



GET COMFORTABLE

A Thermo King publication for the mobile climate control industry.

Winter 2001

Comfortable in Coach



An innovator for nearly 70 years, Motor Coach Industries (MCI) has done it again, flawlessly designing and introducing the latest concept in coaches. The MCI "F3500" is one of the most comfortable coaches for both drivers and passengers available today.

continued on page 2

People Profiles	Page 3
A Ride With Thermo King of Pittsburgh	Page 4
P.M. Tip	Page 5

Understanding the Technology	Page 6
Sleek and Slim	Page 8
Protection, Protection, Protection	Page 8



THERMO KING
World Leader in Transport Temperature Control

continued from cover

“Our F coach is built from the frame up,” explains Mitch Guralnick, MCI’s senior account executive. “We made every engineering choice possible to make this a comfortable small coach. From the Torsilastic front and rear suspension to the climate control system, our F-coach is stylishly designed, easy to handle and maintain as well as being comfortable.”

Introduced in April 2000, the MCI F3500 is a two-axle, 35-foot coach designed for airport shuttles or for tour and charter operators looking for a smaller, comfortable coach.

Passengers will find a comfortable ride in the spacious interior while drivers will find the F3500 easy to maneuver. The MCI® F3500 comes equipped with a 285-horsepower Cummins diesel engine and an Allison automatic transmission. Its monocoque construction provides durability while standard parts make the F3500 easy to maintain. Features include enclosed overhead parcel racks, plenty of baggage capacity and a lavatory. A four-monitor video system is also available.

Interior comfort is constantly maintained with a Thermo King MRT rooftop air conditioning system. It’s the first rooftop system MCI has used, but as Guralnick explains, it was a logical choice.

“Thermo King’s system had the most capacity. In testing, it was the quickest to hit the set temperature. Plus it’s reliable. We’ve used their systems before with little trouble. You know the age-old theory behind heat and air conditioning – heat rises while cold air drops. That’s the reason why Thermo King’s rooftop systems made so much sense to us,” said Guralnick.

Before making a final decision on climate control systems, MCI tested systems in extreme ambient temperatures. In blazing heat, over 100 degrees F, the Thermo King system quickly and accurately held 63 degrees F inside the coach. The system performed just as well in cold temperatures, keeping the inside of the coach warm and comfortable when the outside air was well below freezing. In addition, MCI found that window pane frost wasn’t an issue.

“One of the features customers like the best is the driver’s individual controls,” said Guralnick. “Drivers can easily maintain their own climate control whether it is to their feet, body or the windshield. Overall, the system is easy to operate. It’s all at a driver’s fingertips.”

MCI will also offer the F3500 as a conversion-ready shell, to accommodate those who want to transform their coaches into motorhomes, limousine/executive vehicles and other custom uses.

Available worldwide, MCI has already sold F3500 coaches to companies in Guam and Puerto Rico as well as the United States.

Tropiano Transportation is one of the first U.S. companies to purchase the new buses. Nick Tropiano, president of Tropiano Transportation of Drescher, Pa., said he liked the MCI F3500 because of its seating capacity for 36 passengers. “It’s a good number for the college and sports teams we serve. We were looking for a high-quality coach that will be reliable.”



The MRT's low profile system minimizes the height the climate control system adds to the top of the bus. It's designed to blend into the bus and enhance the vehicle appearance. The MRT controls temperature, humidity, ventilation and air circulation. It also features the IntelligAIRE™ Control System and optional Smart Controller Diagnostic System. For maximum flexibility, the MRT system is available with a 5M, 7.5M or 11M radius base and can be installed anywhere on the roof of the bus.

PeopleProfiles

Thermo King has products for all three major Bus A/C markets – coach, shuttle and transit. In this issue of *Get Comfortable*, we'd like to introduce our customers to the Thermo King people working on the front lines and behind-the-scenes who make sure the needs of our bus customers are met.



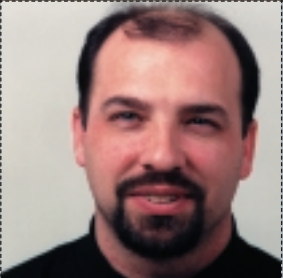
Mark**Nestingen**

Bus Product Service Manager, Central Region, **Mark Nestingen** is no stranger to Thermo King or the bus division. He's been with the company for 22 years in its corporate headquarters in Minneapolis, Minn. He started out in training and education in the truck and trailer divisions, then moved into bus climate control training. Mark took the bus service position 15 years ago. "I really like my job. I never quite know what I'll be faced with each day," said Mark. "I can field up to 50 or 60 phone calls or emails from customers, OEMs, corporate personnel or dealers on a busy day. Identifying the concern, solving the problem, delivering a quality product, responding in an acceptable time frame and gaining repeat business are always my goals."



