



**COLUMBUS STATE**

**FIRE SCIENCE**

**COLUMBUS STATE**

**AUTOMOTIVE AND APPLIED  
TECHNOLOGIES**

# **2019 Alternative Fuel Vehicle Extrication Workshop**



**COLUMBUS STATE**  
**COMMUNITY COLLEGE**

This material is based upon work supported by the National Science Foundation under Grant No. 1600689

For all resources in today's workshop, please visit

<https://tinyurl.com/AltFuelWorkshop>

to view them digitally.

# COLUMBUS STATE

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## COMMUNITY COLLEGE

### Alternative Fuel Vehicle Extrication Workshop Agenda

Time	Agenda Item
<b>8:30</b>	Registration/Continental Breakfast
<b>9:00</b>	Welcome/Introductions
<b>9:05</b>	Pre-requisite Quiz
<b>9:20</b>	Lesson: <ul style="list-style-type: none"> <li>• How to identify the drive system Slides w/ badging (30 minutes) Overview of the hazards</li> <li>• Steps to take (20 minutes) Stress: disconnecting 12v system will disable but does not shut down HV system</li> <li>• YouTube video, narrated and discussion (10 minutes)</li> </ul>
<b>10:20</b>	CNG Fueling Station
<b>10:30</b>	Workstations and Handouts Station are 14 minutes each with a 2 minute rotation between stations: <ol style="list-style-type: none"> <li>1. Toyota Prius hybrid on lift</li> <li>2. Ford F-150 LPG on flat</li> <li>3. Ford C-Max energi PHEV hybrid on lift</li> <li>4. Lincoln MKZ hybrid on flat</li> <li>5. Ford Escape hybrid on lift</li> <li>6. Chevy Malibu LPG on flat</li> <li>7. Honda Hybrid on lift</li> <li>8. Dodge Van CNG on lift</li> </ol>
<b>11:30</b>	Lunch/Ride & Drive
<b>12:15</b>	Complete Remaining Stations
<b>1:30</b>	Stations Review/Prep Car Cutting
<b>1:45</b>	Vehicle Extrication
<b>3:15</b>	Debrief/Post Survey
<b>3:45</b>	Dismissal

# Alternative Fuel Vehicle Extrication Workshop

## Workstation lab sheet

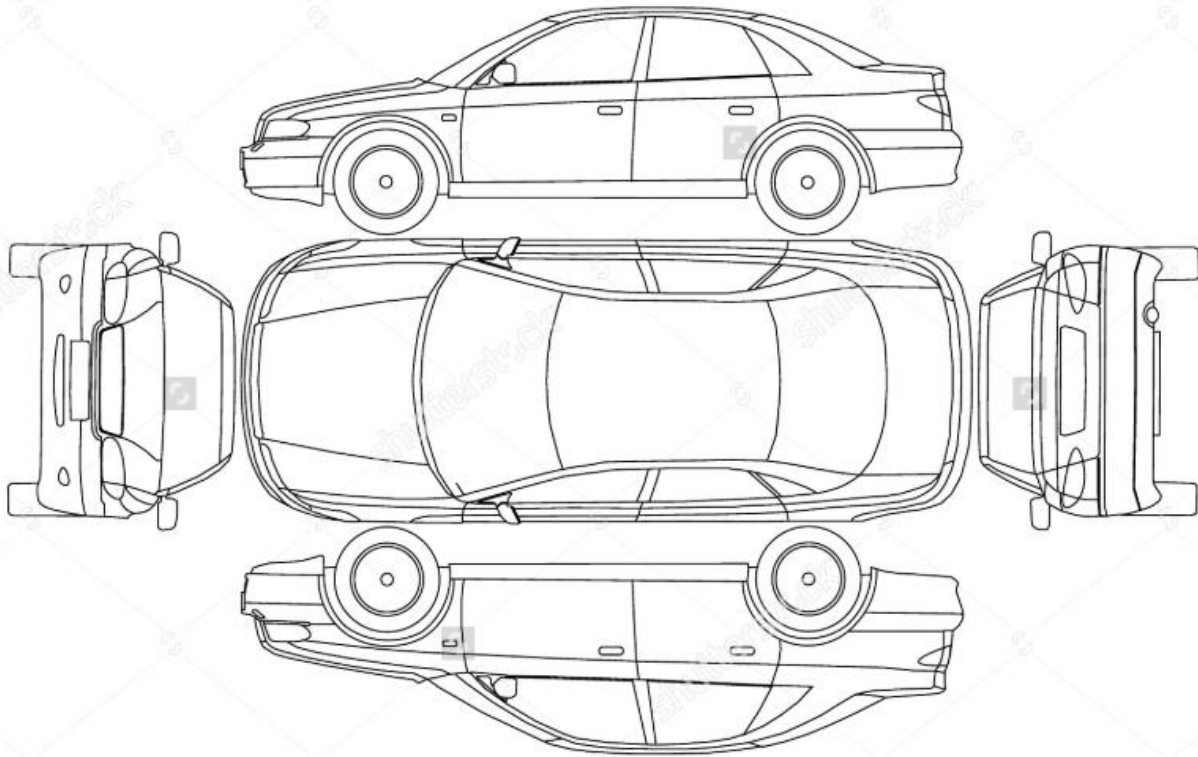
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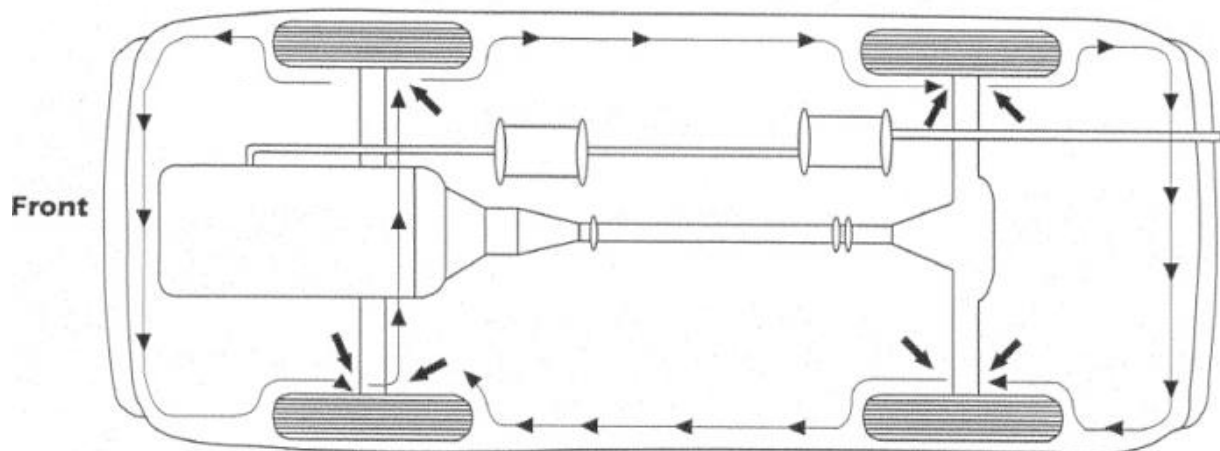
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**Offside**



