



Kold-Ban International, Ltd.

UMA MOTORCOACH

EXPO 2020

January 19-23, 2020 Nashville Music City Center

Nashville, TN.

**START YOUR BUSES EVEN WHEN THE
BATTERIES ARE DEAD WITH PERMANENTLY
INSTALLED SUPERCAPACITORS.**

**James O. Burke, Vice President
KBI / Kold-Ban International, Ltd.**

Stop the breakdown before it occurs!

The West Virginia Breakdown:

a real example of a failed battery event.

- **Outside bus company to move people that evening. - \$950**
- **Direct Expenses to dispatch mechanic to the scene. - \$532**
- **Tow truck jump-start. - \$750**
- **2 new batteries to replace perfectly good batteries. - \$500**
- **Direct expense for fuel & oil on PTI Rescue bus. - \$546**
- **Hotel stay for driver and mechanic while at site. - \$300**
- **Tolls for PTI relief bus. - \$150**
- **Relief driver. - \$350**

Conservative loss value. \$4,078

Consider incidentals - like customer satisfaction !

***Having a permanently installed
supercapacitor onboard would have prevented
all of this !***

BACKGROUND

- **KBI has over 50 years of experience in the field of applications:**
“Starting Internal Combustion Engines”

- **Considering that the bus or equipment is in sound mechanical order, lead-acid battery deficiencies or the inability to crank the engine with sufficient power is the Operator’s & Bus Industry’s number one “no start problem”.**
- *Supercapacitors can provide starting power.*

TRADITIONAL ENGINE STARTING / BATTERY PROBLEMS

Industry has been forced to deal with the restraints and limitations of lead-acid battery technology:

- **Life Cycle Capacity.**
 - **Storage or shelf life.**
 - **Recharge characteristics.**
 - **Internal resistance.**
 - **Hazard / Disposal issues.**
-

****Supercapacitors can help.***

CAPACITOR REQUIREMENTS

The requirements and characteristics of the Supercapacitor are critical to the impact they will have on improving operations and saving the end user money.

- High life cycle capacity.
- Virtually unaffected by long term storage or infrequent use.
- Low leakage current. (Self-discharge rate).
- Low internal resistance (ESR).
- Low ESR dependence on lower temperatures or voltages.
- Packaged in “user friendly” enclosures.
- High power to weight ratios. (Power density).
- Environmentally friendly.



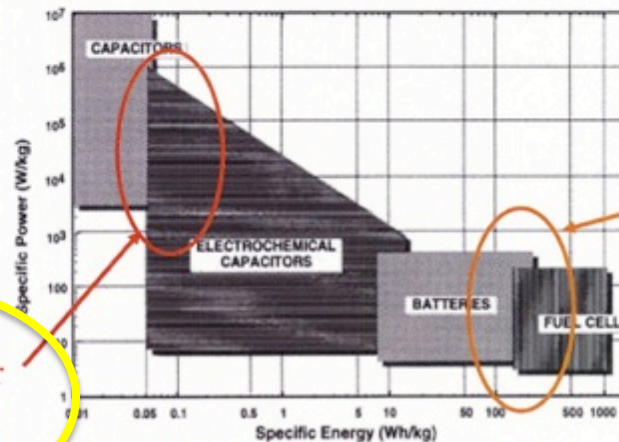
SUPERCAPACITOR WILL ALLOW OPTIMUM USE OF ENERGY STORAGE TECHNOLOGY.