Dennis**Haggerty**

Dennis Haggerty is the Bus Product Service Manager for the West Coast. During his 30-year tenure at Thermo King, he's moved from the test department to the container group and then to the bus group, where he began doing application work, field-testing and troubleshooting. He was named product service manager for the Western Region in 1999. Dennis views the position as a natural extension of working as an engineer. Dennis spends 60 to 70 percent of his time on the road, which allows him to keep an eye on what's going on in the field. He interfaces with customers and the engineers, assists with field-testing, provides support to the sales staff and reworks customer programs. "I love the variety this position provides. I enjoy meeting new people and helping my customers be more efficient and knowledgeable about the product. I also like the time I spend working at my new home in Phoenix. It's quite a change from Minneapolis!"



Joel**Dekovitch**

Joel Dekovitch, Bus Product Service Manager for the Eastern Region, knows Thermo King air conditioning systems. He's been working on them since 1989. First at the New Jersey Transit Authority and then at Thermo King of Philadelphia. Joel accepted the service manager position in August 1999, and he covers the entire East Coast, Canada and Puerto Rico. His goal is to visit customers – bus manufacturers, transit properties or end users – once every four to six weeks. To make that possible, Joel is on the road three to five days a week. His biggest challenge is balancing the needs of his customers and maintaining a regular visit schedule. "I enjoy the travel. There's nothing like meeting face-to-face with your customers. I want to make sure they're happy with the equipment and the service they're getting from Thermo King. In addition, I make sure they're getting proper product training. And it's rare that I'll pass up the opportunity to get my hands dirty and give them a little hands-on training."



Dale**Seiler**

As the technical service instructor for bus climate control products, **Dale Seiler** teaches the six (5-day) factory classes in Minneapolis for bus end-users, bus manufacturers and Thermo King dealer technicians. He also takes the training on the road, traveling to customer locations. When he's not in the classroom, Dale is working to make sure the bus air conditioning training materials are up to date and include new product advances. Dale has 22 years of experience in the bus industry, working with and teaching bus air conditioning. He's been with Thermo King for the past six years. "It's rewarding for me to complete the training program and then have students come up to me and tell me they have learned more about our units in eight hours than they knew in the last ten years of working with them."

A Ride With Thermo King of Pittsburgh

Controlling climates in buses is tough business. There are anywhere from 30 to 60 passengers to satisfy. Some like it a bit cooler, others get too cool a little too fast, while a few are always plain hot. Who wins? Everyone – if the air-conditioning unit is serviced by Thermo King of Pittsburgh.

Thermo King of Pittsburgh has been in the bus business since the '70s. It serves the temperature control needs of about 30 transit and shuttle services spread throughout western Pennsylvania. Roughly, that equates to 1,500 pieces of equipment.

According to Bob Price, president of Thermo King of Pittsburgh, each bus order is different and, in effect, a custom build. Things like temperature pull down and a balanced temperature distribution are scrutinized specifically to each bus and shuttle, all in an effort to meet the various human comfort conditions for that particular vehicle.

Recently, we talked to Bob Price to find out more about some of the challenges that his team at Thermo King of Pittsburgh faces and to learn more about why they're so darned good at their jobs. Here's what he had to say.

Q. How does working in the bus industry vary from selling equipment to the truck and trailer industries?

A. The bus industry is much more demanding up front when compared to the truck and trailer industries. There are more factors to consider with large windows, thin walls, multiple door openings, inconsistent compressor speeds and a complex bus filled with electronics. This planning and design is done six to 12 months ahead of time for a bus that must last 10 to 15 years. For the most part, in the trucking industry there are not as many details. The unit is installed in a standardized opening, the various functions are checked, the equipment is run and tested, the thermostat is set and the equipment is ready for business.

Q. How is Thermo King of Pittsburgh set up to deal with bus?

A. Our shop is equipped with all the necessary tools to handle bus repairs such as electronic diagnostic equipment, evacuation stands, refrigerant recovery equipment, torches, welders, crane, etc. But really, our most important tool is knowledge.

Our managers and technicians are well trained and have what it takes to satisfy the customer's needs in service, parts and warranty. Training is performed at Thermo King headquarters and locally, it includes: bus, truck, trailer and container equipment. Not to mention, we hold annual training classes here at Thermo King of Pittsburgh and perform custom training at customer locations.

Training at the customer's location helps bring technicians up to speed on new equipment. We usually perform all warranty and complex repairs here, but the bulk of the maintenance and regular repairs are done by the transit technicians at their own locations. It is imperative that we help them understand the system operation and offer assistance when needed.

