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<td>Thomas Urbanik II, William Kelley, and Jose' A. Soegaard</td>
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<td>Texas A&amp;M University</td>
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<td>P. O. Box 5051</td>
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Form DOT F 1700.7 (8-69)
SURVEY OF VEHICLES AND EQUIPMENT

FOR

ELDERLY AND HANDICAPPED TRANSPORTATION

by

Thomas Urbanik II
Assistant Research Engineer

William Kelley
Research Associate

and

Jose' A. Soegaard
Research Assistant

Edited by

A. V. Fitzgerald
Assistant Research Specialist

Technical Report 1056-1

Study Number 2-10-78-1056

Transportation of the Elderly and Handicapped

Sponsored by the

State Department of Highways and Public Transportation in cooperation with the
Urban Mass Transportation Administration

Texas Transportation Institute
Texas A&M University
College Station, Texas 77840

September 1978
DISCLAIMER

Neither the Texas Transportation Institute, nor its sponsor endorse any product or manufacturer listed in this report. Trade and manufacturers' names appear only because they are essential to the objective of this survey (to provide potential purchasers with some data on equipment available). Potential buyers are encouraged to survey additional manufacturers which may have inadvertently been omitted from this list and to review in detail the equipment they wish to purchase.

Data presented reflects information available as of September 1978.
EXECUTIVE SUMMARY

This report was prepared in catalog format for use in selecting special equipment and vehicles for transporting the elderly and the handicapped. Basic specifications, special considerations, and cost are discussed for 34 manufacturers.

In addition, summaries of operational experience including a TTI survey of 120 providers of specialized elderly and handicapped transportation are provided.
EXECUTIVE SUMMARY

This report was prepared in catalog format for use in selecting special equipment and vehicles for transporting the elderly and the handicapped. Basic specifications, special considerations, and cost are discussed for 34 manufacturers.

In addition, summaries of operational experience including a TTI survey of 120 providers of specialized elderly and handicapped transportation are provided.
IMPLEMENTATION STATEMENT

The information presented in this report will enable local transit operators, as well as the State Department of Highways and Public Transportation, to evaluate specific vehicles and equipment available for transportation of the elderly and the handicapped. The information should aid in the development of specifications in terms of what equipment is available, what features are particularly troublesome and what features have special impact on users.

The data will also result in reduced effort and elimination of duplicate effort on the part of agencies procuring vehicles, since they will not have to spend significant time determining what equipment is available. The information resulting from the survey of operators should also help avoid some of the problems with new vehicles, since the experience of others will be available to purchasers of new equipment.
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I. INTRODUCTION

The information presented in this report is intended to be used as a preliminary guide in selecting vehicles and equipment for specialized transportation service of the elderly and the handicapped. An initial list of over 70 manufacturers of specialized equipment was assembled from previous reports, transit association registers, and transit operators. The companies were requested to provide current literature on product design and specifications. Additional information, as needed, was requested by telephone. In many cases it was determined that the manufacturers were either no longer in the transportation industry or had discontinued marketing of specialized products applicable to elderly and handicapped transportation. The authors also acknowledge the possibility that some new manufacturers were excluded because their companies were not yet listed in the literature or identified by the operators surveyed.

The main body of the report identifies 34 manufacturers of small buses, van conversions, and equipment that may be used in transporting the elderly and the handicapped. Manufacturers of conventional transit buses (more than 40 passengers) were not included in the report, except in the user survey of vehicles.
II. SMALL BUSES

Classification schemes for small buses vary widely. Categories include a range from light duty vans seating 8-12 passengers to heavy-duty transit vehicles seating 35-40 passengers.

For purposes of this report, small buses are divided into two categories; 1) small buses designed specifically for transit use; 2) and small buses built on truck chassis. Vans are treated separately.

Market demand for small buses in the medium and heavy duty categories is unclear. While many technical reports continue to indicate a significant demand, numerous manufacturers have recently discontinued their small bus programs. On the other hand, at least two domestic firms have initiated new small bus programs specifically designed for transit use.

Transit Type

A small transit bus is defined as being engineered and designed specifically for transit use. It is characterized by:

- heavy-duty, unitized construction of body and chassis
- diesel engine
- seating capacity of 20-35 passengers
- design life of 10 years (400,000 miles)

The small transit bus is intended to represent a higher capital cost vehicle that is more desirable and requires less maintenance.
Classification Small Transit Bus

Manufacturer Chance Manufacturing
Box 12328
Wichita, Kansas 67277

Home Office - 316-942-7411
Sales Office - 214-742-3802

Contact Rod Johnson
Title Vice President, Sales
1103 Ross Ave.
Dallas, Texas 75202

General Description

Model RT - 50
Body Chance
Engine Caterpillar Diesel-
Transmission Auto 4 spd.
Brakes Dual self-adjusting air
Length 25'2'' Width 96'' Height 122'' Wheel Base 168''

Chassis Chance

Interior/Equipment

No. Passenger Seats 25
Seating Option 3-modified for wheelchairs
Aisle Width 20'' Max. Headroom 75'' Door Width 48''
29'' kneeling
Floor Height 33'' normal 1st Step Height 12''-kneeling Step Dimensions 9'' riser
Grab Rails inclined at door-vertical at aisle
Seat Handholds yes-unpadded

Interior Lighting 4 ft. fluorescent
Windows at each seat, 7/32'' single density glazed
Wheelchair Lift/Ramp optional-34'' width
Restraint System American seating foldup seat/restraint
Climate Control air-45,000 BTU's-1600 CFM airflow
heater-90,000 BTU's & 850 CFM

Base $78,000
Cost with Vapor lift $86,000
Delivery Time 180 days

Comments

220 amp battery, air ride, 50 gallon fuel tank, noise level less than 82 dba, 28.6' turning radius, Rockwell - Axle (9,000# front/15,000# rear) MPG estimate: 8-11.
The City of Austin received the first 5 RT-50 with lifts.
Classification Small Transit Bus

Manufacturer Transportation Manufacturing Co. P.O. Box 5670
Contact Mr. Vernon Tull
Roswell, New Mexico 88201 Title Sales Manager (Greyhound Subsidiary)

General Description

Model City Cruiser-TMC-T-30 Body TMC Chassis integrated body
Engine Detroit diesel Transmission Detroit Allison Brakes Rockwell-Std. Camaste full air
Length 31'4" Width 96" Height 96" Wheel Base 180"

Interior/Equipment

No. Passenger Seats 31 Seating Option various options
Aisle Width 20.5" Max. Headroom 78" Door Width 36"-rear, 37.5" front
Floor Height 33" 1st Step Height Average 13" Step Dimensions step rise 10" inclined at door
Grab Rails stanchion along the aisle Seat Handholds American Seating-unpadded
Interior Lighting fluorescent illuminator Windows at each seat-double glazed, tinted
Wheelchair Lift/Ramp TDT Restraint System American Seating
Climate Control Carrier-7 ton ratings at 95° ambient heating 80,000 BTU's-800 CFM air flow

Cost $59,997 without lift
Delivery Time 6 months

Comments


noise level 82 decibels in rear of bus. Bus was originally designed, manufactured, a
marketed as Orion Bus of Canada and as such was tested for 5 weeks by SEMTA (South
Eastern Metro Transit Authority) in Detroit, Mich. TMC division of Greyhound has
now taken over production and marketing in United States.
Truck Chassis Type

The technology of school bus and recreational vehicle manufacturers is being widely adapted to the needs of elderly and handicapped transportation service. The manufacturers add their specialized bodies to standard truck chassis. Such vehicles are characterized by:

- gross vehicle weight in range of 9-11,000 lbs.
- added strength and durability afforded by truck chassis
- passenger capacities range from 16-24.
- option of gasoline or diesel engine.
- low capital cost relative to passenger capacity
Classification  Small Bus - Truck Chassis

Manufacturer  Mercedes Benz of North America  Phone  201-573-0600

One Mercedes Drive  Contact  Mr. R. L. Towner

P.O. Box 350  Title  Manager
Montuakle, NJ 07645

General Description

Model  0309 D  Body  Mercedes  Chassis  Mercedes

4 cyl. diesel  Auto
Engine  (230 cu. in.)  Transmission  4 spd. Allison  Brakes  air assisted hydraulic

Length  236"  Width  83.4"  Height  108.8"  Wheel Base  137.8"

Interior/Equipment

No. Passenger Seats  16  Seating Option customer's - option

Aisle Width  19"  Max. Headroom  74.8"  Door Width  NA

Floor Height  NA  1st Step Height  9"  Step Dimensions  NA

Grab Rails  vertical at aisle and entrance  Seat Handholds  no

Interior Lighting  6 ceiling lights  Windows  at every seat

Wheelchair Lift/Ramp  options  Restraint System  option

Climate Control  heater - hvy. duty AC option

Cost  $28,000 - Base Price

Delivery Time  United States Distribution discontinued.

