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Dream Dream Dream
of an
Electric Car
1923

Antique Car
Museum of Iowa
Iowa City, Iowa

1912 White

1911 Maxwell
Model Q Runabout

Why?

- ❖ Toyota have sold over 10million hybrids and produced 30 different models
- ❖ EU emission regulations of 95g/km mean most manufacturers will need hybrid or full electric models in their range
- ❖ 2020 Predictions - 85million vehicles will be sold worldwide, over 40% will have some form of electric propulsion - full electric, hybrid or fuel cell.
- ❖ Handle it wrongly and it will kill you

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Safe Working on Electric and Hybrids

- ❖ Electric and Hybrid vehicles use High Voltage Electricity and as such represent a very high risk of injury or death through electric shock if not worked on correctly.
- ❖ Electric and Hybrid Vehicles can have a voltage in excess of 500-Volts
- ❖ Electric and Hybrid vehicles have highly magnetic components and appropriate care must be taken.
- ❖ Appropriate First Aid Training is necessary

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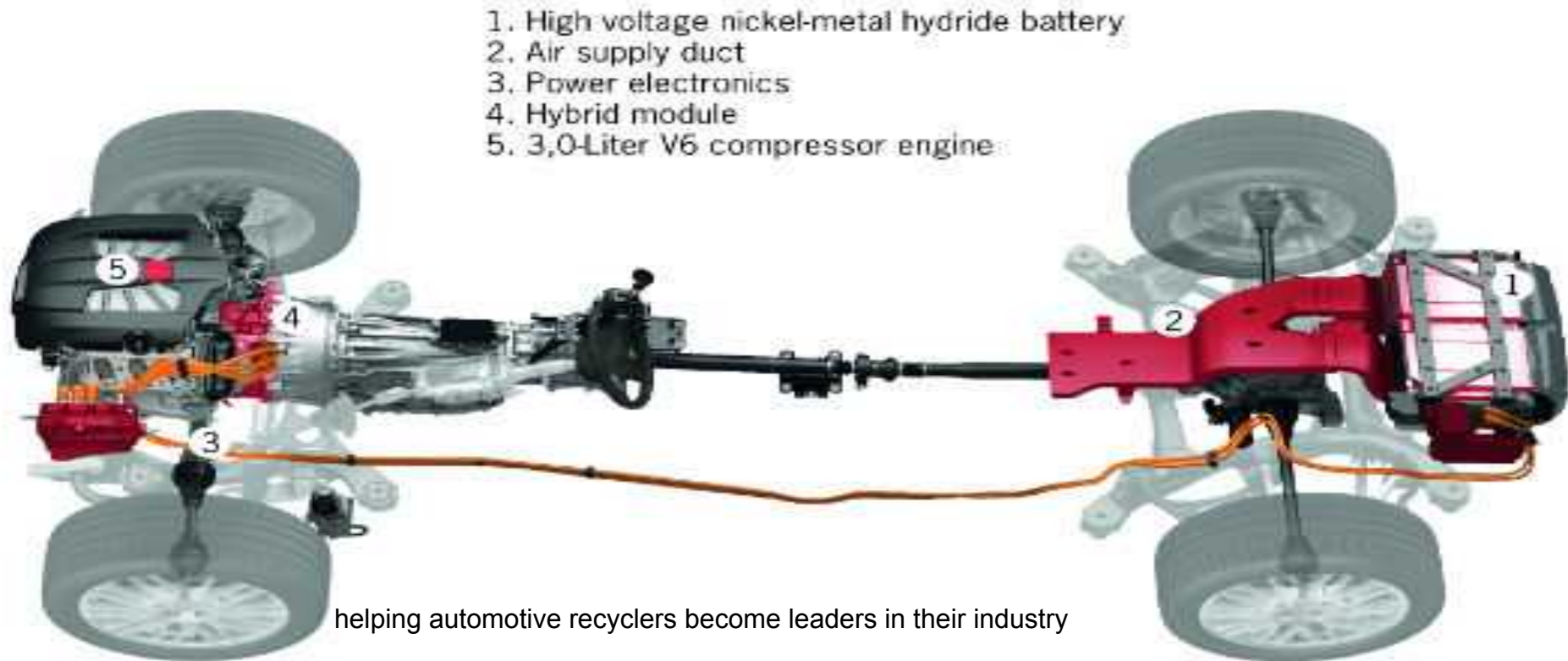
MEASURING, TESTING, AND INSTRUMENTS

