



SAFETY TECHNOLOGIES

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Occupant Protection and Crash Avoidance

Occupant Protection – technologies that help protect the occupant during the crash

- Features such as air bags, safety belts, energy absorbing steering columns, interior head impact.

Crash Avoidance – technologies that help avoid the crash

- Features such as ABS, Electronic Stability Control, lighting, mirrors, collision warning systems.

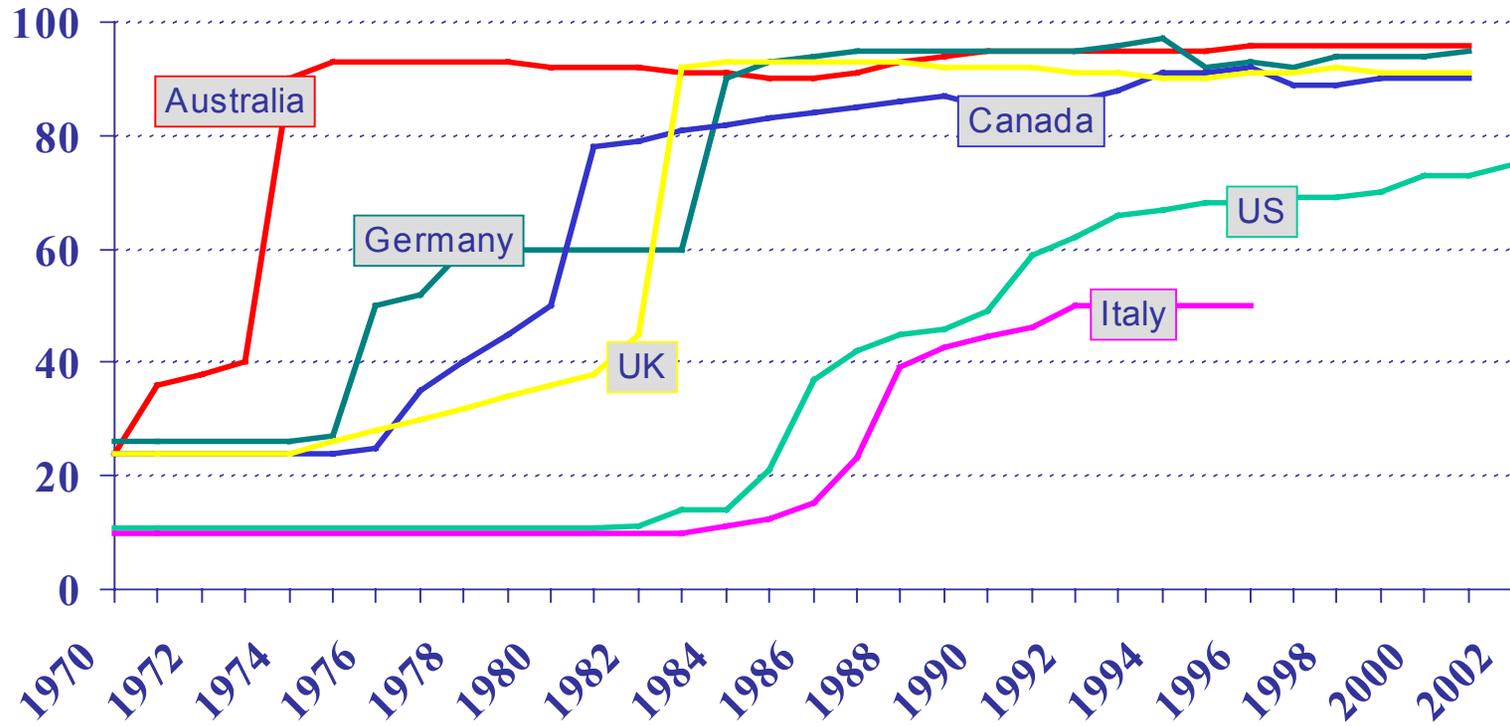
Occupant Protection

- **Safety Belts**
- **Personal Safety System**
 - **Safety Belts**
 - **Airbags**
 - **Occupant Classification Systems**
- **Side Air Bags**

Safety Belts

- Still the number #1 lifesaving feature
- Need to get usage up in the U.S.
- Many initiatives taking place on the Federal and State level
 - one of NHTSA's top priorities