Comments

Michigan study (1) found Mercedes bus to be well-built and economical to operate. Only significant complaint was noise level. TTI survey respondents gave 309 D above average rating with only moderate complaints on parts accessibility.
Classification: Small Bus - Truck Chassis

Manufacturer: Argosy Manufacturing
60 Vista Drive
Versailles, Ohio 45380

Phone: 513-526-3131
Contact: Joel Diehl
Title: National Sales Manager

General Description

Model: CB/20'/24'/28'
Body: Argosy-RU-Diesel MT643
Chassis: Diesel Chevrolet/Detroit Diesel 453 or modified Dodge
Engine: Chevrolet 454
Transmission: Auto Model 1400
Transmission: Brakes power-hydraboost
240' - 125' WB
Length: 288' - 158' WB
Width: 96' (all)
Height: 109'
Wheel Base: 125'/158'/178'

Interior/Equipment

17 Pass. - 125' WB
2 whl. & 22 Pass.-158' WB
No. Passenger Seats: 3
Seating Option: Various (perimeter seating available)
Aisle Width: 21" W/34" seat Max. Headroom: 79"
Door Width: 26"
Floor Height: 28"-30"
1st Step Height: 9½"
Step Dimensions: 8" riser x 9 3/4" depth x 29½" width
Grab Rails: Inclined at entrance, vertical
Seat Handholds: YES-unpadded
Interior Lighting: Full length passenger compartment
Windows: at each seat
Wheelchair Lift/Ramp: optional-TDT system
Restraint System: Collins

Climate Control: 40,000 BTU heater-std. AC & Heater-optional

Cost: $43,000-CB24 & 73,000 CB24 Diesel
Cost: $45,000 - CB-28

Delivery Time: 120 days

Comments

"A good bus when it runs" was reported by the Michigan Study (1). Operators experienced continuous engine and transmission problems. CB-20 available in large quantities only.
Classification: Small Bus-Truck Chassis

Manufacturer: Carpenter Body Works
Contact: Rod Gardner

General Description
Model: Cadet
Body: Carpenter
Chassis: GMC/Chevrolet

Engine: Chevrolet
Transmission: standard
Brakes: front disc/rear drum

Length: 224"/252"/280"
Width: 84"
Height: 108"
Wheel Base: 133"

Interior/Equipment
No. Passenger Seats: 18-32
Seating Option: 6 options
Aisle Width: 13"
Max. Headroom: 78"
Door Width: 75"

Floor Height: 26"-27"
1st Step Height: 12"
Step Dimensions: riser - 7"

Grab Rails: Full length at door
Seat Handholds: yes-option

Interior Lighting: 6 dome lights
Windows: at each seat

Wheelchair Lift/Ramp: optional-Collins
Restraint System: optional
W23A-single, W36A-double

Climate Control: heavy-duty heater/air condition

Cost: approx. $14,000 fully equipped with lift/air/assc.
Delivery Time: 6 months

Comments
Michigan study (1) rated bus as good buy for money with low service cost.
Chief difficulties were high first step and minor problems with electrical system.
Classification: Small Bus-Truck Chassis

Manufacturer: Cortez Enterprises, Inc.
777 Stow Street
Kent, Ohio 44240

Phone: 216-678-4932
Contact: James Whalen
Title: Material Control Manager

General Description

Model: Transporter
Body: Cortez
Chassis: Unitized

Engine: Oldsmobile-403 CI
Transmission: Oldsmobile 3spd
Brakes: Hydraulic-power boosted

Length: 22'4"
Width: 95"
Height: 96"
Wheel Base: 132"

Interior / Equipment

No. Passenger Seats: 15 passengers
Seating Option: optional

Aisle Width: optional
Max. Headroom: 6'3"
Door Width: 40"

Floor Height: 18"
1st Step Height: 14"
Step Dimensions: 7" riser

Grab Rails: option
Seat Handholds: option

Interior Lighting: optional
Windows: 4 lg. windows in passenger section

Wheelchair Lift/Ramp: optional
Restraint System: optional

Climate Control: 36,000 BTU A.C.-optional
40,000 BTU heater

Cost: $18,000 base to nearly $40,000
Delivery Time: 8 weeks

Comments

__________________________________________________________________________
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10
Classification: Small Bus - Truck Chassis

Manufacturer: Grumman Allied

Phone: 614-369-7671

600 Old Country Rd.

Contact: Richard Ripp

Garden City, New York 11530

Title

General Description

Model: 23-Grumman Lift

Body: Grumman

Chassis: Chevrolet/Dodge

Engine: Chevrolet & Dodge

Transmission: Optional

Brakes: Front disc/Rear drum

Length: 243"

Width: 96"

Height: 112"

Wheel Base: 137"

Interior/Equipment

No. Passenger Seats: 17

Seating Option: custom

Aisle Width: 19"

Max. Headroom: 6'6"

Door Width: 23"

Floor Height: 33"

1st Step Height: 17"

Step Dimensions: 8" risers

Grab Rails: vertical at entrance

Seat Handholds: yes, on back of seats

Interior Lighting: 4 ceiling lights

optional

Windows: at every seat

Wheelchair Lift/Ramp: electro-hydraulic

Restraint System: optional

Climate Control: heater - AC option Scott

Cost: Base - $23,000, with lift $28,000

Delivery Time: No longer available

Comments

Note: Michigan Study (1) indicated that while passengers liked design of Grumman Bus, operators were plagued with continuous breakdowns. TTI survey respondents also indicated dissatisfaction with service requirements.
**Classification**  Small Bus - Truck Chassis

**Manufacturer**  Micro Bus CORP -  
12420 Bloomfield Ave.  
Santa Fe Springs, CA 90670  
Contact A. B. Miller  
Phone 213-923-3221  
Title President

---

**General Description**

**Model**  Fortibus Commuter-XB  
**Body**  Microbus  
**Chassis**  Ford/GMC/Dodge/Chevrolet

**Engine**  Gas or Diesel  
Transmission  Optional  
Brakes  std.-front disc/rear drum  
Ford 233" & 253"  
Ford 90"  
Ford- 107"  
Ford 11 & 253"  
Ford 90"  
Ford- 107"

**Length**  Chev. - 249"  
**Width**  Chev. 80"  
**Height**  Chev. - 105"

**Interior/Equipment**

- **Passenger Seats**  12-20  
- **Seating Option**  forward or perimeter
- **Aisle Width**  Min-15"  
- **Max. Headroom**  74-76"  
- **Door Width**  36-54"
- **Floor Height**  27"  
- **1st Step Height**  10-11"  
- **Step Dimensions**  10 3/4" riser
- **Grab Rails**  inclined at entrance-vertical at aisle & optional at ceiling  
- **Seat Handholds**  optical
- **Interior Lighting**  4 domelights  
- **Windows**  at each seat
- **Wheelchair Lift/Ramp**  lift with dual hydraulic cylinders  
- **Restraint System**  optional
- **Climate Control**  optional- 18-36,000 BTU A.C.

**Cost**  $19-23,000 Base.-Add $2750 for lift and $2,600 for air conditioning

**Delivery Time**  3-5 months

---

**Comments**

Micro Bus manufactures electro-hydraulic lift with auxiliary backup 44"door width for lift - 60" height.