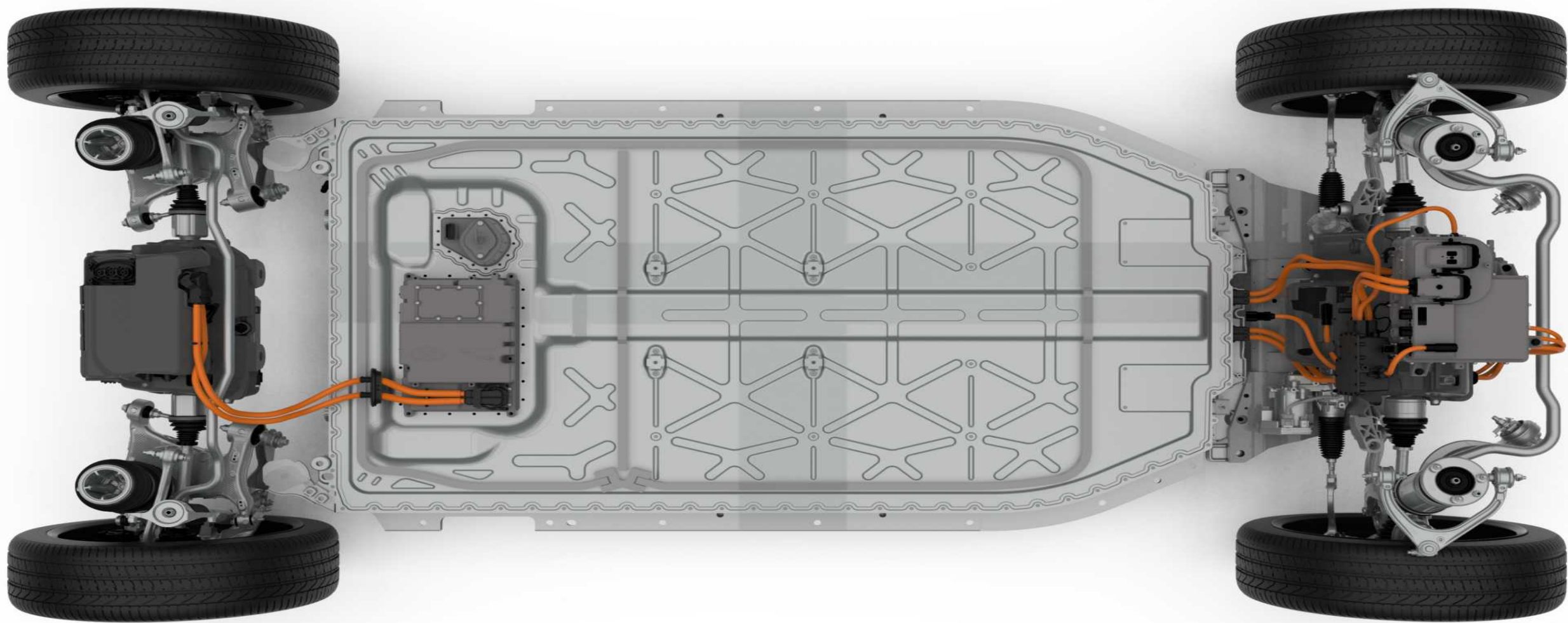
158. Electricians often test circuits for the presence of voltage by touching the conductors with the fingers. This method is safe where the voltage does not exceed 250 and is often very convenient for locating a blown-out fuse or for ascertaining whether or not a circuit is alive. Some men can endure the electric shock that results without discomfort whereas others cannot. Therefore, the method is not feasible in some cases. Which are the outside wires and which is the neutral wire of a 115/230-volt, three-wire system can be determined in this way by noting the intensity of the shock that results by touching different pairs of wires with the fingers. Use the method with caution and be certain that the voltage of the circuit does not exceed 250 before touching the conductors. (This and the several paragraphs that follow are taken from *Electrical Engineering*.)

