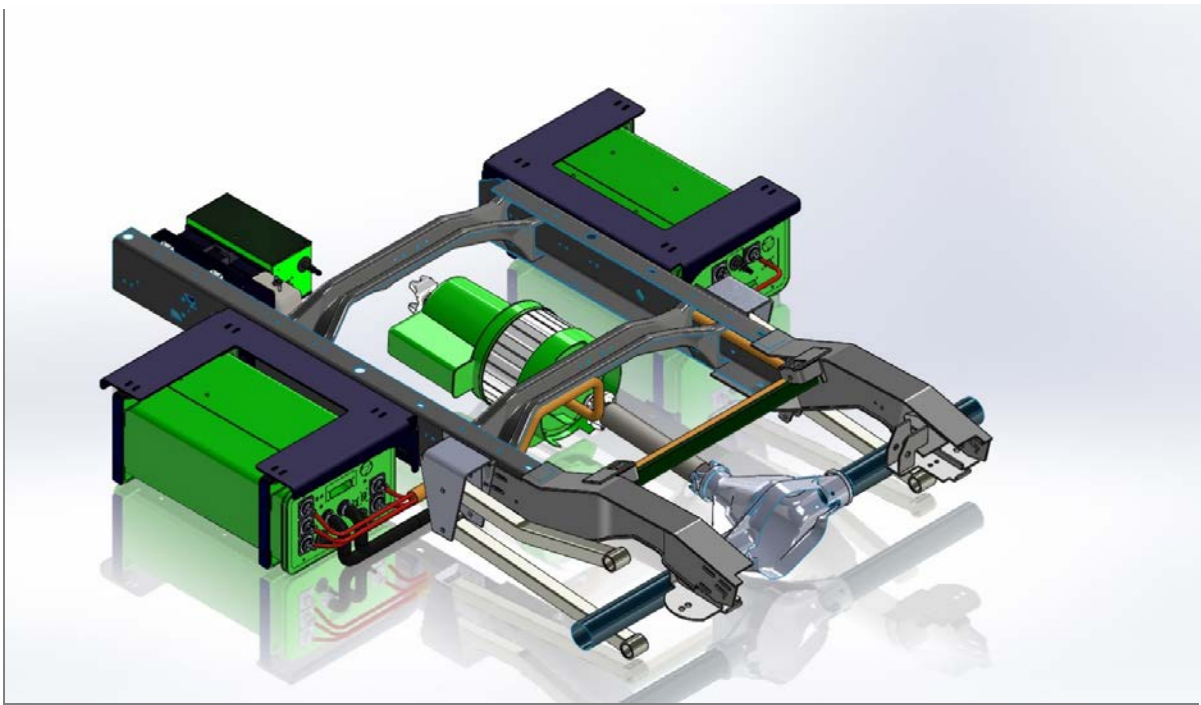


**Kinetics Hybrid Drive System**

**Maintenance and Service Parts Identification**



REVISION RECORD						
REV	DCN	DESCRIPTION	BY	CHECKED	APPROVED	DATE
05	CN 0027	Initial Release	FJ		WAB	3/08/13
06	CN0072	Update	FJ		WAB	11/21/14

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**Recommended Maintenance Intervals for Vehicles in Transit Service:**

- Monthly – Review driver comments about hybrid operation, perform visual inspection, perform GFI test per driver manual procedure. With engine running, turn hybrid switch OFF and verify flashing red LED (disabled state). Turn hybrid switch ON and verify green LED (Ready state).
- Every 6 months or 20,000 miles–
  - Check hybrid coolant reservoir for correct level, add standard 50 / 50% water / glycol coolant as needed. With ignition ON but engine OFF, have a helper cycle hybrid from ON to OFF and then back ON. Verify the shift actuator on hybrid motor moves and shifts quietly. If operation is noisy, replace actuator.
  - Conduct hybrid inspection checklists found in Appendix A and B at the end of this document
  - Conduct hybrid motor linear bearing relube procedure: With ignition ON, turn driver panel switch to off – this will shift magnet rotor to the full forward position. Turn OFF ignition. Disconnect forward driveshaft at front motor yoke. Remove 1/8 NPT pipe plug from center of motor shaft. Use a hand operated grease gun containing Mobil 1 high temp grease and verify this is primed and pumps grease. Connect to the 1/8 “ NPT thread, and pump the handle six (6) times to dispense a measured amount of grease to the motor shaft ball slide. Disconnect grease gun, replace plug and drive shaft. Turn ON ignition and engine, turn ON hybrid switch. Test drive vehicle to verify correct hybrid and driveline operation.
  - Check hybrid system for correct boost and regen performance using a driving test. Visually inspect for cable and connector sealing.

