

CRASH DATA RESEARCH CENTER

Calspan Corporation
Buffalo, NY 14225

NOT-IN-TRAFFIC SURVEILLANCE

CALSPAN REMOTE POWER WINDOW INVESTIGATION

SCI CASE NO.: CA07-016

VEHICLE: 1999 CHEVROLET MONTE CARLO

LOCATION: FLORIDA

DATE OF OCCURANCE: JANUARY 2006

Contract No. DTNH22-07-C-00043

Prepared for:

U.S. Department of Transportation
National Highway Traffic Safety Administration
Washington, D.C. 20590

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points are coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

TECHNICAL REPORT STANDARD TITLE PAGE

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16. <i>Abstract</i> This remote investigation focused on the cause of death for a 23-month-old male front right passenger of a parked 1999 Chevrolet Monte Carlo. The 23-month-old male was fatally injured when his neck became captured between the power window and the door window frame of the Chevrolet. The police reported that the vehicle's engine was off at the time of the incident. In a statement to the police, the driver reported that the key was in the ignition and turned rearward activating the accessory mode. The driver of the vehicle stated to police investigators that he dropped off his daughter, girlfriend, and a family nurse at a pediatrician's office and then backed the Chevrolet into a parking space. Additionally, the driver reported that he had fallen asleep as he waited for the occupants to return. During this time, the 23-month-old male was playing in the front right position of the vehicle. While the driver was asleep, the 23-month-old male leaned his head out of the right front window. During this motion, he activated the switch for the window and the window began to roll-up capturing his neck and resulting in asphyxiation.					
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NOT-IN-TRAFFIC SURVEILLANCE
CALSPAN REMOTE POWER WINDOW INVESTIGATION
SCI CASE NO.: CA07-016
VEHICLE: 1999 CHEVROLET MONTE CARLO
LOCATION: FLORIDA
DATE OF OCCURANCE: JANUARY 2006

BACKGROUND

This remote investigation focused on the cause of death for a 23-month-old male front right passenger of a parked 1999 Chevrolet Monte Carlo. The 23-month-old male was fatally injured when his neck became captured between the power window and the door window frame of the Chevrolet. **Figure 1** is of an exemplar Chevrolet Monte Carlo. The police reported that the vehicle's engine was off at the time of the incident. In a statement to the police, the driver reported that the key was in the ignition and turned rearward activating the accessory mode.



Figure 1. Exemplar Chevrolet Monte Carlo.

The driver of the vehicle stated to police investigators that he dropped off his daughter, girlfriend, and a family nurse at a pediatrician's office and then backed the Chevrolet into a parking space. Additionally, the driver reported that he had fallen asleep as he waited for the occupants to return. During this time, the 23-month-old male was playing in the front right position of the vehicle. While the driver was asleep, the 23-month-old male leaned his head out of the right front window. During this motion, he activated the switch for the window and the window began to roll-up capturing his neck and resulting in asphyxiation.

NHTSA provided notification of this occurrence to the Calspan Special Crash Investigations (SCI) team on May 8, 2007. Due to the Agency's interest in Not-In-Traffic incidents, NHTSA assigned a remote-level investigation to the Calspan SCI team. The efforts for this remote investigation included obtaining the Police Incident Report and an inspection of an exemplar vehicle to determine the power window operation and closure force. This event was documented by the investigating police agency using an Incident Report which is stored at the police department. Since this was not a traffic related crash, it was not reported to the state.

Summary

Site of Incident

This incident occurred during the afternoon hours of January 2006 in the state of Florida. The weather was reported as partly cloudy with scattered rain showers. The temperature ranged from a low of 24.4 degrees C (75.9 F) to a high of 29.0 degrees C (85.0 degrees F). This incident occurred in the parking lot of a local pediatrician's office.

Vehicle Data

The 1999 Chevrolet Monte Carlo was a two-door coupe that was equipped with power operated door windows and door locks. In addition to the front door glazing, the Monte Carlo was equipped with fixed second row and backlight glazing. The Chevrolet was equipped with rocker-type switches for the power windows that were mounted in a horizontal position on the forward aspect of the door panel. It was not known if the vehicle contained aftermarket tint film. The history and condition of the vehicle was unknown. The Vehicle Identification Number (VIN) was not reported by the investigating police agency.