159. The presence of low voltages can be determined by tasting. The method is feasible only where the pressure is but a few volts and hence is used only in bell and signal work. Where the voltage is very low, the bared ends of the conductors constituting the two sides of the circuit are held a short distance apart on the tongue. If voltage is present a peculiar mildly burning sensation results, which will never be forgotten after one has experienced it. The taste is due to the electrolytic decomposition of the liquids on the tongue which produces a salt having a taste. With voltages of 4 or 5 volts, due to as many cells of a battery, it is best to test for the presence of voltage by holding one of the

Power cables

Orange cables under the floor take the power to the inverter





Safety Equipment

- Linesmans Gloves - Class 0 minimum
- Multimeter - cat111 1000v Meter
- Rubber Mat or HV Overboots
- Safety Hook
- Signs
- Safety Goggles
- Red Litmus Paper
- Boric Acid or Vinegar
- Water



High Voltage Tools



Process

- ❖ Research/Resources
- ❖ Check Vehicle Circumstances - Flood/Fire/Accident?
- ❖ Check Safety Kit
- ❖ Walk Around
- ❖ Dry, well lit, well ventilated area
- ❖ Prepare and use safety equipment
- ❖ Shut down vehicle
- ❖ De-Energise Vehicle
- ❖ Check, Lock Out and place signs
- ❖ Commence Dismantling

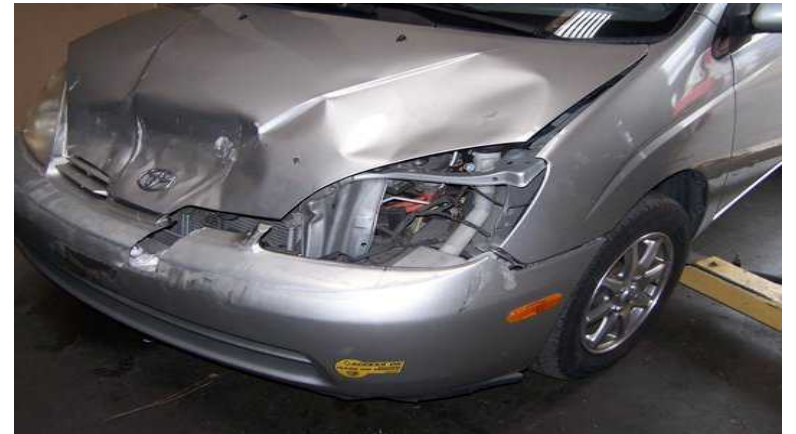
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Process

- ❖ Walk Around
- ❖ Check damage areas
- ❖ Inspect underside of vehicle if possible
- ❖ Carefully open bonnet
- ❖ Check Battery

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Leakage

- ❖ The electrolyte is a strong Alkaline and VERY harmful it is colourless, odourless and cannot be identified by simply looking at it.
- ❖ Dilute boric acid solution or vinegar can be used to neutralise a battery electrolyte spill
- ❖ Once neutralised the spill is harmless and can be washed or wiped away.
- ❖ Solution - 800grams boric acid to 20 litres of water or 5.5 ounces to 1 gallon of water.

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Dealing with Leakages

- ❖ Always wear alkaline resistant gloves and safety glasses
- ❖ Prepare Red litmus paper and neutraliser (saturated boric acid)
- ❖ Apply red litmus paper to leaked solution and check colour change
- ❖ If it changes to Blue, pour on neutraliser
- ❖ Test again with litmus paper. Only when paper does not change colour wipe off with cloth or wash away.
- ❖ Must be in well ventilated area and stand upwind.
- ❖ If skin comes into contact with electrolyte was with large volumes of water immediately
- ❖ If eyes come into contact with electrolyte wash them with large volumes of water and seek immediate medical examination
- ❖ Remove any clothing that comes into contact with electrolyte immediately.