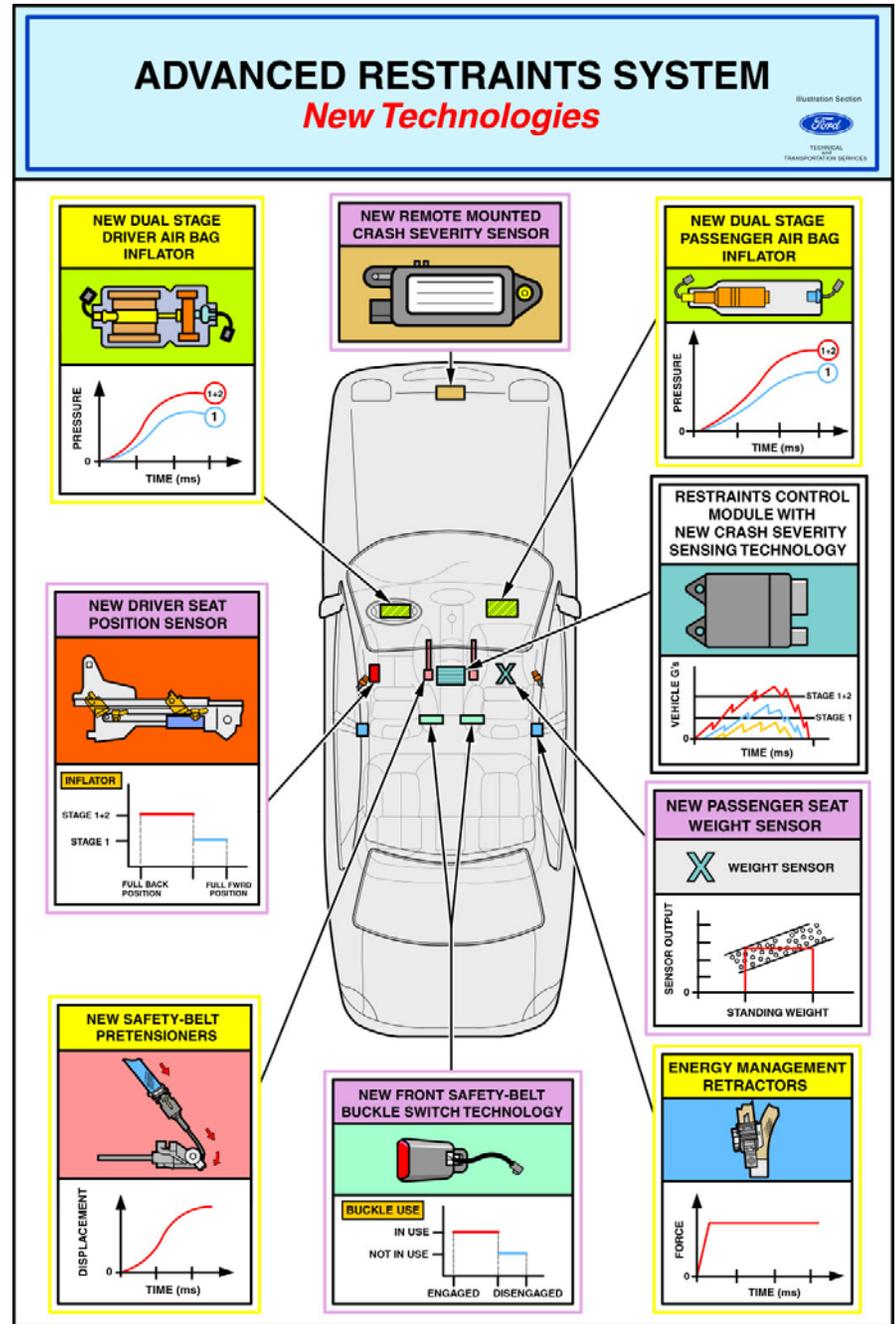
International Safety Belt Use Rates



Ford BeltMinder

- If driver is unbuckled, provides a gentle reminder
 - Chime and tell tale
 - Intermittent during first 5 minutes
- IIHS Study – vehicles with BeltMinder had 5% higher belt use
 - 76% vs. 71%
- Next Step: BeltMinder for front passenger
 - Begin in 2004 in vehicles with Occupant Classification System

