AIR BAG SYSTEM IN PASSENGER CARS

1.HISTORY

FOR YEARS S/BELT HAS BEEN THE SOLE FORM OF PASSIVE RESTRAINT WHICH SAVED THOUSANDS OF LIFE IN DIRECT COLLISIONS.

1950's - RESEARCH WAS STARTED IN A/BAG TECHNOLOGY.

1970's - INVENTION OF SMALL PROPELLANT INFLATORS.

1980's - COMMERCIAL DEVELOPMENT OF A/BAG SYSTEM IN AUTOMOBILES.

STATISTICS SHOW THAT AIR BAG REDUCES RISK OF DYING IN FRONTAL CRASH BY ABOUT 30 %.

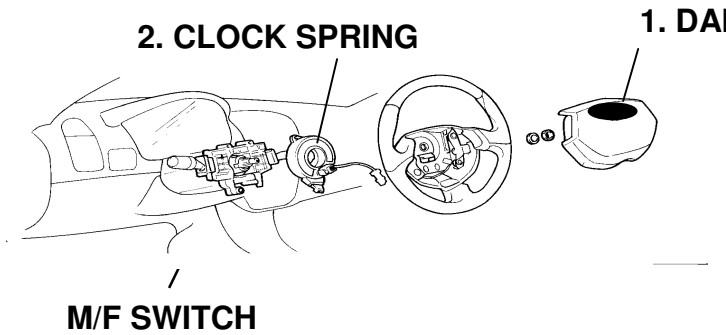
2.FUNCTIONS

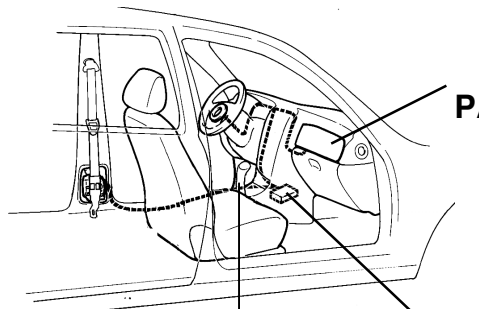
ABSORBS KINEMATIC ENERGY OF OCCUPANTS.

PROTECTS OCCUPANTS FROM INTERIOR TRIMS.

REDUCES OCCUPANT'S NECK LOAD BY KINEMATICALLY RESTRAINING SPIN OF NECK.

3.BASIC COMPONENTS





3.1 DAB MODULE

COMPONENTS

1. BAG

- NYLON/ 2 VENT MODES

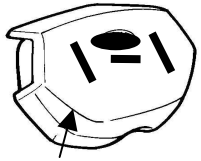
2. INFLATOR

- SOLID PROPELLANT (sodium azide)
- DETONATOR

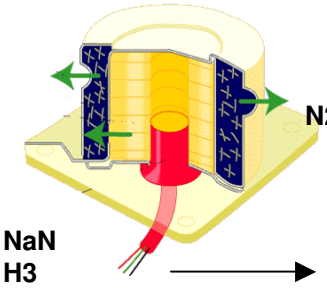
3. MODULE COVER

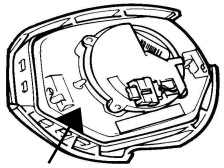
- 'H' Pattern tear seam

Inflator assembly

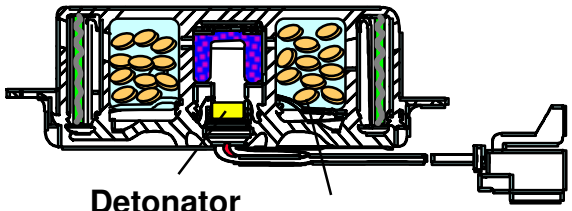


Module cover

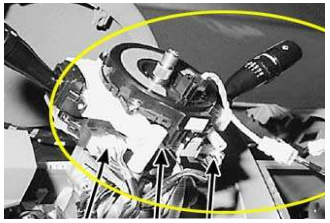




Reacting plate



3.2 CLOCK SPRING



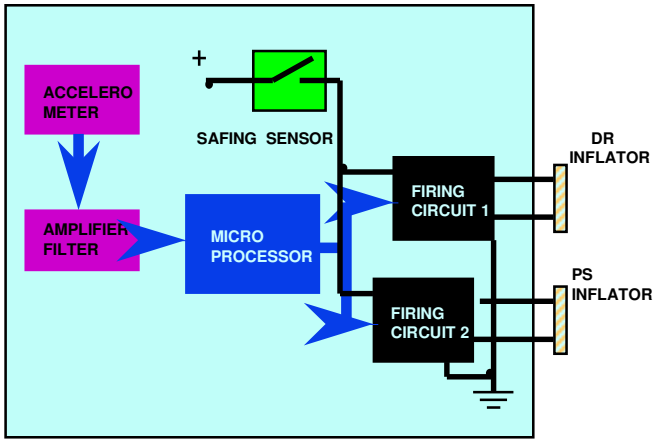
FUNCTION- KEEPS THE DAB CONNECTOR FROM GETTING DAMAGED.