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Process

- ❖ Prepare working area and H&S equipment
- ❖ Shut down vehicle
- ❖ Lock out fuse
- ❖ Identify Vehicle
- ❖ Commence Dismantling



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Vehicle Shut Down

- ❖ Ensure vehicle is switched off
- ❖ Remove key and 'lock it out'
- ❖ Disconnect 12-Volt Battery
- ❖ Remove HV Link and leave vehicle for at least 5 minutes - check manufacturers information.
- ❖ Test to make certain HV is shut down
- ❖ Mark vehicle in preparation for dismantling.

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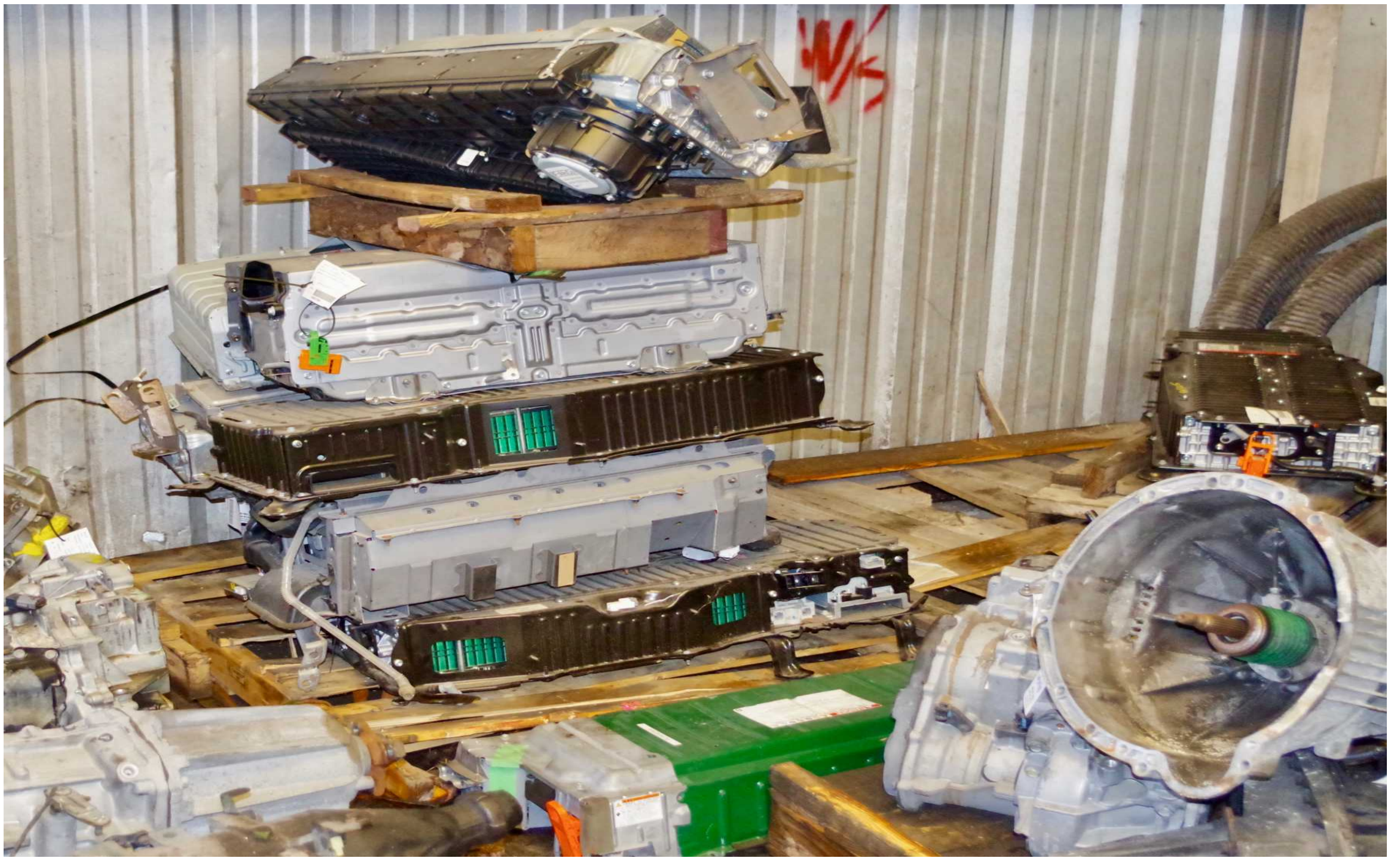
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Battery Storage

