiveness advantages of special service while keeping overall costs in the neighborhood of the lower tab for fixed-route service? Our studies suggest that a private sector approach, involving user-side subsidies and/or coordination of services from other service providers, can have just this result. We therefore suggest that recipients, especially those

that do not already have a well-established system of another type, take a real good look at this approach. "Private sector participation" is an important UMTA policy these days -- my suggestion that recipients take a close look at private sector involvement in providing service to handicapped persons is a reflection not just of this policy, but a very specific result of what the Office of the Secretary's studies for the rule show can be the single most cost effective approach to meeting the new regulatory requirements.

Whatever choice of mode recipients make, however, they will have to be concerned with the hardware that makes accessible service possible. The majority of workshops in this conference deal with the hardware -- the lifts themselves, their design, maintenance, operation, performance, reliability, cost, safety, and general care and feeding. These are all obviously key issues that are of great importance to users, transit providers, and UMTA. We all want good service to be there for disabled users. Good intentions, however, are notoriously deficient in getting people from point A to point B if the darn machinery doesn't work.

Take a recent letter of complaint we got from a wheelchair user in a city which provides "on-call" accessible bus service, in which a user calls ahead and schedules an accessible bus to be on a certain route at a certain time. The man just wanted to go to church, and scheduled buses for the round trip. In the morning, the bus got there and the operator lowered the lift, which then quit working. So the bus driver, who was very courteous, called the garage and had a supervisor sent out to work on the problem. The supervisor wrestled the lift back into the bus, but found, when he tried to extend it manually, found that there was no handle on board to do the job. So our frustrated, would-be churchgoer was told to wait a couple hours for another bus to come. The transit authority had to send a bus from a different service division, since the nearest one had no buses with working lifts that day.

After church, our intrepid rider goes down to the bus stop at the appointed time, and what should appear in two hours but the very same bus that had first arrived that morning, with the lift unrepaired and this time with a less friendly and patient driver. When the driver tried to radio back to the garage to ask for help, he found that the radio didn't work. So, on our rider's insistence, the driver went to a pay phone, from which he called not the garage but the police, claiming that the rider had not really reserved the bus and was disturbing the peace. The police arrived, and when the rider showed them his photocopy of the reservation form, offered the rider the opportunity to swear out an arrest warrant against the bus driver. He declined, though he did exhibit some interest in swearing out a warrant on the transit authority manager. Finally the bus left, and the police suggested the rider might call a cab, which would have been reasonable except he had brought only enough money for bus fare and the church collection plate. Fortunately, a lift equipped bus happened along with a working lift, sparing our hero the necessity of competing for the local wheelchair hitchhiking championship.

The complainant in this case mentioned that in eight of the sixteen instances in which he has reserved service in the last several weeks, an accessible bus didn't arrive or the lift didn't work. Now if you're a ball player, batting .500 will guarantee you a shrine in the Hall of Fame. If you're a transit provider, batting .500 just won't cut it. If you're a transit

provider, it simply won't do to advise wheelchair users, as another system recently has, not to use its accessible bus service because the system can't seem to get the durn fool gadgets to operate.

The only kind of service that means anything is real service on the street, provided at the right times and places by equipment that works. Anything less is just a charade. Our new rule will make this point explicitly, and insist on the provision of real, working, on the street service as a condition of compliance.

The importance of the design, engineering, and maintenance aspects of keeping accessible vehicles working and on the street cannot be overemphasized. I hope that this conference can lead to improved efforts in these areas, and I particularly hope that the performance guidelines for lift and securement systems, the production of which is one of the conference's most important charges, will lead to significant improvements in the consistency of lift performance.

It's not just a question of hardware, however. I contend that the single most important component of a successful accessible transit system is not a lift, or a good group of mechanics, or even well-trained and courteous drivers. The key component is a geniune commitment on the part of management to making the system work. Without such a commitment, the other elements are not too likely to fall into place. Nothing makes the point better than the contrast between the reliability record of Seattle METRO's accessible service, where such a commitment has existed for many years, with the disappointing record of lift service in some cities where there has been only a halfhearted or grudging effort to provide such service.

At the Department of Transportation, from Elizabeth Dole and Ralph Stanley down to those of us in the trenches, we are committed to a transit policy centered on the independence, dignity, and mobility of Americans with disabilities. Transit service for disabled persons is not some sort of sideshow of "real" transit service; it is a necessary and integral part of mass transit service for the general public, of whom disabled persons are unquestionably a part. It's up to us to do everything we can to make sure that the commitment to service reflecting this policy is a part of every public transit operation in the country, and that the commitment can be backed by the best technical support we can muster. Thank you.

2. GENERAL SESSIONS

2.1 GENERAL SESSION I: COMPONENTS OF SUCCESSFUL WHEELCHAIR ACCESSIBLE TRANSIT

Moderator:

Vincent DeMarco, Chief, Office of Bus and Paratransit Systems, U.S. DOT, Urban Mass Transportation Administration

Speakers:

Rick C. Walsh, Manager of Service Planning and Market Development, Seattle METRO

Sandra K. Perkins, On-Call Service Coordinator, Washington Metropolitan Area Transit Authority

Harold C. Jenkins, General Manager, Cambria County Transit Authority

Michael Bolton, Executive Director, Ann Arbor Transportation Authority

King Cushman, Director of Transit Development, Pierce Transit

SUMMARY

The speakers, representing transit agencies that are successfully providing wheelchair accessible service on fixed-route, alternative specialized service or a combination of both, discussed the significant elements of planning, implementation and management that contributed to the service's success. Rick Walsh presented Seattle METRO's efforts in planning marketing and operator training for its 570 lift-equipped buses (53 percent of its fleet) operating in fixed-route service. Sandra Perkins presented the Washington Metropolitan Transit Authority's (WMATA) on-call service which assures that lift-equipped buses are placed on bus routes where requests for accessible services were received. This approach allows WMATA to handle accessible service requests with approximately 15 percent of its bus fleet. Harold Jenkins discussed Cambria County Transit Authority's 100 percent accessible fixed-route bus system. Cambria County operates 27 buses with front door lifts. Ann Arbor Transportation Authority's use of both fixed-route accessible service and demand responsive service was presented by Mike Bolton. Ann Arbor has additional problems operating in cold weather. King Cushman discussed Pierce Transits' paratransit service that operates in both urban and rural areas. Cushman stressed the importance of commitment from both the transit agency and the community for success in providing accessible service.

GENERAL SESSION I: COMPONENTS OF SUCCESSFUL WHEELCHAIR ACCESSIBLE TRANSIT

2.1.1 SEATTLE METRO'S EXPERIENCE

Presented by:
Rick C. Walsh
Manager of Service Planning and Market Development
Seattle METRO
Seattle, Washington

Seattle METRO's experience in providing wheelchair accessible mainline transit service will be discussed. Included will be a discussion of the program performance, the initial planning and implementation efforts and the ongoing tasks necessary to keep the Seattle system operating successfully.

I. Performance Levels

A. 570 buses/53% of the fleet is lift-equipped

B. 51% of all routes have accessible service offered

C. 86% of all system-wide trips offered are accessible trips

D. 200-240 one way lift-assisted trips are taken daily

E. Malfunction rate is 1-3%.

II. Initial Planning/Implementation Efforts

A. Committed to 100% accessible in 1978

B. Significant amount of upfront work prior to service implementation

1. Choosing appropriate lift equipment
2. Prioritizing and planning the service phase-in
3. Bus zone improvement plans
4. Driver involvement
5. Promotion
6. Back-up system
7. Integration of program within the agency

III. Ongoing Tasks

A. Preventative measures are taken to eliminate problems before they occur

1. Driver training
2. Rider training
3. Rider information
4. Relationships with wheelchair dealers
5. Involvement in community groups
6. Involvement with local jurisdictions

B. Established procedures to deal with problems when they do occur

1. Limit driver discretion
2. Use service supervisor staff
3. Active customer assistance program
4. Computerized complaint system
5. Efficient coach replacement

C. Keeping up on the latest technology

1. Testing new training procedures
2. Testing new equipment

PRESENTATION ON ACCESSIBLE SERVICE

I'm here to tell the story of Seattle METRO's experience in providing one method of transit service for physically disabled people - mainstream accessible service. The employees of METRO Transit and the citizens of Seattle and King County have worked to make Seattle METRO's mainstream accessible service one of the most used systems in the country.

In 1979, the METRO Council adopted a policy to provide accessible, mainstream transportation service for disabled people. "Mainstream accessible service" means that the regular transit bus fleet is equipped with wheelchair lifts or other devices to allow access to disabled patrons. In Seattle METRO's case, a commitment was made to equip 100 percent of the fleet with lifts.

For us, where to begin was the first question asked. There were so many things to consider - route planning, citizen input, marketing, equipment. It was clear this wasn't going to be an easy task. Initially, it took a lot of hard work from a lot of people and commitment from the top down. This top-down commitment was important because it let the rest of the agency know that we were serious about making accessible mainstream transit work.

The first step we took was to develop an Objective Statement. Simply put - what were we trying to accomplish? This was fundamental in keeping all the people involved focused on the same goal. The objective of Seattle METRO's accessible service was to "enable disabled people to use regular service transit as safely and efficiently as possible."

Secondly, we set up a project team to reach our goal. The team is key, as it buys folks into the program. We used agency personnel from all levels, including people from operations, maintenance personnel, planners, schedulemakers, safety and marketing people, and drivers. We found that the drivers contributed significantly to the project team. We worked with the drivers' union and set up a drivers task force to deal with the details of providing accessible service. Since drivers are the front line people, we found that not surprisingly they could provide a lot of practical input to the development of the program.

People outside the agency, including disabled riders, were an important part of the project team. Specialists who work with disabled people and other nondisabled people also played an important role, since they too were to be

affected by the mainstream accessible service we were to provide. Organized into a citizens' advisory group; these people helped us to identify what was needed, where it was needed and when it was needed most. Lots of people were involved and what we found was that the more people who were involved, the greater the investment and the greater opportunity for success.

Having our objective statement and team identified, we turned to equipment. It took time to find the right list. The technology was new, and it was necessary to do a complete evaluation prior to purchasing the list. This is still a very important step.

Our equipment evaluation considered availability, reliability and servicing requirements of the lists; features such as safety gates to prevent wheelchairs from rolling off the platform, and grab bars to enable safe standee use. We also had to consider what was important to our agency and our patrons. This included the ability to adapt to the various terrains of the service area. Uneven ground, angled sidewalks, curbs, and drainage ditches were all discussed. Another important factor was the lifts' ability to function in various weather conditions - extreme heat, rain (Seattle's best known weather) or freezing cold.

Once a lift was chosen, we worked closely with the manufacturer to improve the lift. The original safety gate needed quite a bit of testing and modification to work to our satisfaction. Other equipment we needed to evaluate included securement devices. We decided on a system of clamps and straps: a clamp for the wheel of the chair and two safety straps to use in conjunction with or independently of the clamp (when the clamp did not fit).

We wanted to have a securement system which was to be adaptable to the new types of wheelchairs that were being developed. We are still investigating new or improved systems. We also decided on other special equipment, including flip-up seats and an extension on the signal cord. Advisory signs were also produced - it was the attention to detail, early on, that helps make our system work now.

Once we decided on our equipment and it was being installed, we focused on routes and zones; where to initiate accessible service. We decided to go slowly at first, phase-in service to work out the bugs, but we also wanted good levels of service wherever we decided to offer it.

To choose which routes to make accessible we used four criteria. These are the same criteria we use for any service expansion. First was general patronage - is the route one that many people ride? The second was activity center coverage - was the route going places where people needed to go? Could they access major employment centers and basic services? Thirdly, service frequency was considered. Can we schedule enough accessible trips on the route to make the service practical? Finally, balanced geographic coverage was needed. As we add new routes, were they evenly distributed throughout the system?

To review, we emphasized the following:

- high general ridership;
- putting service where people need to go;

- providing enough accessible service to make usage practical; and
- equally distributing the service through our service area.

The next thing we needed to do was to survey the bus zones to make sure they were usable by the riders and equipment. We had to look at the same terrain factors we looked at earlier, when we were selecting accessible zones - uneven ground, ditches, angled sidewalks and obstructing curbs. Adequate wheelchair maneuvering area at the end of the lift was also looked for.

Some zones had level, unobstructed areas at the end of the lift, but others were too narrow to accommodate a chair. Some zones looked good at first, a loading island, for example, but upon closer inspection we found that the rider had no way to access the zone, as there were no curb cuts.

To overcome that problem on necessary zones, we worked with local jurisdictions to improve many bus zones. When we finished surveying zones, we indicated which zones were accessible by marking them with stickers that help identify the zones for both the users and the drivers.

To review what has been done so far, we:

- developed objective statement and project team;
- evaluated equipment; and
- decided on what routes and zones would be made accessible.

Then we needed to develop our policies and procedures to run the operation. We asked "what-if" questions and the answers became the policies. For example, what if a rider in a wheelchair wants to board at a non-accessible zone? What if someone wants to board and the bus is overloaded and there is no room? What if the wheelchair lift malfunctions? What if we need to evacuate the bus and the lift doesn't work? We tried to think of all the things that could happen and planned accordingly.

At first we began to feel over-policied and over-procedured, but we found it was better to modify a policy rather than try to add new ones after things were underway. We also worked with drivers to determine the limits of their responsibilities. Of course they were to operate the lift, but we also had to decide on the level of assistance the drive was expected to give the rider. We got the drivers, the union and the riders together to negotiate mutual responsibilities and found that involvement in making the policies helps people to adjust to the changes of accessible service and minimizes surprises.

Then we needed to train the drivers. We decided to train our drivers in what we see as the two main aspects of accessible service: operating the equipment and relating to the riders - the mechanics and the public relations.

Training included such things as teaching drivers the sequence of steps to operate the lift and where to position the bus for safest loading. Without having drivers become mechanics, we taught them how to troubleshoot some of the lift problems. All equipment has its own idiosyncrasies and making the drivers

aware of these can help make the system run smoother. There is, for instance, a standard, highly sophisticated, troubleshooting technique - a swift kick. Lifts also often look quite worn and dirty - well, it's hard to keep our lifts looking clean when they get used a lot.

In teaching public relations, we tried to help drivers develop an empathy for their disabled riders. As part of their training, all drivers ride in wheelchairs on the lift. They experience what it is like to maneuver a wheelchair through a bus and to secure the wheelchair in the securement area. This role playing has been effective in giving the drivers a feeling of empathy for their new riders.

We also discussed with the drivers any insecurities they may have had in dealing with disabled riders. Initially, we tried to get across the idea that beyond their physical disability, these new riders are just like any other riders and should be treated professionally. Part of our public relations training is helping the drivers deal with the non-disabled public as well. Requesting that a non-disabled rider leave his or her seat to allow a disabled rider to use the securement area takes tact and diplomacy. We also rely on our advisory committee as a valuable resource in modifying and improving our training program.

The next area we dealt with was marketing the service. Our marketing efforts included rider training. We conducted outreach events to familiarize new riders with accessible service. Riding procedures were explained, and the lift demonstrated. It was as important to make the potential users as comfortable using the system as we were in providing it.

As long as we had the service, we were going to promote it. This included getting the word out through Rider Alerts, advertising signs, and newsletters. We also got a lot of media coverage. We rely on the media to get out the word about our program and its procedures, and they are very cooperative.

The ongoing effort requires monitoring and evaluation of the program. We continually gather feedback and revise accordingly. We fine tune.

Now, let me summarize the main points of my presentation. We:

- Wrote an objective statement.
- Defined our goal.
- Gathered together a project team. This included agency staff, drivers, citizens and any other resource people available.
- Selected lift and securement equipment.
- Paid attention to the features that were important to our service area.
- Planned routes and surveyed zones.
- Decided which routes would have good ridership.

- Developed policies and procedures.
- Asked a lot of "what if" questions. Tried to anticipate everything and lay out procedures so everyone would know what to expect.
- Trained. We trained drivers on the mechanics of the lift and the public relations associated with offering lift service.
- Marketed the program.
- Used outreach programs, rider alerts, media - anything to get the word out and encourage people to use the system.
- Monitor and evaluate the program
- Keep on fine-tuning.

Now that I've told you how we set up our mainstream accessible service program, let me tell you how it's operating today. We currently have 570 lift-equipped buses; that's 53 percent of our existing fleet. Another 200 buses will begin arriving next month. Half of our routes have lift service, but more importantly, 86 percent of all the trips we provide are accessible. Ridership is well over 200 trips a day. Based on the costs allocated to the program, the operating cost in 1985 was $5.16/trip and total cost was $6.89/trip.

So that's how we put it together. Don't misunderstand, we have had our share of problems too, but the formula does work if mainline accessible service is right for your community.

GENERAL SESSION I: COMPONENTS OF SUCCESSFUL WHEELCHAIR ACCESSIBLE TRANSIT

2.1.2 ON-CALL SERVICE - AN INTERIM SERVICE

Presented by:
Sandra K. Perkins
On-Call Service Coordinator
Washington Metropolitan Area Transit Authority
Washington, DC

On-Call Service is where, through advanced reservation, a particular trip on a non-accessible route can be operated with a lift-equipped bus.

Implemented in September 1982, WMATA was the first transit property to offer this method of accessible transportation. Since WMATA's Metrobus service did not achieve program accessibility by July 1, 1982, an interim service was required until program accessibility was achieved. WMATA met the 504 requirement by the development of its On-Call program to allow the lift-equipped buses to be placed on specific trips on regular Metrobus routes.

The use of the On-Call Service expands the availability of fixed route accessibility. It targets accessible service to potential users and can guide WMATA planners in identifying priorities for permanent route assignments.

Requests for On-Call Service for Tuesday through Saturday must be called in the day before prior to 1:00 P.M. Bus trips for Sunday or Monday must be called in by 1:00 P.M. on Friday.

The information provided by the passenger on the trip they wish to make is matched up with our bus and rail routes and schedules and the trip plan is prepared. Trip information is then given to the passenger.

The trip information is then used to identify the bus on the route that will make the pick-up and the responsible division is notified of the lift-equipped bus requirements.

The trip information is provided to our central control dispatchers and our street supervisors who monitor the service.

The growth and success of the On-Call program can be attributed to the working relationship between WMATA's Elderly and Handicapped Advisory Committee and WMATA's staff.

It was a member of our advisory committee that came up with the slogan used on our advertisement of the On-Call Service. "Know someone who could use a lift?"

WMATA's Fact Sheet is included as Table 1.

TABLE 1. WMATA'S FACT SHEET

Number of buses in fleet	1,578
Number of lift-equipped buses	225

Approximately 400 bus routes serving 13,000 bus stops.

Lift Boardings

1982 (October through December)	581
1983	6,741
1984	13,108
1985	15,838

Nine bus garages serving the District of Columbia, Maryland and Virginia metro service area.

There are 2,539 Metrobus operators employed by WMATA.

GENERAL SESSION I: COMPONENTS OF SUCCESSFUL WHEELCHAIR ACCESSIBILITY TRANSIT

2.1.3 CAMBRIA COUNTY TRANSIT'S EXPERIENCE

Presented by:
Harold C. Jenkins
General Manager
Cambria County Transit Authority
Johnstown, Pennsylvania

Since 1978, the Cambria County Transit Authority has pursued a bus fleet replacement policy which mandates the purchase of wheelchair accessible vehicles only. This policy was developed after an extensive study conducted by the local Metropolitan Planning Organization (MPO) in conjunction with the Transit Authority and numerous area agencies working with handicapped persons. By May of 1983, the Authority was operating a 100 percent accessible bus fleet consisting of seven GMC RTS IIs, eight Grumman Flxible 870s, and twelve Neoplan buses.

From the beginning, we realized the importance of selling the concept of fixed-route accessible transit to potential users. Prior to the availability of our accessible service, the wheelchair handicapped in the community were serviced by a hodgepodge of uncoordinated and often unreliable programs. However, these programs had one common denominator...the service was largely call-and-demand, door-to-door service. Consequently, if our program of fixed-route accessible service was to be successful, it was incumbent upon us to institute a community-wide education program to eradicate some of the perceived fears associated with combining ambulatory transit with handicapped public transportation service.

The intention of my presentation today is not to focus on the details of our successful public education program. As you know, we are discussing the specifics of wheelchair lift technology, a topic which I'll get to in just a minute. I only want to briefly summarize our educational program for those of you who have expressed an interest in this equally important component of a viable accessible transit program.

After the delivery of the Authority's first contingency of GMC RTS IIs, we conducted public demonstrations of the accessibility features of the bus. The local media provided extensive coverage, a vital consideration in any public awareness program. Concurrent with the bus demos, we inaugurated a program to personally contact as many handicapped folks as possible to explain the accessibility features. The primary effort focused on groups and agencies working on behalf of handicapped persons. We prepared a special publication which highlighted the accessibility components of the bus and the sequence of steps involved in using the vehicles. Thousands of these brochures were distributed in person as well as mailed throughout the community. We also developed a very detailed slide show which shows every step entailed in the boarding and exiting of the bus, and includes a narrative on the special safety training received by the bus operator. All these efforts help to assure the handicapped passenger that public transportation is a safe and reliable

alternative to specialized transit service. By the way, when we received our Grumman Flxible and Neoplan buses, the slide show was updated to encompass the features of these new coaches.

As a result of our educational efforts, we carried an average of 200 wheelchair passengers a month during the first eleven months of operation. Remember, that's 200 passengers a month on only seven accessible buses! We were quite proud of our efforts, and today we continue to strive to provide quality service to this important segment of our passenger field. Which leads me to my topic this morning, the quality, or lack of quality, in some of the wheelchair lift components in our accessible buses.

Let me begin by making several general comments about our experience with using three different types of passive lifts. As I said before, the Cambria County Transit Authority operates three different types of advanced design buses which utilize three different lifts. The GMC and Neoplan buses have rear-loading lifts, the Grumman a front-loading lift. GMC manufactures their own lift. Neoplan uses the TDT lift from Transportation and Technology and Grumman uses the EEC lift from the Environmental Equipment Corporation. We have had operational and repair experience with all three lifts for at least three years, a fact which I think qualifies us to speak authoritatively about their individual track records.

To begin, we feel strongly that the rear location of the lift is far superior to the front-loading lift, for several reasons. First, the front lift on the Grumman is more vulnerable to damage from accidents. Sixty-eight percent of our road accidents involve the front right portion of the bus. Thus, the front lift on the Grumman is directly subject to impact damage. Also, the front of the bus traditionally accumulates more ice and snow than other areas of the bus. This extra build up can have a serious impact on the operating components of the front-loading lift.

Second, we believe that the wheelchair passenger receives more attention from the bus operator if the operator is required to leave his seat to operate a rear lift. This is admittedly a subjective reason, but we think it contributes somewhat to passenger safety. We also experience problems involving the lack of sufficient wheelchair clearance on the front-loading buses. Some of the wider chairs cannot negotiate the left turn, a situation which usually requires the operator to nudge the chair. This extra attention sometimes makes the wheelchair passenger feel more conspicuous and thus uncomfortable. Also, the front-loading lift often requires passengers sitting in the front to move to another seat, again contributing somewhat to a wheelchair passenger's notion that he or she is causing an inconvenience.

Another general comment concerns the comparison of the hydraulic functions of passive lifts. Our experience clearly indicates the value of operating the lift's hydraulic components directly from the bus's power steering unit, instead of deriving power from a separate unit. Our hydraulic repair problems with the GMC lift and Grumman's EEC lift, both of which operate from the power steering unit, are negligible, even during the cold weather months. I'll have a few more comments on hydraulic systems in a moment.

Our mechanics unanimously agree that all three lifts should be re-engineered to improve the mechanism for retracting the lift in the event of electrical or hydraulic breakdown. The EEC and TDT lifts are retracted with a pumping mechanism which is sometimes difficult for a bus driver to operate, especially our female operators. In the case of the GMC lifts the lift cannot be fully retracted at all. The garage must make a road call and drive the bus back to the shop with the lift only partially retracted. The mechanics must subsequently dismantle segments of the lift in order to fully retract it.

Another problem inherent with all three lifts is the sensitive edge along the platform of the lift. The edge mechanism on the lifts are subject to damage and corrosion from ice and salt. They need better protection from the elements and should be redesigned to withstand greater wear-and-tear. In fact, since the edges wear out so quickly and are expensive to replace, our mechanics have figured out a way to adapt the passenger tape switch for use as a sensitive edge on the lift. The tape switch is the interior strip pushed by the passenger to notify the operator of his intention to exit the bus. It would also help to have the sensitive edge designed to be more accommodating to variances in the curb condition. As it now operates, any ice, gravel, etc., can prevent the sensitive edge from activating properly. The sensitive edge should also be extended closer to the end of the platform. If the bus operator does not pull close enough to the curb the sensitive edge is not activated and the lift is subject to damage from excessive pressure against the curb.

Finally, in this category of general comments, the wheelchair clamping mechanisms on all three buses should be re-engineered to encompass greater flexibility in accommodating different size chair wheels.

Now, let's examine each of the lifts specifically to see what steps might be taken to improve their functioning.

As I said previously, the GMC and Grumman lifts operate hydraulically from the power steering unit. This arrangement provides sufficient power to operate the lift and contributes to maintaining the hydraulic fluid at a reasonable operating temperature. Lifts operating from their own hydraulic units sometimes experience problems with the viscosity of the hydraulic fluid during periods of cold weather.

A consistent problem with the GMC lift centers on the build-up of dirt and ice on the step locks. Often our operators are forced to literally jump on the lift to release the step locks in order to extend the lift. Thus, the locks require either a shielding device to prevent dirt and ice from accumulating or possibly a larger solenoid value which has a greater capacity to open the locks when they stick.

I previously mentioned the need for improvements to the sensitive edge and the need for a simplified method for manually returning the lift in the event of breakdown. This later problem is especially significant.

Finally, a need exists for allowing more space between the lift and the side housing panels. If the lift is out of alignment even slightly, it rubs against the side panels during deployment and retraction. Another quarter inch of space on each side would be sufficient.

Next, the Grumman Flxible EEC lift.

I've already discussed the various problems associated with the front-loading lift. We have experienced problems with excessive ice and snow build up on the wiring and switches on this lift. An improved weather protection mechanism is required.

This lift also has a problem with respect to the platform barrier. During retraction, it does not return to a flat position against the underside of the platform. Therefore, the barrier tends to attract ice and snow when the bus is traveling in inclement weather.

The EEC lift also requires a little more clearance between the side of the lift and the front door. When the lift is being retracted, it occasionally rubs against the open front doors.

Finally, this lift has an operating quirk which should be closely examined by the EEC engineers to determine if a remedy can be found. If you talk to our wheelchair riders who use our transit system on a regular basis, they'll agree that the EEC lift on our Grumman buses is their least favorite. In fact, a few wheelchair patrons refuse to board a Grumman bus on the EEC lift. The reason rests with the motion of the lift during its operation, both on boarding and exiting. The GMC and TDT lifts follow roughly a 90 degree path during operation. But the EEC lift rises up and outward, a path which scares the wheelchair user. The motion of the lift conveys the feeling that the user is being flung forward into mid-air, much like a ferris wheel.

The final lift for examination is the Neoplan TDT lift.

The TDT lift is a prime example of the need for operating the hydraulic system off the power steering unit. The motor originally installed in this lift quickly burned out when in operation. The manufacturer subsequently replaced it with a larger capacity motor. However, we have already experienced five burn-outs with the new motors, an expensive proposition. Our mechanics report that the TDT lift could be re-engineered to operate directly from the power steering unit, without extensive alteration.

Another major problem with this lift centers on the single hydraulic piston located on the side of the lift. The operation of this single piston, instead of the double pistons on the other lifts, creates an operational imbalance. In other words, there is a lack of equilibrium between the piston functioning on one side and the chain pulling on the other. Thus, the lift does not operate evenly, causing uneven wear and a jerky ride for the passenger.

The step locks on this lift also lock, requiring an improved shielding device or a solenoid which can provide a greater force on the locks.

The wiring schematic on the TDT lift does not match the actual wiring, creating numerous headaches for our mechanics working on electrical malfunctions.

A need also exists for greater clearance between the lift and the side housing panels; about a quarter of an inch on each side.

Finally, the TDT lift does not always retract properly. During the retraction sequence, the rods attached to the steps sometimes catch on the edges of the receiving frame. The guides on the rods need to be tapered to guide the rods smoothly into the lift hold.

A final word on maintenance. Our overall experience with the three wheelchair lifts resulted in a change in our union contract which now requires the bus operator to cycle the lift at the beginning of the work shift. This procedure accomplishes three things. First, the cycling of the lift is beneficial to the lift itself. The components are, you might say, "exercised." This exercise has resulted in fewer mechanical problems. Second, if the lift is cycled prior to the beginning of the operator's shift, the operator will know if the lift is working properly. If it isn't working correctly, then the operator must request a replacement. As you know, an accessible fixed-route transit system will not be successful if it leaves passengers stranded at a bus stop due to a malfunctioning lift. Third, the requirement to cycle the lift keeps the operator fresh in his knowledge on how to correctly operate the lift. This reduces malfunctions attributable to operator error.

GENERAL SESSION I: COMPONENTS OF SUCCESSFUL WHEELCHAIR ACCESSIBLE TRANSIT

2.1.4 THE ANN ARBOR TRANSPORTATION AUTHORITY'S EXPERIENCE

Presented by:
Michael Bolton
Executive Director
Ann Arbor Transportation Authority
Ann Arbor, Michigan

The Ann Arbor Transportation Authority offers an array of transportation services for the mobility impaired including fixed-route accessible service, dial-a-ride service, and contracted taxi service. The AAT operates 32 standard size lift equipped buses which have a kneeling feature. The older vehicles purchased before 1978 do not have lifts. Six 1980 Grumman Flxibles are equipped with EEC lifts, fourteen RTS IIs have standard GM lifts and the remaining twelve vehicles have the Lift-U lift. These vehicles operate during all regular service hours throughout the entire service area. The Authority requires that each of its eighteen routes have at least one accessible vehicle on it at all times.

In addition to its fixed-route accessible service, which is called "The Ride," it also offers a demand response service called "A-Ride." The A-Ride has two components. One is a sub-contracted service with the local taxi company to provide service to the members of the community whose disability makes it difficult most of the time for them to use fixed-route service. The second component of A-Ride is the service operated by the Authority itself which provides mobility for those members of the community whose disability prevents them from using either the fixed-route service or taxicab service.

This change in the provision of special services came about in 1985 as a result of an agreement reached in 1983 contract negotiations which allowed the Authority to subcontract demand response service. The program was implemented in two phases. The first phase was Good-as-Gold which resulted in a subsidized taxi service for persons 65 and over and at the same time allowed them to ride free on fixed-route buses. Our original projections were for about 4,500 rides per month. Currently the taxi service is booking about 10,000 senior rides a month. The senior ride costs seniors $1.00 but as many of them that want can go along for the ride at no additional fare.

The A-Ride program for the ambulatory handicapped evolved from the success of Good-as-Gold. It was a rather lengthy process in the planning because many members of the handicapped community were fearful that change meant less service and it was only after a number of public meetings and input sessions involving the local Center for Independent Living, our Local Advisory Committee, and other interested members of the handicapped community that the final plan took form. I just want to comment on that process. It was a very revealing process for the AATA staff because even though we had enjoyed a pretty good rapport with disabled members of the community, we ended up learning a lot about their lifestyles, the funding sources, and their view of the world. It was a very good process because it made us a lot more sensitive to how we presented things

and how we evaluated things in our staff meetings. The program went into place. We borrowed a lot of different ideas. One of them was that we wanted to establish a $1.00 fare for the service across the board; essentially just to have a uniformity of fares for any subcontracted service and also to make people aware that the service had a value other than the 30¢ that we had been charging previously. In order to make that part of the program work, we instituted a scrip system where the disabled, once they had enrolled in the program and I'll get to that in a minute, are able to buy ten ride scrip coupon books for $5.00. Each scrip coupon has on it a face value of $1.00, the reason being that each ride had a $1.00 value but the scrip coupons could be used for pre-booked trips. Same day service, scrip coupons could not be used and the fare for the same day trips was $1.00. We felt that was a pretty reasonable way of dealing with the problem of disparity of fares between the seniors and the handicapped and so far it seemed to be working fairly although some people object a little bit to the inconvenience of having to go and buy scrip. Others think scrip is a very good idea because it allows them to purchase the transportation when they have the money. They no longer have to worry about getting somewhere because they don't have the fare.

One of the major problems that we had was that we gave the ambulatory handicapped, the people that were going to use the cabs one color card - a green card, and we gave the people that were going to use the AATA service a blue card. We said that if you have one card you can use one service but you can't use the other service. Originally this had grown out of a fear on the part of the mobility impaired that we would fill up our vans first and then give the overflow to the cab companies. The problem we are now experiencing is that some of the people who have blue cards who are in wheelchairs want to use the cabs. The have the fold-up wheelchairs but they don't have the right kind of card so they can't book the trip on our service. While we are reviewing this, and we said we would review the whole program after a six month period, we have not reached a decision on exactly what to do. However, one problem is the whole question of who is responsible if the wheelchair gets damaged while it is in the trunk of the cab. As you can see, we're going through some of the problems that other systems have gone through and, believe me, we have learned a lot by talking to other systems.

In order to implement this process, we needed to reestablish criteria for elgibility. The prior eligibility system had simply required a medical professional to sign the form. This permitted us to have doctors or other specialists, including mental health counsellors, certifying the extent of the customer's disability. Such a certification helped determine which services best met the customer's need. Just to give you an idea of cost, when we operated our own dial-a-ride service and provided all the trips for elderly and handicapped we were averaging slightly over two passengers per service hour and it was costing us somewhere in the range of maybe $20 to $21 an hour. When we moved the seniors off the service into the taxicabs, our productivity dropped to about 1.5 rides per hour and our costs jumped to about $30 an hour. The reason for this is that we have retained the dispatching and the booking for A-Ride program. So a certain amount of the fixed cost has stayed with us. On the plus side, however, we had originally projected about a 30 percent increase in available rides for handicapped members of the community and we have already realized that.

The next phase in this process will be to subcontract the movement of those whose mobility is restricted by a wheelchair. We hope to be able to do this by getting more vans or vehicles that can be leased to the cab company and then that will allow the AATA to turn over all of the dispatching and all of the other associated costs to the cab company and let them run the service as essentially a taxi service. We would continue to subsidize the rides and monitor the usage of the service. The key to our program is that it is not a cost reduction program per se, it's a service improvement program. Lest this sound like double talk, let me explain. Our service grew out of an old total dial-a-ride system. At one time it was computer driven and we had fifteen dispatchers to take direct in excess of 100 vans. When you have that many vans running around town it is easy to get away with two rides per hour of service and yet still look like you are doing something. But booking procedures and telephone answering habits have been ingrained over ten years and they're very hard to break. Our people do a very good job at what they do. Our question is "Is there a better way to do it?" After watching the cab company, it appeared to us that one of the differences between us and them was that they kept their vehicles moving all the time because there was always a mixture of rides or riders that were available. Our vehicles very often had to stand and wait for people, sometimes for as much as fifteen minutes and in some cases for 45 minutes. In our mind it was a good business decision to subcontract that portion of our service. In case I forgot to mention, we budget and spend approximately $1.5 million of an $8.8 million budget on our elderly and handicapped service so it is not a question of not having the money for the program. It has been a question in our mind for some time as to whether or not we were getting the biggest bang for the buck in this particular service area.

The A-Ride programs are operated only within the city limits of Ann Arbor and to fifteen or twenty destinations outside the city, but one end of the trip must end in Ann Arbor. The reason for this being that it is the city that provides us with our local tax milage. Any other service outside the city is done through Purchases of Service Agreements with other entities of government. None of those other entities, as of this time, have opted for demand response service. Although, because of the success of the A-Ride taxi program, there's increasing pressure for it outside of the city and we have received a number of inquiries regarding the program.

The service which is available to the disabled outside of the city limits of Ann Arbor is limited primarily to Social Service Agencies or to the Ann Arbor Transportation Authority's fixed routes. As I mentioned earlier, thirty-two of our standard fixed-route vehicles are lift equipped. We have two Orion IIs, twenty-one foot coaches, which are ramp equipped, that we use on fixed routes. The two other Orion IIs we used on dial-a-ride. For those of you who were at the APTA annual meeting in Los Angeles you may have heard some of my remarks regarding lifts and how they work and, in our case, how some of them don't work. We have made a commitment that all of our lifts will be operational. We are engaged in a program to keep them that way, even though there is very little regular utilization of the wheelchair lift in regular service. Most of the lifts are cycled only twice a day, once in the morning before the vehicle leaves the facility and once in the evening when it returns. The most durable and reliable of the lifts which we have been using to this point is on the RTS II. They are not perfect, but they tend to be operational. We have been working closely with

another bus manufacturer and lift manufacturer in order to address some of the problems which we are encountering in our particular climate. It really does appear that climate may be a real culprit in terms of these operational difficulties. Some of it may have to do with placement of the lift on the vehicle, some of it may be attributable to driver error. Let me just make one thing clear, the State of Michigan mandates any vehicle purchased using State money must be accessible and since the State at the present time provides the 20 percent local share for bus purchases, it's obvious that all of the buses that we purchase will have lifts or ramps.

Whether the requirement was there or not, however, I think because of the nature of our community certainly a portion of our bus purchases will always be lift equipped. Ann Arbor is the home of the University of Michigan which has a brand new University Hospital. Part of the University Hospital is a therapeutic and rehabilitation unit. In addition we have a Veterans Administration Hospital in town and we also have a very active Center for Independent Living. The term quality of life really does mean something in Ann Arbor and there is a strong commitment to maintaining that quality of life for all elements of the community. Even if we wanted to we could not, under any circumstances, get away with simply welding the lifts in place.

Let's deal briefly with some of the problems we have encountered with the newer lifts. Perhaps the biggest problem would be the power system. We may need, and we will be testing, a separate hydraulic package to power the lift. It is possible that the extreme cold affects the fluidity of the oils that are used in the current system. We will know more about this as we get on with the test. The other problems seem to be related to switches and switch adjustment. The tolerances on the switches seem to be very fine. We have more problems with lifts not stowing properly than we do getting them out or we occasionally get them drifting and that causes problems trying to get them back in. The reason that I mentioned the switches and the reason that I said earlier that we're not sure if the location of the lift is the best idea is that we have roads in Ann Arbor that could be used as a torture test by any manufacturer. You know the commercial where they show the truck going up the hill with another truck on the back and it is climbing over boulders, that's nothing compared to one of the streets that we operate on. So if you have a sensitive switch, imagine what it is going to be going through. Some of you probably say well why don't you fix the roads? When we get winter three or four months out of the year it is a deep freeze. Then we get a January thaw. Then we get a February freeze. In this process the roads come apart. In addition to that, we dump tons of salt on the roads and that salt breaks up the ice but also helps break up the roads. Salt also does something else. It puts a very corrosive dust on everything that has to operate in that environment and as of right now we haven't found a lubricant or metal that is going to stand up to it. Again, we are working with the manufacturer of the bus and the lifts and we are going to testing some different drive screws and also some new nuts.

The third area which I mentioned is the driver error. In order to address this whole problem we insist on the lifts being cycled daily by the driver who pulls the bus out and also by the driver who pulls it in. We do this to make sure that familiarity is maintained with the lift and its operation.

We had some problems with our first order of Grumman Flxibles, we had the old EEC lifts on them, and there was an interesting thing about those lifts that in order to get them to stow properly, you essentially had to shut the lift off in the middle of the cycle so that it would relax and then it would stow. The problem was that nobody bothered to write that down on any instructions. It wasn't until one of our mechanics got tired of going out and working with the drivers that we wrote our own instructions and we put them on the visor right above the driver's head. Since then, we have not had as much of a problem with those early generation of lifts. I should point out that those are not the original lifts either because we went out and purchased some spare lifts from somebody that didn't need them any more and then we went in and pulled all of the original lifts, stuck the new ones in and have since used the original lifts as our part warehouse.

Getting back to driver error, another problem that we had was and still is that when the lift drifts, the driver will get out and try to hand pump it back in. The hand pumping on the front of the bus is fine to get it up or down but it will not get it stowed. We had to make sure that all of our drivers understood what they could and could not do relative to that lift, so we periodically have a street supervisor visit each driver and have them run the lift out and bring it back in. In addition to that, we monitor the lift status every day and if we notice, for instance, that a lift worked in the morning and doesn't work in the evening we go and check it. If it works, the driver would have to operate the lift with the supervisor present the next day. We found that some of our drivers who didn't use lifts or who had had runs that ordinarily didn't leave the garage or didn't pull into the garage had lost their familiarity with them. We think that the program that we now have in place is really helping us out.

This is a pretty broad description of what we do and how we do it. In the time remaining to me I would just like to talk about one area in which I am particularly interested. I am glad to be at the conference to learn about and discuss restraint systems. That chair, or Amigo, or whatever else that is on the bus in which somebody sits in order they have the mobility to move about in our communities needs to be securely restrained. As I mentioned, we have a very active Center for Independent Living in town but we have very few people who will use the fixed-route bus. Part of it is obviously the availability of door-to-door service but another part of it comes from a real fear of the restraint system on the bus. All of our coaches have the single or double wheel restraint system, a pin lock or whatever you want to call it, and it really doesn't seem to provide the kind of security that they are used to or that they want. We have had various types of systems on the vans from things that have held the frame or things that locked the wheels to the bulkhead of the van. On the four Orions we have the frame restraints that buckle into the floor.

Of all of the measures that we have seen for providing this restraint or tie-down on the vehicles the one which seems to be the safest at this point is the floor restraint system. It is a four point tie-down system that attaches to the frame and in our case has the wheelchair user facing foward in the vehicle. A lap belt is offered because some people in wheelchairs with the trays on the front don't like to use our seatbelt. They have their own on their chair, and in many cases our lap belt is not properly padded for their particular use. One

of the reasons we like the four point restraint is that it seems to be the only one which really will hold the powered wheelchairs with the mag wheels in place. There's still a little movement because we haven't gotten a real good way to ratchet down that belt yet. It's certainly better than the pin hooks which don't seem to adequately hold the bigger, heavier chairs.

In concluding my remarks this morning let me just summarize something that I mentioned earlier when I said that we were somewhat surprised by what we learned during the input sessions to the potential subcontracting of our service. We thought that we were a pretty sensitive bunch. After all, one whole day of our driver training is spent on having our driver's work with representatives from the Center for Independent Living in sensitivity training. We have to get our drivers to look beyond the wheelchair or the cane or their fears. We thought that we know our Local Advisory Committee. We proposed that before we subcontracted our service we would write into the contract that we had the right of refusal for any driver that the cab company wanted to provide and we also required sensitivity training of each of their drivers who were going to be operating under our contract. Everyone was agreeable and we went through the sensitivity training for the cab drivers. What we really learned was that the tremendous fear on the part of some of the disabled community that they were going to lose something and it's not something that's a frill. It's not some stupid piece of equipment that's too expensive and doesn't work half of the time. It's not some regulation that people grudgingly follow. What they were afraid of was losing mobility, their ability to live a normal life as they want. There was a real fear that we were going to take something away. One of the greatest surprises for our staff was the subsistence level of some of the people using our service - we had no idea of the low incomes of many of our users.

So, in conclusion, I hope that as you go through this workshop and as we talk about bus wheelchair accessibility that we remember the most important component of a successful wheelchair accessible transit system is the people who use it. In order for the system to work, we need to be doing things with the disabled in the community, not for them.

2.1.5 THE THREE "Cs" FOR SUCCESSFUL ACCESSIBILITY: COMMITMENT--COMMITMENT--COMMITMENT

Presented by:
King Cushman
Director of Transit Development
Pierce Transit
Tacoma, Washington

(The views expressed in this paper are the author's and do not necessarily reflect those of the Agency's Board or management.)

INTRODUCTION

Pierce Transit has learned a lot in the past few years about planning and delivery of accessible public transportation programs. We've had some strong successes and have won quite a few awards, but we've also had some problems and failures--we're still involved in a class action lawsuit over accessible service issues. It is hoped a candid sharing of our experiences, good and bad, might help others learn and be able to make wise decisions for effective operation of their accessible services.

It seems that "commitment" or "non-commitment" is the single biggest reason for success or failure with such programs. Pierce Transit operates accessible fixed-routes and a demand response paratransit alternative. Many variations and refinements of the demand responsive alternative have been continuously and successfully in operation since 1973 by Pierce Transit or its predecessor agency, Tacoma Transit, a smaller municipal transit system. From those early days of prioritized and limited medical and seniors' meals-on-wheels type van programs, much progress has been made to provide improved door-to-door accessible paratransit services. In 1985, our demand response service for the disabled averaged nearly 600 people per weekday. It operates with the same fares as the fixed-route bus service, seven days a week, including all but Sunday evenings, for any trip purpose to any destination desired within our service area.