3.3 ESPS OR CONTROL MODULE

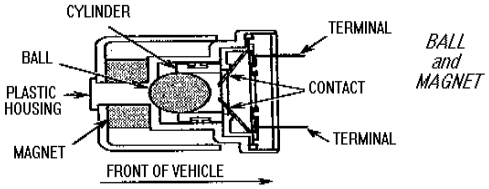
Continuously monitor the vehicle's longitudinal acceleration to detect the beginning of a crash.If an impact is detected, activate the DAB, PAB, and 2 BPTs at the required firing instant.

COMPONENTS

1. SAFING SENSOR
   - Electromechanical switch
   - measures the impact
2. ACCELEROMETER
   - Crash sensor
   - measures deceleration rate
3. MICROPROCESSOR



SAFING SENSOR



4. CHEMISTRY OF INFLATION

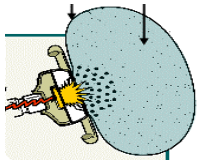
A solid propellant is ignited which burns extremely rapidly to create a large volume of gas to inflate the bag

SODIM AZIDE (NaN3) : MOST COMMONLY USED DUE TO ITS HIGH GAS GENERATION RATIO

2 NaN3(s) → Na (s) + 3N2

SODIUM AZIDE — NITROGEN GAS

RATE OF INFLATION OF A/BAG - 200 mph



4.OPERATING SEQUENCE

Crash

Crash Sensing

Ignite the Inflator

Produce Nitrogen Gas to Inflate the Bag

Bag Deploying

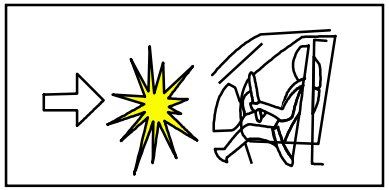
Full Deployment of the Bag

Protect the Occupants

Vent Gas (Bag Deflation)

Airbag System Completed

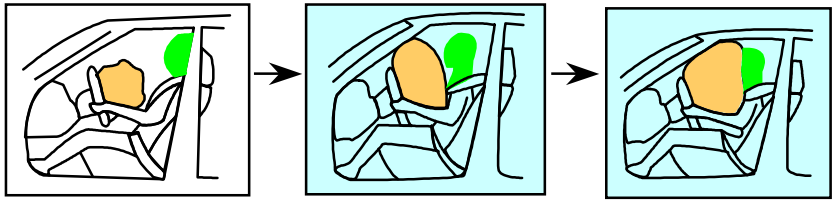
3m Sec



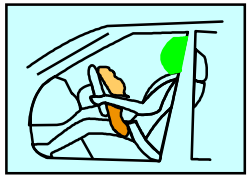
20m Sec

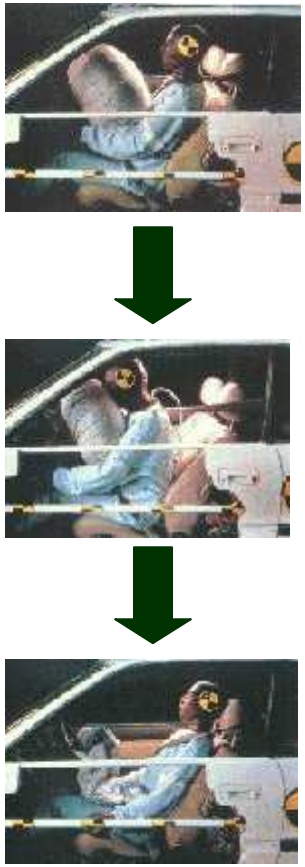
35m Sec

40m Sec (1/25 th)



105m Sec (1/10th)





5.FUTURE OF AIR BAG - SMART SYSTEMS

1.WEIGHT SENSORS: SENSOR TO DETERMINE WEIGHT & TYPE OF OCCUPANT IN SEAT (PASS SIDE)

2.INFRARED OCCUPANT DETECT: INFRA RED BEAMS TO DETECT DISTANCE OF PASS FROM A/BAG AND ADAPT FORCE OF DEPLOYMENT

3.CAPACITIVE REFLECTIVE OCCUPANT SENSING: DETECT PRESENCE OF OCCUPANTS IN SEAT

4.UPDATED SENSOR: CAPABILITY TO DEPLOY S/BELT PRETENSIONERS FASTER ,MORE BENEFIT FROM A/BAG