

Technology To Help Compliance with Americans with Disabilities Act in Public Transit

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The introduction of the Americans with Disabilities Act (ADA) placed new responsibilities on public transit authorities in the United States. The readiness of technology to respond to the challenges of the ADA is addressed. On-board devices to assist people with impaired mobility, devices outside the vehicle, and combinations of the two are examined. It is concluded that the greatest benefits will most likely be derived from lowering the floors of passenger compartments closer to street level.

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HIGH-LEVEL PLATFORMS

Historically, the first effective attempt by public transit to serve people with impaired mobility was demon-

strated in underground transit systems. High-level platforms that matched vehicle floors provided a solution for select systems. The drawback to this solution has always been the high capital cost of the high-level platforms. In addition, when high platforms are installed in the streets for light rail vehicles (LRVs), they are frequently considered to be an eyesore.

Critics also complain that the gap between the platform and the vehicle, usually 3 in., and variations between the station level and the car's floor, sometimes exceeding 2 in., make it impossible for a disabled person in a wheelchair to negotiate the entrance without assistance. Still, several cities—such as Calgary and Edmonton in Canada, Pittsburgh, St. Louis, and Los Angeles in the United States, and Stuttgart in Germany—chose this solution for their light rail transit (LRT) systems. With assistance given where needed, a person in a wheelchair can be taken into or out of a car in a matter of seconds.

MINIHIGH-LEVEL PLATFORMS

A variation of the solution just described occurs when LRVs with high floors and low entrances are matched with minihigh-level platforms at the front end of the station. This arrangement must be supplemented with

an on-board bridge plate, manually deployed above the vehicle's stairwells by the car's operator to bridge the gap between the car and the high platform. This method has been adopted, for instance, by LRV operators in Sacramento (Figure 1), Baltimore, and Denver. Such a system works fairly well, allowing for the transfer of a wheelchair within 30 sec, but it causes longer delays when a car's operator initially fails to stop the car in the right place against the short high-level platform.

Another unfortunate aspect of this arrangement is that the two doors (one on each side of the car) next to the active operator's cab are dedicated solely to serving people with impaired mobility, thus potentially increasing the time required for the exchange of able-bodied patrons.

MECHANICAL WAYSIDE LIFTS

Stationary mechanical wayside lifts were adopted by LRV operators in Portland, Oregon, and Santa Clara, California. They are being contemplated for use with the new San Francisco LRV being supplied by Breda. However, even with readily deployable lifts (Figure 2) such as these, transferring a wheelchair causes delays of approximately 3 min because of difficulties in matching the car's entrance with the lift location at the station. The author has been told that in Santa Clara, where the

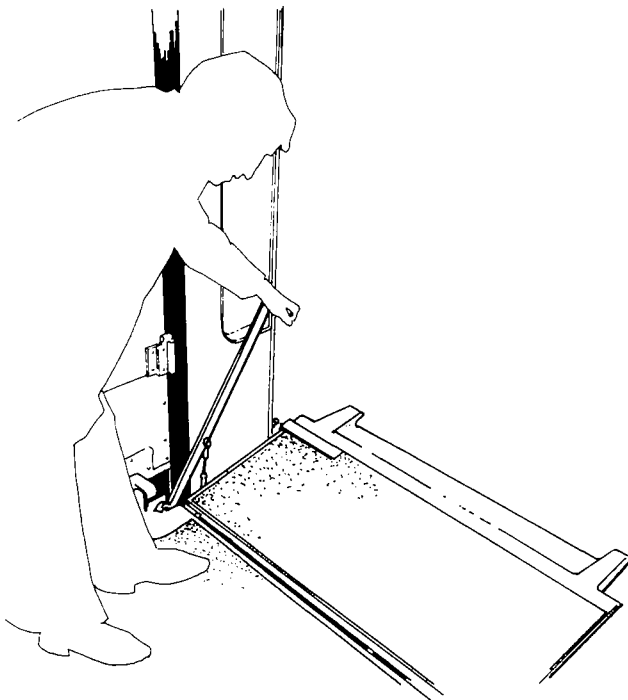


FIGURE 1 Manually deployed ramp on Sacramento LRVs by Duewag.

