Selected Transportation Topics

Mini-bus Profile

U.S. DEPARTMENT
OF TRANSPORTATION

OFFICE
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TRANSPORTATION SYSTEMS
CENTER
TECHNOLOGY SHARING
PROGRAM OFFICE

TECHNOLOGY SHARING A PROGRAM OF THE UNITED STATES DEPARTMENT OF TRANSPORTATION

Introduction

The U.S. Department of Transportation's Technology Sharing Program Office is the designated focal point within the Department for the exchange of information, ideas, experience, and technology with the national transportation community. In this capacity the Office of Technology Sharing has initiated a series of publications on selected transportation topics. These publications are designed to provide transportation practitioners with up-to-date topical information which will allow them to consider the full range of alternatives and options available to them.

This document profiles small transit vehicles which were available in 1974-1975 for application to demand responsive or low-volume, conventional (fixed route, fixed schedule) transportation systems. The particular models of small transit vehicles included in this document are commonly referred to as "mini-buses." These mini-buses are multi-characteristic vehicles having a passenger carrying capacity varying from 7 to 30 people in normal seating arrangements. Regular station wagons and small school buses are excluded.

The information and vehicle characteristic data are not intended to suggest or recommend a particular vehicle or group of vehicles as being the best suited for these services, but rather to provide an overview of vehicle alternatives. The choice of vehicle for any system should depend upon such factors as the expected number and types of patrons, the availability and cost of the vehicle, type of service offered, characteristics of the terrain, ease of maintenance, and whether modifications are available to allow the vehicle to be used comfortably by the elderly and handicapped.

The information contained in this document was derived from a variety of sources, the two most prominent being:

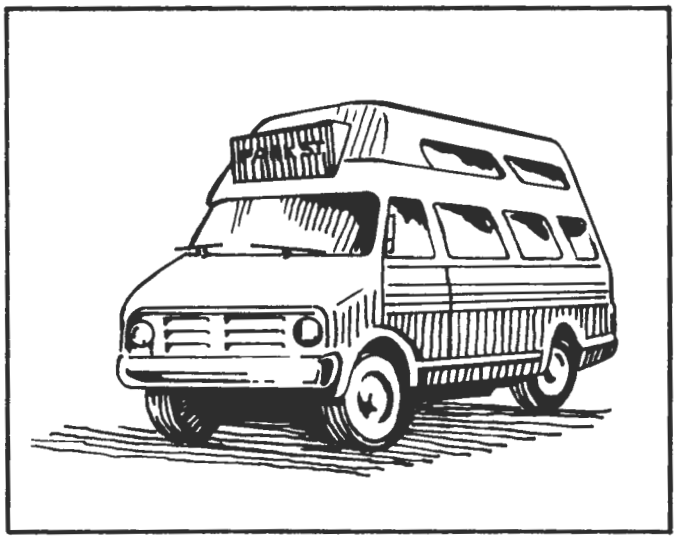
- Small Transit Vehicle Survey, prepared jointly by ECI Systems Inc. and U.S. DOT Transportation Systems Center, both of Cambridge, MA. June 1975.
- A Directory of Vehicles and Related System Components for the Elderly and Handicapped, The Franklin Institute, Philadelphia, PA. Prepared for the Urban Mass Transportation Administration.

In December of 1975 vehicle manufacturers were asked to validate and provide updated specifications. However, since vehicle specifications are continually being altered, readers are encouraged to contact individual vehicle manufacturers for the most complete and up-to-date information.

A directory of vehicle manufacturers is included as supplementary material. Manufacturers who modify existing vehicles to meet the specific needs of the elderly and handicapped are also listed in this directory, although individual manufacturer specifications are not provided.

The inclusion of a vehicle or manufacturer in this document does not in any way constitute endorsement of that vehicle by the U.S. Department of Transportation, nor does the omission of a vehicle from this document imply rejection by that agency.

Mini-bus Profile



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APECO MIDDLE RANGE BUS

The Apeco MRB (Middle Range Bus) was placed on the small bus market in 1975.

The bus is 262 inches long, 93 inches wide, and has a 145-inch wheel base. The vehicle is mounted on the Dodge RM 350 chassis and is powered by a 360 cubic-inch V8 engine.

The original motor home design had included a separate cab. Because of that design, the wall between the cab and the remainder of the vehicle cannot be totally removed. Thus, if this vehicle is used in a transit application there could be problems with the location of the fare box, and the driver could have difficulty interacting with the passengers.

The major modification of this motor home is a redesigned interior and the inclusion of windows in the body. A special driver-operated passenger door is also provided.

APECO MRB

DIMENSIONS

Overall Length	Overall Width	Overall Height	Wheel-base	Inside Width	Aisle Width	Aisle Headroom	Floor Height	Ground to 1st Step	Turning Radius
21.8 ft	7.75 ft	9.0 ft	12.08 ft	NR	NR	6.45 ft	28.5 in	16 in	26.0 ft

Passenger Door Height/Width	Design Capacity	Crush Capacity	Interior Noise	Exterior Noise	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
75 in/26 in	16 - 19 seats	NR	NR	NR	6900/10,000 lbs	NR

PERFORMANCE

Maximum Velocity	Average Acceleration	Average Deceleration	Emergency Deceleration	Fuel Capacity	Average Fuel Consumption	Average Oil Consumption	Average (design) Lifetime
NR	NR	NR	NR	50 gal	NR	NR	NR

ENGINE

Fuel	Number Cylinders	Displacement	Compression Ratio	Bore/Stroke	Maximum RPM	Maximum Output	Maximum Torque
Gasoline	8	360 cubic inches	NR	NR	NR	245 hp	NR

MECHANICAL

Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator	Heating/ Air Conditioner
Chrysler model 727, 3-speed automatic	NR	8.00 x 16.50 8 ply/same as front, dual wheels	Rear drum, Front disc, dual hydraulic operation	Power, ratio 24:1	12 volt, 70Ah/ 60 amps,12 volts	Rear blower 45,000 Btu, front blower 18,000 Btu/ AC - 18,000 Btu rear, 14,000 Btu front

BODY

Walls Exterior/Interior	Framing	Construction Methods	Floor	Windows	Doors	Special Options
Aluminum/steel tube	Steel tube	Body on Dodge RM 350 motor home chassis	NR	NR	NR	Wheelchair lift being developed

KEY: NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles

ARGOSY COMPACT BUS

The ARGOSY division of the Airstream Corporation is now producing a line of mini-buses based on their motor home designs. The 125-inch wheel base chassis yields space for fifteen seated passengers, while other models offer seating capacity up to twenty-seven. Power is supplied by a 350 cubic-inch gasoline engine with automatic transmission. The braking system incorporates disc brakes on the front wheels and conventional drum brakes on the rear.

In conversion from motor home to small bus, the lightweight, all-aluminum body was fitted with a large amount of window area to provide both the driver and the passengers with excellent visibility. Heating and air conditioning are standard items.

