



Small-Sized Non-Step Bus "AERO-MIDI ME"

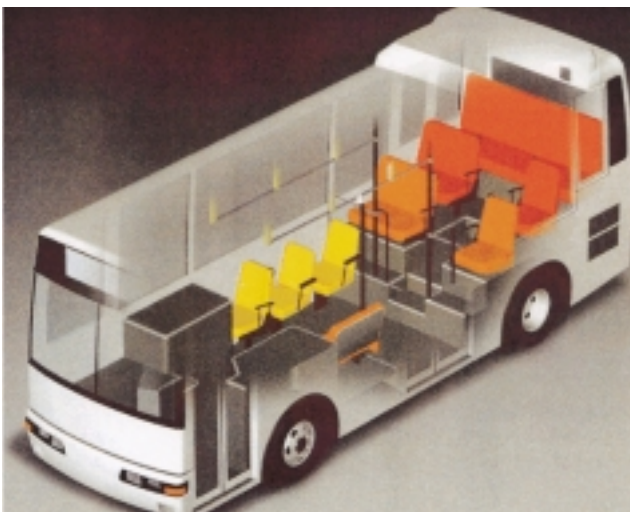
Recently, bus routes which circulate busy shopping areas and residential areas, designed to stem the decline of route bus line passengers, are helping to secure the number of passengers and restore profitability. Also, in areas suffering from aging and depopulation, local governments are operating community buses. To enable these services to be used by the physically disadvantaged, small-sized buses are being produced at a relatively healthy rate. Although Mitsubishi is marketing a small-sized bus "ROSA" for route buses, there is strong market demand for buses having a door at the front overhang portion to enable passengers to get on and off smoothly, as well as to make it easier to check the fare of each passenger. Furthermore, in November, 2000, the "Movement Smoothing Law"^{*1} (so-called "Barrier Free Law") was announced officially. At the time, there was no bus in the domestic market that met the Law and had an overall width of 2.1 m or less, to operate on routes with narrow roads of 4.5 m width or less. Mitsubishi has therefore developed the first small-sized non-step bus in the domestic market, which is equipped with doors at the front overhang portion and between the wheels, which complies with the Barrier Free law, and which has an overall width of 2 m.

*1: To enable handicapped persons to move, the Law limits the ground height of the floor, and requires the mounting of facilities for ascending and descending of wheel chairs, etc.

1. Target

To develop a non-step vehicle of 2.0 m overall width class, which is relatively inexpensive and complies with the Barrier Free Law.

- (1) In spite of the vehicle being in the 2.0 m overall width class for operation on narrow routes (4.5 m road width), the floor area must be 4.5 m² ensuring the non-step portion.
- (2) To suppress the sales price, common parts proven on trucks and buses already in the market must be used.
- (3) Necessary parts to comply with the Barrier Free Law



must be equipped.

2. Features

(1) Lower floor

With the newly designed center-drop type front axle and 5-link type air suspension system, which is common with MJ, according to the narrower body width (overall width 2,060 mm, 240 mm less than the MJ model), the floor from the front door to behind the middle door has no step. To reduce costs, the rear axle was modified based on that for a small truck, and the rear suspension system, a combination of trailing type leaf springs and air springs, is a refined version of that used for the small-sized bus "ROSA". In addition, the ground height of the floor is set at 340 mm for the front door and 300 mm for the end of the entry/exit gate, thus making it "easy to get on and out and ensuring a comfortable ride for passengers". Further, by using the air suspension, vehicle height adjusting systems (4-wheel kneeling^{*2} and vehicle height raising^{*3}) are offered as an option to meet the operational needs of each user, as well as road surfaces and topographical conditions.

*2: A system which makes it easier for passengers and wheelchairs to get on and out, by lowering the vehicle height (50 mm) by discharging air from the air springs of the front and rear wheels.

*3: A system that prevents interference between the body and road surface, by raising the height of the air springs (50 mm) of the front and rear wheels.

(2) Basic layout

Assuming use on narrow routes, the T-drive layout with laterally mounted engine is adopted like MJ, a medium-sized non-step route bus, and with the shorter overall length of 6,990 mm (less than 7 m), wheelbase of 3,560 mm, and overall width of 2,060 mm, to make operation on 4.5 m wide roads possible. In addition, to ensure an interior passage width of 550 mm at the front axle portion to facilitate passenger movement in the bus, new steering linkages with revised steering angle are adopted.

The length of the front overhang (1,850 mm), the length of the rear overhang (1,580 mm) and the wheelbase are the same as the 7 m model of MJ, and although smaller, the middle entry/exit has the same width of 815 mm as the medium-sized bus for the smooth getting on/out of passengers. Furthermore, cost has been reduced by using

the same body side parts as the model of MJ.