Company also provides van conversions.
Classification Small Bus - Truck Chassis (Recreational Vehicle)

Manufacturer Revcon Inc. Phone 714-968-3346
10870 Kalama River Rd. Contact
Fountain Valley, CA 92708 Title

General Description

Model T-27 and T-30 Body Revcon Chassis Revcon
Engine Oldsmobile-403CI Transmission Hydramatic Brakes dual cylinder
Length 30' - T 30 Width 95" Height 101" Wheel Base 185" - T-27

Interior/Equipment

No. Passenger Seats * Seating Option *
Aisle Width * Max. Headroom 77" Door Width N. A.
Floor Height 22" 1st Step Height 12" Step Dimensions riser-10"
Grab Rails * Seat Handholds *
Interior Lighting * Windows *
Wheelchair Lift/Ramp * Restraint System N. A.
Climate Control heater A-C - 16,000 BTU

T-27 - $21,800
Cost T-30 - $23,800
Delivery Time 90 days

Comments

* - Requires customer design for interior
Classification: Small Bus - Truck Chassis

Manufacturer: Superior - Sheller Globe Corp
Phone: 214-371-7715 or 7716
1200 E. Kirby St.
Contact: Lee F. Naugle
Lima, Ohio
Title: Superior Coach Sales of Texas
309 E. Overton Road
Dallas, Texas 75216

General Description

Model: Pacemaker - 3 models
Body: Superior
Chassis: Chevrolet/GMC/Dodge heavy duty-front

Engine: Gas or Diesel
Transmission: *
Brakes: disc/rear drum

18'8"-125" WB
Length 21'-133" WB Width 84" Height 9'6"-133" WB Wheel Base 125", 133", 157"

Interior/Equipment
2 wheelchairs + 15 seated-125"WB
No. Passenger Seats: 4 whl. + 11 seated-133"WB
Seating Option: various wheelchair options

Aisle Width 13"
Max. Headroom 78"
Door Width 27½"

Floor Height 1st Step Height 14"
Step Dimensions 8" riser

Grab Rails: inclined bar at entrance vertical seat handholds option stanchions along aisle

Interior Lighting: 6 ceiling lights
Windows: at every seat

Wheelchair Lift/Ramp: single or double width Restraint System: wheel lock - seat belt platform

Climate Control: heater-AC optional Scot-40,000 BTU

Cost: $22,000-125" wheel base add approx. $3,200 for air conditioning
Cost: $24,000-133" wheel base add approx. $2,400 for lift
Cost: $26,000-157" wheel base
Delivery Time: 6 months

Comments:
Michigan study (1) gave bus good ratings with exception of 1st step height and lift door dimensions. 94 inch wide Pioneer model with 4 cyl. Detroit diesel is available for $33,000. Texas operator: Amarillo

*125" wheel base-std. automatic
133" & 157" wheel base-heavy duty 3 spd. automatic
Classification: Small Bus - Truck Chassis

Manufacturer: Thomas Built Buses
Phone: Factory 919-886-4871
P.O. Box 2450
High Point, North Carolina 27261

Contact: Jack Connel-Sales Manager
Title: Longhorn Bus Sales
P.O. Box 20362
Houston, Texas 77205
Phone: 713-741-1423

General Description

Model: Lift buses
Body: Thomas
Chassis: Chevrolet/GMC

Engine: 350 Chevrolet
Transmission: Chevy MX-1 auto
Brakes: J-55 brakes-heavy duty
Length: 21'-133"WB
Width: 84"
Height: 91"
Wheel Base: 125", 133", 157"

Interior/Equipment

No. Passenger Seats 125"-WB-18-20
Seating Option: several options
Aisle Width: N.A.
Max. Headroom: 73"
Door Width: 30"
Floor Height: 31" max
1st Step Height: 11"
Step Dimensions: 10" riser
Grab Rails: at entrance-along aisle
Seat Handholds: no-grab rails can be adjusted
Interior Lighting: 6 dome lights
Windows: at every seat
Wheelchair Lift/Ramp: REB lift
Restraint System: optional
Climate Control: heater-AC option Therm-air

Base: $16,000
Cost with air: $20,200

Delivery Time: 90-210 days depending on chassis available

Comments

Customers include several several hospitals and school districts in Texas
Classification  Small Bus - Truck Chassis

Manufacturer  Transcoach Division  Phone  

Sportscoach Corp.  Contact  

9601 Cenoga Ave.  Title  

Chatsworth, Calif.  91311

General Description

Model  Transcoach  Body  Transcoach  Chassis  Ford  

Engine  Ford V-8 390 cu. in.  Transmission  optional  Brakes  power-option  

Length  22'4"  Width  7'7"  Height  9'3"  Wheel Base  135"  

Interior/Equipment

14 passengers or 4 wheel-chairs and 6 passengers  Seating Option  optional-vinyl covered & sponge rubber  

Aisle Width  29"  Max. Headroom  79"  Door Width  40"  

Floor Height  1st Step Height  9½"  Step Dimensions  10" riser  

Grab Rails  on lift, at entrance, along aisle  Seat Handholds  None  

Interior Lighting  8 ceiling lights  Windows  at every seat  

Wheelchair Lift/Ramp  option  Restraint System  

Climate Control  heater-AC option  

Cost  N.A.  

Delivery Time  No longer being manufactured  

Comments

Michigan study (1) stated that during brief evaluation; many problems were encountered. TTI data confirms problems with maintainence and serviceability. Emergency exits are windows, making it difficult to evacuate handicapped.
Classification | Small Bus-Truck Chassis
Manufacturer | Urban Transportation Dev. Corp.
Manufacturer Phone | N.A.
Manufacturer Address | 20 Eglinton Ave. West
Manufacturer City, Province | Toronto, Ontario Canada

General Description
Model | Toronto Go-Bus
Body | Toronto Go-Bus
Chassis | Dodge 500
Engine | Chrysler - 440
Transmission | auto
Brakes | dual master cylinder
Length | 24'2"
Width | 8'
Height | 9'4"
Wheel Base | 167"

Interior/Equipment
No. Passenger Seats | 17
Seating Option | contoured-60"
Aisle Width | 24"
Max. Headroom | 6'3"
Door Width | 27"
Floor Height | 
1st Step Height | 16"
Step Dimensions | 9" risers, 11" treads
Grab Rails | horizontal-door-vertical aisle
Seat Handholds | none
Interior Lighting | lighting at every seat
Windows | not at every seat-removable
Wheelchair Lift/Ramp | option
Restraint System | none
Climate Control | heater - AC option

Cost | $21,000
Delivery Time | No longer being manufactured.

Comments
Classification: Small Bus - Truck Chassis

Manufacturer: Winnebago Industries
Phone: 515-582-3535

Contact: Gary D. Gernetzke
Title: Commercial Vehicle Sales Coordinator

General Description

Model: D-23MI, D-23
Body: Winnebago
Chassis: Dodge
Engine: Dodge 360, D-23MI, D-23
Transmission: 3 spd. auto
Length: 22'11" - D-23
28'2" - D-28
Width: 7'9"
Height: 10'6" - D-28
137" - D-23
Wheel Base: 178" - D-28

Interior/Equipment

No. Passenger Seats
Seating Option
Aisle Width
Max. Headroom
Door Width
Floor Height
1st Step Height
Step Dimensions
Grab Rails
Seat Handholds
Interior Lighting
Windows
Wheelchair Lift/Ramp
Restraint System
Climate Control

Cost: $14,000-$14,800 D-23
$16,200-$17,700 D-28

Delivery Time

Comments

* Winnebago Interior Shell must be converted to customer specifications for transportation of E & H. Michigan study indicated passengers liked vehicle but operators complained of time consuming servicing because parts not attainable. TTI survey respondents liked the basic design but felt Winnebago used too many non-standard parts.
Classification  Small Bus - Truck Chassis

Manufacturer  Wayne Corp.
   P.O. Box 1447
   Richmond, Indiana 47374
   Phone Sales-512-385-5300
   Contact Conwell Smith, President
   Title Smith Sales Company
   P.O. Box 1551
   Austin, Texas  78767

General Description

Model  Transette, Busette  Body  Wayne  Chassis GMC/Chevy

Engine  350-V8  Transmission  3 spd. auto  Brakes front disc/rear drum

Length  210"  Width  91.68"  Height  107"  Wheel Base  125"

Interior/Equipment

No. Passenger Seats  11-19 combined pass. &  Seating Option  numerous options
   wheelchairs
Aisle Width  15"  Max. Headroom  63"  Door Width  25.5"

Floor Height  29"  1st Step Height  Busette-14"  Step Dimensions  7½" riser

Grab Rails  optional-one side only

Interior Lighting  1 ceiling light

Wheelchair Lift/Ramp  Collins electro-hydraulic restraint System  manual wall lock

Climate Control  heater-AC option  dual unit

Cost  Transette Vista-$17,000
       Busette-$11,000
       Transette Custom-$15,300

Delivery Time  90-120 days

Comments

III. VANS

Vans constitute the most widely used vehicle type in transporting the elderly and handicapped. Seventy (70) percent of organizations surveyed by TTI were utilizing vans. Of all van models, Dodge was most frequently selected because of the maxivan's extended chassis.