EXTERIOR VIEW

INTERIOR VIEW

ARGOSY - COMPACT BUS

DIMENSIONS

Overall Length	Overall Width	Overall Height	Wheel-base	Inside Width	Aisle Width	Aisle Headroom	Floor Height	Ground to 1st Step	Turning Radius
20.0 ft	8.0 ft	8.9 ft	10.41 ft	NR	NR	6.58 ft	NR	15.5 in	NR

Passenger Door Height/Width	Design Capacity	Crush Capacity	Interior Noise	Exterior Noise	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
NR	15 seats	NR	NR	NR	6820/10,500 lbs	4300/7500 lbs

PERFORMANCE

Maximum Velocity	Average Acceleration	Average Deceleration	Emergency Deceleration	Fuel Capacity	Average Fuel Consumption	Average Oil Consumption	Average (design) Lifetime
NR	NR	NR	NR	30 gal	NR	NR	NR

ENGINE

Fuel	Number Cylinders	Displacement	Compression Ratio	Bore/Stroke	Maximum RPM	Maximum Output	Maximum Torque
Gasoline	8	350 cubic inches	NR	NR	NR	NR	NR

MECHANICAL

Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator	Heating/ Air Conditioner
Turbo-hydramatic model 400	NR	8.75 x 16.50/ same as front, dual wheels	Front disc, rear drum	Power	Two 12 volt, 80Ah/ 80 amps, 12 volt	35,000 Btu/ 40,000 Btu

BODY

Walls Exterior/Interior	Framing	Construction Methods	Floor	Windows	Doors	Special Options
Riveted 0.040 in. aluminum alloy sheet/same	Extruded aluminum	Body on chassis	NR	NR	Air operated	NR

KEY: NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles

BATTRONIC BATTERY-POWERED ELECTRIC VEHICLE

BATTRONIC

Battronic was the first electric battery-powered transit vehicle available for use in the United States. It is manufactured by the Battronic Truck Corporation, a subsidiary of the Boyertown Auto Body Works of Boyertown, Pennsylvania. Two different sized buses have been designed, seating 10 or 15 - 25 passengers. The vehicles have aluminum bodies mounted on Boyertown-designed truck chassis, propelled by General Electric series-wound DC motors which produce a maximum of 6000 RPM using 112-volt batteries. The transmissions are single speed.

The major difference between the two models is size. The 10-passenger vehicle is mounted on a 111-inch wheel base chassis, with a front axle capacity of 3800 lbs. and a rear axle capacity of 7500 lbs. The larger vehicle has a 153-inch wheel base and axle capacities of 4700 and 7800 lbs, respectively. Both vehicles are essentially conversions of previously manufactured electric utility vans.

The electric vehicle operates in a similar manner to traditional gasoline or diesel powered vehicles, at least from the point of view of the driver. The major problem with an electric propulsion system, and the problem that has kept it from general use in the past, is cruising range. Range is entirely a function of battery storage capacity. The manufacturer claims a range of about 40 miles on one battery charge, and a top speed of about 30 mph. Batteries can be changed in under 15 minutes so that theoretically the vehicle can be kept in more or less constant use.

Seven vehicles were in transit use in the country as of December 1975, one in Merrill, Wisconsin, providing demand responsive transit service for the elderly, and six in Lansing, Michigan, operating a shuttle service. Another vehicle is used by the Cleveland Electric Co.

BATTRONIC SUBURBAN 10

DIMENSIONS

Overall Length	Overall Width	Overall Height	Wheel-base	Inside Width	Aisle Width	Aisle Headroom	Floor Height	Ground to 1st Step	Turning Radius
17.83 ft	6.94 ft	9.0 ft	10.17 ft	6.5 ft	21.5 in	6.08 ft	27.75 in	13.0 in	20.3 ft

Passenger Door Height/Width	Design Capacity	Crush Capacity	Interior Noise	Exterior Noise	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
NR/30.13 in	10 seats 6 stand	NR	NR	NR	7565/10,000 lbs	3800/7400 lbs

PERFORMANCE

Maximum Velocity	Average Acceleration	Average Deceleration	Emergency Deceleration	Fuel Capacity	Average Fuel Consumption	Average Oil Consumption	Average (design) Lifetime
35 mph	2.02 ft/sec^2 1.37 mph/sec	NR	NR	NP	1.5 - 2.0 kwh/mile	NP	NR

MOTOR

Type	Rating	Control	Batteries	Weight	Replacement/Recharge	Est. Lifetime
Series-wound DC traction	42 hp 31.3 kw 2300 rpm	Solid state SCR *chopper type*	56 cells, 112 volt, 330Ah	2581 lbs	3 min/6-8 hrs	Minimum of 700 charge cycles

MECHANICAL

Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator	Heating/ Air Conditioner
Helical gears, constant engagement 1 fwd speed	Semi-elliptical steel spring/same as front	9.00 x 16, 10 ply/same as front	Drum type, hydraulic split system	Standard cam and twin lever, 26.5:1 ratio	12 volt, 85Ah/ NP	Gasoline heater/ ventilation only

BODY

Walls Exterior/Interior	Framing	Construction Methods	Floor	Windows	Doors	Special Options
Aluminum alloy/aluminun alloy and textured lining	Pressed steel	Body on separate chassis	Plywood and metal with rubber matting	Horizontal sliding type	Hinged or jack-knife type	NR

KEY: NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles

BATTRONIC 15 - 25 PASSENGER

DIMENSIONS

Overall Length	Overall Width	Overall Height	Wheel-base	Inside Width	Aisle Width	Aisle Headroom	Floor Height	Ground to 1st Step	Turning Radius
19.08 ft	6.94 ft	9.5 ft	12.75 ft	6.5 ft	34.0 in	6.58 ft	32.6 in	13.0 in	25.5 ft

Passenger Door Height/Width	Design Capacity	Crush Capacity	Interior Noise	Exterior Noise	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
84.75 in/54.0 in	15 seats 10 stand	NR	NR	NR	7955/11,200 lbs	3800/7400 lbs

PERFORMANCE

Maximum Velocity	Average Acceleration	Average Deceleration	Emergency Deceleration	Fuel Capacity	Average Fuel Consumption	Average Oil Consumption	Average (design) Lifetime
32 mph	2.00 ft/sec^2 1.36 mph/sec	NR	NR	NP	1.5 - 2.0 kwh/mile	NP	NR

MOTOR

Type	Rating	Control	Batteries	Weight	Replacement/Recharge	Est. Lifetime
Series-wound DC traction	42 hp 31.3 kw 2300 rpm	Solid state SCR chopper type	56 cells 112 volt, 385Ah	3032 lbs	3 min/6-8 hrs	Minimum of 700 charge cycles

MECHANICAL

Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator	Heating/ Air Conditioner
Helical gears, constant engagement 1 fwd speed	Semi-elliptical steel spring/ same as front	9.00 x 16, 10 ply / same as front	Drum type, hydraulic split system	Standard cam and twin lever, 26.5:1 ratio	12 volt, 85Ah/ NP	Gasoline heater/ ventilation only

BODY

Walls Exterior/Interior	Framing	Construction Methods	Floor	Windows	Doors	Special Options
Aluminum alloy/aluminum alloy and textured lining	Pressed steel	Body on separate chassis	Plywood and metal with rubber matting	Horizontal sliding type	Two section - two leaf hinged	Electric dynamic braking

KEY: NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles

DODGE MOTOR HOME CHASSIS

The Dodge Truck Division of the Chrysler Corporation does offer several passenger vans with seating capacities of up to 16 adults. However, to a much greater extent, it acts as a supplier of motor home/light truck chassis which serve as the foundations for vehicles fabricated by other manufacturers.

Three basic chassis are offered in standard and extended wheel base versions with gross vehicle weight capacities of 5, 6, and 7 tons. The Dodge Loadflite 3-speed automatic transmission is standard on all models mating with the 318 cubic-inch V8 engine on the 5 and 6-ton chassis, and the 440 cubic-inch powerplant on the 7-ton vehicle (optional on smaller models). The braking system uses discs up front and drums on the rear in a power operated, dual-circuit design. Sway bars front and rear augment heavy-duty leaf springs on all models.

