

Second Generation “Hydraulic Cooling” System Is The Right Choice For High-End Motorcoaches

Customer

Country Coach, Inc.

Markets Served

Luxury Motor Coaches

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*Ben Buchanan,
Director of Mechanical Engineering,
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A 2008 Country Coach Inspire 360 motorcoach cruising in the country.

Background

Country Coach builds 600 or more luxury motorcoaches annually. They range in length from 34 to 45 feet and weigh up to 54,000 pounds. Power is supplied by Cummins diesels with outputs up to 650 horsepower. Each vehicle is built on an application-engineered steel chassis and extensively customized with luxury features and amenities to suit individual customer tastes and requirements.

Challenge

Buyers of high-end motorcoaches expect highest available levels of quality, performance, and luxury. To maximize usable interior space, the vehicle’s mechanical spaces tend to be very dense,

making it difficult to find room for radiators and fans, tubes and hoses, and cooling control systems. “Engines and cooling systems may not be as visually appealing as exotic wood trim, or plush upholstery,” says Ben Buchanan, Country Coach director of mechanical engineering, “but they are every bit as important to long-term customer satisfaction.”

At the same time, he says, ever more stringent emission regulations, and a growing list of engine-powered accessories are placing increasing loads on cooling systems. Fan motors must be able to handle both the power requirements of spinning large diameter blades, and the axial thrust generated by the blades. In a large fan operating at 2,600 rpm, the

thrust may reach 250 ft lbs. Balancing these demands with a system that performs over a broad range of operating and environmental conditions along with high reliability is an ongoing challenge.

Solution

Country Coach was an early adopter of hydraulic cooling technology, using an engine-powered hydraulic pump to power a hydraulic fan-drive motor. This technology permits the radiator/fan assembly to be mounted virtually anywhere on the vehicle, giving designers great flexibility in component location. Their first implementation of hydraulic cooling was based on discrete components connected with custom-routed tubing. This approach proved to be unsatisfactory in terms



Eaton gear motor (mounted to cooling fan) with special electronic control proportional relief in motor's rear cover.

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of installation economy, space utilization, performance, and reliability.

All Country Coach vehicles now use an Eaton system based on a Model 420 variable displacement piston-type pump mounted to a PTO pad on the transmission. The system is applied to both single and twin-fan cooling installations with blade diameters up to 34 inches.

The same pump is used on all vehicles, with maximum output adjusted by changing

the PTO ratio. Depending on the radiator package used, the pump feeds fluid directly to a 19, 33, or 38 cc/rev fixed-displacement Eaton gear-type fan motor with an integral proportional control valve. The electronic control is wired directly from the ECM (engine control module) to the 12volt DC proportional valve coil. “Eaton has been really helpful during the transition,” Buchanan says. “Our previous supplier tended to show up every three or four months to ask how we were doing, and then disappeared.

Results

Country Coach has been able to reduce the number of components required and standardize the hydraulic cooling system installation across their entire product line. The simplified controls and high level of component integration of the Eaton system has significantly reduced the amount of space required for the system while simultaneously improving both performance and reliability.