Conversion of a van to a more bus-like appearance and application is effected by raising the roof (normally 12-24 inches); this permits most passengers to move within the vehicle while standing. Other modifications include installation of wheelchair lifts or ramps and securing devices. Seating capacities vary with specified mix of wheelchair and seat positions.
Classification: Van Conversion

Manufacturer: Braun Corporation
1014 S. Monticello
Winamac, Indiana 46996

Contact: Keven Crawford

Phone: 219-946-3647

Title: Sales

General Description

Model: Braun Conversion
Body: 12" raised roof
Chassis: Ford, Dodge, Chevy, GMC

Engine
Transmission
Brakes: disc front or heavy-duty hydraulic

Length
Width
Height
Wheel Base

Interior/Equipment

No. Passenger Seats
Seating Option: custom option

Aisle Width
Max. Headroom: 72"
Door Width

Floor Height: NA
1st Step Height: 12½"
Step Dimensions: NA

Grab Rails
Seat Handholds: No

Interior Lighting: 2 dome lights
Windows

Wheelchair Lift/Ramp: Braun-Lift
Restraint System: wheel or over the center tiedown

Climate Control: factory air - rear air

Cost:
$750.00 for 12" raised roof
$850.00 for 24" raised roof

Delivery Time: 6-12 weeks

Comments

Customer may supply van or Braun will provide.
Classification  Van Conversion

Manufacturer  Continental Mobility Systems  Phone  303-988-4433
4345 S. Santa Fe Drive  Contact  Howard Burkett
Englewood, Col  80110  Title  Sales Manager

General Description

Model  Royce mobile  Body  Royce conversion  Chassis  Dodge or Ford
Engine  Dodge-318 CI  Transmission  3 spd.-auto  Brakes  Power Front Discs.
Length  194"-220"  Width  80"  Height  81"  Wheel Base  127"
Maxi van is 18" longer

Interior/Equipment

No. Passenger Seats  9-12  Seating Option  optional
Aisle Width  NA  Max. Headroom  73"  Door Width  50"
Floor Height  29"  1st Step Height  6-9"  Step Dimensions  NA
Grab Rails  NO  Seat Handholds  NO
Interior Lighting  standard  Windows  NO
Wheelchair Lift/Ramp  drawbridge lift-intergate  Restraint System  T Bar lock down-options
with side door  with shoulder belt
Climate Control  factory ARA option

Cost  $9,200 with lift and air
Delivery Time  30 days

Comments

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Classification  Van Conversion and Accessories

Manufacturer  Drive-Master Corp.  Phone  201-785-2204

16 Andrews Drive  Contact  

West Patterson, New Jersey  Title  

General Description

Model  Drive-Master Transportation Body  14" & 24" raised  Chassis  Chevrolet, Dodge, Ford

Engine  Ford Option  Transmission  option  Brakes  option

Length  Standard  Width  standard  Height  standard  +  Wheel Base  standard  

12-22"

Interior/Equipment

No. Passenger Seats  option  Seating Option  option

Aisle Width  NA  Max. Headroom  NA  Door Width  NA

Floor Height  NA  1st Step Height  NA  Step Dimensions  NA

Grab Rails  NA  Seat Handholds  NA

Interior Lighting  standard  Windows  factory/ARA option

Wheelchair Lift/Ramp Ricon or Target swing  Restraint System under center wheelchair lock
way-electric  shoulder harness/seat belt

Climate Control  factory/ARA option

Cost  $15,000

Delivery Time  120-180 days

Comments

Drive-master provides numerous accessories for the handicapped driver.

Majority of Drive-Master's production is oriented toward individual user.
Classification Van Conversion

Manufacturer Medical Coaches Phone 607-432-1333
Box 129 Contact Al Collins
Ononta, New York 13820 Title Vice-President

General Description

Model Medical Coach Van Body Medical Coaches Chassis Ford/Dodge

Engine Option Transmission option Brakes Front disc
Length Low Boy - 9'6" Low boy 5'0" Brakes Front disc
Of Roof High Boy - 10'0" Width High boy 4'6" Height Wheel Base Ford 138"

Interior/Equipment

No. Passenger Seats 8-12 Seating Option customer option
Aisle Width NA Max. Headroom 60"-76" Door Width NA
Floor Height NA 1st Step Height NA Step Dimensions NA
Grab Rails option Seat Handholds option
Interior Lighting 2 ceiling lights Windows
Wheelchair Lift/Ramp Collins Restraint System 2 floor mounted tiedowns
Climate Control factory

Cost for conversion only - $5,365.00 - Low Boy
$5,445.00 - High Boy
Delivery Time 90-120 days

Comments
Low Boy model conversion gives a floor to ceiling height of 60" High Boy model
conversion gives a floor to ceiling height of 76" Conversion cost includes installati
of extended fiberglass roof, reinforced flooring, insulated side walls, Collins
lift, 2 wheelchair tiedowns, and rear mounted seat. Other options available
Classification: Van Conversion

Manufacturer: Recreation Industries, Inc.  Phone: 216-743-3043
716 Union National Bank Bldg.  Contact: Mr. Schlummz
Youngstown, Ohio 44503  Title: 

General Description

Model: Transporter  Body: RI-Conversion  Chassis: Dodge 1-ton Chassis

Engine option  Transmission option  Brakes option

Length 214"  Width 78"  Height 8'4"  Wheel Base 127"

Interior / Equipment

No. Passenger Seats 12  Seating Option: optional

Aisle Width 12"  Max. Headroom 6'2"  Door Width 

Floor Height N.A  1st Step Height 13"  Step Dimensions NA

Grab Rails: Vertical poles at entrance  Seat Handholds: no

Interior Lighting: 4 ceiling lights  Windows: at every seat

Wheelchair Lift / Ramp: Collins W25A  Restraint System: American seating Floor mount T Bar

Climate Control: Heater  AC option / standard front
ARA-rear

Cost: Van Cost + $7500 - $8500 conversion cost

Delivery Time: 60 days

Comments:

Recreational Industries has developed 26 foot F & H transporter with lift from
6 MC Transmode Chassis.

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Classification  Van Conversion

Manufacturer  Skillcraft Industries  Phone  813-488-1501
1270 Ogden Rd.  Contact  T. L. Huston
Venice, Fla  33595  Title  President

General Description

Model  Skillcraft  Body  Skillcraft Conversion  Chassis  B-300 Dodge-Maxi Van
Engine 318  Transmission  auto  Brakes  front-disc/rear drum
Length std.  Width std.  Height std.  Wheel Base std.