Split Energy Storage System Design Benefits



- Separate the two different power requirements
 - High power for engine starting (more CCAs)
 - High energy for silent watch (deep cycle application)
- No battery exists that can be optimized for both functions
 - Use appropriate technology for each requirement



ISOLATED CAPACITOR INSTALLATION

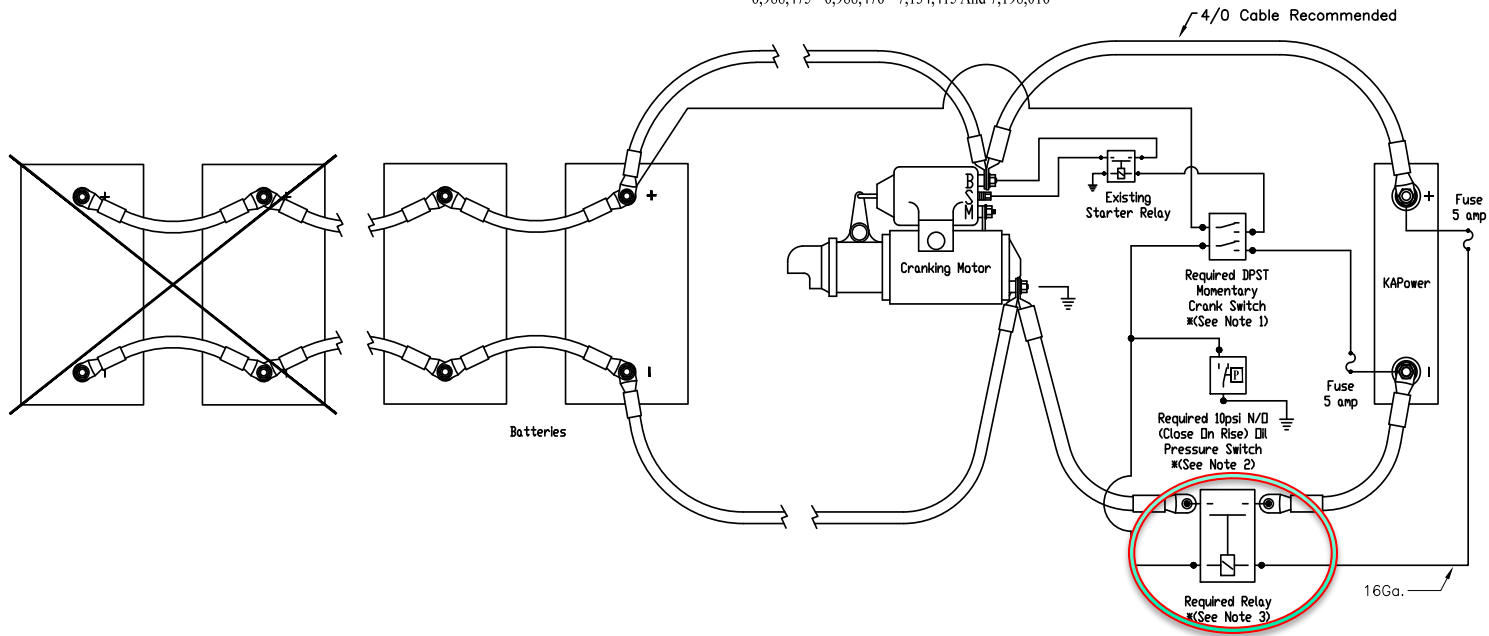
Improves Reliability

* Notes:

PROPRIETARY ITEMS

1. Used to crank engine for starting.
2. Used to recharge capacitor while engine is running. The optional method, opposed to the oil pressure switch is to interface with the vehicle multiplex system to activate the capacitor contactor once the vehicle is running. Leaving the Kapower capacitor in the recharge mode for a period of 1-3 minutes.
3. Used to isolate the capacitor when the engine is not running.

For Use Under One Or More US Patent #s
 6,242,887 - 6,362,595 - 6,819,010 - 6,871,625 - 6,888,266
 6,988,475 - 6,988,476 - 7,134,415 And 7,198,016



You may be able to remove half of the batteries when using a KAPower Module. Replacing the existing lead acid batteries with deep cycle batteries will enhance your system.