DODGE CHASSIS

DIMENSIONS

Chassis	Overall Length	Overall Width	Wheelbase	Fuel Capacity	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
RM 300	15.25 ft or 17.0 ft	6.9 ft	104 in or 125 in	32.5 gal	NR/10,200 lbs	4500/6200 lbs
RM 350	18.0 ft or 19.8 ft	6.9 ft	137 in or 159 in	36.5 gal	NR/12,000 lbs	5000/7500 lbs
RM 400	19.8 ft or 26.4 ft	6.9 ft	159 in or 178 in	36 or 45 gal	NR/14,000 lbs	5000/10,000 lbs

ENGINE

Chassis	Fuel/No. Cylinder/Displacement	Comp. Ratio	Bore/Stroke	Max RPM	Max Output	Max Torque
RM 300	Gasoline/8/318 cubic inches	8.6:1	3.9 in/3.31 in	4000	150 hp SAE @ 4000 rpm	225 ft-lbs SAE @ 2200 rpm
RM 350	Gasoline/8/318 cubic inches	8.6:1	3.9 in/3.31 in	4000	150 hp SAE @ 4000 rpm	225 ft-lbs SAE @ 2200 rpm
RM 400	Gasoline/8/440 cubic inches (optional with RM 300, 350)	8.2:1	4.32 in/3.75 in	4400	279 hp SAE @ 4400 rpm	375 ft-lbs SAE @ 3200 rpm

MECHANICAL

Chassis	Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator
RM 300	Dodge Loadflite auto, 3 fwd speeds	Semi-elliptic leaf springs with swaybar/ same as front	8.00 x 17.5C, 6 ply/same, dual wheels	Power-dual circuit, front disc, rear drum	Power	12 volt, 70Ah/ 60 amps, 12 volt
RM 350	Dodge Loadflite auto, 3 fwd speeds	Semi-elliptic leaf springs with swaybar/ same as front	8.00 x 17.5D 8 ply/8.00 x 17.5C, 6 ply, dual wheels	Power-dual circuit, front disc, rear drum	Power	12 volt, 90Ah/ 60 amps, 12 volt
RM 400	Dodge Loadflite auto, 3 fwd speeds	Semi-elliptic leaf springs with swaybar/ same as front	8.00 x 19.5D, 8 ply/same, dual wheels	Power-dual circuit, front disc, rear drum	Power	12 volt, 80Ah/ 60 amps, 12 volt

KEY

NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles


ELECTRIC BUS
BATTERY ELECTRIC BUS
ELECTROBUS
NO POLLUTION

ELECTROBUS

ELECTROBUS

Electrobus is the second entry into the electric-powered small bus market. It is produced by the Tork-Link Corporation, recently purchased by the Otis Elevator Company.

Electrobus is powered by a series-wound DC electric traction motor, designed especially for the bus by Tork-Link. The motor is connected directly to the rear axle without the use of clutches, gears, or transmission. It is rated at 125 peak horsepower and operates from a 36-cell lead-acid traction battery which weighs about 3400 lbs. Maximum armature speed is 5500 rpm.

Driver controls are basically the same as in a standard vehicle - i.e., there is a steering wheel, and pedals for brake and accelerator. The gear shift is replaced by a "FORWARD-REVERSE-OFF" switch.

The vehicle has been designed from the ground up as a bus. The chassis and body are both designed by Tork-Link. The body of the bus has an aluminum outer skin.

There are two versions of the small bus: Model 20 seats 20, and Model 26 seats up to 30.

A unique feature of this vehicle is the braking system. The brake system is connected to the motor in such a manner that the motor acts as a generator during braking. This action provides a retarding force to the vehicle's movement. The greater the speed of the bus, the greater the retarding power of the engine and the less the necessary brake effort. According to the manufacturer, this should result in greater brake lining life and better braking characteristics.

The manufacturer claims a top speed of 35 miles per hour and a range of about 40 miles or 3 to 5 hours. Battery exchange is estimated at less than 15 minutes. Batteries recharge in about 4 hours, and are estimated to have a 60,000-mile service life.

A prototype of the vehicle has been put through various tests throughout the country. One test in Long Beach, Long Island, New York, indicated that the vehicle has about a 50-mile range. The vehicle traveled 38 miles in heavy traffic, and a test showed the battery to be only 65 percent discharged.

ELECTROBUS MODEL 20

DIMENSIONS

Overall Length	Overall Width	Overall Height	Wheel-base	Inside Width	Aisle Width	Aisle Headroom	Floor Height	Ground to 1st Step	Turning Radius
25.0 ft	8.0 ft	8.42 ft	13.5 ft	7.58 ft	20.0 in	6.42 ft	22.0 in	14.0 in	38 ft

Passenger Door Height/Width	Design Capacity	Crush Capacity	Interior Noise	Exterior Noise	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
NR/29.5 in	21 seats 20 stand	21 seats 31 stand	70 dbA	70 dbA	13,000/18,000 lbs	7000/15,000 lbs

PERFORMANCE

Maximum Velocity	Average Acceleration	Average Deceleration	Emergency Deceleration	Fuel Capacity	Average Fuel Consumption	Average Oil Consumption	Average (design) Lifetime
35 mph	3.96 ft/sec^2 2.7 mph/sec	NR	NR	NP	0.97 kwh/mile	NP	(25 years)

MOTOR

Type	Rating	Control	Batteries	Weight	Replacement/Recharge	Est. Lifetime
Electrobus No. 11A3 series DC traction motor	50 hp @ 2650 rpm	Contactor, 8 steps	36 cells, 72 volt, 650Ah	3396 lbs	5 min/4 hr	1000 charge cycles

MECHANICAL

Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator	Heating/ Air Conditioner
No transmission. Motor directly coupled to rear wheels through differential	Leaf springs/ leaf springs	8.25 x 15, 14 ply radial/same as front	Rockwell RDH hydraulic air-assisted regener-ative electric	Ross 376-1	12 volt, 160Ah/ NP	Petroleum fueled 40,000 Btu/optional AC, electric powered

BODY

Walls Exterior/Interior	Framing	Construction Methods	Floor	Windows	Doors	Special Options
Aluminum and fiberglass/ aluminum	Welded light-weight square steel tubing	Unitized body and frame	Rubber covered plywood	Tinted, full opening	NR	NR

KEY: NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles

ELECTROBUS MODEL 26

DIMENSIONS

Overall Length	Overall Width	Overall Height	Wheel-base	Inside Width	Aisle Width	Aisle Headroom	Floor Height	Ground to 1st Step	Turning Radius
30.0 ft	8.0 ft	8.42 ft	18.25 ft	7.58 ft	20.0 in	6.42 ft	22.0 in	14.0 in	41.0 ft

Passenger Door Height/Width	Design Capacity	Crush Capacity	Interior Noise	Exterior Noise	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
NR/29.5 in	31 seats 26 stand	31 seats 38 stand	70 dbA	70 dbA	14,200/21,500 lbs	7000/15,000 lbs

PERFORMANCE

Maximum Velocity	Average Acceleration	Average Deceleration	Emergency Deceleration	Fuel Capacity	Average Fuel Consumption	Average Oil Consumption	Average (design) Lifetime
NR	3.52 ft/sec^2 2.4 mph/sec	NR	NR	NP	0.97 kwh/mile	NP	(25 years)

MOTOR

Type	Rating	Control	Batteries	Weight	Replacement/Recharge	Est. Lifetime
Electrobus No. 11A3, series DC traction	50 hp @ 2650 rpm	Contactor, 8 steps	36 cells 72 volt, 650 Ah	3396 lbs	5 min/4 hrs	1000 charge cycles

MECHANICAL

Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator	Heating/ Air Conditioner
None. Motor directly coupled to rear wheels through differential.	Leaf springs/ leaf springs	8.75 x 15, 14 ply radial/same as front	Rockwell RDH, hydraulic air assisted, regenrative electric	Ross 376-1	12 volts, 160Ah/ NP	Petroleum fueled. 40,000 Btu/AC optional, electric powered

BODY

Walls Exterior/Interior	Framing	Construction Methods	Floor	Windows	Doors	Special Options
Aluminum and fiberglass/ aluminum	Welded light-weight square steel tubing	Unitized body and frame	Rubber covered plywood	Tinted, full opening	NR	NR

KEY: NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles

FLXIBLE FLXETTE

Flxible, a division of Rohr Industries, is one of the two major manufacturers of full-size transit vehicles in the United States (the other being General Motors).

The Flxette, first manufactured in 1967, is built on a Ford truck chassis and powered by a Ford 390 cubic-inch V8 engine. A few changes, including an upgrading of the engine from 6 to 8 cylinders, have been made as a result of experience with the vehicle, but the basic vehicle is the same today as in 1967.

Air conditioning is available. A hydraulic wheelchair lift is available and is installed in the rear door. (Vehicles can be equipped either with or without the rear door.)

