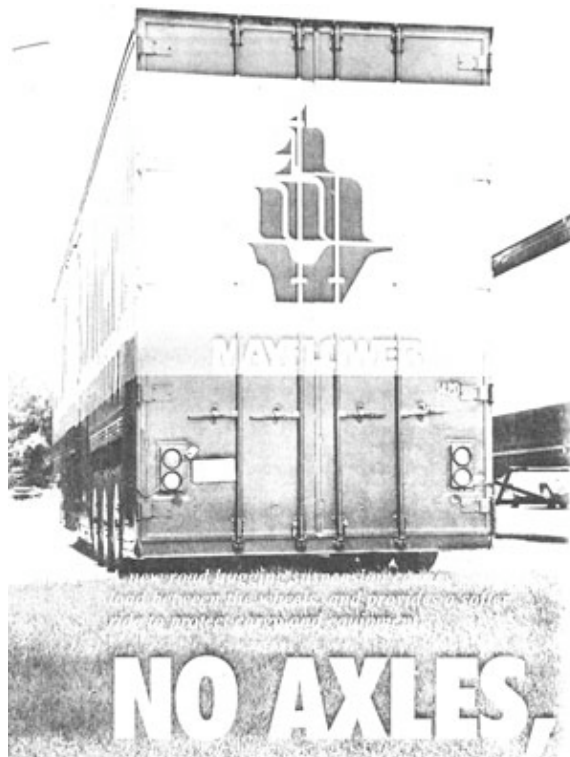




## The World's Leader In AXLELESS® LO-FLOOR™ Vehicles

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### **No Axles, More Cube**

*By Jim Jones*

*A new road hugging suspension carries load between the wheels, and provides a softer ride to protect cargo and equipment.*

Since time immemorial, almost as though they were compelled to do so by some unwritten law, truck, trailer and component manufacturers have been using the term "evolutionary in design" to describe their new equipment innovations. Now along comes DBX Engineering, Inc., with an exciting new technique for putting the wheels on a trailer, and a customer is calling it a truly revolutionary development.

"What this new suspension system does for Mayflower Transit," explains John Vance, vice president of Transport Service, "is to boost our cube more than 20%. Our standard vans for moving household goods have a capacity of 3,600 cubic feet. Now with this new DBX concept, we're just over 4,400 cubes in the same overall 48 by 102 envelope. That in itself is remarkable enough to be revolutionary, but what sets this development apart from anything that has ever gone before it is a totally new approach to the design of a trailer's suspension."

Instead of using a traditional under carriage with dual wheels at both ends of each axle, the DBX system puts the floor of the trailer down near ground level by doing away with the axles. Single 8.25-inch wheels fitted with 22.5-inch low-profile radials are mounted independently on specially designed wheel plates, permitting the load to ride between the wheels rather than on top of them. The Mayflower units have three wheels on each side, and the total intrusion of the wheel box into the interior of the van is only 11 inches wide.

"Lining up three wheels per side gives us all the carrying capacity we need," John continues, "and with a 77-inch span between the wheel boxes, an automobile can be driven right into the trailer without using any special decking. More often than not, people are taking a car along with the furnishings they're moving, so in our case the width of the wheel box was an especially critical consideration."

According to John, Mayflower's gross weight in its household goods division ranges between 60,000 and 72,000 lbs. This he explains is usually about all that can be packed into a conventional 48-ft van. Longer trailers, he adds, are unwieldy in most residential areas, so until the DBX design came along the moving industry had pretty well reached its limit on productivity.

#### **No Problems**

Five DBX trailers have been operating in the Mayflower fleet for about a year, and a couple of them are now closing in on 100,000 miles. "Although they are prototypes," reports Dan Rusher, Mayflower vice president, equipment services, "these first five vans have been remarkably trouble free. We're currently taking delivery of another eight units, and if no problems have shown up by the end of the year, we expect to

add another 40 DBX vans to the fleet early next year.” Summing up the DBX experience to date, Dan says there was some initial concern with the early wear rates on tires. A camber toe-in adjustment has improved the situation, and he advises that tire wear will continue to be monitored very closely. “With the DBX suspension,” Dan continues, “there is much less movement of the trailer vertically and horizontally. If you follow one of these units down the highway, it’s obvious there there’s a big difference in the way it tracks and hugs the road. Our drivers say they can also feel the difference. They all tell us it’s the best handling trailer they’ve ever pulled.”