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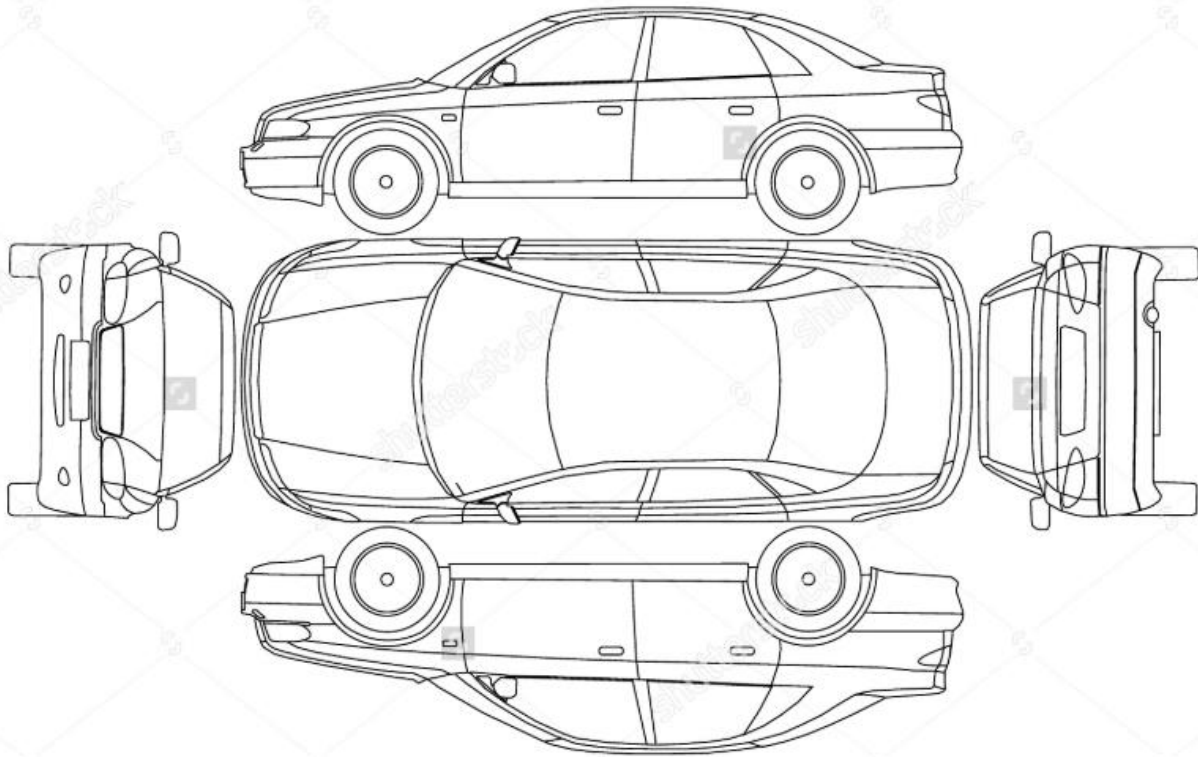
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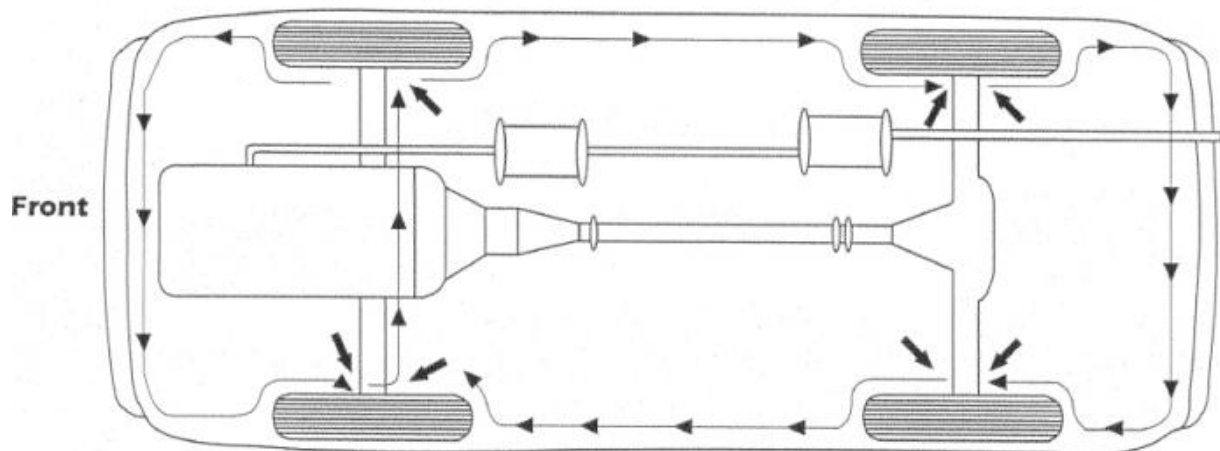
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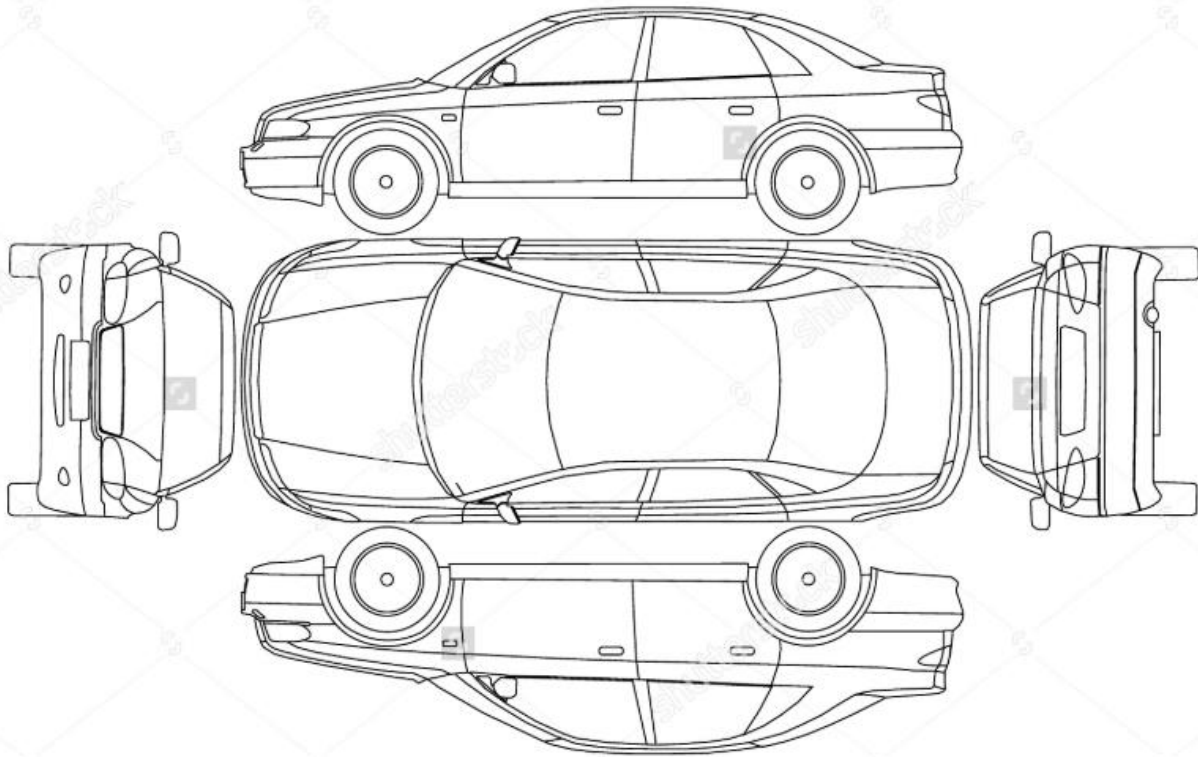
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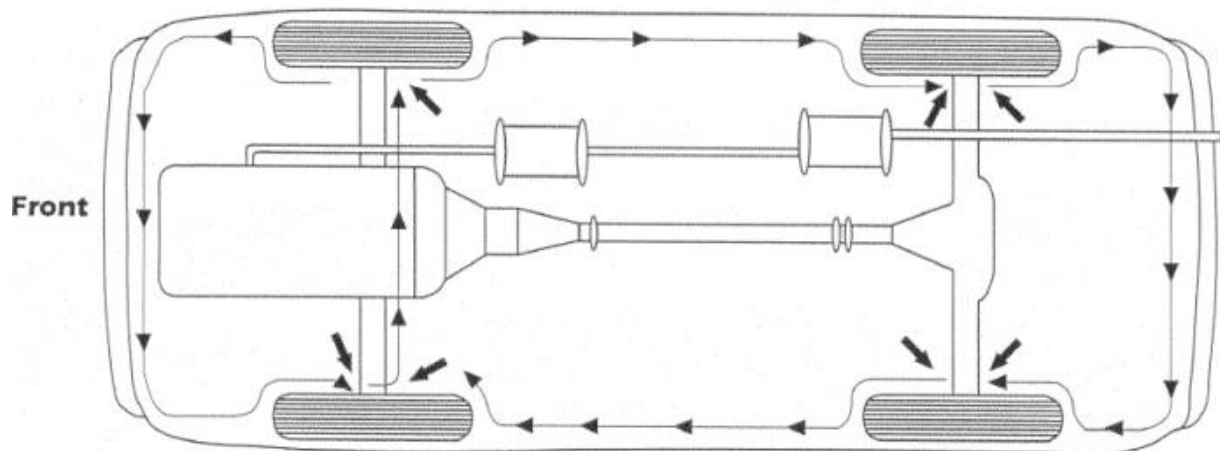