SUPERCAPACITOR WITH BATTERY PERFORMANCE

KAPOWER COLDSTART TEST

ENGINE / TRANS: SERIES 60 12.7L WITH AN ALLISON HD 4070P TRANSMISSION

TEST DATE: 2-18-03

BATTERY: (1) GRP31 950CCA

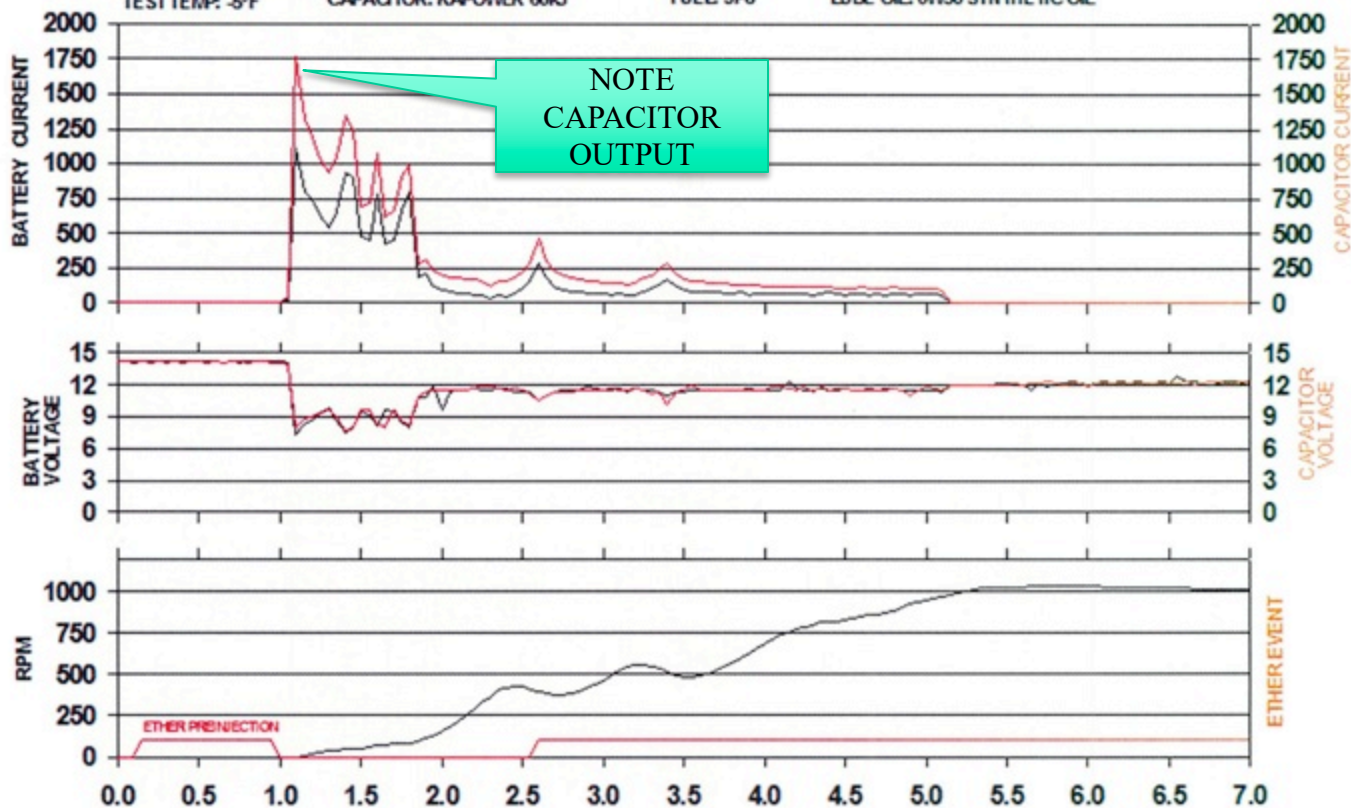
COLDSTART AID: KBI NVT ECM CONTROLLED ETHER SYSTEM

