# RQ13-002

# GM

# 8/16/2013

# Q8A

# 2012 Camaro-Cruze-Verano-Sonic airbag connector-20 Jan 13 NHTSA

# *Shorting Bar within the Driver's Airbag Connector*

**Model Year: 2012 Cruze, Verano, Camaro, and Sonic**
**4,101 vehicles**

ETQ N120261

**Condition:** Some 2012 Cruze, Verano, Camaro, and Sonic vehicles have a driver's side airbag connector shorting bar that may have been damaged during assembly of the airbag.

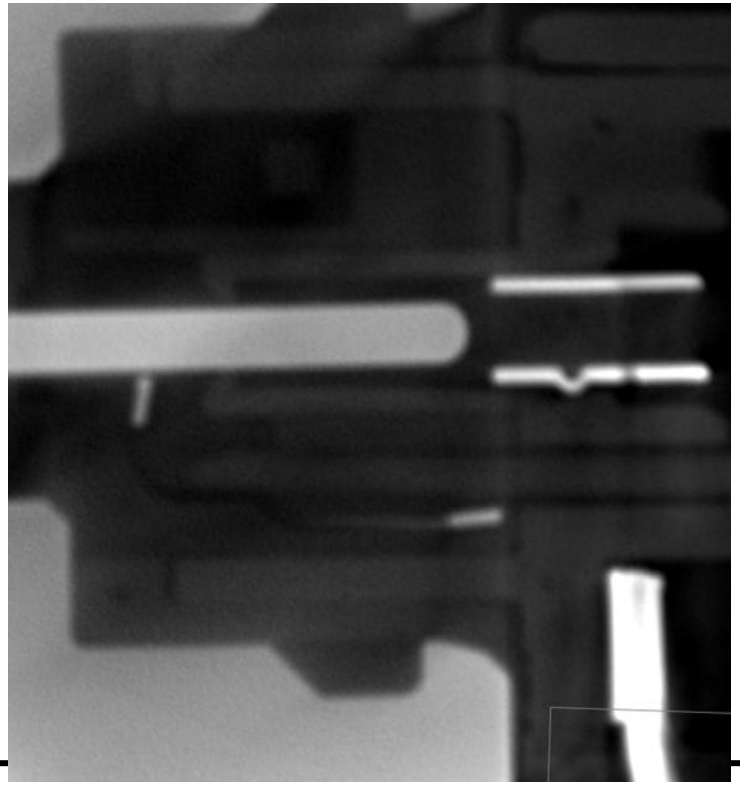
**Effect of the Condition:** A vehicle in this condition may set diagnostic trouble code B0013 (secondary stage inflator). The Sensing and Diagnostic Module (SDM) will request the instrument cluster to illuminate the AIRBAG indicator. If a crash event occurs the the SDM will attempt deployment, but, if the shorting bar is in contact with the airbag terminals, the airbag will not deploy.

**Technical Root Cause:** During the retainer seating process the shorting bars were not fully retracted to prevent contact with the airbag terminals.

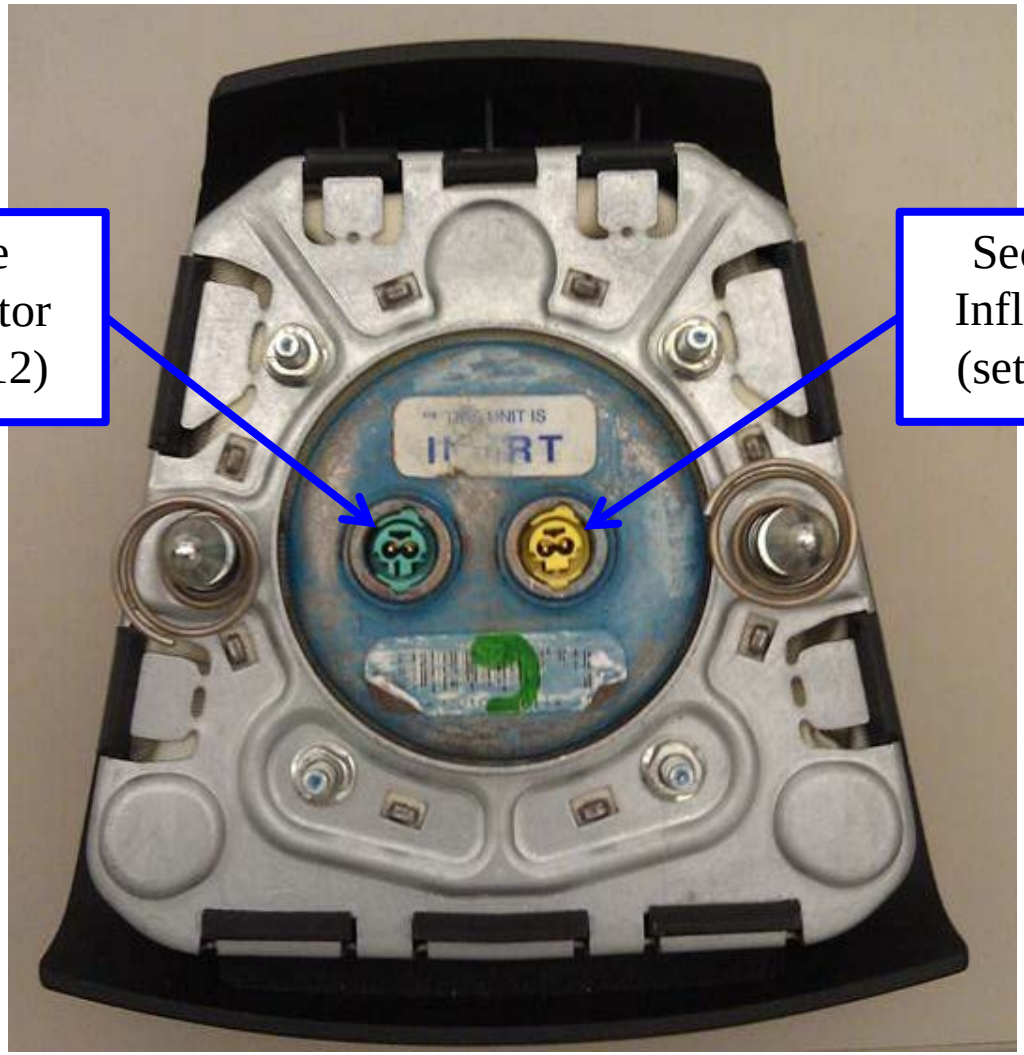
**Responsibility:** Takata

**Potential Field Action Category:** Safety

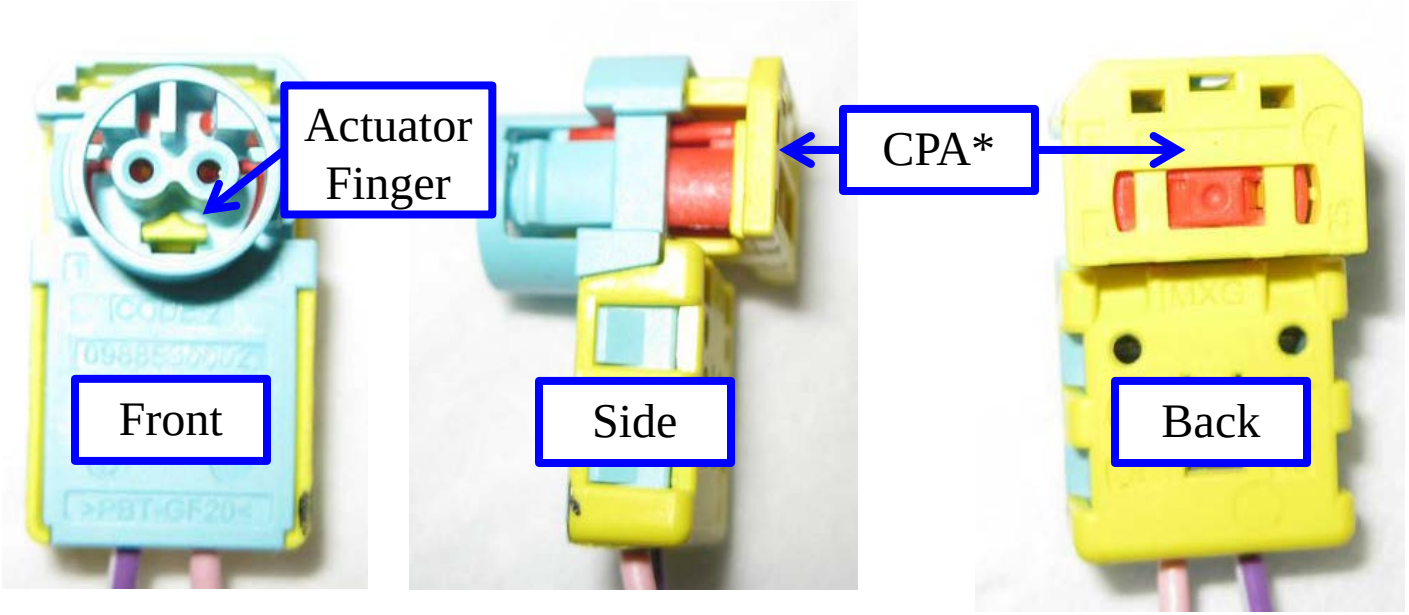
**Potential Field Remedy:** Replace the clock spring.

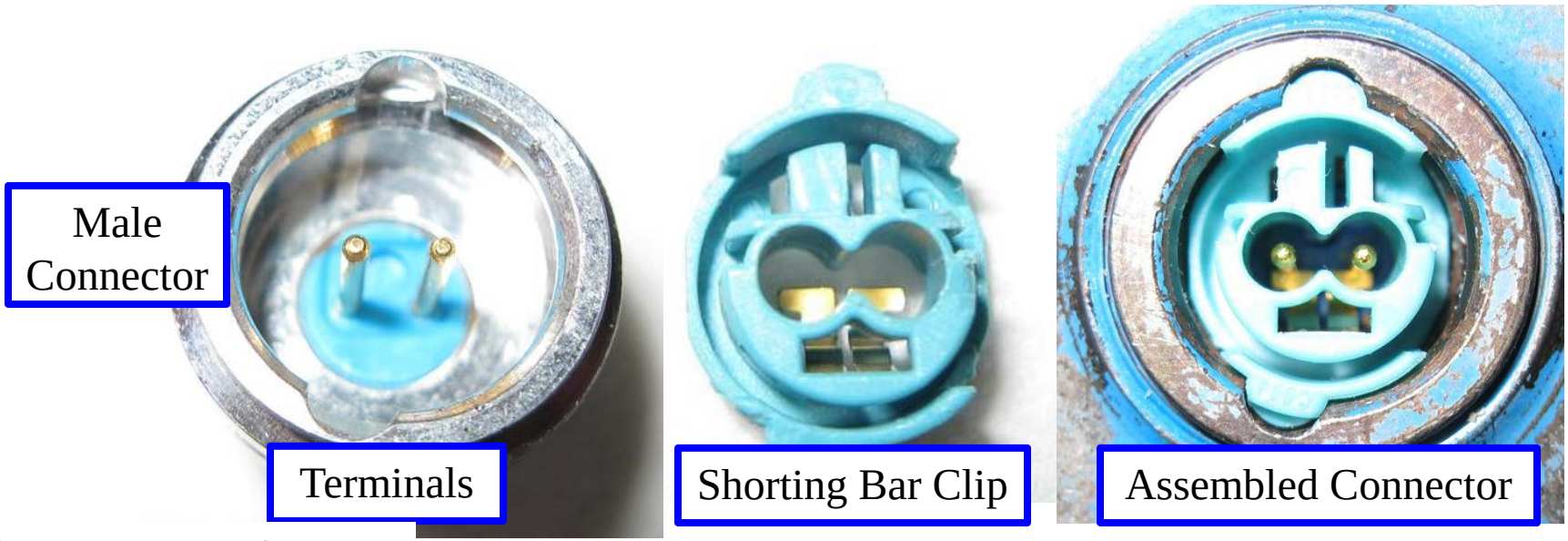


# *Primary and Secondary Stage Inflator Connectors*



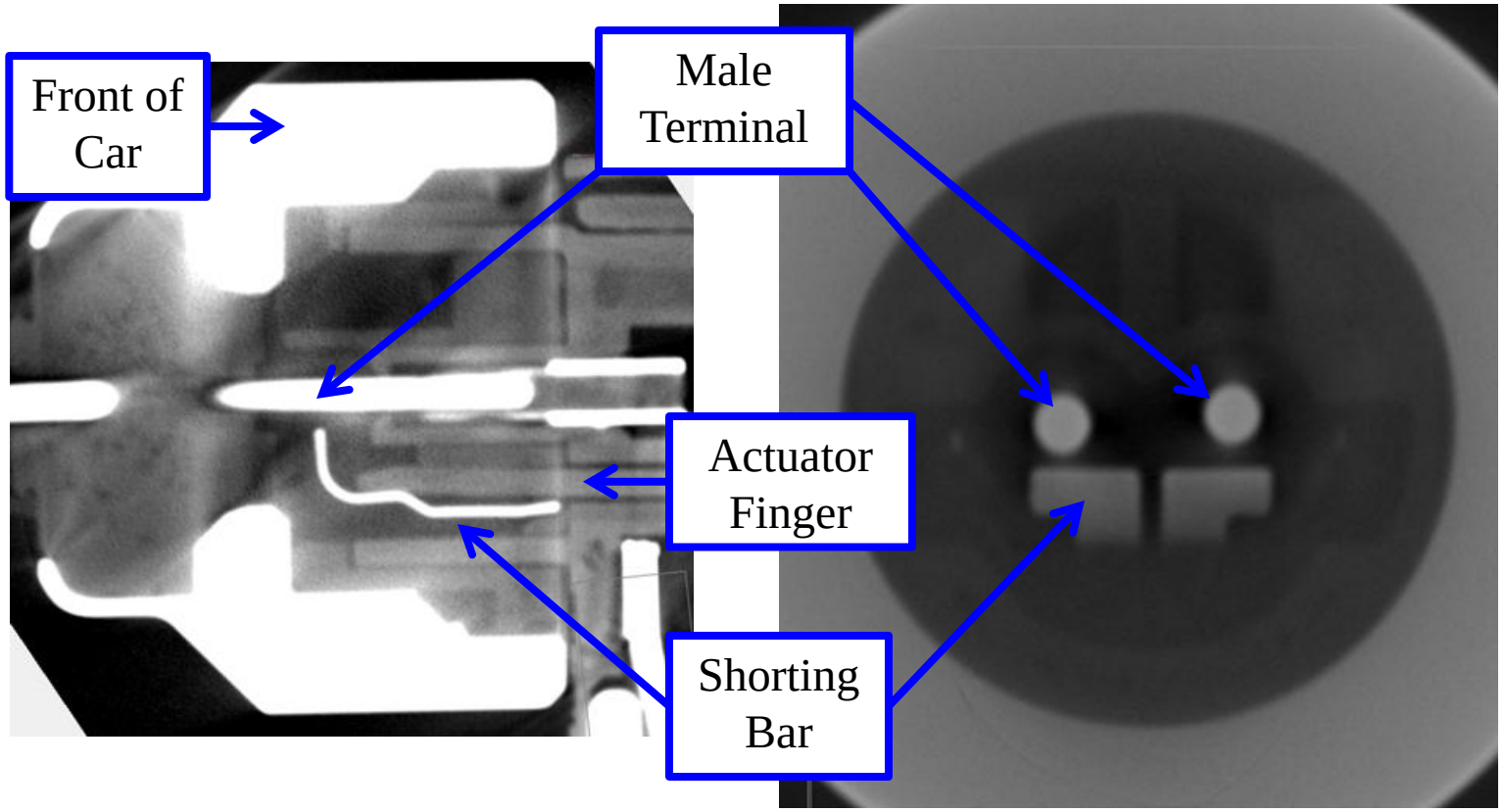
# 2012 Female and Male Connectors




*Connector Position Assurance

# *X-Rays of Assembled Male and Female Connector Shorting Bar Retracted*

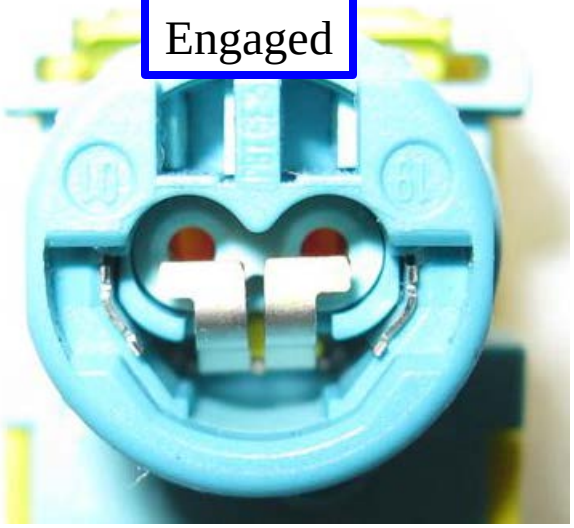


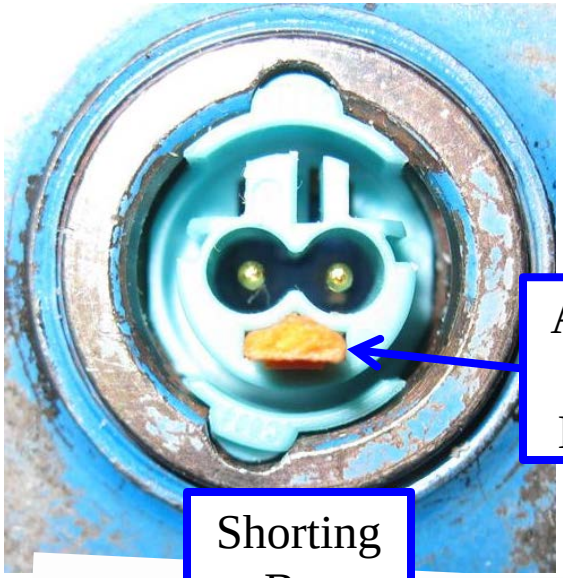
# *Male Connector - Retracting the Shorting Bar*

Front of Male Connector

Shorting Bar Engaged

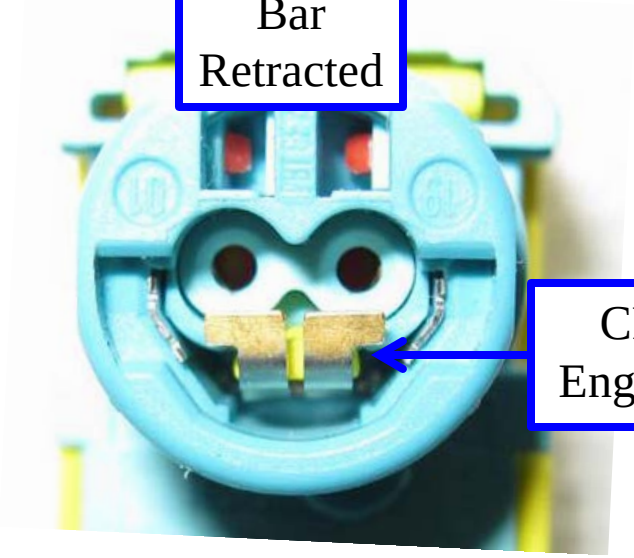
Back of Shorting Bar Clip





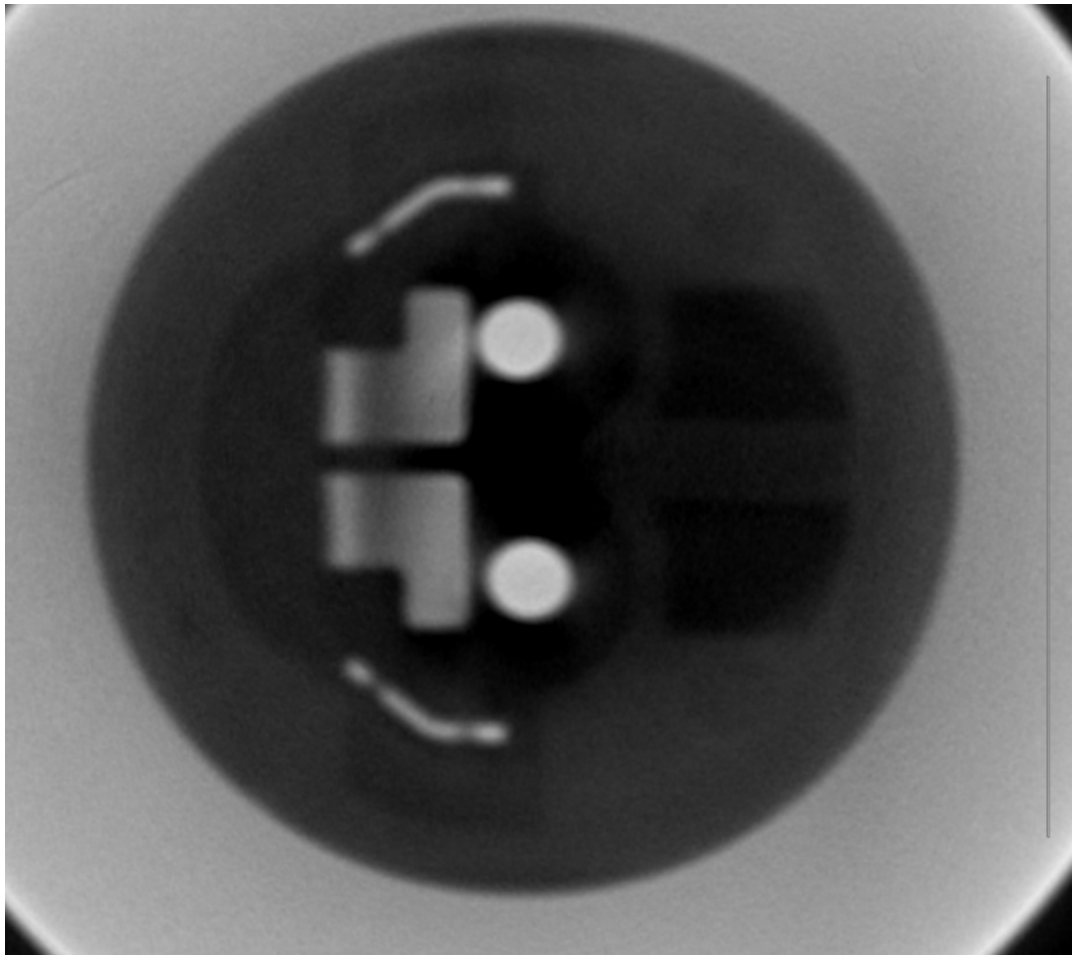
Actuator Finger Inserted

Shorting Bar Retracted

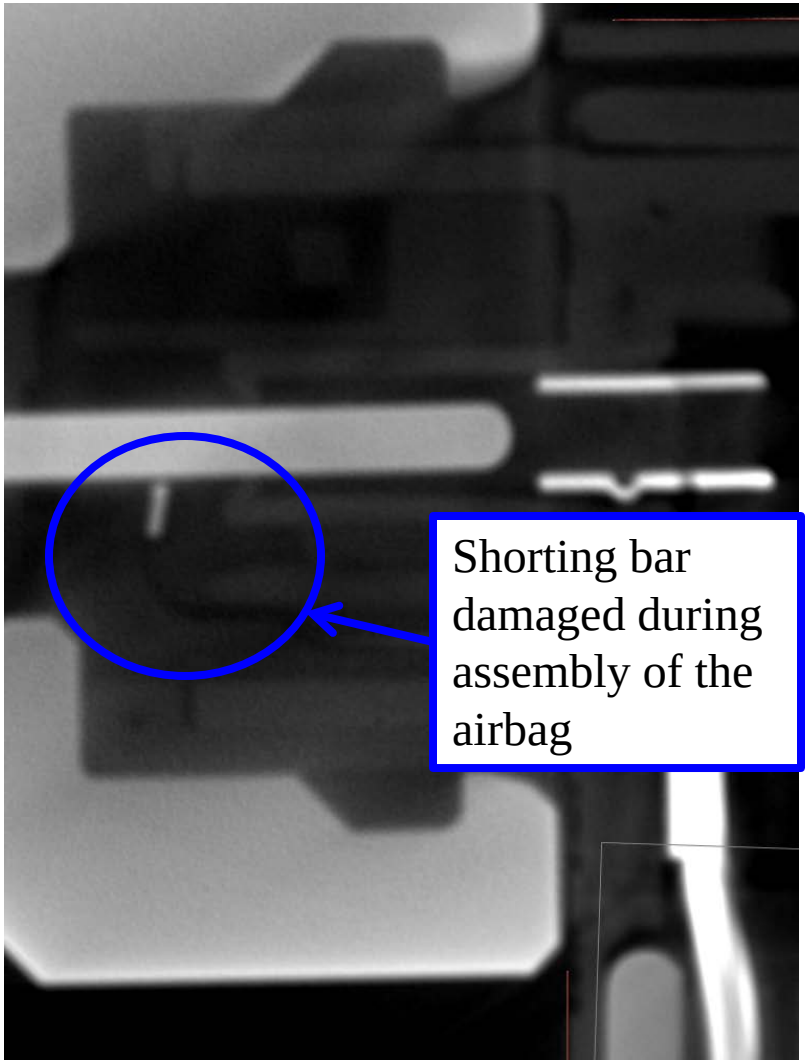


CPA Engaged

# *X-Rays of Assembled Male and Female Connector Shorting Bar Damaged*



# *X-Rays of Assembled Male and Female Connector Shorting Bar Damaged*



# *Shorting Bar within the Driver's Airbag Connector*

**Model Year: 2012 Cruze, Verano, and Sonic**
**3,922**

ETQ N120261

**Condition:** Some 2012 Cruze, Verano, and Sonic vehicles have a driver's side airbag connector shorting bar that may have been damaged during assembly of the airbag.