The Flxette is probably the most widely used vehicle of its type in the country today. They are used in transit applications in over 50 cities, as shuttles in airports, for sightseeing and charter operations by about 20 companies, and for internal purposes by about 20 industries and universities.

FLXIBLE FLXETTE

DIMENSIONS

Overall Length	Overall Width	Overall Height	Wheel-base	Inside Width	Aisle Width	Aisle Headroom	Floor Height	Ground to 1st Step	Turning Radius
21.3 ft	7.5 ft	8.75 ft	11.4 ft	7.0 ft	15.75 in	6.25 ft	30.0 in	14.0 in	25.0 ft

Passenger Door Height/Width	Design Capacity	Crush Capacity	Interior Noise	Exterior Noise	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
NR/24.0 in	19 or 23 seats	NR	NR	NR	9140/12,000 lbs	5500/13,000 lbs

PERFORMANCE

Maximum Velocity	Average Acceleration	Average Deceleration	Emergency Deceleration	Fuel Capacity	Average Fuel Consumption	Average Oil Consumption	Average (design) Lifetime
65 mph	NR	NR	NR	50 gal	6.46 mpg	NR	NR

ENGINE

Fuel	Number Cylinders	Displacement	Compression Ratio	Bore/Stroke	Maximum RPM	Maximum Output	Maximum Torque
Gasoline	8	390 cubic inches	NR	NR	4400	255 hp SAE @ 4400 rpm	376 ft-lbs SAE @ 2600 rpm

MECHANICAL

Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator	Heating/ Air Conditioner
Automatic, 3 fwd speeds	Heavy duty leaf springs/same as front	7.0 x 18, 8 ply tube type/same as front dual wheels	Power, twin circuit hydraulic self-adjusting	NR	12 volt, 120 Ah/ 150 amps, 12 volt	70,000 Btu/fresh air ventilation (AC optional)

BODY

Walls Exterior/Interior	Framing	Construction Methods	Floor	Windows	Doors	Special Options
20 gauge steel/melamine, plastic panels	Welded steel	Body on Ford M500 chassis	Ribbed rubber covered plywood	Horizontal sliding, tinted safety glass	2-leaf air operated	19 pass.-front and rear doors 23 pass.-front door only.

KEY: NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles

FORTIVAN

The Coach and Equipment Sales Corporation of Penn Yann, New York, modifies standard vans for use in transit or school bus operations. The transit version is known as the Fortivan Commuter.

Coach and Equipment performs conversions on Chevrolet, GMC, Dodge, Dodge Maxivan, or Ford Econoline chassis. The engines and transmissions are functions of the chassis used, as are most vehicle dimensions.

The transit conversion includes a raised steel roof that increases interior height to 75 inches. The entrance door is extended into the roof and is also 75 inches high. The other major feature of the conversion is the customized interior, which includes strengthening of the wall and roof supports. Seating arrangements allow up to 16 seated passengers. A hydraulic wheelchair lift is available. Space for one wheelchair and 10 other passengers is standard on the lift-equipped vehicle.

EXTERIOR VIEW

INTERIOR VIEW

FORTIVAN

DIMENSIONS

Overall Length	Overall Width	Overall Height	Wheel-base	Inside Width	Aisle Width	Aisle Headroom	Floor Height	Ground to 1st Step	Turning Radius
DOV	DOV	DOV	123.5 in 127 in	DOV	24 in	DOV	DOV	15.5 in	DOV

Passenger Door Height/Width	Design Capacity	Crush Capacity	Interior Noise	Exterior Noise	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
75 in/NR	DOV	DOV	NR	NR	NR/8000 lbs (minimum)	3300/5050 lbs (minimum)

PERFORMANCE

Maximum Velocity	Average Acceleration	Average Deceleration	Emergency Deceleration	Fuel Capacity	Average Fuel Consumption	Average Oil Consumption	Average (design) Lifetime
DOV	DOV	DOV	DOV	30 gal (minimum)	DOV	DOV	NR

ENGINE

Fuel	Number Cylinders	Displacement	Compression Ratio	Bore/Stroke	Maximum RPM	Maximum Output	Maximum Torque
Gasoline	8	300 cubic inches (minimum)	DOV	DOV	DOV	DOV	DOV

MECHANICAL

Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator	Heating/ Air Conditioner
3-speed manual	DOV	DOV	Dual hydraulic	DOV	NR/60 amps, 12 volt	NR

BODY

Walls Exterior/Interior	Framing	Construction Methods	Floor	Windows	Doors	Special Options
DOV	NR	Conversion of existing van models	1/2-in. 5 ply BB grade plywood	Ventilating, slant type side windows	Manually operated	Conversions of: Chevrolet CG 31305; GMC TG 31305; Dodge B300.

KEY: NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles

GRUMMAN

The Grumman Aerospace Company entered the bus manufacturing business in 1971. The vehicles are manufactured in Montgomery, Pennsylvania.

The Grumman bus is built on a motor home chassis. The body uses some of the features of the trucks and motor homes produced by Grumman, but essentially the vehicle has been designed separately as a small bus. The vehicle can be ordered with either a Ford, Chevrolet, or Dodge chassis. A number of optional gasoline engines are available, ranging from 350 to 454 cubic-inches. Conversion to propane operation is optional. The bodies are made of aluminum, which contributes to a lower overall weight and longer body life.

Two versions of the vehicle are currently available, one seating 17-19 passengers, and one seating 23-25. The larger model is placed on a larger Dodge motor home chassis. There are plans to develop a diesel version of the larger vehicle, but so far that vehicle has not been built. Eleven units had been placed in operation as of March, 1974, all built on the Chevrolet chassis. Currently, the heavier Dodge chassis is being recommended by the distributor as more suitable for transit operation.

GRUMMAN 23 PASSENGER

DIMENSIONS

Overall Length	Overall Width	Overall Height	Wheel-base	Inside Width	Aisle Width	Aisle Headroom	Floor Height	Ground to 1st Step	Turning Radius
23.23 ft	7.98 ft	9.33 ft	13.25 ft	NR	NR	6.48 ft	32.5 in	13.5 in	NR

Passenger Door Height/Width	Design Capacity	Crush Capacity	Interior Noise	Exterior Noise	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
NR/24.0 in	23 seats	NR	NR	NR	7500/11,700 lbs	5000/9500 lbs

PERFORMANCE

Maximum Velocity	Average Acceleration	Average Deceleration	Emergency Deceleration	Fuel Capacity	Average Fuel Consumption	Average Oil Consumption	Average (design) Lifetime
65 mph	NR	NR	NR	40 gal	NR	NR	NR

ENGINE

Fuel	Number Cylinders	Displacement	Compression Ratio	Bore/Stroke	Maximum RPM	Maximum Output	Maximum Torque
Gasoline	8	440 cubic inches	8.2:1	4.32 in/3.75 in	4400	279 hp SAE @ 4400 rpm	375 ft-lbs SAE @ 3200 rpm

MECHANICAL

Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator	Heating/ Air Conditioner
Dodge model A727 automatic 3 fwd speeds	Semi-elliptic leaf springs and sway bar/same as front	8.00 x 19.5, 8 ply/same as front dual wheels	Power OH 4	Power	Two 12 volt, 90Ah/ 62 amps, 12 volt	80,000 Btu/fresh air ventilation (AC optional)

BODY

Walls Exterior/Interior	Framing	Construction Methods	Floor	Windows	Doors	Special Options
Aluminum panels/vinyl coated aluminum	Aluminum alloy sheet	Body on separate chassis (Dodge, Ford, or Chevrolet)	Aluminum and plywood, bus type safety floor covering	Tinted safety glass, sliding panels in all side windows	Vaccum operated	Ford or Chevrolet chassis

KEY: NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles

MERCEDES-BENZ

Mercedes-Benz has been selling small buses in the United States since 1971. With the exception of the Volkswagen, this is the only foreign-manufactured mini-bus available in the United States at the present time.