TEST TEMP: -5°F

CAPACITOR: KAPOWER 60kJ

FUEL: JP8

LUBE OIL: 0W30 SYNTHETIC OIL

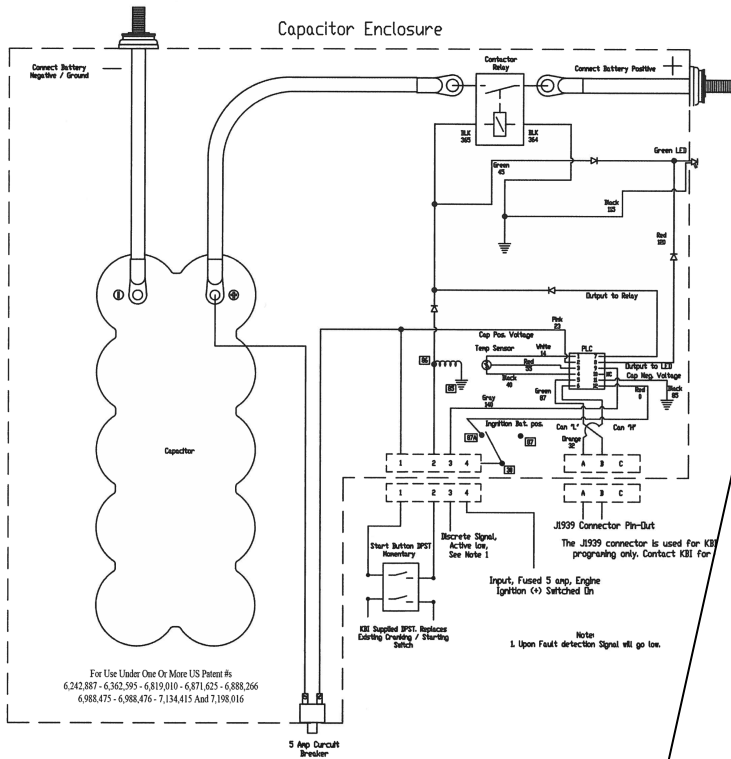




Installation should be made quick & easy.



KBI KSM internal wiring diagram and Theory of Operation.



GENERAL WIRING INSTALLATION PROCEDURE: (CONTINUED)

Theory of Operation, explaining how the KSM module works:

Once installed and wired properly, the LED on the End-Faceplate of the KSM will be illuminated whenever the KSM contactor relay is closed. When the LED is illuminated, the contactor is closed; the KAPower Module is running parallel with the vehicle or equipment batteries and electrical system.

When the DPST switch is depressed you are closing the contactor inside the KSM enclosure, using power from the KAPower module, regardless of the state of charge of the vehicle or equipment's batteries. When depressing the DPST switch you are also engaging the cranking motor circuit. This is done by wiring and using the recommended electrical circuit, displayed on the schematic (page 14), electrical circuit allowing both the KSM (Original Equipment Manufacture) to be engaged, simultaneously. Once the engine starts, the Programmable Logic Controller (PLC) inside the KSM monitors the condition of the KAPower Module and will close or open the Contactor Relay inside the KSM, based on the preprogrammed parameters inside the PLC. When the engine is stopped, the equipment is turned off, the contactor opens and the KAPower module remains isolated, waiting for the next engine-starting event, the pressing down of the DPST switch.

The PLC preprogrammed functions:

The PLC has been preprogrammed to monitor and control the state-of-charge of the KAPower capacitor module based on temperature, voltage & time. Once a voltage signal is received at pin four (4) of the Wiring Interface Connector the PLC "wakes-up" and will determine when and how long to keep the contactor closed. Remember, anytime the LED Status Indicator is illuminated the contactor is closed. In a typical engine-starting event you will see the LED illuminate during engine cranking and then go out for several seconds after the engine has started. The LED will then illuminate again and could remain illuminated for several seconds based on the condition of the KAPower module. The LED may even begin to "cycle" depending on the vehicle or system voltage during the recharging events.