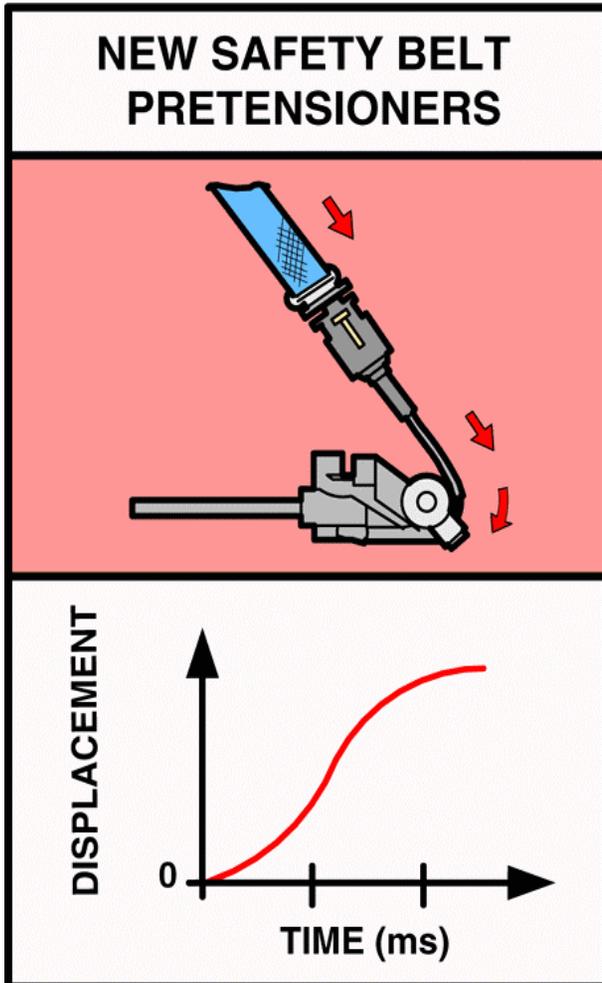
Ford Personal Safety System



Safety Belt Technologies

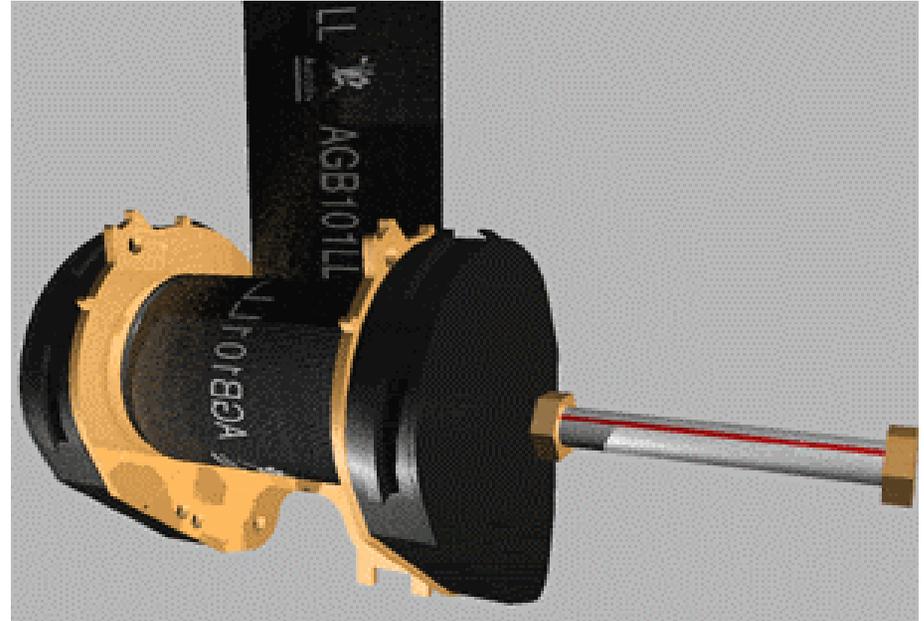
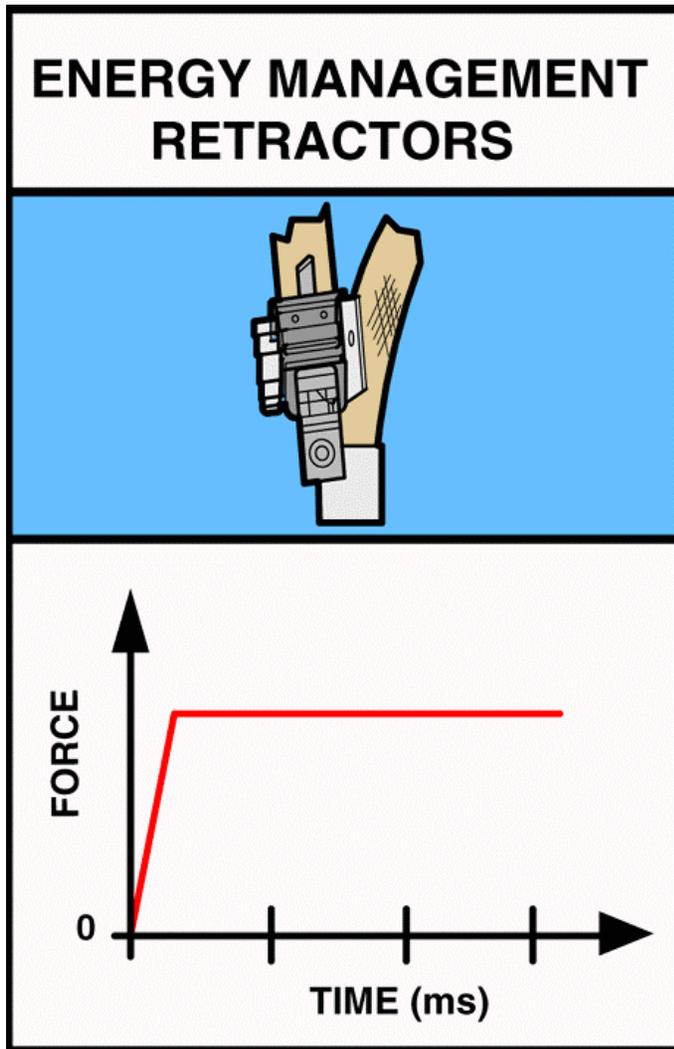
- Pretensioners
- Energy Management Retractors
- Seat Buckle Switch

Pyrotechnic-Pretensioner



Designed to activate during certain frontal crash events to tighten the webbing of the lap and shoulder belts, allowing the belt to begin restraining the occupant sooner in the crash event.