The Mercedes model 0309D is made entirely by Mercedes - body, chassis and engine included. Standard seating arrangements can accommodate up to 23 persons.

The vehicle is powered by a forward-mounted diesel engine. Mercedes claims upwards of 15 mpg on vehicles equipped with automatic transmission. Contact with operators appears to verify this claim. An abbreviated list reveals that there are at least 60 vehicles in transit use in 10 cities, with another 25 - 30 vehicles used in various shuttle operations.

The major drawback of the vehicle is an interior headroom of only 68 inches. An option increasing the headroom to 74 inches is now available, but only on vehicles not equipped with air conditioning. However, the distributor says that the raised roof will be available with air conditioned vehicles at a later date. Automatic transmission has been introduced recently as an option. Lack of automatic transmission in the past made the vehicle less popular for operation in the United States. Another concern noted by some users is the high interior noise level which is not surprising given a 4-cylinder diesel engine. Mercedes plans to provide better insulation for the engine compartment.

Wheelchair lifts are available, but are not installed by the vehicle manufacturer.

MERCEDES-BENZ MODEL 0309D

DIMENSIONS

Overall Length	Overall Width	Overall Height	Wheel-base	Inside Width	Aisle Width	Aisle Headroom	Floor Height	Ground to 1st Step	Turning Radius
19.68 ft	6.95 ft	9.42 ft (w/AC)	11.48 ft	6.17 ft	17.7 in	5.67 ft	29.0 in	15.1 in	20.0 ft

Passenger Door Height/Width	Design Capacity	Crush Capacity	Interior Noise	Exterior Noise	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
75.1 in/31.8 in	19 seats	NR	NR	NR	7640/10,575 lbs	3975/7275 lbs

PERFORMANCE

Maximum Velocity	Average Acceleration	Average Deceleration	Emergency Deceleration	Fuel Capacity	Average Fuel Consumption	Average Oil Consumption	Average (design) Lifetime
58 mph	NR	NR	NR	21 gal	15 mpg	322 miles/qt	NR

ENGINE

Fuel	Number Cylinders	Displacement	Compression Ratio	Bore/Stroke	Maximum RPM	Maximum Output	Maximum Torque
Diesel	4	230 cubic inches	17.0:1	3.82 in/5.04 in	2800	94 hp SAE @ 2800 rpm	188 ft-lbs SAE @ 1800 rpm

MECHANICAL

Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator	Heating/ Air Conditioner
Allison model AT 540, auto, 4 fwd speeds	Multiple leaf springs, anti-sway bar/same as front plus over-load springs	6.50 x 16C, 10 ply radial/same as front, dual wheels	Two circuit hydraulic with air assist	Power, ZF ball nut type, 18.8:1	Two 12-volt, 88Ah/ 120 amps, 12 volt	Hot water, 15,000 Btu, plus diesel fired hot air-12,000 Btu/rotary type-40,000 Btu

BODY

Walls Exterior/Interior	Framing	Construction Methods	Floor	Windows	Doors	Special Options
Heavy gauge steel/ formica covering	Steel U-shaped rails and riveted tubular cross members	Body on chassis - both by Mercedes	Vinyl covering, rubber thread over aisle and entryway	Tinted glass, sliding and push type	Manually operated	13 and 16 seat plans; manual 5-speed transmission.

KEY: NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles

MINIBUS

Minibus, Inc. designs and manufactures a number of small vehicles. The vehicle of most interest for the purposes of this document is an 18 to 23-passenger transit vehicle. A special version of that vehicle is built with provisions for the handicapped. Minibus also builds vehicle trains for use in parks and airports and does custom design work.

The Minibus Model MBS is the basic transit vehicle. It is now constructed utilizing an integrated frame and chassis designed by Minibus; earlier models had used a Chrysler chassis but problems with that design prompted change. A gasoline engine is standard, but a diesel engine is also available. The vehicle can be converted to propane or natural gas operation.

The "Handicap Vehicle" seats 16 and has room for four wheelchairs. It has a hydraulically operated side lift and a folding ramp at the rear of the vehicle. This ramp serves as a manual backup in case of failure of the hydraulic lift.

Fifty to sixty Minibuses are in use in transit applications throughout the country. About another thirty are used for various shuttle operations.

MINIBUS MODEL MBS

DIMENSIONS

Overall Length	Overall Width	Overall Height	Wheel-base	Inside Width	Aisle Width	Aisle Headroom	Floor Height	Ground to 1st Step	Turning Radius
23.75 ft	7.85 ft	8.91 ft	13.25 ft	7.4 ft	19 in	6.38 ft	29 in	14 in	29 ft

Passenger Door Height/Width	Design Capacity	Crush Capacity	Interior Noise	Exterior Noise	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
NR/51 in	20 seats 8 stand	24 seats 20 stand	80 dbA	93 dbA	8500/14,000 lbs	5000/15,000 lbs

PERFORMANCE

Maximum Velocity	Average Acceleration	Average Deceleration	Emergency Deceleration	Fuel Capacity	Average Fuel Consumption	Average Oil Consumption	Average (design) Lifetime
50 mph	3.25 ft/sec^2	15 ft/sec^2	29 ft/sec^2	80 gal	4 mpg	1500 miles/qt	150,000 miles

ENGINE

Fuel	Number Cylinders	Displacement	Compression Ratio	Bore/Stroke	Maximum RPM	Maximum Output	Maximum Torque
Gasoline	8	413 cubic inches	7.5:1	4.18 in/3.75 in	4000	NR	360 ft-lbs SAE @ 2000 rpm

MECHANICAL

Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator	Heating/ Air Conditioner
Allison model AT 540 type 4, auto., 2 fwd speeds	Dodge spring/ air suspension	8.00 x 19.5, 8 ply/same as front	4-wheel disc	Power	12 volt, 150Ah/ 130 amps, 12 volt	Optional/ Optional

BODY

Walls Exterior/Interior	Framing	Construction Methods	Floor	Windows	Doors	Special Options
Coated steel/vinyl coated steel or aluminum	Welded steel tubing	Unitized body and frame	3/4 in, 7 ply AA marine grade plywood	Safety float and safety plate with push-out	Slide guide, double or single	NR

KEY: NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles

PACE ARROW PEOPLE MOVER

Pace Arrow, a subsidiary of Fleetwood Enterprises, markets a para-transit version of a converted motor home which is advertised as a vehicle for small group tours, car-pools, hotel shuttles, and other similar services.

Various seating arrangements are available which will accommodate up to 15 adults. A Dodge RM 300 motor home chassis with the 125-inch wheel base is used. The 318 cubic-inch V8 engine is standard, but the 440 cubic-inch power-plant can be specified. Front disc brakes, rear drum brakes, and dual rear wheels are all standard items.

EXTERIOR VIEW

INTERIOR VIEW

PACE ARROW PEOPLE MOVER

DIMENSIONS

Overall Length	Overall Width	Overall Height	Wheel-base	Inside Width	Aisle Width	Aisle Headroom	Floor Height	Ground to 1st Step	Turning Radius
19.83 ft	7.83 ft	9.0 ft	10.41 ft	NR	NR	6.25 ft	NR	15.5 in	30 ft

Passenger Door Height/Width	Design Capacity	Crush Capacity	Interior Noise	Exterior Noise	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
NR/26.5 in	15	NR	NR	NR	7260/11,000 lbs	4500/6200 lbs

PERFORMANCE

Maximum Velocity	Average Acceleration	Average Deceleration	Emergency Deceleration	Fuel Capacity	Average Fuel Consumption	Average Oil Consumption	Average (design) Lifetime
NR	NR	NR	NR	36 gal	NR	NR	NR

ENGINE

Fuel	Number Cylinders	Displacement	Compression Ratio	Bore/Stroke	Maximum RPM	Maximum Output	Maximum Torque
Gasoline	8	318 cubic inches	8.6:1	3.9 in/3.31 in	4000	150 hp SAE @ 4000 rpm	225 ft-lbs @ 2200 rpm

MECHANICAL

Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator	Heating/ Air Conditioner
Dodge 3-speed automatic	NR	8.00 x 17.5/ same	Power asst. front disc, rear drum	Power	Two 12 volt, 70Ah/ 60 amps, 12 volt	Factory automotive heater/AC optional

BODY

Walls Exterior/Interior	Framing	Construction Methods	Floor	Windows	Doors	Special Options
NR	All steel cage	Body on chassis	NR	NR	NR	Folding ramp for handi-capped

KEY: NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles

SUPERIOR CONSERV-A-RIDE I

This vehicle is based on a Chevrolet model G-30 heavy-duty window van. Superior takes the basic vehicle and widens the van body by 14 inches; the interior height is increased by the addition of a fiberglass roof cap strengthened by seven steel bow supports. Most of the other modifications performed by Superior are in the way of cosmetic and passenger comfort items.

