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## **TECHNICAL BULLETIN No. 03/2009**

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### **SUBJECT                      Converted Electric Vehicles (CEVs)**

#### **INTRODUCTION**

This bulletin raises awareness to road rescuers of the existence of a variety of 'Converted Electric Vehicles'. The Queensland Fire and Rescue Service (QFRS) has recently identified various CEVs and has undertaken some preliminary research into the types and potential hazards that rescuers may encounter with CEVs.

A number of vehicles have been privately converted to electric drive for use on Australian roads <http://www.evalbum.com/geo> and some commercial conversions [Blade Electric Vehicles](#) have also been undertaken. Australia may see the first mass produced electric passenger vehicle, the *Mitsubishi iMiEV*, in 2010.

A concern for rescuers revolves around being able to identify the vehicles, and mitigate any potential hazards if the vehicle is involved in a crash.

#### **VEHICLES**

This awareness session only covers **privately** converted electric vehicles.

#### **SOURCE**

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# **Converted Electric Vehicles**

**Australasian Road Rescue  
Organisation (ARRO)  
Awareness Version**



# Converted Electric Vehicles

- CEVs can also be configured with either Direct Current (DC) or Alternating Current (AC) systems, which range from 120 volts DC up to and above 600 volts AC
- This presentation contains brief examples of three (3) privately Converted Electric Vehicles (CEVs) in use on Queensland roads
- These example CEVs use electrical systems operating at 120 volts Direct Current (DC)
- CEVs still use a traditional 12 volt battery system to supply power to normal vehicle electric components ~



# Converted Electric Vehicles

- Electrical Safety points from the National Code of Practice..... *'Guidelines for Installation of Electric Drives in road vehicles'*
  - 'Electrical potential greater than 32 volts connected to a source, such as a traction battery must be regarded as dangerous'. 'It is recommended that vehicles using such voltages be equipped with a automatic power disconnection device to minimise the hazard of fire or shock in the event of a crash'.
  - Recommended main battery cable conductor colours:
    - Negative cables - **Black**
    - Positive cables 32 Volts and under - **Red**
    - Positive cables above 32 Volts - **Orange** ~



# Converted Electric Vehicles

- Commercially converted vehicles are also produced (**these are not** covered in this awareness session)
- All CEVs in Queensland must be approved for use by the Department of Transport and Main Roads, under standard National Guidelines
- Each vehicle compartment that houses batteries should be labelled with the appropriate hazard symbol/s and operating voltages
- A mechanical master isolation switch to isolate the electrical components from the power supply (batteries) should be within easy reach of the driver's position ~



# Proton Satria 120 volt DC system

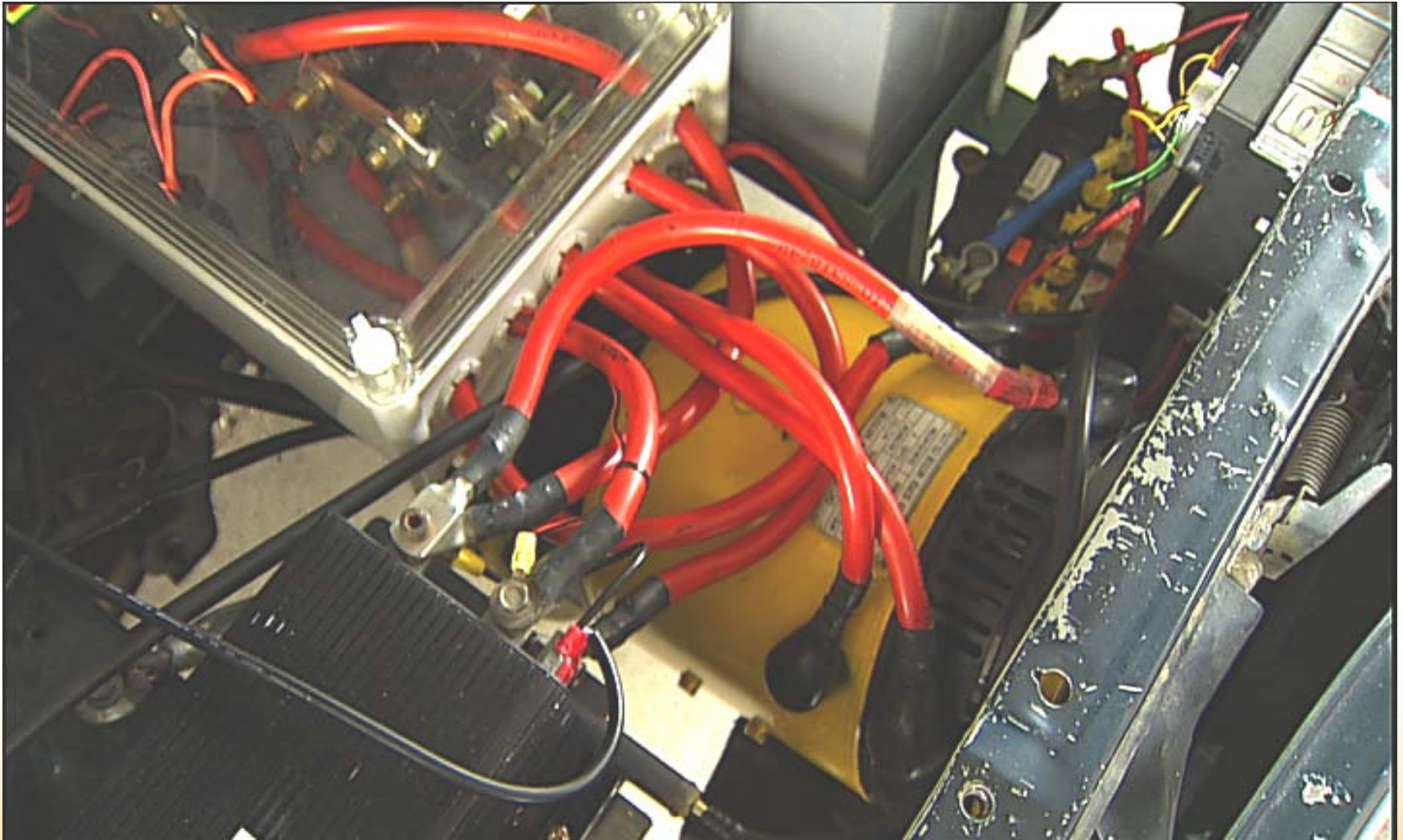


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# 5 x 12 Volt batteries and electrical controller