Child Passenger

The front passenger at the time of the incident was a 23-month-old male. He was the son the driver. His reported height and weight were 86 cm (34”) and 13 kgs (28 lbs). As a result of this incident, 23-year-old male sustained the following injuries:

Injury	Injury Severity AIS90/Update 98	Injury Source
Asphyxia induced cerebral edema with flat gyri and narrow sulci, NFS	Not coded under AIS	Power window
Red and blue superficial discoloration to the left side of the neck 2.5 x 0.5 cm (1” x 0.2”)	Not coded under AIS	Power window

Source – Autopsy

Incident

The vehicle was initially occupied by a 25-year-old male driver, an adult female front right passenger (age unknown), the 23-month-old male, a female child passenger (age unknown), and a second adult female passenger (age unknown). The driver transported the passengers to the family pediatrician’s office where the adult female passengers and the female child passenger exited the vehicle. The driver proceeded to back the vehicle into a designated parking space in the commercial parking lot. He reportedly positioned the ignition key rearward to the accessories mode and lowered the front windows halfway down and turned on the radio. The driver subsequently fell asleep. The 23-month-old male was in the front right seat during this time and began to play within the vehicle. While the driver was asleep, the 23-month-old male leaned his head out of the front right window. With his head positioned out of the vehicle, he inadvertently pressed and held the rocker-type power window switch and the window began to roll-up. The child’s neck became captured between the window and the door window frame.

A passerby noticed the child’s head protruding from the window as she was walking to her vehicle in the parking lot. She entered her vehicle and activated the horn in an attempt to gain the attention of the driver. She was unable to wake the driver and approached the Chevrolet and began to knock on the front right window and awoke the driver. The driver observed the child captured within the front right window and

powered the window down. He removed the child from the vehicle and carried him into the pediatrician's office. A doctor at the facility examined the child and began CPR efforts until emergency medical personnel arrived. The child was transported by ambulance to a local hospital where he pronounced deceased.

The investigating police officer attended the autopsy for the 23-month-old male. The medical examiner ruled the caused of death as asphyxia and the manner of death was accidental.

Police Inspection of the Power Windows

A police department mechanic conducted an inspection of the power window function. The inspection included testing the operation of the front right window from the driver's main control and the front right rocker switch. The test from the main driver's control consisted of lowering and raising the window six times. This test was conducted without failure. The same test was repeated using the front right switch which yielded the same results. The window tests were conducted with the ignition in the accessory and run positions. The police department mechanic noted that upon completing the test and inspection, he determined that the power windows functioned properly.

Exemplar Vehicle Inspection

An exemplar Chevrolet Monte Carlo was inspected for this remote investigation. The vehicle was equipped with power operated windows for the driver and right door similar to the subject vehicle. The rear side glazing was fixed. The windows were operated by depressing a horizontally mounted rocker-type switch. Depressing the forward aspect of the switch raised the window; depressing the switch's rear aspect lowered the window. The main switch panel was located on the top forward aspect of the left door panel



Figure 2. Left front door and main switch panel.

(**Figure 2**). The left window was equipped with an Auto-down feature. Full depression to the rear aspect of the rocker switch was required to activate this feature. The Chevrolet was not equipped with a lock-out switch for the right window; this was also noted in the police incident report.



Figure 3. Overall view of the front right door.



Figure 4. Front right window rocker switch.

During the inspection of the exemplar vehicle, it was determined that the power windows could be operated with the ignition key turned rearward in the accessories mode. The windows could also be operated with the ignition switch turned forward to the run position.

The front right window was operated by a rocker switch that was horizontally mounted on the top of the door panel arm rest at the forward aspect. **Figure 3** is an overall view of the front right door. This window was not equipped with an Auto-Down feature. The rocker switch was flush mounted within a plastic trim face plate (**Figure 4**). The switch was located 81 cm (31.75”) forward of the lower right corner of the glazing and 8 cm (3.25”) below the bottom of the window frame. Additionally, the switch was located 34 cm (13.25”) above the seat cushion.