Q. What is the secret to working well with bus customers?

A. To do a good job for the bus customer – whether it's government or private -- is a complex business since one bus design is usually very different from the next. The job starts with making sure the right unit is specified for the job and, more importantly, that the equipment is integrated properly into the bus. This includes the power take off, compressor mount system, refrigerant and coolant line plumbing, air ducting, electronics and controls. It takes a true partnership to work through these details.

Q. As a Thermo King dealer, what is it like to be limited to offering only service to bus customers, versus offering both sales and service to truck and trailer customers?

A. As a dealer, it is a little easier working on a truck or trailer unit sale because there is opportunity to work out specific end-user details with the OEM. When a trailer or truck arrives, we know what to expect because we were part of the sales process. With a bus, there are many more issues to be considered and the dealer is somewhat removed from the process. We try to get involved as much as possible to ensure that the proper temperature control system will deliver excellent performance at a minimal cost over a 15-year period.

Q. What do your bus customers expect from Thermo King? Are they more or less demanding than other customers?

A. All of our customers expect to get the best mobile temperature control equipment when they purchase a Thermo King unit. They also expect to be supported by a trained and knowledgeable service and parts network. Whether truck, trailer, bus or seagoing container, our customers want a product that is dependable and delivers top performance. When there is a problem, they want someone close by with a solution.

So is the time and effort that Thermo King of Pittsburgh puts into customer satisfaction working? We talked with Bob Grove from the Port Authority of Allegheny County to find out.

"Our customers have high expectations from public transportation and we join them in that regard. They want to board a comfortable, clean vehicle and receive a timely trip to their destination. Their comfort is dependent on having a warm bus throughout the winter and a cool bus in the summer. Because climate control is always a very important issue to Port Authority and its customers, we have written Thermo King units into our bus procurement specifications for a number of years.

"Thermo King's response to service and warranty issues has been outstanding, and the proximity of Thermo King of Pittsburgh has been a plus. In addition, they have arranged an annual training program for our mechanics, so we are able to better service units ourselves beyond the warranty period."

Now that's good customer service.

Port Authority of Allegheny County – At a glance

Specing Thermo King units in its bus procurements isn't the only thing keeping the Port Authority of Allegheny County busy. Take a look at this.

The Port Authority of Allegheny County:

Employs more than 3,100 people

Operates 1,000 buses, 55 light rail cars and four inclined plane cars

Serves 76 million annual riders on 228 bus routes and four light rail transit routes

Is poised to open its third buses-only roadway, the West Busway

Continues to make expanded Park and Ride options a cornerstone of its growth, with 41 facilities and 7,500 parking spaces

Is currently working on three new Park and Ride facilities after seeing a 40 percent growth in Park and Ride passengers in just three years

Is about to begin construction of an extension to the East Busway



Posing in front of a Port Authority bus and trailer equipped with a Thermo King SB-III DE unit are (from left to right) Scott McIntyre, parts manager; Bob Price, president; and Rick Boes, service manager; all from Thermo King of Pittsburgh.



Easy as A, B, C

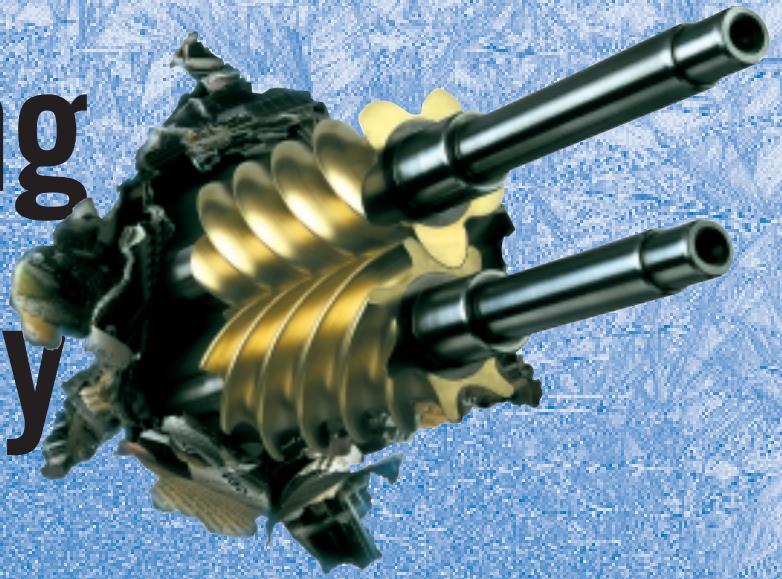
Preventative maintenance (P.M.) is the key to a long and healthy bus climate control system life. It will help prevent component wear and tear, as well as system breakdowns. Just like anything you own, the better you take care of it, the better it will perform and the longer it will last.