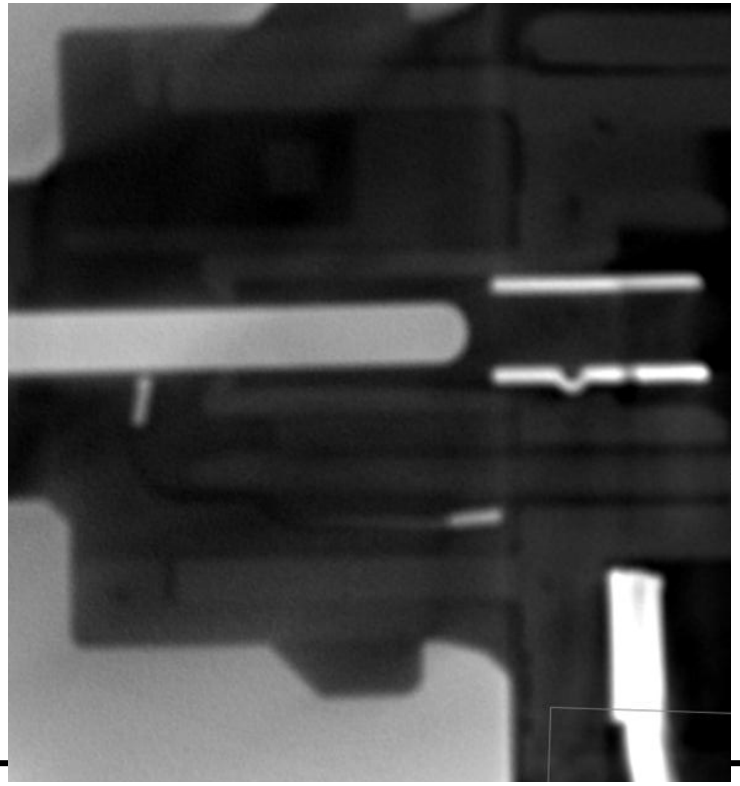
**Effect of the Condition:** A vehicle in this condition may set diagnostic trouble code B0012 (primary stage inflator). The Sensing and Diagnostic Module (SDM) will request the instrument cluster to illuminate the AIRBAG indicator. If a crash event occurs the the SDM will attempt deployment, but, if the shorting bar is in contact with the airbag terminals, the airbag will not deploy.

**Technical Root Cause:** During the retainer seating process the shorting bars were not fully retracted to prevent contact with the airbag terminals.

**Responsibility:** Takata

**Potential Field Action Category:** Safety

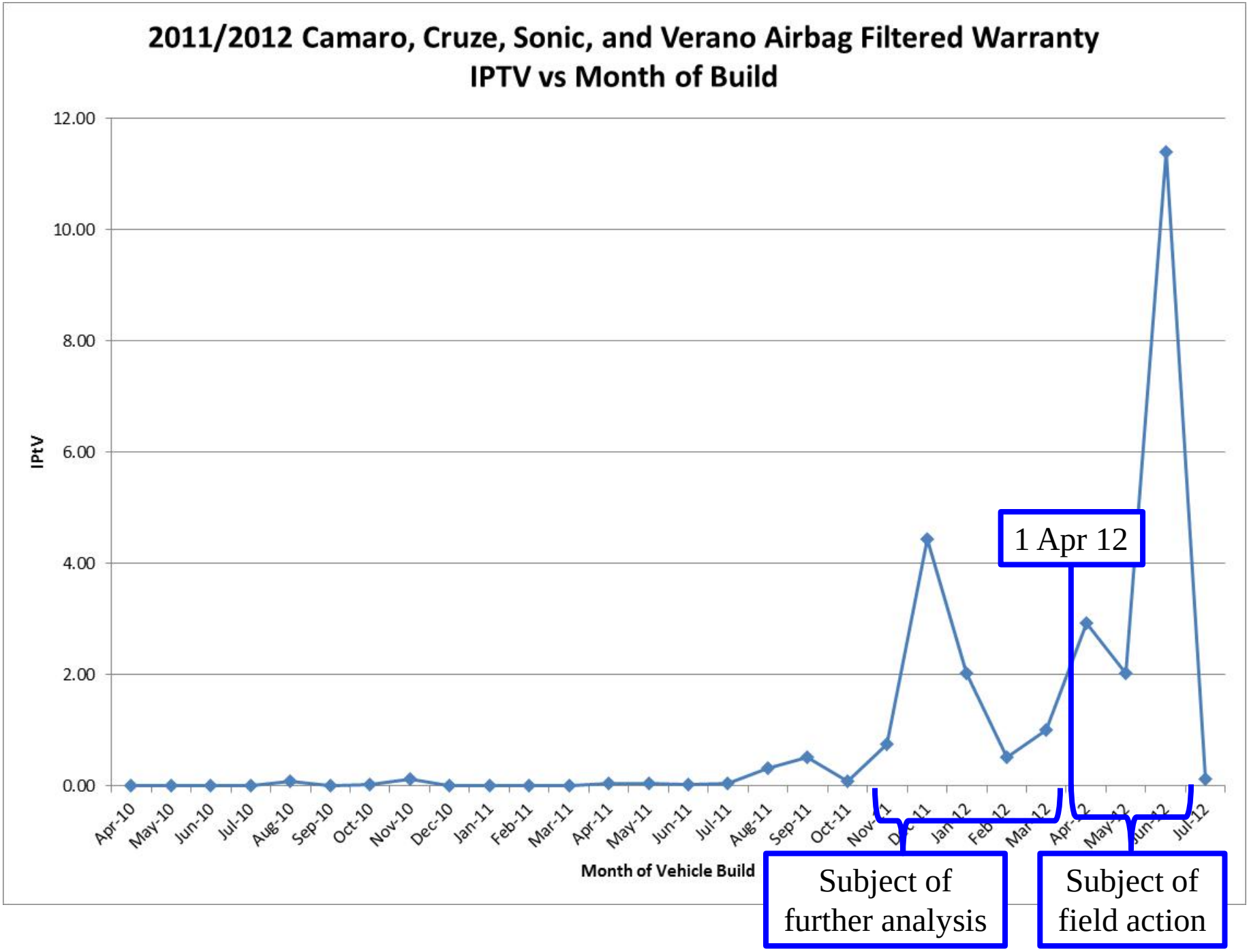
**Potential Field Remedy:** Inspect the connection or replace the clock spring or the driver's side airbag.

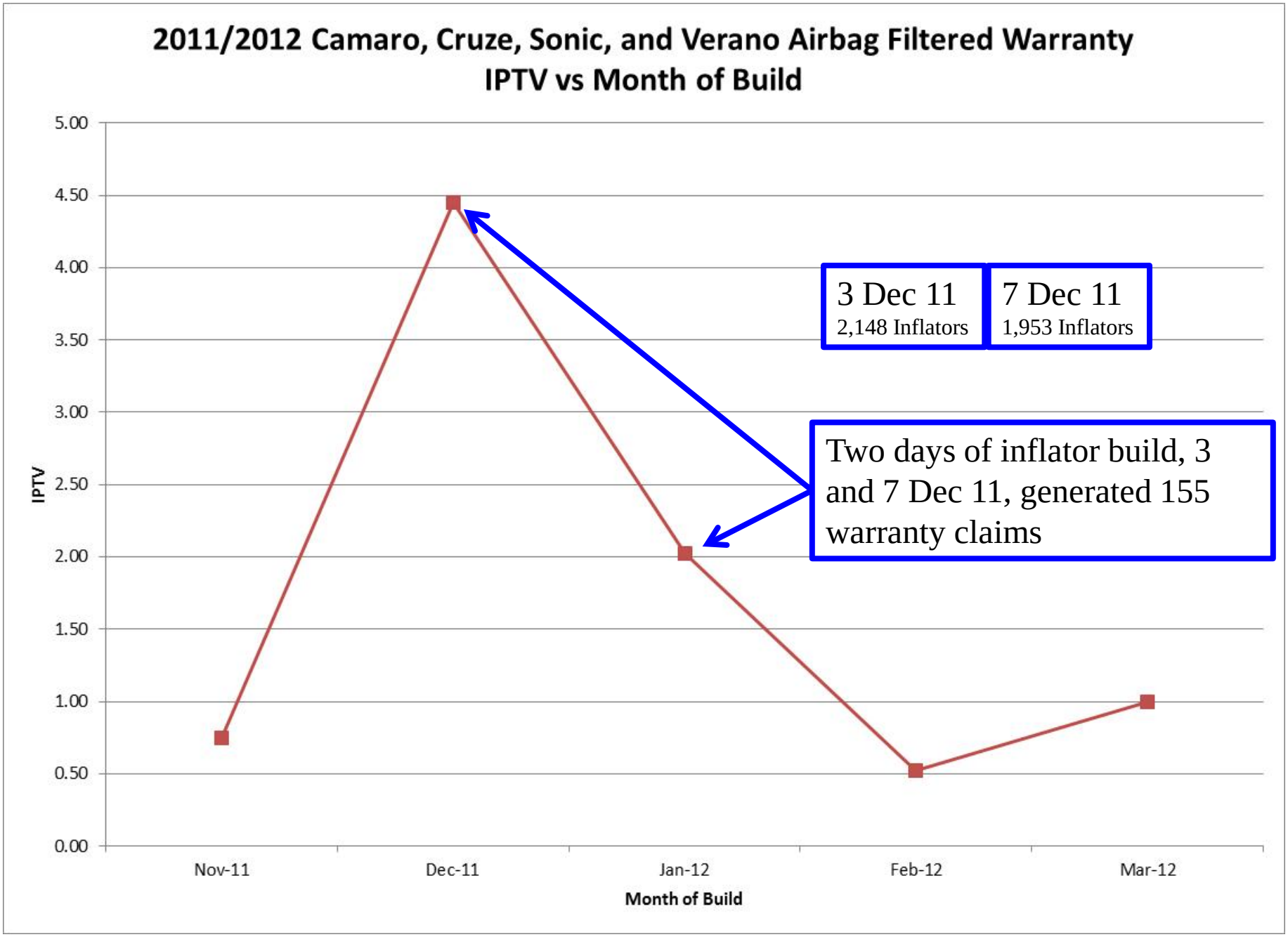


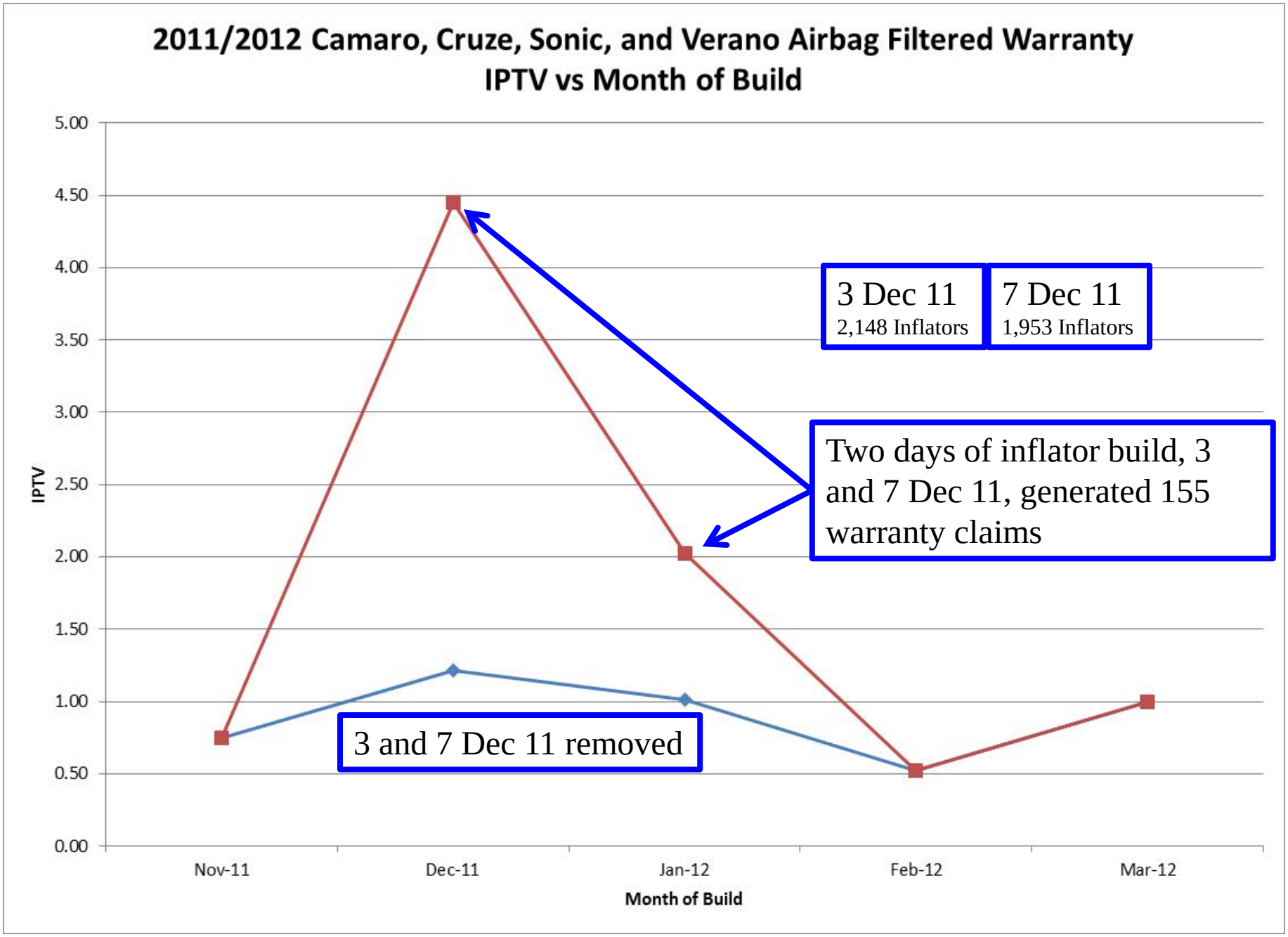
# *Shorting Bar*

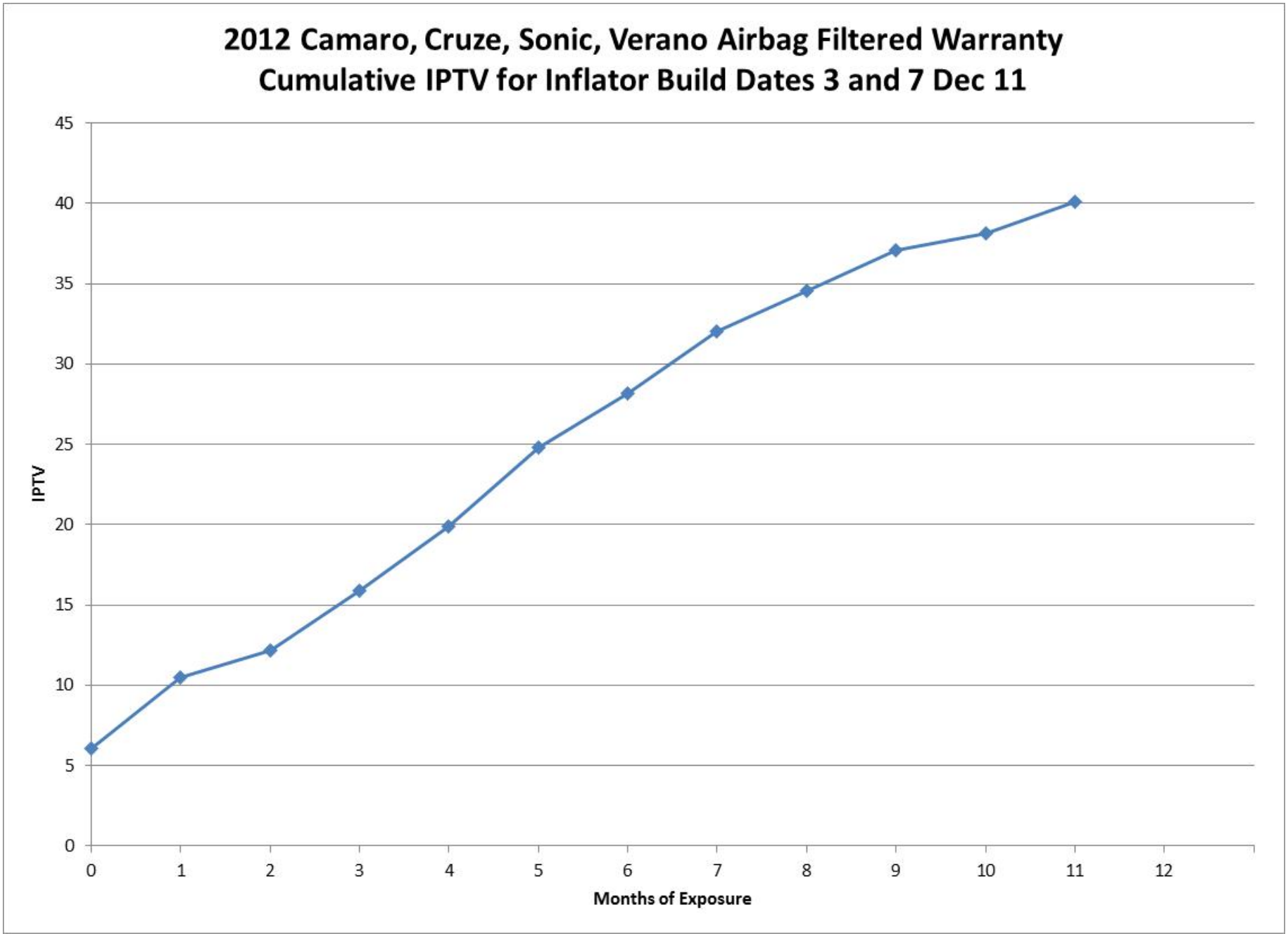
## *Conversation with the NHTSA*

- Did the issue start in April 12
- Infant mortality


2011/2012 Camaro, Cruze, Sonic, and Verano Airbag Filtered Warranty
IPTV vs Month of Build
IPtV
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Apr-10
May-10
Jun-10
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10
Jan-11
Feb-11
Mar-11
Apr-11
May-11
Jun-11
Jul-11
Aug-11
Sep-11
Oct-11
Nov-11
Dec-11
Jan-12
Feb-12
Mar-12
Apr-12
May-12
Jun-12
Jul-12
Month of Vehicle Build
1 Apr 12
Subject of further analysis
Subject of field action


2011/2012 Camaro, Cruze, Sonic, and Verano Airbag Filtered Warranty
IPTV vs Month of Build
IPTV
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Nov-11
Dec-11
Jan-12
Feb-12
Mar-12
Month of Build
3 Dec 11
2,148 Inflators
7 Dec 11
1,953 Inflators
Two days of inflator build, 3 and 7 Dec 11, generated 155 warranty claims

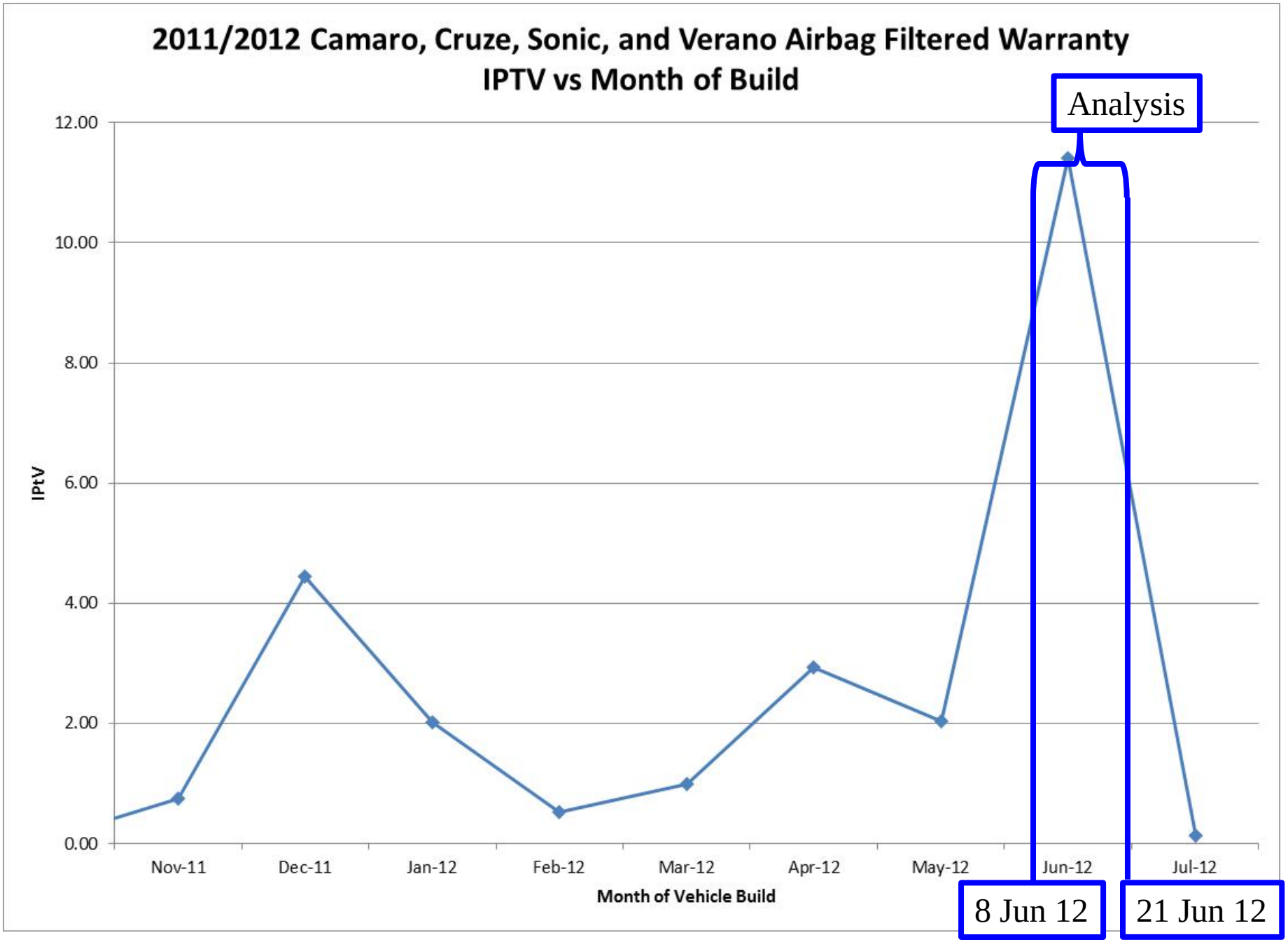

2011/2012 Camaro, Cruze, Sonic, and Verano Airbag Filtered Warranty
IPTV vs Month of Build
IPTV
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Nov-11
Dec-11
Jan-12
Feb-12
Mar-12
Month of Build
3 Dec 11
2,148 Inflators
7 Dec 11
1,953 Inflators
Two days of inflator build, 3 and 7 Dec 11, generated 155 warranty claims
3 and 7 Dec 11 removed