# Electric motor and standard 12 Volt vehicle battery



# Rear compartment holding 5 x 12 Volt batteries



# Master isolation switch in centre console



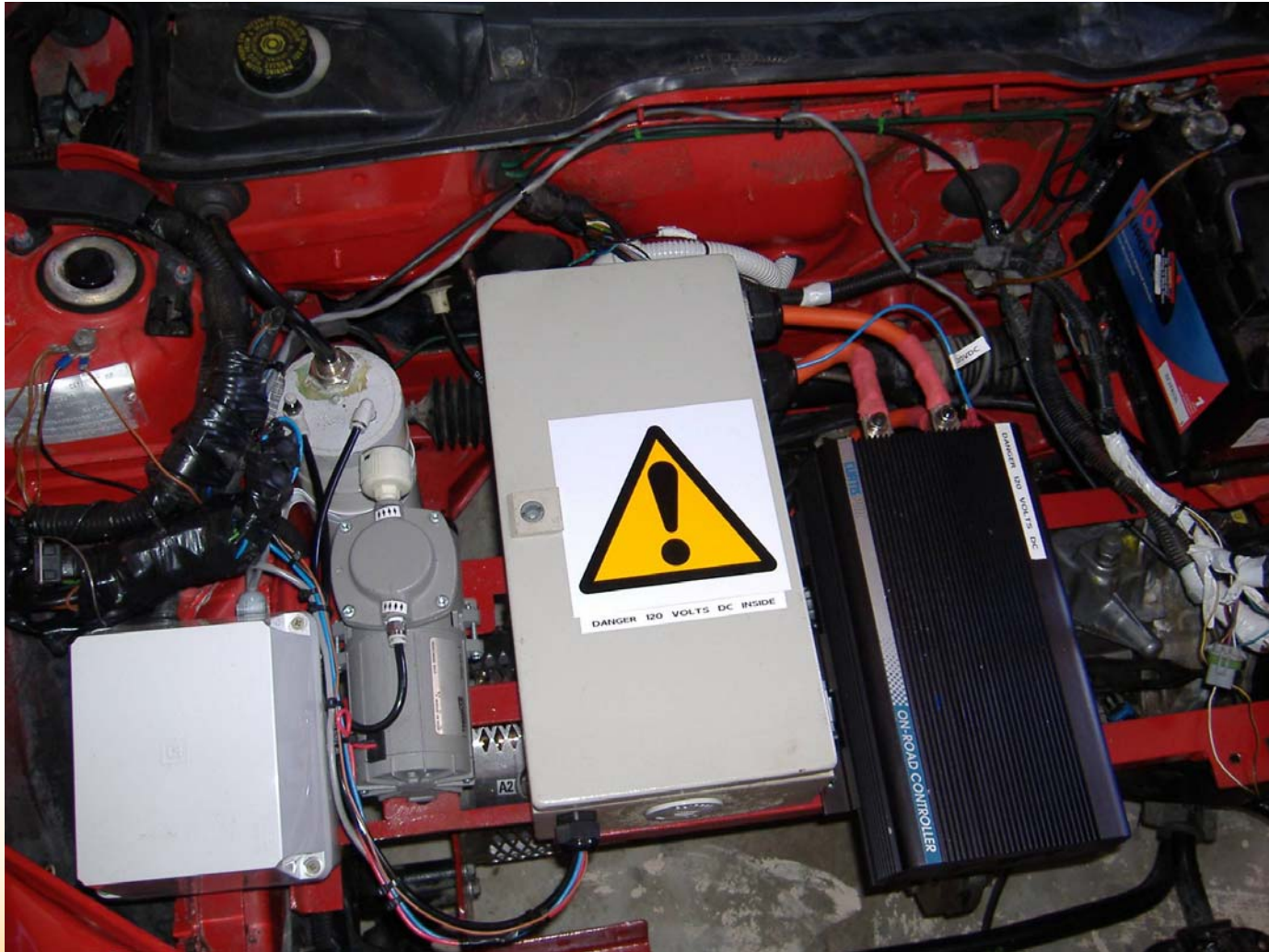
# Holden Combo Van 120 volt DC



# Battery compartment in cargo area



# Electrical controllers



# Master isolation switch between seats



# Toyota Echo 120 volt DC system with master isolation switch under bonnet



# Interim Emergency Response Guide

*Results from current QFRS research will determine any future tactical measures, including the potential use AC detection equipment as an assessment tool for rescuers*

1. Scan the vehicle for any hazard symbols, labels or signs indicating it contains electrical hazards
2. Chock wheels to limit forward/rearward movement of the vehicle
3. Identify any incident damage and potentially damaged electrical vehicle components - assess if it is safe to access the vehicle ~



# Interim Emergency Response Guide

4. Identify the location of the master isolation switch (generally in close proximity to the driver's position) and operate to isolate the electrical system
5. Never touch, cut, or open any **orange** high voltage power cable or high voltage components
6. Locate the 12 volt standard battery system and isolate, tape and cover any battery cables (negative first, then positive) ~



# Session End



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