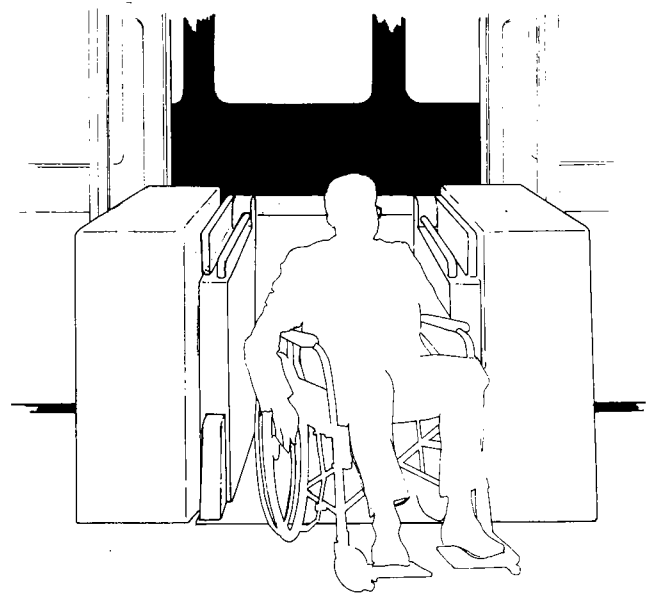


FIGURE 2 Wayside lift by Lift-U, Inc.

lifts are neatly packaged for architectural effect, the average transfer may cause delays of up to 5 min.

MOVABLE MECHANICAL WAYSIDE LIFTS

The action of wayside lifts can be improved if they can be moved to match the lift platform with the entrance of the car. Such a lift serves the super-fast French intercity train, the TGV, in Grenoble.

MECHANICAL FOLDING ON-BOARD LIFTS

A distinct group of accessibility devices are the mechanically powered on-board lifts. The folding on-board lifts are especially popular for use with the small vans of paratransit operations (Figure 3). Similarly to the wayside mechanical lifts, these are not well suited for a fixed-route service because their slow action results in operational delays. In addition, they occupy the entire door entrance, as on the San Diego LRV (Figure 4). To avoid this inconvenience, Japanese car builder Nippon Sharyo locates its folding lift in a special opening in the side of the car. However, this solution affects the seating and standing capacity of the car.

ROTARY LIFTS

Some portion of the door entrance can be better used for foot passengers when a rotary on-board lift is used.

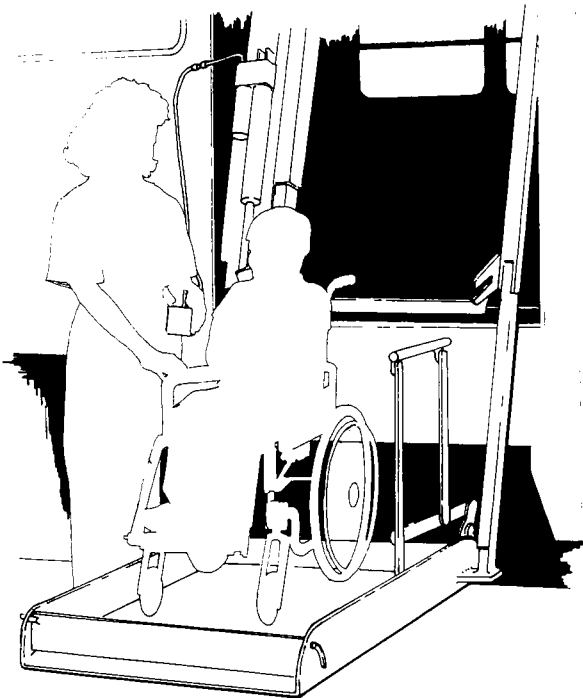


FIGURE 3 Folding lift by Ricon on San Diego LRVs by Duewag. Lift (seen here in folded position) occupies entire entrance.