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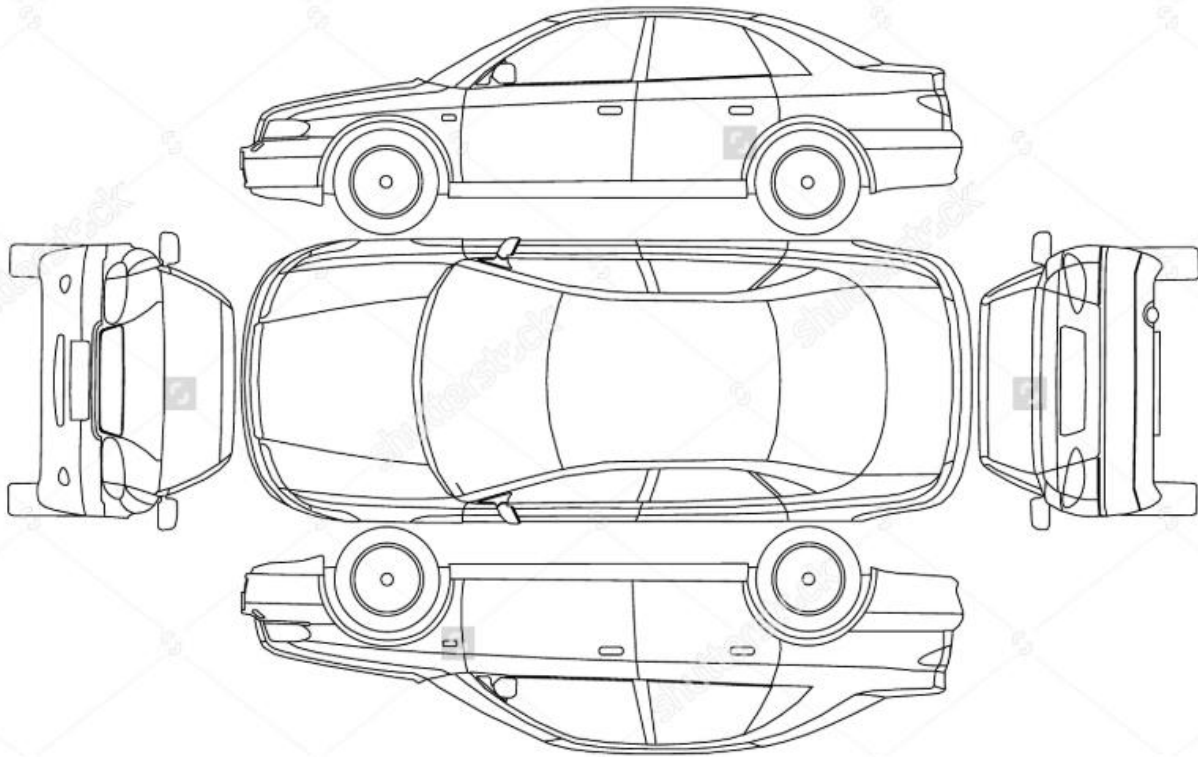
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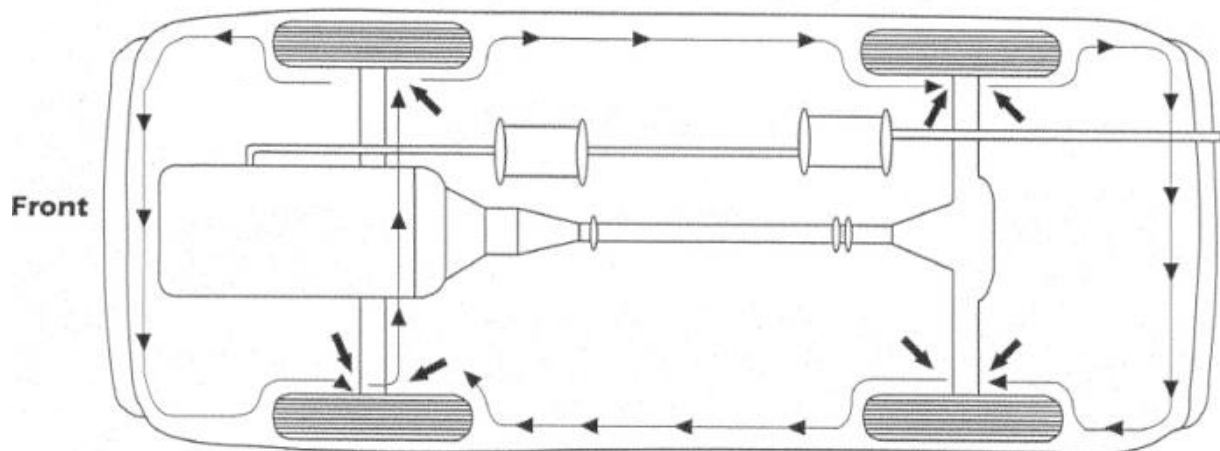
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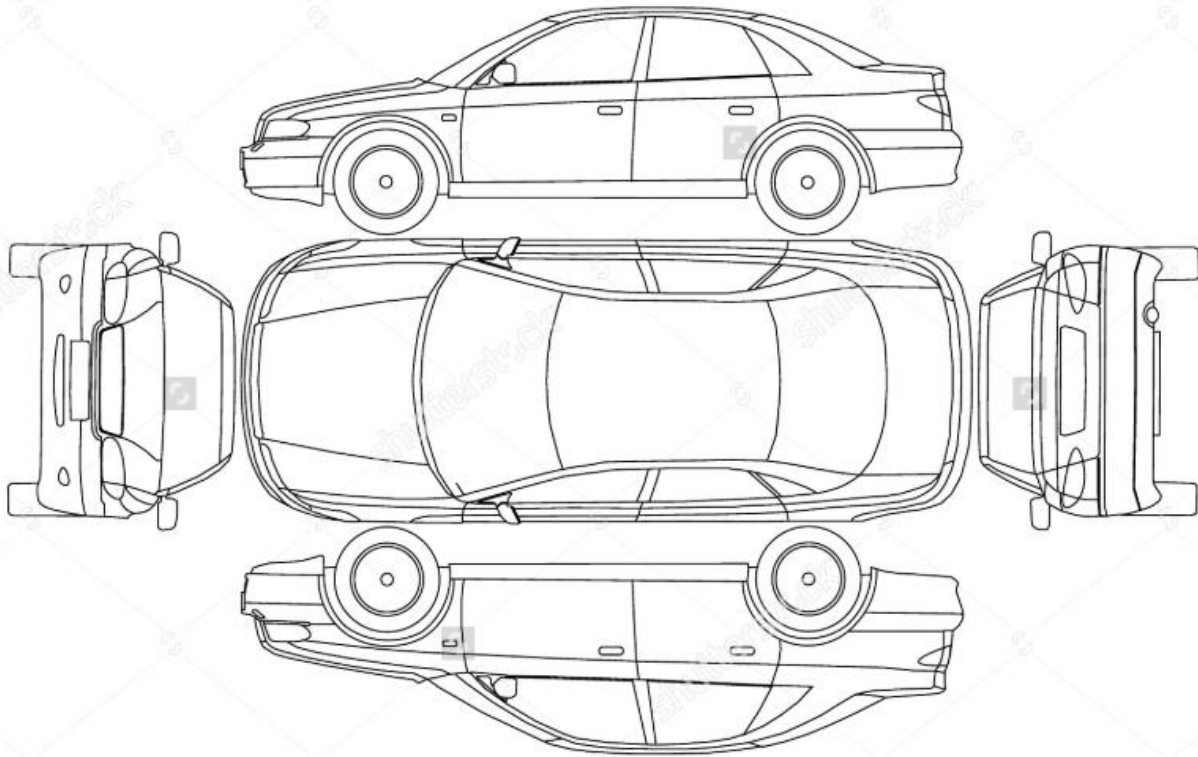
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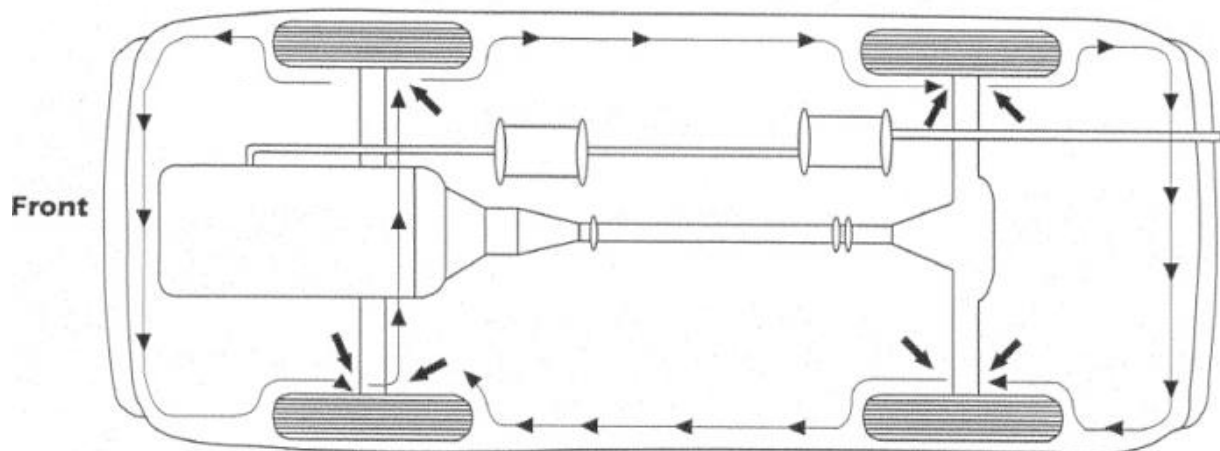