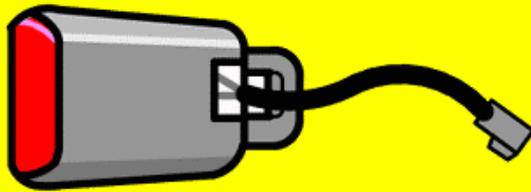
Energy Management Retractors



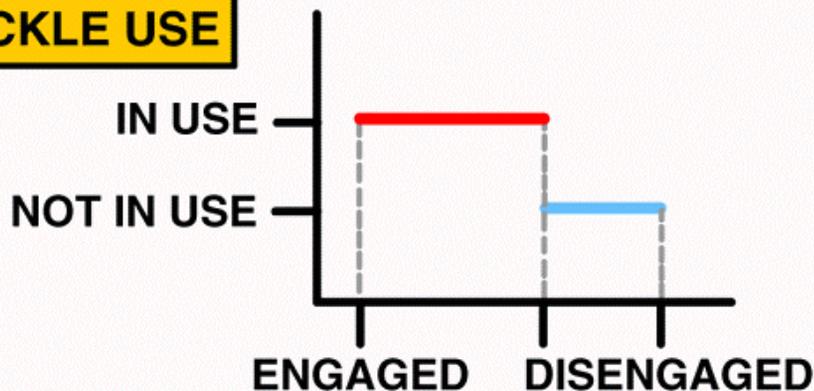
Designed to release webbing in a controlled manner to reduce belt forces on the occupant's chest during higher severity crash events.

Seat Buckle Switch

NEW FRONT SAFETY BELT BUCKLE SWITCH TECHNOLOGY



BUCKLE USE



Sends the belt use status to the Restraint Control Module resulting in a 'belted' or 'unbelted' air bag deployment command

Advancements in Front Air Bag Designs at Ford

First Introduction

1989 MY Standard Driver & Passenger Air Bag

- MY Depowered Air Bags

2000+ MY Personnel Safety System (PSS) with
Dual Stage Air Bag

2001+ MY Occupant Classification added to PSS

2004 MY New FMVSS 208 compliant PSS

Front Impact Airbag Technology

Depowered Air Bags

Offered in 1998MY after NHTSA revised crash standards to allow an optional sled test method for unbelted dummies.

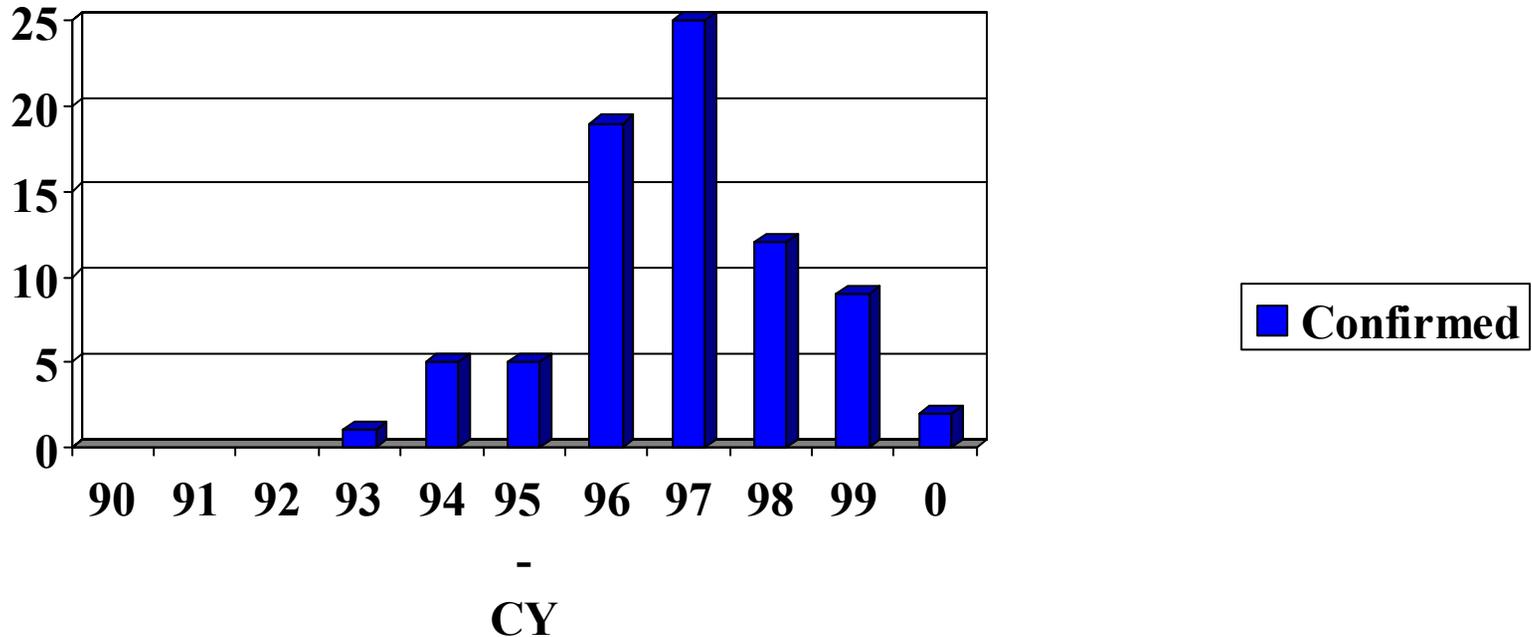
The resulting depowered air bags reduced the risk to small occupants from a deploying air bag induced injury.

