



Automotive Tech.

Flexible Instruction Day

Assignment #5

Learning Standard	Automotive Technology CIP 47.0604
Task # & Description	500 Suspension and Steering and 700 Electrical/Electronic System Restraint System Technology

CONTACT INFORMATION/ASSISTANCE

Instructor Name: Tim McLaughlin

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I will be available by email and Phone 724-282-0735 Ext. 216 from 7:40-12, and 12:30-3:10 to answer your questions. Please reach out if you are having difficulty completing your assignments.

INSTRUCTIONS

All work is due on the day we return to school. This is counted towards your attendance **and** as a classroom assignment.

Read over PowerPoint slide print out and answer questions.

Name: _____

Session: _____

____/____40____ points

Day 5

Presentations for PowerPoint

Modern Automotive Technology

1

CHAPTER 85 Restraint System Technology

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Objectives

- Explain how vehicle body and frame construction works with restraint systems to protect a vehicle's occupants.
- Describe the purpose of restraint systems.
- Identify and locate the most important parts of vehicle restraint systems.
- Describe restraint system variations.
- Correctly answer ASE certification test questions requiring a knowledge of restraint system operation and construction.

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Vehicle Collisions (1 of 2)

- Vehicles are designed to absorb the tremendous force generated when vehicle crashes to a halt
- Crush zones
 - Located at front and rear of body-frame assembly
 - Collapse during severe impact to absorb forces



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Vehicle Collisions (2 of 2)

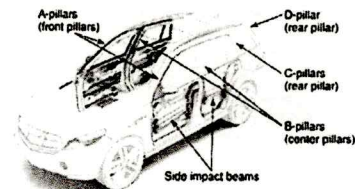
- Side-impact beams
 - Made of high-strength steel or carbon fiber
 - Mounted in vehicle's doors to help prevent intrusion into passenger compartment
- Body pillars
 - Metal beams that extend vertically to support roof panel
 - Protect passenger compartment, especially in event of rollover

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Types of Body Pillars

- Front pillars
- Center pillars
- Rear pillars

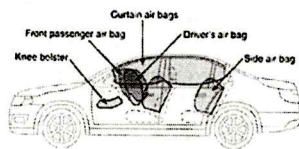


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Knee Diverter (Knee Bolster)

- Formed into lower part of dash to protect driver's and front passengers' knees from being injured on dash's metal frame
- Prevents driver and passengers from sliding under air bag during collision
- Thick plastic panel that covers metal frame of dash



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Air Bag System

- Deploys inflatable nylon bags to help protect vehicle's occupants during collision
- Air bags inflate in about 1/20th of a second
 - Well before body can fly forward during collision
- Tough nylon bags can easily absorb forward inertia of human body

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Air Bag System Parts (1 of 2)

- Air bag module
 - Contains inflator mechanism and nylon air bag that expands to protect vehicle's occupants during collision
- Air bag controller
 - Computer that operates system and detects faults

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Air Bag System Parts (2 of 2)

- Impact sensors
 - Inertia sensors that signal controller in event of collision
 - When at least two impact sensors are energized, controller activates air bag module
- Clock spring
 - Mounted in steering column
 - Provides continuous electrical connection between driver's-side air bag module and bag wiring harness in steering column

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Dash Warning Light

- Glows when vehicle is started and remains on until system is armed
 - Approximately 5 seconds
- Bulb also glows if controller detects problem in system



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Air Bag Types (1 of 3)

- Driver's-side air bag
 - Located inside steering wheel
 - Protects driver from head and chest injury during high-speed frontal collision
- All late-model vehicles have dual air bags: driver's-side air bag and passenger-side air bag
 - Deploy only during frontal impacts



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Warning: Placing Children in Vehicles

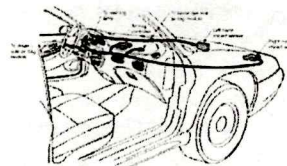
- Warn customers of danger of placing children in front seats of vehicles equipped with dual air bags
- Children should be placed in vehicle's rear seats
 - Must be buckled into approved child seat until tall enough to be restrained properly by seat belt
- Frontal air bags are designed for full-size adults, not small children

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Air Bag Sensors (1 of 3)

- Detect collision by measuring vehicle deceleration during collision
- Impact sensors
 - Mounted in front and sides of vehicle to detect collision

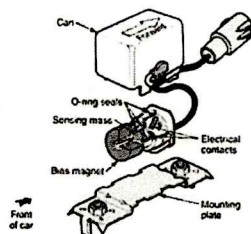


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Air Bag Sensors (2 of 3)

