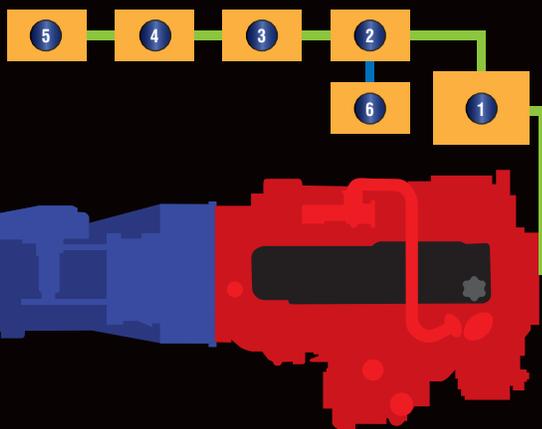


INDEPENDENCE

ELECTRIFYING THE WAY BUS AND COACH ACCESSORIES ARE POWERED

INDEPENDENCE is a simple, compact system designed for CNG and diesel-powered buses and coaches that provides the majority of the benefits of hybrid and battery-powered buses without the upfront costs and expensive hybrid battery replacement. This single-belt electric system completely decouples accessories such as the alternator, air conditioning, power steering, and air compressors from the engine, significantly increasing efficiencies by operating electric powered accessories independently of engine speed, thus decreasing fuel usage and emissions with an added benefit of lower NVH for passenger comfort. Plus, Independence greatly reduces operational and maintenance costs. Unique to the Independence is our Model Based Battery Monitoring® (MBBM) that can dynamically charge the batteries and provide a low SOC disconnect feature. **Below is an overview illustrating Independence's components and electrical power flow.**

INDEPENDENCE COMPONENTS



- 1 GENERATOR PRODUCES >45kW OF POWER**
- 2 EXPORTABLE POWER INVERTER-DUAL (VEPI-DUAL)**
MANAGES POWER TO THESE 230VAC ACCESSORIES
 - HVAC compressor
 - Air compressor
 - Power steering pump
 - Electric water heater
- 3 HYBRID BELTLESS ALTERNATORS (HBA's)**
MANAGES POWER TO THESE 28VDC ACCESSORIES
 - Cooling system
 - Power steering pump
 - Electric doors
 - Low voltage hotel loads
 - Dynamic charging of house batteries
 - Low state of charge disconnect
- 4 VANNER SERIES EQUALIZER WITH MBBM**
- 5 CONTROLLER**
- 6 WEG COOLING SYSTEM**

INDEPENDENCE OVERVIEW

A SIMPLE, COMPACT ECONOMIC SOLUTION TO ELECTRIFY BUS AND COACH ACCESSORIES

VANNER'S Independence, with its single-belt, high-voltage permanent magnet generator that produces in excess of 45kW, enables the replacement of conventional mechanical accessories with more efficient electric accessories managed by Vanner's Exportable Power Inverter-Dual (VEPI-Dual) and Hybrid Beltless Alternators® (HBAs). The VEPI-Dual provides 230VAC power management and functionality to power fully electric A/C system, electric water heating unit, and electric oil-less air compressor. Meanwhile, Vanner's Hybrid Beltless Alternators (HBA's) supplies and distributes 28VDC solid-state power for the cooling system, electric power steering, electric doors, and low voltage hotel loads. Unique to the Independence, the HBAs are optimized using Vanner's Model Based Battery Monitoring® (MBBM) that can dynamically charge the house batteries and provide a low SOC disconnect if vehicles are parked for three or more days!

If you're ready to declare Independence from conventionally driven accessories and transform your bottom line, contact Chris Collet at 1.614.329.1642 or at chrisc@vanner.com. To learn more about Vanner, visit us at vanner.com. Follow us on Twitter @VannerInc.

INDEPENDENCE FEATURES

- >45 kW HD industrial generator
- Low tension single-belt-drive system that eliminates multiple belts, pulleys and mechanical accessories
- Individual electrically powered components for simplified servicing
- Bi-directional DC to DC converter (foundation for stop-start and engine off)
- Up to 600 amps charging capacity
- Dynamic charging of house batteries based on SOC and SOH with Vanner's proprietary Model Based Battery Monitoring
- Use with Allison Transmission's FuelSense® 2.0 Max with Enhanced Acceleration Rate Management to save even more fuel

REAL BENEFITS

- Emulates total accessory electrification of electric, hybrid, and fuel cell buses and coaches at a fraction of the cost
- Maximum electrical efficiencies within 1% of a high-efficiency diesel-hybrid
- Uses existing power management and conversion hardware proven in hybrid-electric, electric, and fuel-cell vehicles
- Can be used with CNG or diesel-powered buses and coaches
- Reduces maintenance downtime as well as scheduled and unscheduled maintenance costs
- Reduces external noise emissions providing less internal noise, vibration, and harshness (NVH) for passengers
- Eliminates hydraulic oil in the engine compartment and associated fire risk
- Can eliminate diesel oil-fired water heaters

ABOUT VANNER

Vanner has been recognized as an accessory electrification and power management leader in the bus and coach industry for more than 40 years. We commercialized accessory electrification with the legendary Hybrid Beltless Alternator (air-cooled solid-state converter) for hybrids, battery and fuel cell buses and coaches as well as our Increased Accessory Power II (IAP II) is a total accessory electrification system for the Allison H 40/50 EP Hybrid.

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Product designs and specifications described in this literature are subject to change without notice.
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