The air conditioning equipment, applying the refrigerating evaporator originally for passenger cars, is newly designed to ensure sufficient cooling capacity for the body size, and is installed on the ceiling of the rear portion of the body.

(3) Interior layout

The interior room height is set at 2,285 mm, the same as MJ, to ease the closed feeling caused by the narrower vehicle width. As the fuel tank (100 liters) is installed under the left side of the floor between the wheels, the floor height of the portion is inevitably a little higher. By locating a side-facing bench seat for two persons on that floor portion, however, passengers are able to sit down from the non-step floor.

The right side of the vehicle has the same floor height continuously from the entrance, and is equipped with three front-facing one-person seats. Of the three seats, the two rearward ones are foldable to accommodate a wheel chair when necessary, and the floor has fixtures for belts to secure the wheel chair.

Although the rear portion of the floor has a stair shape because of the rear axle, the driveline and the engine, there are front-facing seats for 10 persons, thus ensuring seating for 15 persons per vehicle.

(4) Major functions

The frame has a new structure to adapt to the non-step floor, narrower overall width and the smaller engine. At the same time, it ensures lighter weight and appropriate rigidity, while keeping sufficient durability for a small-sized bus.

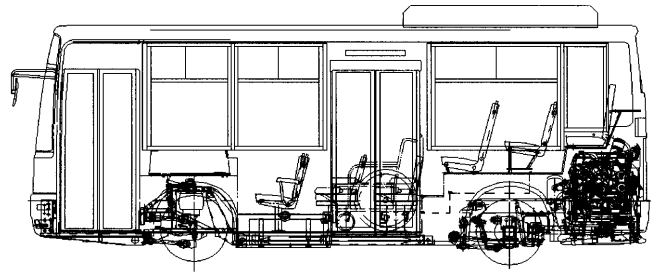
The engine is the 4M50T, which is using for small-sized trucks and buses, with a new starting motor, a large-capacity air compressor and combination of 50 A and 80 A alternators for the idling stop and starting system (ISS), which has recently become mandatory for route buses. This makes the engine able to satisfy customer requirements for similar performance to large-sized buses.

The standard 5-speed finger-control transmission (M050S5), which is the same as that of the MJ non-step bus, combined with final reduction gears of 4.875 ratio, ensures adequate driving performance for urban routes. Further, for routes in hilly residential areas, a final reduction gear with better hill climbing ability (reduction ratio 5.285) is available as an option.

The brake system is an air-over-hydraulic type, which, combined with the brakes for small-sized trucks (320 diameter x 110), has adequate functionality and is lightweight. Further, a hydraulic control type ABS, which is the same as that of other small-sized buses, is available as an option.

(5) Major equipment

- Equipment for compliance with



Barrier Free Law

As a "passenger-friendly bus", the following equipment is installed as standard:

- ① A detachable slope board for wheel chairs (at the middle door)
- ② Folding seats (two seats) to make space for a wheel chair and indicating stickers
- ③ Fixtures and belts to fix the wheel chair (for one wheel chair)
- ④ A public announcement system to provide information to the passengers, such as the next bus stop, and a LED type indicator for the name of the next bus stop (also indicating the fare at the same time)
- ⑤ Stanchions (vertical poles for holding) every 3 rows of seats to ensure safety when moving in the bus, with button switches to signal the driver to stop at the next bus stop, etc.
- ⑥ Floor covering to prevent slippage

• Seats

Seats for 15 passengers are all covered with moquette fabric, with different colors for "priority seats" on the left side between the wheels

• Trims around the passenger seats

According to the standard specification for large route buses, trims are unified to a cream color.

3. Major Specifications

The major specifications of the AERO-MIDI ME are shown below.

Specifications		Model	ME17DF	
Rated passenger capacity [Seated passengers + standing passengers + driver]		(persons)	35 [15 + 19 + 1]	
Dimensions	Overall length	(mm)	6,990	
	Overall width	(mm)	2,060	
	Overall height	(mm)	2,990	
	Wheelbase	(mm)	3,560	
	Tread	Front	(mm)	1,695
		Rear	(mm)	1,560
	Minimum turning radius	(m)	5.7	
	Width of area occupied on road during a 90 degree turn	(m)	4.5	
Minimum ground clearance	(mm)	150		
Engine	Model		4M50T	
	Total displacement	(L)	4.899	
	Maximum output	{kW (PS)/min ⁻¹ Net}	132 (180)/3,200	
	Maximum torque	{Nm (kgf·m)/min ⁻¹ Net}	412 (42)/1,800	
	Steering		Ball and nut type integral power steering	
Running equipment	Suspension	Front	Axle type air suspension	
		Rear	Axle type air suspension	
	Brakes	Both front and rear	Air-over hydraulic	
	Tires	Both front and rear	225/80R17.5	

(Vehicle Dev. & Design Dept., Truck & Bus Resrch & Dev. Office: Sueyoshi, Yamaguchi)