Buying a Prevost conversion is a big step for many. Unfortunately, there are too many that scare prospective buyers away suggesting our Prevost conversions are overly complex and require a yachtsman’s budget to keep them going. Even the air conditioning systems are often a hot topic; pun intended. Granted our conversions are complex, as is almost any higher end motor coach. The same can be said of cost to keep you on the road or enjoying your favorite RV resort. That too doesn’t have to be significantly different than any high end motor coach. As for air conditioning systems, it’s good for you to understand the differences between air conditioning systems and how one might be more advantageous to you than another. Before starting the discussion air conditioning, let me define the three general categories of air conditioning systems. AC Powered systems are those that are powered by AC power and are used while parked and often times while travelling. Dash Air is the system that is like the one in our car that is responsible for defrosting the windshield and provides comfort to those in the area of the dash. Bus Air is a big brother system to Dash Air. It too is engine driven (although new systems not found in our coaches can be DC powered), but has much more cooling capacity and is typically distributed throughout the rest of the coach.

Let’s start with a discussion on how much cooling do you need to keep your coach comfortable. You would think this is an easy question to answer with simply some number of BTUs of necessary cooling. There are simply too many variables to give a single right answer. Let me approach this a bit differently. I’ll start with a parked coach running on commercial power. Variables to consider include outside temperature and humidity, the color of the coach, how well the coach is insulated, whether the coach has any shade, and whether the awnings are deployed and windows are covered. As you can see, even this is not going to be easy. Rather than drawing out a calculation, which I probably couldn’t do anyway, I’ll use real world experience. I’ll use my non-slide 1999 Country Coach XLV conversion and my quad slide 2008 42-foot Beaver Contessa. I have used both in the heat of Florida’s summer and have had both in direct, unshaded sunlight. The Contessa was mainly black with black windshield covers and awnings extended most of the time. The Country Coach is mainly shades of brown with some black. The main awning is generally not extended while the small shades are. The windshield has an interior white pull down shade. The Beaver had 3 roof airs, 2 @ 15,000 BTU and 1 @ 13,500 BTU. I would rarely have all three on, but did on occasion. My Country Coach has 3 roof airs, all of which are 15,000 BTU. Again, I would rarely use all three. So in my case, which should be near the worse heat and humidity conditions, my need for cooling has never exceeded 45,000 BTU. I also doubt I have 45,000 BTU of capacity from the roof airs on my Country Coach given the roof airs are over 14 years old.

If we can agree on a need for 45,000 BTU of cooling for a non-slide 45-footer, let’s tackle the cooling needs while driving. Frankly, I don’t know where to begin but I do have a good idea. I know the coach will be in full sun most of the time, that the engine will likely add some heat to rear of the coach, that I can’t benefit from window shades, and that I will likely feel a need for cooler air sitting in front of the windshield. I’ll go down the same practical path that I did before and look at some industry requirements. In the case of my Beaver, the three roof airs and dash air were always more than adequate. I’ll guess the dash air to be on the average size of 15,000 BTUs not knowing exactly what it was rated for. I’m sure it was rated for at least 15,000 BTUs. So, less than 60,000 BTUs was more than
adequate. I know that converters that don’t have Bus Air typically have an additional roof air, so I’m guessing they believe 45,000 BTUs of cooling capacity is not enough and 60,000 BTU is more adequate. I also know that I have about 65,000 BTUs of cooling in my Country Coach with both Bus and dash air and that it’s always been more than adequate. My Beaver had approximately 60,000 BTUs of cooling capacity and too was always capable of meeting our cooling requirements while driving.

Practical information suggests that minimum cooling targets should be 45,000 BTU for an RV resort setting and 60,000 BTU for traveling. Keep in mind these will be impacted positively or negatively based on number of windows, insulation and shading, number of passengers, volume of open slides, coach color, and other factors. To give you an extreme example of cooling requirements, school buses, commercial buses, and transit buses have a cooling standard. The worse being a transit bus that has to cool from 110 degrees to 70 degrees in 30 minutes! With the number of windows and limited insulation, that would require over 100,000 BTUs of cooling capacity. Obviously an extreme requirement; one that most of us wouldn’t need.

**AC Powered Systems**

Let’s look at AC powered systems first. These are always the systems we used while parked and often times also used when travelling.