The consistency of our commitment to fully accessible fixed-route services has been more of a mixed bag, but it's finally working well. We've gone from "no service" only 15 months ago to now having over 1,000 daily accessible bus trips on 50 percent of our 42 bus routes. The ridership on this part of the program started slowly, only two in the first month, but it grew to over 400 riders in late fall 1985. It now seems to be settling back to an average of about 250 to 275 per month in 1986, at least until we can get more buses to make more routes accessible. Though we discontinued this program twice, we restarted it three times and got better each time--we finally got the right combination of "commitments" matching the essential components to keep it successfully running.

Before going into a little more depth on what is meant by "commitment" to an accessible services program and the key components for such, it would be useful to describe Pierce Transit's setting; i.e., the transit system and its environment.

Pierce Transit now operates 149 buses (110 in the peak period) on 42 fixed-routes over a 275 square mile service area. We also operate supplemental demand response service for the disabled with 20 vans and contract taxis. The population of the service area was estimated at just over 443,000 in 1985. About one third of the service area has a truly "urban" character, mostly the greater Tacoma area; the rest of the area is suburban or even quite rural in nature. Pierce County is not your ideal transit service area for high ridership, and it is particularly challenging for accessible services, as only the City of Tacoma has a reasonably extensive system of sidewalks with a conscious program for curb cuts. Many routes in suburban and rural areas pose difficulties for locating safe bus stops. The absence of sidewalks, and sometimes shoulders, presents a challenge for reasonably safe access for anyone, so the disabled can find access particularly troublesome. Nonetheless, there are accessible stops, more are going to be improved, and the disabled are making good use of the system.

WHAT ABOUT COMMITMENTS?

Real estate developers say there are three critical elements for success in real estate; location, location, and location. One can use the same theme for success with an accessible services program, except it's "commitment, commitment, commitment." From the general to the specific, this first means a commitment to the program itself, then a commitment from all levels in the system and community that have to make it happen (including those who will have to use it), and finally, a commitment to four key components that are essential for successful follow-through and operation: resources, participation, training, and maintenance. What's meant by each of these commitments and the components?

PROGRAM COMMITMENT

A true commitment to the ultimate success of an accessible services program is distinguished here from just having a policy statement in place to conduct such a program without really believing in it. Sometimes we adopt a policy without making a genuine commitment to it (too often "because we have to"). Running any important program without a real commitment is like saying we're going to field an Olympic basketball team and then throwing uniforms on any five people off the street and sending them into competition--they may look the part, but your team is doomed to failure. Pierce Transit has some experience in this area. We have had a strong and steady commitment to our demand response accessible service program for years, and it has been a quality program with much success. On the other hand, the development and operation of our accessible fixed-route program has not, until lately, had this same commitment. Its record, prior to the last two years, has been more like my Olympic basketball team of street people--it was nicely dressed up, but it lacked skills and commitment to play, and it lost. There had been a "policy" statement saying Pierce Transit would have fully accessible fixed-route services, but there was never a comprehensive or concerted effort to commit all the elements necessary to make it a success; thus it failed in two false starts, 1981 and 1983. Although many involved in the program sincerely wanted it to work, not everyone who had to make it happen believed in it or thought it really could work. With every hurdle or problem that came along (faulty equipment, cost issues, etc.), negative expectations of the naysayers were fulfilled and the accessible fixed-

route program was aborted in a trial operation in early 1981, and then the policy for the accessible fixed-route service was withdrawn in 1983. What happened? If one tried to characterize the failure of Pierce Transit's earlier accessible fixed-route program, it was probably the lack of a philosophical belief in or commitment to fixed-route accessibility; i.e., "normalization." This lack of support for the program was rationally supported by truly deficient wheelchair lifts on the agency's 33 unreliable Grumman buses which required substantial costs to properly fix. Also, there was a sprinkling of well-intended paternalism from many sources that preferred doing "even more" for the disabled with "better" door-to-door services.

Then came the factors which turned the program around again in 1984, but this time it was to be a "commitment." The agency's financial outlook improved by early 1984, taking away the problematical "cost" argument. The costs for the "separate but equal" demand response alternative program were also seen to rise an impressive 64 percent in that one year, and then there was the not incidental filing of a class action lawsuit by the disabled community. The lawsuit requested the reinstatement of accessible fixed-route services. Taken together, Pierce Transit decided by mid-1984 to fully go for accessible fixed-route services and wanted to make it a success. The concept of "normalization" was no longer an abstract, foreign term. It came to be understood that quite a few disabled people in Pierce County really preferred accessible fixed-route services and would make use of them, in spite of other physical barriers and difficulties. However, it was also equally clear that a large number of other disabled persons among the over 6,000 people registered in Pierce Transit's specialized demand response program would not make use of accessible fixed-route services, and they continued to prefer the door-to-door services. Therefore, returning to its original position, Pierce Transit reinstated its dual commitment to accessible fixed-route and demand response services in May of 1984. One year later, after much hustling to fix lifts on the Grumman buses, the accessible fixed-route program was in successful operation and was rapidly expanding. By fall 1985, Pierce Transit had acquired and put into service 39 new accessible Gillig buses and had half its routes and half its total daily bus trips in accessible service. Full blown training programs for drivers, mechanics, and the public were undertaken; schedules were printed marking routes "accessible;" and public information went out about the program. The use of the lifts in accessible service in 1985 rose from two in the first month to over 400 per month by year end. The difference? Commitment to success. This time, it had to work.

PEOPLE COMMITMENT

Who needs to make this commitment? To be effective, an accessible transit program, like any other program you really want to work, needs commitment from all levels in the organization and from the public. These levels of commitment had already been fully demonstrated over the years for Pierce Transit's demand response service program, but now these same commitments had to be repeated and proven for the accessible fixed-route program.

- Board/Policy Makers: The agency's Board is usually a reflection of community values and priorities. They are the ones who have to make the decisions to spend or not spend the money needed for program effectiveness. They have to believe its right and want it to succeed. The Pierce Transit Board got behind this program and made the policy and resource commitments.

- Management: The degree of success and effectiveness is ultimately on management's shoulders. Management is responsible and accountable for the program expenditures and its performance. The extent to which management demonstrates that it really wants the program to work, or only half-heartedly carries out the policy without fully "buying in" to it, will set the tone for how the rest of the organization's staff carry out their part of the action, to make things happen well--or maybe just watch them happen and fail.

- Staff: The commitment from staff is highly important. They truly are the "front line" of a program. The drivers, in particular, are critically important, as they are highly visible and give readily identifiable positive or negative public relations to the program through their own behavior and reactions. At Pierce Transit, all drivers went through special training, not just for operating lift-equipment, but for sensitivity to the needs of the handicapped, with a stress on the importance of the accessible fixed-route program and a clear message from management that any "put downs" or negative public relations about accessible services was unacceptable. Also critical is the "buy in" from other important staff who are very involved, such as mechanics, marketing, and customer services people. More on staff activities later.

- The Public: The all-important ingredient is the public, and this goes for consumers and non-consumers alike. There is no way of separating the collective community commitment to a successful accessible services program from the attitudes and tone set by the Board and management about how they tend to value and support (or not support) and report on or discuss such a program. If all elements are in agreement, it will work, but any weak links result in discord, distrust, and potential failure. The public, as consumers, disabled or not, need to "value" the program, for there will inevitably be some problems that arise, and these take patience, trust, and commitment to overcome. The public has to be willing to try it and support it. It's too easy to avoid involvement or commitment and stand on the sidelines taking cheap shots at the problems that may arise, putting down the program effort as a waste of time and money. The public, riders and non-riders, have to want the program to work. As we've heard it well said before, "If you're not part of the solution, you're probably part of the problem."

ACTION COMMITMENT: THE COMPONENTS FOR SUCCESS

Once there is a commitment to the program from all the right people, what action is needed to make it work? Though certainly not all-inclusive, the action components for success seem to fall into four categories; resources, participation, training, and maintenance.

Resources

The commitment of resources requires recognizing that time and money must be allocated and budgeted for an effective program. This sounds overly

simplistic, but one can find too many examples of program failures that suffered largely from shortsightedness.

Management must begin the process by thoroughly estimating all the labor and materials that have to go into the accessibility program. This means estimating for training; parts and materials for lifts, bus stops, and signs; and time and materials for public information and marketing, to name some of the obvious. The action part of this component then comes from the policy Board which approves the budget, making a commitment of the critical resources. Management and staff have the burden of committing adequate time to the program to assure that proper training takes place and that there is a concerted effort for "quality control" for the effective operation of the program.

Participation

This component has many facets and is an iterative, dynamic process. It is assumed that the program was developed in the first place from some form of a public participation process. At Pierce Transit, this process has been an eclectic ad hoc series of activities utilizing public workshops, attitude surveys, one-on-one consumer accessibility travel training, household mailers and questionnaires, ad hoc citizen committees and a task force--the intent of all of them is to seek the best form or process to yield the optimal citizen, consumer, or community dialogue for input on a given issue. There will be more discussion on the specifics and rationale for Pierce Transit's participation process in a later workshop during this conference. (See paper by same author on "Eclectic Participation" for Workshop D.)

It should be emphasized that there is no one "right" way to effectively conduct or obtain community participation. Pierce Transit has experienced a great deal of success with some very sensitive issues and projects by employing a wide variety of participation techniques. The only time this may have failed on the accessibility program was when a true communication dialogue broke down and "listening" somehow got lost in the process. It was subsequently addressed, however, for a successful conclusion.

Participation, while primarily thought of as part of the "planning" phase of a program, also involves bringing in the public consumers when even setting up the training elements and to assist with a post-operational evaluation of the adequacy and relative satisfaction with the program. They can, and did at Pierce Transit, help identify and recommend the specific routes most desirable for phasing in service in the fixed-route program. Due to equipment and cost constraints, it is realistic to assume that a fixed-route program would not become accessible for all routes simultaneously.

There are other specific detailed questions to face that lend themselves to public input when putting in accessible fixed-routes. In addition to the phasing of the routes as buses become available and accessible, a key concern is whether you go with having all trips on a few given routes accessible, or do you spread the accessible buses around to provide greater coverage on more routes initially, but not on all trips on those routes. The ad hoc citizens committee that advised Pierce Transit on its fixed-route accessible services program felt very strongly that every bus trip on a route that was to be called "accessible" should be accessible before the route went into accessible service. The

citizens in Pierce County felt that only having every other trip or only certain selected trips accessible on a route would be too confusing for the public, and it is unfair to try to "guess" which time a bus trip would be relevant. Better, they felt, to have a route totally accessible, or not at all, at least until sufficient bus equipment could be obtained. From the staff viewpoint, this approach was also far less complicated for equipment assignment and scheduling and for providing clearer public information about accessible services on public schedules. This is an example of no one "right" way. It was a question of community values and an appropriate place for public input.

In a like manner, many changes have been brought about over the past few years in Pierce Transit's demand response service through constructive public input. Some changes have come from customer complaints or comments, but more have resulted from advice from an ad hoc citizen review committee or the special task force on accessible services. These services have changed a great deal from the earlier "priority" trip system which operated only on weekdays, with 24 hour advanced reservations required. With input from the public during sometimes spirited meetings with the staff, the present system has evolved to a seven day a week operation, including all but Sunday evenings, with no trip priorities and more immediate "same day" trip requests. This now includes the ability to request trips almost right away or up to 24 hours in advance.

It needs to be pointed out that it takes time and a fair amount of patience to have an effective public participation process, but the results are worth it. When trying to make decisions about basic judgments on priorities, public needs, and community values, it is far better to take the time to work with and listen to the consumer than hassle two steps forward and one step back, more typical when unilaterally wandering through judgmental "public interest" minefields.

Training

Another one of those terribly important areas. Training is important to many different groups--drivers, mechanics, customer service "trainers," and, of course, the public as consumers of the services. At Pierce Transit, training for drivers to safely and sensitively handle disabled passengers has been going on for years, at least for the demand response service. In 1985, the second time around at Pierce Transit for implementing accessible fixed-route services, the driver training program was quite effective, for it had a top to bottom commitment to success.

Pierce Transit has a total of 263 drivers in the fixed-route and demand response service programs. The existing labor practices allow and encourage drivers to be qualified and trained in both types of services. Although the present level of service for the demand response van service only calls for 20 drivers at any one time, there are 93 drivers fully qualified and trained for the special van service for the disabled, about 35 percent of the total drivers. This interchange of drivers has helped tremendously with successful training and implementation for the more recent accessible fixed-route service, for it has meant that more drivers have had regular day-to-day contact with the disabled and are more attuned to their needs. To head up Pierce Transit's driver training for the accessible fixed-route program, a fairly senior driver was assigned who had 20 years driving experience in the fixed-route area and

four years with the demand response service. He had the respect of the other drivers and brought much credibility to the program as an instructor.

Pierce Transit's first trial in 1981 with accessible fixed-route services failed primarily due to unreliable equipment--the Grumman buses and their EEC (Environmental Equipment Corporation) lifts. However, it was recognized in hindsight that the training program for that first trial probably also fell short of the mark for a good program, as it focused too much on using the equipment and too little on effectively dealing with the disabled passenger. Our current successful program, begun in 1985, addressed this deficiency. Pierce Transit has borrowed heavily from METRO's (Seattle) accessible services training program and used a staff team of Operations, Marketing, and Customer Services to modify the program to fit the needs in Pierce County. One element of training which has been particularly beneficial was the training of supervisors and dispatchers before training the drivers. Now, if any problems develop on the road, the dispatcher has had special training on lift operations from the Maintenance staff and can sometimes "talk through" a problem over the radio without having to send out the maintenance crew or a back-up bus.

Pierce Transit's drivers are trained for fixed-route accessible service in groups of four, with each driver receiving four hours of training. The training curriculum is split between classroom time and "field" training using the bus lifts. The classroom component begins with an excellent movie called A Different Approach, produced in 1978 with funding from the U.S. Department of Health, Education, and Welfare, Office of Education. It was produced by Fern Field and Jim Belcher for the South Bay Mayors Committee for Employment of the Handicapped. ("South Bay" is part of the metropolitan Los Angeles area, California.) The film uses many well-known celebrities to provide a strong message on sensitivity to the handicapped, with a focus on employment. The film delivers a very positive message using a very entertaining medium. A second film used in driver training deals specifically with fixed-route bus accessibility and is called Riding Together. This film was produced in 1981 for the Alameda-Contra Costa Transit District by Parker Productions, Inc., San Mateo, California. It does a good job covering the aspects of mobility and driver-passenger relationships and responsibilities for accessible fixed-route services. Driver training continues with a staff-prepared slide show depicting complete step-by-step procedures and boarding/deboarding operation of the EEC lifts on the Grumman buses and the Lift-U lifts on the Gillig buses.

The "field" aspect of the drivers' accessibility training involves working in the parking lot with wheelchairs and the two types of lifts on the buses to practice boarding, securing, and deboarding a wheelchair passenger. The drivers take turns playing roles and get the feel of being a disabled passenger while learning how to safely conduct the process.

With the special demand response door-to-door service, even more extensive training is provided for the van drivers. Pierce Transit's van drivers receive three full days of training. This is a combination of classroom and "hands on" experience with the equipment and vehicles, though not with vehicles in revenue service. In addition to the sensitivity training described earlier for fixed route drivers, the door-to-door van drivers get special training on the various types of wheelchairs that may be carried, the mechanical aspects of how to move them between the passenger's door and the vehicle, how to get them on and off

the lifts and secure them in tie-downs. Since the demand response service, by definition, can be anywhere in the service area, a good deal of time must also be spent on geography; i.e., familiarization with all the communities and learning how to read maps and understand the various local address systems around Pierce County.

As will be noted later, maintenance is a critical component for a successful program, and the mechanics must also have training on the procedures for routine maintenance and troubleshooting to keep both types of lifts operable. One only wishes the manufacturers would someday learn to develop truly complete and useful manuals for such maintenance and troubleshooting procedures, but that's a widespread deficiency that applies to more equipment than just wheelchair lifts.

The last area to touch on is training for the public, the consumer of the services. Pierce Transit uses its Customer Services Division to head up the training of passengers. Incidentally, this training on how to plan your bus trips and use the fixed-route transit system is available to disabled and non-disabled alike. For the accessible fixed-route services, Pierce Transit periodically advertises the availability of special orientation and training sessions for the disabled to learn how to plan a trip and actually practice using the accessible buses. This training is then conducted when several requests come in. A customer services staff person will go with a specially trained bus driver to a convenient site in a community near the customers desiring the orientation, typically a transit center or one of the special community facilities already involved with the handicapped. The training consists of a brief orientation to the accessible services program, noting the accessible routes, and then taking the time to first observe the wheelchair lift in operation and then practice boarding the lift and getting into and out of a secured place on the bus. This program has been very well received and appreciated. It might be noted that this training takes more of that "commitment." It's a commitment of resources in terms of staff time that carries a message to the public that this program is "valued" and intended to work.

Maintenance

The last component to be discussed is truly a critical "silent partner" for success. In reality, when maintenance has the necessary resources to do their job, all works well and all is quiet. But if maintenance doesn't to its job, for any possible reason, the results are immediate, "noisy," totally negative, and can bring the program to a screeching halt. If the lifts don't work, there is no program.

The demand response vans operated by Pierce Transit are now a well known commodity and have come to be reasonably trouble-free. We've been able to get 120,000 - 140,000 miles out of a gasoline powered van before it wears out. We are now trying diesel powered vans and hope to get around 200,000 miles per vehicle. The lifts have been Collins and Braun varieties and, with proper attention, they have been quite reliable.

The experiences on the fixed-route bus lifts have been quite another story. The original lifts received on the Grumman 870 buses were the EEC model 120B. For reasons to be noted, these have since been retrofitted to work properly.

They originally had a "non-user friendly" control panel that required remembering the proper sequence in which to push three different colored buttons to get the lift ready to operate. With lots of people moving in and out of the bus doors, asking questions, etc., the driver could easily get the wrong sequence or a passenger might bump the button, and then the lift operation would cease or be unable to start. The lift could get stuck in the lowered position (and did, more than once), leaving the total bus inoperable with a bunch of unhappy customers and a humiliated handicapped passenger.

From a "maintenance" perspective, the original lifts were considered quite touchy, and the driver hesitated to use or operate these lifts unless he absolutely had to--exactly the wrong thing to do. Like any other equipment, it has to be used or "exercised" to be kept in proper working order. It is now standard procedure to cycle the lift at least once per day--two or three times is even better. Though the earlier fixed-route accessible service trial failed in 1981, Pierce Transit later put around $150,000 (about $4,500 per lift) into new control panels and a few other modifications to make the lifts reliably operable in 1985.

The other lift in use on the Gillig buses is Lift-U's Model 3036. This lift has worked reasonably well, though, as previously noted, the maintenance manual for this lift is also weak for troubleshooting.

The Maintenance Division has found that both types of lifts have their strengths and weaknesses. Both lifts have significant problems with Pierce County's occasional snow conditions. The problem is not the temperature or moisture but rather the sand that is used on the streets which gets into the lift mechanisms. After last November's ten day snow period, the lifts became inoperable for a six week period before they could all be put back in service. Cleaning out the sand became a critical problem for both types of buses, but no access was possible on the Gillig buses to steam clean the tracks for the Lift-U lifts. The Maintenance Division cut a special access door on the side of the bus beneath the driver's seat to be able to clean these tracks; it works much better now. Shouldn't the manufacturers have considered access for cleaning? Will they in the future? Pierce Transit has suggested this approach, but one wonders if they are listening.

To assure responsible maintenance of lifts for a highly reliable operation takes a commitment of resources--time and materials. The amount needed for proper maintenance may seem like a lot, but it's a "commitment" to an element of the transit system that reflects the community's values. Much like air conditioning on buses in some parts of the country, or building transit centers, bus shelters, or having nice paint jobs and comfortable seating, lifts are just another element of the system, and they all require maintenance to keep them in order. Pierce Transit estimates that it now takes just over $500 per lift per year for directly related maintenance and that this will probably rise to about $750 per lift per year as they get older and, like all older equipment, require more attention. In addition, there are the equivalent of three full-time journeymen-level mechanics whose services are dedicated to the maintenance of wheelchair lifts. One specific journeyman mechanic is directly responsible and accountable for the effective maintenance on the lifts. This works out to a ratio of about one journeyman-level mechanic being required per 24 accessible buses.

Although the program has not been without problems, its success is nonetheless a point of pride for the Maintenance Division, for they truly do keep it all running.

Residual Concerns

Through the experiences of operating accessible public transportation services, and after dealing with the U.S. Department of Transportation's Urban Mass Transportation Administration (UMTA) on issues like accessibility and privatization, a few residual concerns come to mind which may be side issues but relevant to bus wheelchair accessibility. Perhaps these concerns could be addressed later in the workshops at this conference. First, given the apparent absence of any engineering standards for the manufacturing of wheelchairs or related mobility devices, should the public transportation industry itself try to define standards regarding the types of wheelchair devices it can safely transport and for which it can reasonably accept liability? (Some scooter type wheelchairs have been known to tip over and have their bolts shear off in routine transport on public vans.) Second, what is the liability for public transportation agencies which transport individuals needing an attendant but whose attendant only helps the individual at one end of the trip, leaving the individual in the sole care of the transportation agency at the other end of the trip? With fixed-route services, this is a major concern, but how can it be handled? Lastly, should public transportation agencies be expected to deviate from their accessibility policies and standards for equipment, training, and maintenance requirements when dealing with the private sector under the UMTA thrust for privatization?

CONCLUSION

It is hoped that Pierce Transit's experiences with its dual commitment to accessible fixed-route and door-to-door demand response services will be of value and interest to others. A whole lot of people have to care a lot and pay attention to a whole lot of details to keep it all running well. The theme of "commitment" can't be stressed enough as the difference between success or failure with accessible services. Commitment is a must at all levels of an organization and from the community.

2.2 GENERAL SESSION II: SAFETY AND POLICY ISSUES

Moderator:

Joseph G. Reyes, Director of Safety, Southern California Rapid Transit District

Speakers:

Monty C. Lish, Manager of Safety and Training, Municipality of Metropolitan Seattle

William H. Henderson, Program Director, Dial-a-Ride Transportation

John Balog, Associate Manager, Transportation Planning, Ketron, Inc.

Joseph G. Reyes, Director of Safety, Southern California Rapid Transit District

SUMMARY

The purpose of General Session II was to address safety and policy issues for both fixed-route (large buses) and alternative transit (small buses and vans) services. Critical safety problems and operational policy issues related to the provision of accessible services were discussed. Monty Lish discussed Seattle METRO's safety experience with accessible service in the areas of lifts, accessible zones around bus stops, wheelchair securement and operator-related injuries. William Henderson of Dial-A-Ride Transportation discussed some of the many expectations placed upon drivers in accessible transportation service with emphasis on paratransit operations. Henderson also discussed some common system policies' impact on safety. John Balog's presentation dealt with Ketron's work on paratransit safety problems and issues with particular emphasis on emergency evacuation and rescue concerns. Joseph Reyes' presentation addressed development of safety policy and acceptable limits of risks involved with accessible transit. Reyes also discussed Southern California Rapid Transit district's lift safety problems and its test program to evaluate lift barriers.

GENERAL SESSION II: SAFETY AND POLICY ISSUES

2.2.1 METRO TRANSIT'S SAFETY ISSUES WITH A FIXED-ROUTE SYSTEM

Presented by:
Monty C. Lish
Manager of Safety and Training
Municipality of Metropolitan Seattle
Seattle, Washington

After your first day at this session, I'm sure you heard frequently about Seattle METRO's commitment to a fully accessible fixed-route transit system. I shall not belabor that point any further, but I will give you some statistics on the size and activity of our METRO system before launching directly into the safety issues and our approach to them here at METRO.

METRO has an active coach fleet of approximately 1,100 coaches; 600 of these coaches are lift-equipped. By year end, we will add an additional 200 coaches to our fleet, all of which will be lift-equipped coaches. METRO has 190 routes and approximately 100 of these routes have accessible service. Of those 100 accessible routes, 85 percent of the trips provide accessible lift service to wheelchair riders. METRO experiences approximately 200 lift riders per day and METRO's lift service has approximately 97-99 percent reliability in daily service. And, finally, METRO receives approximately 2-3 complaints every month pertaining to our lift service.

Now that you know about us and our lift service activity, let us share with you some of our safety issues with accessible service. These issues have not all been solved and some of them may not have solutions for some time. I will break down the safety issues in four categories: lifts, zones, tie-downs and operators.

LIFTS

With lifts we have had three basic problems to deal with:

1. In 1978 METRO experienced its first wheelchair accident where an electric wheelchair powered over the safety lip or gate.

   The solution to this problem was to reposition the safety gate on the lift to an angle of 70 degrees but no more than 90 degrees, thus to reduce the grip that the wheel could make on the edge of the gate to power over the top. Even with this effort, as well as later getting higher gates for the lift, I cannot say that the problem has been solved.

   In fact, only three weeks ago, we had a passenger inadvertently put the power on the wheelchair and climb the gate when it was in the full up position, thus passenger and chair went to the ground; fortunately there was no injury. It was strictly a passenger error, but again it reminds us of the need to have a more absolute solution to this problem then we have yet been able to gain.

This problem is further exacerbated by the fact that wheelchairs have been changing and improving as we have changed and improved our safety measures. Wheelchairs are getting more powerful and they are getting wheels designed with greater grip, thus it is a problem that needs new focus. This workshop may present us with some eventual solution.

2. The second problem we have had with the lift is a deployment and landing problem wherein the gate will not drop to the sidewalk or street because of the angle of the terrain, sidewalk, or landing pad.

   The solution is simple to identify but difficult to implement. What we do is assure the landing surfaces or pads are constructed in a manner that will ensure a flat horizontal surface that the lift can strike in a full level position.

3. The third lift problem is caused by a passenger activating the power chair before the lift has fully cycled and the safety gate has dropped.

   When this happens, the typical chain of events are: the chair hits the gate, the passenger lurches forward, grabs for the handrail, misses the handrail, grabbing the chair and then the chair and passenger are thrust forward off the nose of the lift.

   This is much like the first problem we spoke of where a wheelchair can power over a gate when the lift is in an extended position and may be fully raised. A satisfactory solution has not yet been found. We have been looking at the placement of handrails and considering that they need to be placed on both sides of the lift and extended in such a manner that a passenger may have easy access to them, whether they are boarding or deboarding in a forward or rear-facing position. We realize this may be difficult to achieve in lift design because we must also be able to store the lift properly, use the front door for regular access, and close the doors without too much mechanical complication.

   A horizontal bar which swings across the lift from handrail to handrail would be a possible solution if it can be properly designed to swing and lock in the controlled, as well as stored, position. This feature is available on a number of personal lifts, but we have not seen them in transit service. It may be better than the side handrails we currently find unsatisfactory.

ZONES

Our second category of problems is the accessible zone, or bus zone. The major problems we face with zones are operational, the first being insufficient room for the zone. As we all know, there is the problem of needing a zone where it is convenient to both the passenger and the stop. In regular service, the individual can maneuver in a relatively close area. The same is not true with a wheelchair and lift, and we have found many zones inadequent in this manner.

A second zone problem is a lack of symmetrical service. That is, zones have to exist in a manner which will provide service to people, not just where zones happen to be perfect leaving them miles apart, but where there is a symmetry so that service is in fact given a fixed-route concept, not simply being where it is most convenient.

A third problem is the lack of safe easement to or from the bus zone. We can sometimes resolve the matters of sufficient room or symmetry of service for an inadequate zone, but we should not unload the passenger and then have no practical way for them to get to their destination in the wheelchair. I must say, we have been a bit "red faced" at times to find we had a zone which within 100 feet was almost totally untendable for a wheel vehicle of any sort, and certainly the configuration of the wheelchair made it hazardous as well as impractical.

Number four on our list of zone problems relates to the one we just mentioned, safe easement. This is poor sidewalk geometry and topography. What I mean is, we have sidewalks in areas that do not consider wheelchair accessibility. While wheelchair ramps have for some time been a priority construction project in our service area, we find there are still areas which have not received modifications to provide the wheelchair accommodation. It is clear that zones should provide sufficient room for lift deployment maneuvering room for passengers in wheelchairs, and access to and from the zone.

We do have an answer to the zone problem. METRO has developed facility guidelines for the implementation of transit route service. There is a checklist of specifications necessary to make an accessible zone. This information is provided to outside contractors, including all city, county, and state engineering departments who have been a significant aid to us in reducing zone problems.

TIE-DOWNS

The third safety problem area continues to be somewhat frustrating, as well as unresolveable, because of the change in wheelchair or mobility equipment being designed for the physically restricted person. There has been some argument in transit circles about what wheelchair tie-downs should achieve in transit vehicles. We accept the position that tie-downs serve to secure the wheelchair, similar to the security provided to regular passenger seats. In discussions involving wheelchair passengers, we have come to understand that a safety belt is a matter of individual decision. As we do not have mandatory belts for other passengers, to be consistent in our service our efforts are to provide a secure seating position.

We are constantly identifying new wheelchair mobility devices which need different securement procedures. The securement straps and wheel claw that we use and modify are constantly challenged by these new pieces of equipment. Often times the manufacturer gives no consideration to tie-down arrangements, and there is certainly a lack of standarization in design and configuration of the chairs. This is an understandable problem brought on by wheelchair passengers who are becoming more mobile and active, owning more than one wheelchair to accommodate a variety of activities.

The criteria we consider in our constant pursuit of this problem are that the tie-down should be:

1. Quick and easy to use by most disabled passengers.

2. Flexible enough to accommodate wheelchairs other than standard manual chairs.

3. Retract away to prevent being hazardous when not in use.

4. Secure the wheelchair at two points, preferrably symmetrically.

5. Position the wheelchair facing forward.

We all recognize that transit has an obligation to see a chair is secure before the coach is put into motion. This provides the same relative degree of safety afforded other passengers. We expect this area to gain more consideration from manufacturers, researchers, and members of the transit industry.

OPERATORS (DRIVERS)

The final category of safety issues, the coach operator, does not fit the typical realm of wheelchair and lift issues. I would be remiss if I did not mention that there is a category of operator injury which has been affected by the wheelchair program. I don't mention this as a deterrent or significant obstacle to providing the wheelchair service, but to remind all transit organizations that in designing procedures for the accessible service, it is necessary to consider the implication on the operator.

We have had a series of injuries wherein the operator identified a faulty lift or the need to assist the wheelchair passenger as the culprit of physical injury. This can be an arm or shoulder pull, back strains and things of this nature. I will not give statistics on industrial injuries related to lift functions or assistance to wheelchair passengers because I am not sure they are completely valid. It has been my experience that industrial injuries tend to conveniently be of the type readily accepted as occuring, and there is little challenge on the part of the organization to deny the circumstances or to challenge the industrial injury claim. I will emphasize again that this area of injury has to be considered in designing the service and the procedures that are expected of the operator. I also believe that there will in fact be some industrial injuries from attempts to assist wheelchair lift passengers.

Finally, I am convinced that the risk of industrial injury and the costs associated with providing this service are not deterrents. Nor do they give me reservation in recommending either in our safety program or in our training program to encourage operator activities and procedures that can make this service more functional and convenient for both the wheelchair passenger and other passengers in the system. As it is often said, we are taking a risk when we get out of bed in the morning, and while any good safety program considers risk, it should not be an excuse for lack of action. It should more accurately be a criteria for well-considered action which achieves the purpose of our

organization: providing transportation to citizens of our community as openly and freely as reasonably possible with the technology and skills we have available to us.

I know what I presented here will not solve any of your individual problems and I certainly didn't suggest that this was my intent. I have tried to give you the benefit of our experiences, both positive and negative, and to share with you those problems which we consider to be unresolved so that we all might do better in our public responsibility in transit service. I know we can learn from all of you as well by listening, and I thank you for listening to me.

GENERAL SESSION II: SAFETY AND POLICY ISSUES

2.2.2 IMPACT THAT EXPECTATIONS PLACED UPON THE OPERATOR AND SYSTEMS POLICIES HAVE UPON SAFETY

Presented by:
William H. Henderson
Program Director
Dial-a-Ride Transportation
Everett, Washington

First, I would like to put into perspective some of the many demands and expectations placed upon drivers in elderly/handicapped transportation service. While the major thrust is toward paratransit service, many of the basic elements apply to fixed-route, fixed scheduled services as well. I will also attempt to relate these demands to safety concerns. Second, I would like to briefly touch on the impact that some fairly common system policies have on safety. Finally, I would like to suggest several recommendations.

After listening to yesterday's general session and resulting comments, it's apparent that community values will have significant impact on the choices of equipment, lift styles and placement on the vehicle.

I hope these issues won't detract from the critical concerns of safety, reliability, comfort, and to some degree, cost/benefits.

It's my intent to focus on the interface between the vehicle and passenger, namely the driver and special assistance equipment.

To set the stage for much of my presentation I would like you to place yourself into the setting I'm about to describe.

You're the driver of a lift-equipped vehicle of indeterminate size. The lift is situated at the rear side or side door.

The lift is an out-of-body, electro-hydraulic type. Controls are door mounted with two buttons, neither are marked (markings which used to be labels have worn off, or are at least indecipherable). The backstop is only 2-1/2 inches high and the latch mechanism does not receive regular inspection or maintenance. Side rails on the lift platform are 1-1/4 inches high.

The passenger from all appearances is moderately to severely disabled and appears to have significant hand, arm and shoulder involvement. The passenger on occasion has muscle spasms in the arms.

The passenger's wheelchair is of a standard configuration, electric and of uncertain vintage but obviously has been in operation for some time. Brakes are cam locking type acting on smooth tires. Wheelchair control is a "joy" stick type. There is no evidence of any means of disengaging the drive system.

You've not driven this vehicle for a long time, nor have you ever transported this particular passenger in the past.

System policy dictates that you have the choice of boarding the chair under the passengers control or yours. The passenger says, "Oh I'll run it on."

Just to complete the picture there's a light, misty rain so the lift platform is damp, tires are wet and your shoe soles are wet. You're wearing glasses which have become somewhat obscured due to the mist.

In light of this scene, we can now take the next step.

If we examine more closely the nature of the demands and expectations placed upon drivers in the special transportation setting, either in paratransit or transit, we can identify a number of things:

1. First, drivers must be top notch, attentive, and careful, probably with unblemished driving records.

2. Second, drivers are the front line customer relations and marketing representatives for the system.

3. Third, they must be excellent psychologists to deal with passengers who may be fearful or forgetful, who may be in various degrees of pain and who may be a pain.

4. Fourth, they must be diagnosticians to recognize what a passenger's mobility problem may be, and then be aware of what assistance they must be prepared to render, if any.

5. Fifth, they must be veritable mechanics to be able to collapse, partially disassemble and otherwise handle the highly variable kinds of personal equipment presented by passengers when boarding.

6. In more extreme cases, especially in more isolated systems, drivers may be expected to carry groceries, assist wheelchairs up or down flights of steps, assist passengers in dressing and assist passengers who may become ill or are incontinent, etc.

7. How many of us fully understand and appreciate the nature of the physical and psychological demands of driving in elderly/handicapped transportation? The general public is bad enough. Now a whole new set of problems are superimposed on the existing ones.

The above are in addition to the requirements for being knowledgeable about the lifts, securement systems and other special equipment on the vehicle including any special safety aspects of the equipment. Within a given fleet many different types of equipment may be in use, thus the driver must be thoroughly familiar with each type and its idiosyncrasies.

Perhaps the most crucial skill of all is the ability to interrelate all of the demands created by the various roles and to recognize the hazards arising

from many situations. The example illustrates this point since many hazards are described, some not so obvious.

Some elaboration of items 4 and 5 might be in order. Impairments with which the driver may have to contend may be physical, sensory (sight, vision, hearing) and psychological, including emotional. They may exist singly or in many combinations and to many different degrees.

In addition to one or more impairments, a passenger may present language problems, ranging from being non-English speaking to being non-verbal. In non-verbal situations, the driver may be communicating via notes from the passenger, electronic communicators, sign language, alphabet boards, Bliss symbol boards, etc.

Compounding the above are a host of invisible impairments including such things as cardiac conditions, respiratory conditions, epilepsy, etc.

We expect the experienced driver to cope with all of these with surprisingly little training and even less information about the passenger.

In recent years another problem has been surfacing. This is the proliferation of new and different types of personal equipment coming on the market.

Judging from some I've seen many items were created, not designed.

Little or no consideration appears to have been given to interfacing passengers' equipment with the transportation system vehicles. In fact manufacturers appear to not even be concerned, apparently feeling they have no responsibility in this area.

Consider that as recently as 20 years ago there were perhaps 3 powered chairs commonly seen and as many as four or five wheelchair manufacturers. Today there may be as many as 15 manufacturers of wheeled chairs. I use "wheeled chairs" since this includes 3-wheel electric scooters, standard types of wheelchairs and their powered versions, powered chairs which are not wheelchairs in the commonly accepted connotation, plus a variety of specialty chairs for children, amputees, etc. I also used the term powered because some devices are powered by small gasoline engines such as seen on European bicycles.

It may not have been the manufacturers' intent that devices such as the 3-wheeled devices and specialty chairs with relatively high speeds be used in place of the wheelchair. However, those in position to prescribe or recommend these devices fail to take this into consideration. The net result is the passenger's expectation to board and remain seated in these devices. The problem is the lack of means to safely secure these devices while in transit. In fact, many of the newer chairs are difficult if not impossible to secure safely. In addition, on some devices the attachments of the seat and arm rests are of questionable strength.

There are many varied types of wheelchair securement systems in use today ranging from pieces of rope to the newly integrated four point chair/passenger securement system marketed by Q Straint of Canada.

Thoughtless and/or careless use of some securement equipment can result in wheelchair damage, e.g. securing wheelchairs only by the wheels on chairs with spoked wheels can result in substantial wheel damage, or when using ratchet securement devices damages the thin-walled tubular frames causing dents or bends in the tubing (which may lead to premature failure in the frames). On older chairs, frame welds are easily broken. Added to these problems may be poor preventive maintenance of the passenger's wheelchair itself, e.g. poor brakes (wheellocks), worn tires, failure to keep tubular frames clean resulting in pitting and weak spots in the frame, broken or loose wheel spokes causing loss of structural integrity of the wheel, etc. The driver must be alert to these problems too.

Finally, the driver has to put up with improperly selected equipment, e.g. wheelchair lift-equipped vehicles without expended tops and doors, equipment which is poorly designed (inadequate back stop height and latches which must be constantly checked), and poor or no maintenance. These shortcomings are compounded by poor quality control in equipment production: cold welds, hinge pins which are not properly secured allowing them to work out, hydraulic lines not properly attached resulting in leaks, and hydraulic lines installed against moving parts, which if undetected can lead to fires.

I would now like to briefly touch on several possible policy concerns.

As I've listened to the various discussions centered around equipment, it seems timely to step back and raise some questions about those we transport. For example, I've not heard anyone say there are perhaps some persons we can't or should not attempt to serve. This becomes especially true in light of today's problems with getting or keeping insurance. If a wheelchair, such as the 3-wheeled types or any type of wheeled device, cannot be safely secured should the passenger be transported in it? The question is not one of refusing the passenger but rather refusing the wheelchair. Is it fair to the driver to be forced to accept the burden of responsibility for safe securement, especially when faced with inadquate securement systems? Should systems be expected to accept persons who must be maintained in prone or supine positions? Should systems be expected to accept persons who cannot safely negotiate steps and instead board them standing on a lift platform which at best is unsafe? It's not my purpose to be judgemental but merely to raise an issue which sooner or later may have to be considered, especially in light of equipment design choices which may result from this conference.

Another area of policy concern is that of work rules. It seems unrealistic to expect to design safe special transportation equipment whose use is predicated upon little or no driver involvement in the boarding, deboarding and securement processes. I can recall one boarding fatality in which the failure of the driver to be available at least contributed to the loss of a disabled person's life. In any event we must presume that for many elderly and disabled persons boarding or deboarding safely will require varying degrees of physical assistance, or at least having someone immediately available to prevent accidents from occurring and resulting in serious injury.

At this point it should be apparent that the training of drivers who must work in elderly/handcapped transportation services should not and cannot be taken lightly. This presumes we've done a good job by selecting those persons who have the temperament and psychological and physical requirements demanded in this kind of service.

I would like to repeat an axiom which was an outgrowth of our experience with the Passenger Assistance Technique Training program. The axiom simply states, "The poorer or less sophisticated the equipment the greater the sophistication, training and skills required of the driver."

Unfortunately training is expensive and time consuming, but this must not be allowed to become a "cop out" to avoid our training obligations.

In conclusion I would like to offer a few thoughts and recommendations for future action.

RECOMMENDATIONS

a. I would like to urge the adoption of minimum driver training profiles, followed by a definition of minimum requirements for training content for each segment of the training profile. Much of the curricula already exists. Some elements need to be tailored for different segments of the transit industry.

b. Much of my second recommendation may have been accomplished or will result from this conference. Namely, the development of standards and specifications for lifts and securement systems. However, I feel we need to go several steps further. If standardized attachment points for wheelchair securement systems could be adopted, either as original equipment or as a retrofit attachment, several benefits would result. First, this would enable wheelchairs to utilize different systems with an assurance of safe securement. Second, this would avoid attaching securement systems to wire spoked wheels, removable foot rests, etc., enhancing safety and minimizing damage to wheelchairs. Third, driver training in the use of securement systems would be simplified.

Finally, the basic mechanical principles of safe securement need to be written out and made available to all drivers and training personnel. While there are several excellent reports on securement they fall short of being readily useable by drivers and trainers. The net result of these recommendations is to get away from the many jury rigged tie-down methods so prevalent today.

c. The time has come to systematically identify the steps that systems can and must take to reduce their liability exposure and accidents. The insurance issue is not going to go away and steps must be taken to prevent system closures due to inability to obtain insurance. This may entail technical assistance from the insurance carriers to be certain that everything is being done that is reasonably possible. The development and implementation of well thought out safety plans would be beneficial.

GENERAL SESSION II: SAFETY AND POLICY ISSUES

2.2.3 PARATRANSIT SYSTEMS: SAFETY AND POLICY ISSUES

Presented by:
John Balog
Associate Manager
Transportation Planning
Ketron, Inc.
Malvern, Pennsylvania

ABSTRACT

The provision of efficient and safe methods for the effective evacuation and rescue of elderly and handicapped (E&H) passengers from standard and modified vans, body-on-chassis small buses, and heavy-duty transit buses is necessary to ensure their safety during system use. Standard methods are not always useful for these patrons as a result of their physical and mental condition and their insufficent ability to manage self-evacuation. Effective methods and equipment are identified and developed as a function of transit use by the E&H, accident incidence types for the various transit vehicles, a study of actual transit vehicle characteristics and their crashworthiness, and an analysis of emergency preparedness forces. Needed equipment is identified along with suggestions for familiarity and simulation training, the development of standard operating procedures, the debriefing of actual accident experiences and the sharing of this technology. An industry-wide Project Review Committee was established and utilized for the purpose of comment and input regarding the development of evacuation and rescue scenarios and alternative methods. Transit operators, State DOTs and transit equipment manufacturers were contacted and interviewed as part of this U.S. Department of Transportation-sponsored research.

INTRODUCTION

The provision of efficient and safe methods for the effective evacuation and rescue (E&R) of passengers from public transit vehicles is necessary to ensure their safety during system use. Methods applicable to the general public, however, may not always be useful in the E&R of elderly and handicapped (E&H) passengers as a result of their physical condition and often their insufficient agility to manage self-evacuation. The identification, development and implementation of effective methods for safely evacuating and rescuing such passengers is absolutely necessary and increases in importance as greater accessibility is provided.

The research reported here was sponsored by the Transportation Systems Center and the Urban Mass Transportation Administration. (1) The specific goal was to identify and evaluate alternative methods which can be used to ensure the safe and timely E&R of E&H passengers from standard and modified paratransit vans, body-on-chassis small buses, heavy-duty urban transit buses, and intercity

buses. The term E&H includes any member of the population who is either elderly or handicapped. One does not have to be both elderly and handicapped in order to be part of the population to which this research is directed. Particular concern is assigned to those who, because of age, handicap, or age and handicap, would find it difficult to escape from an accident involving a public transit vehicle without aid from transit personnel, rescue forces and/or fellow passengers.

An industry-wide Project Review Committee was utilized for the purpose of comment and input regarding the development of E&R scenarios, and the evaluation of alternative methods, equipment, procedures and techniques which were identified or developed by this research program.

THE TRANSPORTATION HANDICAPPED

The transportation characteristics of the E&H population have been extensively studied over the previous decade or so (2, 3, 4), and others mentioned in Reference (1). Much of this work has been concerned with defining a subgroup of this population referred to as the Transportation Handicapped (TH). Section 16(c) of the Urban Mass Transportation Act of 1964, as amended, defines a TH person as:

> Any individual who, by reason of illness, injury, age, congenital malfunction, or other permanent or temporary incapacity or disability, is unable without special facilities or special planning or design to utilize mass transportation facilities as effectively as persons who are not so affected.

The TH differ considerably among themselves in the severity and extent of their disabilities, attitudes toward their physical and mental limitations, income, age, and mobility. Because of these differences, the transportation problems and needs of the TH also differ widely.