- Safing sensor, or arming sensor
 - Backup sensor designed to ensure vehicle is actually in collision
- Magnet-and-ball sensor
 - Small permanent magnet holds steel ball away from electrical contacts in sensor
- Coil spring sensor
 - Uses small metal weight attached to metal coil spring



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Air Bag Sensors (3 of 3)

- Seat cushion sensors
 - Detect weight of person sitting in passenger seat
- Accelerometer
 - Replaces separate impact and safing sensors
 - Measures changes in motion or deceleration
 - Sometimes mounted in air bag controller or ECM
- Decibel impact sensor
 - Measures amount of sound produced by major collision

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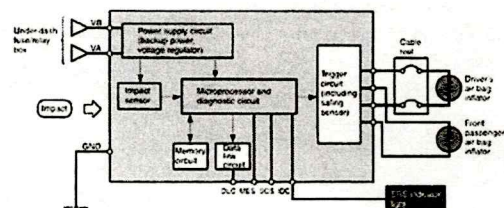
Air Bag Controller

- Air bag controller, or air bag control ECM
 - Uses inputs from impact and safing sensors to determine if air bag deployment is needed
- Generates trouble codes and energizes warning light
- Smart restraint system
 - Uses additional inputs to affect operation of air bags

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Air Bag Controller Operation



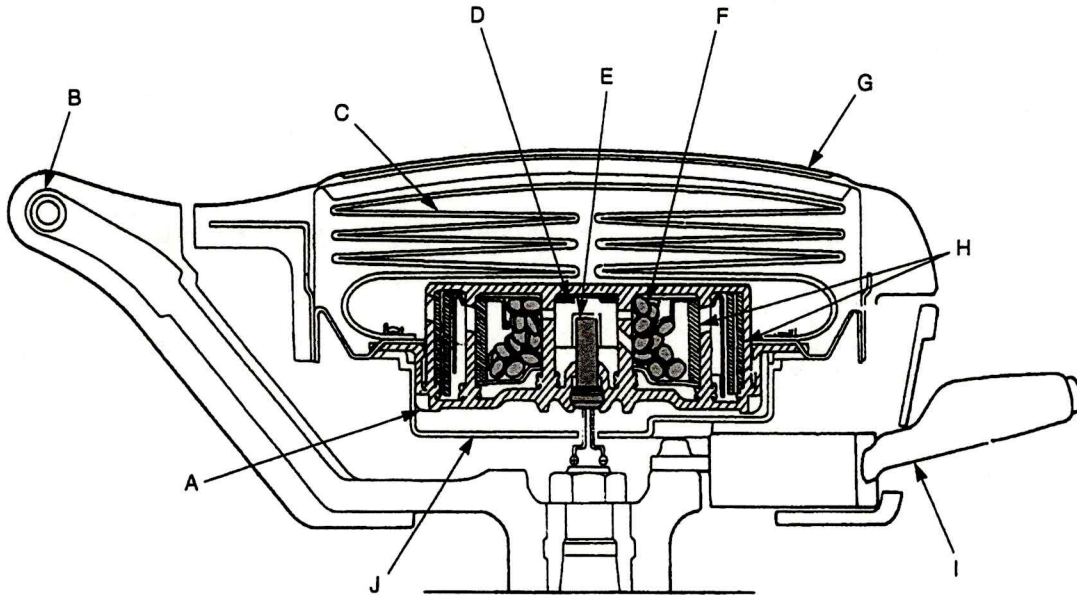
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Day 5 Restraint System Technology

Matching

Identify each of the common air bag module parts marked on the diagram.



- A. Choice A
- B. Choice B
- C. Choice C
- D. Choice D
- E. Choice E
- F. Choice F
- G. Choice G
- H. Choice H
- I. Choice I
- J. Choice J

- ___ 1. Igniter charge
- ___ 2. Inflator
- ___ 3. Gas generant
- ___ 4. Inflator cover
- ___ 5. Bag
- ___ 6. Steering wheel pad
- ___ 7. Steering wheel

OVER →

Name: _____

ID: A

Completion

Complete each statement.

8. Vehicles are designed with _____ that collapse and absorb energy during a collision.
9. A _____ sensor provides a fail-safe system to prevent accidental bag deployment.
10. A(n) _____ restraint system can adjust the inflation speed and pressure of an air bag to adjust for different-size passengers.