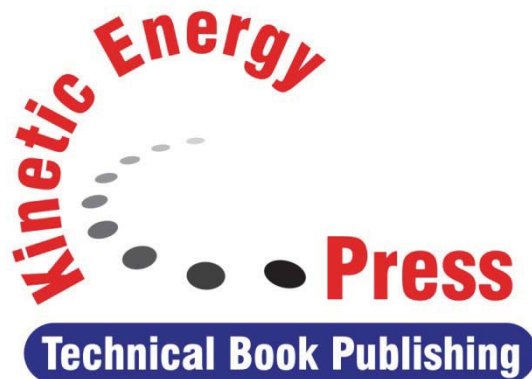


FORENSIC ANALYSIS OF SEAT BELTS

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Kinetic Energy Press

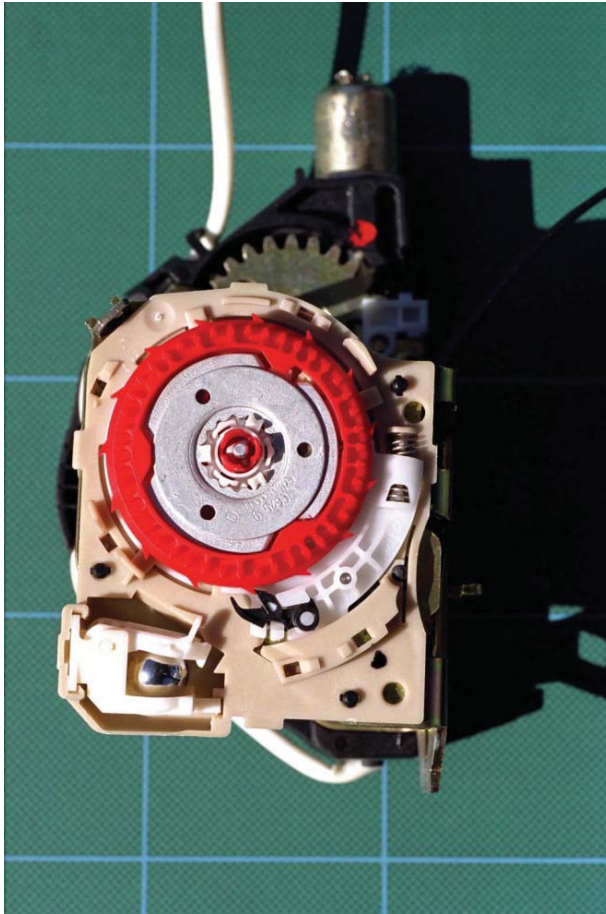


Rocklin, California

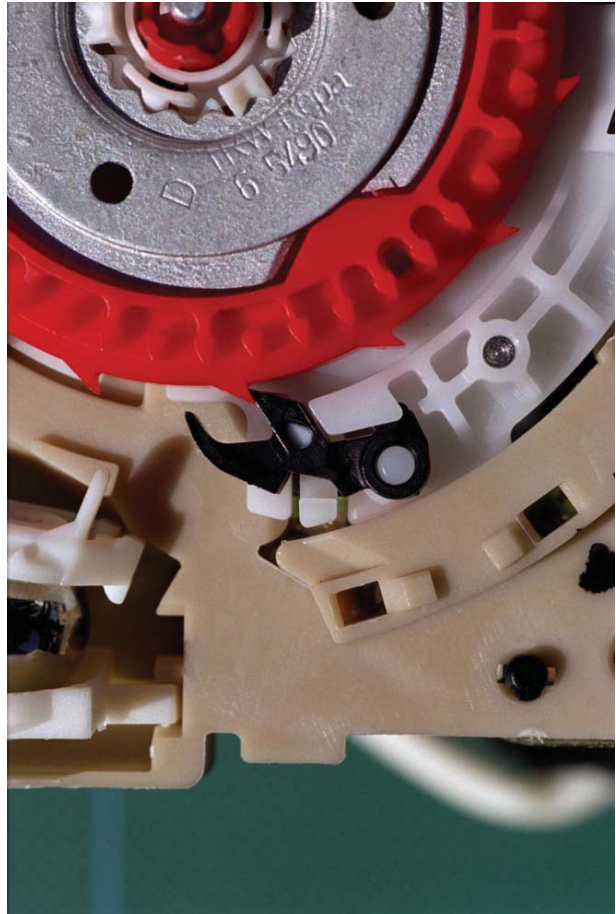
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Typically a signal is received by the vehicles airbag control module (ACM) detecting that a collision has occurred, in turn the ACM transmits the deployment command to the pretensioners to fire. The pretensioners then reduce the slack in the system by either spooling in webbing in the case of a retractor type of pretensioner or moving the buckle downward in the case of a buckle pretensioner system.



Photograph 4-23: Retractor Pretensioner with side Cover removed to show mechanism



Photograph 4-24: Close Up of Locking Mechanism

The above photographs are of a TRW Seat Belt Pretensioner. This pyrotechnic pretensioner can have an electric or mechanical sensor. It is capable of having 150mm of total webbing retraction (96mm lap belt retraction and 54mm torso belt retraction) [4-6].

One type of design uses a piston, which has an attached rack gear inside of a chamber, and is connected to the retractor spool. Inside the chamber is combustible gas and an igniter, which is connected to a sensor. During a collision, the sensor detects the collision and sends an electrical current to the igniter. When the gas is ignited it creates pressure that pushes the piston across the retractor spool rotating the spool and winding up any slack in the seat belt webbing.