The J1939 connector is used for programming the PLC and for communications between the KSM and the equipment being operated. Optional, Contact KBI for details.

SUPERCAPACITOR PERFORMANCE WILL REDUCE “DOWNTIME”.

M915 -40∞COLDSTART TEST

ENGINE: SERIES 60 12.7L WITH AN ALLISON HD 4070P TRANSMISSION

TEST DATE: 03/03/03

BATTERIES: (2) 6TL

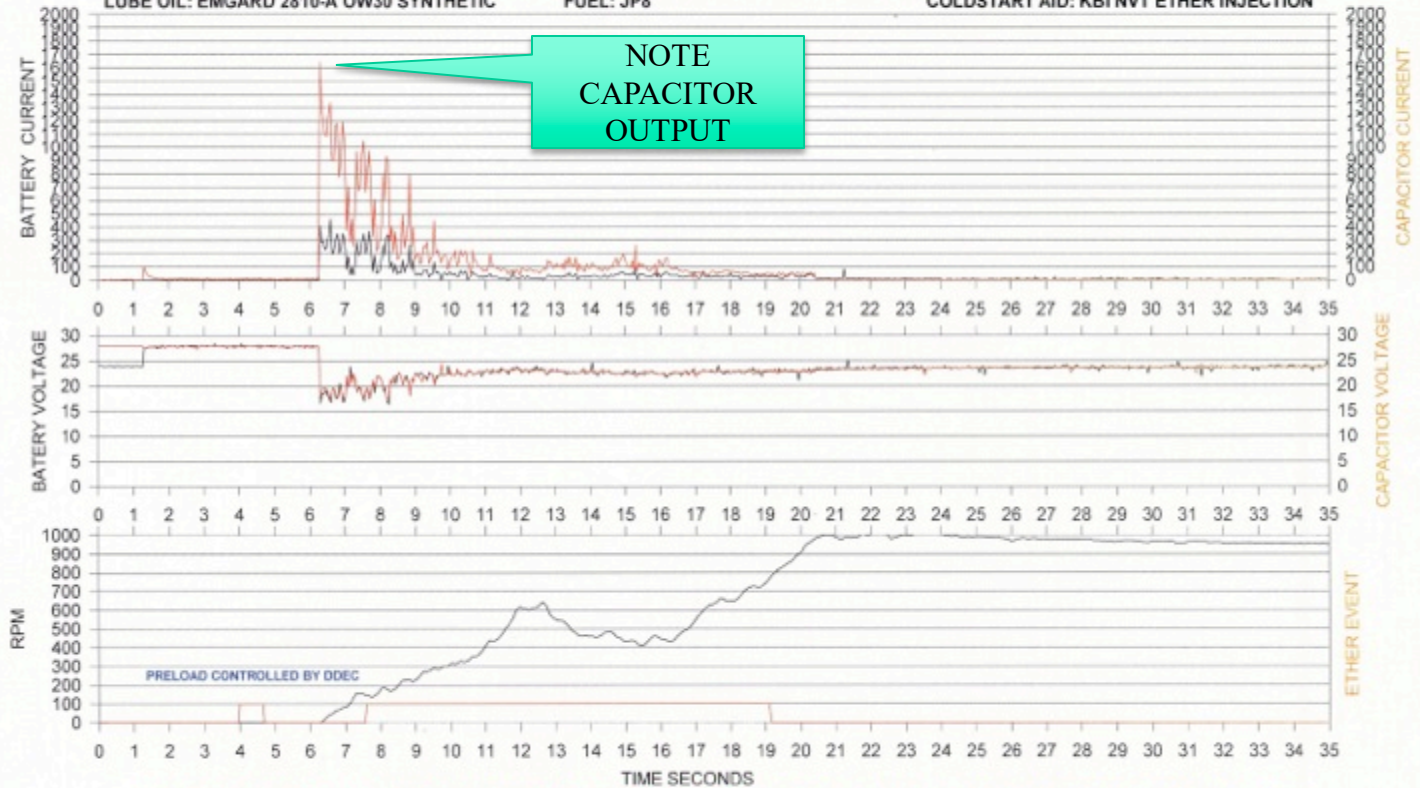
CAPACITOR: (2) 120 kJ

Note: Standard preheat circulation

LUBE OIL: EMGARD 2810-A OW30 SYNTHETIC

FUEL: JP8

COLDSTART AID: KBI NVT ETHER INJECTION



TEST PERFORMED BY KOLD BAN INTERNATIONAL 8390 PINGREE RD. LAKE IN THE HILLS IL 60102 PH (847)658-8561 FAX (847) 658-9280

FUTURE CONTROLS :

“POWER MANAGEMENT”

**SMART
ALTERNATOR
REGULATORS**

***CAPACITOR
CIRCUIT
CONTROLLERS***

***DC / DC
CONVERTERS***

***ADVANCED ELECTRODE
DESIGNS***

FUEL CELLS

***VEHICLE SHORE
POWER SYSTEMS***

***MODULAR
INSTALLATIONS***

***ADVANCED BATTERY
CHEMISTRIES***
*(Increased energy density
to satisfy “Hotel Loads”)*

Kitsap Transit 2013/14 Trial