- Dry and not exposed to high temperatures.
- Do not crush or puncture.
- Store by battery type.
- Store and recycle according to national legislation - batteries are special waste and subject to mandatory recycling requirements.
- Dry storage environment.
- Refer to insurers, E Agency, specialist for storage advice





Causes of Battery Fires

- Mechanical Damage
- External Thermal Stress
- External Short Circuit
- Internal Short Circuit
- Incorrect Handling
- Overcharging
- Deep Discharging



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Safety when extinguishing a battery fire

- Protect yourself: Use the full PPE available and Self-Contained Breathing Apparatus
- Control the temperature of the Battery for at least 1 hour after it was cooled down
- There is a risk that the battery will re-ignite



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Hazardous Substances Released by Battery Fires

Hydrogen Fluoride
Phosphoric Acid
Toxic Metals

- Nickel
- Cobalt
- Manganese
- Lithium
- Aluminium Oxyhydrogen



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Batteries



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Opportunities

- The volume of vehicles is only going to increase.
- Second use will bring revenue to the value chain
- Training and development - grow skills, knowledge and experience
- Increase professional standards in the industry
- Become a specialist.
- Standing on the sidelines is not an option any more
- Find New ways to do our 'old' business.

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Additional Training

- Awareness Training
- City and Guilds Level 3 and Level 4 Training
- Bespoke Training

Resources

- IDIS (www.idis2.com)
- NFPA (nfpa.org)
- EINTAC (<http://eintac.com>)
- Battery Safety Solutions (<https://www.batterysafetysolutions.com>)
- Car Fire Blanket (www.carfireblanket.com)
- ARA (www.a-r-a.org)
- Salvage Wire (www.salvagewire.com)
- E-Comply (<https://www.ecomply.com>)
- Pro-Assist Hybrid

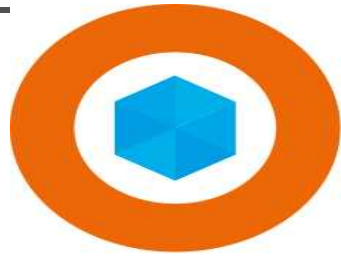
Discount Code

SW1019

10% discount for
the rest of 2019

PPE and Tools

<http://eintac.com>



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Expert in **safe-working**
on **electric vehicles**

EQUIPMENT + TRAINING

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the rest of 2019



Pro Moto (pro-moto.co.uk)

Pro-Assist Hybrid

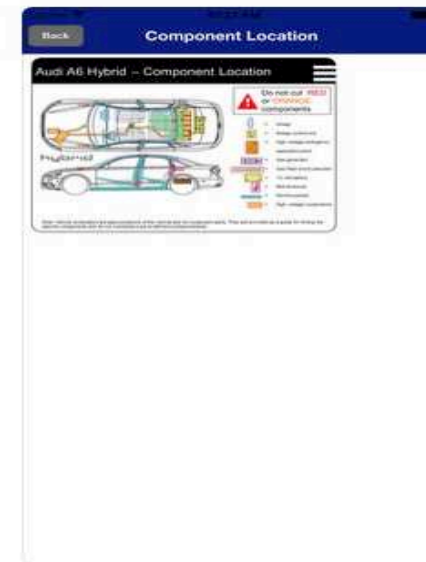
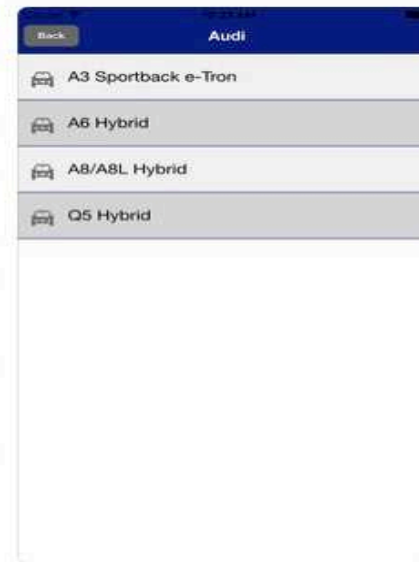
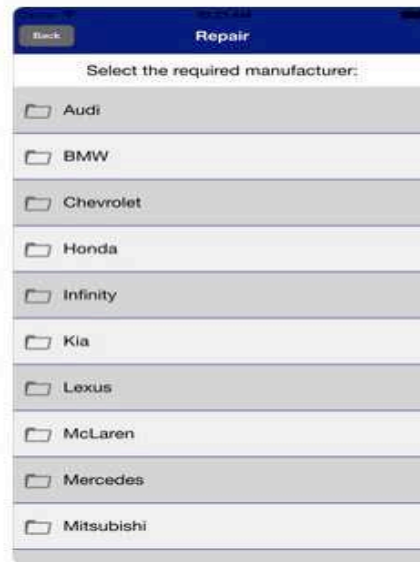