The basic drivetrain, consisting of a 350 cubic-inch V8 engine and Turbo Hydramatic 3-speed automatic transmission, remains intact, as do stock braking and power steering systems. A heavy-duty suspension complete with front sway bar is included in the package.

SUPERIOR CONSERV-A-RIDE I

DIMENSIONS

Overall Length	Overall Width	Overall Height	Wheel-base	Inside Width	Aisle Width	Aisle Headroom	Floor Height	Ground to 1st Step	Turning Radius
16.75 ft	7.75 ft	7.83 ft	10.41 ft	NR	NR	61 in	NR	NR	NR

Passenger Door Height/Width	Design Capacity	Crush Capacity	Interior Noise	Exterior Noise	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
NR	10 - 13	NR	NR	NR	NR/7900 lbs	NR

PERFORMANCE

Maximum Velocity	Average Acceleration	Average Deceleration	Emergency Deceleration	Fuel Capacity	Average Fuel Consumption	Average Oil Consumption	Average (design) Lifetime
NR	NR	NR	NR	36 gal	NR	NR	NR

ENGINE

Fuel	Number Cylinders	Displacement	Compression Ratio	Bore/Stroke	Maximum RPM	Maximum Output	Maximum Torque
Gasoline	8	350 cubic inches	NR	NR	NR	160 hp @ 3800 rpm	255 ft-lbs @ 2400 rpm

MECHANICAL

Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator	Heating/ Air Conditioner
Automatic 3 speed	Independent coil spring/same as front	8.75 x 16.50, 8 ply/same as front	Power assisted front disc, rear drum	Power	12 volt, 80 Ah/ 61 amps, 12 volt	Fresh air heater (optional rear heater)/ AC optional

BODY

Walls Exterior/Interior	Framing	Construction Methods	Floor	Windows	Doors	Special Options
NR	All steel welded	Chevrolet G-30 van reinforced and widened	5/8 inch plywood covered with carpet or lineoleum	NR	NR	NR

KEY: NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles

SUPERIOR CONSERV-A-RIDE II

The Conserv-a-Ride II is a converted motor home developed by Superior Coach.

There are actually three versions of this vehicle. Model 2000 seats up to 16 persons, is mounted on a Dodge RM-300 chassis with a Dodge 318 cubic-inch V8 engine, and is 20 feet long. Model 2200 seats up to 20, is mounted on a RM-350 chassis with the 318 engine, and is 22 feet long. Model 2500 seats up to 27 persons, is mounted on the Dodge RM-400 chassis, is powered by the Dodge 440 cubic-inch V8 engine, and is 25 feet long. (The larger engine is available on all models.)

The major modifications to this vehicle have been the addition of seats to the interior, and an improvement in the operation of the door. No additional windows have been added.

SUPERIOR CONSERV-A-RIDE II

DIMENSIONS

Overall Length	Overall Width	Overall Height	Wheel-base	Inside Width	Aisle Width	Aisle Headroom	Floor Height	Ground to 1st Step	Turning Radius
20 or 22 ft	NR	NR	10.42 or 11.25 ft	NR	NR	6.5 ft	NR	NR	NR

Passenger Door Height/Width	Design Capacity	Crush Capacity	Interior Noise	Exterior Noise	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
NR	10 - 15	NR	NR	NR	NR/10,200 lbs NR/12,000 lbs	4500/6200 lbs 5000/7500 lbs

PERFORMANCE

Maximum Velocity	Average Acceleration	Average Deceleration	Emergency Deceleration	Fuel Capacity	Average Fuel Consumption	Average Oil Consumption	Average (design) Lifetime
NR	NR	NR	NR	NR	NR	NR	NR

ENGINE

Fuel	Number Cylinders	Displacement	Compression Ratio	Bore/Stroke	Maximum RPM	Maximum Output	Maximum Torque
Gasoline	8	318 cubic inches (440 cubic inches optional)	8.6:1	3.9 in/3.31 in	4000	150 hp SAE @ 4000 rpm	225 ft-lbs SAE @ 2200 rpm

MECHANICAL

Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator	Heating/ Air Conditioner
Dodge 3-speed automatic	Semi-elliptic leaf spring with sway bar/same as front	8.00 x 17.5/same, dual wheels	Power, dual circuit, front disc, rear drum	Power	12 volt, 80 Ah/ 60 amps, 12 volt	NR

BODY

Walls Exterior/Interior	Framing	Construction Methods	Floor	Windows	Doors	Special Options
NR	Welded steel wrap-around	Body on chassis	NR	NR	NR	NR

KEY: NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles

TWIN COACH: TC-25 AND TC-31

Twin Coach manufactures the TC-25, a 25-passenger, 25-foot bus which is identical except in size to the 28-foot TC-31 which seats up to 31 passengers.

Both models are designed with unitized, integral construction. They can be powered by either gasoline, diesel, propane, or natural gas engines. A four-speed automatic Allison transmission is now standard on all models, replacing the three-speed Chrysler automatic which was used originally. This change, as well as a number of others, was prompted by customer complaints. Other changes include:

(1) Air suspension is now standard, replacing the spring suspension.

(2) Brakes are now larger - 628 square inches of lining as opposed to 502.

Special options are designed for the elderly and handicapped. These modifications were designed specifically for the demand responsive transit system in Naugatuck Valley, Connecticut.

As of January, 1974, approximately 120 TC-25's were in use in transit applications throughout the country. (There are a few being used as university shuttles or other such applications.) There are a number of TC-31's, earlier model TC-29's, and suburban versions of the TC-25's in use as well. The first version of the TC-25, as it is now available, was sold to the New Jersey Department of Transportation for the Haddonfield Dial-a-Ride Program in January 1972.

TWIN COACH TC-25

*Gasoline engine version
**Diesel engine version

TWIN COACH MODEL TC-25-B

DIMENSIONS

Overall Length	Overall Width	Overall Height	Wheel-base	Inside Width	Aisle Width	Aisle Headroom	Floor Height	Ground to 1st Step	Turning Radius
25.17 ft	8.0 ft	9.33 ft	11.08 ft	7.67 ft	20.0 in	6.29 ft	30.0 in	14.0 in	27.3 ft

Passenger Door Height/Width	Design Capacity	Crush Capacity	Interior Noise	Exterior Noise	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
Front - 79.0 in/29.0 in Rear - 79.0 in/26.0 in	25 seats 13 stand	25 seats 20 stand	82 dbA* 86 dbA**	74 dbA* 77 dbA**	12,570/19,320 lbs	9000/15,000 lbs

PERFORMANCE

Maximum Velocity	Average Acceleration	Average Deceleration	Emergency Deceleration	Fuel Capacity	Average Fuel Consumption	Average Oil Consumption	Average (design) Lifetime
60 mph	2.93 ft/sec^2 * 1.4 ft/sec^2 **	11.4 ft/sec^2	22.8 ft/sec^2	80 gal* 70 gal**	7 mpg* 9 mpg**	500 miles/qt.	300,000 miles* 500,000 miles**

ENGINE

Fuel	Number Cylinders	Displacement	Compression Ratio	Bore/Stroke	Maximum RPM	Maximum Output	Maximum Torque
*Gasoline	8	440 cubic inches	8.0:1	4.32in/3.75 in	4000	220 hp @ 4000 rpm	370 ft-lbs @ 2400 rpm
**Diesel	4	212 cubic inches	21.0:1	3.87 in/4.5 in	2800	127 hp @ 2800 rpm	NR

MECHANICAL

Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator	Heating/ Air Conditioner
Allison model AT 540, auto 4 fwd speeds	Neway full air/same as front	8.00 x 22.5/same as front, dual wheels	Rockwell RDA wedge type	Ross cam and lever	12 volt, 180Ah/ 120 Amps, 12 volt	Gradustat, 155,000 Btu/ (optional 41,000 Btu Thermo King, B1-M6)

BODY

Walls Exterior/Interior	Framing	Construction Methods	Floor	Windows	Doors	Special Options
0.080 inch aluminum panels/ 0.100 inch melamine	Welded steel	United frame and body	3/4-inch plywood covered with ribbed rubber	Single density tempered	Two-section, slide-glide type, air operated	Elderly and handicapped features available.