A variety of mobility problems are experienced by the transportation handicapped population. A national sample survey (4) of the transportation handicapped population base of 7.44 million studied by UMTA revealed the statistics of Table 2. One can infer that many transportation handicapped individuals experience some combination of the eight mobility problems. It is important to realize that any of these problems can negatively affect E&R efforts.

EVACUATION AND RESCUE FROM PARATRANSIT VANS

Paratransit vans are growing in popularity among the E&H and are providing for significant numbers of trips in areas where coordinated or special efforts systems exist. The E&R of E&H passengers from paratransit vans is more difficult than from other transit vehicles because the incidence of E&H passengers on vans is much greater than on full size transit and intercity buses. This can mean that the only able-bodied occupant of a van which has been involved in an accident may be the driver. Even if the driver is uninjured or only slightly injured, he/she may not be capable of singly extracting E&H passengers from the involved vehicle. Outside help from properly trained rescue, emergency rescue services (EMS) and police individuals will generally be

TABLE 2. INCIDENCE OF GENERAL MOBILITY PROBLEMS AMONG TRANSPORTATION HANDICAPPED PEOPLE

Mobility Problems	Transportation Handicapped With Problem (%)
Difficulty going up or down stairs/inclines	64.9
Difficulty stooping/kneeling/crouching	60.6
Difficulty walking/going more than one block	56.9
Difficulty waiting/standard	56.2
Difficulty lifting or carrying weights up to 10 lbs.	47.3
Difficulty moving in crowds	41.4
Difficulty sitting down or getting up	40.5
Difficulty reaching/handling or grasping	33.5

NOTE: Percents add to more than 100% because of multiple general mobility probblems among transportation handicapped people.

required for non-fire-related incidents. For fire-related emergencies, the passengers and the driver may have to rely on the immediate help and assistance of witnesses and nearby motorists before professional E&R personnel arrive on the scene.

Vans have become commonplace on the nation's highways and typical emergency response individuals may feel a familiarity with them already. However, in paratransit usage, vans are often equipped to seat up to 15 individuals, may be modified with lifts and tie-down devices to serve the special needs of the handicapped or may be equipped with a raised roof structure. The passengers are consequently tightly packaged within the vehicle.

The critical problems associated with the E&R of E&H passengers from vans result from an interaction between the characteristics of:

- o emergency causing incidents (ECI);
- o passengers;
- o van vehicle;
- o E&R forces; and
- o modifying factors.

Emergency Characteristics

The interaction of these characteristics in the development of critical E&R problems is illustrated in Figure 1.

An ECI may be any of the following events:

- o driver incapacitation;
- o collision;
- o rollover;
- o fire;
- o water immersion/submersion; or
- o any combination thereof.

Driver incapacitation is an interesting ECI. If it happens while the van is in motion, it can lead to ten combinations of ECIs as shown in Figure 2. Even if incapacitation happens while the vehicle is stopped, an emergency could develop if, for example:

- o the passengers are retarded to the point of not being capable of taking control of the situation;

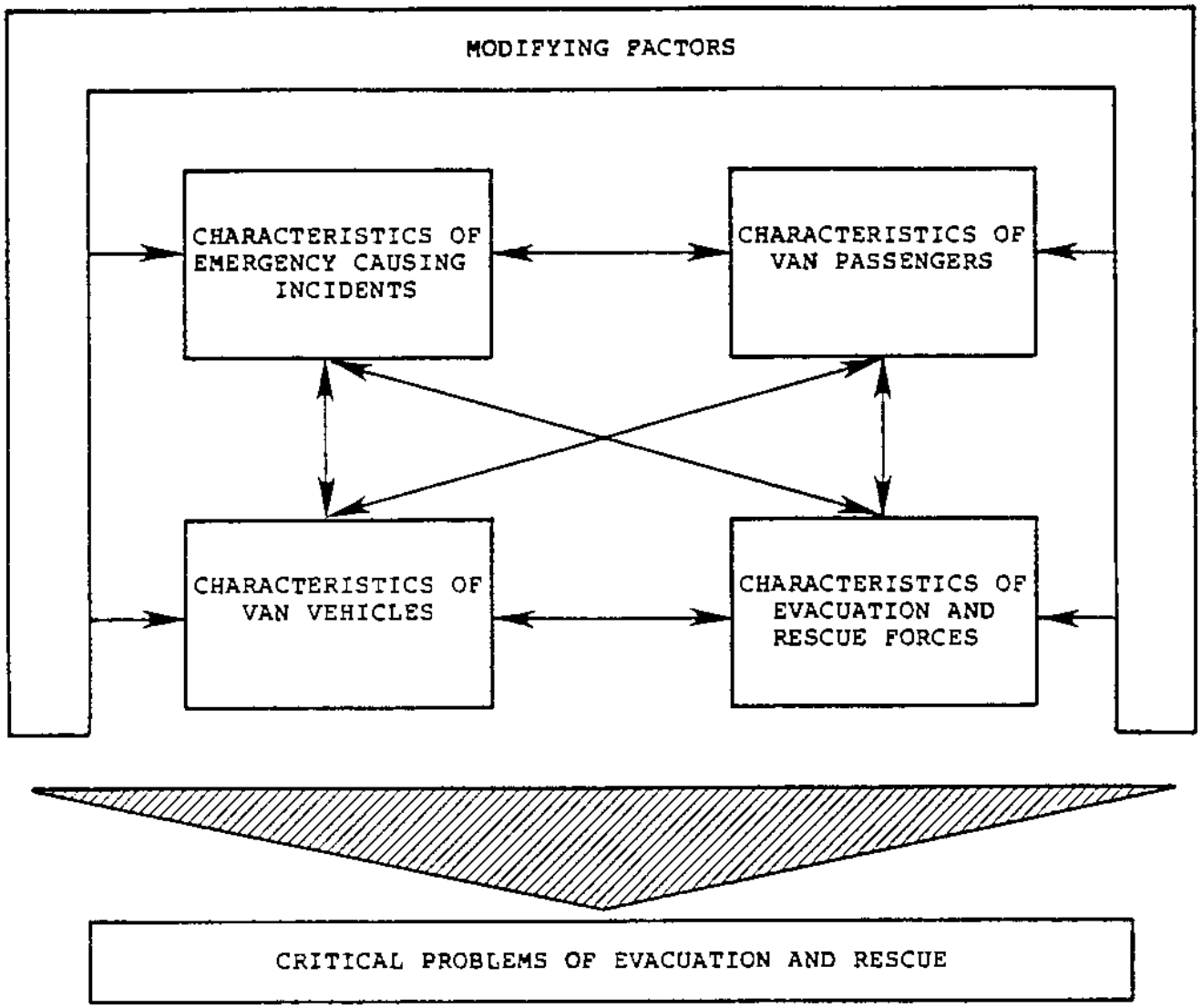


FIGURE 1. COMPONENTS FOR DEVELOPING CRITICAL EVACUATION AND RESCUE PROBLEMS

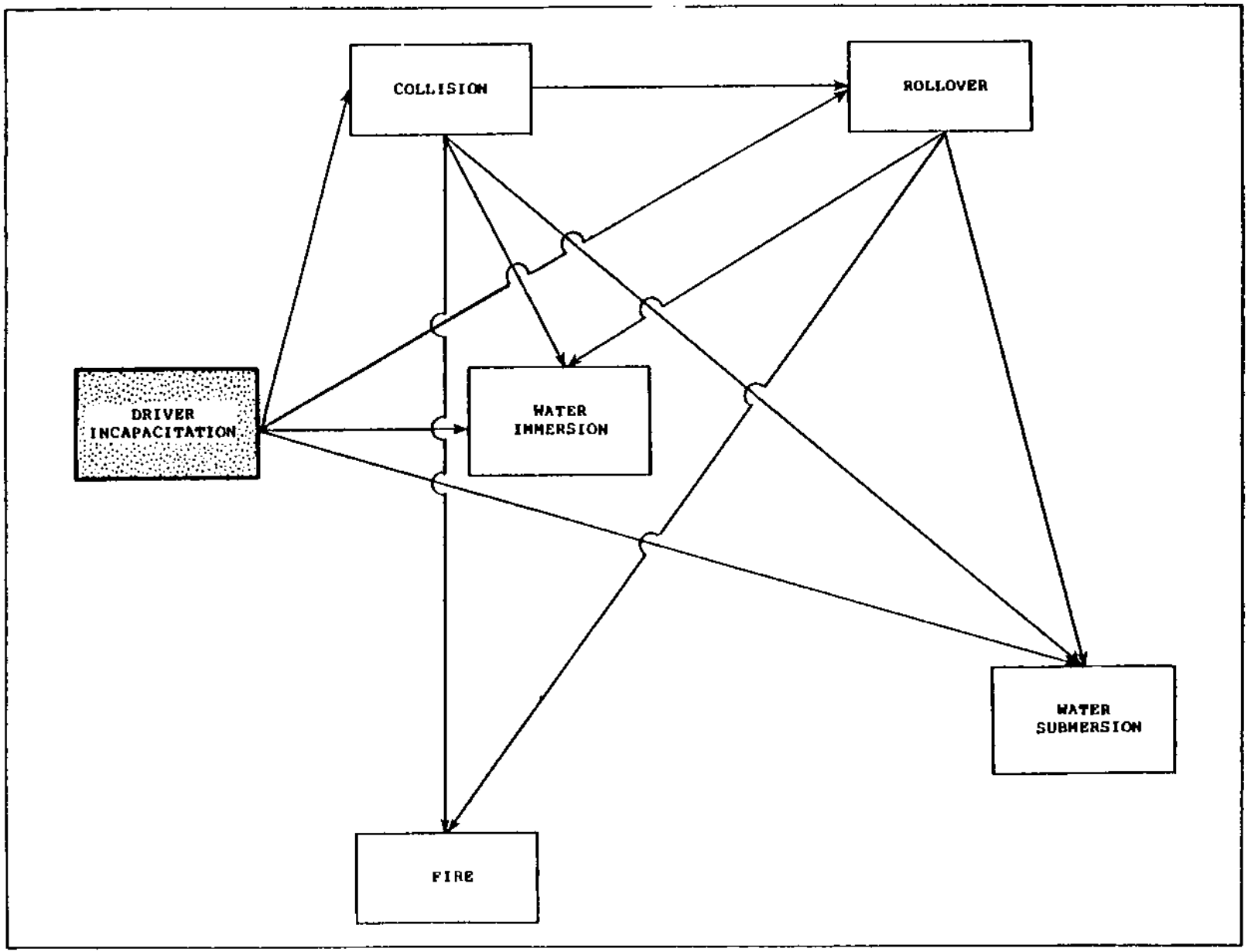


FIGURE 2. SCHEMATIC OF VARIOUS EMERGENCY-CAUSING INCIDENTS INITIATED BY A DRIVER INCAPACITATION

- o the passengers are handicapped to the point, perhaps wheelchair consumers, which would prevent them from easily leaving the van to seek help; or

- o the senility of the passengers prevents them from taking direct positive action.

Schematics of other emergency causing incidents initiated respectively by a collision, rollover, fire or water immersion/submersion are illustrated in Figures 3, 4, 5, and 6.

Of the ECIs or combinations thereof, those which possess a fire or a water immersion/submersion aspect may be most time-immediate in required action. If a van fire starts with the evidence of smoke, the operator may have time to evacuate all occupants before the vehicle becomes totally involved. Such an evacuation would have to be conducted by the operator in a very physical manner; there probably would not be sufficient time available to use a wheelchair lift or ramp. Evacuation should always occur before any effort is made to fight a fire. If the first evidence of a fire is flame, only those most easily assisted would probably have time to escape; a form of triage decision-making would occur.

For example, a paratransit association recently experienced an emergency whereby the engine compartment of a modified van ignited without warning and from an unknown cause. The vehicle was lift-equipped and was carrying eleven retarded adults and a driver. Upon appearance of smoke, the driver evacuated the passengers through the right front door. After getting what he thought was everyone off the van, he counted the passengers and found one to be missing. He reentered the vehicle and had to physically remove one passenger whom had become immobilized as a result of the emergency. Recognizing that retarded individuals have a tendency to wander off, he told all of them to form a single-file line and to move away from the vehicle.

A water submersion would probably result in even fewer survivors. Presumably each of the occupants would be initially dazed by the impact with the water and instinct reactions would govern. With a lift-equipped van, the right side door in most cases would not be functional as an exit. Similarly, with any van equipped with a full width rear seat, the rear door would be difficult at best to use, particularly with the force of the water against it. This leaves only the two cab doors as the most probable exits. The driver side door would be less than ideal for volume escape because of the seat and the position of the steering wheel. The expectation that many would survive from a submerged van is minimal.

The other ECIs can be negotiated to a greater extent because of the probability that some time will be available for E&R and EMS personnel to arrive on the scene and to administer appropriate treatment. However, complex extrication may be required if the van has rolled over. A Council on Aging van, for example, was struck on the left front by an opposing pick-up truck. Six passengers were killed, and five sustained significant injuries. Two of the injured were pinned in the wreckage. The upside down orientation of the van made gaining access to the victims extremely difficult. Roof crush and body distortion also contributed to the problems of E&R and the administration of emergency medical services.

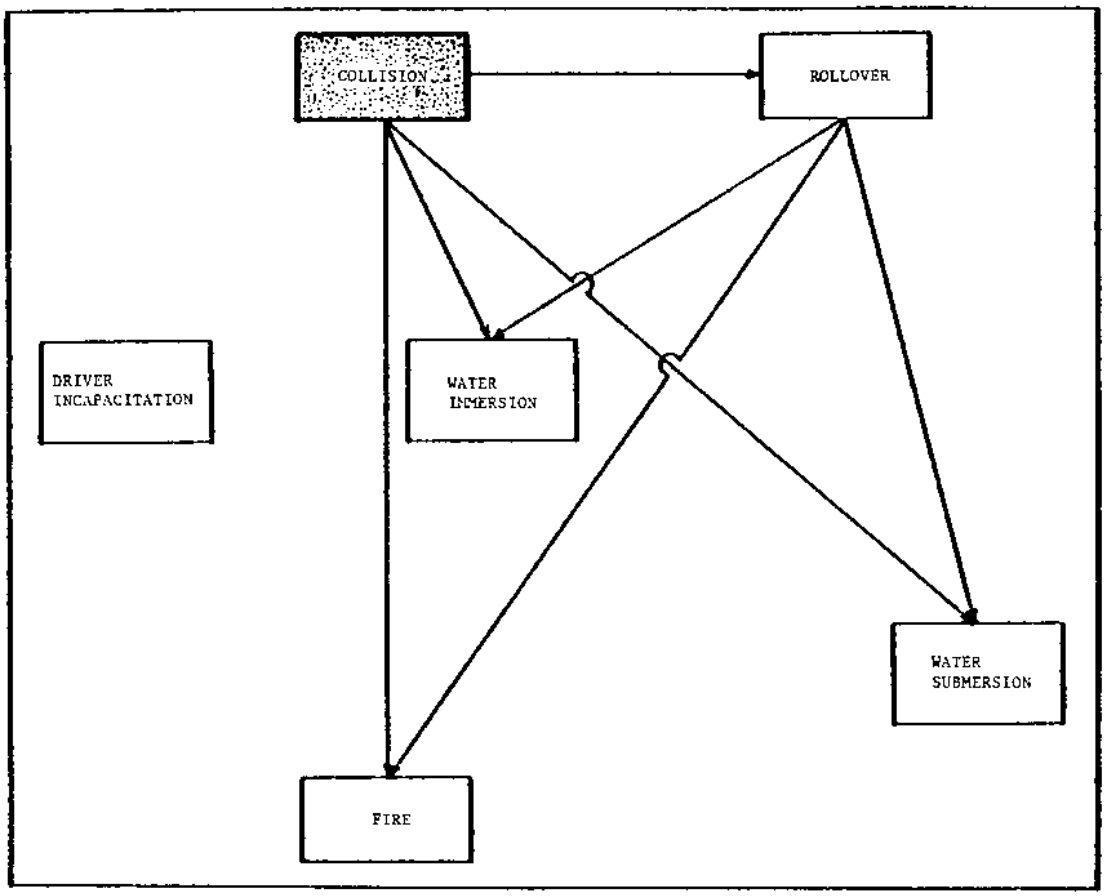


FIGURE 3. EMERGENCY-CAUSING INCIDENT INITIATED BY A COLLISION

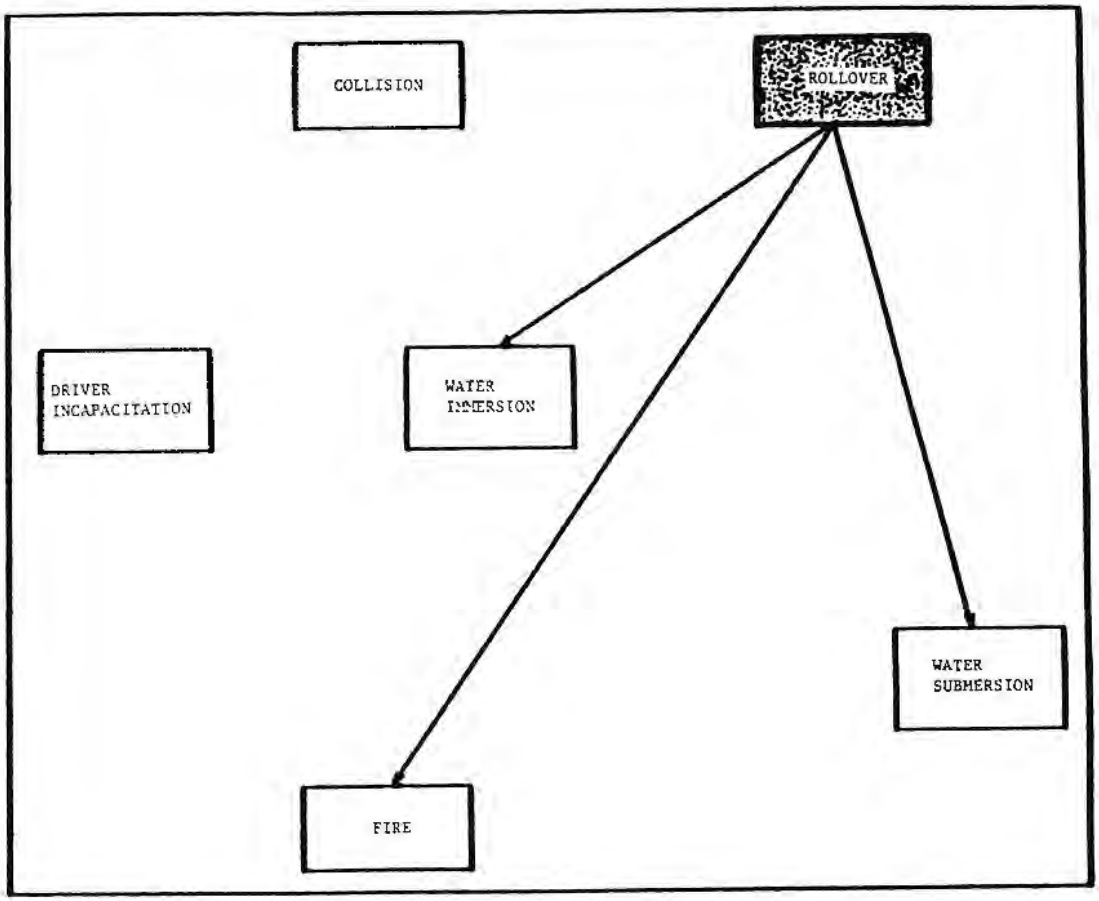


FIGURE 4. EMERGENCY-CAUSING INCIDENT INITIATED BY A ROLLOVER

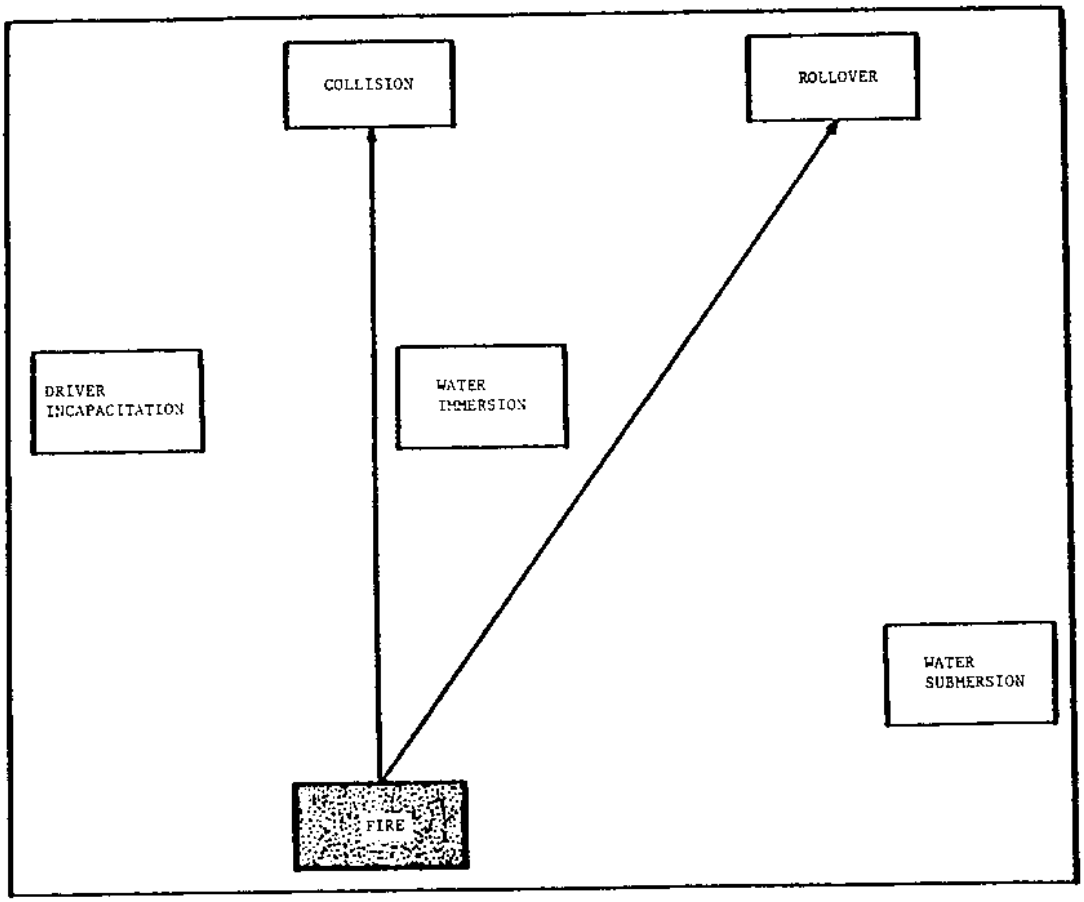


FIGURE 5. EMERGENCY-CAUSING INCIDENT INITIATED BY A FIRE

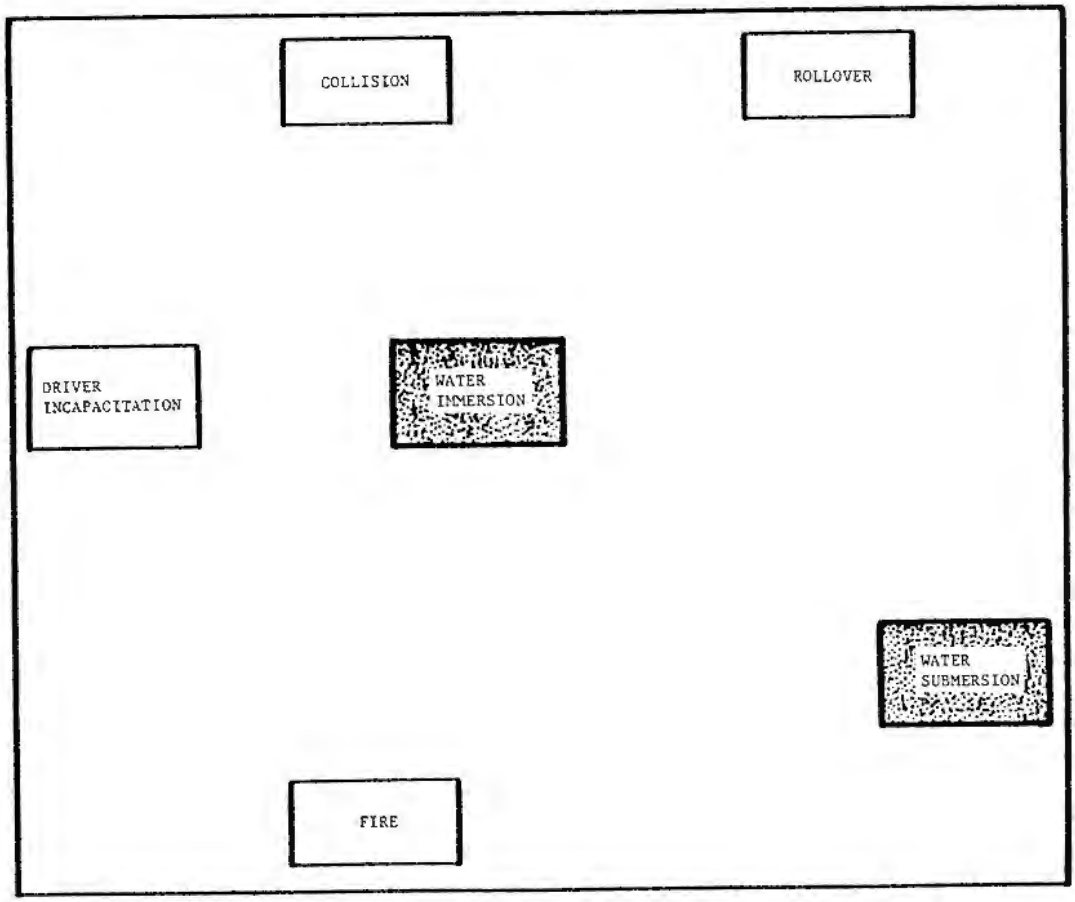


FIGURE 6. EMERGENCY-CAUSING INCIDENT INITIATED BY A WATER IMMERSION/SUBMERSION

Passenger Characteristics

The characteristics of the van passengers play an important role in the development of the critical E&R problems. In the worst cases, they may be:

- o only partially ambulatory;
- o nonambulatory;
- o senile;
- o retarded;
- o blind;
- o deaf; or
- o some combination thereof.

These characteristics cause the following problems for E&R and EMS personnel during an emergency:

- o passengers may not be able to effectively communicate;
- o passengers may have preexisting characteristics, perhaps medical, which may affect the type of emergency treatment and the manner of its administration;
- o passengers may become entrapped or impaled by the very aids that generally improve their life experience (e.g., wheelchairs, tie-downs, walkers, crutches, prostheses);
- o passengers may not be rational;
- o passengers may not be able to physically contribute to extrication maneuvers; and/or
- o passengers may have to be specially packaged before removal from the vehicle and transport to a hospital.

Van Characteristics

The characteristics of paratransit van vehicles also contribute to the development of critical E&R scenarios. For example, they:

- o possess a greater propensity than automobiles to overturn and to jam doors;
- o are often fully utilized with up to 15 occupants;

- o are often equipped with a wheelchair lift device which, in the stored position, can prevent emergency exit through the door in which it is placed;

- o are often equipped with a full width rear seat which can prevent easy emergency exit through the rear door; and

- o may have been modified with a roof structure which has reduced the structural integrity of the vehicle allowing greater crush penetration into the passenger compartment, and/or which has contributed to the ease of passenger ejection.

Rescue Worker Characteristics

Also contributory to the development of scenarios of critical E&R problems are the characteristics of the E&R forces. Assuming that all of the personnel are appropriately motivated to respond to emergencies in an effective manner, the two relevant characteristic bundles are:

- o availability of necessary and appropriate equipment; and

- o demonstrated ability to make best use of all resources as a result of proper education, training and simulation exercises.

Since only minimal experience with van accidents is currently the case for most E&R forces, basic equipment needs can only be the result of speculation. Only more experience and the simulated extrication of E&H passengers from paratransit vans will provide an answer. In any case, the factor can contribute to critical E&R problems.

On the education/training side, definitive comments can be made. The better educated and trained the E&R forces, the more impressive is their performance in an actual emergency. This cannot be overstated. A paratransit van accident is an infrequent occurrence, and yet may require the application of unique and complex techniques. The only way to be prepared is to be familiar with what to expect from the vehicles, and what to expect (or not to expect) from the passengers.

Modifying Factors

The type of ECI, the characteristics of the van vehicle, the passengers and the E&R forces all interact to form a unique, emergency situation. However, there are several modifying factors which can further contribute to the complexity. They include, for example:

- o the time of day of the accident;

- o the day of the week;

- o the location of the accident; and

- o the potential for secondary injuries.

The first three modifying factors can be addressed simultaneously. If the incident is in an urban area, it is probable that it will be identified quickly and that E&R and EMS personnel will be able to reach the scene quickly. In contrast a rural setting may mean that precious time is lost before a passerby notices the accident (particularly if it is of the off-the-road or water immersion/submersion type) and before E&R personnel can arrive on the scene. Similarly, with time of day and day of week, the response time and the number of respondees may affect both the timeliness and the adequacy of emergency action and treatment.

With highway vehicles, there is always the potential for secondary injury to passenger victims and for primary injury to rescue forces, other motorists, witnesses and spectators. They may be caused by:

- o an after-the-accident fire or explosion;
- o involvement of other vehicles with the wreckage, rescue equipment, personnel or victims; and/or
- o ineffective or improper use of equipment and/or extrication methods or procedures as applied to the victims.

Emergency Response Effectiveness

The effectiveness of the E&R of E&H passengers from paratransit vans is a function of three distinct temporal actions:

- o preaccident;
- o prearrival on-site (after accident); and
- o on-site.

The most effective E&R procedures are founded on the following preaccident actions:

- o the use of quality personnel;
- o the continual education of personnel;
- o the continual training and simulation experience of personnel; and
- o the availability of a reasonable quantity of specialized equipment.

Every effort must be taken to ensure that the best available personnel are identified and acquired for E&R and EMS duties. They must be sensitive, properly motivated and dedicated to the saving of lives and the minimization of injuries, and be reasonably intelligent. These carefully selected individuals must be provided with the opportunity to become fully educated with respect to:

- o the incidence of use of paratransit vans by E&H passengers;
- o the physical, mental and emotional characteristics of E&H passengers;

- o the characteristics of the prostheses and orthopedic aids used by E&H passengers;
- o the characteristics of the paratransit vans, including special modifications, primarily used by E&H passengers; and
- o the need in most cases to handle and treat E&H passengers differently than non-E&H passengers.

This necessary education is best accomplished by requiring classroom instruction, direct contact with E&H individuals and the paratransit vehicles they use, and simulations of paratransit van accidents (including collisions, rollovers, fires and water immersion/submersions) using actual or mock E&H "victims." A single simulation is better than none but the best E&R response will come from forces which have experienced multiple simulation exercises designed to acquaint personnel with the uniqueness of paratransit vans and E&H passengers.

It is necessary for the E&R unit to own a basic set of equipment and to be fully familiar through training and simulation with its useful characteristics and capabilities. It is also important to provide simulation training which will encourage personnel to be innovative when necessary to react to unusual or unexpected circumstances.

The effectiveness of E&R procedures are also dependent on the prearrival on-site actions of the emergency preparedness forces. When notice of a van accident is received by an E&R unit, it is imperative that the following be obtained in addition to regular information:

- o whether or not it is a paratransit van;
- o the name of the agency operator (usually on side of van);
- o if it has rolled over; and
- o the number of occupants in the van.

If it is a paratransit van, it can be immediately assumed that all of the passengers are elderly and/or handicapped and that extrication will require considerable effort. An appropriate, probably large, contingent of E&R and EMS personnel should be dispatched to the scene along with an adequate supply of ambulances.

While this contingent is on its way to the scene, the dispatcher or other designated individual should call the agency which operates the van to determine the types of preexisting medical conditions present among the passengers and to associate them with specific individuals. This information should be immediately radioed to the rescue and EMS forces. A representative from the operating agency should also go to the site, if within a reasonable distance, to provide assistance and information to the forces and reassurance to the passengers.

When on-site the E&R and EMS personnel must bring all of their education, training, experience and capabilities to bear on the problem at hand. This means recognizing the presence of E&H passengers, assessing their injuries, providing immediate life-saving actions, stabilizing their injuries, packaging them appropriately (it may be necessary to assume fractures to all limbs and a spinal injury if para- or quadriplegics are on board), extricating them from the vehicle, and transporting them to hospital facilities. This often has to be accomplished without any aid from the injured passengers.

The agency operator of paratransit vans should also help E&R personnel before the incidence of an accident. It is recommended that all van operators should provide the E&R and EMS forces in their service area with the following information:

- o agency name, address and telephone number;
- o names and telephone numbers of responsible primary and backup officials;
- o description of vehicles in fleet including passenger carrying capacity;
- o the characteristics of the passengers most generally transported; and
- o any other information which could be useful to E&R and EMS personnel in the event of an accident.

It is also recommended that each agency should develop a one page summary of the pertinent characteristics of each passenger carried. For example, it would contain:

- o name and address;
- o date of birth;
- o description of individual (eye color, height, weight, hair color, etc.);
- o person to notify in case of emergency (and telephone number);
- o existing medical condition/injuries;
- o unusual characteristics (senility, retardness, deafness, missing limbs, wheelchair consumer, etc.); and
- o name and telephone number of attending physicians, doctors, therapists, etc.

These client-specific summary sheets should be bound in plastic and given to the driver for placement in the vehicle when the client is a passenger. Since many E&H transportation services require advance reservations, the dispatcher could pull the proper emergency information sheets and provide them to the drivers before each day's runs. The intent of the system is to provide E&R and EMS personnel with specific on-site information on the accident victims.

It is also recommended that all paratransit vans be equipped with two-way radios (mounted to also be accessible to passengers) and permanently posted with instructions on how to use them. In the event of an accident or emergency, the driver could call for help. If the driver is incapacitated, a passenger could call for help. Or if the radio is still operable after an accident, E&R personnel may want to converse directly with the agency about a victim.

Another recommendation is that every paratransit van should be equipped with the name of the sponsoring agency on its side and should be provided with a unique identification number. Again, these measures could speed the flow of critical information to E&R and EMS personnel.

Since there are so few paratransit vans as compared to passenger cars, their involvement in an accident is a rare event and perhaps even unique to the rescue and EMS personnel. It is, consequently, imperative that their experiences be fully debriefed, documented and the results disseminated. Such actual experiences could serve as the basis for the development of more effective training programs and simulations and clarify what equipment and procedures were appropriate and useful, and what voids exist and need to be filled. Documentation and full dissemination of such experience would indeed benefit the industry.

EVACUATION AND RESCUE FROM BUSES

As might be expected from its widespread availability, the bus is relied on most frequently by E&H people. It is used by 22 percent of the total E&H population and provides them with 41 percent of their total trips.

The frequency with which the E&H will be encountered on a bus is a very variable quantity. Historically, a large proportion of transit riders have been the captive transit dependents which includes the elderly. Overall the elderly may have represented 40 percent of all transit riders. However, the temporal distribution is not uniform. The number of elderly passengers is significantly lower during peak hours which are largely devoted to work-oriented trips and higher during off-peak service. Consequently, although bus occupancy may be lower during the non-peak period, the proportion of elderly on board may be much higher. Generally, with the exception of some special express bus commuter services, it is probable that there will be elderly on board every bus trip.

The aurally and visually impaired are also frequent users. The deaf and hearing impaired are difficult to recognize but may need special help during an emergency since they would not receive verbal directions unless they were in the position to read lips. The blind person is distinguished by the presence of a cane or a seeing-eye dog. However, currently only about 3 percent of the visually impaired population use dogs.

While the overall incidence of wheelchair consumers within the general population is known to be around 0.2 percent, their transit ridership characteristics are not yet defined. Obviously those systems with inaccessible fleets have zero ridership. It must be emphasized that no major metropolitan area has as yet established a fully accessible bus transit system. However, in Seattle where an overall environmental as well as transportation commitment to accessibility has been made, the rate of wheelchair ridership is approaching that expected from their population incidence. Similar trends are evident in some smaller cities such as Johnstown, PA. where a high level of accessibility is provided.

Buses may most conveniently be divided into three categories: body-on-chassis and other small buses used in paratransit, E&H and small city or rural areas; heavy-duty transit buses designed for long life, low maintenance operation in regular fixed-route transit services; and motor coaches designed for over-the-road intercity service. Buses also experience the same ECIs as vans but their large size and weight generally serve to protect passengers. It is apparent, though, that existing methods for E&R of E&H passengers leave a lot to be desired. Many of the suggestions previously offered in the paratransit van section within the following categorical areas are also directly related to E&R from buses: familiarity/training; equipment training; operational procedures; simulation/training; debriefing of accidents; and technology sharing. This section will consider some of the problems and solutions which are bus-specific.

Emergency Equipment/Information

Some of the existing common emergency equipment is adequate to satisfy needs and should be required by operators to be on board. However, it is apparent that some new equipment needs to be developed and implemented by system operators, bus manufacturers and emergency personnel.

The transit operator should require all purchased buses to be equipped with an appropriate hand-held fire extinguisher and a first aid kit. Drivers should be trained on how to initially fight a fire after all passengers have been evacuated and who to administer basic first aid. Agency operators of buses should paint their names on the sides of their vehicles and provide all relevant emergency information to rescue personnel before the incidence of an accident. Passenger information should also be carried within the vehicle for use by emergency personnel at the time of an accident. Drivers should identify and demonstrate the use of all emergency exits to passengers by using a custom-designed procedure.

The manufacturers of bus vehicles should recognize that their vehicles could become involved in an emergency incident and as a result should be equipped with information on how to get out of the bus which is directed to passengers and information on how to get into the bus which is directed to rescue forces. For example, information on the location of emergency exits should be clearly and permanently attached to the interior of the vehicle.

Ideally, passengers should have more than one egress option. Information should also be posted on how to open the exit. This is an area where standardization of symbols and location of information is needed.

Rescue forces need to know which windows are meant to be used as exits. Generally, none of the buses have any information on their outside that would help emergency personnel or others to gain access to the interior of the vehicle. Yet if a bus turns over on its door side, the only available exits are the windows or the roof escape hatches. With respect to the escape hatch, no information is on the top (outside) of the bus or on its side indicating existence of the hatch. The two most widely used roof escape hatches vary greatly in their design and in their ability to be easily opened from the outside by E&R forces.

Information should also be placed on the outside of vehicles with respect to how to open the door. Some intercity coaches are equipped with an outside door opener but no attention is drawn to it by way of verbage or symbols. One can appreciate that much of this is done with the intent to prevent theft and vandalism. However, the goals of access and security could probably both be realized with a clever application. In some ways, this is similar to the universal key concept for rail transit systems.

The final suggestion to manufacturers is the need to produce a reasonably inexpensive, reliable and effective engine compartment fire suppression system. Several currently exist and in many ways are quite effective, but improvements could still be made. A suppression system can be the first step in the E&R process associated with a fire incident; and indeed could either eliminate the cause of the emergency or provide valuable time.

Emergency forces also have need for the development of additional equipment related to the effective use of window exits. If a bus equipped with hinged windows turns on its side or on its roof, the windows, once disengaged, fall by gravity to the side of the bus in newer models or remain vertical and facilitate escape. In contrast, accidents, whereby the vehicle remains upright and the door is blocked or rendered inoperable, require that the emergency exit windows be used. The simple question is how does one keep the window open while EMS personnel and supplies enter the passenger compartment and while injured passengers, some on stretchers or backboards are removed? Obviously expandable poles can be used and need to be made available at low cost to emergency forces. In addition to facilitating access, an effective device would prevent a 40 to 80 pound window from falling onto a passenger or an emergency individual.

Also related to the window exit equipment situation is the need for a short ladder which can be used to reach the windows from the ground if the bus is upright or to reach the side of an overturned bus. This should not be a difficult development problem. The question to be raised is whether such ladders should be carried on the vehicle during revenue service?

Lastly, emergency personnel should be creative in their response to an emergency. For example, the author witnessed an accident simulation which included a victim with a spinal injury. The EMS personnel struggled for quite some time trying to place a canvas and stave spinal immobilization device on the victim. In reality, this victim would have probably suffered a great deal during this struggle. However, it seems apparent that the victim was already in a contoured device, the seat, and it would have been more effective to strap him to the seat and to remove the seat from the vehicle.

Learning And Sharing

Every transit system or operator investigates each accident that it experiences in order to determine whether or not it was avoidable and to assign disciplinary action. Few systems or operators debrief with the intent of identifying what E&R methods were effective and which were not, what changes should be made to standard operating procedures (SOP) if they exist and what modifications should be made to the vehicles or their safety equipment. Yet this is exactly the type of information that needs to be collected. If it was it could also be disseminated to all interested individuals and groups and produce a positive educational benefit.

The sharing of technology associated with the crashworthiness of bus vehicles and the techniques of E&R from them is encouraged. Systems/operators are also encouraged to contribute to the identification and development of E&R equipment and techniques. A formal program via the American Public Transit Association (APTA) may be a methodology for distributing the cost burden among all operators.

SUMMARY

A summary of the results of the research is as follows.

- The provision of efficient and safe methods for the effective E&R of E&H passengers from paratransit vans, body-on-chassis small buses, heavy-duty urban transit and intercity motor coach buses is necessary to ensure their safety.

- E&H individuals can be found as a passenger majority on standard and modified paratransit vans, and on body-on-chassis small buses. In contrast they are found to lesser degrees on urban transit buses and intercity motor coaches. Their incidence on vans and small buses is expected to increase due to special effort services being provided by transit operators. The existing incidence of travel on the remaining kinds of buses is expected to remain constant.

- Standard paratransit vans seem to possess sufficient crashworthiness characteristics but appear to be more inclined than automobiles to roll over in accidents. Modified vans, if properly constructed, possess safety characteristics similar to standard vans. However, poorly

designed raised roof structures, wheelchair lifts that block entrances and which are not effectively counterbalanced, and other poorly accomplished modifications have proven to reduce the degree of safety associated with some modified vans.

- Body-on-chassis small buses, if properly designed and constructed, seem to possess sufficient crashworthiness characteristics but appear to be more inclined than automobiles to roll over in accidents. One body-on-chassis small bus exhibited poor crashworthiness.

- Heavy-duty urban transit buses and intercity motor coach buses seem to exhibit positive crashworthiness characteristics.

- The crashworthiness of highway transit vehicles is important since it influences the kind of crush that can be incurred and as a result the amount of entrapment and the kind of equipment and procedures that must be used to effect extrication.

- Standard automotive E&R techniques serve as a basis for the E&R of E&H passengers from transit vehicles but are not sufficient in and of themselves. Passengers may be only partially ambulatory, nonambulatory, senile, retarded, blind, deaf or some combination thereof. These characteristics cause problems for E&R and EMS personnel, as E&H passengers may not be able to effectively communicate; have preexisting conditions (e.g., medical) which may affect the type of emergency treatment and its administration; become entrapped or impaled by their mechanical aids; not be rational; not be able to physically contribute to extrication maneuvers; and/or have to be specially packaged before removal from the vehicle and transport to a hospital.

- Various identified scenarios of emergency causing incidents and accident types were determined. Evaluation of the methods and equipment characteristics with respect to these scenarios reveals a number of shortcomings which fall into the following generic categories: familiarity/training; equipment/training; operational procedures; simulation/training; technology sharing; and debriefing of accidents.

- There is a definite need for emergency preparedness individuals to become familiar with the characteristics of each of the transit vehicles and the environment in which they operate, and the characteristics of E&H passengers. Transit operators need to interface with emergency forces and to contribute to preaccident familiarity.

- There is a definite need for the development of specific E&R equipment and for creativity on the part of rescue forces in the application and use of currently available equipment.

- There is a definite need for the development and implementation of standard operating procedures for transit operators and for emergency forces. These developments should be jointly accomplished.

- There is a definite need for properly designed and conducted simulation training exercises which occur regularly and which fully involve all relevant parties including actual or mock E&H passengers.

- There is a definite need for the expansion of existing technology sharing programs to include information on E&R. This will require E&R forces, transit operators and others within the industry to fully document experiences and to convey this information to appropriate governmental or industry officials.

- There is a definite need for the debriefing of all transit accidents which required the E&R of E&H passengers in order to gain additional information on the degree of effectiveness associated with existing techniques and equipment and to identify newly developed methodologies and equipment. This needs to be done in concert with a technology sharing program.

REFERENCES

1. Balog, J., et al., Evacuation and Rescue of Elderly and Handicapped Passengers from Paratransit Vans and Buses, Transportation Systems Center and Urban Mass Transportation Administration, Contract No. DTRS-57-81-00144, May 1983.

2. Crain and Associates, Transportation Problems of the Handicapped: Volume I: The Transportation Handicapped Population, Definition and Counts, Washington, D.C.: U.S. DOT/UMTA, Report No. CA-OG-0092, August 1976.