Dual Stage Air Bags

Allows bags to deploy at various levels of pressure depending on crash severity, seat position, and belt use.

Child Fatalities (NHTSA data)

(7-1-00 Cumulative = 96)



...and in 2002, NHTSA has confirmed zero (0) child fatalities attributed to front air bag deployment.

Education Played a Part in Reducing Child Fatalities

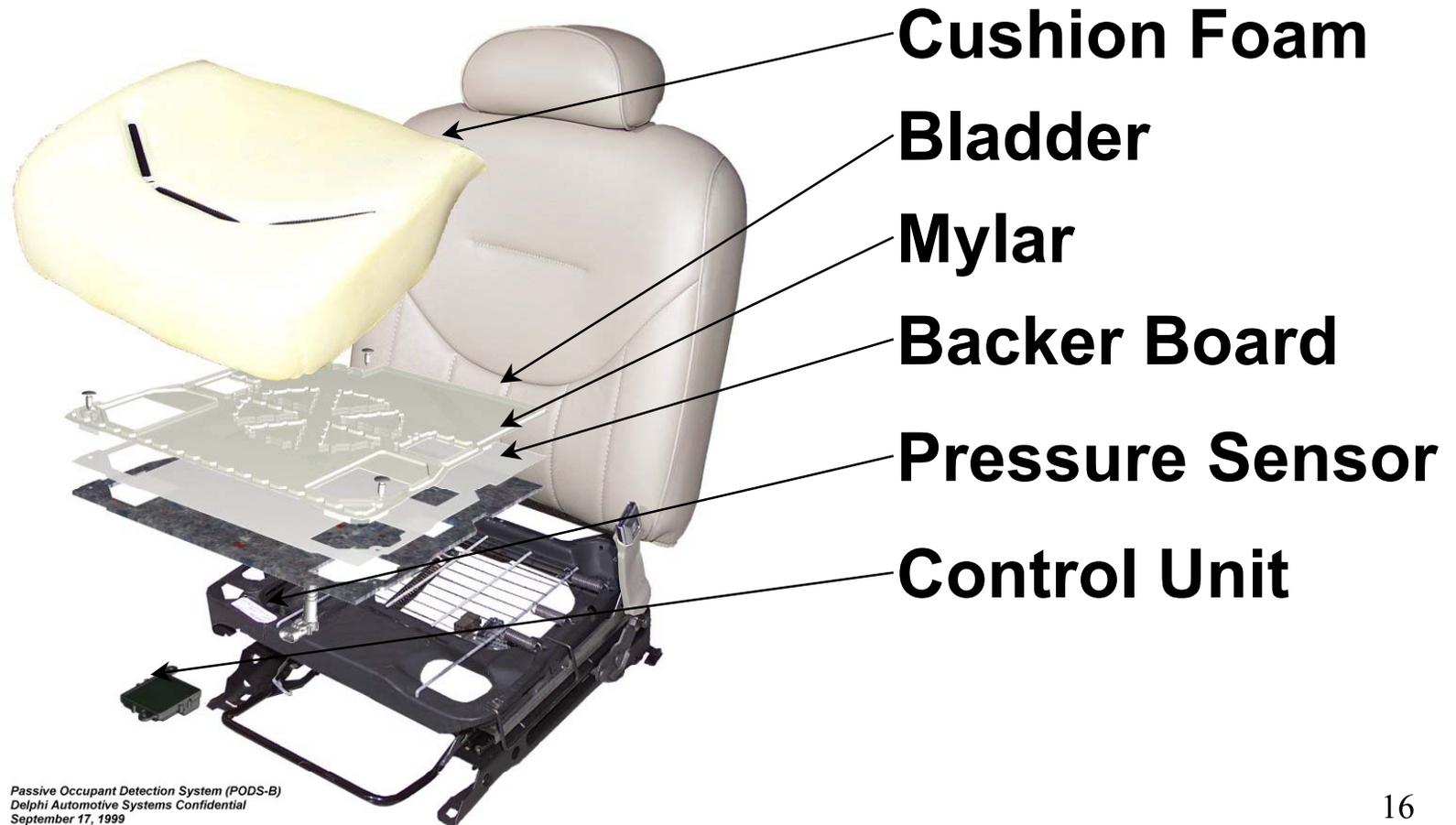
- Ford's Blue's Clues, Sesame Street, and Boost America! educational programs were designed to increase the awareness of both children and parents on how to properly restrain children

- New restraint systems will not change the main message:

Children 12 years old and under are recommended to be properly restrained in the back seat. Even older children and adults are safer in the rear seat, regardless of whether the vehicle has an air bag. If the vehicle does not have a back seat, the child should be properly restrained and the air bag turned OFF, if an ON/OFF switch is available.