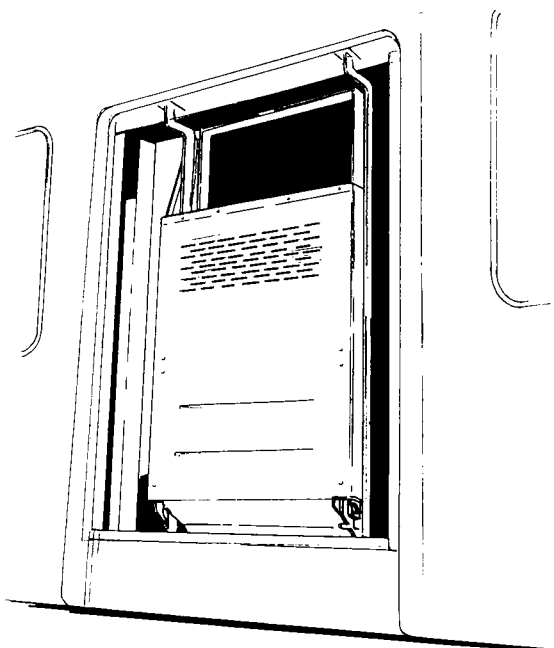


FIGURE 4 Folding lift by Braun Corporation.

The lift is stored next to the door post, transversely to the centerline of the car. After a complex set of movements, it unloads the passenger in the lift parallel to the side wall of the vehicle (Figure 5). These lifts are used on paratransit passenger vans, and one is being considered for the new double-deck intercity railcar of the California Department of Transportation.

LIFTS IN ENTRANCE STEPS

Another version of the on-board lift is the lift in the entrance steps. When folded, it forms the steps of the car. These lifts are popular in buses but are avoided in railcars since railcars have much higher structural strength requirements. A lift in the entrance steps needs a large cutout in the underframe, thus making it less resistant to the specified construction loads.

LOW-FLOOR VEHICLES

A breakthrough in serving the public occurred with the introduction of low-floor vehicles, both buses and railcars. In buses and LRVs the low floors are approximately 1 ft above (most typically 14 in. above) the road, 2 ft lower than in earlier designs. This includes vehicles with low floors along their entire length or partially low-floor arrangements, typically 70 percent low floors.

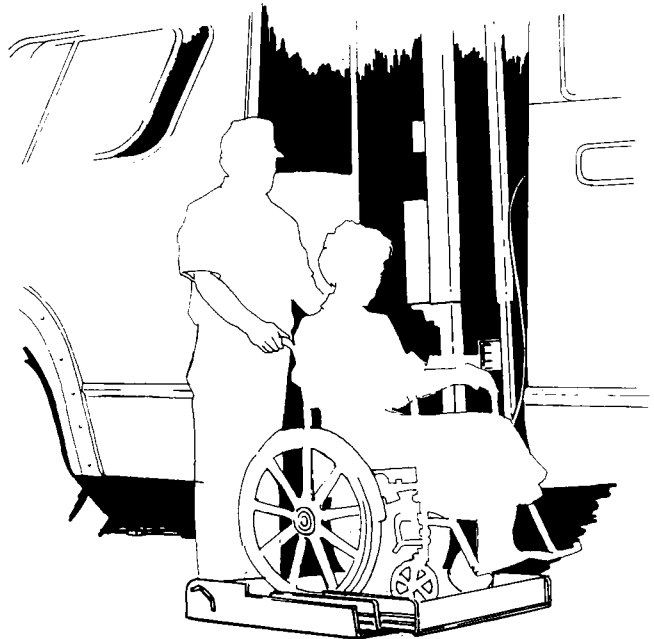


FIGURE 5 Rotary lift by Braun Corporation. After a sequence of linear and rotary motions of lift, a passenger in a wheelchair reaches ground with side to vehicle.