The door glazing was AS2 tempered glass and was enclosed in a full door window frame. The maximum width of the glazing was 97 cm (38”) with a maximum height of 50 cm (15.9”).

Power Window Closing Force Test

The closing force test of the front right window was conducted on the exemplar Chevrolet Monte Carlo by the SCI team. The instrument used to conduct this test was an IMADA digital force gauge that was calibrated to 311 N (70 lbs) of force on 11/6/2006. The gauge consisted of a plunger with a duck-bill cut on the bottom. The test was conducted by placing the top aspect of the gauge against the top of the window frame and the plunger against the glazing (**Figure 5**).



Figure 3. Placement of the force gauge.

The test was conducted by raising the glazing against the force gauge with the vehicle ignition in the accessory position with the engine off (battery power) and with the vehicle engine on (maximum power). The window operating force was lower using solely battery power to open and close the window. With the engine off, the maximum force measured 211 N (47.4 lbs). The maximum closing force measured 238 N (53.4 lbs) with the engine on. **Figures 6 and 7** are of the force gauge readings.



Figure 6. Maximum force achieved with battery power.



Figure 7. Maximum force with the engine on.



1. Case Number

IDENTIFICATION

2. Date of Crash ____ / ____ / ____

3. Time of Crash _____

Code reported military time of crash.

NOTE: Midnight = 2400
Unknown = 9999

AMBIENT CONDITIONS

4. Light Conditions

- Daylight
- Dark
- Dark but lighted
- Dawn
- Dusk
- Unknown

5. Atmospheric Conditions
(Select all that apply)

- Clear-No adverse conditions
- Cloudy
- Rain
- Snow
- Fog, Smog, Smoke
- Sleet, Hail (freezing rain or drizzle)
- Blowing Snow
- Severe Crosswinds
- Blowing Sand, Soil, Dirt
- Other (specify):
- Unknown

6. Temperature

- Below 0 degrees Celsius (Below 32 F)
- 1-10 degrees Celsius (33-50 F)
- >10-24 degrees Celsius (51-75 F)
- Over 24 degrees Celsius (Over 75 F)
- Unknown

SCENE INFORMATION

7. Type of area in which crash occurred
(Select all that apply)

- Single family residential
- Row houses/townhouses
- Multi family housing
- Commercial
- Industrial
- Rural
- Unknown

8. Driver exterior sightline obstructions
(Select all that apply)

- None
- Other vehicles
- Building
- Trees
- Shrubby
- Other (specify) _____
- Utility poles
- Signs
- Glare
- Unknown
- No driver present

9. Crash location

- Driveway
- Parking Lot
- Sidewalk
- Alley
- Intersection of driveway and sidewalk
- Road / street
- Roadside / shoulder
- Other (specify) _____
- Unknown

10. Non motorist sightline obstructions
(Select all that apply)

- None
- Other vehicles
- Building
- Trees
- Shrubby
- Utility poles
- Signs
- Glare
- Other (specify) _____
- Unknown