Occupant Classification System

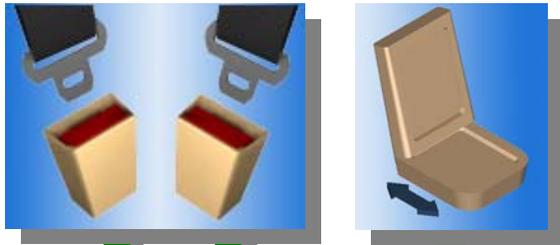
Bladder System Components



Occupant Classification Phase-in

- 2001 and 2002 MY
 - Windstar (2001+) and Town Car (2002)
(first generation)
- 2004 MY
 - F-Series, Taurus, Escape
(2nd generation fully compliant with new FMVSS 208 crash requirements)
- 2005+ MY
 - Other vehicles to follow

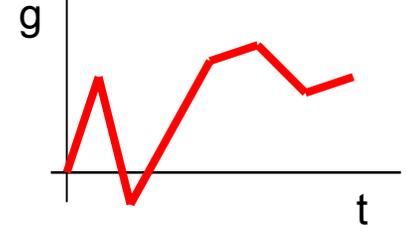
Frontal Impacts



RCM (Sensor)



Front Sensor



Occupant Status

Severity Assessment

Deployment Control (RCM)

Driver

Passenger



Side Impact Air Bags

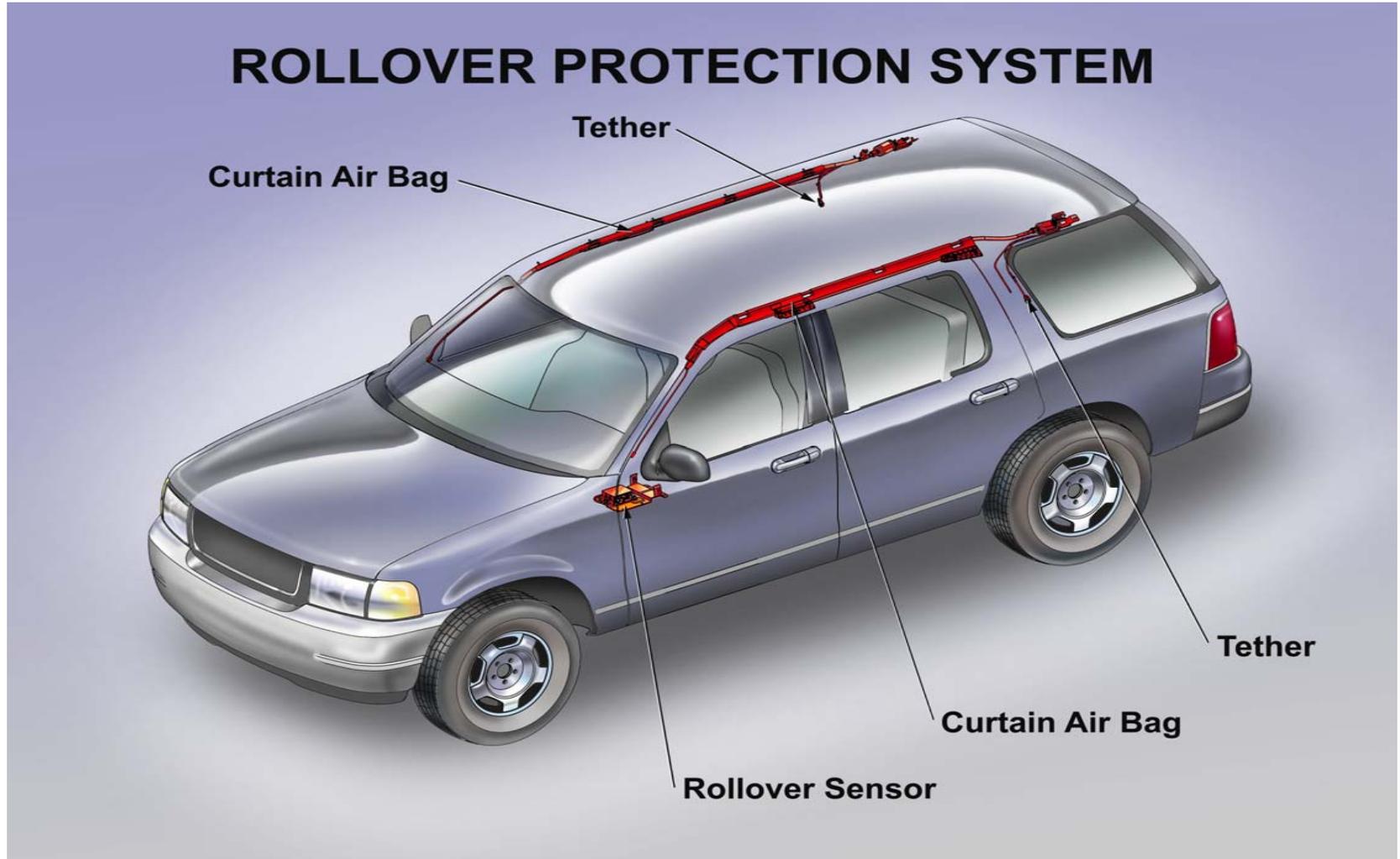
- Combination Head + Chest Bag
 - Mounted in seat
- Side Air Curtain
 - Mounted in roof
 - Improves side impact protection
- Safety Canopy
 - Air Curtain + rollover sensor
 - Improves side impact and rollover protection