- Kitsap's unique geography was triggering up to a 90 minute road calls to jump start vehicles.
- Kitsap was considering moving to anti idling and instructing drivers to cut off engines after 15 minutes.
- Test Bus was a 2005 Gillig in November of 2013.
- Current draws include Head signs, Radios, APC, Interior and Exterior Lighting, and Fare boxes.
- No road calls for starting issues have been recorded on this vehicle since installation.

Steve Schipper, Fleet and Facilities Manager at The Rapid, Grand Rapids, MI says: "We have been very happy with the KBI super cap, so much so that we intend to include it on future bus procurements. *We have not experienced a single battery issue with the vehicle since the unit was installed and more importantly, we have not had to jump start the vehicle since it was installed.*"



MBTABUS OPERATIONS

Ultra Capacitors A Power Solution for Cold Starts and Engine Idle Compliance

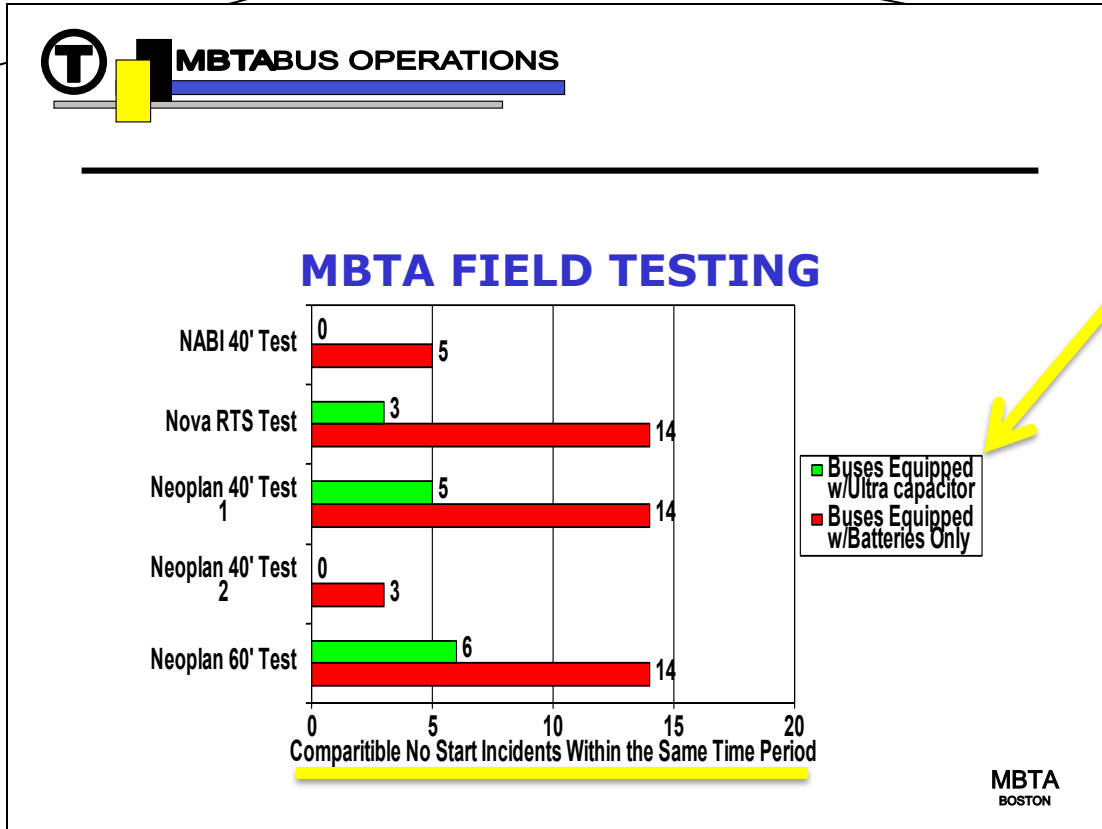
Jeffrey D. Gonneville
Massachusetts Bay Transportation Authority
Deputy Director of Bus Operations