In mainline commuter and intercity railcars, the low-floor level is at 2 ft as opposed to the earlier height, typically 4 ft. Although a low floor does not mean a street-level floor, the described vehicles, when combined with adequately elevated station platforms, greatly facilitate the movement of passengers through their doors, even without supplementary ramps or lifts.

LOW-FLOOR VEHICLES WITH SUPPLEMENTARY LIFTS

A low-floor vehicle with a supplementary lift exists in Munich on a 100 percent low-floor LRV manufactured by AEG (Figure 6). The lift, supplied by Messerschmidt-Boelkow-Blohm GmbH, drops part of the entrance floor to the ground and allows a wheelchair to be picked up even from rail level. In Munich 120 buses are also fitted with these lifts. However, this complex mechanism is relatively expensive.

MANUALLY DEPLOYED RAMP

At the opposite end of the price and complexity range is a manually deployed ramp manufactured by the Canadian company Bombardier for its Los Angeles Metro Link commuter cars (Figure 7). This simple ramp, constructed of aluminum extrusions and honeycomb sand-

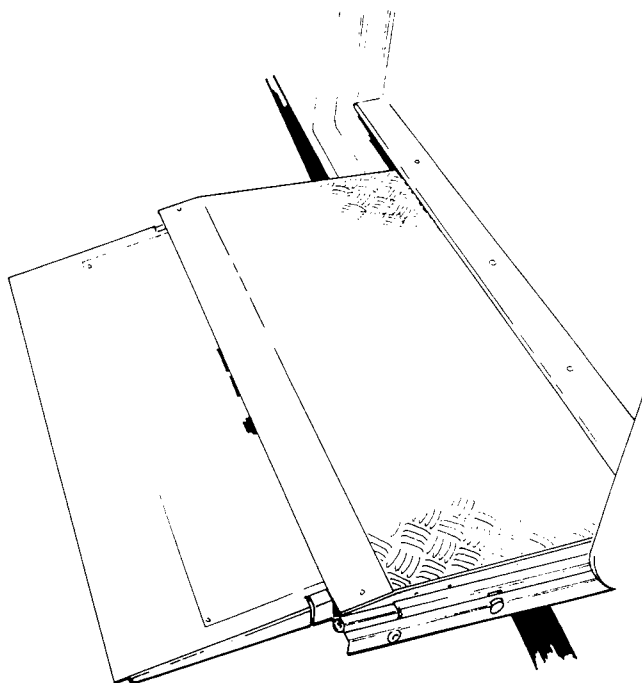


FIGURE 6 Lift by Messerschmidt-Boelkow-Blohm GmbH on low-floor AEG LRVs in Munich, Germany.

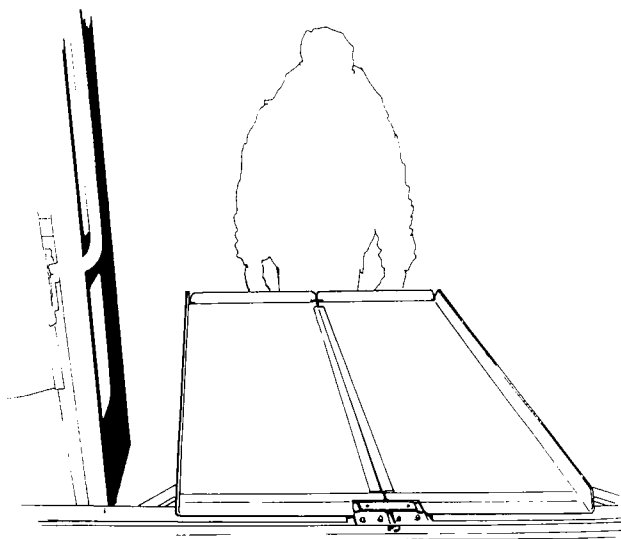


FIGURE 7 Manually unfolded ramp by Bombardier on Los Angeles Metro Link bilevel commuter cars.

wich panels with fiberglass skins, weighs only 30 lb and can be provided at a fraction of the cost of the Messerschmidt ramp. Because of its relatively longer time of deployment, this ramp is considered more appropriate for use on railroads than on light rail systems with their tight travel schedules.