Interior/Equipment

No. Passenger Seats  14 passenger-3 spd  Seating Option  Perimeter seating-foldup seat
Aisle Width  20"  Max. Headroom  70"  Door Width  NA
Floor Height  NA  1st Step Height  11"  Step Dimensions  Riser- 7½"
Grab Rails  handrail at door  Seat Handholds  option
Interior Lighting  standard  Windows
Wheelchair Lift/Ramp  side or rear mounted  Restraint System  J Bolt at wheel with seat
Climate Control  elect-hydraulic  factory-evap at rear

Cost  $14,500

Delivery Time  90 days

Comments

Electric-hydraulic lift manufactured by skillcraft and marketed by Collins and Associates.
**Classification**  Van Conversion

**Manufacturer**  Speedy Wagon  
1700A Scherer Parkway  
St. Charles, MO 63301  
Phone 314-724-0400  
Contact Joan Meng  
Title Sales Coordinator

---

**General Description**

<table>
<thead>
<tr>
<th>Model</th>
<th>Body</th>
<th>Chassis</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-200/S-201</td>
<td>12&quot;/24&quot; extended roof</td>
<td>24&quot;-Dodge only, Dodge, Chevrolet, Ford</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Engine</th>
<th>Transmission</th>
<th>Brakes</th>
</tr>
</thead>
<tbody>
<tr>
<td>std.</td>
<td>standard</td>
<td>standard</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length</th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>standard</td>
<td>to top Wheel Base</td>
</tr>
</tbody>
</table>

---

**Interior/Equipment**

<table>
<thead>
<tr>
<th>No. Passenger Seats</th>
<th>Optional Seating Option</th>
<th>Aisle Width</th>
<th>Max. Headroom</th>
<th>Door Width</th>
<th>Floor Height</th>
<th>1st Step Height</th>
<th>Step Dimensions</th>
<th>Grab Rails</th>
<th>Seat Handholds</th>
<th>Interior Lighting</th>
<th>Windows</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-200-63</td>
<td>S-201-74</td>
<td>NA</td>
<td>S-200-63</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>option</td>
<td>no</td>
<td>standard</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wheelchair Lift/Ramp</th>
<th>Restraint System</th>
<th>Climate Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>side fold or swing out</td>
<td>floor mounted tiedowns</td>
<td>Factory AC-heater</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost</th>
<th>Delivery Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base price $7500-12&quot; top-$10,700</td>
<td>approximately 90 days</td>
</tr>
</tbody>
</table>

**Comments**

Manufacturing is oriented toward handicapped owner/operator. Lift system is electric with manual hand crank backup system. Other options may be specified. Manufacturer also provides numerous accessories for wheelchair driver.
### General Description

**Model** Superior Van  
**Body** Superior Conversion  
**Chassis** Chevy, Ford, Dodge, GMC option  
**Engine** optional  
**Transmission** std-Heavy duty  
**Brakes** std-heavy-duty option  
**Length** 201"  
**Width** 77.5"  
**Height** 88.5"  
**Wheel Base** 125"

### Interior / Equipment

- **No. Passenger Seats**: 12  
- **Seating Option**: numerous options  
- **Aisle Width**: 8"  
- **Max. Headroom**: 63.5"  
- **Door Width**: 39"  
- **Floor Height**:  
- **1st Step Height**: 14½"  
- **Step Dimensions**: NA  
- **Grab Rails** at entrance  
- **Seat Handholds**: none  
- **Interior Lighting**: 3 ceiling lights  
- **Windows**: none  
- **Wheelchair Lift/Ramp**: Collins  
- **Restraint System**: Collins option  
- **Climate Control**: Heater-AC option

### Cost

$10,400

### Delivery Time

120 days

### Comments

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IV. LIFTS AND RESTRAINT SYSTEMS

Wheelchair lifts and restraint systems are the most commonly used aids in transporting the handicapped client. Transit bus lifts are generally integrated into the body of the steps, whereas lifts for vans and small buses are separate components fitting into the side of the vehicle.
Equipment Category: Wheelchair Restraint System—Small Buses—Transit

Manufacturer: American Seating Company
Transportation Seating Division
Grand Rapids, MI 49504
Phone: 616-456-0600
Contact: Guy Soda—Home office 616-456-0408
Title: Sales Rep. for Texas
Al Trager—Atlanta, GA 404-523-1916

Model #: 6426-Bench
Cost: $490.00 - $544.00
6464-2 separate cushions
12 weeks shipment

Description
In the down position, the seat may be used by any passenger. In up position, the lock is set to restrain a standard wheelchair. The 36" conventional two passenger seat may be installed at front or rear of bus. Restraint system activates upon contact with wheel and depression of release lever releases chair. System also features energy-absorbing grab rail across top of seat. Seats can be mounted on floor.

Safety Features

Options
- Fiberglass or upholstered seats
- Optional Type II seat belt (and/or shoulder harness) for wheelchair occupant
Some operators have expressed dissatisfaction with quality of shoulder harness.

Comments
Equipment Category: Wheelchair Lift - Vans and Small Buses

Manufacturer: Braum Corporation

Phone: 219-946-3647

1014 South Monticello
Wonamac, Indiana 46996

Contact: Keven Crawford
Title: Sales Dept.

Model #: fully automatic side mount

Cost: $2497.00

Description

Designed for vans, motorhomes and larger vehicles. Electro-hydraulic system with maximum lift capacity of 750 lbs. Self-contained unit requiring no modification. May be operated remotely or by occupant. Platform dimension is 30" x 46". Lift stores in approximately 2 ft. of floor space.

Safety Features

Guard prevents wheelchairs from slipping off platform. Fastening devices installed optionally.

Options

Semi-automatic and automatic for rear mount or side mount.

Comments

Braum manufacturers numerous products for handicapped operators of vehicles.
Equipment Category  Wheelchair lift-vans and small buses

Manufacturer  Collins Industries  Phone  316-663-4441

Box 58  Contact

Hutchinson, Kansas 67501  Title  Texas Representative

Larry Hemphill  817-383-3518

Model #  SAF-T-lift  Cost  $1600-2200.00 + installation

Description  (Standard Model)

Hydraulic power up + down; lift cycle-12 seconds up-10 seconds down; cylinder; 1½-in. diameter/Piston Rod: 3/4-in.diameter; Power Unit-Electro-hydraulic, self-contained, 12 volt motor, pump, valve, and reservoir; Platform-2½" x 30" x 44"; (average)

Lift Height-33" min; 39" max

Capacity - 700 lbs; mounted weight - 360 lbs.

Safety Features

Equipped with swing up safety stop plate

Door activated power cutoff switch prevents accidental movement of lift from transport position when doors are closed. Manual operation in case of electrical failure.

Options

Collins offers nine (9) models of lifts. Various features add additional safety devices at many points of operation as well as auxillary power sources.

Comments

Platform folds on the inside of van flush with side doors-14" deep. Collins also manufactures foldup ramps, and other equipment used in transporting the handicapped. Collins is considered to be one of the principal suppliers to school bus manufacturers.
Equipment Category Wheelchair lift and Accessories-Vans

Manufacturer Handicapps, Inc. Phone 303-781-2062

4335 So. Santa Fe Drive Contact Mr. Haynes
Englewood, Col. 80110 Title Texas Distributer:

Model #: Superlift II Cost $1,243 plus shipping

5118 Westheimer Houston, Texas 77056

713-621-6400

Description

Electrically powered by ½ or 3/4 HP motor powered from van battery. May be installed on any side door.

Platform 29" x 42" - sets high to door

400 lb. test capacity.

Cycle time - approx. 20 seconds.

Safety Features

Safety stop optional

Options

Comments

Handicapps, Inc. Also manufactures numerous vehicle control accessories for handicapped drivers.
Equipment Category: Wheelchair lift-Vans

Manufacturer: Mac's Lift Gate, Inc.

Phone: 213-634-5962

2727 South Street

Contact Jerry MacDonald

Long Beach, Calif. 90805

Title: Sales Manager

Model # 1 WBU57 1 WSU32

Cost Side Lift-$785.00 including shipping charge

Back Lift-$850

Model Capacity Weight Max Height Lowering Power Platform Closing Mount

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Weight</th>
<th>Max Height</th>
<th>Lowering Power</th>
<th>Platform Size</th>
<th>Mount</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSB2</td>
<td>800 lbs.</td>
<td>175 lbs.</td>
<td>29&quot;</td>
<td>Gravity</td>
<td>30&quot;x47&quot;</td>
<td>Power side</td>
</tr>
<tr>
<td>LRBV57</td>
<td>800 lbs.</td>
<td>250 lbs.</td>
<td>33&quot;</td>
<td>Gravity</td>
<td>55&quot;x31&quot;</td>
<td>Power rear</td>
</tr>
</tbody>
</table>

Both Units have remote control

Safety Features

- Foot safety plate to turn off power
- Wheelchair stop on end of platform
- Emergency gate release

Options

- Extension for LBV57 of 30" x 18" to produce 55" x 31" platform area.