3. Michaels, R.M., and N.S. Weiler, Transportation Needs of the Mobility Limited, Northeastern Illinois Planning Commission, Evanston, 1974.

4. Grey Advertising, Inc., Summary Report of Data From National Survey of Transportation Handicapped People, UMTA/U.S. DOT, Washington, D.C., June 1978.

ACKNOWLEDGMENTS

The successful completion of every project is supported by a number of individuals who tend to serve without seeking direct attribution for their contributions. With this project, the number is significant: Messrs. Arthur L. Flores, William T. Hathaway, Irving Litant, Stuart Palonen, Richard J. Porcaro, Donald E. Sussman, and Ms. Stephanie H. Markos from the Transportation Systems Center; Messrs. Abdo S. Ahmed, Roy Field, Jeffery G. Mora, and Lloyd G. Murphy and Ms. Patricia Cass from the Urban Mass Transportation Administration; George L. Cancro, Robert S. Carpenter, Richard Fasy, Farnham Folsom, Terrence J. Moakley, Thomas O'Brien, Albert Sergio, Robert Williams, and Ms. Carmello Strano, the Members of the Industry-Wide Review Committee whom contributed significant amounts of time and expert comment on the draft documents and at the Review Committee Meetings; and Robert Scott from our subcontractor, the University of Michigan Transportation Research Institute.

GENERAL SESSION II: SAFETY AND POLICY ISSUES

2.2.4 SAFETY POLICY DEVELOPMENT: DETERMINING ACCEPTABLE LIMITS OF RISK

Presented by:
Joseph G. Reyes
Director of Safety
Southern California Rapid Transit District
Los Angeles, California

I. Making the Determination as to "What is Safe"

- o Differing perspectives
  - -- lift/bus manufacturer's viewpoint
  - -- safety professional's viewpoint
  - -- patron's viewpoint (security - reliability)
- o Ideal vs acceptable levels of risk
- o "Safety" is the level of risk that is deemed to be acceptable
- o Safety practioner determines the tolerance levels which are acceptable based upon various risk factors including:
  - -- cost vs benefits
  - -- exposure vs experience (frequency/severity)
  - -- actual vs potential losses
  - -- political considerations

II. Evaluating Risk Factors

- o Analysis encompasses many techniques - subjective/objective
- o Qualitative (subjective) techniques may be sufficient
- o Many political decisions are based upon qualitative influences ("Don't confuse me with facts, I've already made up my mind")
- o Examples of qualitative reviews include:
  - -- review of miscellaneous of incident reports
  - -- review of passenger complaints
  - -- investigation of accidents and review of reports

-- epidemiologic analysis (statistical/historical experience)

-- failure analysis (logic display of failure modes probability)

-- non-destructive systems testing

III. Risk Management Alternatives

- o Risk Avoidance - restrict use of accessible service systems
  - contract for services (paratransit alternatives)
- o Risk Transfer - limit liability through contract specifications
  - pursue recovery for faulty equipment under contract/waranty provisions
- o Risk Assumption - accept financial liability up to set limitations
  - self insurance - self-retention - excess coverage
- o Risk Control - design new operating procedures to mitigate risk
  - provide warning or caution notices
  - develop new design specifications to improve safety assurance and reliability of equipment
  - draw support and cooperation of disabled community in developing patron safety awareness campaigns
  - obtain improved and safer lifts

IV. Applying Safety Theory and Risk Management to Practice at the SCRTD

Risk Evaluations/Analysis

- o Review of accident history by type bus/lift (See Table 3)
- o Review of claims - description of causes (See Table 4)
- o Report of vehicle lifts (See Table 5)
- o Accident rate analysis (See Table 6)
- o Hazard evaluation matrix (See Figure 7)
- o Failure analysis

Risk Controls

- o Accident investigation
- o Plan of action/accomplishments

TABLE 3. SUMMARY OF COACHES AND WHEELCHAIR LIFT TYPES

SCRTD SERIES	* COACH MFG.	COACH MODEL	DELIVERY YEAR	**LIFT MFG.	LIFT LOCATION	NO. LIFTS IN SERVICE	WHEELCHAIR LIFT INCIDENTS 1982	1983	1984	GROUP TOTALS
3300	NEOPLAN	AN-440-A	1984	EEC	FRONT	415	-	-	4	4
4100	CBW	CBW-300	1984	EEC	REAR	32	-	-	-	
4132	CBW	CBW-300	1984	LIFT-U	FRONT	30	-	-	-	
4400	GMC	T70-604	1982	GMC	REAR	35	-	-	-	
7500	GFC	53102-8V-1	1980	EEC	FRONT	230	3	1	4	8
8000	AMG	10240B-8	1977	TDT	FRONT	200	5	2	1	8
8200	GMC	T80-204	1978	GMC	REAR	939	3	2	1	6
9250	§AMG/M.A.N.	SG220-18-2A	1978	EEC	REAR	10	-	-	-	
				UNKNOWN - Blind Claims			2	2	1	5
					TOTALS 1981		13	7	11	31

NO. OF LIFTS BY MFG. AND LIFT LOCATION:

EEC FRONT - 645 = 34%
EEC REAR - 42 = 2%

GMC REAR - 974 = 52%
LIFT-U - 30 = 2%

TDT FRONT - 200 = 10%

EEC TOTAL - 687 = 36%

* CBW - Carpenter Body Works
GMC - General Motors Corporation
GFC - Grumman Flxible Corporation
GFC - AM General
§AMG/M.A.N. - AM General (purchased from Golden Gate Transit 1983, in service January 1984).

** EEC - Environmental Equipment Corporation
Lift-U - Lift-U
GMC - General Motors Corporation
TDT - Technical Design & Technology

TABLE 4. REVIEW OF CLAIMS, DESCRIPTION OF CAUSES

CLAIM NUMBER	TOTAL RESERVES	PAYMENTS	BRIEF FACTS
235/060197	$ 2,500.00		Claimant caused wheel chair to "over-power". Chair failed to stop on lift and fell to ground.
238/059069	2,500.00		Man in wheel chair fell in front of bus.
238/060529	2,500.00		Lift tilted forward causing claimant to fall from lift.
288/055659	13,900.00		As bus moved forward, bus struck wheel chair prior to claimant's boarding.
288/056905		$1,500.00	Claimant fell back as he backed off lift.
288/059280	12,500.00		Lift gate (restraint) failed and claimant rolled forward and fell to sidewalk.
702/059488	2,500.00		Claimant fell from platform as he was moving off of lift.
702/060890	5,000.00		Claimant's electric wheel chair moved forward too fast.
718/055509	Closed without Payment		Operator damaged wheel chair as he helped claimant.
718/059436	Closed without Payment		Wheel chair flipped over as claimant exited lift.

TABLE 5. REPORT OF VEHICLE LIFTS, APRIL 1985

	VEHICLE	DIV	LINE	BUS RUN	OPER ID	MECH ID	DATE	CODES	COMP CODE	PROBLEM DESCRIPTIONS
ROADCALL:	8269	18	081	51	10935		04/01/85	1785		HELD FOR REPAIR.
	8269	18	120	03	08763	05047	04/03/85	1981		OPERATOR ERROR
	8269	18	053	04	09811	08362	04/13/85	1185		HELD FOR REPAIR
	8269	18	053	10	04053	06716	04/19/85	1585		CLEANEDCOACH&LEFTINSERV.
	8269	18	225	06	00168	06137	04/24/85	2104		CHNGD. FUEL FILTERS
CS10:	8292	18	051	<54	00591		04/25/85	BOP		LIFT INOPERABLE
	8292	18	207	<22	03258		04/29/85	BOP		SAFETY GATE B.O.
ROADCALL:	8292	18	053	12	00000	00000	04/01/85	2189		CANCELLED BY DISP.
	8292	18	081	51	07890	05513	04/11/85	1285		NO DEFECTS FOUND
	8292	18	207	22	03258	00000	04/29/85	1685		WHEELCAHIR BARRIER STUCK
VMS MAINT:	8292					06706	04/27/85	1674	16	CHAIR LIFT SYSTEM
	8292					13035	04/29/85	1674	41	CHAIR LIFT SYSTEM
CS10:	8294	06	033	<01	07287		04/09/85	BOO		LIFT WON'T DEPLOY; CLRD
ROADCALL:	8294	06	004	06	03000		04/23/85	1585		REAR DOOR O.K..
CS10:	8295	06	004	<03	10612		04/12/85	BOP		LIFT WON'T DEPLOY
ROADCALL:	8295	06	033	03	02619	06774	04/03/85	2585		FAULTY HEADSIGN
	8295	06	004	06	D6234	R/OP.	04/15/85	3185		HEADSIGN BULB BURNT
	8295	06	004	05	03502		04/17/85	3185		NOT TRANSMITTING MESSAGE
	8295	06	004	41	00000		04/22/85	1584		SICK PASSENGER
VMS MAINT:	8295					11822	04/13/85	1674	22	CHAIR LIFT SYSTEM
CS10:	8330	07	028	<01	00000		04/22/85	80		FAULTY LIFT
ROADCALL:	8330	07	001	07	03523	01941	04/13/85	1645		REPLACED LEVEL VALVE
	8330	07	004	52	02191	03194	04/15/85	1625		CHG. KNEELING SENSOR
	8330	07	002	10	10817	04959	04/27/85	2019		WONT START
	8330	07	010	03	09780	11333	04/28/85	1701		CHANGED HEATER PUMP
	8330	07	014	56	02403		04/30/85	21		
VMS MAINT:	8330					06283	04/15/85	1676	24	KNEELING SYSTEM
	8330					03819	04/18/85	1674	21	CHAIR LIFT SYSTEM
	8330					03819	04/23/85	1674	14	CHAIR LIFT SYSTEM
CS10:	8339	07	002	<14	01790		04/23/85	80		LIFT WON'T STOW; CLRD
ROADCALL:	8339	07	028	07	09445	06371	04/02/85	2102		REPLACE FOOT VALVE
	8339	07	010	14	00934	OPERA	04/03/85	2183		NO DEFECTS
	8339	07	002	01	09527	07397	04/12/85	1719		DEAD BATTERY
	8339	07	002	14	01790	00000	04/23/85	2189		CANCELLED
VMS MAINT:	8339					06370	04/29/85	9952	16	FRT.AXL.BRK.RELINE
CS10:	8356	07	004	<52	07349		04/20/85	BOP		LIFT RED TAGGED

TABLE 6. WHEELCHAIR LIFT SAFETY ACCIDENT RATE ANALYSIS

Risk Assessment

The risk exposure for wheelchair patrons is substantially higher than for ambulatory patrons. Wheelchair patrons have an accident rate over 350 times greater than ambulatory passengers. The present accident rate for ambulatory passengers is .2 accidents per 100,000 boardings. By contrast, wheelchair patrons are presently experiencing an accident rate of 73.3 per 100,000 boardings. This equates to an average of 1.5 wheelchair accidents per month.

Furthermore, the number of accidents involving wheelchair patrons has increased during the past year. An aggregate amount of $1.2 million has been reserved for wheelchair accident claims so far in 1985. It is evident that loss control and reduction efforts must be initiated to mitigate the risk exposure to this population and reduce the District's loss potential.

Analysis

Recent tests conducted with various wheelchairs demonstrated that wheelchair lift safety barriers are inadequate for restraining electric wheelchairs (see exhibits). These tests have also documented that proper adjustment of the outer barrier is necessary as required by the EEC Maintenance Manual.

The safety barriers for the EEC, Lift-U and GMC wheelchair lifts are pseudo-safety measures provided by the lift manufacturers. The safety barrier restraint test recently undertaken with various electric-powered wheelchairs demonstrated that the wheelchairs can override the barrier. Until modifications to the District's wheelchair lift specifications are developed and result in changes to the District's fleet, follow-up actions should be initiated to reduce the District's liability expense and increase patron safety.

EXCERPT FROM MANAGEMENT REPORT
JUNE 5, 1985

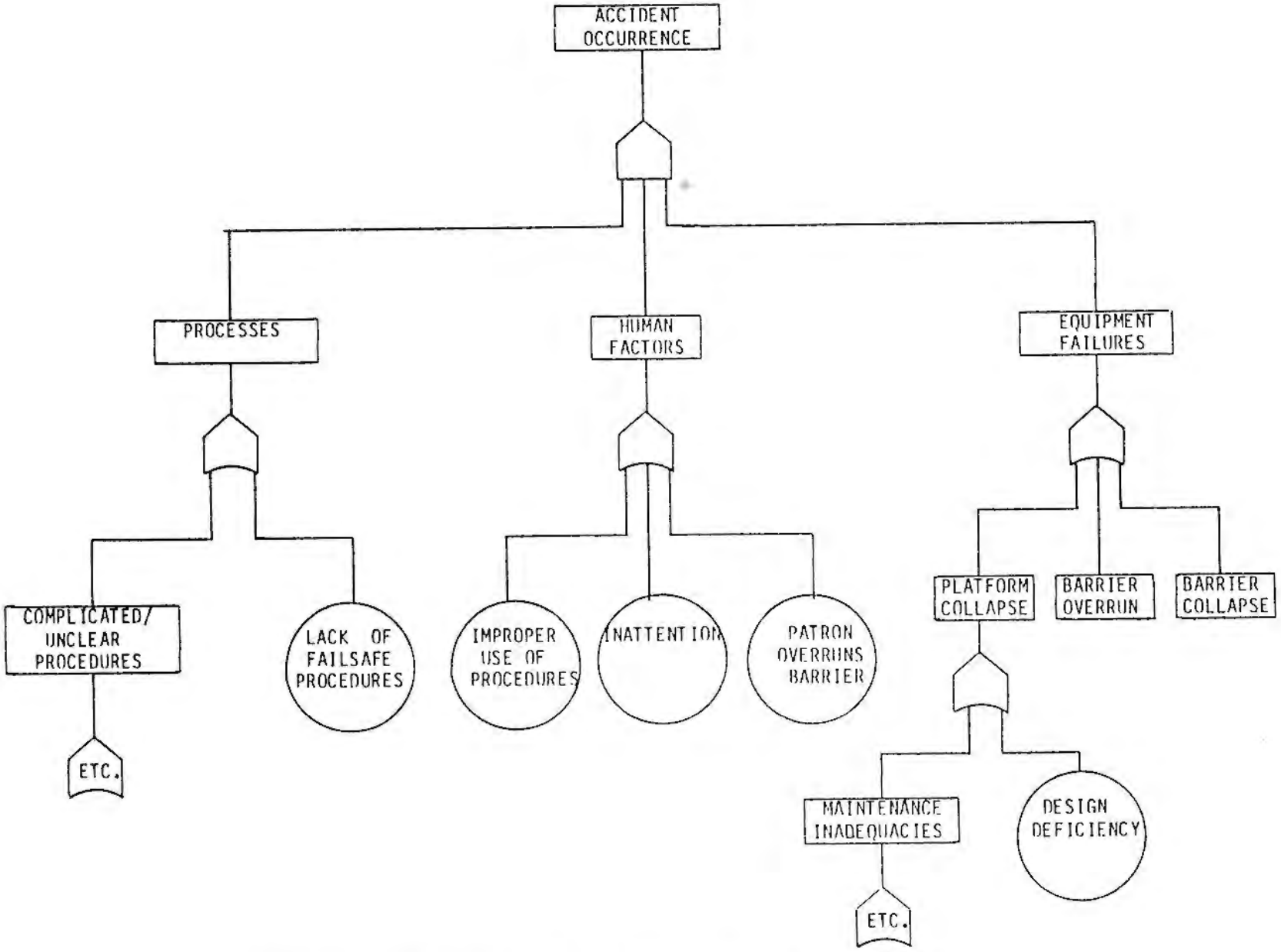


FIGURE 7. SYSTEMS SAFETY FAULT TREE - WHEELCHAIR ACCIDENTS

TABLE 7. ELECTRIC WHEELCHAIR TEST OF SAFETY BARRIER

Bus Model	Number	Lift Manuf. (Fleet Size)	WHEELCHAIR CAPABLE OF OVERRIDING SAFETY BARRIER				FIELD TEST OBSERVATIONS	
			E & J 3-P	E & J 34	INVACARE MAXTRA	A-BEC	WHEELCHAIR CHARACTERISTIC	POTENTIAL HAZARD POSED BY CONDITIONS AND PLATFORMS
General Motors Corp. RTS II	9084	GMC (974)	X	X	X		1. Outer Safety barrier can drop at any platform height other than floor level. 2. Ground level sensor required adjustment.	1. Patron could be dropped. 2. Lift/Bus damage could occur.
Grumman Flxible Corp.	7528	EEC 120-B (230)	X	X	X	X	1. Interlocks not activated until functions used. 2. Outer barrier can be dropped at any time or cycle. 3. Lift will stow without use of "no steps" button. 4. Platform lacks side barriers. 5. Outer barrier can be forced down/was worn and loose.	1. Bus can be moved prior to switch activation. 2. Patron can roll off platform. 3. Patron could be swept off platform. 4. Patron could roll off platform. 5. Patron can override safety barrier.
Carpenter Body Works	4130	EEC 124 (32)	X	X	X	X	1. All lift features working.	1. Patron can override barrier.
	4143	Lift-U (30)	X	X	X		1. Platform settled during test 1-1/2".	1. Patron can experience difficulty in moving wheelchair.
	4145	Lift-U (30)	NO TESTING CONDUCTED ON BUS 4145 DUE TO DEFECTIVE BARRIER.				Test stopped on this bus due to lift failure: 1. Outer barrier drive linkage missing. 2. Platform dock height needs adjustment. 3. Inner barrier would not lower. Will retest using bus number 4143.	1. Patron could be dropped. 2. Patron can experience difficulty in moving wheelchair. 3. Lift/Bus damage could occur.
Neoplan	3697	EEC 124 (415)	X	X	X		1. All lift features working.	1. Patron can override barrier.
AM General	8012	TD&T (200)	X	X	X	X	1. Barrier deflects when hit by wheelchair.	1. Patron can override barrier.

NOTE: All wheelchair lifts can be stowed from platform when occupied with a wheelchair.

SAFETY DEPARTMENT REPORT

EVALUATION OF DISTRICT WHEELCHAIR LIFT SYSTEMS

RECOMMENDATIONS

It is recommended that the following actions be implemented to assure wheelchair patron safety:

1. Temporarily suspend carrying electric wheelchairs as part of the District's accessible service program.

   Impact: Will affect some portion of our disabled ridership population.

2. Cancel award of the AMG Lift Retrofit contract until specifications are developed which assure an adequate level of safety.

   Impact: May delay the District's retrofit program.

3. Instruct Operations staff to implement new wheelchair lift procedures for the Transportation and Maintenance Departments which would allow the resumption of full accessible service.

   Impact: May require additional funding for support training activities.

4. Instruct staff to conduct further test and data collection to identify feasible long-term alternatives and new bus/lift performance specifications which incorporate safety redundancy or failsafe features.

   Impact: May delay next bus procurement and increase cost by $5,000 per bus.

5. Modify the operator lift control system on all accessible buses to assure an adequate level of safety.

   Impact: Will require additional funding to implement modifications.

BACKGROUND

Recently, attention has been focused on the safety, reliability, and maintainability of wheelchair lifts as the result of patron accidents occurring at various transit properties. Most noteworthy was the recent fatality which occurred in Sacramento. Locally, the District has experienced two major accidents during the past six months which resulted in serious wheelchair patron injuries.

Following a thorough investigation of these accidents and various field tests, the Safety Department concludes that the present wheelchair lift systems are inadequately designed and impose an unnecessary risk to patrons utilizing electric wheelchairs. This risk is caused by two general conditions inherent to all lifts utilized by the District, regardless of vendor:

1) The safety barriers can be overridden by various electric wheelchairs.

2) The control system allows for the collapse or stowing of the occupied lift platform if operated in an incorrect sequence.

FIELD EVALUATIONS

Following two wheelchair patron accidents in April, 1985, the Safety Department commissioned Garrett Forensic Engineers to assist the District's accident investigation team with the examination of the EEC and GMC wheelchair lift systems. Representatives from the Maintenance Instruction and Equipment Engineering Departments supported this effort.

On April 10 and 11, a preliminary examination of Neoplan equipment (EEC lifts) was conducted at Division 9. During this review, the consultant discovered a defective barrier while reviewing exemplar Neoplan Bus 3706. The barrier was capable of being deflected with a nominal amount of pressure (20 pounds). It was determined that the barrier had a faulty hydraulic cylinder and was out of adjustment.

Thereafter, 17 Neoplan buses with EEC lifts were randomly selected and inspected for proper plate adjustment (see Table 3). From the buses inspected, 12 were found to be out of adjustment (see Table 4). In no case however, could the barrier be pushed down as with Bus 3706.

On April 15, the team assembled at Division 15 to test the integrity of the GMC and EEC safety barriers. Six different types of electric wheelchairs were used in these tests. Through these tests we were able to document that even a functional safety barrier (one that is properly adjusted) can be easily overridden by at least three different electric wheelchair models (see Tables 3 through 7 and Figure 7).

On April 26, Garrett Engineers reported their findings related to the April 12, 1985 accident. The probable cause of that accident was opined to be the patron's powering of the wheelchair over the outer safety barrier. Other problems unrelated to the accident were cited by the consultant, including the lack of an adequate outer barrier height and/or angle to preclude a wheelchair from overriding the barrier and lack of appropriate interlock sequencing to prevent the platform from stowing if the outer barrier is not in the fully raised position.

Subsequently, further field tests were commenced to check the integrity of the Transportation Design and Technology (TDT) installed on 200 AMG buses and the Lift-U, Inc. lifts installed on 30 Carpenter buses. On June 17 and 18 the team convened at Division 3 and utilized four wheelchairs to complete these tests. These tests demonstrated that all four different types of electric wheelchairs are capable of overriding the safety barriers of these lifts. Other problems related to the various lift models used by the District were also documented.

DESIGN CHARACTERISTICS OF LIFTS

A. General Motors Corporation Lifts

Since 1978, GMC has been the only major bus manufacturer to develop and provide its own lift. All GMC lifts are located at the rear door. The District presently operates 974 buses with GMC lifts.

Unlike other lifts, the GMC safety barrier is not formed from the step, but is a separate device stored under the lower step when the lift is stowed. The overall platform operation is provided by hydraulic pressure from the power steering system. In addition, the GMC lift differs from other lift designs by its use of pneumatic power for the locking pins which stop lift drift from the stowed position. Pneumatics are also used to activate the safety barrier.

The GMC bus also employs a kneeling feature which tilts the bus to reduce step height for ambulatory riders. The tilt of the bus also insures that the lift's sensitive edge is the first item to make ground contact. Unfortunately, the resulting platform gradient makes it more difficult for some wheelchair users to board the lift.

Potential Problems Associated with GMC Lifts in Addition to Common Problems

1. Barrier deflects when hit by a wheelchair.

2. Equipment damage due to jacking-related failures. When the lift sensor fails to detect the ground, it tends to jack or lift the bus up. This can damage various components of the bus and lift system.

3. Lifts can be activated even with a defective rear door. Lift power circuit activation should not occur until the doors are fully open.

B. Environmental Equipment Corporation Lifts

EEC has been providing lifts since 1975 and has developed numerous series of lifts designated by Models 111, 120, 124, 140, and added 141 for various installations. The District has 677 buses equipped with EEC lifts as follows:

- 415 Neoplan coaches with Model 124
- 230 Grumman Flxible Corporation coaches with Model 120-B
- 32 Carpenter coaches with Model 141

Although all models use the same basic geometry of a platform formed from the steps and risers, they differ in many of their mechanical features and applications.

The EEC Model 120 lift was specifically designed for and tailored to the lower floor and step geometrics of the ADB specification buses. It was the standard production item for accessible GFC-870 buses through 1981. The 120 model has evolved through three sub-models:

- o A-Series Lifts, which constitute the initial production of 280 units for the State of Connecticut.
- o B-Series Lifts, which were produced after the A series and incorporated modifications to the electrical systems and a revised barrier (this is the type used by the SCRTD).
- o C-Series, which substituted a hydraulic rotary activator for the earlier A and B development drive system which used a lever attached to a worm gear reduction box to deploy the lift.

The 140 Series was developed to provide a module for both original and retrofit installations. It uses an EEC designed and assembled rotary hydraulic activator to deploy the lift platform. The 140 control system includes the use of an extra switch called a Step Bypass switch which is mounted separately from the control panel and generally to the left of the driver. As designed, this switch must be engaged simultaneously with the Barrier-Down switch to allow the step mode or barrier down function to occur.

The 124 and 141 models are the latest, state-of-the-art EEC lifts and are part of the District's Neoplan and Carpenter bus fleets. The Carpenter buses use a rear door lift which also incorporates the Step Bypass switch and requires a "two-handed" operation. Unlike the front door 120-B model on the GFC 870s the outer barrier is not capable of drifting. Although better than the earlier generation lifts, this configuration still has problems with the control mechanisms.

Potential Problems Associated with Lift in Addition to Common Problems

1. The level sensor has a propensity for being damaged and is unreliable. The leveling sensor occasionally sticks and negates the leveling feature.
2. There is no interlock to prevent platform from raising to a platform position until the outer barriers are mechanically locked in place.
3. With the 124 lift, the rotary selector switch loosens and does not afford positive indication of the function selected.

C. Lift-U, Inc., Lift

Developed by an engineer working for Seattle-METRO, the Lift-U lift design uses a one piece platform which is deployed along tracks. It is raised and lowered between ground and floor level by parallel arms on both sides of the platform. This type of lift is provided in 30 District Carpenter coaches and is located in the front door.

Potential Problems Associated with Lift in Addition to Common Problems

1. The outer barriers are smaller than those on other lifts and can be easily overridden by electric wheelchairs.

2. The lift has numerous potential shear points which can cause injury to patrons.

3. The outer barrier does not mechanically lock (it is hydraulically activated) and can be deflected when the cylinder leaks.

4. If the lift sensors are activated on a high crown road, they must be reset from beneath the coach.

D. Transportation Design and Technology, Inc., Lift

TD&T first provided lifts in 1974 for use in paratransit vehicles. The lift was first developed as retrofit kit for GMC "new look buses" used by San Diego and Atlanta. This lift was supplied as original equipment on AM General coaches until the manufacturer withdrew from the marketplace. All of the District's 1978 Model 200 AM General coaches are fitted with TD&T lifts. TD&T pulled out of the marketplace in 1984 and no longer provides wheelchair lifts.

Potential Problems Associated with Lifts in Addition to Common Problems

1. Barrier is relatively small and deflects when hit by wheelchair.

2. Barrier can be overridden by electric wheelchair.

3. Platform does not provide side barriers which are now required under California Administrative Code, Title 13, Motor Carriers.

4. Spare parts cannot be obtained since the manufacturer is no longer in business.

FINDINGS AND RECOMMENDATIONS

Recent tests conducted with various wheelchairs demonstrated that wheelchair lift safety barriers on all models of District wheelchair lifts are inadequate for restraining electric wheelchairs. The safety barrier integrity test recently undertaken with various electric-powered wheelchairs documents that these wheelchairs can override the barrier. The safety barriers for all wheelchair lifts used by the District serve as pseudo-safety, rather than actual-safety features.

Modifications to the District's wheelchair lift specifications must be made to ensure an improved lift which provides an adequate degree of safety. In addition, current systems should be modified or alternative procedures implemented to improve patron safety. In the absence of system modifications, the following actions should provide an adequate degree of safety for all wheelchair patrons:

Transportation

1. A new requirement to have all wheelchair patrons face the outer safety barrier while boarding and alighting.

2. A new rule requiring the operator to personally guide and assist the wheelchair patron onto the platform (other potential liability issues would be created with this rule).

3. A new procedure requiring operators to instruct and require the motorized wheelchair patrons to disengage the power and engage the wheelchair safety brake when the patron is on the platform and before the lift is lowered or raised.

Community Relations

1. Integrate the new boarding and alighting procedures into community awareness training programs.

2. Issue safety alert notices on accessible service routes.

Maintenance/Equipment Engineering

1. Complete implementation of a fleetwide inspection of all wheelchair lifts to ensure proper adjustment of the outer barrier.

2. Incorporate inspection of the outer barrier into the 6,000 mile maintenance inspection.

3. Develop performance-based Equipment Engineering specifications for the future procurement of lift-equipped buses.

3. WORKSHOP SESSIONS

3.1 WORKSHOP A: FIXED ROUTE ACCESSIBLE BUSES: WHEELCHAIR LIFT EQUIPMENT PROBLEMS, ISSUES, AND SOLUTIONS

Chairperson:

Frank Kirshner, Superintendent of Equipment Engineering, Southern California Rapid Transit District

Panelists:

Diane Coleman, J.D., Vice President, West Side Center for Independent Living

Emmett W. Heath, Manager, Vehicle Maintenance, Municipality of Metropolitan Seattle

Robert H. Garside, Assistant General Manager, Bus Operation, Regional Transportation District

Paul Kaufman, Project Manager, New Jersey Transit Bus Operations

James W. Lee, Accessible Service Coordinator, Alameda-Contra Costa Transit District

Lance Watt, Director of R&D and Advanced Vehicle Engineering, The Flxible Corporation

SUMMARY

In Workshop A, maintenance staff from agencies providing fixed-route service highlighted recent maintenance problems and solutions concerning wheelchair lift and restraint equipment. Panel members addressed such areas as engineering design, material selection of controls and barriers, mechanic training, sophistication of new technology, operator training, user awareness, and manufacturer maintenance support. This session provided attendees with the opportunity to learn about and share experiences and solutions to problems with recently developed lift equipment and securement systems.

Perhaps the most interesting aspect of Workshop A was the makeup of the panel itself. There was representation from the bus manufacturing side of the industry, Lance Watt (Director of Engineering, the Flxible Corporation), a representative from the user side, Diane Coleman (J.D., Vice President, West Side Center for Independent Living), as well as several representatives from the Transit Industry: Frank Kirshner (Superintendent of Equipment Engineering, Southern California Rapid Transit District), Emmett Heath (Manager, Vehicle Maintenance, Municipality of Metropolitan Seattle), Paul Kaufman (Project Manager, New Jersey Transit Bus Operations, Inc.), James Lee (Accessible Service Coordinator, Alameda Contra-Costa Transit District) and myself, R. H. Garside (Assistant General Manager, Bus Operations, Regional Transportation District, Denver, Colorado).

The diversity of the panel alone was a very interesting setup. Even within the transit portion of the panel there were representatives from all parts of transportation, maintenance, equipment engineering, procurement and projects, as well as in the administrative/policy area.

Most cases that were discussed by the panel related to the problems encountered by transit properties in supplying accessible fixed-route service, such as frequent breakdowns, poor engineering in early models, the high cost of fixing lifts and the use of improper lubricants. The major source of the problems were the use of lubricants which attracted dust and then became a cause of excessive wear. Salt and corrosion were the next major problems, with New Jersey Transit displaying slides of lift equipment that had failed due to rust that had eaten away major structural components of the lift.

RTD, Denver, outlined our major modifications to the EEC Wheelchair Lift that had caused us no end of problems. The modification to the electrical systems, upcoming modification to the outer barrier, and the continuing efforts to improve the actuator of the EEC lift were explored.

Lance Watt of Flxible Corporation gave the panel a great deal of information on how a lift is designed into the bus and the restrictions the actual design of the bus imposes in the design of the lift.

What was perhaps the most interesting were the similarities in problems that were found in Seattle, Los Angeles, New Jersey, and Denver. The solutions in most cases were different and unique to each property. The biggest single example was the different use of tie-downs used by each property. In fact, Denver is now actively pursuing the tie-down used at METRO in Seattle.

The comments from the user of the panel, Diane Coleman, were extremely interesting, especially her concerns with a rear door mounted lift and the difficulty she had experienced using this type of lift. Ms. Coleman's comments were supported from the floor with several handicapped persons relating their experiences with rear door lift equipped buses.

Mr. Kirshner related problems that SCRTD were experiencing with the outer barrier and its inability to contain an electric chair with knobby wheels when power is applied in a reverse motion. The chair has the ability to climb up and over the outer barrier, which raises the issue of who is liable for damages if this occurs.

I found that the discussions held by the panelists off the floor were just as important as the formal presentations made by the panel. I came away with a much better understanding of problems of not only the transit properties but those of the user's position the supply of fixed-route accessible transit service.

WORKSHOP A: FIXED ROUTE ACCESSIBLE BUSES: WHEELCHAIR LIFT EQUIPMENT PROBLEMS, ISSUES, AND SOLUTIONS

3.1.1 PANELIST PRESENTATIONS

3.1.1.1 COMMENTS OF A USER

Presented by:
Diane Coleman
J.D., Vice President
West Side Center for Independent Living
Van Nuys, California

I. Lifts should be located at the front of the bus

- A. Driver and passenger convenience
- B. Enabling wheelchair user to notify driver when exit desired
- C. Crime reduction/prevention
- D. Same entrance as able-bodied passengers

II. Lift evaluation factors

- A. Barriers - side and end (GM is good)
- B. Tilt - to be avoided (early EEC is bad)
- C. Ease of operation coupled with non-collapsibility (Lift-U good)
- D. Usable by "standees" who cannot use steps

III. Securement position - as close to entrance as possible

IV. Securement orientation

- A. Facing backward is safer and preferred when there is any lack of confidence in the securement system
- B. Other orientations are acceptable if securement system is fully adequate

V. Securement systems for wheelchair and person

- A. Clamps should fit all common wheelchair types
- B. Straps have advantage of flexibility, disadvantage of time to apply
- C. Personal seatbelts should be available but optional

VI. Informed choices on the part of passengers should always be favored over inflexible rules

WORKSHOP A: FIXED ROUTE ACCESSIBLE BUSES: WHEELCHAIR LIFT EQUIPMENT PROBLEMS, ISSUES, AND SOLUTIONS

3.1.1.2 **METRO'S EXPERIENCES**

Presented by:
Emmett W. Heath
Manager, Vehicle Maintenance
Municipality of Metropolitan Seattle
Seattle, Washington

Coach Type			Lift Type 1978 to 1983	
1978	40'	Flyer	Lift-U lift	259
1978	40'	AMG Trolley	Lift-U lift	109
1982	60'	M.A.N. Artics	Lift-U lift	202
	35'	GMC		2
		Subtotal In Service Now (53% of active fleet of 1,086)		572
1986	40'	Americana	Lift-U lift	157
1986	60'	M.A.N. Trolley	Lift-U lift	46
1989	60'	Dual Mode	Undetermined	236
		Subtotal on Order		439
		Grand Total Lift Equipped Coaches		1,011

51% of routes; 86% of trips are now accessible

RELIABILITY

- First, all other functions of the bus must work properly.
- WCL reliability is about 98%; 200-250 trips per day with 4 failures/day.
- Back-up service by next bus, another route, supervisor van or coach change.

MAINTENANCE PROGRAM

- 5 operating bases
- All operate lifts
- All maintain and stock replacement parts
- All mechanics are required to repair lifts as assigned
- Inspection and exercising and mechanic training programs later

LIFT-U LIFT DESCRIPTION

- See Figures 8, 9, and 10.

INTERESTING STATISTIC

Sources of defect reports

TC (trouble call) or road calls	15%
PM (preventive maintenance)	39%
OR (operator report)	28%
SR (shop request)	18%

85% of repair work is done before a significant failure occurs

PROBLEMS

- About 85% of all repairs fall in clean and adjust category

o Chains, tracks, limit switches, grab rails, speed or flow control, main screw, valves, platform.

- Comment on the environment the lift works in (as a problem)

- Summary of problems (not necessarily in order of magnitude)

o Staff skills

- electrical trouble shooting
- infrequent contact with lifts

o Electrical failures; water in switches, maladjusted switches

o Hydraulic failures, pumps, motors, leaks, bad valves

o Infrequent use per unit

o Adjustments are critical; platform leveling, limit switches, flow control

o Drive screw; keep it clean

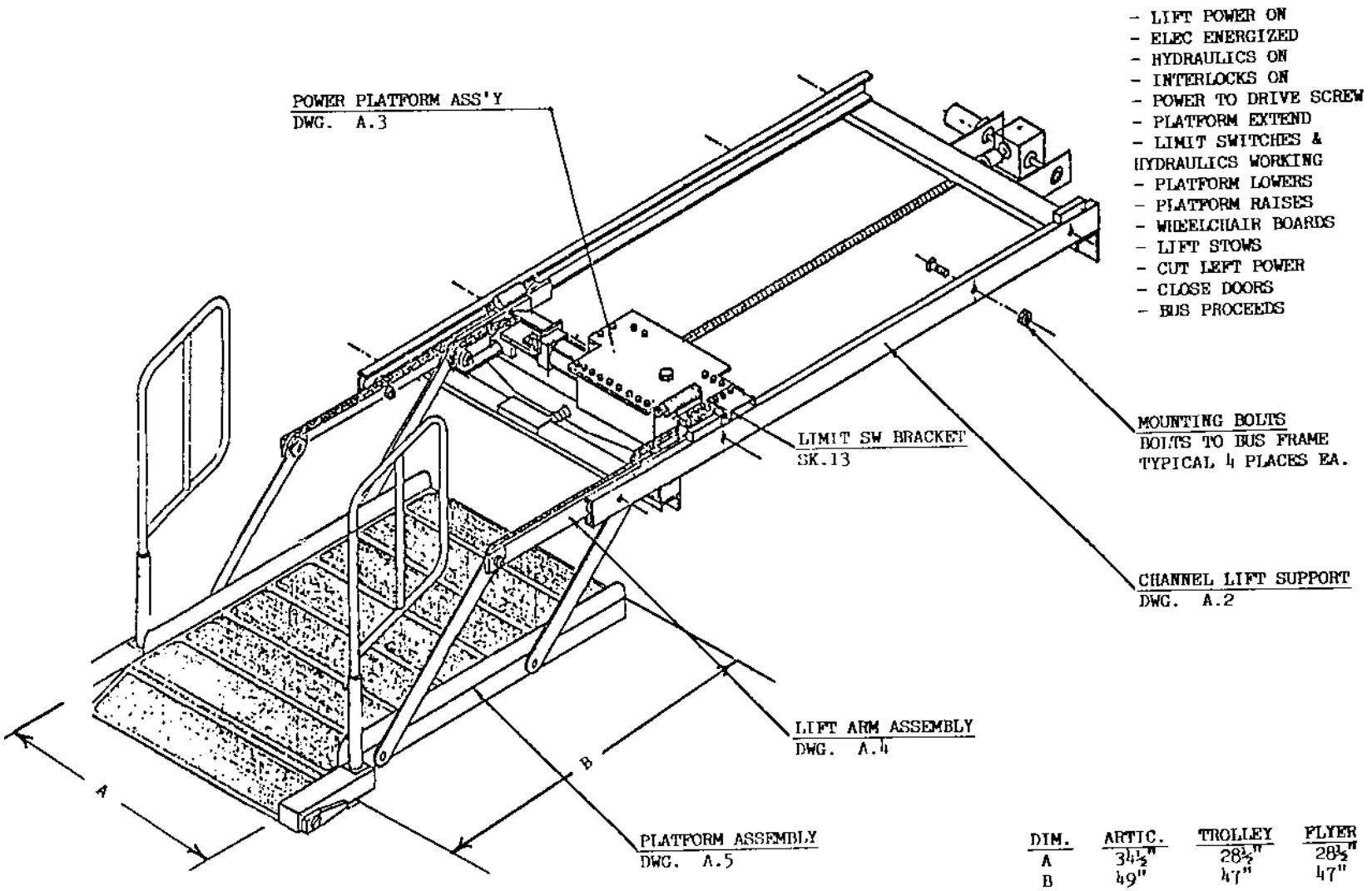
o Channels and rollers; flat rollers, debris in channel, cold weather operation blocks channels repeatedly

o Material quality e.g. drive screw bushing

o Electric/hydraulic sequencing

o Vendor support switch quality, drive bushing, non-skid surfacing

o Bus interlock systems when lift engaged, neutral, throttle, brakes, audio and visual alarms



DIM.	ARTIC.	TROLLEY	FLYER
A	34½"	28½"	28½"
B	49"	47"	47"

FIGURE 8. WHEELCHAIR LIFT ASSEMBLY

DIM.	ARTIC	TROLLEY	FLYER
A	78	86	86
B	47	46	48
C	31.5	47	47
D	-	96	-
E	149	130	137
F	31.5	34	34
G	34.5	28.5	28.5
H	49	47	47
J	62.5	58.5	58.5

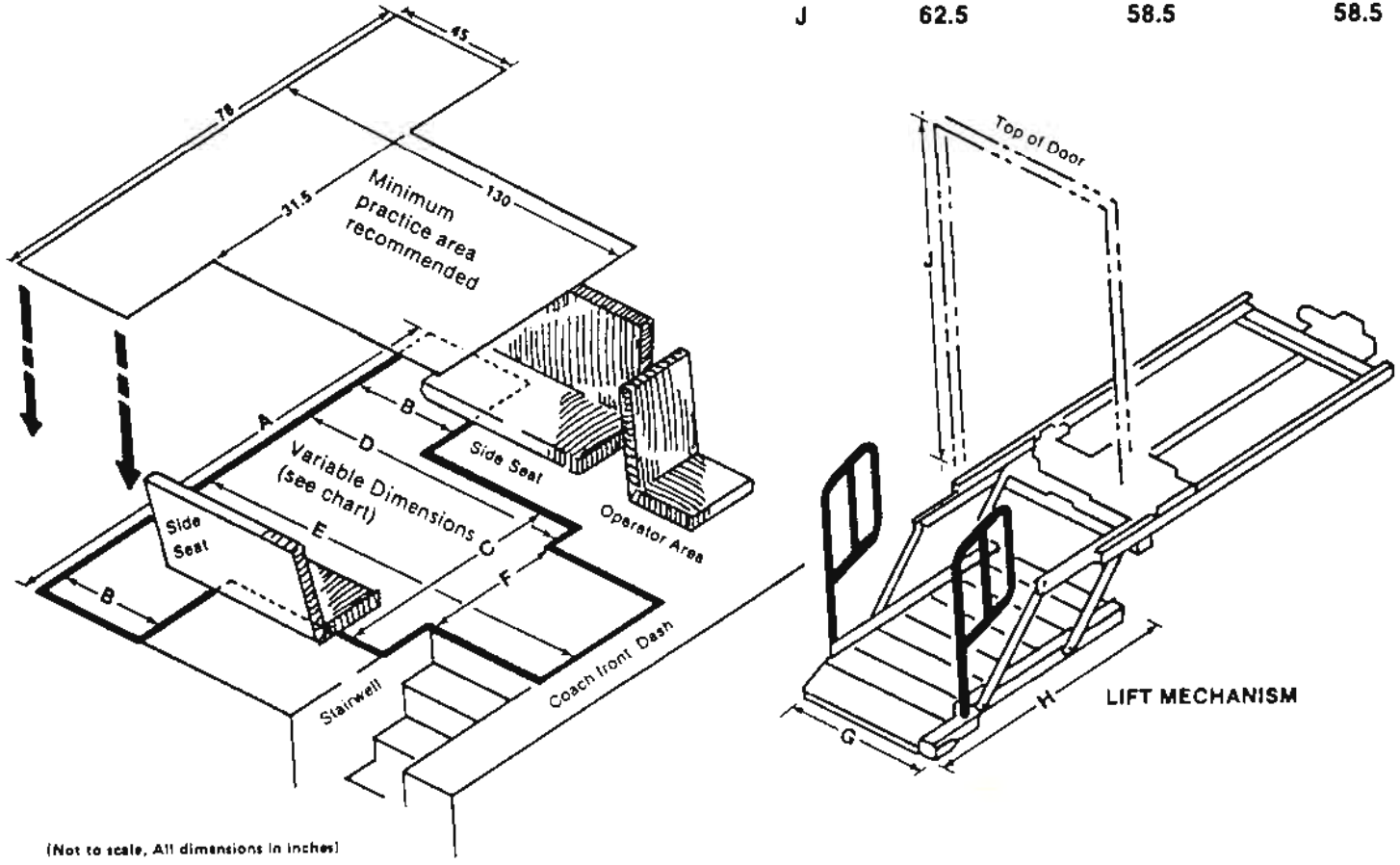
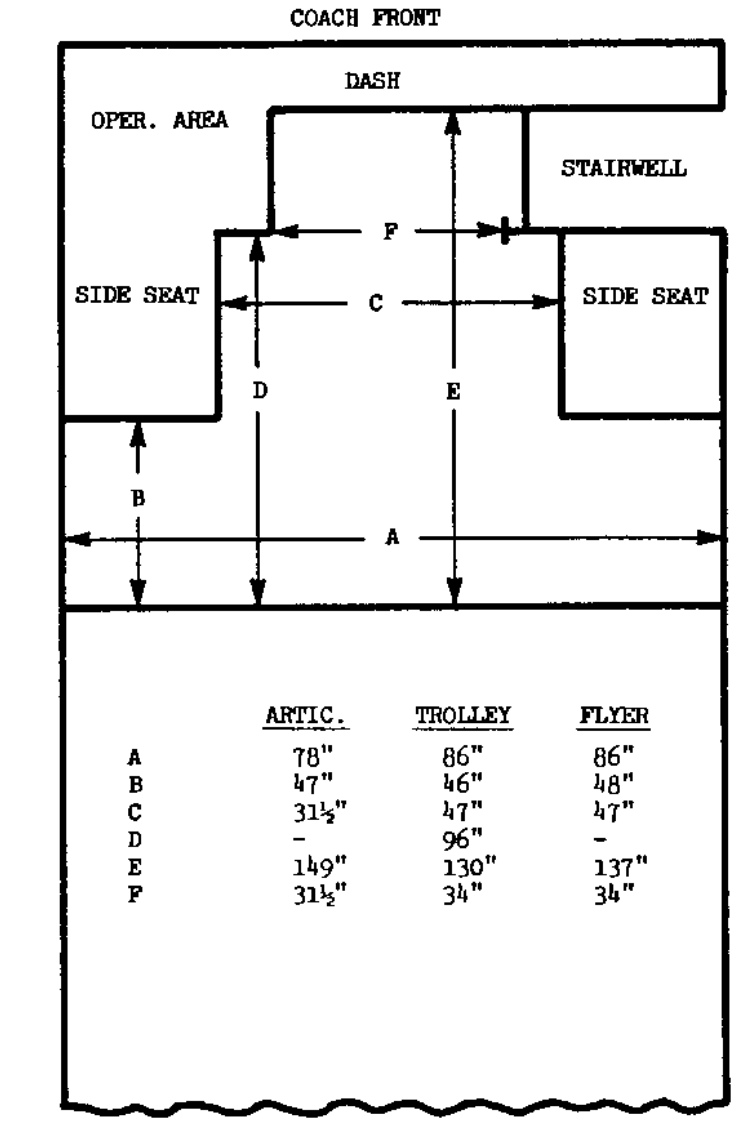


FIGURE 9. WHEELCHAIR WORKING AREA



	ARTIC.	TROLLEY	FLYER
A	78"	86"	86"
B	47"	46"	48"
C	31½"	47"	47"
D	-	96"	-
E	149"	130"	137"
F	31½"	34"	34"

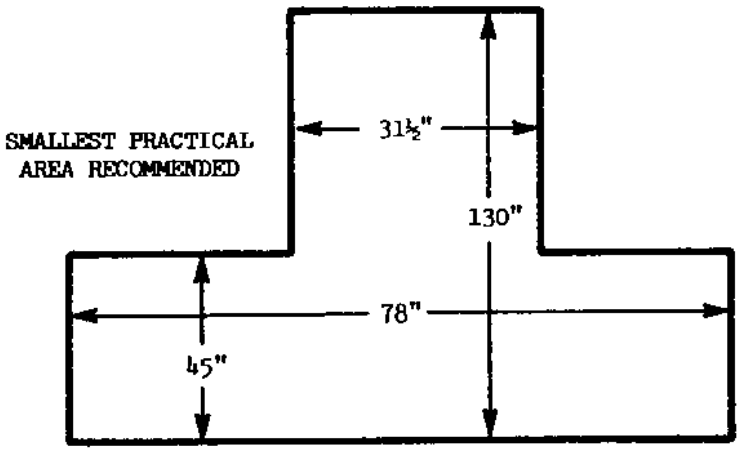


FIGURE 10. WHEELCHAIR AREAS

GENERAL SOLUTIONS

Staff commitment

Exercising the lifts

PM program - Thorough and detail (85% prevention rate)

Operator training and street supervision training

Mechanical training and user training

Parts availability, parts quality and manufacturer support

SPECIFIC SOLUTIONS

- Adjustments are critical - platform leveling, limit switches
- Cleaning is critical - steam clean rails, clean and lube screw
- 8 hour mechanic training program. Electric, hydraulic and mechanical functions
- Parts upgrade: drive screw bushing, electric switches
- Special effort during adverse weather
- Use dry lubricants, especially on drive screw

ISSUES

1. Procurement - Standardization for

   A) Common controls
   B) Parts inventory advantages
   C) Mechanical training
   D) "or equal lifts"
   E) Best bid vs low bid and LCC and buy with local funds if possible.