Thermo King strongly encourages a complete P.M. program for all its bus climate control systems as it helps ensure system quality, reliability and longevity. To make it easier for customers to implement such a program, Thermo King provides each customer with a complete bus maintenance packet with recommended P.M. procedures.

Each packet includes an A, B and C inspection sheet itemizing the procedures to be done before and during the inspection. The technicians need only record the system information (i.e., bus number, A/C unit serial number, etc.) and go down the checklist to complete a proper P.M. inspection. In addition, there is a section on each form to record any parts used, as well as observations or comments about the system and the check.

Thermo King recommends the A inspection be performed monthly, the B inspection pre-season and the C inspection annually. If you have questions about Thermo King's P.M. program, call your local dealer.

Understanding the Technology



The S391 is the latest in Thermo King bus compressor technology. In a previous issue of *Get Comfortable*, we explained the S391 features:

- Environmentally friendly HFC refrigerants
- Fewer moving parts than reciprocating compressors
- Lower noise levels
- Low-level vibration to reduce mount and drive kit costs
- Programmable capacity control for fuel savings
- Exclusive oil management system for increased reliability.

Get Comfortable talked with Lars Sjöholm, Thermo King screw compressor program manager, about the technology behind the S391 and to find out what makes this compressor revolutionary.

Compression

The S391 is different from a reciprocating compressor in that it does not have internal valves or other parts that go back and forth. What does that mean for customers? There are fewer moving components, which lowers the noise and vibration levels and ensures a quieter ride for passengers.

The Thermo King-designed internal check valve makes sure the compressor does not rotate backward when the clutch disengages. It also stops the oil flow from the sump when the clutch disengages. At start-up the oil is ready to lubricate the shaft seal, bearings and rotors, which reduces wear and tear.

Integrated oil system

The oil separator and oil sump are located on the discharge side of the compressor, instead of the suction side. When the oil is on the discharge side, you do not have foam-up at the start. This reduces compressor wear and tear during start-up.

The S391 also has a fully integrated oil filter that makes sure oil supplied to the shaft seal is kept very clean. Getting particles into the shaft seal can cause refrigerant leaks. The filter helps keep particles out and the refrigerant clean, which increases compressor life.

Anti-friction bearings

The compressor rotors feature rolling element type bearings, in contrast to sleeve bearings. Rolling element bearings have low friction and can handle a high variety of lubrication conditions without breaking down or having bearing failure. The anti-friction bearings in the S391 translate into increased compressor durability for customers.

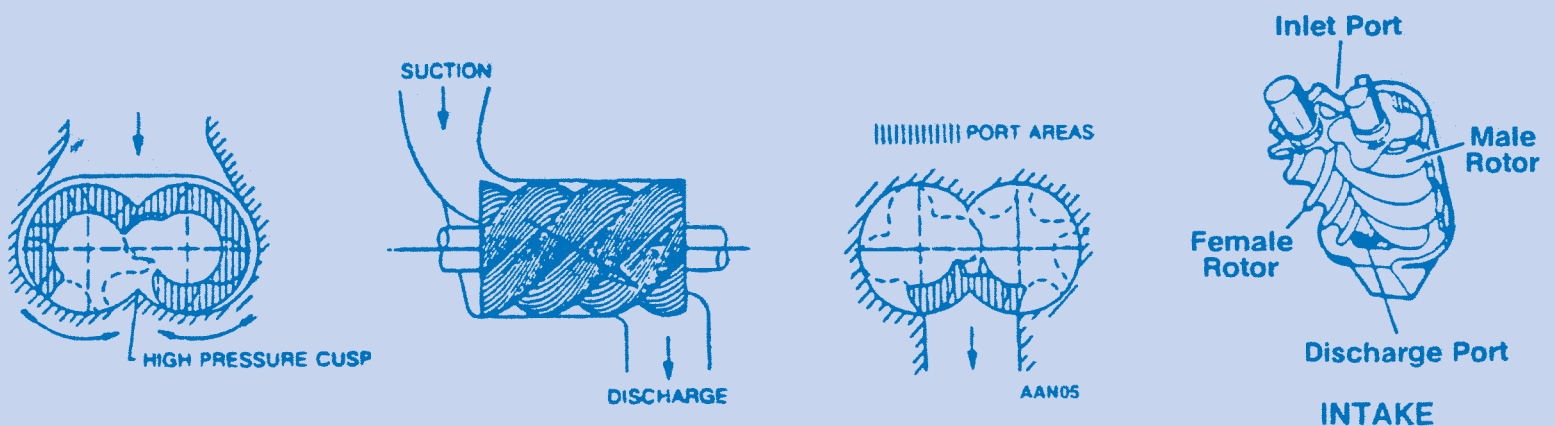
Capacity control

The compressor has an internal capacity control scheme. The capacity control steps are full load, partial load step I and partial load step II. The working displacement of the compressor is changed with internal unloaders, which prevents the frost build-up on the evaporator and reduces power consumption at high engine speeds.