Comments

- Fits Chevrolet, Ford, and Dodge vans
Equipment Category  Wheelchair lift-Van

Manufacturer  Maxon Industries

1960 East Slauson Ave.
Huntington Park, CA  90255

Phone  213-725-0200
Contact Wendell Smith
Title  Product Manager

Model #  WL-5A  Cost  Unavailable

Description

Swing type platform lift designed for use with vans. It is powered by electric-hydraulic system that works off 12-volt battery. Requires little or no modification to vehicle. Capacity is 500 lbs. Height Range is 0-31 inches. Hand held control cycle time is 25 seconds.

Safety Features

A horizontal grab rail is installed on platform.

The wheelchair is rolled on a sturdy platform and secured with the chair's handbrake.

Options

AC-DC current option

 Comments

Lift takes up space of one bench seat.

May be mounted on rear or side. Company specializes in cargo lifts as opposed to wheelchair lifts.
Equipment Category  Wheelchair lift-Van & Small Buses

Manufacturer  Para Industries Ltd.  Phone  403-276-3133

11 Street NE  Contact  Doug Arnesson

Calgary, Alberta, Canada  Title  Sales - Dallas

214-526-8391

Model # Mark II  Cost $1898.00 - Base plus freight and installation

Description

Operates on roller chains over dual hydraulic cylinders

Handrails move with lift. 12-volt power pack

Height - 46½"

Width - 36"

Length - 41"  Max Capacity - 1,000 lbs.

Depth of Unit - 12"  Total Weight - 315 lbs.

Safety Features

Handrails are standard item

Emergency switch activities override in a event of failure to complete cycle.

Sensitivity edge ensures safety stop.

Safety gate/roll stop prevents wheelchair from rolling off platform.

Options

May be purchased with automatic door opener, extended platforms, manual hydraulic pump back up system.

Comments
Equipment Category: Wheelchair Lift - Vans and Small Buses

Manufacturer: REB Manufacturing Inc.  
Address: P.O. Box 276, Carey, Ohio 43316  
Phone: 419-396-6969  
Contact: Raymond Smalley  
Title: President  
Model #: 10500  
Cost: $1265.00

Description
Electro-hydraulic lift with dual cylinders. Cycle time = 43 sec; Unfolded = 6 sec. Lower-17 sec., Raise-20 secs. Installation can be made without modification to vehicle. Interior storage depth of lift is less than 8½" (excluding power pack). Platform 30" x 44" with 5" ramp. Lift height 26" maximum. Maximum capacity is 1000 lbs. Mounted weight is 190 lbs.

Safety Features
- Has anti-rollbar on platform  
- Flip stop on platform  
- Handrail optional.  

Options
- Grab rail, semi-automatic operation, manual operation, cutoff switch, and special paint per specification. 9 models reflecting different platform dimensions and operating criteria. 3 auxiliary systems.

Comments
1-2 weeks shipment. REB is used by many bus manufacturers.
Equipment Category: Wheelchair Lift and Accessories-Vans

Manufacturer: Total Mobility Systems & Design Inc. Phone: 503-686-9706

4060 Stewart Rd. Contact: Chris Casady
Eugene, Oregon 97402 Title: President

Model #: Safety Van Lift* Cost: $1495.00-$2195.00 F.O.B.-Eugene, Oregon

Description

Electro-hydraulic system designed for 750-pound capacity. With a platform size of one square yard and rotating platform, operation lift extends 38" from side of van. The lift platform, when folded, extends into the van 12" (6" are stepwell) One day installation requires no modification.

Safety Features

Structural support of platform provides built-in grab rail and ramp serves as safety stop during cycle.

Options

* Automatic or semi-automatic models. Semi-automatic can be converted to automatic. Other accessories for the handicapped driver are also manufactured.

Comments

Wheelchair lift designed for van use.
Equipment Category  Wheelchair lift-Transit Vehicle

Manufacturer  Transportation Design & Technology  Phone  714-566-8940
9345 Cabot Drive  Contact  L. W. Smith
San Diego, Calif. 92126  Title  President

Model #  TDT steplift  Cost  average price $5,000.00

Description
Integral part of standard door opening, steel frame. Operation is electro-hydraulic
with 1000 lb. capacity or a power-steering pump with 3,000 lb. capacity. Cycle
time is 30-45 seconds. Platform dimensions are 35" x 36" with 16" 8-degree ramp.
In the stowed mode, the lift shall assume the normal entrance step configuration.

Safety Features
Hand pump enables driver or attendant to operate lift mechanically. Lift platform
has sensitivity edge, when it touches any obstruction (person, ground, etc); it
amatically stops. Platform has safety roll, stop feature. Platform and lift
are covered with non-skid material. Bus cannot operate until lift is in stowed
position.

Options
Platform dimensions may be at customer's specification.

Comments
Lift has undergone testing by AM General at the request of the Southern California
Rapid Transit District.

* Designed for small or large transit bus.
Equipment Category: Wheelchair Lift-Transit Vehicle

Manufacturer: Vapor Corporation

6420 West Howard Street
Chicago, ILL 60648

Phone: 312-631-9200
Contact: C. Krisco
Title: Sales Engineer

Model #: Travel Lift
Cost: $7,990

Description:
Designed for application to front door of standard transit bus. Integrated with steps. Lifting capacity is 600 lbs. Cycle time is 30.45 seconds. Platform dimensions are 48" length + 8" ramp (56" total length) and 34" width.

Safety Features:
- Sensitivity edge action of lift at ground or curb level.
- Ramp becomes end gate during cycle of lift.
- Bus cannot operate until lift is in stowed position.

Options:
Application other than described above is possible.

Comments:
Vapor is undergoing extensive testing with CALTRANS. in Calif. Delivery 60-120 days.
V. VEHICLE SURVEY

In order to obtain operating data on vehicles actually in service for elderly and handicapped transportation, a survey of 120 agencies was conducted. The survey represented response from 34 transit agencies and 24 social service agencies. These agencies produced a total of 67 usable responses, as some agencies had more than one type of vehicle. A total of 1418 vehicles were represented in the survey.

Of the 120 agencies, 58 completed the survey, 15 did not have service, and 9 questionnaires were returned as undeliverable. The survey responses were tabulated in 4 classifications as follows: 1) Vans with lifts; 2) Vans without lifts; 3) Small buses; and 4) Large transit coaches. The following summarizes the results of the survey.

**Vans With Lifts**

Fourteen transit agencies and 8 social service agencies operated a total of 74 vans with lifts. Table 1 is a summary of the equipment operated.

The results of the survey are summarized in Table 2. Perhaps the most striking result is the low level of dissatisfaction. The most noticeable problem is with steps. Air conditioning is another area that warrants special attention.

**Vans Without Lift**

Two transit agencies and 13 social service agencies operated a total of 67 vans without lifts. Table 3 is a summary of the equipment operated.
The results of the survey are summarized in Table 4. The results, as would be expected, are similar to vans with lifts. Steps are the most significant problem. Overall, the ratings would still have to be characterized as good.