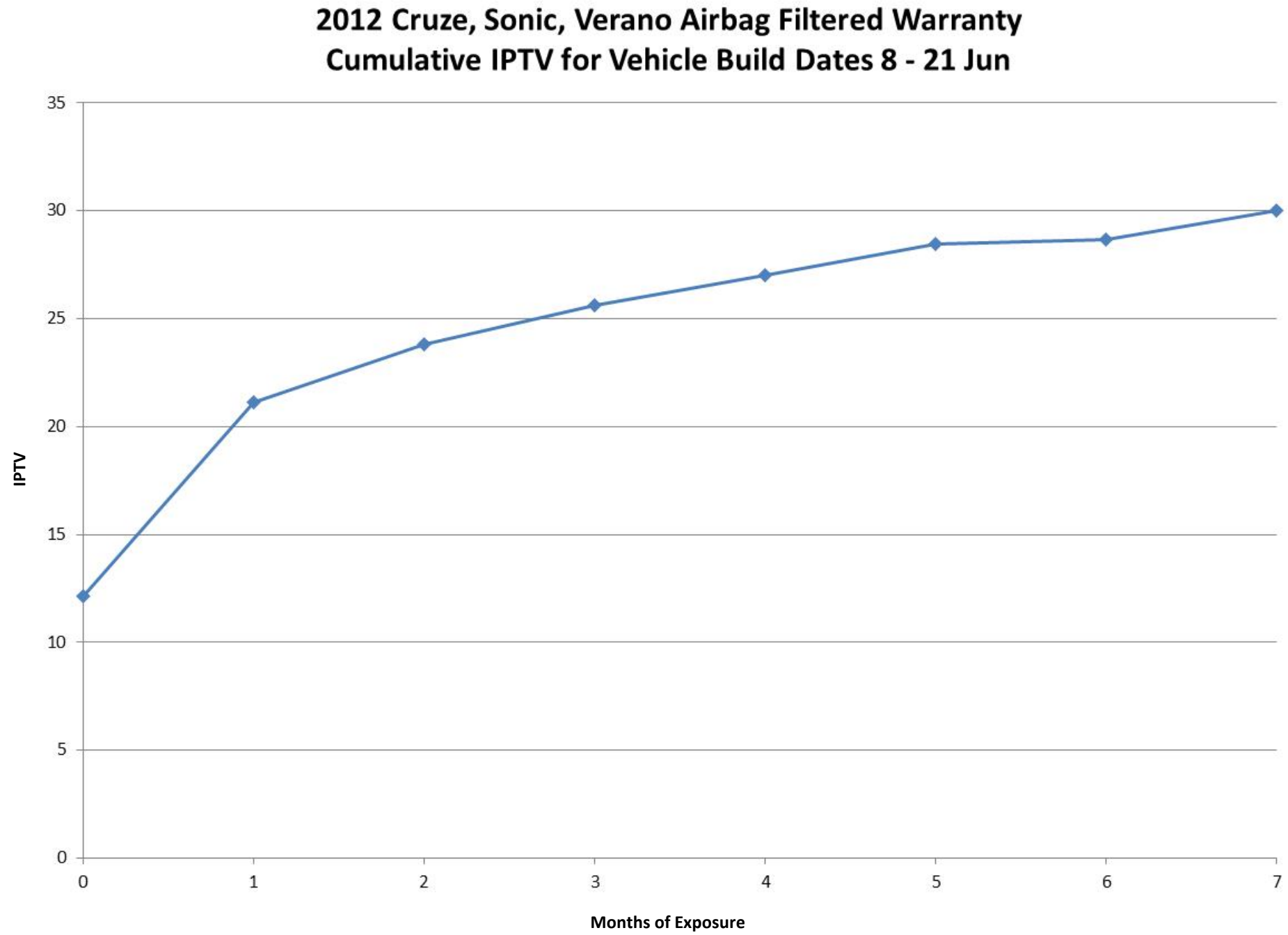

2012 Camaro, Cruze, Sonic, Verano Airbag Filtered Warranty
Cumulative IPTV for Inflator Build Dates 3 and 7 Dec 11
IPTV
45
40
35
30
25
20
15
10
5
0
0
1
2
3
4
5
6
7
8
9
10
11
12
Months of Exposure

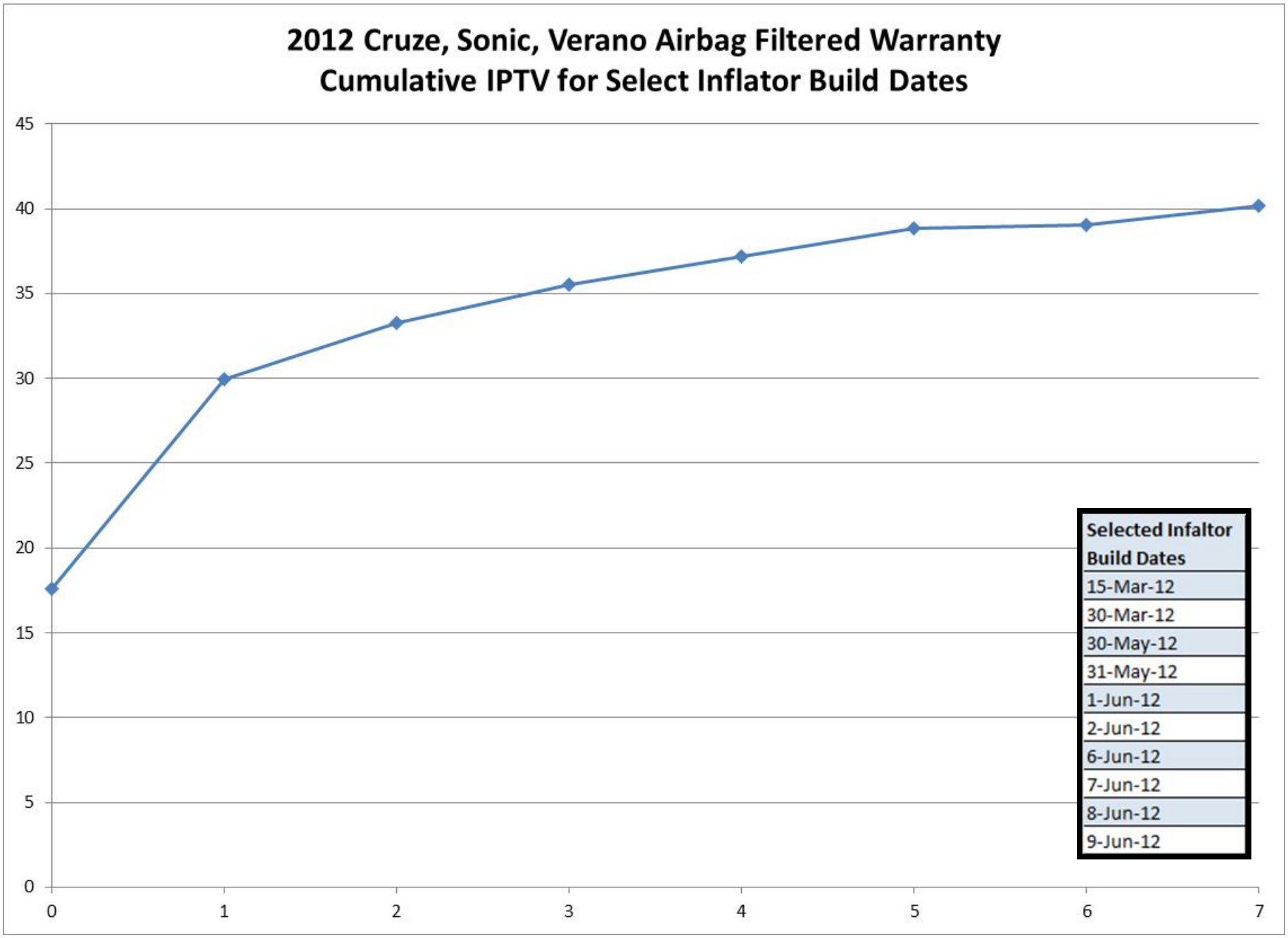
# *Shorting Bar*

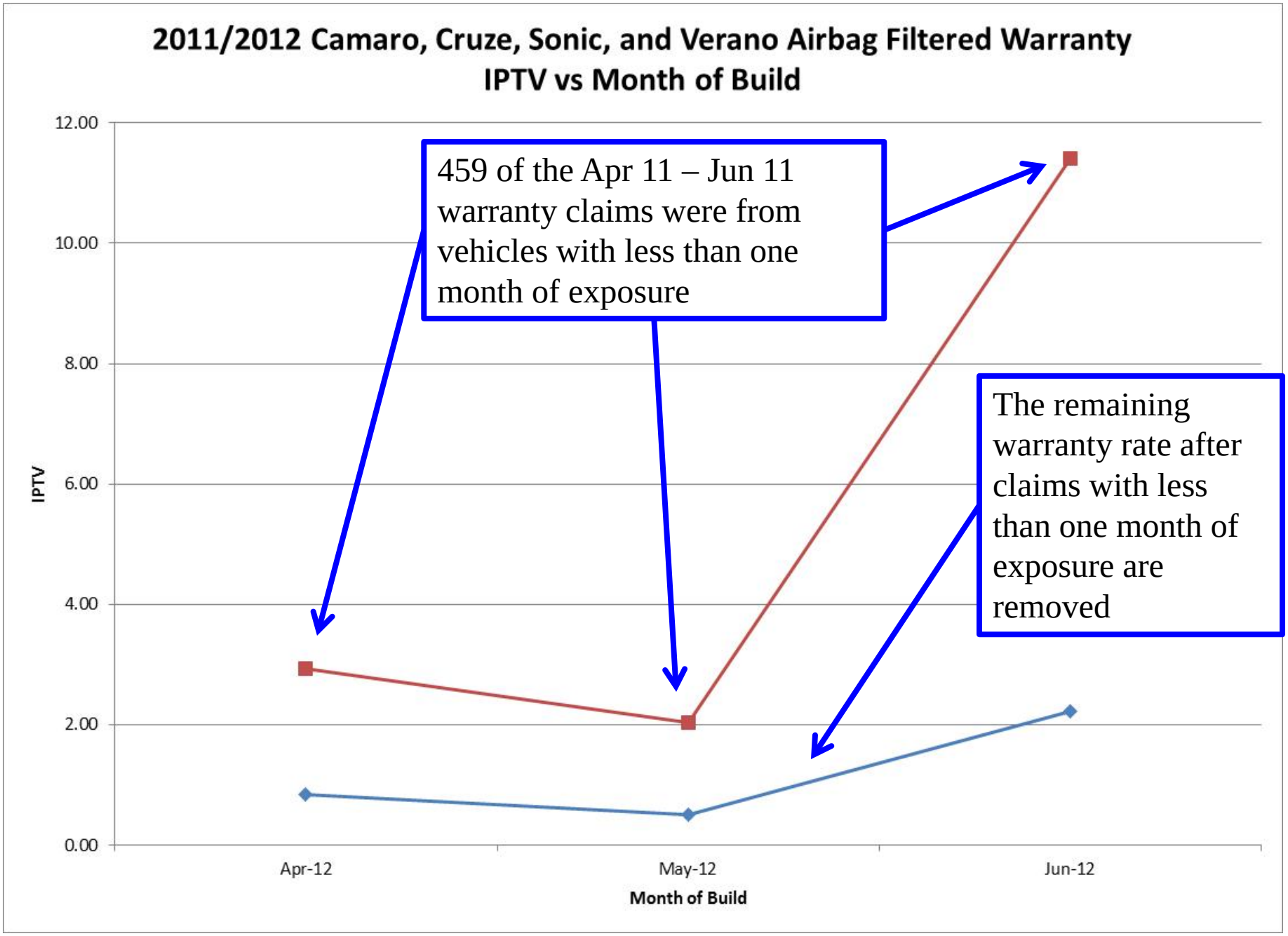
## *Conversation with the NHTSA*

- Did the issue start in April 12
- Infant mortality


2011/2012 Camaro, Cruze, Sonic, and Verano Airbag Filtered Warranty
IPTV vs Month of Build
Analysis
12.00
10.00
8.00
6.00
4.00
2.00
0.00
IPtV
Nov-11
Dec-11
Jan-12
Feb-12
Mar-12
Apr-12
May-12
Jun-12
Jul-12
Month of Vehicle Build
8 Jun 12
21 Jun 12


2012 Cruze, Sonic, Verano Airbag Filtered Warranty
Cumulative IPTV for Vehicle Build Dates 8 - 21 Jun
IPTV
35
30
25
20
15
10
5
0
0
1
2
3
4
5
6
7
Months of Exposure


2012 Cruze, Sonic, Verano Airbag Filtered Warranty
Cumulative IPTV for Select Inflator Build Dates
IPTV
45
40
35
30
25
20
15
10
5
0
0
1
2
3
4
5
6
7
Months of Exposure
Selected Infaltor Build Dates
15-Mar-12
30-Mar-12
30-May-12
31-May-12
1-Jun-12
2-Jun-12
6-Jun-12
7-Jun-12
8-Jun-12
9-Jun-12


2011/2012 Camaro, Cruze, Sonic, and Verano Airbag Filtered Warranty
IPTV vs Month of Build
12.00
10.00
8.00
6.00
4.00
2.00
0.00
IPTV
459 of the Apr 11 – Jun 11 warranty claims were from vehicles with less than one month of exposure
The remaining warranty rate after claims with less than one month of exposure are removed
Apr-12
May-12
Jun-12
Month of Build

# *Shorting Bar*
## *Population*

| | Model Year | Number Involved |
|---|---|---|
| **US** | | |
| Verano | 2012 | 409 |
| Camaro | 2012 | 429 |
| Cruze | 2012 | 1,981 |
| Sonic | 2012 | 1,077 |
| **Total** | | **3,487** |
| **GM CANADA** | | |
| Verano | 2012 | 33 |
| Camaro | 2012 | 4 |
| Cruze | 2012 | 36 |
| Sonic | 2012 | 132 |
| **Total** | | **205** |
| **Total GM** | | **4,101** |

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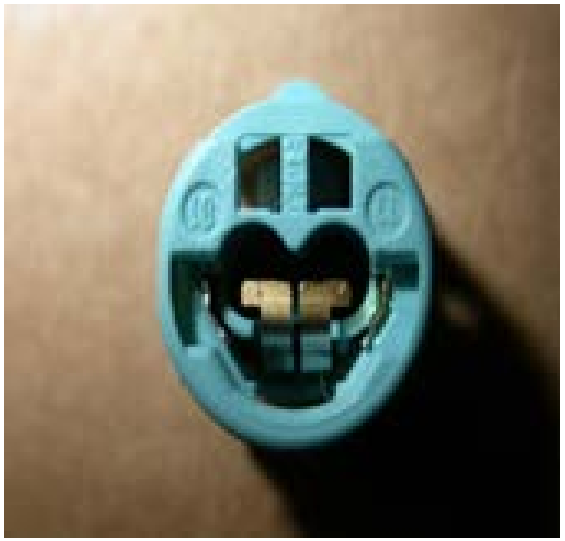
# Pictures of Damaged Parts

# *2012 Chevrolet Cruze, Verano, and Sonic*

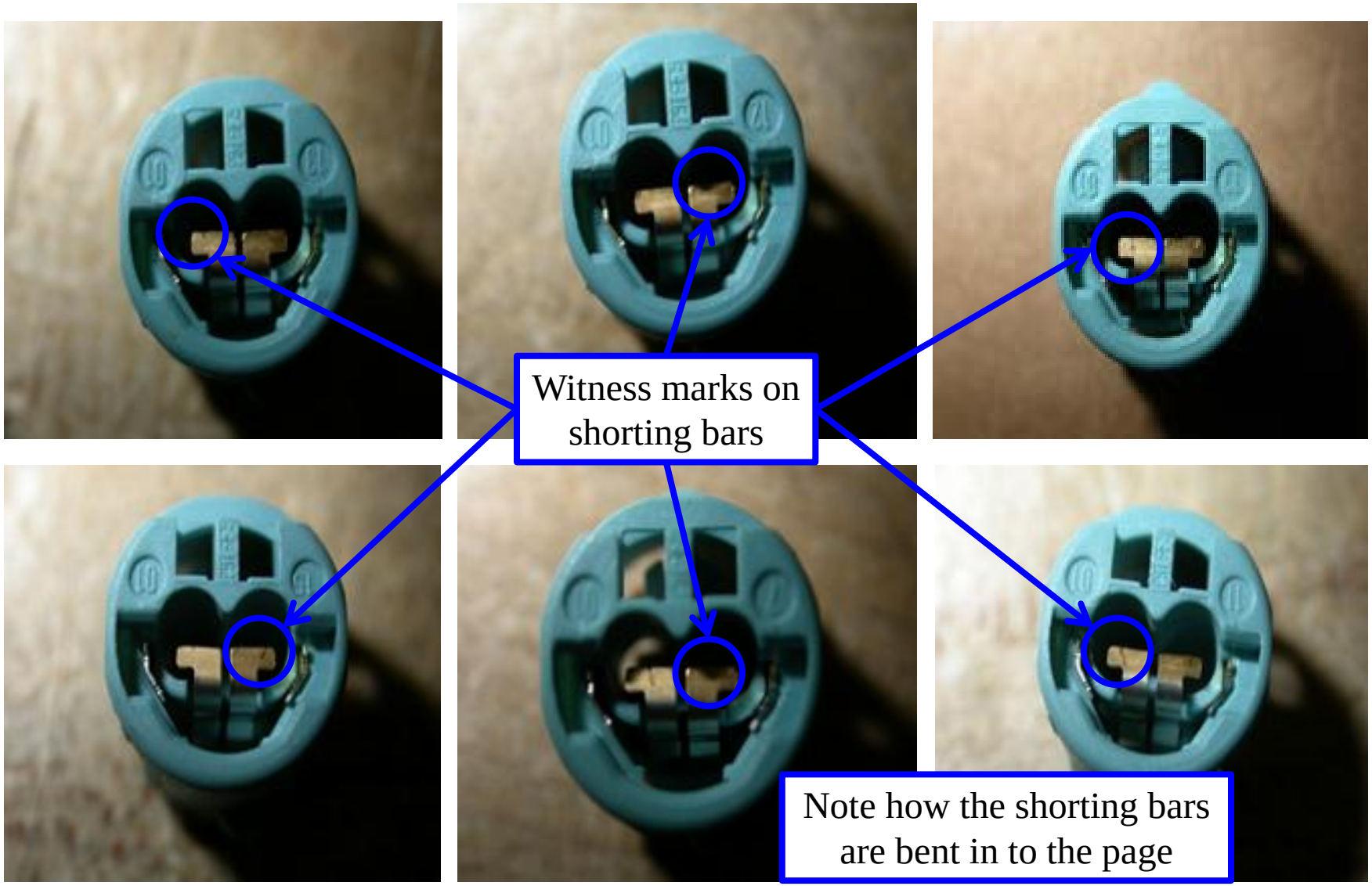
## *Pictures of Damaged Parts*






# *2012 Chevrolet Cruze, Verano, and Sonic*

## *Pictures of Damaged Parts*



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Q_08_2012 2013 Cruze and Verano Warranty Summary with 5 phase 29OCT12 Rev. 1-p

# 2012 Buick Verano and Chevrolet Cruze Driver Airbag & Clockspring Quality Issues

Craig Zinser – Infotainment and Controls Global BOM Leader
David Silvestri – Switches and Controls GSSLT Lead
Lenore Kolhoff – CEA EGM

Douglas Houlihan – Safety Components Global BOM Leader
George Helou – Safety Components GSSLT Lead
Lisa Amin – SW & DAB EGM

October 31st, 2012

WORLD'S BEST VEHICLES

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(Back to Summary)

{ * }

{ * }

# Airbag Light On

{ * }

**Root Cause:**

- Bent DAB inflator shorting clips due to damage to installation tool.
- Supplier quality spill at inflator facility.

**Containment:**

- Quality Spill Start: Approx. 01AP12
- GM notified: 12JN12
- Clean Break point: 22JN12. Replaced shorting clips.

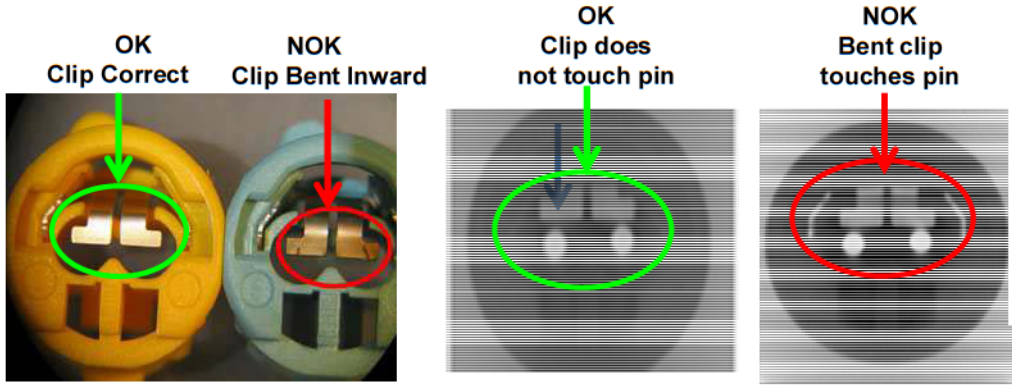
**Corrective Action**

- Replaced shorting clip installation tool.