MOTORIZED RAMP

Motorized ramps are installed on some MAN kneeling buses. The driver first lets the air out of the air-bag suspension on the curb side of the bus, lowering the low-floor from its normal 12 in. down to 7 in. Then the driver remotely deploys from a slot in the underframe a thin blade-like ramp, some 3 ft long, that bridges the door and the wayside pavement. A similar ramp is in service on the Duewag low-floor Frankfurt LRVs, deployed of course without a kneeling action of the vehicle. The deployment of the ramp appears to take some 5 sec or so.

SHORT RAMP MOUNTED IN THRESHOLD

The French car builder GEC Alstom provides on its Grenoble low-floor LRV cars with a short, wide ramp incorporated into the side-door threshold and deployed when needed within seconds (Figure 8). This ramp, covering the gap between the car and the station, has the flexibility to accommodate variations in the height of station platforms. The entire ramp mechanism is a module that can be quickly removed for service or replace-

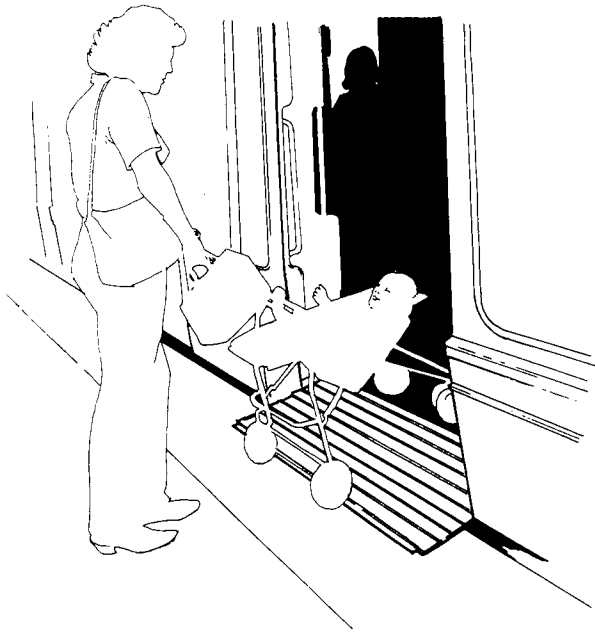


FIGURE 8 Powered ramp on GEC Alsthom low-floor LRVs in Nantes, France. Ramp is deployed within a fraction of a second, together with opening door.

ment when damaged. Since the ramp is short and engages the station platform only across a couple of inches, its sudden and aggressive emergence from the door threshold does not startle passengers waiting at the stop.

NANTES LRV RAMPs: DEPLOYED AT EVERY STOP

The action of similar ramps was observed on the newer Nantes low-floor LRVs, also by GEC Alsthom. Here, the ramps are deployed automatically every time the side doors are opened. This relieves the driver from making decisions about the ramp and invites all patrons to enjoy this convenience. Mothers with children in strollers, elderly people with canes, and people with shopping carts enter and leave the cars naturally and without thinking much about it, something that cannot be said for other accessibility arrangements. However, some operators prefer the type of ramp deployed only on demand, citing the lesser cost of maintenance if the ramps are used selectively.

CONCLUSIONS

The introduction of the steam engine, almost 200 years ago, changed the aspect of speed in transportation. Electricity has made transportation efficient and continually raised its level of comfort over the past 100 years. Today the general arrangements of passenger rail vehicles are being rethought in an effort to make them widely accessible to all segments of the public. In this respect it appears that the greatest benefits will be derived from lowering passenger compartments closer to street level. As has been true in the past with similar challenges, the role of technology will be decisive in ensuring accessibility to public means of transportation.