**Roof Air** systems have become the defacto standard and with good reason, they are inexpensive to purchase, inexpensive to install, and inexpensive to service. They are used in so many applications today that price has been driven down by volume. High volume manufacturing should also equate to improved quality. Even my units that are well over 10 years old still work fine. They come in variety of sizes, but in almost every case the ones the converters use will be 15,000 BTU units. Although not in the scope of this document, they can be equipped to heat with a heat pump or electric heat strips. These come as duct supporting or self-contained. I’m pretty sure all converters build their own ducts and use the ducted systems. The ducted systems not only are better for evenly distributing the air, but also are less noisy. The latest Dometic units claim to be even quieter. I don’t find the noise level to be disturbing, but you should make sure you hear the units run on high speed before buying. Not all systems are ducted the same. My Country Coach has a common duct for all three roof airs. This allows, for example, for me to turn off the bedroom unit and turn on the middle unit at night almost totally eliminating noise in the bedroom while maintaining the desired temperature. Generally, all roof airs will be controlled from a single remote electronic control panel with each unit can be independently set for temperature and fan operation. If you want the bedroom to be a different temperature than, let’s say the galley, then you can certainly do so.

Besides the potential for compressor related noise, roof airs require roof penetrations. Any roof penetration is also a potential point of leaks. Properly installed this shouldn’t be a concern. Another concern is what to do with the condensation. It can simply be drained onto the roof, although most converters install a drain hose in the ceiling through the walls to drain below the coach.

**Split Systems** (often referred to as the once available Cruisair product) are very similar to residential systems. There is an indoor evaporator and fan for each system. Like roof air these indoor units are
often ducted and zoned. They may be ducted at or near the floor which is generally recognized as preferential to ceiling ducting. Air forced through ceiling ducting has to overcome the heat of ceiling ducts before cooling the area whereas floor ducts allow cold air to cool the space before it reaches the warmer temperatures at the ceiling. The outdoor unit has the compressor and condenser coil. The biggest advantage to these systems is that the compressor is generally isolated so compressor noise is very low, if even detectable. There’s no roof penetration or roof mounting, so no potential for leak (even though a leak is not likely in properly installed roof air systems). What may be a minor benefit to some; if you don’t have a satellite system on the roof, these may help in keeping your overall height a bit lower. The challenge with these systems is where to put the outside system them so that it gets adequate air flow to allow the evaporator to work efficiently. In some cases, maybe most, they are located behind the front bumper where there may be as many as three units. There are some that say they simply can’t keep their coach cool due to ineffective air flow resulting from where they are installed. These units, if properly installed, produce the same amount of cooling as roof air units and have the same heating options.

Dometic, the manufacturer of Cruiseair products, has discontinued Cruiseair products not related to the marine industry. The marine split units are different in that they rely on sea water for cooling. As an FYI, Cruiseair is a well-known and respected supplier to the marine industry. This may ensure parts availability well into the future. If you can find a good Cruiseair technician that doesn’t mind tight spaces these can easily be maintained. Still, many owners have reported problems finding skilled technicians, have incurred a high maintenance costs, and/or the quality of maintenance has been poor.

Dash Air

Prevost used TCCI 210 series compressors in late 90’s coaches. These units are rated at somewhere near 30,000 BTU (getting exact numbers has been difficult). I’ve also discovered that unless the system is sold as a self-contained system or matched components, like roof air or cruise air, the BTU ratings may be over stated. The BTU rating must take into consideration each component of the system, not just the compressor. Seeing we all have dash air, there’s little point in having a deep discussion on this system. However, exact BTU ratings would be helpful to determine the amount of additional cooling required for the entire coach. I think we can all agree that dash air is effective for its intended purpose, which is to keep the windshield fog free and to provide cooling to anyone in the front 2 seats. It’s not ducted to provide creature comfort beyond the area in the immediate vicinity of the windshield.

Bus Air

Prevost’s Version

Prevost refers to their Bus Air as Full Air which I assume to mean dash air as well as their bus air. Their bus air, often referred to as OTR Air, supplies ducted cooling that is generally, but not always, ducted at or near the windows. It is simple to use with a single control system at the dash.

Although I don’t have the specs on the specific compressor or other components, it has a very large compressor and sits to the right of the engine when you are facing the engine from behind the coach.
Prevost rates their Full Air at 108,000 BTUs. What is not clear to me is if this is the combined ratings of the two systems. In any case, this compressor is huge! In fact, Prevost’s Full Air adds 700 pounds to a coach as compared to the same coach with only dash air. Again, I don’t have the exact specifications on the compressor, but I’ve been told it requires up to 30 horse power depending on its RPM. This would seem a bit high for a system of at least 80,000 BTUs, so take this number with a grain of salt until someone can validate its power use.

In an XL or XL-II Prevost installs the condenser coils in bay 3; depending on the model year they may be installed in both bay 3 locations. Bay 3 is a narrow bay as the fuel tank occupies the middle of bay 3. So, you do lose a complete pass through bay just one or two of the smaller bays.