**TABLE 1: SUMMARY OF VANS WITH LIFTS**

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Year</th>
<th>Cost Range*</th>
<th># of Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dodge</td>
<td>74-78</td>
<td>5-16,000</td>
<td>47</td>
</tr>
<tr>
<td>Chevrolet</td>
<td>72-78</td>
<td>5-16,000</td>
<td>12</td>
</tr>
<tr>
<td>Plymouth</td>
<td>77</td>
<td>7,200-9,250</td>
<td>3</td>
</tr>
<tr>
<td>Ford</td>
<td>73-78</td>
<td>5-9,000</td>
<td>9</td>
</tr>
<tr>
<td>GMC</td>
<td>77</td>
<td>15,000</td>
<td>2</td>
</tr>
<tr>
<td>Unknown</td>
<td>74</td>
<td>8-9,000</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>74</strong></td>
</tr>
</tbody>
</table>

*Two organizations leased vehicles*
### TABLE 2: RESPONSES TO SURVEY OF VANS WITH LIFTS

<table>
<thead>
<tr>
<th>Feature/Performance</th>
<th>Very Satisfactory</th>
<th>Satisfactory</th>
<th>Not Satisfactory</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seating Comfort</td>
<td>42%</td>
<td>45%</td>
<td>13%</td>
<td></td>
</tr>
<tr>
<td>Tiedown Method</td>
<td>23%</td>
<td>61%</td>
<td>6%</td>
<td>10%</td>
</tr>
<tr>
<td>Width of Aisles</td>
<td>20%</td>
<td>42%</td>
<td>6%</td>
<td>32%</td>
</tr>
<tr>
<td>Head Room</td>
<td>35%</td>
<td>52%</td>
<td>13%</td>
<td></td>
</tr>
<tr>
<td>Storage Space</td>
<td>13%</td>
<td>42%</td>
<td>19%</td>
<td>26%</td>
</tr>
<tr>
<td>Air Conditioning</td>
<td>13%</td>
<td>52%</td>
<td>23%</td>
<td>12%</td>
</tr>
<tr>
<td>Heating</td>
<td>29%</td>
<td>65%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Ramp/Lift System</td>
<td>26%</td>
<td>58%</td>
<td>13%</td>
<td>3%</td>
</tr>
<tr>
<td>Doors</td>
<td>16%</td>
<td>65%</td>
<td>19%</td>
<td></td>
</tr>
<tr>
<td>Steps</td>
<td>10%</td>
<td>42%</td>
<td>38%</td>
<td>10%</td>
</tr>
<tr>
<td>Smoothness of Ride</td>
<td>23%</td>
<td>55%</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>Doorway Assist Rails</td>
<td>10%</td>
<td>48%</td>
<td>13%</td>
<td>29%</td>
</tr>
<tr>
<td>Noise Levels</td>
<td>16%</td>
<td>74%</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Driver/Service Oriented Features</th>
<th>Very Satisfactory</th>
<th>Satisfactory</th>
<th>Not Satisfactory</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting &amp; Stopping</td>
<td>35%</td>
<td>58%</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td>Maneuverability</td>
<td>35%</td>
<td>65%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Driver Visibility</td>
<td>26%</td>
<td>68%</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>Serviceability</td>
<td>6%</td>
<td>75%</td>
<td>19%</td>
<td></td>
</tr>
</tbody>
</table>
TABLE 3: SUMMARY OF VANS WITHOUT LIFTS

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Year</th>
<th>Cost Range</th>
<th># of Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dodge</td>
<td>74-77</td>
<td>5,400-8,800</td>
<td>29</td>
</tr>
<tr>
<td>Chevrolet</td>
<td>71-75</td>
<td>4,500-6,600</td>
<td>13</td>
</tr>
<tr>
<td>Ford</td>
<td>74</td>
<td>6,800</td>
<td>4</td>
</tr>
<tr>
<td>GMC</td>
<td>73-77</td>
<td>5,000-7,000</td>
<td>3</td>
</tr>
<tr>
<td>Plymouth</td>
<td>75-77</td>
<td>4,000-6,300</td>
<td>12</td>
</tr>
<tr>
<td>Unknown</td>
<td>69-73</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>67</td>
</tr>
<tr>
<td>Feature/Performance</td>
<td>Very Satisfactory</td>
<td>Satisfactory</td>
<td>Not Satisfactory</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------------</td>
<td>--------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Seating Comfort</td>
<td>5%</td>
<td>95%</td>
<td></td>
</tr>
<tr>
<td>Tiedown Method</td>
<td>24%</td>
<td>5%</td>
<td>71%</td>
</tr>
<tr>
<td>Width of Aisles</td>
<td>9%</td>
<td>62%</td>
<td>10%</td>
</tr>
<tr>
<td>Head Room</td>
<td>14%</td>
<td>71%</td>
<td>10%</td>
</tr>
<tr>
<td>Storage Space</td>
<td>5%</td>
<td>43%</td>
<td>4%</td>
</tr>
<tr>
<td>Air Conditioning</td>
<td>67%</td>
<td>14%</td>
<td>19%</td>
</tr>
<tr>
<td>Heating</td>
<td>5%</td>
<td>90%</td>
<td>5%</td>
</tr>
<tr>
<td>Ramp/Lift System</td>
<td>9%</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Doors</td>
<td>5%</td>
<td>71%</td>
<td>24%</td>
</tr>
<tr>
<td>Steps</td>
<td>43%</td>
<td>48%</td>
<td>9%</td>
</tr>
<tr>
<td>Smoothness of Ride</td>
<td>5%</td>
<td>76%</td>
<td>19%</td>
</tr>
<tr>
<td>Doorway Assist Rails</td>
<td>38%</td>
<td>14%</td>
<td>48%</td>
</tr>
<tr>
<td>Noise Levels</td>
<td>76%</td>
<td>14%</td>
<td>10%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Driver/Service Oriented Features</th>
<th>Very Satisfactory</th>
<th>Satisfactory</th>
<th>Not Satisfactory</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting &amp; Stopping</td>
<td>24%</td>
<td>76%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maneuverability</td>
<td>19%</td>
<td>76%</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Driver Visibility</td>
<td>14%</td>
<td>76%</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Serviceability</td>
<td>95%</td>
<td>5%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Small Buses

The third category of buses includes vehicles in the 20 to 30 foot size range. Seventeen transit agencies and 4 social service agencies operated a total of 258 small buses. Table 5 is a summary of the equipment operated.

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Year</th>
<th>Cost Range</th>
<th># of Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMC</td>
<td>74-76</td>
<td>48-62,000</td>
<td>15</td>
</tr>
<tr>
<td>Ford</td>
<td>75</td>
<td>18-19,000</td>
<td>26</td>
</tr>
<tr>
<td>Argosy</td>
<td>77</td>
<td>20-27,000</td>
<td>30</td>
</tr>
<tr>
<td>Mercedes Benz</td>
<td>75-77</td>
<td>25-30,000</td>
<td>9</td>
</tr>
<tr>
<td>Transcoach</td>
<td>75</td>
<td>20-30,000</td>
<td>79</td>
</tr>
<tr>
<td>Winnebago</td>
<td>76</td>
<td>24,000</td>
<td>3</td>
</tr>
<tr>
<td>Wayne</td>
<td>77</td>
<td>10-11,000</td>
<td>5</td>
</tr>
<tr>
<td>Grumman</td>
<td>74-77</td>
<td>18-27,000</td>
<td>31</td>
</tr>
<tr>
<td>Carpenter</td>
<td>77-78</td>
<td>22-30,000</td>
<td>50</td>
</tr>
<tr>
<td>Twin Coach</td>
<td>75</td>
<td>45,000</td>
<td>2</td>
</tr>
<tr>
<td>Unknown</td>
<td>74-75</td>
<td>28-40,000</td>
<td>4</td>
</tr>
<tr>
<td>Chrysler</td>
<td>75</td>
<td>35,000</td>
<td>4</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>258</strong></td>
</tr>
</tbody>
</table>

The results of the survey are summarized in Table 6. The most significant finding is the high level of dissatisfaction (44%) with the serviceability of the vehicle. A related area, air conditioning, also appears to be a problem.
TABLE 6: RESPONSES TO SURVEY OF SMALL BUSES

