Group:	0 – GENERAL
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TECHNICAL SERVICE BULLETIN

COE HYBRID SAFETY PRACTICES

SUBJECT VEHICLES:

Hybrid COE models

HYBRID VEHICLE SERVICE PRECAUTIONS:

The following items outline the recommended safety practices when working on a Hybrid COE truck.

WARNING: The hybrid HV (high voltage) system contains a high voltage battery and high voltage circuits. Improper handling of these components can result in serious injury of death due to electrical shock. Only technicians with special Hybrid training should perform service on these vehicles. Ensure that all work is performed correctly following the procedures set forth within this publication.

BEFORE YOU BEGIN:
- Read and understand all instructions and procedures before you begin the work.
- Confirm that someone other than the technician working on the truck has CPR (Cardio Pulmonary Resuscitation) training and there is an AED (Automated External Defibrillator) on sight.
- Read and follow all **NOTICES** and **WARNINGS** set forth in this publication. These alerts help to avoid damage to components, serious personal injury, or both.
- Park the vehicle on a level and solid surface and apply the parking brake.
- Confirm the engine is stopped, the ignition switch is in the off (LOCK) position, and the key is removed.
- Wear safety glasses to prevent eye injuries.
- Place wheel chocks in front of and behind all wheels.

1. Technicians performing maintenance or repair on the HV system must have previously received training on the Hino COE Hybrid system.

2. Create a safety zone and surround the work area with orange cones to notify people in the area that high voltage service is being performed. During work on the HV system, display a placard which states “Caution High Voltage Work, Do Not Touch this Vehicle!” or words with similar language.

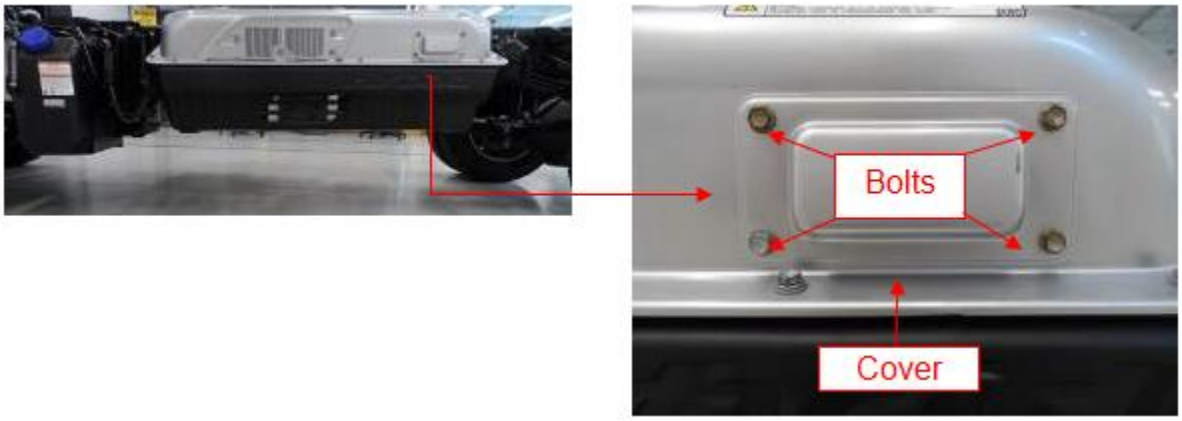
3. ALWAYS remove any loose hanging badges, jewelry, bracelets, belt, or wrist watches or any metal item prior to service of the HV system.

4. Always wear Hybrid specific, high voltage insulating gloves (Class 0 1000V), safety glasses and insulated shoes when performing maintenance or repair of the HV system.

5. NEVER use insulating gloves that have expired. Prior to each use of the insulating gloves, confirm that the certification date, stamped on the gloves, is within 6 months of the current usage date. The gloves need to be recertified after every six months of use by an approved facility. Check the gloves for cracks, tears, or damage by rolling the gloves to check for air leaks. Do not use any leaking gloves.

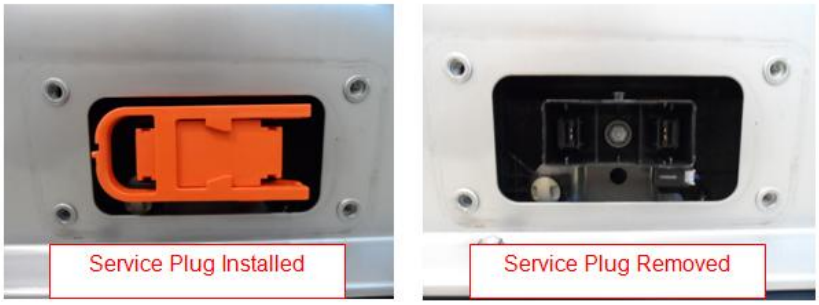
CAUTION: The leather portion of the glove must be worn over the red rubber portion of the glove.