According to Dan, however, the equipment people at Mayflower also had a number of other tire, wheel and brake concerns about the DBX design. “We wondered about scrubbing the tires in tight turns,” he recalls, “but of course in this respect it’s really no different than a spread tandem.”

Another point to keep in mind, Dan adds, is that each wheel has its own individual air spring and therefore can be lifted off the ground after the bag is deflated. When backing into a driveway the rear of the trailer becomes a pivot point. Cranking up the two rear wheels on each side, Dan notes, enables a 48-ft DBX trailer to be maneuvered almost as tightly as a standard 42-footer. In addition, of course, when running empty or very lightly loaded, two or maybe even four tires can be lifted off the road to extend their life still further.

#### Boxed In

With the wheel well opening boxed in at the front and rear, as well as the side behind the wheels, it was originally thought that there might be insufficient circulation of air to cool the brakes. This has not turned out to be problem, however, even when an aerodynamic cover was installed over the outside of the wheel wells. Unfortunately the covers did little except to enhance the DBX van’s appearance, and Mayflower has therefore taken them off.

“We always check the tires, wheels and suspension components during a pre-trip walk-around,” Dan explains, “and the covers made it difficult to perform a proper inspection. Closing up the box had no detrimental effect on brake cooling, however, and prior to the removal of the covers, some of those early trailers had operated in all kinds of weather and in all kinds of terrain.” Mud, snow and ice buildup inside the box was something else Mayflower worried about, but Dan says it has not been a problem. In view of the tight clearances inside the box, the equipment people had been concerned about what might happen in the event of a blow-out or run-flat. The one blow-out to date has eased everybody’s mind on the score – the driver merely cranked the blown tire up far enough to clear the pavement and continued on down the road.

As seen in the close-up photo, as well as in the cut-away schematic, there is a complete suspension system at each wheel position. As noted, each individual suspension has its own air spring and shock absorber, as well as a brake chamber, 16-1/2 x 5-inch S-cam brake, automatic slack adjuster and torsion bar. Total braking effort, according to Dan, is equal in all respects to that of a conventional trailer even though there are only six wheels instead of eight. The secret, he says, is the ability of the independently suspended wheels to maintain better contact with the pavement.

#### All Together

The new Mayflower trailers are being built by Wabash National, and working to a design developed and patented by DBX, Wabash is also fabricating the suspension. DBX president

Dallas Smith says the project has been a near lifelong dream and its fruition is due in no small part to the whole-hearted collaboration of Mayflower Transit and Wabash National. Other suppliers have pitched in as well, but essentially he says it has been only with the help of Mayflower and Wabash that he has been able to bring to the marketplace an idea he's had "knocking around" in the back of his head for more than 25 years. It all started, he explains, back in the early days of his career as an auto hauler when he kept thinking how easy it would be to carry one more car per trip if only he could figure out some way to eliminate the axles on the trailer.

Now that the dream has become a reality, long-range plans call for further adaptations and refinements of the basic design. There is a long list of potential applications. But initially most of the attention will be focused on niche markets in which the existing benefits of the axleless concept can be put to use most advantageously. Car racing teams, tanker operators and furniture haulers are some of the most promising immediate prospects, but somewhere further down the road it appears that the possibilities are limited only by the imagination.

"The improvements we're able to offer carriers who operate tankers are especially impressive," Dallas observes. "By getting the tank much closer to the ground, we lower the center of gravity and greatly reduce the rollover tendency. Also, a tank is an expensive piece of equipment that is highly susceptible to very costly damage when bouncing down the road on the way back to the terminal after delivering its cargo. With a DBX suspension, an empty tank will cling to the pavement much more securely, thereby avoiding this type of structural damage to the chassis.

Another likely example, Dallas notes, is the big bonus a DBX trailer offers a furniture hauler. The full cube DBX van could be used on the outbound load, while a dock-height deck could be put in place to permit the forklift loading a back haul. Eventually decks might also be used to facilitate the dock-height loading trailers that deliver their contents at ground level. Operations that service convenience stores and fast food restaurants are prime examples of this type of application.

"When you really start thinking about it," Dallas concludes, "the possibilities are virtually unlimited."

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