2. Design Criteria - Elevators, escalators, manual lifts

   A) Safety factors
   B) Reliability
   C) Operating cost effectiveness
   D) Expected life (i.e.) same or less than bus life

3. Manufacturers Health

   A) Financial stability (Parts and Service Support)
   B) Long term product support (12-16 years)

4. Usable Lift Life Less Than Bus Life

   A) Cost to rehabilitate lift
   B) Liability
      - Who does the work? Property or 3rd party?
      - New parts or rebuilt parts
   C) Cost to rehabilitate

SUMMMARY

1. The problems are not insurmountable.

   There are many and they are varied but each can be overcome through attention to generally accepted maintenance practices.

2. Solutions will follow if you, your property and local community are truly committed to providing mainstream public transportation services for the Elderly and Disabled.

   There are some significant issues facing our industry regarding bus wheelchair accessibility.

   I personally feel like a couple of issues facing us now will be very difficult to overcome. Specifically, I think good progress has already been made with the procurement and design criteria issues. I'm concerned about the manufacturer's health issue and the lift life less than bus life issue.

   I'm anxious for the transit industry, the manufacturers and the wheelchair lift users to begin to address these issues.

   We've all been successful resolving tough issues in the past and I'm confident we'll continue that tradition.

WORKSHOP A: FIXED ROUTE ACCESSIBLE BUSES: WHEELCHAIR LIFT EQUIPMENT PROBLEMS, ISSUES AND SOLUTIONS

3.1.1.3 DENVER'S EXPERIENCES WITH WHEELCHAIR ACCESSIBILITY

Presented by:
Robert H. Garside
Assistant General Manager, Bus Operation
Regional Transportation District
Denver, Colorado

The Regional Transportation District in Denver, Colorado began providing wheelchair accessible service in 1975 when we established a subscription service for the severely disabled called HandyRide. This service was operated with 12 specially designed FMC vehicles equipped with platform-type lifts similar to the lifts used on truck tailgates. In 1978, 10 GMC coaches were retrofitted with first generation EEC lifts and 18 - 30' FLXs were purchased with TDT lifts. The FLXs were later retrofitted with updated TDT lifts. In 1980 we ordered 127 new look GMC buses equipped with EEC model 140 third generation lifts and began a retrofit of 176 - 1977 AMGs with the same lifts. The 19 MCR mall shuttle vehicles purchased in 1982 are equipped with special ramps instead of lifts. This is possible due to the low floor of these vehicles and the low curb height on the Mall. Seven additional mall shuttle vehicles purchased in late 1985 and early 1986 are also equipped with an updated version of the special MCR ramp. Eighty-nine M.A.N. articulated buses were purchased in 1983 and are equipped with Lift-U lifts.

Currently, the RTD has a contract with Neoplan for 167 standard transit buses equipped with Lift-U lifts which have incorporated the latest design updates. In addition, Neoplan is contracted to manufacture 28 over-the-road coaches, 17 of which will be equipped with a special new design EEC wheelchair lift so that we will now be able to provide fixed-route accessible service on our intercity routes between Boulder and Denver. We will also soon receive 5 vans for elderly and handicapped service equipped with Braun lifts. After receipt of the new buses, RTD will be operating approximately 500 wheelchair accessible vehicles. Our current fleet is 57 percent wheelchair accessible.

During the more than 10 years that the RTD has been operating wheelchair lift-equipped buses we have experienced a multitude of technical problems with the lifts. As a result, a great deal of effort has been expended by our Technical Support staff in identifying and correcting these problems. The vast majority of the lifts we operate are EEC lifts. Three main problem areas in these lifts have been identified.

First, the electrical system was not originally designed for the severe conditions experienced in RTD transit service. All wires were the same color and could not be easily identified, which did not readily lend itself to routine maintenance, diagnosis, or troubleshooting. Circuits which were longer than necessary were routed through connectors exposed to under-coach spray. Many of the primary electrical components such as control switches, sensor switches, and wiring connectors were not sufficiently weather resistant to withstand the dust, water, and snow conditions which occur

in Denver. The system redesign and recently completed retrofit of 127 GMC buses has upgraded the quality of all electrical components on the EEC lifts. The simplified control panel has also made the lift operation much more foolproof for the operator.

Higher quality SAE-type SXL electrical wiring is now used because it offers improved mechanical properties such as increased flexibility in extreme temperatures. We also require that all electric switches be completely sealed inside and outside with flexible rubber glue. This prevents moisture from getting into the switch contact points and helps to prevent mechanical damage to the switch in the event that the wires are flexed. Dielectric grease is now applied to contact points and switches. This grease is non-conductive and prevents oxidation in these areas. The waterproofing capabilities of dielectric grease aid in eliminating shorting and corrosion problems.

The second problem we have had is with the outer barrier on the EEC lifts. This barrier, though giving the appearance of being safe and functioning properly, has many times not provided the restraining capabilities for which it was designed. The locking mechanism can appear to be in place but is not, resulting in wheelchairs which can and have rolled off the lift. The problem has been to obtain a reliable or repeatable adjustment to the mechanism that locks the outer barrier into position. Work is currently in progress on a redesigned outer barrier and operating mechanism which will be retrofitted on our EEC lifts. We also have designed a skid plate on the right front lower corner to prevent damage from curb strikes. This skid plate has also been included on the new bus purchase.

The environment has also caused problems with the outer barriers. The outer barriers freeze in cold weather due to splash and spray from the roadways and as a result will not fully extend and lock. Denver's climate results in heavy accumulations of sand, grit, and dust at the road curb where the lift is operated. This sand and grit mixes with the lubricant used to lubricate the outer barrier and mechanical joints and becomes a paste which causes binding and increased component wear in these areas. We have switched to the use of a dry lubricant (Molybdenum disulfide MoS_4) which doesn't attract dust and dirt as readily as other lubricants in order to prevent this type of component wear.

The third problem we have encountered is with the rotary hydraulic actuator which raises and lowers the lift. Our experience has been that the sealing material on the internal paddle of the actuator fails, resulting in bypass of hydraulic fluid which renders the lift inoperable. We are working with EEC now in an attempt to resolve this problem. We have changed to the use of a multi-viscosity hydraulic oil which provides a more consistent viscosity to address the wide range of temperatures which we experience in Denver. This minimizes slow operation of the lift in cold temperatures.

The Regional Transportation District continues to be committed to providing mainline accessible service to the disabled. We remain in the forefront of the industry with this commitment as evidenced by our recent order for 17 over-the-road coaches with lifts for operation in our intercity

service between Denver and Boulder. This represents new technology since neither Neoplan nor EEC have previously manufactured lifts for over-the-road coaches for transit service.

Although the RTD's experiences with lift technology haven't always been positive, we remain committed to providing transportation to the public as a whole. As more transit properties face the accessibility issue, we are convinced that the efforts we have made will aid in the development of consistently reliable and safer wheelchair lift equipment for the transit industry.

3.1.1.4 NEW JERSEY TRANSIT'S EXPERIENCES

Presented by:
Paul Kaufman
Project Manager
New Jersey Transit Bus Operations
Maplewood, New Jersey

NJ TRANSIT presently runs 78 accessible routes to provide public transportation for the elderly and handicapped. This represents 53 percent of all routes operated by NJ TRANSIT. NJ TRANSIT's operating experience is primarily with the Lift-U model wheelchair lift. NJ TRANSIT operates 271 Grumman 870s, 165 Grumman Metros, and 25 rehabilitated 1976 Flxibles with this lift.

NJ TRANSIT has recently added a second lift to its fleet through the purchase of 110 Volvo articulated buses equipped with the lift manufactured by Environmental Equipment Corporation (ECC). As a result our operating experience is very limited on this lift. All in all, NJ TRANSIT operates a total of 571 wheelchair lift equipped buses. All the buses equipped with wheelchair lifts are equipped with a kneeling feature as well. The kneeling feature is also present on a majority of buses including buses in our fleet that are not wheelchair lift equipped.

The 25 rehabilitated 1976 Flxible buses as well as 60 of the Volvo articulated buses are constructed with lifts in 96-inch wide buses. This permits operation through the Lincoln tunnel, thus providing accessible transportation into New York City.

New Jersey provides an interesting challenge to a wheelchair lift. The climate provides extreme cold (subzero) temperatures, extreme heat (in excess of 100 degrees), high humidity (99 percent), as well as rain, hail, snow and sleet. These environmental conditions can be very difficult on a wheelchair lift. To add to this problem, we have the fortune of being a coastline state. This provides the highly corrosive environmental problem of salt water. New Jersey also uses deicing salt to combat snow and ice covered roadways. All of these factors lead to trouble for a wheelchair lift.

A common Lift-U wheelchair lift platform in northern New Jersey is not as adversely affected by the elements as the south Jersey operations, which must also combat the salt water. The lift shows signs of severe corrosion to the platform and related components. Numerous stress cracks are present as well as various attempts by garage personnel to weld up the cracks. Numerous buses in our southern division operations have the wheelchairs bolted shut to prevent drift and to prevent operation. Inspection of the lifts demonstrated severe fatigue of structural components to the point where standing on the platform results in bowing of the handrails in toward each other. Besides the major deterent to operation of the lifts, NJ TRANSIT has also had problems in the following areas:

- o inadvertant setting of brake interlock due to drifting
- o inadequate weather-proofing
- o wheelchair lift rusting of:
  - platform and hinges
  - grab rail bottoms
  - hydraulic lines and valve bodies
- o drivenut failures
- o wheelchair crank failures
- o rapid wear of wheelchair lift guides

NJ TRANSIT has entered into warranty discussions with Flxible Corporation and Lift-U to try and resolve the issues and develop an equitable solution to NJ TRANSIT's problems. To support NJ TRANSIT's position, a separate and independent test and evaluation was conducted on a new design and on a corroded platform by Public Service Electric and Gas Research Corporation with the following conclusions:

- o insufficient corrosion protection was provided
- o cracks developed in weld areas due to bending loads
- o extensive corrosion due to the use of carbon steel in the platform construction
- o enhanced corrosion by sodium chloride de-icing salts and sulphur compounds
- o weld areas lacked proper fusion between structural members with voids in the weld material

It is important to understand that NJ TRANSIT is not trying to paint a bad picture of one particular lift. It is my intention to demonstrate the harsh operating conditions which these lifts are required to operate under in New Jersey and the toll the environment has taken. Also note that these lifts are early "generation" which do not have all the state-of-the-art features as the lift demonstrated by Lift-U in Seattle. The 25 rehabilitated buses feature an improved design and consequently have fewer problems than the earlier models. A check at one of NJ TRANSIT's operating garages prior to the Workshop showed that 57 out of 64 Lift-U lifts were in operating condition.

NJ TRANSIT looks to the Workshop to develop a specification that can be used to purchase a safe, durable, and maintainable wheelchair lift.

WORKSHOP A: FIXED ROUTE ACCESSIBLE BUSES: WHEELCHAIR LIFT EQUIPMENT PROBLEMS, ISSUES AND SOLUTIONS

3.1.1.5 PASSENGER-LIFT SERVICE: PAST, PRESENT AND FUTURE DIRECTION

Presented by:
James W. Lee
Accessible Service Coordinator
Alameda-Contra Costa Transit District
Oakland, California

BACKGROUND

The Alameda-Contra Costa Transit District is dedicated to providing to the Elderly and Handicapped the most reliable and convenient services possible. In this effort, the District has been assisted by a citizens' Advisory Committee comprised of individuals who are themselves elderly or disabled and who provide input into the development and ongoing operation of AC Transit's Elderly and Handicapped Transportation Program.

The first step in developing an effective program was to clearly identify the needs of the transit handicapped. AC Transit contracted with an independent research firm, Crain & Associates, which identified the size and needs of the target population. A group of elderly and handicapped individuals worked with AC Transit staff in selecting the firm, and formed the nucleus of the committee that eventually became a permanent Advisory Committee to AC Transit. Based on the findings, the Board chose to develop a fixed-route accessible system rather than a combination or exclusive paratransit system.

In 1977, AC Transit formally adopted an elderly and handicapped transportation program. During 1977, the Board included driver sensitivity training, priority seating for elderly and handicapped people, teletype equipment to provide transit information for the deaf, and an outreach program for elderly and handicapped people. The Board also in 1977 adopted a policy that all buses purchased in the future be accessible to persons who use a wheelchair.

In the late 1970s, lifts were extensively researched by staff and the Advisory Committee, which then had grown in number and acquired permanent status. Some committee members conducted on-site tests at other systems which had already begun accessibility programs.

The new lift-equipped buses were introduced on 21 AC Transit bus lines in June, 1981, the International Year of Disabled Persons. Outreach and marketing efforts were designed to encourage the elderly and handicapped community to practice using the new equipment. Demonstration and practice sessions were conducted almost daily for five weeks. Committee members frequently accompanied staff to encourage and assist passengers in a practice run. Practice sessions were held at every college campus in the service area and at independent living centers, senior centers, and all major events held in recognition of the International Year of Disabled Persons.

Presently, there are 38 District bus lines operating accessible schedules, thirteen (13) of which have every schedule designated for accessible service.

After implementation, information on use, consumer satisfaction, mechanical problems, attitudes, and suggestions for improvements were obtained and analyzed on a continuous basis.

In the five years since implementation of lift service, use has been high, but problems have been detected in the lift design, maintenance of lifts, and with some bus drivers having difficulty with lift operation.

To address these problems a task force including representatives from the maintenance and operations departments of each division, the planning, training and scheduling departments and the executive office met for weekly meetings during April, May, and June of 1985.

The Accessible Service Task Force responsibilities were to:

- o identify problems with service reliability,
- o plan service expansion,
- o develop a work plan to implement service expansion and correction of lift reliability problems.

The task force, in an effort to increase the availability and reliability of lift service, began implementing an Accessible Service Improvement Plan in October, 1985. Many of the tasks identified in the plan have already been completed or are now in the process of completion. These tasks are a part of the District's Accessible Service Improvement Program.

ACCESSIBLE SERVICE IMPROVEMENT PROGRAM

To begin addressing the chronic problems of the District's lift service, a lift improvement program was established in October, 1985.

A lift training and monitoring team was formed consisting of one training person to perform continued re-training of drivers; one maintenance mechanic to train a pool of lift mechanics; and an accessible services coordinator to monitor the accessible service performance and work with the Advisory Committee on Accessibility. This accessibility team is assigned to work directly with the Operations Center Manager. The team is responsible for the following:

1. Train lift mechanics on preventive maintenance and repair at the four operating divisions at Central Maintenance.
2. Refresher training of management personnel, especially road supervisors, and dispatchers on passenger-lift operating procedures and policies.

3. Monitor the lift bus fleet to:

   - o Establish lists of good order lift buses at all divisions and make available to Division Dispatchers.
   - o Observe bus drivers operating the lift and reinstruct as appropriate.
   - o Work with problem drivers on lift operation.
   - o Document recurring lift problems and propose modification where appropriate.
   - o Monitor all lift Road Calls.
   - o Respond to lift problems on a priority basis.
   - o Report to Executive Staff and the Board of Directors as required.

The accessibility team's Driver Training Coordinator retired in January, 1986, and a qualified replacement is expected in early 1986. The Accessible Services Coordinator position was filled in January, 1986.

Currently, due to the major construction underway at the Emeryville and East Oakland divisions, significant improvements in the current performance of the District's lift services is not expected until this work is completed. The majority of the District's lift-equipped buses are maintained at the Emeryville and East Oakland Divisions. Buses are assigned to the majority of the designated accessible routes from these Divisions. Due to the construction at these two divisions, buses cannot be dispatched in a fashion which would allow for all buses with working lifts to be deployed on the accessible schedules. Currently, buses at the Emeryville and East Oakland divisions are parked before being dispatched in a single line, side by side fashion. Once construction is completed (expected completion date for Emeryville Division is Spring, 1987, and for East Oakland Division is late 1987) buses can then be parked in a "herringbone" fashion (staggered with the ability to dispatch each bus independently).

Listed below are the various projects or programs underway for improving the District's lift services:

1. Retrain all drivers at the four divisions on proper lift operations procedures (completed at Emeryville, underway at East Oakland).
2. Establish and maintain a preventative maintenance program for lifts.

3. Assign and train dedicated lift mechanics of each division to work mostly on lifts (completed at East Oakland and Emeryville divisions).

4. Active participation by disabled lift riders with the driver and staff training on lift operations and procedures.

5. Coordinate uniform reporting procedures for monitoring the lift service program.

6. Establish a service-level goal of deploying workable lifts to 95 percent of the present accessible schedules before implementing new accessible schedules on routes.

7. Begin final planning and review for incremental expansion of accessible bus assignments.

8. Improve the yard layout at the divisions for efficient parking of buses and cycling of lifts for drivers.

9. Elderly and Handicapped Coordinator to work closely with the District's Elderly and Handicapped Accessibility Committee.

Please refer to Table 8, Schedule for Accessible Service Improvement Program, for a schedule of when the above tasks are expected to be completed.

The District is planning to purchase five "Supervisor Vans" equipped with wheelchair lifts and securement areas during FY 1987-88. These vans would be used to provide back-up service when a lift failure occurs and the passenger is subjected to an unreasonable delay. The District's Advisory Committee on Accessibility and District staff will be developing recommendations to the District Board of Directors on the accessibility specifications for the five vans early in FY 1987-88.

SYSTEM DESCRIPTION

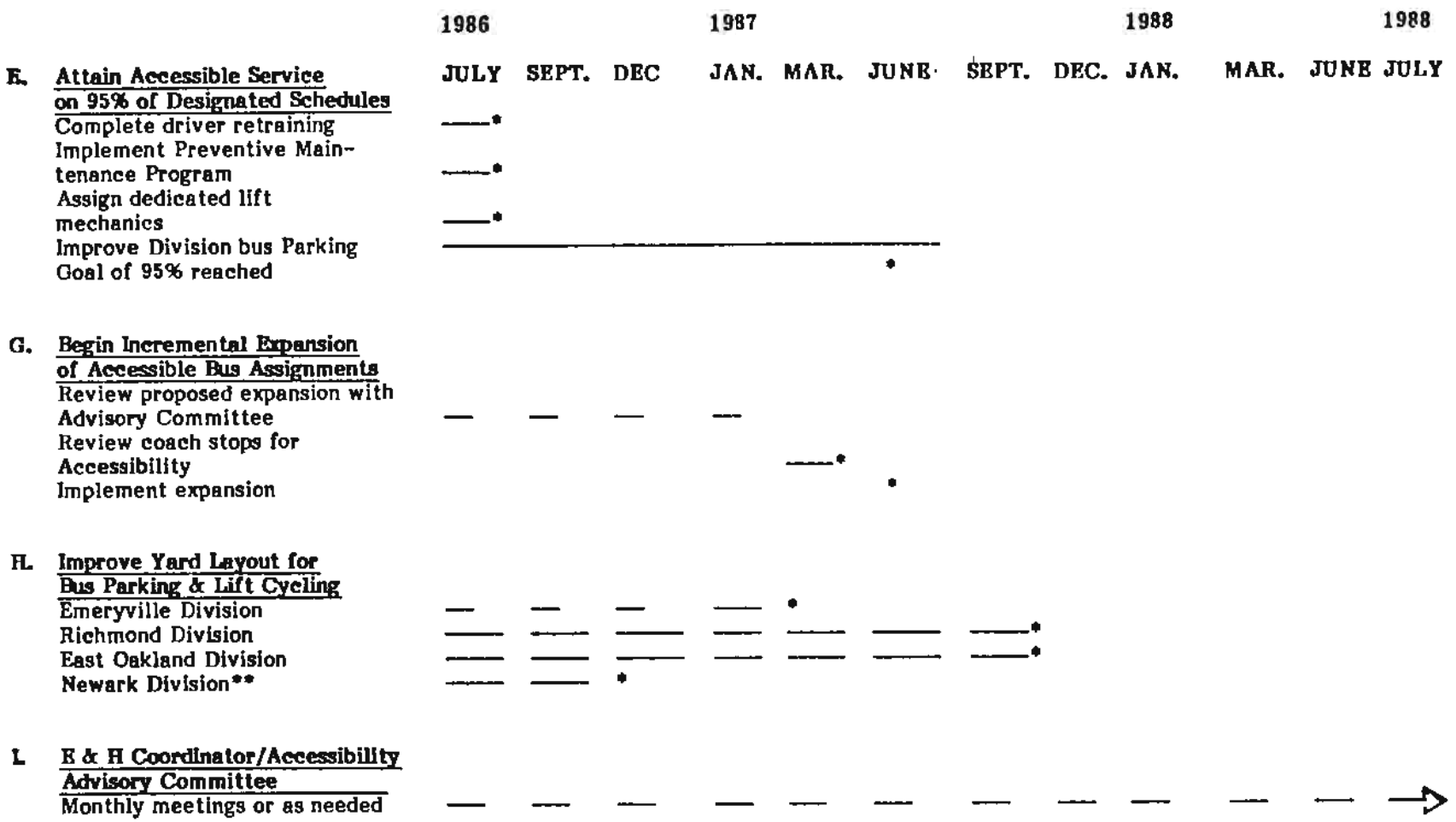
AC Transit provides a fixed-route bus service that is accessible to elderly and handicapped patrons.

AC Transit's fixed-route accessible service is provided via lift-equipped buses (please see Table 9, Passenger Lift Bus Inventory). There are 513 wheelchair lift-equipped buses (58 percent of the total bus fleet) with the lift located in the front entrance. Each bus has a kneeling feature which lowers the front of the coach to assist passengers in reaching the first step. In June and July of 1985, District routes #82, 83, 98, 51, and 72 began operating all of the schedules with lift-equipped buses. Two new lines, route #54 and 65 beginning in September, 1985, began providing accessible service. This brings the total to 38 routes offering accessible service.

TABLE 8. SCHEDULE FOR ACCESSIBLE SERVICE IMPROVEMENT PROGRAM

	1986			1987					1988			1988
	JULY	SEPT.	DEC.	JAN.	MAR.	JUNE	SEPT.	DEC.	JAN.	MAR.	JUNE	JULY
A. Driver Retraining												
Emeryville Division*	*	—	—	—	—	—	—	—	—	—	—	→
Richmond Division		Ongoing as drivers are identified for retraining.										
East Oakland Division*	—*											
Newark Division												
B. Lift Preventive Maintenance Program												
Emeryville Division*	*	—	—	—	—	—	—	—	—	—	—	→
Richmond Division		Ongoing preventive maintenance of lifts at every 2,500 miles of bus operation										
East Oakland Division*	—*											
Newark Division												
C. Dedicated Lift Mechanics												
Emeryville Division*	*	—	—	—	—	—	—	—	—	—	—	→
Richmond Division		Two lift mechanics dedicated at each Division to work primarily on passenger-lifts										
East Oakland Division*	—*											
Newark Division												
D. Sensitivity Training for New Drivers												
Review Liability Concerns*												
Develop Program with Advisory Committee Assistance	—*											
Implement		—*										
E. Improve Monitoring System												
Develop Uniform Reporting for:												
Missed Schedules	—*											
Bad Order Lifts	—*											
Reporting of Lift Boarding	*											

TABLE 8. SCHEDULE FOR ACCESSIBLE SERVICE IMPROVEMENT PROGRAM, CONTINUED



* Task Completed

** This Division is expected to be operating at the new division yard located near the AC Transit Training & Education Center in Newark.

TABLE 9. PASSENGER LIFT BUS INVENTORY

January 1986

AC TRANSIT BUS NUMBER	MODEL	YEAR	AGE	NUMBER OF BUSES	TYPE OF LIFT
1003-1022	FLYER-0901-10240	1980	6	9	VAPOR
1023-1154	FLYER-0901-10240	1981	5	132	VAPOR
2000-2019	FLYER-0901-10235	1981	5	20	VAPOR
1155-1169	FLYER-0901-10240	1982	4	15	VAPOR
1300-1390	GILLIG 40TA	1982	4	91	EEC
2049-2099	GILLIG 35TA	1983	3	51	EEC
1200-1260	NEOPLAN AN440	1983	3	61	VAPOR
1400-1483	GILLIG	1984	2	84	EEC
1500-1549	GILLIG	1984	2	50	EEC
			TOTAL	513*	

*14 buses turned over to CCCTA in June, 1982

The number of lift-equipped buses required to fill all the weekday accessible schedules is 248.

The District is proposing that a policy be established that no further expansion of the accessible service be implemented until such time that the current accessible schedules are operating at an average level of 95 percent of weekday accessible schedules. As of January, 1986, an average of 86.73 percent of weekday accessible schedules at the East Oakland Division are being filled with good order lifts, and at the Emeryville Division for this period only an average of 77.5 percent of weekday accessible schedules were being filled. For the Newark and Richmond divisions, 95 percent and 90 percent of the accessible schedules respectively were filled during this period. The lower number of accessible schedules being filled at the Emeryville Division is due in part to the distribution of the lift models (please see Table 10). The Vapor lift requires 50 percent more time for repair and access, and since the Emeryville Division has the majority of Vapor models and is the busiest maintenance yard within the District, this further compounds the problem. Two wheelchair lift mechanics are presently assigned to the Emeryville Division to work primarily on lift repairs. Once construction is completed at the Emeryville and East Oakland divisions and an improved working environment for lift mechanics becomes available, an increase in the number of good order lifts should be available for dispatching on accessible schedules. Staff will continue to monitor this progress.

Table 11 describes the expansion of the accessible bus program over the next six years, culminating in 100 percent accessible service in March 1992. The target date for reaching 95 percent lift availability on accessible schedules is June, 1987.

The District is proposing that there be no further expansion or establishment of accessible routes until the time the District reaches a 95 percent availability rate of working lifts on the existing designated accessible routes.

At the request of the District's Advisory Committee on Accessibility, Comment Cards are now being placed on all AC Transit buses for passengers to use in addressing their request for additional service, suggestions for improvement, or any commendations or complaints they may have regarding the service. The Comment Cards are addressed to the AC Transit Customer Relations department.

REGIONAL TRANSIT CONNECTION DISCOUNT CARD

During 1984, regional transit providers approved revisions to eligibility criteria which are designed to insure the program's equity, uniformity and integrity, in line with DOT 504 regulations. In addition, the program has been converted to a computer data bank for regional access and control. Implementation of these program revisions began in October, 1984, and the transition to the new program was completed with the replacement of old ID cards by March, 1985.

TABLE 10. DISTRIBUTION OF LIFT MODELS BY DIVISION

DIVISION	VAPOR	EEC	TOTAL
EMERYVILLE	115	34	149
RICHMOND	37	50	87
EAST OAKLAND	53	140	193
NEWARK	32	52	84
TOTAL	237	276	513

TABLE 11. INCREMENTAL EXPANSION ACCESSIBLE BUS ASSIGNMENT

			Additional Lift Assignment	Accum. Total
		Present Assigmnent		248
		100% of Assignment		
87/88	June 1987	Line 37, 53, 80/81/85, 33, 47	=+ 25	273
	Sept. '87	Line 68, 69, 70, 84, 23, 24	=+ 28	
	Dec. '87	Line 12, 86, 89, 95	=+ 22	
	March '88	Line 18, 88, 90, T	=+ 31	
	June '88	Line 15, 21, 42, 56	=+ 35	
			+116	389
88/89	Sept. '88	Line 63, 64, 78, V	=+ 24	
	Dec. '88	Line 46, 87, 93, 17	=+ 8	
	March '89	Line 7, 67, A/B	=+ 24	
	June '89	Line 14, 59/76, 79	=+ 18	
			+ 74	463
89/90	Sept. '89	Line 55, O/W*	=+ 13	
	Dec. '89	Line 16/25/30, 8, 33A 57N, 66, 71	=+ 14	
	March '90	Line 5, 36, 38, 56s	=+ 15	
	June '90	Line 34	=+ 18	
			+ 60	523
90/91	Sept. '90	Line G, H	=+ 19	
	Dec. '90	Line F	=+ 23	
	March '91	Line O/W	=+ 18	
	June '91	Line 9, 10, 39, 62, Y	=+ 9	
			+ 69	592
91/92	Sept. '91	Line C/E	=+ 28	
	Dec. '91	Line RCV	=+ 7	
	March '92	Line K/R/S, L, N	=+ 96	
			+131	723

TOTAL 100% LIFT SERVICE ASSIGNED

*10 of 28 assignments filled on O/W Line

During FY 1985, extensive modifications were completed to upgrade issuance of Regional Transit Connection Discount Cards for disabled persons. These changes should remain in place through the next five years, although modifications may be made as experience with the new program continues.

ADVISORY COMMITTEE ON ACCESSIBILITY

The Advisory Committee continues to meet regularly with District staff. This year, the committee and District staff will focus on improving the level of the District's accessible service. The District looks forward to working with the committee on implementing and monitoring the success of the Accessible Service Improvement Program.

WORKSHOP A: FIXED ROUTE ACCESSIBLE BUSES: WHEELCHAIR LIFT EQUIPMENT PROBLEMS, ISSUES AND SOLUTIONS

3.1.1.6 **THE VEHICLE MANUFACTURER'S SIDE OF THE WHEELCHAIR LIFT**

Presented by:
Lance Watt
Director of R&D and Advanced Vehicle Engineering
The Flxible Corporation
Delaware, Ohio

CONSIDERATIONS IN INTERFACING THE LIFT TO THE VEHICLE

a) Structural Considerations

The vehicle structure must not be compromised when marrying the lift to the vehicle

b) Systems and Subsystems

The vehicle electrical system, hydraulic system, pneumatic system and related components and hardware must be a designed match for interfacing to wheelchair lift systems, subsystems and controls.

c) Wheelchair Negotiation Space

To the extent most practical, considering vehicle on board equipment such as: grab rails, stanchions, operators station, emergency equipment, radio equipment, fare boxes and seating layouts, the maximum free space must be arrived at. White Book also specifies the minimum required wheelchair negotiation space that an ADB vehicle must meet.

d) White Book Specification

The White Book, or Advanced Design Bus Specification, specifies minimum vehicle approach angle, maximum floor height, bumper height and a host of other dimensional and performance criteria. Those dimensional limits, along with component physical size (such as tires) and S.A.E. recommended practices (such as tire to wheelhouse clearances) plus vehicle structural considerations, define the envelope available for lift installation. In turn, lift structural requirements, when married to available envelope, establish such criteria as maximum platform widths and lengths.

LIFT OPERATIONAL CONTROLS

a) Convenience of Controls

Controls must be positioned for ease of operation and be placed conveniently so that they are readily accessed by the operator while affording a clear view of the wheelchair lift and patron during all phases of operation.

b) Simplicity of Controls

Controls should be clearly identified by function and as self-explanatory as possible to preclude the possibility of misuse or operator error.

SERVICEABILITY

a) Location of Frequently Accessed Maintenance Points

Components that require frequent maintenance or checking should be placed in easily accessed locations to ensure that the work is performed. An "out of sight, out of mind" syndrome should not be encouraged.

b) Accessibility of Emergency Operation Controls

Emergency operation controls should be readily accessed, easily used and easily understood. They should also be positioned so that the operator is afforded a clear view of the wheelchair lift and patron during all phases of operation.

RELIABILTY

a) Component Selection

Due to the harsh environment that a lift must operate in, and at extremes of temperature, the component selection process becomes very critical in designing for reliable operation and service.

b) Component Location

When environmentally acceptable components cannot be obtained, a suitable protected location or housing must be provided to afford the same end result from the component.

OPERATING ENVIRONMENT

a) Extremes of Temperature

Lifts are required in geographical locations that exceed the design operating temperatures specified by White Book. In such cases, special provisions, maintenance practices, lubricants, service intervals, etc., must be specified to ensure reliable operation.

b) Corrosive Environments

In many cases, in locations subject to freezing roadway surfaces, snow, sleet, and other elements, corrosive elements are employed by cities and highway departments to keep roads in a relatively safe state of use. Usually, the elements used, salt and the like, when they dissolve into solution with the moisture present cause severe corrosion on lift

structures. In may cases, stones and gravel thrown up during the non-winter seasons, chip and degrade painted surfaces leaving them bare for corrosive attack during winter. Those severe road use conditions are usually, unfortunately, overlooked during design stages of wheelchair lifts.

c) Dirt, Dust, Water, Etc.

In addition to encountering strong saline solutions during winter, other seasons usually have dirt, dust, etc., mixing with water during rains to form deposits on lift members. The dirt and dust is abrasive, thus causing accelerated wear on the various working components. With the presence of water, areas with poor air flow around them stay damp for long periods of time. This effect usually shows up in the form of corrosion of the lift structures. Ideally such trap areas should be anticipated and designed out of the lift to the extent most practical.

SAFETY CONSIDERATIONS

a) Sensitive Mats

The use of sensitive mats in the passenger area of the lift platform will preclude the possibility of dumping patrons should an operator error occur. Such an error would be to inadvertantly select the "step" mode while a patron was on the platform.

b) Control Interfaces and Operation

Circuit logic should be employed that prohibits modes being selected simultaneously or prior to completion of a previously selected operational mode. Each action should be contingent upon the full cycle completion of any previous action selected.

c) Hand Rails

Hand rails on the lift should interface with other adjacent hand and grab rails in the vehicle, both when the lift is in operation and when it is stowed. Pinch points, even those that could develop from bent or damaged equipment, must be anticipated during lift to coach interface design.

WHEELCHAIR TIE-DOWN AREA

a) Tie-Down Locations

Ideally, tie-down locations should be as close to the lift as practical to reduce any "inconvenience factors" of other boarded patrons.

b) Securement Devices

Such devices and equipment must be positioned so that it is easily accessed, easily stowed when not in use, allows easy interpretation of use (especially if it is very universal in nature), does not tangle with other equipment and will not be easily damaged to render it dangerous or even useless before it has lived its expected life.

TESTING

Numerous tests are normally performed on a wheelchair lift, both as bench tests prior to vehicle installation and as a "system" after vehicle installation.

Such tests would typically be:

1. Static testing of lift to vehicle interface.

2. a) Stationary (in vehicle) load tests.
   b) Stationary (on bench) load tests.

3. a) In vehicle cycle tests with load.
   b) On bench cycle tests with load.

4. Dynamic operational and endurance tests in outdoor environments.

5. Review of supplier qualification tests during early design stages and at various stages of initial production run.

HISTORY AND EXPERIENCES

Due to the relative young age of vehicle wheelchair lifts, there is still a lot to be learned as lift populations increase and as they get introduced into service in the various geographical environmental extremes of the U.S.

The need exists through regular monitoring of the product, to quickly identify any potential problems and develop corrective actions at the earliest possible point in time.

Only significant problem areas can usually be identified in the lab tests and during controlled vehicle dynamic operational and endurance tests. This is due to the relatively short period of such tests.

The real picture gets painted when the product is put in the field and used and maintained (or abused and not maintained).

This is not unlike the woes of many other industries and consumer products, though, when it unfortunately is in the constant view of the public, constantly in use and as large as transit buses are, there are very few problems that can be hidden or go unnoticed.

SUMMARY

There has been a lot of work done and monies spent to develop wheelchair lifts to the stage that you see them today.

Research, re-design, new designs, new technologies and significant dollar investments are being constantly employed to further improve and advance lifts as well as correct past problems.

Even with all the expended efforts and resources, past, present and near future, the perfect, maintenance free, trouble free, lifetime service wheelchair lift is still somewhat down the road.

With so many Federal regulations, as well as state and local regulations that affect vehicles and vehicle equipment, and usually with one change potentially affecting many areas mandated by those regulations, it will not be an easy task to arrive at the ideal end result.

WORKSHOP B: ALTERNATIVE SERVICE (SMALL BUSES AND PARATRANSIT): WHEELCHAIR LIFT EQUIPMENT PROBLEMS, ISSUES AND SOLUTIONS

Chairperson:

Loretta Sharpe, President, LRS Associates

Panelists:

Douglas J. Cross, Paratransit Planner, Northeast Ohio Areawide Coordinating Agency

William H. Henderson, Program Director, Dial-a-Ride Transportation

Donna Shaunesey, Assistant Director, JAUNT, Inc.

Barbara Singleton, Director, Kitsap Paratransit

Emilio Zamora, Director, Spokane Transit Authority

SUMMARY

This workshop was to provide the opportunity for maintenance staff from agencies that provide or manage special services to highlight recent maintenance problems and solutions concerning wheelchair elevation and securement systems for small buses and vans. Panel members addressed engineering design and material selection, mechanic and operator training, new technologies, user awareness, and manufacturer maintenance support.

While Workshop B included discussion on many of the wheelchair lift problems amplified in Workshop A, its emphasis was more on the practical, cost-effective measures a small, alternative transportation system could incorporate. Because a smaller service is all the more concerned with funding, the drivers and operators become the highest priority, a concern applicable to all sizes and types of systems.

Douglas J. Cross, Paratransit Planner for the Northwest Areawide Coordinating Agency in Cleveland, gave a detailed presentation on various vehicle options for carrying mobility-limited passengers. Although there have been many vehicle and van design improvements, many systems must still rely on the more traditional vehicles, many without any kind of lift equipment. Specifics on design, capacity, size and cost for small buses, conventional school buses, and all types of vans are supplied. Mr. Cross also offers the same specifics for those vehicles with more limited suitability and notes the circumstances where specific situations will limit vehicle availability and require modification.

Given the equipment limitations of smaller transportation services, William Henderson, Program Director of Dial-a-Ride Transportation, discusses the need to emphasize driver training. A survey was conducted among 400 services to determine accident types, contributing factors, and any associated system characteristics. Analysis of the results indicated that lack of driver familiarity with safety procedures and assistance techniques, lax rule enforcement, and mechanical failures were the primary accident sources. As necessary practice dictates working with off-the-shelf equipment, the burden of safety is primarily on the drivers and operators. The more familiar a driver is with the various vehicles, lifts, and securements, the better and safer the passenger service.

Driver training is the focus of Donna Shaunesey's presentation. As Assistant Director of JAUNT, Inc., a small, non-profit transit company, she is familiar with the assortment of materiel and the drivers' role in equipment and passenger care. JAUNT modifies and adds to its existing equipment; it also performs much of its own maintenance. Further, drivers are carefully selected and trained in defensive driving, first aid, CPR, and vehicle mechanical requirements. Through Passenger Assistance Training (PAT) and hands-on practice, JAUNT's staff acquires both technical operating skills and the ability to deal with customers in an efficient, safe, and sympathetic manner.

Workshop B's focus on the need for increased driver awareness and training is applicable to more than small transit systems, however. To best contend with changes in equipment, budget, and the handicapped population's needs, all systems must emphasize the importance of knowledgeable drivers to meet existing restraints.

WORKSHOP B: ALTERNATIVE SERVICE (SMALL BUSES AND PARATRANSIT): WHEELCHAIR LIFT EQUIPMENT PROBLEMS, ISSUES AND SOLUTIONS

3.2.1 PANELIST PRESENTATIONS

3.2.1.1 OPTIONS FOR ACCESSIBLE PARATRANSIT VEHICLES

Presented by:
Douglas J. Cross
Paratransit Planner
Northeast Ohio Areawide Coordinating Agency
Cleveland, Ohio

Many options are now available to operators of paratransit and circulator-type fixed-route services for carrying wheelchair and other mobility-limited passengers. Vehicle manufacturers have responded to this need over the past several years by introducing new and innovative vehicle designs. The need to operate a vehicle with platform or steptype lifts has been obviated with the development of low-floored, accessible transit vehicle and passenger van designs. This development may prove to be beneficial to many small operations which cannot properly maintain the often complicated lift mechanisms of the platform and steplifts. However, for many operations, and those requiring certain vehicle types, the traditional wheelchair lift equipment will continue to be preferred.