6. Remove the 4 bolts and the service plug cover. Retain the bolts for reinstallation.

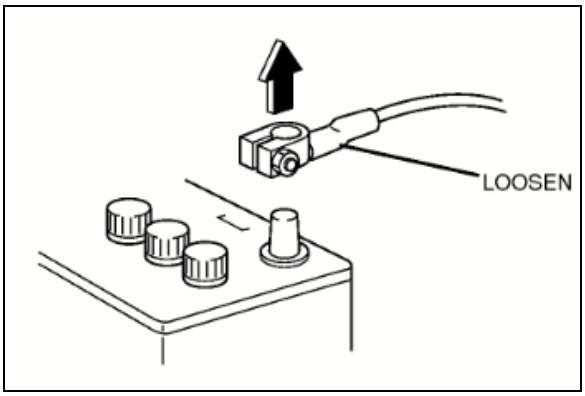


7. Confirm the ignition switch is in the off (LOCK) position and the key is removed. The HV system service plug must be removed any time the HV system is being serviced. Always wait a minimum of seven (7) minutes after the service plug has been removed before beginning service on the HV system to allow the system time to fully power down. Place the service plug in a secure location which is out of sight to prevent someone from accidentally connecting it to the vehicle while service is being performed. For safety, reinstall the service plug cover and retaining bolts while the service plug is removed for service of the HV system.

CAUTION: NEVER turn the ignition switch to the "ON" position any time the service plug is removed. This can result in damage to the vehicle's electrical system and create fault codes.

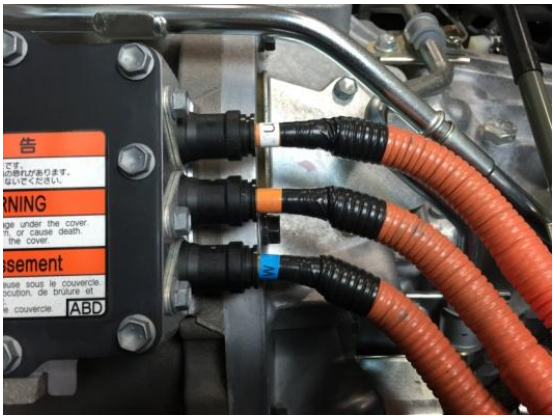


8. Disconnect the negative terminal of the 12 volt battery.

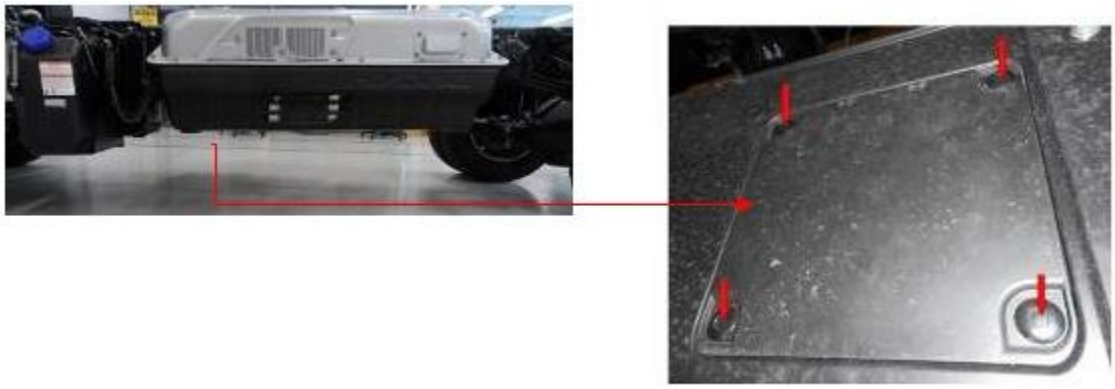


9. While performing service, ensure that the work area is clear of loose metal objects such as socket extensions, bolts, etc. which could cause HV circuits to short circuit if dropped. **Always** use the Hybrid Insulated Tool kit (No. HDT-195HVST) provided when working with HV circuits or terminals. **NEVER** use other tools.