{ * }

Supplier Quality Spill

(Back to Summary)

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WORLD'S BEST VEHICLES

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# BACK UP

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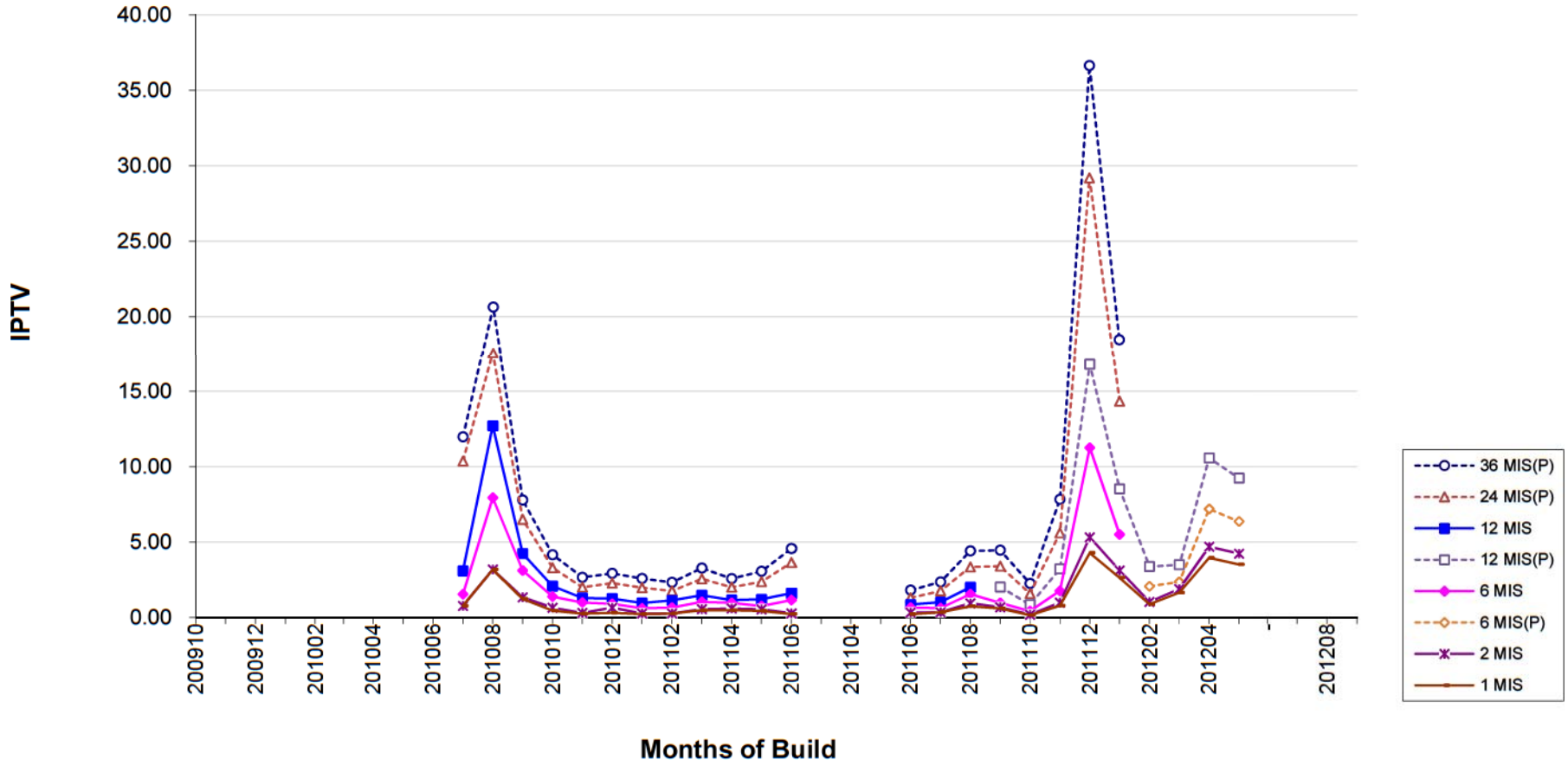
# 2011-2012 Cruze and Verano Clockspring and Airbag Trend Chart




WORLD'S BEST VEHICLES

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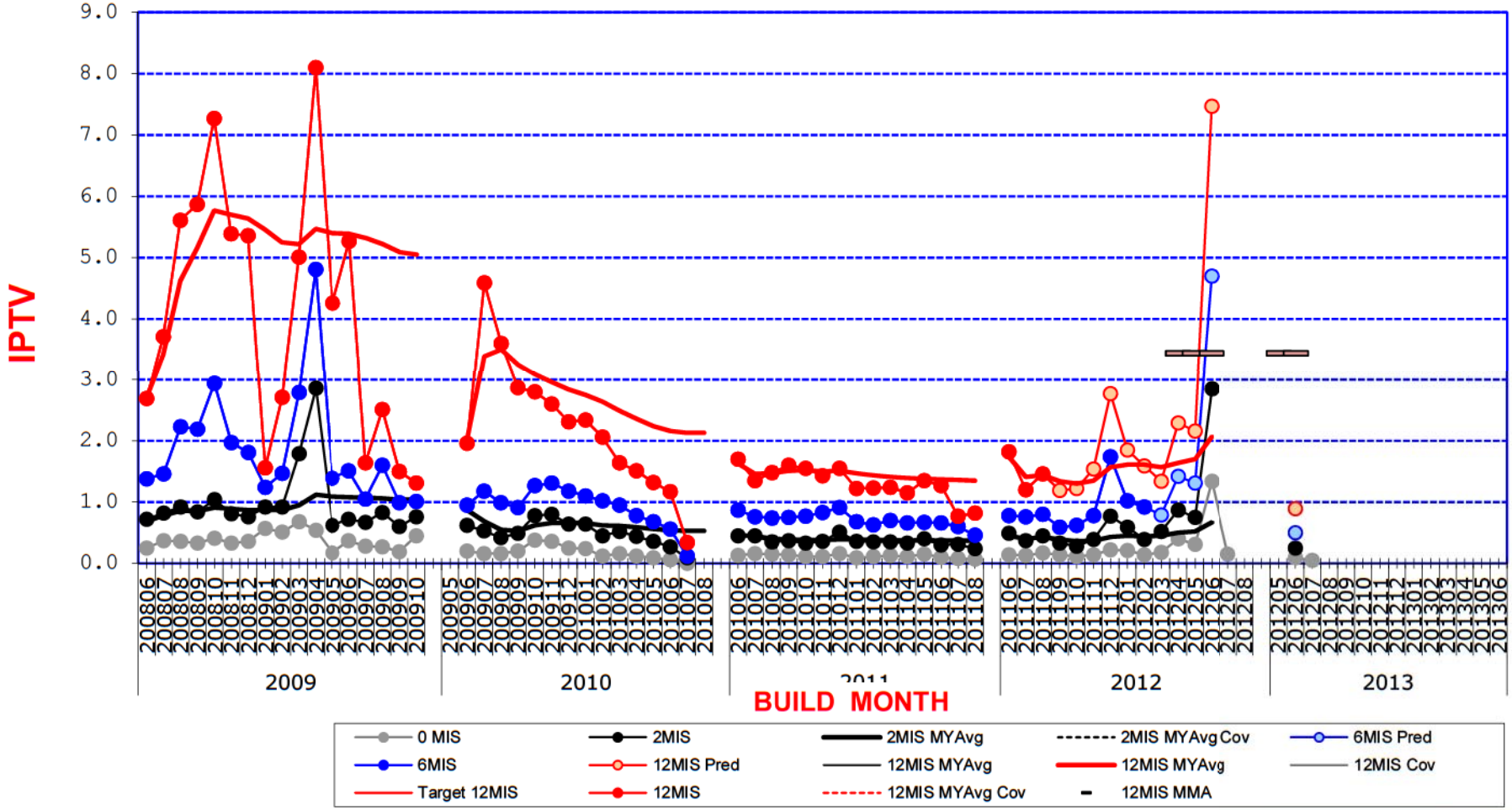
# 2009-2013 All GMNA Vehicles
# Clockspring Trend Chart




WORLD'S BEST VEHICLES

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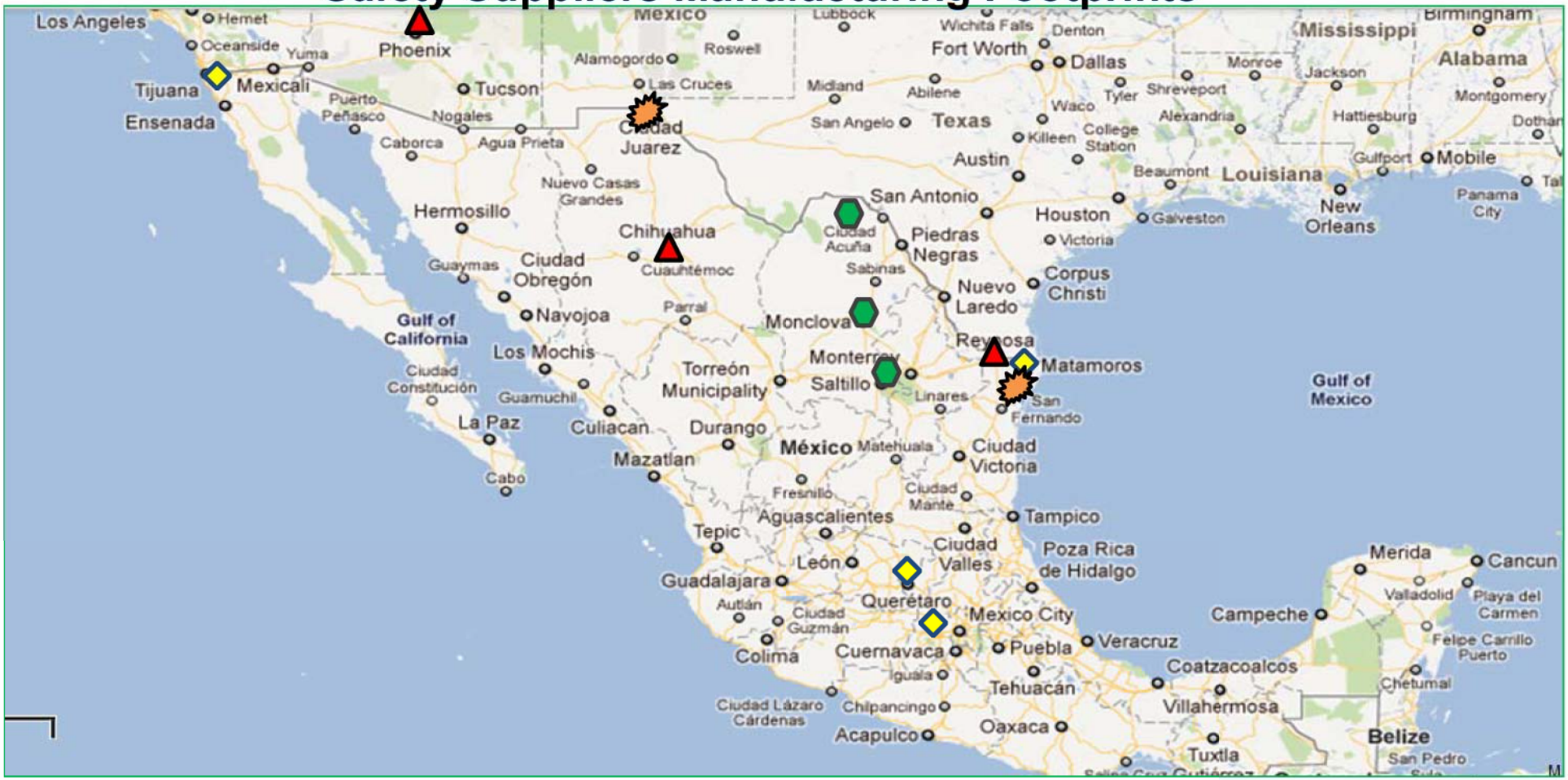
# Safety Suppliers Manufacturing Footprints




**Autoliv**:
Seatbelts: Tijuana & Toluca Mexico
Airbags: Ogden, Utah & Queretaro, Mexico
Steering Wheels: Matamoros, Mexico
Inflator: **Brigham, Utah**
Cushion: Queretaro, Mexico

**TRW:**
Seatbelts: Reynosa, Mexico
Airbags: Chihuahua, Mexico
Steering Wheels: Chihuahua, Mexico
Inflator: Meza, Arizona

**KSS**:
Seatbelts: Valle Hermoso, Mexico
Airbags: Knoxville, Tennessee
Steering Wheels: Valle Hermoso, Mexico
Inflator: Valle Hermoso, Mexico
Cushion: Juarez, Mexico

**Takata**:
Seatbelts: Acuna, Mexico
Airbags: Acuna, Mexico
Steering Wheels: Monterrey, Mexico
Inflator: Monclova, Mexico
Airbag cover & Cushion: Monclova, Mexico

**TGNA**:
Airbags: Perryville, Missouri
Steering Wheels: Perryville, Missouri
Inflator: Purchased (ARC)

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Q_08_2012 Cruze and Verano Warranty 29OCT12-p

# Airbag Light On

{ * }

**Root Cause:**

- Bent DAB inflator shorting clips due to damage to installation tool.
- Supplier quality spill at inflator facility.

**Containment:**

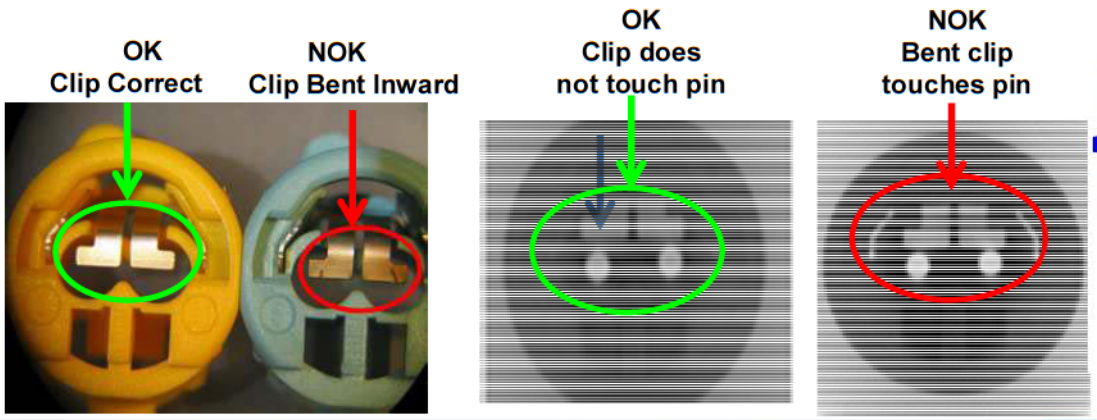
- Quality Spill Start: Approx. 01AP12
- GM notified: 12JN12
- Clean Break point: 22JN12. Replaced shorting clips.

**Corrective Action**

- Replaced shorting clip installation tool on 16JN12.

{ * }

Supplier Quality Spill

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WORLD'S BEST VEHICLES

RQ13-002

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8/16/2013

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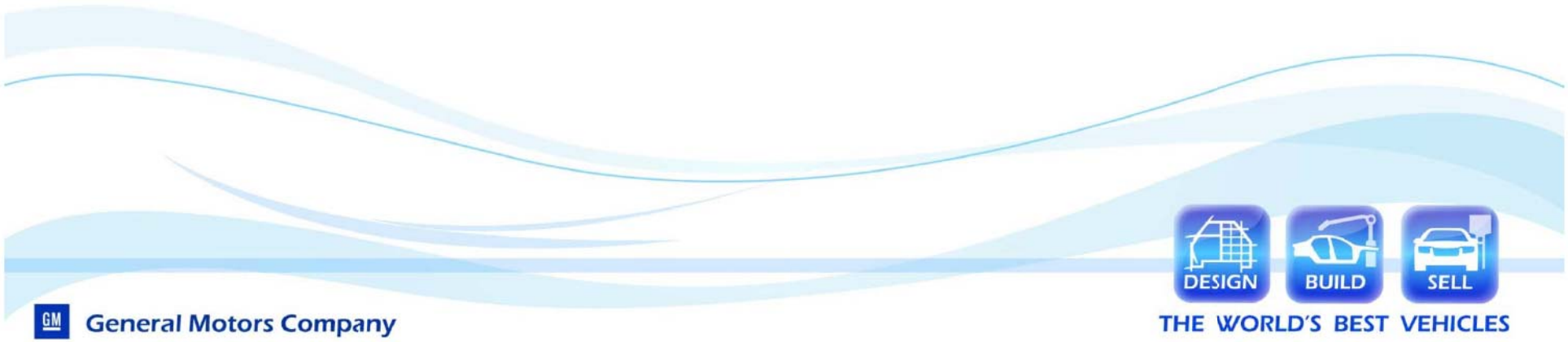
Interior Tech Symposium_GSSLT Restraints Breakout Session (Materials)_06DEC2012 rev-p

# Driver Airbag Light On
# 2012 Cruze, Verano, Sonic & Volt




General Motors Company

# *Shorting Bar within the Driver's Airbag Connector*

**Model Year: 2012 Cruze, Verano, and Sonic**
**3,922 plus recently sold vehicles**
**Cost Estimate: TBD**

ETQ N120261

**Condition:** Some 2012 Cruze, Verano, and Sonic vehicles have a driver's side airbag connector shorting bar that may have been damaged during assembly of the airbag.

**Effect of the Condition:** A vehicle in this condition may set diagnostic trouble code B0012 (primary stage inflator). The Sensing and Diagnostic Module (SDM) will request the instrument cluster to illuminate the AIRBAG indicator. If a crash event occurs the the SDM will attempt deployment, but, if the shorting bar is in contact with the airbag terminals, the airbag will not deploy.

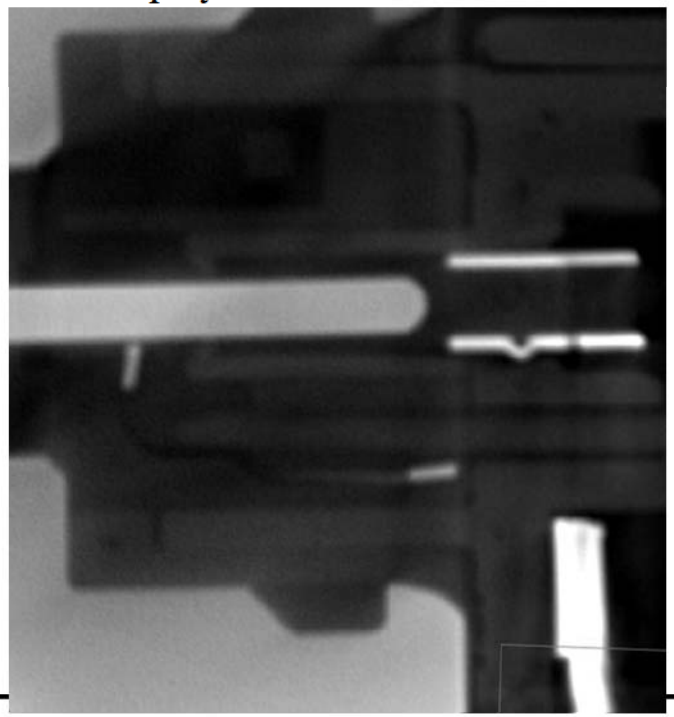
**Technical Root Cause:** During the retainer seating process the shorting bars were not fully retracted to prevent contact with the airbag terminals.

**Responsibility:** Takata

**Projected Frequency:** TBD IPTV

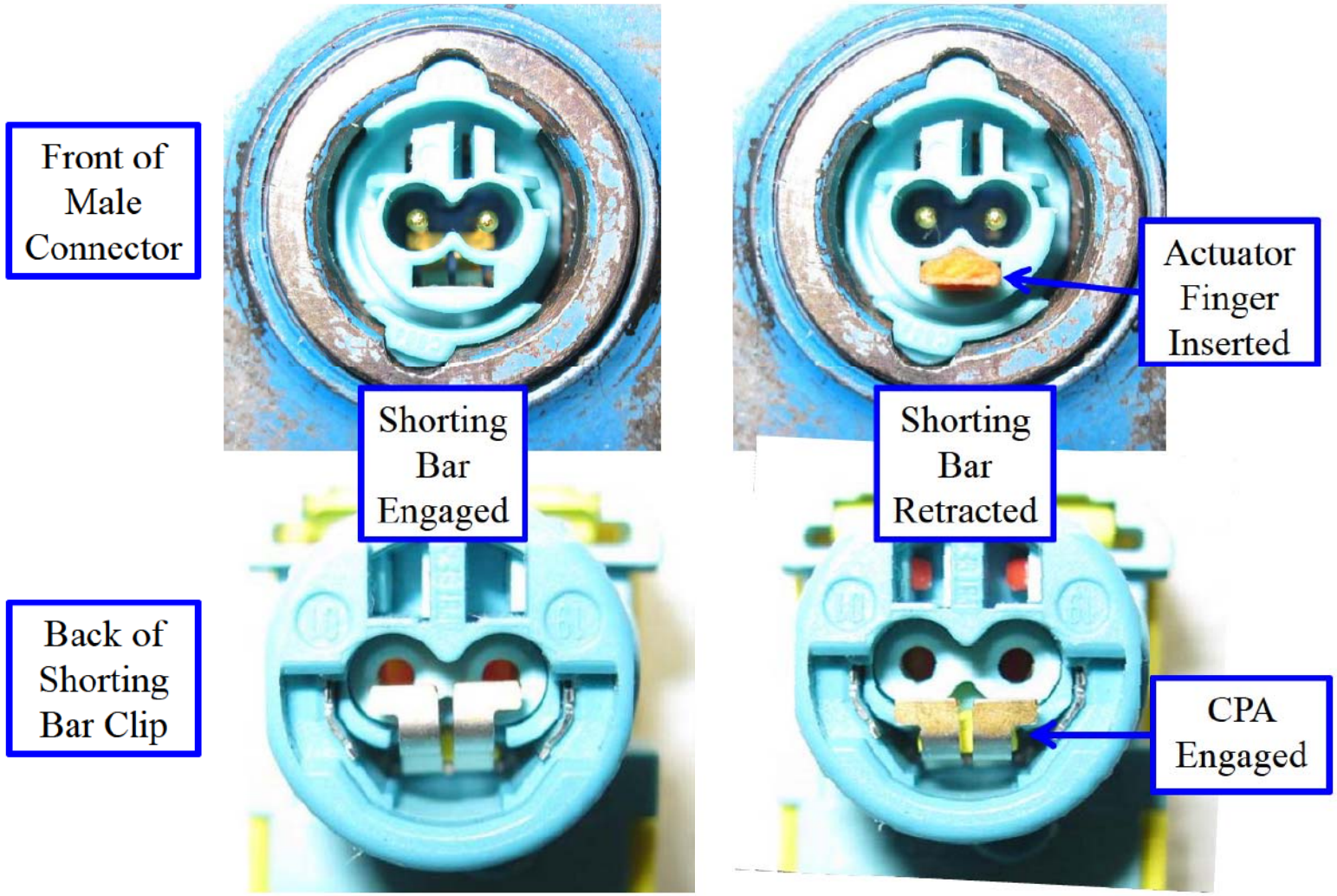
**Potential Field Action Category:** Safety