11. Grade at parked position _____ +/- %

12. Estimated distance from parked position to impact

_____ m

13. Estimated speed at impact _____ +/- kmph

14. Grade at impact _____ +/- %

15. Estimated distance from impact to vehicle final rest

_____ m

Unknown = 999 Reference Items 11,12, 13, 14, 15



1. Case Number _____

VEHICLE IDENTIFICATION

2. VIN _____

3. Model Year _____

4. Vehicle Make (specify): _____

5. Vehicle Model (specify): _____

GLAZING

Location	Presence (check)	Status (select)	Clarity (select)	Tint (check)	Glazing Obstructions (specify if present)
Windshield		Fixed / Closed / Open / Partially Open / Unknown	Clear / Hazy / Very Dirty / Unknown		
LF		Fixed / Closed / Open / Partially Open / Unknown	Clear / Hazy / Very Dirty / Unknown		
RF		Fixed / Closed / Open / Partially Open / Unknown	Clear / Hazy / Very Dirty / Unknown		
2 nd Left		Fixed / Closed / Open / Partially Open / Unknown	Clear / Hazy / Very Dirty / Unknown		
2 nd Right		Fixed / Closed / Open / Partially Open / Unknown	Clear / Hazy / Very Dirty / Unknown		
3 rd Left		Fixed / Closed / Open / Partially Open / Unknown	Clear / Hazy / Very Dirty / Unknown		
3 rd Right		Fixed / Closed / Open / Partially Open / Unknown	Clear / Hazy / Very Dirty / Unknown		
Backlight		Fixed / Closed / Open / Partially Open / Unknown	Clear / Hazy / Very Dirty / Unknown		
Left Backlight		Fixed / Closed / Open / Partially Open / Unknown	Clear / Hazy / Very Dirty / Unknown		
Right Backlight		Fixed / Closed / Open / Partially Open / Unknown	Clear / Hazy / Very Dirty / Unknown		
Roof		Fixed / Closed / Open / Partially Open / Unknown	Clear / Hazy / Very Dirty / Unknown		
Other (specify)		Fixed / Closed / Open / Partially Open / Unknown	Clear / Hazy / Very Dirty / Unknown		

TIRE DATA

6. Vehicle Manufacturer Recommended Tire Size _____

7. LF Tire Size _____

9. RF Tire Size _____

8. LR Tire Size _____

10. RR Tire Size _____

Seats / Head Restraint Data

Seat Position	Seat Type (Select from below)	Head Restraint (Check if available)	Head Restraint Adjustment (select)	NOTES:
Front Left			Full Down / Mid / Full Up	
Front Middle			Full Down / Mid / Full Up	
Front Right			Full Down / Mid / Full Up	
2 nd Left			Full Down / Mid / Full Up	
2 nd Middle			Full Down / Mid / Full Up	
2 nd Right			Full Down / Mid / Full Up	
3 rd Left			Full Down / Mid / Full Up	
3 rd Middle			Full Down / Mid / Full Up	
3 rd Right			Full Down / Mid / Full Up	

Seat Type codes:

- | | |
|---|--------------------------------------|
| 0 = No seat or seat folded down | 8 = Pedestal (i.e. column supported) |
| 1 = Bucket | 9 = Box mounted (i.e. van type) |
| 2 = Bucket w/ folding back | 10= Other seat type (specify) |
| 3 = Bench | 99= Unknown seat type |
| 4 = Bench with folding back cushions | |
| 5 = Bench w/ folding back | |
| 6 = Split bench w/ separate back cushions | |
| 7 = Split bench w/ separate folding back | |

VEHICLE MEASUREMENTS

Clearance Heights	Measurements (all from ground, and in centimeters)	NOTES
Beltline		
Top of trunk/tailgate		
Bottom of bumper		
Trailer hitch (if applicable)		
Undercarriage		
Sway bar		
Axle		
Differential		
Other (specify):		
Sensor Height (if equipped)		
Camera Height (if equipped)		



1. Case Number

PARKING AID PRESENCE

2. Type of backing/parking aid present

- OEM camera
- OEM ultrasonic/radar sensor
- OEM combination camera-ultrasonic/radar sensor
- OEM Fresnel lens
- OEM interior mirrors
- Aftermarket camera
- Aftermarket ultrasonic/radar sensor
- Aftermarket combination camera-ultrasonic radar sensor
- Aftermarket Fresnel lens
- Aftermarket interior mirrors
- Other (specify): _____

CAMERA INFORMATION

Specify field of view measurements on diagram

3. System make/model

4. Video monitor type

- None present
- LCD (color)
- CRT (black & white)
- Unknown

5. Video display size _____ cm
(Diagonal)

6. Camera location

- None present
- Bumper
- License plate
- Tailgate/Hatch/Trunk
- Other (specify): _____

7. Video image quality under scene lighting conditions

- None present
- Good
- Average
- Poor (specify): _____
- Unknown

8. Was the camera functioning properly

- None present
- Yes
- No, poor image quality due to glare
- No, poor image quality due to atmospheric conditions
- No, camera turned off
- No, camera inoperable
- Unknown

ULTRASONIC/RADAR SENSOR

Specify object detection range on diagram

9. System make/model

10. Auditory warning illumination

- No sensor present
- Yes
- No
- Unknown

11. Number of sensors _____

12. Sensor locations
(Select all that apply)

- No sensor present
- Left bumper
- Center bumper
- Right bumper
- License plate area
- Tailgate/Hatch/Trunk