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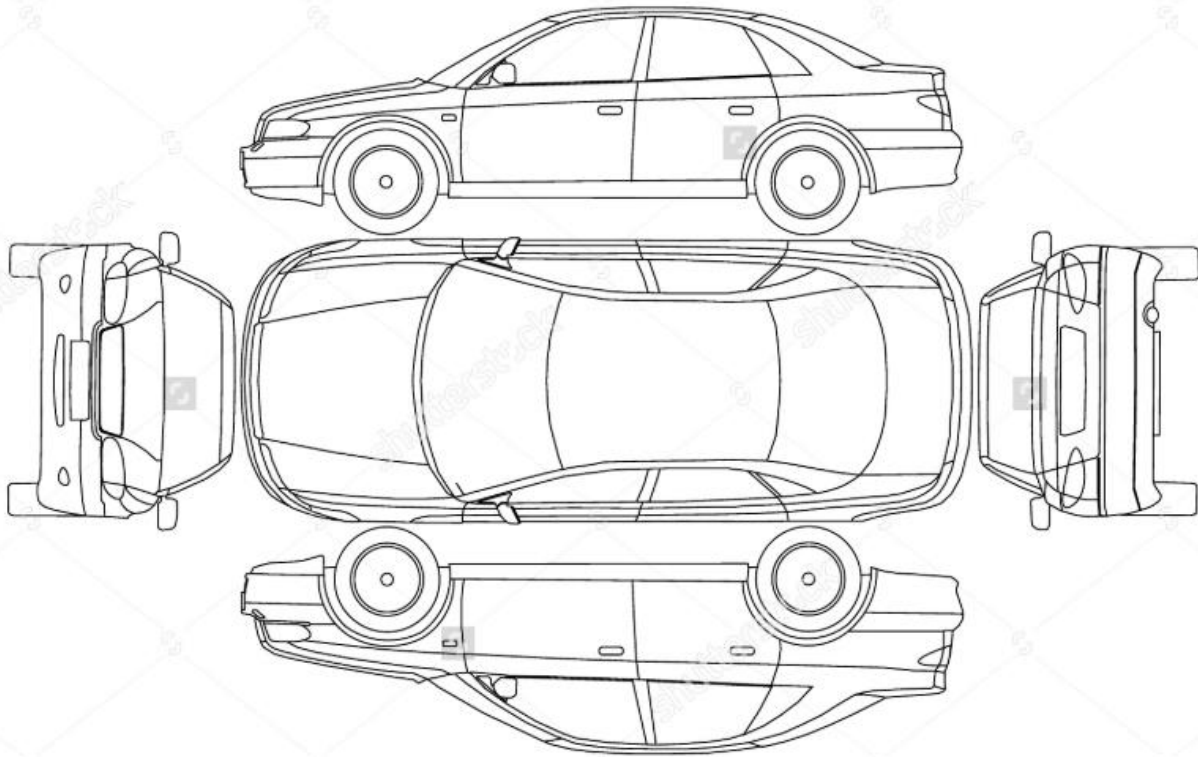
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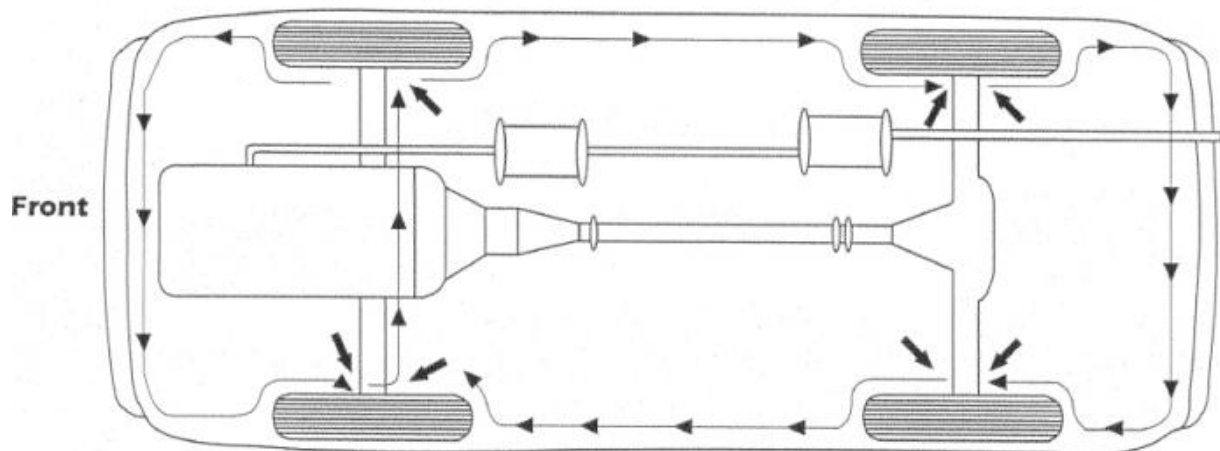
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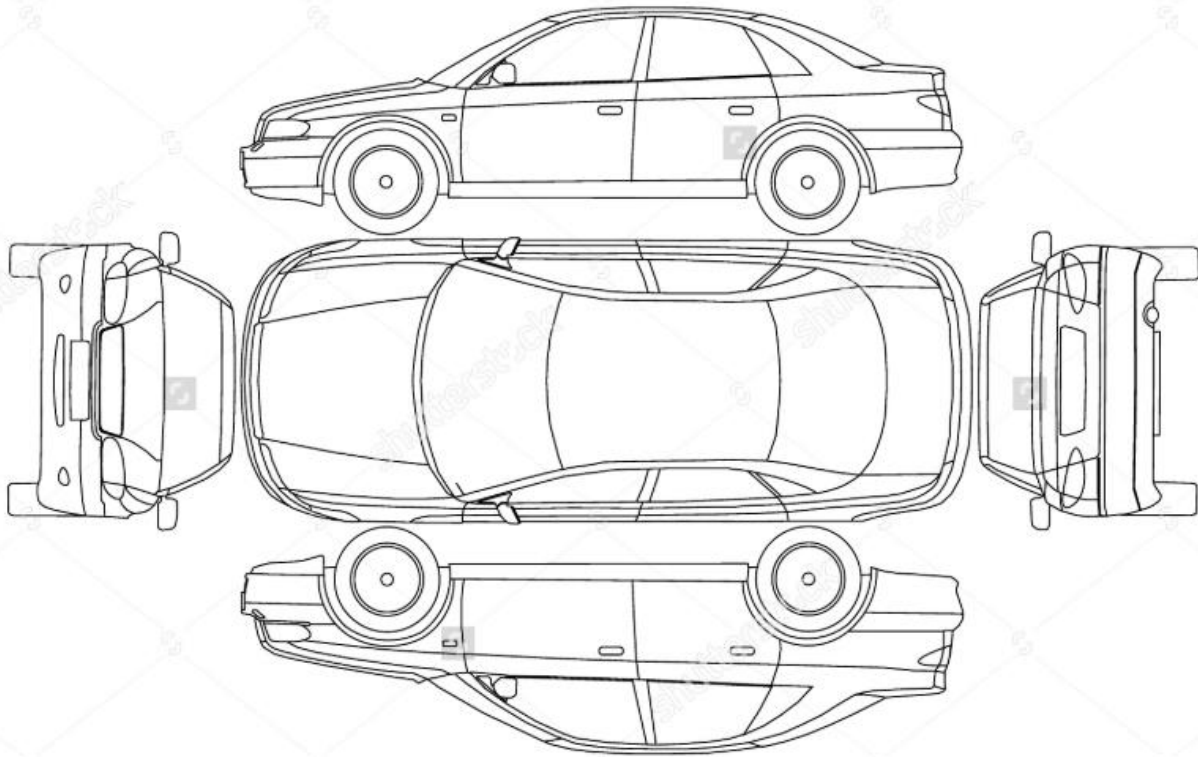
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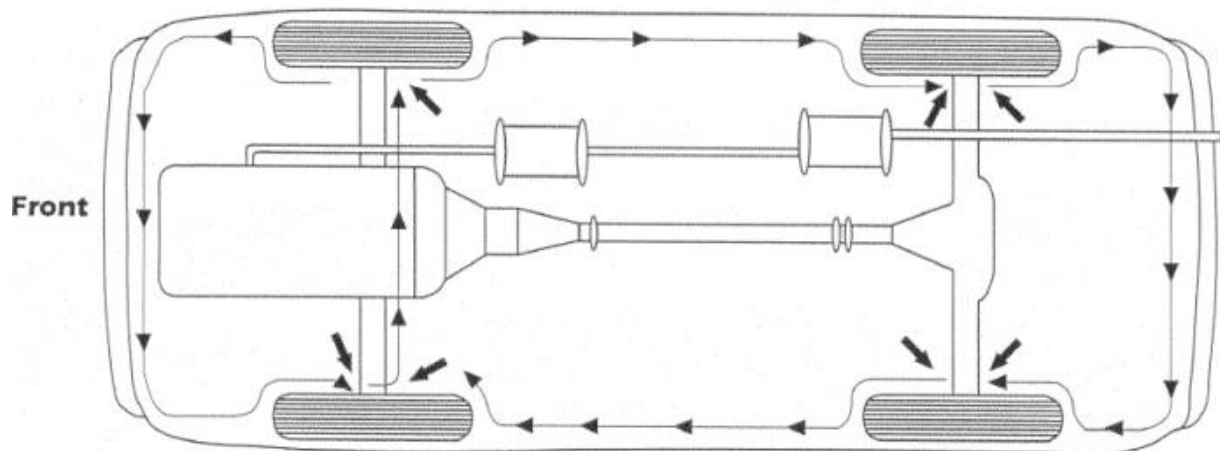