Combination Head and Chest Side Air Bag



First Introduced by Ford in 2000+ MY Focus

SAFETY CANOPY



Safety Canopy



Explorer

2004 MY

Freestar, Monterey

Explorer, Mountaineer

Expedition, Navigator

Aviator

All Volvos

Jaguar X-Type, S-Type, XJ

New IIHS Side Impact Barrier – Taller to Represent Light Trucks



First Test Series Results:

- **“GOOD” Rating for Escape** with the head and chest side air bag -- the Highest Rating
- Only 2 of the 12 vehicles tested achieved Good rating

Crash Avoidance

- Industry and governments are shifting their focus to crash avoidance technologies:
 - Electronic Stability Control
 - Upgraded Tires
 - Tire Pressure Monitoring Systems (TPMS)
 - Controls Designed to Minimize Driver Distractions

Electronic Stability Control (ESC)

- ESC constantly monitors the drivers intent versus what the vehicle is actually doing
 - Steering wheel input
 - Direction vehicle is heading
 - Amount of Yaw (“vehicle spin”)
- Automatically applies braking at selected wheels and reduces engine power to help control the vehicle
 - Uses ABS and Traction Control

AdvanceTrac™ Off



AdvanceTrac™ On



Roll Stability Control (RSC)

- Adds roll sensors to the ESC's yaw sensors
- Safety Canopy is unvented and remains inflated for about six seconds
- Volvo XC-90 – Industry first RSC application
 - Gyroscopic sensor monitors roll angle and rate and if necessary, activates the Dynamic Stability and Traction Control system (ESC).

TIRES and the TREAD ACT

TREAD -- Transportation, Recall, Enhancement, Accountability and Documentation Act directs NHTSA to set more stringent tire standards and require low tire pressure warning systems

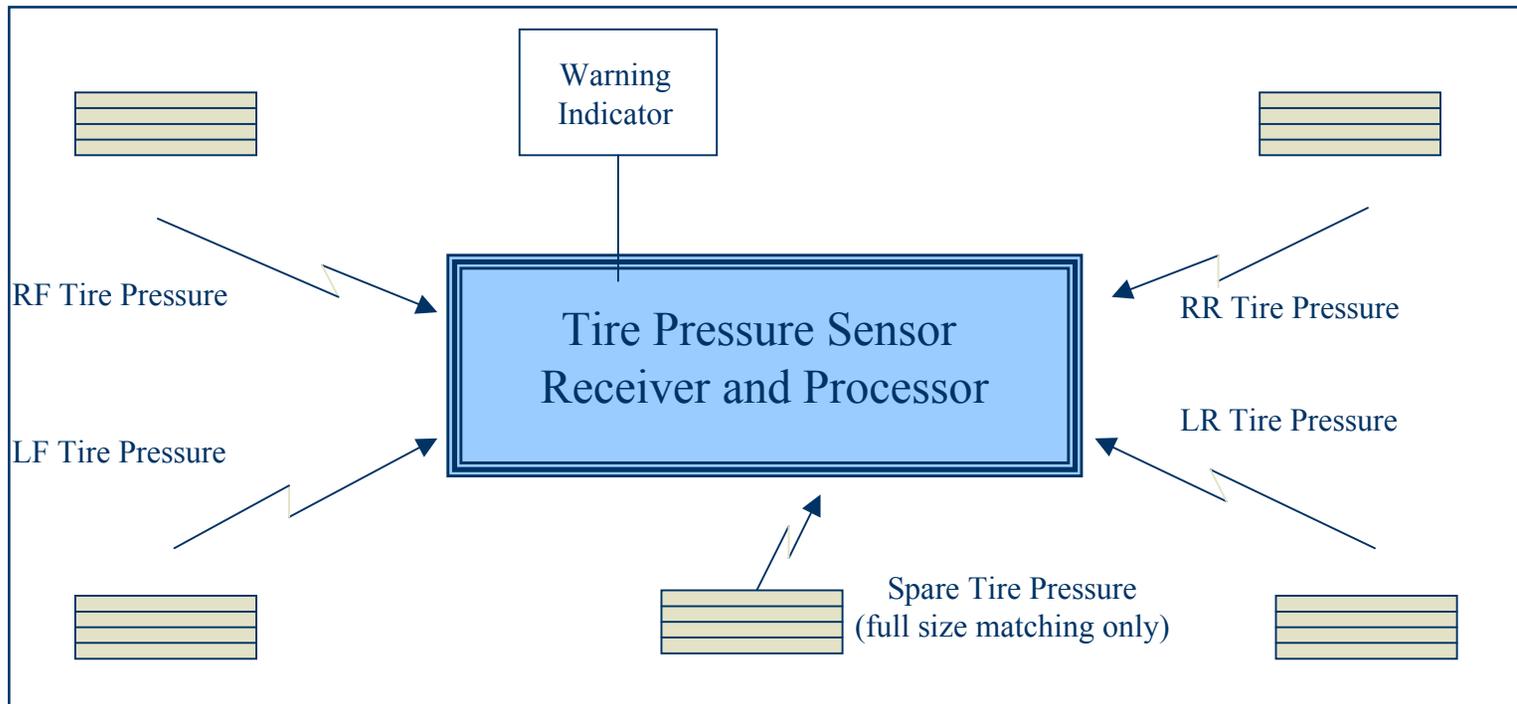
More Stringent Tire Standards

- Test at higher speed
- New tests at low pressure and at a simulated condition approximating 3 years of tire aging