<table>
<thead>
<tr>
<th>Feature/Performance</th>
<th>Very Satisfactory</th>
<th>Satisfactory</th>
<th>Not Satisfactory</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seating Comfort</td>
<td>28%</td>
<td>56%</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>Tiedown Method</td>
<td>20%</td>
<td>40%</td>
<td>12%</td>
<td>28%</td>
</tr>
<tr>
<td>Width of Aisles</td>
<td>48%</td>
<td>44%</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Head Room</td>
<td>52%</td>
<td>44%</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Storage Space</td>
<td>8%</td>
<td>44%</td>
<td>12%</td>
<td>36%</td>
</tr>
<tr>
<td>Air Conditioning</td>
<td>12%</td>
<td>36%</td>
<td>36%</td>
<td>16%</td>
</tr>
<tr>
<td>Heating</td>
<td>20%</td>
<td>52%</td>
<td>20%</td>
<td>8%</td>
</tr>
<tr>
<td>Ramp/Lift System</td>
<td>16%</td>
<td>40%</td>
<td>12%</td>
<td>32%</td>
</tr>
<tr>
<td>Doors</td>
<td>16%</td>
<td>68%</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>Steps</td>
<td>12%</td>
<td>68%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Smoothness of Ride</td>
<td>16%</td>
<td>60%</td>
<td>24%</td>
<td></td>
</tr>
<tr>
<td>Doorway Assist Rails</td>
<td>12%</td>
<td>68%</td>
<td>16%</td>
<td>4%</td>
</tr>
<tr>
<td>Noise Levels</td>
<td>4%</td>
<td>68%</td>
<td>28%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Driver/Service Oriented Features</th>
<th>Very Satisfactory</th>
<th>Satisfactory</th>
<th>Not Satisfactory</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting &amp; Stopping</td>
<td>24%</td>
<td>56%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Maneuverability</td>
<td>44%</td>
<td>52%</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Driver Visibility</td>
<td>32%</td>
<td>56%</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>Serviceability</td>
<td>4%</td>
<td>52%</td>
<td>44%</td>
<td></td>
</tr>
</tbody>
</table>
Large Transit Coaches

Although not originally intended to be included in the survey, 7 agencies including one social service agency included responses on their large transit coaches. The data are included here primarily for comparison purposes. Table 7 is a summary of the 1056 vehicles represented in the survey.

TABLE 7: SUMMARY OF LARGE TRANSIT COACHES

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Year</th>
<th>Cost Range</th>
<th># of Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible</td>
<td>76-77</td>
<td>65-77,000</td>
<td>269</td>
</tr>
<tr>
<td>GMC</td>
<td>63-76</td>
<td>Unknown-65,000</td>
<td>743</td>
</tr>
<tr>
<td>AMC</td>
<td>74-77</td>
<td>31,000-66,500</td>
<td>50</td>
</tr>
<tr>
<td>Unknown</td>
<td>75-76</td>
<td>39,000</td>
<td>4</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>1066</td>
</tr>
</tbody>
</table>

Many of the vehicles were equipped with a kneeling feature or were retro-fitted with lifts. Some agencies appeared to favor a retrofit approach as the most cost-effective method of developing necessary vehicles for the handicapped.

Table 8 summarizes the responses to the survey. The results indicate a generally high overall level of satisfaction. A high level of satisfaction could be expected from those choosing the retrofit approach.
### TABLE 8: RESPONSES TO SURVEY OF LARGE TRANSIT COACHES

<table>
<thead>
<tr>
<th>Feature/Performance</th>
<th>Very Satisfactory</th>
<th>Satisfactory</th>
<th>Not Satisfactory</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seating Comfort</td>
<td>40%</td>
<td>60%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tiedown Method</td>
<td>10%</td>
<td>40%</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Width of Aisles</td>
<td>10%</td>
<td>80%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Head Room</td>
<td>20%</td>
<td>80%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage Space</td>
<td>20%</td>
<td>30%</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Air Conditioning</td>
<td>80%</td>
<td>10%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Heating</td>
<td>10%</td>
<td>80%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Ramp/Lift System</td>
<td>40%</td>
<td>20%</td>
<td>40%</td>
<td></td>
</tr>
<tr>
<td>Doors</td>
<td>80%</td>
<td>10%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Steps</td>
<td>70%</td>
<td>20%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Smoothness of Ride</td>
<td>90%</td>
<td>10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doorway Assist Rails</td>
<td>70%</td>
<td>10%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Noise Levels</td>
<td>70%</td>
<td>30%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Driver/Service Oriented Features</th>
<th>Very Satisfactory</th>
<th>Satisfactory</th>
<th>Not Satisfactory</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting &amp; Stopping</td>
<td>10%</td>
<td>90%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maneuverability</td>
<td>20%</td>
<td>80%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Driver Visibility</td>
<td>50%</td>
<td>40%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Serviceability</td>
<td>30%</td>
<td>50%</td>
<td>20%</td>
<td></td>
</tr>
</tbody>
</table>
VI. CONCLUSIONS

There is significant evidence of existing problems with entrance/exit ways of van type vehicles. The most repeated dissatisfaction was with the steps. Overall, however, the vehicles were rated as satisfactory. It is noteworthy that 44% of users in the Small Bus classification expressed dissatisfaction with serviceability.

The third serious problem highlighted in the survey was in the area of climate control; most notably air conditioning systems were not adequate in midsize vehicles.

Survey design emphasized brevity and simplicity. Due to the constraints of this approach, several gaps in the information resulted. In addition some problems become apparent only after completion of the survey. The following are a summary of the shortcomings.

- No specific information was requested on manufacturers of lift systems, ramps or retractable step devices.
- There was such a wide disparity in estimates of operating cost as to make even "guesstimates" useless.
- No information was sought as to identify specific maintenance problems (e.g., radiators, brakes, transmissions, etc.).


Assessment of Service Requirements and Design Characteristics for Present and Future Paratransit Vehicles, Ronald Adams, New York, NY, April 1977, PB 267-574.


Dear Sir or Madam:

The Texas Transportation Institute is investigating transportation for the elderly and the handicapped.

Attached you will find a brief questionnaire regarding vehicle satisfaction levels. TTI would appreciate your response. Please make additional copies of the survey form if you have more than one type of vehicle for the elderly and the handicapped.

For your convenience we have enclosed a stamped, self-addressed envelope. If you so request, TTI will make available a copy of the survey results.

Thank you for taking the time to share this information.

Sincerely,

Thomas Urbanik, II
Assistant Research Engineer

TU:nc
Enclosure
**VEHICLE SURVEY**

| Organization | Address | Contact Person | Telephone No.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year/Model</th>
<th>Type/Size Engine</th>
<th>Special Equipment (check)</th>
<th>Purchase Date</th>
<th># of Vehicles</th>
<th>Cost</th>
<th>Miles per gallon</th>
<th>Average Mileage per Vehicle</th>
<th>Approximate Total Operating Cost per Mile (Gas, Oil, Maint.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lift</td>
<td></td>
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<td>Ramps</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Retractable Steps</td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td># of Seats</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># of Wheelchairs</td>
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<td></td>
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</tbody>
</table>

Please check appropriate box to indicate level of satisfaction.

<table>
<thead>
<tr>
<th>Feature/Performance</th>
<th>Very Satisfactory</th>
<th>Satisfactory</th>
<th>Unsatisfactory</th>
<th>Not Applicable</th>
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</thead>
<tbody>
<tr>
<td>Seating Comfort</td>
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<tr>
<td>Tiedown Method</td>
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<td>Width of Aisles</td>
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<td>Head Room</td>
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<td>Storage Space</td>
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<td>Air Conditioning</td>
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<td>Heating</td>
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<tr>
<td>Ramp/Lift System</td>
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<td>Doors</td>
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<td>Steps</td>
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<td>Smoothness of Ride</td>
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<td>Assist Rails in Doorway</td>
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<tr>
<td>Noise Levels</td>
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<tr>
<th>Driver/Service Oriented Features</th>
<th>Very Satisfactory</th>
<th>Satisfactory</th>
<th>Unsatisfactory</th>
<th>Not Applicable</th>
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<tbody>
<tr>
<td>Starting and Stopping</td>
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<td>Maneuverability</td>
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<td>Visibility (Windows/Mirrors)</td>
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<td>Serviceability</td>
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Additional Comments:

__________________________________________________________________________________________

Would you like a copy of survey?   [ ] Yes   [ ] No
Dear Sir:

Last month, Texas Transportation Institute initiated a survey requesting information regarding vehicles used in transporting the elderly and the handicapped. The survey was mailed to transportation agencies believed to be offering specialized elderly and handicapped service. Your organization should have received a copy, but in the event you did not, another is enclosed.

If your organization does not provide specialized service, just make a note to that effect and return the survey. If your organization is operating converted vans, please specify company doing the conversion.

Thus far, the response level to the survey is 50 percent. Our goal, of course, is 100 percent. Your effort in helping us achieve that goal will be greatly appreciated.

Sincerely,

Thomas Urbanik, II
Assistant Research Engineer