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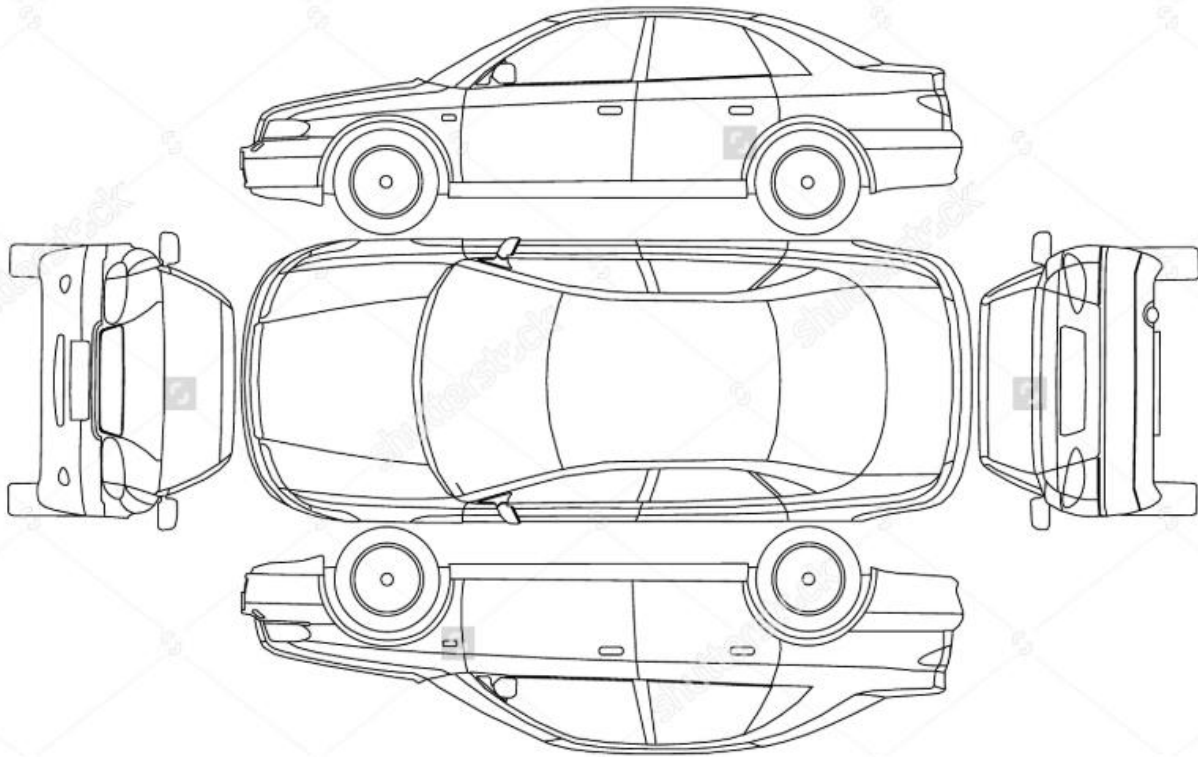
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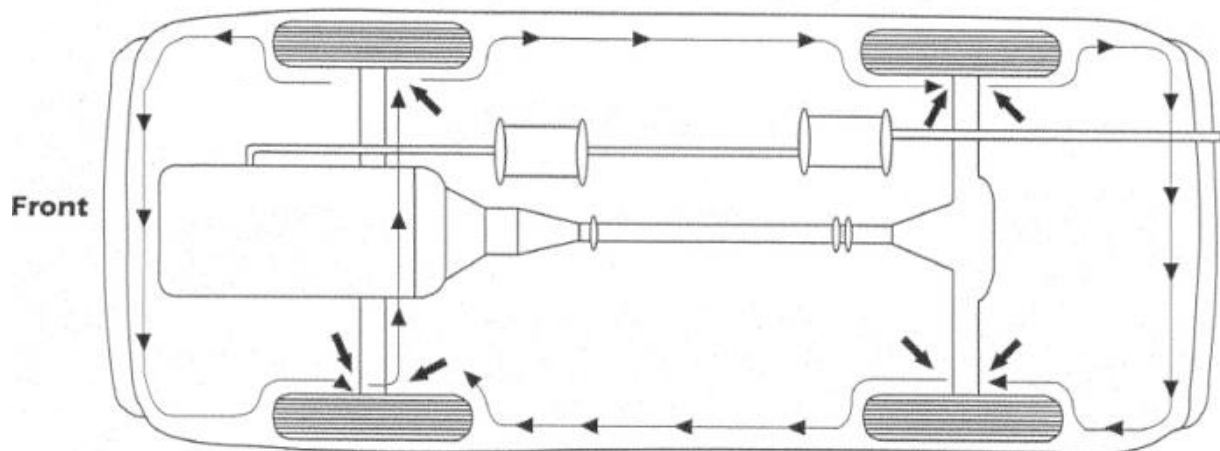
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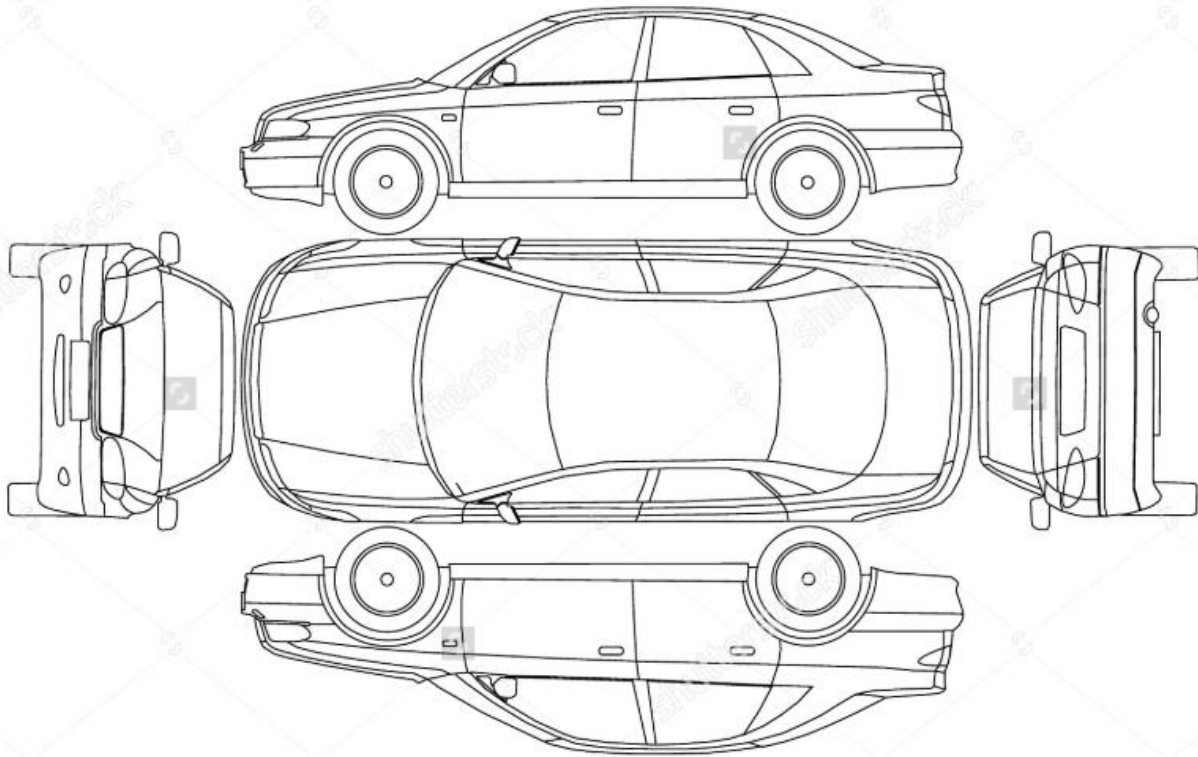
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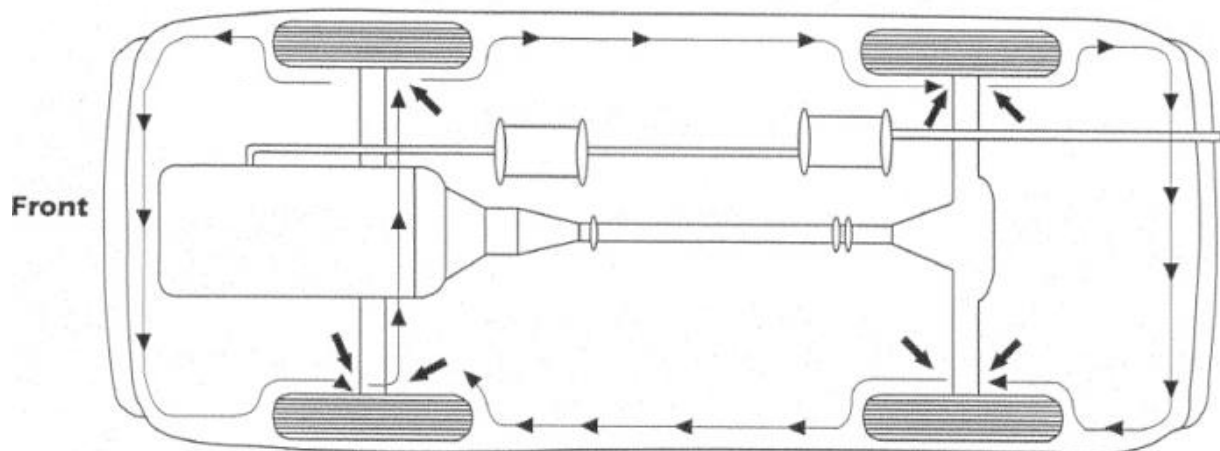