Tire Pressure Monitoring Systems (TPMS)

- Direct System – measures pressure directly
- Indirect System – calculates pressure with ABS input

2004 MY Ford Tire Pressure Monitoring System (TPMS)



Direct Sensing Type

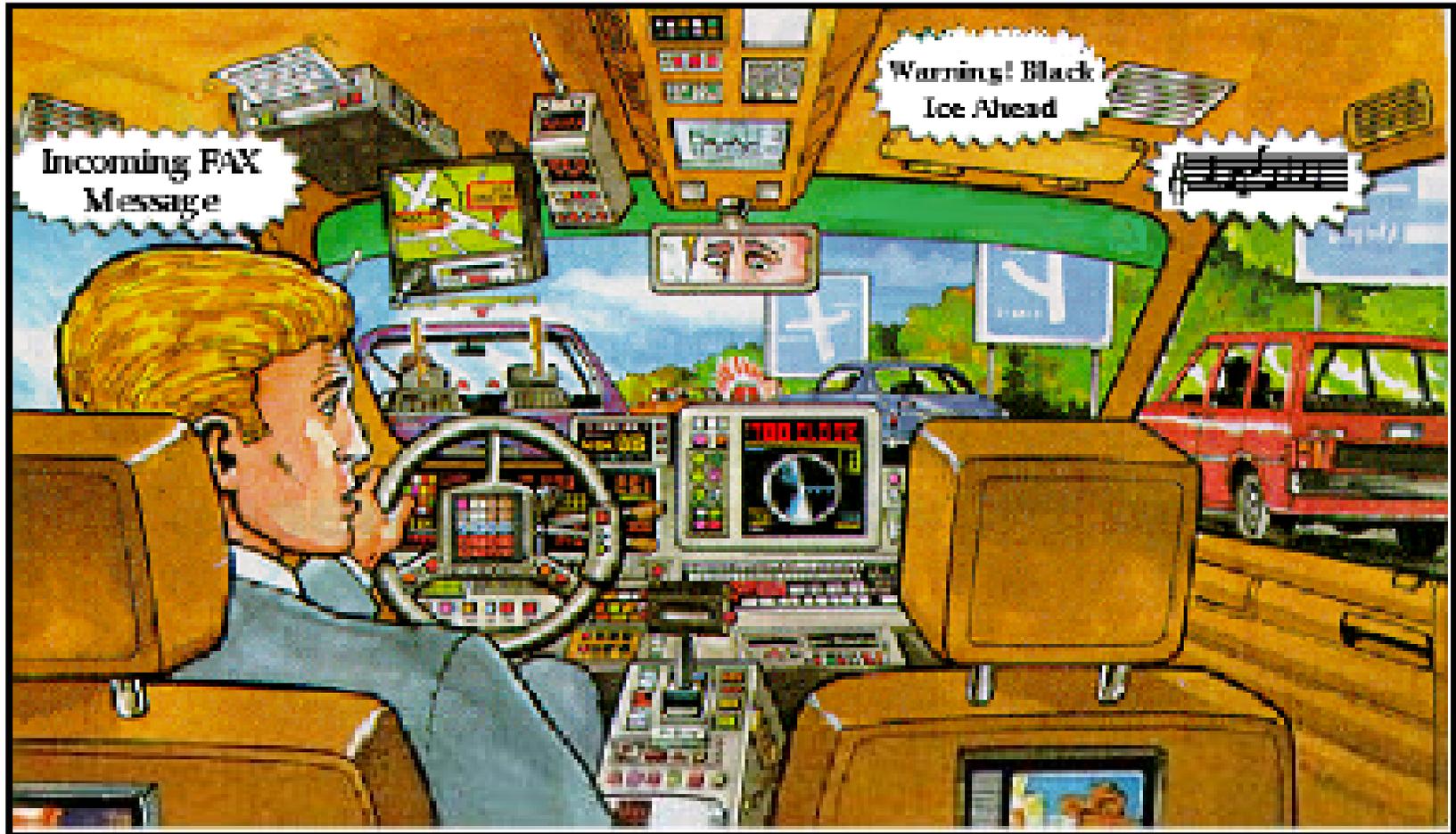
Direct Sensing TPMS

- Sensor is mounted inside the tire, and....
 - Directly measures tire pressure, barometric pressure, and senses vehicle motion
 - Radio Frequency transmitter in sensor sends signal to receiver every 60 seconds (every hour when stopped)
 - Uses a lithium battery with expected 10 year life
 - Can continue operation when spare is mounted
 - Senses multiple deflations

Direct Sensing TPMS

- Direct Sensing TPMS warns the driver when tire(s) are 25% below recommended placard pressure

The Driver Distraction Challenge



Addressing the Driver Distraction Challenge



**Ford Full
Vehicle Driving
Simulator
(VIRTTEX)**



Questions ?