I. VEHICLES WITH WHEELCHAIR LIFTS

A. Small heavy-duty transit buses

1) Front (or center) door steplift design

2) Suitable for small city fixed-route or circulator-type services

3) Passenger capacity: 25-30 (regular)

4) Length: 25-32 feet

5) Cost: $85,000-$120,000

B. Body-on-chassis transit vehicles

1) Platform lifts located in special doors just aft of main doors or at rear of vehicle

2) Suitable for all types of services, depending on size of bus purchased

3) Passenger capacity: 12-25 (regular)

4) Length: 17-27 feet (those over 23 feet in length may not be suitable for continuous, heavy-duty transit use, however)

5) Cost. $22,000-$40,000

C. Conventional school buses

1) Platform lifts located in special doors just aft of main doors or at rear of vehicle

2) Not suitable for many transit and paratransit applications - for use only where large passenger capacity is needed and cost must be kept to a minimum

3) Passenger capacity: 20 to 40+ (regular)

4) Length: 20-35 feet

5) Cost: $25,000-$35,000

D. Standard vans (no modifications besides wheelchair lift)

1) Platform lifts located in standard side or rear doors; or ramp in rear doors

2) Suitable for demand responsive or jitney service where wheelchair positions are used infrequently; not suitable for regular wheelchair service

3) Passenger capacity: 11-14 (regular)

4) Length: 16-19 feet

5) Cost: $15,000-$20,000

E. Modified standard vans

1) Platform lifts in modified (raised) side doors, combined with raised roof and bus-like modified front entrance and stepwell

2) Suitable for demand responsive service where one or two wheelchair passengers will be carried frequently; more wheelchair passengers possible with elimination of regular seating

3) Passenger capacity: 11-14 (regular)

4) Length: 15-19 feet

5) Cost: $22,000-$25,000

F. Modified mini-vans

1) Platform lifts in modified (raised) side doors, combined with raised roof

2) Suitable only for small capacity, demand responsive trips - wheelchair lift and positions take up all available space in vehicle; modified standard vans more suitable for most purposes

3) Passenger capacity: 5-7 (regular)

4) Length: 15 feet

5) Cost: $17,500-$20,000

11. VEHICLES WITHOUT WHEELCHAIR LIFTS

A. Small, low-floored transit buses

1) Front (or rear) door with low-floor ramp access; some combined with kneeling features (maximum 15 degree ramp angle)

2) Suitable for all types of services, depending on size of bus purchased

3) Passenger capacity: 18-31 (regular)

4) Length: 22-34 feet

5) Cost: $90,000-$110,000

B. Modified conventional mini-vans

1) Modified (raised) side door(s) with moderately low-floor ramp access (available on Chrysler models only - maximum 15 degree ramp angle)

2) Suitable for small capacity, demand responsive trips with wheelchairs; two wheelchairs and three regular seated passengers are possible, but a moderate effort will be required to push wheelchair passengers up ramp; removable track-type ramps are stored behind rear seat, leaving door area free of ramp or lift protrusion

3) Passenger capacity: 5-7 (regular)

4) Length: 15 feet

5) Cost: $16,000-$19,000

C. Specially-designed, low-floored mini-vans

1) Side doors with low-floor ramp access - slight or no assistance to wheelchair passengers required for entry

2) Suitable for small capacity, demand responsive trips with wheelchairs; specially designed ramps stow away or remove for storage behind rear seats, leaving door area free; some manufacturers offer "stretch" version for greater passenger capacity

3) Passenger capacity: 5-9 (regular)

4) Length: 15-18 feet

5) Cost: $22,000-$30,000

WORKSHOP B: ALTERNATIVE SERVICE (SMALL BUSES AND PARATRANSIT): WHEELCHAIR LIFT EQUIPMENT PROBLEMS, ISSUES AND SOLUTIONS

3.2.1.2 VEHICLE OPERATOR AS THE INTERFACE BETWEEN THE SYSTEM AND THE PASSENGER AND POTENTIAL IMPACT ON SAFETY

Presented by:
William H. Henderson
Program Director
Dial-a-Ride Transportation
Everett, Washington

Good afternoon. I'm pleased to be able to participate in a conference which to my mind is a veritable milestone for elderly and handicapped transportation services.

My particular objectives this afternoon are two-fold. First, I would like to enhance your awareness of the impact that equipment selection may have upon driver safety and efficiency, as well as passenger safety and comfort. Second, to the extent necessary, I would like to tie together some aspects of the previous presentations that affect driver training and safety.

As some of you may be aware, I've been heavily involved in the development and utilization of the Passenger Assistance Techniques Training materials. One outgrowth of this was to use the same 300 PAT instructors from 30 states as a resource on accidents in special transportation systems.

It is with this effort that I would like to begin. Time does not permit more than highlighting several critical findings that bear on today's subject matter.

SURVEY RESULTS

The purpose of the survey was to determine:

1. what type of accidents were occurring in systems transporting the elderly and handicapped,

2. what factors were contributing to these accidents, and

3. if there were any system characteristics that could be associated with the type or frequency of accidents.

A primary objective of the survey results was to gain a better understanding of the nature of the types and causes of accidents in order to develop improved driver training and equipment selection and design criteria.

Briefly then, some 400 systems were contacted with 84 responses, of which 33 reported accidents and 51 reported no injury accidents. Systems reporting accidents reported a total of 268.

Characteristics of Accidents

While accidents associated with transportation systems are usually thought of as single or multiple vehicle accidents, 46 percent of the accidents reported by special transportation systems occurred while passengers were entering or exiting the vehicle. Thirty-six percent of the total number of accidents occurred while the vehicle was in motion.

As might be expected the majority of accidents in all categories were in the minor to moderate categories. In the serious category (requiring hospitalization) 15 percent of the accidents were in the entering and exiting and vehicle-in-motion categories. The fatal category accounted for 8 percent of the entering and exiting accidents and 3 percent of vehicle-in-motion accidents. One of the most significant findings in the study was a comparison within the vehicle-in-motion category in which passengers were and were not using seatbelts. In both categories, the types and severity of the vehicular accidents were very similar. The resulting injuries to passengers were very different, however. In the "with seat belt" category 56 percent of injuries were minor and there were no fatalities. In the "without seat belt" category 30 percent of injuries were serious and 8 percent were fatal.

In the category of fatal accidents in entering and leaving the vehicle all included mechanical failure of the lift equipment. Mechanical failure of the lift equipment accounted for a majority of the serious injuries in this category.

Categorization of Accidents

One result of the survey was that the collection of data allowed for the development of categories of accidents for purposes of classification and analysis. From an examination of all 268 accidents reported, seven categories were developed. They were:

1. Wheelchair lift accidents
2. Multiple vehicle traffic accidents
3. Single vehicle traffic accidents
4. Assistance errors
5. Finger and hand injury
6. Passenger fault/policy issues
7. Weather conditions

ANALYSIS

Considering the fact that the survey sample came from specialized transportation systems that had sought assistance in training drivers and selecting equipment, the survey results probably represented a somewhat more safety-minded segment of the elderly and handicapped transportation service providers.

The results of the survey indicate there is definitely a problem of accidents with providers of transportation to elderly and handicapped passengers. Three major problem areas emerged from the survey. They are:

1. a lack of knowledge by drivers on safety procedures and proper techniques in assisting elderly and handicapped passengers,

2. the lack of rule enforcement and usage of seat belts on specialized transport vehicles, and

3. the mechanical failure of special devices added to the vehicle to assist elderly and handicapped passengers.

The failure of lifts in the survey included several different makes of wheelchair lifts. The most common lift failure was that of the back stop designed to prevent the wheelchair from rolling off the lift platform. While lift accidents almost always resulted in serious accidents, all fatal lift accidents occurred in cases in which the passenger was loaded facing the vehicle. No fatalities occurred in even major lift accidents in which the passenger was facing away from the vehicle.

An analysis of accident factors indicates that almost all accidents could have been reduced in seriousness or avoided completely if drivers had been more knowledgeable about potential safety hazards and followed established safety precautions. This was true even in cases of mechanical failure.

Bearing the above in mind, I would like to discuss some equipment and driver concerns.

It should be obvious that two primary things represent a system to the passenger: the equipment and the driver.

While it would be great to be able to select equipment that enables the system to accommodate all of the needs of passengers arising from the many variations of handicaps, it's just not practical. The practice has been to use off-the-shelf equipment and work around its limitations. This prevalent attitude results in shifting the burden of the safety program from system management onto the driver and passengers. Unfortunately the driver in many instances is not experienced or sufficiently trained to handle this responsibility. For the passenger, this approach results in more than just an inconvenience, it can result in significant safety hazards.

The first several years of driver training tended to bear out the validity of the original conceptual basis for the PAT training program. For example, the focus on the functional losses resulting from disease or trauma were far more important than knowing what condition caused the losses.

It was easier to teach a driver to recognize the signs of a particular functional deficit and relate these to what assistance might be required. This is in contrast to attempting to teach a whole laundry list of medical conditions. We also substantiated the fact that poorly selected equipment would place far greater demands upon the driver than properly selected equipment.

This led to the axiom that "the less sophisticated or poorer the equipment the greater sophistication and training is required on the part of the driver." A classic example is providing lift-equipped vehicles without extended tops or doors. This necessitates the passenger being able to bend their neck and/or the driver stooping over or being on their knees to manipulate a wheelchair into position on the vehicle. Another example is unthinkingly specifying semi-automatic out-of-body lifts. In this instance, the lift platform must be manually placed in the deployed position. A driver not paying attention can easily get their "bell rung" or in the case of some older drivers, it may be difficult and unsafe for them to lower the platform to the deployed position or raise it to lock in place.

Other than seating configurations, the two most troublesome areas of special equipment are lifts and wheelchair securements. These problems are compounded by the almost infinite variety of personal equipment presented by passengers that have to be dealt with by the driver.

The following attempts to highlight potential problems in the areas of lifts, securement systems and issues arising from the proliferation of new and varied wheeled devices used by passengers.

Lifts

In recent years there has been a proliferation of lift designs. Reliability has improved, plus improved features such as limit switches to restrict platform travel and the addition of railings have resulted in a better product. Yet lift manufacturers seem to have surprisingly little awareness of the many types of wheeled devices special transportation services are expected to accommodate. For example, the large diameter pneumatic tires can easily over-run the 3/4" to 1-1/2" side rails on many lift platforms and some ramp designs. The stock answer seems to be "it's never been a problem." Probably not, because they've never asked the question.

Two features of lifts create ever-present hazards. First is that most lifts start to move with an initial jerk. Persons standing on lifts are usually unprepared for this jerk, causing them to look for something to grab hold of. Keep in mind the reason the person is on the lift is the lack of strength and ability to manage steps. Implicit in a lack of strength is impaired balance. Another feature is that most lift platforms move in an angular motion. This, coupled with the initial jerk, can easily result in the knees buckling, ending in a stumble or fall. The untrained or inattentive driver now must deal with the resulting problem.

Many systems are unable to enjoy the situation where all their special equipment, including lifts, is the same. This means drivers must be familiar with each type and must constantly have in mind the different operational characteristics. Some of the more significant kinds of problems most commonly found are:

1. Lift platforms may be gravity or powered down.

Powered down may or may not have limit switches or may have switches that won't operate unless the platform is on a perfectly level surface.

2. Lift controls may be dash mounted, door mounted or be on tethers.

Controls may be buttons or toggle switches.

3. Switches may be single or multiple.

Controls may be marked: up, down, raise, lower, stow, or be unmarked. These may be unmarked due to directions having worn off or having been on labels that have long since disappeared.

Controls, when on tethers, may be oriented with "up" at the cable end or at the opposite end. If unmarked, the potential for mis-operation is great.

The point of noting the above is that these potential sources of problems mean the drivers must be constantly on the alert. Failure to be alert can result in injuries to the passenger, injury to the operator or to the equipment. Obviously, training on the equipment and its foibles is crucial to reducing accidents and the systems liability exposure.

It should also be borne in mind that many lifts designed for personal use will probably not withstand the rigors of paratransit and/or transit use, and the probability of various failures increases with frequency of cycling.

At this point I would like to highlight some tie-downs or securement concerns.

Probably the most persistent problem facing all systems, but more so the paratransit and small systems, is that of tie-downs (wheelchair securement).

The almost infinite variety of securement methods range from the recent and fairly sophisticated approach of an integrated wheelchair/passenger securement system offered by Q Straint, to something as simple as rope and everything in between.

There is no agreement between operators, manufacturers and equipment vendors as to even basic principles of securement, much less the method of securement or where to attach to the wheelchair.

Added to this are the many, many variations in wheelchair configurations now being seen.

Finally, except for several states there are no required standards for wheelchair securement systems. It is unbelievable that for something so critical to passenger welfare, comfort, and safety that wheelchair securement standards have not been developed, approved and adopted at the federal and/or state levels as has been done for beat belts.

Because of the above I strongly urge that UMTA convene a wheelchair securement specifications conference of wheelchair manufacturers, securement system manufacturers, vehicle suppliers and experienced systems representatives. This conference would have the task at a minimum of developing standards and specifications in addition to the following:

1. Standards for securement points on wheelchairs, including identification of specific or generic chairs which cannot be safely secured.

2. Minimum requirements for retro-fitted attachment points such as brackets, etc.

3. Specifications for materials

   a. steel
   b. aluminum, if approved
   c. webbing
   d. stitching, including thread and pattern
   e. bolts, washers, etc.

A recent problem emerging is the many variations of three wheeled scooter type electric chairs. These are virtually impossible to tie down safely with existing systems including Q Straint. Being wheeled devices these are prescribed and/or sold with little consideration given to the functional environment of the user.

Because of the high center of gravity, narrow and short wheelbase and potential seat instability, the passenger should not be allowed to remain in the chair when being transported. Unfortunately, users become very upset when they are told they must transfer to a vehicle seat. If they do transfer the problem still remains of securing the chair while in transit, but at least the passenger is less at risk.

Some newer chairs have four smaller wheels (14" diameter or less) and a molded plastic shroud or cover over the power supply/charger and drive system. These shrouds tend to be attached only enough to hold them in place and offer no points for attaching securement systems.

The two situations noted above serve to illustrate the urgency of the need to implement recommendations for convening the standards conference.

Many of the chairs are powered, usually with electric motors but occasionally with small gas engines. All powered chairs should be equipped with a "free wheeling" feature so such chairs can be easily moved with the power off and the wheel locks disengaged. This will eliminate the necessity for moving the chair onto or off of the raised left platform under its own power.

The risk of inadvertently moving in the wrong direction is too great. For example, a muscle spasm (cramps) in the hand or arm could cause an electric chair with joystick controls to move abruptly in reverse when the intended direction was forward. Even if an alert driver were in attendance, the likelihood of preventing a serious accident would be virtually nil.

As I've already noted the proliferation of wheeled chairs of varied styles, each posing its own securement problems, is of immediate and great concern. However, we shouldn't ignore the new variations in walkers, multi-tipped canes, specialty chairs for amputees, strokes and cerebral palsied.

Many of these devices have implications for the driver in terms of providing assistance to the user. Since there is no organized evaluation of new devices in this context each system must be alert to new personal equipment as it shows up in their system. Drivers should be encouraged to report equipment they've not encountered before noting any special problems they may have experienced.

In conclusion, I hope that I've succeeded in sensitizing you to the need to approach equipment specification with special attention on the effect upon drivers and passengers, not merely from the "Low Bid" perspective.

In addition, I'm hopeful that the need for comprehensive driver training is recognized and will no longer be taken quite so lightly as you plan your budgets.

WORKSHOP B: ALTERNATIVE SERVICE (SMALL BUSES AND PARATRANSIT): WHEELCHAIR LIFT EQUIPMENT PROBLEMS, ISSUES AND SOLUTIONS

3.2.1.3 WELL-TRAINED DRIVERS ARE THE MOST IMPORTANT TOOLS FOR ACCESSIBILITY

Presented by:
Donna Shaunesey
Assistant Director
JAUNT, Inc.
Charlottesville, Virginia

BACKGROUND

JAUNT is a small, nonprofit transit company in central Virginia providing over 120,000 trips per year. We operate twenty-five small vehicles and provide a whole rainbow of services in our five county service area. JAUNT provides the handicapped service for the city of Charlottesville, and does virtually all the area's human service agency transportation. JAUNT also provides commuter routes bringing rural workers to the city on weekdays, demand responsive service for the rural general public, as well as administering a car and vanpool matching service. JAUNT has been providing wheelchair trips since 1979, and currently makes over 5,000 wheelchair trips per year.

EQUIPMENT

JAUNT has four lift-equipped vehicles: One is a raised roof van that has been in use since 1979; the other three are relatively new body-on-chassis vehicles built by Wayne Corporation that can carry at least nine ambulatory passengers in addition to three wheelchairs. All four have Braun semi-automatic lifts mounted on the sides of the vehicles and Collins tie-downs. Three of the vehicles have two crab-claw tie-downs each, the fourth has a pin and bracket type tie-down. Each vehicle also has one four point Aeroquip tie-down to handle different sized wheelchairs and provide extra capacity.

In addition to this standard equipment, JAUNT has made some other purchases to improve accessibility. First, we invested in some wheelchairs of our own. These are very helpful for those passengers who are not in wheelchairs, but who have severe problems managing steps. A wheelchair is carried in each of our lift-equipped vehicles for use by the semi-ambulatory.

We have also added new steps and handgrips to our standard vans to make getting in a little easier. Both were designed by a local wrought iron craftsman. The steps are very strong, and allow mud and ice to pass straight through without making the step slippery. The handgrips are firmly bolted to the column between the right front passenger door and the main side door. They project horizontally into the doorway about 5 feet above ground level. They are covered with ridged rubber both to give a better grip and so they won't get so hot that they burn passengers' hands. The cost of a step was $60; the handgrips were $44 each.

Equipment Maintenance

JAUNT has had to make only a few repairs to accessibility equipment and these have been easily and inexpensively done. Two hydraulic lines have been replaced, as well as one switch and a shock absorber. The sum total of lift repairs in the past three years has been less than $200, and this includes routine maintenance charges. There have been a few more problems with tie-downs, or rather the tie-down releases. The releases on one vehicle are activated by flipping down a lever. Unfortunately, going over any kind of bump caused the lever to flip down by itself, releasing the wheelchair, which of course is very dangerous. JAUNT's inventive mechanic simply bolted in some springs to hold the releases in place. Another vehicle has tall rod releases that look a bit like gear shifts. Unfortunately, the release rods were a bit too fragile and two have broken off and had to be welded. Our most reliable tie-downs have been the pin and bracket type.

JAUNT's biggest equipment problems have not been with lifts and tie-downs, but with the vehicles themselves, since the ideal vehicle for transporting passengers in wheelchairs doesn't seem to exist.

The Wheelchair Equipment That You Hire: The Driving Staff

At JAUNT we firmly believe that drivers are the most important tool we have for providing reliable, accessible transportation. No matter how high-tech your lifts and securement devices are they do not guarantee good service unless the driving staff is dependable. The staff at JAUNT works hard to make sure the drivers are the best possible, with the best training. And when we get them, we do our best to keep them with fair salaries and good benefits.

The first step in getting good drivers is the selection process. Clearly we are all looking for people with good driving records who are able-bodied, well groomed and friendly. What seems most important to us is a driver who can inspire confidence. When someone has tilted you in your chair backwards at a 45 degree angle and is lowering you down a flight of concrete steps, you want to trust that that someone is strong and competent. At JAUNT we look hard for that quality that makes passengers feel comfortable.

Once you've selected confidence-inspiring drivers, the training begins. At JAUNT we require classes in defensive driving, first aid, CPR, and passenger assistance techniques, as well as on-the-job training in JAUNT's procedures. The need for defensive driving and CPR training is obvious. We require first aid due to the kind of area we serve. If JAUNT operated solely in the city first aid classes might not be a requirement because emergency care and telephones would be so close at hand. Since much of our transportation is rural we feel it is important to make sure that our drivers can deal with emergencies that arise, so they must take a first aid course every three years.

Our fourth required class is in passenger assistance techniques, or PAT training. PAT is a nationally-recognized course for drivers of the elderly and handicapped. The PAT course lasts a full eight hours and trains drivers in several subject areas.

First there is general instruction in the basics of disabilities. Along with descriptions of disabilities and common assistive devices, the driver learns what he or she should be aware of when transporting people with disabilities. To give one example from the course, drivers are told that amputees often have trouble staying cool since they have reduced skin surface to help them get rid of excess heat. Therefore they may be at greater risk in cases of a vehicle breakdown in hot weather. Information of this kind can be life-saving.

Half of the course is devoted to hands-on practice at assisting the handicapped. Drivers learn safe techniques for maneuvering wheelchairs in a variety of situations, including over curbs, steps, onto lifts, and up and down ramps. Techniques for transferring passengers in and out of wheelchairs are also taught, as well as methods for assisting the blind.

In addition, the course provides drivers with some first-hand experience with handicaps. Drivers take turns being the passenger during the hands-on part of the wheelchair maneuvering training. Then they take turns being blindfolded to learn how to guide the blind over a variety of terrains. Experiences like these are worth a thousand words in making drivers more sensitive to the problems of individuals with handicaps.

A driver who has taken this one-day course is certified in a national registry and is entitled to wear the PAT patch and have the PAT decal on his or her vehicle.

We were fortunate enough to be able to have one of our drivers take the Instructor's Course. He has trained all the JAUNT staff, and is now beginning to train drivers at transit properties all over the state of Virginia. He has also become a qualified CPR instructor and over the next six months will take instructor's training in defensive driving and first aid. Having a trainer on the staff makes training much more convenient and less expensive.

At JAUNT, we had everyone on the staff take PAT training, including dispatchers and administrative staff. It gave all of us a much better feel for what is going on out there in the field. Knowing what the drivers are up against is one benefit, and gaining an inkling of what the passengers are up against is another. We recommend this universal training for all transit systems. A further recommendation is for managers to spend some time out riding with their passengers and trying to get a feel for how the system is actually working. They should look into how long passengers have to wait for pickups, how busy the schedule is, how well-kept the equipment. Although the advice seems simple, we all know how easy it is for managers to get so caught up in the scramble for funding and the fight to make sense of regulations that they lose touch with what the service is actually doing out there.

3.3 WORKSHOP C: WHEELCHAIR LIFT EQUIPMENT - RELIABILITY AND COST

Chairperson:

Rick Walsh, Manager of Service Planning and Development, Municipality of Metropolitan Seattle

Panelists:

Jim Burton, Superintendent of Operations, Seattle METRO

Michael Hubbell, Manager of North Base Maintenance, San Mateo County Transit District

Michael Kurtz, Assistant Director of Maintenance Support, Washington Metropolitan Area Transit Authority

William Freeman, Manager of Base Operations, San Mateo County Transit District

Alan Romano, Engineering Consultant

SUMMARY

Workshop C helped establish definitions of equipment and service reliability, as well as guidelines for collecting cost data for both fixed-route and alternative accessible bus services. Panel members were asked to develop consensus definitions of reliability and quantitative approaches to establishing a comprehensive cost accounting system for various types of accessible services. The use of such information by transit providers, it is hoped, will eliminate much of the ambiguity associated with comparisons of reliability and costs of accessible fixed-route services with specialized bus services.

The participants in Workshop C deal with ongoing questions of efficiency, reliability, safety, and cost from a managerial/engineering perspective. Since many properties have limited funds, in addition to obsolete or non-standard equipment, it is important that they be aware of the many techniques used by successful properties to maintain equipment while minimizing costs.

As Superintendent of Operations for Seattle METRO, Jim Burton is concerned with how to measure reliability, quality and cost of wheelchair lift systems. Reliability can be measured by quantifying two indicators, lift malfunctions and accessible passenger trips taken. Quality can be quantified by measuring the total time of "in-service delay." Burton outlines a method of quantifying capital and operating costs in order to facilitate agency comparisons. A Standard Costing Method is presented where nine cost elements common to all agencies that operate accessible bus service are detailed.

Michael Hubbell, Manager of North Base Maintenance in San Mateo, CA discusses factors that affect equipment reliability, including the operating environment, staff training, manufacturer support, and budgetary considerations. From an engineering viewpoint, Hubbell emphasizes that constant, yet flexible

maintenance is necessary, particularly in a financially restricted situation. The need to bolster staff confidence through agencywide commitment is also discussed. With well-trained operators and cooperation from management and manufacturers, lift life can be prolonged and made more efficient.

Finally, Michael Kurtz describes how Washington Metropolitan Area Transit Authority mechanics keep lifts and vehicles in service despite limited engineering and budgetary resources. In his capacity as Director of Maintenance Support, Kurtz's daily activities include monitoring a disparate set of mechanical parts, operator training, in-house repairs and maintenance, and exchange of practical solutions that minimize expensive and time consuming repairs. Like Hubbell, he stresses the need not only to maintain lifts in good working order, but also to periodically update equipment. Each operating division has a specialized lift mechanic to meet unanticipated, day-to-day needs.

Kurtz strongly recommends that manufacturers develop joint ventures with operating properties in the development of a wheelchair lift that is safe, reliable, and mechanically dependable.

WORKSHOP C: WHEELCHAIR LIFT EQUIPMENT - RELIABILITY AND COST

3.3.1 PANELIST PRESENTATIONS

3.3.1.1 DEFINITION AND COST METHOD

Presented by:
Jim Burton
Superintendent of Operations
Seattle METRO
Seattle, Washington

RELIABILITY

Accessible Service reliability should be measured by a common method that balances the variations of accessible ridership, route miles and accessible fleet size of each property. This excludes indicators of miles and platform hours.

Reliability accessible service is one increment of the overall Service Quality picture. To quantify its impact, accessible service should be measured on its own discrete reliability merits and on how well it can fulfill the demands of the ridership for which it is directly intended. Two indicators; (1) "lift malfunctions", and (2) "accessible passenger trips taken" appear to quantify reliable performance of lift service regardless of the transit property size.

For purposes of discussion, a "passenger trip" may be defined as a one-way trip consisting of a boarding and a deboarding. A "lift malfunction" may be defined as anytime the wheelchair lift fails to start or complete its full cycle. Seattle METRO uses two minutes for the cycle time. Any time beyond that is considered a delay.

Calculate the lift performance as follows:

$$\frac{\text{Total Lift Malfunctions}}{\text{Accessible Passenger Trips} \times 2} = \text{Malfunctions/Accessible Trip}$$

Depending on the data collection capability of each property, lift malfunction tracking and evaluation can be monitored and reviewed by lift manufacturer, by coach type, by route, etc.

SERVICE QUALITY

The quality of accessible service provided should measure the total minutes of "in-service delay" beyond the time assumed to board or deboard the passenger. This performance measurement equalizes all accessible fleets regardless of the lift equipment population within a property, or the number of accessible miles offered. Data collection may be isolated by lift manufacturer, coach type, route, time of day, etc.

Seattle METRO uses two minutes as the normal zone dwell time for boarding or deboarding with a lift. Beyond two minutes, an "in-service" delay is assumed. Calculate the "quality of accessible" service as follows:

$$\frac{\text{Total Minutes of Lift Delay}}{\text{Accessible Passenger Trips x 2}} = \text{Minutes of Delay/Trip}$$

STANDARD COSTING METHOD FOR ACCESSIBLE BUS SERVICE

Quantifying capital and operating costs associated with accessible service should focus on an approach that can easily balance agency comparisons regardless of property size or lift equipment population within each property.

Nine general cost elements appear within any agency committed to accessible service (see Table 12):

1. Capital cost of lift equipment
2. Associated spare parts investment
3. Operator training
4. Mechanic costs
5. Maintenance training
6. Insurance
7. Promotion and signage
8. Administrative and staff support
9. Route facility modifications

Capital Cost of Lift Equipment

Capital costs include the lift mechanism and associated installation expense. On an annual basis this should be expressed as depreciation with the depreciable life being established by each property. Seattle METRO uses 12 years.

Associated Spare Parts

A commitment to providing accessible service also assumes an investment in spare parts. This investment should be complimentary to the quantity of lifts in use. Seattle METRO has a wheelchair lift parts inventory of $69,000 which equals $120 per lift. Since spare parts are an investment they are not figured in the Standard Cost Method until they are used (i.e., expensed and listed within the maintenance cost).

TABLE 12. SAMPLE STANDARD COST METHOD FOR ACCESSIBLE BUS SERVICE

	CAPITAL	ANNUAL OPERATING
1) Lift cost each life_____years		
2) Operator Training		
3) Mechanic Training		
4) Routine Maintnce. Parts Labor		
5) Insurance		
6) Promo. & Signage		
7) Admin. Support Staff .007 Staff/Lift		
Annual Total Operating $		

Summary:

$$\frac{\text{Total Annual Operating \$}}{\text{Number of Passenger Trips}} = \text{Operating Cost/Trip}$$

Operator Training

Operator training may be amortized over the life of the lift for comparative purposes. Seattle METRO performs 1½ hours per operator for lift operation training, which includes classroom and 'hands on' instruction. Operator training may be calculated as follows:

$$\frac{(\text{Wage+Fringe})(\text{Operators Trained})(\text{Hrs Trained})}{\text{Depreciable Life Years}} = \text{Training cost/year}$$

Mechanic Training

Training expense should be amortized over the life of the lift for comparative purposes. This approach will tend to equalize training depending on the size of the property and the intensity of instruction.

Seattle METRO has a four-hour instruction class that is primarily directed to the electrical controls. Less instruction is directed toward mechanical elements since they are fairly generic for a journeyman mechanic. Calculate training as follows:

$$\frac{(\text{Wage+Fringe})(\text{Mech Trained})(\text{Hrs Trained})}{\text{Depreciable Life Years}} = \text{Training Cost/Year}$$

Maintenance Costs

These costs should include all elements of labor and parts necessary to maintain accessible service. Methods of capturing the information may vary between properties but at a minimum should include:

- Repair labor
- Preventive maintenance labor
- Inspection labor
- All repair parts

Repair expenses performed and reimbursed through a warranty arrangement should be included in the maintenance cost evaluation.

Insurance Costs

If a property is experiencing an insurance expense specific to the addition or growth of their accessible fleet - the increased increment should be included in the Standard Cost Method.

Promotion and Signage

Only those significant costs associated with promotion and signage should be considered in this evaluation. Promotion relates to identifying accessible routes on the printed timetables, printing information brochures and community relations work performed.

Signage refers to accessible identification for coaches, route signs, transfer centers and other facilities as necessary. Initially this cost may be substantial but on an ongoing maintenance basis may be only a minimal expense.

Route Facility Modifications

For purposes of attempting to establish a Standard Cost Method for accessible coach service, expenses related to route facility modifications have not been included. Capital costs for zone development throughout a service area will not increase significantly by making it accessible. Modifications such as curb cuts and ramps have a disproportionate impact to a small property. Many parts of the country have route terrain that may require no modification. When modifications are made, the depreciable life may be 12 to 20 years and the relative cost impact is low for comparative purposes.

Equipment Life

Usable life of accessible lifts vary throughout the country. Reasons range from maintenance to weather. Both reasons have foundation. Seattle METRO assigns a 12 year life to wheelchair lifts for depreciation only. The oldest lifts in the system are eight years old and used every day in revenue service.

Wheelchair lifts in Seattle are certainly not subjected to the extreme conditions of some other cities. Equipment life and associated costs are going to be significantly different between most properties because of the diverse operating environments.

WORKSHOP C: WHEELCHAIR LIFT EQUIPMENT - RELIABILITY AND COST

3.3.1.2 FLEET MAINTENANCE AND MECHANICAL SUPPORT IN THE SAN MATEO COUNTY TRANSIT DISTRICT

Presented by:
Michael Hubbell
Manager of North Base Maintenance
San Mateo County Transit District
Burlingame, California

San Mateo County Transit District operates just south of San Francisco on the peninsula. Currently, the district has 117 accessible buses in a fixed-route service, or about 1/3 of the total fleet. All lifts are located in the front door. Concurrently, a fleet of 17 paratransit vehicles called "Our Ready Wheel Service" with yearly service of 1/2 million miles is also operated. Three years ago, when I first took my current position, the system was having significant problems that are not uncommon to most properties. My task was to increase system reliability and the number of accessible buses.

To enhance reliability, we looked at the various factors that affect the equipment's reliability. Obviously, the first factors that come to mind are the climate and the operating environment. San Mateo's climate is probably one of the most temperate in the country. Snow, salt, and related corrosion problems are minimal or nonexistant. On the other hand, San Mateo has an extremely hilly terrain, similar to that found in Seattle. This terrain creates crowns in the road that significantly diminish the approach angle of buses with front door wheelchair lifts. By evaluating the routes where the lifts were bottoming out and working with the City to remove the crowns or reroute the buses, 20 percent of the lift problems were eliminated.

Training was another important factor in improving service. Previously, the system relied on mechanics with little formal training; many of whom fixed lifts by guessing. Approximately 2400 hours of mechanical training were provided for all employees in order to increase familiarity in preventative maintenance and light repair. Some of the mechanics really took the training to heart and became specialists. So we now have specialists at each location in the event that an employee with standard training cannot repair a lift.

When training was initiated, many operators said, "Hey, I'm not going to use the lifts because I'm not sure if they're going to work." I heard a lot of talk about commitment on the part of the property as a whole, but it really took a commitment on the management's part to convince those who were actually required to use the lift that we were truly serious; that the lift was supposed to work when they cycled it. A six month-long sales pitch to the mechanics and operators alone was necessary before we even got to the passengers. Now that all operators have been oriented in lift operation, they know exactly what the lift cycles are supposed to do. Eight hours of sensitivity training has also been provided.

We also found that when a bus component isn't used regularly, it's destined to fail from simple lack of use. After discussing the morning pull-out checks with the staff, we then produced the requirement that lifts be cycled a minimum of twice a day. As part of the morning pull-out, the driver must cycle the lift to ensure that it's fully operational, including the barrier drops, and that each stage of the cycle works perfectly. In the evening, when the bus comes in, the hostler that takes the bus to the fuel island is also required to cycle the lift. Should either test fail, the bus is removed from service until the lift is repaired. Three years ago this was a major problem, particularly in the morning pull-out, because the chair constantly failed even though the operators performed the cycle correctly. I was chasing wheelchair lifts out in the yard all morning. Now, according to the last report I've received, we missed only two pull-outs because of a failed lift so far this year.

Field support from the manufacturers is essential if the lifts are to function reliably. San Mateo operates four different types of lifts, one of which was made by a company no longer in the business and another that has withdrawn from the manufacturing business of the lift. Meetings with the manufacturers were held to discuss this issue. One manufacturer, Lift-U, worked with us for at least a month to evaluate lift conditions and assist us in our reliability program. EEC, a local supplier from right across the bay, was also contacted. A major issue is parts availability, since San Mateo maintains an inventory for four different sets of lifts. By developing an effective inventory system, the number of buses kept out of service for lack of parts is minimized.

Maintaining and improving a system that has been badly decaying is much more difficult than doing so for a new system, especially in respect to financial considerations. San Mateo is just beginning to develop a firm estimate for the operation of a normal system, a system with standard operation and routine repairs, and continues to significantly rehabilitate. In this process cost standards can be developed and integrated into the system.

Cost factors are important, however, the system's board and staff prefer to look at the service's value to the community rather than the costs. I look forward to developing the cost standards because they will provide the opportunity for San Mateo Transit to compare itself with other properties, and perhaps, find more efficent methods and ideas.

WORKSHOP C: WHEELCHAIR LIFT EQUIPMENT - RELIABILITY AND COST

3.3.1.3 LIFT AND BUS MECHANICAL MAINTENANCE

Presented by:
Michael Kurtz
Assistant Director of Maintenance Support
Washington Metropolitan Area Transit Authority
Washington, DC

The Washington Metropolitan Area Transit Authority implemented lift service with a procurement of 150 53096 new flexible coaches in 1978; 130 forty-footers and 20 31-footers. These coaches were equipped with the vapor travel lifts. In 1983 we received 76 Neoplan ADBs with TDT lifts. To make a comparison, this would be like having a Desoto and an Edsel in your garage.

Like all equipment, it looks great on the drawing boards, but in the real world, you always have to make changes and enhancements. We've made several to keep those lifts in service, such as a hydraulic latch bar. Originally when the lifts were designed, the latching or drifting wasn't taken into consideration, so we worked with the manufacturer to develop a positive hydraulic latch bar. We also rewired the control console. A vapor control console can best be described as a pinball machine with lights and buttons flashing; recognizing this, we had to simplify the logic and sequencing by rewiring the consoles.

Dust and waterproof covers for the consoles were also developed. Traditionally, transit properties use a cyclone cleaner to clean interiors of coaches. The cyclone is no more than a big vacuum cleaner that plugs onto the front door and vacuums out all the dust and dirt. Because the buttons on the console are prone to dust contamination, which causes jamming, a dust cover was developed. We do stress interior cleanliness on our coaches. Earlier on when we took delivery of the flexibles, one of our cleaners drenched a control console that activated and shoved a latch bar right through the front of the bus. We then knew we needed a waterproof cover and dust cover.

In terms of structural reinforcements, we strengthened the lifts at the pivot points by adding new stainless steel pins. Our latest and greatest enhancement is a lift pressure relief kit system that eliminates dependency on sensitive edges which are prone to curbing. Those are just being installed. So we are updating our lifts as we go along.

Due to our service requirements and being blessed with two dinosaur-make lifts, we have been required to fabricate a high percentage of parts in-house. We do have the capability for most fabricating. This is essential not only to keep the lifts in operation, but to keep the buses in service.

All the lift buses are the base block buses. A base block bus is a bus that has a fuel range and the E&H capability and can go out probably for about 16 to 18 hours of service. Put it out in the morning and you don't see it until late that night.

On the mechanic side, we have a somewhat unique approach to mechanic allocation in support of our lift program. Each of our nine operating divisions has one assigned lift mechanic who gives us specialists. The position was posted, bid and tested as a lift mechanic. So at the yearly maintenance bump, a lift mechanic can only be bumped by another lift mechanic. We don't lose the expertise of the lift mechanic at a division. In the main shop we have three mechanics and a lead person dedicated to all the lift maintenance. They cover the whole spectrum by overhauling all the components, performing accident damage work, supporting the divisions if a division mechanic has trouble, or bringing the coach into the main shop and assisting in correcting the problem. Our mechanics are trained in an intense classroom situation where electrical hydraulic and mechanical systems are covered in depth. Additionally, there's hands-on training, as they work with the shop mechanics for about a two-week period.

On the cost aspect, we're in the process of developing a bill of materials and repair program where we'll be able to put our hands on the cost directly associated with the lift maintenance. It's deceptive in a way because we do fabricate a lot of our parts and units.

In closing, from my perspective as being a maintenance manager, I feel the operating properties that I have been involved with have done a remarkable job of effectively keeping the lift buses in service with limited engineering resources. I strongly encourage the manufacturers to devise joint ventures with operating properties in the development of a wheelchair lift that can be safe and reliable to the user and maintainable by the service providers.

3.4 WORKSHOP D: COMMUNITY INPUT AND SERVICE INTEGRATION

Chairperson:

David Capozzi, Associate Advocate Director, Paralyzed Veterans of America

Panelists:

Candace Arvin, Transportation Commissioner, Santa Clara County Transportation Agency

King Cushman, Director of Transit Development, Pierce Transit

Ann Haruki-Pinedo, Community Relations Planner, Elderly and Handicapped Transit Advisory Committee, Municipality of Metropolitan Seattle

Francis-joseph Masson, E&H Service Coordinator, Santa Clara County Transportation District

Jack Michaels, Sr. Vice President, NW Paralized Veterans of America

George B. Turner, Elderly and Handicapped Transit Advisory Committee Chair, Municipality of Metropolitan Seattle

Jim Weisman, Attorney, Eastern Paralyzed Veterans Association

SUMMARY

This workshop addressed two important aspects which are necessary for a successful wheelchair accessible bus service. The first is the role of passenger input in the design, implementation, and continuing review of accessible bus operations. The second aspect is integration of accessible bus services with pedestrian amenities, such as curb cuts and loading and unloading zones.

The panelists discussed key elements which they felt were critical to ensure a successful community input program. Several of the panelists indicated that a loosely structured Elderly and Handicapped (E&H) committee works better than a more formally structured committee. Although an ad hoc committee may be disbanded or disregarded with more ease than a committee which has formal requirements for admissions, loosely structured E&H advisory committees have the advantage of flexibility. It is important to establish the role of the E&H committee early on in the process, in order that both transit officials and consumers understand the role each plays. In order to implement the committee, their role should be clearly understood to be advisory in nature. Panelists suggested that the E&H role should encompass policy review, planning, equipment evaluation, route selection, and review of loading and unloading zones. At least one panelist felt that it is not the proper role of the E&H committee to provide technical guidance to transit officials and engineers. The committee itself should represent a variety of handicapping conditions and provide an

equitable mix of elderly and handicapped persons. Sex, ethnicity, and racial composition should be fairly represented. Also, a blend of persons from broad geographic regions should compose the advisory committee.

E&H advisory committees should strive to establish a working rapport with local transportation authorities. Several methods were identified which the panelists felt were important in order to achieve a successful and useable accessible transit system. One of the most effective methods which was discussed was public relations. In New York City, the Eastern Paralyzed Veterans Association have developed a series of radio and television public service announcements. They also have printed a poster which is used to advertise on New York City buses, pointing out the accessible features of the system. Other methods which were discussed include posters with reply cards, surveys of public support, community speaker bureaus, bus driver awards and mobility training.

An accessible bus is of little value to disabled passengers if the transit service is not integrated with pedestrian amenities. These amenities include such items as curb cuts and accessible loading and unloading zones. A good example of how these amenities should coordinate with transit operations is the apex curb cut which is utilized in many cities. Rather than providing two curb cuts per corner of an intersection, some municipalities utilize a curb cut installed on a diagonal, thus requiring one curb cut per corner.

This is the beauty of the apex curb cut, it saves the city money. However, individuals with visual impairments often become disoriented when using these curb cuts since if they proceeded in a straight line they would cross in the face of on-coming traffic. In Seattle, the E&H committee prefers perpendicular curb cuts and has brought the safety problem posed by apex curb cuts to the attention of transit officials.

Loading and unloading zones often present rather unique problems because of their sometimes close proximity to residential property. At times it is not possible to provide the four foot wide and eight foot deep area that several of the panelists suggested is necessary for easy access by persons using wheelchairs. The slope of the zone is another factor to be considered, since individual lifts have varying degrees of tolerance for changes in elevation. The surface of the zone should be flat and have a hard surface to prevent front wheels of a wheelchair from digging into the ground. An excellent suggestion made by one of the panel members was to have a coach make a dry run to ensure that each site for loading and unloading is accessible to individuals with disabilities.

WORKSHOP D: COMMUNITY INPUT AND SERVICE INTEGRATION

3.4.1 PANELIST PRESENTATIONS

3.4.1.1 SANTA CLARA COUNTY'S ELDERLY AND HANDICAPPED TRANSPORTATION

Presented by:
Candace Arvin
Transportation Commissioner
Hope Rehabilitation Service
Santa Clara County Transportation Agency
San Jose, California

I. Discuss the process in Santa Clara County that facilitates a successful communication between Elderly and Handicapped groups, individuals, and policy makers.

   A. Briefly explain personal experience in transportation provision

      1. Community involvement
      2. Employment and transportation goal

         a. Current paratransit provision
         b. Ongoing bus mobility training

   B. Current and historical discussion of Santa Clara County and the Transportation Agency

      1. Physical location in California
      2. Growth and traffic problems
      3. Transportation agency formation and funds

         a. Transit Board of Directors
         b. Transportation Commission
         c. Level of service and goals for Elderly and Handicapped groups

            (1) Dial-a-ride
            (2) Accessibility policy

      4. Elderly and Handicapped Advisory Boards; their composition and input in goal setting

         a. Transportation Commission issues and public hearing process

            (1) Annual fare structure review
            (2) Ridership on assorted lines
            (3) Reliability of lifts
            (4) Elderly and Handicapped certification and discount card
            (5) Paratransit funding

b. Transportation Ad Hoc Committee
c. Creation of an effective advisory board

(1) Identification of need
(2) Determine planning steps
(3) Expectations and results

II. Discuss pedestrian amenities for bus and potential rail transportation

A. Explain County Transit's lift-equipped service

1. Types of lifts and coaches
2. Bus shelters and signs
3. Curb cut coordination

B. Pedestrian amenities and the need for mobility training

1. Teach the basics
2. Reduce confusion by direct instruction

C. Briefly describe the future rail construction on the Guadalupe Corridor

1. Where it is
2. When it will be completed
3. Information sharing with design engineers and Elderly and Handicapped advisory groups

WORKSHOP D: COMMUNITY INPUT AND SERVICE INTEGRATION

3.4.1.2 ECLECTIC PARTICIPATION: MORE EFFECTIVE COMMUNICATIONS AND DECISIONS

Presented by:
King Cushman
Director of Transit Development
Pierce Transit
Tacoma, Washington

(The views expressed in this paper are the author's and do not necessarily reflect the views of the Agency's Board or management.)

INTRODUCTION

This paper describes an eclectic approach to community participation that is a little less conventional than the more typical "standing citizens committee" found in many public transportation agencies. It is an approach that has evolved over the years at Pierce Transit, one which formalizes the use of various ad hoc processes. The process chosen for a given situation is tailored for the best fit to achieve effective citizen/consumer/community input. The eclectic approach to community participation may not suit some other areas or agencies, but it has served Pierce Transit particularly well as a cost-effective process for achieving many difficult public policy, service, and facility decisions, usually with little or no public controversy or complaint. Simply stated, the eclectic or ad hoc participation approach involves focusing on communications for achieving results rather than structure. Admittedly, the structure of a committee appears to lend more legitimacy to participation, but is it really the most representative communication from those most affected or involved on a wide variety of issues or projects? Before describing Pierce Transit's approach as it has evolved and been applied in recent years, it seems appropriate to first explain Pierce Transit's accessibility policy and provide a profile of the transit system and its service area.

ACCESSIBILITY POLICY AND SYSTEM PROFILE

Pierce Transit has maintained a dual commitment to operating accessible fixed-route and demand responsive door-to-door services for the disabled. The agency's policy on accessibility is stated below, as adopted on May 21, 1984 in its Five Year Transportation Development Plan: 1984-1988:

> Accessibility Policy: Pierce Transit shall provide a reasonable level of mobility for disabled residents in the service area by providing a system of accessible fixed-route and door-to-door services.
>
> A number of disabled residents are unable to use public transportation unless special provisions are made to ensure accessibility. To achieve this objective, a system of accessible fixed-route and door-to-door services shall be offered, subject to budget limitations. Operating hours and fares for such service shall be comparable to other public transportation services.