13. Was warning system functioning properly

- No sensor present
- Yes, system alerted driver
- No, system did not alert driver
- No, system turned off
- No, system inoperable
- Unknown

14. Did driver react to warning

- No sensor present
- Yes
- No
- Unknown

15. Did driver report common false warnings

- No sensor present
- Yes
- No
- Unknown



DRIVER FORM

1. Case Number

DRIVER PROFILE

2. Driver's Age _____
99 = Unknown

3. Driver's Sex Male
 Female
 Unknown

4. Driver's Height _____ cm
999 = Unknown

5. Driver's Weight _____ kg
999 = Unknown

6. Driver eyewear worn
(Select all that apply)
 None
 Eyeglasses
 Sunglasses
 Contacts
 Unknown

7. Driver vision deficiency condition
(Select all that apply)
 None
 Near sighted
 Far sighted
 Astigmatism
 Other (specify): _____
 Unknown

8. Non motorist's relationship to driver
 No relationship
 Child
 Grandchild
 Sibling
 Neighbor
 Friend
 Other (specify): _____
 Unknown

DRIVER ACTIONS

9. Driver approach to vehicle for entry
From left front
 From left
 From left rear
 From right rear
 From right front
 Circled vehicle
 Return trip (backing into driveway/lot)
 Other (specify): _____
 N/A
 Unknown

10. Driver entry interruption
(Select all that apply)
 Direct trip from building to vehicle
 Loaded items into vehicle
 Spoke with family
 Spoke with neighbors
 Spoke with contacted nonmotorist
 Return trip (backing into driveway/lot)
 Other (specify): _____
 N/A
Unknown

11. Purpose of backing
 Leaving parking space in parking lot
 Backing onto roadway from driveway
 Entering parking space in parking lot
 Backing into driveway from roadway
 Other (specify): _____
 N/A
Unknown

12. Where was driver going
Description:

13. Driver in a hurry
 Yes N/A
 No Unknown
 Unknown

14. How did driver check behind (rear area of vehicle)
after vehicle entry
(Select all that apply)
 Did not look
 Checked mirrors
 Turned right and looked back
 Turned left and looked back
 Viewed Camera
 Listened for auditory/visual warning from system
 Other (specify): _____
N/A Unknown

15. Estimated time between vehicle entry and start
of backing
 0-10 Seconds Over 60 Seconds
 11-30 Seconds N/A
 31-60 Seconds Unknown

16. What direction was the driver looking during backing maneuver
(Select all that apply)
- Straight ahead
 - Right
 - Left
 - Rearward
 - At object inside the car
 - At mirrors
 - Other (specify): _____
 - N/A
 - Unknown
17. Was the driver distracted during back up maneuver
(Select all that apply)
- No non-driving activities
 - External**
 - Looking at other vehicles
 - Looking at other non motorist
 - Looking at intended turn destination
 - External focus, not specified
 - Other external focus (specify): _____
 - Internal**
 - Looking at other occupant
 - Talking to passenger
 - Dialing phone
 - Talking on phone
 - Listening to radio/cd/portable playback device
 - Adjusting radio/cd player
 - Adjusting climate controls
 - Using a device/controls integral to vehicle (specify): _____
 - Reading/adjusting navigation system
 - Eating or drinking
 - Smoking related
 - Retrieving fallen object (specify): _____
 - Internal focus, not specified
 - Focused on other internal object (specify): _____
 - N/A
 - Unknown
18. Driver avoidance actions prior to impact
(Select all that apply)
- None
 - Braking
 - Steering left
 - Steering right
 - Accelerating
 - Other (specify): _____
 - N/A
 - Unknown
19. Did driver see struck non motorist prior to impact
(Select all that apply)
- No, never saw non motorist
 - Saw non motorist prior to entering vehicle
 - Saw non motorist after entering vehicle
 - Other (specify): _____
 - N/A
 - Unknown
20. Est time between start of backing and impact
- <2 or = 1 second
 - 2-5 seconds
 - 6-10 seconds
 - > 10 seconds
 - N/A
 - Unknown
21. Driver interior sightline obstructions
(Select all that apply)
- Pillar
 - Headrest
 - Cargo
 - Other occupant
 - Other (specify) _____
 - Unknown
 - None
22. Recent experience driving this vehicle
- More than 10 times the last three months
 - 6-10 times the last three months
 - 2-5 times the last three months
 - Less than 2 times the last three months
 - First time driving this vehicle
 - N/A
 - Unknown
23. Frequency of driving in this parking lot/driveway
- Daily
 - Weekly
 - Several times a month
 - Monthly
 - Rarely
 - First time in lot/driveway
 - N/A
 - Unknown
24. Driver Impairment
(Select all that apply)
- No drugs or alcohol present
 - Alcohol present (specify BAC): _____
 - Drugs present (specify): _____
 - Unknown
25. Source of alcohol/drug results
- Police reported
 - Medical record
 - Other (specify) _____
 - Not Tested
 - Unknown if tested