Pro-Assist Hybrid 4+

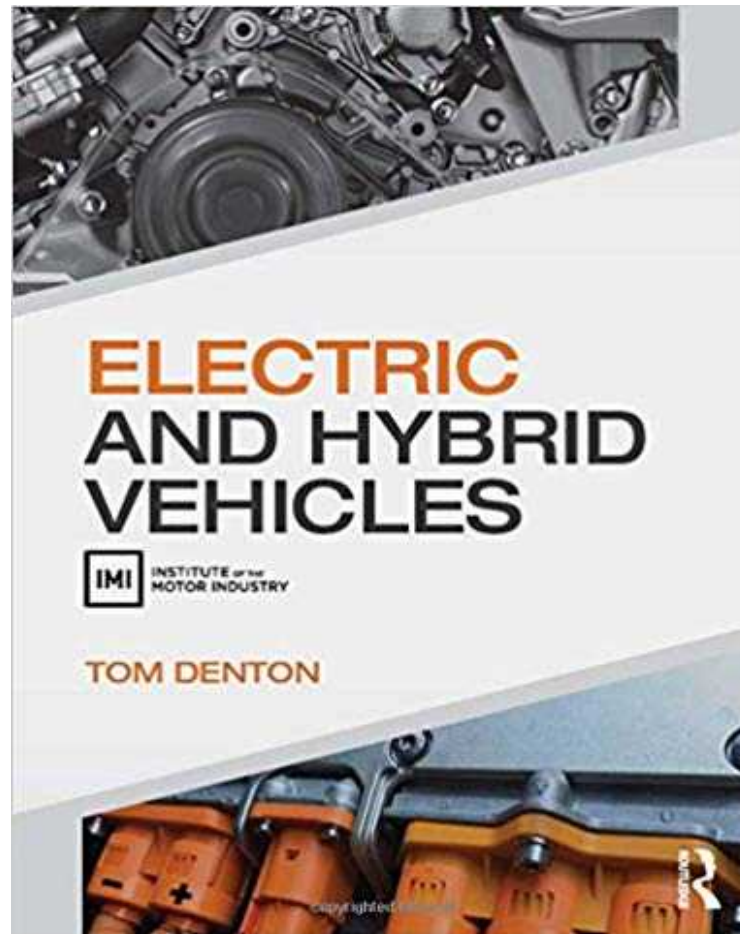
Pro-Moto Europe Ltd

\$2.99

Screenshots iPhone iPad



Electric and Hybrid Vehicles Text Book



ARA

Hybrid Vehicle Dismantling Guide

The ARA University online storefront enables students to find and purchase ARAU approved educational training products and services for advance automotive recycling training. Shop online for training resources, publication guides and resource supplies.

Shopping cart is empty

Hybrid Vehicle Dismantling Guide

\$99.99

1

Add to Cart

The first of its kind to be developed specifically for Hybrid vehicles, the Guide educates automotive recyclers on the safe and efficient dismantling of Hybrids, as well as their differences from other vehicles. With the popularity of Hybrids on the rise, these green recycled parts will increase in demand. The Guide serves to assist automotive recyclers prepare for the rise in this consumer market segment.



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ARA

Automotive Recycler's Guide to Hybrid Batteries

**New Hybrid Guide
from the ARA**
\$15 for members
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properly recycle end of life hybrid batteries



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