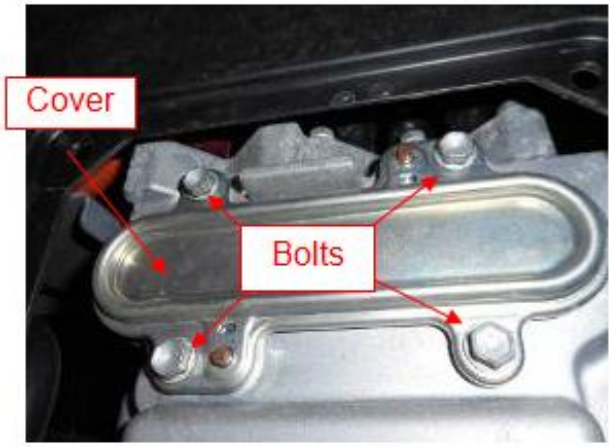
10. High voltage circuit harnesses are colored **ORANGE**. **NEVER** touch the connections of these high voltage circuits unless required to do so.



11. Remove the 4 push pin retainers from underneath the Hybrid battery unit and retain for reinstallation.

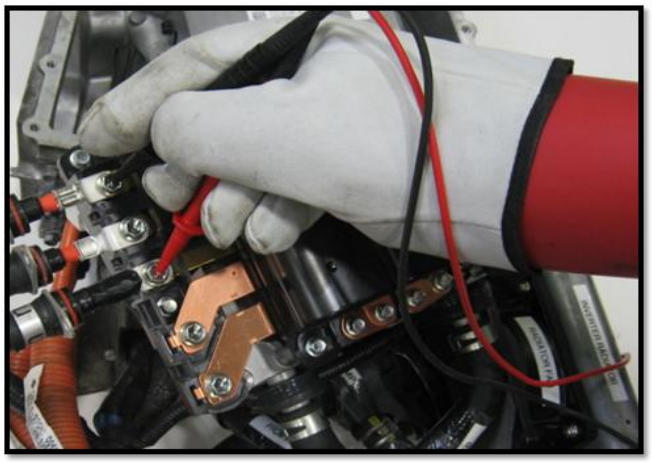


12. Remove the four (4) retaining bolts and the terminal inspection cover and retain for reinstallation.



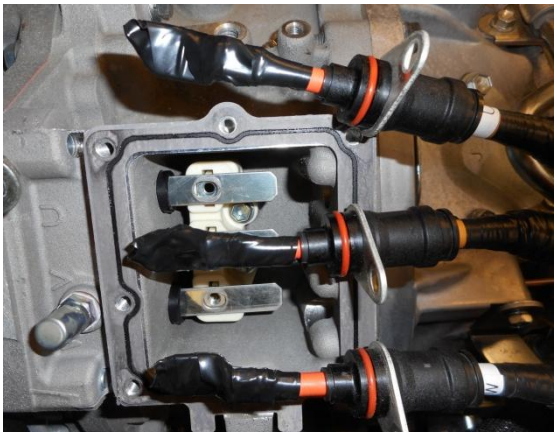
13. ALWAYS wear the hybrid-specific insulating gloves before touching any high voltage circuit, and verify that the voltage on that circuit is at 0V (zero voltage) using a Megger Meter. The meter is shown in the photograph to the right. The Megger Meter must be able to generate up to 1000V DC and deliver a resistance value in Mega ohms.

14. Ground the Megger Meter to the inverter case. Verify that the meter operates properly on a 12V system prior to performing any high voltage checks. This will ensure proper operation of the meter.



NEVER use two hands to check voltage readings. Using only one hand (the one hand rule), check each terminal within the inverter opening for any voltage on the 5 terminals. The Megger Meter should indicate .01 volts or less on each terminal and circuit.

15. After removal of high voltage terminals, immediately insulate their connectors using electrical tape to prevent electrical shock or short circuit.