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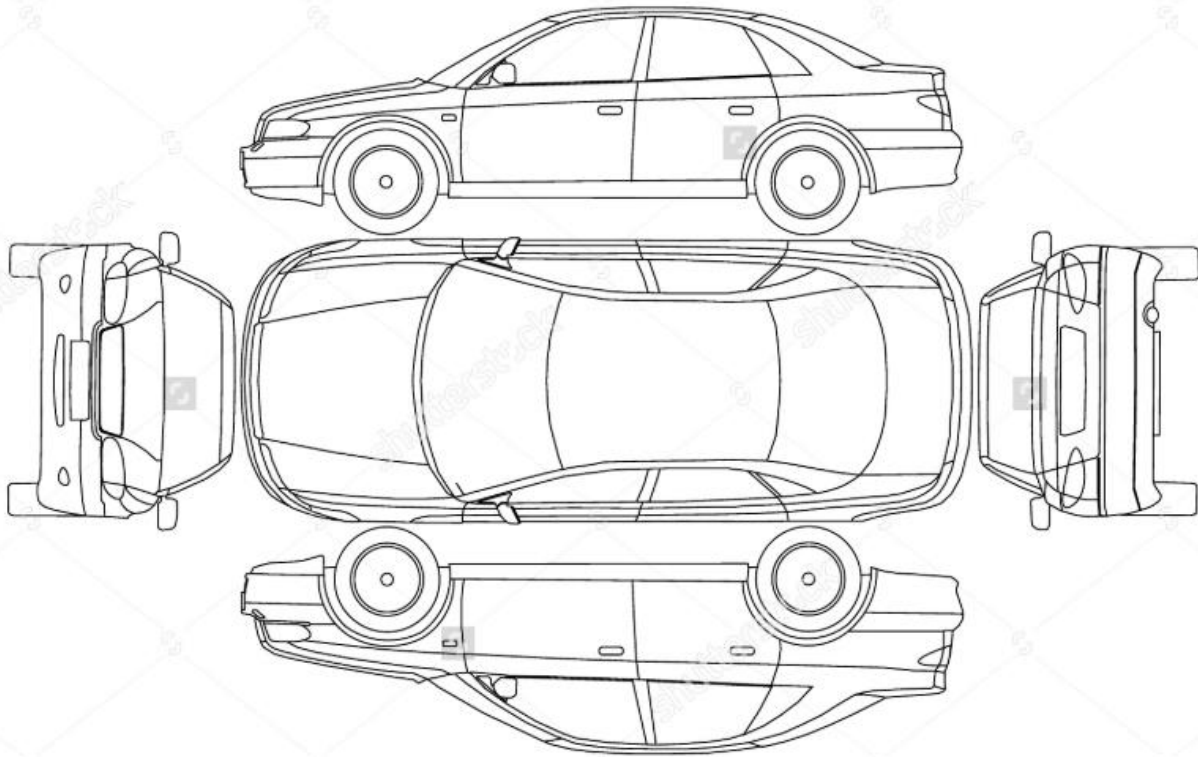
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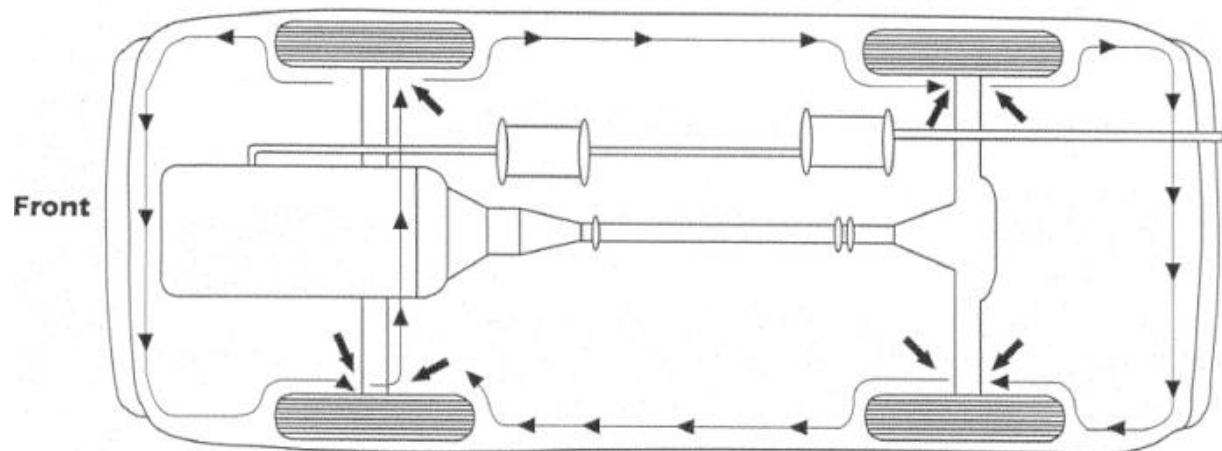
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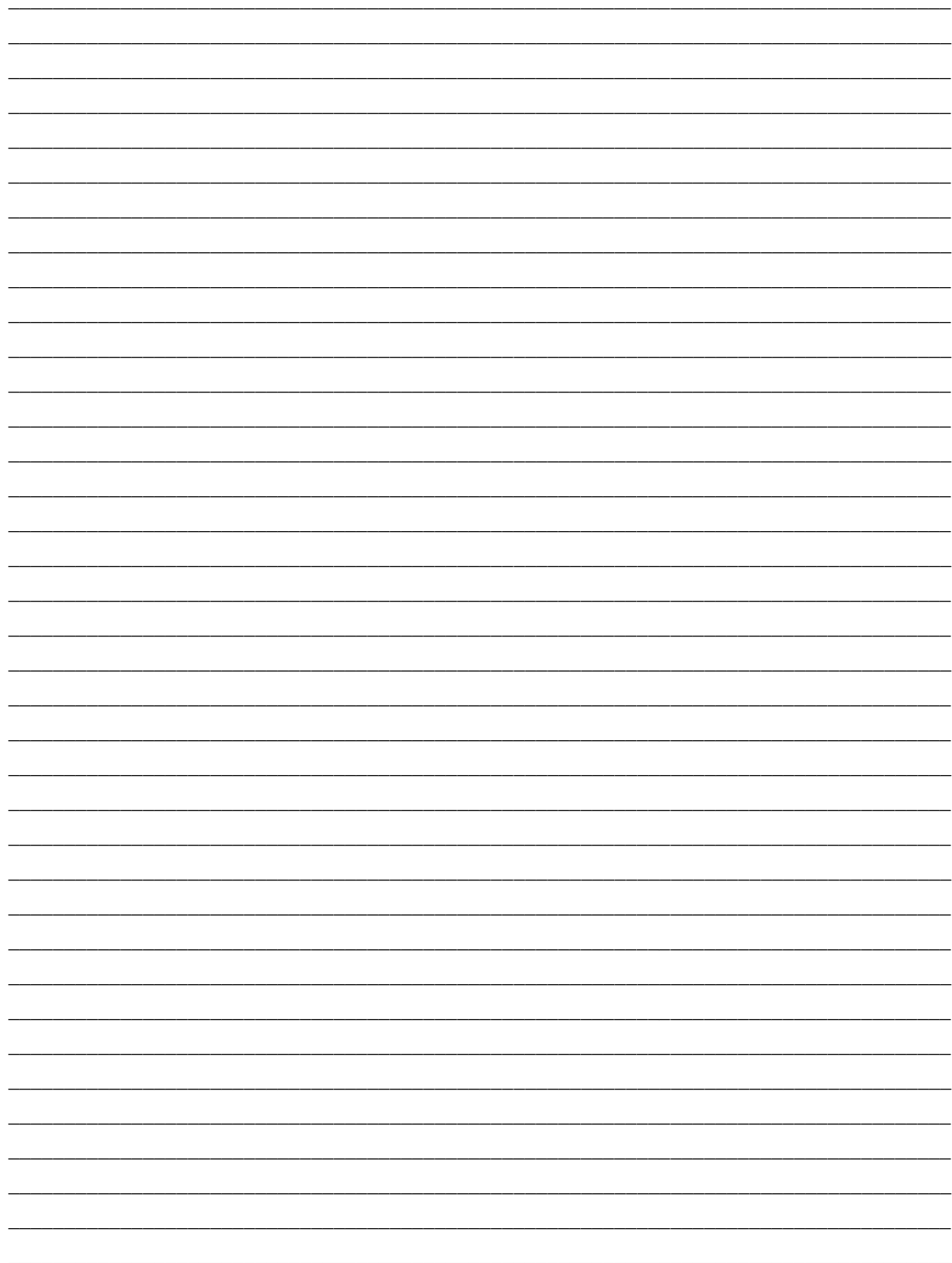
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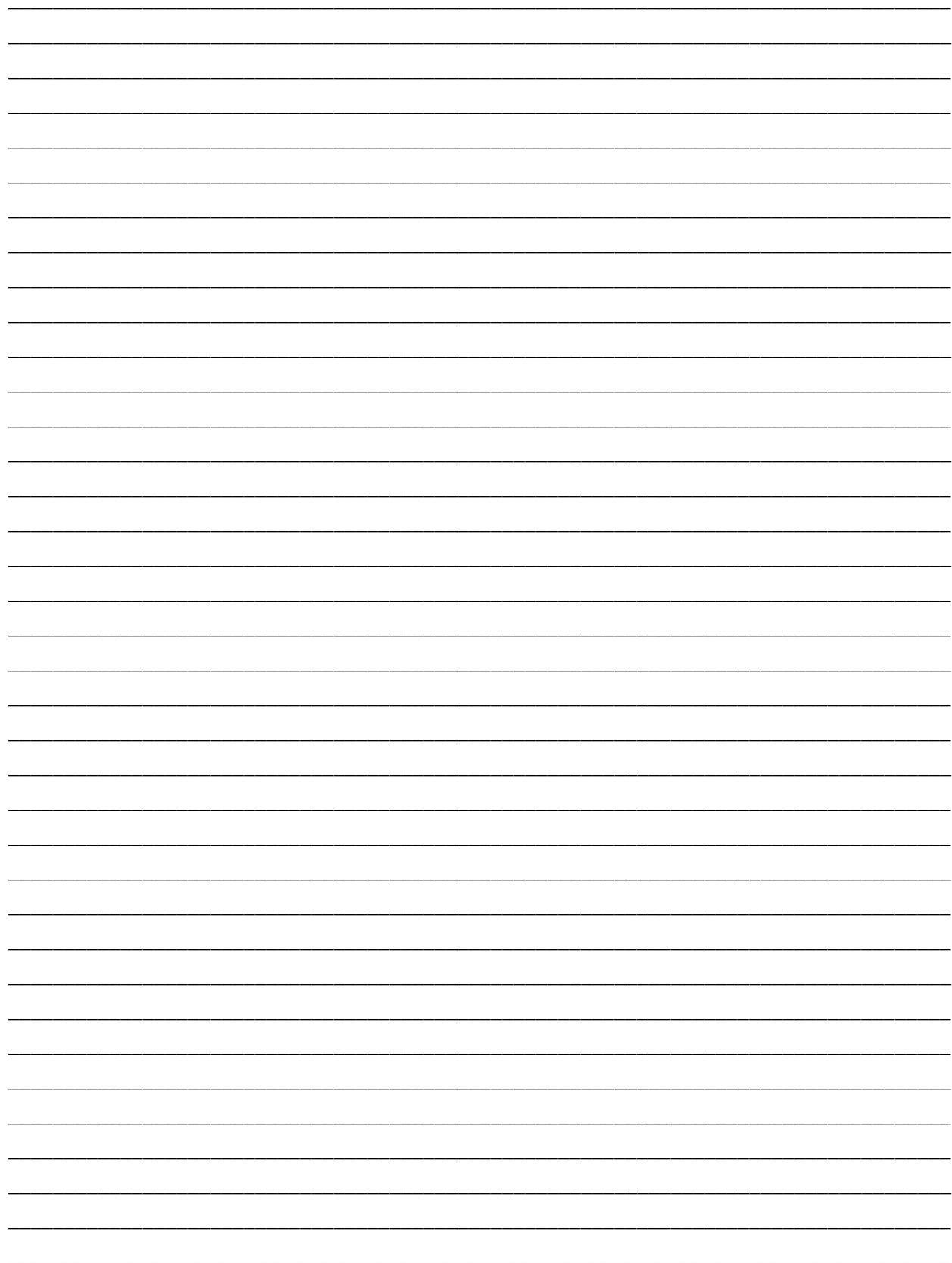