Non Motorist Form

1. Case Number

NON-MOTORIST PROFILE

2. Non-motorist's Age _____ Months
_____ Years
99 = Unknown

3. Non-motorist's Sex
 Male
 Female
 Unknown

4. Non-motorist's Height _____ cm
999 = Unknown

5. Non-motorist's Weight _____ kg
999 = Unknown

6. Medical outcome
 Not injured
 ER only
 Hospitalized 1-4 days
 Hospitalized 5 days or more
 Treatment later
 Fatal
 Unknown

7. Source of most severe injury
 Bumper
 Tire
 Undercarriage
 Other Specify: _____
 Ground
 N/A
 Unknown

8. Non-motorist impairment
(Select all that apply)
 No drugs or alcohol present
 Positive for alcohol (specify BAC): _____
 Positive for drugs (specify): _____
 Unknown

9. Source of alcohol/drug results
 Police reported
 Medical Report
 Other (specify) _____
 Not Tested
 Unknown if tested

NON-MOTORIST ACTIONS

10. Non-motorist attitude
 Standing
 Bending at waist
 Sitting
 Crouching
 Kneeling
 On skates/skateboard
 On bike/scooter
 Other (specify) _____
 Unknown

11. Non-motorist motion
 Not moving
 Walking slowly
 Walking rapidly
 Running or jogging
 Skipping/Hopping/Jumping
 Falling/Stumbling/Rising
 On skates/skateboard
 On bike/scooter
 Other (specify): _____
 Unknown

12. Non-motorist approach relative to rear of vehicle
 Stationary
 From left
 From right
 From behind
 Other (specify): _____
 Unknown

13. Non-motorist first avoidance action
 No avoidance actions
 Stopped
 Accelerated pace
 Ran away (along vehicle path)
 Jumped
 Turned away from vehicle
 Turned toward vehicle and braced
 Dove or fell away from vehicle
 Other (specify): _____
 Unknown

14. Non-motorist primary focus of attention
 Striking vehicle
 Play object
 Person
 Surrounding traffic
 Animal
 Handheld electronic (phone, MP3 player, etc.)
 Other Object (specify) _____
 Unknown

15. Were any other Non-motorists present?
(Select all that apply)
 Alone
 One adult present
 One other child present
 Multiple adults present
 Multiple children present
 Unknown

NON MOTORIST CLOTHING

NOTES:

- Specify Color, Fabric and Texture/Weight for outermost layer only
- Indicate "NONE" if applicable
- Available codes:

	<u>Colors</u>		<u>Fabrics</u>		<u>Textures</u>		<u>Weights</u>
Black	Charcoal gray		Natural		Soft		Heavy
Lt gray/silver	Brown		Synthetic		Slick		Medium
Gold/tan	Purple		Blend		Coarse		Light
Dark blue	Light blue						
Dark green	Light green						
Maroon	Red						
Orange	Yellow						
White	Other (specify)						

	Clothing	Color	Fabric	Texture	Weight
H E A D W E A R	Hat				
	Helmet				
	Hood				
	Other (specify): _____				
U P P E R B O D Y	Short Sleeve				
	Long Sleeve				
	Light Jacket				
	Heavy Jacket				
	Other (Specify): _____				
L O W E R B O D Y	Shorts				
	Pants				
	Shoes				
	Other (specify): _____				