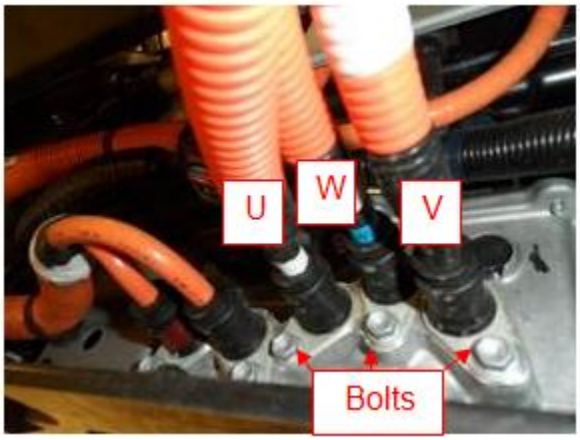


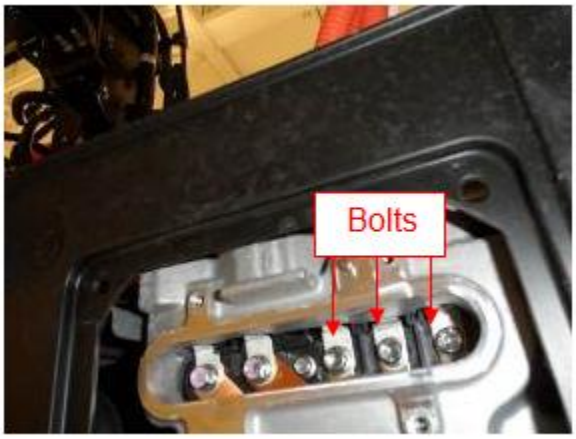
16. When reinstalling the U, W, and V cables into the inverter, be certain to install them into the correct positions. Refer to the photograph, below, and the corresponding labels on each cable. Install the 6 bolts which retain the U, W, and V cables to the inverter and tighten them to the specified torque.

WARNING: ALWAYS use the insulated tools and insulated gloves during this step. Such use is required. Failure to wear high voltage safety gloves may result in personal injury or death due to electrical shock.

NOTICE: Tighten the cable side of each wire before tightening the terminal side.

Specified Torque: 7 lb-ft (9 Nm)

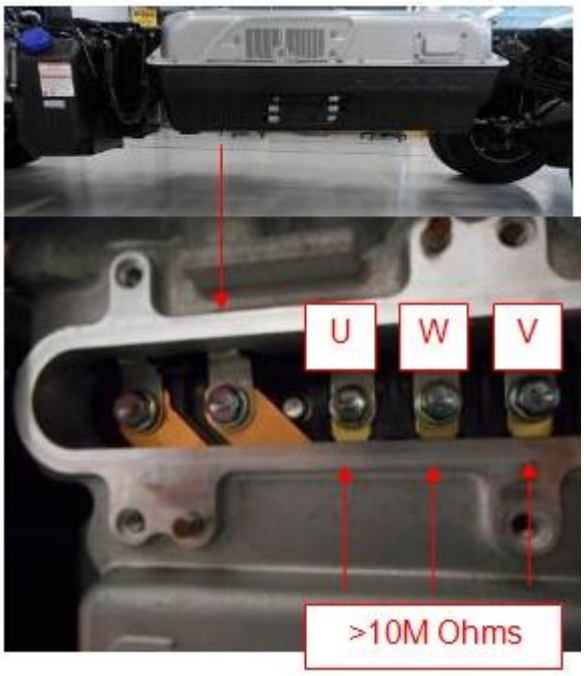


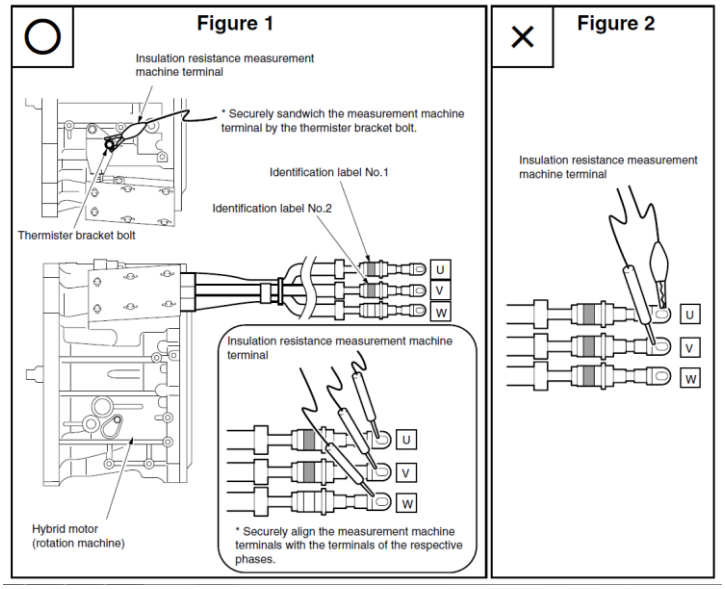


17. After repairs have been completed on the HV system, an insulation test is required on the HV cables any time service is performed to confirm that no voltage leaks are present in the electrical insulation of the cables. Measure the insulation resistance from the U-Phase to ground, the W-Phase to ground, and the V-Phase to ground. Make certain that the insulation resistance is 10 Mega ohms or greater.