**Potential Field Remedy:** Inspect the connection or replace the clock spring or the driver's side airbag.

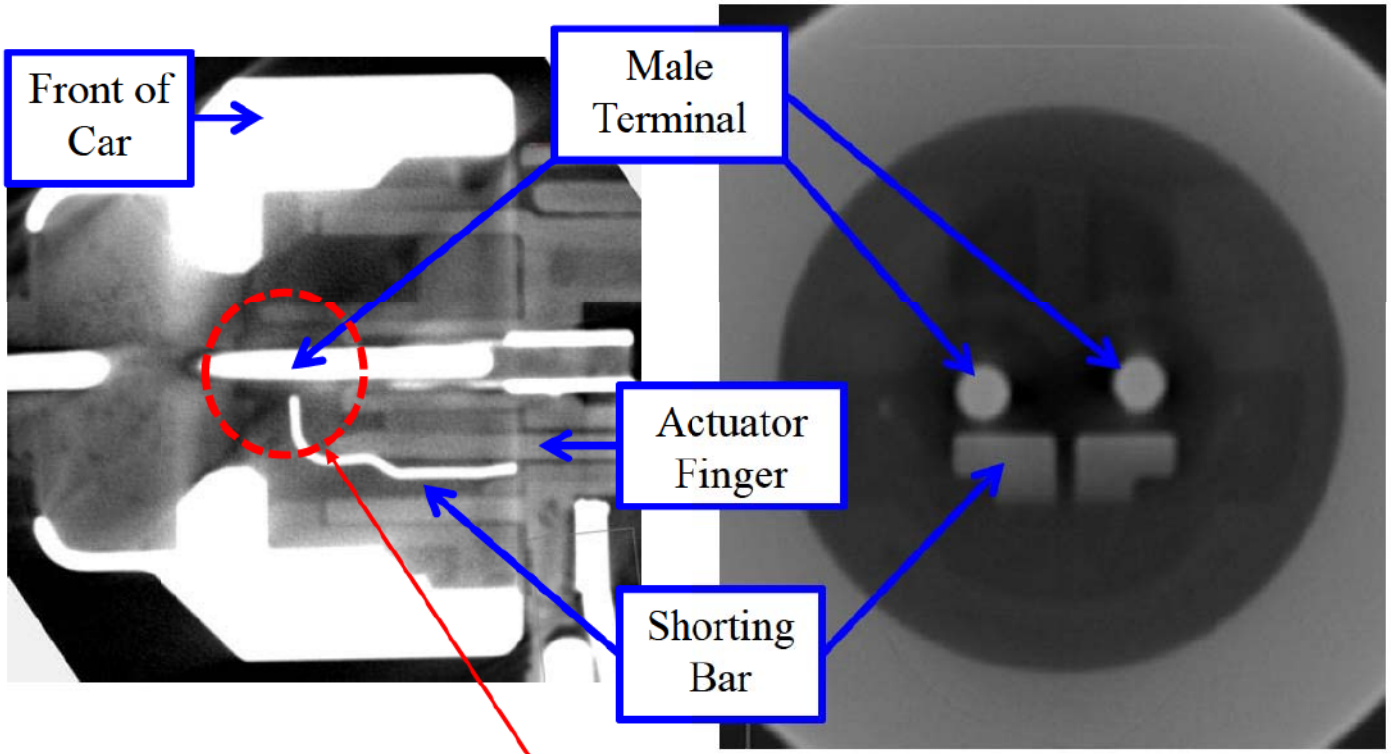


# 2012 Chevrolet Cruze, Verano, and Sonic

## Male Connector - Retracting the Shorting Bar



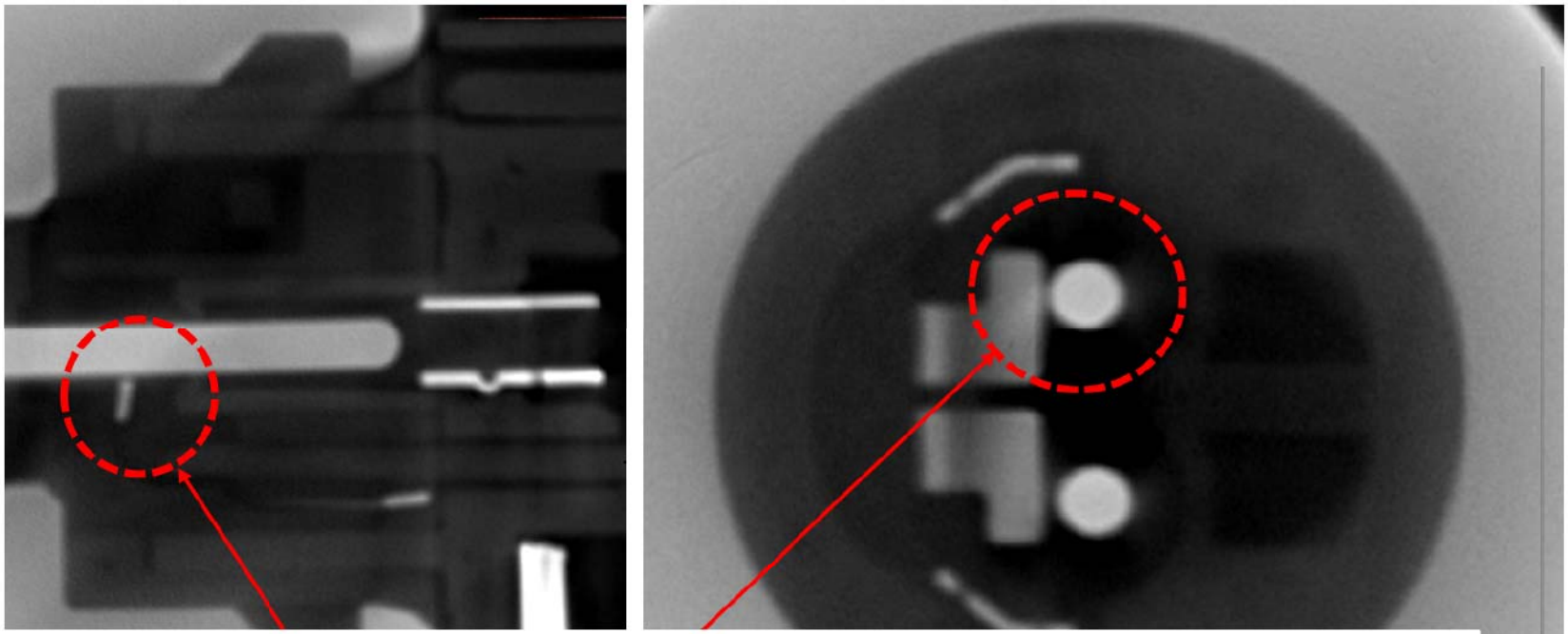
# *2012 Chevrolet Cruze, Verano, and Sonic*
## *X-Rays of Assembled Male and Female Connector*
## *Shorting Bar Retracted*



# *2012 Chevrolet Cruze, Verano, and Sonic*

## *X-Rays of Assembled Male and Female Connector*

## *Shorting Bar Damaged*



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RQ13-002

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8/16/2013

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Cruze,+Verano,+and+Sonic+air bag+connector+- +22+Oct+12+FPET-p

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**Cost Estimate: TBD**

ETQ N120261

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**Responsibility:** Takata

**Projected Frequency:** TBD IPTV

**Potential Field Action Category:** Safety

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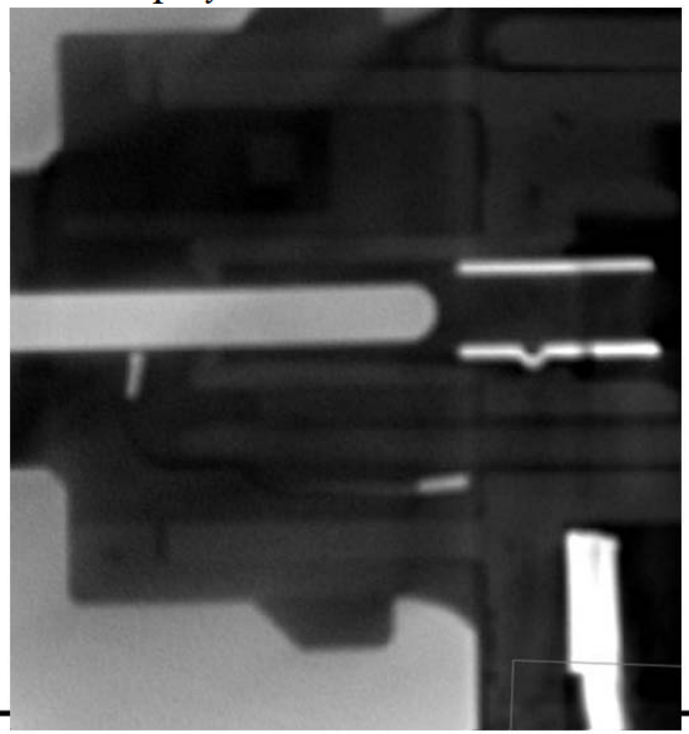
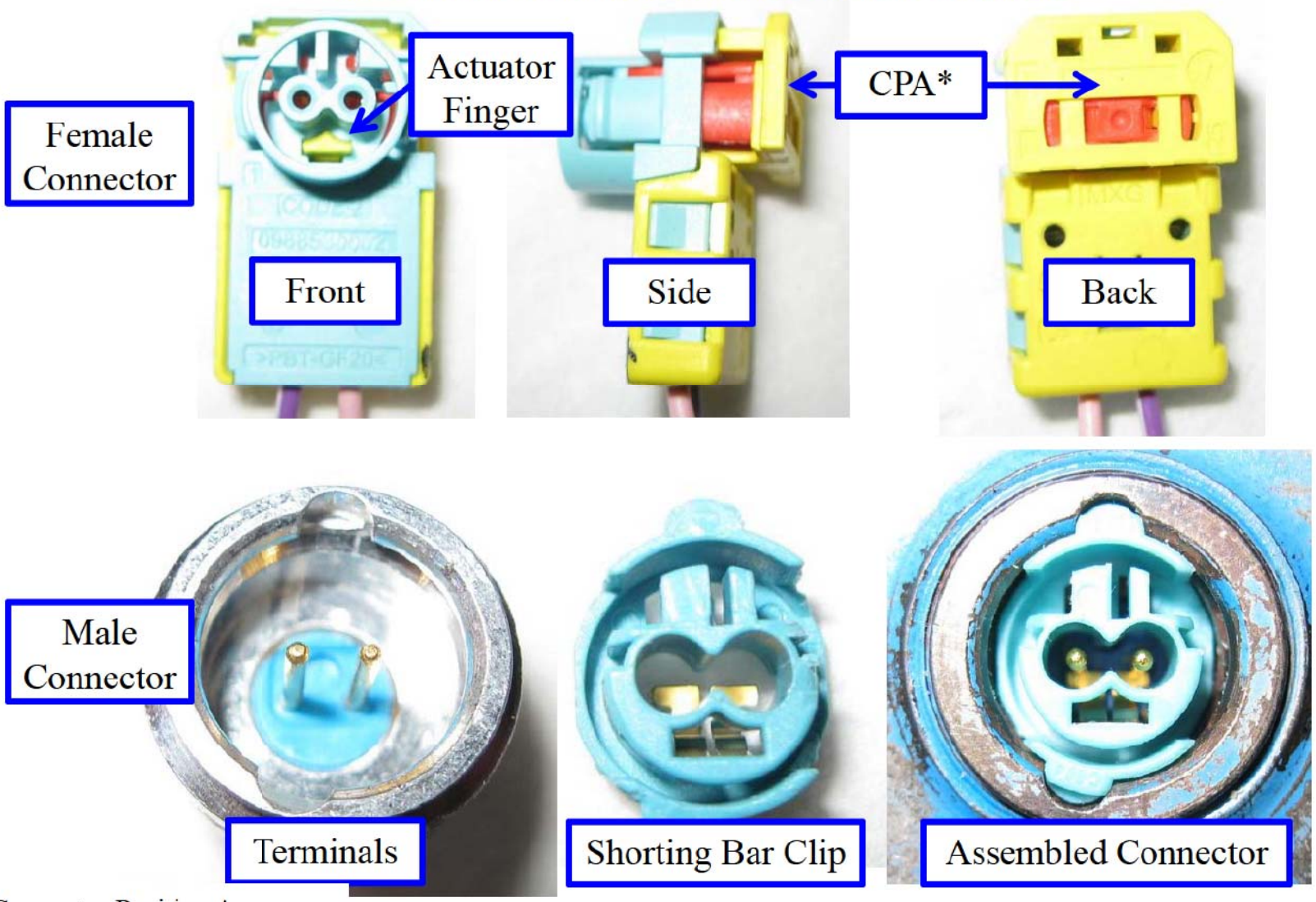


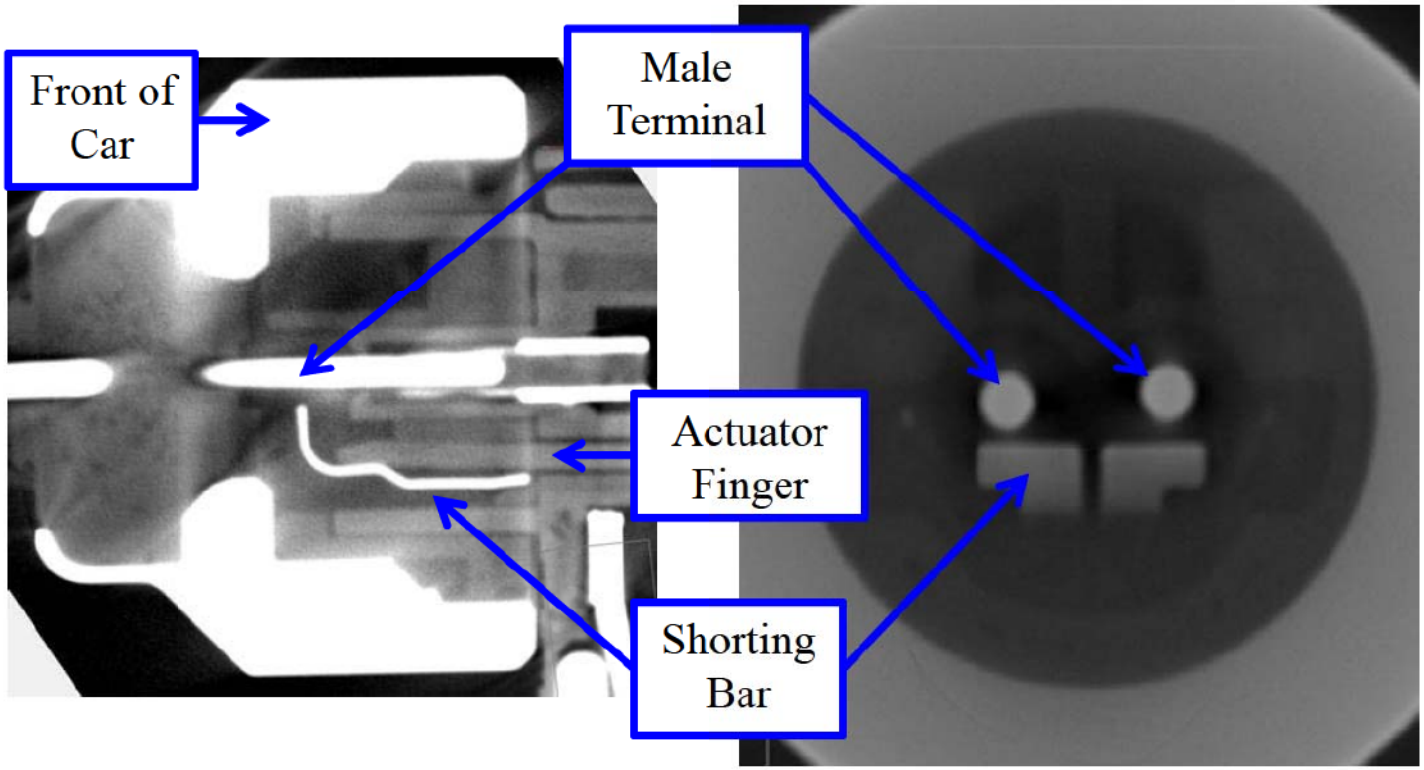
# 2012 Chevrolet Cruze, Verano, and Sonic

## Female and Male Connectors



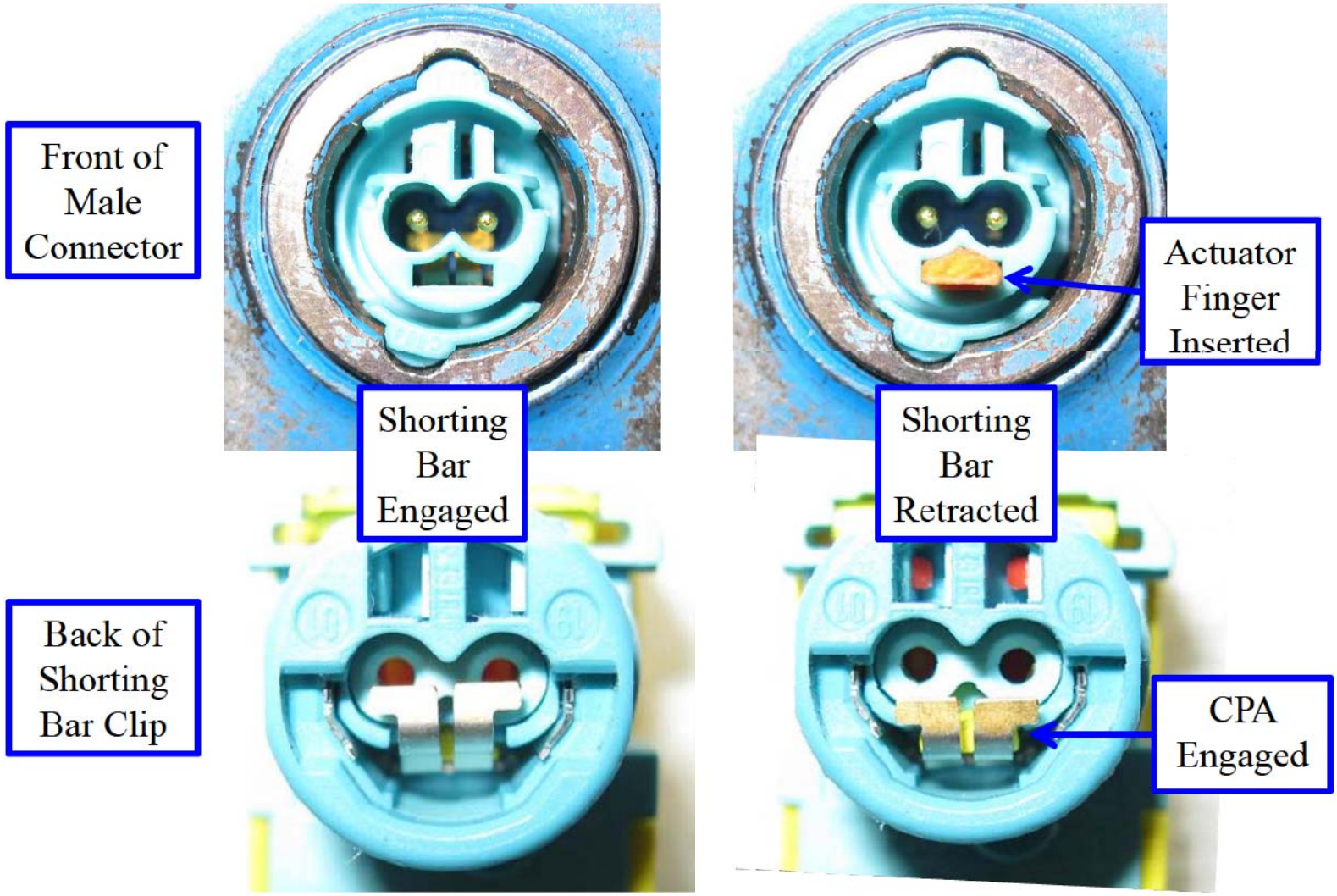

*Connector Position Assurance

# *2012 Chevrolet Cruze, Verano, and Sonic*
## *X-Rays of Assembled Male and Female Connector*
## *Shorting Bar Retracted*



# 2012 Chevrolet Cruze, Verano, and Sonic

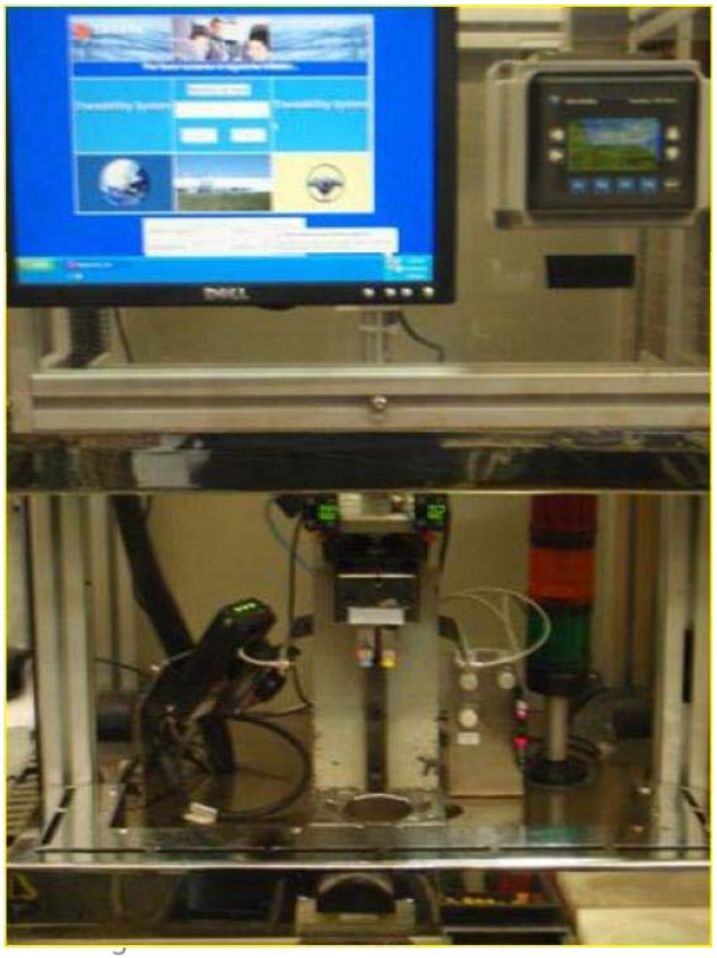
## Male Connector - Retracting the Shorting Bar



# 2012 Chevrolet Cruze, Verano, and Sonic

## Root Cause

The length of the Push Tab was measured using a microscope. The push tab length of the primary chamber shorting clip insertion tool was shorter than the secondary chamber shorting clip insertion tool.