> This policy relates to Pierce Transit's facilities as well. Transit centers, administrative and maintenance buildings, shelters, park-and-ride lots, and other Pierce Transit facilities shall be accessible to disabled persons. All new revenue vehicles obtained by Pierce Transit shall be lift-equipped. Pierce Transit's public information shall be made available in a form that is accessible to disabled riders.

Pierce Transit operates a fixed-route bus fleet of 110 vehicles in the peak period over a 275 square mile service area containing an estimated 1985 population of 443,238. It has 72 accessible lift-equipped buses in this fleet (65 percent of peak fleet and 48 percent of the total bus fleet of 149 buses). The 1986 budget for Pierce Transit proposes purchasing another 19 fully accessible replacement buses, which will bring the total accessible buses to 91, or 83 percent of the peak fleet and 61 percent of the total fleet by the end of 1986 (or early 1987, depending on the timing delays in obtaining UMTA Section 9 grant approval). Total annual ridership for the system in 1985 was 10.8 million. About 50 percent of the total 2,089 daily fixed-route bus trips operated by Pierce Transit are fully accessible. Pierce Transit began "successfully" (to be explained later) operating accessible fixed-route bus service in March 1985 with only 17 buses on nine routes in the first phase of accessible operations. The second phase added eight more buses on three more routes in June 1985. With the acquisition of 39 new fully accessible Gillig buses in the summer of 1985, Pierce Transit then had 54 buses in daily accessible service on 20 of its total 42 bus routes. Riders using the accessible lifts on the accessible bus routes have increased from only two in the first full month of operation (April 1985) to an average of over 264 monthly accessible passenger trips in early 1986. There had been up to 400 per month by late fall 1985, but a snow storm and street sanding stopped the lift operations for six weeks, and many people may have been discouraged.

Additional demand responsive service is provided exclusively for the disabled on a door-to-door basis by 20 lift-equipped agency vans and contracted taxi service. 169,000 passengers were carried by these specialized transportation services in 1985, a 245 percent increase since Pierce Transit was created at the end of 1979 and began operation with nine vans from the City of Tacoma. There were 580 average weekday riders using this demand responsive service in 1985.

The passenger fares are the same for both transit services: $.60 in the peak period (weekdays before 9:00 A.M. and from 3:00 - 6:00 P.M.), $.35 off-peak, and $.25 off-peak for senior citizens and disabled persons. Monthly passes are $18 for regular commuters, $15 for youth (6-18), and $10 for seniors and the disabled. Hours of operations are:

	Fixed Route	Demand Response
Weekdays	4:00 A.M.-1:30 A.M.	6:00 A.M.-11:00 P.M.
Saturdays	5:00 A.M.-1:00 A.M.	9:00 A.M.-11:00 P.M.
Sundays	5:00 A.M.-1:00 A.M.	9:00 A.M.- 5:00 P.M.

The total operating budget for 1985 was $19 million, of which $1.4 million was for the specialized demand response services.

ECLECTIC PARTICIPATION

Pierce Transit's approach to consciously choosing an eclectic form of community participation evolved over a five to six year period. In 1978-79, the local elected officials from the City of Tacoma, Pierce County, and the other incorporated cities within Pierce County got together to look at the feasibility of expanding Tacoma's municipal bus system into a much larger transit district that could serve the more populated suburban and rural areas of Pierce County. In the State of Washington, the true test of financial feasibility for such an expanded system could only be determined if a majority of the local area's voters said "yes" on a ballot to add a new local sales tax for transit. To tell the voters what they might get for the tax, the elected officials needed a transit plan. That plan, and the assessment of its feasibility for a successful vote, involved having consultants conduct a wide range of community participation activities--evening workshops in schools and churches to find out what people wanted, special forums with local civic and business leaders to ascertain their interests and support, newspaper ads with questionnaires, and a statistically controlled telephone attitudinal survey of registered voters who would ultimately say "yes or no" to the issue. The conclusion of all this activity was very positive (including the plan's commitment to dual accessible services). In the fall of 1979, there was a 61 percent "yes" vote supporting the new local sales tax.

In 1980-84, as the new system expanded its services and facilities, a number of activities continued to need community/consumer participation. Specific planning for neighborhood routes had to be undertaken; a number of local sites had to be found for transit centers; decisions were needed under new federal "local option" accessibility regulations; a phased implementation plan for starting up accessible bus routes had to be developed; program modifications were needed for the demand responsive services to take on the challenge of expanding, improving, and controlling costs; and fare and pass prices for the total system had to be changed to maintain a responsible farebox recovery ratio. These many activities dictated the need for different forms of communication and community/consumer participation.

The approaches used over this period for citizen, community, and consumer participation may have taken a number of different forms, but they all had one thing in common--seeking to achieve direct, constructive input for decision making from those individuals or group interests most affected by a given issue. The following describes some of the approaches taken to address a variety of issues.

1. Community Workshops: For locating routes in a community, neighborhood workshops were held in those communities. Typically, these community workshops were after work, only at accessible locations (usually the local area's school cafeteria), and Pierce Transit always offered special taxi/van service for the disabled if they couldn't make it to a given meeting. Members of the handicapped community often used these services to attend and help plan services.

When trying to locate sites (one to three acres) for transit centers in various communities, again, Pierce Transit went out to the communities that could be affected for evening workshops to present ideas and listened to the public. The sites were then easily selected without controversy, though they did change from original staff concepts.

2. Community Workshops and the Formal EIS Process: In 1983-84, Pierce Transit needed to locate a 16-acre site for the agency's proposed new maintenance and operating base; it came down to a split between two competing but workable sites, after holding local community workshops. A full draft EIS was then prepared, and staff and the Board conducted well-advertised, well-attended public hearings. These hearings clearly indicated that the staff's least favorite site was the "publicly preferred" site; the base is now under development at the site "preferred" by the public for having less negative impacts.

3. On-Board Ridership Survey: By mid-1982, the service expansion was complete, and Pierce Transit wanted to know if the system of routes was adequately meeting the needs of the riders. In the fall of 1982, a consulting firm was hired to conduct a 100 percent ridership survey of where people lived, worked, etc., and how they used the system. This was of immeasurable benefit for many subsequent changes to improve routes and services.

4. Ad Hoc Citizens Committee (18 months plus community workshops and telephone survey): In mid-1981, the federal "504" regulations allowed for a "local option" for accessibility between fixed-routes or the paratransit alternative. Pierce Transit initiated a reexamination of its policy commitment to accessible fixed-route services and also sought input to improve the agency's special demand responsive services. A special Citizen Review Committee was formed for this project with representation from the disabled and non-disabled community. This ad hoc committee worked closely and well with Pierce Transit staff and the Board. The committee attended and helped conduct additional community workshops in the fall of 1981 to gather more "grass roots" feelings about accessibility issues. The committee also oversaw the conduct of a special "public attitude" telephone survey on the issue of supporting or not supporting accessible fixed-route bus services.

In December 1981, the Pierce Transit Board agreed with the committee's recommendation and reaffirmed the agency's accessible fixed-route commitment. Arriving at this commitment to reaffirm the accessible fixed-route program at the end of 1981 was important and significant. In the first six weeks of 1981, an unsuccessful attempt at operating 33 new Grumman buses in accessible lift-equipped fixed-route service had to be aborted. These routes had been selected in 1980 with input from a number of disabled persons who were regular riders using Pierce Transit's demand response services. The program failure was a big disappointment to the handicapped community. The reasons for its termination related to safety issues with serious equipment deficiencies. Some problems were associated with the lift design, but an even more deficient bus design itself made the buses unreliable. By the end of 1981, after much research, warranty examination, and legal hassles with the bus manufacturer, staff felt that the problems with the buses and their lifts could be overcome through an injection of substantial funds over the next year or two--about $800,000.

Planning by the Citizen Review Committee in 1982 focused on improving the quality of the demand response service. At that time the demand response service required 24 hour advanced reservations, had only weekday service (no evenings), and provided trips with a modified priority trip system, giving preference to medical, employment, and educational trips. Other types of trips were only taken if space allowed.

By the end of 1982, recommendations were made by the Committee to conduct a trial year of evening and weekend service, with no priorities, through contracted taxi services using a 70 percent subsidized taxi ticket program (the rider to pay 30 percent, Pierce Transit to pay 70 percent of the fare). This concept was approved and went into effect in early 1983.

5. Ad Hoc Task Force: By mid-1984, Pierce Transit projected significantly higher costs than anticipated on its, by then, greatly-expanded demand response van and contract taxi services. In the late fall of 1984, an eight member Task Force on Accessible Services was appointed to (1) recommend implementation phasing for soon to be accessible fixed-routes, and (2) recommend service policy modifications for the demand response service to help achieve budget and cost controls. The task force met ten times and completed their work by the April 1, 1985 deadline. The phased routes went into service, and the Board adopted guidelines to improve Pierce Transit's accessible services based on recommendations from the task force. These recommendations and guidelines resulted in: a greater emphasis on "consumer training" to show more disabled people how to plan their travel and actually practice using the accessible lifts on fixed-route buses; deferring judgment on the effectiveness of the accessible fixed-route services until at least nine to twelve months beyond the time at which at least half of the peak operating buses are in fully accessible service; committing to a policy of "no travel priorities" in the demand response services; allowing up to 24 hours for advanced reservations for the demand response services, but still allowing immediate calls as well, about two hours in advance of the trip request. Their work completed, the task force was dissolved.

6. Community Affairs and Speakers Bureau: Much useful "intelligence" on the pulse of the community and attitudes towards the transit system come from various outreach efforts by staff and even Board members. This can be as casual as simply keeping in touch with the local business community through regular attendance at Chamber of Commerce or Downtown Association meetings, or it can be more structured with presentations to senior centers, schools, etc. Additionally, effective feedback on the accessibility program for fixed-route services was gained in 1985 through direct training of consumers. This training used a bus and driver along with a Customer Services Supervisor at transit centers or at a training center for the disabled. This training showed disabled riders how to plan trips and enabled riders to overcome anxieties about the use of lifts on buses by actually riding up and down on the lift and having their wheelchair secured in its place on the bus. This is now an ongoing consumer training service offered by Pierce Transit's Customer Service staff and a specially trained driver from the Operations Division.

Overall, the eclectic approach can be very effective in trying to reach people most interested or affected by a given issue. It can also be more effective for sensitizing staff to the issues of the community. The agency doesn't "staff up" for community involvement and have a resident communications "expert" as the only one to deal with the community. Communication, the process of clearly presenting and receiving information, becomes the focus. Many staff persons end up being involved, but those whose problem or project is under discussion experience the most direct (even face-to-face) involvement with the community. This process also costs less to conduct, as there are no dedicated staff positions as a cost to maintain a structured committee. The trade-off can well be more service on the streets for the public instead of extra people in the offices trying to deal with talking to the public.

"LISTENING": A LESSON IN PUBLIC PARTICIPATION

From the end of 1982 through February 1983, Pierce Transit reexamined and took a policy action that ran counter to its previous positions on fixed-route accessibility. More importantly, it ran counter to fairly reasonable and well articulated input from its then active citizens committee and members of the public in public hearings. Pierce Transit subsequently learned the hard way about the need to listen well to public input and be consistent in the application of policy.

During summer and fall of 1982, training was underway for drivers to once again try to operate accessible fixed-route services. These services were scheduled to begin in early 1983 after the lifts and control panels were modified on the Grumman buses to address the earlier design problems. At the end of 1982, there was a very real fear of having federal UMTA operating funds cut off in 1983/1984, and Pierce Transit staff got nervous about the high costs that were about to be spent on the "fixes" required to modify the bus lifts on all 33 Grumman buses to put the lifts into, hopefully, reasonable working order. Staff management went to the Board with the 1983 budget and recommended holding back on expenditure of funds for the fixed-route accessibility program. The Board agreed and in early 1983, over significant statements of protest from the citizen committee and others at public hearings, changed the agency's policy. Pierce Transit withdrew its commitment to accessible fixed-route services and chose instead to focus on satisfying <u>all</u> demand for accessible services with improvements to the special demand responsive services. The citizens committee's argument asked that Pierce Transit simply defer the once proposed 1983 accessible service expenditures to fix the lifts, if indeed they could not be afforded, making it only a budgetary delay. The citizens committee argued to at least keep the policy commitment to fixed-route accessibility intact for some future time when it could be afforded. This argument was not supported, and the policy was changed. A number of actions and events followed that provided a pattern for an important lesson in listening to the public when making significant policy decisions.

1. Four months after the Board action was taken to remove the policy commitment for accessible fixed-route services, a class action lawsuit was filed against Pierce Transit, asking restitution of the policy and restarting the operation of the 33 lift-equipped buses in accessible fixed-route service. The lawsuit was subsequently expanded (thousands of dollars have been spent by both sides on legal services), and it is still not settled in 1986.

2. To help improve the demand response services and make them of more reasonably comparable quality (they became the only accessible alternative service), a new dispatching program was started in early 1983, allowing "same day" call in and eliminating the 24 hour advanced reservation requirement. Passenger use went up 26 percent in 1983.

3. Beginning in 1984, the taxi ticket program was dropped. (It was little used, with criticism of unequal and relatively high fares, compared to buses.) Full evening and weekend taxi services were started for the disabled at the same cost as bus fares, and all priorities were eliminated. By the end of 1984, passenger use was up another 51 percent beyond 1983, and the operating budget for these services also went up substantially, 64 percent over 1983.

4. By spring 1984, the significantly increasing demand and cost trends were clear for operating only demand response accessible services, and the agency reversed its policy position and recommited to accessible fixed-route services (per the accessibility policy stated at the front of this paper).

5. In spring 1985, with its Five Year Plan, Pierce Transit also adopted a formal policy recognizing the importance of citizen participation and committing to such in a variety of ways to achieve improved communications. That policy is stated as:

> Citizen Participation Policy: Pierce Transit shall involve citizens in decisions involving major policy issues or projects by way of public forums, workshops, surveys, or other appropriate methods.
>
> A transportation system that makes an effort to meet the collective needs of local citizens is likely to experience the support necessary for its continued development. Pierce Transit must set its goals and policies according to what the community, as a whole, identifies as top priorities. The opinions of citizens affected by capital projects or service changes must be sought and, when possible, accommodated.

6. In March, June, and September of 1985, Pierce Transit progressively instituted accessible fixed-route services with the original 33 Grumman buses and with 39 new Gillig lift-equipped buses. Ridership using the lifts went from only two in the first month to over 400 by late fall 1985. Demand responsive services saw an 11 percent drop in riders by the end of 1985, due mostly to cost control measures being put into place to bring the demand in balance with the budget.

CONCLUSION

The lessons learned from all of the above? An eclectic approach to partcipation can work quite well to address and resolve any variety of public issues. As noted earlier, it can also be less costly and more effective for a two-way staff/public dialogue. More importantly, community participation per se needs to be respected, regardless of the process through which it is communicated, structured or ad hoc. Pierce Transit has usually made many

difficult program, policy, project, or facility decisions with little or no public controversy or dissent. This has largely been successful when there has been a conscious intent to solicit public communications, with or without a structured committee. The legal problems that arose over Pierce Transit's change in the fixed-route accessibility policy happened to occur when the agency had an ad hoc citizens committee. The problem had little to do with structure, but a whole lot to do with a lack of effective communications, along with divergent opinions over priorities and community values. Effective participation may take many forms for effective decisions, but it requires a sincere effort at public communications. Effective "listening" is an equally important talent for effective decision-making when dealing with communications in a citizen/community involvement process.

WORKSHOP D: COMMUNITY INPUT AND SERVICE INTEGRATION

3.4.1.3 ROLE OF AN ADVISORY COMMITTEE

Presented by:
Ann Haruki-Pinedo
Community Relations Planner, Elderly and Handicapped Transit Advisory Committee
Municipality of Metropolitan Seattle
Seattle, Washington

Good morning. I will continue Seattle METRO's presentation by reviewing the role and specific tasks that the Citizens' Elderly and Handicapped Transit Advisory Committee (EHTAC) is involved with. I serve as the primary staff person to the committee in the Community Relations section and work closely with the Transit Department staff in setting the committee's agendas.

The Elderly and Handicapped Transit Advisory Committee, or EHTAC as we call it, has an advisory role to the Elderly and Handicapped Transportation Subcommittee of the Transit Committee. The Transit Committee is one of two major committees of the METRO Council, the governing body of the agency.

The committee is formally recognized by council resolution which delineates its advisory responsibilities to the E&H Transportation Subcommittee.

EHTAC also plays a major role as an advisory committee to the staff of the Transit Department.

There are three major areas that EHTAC is involved with. The first is policy and program revision review. In the very early planning stages, EHTAC is involved in policy and program revision review. Its most recent work has involved reviewing the changes to METRO's special transportation services which is a user-side subsidy paratransit program.

The committee has also spent time in developing and producing training films for drivers. These include a film on wheelchair securement procedures and most recently a training film giving tips on assisting deaf-blind patrons, persons who may have epileptic seizures while in transit and developmentally disabled persons.

The second area of EHTAC's involvement is recommending changes to operational procedures that affect elderly and disabled riders. The committee's Visually Impaired Deaf-Blind Task Force has recently developed procedures for assisting deaf-blind patrons in identifying the correct bus and communicating with the operators by using special assistance cards.

The third area of involvement is capital facility design review. Here you see committee members who are both visually impaired and wheelchair users testing brick paver materials, which were used in our transit centers. In the very early stages of planning, specifically in the pre-design stage, the

committee is involved in reviewing proposed transit center plans. This is a three dimensional tactile model of the Bellevue Transit Center, which was recently built.

The committee is extensively involved in reviewing the proposed Downtown Seattle Tunnel station designs. Using models such as these enable visually impaired members to raise design questions.

One of the most significant roles that the committee plays is assessing how different amenities and designs affect both the visually impaired and the wheelchair user. For example, does a curb cut at the apex of the corner disorient a visually impaired person? Compromises are often developed by the committee which considers the best interests of both groups.

It is important to remember that the committee functions as a citizen advisory committee and should not be used as a technical review team. Technical experts, such as a low-vision mobility specialist, need to be retained for capital facility review in user facilities.

The committee members also participate in new equipment testing and bus specifications review.

The work of the committee is broad and continues to grow. One of our most recent issues is identifying types of flashing lights that may precipitate epileptic seizures. This issue raised by the committee, is being considered in the selection of art in the tunnel and dynamic signage.

Part of making our system accessible is having accessible zones throughout the system. A criteria for making a route accessible is a sufficient percentage of accessible zones on the route.

The committee is involved in route prioritization and requesting evaluations of zones for accessibility.

We were asked to discuss accessible zone criteria in today's presentation. The zones need sufficient width, which is 5 feet in METRO's system--4 feet for the lift plus one additional foot. Sufficient depth is considered 8 feet - 4 feet deep for the lift plus an additional 4 feet for wheelchair maneuvering. The grade of the zone, the slope of the sidewalk or zone to the roadway, needs to be evaluated. As you are all becoming aware, Seattle's hills are a major consideration. The tolerance for slopes vary between lifts. The zone needs to be firm, compact and tolerant of different weather conditions. I will review some of the potential exclusions to look for in evaluating zones:

- o tree roots,
- o intolerance for weather conditions,
- o certain grades of crushed rocks that impair wheelchair use or cause wheels to sink,

- o curbs that are too high or conditions that do not allow the lift to be flush with the ground when deployed,

- o insufficient depth may result in riders trespassing onto private property or not provide safe maneuvering space.

Access to and from the zone is also a consideration. The potential blocking of private or commercial driveways or intersections should be evaluated. Local jurisdictions also do not allow lift operations where the bus is unable to pull off the roadway, obstructing traffic, or in high-speed, high-volume roadways. Safety is a key element in making our system accessible for riders to get around easily. We also need to keep in mind that accessibility is not limited to wheelchair lifts. Citizen advisory committees can play the important role of addressing a community with a range of special needs or, as we say today, a range of different abilities.

WORKSHOP D: COMMUNITY INPUT AND SERVICE INTEGRATION

3.4.1.4 A BRIEF OUTLINE OF SANTA CLARA COUNTY TRANSPORTATION AGENCY'S ELDERLY AND HANDICAPPED SERVICES PROGRAM

Presented by:
Francis-joseph Masson
E&H Service Coordinator
Santa Clara County Transportation District
San Jose, California

I. Introduction

A very brief synopsis of presentation contents which will include how our E&H program was designed, eventually came to be established, and what we believe it accomplishes for the E&H community.

II. General Background - an opportunity for comparisons.

1. What we're like, and how we may differ from your transportation property.

2. Historical and current characteristics of Santa Clara County Transportation Agency (SCCTA).

3. Conditions in Santa Clara County, state and local accessibility policy, information regarding demographics, area served, sources of Agency funding, and earlier attempts to meet local E&H service needs.

4. Description of advisory and advocacy groups upon whom we rely for advice and feedback.

5. Description of social service groups with which we cooperate. Refer to 5 year plan and to Accessibility Report

III. Program Decision Process - how and why we decided to develop an E&H program, and how we implemented our decision.

1. Problems and unmet needs

2. Setting our goals

3. Process of designing a program to meet goals and objectives for our Agency and E&H Community.

Refer to Report on E&H Organizational Analysis

IV. Results - our Action Program characteristics.

1. Limits of our program (target market and E&H marketing philosophy)
2. Budget as part of the Marketing Department
3. Staffing
4. Inter-agency cooperation (responding to community needs)
5. Types of marketing efforts under varied conditions
6. Examples of E&H community interaction and support
7. Marketing methods, approach, and materials produced

V. Other concerns

1. What we have observed so far, successes and failures
2. Opportunity for questions and answers

WORKSHOP D: COMMUNITY INPUT AND SERVICE INTEGRATION

3.4.1.5 MAKING IT WORK - THE SEATTLE EXPERIENCE

Presented by:
Jack Michaels
Sr. Vice President
NW Paralyzed Veterans of America
Seattle, Washington

In the years since the first 504 regulations were issued by the Department of Transportation, several transit agencies around the country have attempted to incorporate wheelchair lifts in mainline bus service. These attempts have met with limited success in some areas and abject failure in others. Only in Seattle is the program recognized as a success by both the transit agency and the disabled community. In light of the disasters in some cities I would like to give my opinions on why it works in Seattle, in hopes that there are parts of our program that are applicable to other transit agencies.

Since April of 1978 every bus purchased by the Municipality of Metropolitan Seattle (METRO) has been equipped with a wheelchair lift. In that year the governing body of METRO adopted a policy which made a long range commitment to providing transit services to citizens with disabilities. The policy statement, which was developed from input of the disabled community, has four sections. It stipulates that all future buses purchased will have wheelchair lifts, provide reduced fares for disabled and elderly transit users, require 5 percent of the Section 5 apportionment from UMTA be used for special service projects, and provide for participation of the elderly and disabled communities in implementing the policy.

With this policy statement we have developed a transit system that operates 546 accessible buses and trolleys (50.8 percent of the fleet) on 95 routes (53 percent of all routes) throughout King County. Each day over 250 wheelchair users ride the bus to work, school, play or just for the fun of it without the need to make reservations the day before, have someone else prioritize the trip purpose, or use a separate special service system. The operational cost of each trip is $5.08.

Why does the system work here and why do people use it? I believe there are three things you need to make accessible mainline service work. First, you need a good transit system in place. Putting lifts on buses certainly isn't going to make a bad system better. Second, you must have good, reliable and safe lift equipment. If you can't depend on a working lift, you're not likely to wait very long for the bus. And third, you must have ongoing participation of knowledgeable members of the disabled community. It is not necessary for us to do the planning or implementation for the transit agency, but to ensure good service we have to be there with input on every aspect of transit operation.

These three critical components existed in Seattle or were created to ensure the success of the mainline service. There are several important criteria in each of these components. A good transit agency is one that is well managed, responsive to the needs of all its citizens, has adequate staff for planning and interaction with the community, maintains its equipment in good order to ensure reliability of schedules, ensures that all personnel are properly trained for the jobs they perform, and continually monitors the operation of its equipment and personnel to find ways of improving performance and service.

The staff of METRO performs these functions in an outstanding manner. From the Executive Director to telephone operators each employee exhibits a positive attitude and is aware of and proud of the team effort they put forth to provide quality transit service to all the citizens of King County. The attitude and performance of drivers is especially noteworthy.

The second factor in our success was in choosing a safe, affordable and reliable wheelchair lift for installation on our buses. In 1978, when the decision was made to put lifts on the buses, the state of the art for wheelchair lifts was not advanced enough to provide the safe, reliable and affordable lift we required. Our first order of lifts was placed for the second generation lift of Transportation Design and Technology (TDT). When the first 10 arrived it was clear that they would not be adequate for mainline use. METRO looked for help from the disabled community to find a better product. Anne Waltz (a post-polio quadriplegic) and I travelled the country with METRO engineers looking at various lifts. We evaluated the TDT lift, as well as lifts from Transilift, Vapor, Environmental Equipment Corporation, and Lift-U.

The Lift-U was selected as the best available lift and even though it was new on the market and not tested in mainline service, METRO cancelled its order for TDT lifts and now has over five hundred Lift-U units in service. Despite some early mechanical problems which were corrected, the lift has worked remarkably well. The current malfunction rate is 1.1 percent. Many of the lifts have been on the streets for almost five years and continue to provide reliable service. The reliability and security of the lift are major factors in the success of the accessible mainline service.

Although the 1979 lift evaluation report is somewhat dated, copies of the report and criteria are available from the NWPVA office.

The last factor in our successful mainline program is the involvement of the disabled community in the development, implementation and operation of the mainline service program. METRO had an active Citizens Transit Advisory Committee (CTAC) years before the needs of disabled passengers were considered. The committee was created partly due to the requirements of UMTA regulations, but more so because METRO management genuinely believed that private citizen input improves transit service.

Disabled members of CTAC began to advocate for a special committee to address their needs for public transportation. An ad hoc committee was instituted to help draft the 1978 policy statement on services for disabled

patrons. This committee has been active since then and is now a permanent fixture known as the Elderly and Handicapped Transit Advisory Committee (EHTAC). It has been involved in every phase of the accessible mainline service, including lift selection, route selection, driver training, passenger training, and policy development. While the committee has no statutory authority, METRO staff has enough respect for the expertise of the committee to present their proposals to the group in draft form and incorporate their recommendations.

I would not try to delude you by implying that we have no problems with our mainline service. There are breakdowns and service problems which occur from time to time. The beauty of our system is that a spirit of cooperation exists between METRO and the disabled community which allows rapid consideration and resolution of the issues. This relationship is perhaps the key to our success.

METRO currently operates an all-bus system. As planning goes on to meet the transportation needs of the 1990s and beyond, we know that needs of disabled citizens will always be included. Whatever modes of public transportation - light rail, subways, ferries or buses - the system will be barrier free.

METRO has an advertising slogan that is used frequently on radio and T.V. It asks and answers a question which best describes our system: "Who Rides METRO? People just like you."

WORKSHOP D: COMMUNITY INPUT AND SERVICE INTEGRATION

3.4.1.6 ROLE OF AN ADVISORY COMMITTEE

Presented by:
George B. Turner
Elderly and Handicapped Transit Advisory Committee Chair
Municipality of Metropolitan Seattle
Seattle, Washington

The Municipality of Metropolitan Seattle made the decision to provide accessible service to the elderly and handicapped communities several years ago. Through its governing body, the METRO Council and staff, METRO decided to involve and consult with the expertise of elderly and handicapped persons in the operations of accessible transportation.

METRO accomplished this forming a citizens' advisory committee. A formal application of membership serves two purposes. First, it provides application review, and second, it helps ensure that anyone taking the time to complete the form has a real interest. The applicants are selected and appointed by the Elderly and Handicapped Transportation Subcommittee of the METRO Council Transit Committee. Appointment is from January 1 to December 31. This advisory committee of volunteers is the Elderly and Handicapped Transit Advisory Committee (EHTAC).

EHTAC, as I said is made up of volunteers. These citizens serve on the committee for two years with the option of applying for an additional two years. The terms of the members are staggered to allow continuity of the committee's work. EHTAC members elect a chair and vice-chairperson to conduct meetings. We hold meetings twice a month. The officers, a Chair, Vice-Chair and Recording Secretary are selected in June and serve for one year. Holding the elections in June prevents a newly assembled committee from electing officers. This also provides continuity.

Committee members are screened by EHTAC officers which advances its recommendations to the selection committee of the Elderly and Handicapped Transportation Subcommittee. The subcommittee appoints 24 members and 6 alternates. They review the applications for two general categories trying to maintain a balanced representation of both the elderly and handicapped communities. Also of importance is selecting persons with broad variety of disabilities. This includes:

- visually and mobility impaired,
- mentally disadvantaged,
- hearing impaired and many others.

Because METRO serves both urban and rural areas, we also consider a geographic representation.

We look for a balance in ethnic minority representation and age, with special attention given to getting a strong contingency of elderly members.

The by-laws of the committee require that at least 50 percent of the committee needs to be elderly and handicapped consumers. We have generally had closer to 75 - 80 percent consumers as members.

We include in the membership people who represent different organizations.

Removal of members from EHTAC usually happens in two ways. A member may resign for some reason or the committee may advise a member to resign because of poor attendance. In either case, the resignation or recommendation is done in writing. From the available alternates, a person most like the departed member is moved to a full membership status.

You may have noticed that EHTAC membership does not include staff members. The by-laws specifically prohibit any METRO staff member from being on the committee. Instead, METRO designates a staff person to serve as the coordinator between its staff and the committee. This person carries most of the responsibility for planning meeting agendas, keeping records and providing the committee with advanced information on meetings. Another important function is to assess what issues and programs should be reviewed by the committee and obtaining the key METRO staff person to present this information to the committee for its deliberations. These staff members range from the Transit Department Director to planners and operators.

Meeting topics either originate from the staff's requests for committee input or the committee's request for information. All programs, plans and policies that affect the elderly and handicapped riders are brought to the committee for review and recommendation.

EHTAC has the responsibility to represent, in the best possible way, the needs and wishes of the elderly and disabled people of our area. These needs could include information, better signage, repair of a bus zone for accessibility, request for the installation of a curb cut and many others. In the event of a service change, EHTAC and staff review the options created by the change and relay this to the public. In addition, EHTAC is responsible for keeping the METRO Council Transit Committee's Elderly and Handicapped Transportation Subcommittee informed about its recommendations on policy and operating changes.

METRO uses outside transit providers through the scrip program. EHTAC keeps track of these services through reports and direct presentations by the providers. These services are primarily in the rural sections of METRO's service region.

In general, this summarizes the reason for, and composition, size and responsibilities of, the Elderly and Handicapped Transit Advisory Committee. EHTAC's by-laws are reproduced on the following pages.

BY-LAWS OF THE ELDERLY AND HANDICAPPED TRANSIT ADVISORY COMMITTEE

Adopted May 27, 1982
Amended March 11, 1985
Amended December 2, 1985

MISSION

Advise METRO staff and the Elderly and Handicapped Transportation Subcommittee members regarding the need for and proposed improvements to all transportation relative to the elderly and handicapped population of the county.

Provide, in an organized fashion, responsible review and comment to METRO staff and the Elderly and Handicapped Transportation Subcommittee on all issues, plans, and programs of transportation services relative to the elderly and handicapped population.

Aid METRO staff in providing consultation, education and advice to the elderly and handicapped community and the community at large.

STRUCTURE

The Elderly and Handicapped Transit Advisory Committee shall be comprised of 24 members. At least 50 percent of the membership shall be a balanced representation of the elderly and/or disabled population, and representing a broad cross-section of the service population.

Officers shall consist of a Chairperson, Vice-Chairperson and a corresponding secretary. Officers shall hold their office for one year from June to June. If a member's term of office exceeds his/her membership appointment, the membership appointment shall be extended to the end of the term of office. Officers may be re-elected for the same office for one additional year.

A quorum will exist when the majority of the membership (13) is in attendance, provided at least one elderly and one disabled member is present.

SELECTION

Applications for membership shall be widely distributed among agencies, consumer groups, and interested individuals, representing the elderly and handicapped population.

A selection subcommittee of the Elderly and Handicapped Transit Advisory Committee shall evaluate the applications and shall provide this evaluation to the Elderly and Handicapped Transportation Subcommittee as recommendation.

The Elderly and Handicapped Transportation Subcommittee of METRO Council's Transit Committee shall make the final membership appointments.

TERMS

Members shall be appointed for a two (2) year term. A single additional appointment following the first is permissable. Members who have served two consecutive terms shall wait at least one (1) year before reapplying for membership.*

One-half of the initial membership shall be appointed for a one year term, the rest of the membership will serve a two (2) year term.

Terms shall run from January 1st and end December 31st of the following year.* One-half of the membership will be appointed each year.

Meetings will be held monthly and/or as necessary. Meetings are open to the public.

AMENDMENTS

Amendments to the by-laws may be made upon approval of the majority of the membership.

RESPONSIBILITIES

Members' Responsibilities

- Attend at least 50 percent of the meetings held each quarter. (Attendance will be evaluated every quarter by the officers of the committee to determine the appropriate course of action for members who exceed the allowable absenteeism.)
- Understand the needs and interests of his/her individual constituency group.

Elderly and Handicapped Transit Advisory Committee

- Understand the needs and interests of its constituency group.
- Provide a forum to which citizens can bring suggestions, requests and complaints regarding elderly and handicapped transportation.
- Review and make recommendations to METRO staff on elderly and handicapped transportation planning and programs.

METRO Staff Responsibilities

- Designate and identify staff responsible for coordination between the Elderly and Handicapped Transportation Advisory Committee, the Elderly and Handicapped Subcommittee and METRO staff.

*Exception is the one-half of the members initially appointed for a one year term only.

- Provide meeting notices and agendas to the membership. Attend all meetings, keep minutes/records of all meetings, and advise as necessary.

- Respond to the questions/comments of members in a timely manner.

- Provide for the exchange of meeting agendas and minutes between Elderly and Handicapped Transportation Subcommittee and the Elderly and Handicapped Transit Advisory Committee

Elderly and Handicapped Transportation Subcommittee Responsibilities

- Understand the needs and interests of the elderly and handicapped population.

- Appoint Elderly and Handicapped Transit Advisory Committee members.

WORKSHOP E: PERFORMANCE GUIDELINES ON WHEELCHAIR LIFT AND SECUREMENT SYSTEMS FOR FIXED ROUTE ACCESSIBLE SERVICE

Co-Chairpersons:

Dennis Cannon, Transportation Barriers Specialist, Architectural Transportation Barriers Compliance Board

Howard Hall, Program Manager, Accessibility Program, Division of Mass Transit, California Department of Transportation

Panelists:

Jim Burton, Superintendent of Operations, Municipality of Metropolitan Seattle

Robert Garside, Assistant General Manager of Operations, Denver Regional Transportation District

Gregory Hill, Assistant Staff Engineer, GM Truck & Bus Coach Operations

Philip Jones, Project Engineer, Everest & Jennings

Frank Kirshner, Superintendent of Equipment Engineering, Southern California Rapid Transit District

Keith McDowell, Director of Engineering, American Seating Company

Austin Morris, Vice President and General Manager, Environmental Equipment Corporation

Joseph Reyes, Director of Safety, Southern California Rapid Transit District

Donald Smith, Assistant General Manager, Lift-U, Inc.

Lance Watt, Director of Engineering, The Flxible Corporation

SUMMARY

This workshop was held in order to develop a performance guideline document for wheelchair lift and securement systems based on recent fixed-route bus experiences and consistent with available manufacturing capabilities and wheelchair designs. The Workshop panel included personnel from fixed-route accessible services, bus lift and wheelchair manufacturers. It is anticipated that the guideline performance document will be useful for retrofit activities and new procurement of wheelchair lift or securement systems for fixed-route bus service. The Preliminary Draft Guideline Specification for passive wheelchair lifts and securement devices was used for a basis of discussion in the Workshop. Prior to the meeting, registered attendees received copies of the draft guidelines for review, whereupon written comments were to be submitted at the

Workshop. Comments submitted were summarized and then presented for Workshop discussion.

As defined by the specification, passive lifts are those devices that fold into a step or retreat into the stepwell. Much of the discussion was related to such matters as syntax and terminology clarification. Because equipment, operating environments, and community needs and standards vary so widely, any textual alterations to the guidelines will depend on their applicability to the widest possible range of properties. For example, changes in wording about lift maintenance were allowed, but regulations pertaining to particular electronic signal configurations were left to individual systems. The definitions should also be rewritten to emphasize that lift devices are intended for disabled people other than those in wheelchairs.

Another issue similarly covered in the Workshop was the lift design itself. Since there are many lifts and vehicle types in varying states of mechanical condition, it was inevitable that there was disagreement on certain specifications, as well as the inclusion and exclusion of several equipment types. While wheelchairs are getting faster and more powerful, there are still many passengers dependent on older, simpler models. Interface with the vehicle and wheelchair manufacturers is necessary if the new devices can board and be secured on available transit vehicles. It was emphasized that the specification should not recommend or discourage use of certain equipment, rather, it should accommodate existing variables, anticipate future changes, and include the largest number of passengers.

Mechanical and maintenance concerns were also discussed. The lift is a vehicle component similar to transmissions and engines; it should be maintained in accordance with a defined maintenance program and be compatible with the existing life of the vehicle. Durability testing was therefore determined to be necessary, because it effectively measures the lift's ability to function. Manufacturers, it was agreed, should inform all members of the disabled and transit communities of changes in models and design, especially if such changes will significantly affect vehicle access and securement. Many platforms, for example, are generally too narrow to accommodate newer wheelchair models; both consumers and transit authorities feel that a definite date should be set to lengthen and widen platforms while giving manufacturers an opportunity to redesign accordingly.

There was a strong consensus from the consumers that their viewpoint should have precedence over mechanical problems or the design desirabilities of certain manufacturers, however. A lift with a particular size that was purchased because of its ease of manufacture is of no use if the design prevents consumers from using it. Again, although there are many inherent disagreements between users, it is also a primary point of agreement that their preferences and requirements be of first consideration in design, maintenance, and administration. To this end, dissemination of information and exchange of ideas should be encouraged.

Final recommendations were given to the UMTA Advisory Panel and to Battelle Laboratories for incorporation into the final version of the Guideline Specifications.

WORKSHOP F: PERFORMANCE GUIDELINES ON WHEELCHAIR LIFT AND SECUREMENT SYSTEMS FOR ALTERNATIVE SERVICES

Chairperson:

Donald Meacham, Chief, Bureau of Transit Technology, Division of Public Transportation, Ohio Department of Transportation

Panelists:

John Balog, Associate Manager of Transportation Planning, Ketron, Inc.

Tom Bonnell, National Sales Manager, The Braun Corporation

Michael Bolton, Executive Director, Ann Arbor Transportation Authority

Steve Holmstrom, Sales Manager, Cargo Control Products, Aeroquip Corporation

Fredrick Jensen, Sales Representative, Invacare Corporation

John Hutchinson, Deputy Director of Policy and Research, South Australian Department of Transport

Vic Willems, National Sales Representative, Collins Industries, Inc.

SUMMARY

Like Workshop E, Workshop F was held to develop a performance guideline document for wheelchair lift and securement systems for contemporary alternative bus service (small buses and paratransit). Personnel from accessible bus services, lift and wheelchair manufacturers were included in the workshop panel. The guideline performance document should be useful for retrofit activities or new procurement of wheelchair lift/securement systems for alternative services. As a basis for discussion in this Workshop, the Preliminary Draft Guideline Specification for active wheelchair lifts, securement devices, and ramps was sent to registered attendees prior to the national conference. Attendees were asked to review the guidelines and submit written comments at the conference. At Workshop F, these summarized comments were presented for discussion.

Workshop F was reminiscent of Workshop E in that the same basic concerns of most fixed-route services also apply to alternative services. It was emphasized that the guidelines are not dictatorial or considered required specifications; they will provide wheelchair, lift, and ramp manufacturers, operators, and system managers with a set of common points from which the product can be maintained and improved. Equipment and system designs, as put forth in the guidelines, should promote safety and reliability in a cost effective manner. Most systems do not have in-house expertise in preparing specifications, nor do they have the resources to hire consultants and experts to do so. The guidelines, then, do become de facto specifications, which must be kept in mind by the advisory committee.

Because floor space is at a premium in smaller transport vehicles, design criteria are of major interest. Wheelchairs, lifts, and ramps must be as simple and provide as much maneuverability as possible. Due to the wide range of available equipment, it was recommended that the advisory committee find better, more specific terms and definitions for active lifts and related equipment.

While greater specificity was requested for the definitions, a broader range for interpretation was considered desireable for many mechanically related issues. For example, active and passive lifts need different barriers; active lift use should not be restricted by passive lift specifications. Other related issues were vehicle, lift, and wheelchair weights, maximum noise levels, and "pinching points" from exposed machinery joints. It was agreed that Veteran's Administration requirements and federal safety and motor vehicle specifications were adequate guidelines for gross vehicle weights and noise levels; it was up to individual properties to be aware of excesses due to various equipment configurations and uses. Although "pinching points" are easily covered with padding, the pads' inconvenience and expense outweight any additional safety or comfort obtained by their use. Such constraints for relatively minor problems can be excessively costly and should be left to the discretion of the service. Generally, it was recommended that design components that have a relatively minor effect on passengers be directed more toward the manufacturers than the individual properties.

On the other hand, it was felt that safety factors must be more clearly defined. "Mechanical hydraulic safety factors", for instance, may not be meaningful to passengers or the transporation provider's administrators, but it is essential to the manufacturers that design components. It was noted that engineering values for the lifts are pertinent to the guidelines, because reflective engineering results do affect the relevance of report inclusions and exclusions. An engineering viewpont will be expanded upon, but again, it must be remembered that a small degree of additional safety may be obtained at a disproportionately higher cost.

Toward the goal of increased safety, it was also determined that a standard lift test that incorporates as many brands, models and manufacturers as possible be developed. If such a test is made, it should be done in the larger context of the design limitations, existing barriers and vehicles, and other related equipment. In theory, a completely safe system could be designed -- in practice, there are finite resources that limit the extent of certain safety features. Further, the possibility of injury to one passenger cannot be emphasized at the expense of a hundred other passengers, whether ambulatory or handicapped. Frequently, properties operate on a component-by-component basis, even though the sum of the parts may not be a workable system. By integrating mechanical and human factors, including operators and passengers, more realistic expectations may be realized.

Such integration was reflected in the discussion on wheelchair position and securement devices. Tests have shown that there is little, if any, difference or advantage to forward-, rear-, or aisle-facing seating arrangements. The panel's consensus was that while the lift itself should be boarded in an outward-facing position, altering seating position within the vehicle would not enhance safety or cost efficiency. Further testing was recommended; it was felt that securement of the wheelchair and its occupant was more important. Since

wheelchairs vary from fully automatic to very simplified pin-systems, a universal attachment or tie-down for the chair and lap belt for the passenger would be ideal, if precluded for the moment. The safest possible securement must restrain both customer and chair in such a way that it is also easy to remove quickly should an accident make evacuation necessary. More importantly, the choice of securement system must be acceptable to the passengers that must use it. To this end, it was recommended that a securement system for the wheelchair occupant be separate from the securement system used for the wheelchair itself. Driver training in securement and the evacuation process is also needed, but not to the exclusion of concern for other passengers.

In the light of mechanical and maintenance concerns, the relationship between the operators and customers was discussed. The panel felt that it is not possible for a manufacturer to be aware of all the different wheelchairs that are on the market or forthcoming, as well as passenger preferences and needs and transit property budgets. Once the lift platform dimensions are defined, the wheelchair parameters that can be accommodated are automatically established. Therefore, it is up to the equipment procurement personnel to know what and whom they will be serving. Further, restrictions must be enforced by the operators, who must know the capacity of their equipment, elicit the best information possible from consumers, and keep up with the new types of equipment that continually appear on the market, as well as the old types that the property may have inherited. Realistically, the drivers and system managers are responsible for ensuring rider safety and satisfaction.

As in Workshop E and throughout the entire conference, the consensus was that input from system users, advisory groups, drivers, and maintenance personnel and manufacturers is essential if an alternative transit system is to be fully accessible, safe, and cost effective. By combining perspectives of these different mechanical and human components, a transit property can best serve its community. Final recommendations from this Workshop were given to the UMTA Advisory Panel and to Battelle Laboratories for incorporation into the final version of the Guideline Specifications.

4. CONFERENCE OVERVIEW: STRATEGY FOR IMPLEMENTATION

4.1 WHERE THERE'S A WILL . . .

Presented by:
Stephen H. Lantz
Community Relations Manager
Los Angeles County Transportation Commission (LACTC)
Los Angeles, CA

During the past three days, many speakers have alluded to the topics of my speech, so this should be something of a review, a chance to recap the major themes of this seminar. My speech topic is, "Where there's a will there's probably a suitable way. Where there is no will there is probably a suit."