KEY: NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles

TWIN COACH TC-31

*Gasoline engine version
**Diesel engine version

TWIN COACH MODEL TC-31-B

DIMENSIONS

Overall Length	Overall Width	Overall Height	Wheel-base	Inside Width	Aisle Width	Aisle Headroom	Floor Height	Ground to 1st Step	Turning Radius
28.2 ft	8.0 ft	9.33 ft	14.1 ft	7.67 ft	20 in	6.3 ft	30 in	14.0 in	29.9 ft

Passenger Door Height/Width	Design Capacity	Crush Capacity	Interior Noise	Exterior Noise	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
Front - 79 in/29 in Rear - 79 in/26 in	31 seats 6 stand	31 seats 23 stand	82 dbA* 86 dbA**	74 dbA* 77 dbA**	12,450/19,950 lbs* 13,250/20,750 lbs**	9000/15,000 lbs

PERFORMANCE

Maximum Velocity	Average Acceleration	Average Deceleration	Emergency Deceleration	Fuel Capacity	Average Fuel Consumption	Average Oil Consumption	Average (design) Lifetime
60 mph	2.93 ft/sec^2* 1.4 ft/sec^2**	11.4 ft/sec^2	22.8 ft/sec^2	70 gal	7 mpg* 8.1 mpg**	500 miles/qt	300,000 miles* 500,000 miles**

ENGINE

Fuel	Number Cylinders	Displacement	Compression Ratio	Bore/Stroke	Maximum RPM	Maximum Output	Maximum Torque
*Gasoline	8	440 cubic inches	8.0:1	4.32 in/3.75 in	4000	220 hp @ 4000 rpm	370 ft-lbs @ 2400 rpm
**Diesel	4	212 cubic inches	21.0:1	3.87 in/4.5 in	2800	127 hp @ 2800 rpm	270 ft-lbs @ 1800 rpm

MECHANICAL

Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator	Heating/ Air Conditioner
Allison model AT 540, auto., 4 fwd speeds	Neway full air/same as front	9.00 x 22.5/same as front, dual wheels	Rockwell RDA wedge type	Ross cam and level	12 volt, 100Ah/ 120 amps, 12 volt	Gradustat, warm water 185,000 Btu/(optional 41,000 Btu)

BODY

Walls Exterior/Interior	Framing	Construction Methods	Floor	Windows	Doors	Special Options
0.080 inch aluminim panels/0.100 inch melamine	Welded steel	Unitized frame and body	3/4-inch plywood covered with ribbed rubber	Single density, tempered	Two section slide-guide type, air operated	Elderly and handicapped features available

KEY: NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles

UTDC CLUB CAR DIAL-A-BUS

The Urban Transportation Development Corporation (UTDC) was established by the Ontario Ministry of Transportation and Communication to help develop better public transit service. The development of a suitable demand responsive transit vehicle became the major part of the overall UTDC program. They set out to develop a proper vehicle over a number of phases. The first phase involved the development of a suitable vehicle for immediate use. The result of the first phase is the Club Car, a remodeled motor home, with a body by Rek Vee of Scarborough, Ontario, and a Dodge motor home chassis. The interior furnishings of the bus are by Funcraft of Cambridge, Ontario, which has been involved with other Canadian vehicle modifications. The interiors are designed to be extremely plush; hence, the name Club Car.

The Club Car can perhaps be considered the forerunner of the current rush to transform a motor home into a small transit vehicle. This vehicle however was developed by a transit group rather than by a motor home manufacturer, and was developed for the express purpose of acting as a suitable vehicle for a demand responsive transportation system. Rek Vee, the manufacturer of the motor home converted into the Club Car, serves only as a contractor, and has not been responsible for marketing the vehicle.

The vehicle is mounted on a Dodge RM-400 motor home chassis, which is considered the strongest such chassis available. The engine is a Chrysler 440 cubic-inch V8 and is coupled with a Chrysler 3-speed automatic transmission.

The body is made of fiberglass - reinforced plastic (FRP). Advantages of a fiberglass body are: lighter weight for better gasoline mileage and better maneuverability, and better body appearance without corrosion. It remains to be seen how well a fiberglass body will hold up in any collision. Repairs of fiberglass in the case of damage can be fairly expensive.

EXTERIOR VIEW

INTERIOR VIEW

UTDC CLUB CAR

DIMENSIONS

Overall Length	Overall Width	Overall Height	Wheel-base	Inside Width	Aisle Width	Aisle Headroom	Floor Height	Ground to 1st Step	Turning Radius
24.0 ft	8.0 ft	8.83 ft	13.25 ft	NR	NR	NR	NR	NR	NR

Passenger Door Height/Width	Design Capacity	Crush Capacity	Interior Noise	Exterior Noise	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
NR	17 seats 10 stand	NR	NR	NR	8000/11,861 lbs	5000/7500 lbs

PERFORMANCE

Maximum Velocity	Average Acceleration	Average Deceleration	Emergency Deceleration	Fuel Capacity	Average Fuel Consumption	Average Oil Consumption	Average (design) Lifetime
NR	NR	NR	NR	52 gal	NR	NR	NR

ENGINE

Fuel	Number Cylinders	Displacement	Compression Ratio	Bore/Stroke	Maximum RPM	Maximum Output	Maximum Torque
Gasoline	8	440 cubic inches	8.2:1	4.32 in/3.75 in	4400	279 hp SAE @ 4400 rpm	375 ft-lbs SAE @ 3200 rpm

MECHANICAL

Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator	Heating/ Air Conditioner
Dodge Loadflite, auto., 3 fwd speeds	Semi-elliptic leaf springs and sway bar/same as front	8.00 x 17.5, 8 ply/same as front, dual wheels	Power, dual hydraulic, front disc rear drum	Power	12 volt, 205Ah/ 105 amps, 12 volt	NR

BODY

Walls Exterior/Interior	Framing	Construction Methods	Floor	Windows	Doors	Special Options
Fiberglass reinforced plastic/ same	NR	Body mounted on Dodge RM400 chassis	Carpeted	Laminated safety glass, push out to open	Electric worm drive operation	Other seating plans available

KEY: NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles

WINNEBAGO

Winnebago, the largest manufacturer of motor homes in the United States, entered the small bus market in late 1973 with their version of a converted motor home.

Their vehicle is 267 inches long, turning radius is 28 feet, weight is just over 8,000 lbs, and a seating capacity of 19 adults. The vehicle is mounted on a Dodge RM-350 chassis and is powered by a Chrysler 440 cubic-inch engine. The major change from the motor home design is the modification of the interior, plus the addition of windows to the body.