NOTICE: Never measure insulation resistance between each phase (U, W, V) terminal of three-phase cable connector side. See Figure 2, below.

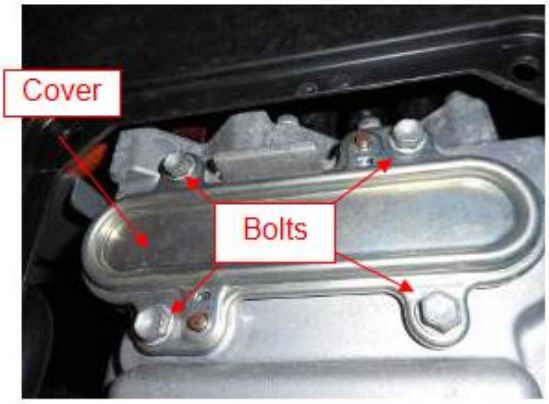
WARNING: ALWAYS use high voltage safety gloves during this step. Failure to wear high voltage safety gloves may result in personal injury or death due to electrical shock.



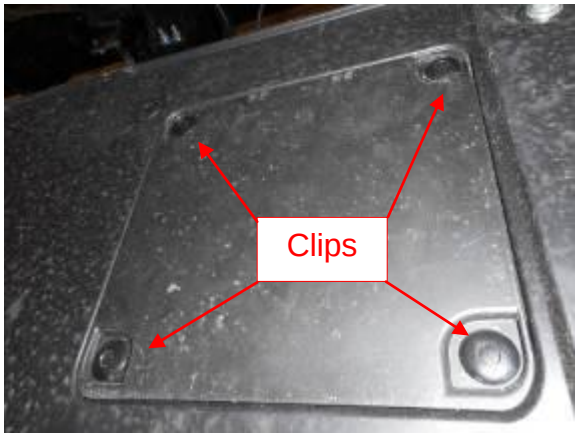


18. Install the four (4) retaining bolts and the terminal inspection cover. Tighten the bolts to the specified torque.

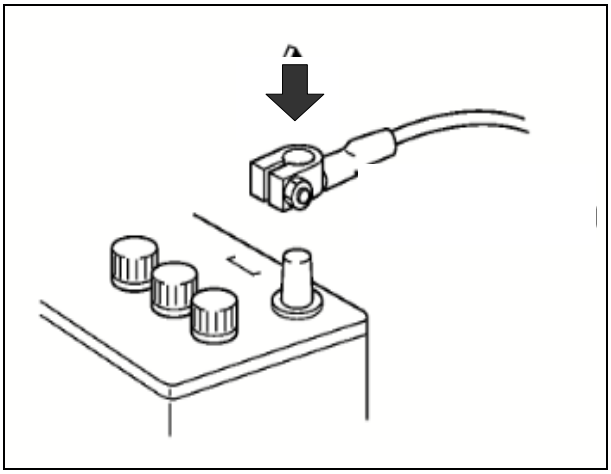
Specified Torque: 7 lb-ft (9 Nm)



19. Install the service cover using the 4 clips which were previously removed.



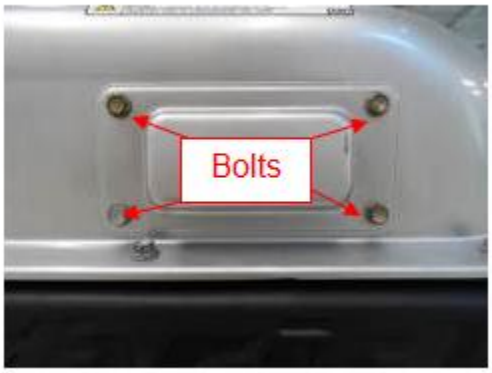
20. Connect the negative terminal of the 12 volt battery.



21. Double check the torque of the HV circuit terminals, and verify that no loose parts or tools have been left behind prior to installing the service plug.

22. Remove the service plug cover. Install the service plug into the HV battery. Ensure that the locking lever is fully engaged and is slid towards the rear of the vehicle. Install the 4 bolts into the service plug cover. Tighten the bolts to the specified torque.

Specified Torque: 7 lb-ft (9 Nm)



WARNING: Be certain that all steps of the Hybrid Vehicle Service Precautions procedure, specified above, have been completed prior to performing this Repair Procedure. Failure to properly perform the HV system service disconnect, and complete all steps of the procedure, can result in personal injury or death due to electrical shock.