MBTA
BOSTON

MBTABUS OPERATIONS

ULTRA CAPACITOR

- Protective Case Contains Capacitor Cells
- Cells are of an Electrochemical Double Layer Capacitor (EDLC) Design.
- Contains 20 Cells for a 24V System
- Each Cell Contains 26 Electrodes



OEM details and Users

- Currently OEM engineered at Gillig, New Flyer, MCI, Eldorado, Prevost and Nova Bus.
- Most common configuration is 2 Group 31 Batteries and a KBI KSM Supercapacitor system.
- Users include TriMet (testing going back to flooded batteries), Bi State (keeping the cap in the circuit to take power spikes), Salt Lake, Houston, Chicago, Mississauga, MBTA, NJT, PACE, Ft. Worth, San Antonio, Milwaukee, Santa Cruz and many others.

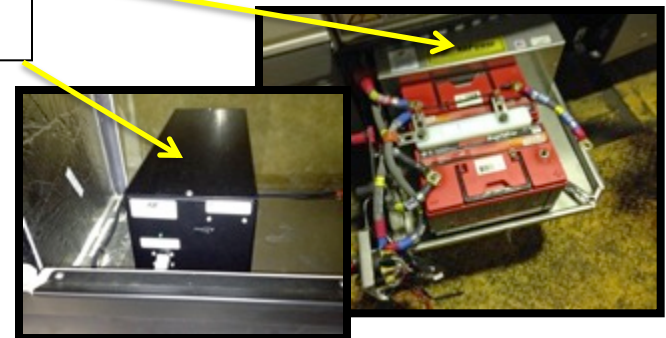
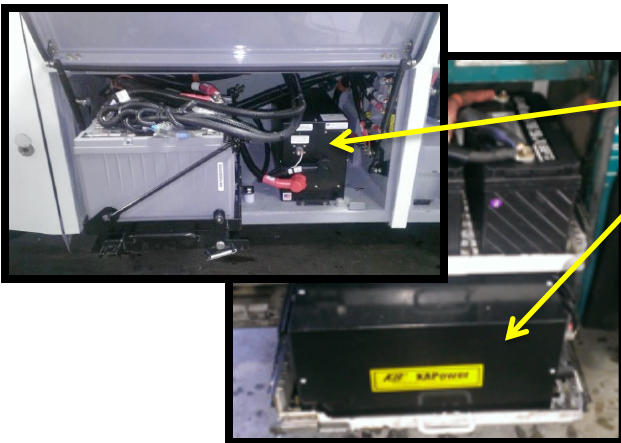