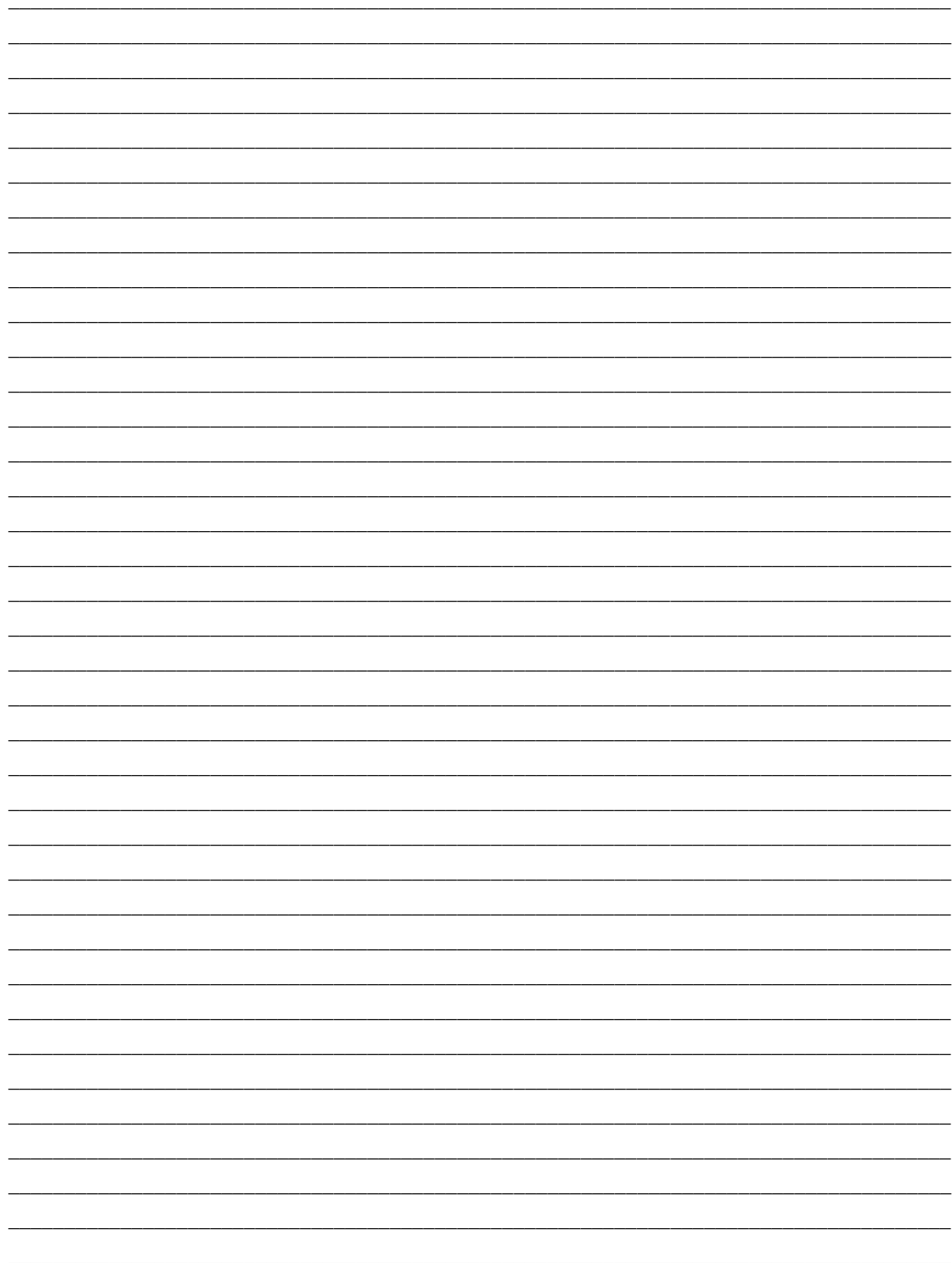
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# Electric and Hybrid Vehicle Quick Reference