Two refrigerants

Customers can choose to operate the S391 with either R-407C or R-134a refrigerant, depending on their capacity requirements. Operating the S391 using R-407C refrigerant gives the system a higher capacity. The S391, used with R-134a refrigerant, is better suited to operations with lower capacity requirements. To pick the right refrigerant for the job, bus size, expected ambient temperatures and operational duty need to be determined. The S391 with R-407C is best suited for larger buses, buses operating in hot temperatures, high humidity or if the bus has frequent door openings. On the other hand, the S391 with R-134a is better for smaller buses, those with lower ambient temps or fewer door openings. With fuel consumption a high-priority factor, fitting the proper unit, refrigerant and compressor are critical. Thermo King personnel can assist with the decision using our SMARTBUS system balance program. Making sure the bus' operating situation is clearly understood will help to determine if R-407C or R-134a is better.

Thermo King will be introducing its larger bus screw compressor, the S616, later in 2001, which will allow larger buses needing higher cooling capacity to run on R-134a.



Sleek and Slim

Space limitations are always a challenge. In fact, some smaller buses even have climate control equipment share rooftop space with compressed natural gas fuel tanks. With space at a premium, the sleek R-7 was designed to take less roof space while not compromising capacity, which makes it well suited for the under 30-foot bus market.

To help keep the unit size small, the R-7's controls are not mounted inside the unit. Instead, the new unit features remote controllers. The controllers can be mounted in the interior of the bus – perhaps under a seat or in the roof structure. The remote controls can be more accessible than traditional interior mounted controls – depending on the installation location.

The R-7 is our first unit with flexible radius choices. The one-size-fits-all R-7 can be adjusted to fit a five-meter to flat roof bus without adding adapters, special unit spec'ing or modifying it to fit the profile of the bus.

Size is also a factor in the split compressor system in the R-7. Each side of the unit runs off a separate TM-16 compressor. A single circuit version will be available in 2001 for the R-7, which will run in a single circuit with a TM-31-type compressor.

The R-7 is also a lighter weight unit, which is often a critical consideration for buses. The R-7 weighs 440 pounds. The weight benefits to customers are better fuel efficiency and lower axle weight requirements.

One part of the unit that is bigger are the fans, which actually reduce the interior noise levels. In addition to decreased noise emissions, the design choice also increases airflow by more than 25 percent. Because of the increased airflow, the R-7 is also more fuel-efficient. The R-7 uses R-134a refrigerant.



Protection, Protection, Protection

Thermo King's new digital controller, ClimaAIRE™, sets a new level of quality and functionality for small bus climate control. The sophisticated digital controller was designed to be operator-friendly while providing optimum temperature control. In addition to controlling the temperature inside the bus, ClimaAIRE protects the system from potential problems. In effect, it is the designated protector for your bus climate control system. ClimaAIRE continuously monitors the performance of the climate control system and protects the coils and compressor. In the event of a problem, ClimaAIRE issues a warning or may even shut down the system to prevent further problems. ClimaAIRE will be standard on all ShuttleAire™ product lines.

System protection

- ClimaAIRE protects the climate control system in three ways.
 1. Test mode, the first step of troubleshooting, checks all inputs and outputs and confirms that unit is operating properly.
 2. While the climate control system is operating, the controller constantly monitors critical temperatures and pressures.
 3. If there is a problem with the system an alarm is activated. The alarm display gives drivers an advance notice of problems, thus increasing your chances for catching a problem early.

Freeze protection

- If the coil temperature drops below 26.6 degrees F (-3 degrees C), the compressor, clutch and condenser fans automatically switch off, extending the compressor life and reducing costly repairs.

Compressor protection

- The compressor clutch can't be switched on for A/C operation at low ambient temperatures. The compressor is automatically turned on momentarily each time the vehicle is started. This momentary operation allows the compressor shaft seal to get oil – even in the off-season, when A/C is not required. This prevents leaks and extends the operating life of the compressor.

With all that protection, there's one less thing to worry about.



The easy-to-operate controller is standard on ShuttleAire SR-50C, SR-50S and SR-15 units.



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