**KBI has thousands of systems installed
on US City Transit Buses.**



**Virtually every North
American bus builder offers
it's customers the KBI KSM
system as factory installed.**

**The KBI KSM
factory
installed.**



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We Are The Expert Leader In Engine Starting Solutions

Visit us at the UMA MOTORCOACH EXPO 2020
January 19-23 - Nashville Music City Center - Booth # 623

KAPower® Starting Module

Tour buses—avoid unscheduled stops

- **Productive**—Eliminate downtime, no starts from "dead" batteries and costs associated with jump starting a dead battery
- **Economical**—No maintenance and up to 20 year life expectancy
- **Efficient**—Virtually unaffected by temperature and maintains performance for up to one million cycles

Have you considered what a dead battery can cost?

- Hotel and flight reimbursements for passengers
- Lost customer trust and loyalty

Powered by the KAPower Supercapacitor

» How the KSM Fits Your Needs » Order Your KSM Now

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JANUARY 19-23, 2020
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RESERVE YOUR 2020 EXHIBIT SPACE FOR THE LARGEST ANNUAL GATHERING OF BUS OWNERS AND OPERATORS IN NORTH AMERICA!

www.motorcoachexpo.com

KBI is proud to be a part of the Motorcoach Bus Industry. KBI will continue to develop and supply superior products in order to enhance the customer's business and satisfy their needs.

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Thank you to Panorama Tours, Inc. Wallington, NJ for the testimonial, supporting data and endorsement.



Panorama Tours, Inc.

**480 Main Ave., Ste. 8
Wallington, NJ 07057
973-470-9700**

7/9/2019
Best Idea

KAPower Starting Module

If you ever received a call from your driver, that the bus does not start and it turns out to be a dead battery. Remember the trouble you went through to get a Jump Start? We even had issues where we couldn't jump start a bus, because the battery shorted out. On one occasion we suffered major electrical damage, because the jumper cables were crossed. On many occasions a tow truck tried to jump start the 24-volt system on the bus with a 12-volt system from his truck without success, even telling you, that your starter is bad.

With all the shutdown procedures in place to be followed, our drivers, still run into problems with dead batteries. After seriously considering wiring all buses with another set of batteries, which are still Lead Acid based and subject to failure, I came across KBI Engine Starting Solutions. The system originally was developed to start heavy duty equipment in the dead of winter sitting out in the field, or a construction site for over a month, or two and be able to start, at the turn of the key. Transit buses in Upstate New York, have been using this system for over a decade. So far we have installed four of these units and ran a following test. By turning on all the lights and blower motors, we drained the batteries to 17.5 volts. The lights on the bus were barely visible, the bus started without any hesitation, just as if the batteries were at full charge. It only takes a couple of minutes of running time to restore the Capacitor to full power and be ready for the next episode.

Benefits:

1. Peace of mind
2. Saves wear on the batteries, so they last longer
3. Better starts in the winter.
4. Less headache of finding electricity to plug in your block heater.
5. Less damage to your electronic system, due to improper jumper cable connection.

The system cost is about \$2,250.00.

Installation time is approximately 4 hours.

Takes the space of one back pack in the luggage compartment (20" by 8" 8" high).

WV Rescue Cost Analysis

**** Ultimate findings determined that the driver did not properly shut down the bus and killed the batteries****

\$950 Outside bus company to move people that evening

\$532 Direct Expenses to dispatch out mechanic to the scene

Tow truck & mechanic that were dispatched to the scene to

\$750 jump the bus & ultimately blamed the starter

\$500 2 new batteries to replace perfectly good batteries

\$546 Direct expense for fuel & oil on PTI Rescue bus

\$300 Hotel stay for driver and mechanic while at rescue site

\$150 Tolls for PTI relief bus

\$350 Relief driver

\$4,078 conservative loss value