- Every 24 months *OR if using extended life coolant, every 100,000 mi.* – Disconnect hose at the bottom of the coolant reservoir and drain coolant. Turn ON the ignition and hybrid system to drain hybrid coolant for approx. 2 min. Do not allow pumps to run dry for more than 5 minutes or damage will result. Turn OFF, reconnect hose to reservoir and refill with new 50% automotive water / glycol coolant while the hybrid is ON. Verify coolant flow back into reservoir and run for 5 minutes. Top off coolant. ***After purging and filling the hybrid system, add 8 ml per gallon of Triadine 20 microbiocide additive (sold by ITW / Rustlick PN 77116) to the hybrid reservoir to prevent bacterial growth. (Available at [www.mscdirect.com](http://www.mscdirect.com) PN 07559974)***
- 50,000 miles – Replace shift actuator PN 30-3016

### **Recommended Crosspoint Kinetics Service Parts:**

The major hybrid components: hybrid motor assy, controller and ultracapacitor are all plug-and-play sealed units. **DO NOT open the case of these or the warranty will be void.** In the event of an operational problem, replacement units can be obtained from your local Cummins dealer. In general, the Crosspoint Kinetics major components should last for the service life of the vehicle.

### **Optional Service parts:**

- Vibration mount, hybrid motor – PN 30-982
- Vibration mount, hybrid controller housing – PN 80-2280
- Vibration mount, hybrid ultracap housing, single– PN 80-2280
- Vibration mount, hybrid ultracap housing, double– PN 80-2282
- Accelerator pedal sensor assy. – PN 80-2530
- Inertial switch assy – PN 80-2540
- Brake pressure transducer, hydraulic brake – 80-2550
- Brake pressure transducer, air brake – 80-2560
- Hybrid driver panel assy. – 80-2520
- Hybrid shift actuator – 30-3016
- 400 amp fuse (near ucap in conduit box) – 80-5731,(Alt. Grainger 4XC85)
- 40 amp fuse (power box) – 80-5803, (Alt. McMaster-Carr 9180K88)

## **Appendix A**

### **Visual Inspection under bus.**

Note: This can coincide with other operator maintenance items while bus is on a lift.

- Inspect Ultracap, controller, motor and cooling unit mountings for integrity. Include motor cross members and frame brackets.
- Inspect mounting of actuator on motor. Check rear actuator mount brackets for cracks.
- Inspect yokes on front and rear of motor.
- Check condition of exhaust wrap next to motor.
- Inspect all glycol hoses for chafing, leaks and kinks.
- Inspect all electrical connections on motor, Ultracap, motor and cooling unit.
- Check integrity of cable boots on controller (5ea) and Ultracap (2ea). Worm clamps should be on both ends of boot.
- Check all ground straps are secure. 2 straps on controller attach to ground stud, 1 on Ultracap attaches to ground stud and 2 on motor (1 goes to chassis).
- Inspect entire harness from entry to floor back to individual units. Check routing for chafing and pinching. Critical area is near suspension where it passes under body forward of rear wheels.
- With ignition key 'on', check cooling unit fan operation. Fan and cooling pumps run even when hybrid switch is 'off'.
- Check that inlets to fan are clear and exit is not blocked.
- With ignition key 'on', engage hybrid switch to 'on'. Press in red 'EMER STOP' button on Ultracap. Actuator will be heard running and stop. Pull red 'EMER STOP' button. Actuator will be heard running and stop. Turn ignition key 'off'.
- Inspect brake sensor and electrical connection.

## **Appendix B**

### **Visual Inspection above floor.**

- Check reservoir mounting and fluid level (1/2" from top).
- Inspect power box mounting.
- Inspect impact switch mounting. Should be mounted solidly.
- Inspect driver panel mounting and light function. Turn ignition key 'on'.  
Hybrid switch 'off': RED light flashing.  
Hybrid switch 'on': GREEN light on solid.
- Check Driver Placard is installed near hybrid switch.
- Inspect mounting of throttle pot switch attached to and above throttle pedal. Check for loose switch pedal wires that may get caught in pedal.