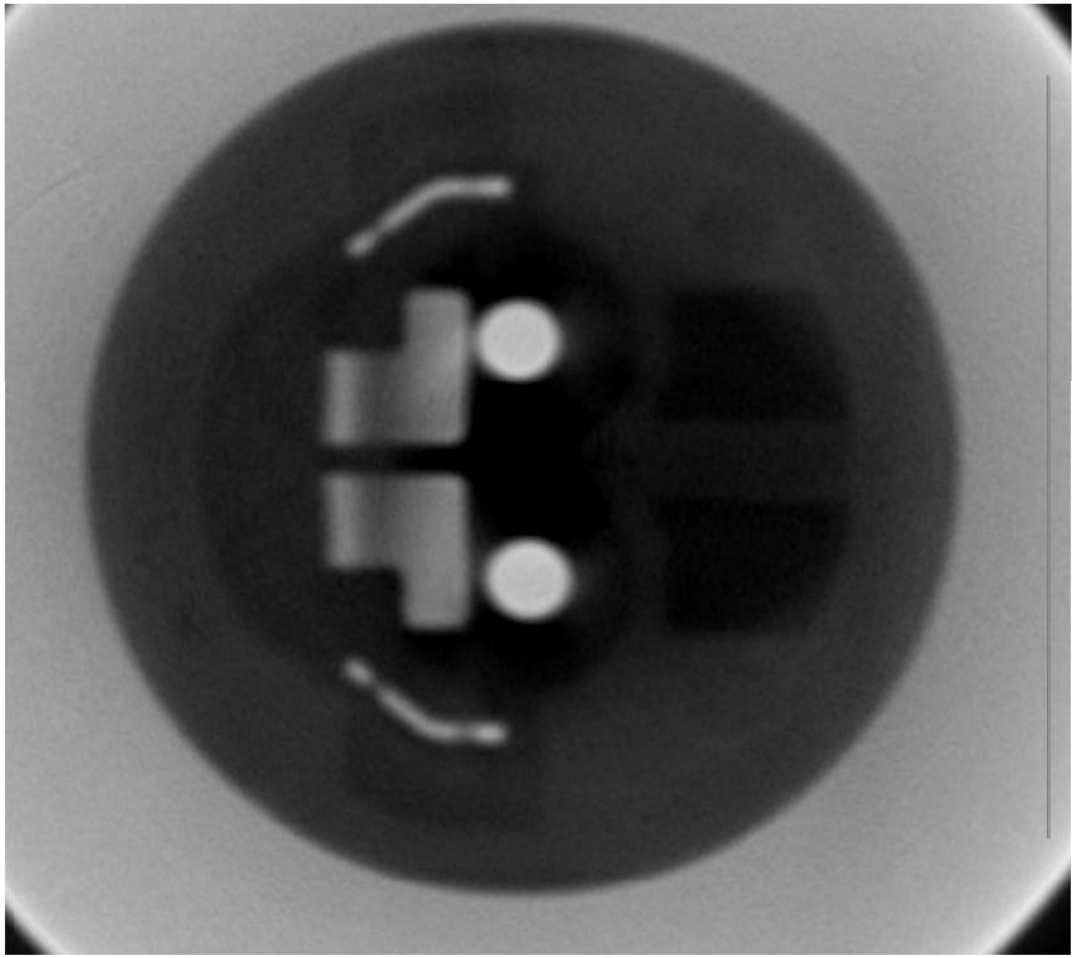


{ * }

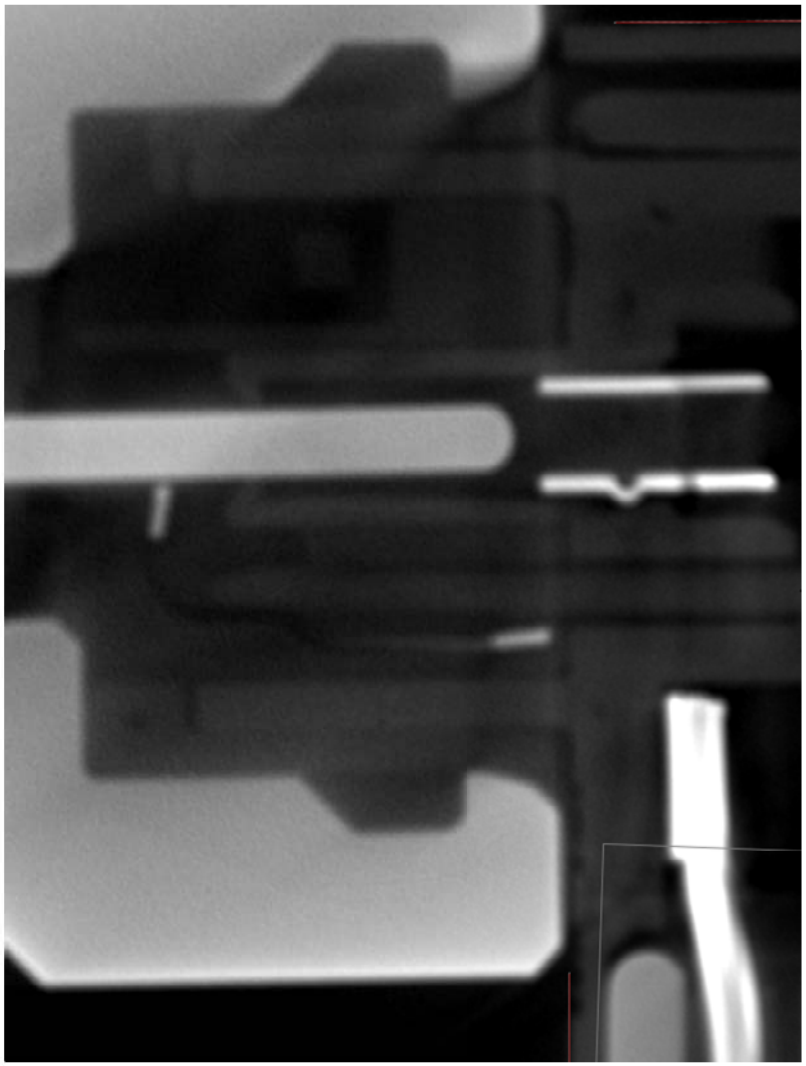
# *2012 Chevrolet Cruze, Verano, and Sonic*

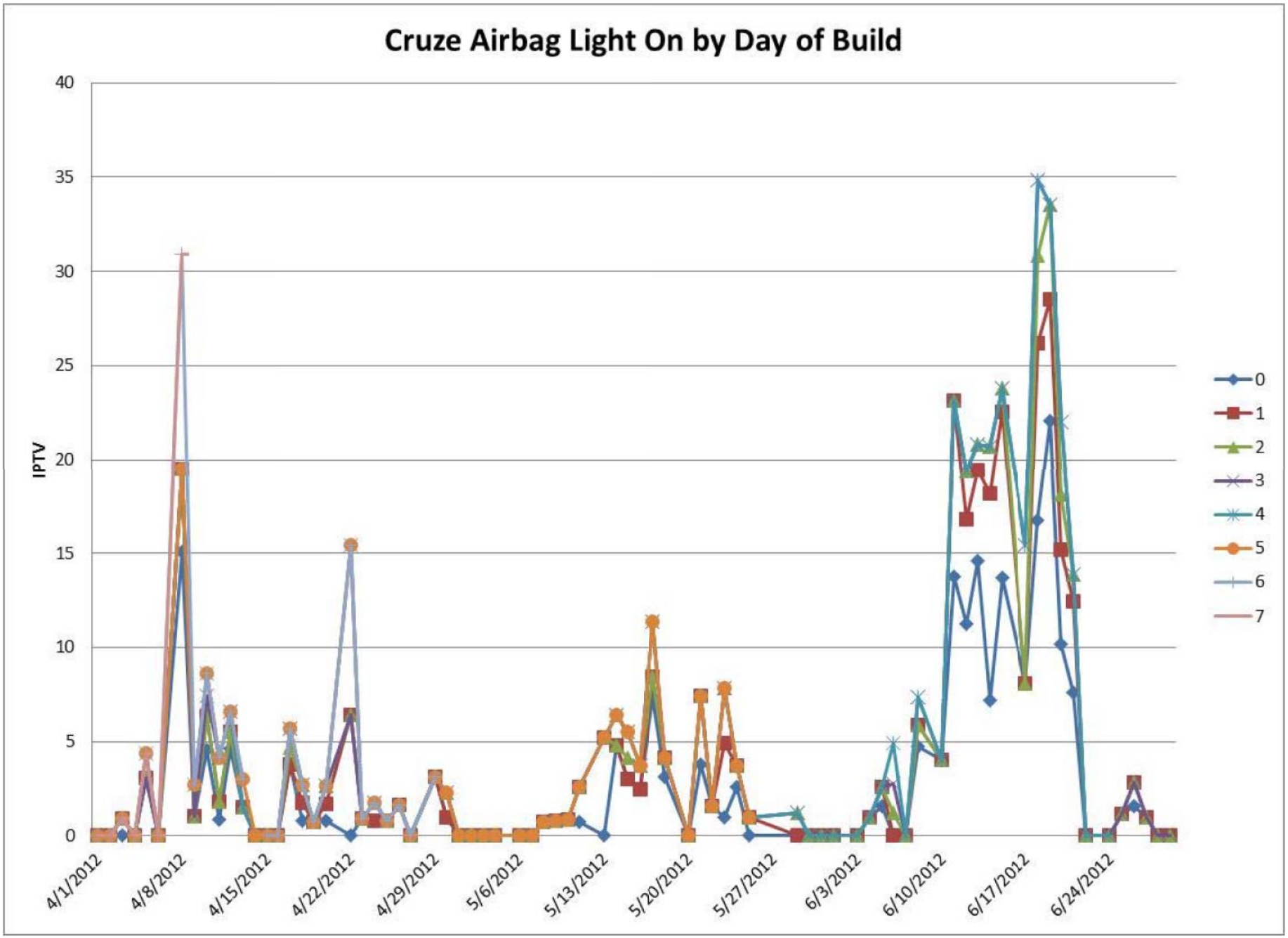
## *X-Rays of Assembled Male and Female Connector*

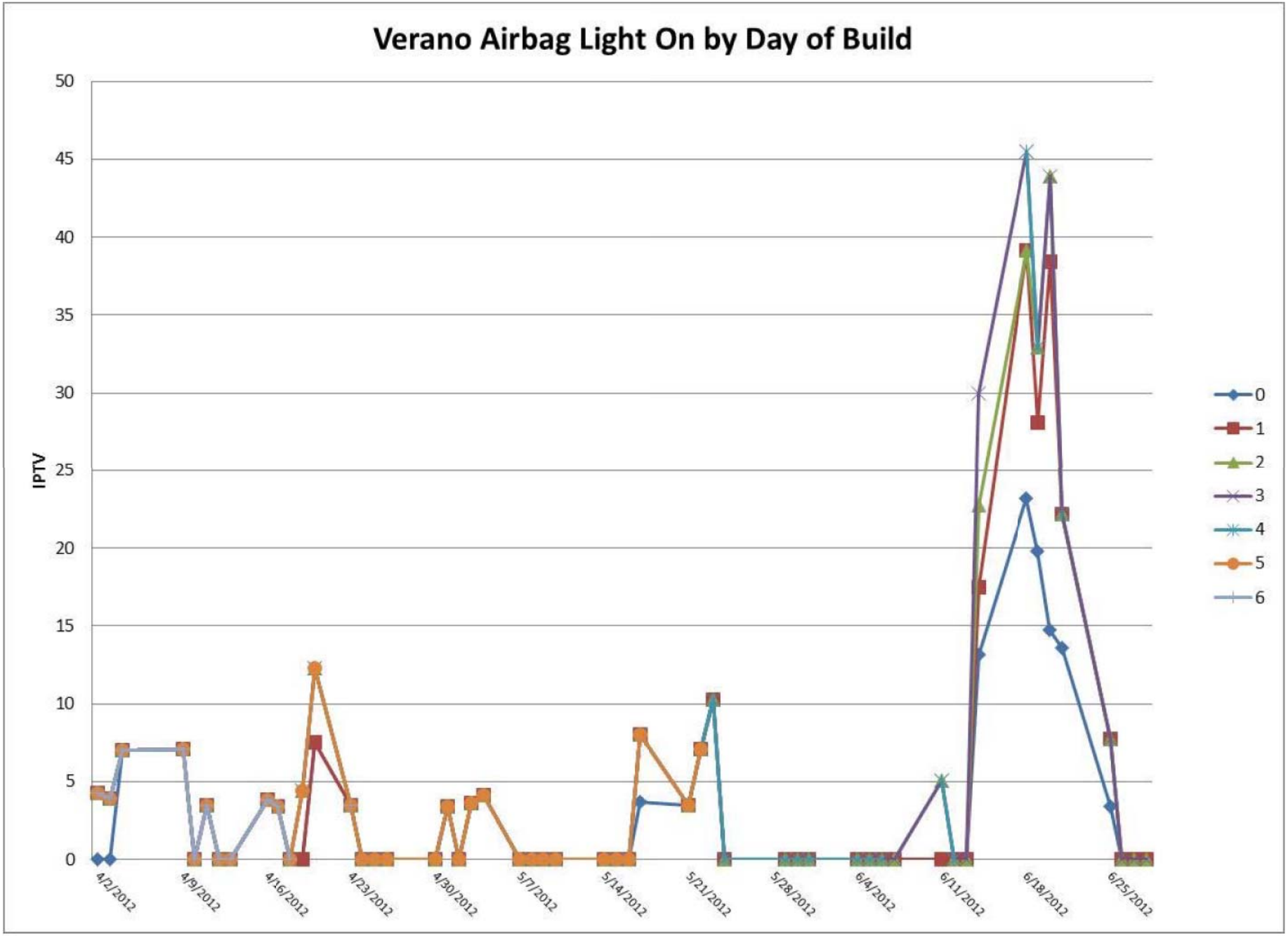
## *Shorting Bar Damaged*

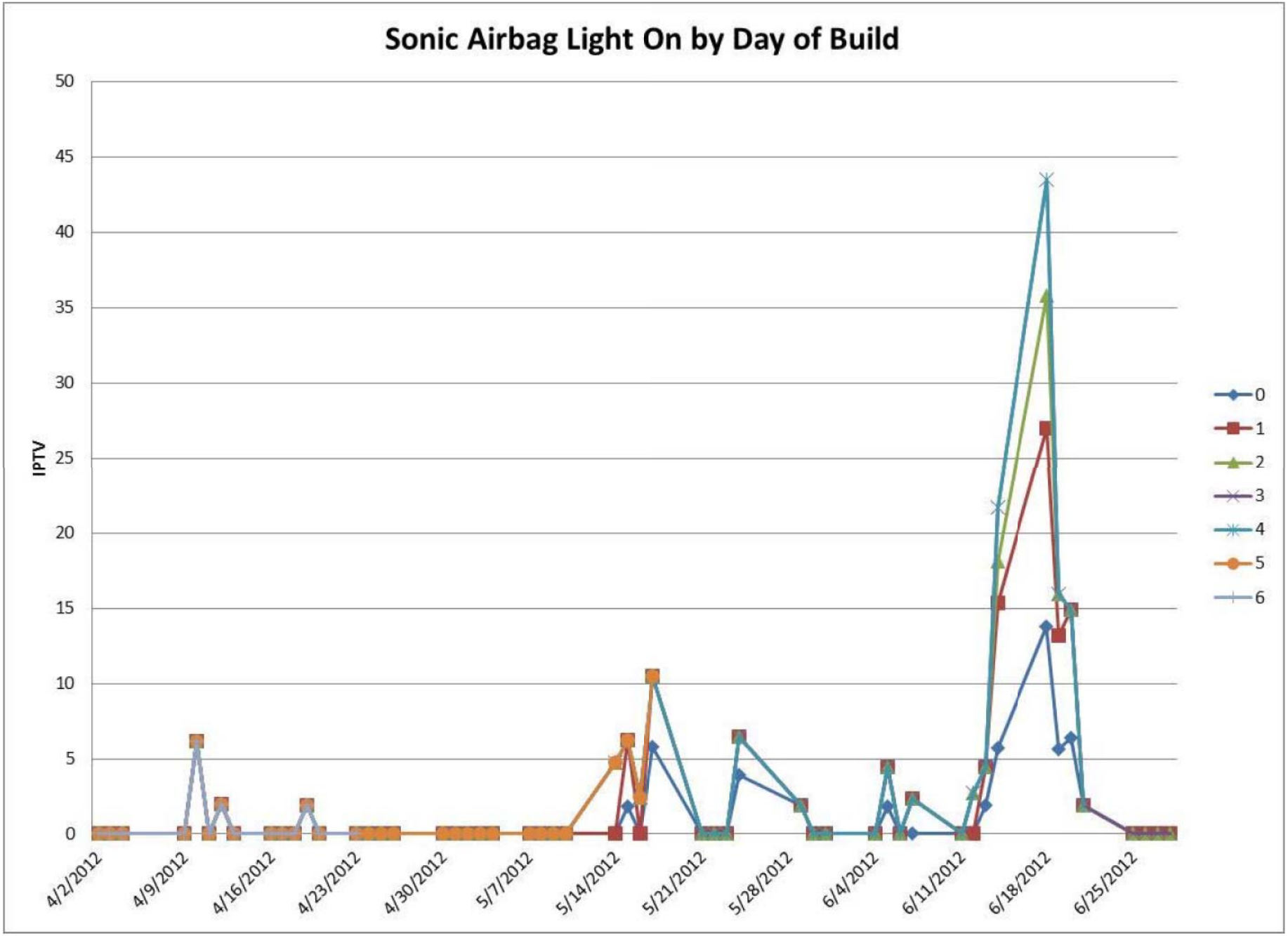


# *2012 Chevrolet Cruze, Verano, and Sonic*
## *X-Rays of Assembled Male and Female Connector*
## *Shorting Bar Damaged*




Cruze Airbag Light On by Day of Build
IPTV
40
35
30
25
20
15
10
5
0
4/1/2012
4/8/2012
4/15/2012
4/22/2012
4/29/2012
5/6/2012
5/13/2012
5/20/2012
5/27/2012
6/3/2012
6/10/2012
6/17/2012
6/24/2012
0
1
2
3
4
5
6
7


Verano Airbag Light On by Day of Build
IPTV
50
45
40
35
30
25
20
15
10
5
0
4/2/2012
4/9/2012
4/16/2012
4/23/2012
4/30/2012
5/7/2012
5/14/2012
5/21/2012
5/28/2012
6/4/2012
6/11/2012
6/18/2012
6/25/2012
0
1
2
3
4
5
6


Sonic Airbag Light On by Day of Build
IPTV
50
45
40
35
30
25
20
15
10
5
0
4/2/2012
4/9/2012
4/16/2012
4/23/2012
4/30/2012
5/7/2012
5/14/2012
5/21/2012
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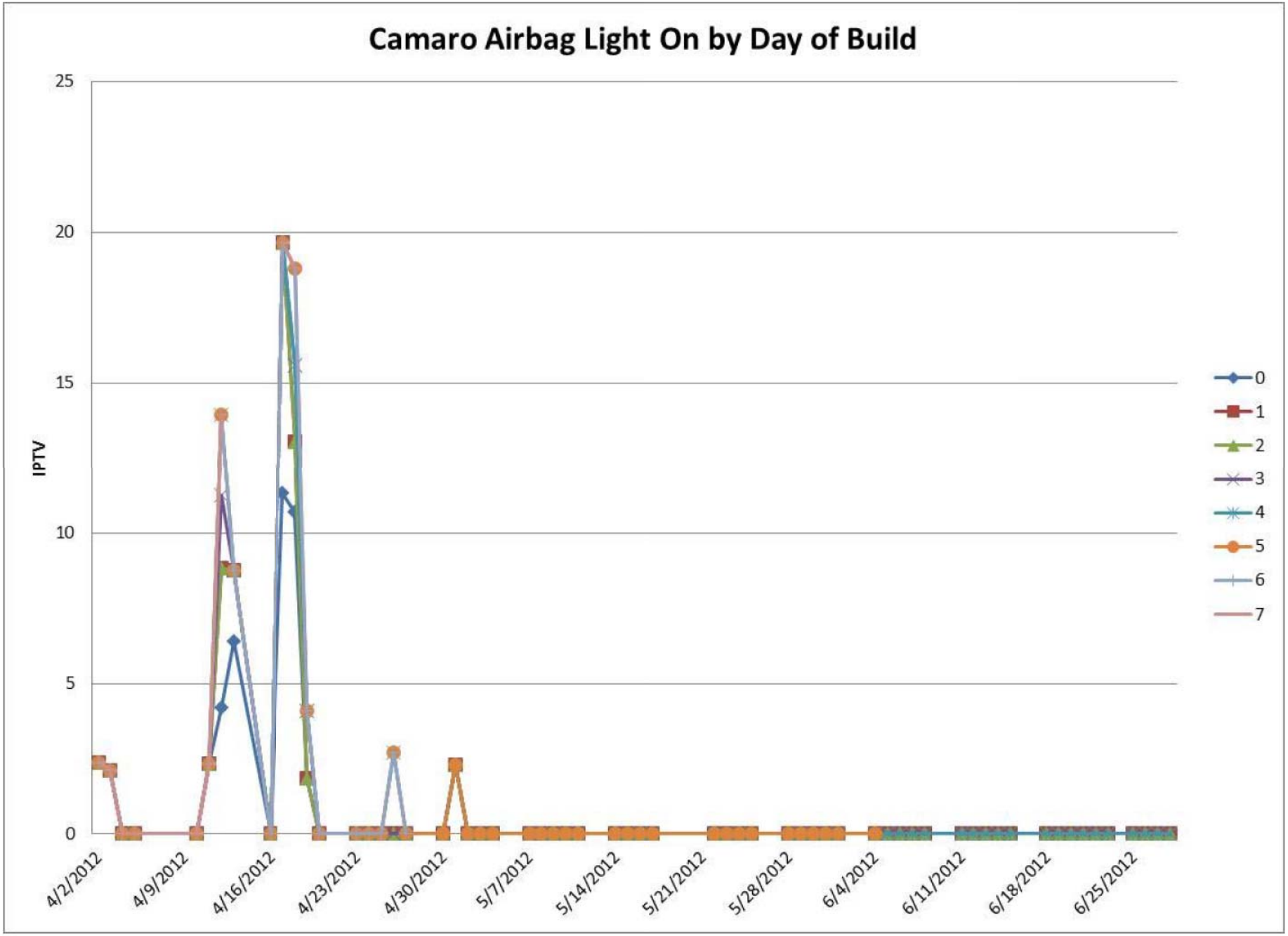
6/25/2012
0
1
2
3
4
5
6