WINNEBAGO SERIES 19 BUS

DIMENSIONS

Overall Length	Overall Width	Overall Height	Wheel-base	Inside Width	Aisle Width	Aisle Headroom	Floor Height	Ground to 1st Step	Turning Radius
22.25 ft	7.25 ft	9.08 ft	13.25 ft	6.8 ft	21.0 in	6.2 ft	31 in	13.0 in	28.1 ft

Passenger Door Height/Width	Design Capacity	Crush Capacity	Interior Noise	Exterior Noise	Vehicle Weight Curb/Gross	Axle Permit Weight Front/Rear
NR/26.5 in	19 seats	19 seats 6 stand	NR	NR	8136/11,691 lbs	5000/7500 lbs

PERFORMANCE

Maximum Velocity	Average Acceleration	Average Deceleration	Emergency Deceleration	Fuel Capacity	Average Fuel Consumption	Average Oil Consumption	Average (design) Lifetime
NR	NR	NR	NR	36 gal	NR	NR	NR

ENGINE

Fuel	Number Cylinders	Displacement	Compression Ratio	Bore/Stroke	Maximum RPM	Maximum Output	Maximum Torque
Gasoline	8	318 cubic inches	8.6:1	3.9 in/3.31 in	4000	152 hp SAE @ 4000 rpm	225 ft-lbs SAE @ 2200 rpm

MECHANICAL

Transmission	Suspension Front/Rear	Tires Front/Rear	Brakes	Steering	Battery/ Alternator	Heating/ Air Conditioner
Dodge Loadflite, auto., 3 fwd speeds	Leaf springs with stabilizer bar/same as front	8.00 x 17.5C 8 ply radial/same as front, dual wheels	Two circuit hydraulic, front disc, rear drum	Power	12 volt, 200Ah/ 130 amps, 12 volt	Front and rear units, 105,000 Btu total/ (optional AC)

BODY

Walls Exterior/Interior	Framing	Construction Methods	Floor	Windows	Doors	Special Options
Thermo steel/white plastic laminate	Square steel tubing, jig assembled and welded	Body on Dodge RM 350 chassis	Aluminum covered plywood	Sliding side, laminated safety glass	Manually operated (optional air operation)	Dodge RM 400 chassis

KEY: NA – Not available NP – Not applicable NR – Not received DOV – Dependent on original vehicles

DIRECTORY OF MINI-BUS VEHICLE MANUFACTURES

SMALL VEHICLES[1]

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Far West Coach, Inc.
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Lance Enterprise Inc.
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Phone: (914) 963-0310

Medical Coaches, Inc.
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Recreation Industries, Inc.
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Warren Space Center
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Phone: (216) 393-1518

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Robin-Aids, Inc.
3353 Broadway
Vallejo, California 94590
Phone: (707) 643-1795

Royce International
4345 So. Santa Fe Drive
Englewood, Colorado 80110
Phone: (303) 789-1032

Sheller-Globe Corporation
Superior Division
1200 East Kibby Street
Lima, Ohio 45802
Phone: (419) 222-6010

Skillcraft Industries, Inc.
P.O. Box 519
Venice, Florida 33595
Phone: (813) 488-1501

Speedy-Wagon Sales Corp.
2237 Harvester Road
St. Charles, Missouri 63301
Phone: (314) 723-1119

Target Industries, Inc.
8 Heywood Street
P.O. Box 3898
Springfield, Massachusetts 01101
Phone: (413) 736-5442

Travel Equipment Corporation
U.S. Highway 33
P.O. Box 512
Goshen, Indiana 46526
Phone: (219) 533-4161

SPECIAL BODY/VAN OR LIGHT TRUCK CHASSIS

Carpenter Body Works, Inc.
Mitchell, Indiana 47466
Phone: (812) 849-3131

Checker Motors, Inc.
2016 Pitcher St.
Kalamazoo, Michigan 49007

Grumman Allied Industries, Inc.
600 Old Country Road
Garden City, New York 11530
Phone: (516) 741-3500

HP Bus Corporation
Faulkner Street
North Billerica, Mass. 01862
Phone: (617) 729-8983

Mercedes-Benz of North America, Inc.
One Mercedes Drive
Montvale, New Jersey 07645
Phone: (201) 573-2684

Microbus Corporation
11806 Woodruff Avenue
Downey, California 90241
Phone: (213) 923-3221

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

VanGinkel Associates Ltd.
1170 Beaver Hall Square
Montreal III, P.Q., Canada

Volkswagen of America, Inc.
Englewood Cliffs, New Jersey 07632

Wayne Corporation
P.O. Box 1447
Industries Road
Richmond, Indiana 47373
Phone: (317) 962-7511

[1] Small Vehicle category: up to 16 adult passengers.
Medium-Size Vehicle category: 16 to 30 adult passengers.

DIRECTORY OF MINI-BUS VEHICLE MANUFACTURERS

MEDIUM-SIZE VEHICLES

MOTOR HOME ADAPTATIONS

Apeco Transit Division
White Pigeon, Michigan 49099

Argosy - Airstream
Ohio Building
Sidney, Ohio 45385
Phone: (513) 492-9175

Dodge Trucks Division
Chrysler Corporation
Detroit, Michigan 48231

FMC Corporation
333 Brokaw Road
Santa Clara, California 95052
Phone: (408) 289-3881

Funcraft Vehicles, Limited
(Toronto "Go" Bus)
Cambridge, Ontario

Grumman Allied Industries,
600 Old Country Road
Garden City, New York 90241
Phone: (156) 741-3500

Pace-Arrow Inc.
Ontario, California 91761

Rec Vee, Inc.
39 Iron Hill Road
New Britain, Pennsylvania 18901

Revcon
P.O. Box 8797
10870 Kulama River Road
Fountain Valley, California 92708
Phone: (714) 968-3341

Sheller-Globe Corporation
Superior Division (Conserv-a-Ride II)
1200 East Kibby Street
Lima, Ohio 45802
Phone: (149) 222-6010

Urban Transportation Devel. Corp.
Yonge Eglinton Center
30 Eglinton Avenue West
Toronto, Ontario
Canada M4R IK8

Winnebago Industries, Inc.
Forest City, Iowa 60436
Phone: (515) 582-3535

Wolf Coach, Inc.
200 Bartlett Street
Northboro, Massachusetts 01532
Phone: (617) 393-6038

MEDIUM BUS-TYPE VEHICLES

Fleetwood Transit Buses, Inc.
P.O. Box 1667,
3200 Myers Street
Riverside, California 92502
Phone: (714) 785-0565

The Flxible Company
970 Pittsburgh Drive
Delaware, Ohio 43015
Phone: (205) 578-1820

Minibus
9301 Stewart and Gray Road
Downey, California 90241
Phone: (213) 862-1972

ELECTRIC VEHICLES

Battronic Truck Corporation
3rd and Walnut Streets
Boyertown, Pennsylvania 19512
Phone: (215) 367-2091

Canada Power Skoot Ltd.
74 Holmcrest Trail
West Hill, Ontario MIC 1V5 Canada
Phone: (416) 282-3803

Electric Vehicle Associates, Inc.
5294 Ridge Road
Parma, Ohio 44129
Phone: (216) 888-1233

SCHOOL BUSES

Bluebird Body Company
Fort Valley, Georgia 31030
Phone: (912) 825-2026

Sheller-Globe Corporation
Superior Division
1200 East Kibby Street
Lima, Ohio 45802
Phone: (419) 222-6010

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

Sportscoach Corporation
9601 Canoga Avenue
Chatsworth, California 91311
Phone: 213) 882-8522

Twin Coach Division
Highway Products
789 Stow Street
Kent, Ohio 44240
Phone: (216) 673-9821

Electrobus
7739 Woodley Avenue
Van Nuys, California 91409
Phone: (213) 988-5630

Petro-Electric Motors, Ltd.
342 Madison Avenue
New York, New York 10017
Phone: (212) 986-2873

Carpenter Body Works, Inc.
Mitchell, Indiana 47446
Phone: (812) 849-3131

Ward School Bus
P.O. Box 849
Highway South
Conway, Arkansas 72032
Phone: (501) 327-7761

Wayne Corporation
P.O. Box 1447
Industries Road
Richmond, Indiana 47374
Phone: (317) 962-7511

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