I had planned on covering goal setting, planning and implementation in my speech. But the current knowledge and level of responsibility of conference attendees has changed my focus. Rather than delving into a "how to," I will summarize why we are here and where we should be headed.

I have an unusual perspective on these topics because the Los Angeles County Transportation Commission does not operate any service. We are the banker and a policy maker for the regional operators, which includes the SCRTD, 13 federally funded operators and some 70 to 75 local public transit operators. I have a superficial acquaintance with a wide variation of commitments and a seemingly endless assortment of solutions. Each jurisdiction has its own policies, and there is little regional coordination of accessible service. Though the SCRTD has done a superb job, not just for Los Angeles, but for the rest of the nation, in pioneering accessibility policies, procedures and equipment, there has been little effort to develop a useable, accessible service program for the county. One of the most important actions taken by SCRTD has been the adoption of a policy that commits the agency to a 100 percent accessible system. Yet there are others in Los Angeles County that have committed to a lesser percentage and some who are still getting away with no commitment to accessible service.

Our Elderly and Handicapped Transportation Advisory Council has been instrumental for much longer than I've been involved in the issue, for keeping the operators' feet to the fire. It frustrates me and others on the committee that even today, ten years after we started this effort to make public transit accessible, we are having to go out to 70 cities independently and individually and tell them, "We're part of the public too. We are not just asking you to put a lift on your vehicle; we are asking you to open the door to public transit by removing the physical and attitudinal barriers." Many transit agencies in our community have no problem whatsoever keeping a bus or a van off the street if the door doesn't work. And they have no problem at all putting that bus on the street without a lift or with a lift that doesn't work.

I sense that this discord isn't unique to Los Angeles. In fact, I believe that there needs to be a simple goal that can be universally shared by operators, funding sources, accessible service consumers, and the general public.

Before we begin to facilitate a special public transportation system, we must identify all available resources. Fixed-route service does not operate in a vacuum - other fixed-routes, paratransit, and social service transportation services need to be closely coordinated. Once this has been established, business and community members should be contacted. Sources that come immediately to mind are operations management, local officials, and private and public transportation groups. Not so obvious are community activists, users, and non-transportation service providers. When we extend involvement to all levels of the community, we get a firmer commitment to service and a wider potential for new ideas.

Reliable individuals and institutions are only part of the picture, though; the area's market needs are also important. Market factors should include the area's demographics, where people want to go, and any competing or duplicate services. Service and performance criteria are also needed, and need to be followed up by a deployment strategy phased within your existing resource limits. Complete the picture with a consensus between users and all system members, and you're ready to begin implementation.

How to best combine, coordinate, and implement the many system elements, though, may seem to be an immense task. Each system component is important, from technical and mechanical considerations such as scheduling, zone determination and maintenance, to administrative issues like risk and financial management, and even follow-up by way of an ongoing feedback and monitoring systems. The goal should be to create a truly regional accessible transit service. Incorporated into that simple goal of reliable accessible service are a myriad of issues and objectives. Your services should meet the following four simple objectives:

1. Every potential user should understand the services in their region. If I can't figure out how to get on your bus, from your bus to a dial-a-ride, if I can't tell if my chair is going to fit the lift and securements on your vehicle, or which of these systems I may ride on, you can't expect me to ride your bus.

2. No potential user should be passed up. It seems pretty foolish to spend all of this money on accessible equipment and then to adopt policies that prevent potential riders from boarding. Your system should be just as accessible for those who need the special equipment as it is for the general public. SCRTD established policies years ago that said, in essence, "If you get to the bus, we'll pick you up, regardless of your destination. Just like other patrons, it is up to the rider to know where to board and to know where to alight." This policy makes sense. We are not trying to provide a transportation womb, but to provide an integrated, accessible transit service in accordance with policies and procedures for the general public.

3. The system should be user friendly, rather than manufacturer friendly. Manufacturers are asking for 15-20 years to develop a reliable accessible bus. Agencies estimate redesigns will take 8-10 years. But the consumers, the public, are getting impatient. We're hearing statements like, "Come on, guys, you wouldn't run a bus with an air conditioner that wasn't going to work reliably for the next twenty years. Why are you going to run a bus with a lift that doesn't work?"

This goal to favor the user over the manufacturer will only be attained when transit agencies decide they want to provide accessible transit today, not at some convenient time in the future.

4. Your system should be based on reliability, not liability. We should design the buses to accommodate all potential riders, but that doesn't mean that we need to design securements capable of suspending a wheelchair and passenger upside down after a bus roll over, especially when we are not providing seatbelts at all for the general public. Liability concerns have created a more insidious barrier than equipment. It seems time to stop coddling the disabled rider and to say yes rather than no if a hazy liability risk is the only obstacle.

Another insidious obstacle to accessibility is the type of statistics that are being kept and misused. We don't care how many people you are carrying. The most important statistics are how many people know how to use the system, and how many people who showed up at a stop were able to ride.

The commitment is very simple. It starts with your board, your general manager, through the staff. It only takes a unanimous objective, perhaps with a sign on the wall that says, "I want to see it work." If it takes ten years, that's OK, because everyone is walking down the same road, marching to the same song.

Access is a reflection of a community. Seattle's superb accessible transit system attests to this community's commitment to accessibiliity. Seattle is justifiably recognized as one of the most liveable cities in the country. There is a pervasive warmth, a caring friendliness, a responsibility in this town that you just don't see too many other places. It pervades much further than the person who figures out how to tie down a chair.

In the last three days we have created a community of Can Do spirit that is really exciting. All of a sudden, if I go back to Los Angeles, I know that accessible service is working in Seattle, in Denver and elsewhere. All of us experienced the Seattle attitude that says, I want to make it work. If you don't want to make accessible service work, do something else with your life because you're going to be a miserable person. If you have maintenance mechanics who really believe they should simply weld the lifts shut, maybe they ought to go into heavy steel construction where welding things shut is the goal.

I want to thank you all for your attention during my presentation. There is no doubt that for once we are singing the same song at least. There is no doubt that with practice we could get good at this. All of a sudden, there could be harmony...the operators, maintenance guys and financial wizards could say, this is a great song. I leave with the hope that next year we can bring in some new singers, like the wheelchair manufacturers, and have them start singing harmoniously with us. And after a couple of years of doing things together, rather than separately, then even APTA will be able to sing with the rest of us, in the same room.

Let's keep the community we have created here working together.

5. RECOMMENDATIONS

The National Workshop on Bus Wheelchair Accessibility was held in order to provide a forum of discussion to identify and resolve key problems in providing accessible service. A workable set of industry guidelines for wheelchair lifts, securement devices and ramps was also sought. Issues such as safety, reliability, and cost were discussed, in addition to specific fixed-route and paratransit concerns.

The major recommendations from the workshop participants were:

1. The need to conduct future workshops, such as this one, with a broad-based participation of all parts of the accessible transit industry to review progress and address current needs.

2. To extend the work on equipment guidelines to address non-equipment areas such as operations and maintenance procedures and policies regarding accessible service, and the training of drivers and passengers.

3. Develop design guidelines for small buses and paratransit vehicles used for accessible transportation. Many of these vehicles have problems with stability and crashworthiness. The body manufacturer is usually different from the chassis manufacturer, which may result in mismatched vehicle assemblies. The guidelines would assist transit agencies in properly specifying accessible small buses and paratransit vehicles.

4. Need for research and development of wheelchair securement systems, especially automatic securement systems. Present securement clamping systems do not fit all chairs; belt systems take too long to secure a wheelchair.

5. Need for better and more effective communications between transit agencies and the handicapped community.

APPENDIX I

WORKSHOP AGENDA

NATIONAL WORKSHOP ON BUS WHEELCHAIR ACCESSIBILITY

Seattle, Washington
May 7-9, 1986

PROGRAM

TUESDAY, MAY 6, 1986

4:00-7:00 P.M. REGISTRATION

WEDNESDAY, MAY 7

8:00 A.M. REGISTRATION

9:00 **Aubrey Davis**, Regional Administrator, U.S. DOT, Urban Mass Transportation Administration
Paul Wysocki, Suppervisor of Affirmative Action, Disability Specialist for Seattle Human Rights Department
George Turner, Chairman, Seattle METRO Elderly and Handicapped Transit Advisory Committee

KEYNOTE ADDRESS AND STATUS OF 504 REGULATIONS

Robert Ashby, Senior Attorney-Advisor, U.S. DOT, Office of the Secretary

10:00 BREAK

10:30 GENERAL SESSION I - COMPONENTS OF SUCCESSFUL WHEELCHAIR ACCESSIBLE TRANSIT (Fixed-Route Accessible and Alternative Systems)

Moderator: Vincent DeMarco, Chief, Bus Subsystems Technology, U.S. DOT, Urban Mass Transportation Administration
Rick Walsh, Manager of Service Planning and Development, Municipality of Metropolitan Seattle
Sandra Perkins, On-Call Service Coordinator, Washington Metropolitan Area Transit Authority
Harold Jenkins, General Manager, Cambria County Transit
Michael Bolton, Executive Director, Ann Arbor Transportation Authority
King Cushman, Director of Transportation Development, Pierce Transit

1200-2:00 P.M. LUNCHEON

Guest Speaker: The Honorable Jesse Wineberry,
Vice Chairman, The House Transportation Committee,
Washington State House of Representatives

2:00-5:00 P.M. **CONCURRENT WORKSHOPS**

WORKSHOP A - FIXED ROUTE ACCESSIBLE BUSES: WHEELCHAIR LIFT EQUIPMENT PROBLEMS, ISSUES AND SOLUTIONS

Chairperson: Frank Kirshner, Superintendent of Equipment Engineering, Southern California Rapid Transit District

Panelists:
Diane Coleman, J.D., Vice President, West Side Center for Independent Living
Robert Garside, Assistant General Manager of Operations, Denver Regional Transportation District
Emmett Heath, Manager, Vehicle Maintenance, Municipality of Metropolitan Seattle
Paul Kaufman, Project Manager, New Jersey Transit Bus Operations, Inc.
James Lee, Accessible Service Coordinator, Alameda - Contra Costa Transit District
Lance Watt, Director of Engineering, The Flxible Corporation

WORKSHOP B - ALTERNATIVE SERVICE (SMALL BUSES AND PARATRANSIT): WHEELCHAIR LIFT EQUIPMENT PROBLEMS, ISSUES AND SOLUTIONS

Chairperson: Loretta Sharpe, President, LRS Associates

Panelists:
Douglas Cross, Paratransit Planner, Northeast Ohio Areawide Coordinating Agency
William Henderson, Program Director, Dial-a-Ride Transportation
Donna Shaunesey, Assistant Director, JAUNT Inc.
Barbara Singleton, Director, Kitsap Paratransit
Emilio Zamora, Director, Spokane Transit Authority

3:15 Coffee breaks during workshops will be called by chairpersons. Approximate times are indicated.

5:45 - 7:30 **RECEPTION (Cash Bar)**

THURSDAY, MAY 8

8:30 **A.M.** **GENERAL SESSION II - SAFETY AND POLICY ISSUES (Identify and Assess Hazards and Operational Policies for Fixed-Route Accessible and Alternative Systems)**

Moderator: John Clare, Director of Program Development, Central New York Regional Transportation Authority
Monty Lish, Manager of Safety and Training, Municipality of Metropolitan Seattle

Joseph Reyes, Director of Safety, Southern California Rapid Transit District.
William Henderson, Director, Dial-a-Ride, Senior Services of Snohomish County
John Balog, Associate Manager of Transportation Planning, Ketron, Inc.

10:00 **BREAK**

10:30 A.M. **CONCURRENT WORKSHOPS**

WORKSHOP C - WHEELCHAIR LIFT EQUIPMENT; RELIABILITY AND COST

Chairperson: Rick Walsh, Manager of Service Planning and Development, Municipality of Metropolitan Seattle

Panelists:
Jim Burton, Superintendent of Operations, Municipality of Metropolitan Seattle
John Clare, Director of Program and Development, Central New York Regional Transportation Authority
William Freeman, Manager of Base Operations, San Mateo County Transit District
Michael Hubbell, Manager of North Base Maintenance, San Mateo County Transit District
Michael Kurtz, Assistant Director of Maintenance Support, Washington Metropolitan Area Transit Authority
Alan Romano, Engineering Consultant

WORKSHOP D - COMMUNITY INPUT AND SERVICE INTEGRATION

Chairperson: David Capozzi, Associate Advocacy Director, Paralyzed Veterans of America

Panelists:
Candace Arvin, Transportation Commissioner, Hope Rehabilitation Service
King Cushman, Director of Transit Development, Pierce Transit
Ann Haruki-Pinedo, Community Relations Planner, Municipality of Metropolitan Seattle
Francis Masson, Elderly and Handicapped Service Coordinator, Santa Clara County Transportation District
Jack Michaels, Senior Vice President, Paralyzed Veterans of America
George Turner, Chairman, Elderly and Handicapped Advisory Board, Municipality of Metropolitan Seattle
Jim Weisman, Attorney, Eastern Paralyzed Veterans Association

12:30 P.M. **LUNCHEON**

Guest Speaker: **Ernesta Barnes**, Executive Director, Pacific Celebration

2:00 **FIELD TRIPS - Two tour options will be offered.**

I. SEATTLE METRO MAINTENANCE FACILITY plus VEHICLE DEMONSTRATIONS. This tour will be geared to a technical group.

II. SCENIC CITY TOUR plus VEHICLE DEMONSTRATIONS

Please register for either field trip at the workshop desk before 4:00 P.M. on Wednesday.

FRIDAY, MAY 9

8:30 A.M. **CONCURRENT WORKSHOPS**

WORKSHOP E - PERFORMANCE GUIDELINES ON WHEELCHAIR LIFT AND SECUREMENT SYSTEMS FOR FIXED ROUTE ACCESSIBLE SERVICE

Co-Chairpersons: **Dennis Cannon**, Transportation Barriers Specialist, Architectural Transportation Barriers Compliance Board
Howard Hall, Program Manager, Accessibility Program, Division of Mass Transit, California Department of Transportation

Panelists:
Jim Burton, Superintendent of Operations, Municipality of Metropolitan Seattle
Robert Garside, Assistant General Manager of Operations, Denver Regional Transportation District
Gregory Hill, Assistant Staff Engineer, GM Truck and Bus Coach Operations
Philip Jones, Project Engineer, Everest and Jennings
Frank Kirshner, Superintendent of Equipment Enginering, Southern California Rapid Transit District
Keith McDowell, Director of Engineering, American Seating Company
Austin Morris, Vice President and General Manager, Environmental Equipment Corporation
Joseph Reyes, Director of Safety, Southern California Rapid Transit District
Donald Smith, Assistant General Manager, Lift-U, Inc.
Lance Watt, Director of Engineering, The Flxible Corporation

WORKSHOP F - PERFORMANCE GUIDELINES ON WHEELCHAIR LIFT AND SECUREMENT SYSTEMS FOR ALTERNATIVE SERVICE

Chairperson: Donald Meacham, Chief, Bureau of Transit Technology, Division of Public Transportation, Ohio Department of Transportation

Panelists:
John Balog, Associate Manager of Transportation Planning, Ketron, Inc.
Tom Bonnell, National Sales Manager, The Braun Corporation
Michael Bolton, Executive Director, Ann Arbor Transportation Authority
Steve Holmstrom, Sales Manager, Cargo Control Products, Aeroquip Corporation
Fredrick Jensen, Sales Representative, Invacare Corporation
John Hutchinson, Deputy Director of Policy and Research, South Australian Department of Transport
Vic Willems, National Sales Representative, Collins Industries, Inc.

12:00 noon — **LUNCHEON**

1:00 P.M. — **Plenary Session - CHAIRPERSONS REPORT ON WORKSHOP RESULTS**
Moderator: George Izumi, Program Manager, U.S. DOT, Urban Mass Transportation Administration

2:30 — **STRATEGY FOR IMPLEMENTATION**
Steven Lantz, Community Relations Manager, Los Angeles County Transportation Commission

3:00 P.M. — **ADJOURN**

APPENDIX II

LIST OF ATTENDEES

ORGANIZING COMMITTEE

Vincent DeMarco
Chief, Bus Systems Technology
(202) 366-0223
George Izumi
Program Manager
(202) 366-0222
U.S. Department of Transportation
Urban Mass Transportation Administration
400 Seventh St. SW
Washington, DC 20590

Christina Chang
Engineer
U.S. Department of Transportation
Transportation Systems Center, DTS-74
Kendall Square
Cambridge, MA 02142
(617) 494-2552

Ellen Witt-Dewey
Conference Manger
E. Witt Associates
230 Beacon St.
Boston, MA 02116
(617) 266-5299

Karol Olsen
Asst. to Director of Transit
(206) 447-6562
Ann Haruki-Pinedo
Community Relations Planner
(206) 527-3344
Municipality of Metropolitan Seattle
821 Second Ave.
Exchange Bldg.
Seattle, WA 98104

Roland King
Manager, Transportation Systems
Project Office
(614) 424-5162
David Norstrom
Principal Research Scientist
(614) 424-6109
Jerry Francis
Consultant
(614) 424-7356
Batelle Columbus Laboratories
505 King Ave.
Columbus, Ohio 43201

Speakers and Panelists

Candace Arvin
Transportation Commissioner
Hope Rehabilitation Service
2300 Clove Drive
San Jose, CA 95128
(408) 998-4673

Robert Ashby
Senior Attorney-Advisor
U.S. Department of Transportation
Office of the Secretary
400 Seventh St., SW
Washington, DC 20590

John Balog
Associate Manager
Transportation Planning
Ketron, Inc.
Great Valley Corporate Center
350 Technology Drive
Malvern, PA 19355
(215) 648-9000

Michael Bolton
Executive Director
Ann Arbor Transportation Authority
2700 South Industrial Highway
Ann Arbor, MI 48104
(313) 973-6500

Tom Bonnell
National Sales Manager
The Braun Corporation
1014 S. Monticello
P.O. Box 310
Winamac, IN 46996
(219) 946-6157

Jim Burton
Superintendent of Operations
Seattle METRO
821 Second Ave.
Exchange Bldg.
Seattle, WA 98104
(206) 447-5871

Diane Coleman, J.D.
Vice President
West Side Center for Independent Living
17015 Covello St.
Van Nuys, CA 91406-2621
(213) 736-2505

Dennis Cannon
Transportation Barrier Specialist
Architectural Transportation Barriers Compliance Board
330 C. St., SW
Washington, DC 20202
(202) 472-2700

David Capozzi
Associate Advocacy Director
Paralyzed Veterans of America
801 Eighteenth St., NW
Washington, DC 20006
(202) 872-1300

Douglas Cross
Paratransit Planner
Northeast Ohio Areawide Coordinating Agency
1501 Euclid Ave.
Cleveland, OH 44115
(216) 241-2414

King Cushman
Director of Transit Development
Pierce Transit
1235 Sprague Ave.
Tacoma, WA 98405-2999
(206) 593-4525

Aubrey Davis
Administrator
U.S. DOT/UMTA Regional Office
915 Second Ave.
Suite 3142
Seattle, WA 98174
(202) 442-4210

Vincent DeMarco
Chief, Bus Subsystems Technology
U.S. DOT/UMTA
URT-22
400 7th St., SW
Washington, DC 20590
(202) 426-4035

William Freeman
Manager of Base Operations
San Mateo County Transit
District
945 California Dr.
Burlingame, CA 94010

Robert Garside
Assistant General Manager, Bus
Operation
Regional Transporation District
1600 Blake St.
Denver, CO 80202
(303) 778-3430

Howard Hall
Program Manager
Division of Mass Transportation
California Department of
Transportation
1120 N St.
Sacramento, CA 95814
(916) 322-1419

Ann Haruki-Pinedo
Community Relations Planner
Municipality of Metropolitan
Seattle
821 Second Ave.
Exchange Bldg.
Seattle, WA 98104
(206) 625-7710

Emmett Heath
Manager, Vehicle Maintenance
Municipality of Metropolitan
Seattle
821 Second Ave.
Exchange Bldg.
Seattle, WA 98104
(206) 447-6666

William Henderson
Program Director
Dial-a-Ride Transportation
Senior Services of Snohomish County
3402 112th St., S.W.
Everett, WA 98204-3599
(206) 355-1112

Gregory Hill
Assistant Staff Engineer
General Motors Truck and Bus Group
Mail Code: 1201-110
140 S. Saginaw St.
Pontiac, MI 48058
(313) 456-7315

Steve Holmstrom
Sales Manager
Aeroquip Corp
300 S.E. Ave.
Jackson, MI 49203
(517) 787-8121

Michael Hubbell
Manager of North Base Maintenance
San Mateo County Transit District
945 California Dr.
Burlingame, CA 94010
(415) 340-6253

Harold Jenkins
General Manager
Cambria County Transit Authority
762 Central Ave.
Johnstown, PA 15902-2996
(814) 535-5526

Fredrick Jensen
Sales Representative
Invacare Corp.
899 Cleveland St.
Elyria, OH 44036
(216) 329-6000

Philip Jones
Everest & Jennings
3233 E. Mission Blvd.
Camarillo, CA 93101
(805) 987-6911

Paul Kaufman
Project Manager
New Jersey Transit Bus Operations
180 Boyden Ave.
Maplewood, NJ 07040
(201) 761-8658

Frank Kirshner
Superintendent of Equipment Engineering
Southern California Rapid Transit District
425 South Main St.
Los Angeles, CA 90013
(213) 972-6608

Michael Kurtz
Director of Maintenance Support
Washington Metropolitan Area Transit Authority
2250 26th St. N.E.
Washington, DC 20018
(202) 635-6752

Stephen Lantz
Community Relations Manager
Los Angeles County Transportation Commission
403-W 8th St., Suite 500
Los Angeles, CA 90014
(213) 626-0370

James Lee
Accessible Services Coordinator
Alameda-Contra Costa Transit District
508 16th St.
Oakland, CA 94612
(415) 891-4853

Monty Lish
Manager of Safety and Training
Municipality of Metropolitan Seattle
821 Second Ave.
Seattle, WA 98104
(206) 447-6666

Francis Masson
E&H Service Coordinator
Santa Clara County Transportation District
1555 Berger Dr.
San Jose, CA 95112
(408) 299-2132

Keith McDowell
Director of Engineering
American Seating
Transportation Products Division
901 Broadway, NW
Grand Rapids, MI 49504
(616) 456-0600

Donald Meacham
Chief Engineer
Bureau of Transit Technology
Division of Public Transportation
Ohio Department of Transportation
25 South Front St., Rm. 710
Columbus, OH 43216-0899
(614) 466-8955

Jack Michaels
Senior Vice President
NW Paralyzed Veterans of America
901 SW 152nd St.
Seattle, WA 98166
(206) 241-1843

Austin Morris
Executive Vice President and General Manager
Environmental Equipment Corporation
310 Preda St.
San Leandro, CA 94577
(415) 568-1422

Sandra Perkins
On-Call Service Coordinator
Washington Metropolitan Area Transit Authority
600 Fifth St., NW
Washington, DC 20001
(202) 962-1825

Joseph Reyes
Director of Safety
Southern California Rapid Transit District
425 South Main St.
Los Angeles, CA 90013
(213) 972-6545

Alan Romano
203 East Mitchell Rd.
Houston, TX 77037
(713) 447-8567

Loretta Sharpe
LRS Associates
26 Kenneth Rd.
South Portland, ME 04106
(207) 772-5057

Donna Shaunesey
Assistant Director
JAUNT, Inc.
1138 E. High St.
Charlottsville, VA 22901
(804) 296-3104

Barbara Singleton
Director
Kitsap Paratransit
7000 Werier Rd.
Bremerton, WA 98312
(206) 377-7176

Don Smith
Assistant General Manager
Lift-U, Inc.
8206 S. 192nd St.
Kent, WA 98032
(206) 251-6668

George Turner
Chairman of E&H Advisory Board
to Seattle METRO
3037 64th Ave., SW
Seattle, WA 98116
(206) 937-0367

Rick Walsh
Manager of Service Planning
and Market Development
Seattle METRO
Exchange Building
821 Second Ave.
Seattle, WA 98104
(206) 447-5845

Lance Watt
Director of R&D and Advanced
Vehicle Engineering
The Flxible Corporation
970 Pittsburgh Dr.
Delaware, OH 43015
(614) 362-2730

Jim Weisman
Attorney
Eastern Paralyzed Veterans
432 Park Ave. S., 4th fl.
New York, NY 10016
(212) 686-6770

Vic Willems
National Sales Representative
Mobile-Tech Corporation
P.O. Box 2326
Hutchinson, KS 67504-0058
(316) 663-4441

Paul Wysocki
Supervisor of Affirmative Action
Disability Specialist for Human
Rights Department
105 14th Ave.
Seattle, WA 98122

Emilio Zamora
Director
Spokane Transit Authority
West 1027 Broadway
Spokane, WA 99201-0706
(509) 456-3616

Special thanks to:

Arlene Battis
Advocacy Attorney
Paralyzed Veterans of America
801 18th St., NW
Washington, DC 20006

William Jensen
Program Manager
Division of Mass Transportation
California Department of
Transportation
1120 N Street
Sacramento, CA 95814

LIST OF REGISTERED ATTENDEES

Tony Aforismo
Supt. of Equipment and Maintenance
Connecticut Transit
53 Vernon St.
Hartford, CT 06106
(203) 524-5914

Steve Alger
Fleet Manager
BC Transit
Victoria, British Columbia
Canada
(604) 385-2551

John S. Andrews
Vice President
New Coach Sales
Hausman Bus Sales
10 E. Golf Rd.
Des Plaines, IL 60016
(312) 299-9900

Elise Anfield
Member, Committtee on Accessible Transportation
Tri-Met
4012 S.E. 17th Ave.
Portland, OR 97202
(503) 238-4879

Gerald Auchard
Chief Body Engineer
Eagle International, Inc.
Brownsville, TX 78520
(512) 541-3111

Gary L. Blahm
Membership Director
Oregon Paralyzed Veterans of America
3602 SE Powell Blvd.
Portland, OR 97202
(503) 234-6782

Robert M. Blaisdell
Maine Association of Handicapped Persons
237 Oxford St.
Portland, ME 04101
(207) 774-4360

Patrick Bonin
Supervisor
DAVE Systems Northwest
E4445 Hayden Lake Rd.
Vancouver, WA 98660
(206) 694-2956

Barbara Brown
Coordinator, Elderly and Handicapped Transportation
New Mexico Transportation Department
P.O. Box 1028
Santa Fe, NM 87504
(505) 827-4770

Allan Byam
Operations Manager
UMass Transit
Amherst, MA 01003
(413) 545-0056

Cindy Callis-Oberg
Planner, Special Needs Transportation
Tri-Met
4012 S.E.17th Ave.
Portland, OR 97202
(503) 238-4904

Jeff Campbell
Manager - Canadian Coach Sales
Motor Coach Industries Limited
P.O. Box 9372
Winnepeg, Manitoba R3T 1T5
Canada
(204) 942-4477

Bobbie Clements
American Transportation Corp.
Hwy. 65 South
Conway, AR 72032

Cris Colburn
Specialized Transportation Chief
Pierce Transit
1235 Sprague Ave.
Tacoma, WA 98405
(206) 593-6277

Marj Colton
Project Manager
PACE
550 W. Algonquin Rd.
Arlington Heights, IL 60005
(312) 364-7223, Ext. 4033

Sid Cope
President
WECO Manufacturing
Box 100
Kamloops, British Columbia
Canada V2C 5K3
(604) 376-1261

Robert H. Corressel
Manager of Special Services
SEPTA
25 S. 9th St.
Philadelphia, PA 19107
(215) 574-7390

Joseph Costanza
Administrator
Merrimack Valley Transit Authority
85 Railroad Ave.
Bradford, MA 01830
(617) 373-1184

Joy Culp
Panel on Special Transportation
W 1027 Broadway
Spokane, WA 99201
(503) 456-3616

Mary Lou Daly
Service Planning Analyst
Massachusetts Bay Transit Authority
10 Park Plaza
Boston, MA 02116
(617) 722-5123

Carolyn Davis
Manager-Special Transportation Service
Charlotte Department of Transportation
910 N. Alexander St.
Charlotte, NC 28206
(704) 336-2637

John F. Day
Director and Chairman of Ad Hoc Committee on Accessible Transportation
Southern California Rapid Transit District
425 South Main St.
Los Angeles, CA 90013
(213) 972-6657

Beth Dearinger
Dispatch Supervisor
Kitsap Paratransit
7000 Werner Rd.
Bremerton, WA 98312
(206) 377-7176

Charles Devlin
Chairman, Citizens Advisory Committee on Accessible Transportation
Southern California Rapid Transit District
425 South Main St.
Los Angeles, CA 90013
(213) 972-6657

David R. Diamond
Program Planning Supervisor
Illinois Department of Rehabilitation Services
623 East Adams St.
Springfield, IL 62705
(217) 782-9432

Edward W. Dwyer
Transit Manager
Connecticut Department of Transportation
PO Drawer A
Wethersfield, CT 06109
(203) 566-4954

Terry Ebersole
U.S. DOT/UMTA
Regional Office
915 2nd Ave. Suite 3142
Seattle, WA 98174
(206) 442-4210

Peter Edwins
Driver Supervisor
Special Mobility Services, Inc.
2950 S.E. Stark
Portland, OR 97214
(503) 233-9961

Murray English
Transportation Officer
Ministry of Transportation and Communications
Transit Office-3rd Fl, West Tower
1201 Wilson Ave.
Downsview, Ontario
Canada, M3M 1JL8
(416) 248-3785

Donald K. Fleck
President
Lift-U-Inc.
8206 S. 192nd St.
Kent, WA 98032
(206) 251-6668

Merle Ferber
Commission Member
Governor's Commission on Accessible Transportation
1 Ashburton Place, Room 1305
Boston, MA 02108
(617) 727-7440

Stephen Fosdick
Special Transportation Coordinator
Oregon Department of Transportation
131 Transportation Bldg.
Salem, OR 97310
(503) 378-8201

William Fort
U.S. DOT/UMTA
Regional Office
915 2nd Ave. Suite 3142
Seattle, WA 98174
(206) 442-4210

Roger Gadway
Director
Klickitat County Senior Services
228 W. Main St., Rm. 110
White Salmon, WA 98672
(509) 493-3068

Paul Gamble
Washington State Department of Transportation
Transportation Bldg.
Olympia, WA 98504
(206) 753-3407

Raymond W. Gareau
General Manager
Southeastern Regional Transit Authority
65 Potomska St., PO Box 13-946
New Bedford, MA 02741
(617) 999-5211

Francis Gay
Administrator
GATRA
Attleboro, MA 02703
(617) 226-1102

Miriam L. Gholikely
Board Member
San Mateo County Transit District
945 California Dr.
Burlingame, CA 94010
(415) 340-6289

Nancy Greenstein
Customer Relations
Southern California Rapid Transit District
425 S. Main St.
Los Angeles, CA 90013
(213) 972-6685

James T. Griffith
P.V.A. & Ad Hoc Committee on E & H Program
Santa Clara County Transit
4948 Wellington Park Dr.
San Jose, CA 95136
(408) 629-1012

Dr. Paul N. Hale, Jr.
Director
Center Rehabilitation Science and Biomedical Engineering
Louisiana Tech University
PO Box 10426
Ruston, LA 71272-0046
(318) 257-4562

Joe Hansen
Production Manager
Aeroquip Corp.
1125 W. Main St.
Jackson, MI 49203
(517) 787-8121

Edith Harris
Coordinator
ADAPT
410 Asylum St.
Hartford, CT 06105
(203) 233-3169

Vikki Harris
METROLift
Houston, TX 77208

Lawrence Harmen
Asst. Secretary
Executive Office of Transporatation
10 Park Plaza
Boston, MA 02116
(617) 697-7000

Richard Hayes
Executive Director
Kitsap Transit
2345 S. Wycoff
Bremerton, WA 98312
(206) 478-6230

Gail A. Heald
Elderly and Handicapped
Transportation Planner
Central Massachusetts Regional
Planning Commission
340 Main St., Suite 747
Worcester, MA 01568
(617) 756-7717

Rita Healy
U.S. DOT/UMTA
Regional Office
915 2nd Ave., Suite 3142
Seattle, WA 98174
(206) 442-4210

William Heavrin
Dir. of Jeff. County Office for
Citizens With Disabilities
Transit Authority of River City
1000 W. Broadway
Louisville, KY 40203
(502) 561-5108

Richard W. Heddinger
Rep. Spinal Cord Injury Network of
Metropolitan Washington, DC
12114 Millstream Drive
Bowie, MD 20711
(202) 523-1278

Karl A. Hekler
Chairman
Berkshire Regional Transit Authority
67 Downing Pkwy.
Pittsfield, MA 01201
(413) 499-2782

Sharon Helppie
Administrative Asst.
Community Transit
8905 Airport Rd.
Everett, WA 98204
(206) 348-7103

Kris Hill
Transportation Planner
Puget Sound Council of Governments
216 First Avenue South
Seattle, WA 98104
(206) 464-6843

James A. Hilly
Executive Director
Regional Transportation Program, Inc.
Portland, ME 04102-3013
(207) 774-2666

William Hinze
Regional Sales Manager
TARGET by INTEX
7032 Valjean St.
Van Nuys, CA 91406
(818) 785-0462

Ross Hudson
Special Ridership Coordinator
METRO Transit
821 Second Ave.
Seattle, WA 98104
(206) 447-5854

Ian Hussey
Environmental Equipment Corp.
310 Preda St.
San Leandro, CA 94577
(415) 568-1422

John Hutchinson
Deputy Director
S. Australian Department of Transport
Adelaide, S. Australia 5001
(08) 227-2833

David Ingerson
Member, Committee on Accessible Transportation
Tri-Met
4012 S.E. 17th Ave.
Portland, OR 97202
(503) 238-4879

Sharon Joseph
Board of Directors
The Whole Person, Inc.
6301 Rockhill Rd.
Kansas City, MO 64131
(816) 361-0304

Denise Karuth
Chair
Governor's Commission on Accessible Transportation
1 Ashburton Place, Room 1305
Boston, MA 02108
(617) 727-7440

John G. Kimball
Exec. V. President
DAVE Systems, Inc.
E445 Hayden Lake Rd.
Hayden Lake, ID 83835
(208) 772-6138

Lawrence Kites
Owner/Operator
HANDYLIFT
98 Melha Ave.
Springfield, MA 01104
(413) 737-7208/594-5560

Charlotte Kitowski
Director
Transportation Alternatives Inc.
50 Arnoldale Rd.
W. Hartford, CT 06119
(203) 233-4850

Stephen Klick
Associate
Fleet Maintenance Consultants
PO Box 82008
Houston, TX 77282-0008
(713) 496-7717

Jim Laughlin
Manager, METROLift Services
Metro Transit Authority
PO Box 61429
Houston, TX 77208
(713) 739-4986

Ira Laster, Jr.
Senior Program Coordinator
U.S. Department of Transportation
400 Seventh St. SW
Washington, DC 20590
(202) 426-4380

Jeffrey H. McCormick
Chief Automotive Officer
Southeastern Pennsylvania Transportation Authority
841 Chestnut St.
Philadelphia, PA 19140
(215) 456-4500

William MacCully
Director of Transit Development
Community Transit
8905 Airport Rd.
Everett, WA 98204
(206) 348-7111

William F. McQueen
Coach Service and Parts Manager
GMC Truck and Bus Coach Operation
31 Judson St.
Pontiac, MI 48058
(313) 456-4953

Dwight Maddox
Director of Planning
Transit Authority of River City
1000 W. Broadway
Louisville, KY 40203
(502) 561-5108

Elaine Marcus
Director, Office of Special Services
New Jersey Transit
McCarter Highway & Market St.
Newark, NJ 10007
(201) 648-2572

Jeffrey A. Mark
Supervisor, Coach Sales Engineering
GMC Truck and Bus Coach Operations
31 Judson St.
Pontiac, MI 48058
(313) 456-4073

Marsha Mazz
Director of Advocacy
Independence Center of Northern Virginia
4214 9th St. N.
Arlington, VA 22203
(703) 525-3268

George Montoya
Transit Planner
C-TRAN
PO Box 2529
Vancouver, WA 98668
(206) 696-4494

Teresa A. Moren
Accessible Service Project Manager
Southern California Rapid Transit District
425 S. Main St.
Los Angeles, CA 90013
(213) 972-3565

Elizabeth Mulcahy
Contract Administration Manager
Special Mobility Services, Inc.
2950 S. E. Stark
Portland, OR 97214
(503) 233-9961

Roy Nakadegawa
Board Member
Alameda-Contra Costa Transit District
508 16th St.
Oakland, CA 94612
(415) 891-4863

William S. Nanninga
16(b)(2) Program Manager
Wisconsin Department of Transportation
4802 Sheboygan Ave.
Madison, WI 54128
(608) 266-0560

Lou Nau
Travel Consultant
Valley Oaks Travel
13323 Moor Park St.
Sherman Oaks, CA 91423
(818) 990-4560

Yvonne Nau
Travel Consultant
Valley Oaks Travel
13323 Moor Park St.
Sherman Oaks, CA 91423
(818) 990-4560

Charles S. Neal
Project Engineer
GM Truck and Bus Group
31 Judson St.
Pontiac, MI 48058
(313) 456-7684

Dave O'Connell
Transportation Manager
Whatcom Specialized Transportation
315 Halleck St.
Bellingham, WA 98225
(206) 733-4030

Karen Pannell
Transportation Analyst
Special Projects Office
Washington Metropolitan Area
Transit Authority
600 Fifth St., NW
Washington, DC 20001
(202) 637-1234

Edward F. Pittelkow
P.V.A. - Santa Clara County
Transit
501 Moordark Way #64
Mt. View, CA 94041
(415) 969-6574

Donald W. Poston
Main Association of Handicapped
Persons
237 Oxford St.
Portland, ME 04101
(207) 774-4360

Pat Piras
892 Grant Ave.
San Lorenzo, CA 94580
(415) 278-1631

Timothy M. Price
Transit Planner-Program Development
San Diego Transit
100 16th St.
P.O. Box 2511
San Diego, CA 92101
(619) 238-0100

Rick Ramone
U.S. DOT/UMTA
Regional Office
915 2nd Ave., Suite 3142
Seattle, WA 98174
(206) 442-4210

Sue Ridenour
Representative
Citizen's Advisory Committee on
Accessibility
Southern California Rapid Transit
District
425 South Main St.
Los Angeles, CA 90013
(213) 972-6657

Jim Reaume
Q'Straint
33 Highridge Ct.
Cambridge, Ontario N1R 7L3
Canada

Ray Ripley
Mechanics Instructor
Santa Clara County Transit Agency
1555 Berger Dr.
San Jose, CA 95112
(408) 299-3857

Karen Rosenzweig
Transit Planner
Seattle METRO
821 Second Ave.
Seattle, WA 98102
(206) 447-6358

Glenn A. Russo
Planner
Berkshire County Reg. Planning
Commisssion
67 Downing Pky.
Pittsfield, MA 01201
(413) 499-2782

Tom Ryan
Pierce Transit
550 American Savings Ctr.
820 A St.
Tacoma, WA 98402
(206) 572-4161

Stephen Schindel
Deputy Director
Division of Public Transportation
Illinois Department of Transportation
310 S. Michigan Ave., 16th Fl.
Chicago, IL 60453
(312) 793-2111

Jason A. Schneider
Director
Governor's Commission on Accessible
Transportation
1 Ashburton Place, Room 1305
Boston, MA 02108

Joseph F. Schrotti
Production Manager
Saab-Scania of America, Inc.
Saab Drive
P.O. Box 697
Orange, CT 06477
(203) 795-1326

Paul E. Schraeder
Manager of Fleet Maintenance
Santa Cruz METRO
109 Sorrell Ave.
Santa Cruz, CA 95065
(408) 475-4801

Dave Schwagler
Maintenance Superintendent
Intercity Transit
P.O. Box 659
Olympia, WA 98507
(206) 786-8585

Klaus Schweintek
Field Service Representative
MAN Truck and Bus
10130 NE 143rd St.
Bothell, WA 98011
(206) 821-0465

Michael Sharff
Dir. Bus Capital Asst.
Massachusetts Executive Office of
Transportation
10 Park Plaza
Boston, MA 02116
(617) 973-7000

Fred Seekell
Project Engineer
U.S. DOT/Transportation
Systems Center, DTS-74
Kendall Square
Cambridge, MA 02142
(617) 494-2024

Noel P. Shillito
General Counsel
Pierce Transit
820 A St., #550
Tacoma, WA 98402
(206) 572-4161

Ron Shipley
Maintenance Manager
Pierce Transit
1235 Sprague Ave.
P.O. Box 5738
Tacoma, WA 98405-0738
(206) 593-4529

Ernest D. Sigler
Mechanic
N.E. King Co. Multi Service Van-Go
18220-96th NE
Bothell, WA 98011
(206) 485-6524

Richard Skaff
Member, Golden Gate Advisory
Committee
Golden Gate Transit
Box 9000 Presidio Station
San Francisco, CA 94129
(415) 457-3110

James Slack
Maintenance Foreman
Transit Authority of River City
1000 W. Broadway
Louisville, KY 40203
(502) 561-5108

Edward C. Smith
Product Safety Manager
Everest & Jennings, Inc.
3233 E. Mission Oaks Blvd.
Camarillo, CA 93010
(805) 987-6911

Robert Slagel
Director of Marketing
Environmental Equipment Corp.
310 Preda St.
San Leandro, CA 94577
(415) 568-1422

Donald Smith
Vice President, Operations
Lift-U, Inc.
8206 S. 192nd St.
Kent, WA 98032
(206) 251-6668

Lorraine Snorden
Pace Suburban Bus Service
550 West Algonquin Rd.
Arlington, Heights, Ill 60005

Mark Stanisich
Director of Transportation
Pierce Transit
1235 Sprague Ave.
PO Box 5738
Tacoma, WA 98405-0738
(206) 593-4525

Stanley R. Stavinski
Associate Advocate Barrier-Free Design
Eastern Paralyzed Veterans Association
432 Park Ave. S., 4th Fl.
New York, NY 10016
(212) 686-6770

Dolores Steichen
Board Member
Kitsap Paratransit
7000 Werner Rd.
Bremerton, WA 98312
(206) 377-7176

Dileep R. Sule
Professor
Center for Rehabilitation Science and Biomedical Engineering
Louisiana Tech University
PO Box 10426
Ruston, LA 71272-0046

Pat Sullivan
Maintenance Supervisor
Seattle METRO
1555 Airport Way S.
Seattle, WA 98056
(206) 447-6890

Larry Tapia
Community Resource Manager
New Vistas Independent Living Center
Santa Fe, NM 87501
(505) 984-8171

Roland Tigno
Asst. Auto Mech. Engineer
Santa Clara County Transportation
1555 Berger Dr.
San Jose, CA 95112
(408) 299-4384

John L. Tibbetts
Assistant General Manager
Greater Portland Transit District
114 Valley St., P.O. Box 1097
Portland, ME 04102
(207) 774-8306

Perry Tillman
President
Paralyzed Veterans of America Bayou Chapter
3308 Tulane, Suite 220
New Orleans, LA 70119
(504) 822-7941

Michael Van Gelder
Planning Coordinator
Intercity Transit
P.O. Box 659
Olympia, WA 98507
(206) 786-8585

Arne Wettler
Purchasing Manager
Saab-Scania of America
Saab Drive
Orange, CT 06477
(203) 795-1326

Colleen Weule
Regional Counsel
US DOT/UMTA
915 2nd Ave.
Seattle, WA 98174
(206) 442-4210

Ed Walsh
Sales Manager
Ancra Corporation
1115 W. National Ave.
Lynnwood, WA 98037-5017
(206) 353-7211

Allen W. Wamester
Elderly and Handicapped Coordinator
Conn. Dept. of Transportation
PO Drawer A
Wethersfield, CT 06109
(203) 566-4680

John Warren
Regional Sales Manager
Bus Industries of America, Inc.
Base Road R.D.1
Oriskany, NY 13424

Fred Weber
Manager Equipment and Maintenance
Connecticut Transit
53 Vernon St. P.O. Box 6450
Hartford, CT 06106
(203) 524-5914

Roger Winter
Superintendent - Operations
Toronto Transit Commission
1900 Yonge St.
Toronto, Ontario
Canada, M4S 1Z2
(416) 393-4173

Frank A. Varker
Principal
Varker and Associates
184 Sterling Rd.
Trumbull, CT 06611
(203) 268-7414

Park Woodworth
Manager, Contracted & Accessible
Transportation
Tri-Met
4012 S.E. 17th Ave.
Portland, OR 97202
(503) 238-4879

Dorothy Yellon
METROLift
Houston, TX 77208

Hale Zukas
AC Transit Accessibility Member
Alameda-Contra Costa
Transit District
501 16th St.
Oakland, CA 94612
(415) 891-4863

NOTICE

DOT-I-87-11

DOT-I-87-11

TECHNOLOGY SHARING

A Program of the U.S. Department of Transportation