Camaro Airbag Light On by Day of Build
IPTV
25
20
15
10
5
0
4/2/2012
4/9/2012
4/16/2012
4/23/2012
4/30/2012
5/7/2012
5/14/2012
5/21/2012
5/28/2012
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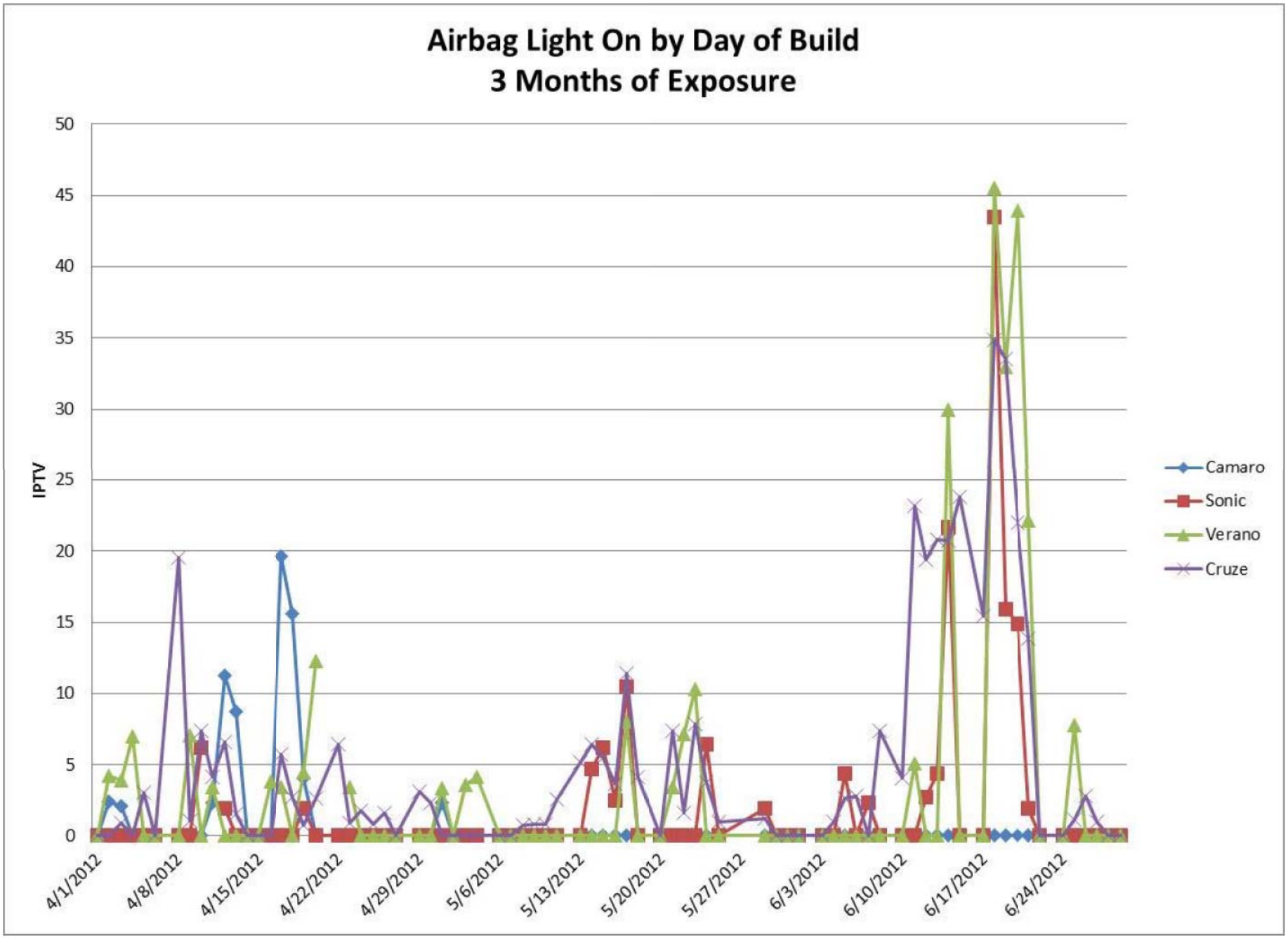
6/25/2012
0
1
2
3
4
5
6
7


Airbag Light On by Day of Build
3 Months of Exposure
IPTV
50
45
40
35
30
25
20
15
10
5
0
4/1/2012
4/8/2012
4/15/2012
4/22/2012
4/29/2012
5/6/2012
5/13/2012
5/20/2012
5/27/2012
6/3/2012
6/10/2012
6/17/2012
6/24/2012
Camaro
Sonic
Verano
Cruze

# *2012 Chevrolet Cruze, Verano, and Sonic*
## *Options*

| Vehicle | 11 Jun 12 - 21 Jun 12 | Jun 2012 at Dealer |
|---|---|---|
| Cruze Population | 10,511 | 2,989 |
| Verano Population | 1,475 | 310 |
| Sonic Population | 2,534 | 623 |
| Total Population | 14,520 | 3,922 |
| Airbag Cost | { ** } | { ** } |
| Clockspring cost | { ** } | { ** } |
| Inspect Cost | { ** } | { ** } |

# RQ13-002

# GM

# 8/16/2013

# Q8A

# Cruze Warranty Summary 10302012

# 2013 Cruze Warranty

- 29 unique VINS have roll coil (C8800) or air bag (C8835) claims
  - 8 VINS with air bag (C8835) labor op
  - 21 VINS with roll coil (C8800) labor op
  - 13 of 29 VINS had LPO Cruise Control Installed *prior* to Roll Coil/Air Bag labor op
    - 12 of 13 claims 10 miles or less (exception of 1 claim at 29 miles)
  - 2 of 29 VINS had LPO installed *after* Roll Coil/Air Bag labor op
  - No repeat dealers (all unique)
  - Accessory Cruze RPO RXZ Penetration of 7% according to PPC
- Accessory Install Procedure provided to engineering for review
- Accessory Install Procedure to be performed on-vehicle with engineering (coil and air bag ) to review procedure and identify any issues
- Contacting dealers with recent claims in an effort to understand issues/concerns with procedure

# RQ13-002

# GM

# 8/16/2013

# Q8A

# Driver Airbag Check - TIS-p

{ * }

{ * }


| Signature Block | | | | | Date: | Name: | Change Description: |
|---|---|---|---|---|---|---|---|
| Shift | | Team Leader | Group Leader | | | | |
| 1 | Sign | | | | | | |
| | Date | | | | | | |
| 2 | Sign | | | | | | |
| | Date | | | | | | |
| 3 | Sign | | | | | | |
| | Date | | | | | | |

RQ13-002

GM

8/16/2013

Q8B

2458853-AA Amphenol

| Distribution: | Author | Date |
|---|---|---|
| to: | S. Schulz | September 22, 2009 |
| cc: Herr Annecke<br>Herr Dullin<br>Herr Beck, Till<br>Herr Plappert<br>Herr Schmid<br>Herr Schuster<br>Herr Treanor | Approved by 05.10.09 i.A. i.A. | Order no. PA 09/099 |
| | Test object **Airbag AK2 Retainer** C252 14B002 XXX 2 **EP200400423** | |

Task

Qualifying test for **Design Verification** of Airbag retainers with AK2 interface

## 1. Summary

Presented were Airbag retainers AK2 C252 14B002 XXX 2, manually assembled in insulator rings of types AK2 codes I, II and III, for Design Verification. The retainers C252 14B002 X0X 2 and shorting clips were subjected to selected tests acc. to the qualifying matrix of Amphenol specification N50 252 0015 Rev.02.

The test samples meet the specified requirements of all test lots.

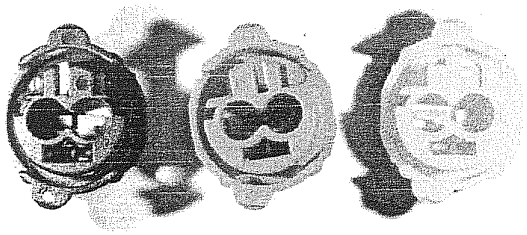
O.K.

## 2. Used documents

Working Committee Test Guideline of the German Automotive Industry. Edition1, April 1996
Specification Retainer AK2 Amphenol Tuchel Electronics N 50 252 0015 Rev.02
Drawings:
Retainer C252 14B002 X0X 2 Rev.02
Shorting clip N 02 072 0014 100
Shorting clip on strip N 02 072 0014 102
Insulator ring C252 H09 X0X E2

## 3. Test samples

46 Airbag AK_2 retainers, coding I, black: C252 14B002 101 2
46 Airbag AK_2 retainers, coding II, light green: C252 14B002 205 2
46 Airbag AK_2 retainers, coding III, yellow: C252 14B002 306 2
All test samples without date code, production location Heilbronn



## 4. Tests (Test groups)

- PG 0: Receiving inspection (electrical resistances $R_{D\ contact}$ and $R_{D\ bulk}$)
- PG 1: Dimensions
- PG 2: Surface analysis
- PG 5: Electrical characteristics
- PG 11: Mechanical characteristics (contact normal force, service life / mating cycles)
- PG 17: Dynamic stress (Vibration covered with temperature change)
- PG 19: Environmental simulation (Temperature shock, dry heat, damp heat cyclic)
- PG 21: Long term temperature storage

## 5. Results

### PG 0: Receiving inspection

| No. | Test | Requirement | Result | Remark |
|---|---|---|---|---|
| E 0.1 | Visual inspection<br>DIN IEC 512 P.2 | No mech. defects on housing; no corrosion or damage on contact surfaces; no crushes | No deviations | O.K. |
| E 0.2 | Shorting resistance in contact area of firing pellet<br>Test groups PG11 and PG19<br>DIN IEC 512 P.2 | $R_D$ <100 mΩ | min 45,76 mΩ<br>max 48,22 mΩ<br>avg 46,96 mΩ | O.K. |
| E 0.2 | Shorting resistance in contact area of firing pellet<br>Test groups PG 2, 5, 17, 21<br>DIN IEC 512 P.2 | $R_D$ <100 mΩ | min 40,26 mΩ<br>max 44,10 mΩ<br>avg 41,66 mΩ | OK. |
| E 0.2 | Path resistance (Bulk)<br><br>DIN IEC 512 P.2 | $R_B$ < 40 mΩ | min 37,01 mΩ<br>max 39,73 mΩ<br>avg 38,56 mΩ | O.K. |

### PG 1: Dimensions:

| No. | Test | Requirement | Result | Remark |
|---|---|---|---|---|
| E 0.1 | Visual inspection<br><br>DIN IEC 512 P.2 | No mech. defects on housing; no corrosion or damage on contact surfaces | No deviations | O.K. |
| E 1.1 | Dimensions | Dimensions conform to release drawing | Dim. within tolerances, see First Sample Test Report<br>Shorting clip 0065-02/08<br>Ins.ring I 0070-03/08<br>Ins.ring II 0071-03/08<br>Ins.ring III 0072-03/08 | O.K. |

## PG 2: Surface analysis of contacts:

Only contacts of Test groups PG 11-1 and PG 19:

| No. | Test | Requirement | Result | Remark |
|---|---|---|---|---|
| E 2.1.2 | Layer structure of shorting clip N 02 072 0011 102<br><br>Test groups PG 11-1 and PG19 | Area (1):<br><br>Ni > 5 µm | Ni thickness:<br><br>min 6,42 µm<br>max 7,67 µm<br>avg. 6,91 µm | <br><br><br><br>O.K. |

## PG 11-1: Mechanical characteristics / Service life (3 x 5 Test samples)

| No. | Test | Requirement | Result | Remark |
|---|---|---|---|---|
| E 0.1 | Visual inspection<br>15 test samples<br><br>DIN IEC 512 P.2 | No mech. defects on insulator ring; no corrosion or damage on contact surfaces | No deviations | O.K. |
| E 11.1 | Contact normal force | Determination of contact normal force in new state, deflection of clip in new state in firing pellet;<br>Specified: F > 40 cN | $F_N$: min 101 cN<br>max 128 cN<br>avg. 119 cN | <br><br><br>O.K. |
| | Life cycle test:<br>Operation of shorting clip | **20 x** mating and locking of an Airbag connector | Accomplished | O.K. |
| E 11.1 | Contact normal force | Determination of contact normal force<br><br>Specified: F > 40 cN | $F_N$: min 90 cN<br>max 102 cN<br>avg. 95 cN | <br><br><br>O.K. |
| E 0.2 | Shorting resistance in contact area of firing pellet<br><br>DIN IEC 512 P.2 | $R_D$ <= 100 mΩ | $R_D$: min 48,68 mΩ<br>max 52,52 mΩ<br>avg. 50,17 mΩ | <br><br><br>O.K. |

**PG 11-2: Mechanical characteristics** acc. to N50 252 0015 Rev.01

| | | | | |
|---|---|---|---|---|
| E 0.1 | Visual inspection<br>15 new test samples<br><br>DIN IEC 512 P.2 | No mech. defects on insulator ring; no corrosion or damage on contact surfaces | No deviations | O.K. |
| E 11.2 | Retention force of shorting clip in insulator ring | Determination of retention force of clip in insulator ring in new state at RT:<br>**F > 10 N** | $F_N$: min: 87,4 N<br>max: 106,7 N<br>avg. 98,6 N | O.K. |

| | | | | |
|---|---|---|---|---|
| E 0.1 | Visual inspection<br>15 new test samples<br><br>DIN IEC 512 P.2 | No mech. defects on insulator ring; no corrosion or damage on contact surfaces | No deviations | O.K. |
| E 11.3 | Retention force of insulator ring in ignitor carrier | Determination of retention force of retainer in ignitor carrier (Type L) in new state at room temperature:<br>**F > 20 N** | $F_N$: min 44,3 N<br>max 64,9 N<br>avg. 54,1 N | O.K. |

**PG 12: Electrical characteristics:**

| No. | Test | Requirement | Result | Remark |
|---|---|---|---|---|
| E 0.1 | Visual inspection<br><br>DIN IEC 512 P.2 | No mech. defects on insulator ring; no corrosion or damage on contact surfaces | No deviations | O.K. |
| E 1.1 | Derating<br><br>3 test samples | Current carrying capacity of shorting clip | Will be measured with other plating acc. to new specification | |
| | Dielectric strength<br><br>30 test samples from test group PG 19<br>DIN IEC 512-2 test 4a | No flash over at 1000 $V_{DC}$ to pins of firing pellet under connector position assurance | No flash over at 1000 $V_{DC}$ | O.K. |

PG 17: Dynamic stress acc. to N50 252 0015 Rev.01

3x5 test samples

| No. | Test | Requirement | Result | Remark |
|---|---|---|---|---|
| E 0.1 | Visual inspection<br>DIN IEC 512 P.2 | No mech. defects on insulator ring; no corrosion or damage on contact surfaces | No deviations | O.K. |
| E 0.2 | Contact resistance in contact area<br><br>DIN IEC 512 P.2 | $R_D$ <= 100 mΩ | min 40,735 mΩ<br>max 42,578 mΩ<br>avg. 41,687 mΩ | O.K. |
| E 11.1 | Contact normal force | Determination of contact normal force in new state, deflection of clip as mounted in firing pellet;<br>Specified: **F > 40 cN** | $F_N$: min 61,8 cN<br>max 91,7 cN<br>avg. 79,8 cN | O.K. |
| B 17.1 | Sinus oscillation<br>covered with temperature change acc. test group B19.2<br>DIN IEC 512-4, test 6d | Sinus oscillation<br>15...1000 Hz: **5 g**<br>acc. test group B17.1<br>max. temperature: 100°C<br>24 h per spatial axis | Accomplished at Amphenol Tuchel Electronics,<br>mated with Airbag_AK2 cable asemblies | O.K. |
| B 17.3 | Mechanical shocks | 30g, 6 ms<br>1000 shocks per axis and direction,<br>total: 6000 shocks | Accomplished at Amphenol Tuchel Electronics,<br>mated with Airbag_AK2 connectors | O.K. |
| E 0.2 | Contact resistance in contact area<br><br>DIN IEC 512 P.2 | $R_D$ <= 100 mΩ | min 42,67 mΩ<br>max 77,80 mΩ<br>avg. 47,14 mΩ | O.K. |
| E 11.1 | Contact normal force | Contact normal force after dynamic stress<br><br>**F > 40 cN** | $F_N$: min 40,7 cN<br>max 66,2 cN<br>avg. 50,3 cN | O.K. |
| E 0.1 | Visual inspection<br><br><br>DIN IEC 512 P.2 | No mech. defects on insulator ring; no corrosion or damage on contact surfaces | No deviations | O.K. |

**PG 19: Environmental simulation** acc. to Working Committee Test Guideline

(Group 1: 3 x 5 pcs. unmated, Group 2: 3 x 5 pcs. mated with AK2 connector)

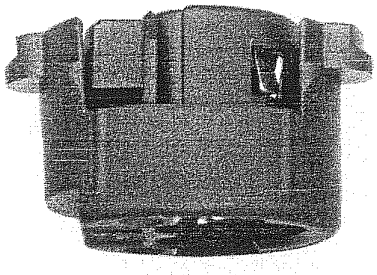
| No. | Test | Requirement | Result | Remark |
|---|---|---|---|---|
| E 0.1 | Visual inspection<br><br>DIN IEC 512 P.2 | No mech. defects on insulator ring; no corrosion or damage on contact surfaces | No deviations | O.K. |
| E 0.2 | Contact resistance in contact area<br>Group 1 and 2<br><br>DIN IEC 512 P.2 | $R_D$ <= 100 mΩ | min 45,76 mΩ<br>max 48,22 mΩ<br>avg. 46,96 mΩ | O.K. |
| | | Separation of Group 1 | Accomplished | O.K. |
| B19.1 | Rapid change of temperature<br><br>DIN IEC 60068-2-14, Na | $T_U$= -40°C, 15 minutes,<br>$T_O$=+90°C, 15 minutes<br>144 cycles<br>Duration: 3 days | Accomplished at AMPHENOL TUCHEL Electronics GmbH | O.K. |
| E 02 | Contact resistance in contact area<br>Group 2 only<br>DIN IEC 512 P.2 | $R_D$ <= 100 mΩ<br><br>Group 2 only | min 47,34 mΩ<br>max 52,04 mΩ<br>avg. 50,12 mΩ | O.K. |
| B19.3 | Dry heat<br><br>DIN EN 60068-2-2, Ba | Temperature: T= 90°C<br><br>Duration: 120 hrs. | Accomplished at AMPHENOL TUCHEL Electronics GmbH | O.K. |
| E 0.2 | Contact resistance in contact area<br>Group 2 only<br>DIN IEC 512 P.2 | RD <= 100 mΩ<br><br>Group 2 only | min 51,31 mΩ<br>max 60,05 mΩ<br>avg. 54,46 mΩ | O.K. |
| E 0.1 | Visual inspection<br><br>DIN IEC 512 P.2 | No mech. defects on insulator ring; no corrosion or damage on contact surfaces | No deviations | O.K. |
| B 19.5 | Damp heat, cyclic<br><br>DIN IEC 68068-2-30, Var. 2 | 95% rel. hum.<br>+25°C / +55°C<br>10 cycles<br>Duration: 10 days | Accomplished at AMPHENOL TUCHEL Electronics GmbH | O.K. |
| | | Mating with Group 1 | Accomplished | O.K. |
| E 0.1 | Visual inspection<br><br>DIN IEC 512 P.2 | No mech. defects on insulator ring; no corrosion or damage on contact surfaces | No deviations | O.K. |
| E 0.2 | Contact resistance in contact area<br>Group 1 and 2<br>DIN IEC 512 P.2 | RD <= 100 mΩ<br><br>Group 1 and 2,<br>after environmental simulation | Group 1:<br>min 45,92 mΩ<br>max 49,43 mΩ<br>avg. 47,52 mΩ<br>Group 2:<br>min 49,42 mΩ<br>max 62,20 mΩ<br>avg. 55,27 mΩ | O.K.<br><br>O.K. |

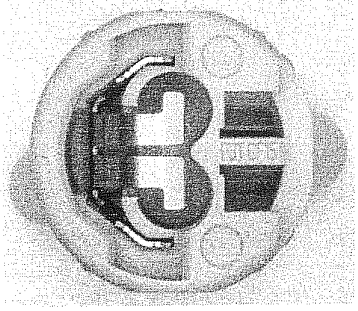
Continuation **PG 19: Environmental simualtion**

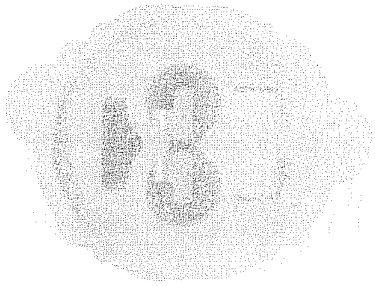
| No. | Test | Requirement | Result | Remark |
|---|---|---|---|---|
| E 0.3 | Dielectric strength<br>at 1000 $V_{DC}$ | No flash over at 1000 $V_{DC}$ | No flash over | O.K. |
| E 11.1 | Contact normal force | Contact normal force<br>Group 1 and 2,<br>after environmental simulation<br><br>F > 40 cN | Group 1<br>min 100 cN<br>max 129cN<br>avg. 113 cN<br><br>Group 2<br>min 46 cN<br>max 71 cN<br>avg. 55 cN | O. K.<br><br>O.K. |

**PG 21 Long term temperature storage**

| No. | Test | Requirement | Result | Remark |
|---|---|---|---|---|
| E 0.1 | Visual inspection<br><br>DIN IEC 512 P.2 | No mech. defects on insulator ring; no corrosion or damage on contact surfaces | No deviations | O.K. |
| B21.1 | Dry heat<br><br>DIN EN 60068-2-2, Ba | Long term temperature storage<br>T = 120°C<br>Duration: 1000 hrs. | Accomplished at AMPHENOL TUCHEL Electronics GmbH | O.K. |
| | Storage | Storage at room temperature<br><br>Duration: 7 days | Accomplished at AMPHENOL TUCHEL Electronics GmbH | O.K. |
| E 0.1 | Visual inspection<br><br>DIN IEC 512 P.2 | No mech. defects on insulator ring; no corrosion or damage on contact surfaces | No deviations, no cracks, no delaminations, see photographs below: | O.K. |







S. Schulz
QA Laboratory

RQ13-002

GM

8/16/2013

Q8B

601554

Global Quality Tracking System

Problem Reporting and Resolution

PRR Number 601554

Issuing Plant LORDSTOWN ASSEMBLY

Status Closed

| | | | |
|---|---|---|---|
| Supplier: | 823761820<br>INDUSTRIAS IRVIN DE MEXICO SA DE CV<br>KM 7 CARR PRESA LA AMISTAD<br>COL PARQUE INDUSTRIAL LA AMISTAD<br>CIUDAD ACUNA,CZ,26238,MX | Contact: | Hector Falcon |
| | | Phone Number: | 830 703 7253 |
| | | Title: | cust serv quality |
| | | Email Address: | hecto.falcon@takata.com |

| | | | |
|---|---|---|---|
| Customer: | Mauro R Jadue | Issue Date: | 18-Jun-2012 |
| Contact No: | +1 330 553 6062 | Time: | 09:44:51 AM |
| Internal Destination: | | PRR Type: | Quality |
| Phase: | Production | Primary N/C: | Electrical |
| Station: | Not Applicable | Secondary N/C: | Inoperative |
| Supplier Initiated: | N | Vehicle/PWT/Component Impact: | Not Applicable |
| Direct Run Rate: | N | Plant Impact: | Not Applicable |
| Email Address for Notification: | mauro.jadue@gm.com | Major Disruption: | Plant Disruption |
| | | Initiator Role Code: | 1LD0MJ |
| Ship From Duns#: | | Internal Indicator: | false |
| Ship From Duns Name: | | Approver Role Code: | 1LD0MJ |
| | | Repeated PRR Number Issued: | N |
| DDW / Read Across Required : | N | | |

Supplier Contacted: N

Person Contacted Reason Supplier Not Contacted

Problem Information

Material Identification

| Location | Line Item | Part Number | DLS/PLS | Part Descripti | Misc 1 | Misc 2 | SID | Carrier | PRTS | Date Shipp | Quantity | Quanti ty | Quanti ty N/C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| Code | Date | | | on | | | | Code | | ed | Suspected | Checked | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01LD | 18-JUN-2012 | 95214734 | | AIRBAG ASM-STRG WHL | | | | | | 18-JUN-2012 | 1 | 1 | 1 |

Problem Description

Driver air bag has damaged internal shorting bar.
This causes DTC code to be set (B0012 OE)
GM Lordstown requests containment and a breakpoint of certified material to be provided to our ESEP provider, PTI. The

Note: The latest revised Drill Deep & Wide (DDW) found on GM Supplypower (Quality folder=> Current Quality) must be

Please provide federal express tracking account number for return shipment of suspect parts.

"Please update this PRR today with the conforming material date which should be no later than within 48 hrs of the origi
date of this PRR. If you cannot meet this date please email the originator of this PRR with an explanation."