## Fire Service Edition

### INITIAL RESPONSE ACTIONS:

Conduct an Initial Scene Assessment to identify hazards.

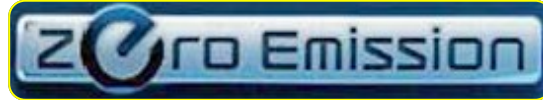
- Then: 1. **IDENTIFY** the drive system.  
2. **IMMOBILIZE** the vehicle.  
3. **DISABLE** high voltage & SRS.



Photo courtesy of Kevin Cooney

### IDENTIFY

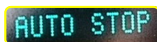
**BADGES:**



**LABELS:**



**INSTRUMENTS:**



**COMPONENTS:**

**Orange Cables  
= High Voltage**



### IMMOBILIZE

1. Chock wheels



2. Set Emergency **BRAKE**



3. Place vehicle in **PARK**



### DISABLE

1. Ensure ignition is **OFF**\*



2. Disconnect 12V battery

**\*If vehicle is  
equipped with  
proximity key,  
move it at  
least 16 feet  
away.**



# Electric and Hybrid Vehicle Quick Reference

## Fire Service Edition

### GENERAL WARNING AND CAUTIONS

- Never cut orange high voltage (HV), or yellow or blue medium (MV) voltage cabling. Never touch damaged or submerged HV or MV cables or components.
- Lack of engine noise in most hybrids and electrics does not mean that the vehicle is OFF. **Silent movement** or instant restart capability exists until vehicle is fully shut down.



### SUBMERSION

- Vehicle chassis is safe to touch.
- High voltage (HV) system is **isolated** from chassis.
- Do not touch submerged HV cables or components.



### FIRE

- High voltage (HV) battery fires may take much longer to extinguish than conventional fires.
- **Water** is the best extinguishing agent.
- Establish a water supply from hydrant or static source.
- **Smoke is toxic.**



### POST INCIDENT

- Tow with a flatbed. Towing with drive wheels on ground may cause electrical fire.
- If high voltage (HV) battery is damaged, store vehicle at least 50 ft. from structures or vehicles.



- Monitor for signs of HV battery damage (inform tow operator).

For more detailed information and vehicle-specific alternate shutdown methods, see NFPA's **EV Emergency Field Guide**

### DAMAGED HIGH VOLTAGE BATTERIES

- High voltage (HV) electrolyte leakage should be minimal, but is likely caustic and/or flammable *if* released.
- **Warning signs of hazardous damage:** sparks, smoke, Increasing temperature, gurgling/ bubbling sounds from HV battery.
- If any of these signs are observed, **ventilate the vehicle immediately**. The HV battery may be giving off harmful/ flammable gases and may become a delayed fire hazard.



# ALTERNATIVE ENERGY AUTOMOTIVE TECHNICIAN



## COLUMBUS STATE

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FIRE SCIENCE

## COLUMBUS STATE

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AUTOMOTIVE AND APPLIED  
TECHNOLOGIES

For more info on:

**Fire Safety Training** go to [www.cscs.edu/fire](http://www.cscs.edu/fire)

**Automotive Technology** go to [www.cscs.edu/autotech](http://www.cscs.edu/autotech)



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