It’s hard to imagine anyone complaining that their Full Air didn’t provide adequate cooling. Keep in mind this same system is installed in the seated coaches that have significant heat loads when compared to our coaches. Full side windows and 55 passengers are the biggest factors. There are also cooling standards that have been established for both commercial and school buses. Both require a bus that’s heat soaked in a 100 degree paint booth to achieve 70 degrees in 30 minutes. The public transit bus requirement is even more difficult to achieve in that it requires a 110 degree bus to cool to 70 degrees in 30 minutes. Clearly these standards require LARGE capacity air conditioning systems, such as Prevost’s Full Air.

Finally, these are expensive at the time of initial purchase. Being very robust systems I would anticipate their maintenance costs to be reasonable but those costs may be offset by the size of the system requiring maintenance.

**Country Coach’s (and some Marathons) Version**

Country Coach’s air conditioner compressor supplies cooling refrigerant to two evaporators; one located in the galley at about the mid-point of the coach and the other in the bedroom. Each evaporator distributes cold air through a single duct with air flow controlled at the driver’s seat through two fan speed switches. Each switch is dedicated to a 3 speed fan at one of the two evaporators and either switch will control the compressor.

Country Coach uses an engine driven Seltec TM-31 air compressor mounted in the same location as the optional Prevost OTR Air, although much smaller in physical size. This compressor is a very flat capacity range of just under 40,000 BTU to just over 45,000 BTU. The benefit of the relatively flat capacity range is that regardless of engine RPM more than 40,000+ BTUs of cooling is supplied to the coach. Keep in mind the compressor is just one variable in determining a system’s cooling capacity. I haven’t been able to confirm the other components used by Country Coach allow the system to deliver 40,000+ BTU and can only say mine seems to cool more than adequately. Depending on RPM the compressor is operating at it uses approximately 9-14 horsepower.

Country Coach chose to locate the condensers under the coach just forward of the drive axle. To ensure adequate cooling, electric fans force air across the evaporators. Although located just more than a foot above the road, a road surface that may be hot, this location should be much cooler than traditional
mounting of automotive evaporators against the radiator or charge air cooler. Unlike Prevost’s Full Air, there is no loss of bay space.

Several Country Coach owners have said their system was difficult and expensive to maintain. Given the cost of Prevost’s Full Air a Country Coach system could be totally replaced a few times for less than the initial cost of the Prevost system. When this system works it does provide adequate cooling on the hottest of days in Florida.

**Over the Road Cooling without Bus Air**

If you don’t have bus air, how do you cool the coach when driving? All you need is 120VAC of adequate power and you can run your roof air or split air systems.

We all have generators with more than enough power to run all roof or split system airs as you drive down the road. You can run all air conditioners while on generator power. The only two negatives to running the generator is noise and fuel use. Personally, I can barely hear the generator, if at all, when I driving down the road. Depending on how many air conditioners and other AC loads you’re supporting, the fuel use may be less than you expect. Lightly loaded and running 2 air conditioners the fuel use will likely be in the 1/2 gallon per hour range.

We all also have inverter systems, house batteries, and an alternator to keep the batteries charged. The benefit of operating your roof or split system air conditioners off an inverter is that you don’t have to run the generator using fuel and adding to noise. The down side is you can’t generally run all air conditioners at the same time. Most coaches have 3KW inverters, which would struggle to support more than 1 air conditioner per inverter. While a few coaches have 2 4KW inverters that should be capable of supporting up to 2 air conditioners per inverter, if the coach is also equipped with sufficient alternator capacity to keep the batteries from being depleted while running the air conditioners. Alternator setups seem to be all over the map. Many have a 270A alternator for 24 or 12 volts, depending on the converter. You should figure on about 140A per air conditioner running through a 12 volt inverter and half that (70A) running through a 24 volt inverter. You should also realize running an alternator at or near its rated capacity will shorten its life and potentially lead to increased heat.

I’m not a big fan of using the inverters with high loads and especially those with large startup current loads like air conditioners. Even if I could run air conditioners through my inverters I’d likely use my generator before the inverters. This is a personal preference, so your preference may differ.

**Conclusion**

The best conclusion is that any of these systems will adequately cool a stationary coach and, if properly installed, these should all provide adequate cooling while driving. Installation practices used by some converters on at least of some of their units, as reported by owners, must have been improper because they can adequately cool these coaches. The hands down winner, as reported by owners, for keeping the beer cold and icicles on your whiskers is Prevost’s Full Air system. It does so at a hefty initial cost, taking more space than others, and the largest increase in weight.
The future of air conditioning looks like roof air for everyone. If keeping the cost down on a new conversion was the only factor, then roof airs would be for stationary and travelling air conditioning requirements. If a converter wants to get into HVAC engineering, which I doubt they do today, there are several Bus Air systems available in the marketplace today. Some use engine driven compressors while others run on DC powered compressors. I can easily see a small Bus Air system being adapted to coach applications.