Dan Heck
PTI QCS

Quality Liaison - GM Lordstown
Cell – 812-447-1130
Cell – 330-353-6899 off shift
Nextel - 136*53468*1
Fax - 330-824-7576
E-Mail - dheck@ptiqcs.com

Initial Response

Material Disposition

| In Plant: Not Applicable | In Transit: Not Applicable |
|---|---|

Compliance Measurement Method

1.-Communicate issue to all involved personel (FRancisco fuentes)
2.-Create and post a quality alert at process area (Francisco Fuentes)
3.-Sort material in warehosue and house. Certified material will be identified with a green dot 1/4 inch diameter placed ov
Takata initiated production with certifed inflators - upon process improvements at inflator mfg facility.
Takata materials is working with Gm to expedite certified material. Upon priorities provided by the team.

Containment Action

1.-Communicate issue to all involved personel (FRancisco fuentes)
2.-Create and post a quality alert at process area (Francisco Fuentes)
3.-Sort material in warehosue and house. Certified material will be identified with a green dot 1/4 inch diameter placed ov
Takata initiated production with certifed inflators - upon process improvements at inflator mfg facility.
Takata materials is working with Gm to expedite certified material. Upon priorities provided by the team.

Conforming Material Date: 20-Jun-2012

Problem Identification

| | |
|---|---|
| Caused By Sub Tier Supplier : N | |
| GM Directed Buy Indicator : N | Supplier's Duns Number : |
| GM Component Part Number : | Supplier Part Description : |

Root Cause

Supplier: Shorting clip installation into inflator results in dmaged or misaligned placement of shorting bar.
Escape: On 6/14/2012 damage to underside of shorting bars were observed in returned parts that correlated with the a
Primary stage shorting clip installation tool does not match secondary shorting clip installation tool dimensionally (0.3mm
Escape: Shortingclip installation tooling not covered by normal equipment preventative maintenance plan. As a result toc
Overall system interface and stack-up between multiple vendor supplied components do not provide adequate clearanc

| | |
|---|---|
| QSB Status: CF | Certified - Expires : 15-Dec-2013 |
| QSB Failure Mode : | |

| | | |
|---|---|---|
| Failure Cause - Prevent: Other - Please Specify Details in Root Cause Memo Field | Failure Cause - Predict: Other - Please Specify Details in Root Cause Memo Field | Failure Cause - Protect: Other - Please Specify Details in Root Cause Memo Field |

Corrective Action

1.-Redesign improved shorting clip insertion tool according to shorting clip supplier's recommendation to guarantee corre
2.-Include short clip insertion tooling preventive maintenence plan to inspect condition and dimensional validation of the t
3.-Implement next generation Molex body side connector to improve robustness of AK2 system and shorting bar retracti
4.-Investigate removing shorting bar from design of record to eliminate chance of low airbag resistance.

| FMEA Changes Complete Date: 29-Jun-2012 | Process Control Plan Changes Complete Date: 29-Jun-2012 |
|---|---|
| Corrective Action Implementation Date: 12-Jul-2012 | |

Implementation

| Implementation |
|---|
| Install redesigned shorting clip installation tool from D5-1 above on all PSDI-Xlines 7/12/2012<br>Update tooling preventative maintenence schedule and QA documents to include shorting clip installation tools per D5-2<br>Implement next generation molex body side connector per D5-3 above. MY13 breakpoint |
| Evaluate |
| Validation of actions upon complete of actions. |
| Institutionalized |
| Communicate global read across to all Takata inflator manufacturing locations and product lines. |
| DDW/Read Across Completed : N |
| DDW Comment |
| |

Cost Recovery Information

Cost Recovery Detail

| Location Code | Currency | CR Line Item Create Date | Department To Credit | Finance Recovery | Man Hours Requested | Downtime Minutes | Number of Units Impacted | Additional Costs | Negotiated Total Cost | Total Cost Requested | Approved By |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 01LD | USD | 19-JUL-2012 | 01LDE1 | | 2840 | 0 | 1 | 0 | 0 | 156200 | |

Reason for Cost Recovery

Recovery hours per attached excel file.

Cost Recovery Status

Response Pending

Supplier Response to Cost Recovery

Customer Comments

Status : Closed

Approval Date : 24-Jul-2012

Approver Name : tzl576 - Mauro R Jadue

Comments

Supplier corrected tooling. Confirmed certified material received.
24 July 2012 Mauro Jadue

---

Last updated on 27-Jun-13

RQ13-002

GM

8/16/2013

Q8B

602022

Global Quality Tracking System

# Problem Reporting and Resolution

PRR Number 602022

Issuing Plant ORION ASSEMBLY

Status Closed

| | | | |
|---|---|---|---|
| Supplier: | 823761820<br>INDUSTRIAS IRVIN DE MEXICO SA DE CV<br>KM 7 CARR PRESA LA AMISTAD<br>COL PARQUE INDUSTRIAL LA AMISTAD<br>CIUDAD ACUNA,CZ,26238,MX | Contact:<br>Phone Number:<br>Title:<br>Email Address: | Hector Falcon<br>8307037170<br>Quality eng<br>hector.falcon@takata.com |

| | | | |
|---|---|---|---|
| Customer: | Mark E Wenzlick | Issue Date: | 19-Jun-2012 |
| Contact No: | 248-377-5272 | Time: | 12:13:03 PM |
| Internal Destination: | | PRR Type: | Customer Satisfaction |
| Phase: | Production | Primary N/C: | Miscellaneous |
| Station: | Production Line | Secondary N/C: | Other |
| Supplier Initiated: | N | Vehicle/PWT/Component Impact: | Not Applicable |
| Direct Run Rate: | N | Plant Impact: | Not Applicable |
| Email Address for Notification: | | Major Disruption: | Not Applicable |
| | | Initiator Role Code: | 1OR0MW |
| Ship From Duns#: | | Internal Indicator: | false |
| Ship From Duns Name: | | Approver Role Code: | 1OR0MW |
| | | Repeated PRR Number Issued: | N |
| DDW / Read Across Required : | N | | |

Supplier Contacted: N

Person Contacted Reason Supplier Not Contacted

Problem Information

Material Identification

| Location | Line Item | Part Number | DLS/PLS | Part Descripti | Misc 1 | Misc 2 | SID | Carrier | PRTS | Date Shipp | Quantity | Quanti ty | Quanti ty N/C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| Code | Date | | | on | | | | Code | | ed | Suspected | Checked | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01OR | 19-JUN-2012 | 95181997 | | MODULE ASM-AIRBAG STRG WHL <USE 1A2R 006 | | | | | | 19-JUN-2012 | 1 | 1 | 1 |
| 01OR | 19-JUN-2012 | 20986955 | | MODULE ASM-INFL RST STRG WHL | | | | | | 19-JUN-2012 | 1 | 1 | 1 |
| 01OR | 19-JUN-2012 | 20986956 | | MODULE ASM-INFL RST STRG WHL | | | | | | 19-JUN-2012 | 1 | 1 | 1 |

Problem Description

This customer satisfaction PRR is to cover the cost related to all of Orion Assemblies activities for PRR 601554 w ritten b

The cost recovery w ill be updated aw hen the inspection and repair process is completed.

Total cost of yard sort, remove and replace aribags is completed.

Initial Response

| Material Disposition | |
|---|---|
| In Plant: Not Applicable | In Transit: Not Applicable |

Compliance Measurement Method

1.-Communicate issue to all involved personel (FRancisco fuentes)
2.-Create and post a quality alert at process area (Francisco Fuentes)
3.-Sort material in w arehosue and house. Certified material w ill be identified w ith a green dot 1/8 inch diameter placed ov
Takata initiated production w ith certifed inflators - upon process improvements at inflator mfg facility.
Takata materials is w orking w ith Gm to expedite certified material. Upon priorities provided by the team.

Containment Action

1.-Communicate issue to all involved personel (FRancisco fuentes)
2.-Create and post a quality alert at process area (Francisco Fuentes)
3.-Sort material in warehosue and house. Certified material will be identified with a green dot 1/4 inch diameter placed ov
Takata initiated production with certifed inflators - upon process improvements at inflator mfg facility.
Takata materials is working with Gm to expedite certified material. Upon priorities provided by the team.

Conforming Material Date: 21-Jun-2012

Problem Identification

| | |
|---|---|
| Caused By Sub Tier Supplier : N | |
| GM Directed Buy Indicator : N | Supplier's Duns Number : |
| GM Component Part Number : | Supplier Part Description : |

Root Cause

Supplier: Shorting clip installation into inflator results in dmaged or misaligned placement of shorting bar.
Escape: On 6/14/2012 damage to underside of shorting bars were observed in returned parts that correlated with the a
Primary stage shorting clip installation tool does not match secondary shorting clip installation tool dimensionally (0.3mm
Escape: Shortingclip installation tooling not covered by normal equipment preventative maintenance plan. As a result toc
Overall system interface and stack-up between multiple vendor supplied components do not provide adequate clearanc

| | |
|---|---|
| QSB Status: CF | Certified - Expires : 15-Dec-2013 |
| QSB Failure Mode : | |

| | | |
|---|---|---|
| Failure Cause - Prevent: Other - Please Specify Details in Root Cause Memo Field | Failure Cause - Predict: Other - Please Specify Details in Root Cause Memo Field | Failure Cause - Protect: Other - Please Specify Details in Root Cause Memo Field |

Corrective Action

1.-Redesign improved shorting clip insertion tool according to shorting clip supplier's recommendation to guarantee corre
2.-Include short clip insertion tooling preventive maintenence plan to inspect condition and dimensional validation of the t
3.-Implement next generation Molex body side connector to improve robustness of AK2 system and shorting bar retracti
4.-Investigate removing shorting bar from design of record to eliminate chance of low airbag resistance.

| FMEA Changes Complete Date: 29-Jun-2012 | Process Control Plan Changes Complete Date: 29-Jun-2012 |
|---|---|
| Corrective Action Implementation Date: 12-Jul-2012 | |

Implementation

| Implementation |
|---|
| Install redesigned shorting clip installation tool from D5-1 above on all PSDI-Xlines 7/12/2012<br>Update tooling preventative maintenence schedule and QA documents to include shorting clip installation tools per D5-2<br>Implement next generation molex body side connector per D5-3 above. MY13 breakpoint |
| Evaluate |
| Validation of actions upon complete of actions. |
| Institutionalized |
| Communicate global read across to all Takata inflator manufacturing locations and product lines. |
| DDW/Read Across Completed : N |
| DDW Comment |
| |

Cost Recovery Information

Cost Recovery Detail

| Location Code | Currency | CR Line Item Create Date | Department To Credit | Finance Recovery | Man Hours Requested | Downtime Minutes | Number of Units Impacted | Additional Costs | Negotiated Total Cost | Total Cost Requested | Approved By |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 01OR | USD | 16-JUL-2012 | | | 0 | 0 | 0 | 38676 | 0 | 38676 | |

Reason for Cost Recovery

Problem Solving_____ $0
Event Management_____ $0
Dow ntime_____ $0
In-plant w ork by GM____ $9,350
Shipping yard_____ $29,326
External support_____ $0
Misc_____ $0
Explanation for misc.:
Total_____ $38,676

Cost break dow n

$ 12,856 AWC yard cost
$ 16,470 Rousch inspection and rew ork in the yard
40 Hours 2 QEs monitoring the w ork
50 Hours repair of vehicles in the plant
80 Hours 2 operators do line inspection

Cost Recovery Status

Approved

Supplier Response to Cost Recovery

Customer Comments

Status : Closed

Approval Date :

Approver Name : -

Comments

Last updated on 27-Jun-13

RQ13-002

GM

8/16/2013

Q8B

8D - 2012 GM DAB Inflator with marks on shorting bar 7-20-12

# G8D Report

| Title | Date Opened | Last Updated |
|---|---|---|
| 2012 GM DAB Airbag Light On – Low Resistance | 06/15/2012 | 07/20/12 |

| Product/Process Information | Organization Information |
|---|---|
| Inflator: TK PSDI-X PN 2448636-AB<br>Shorting clip: Amphenol PN 2458853-AA<br>MIO: Production line F. | TKH (North America) / MIO (Monclova Inflators Operation) |

**DØ Symptom(s)**

During vehicle assembly process, line operators at Lordstown identified intermittent electrical connection with the primary (code 2, stage 1). Vehicle found with fault code (low resistance stage 1 – primary) resulting in an airbag light on.

| DØ Emergency Response Action(s) | % Effective | Date Implemented |
|---|---|---|
| TKH-MIO: Validate assembly process controls to guarantee good parts for customer. | 100 | 06/15/12 |
| TKH-MIO: Validate all stock of Inflators to assure no marks on shorting bar. | 100 | 06/15/12 |

**D1 Team**

TAKATA: Don Sztaba, Tim Kmiec, Will Chavez, Mike Done, Tony Rivera, Bob Phillion, Jeff Deevey, Carlos Iruegas, Mario Ramos, Jesus Flores, Rodolfo Rodriguez, Luis Briones, Guillermo Apud, Jaime Villarreal, Dagoberto Gutierrez, Luis Dominguez, Rodolfo Gaytan, David Villarreal, Omar Gaytan, Francisco Contreras, Jack Vaughn

GM: Lisa Amin, Karen May, Pradeep Singh, Phil Stasevich, Jay Kelly, George Helou, Steve Drop

Molex: Dave Koehler

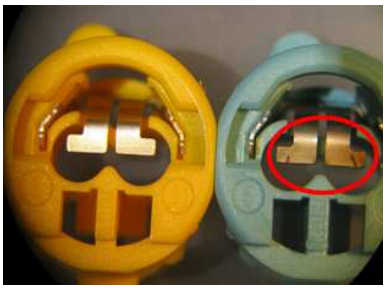
FCI: Mike Matusik, Terry Herfurth

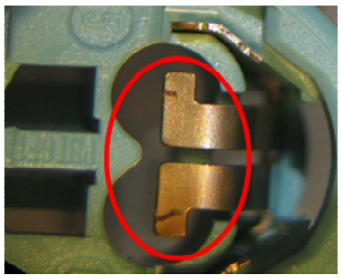
**D2 Problem**

Problem Statement:

On 06/12/12 there were 15 consecutive GM driver airbag modules at Lordstown plant with electrical intermittence due to short circuit condition between inflator initiator pin and shorting bar on the primary stage.

| D3 Interim Containment Action(s) | % Effective | Date Implemented |
|---|---|---|
| 1. RED-X team was assembled at TKH lead by Pradeep Singh to evaluate BOB/WOW. The team worked with BOB/WOW samples from Lordstown and Orion. Investigation into the body side connector / shorting clip / the team concluded the shorting clip (code2) was the RED-X. | 100 | 06/14/12 |
| 2. TKH MIO - Validate no marks on Shorting bar during assembly process (10 pieces each hour) | 100 | 06/15/12 |
| 3. TKH MIO – Replaced the primary stage installation tool with a revised tool matching the secondary stage dimensional and design intent. | 100 | 06/16/12 |
| 4. TKH MIO - Validate shorting bar retraction reference dimension (>2.50mm) between shorting clip base and shorting clip bar when shorting clip is placed on tool. (1 at beginning each shift / 1 at change over) | 100 | 06/16/12 |
| 5. TKH Acuna – Raw material 100% sort, insert connector, press for 15sec and verify resistance value spec 1.7 – 2.3 ohms, each inflator is marked with a blue line. | 100 | 06/18/12 |
| 6. TKH Acuna – In line verification 100% - no connector only probes and resistance checks range 1.7 to 2.3 ohms – a green dot is places on protective film (emblem) on top of cover. | 100 | 06/18/12 |
| 7. TKH Acuna – Finished goods off line random audit 10% - same process as raw material sort activity, a number 2 is marked on retainer side upon inspection. | 100 | 06/18/12 |
| 8. Inventory produced from April 18th to May 23rd was reviewed for witness marks on shorting bar. No damage or marks seen on shorting bars. | 100 | 06/21/12 |





| | | |
|---|---|---|
| **D4 Root Cause(s)** | | **% Contribution** 6/27 / 7/17 |
| 1. One or more incoming components or sub-assemblies was not to print or specification<br>Verification: All materials, components verified and within specifications. | | **0%** / **0%*** |
| 2. Shorting clip installation into inflator results in damaged or misaligned placement of shorting bar.<br>Escape: On 06/14/12 damage to underside of shorting bars were observed in returned parts that correlated with the Airbag Light on condition. Examination of the manufacturing process found that shorting bar was not fully retracted during insertion process resulting in interference/contact between initiator pins and shorting bar. Additional comparisons were made to secondary stage (no reported issues) and a 0.3 mm shorter difference in tab length was detected in the insertion tool itself. | | **40%** / **0%** |
| 3. Primary stage shorting clip installation tool does not match secondary shorting clip installation tool dimensionally (0.3 mm difference in tab length).<br>Escape: On or approximately May 25th, the primary shorting clip installation tooling was repaired by plant maintenance changing the effect work point of the tool. This event was not covered by normal equipment preventative maintenance plan. As a result tooling validation (dimensional/visual inspection) not defined at preventive maintenance or at QA assurance routines. | | **20%** / **60%** |
| 4. Overall system interface and stack-up between multiple vendor supplied components do not provide adequate clearance in all combinations (Molex, FCI, Amphenol) between the shorting bar and initiator pins when the body side connectors are installed in vehicle position.<br>* awaiting measurement data from Molex and capability study of electrical connection. | | **40%** / **40%*** |
| **D5 Chosen Permanent Corrective Action(s)** | | **% Effective** 6/27 / 7/17 |
| 1. N/A | | **-** / **-** |
| 2. Redesign improved shorting clip insertion tool according to shorting clip supplier's recommendation to guarantee correct shorting bar retraction and no damage during installation. | | **40%** / **100%** |
| 3. Include short clip insertion tooling on the tooling preventative maintenance plan to inspect condition and dimensional validation of the tool. Frequency to define tool life will be confirmed by tooling lay out every 15 days. Include on QA check sheet dimensional validation for shorting bar retraction distance (one piece) and no marks condition on shorting bar (5 pieces). (Beginning of shift and change over). | | |
| A) To keep shorting clip insertion tool, according to print the following actions will be taken:<br>*Define special dimensions on tool.<br>*Develop procedure.<br>*Make shorting clip insertion tool spare parts. | | **30%** / **100%** |
| B) *Implement next generation Molex body side connector to improve robustness of AK2 system and shorting bar retraction by the CPA. | | **30%** / **30%** |
| 4. Investigate removing shorting bar from design of record to eliminate chance of low airbag resistance.<br>Update: On QRDCP meeting on Wed 27th, GM agreed to re-visit the possibility of removing the shorting bar feature from the shorting clip. The decision will come from GM Electrical team, the Safety team does support moving in this direction. | | **100%** / **100%** |

| D6 Implemented Permanent Corrective Action(s) | Date Implemented |
|---|---|
| 1. N/A | N/A |
| 2. Install redesigned shorting clip installation tool from D5-2 above on all PSDI-X lines. Based upon the FCI recommended insertion tool design (5.4 +/- 0.2 mm critical dimension), the tool was tested and found to be capable for inserting the shorting clip with damage. | Complete |
| 3. Update tooling preventative maintenance schedule and QA documents to include shorting clip installation tools per D5-3 above. | Complete |
| 3A) Implement new procedure to validate specific insertion tool dimensions before start of production. | Complete |
| 4 Implement next generation Molex body side connector per D5-3 above. | MY13 Breakpoint |

| D7 Prevent Actions | Date Implemented |
|---|---|
| 1. Update D/PFMEA and PQCT to include the shorting clip insertion failure mode. | Complete |
| 2. Communicate global read across to all Takata inflator manufacturing locations and product lines. A meeting was held with Takata Germany to inform and assure this problem will not happen. Meeting held on 7/6. | 07/20/12 |
| 3. Implement layered audits in order to assure all actions have been completed. | Completed |

| D7 Systemic Prevent Recommendations | Responsibility |
|---|---|
| 1. Specify OEM approved and validated connector and shorting clip combinations to reduce variability. | GM |
| 2. Utilize shorting clip supplier approved installation tools and/or tooling drawings for future programs and verify again when supplier changes occur. | TAKATA |

| D8 Team and Individual Recognition | Date Closed | Reported By |
|---|---|---|

RQ13-002

GM

8/16/2013

Q8B

Public ER-0522-031

# Potential Failure Mode And Effects Analysis (Design FMEA)
# ER-0522 Rev 03 DFMEA PSDI-X Inflator Family with AIB

Eight Pages Submitted To The Office Of Chief Counsel With A Request For Confidential Treatment

# RQ13-002

# GM

# 8/16/2013

# Q8B

# Public PFMEA Linea F SU GM DELTA

Confidential Excel Workbook Submitted To The Office Of Chief Counsel With A Request For Confidential Treatment

RQ13-002

GM

8/16/2013

Q8C

2012 Camaro, Cruze, Verano, Sonic airbag connector - 15 Aug 13 FPERC

# *Shorting Bar within the Driver's Airbag Connector*

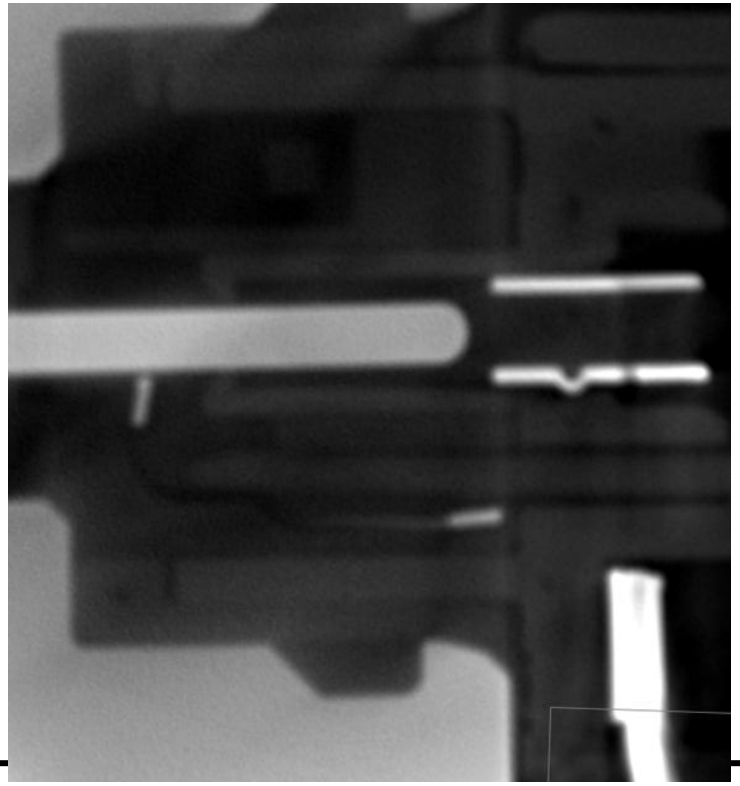
## Model Year: 2012 Cruze, Verano, Camaro, and Sonic
## 8,023 vehicles

ETQ N120261
RQ13002

**Condition:** Some 2012 Cruze, Verano, Camaro, and Sonic vehicles have a driver's side airbag connector shorting bar that may have been damaged during assembly of the airbag.

**Effect of the Condition:** A vehicle in this condition may set diagnostic trouble code B0012 (primary stage inflator) or B0013 (secondary stage inflator). The Sensing and Diagnostic Module (SDM) will request the instrument cluster to illuminate the AIRBAG indicator. If a crash event occurs the the SDM will attempt deployment, but, if the shorting bar is in contact with the airbag terminals, the airbag will not deploy.

**Technical Root Cause:** During the retainer seating process the shorting bars were not fully retracted to prevent contact with the airbag terminals.

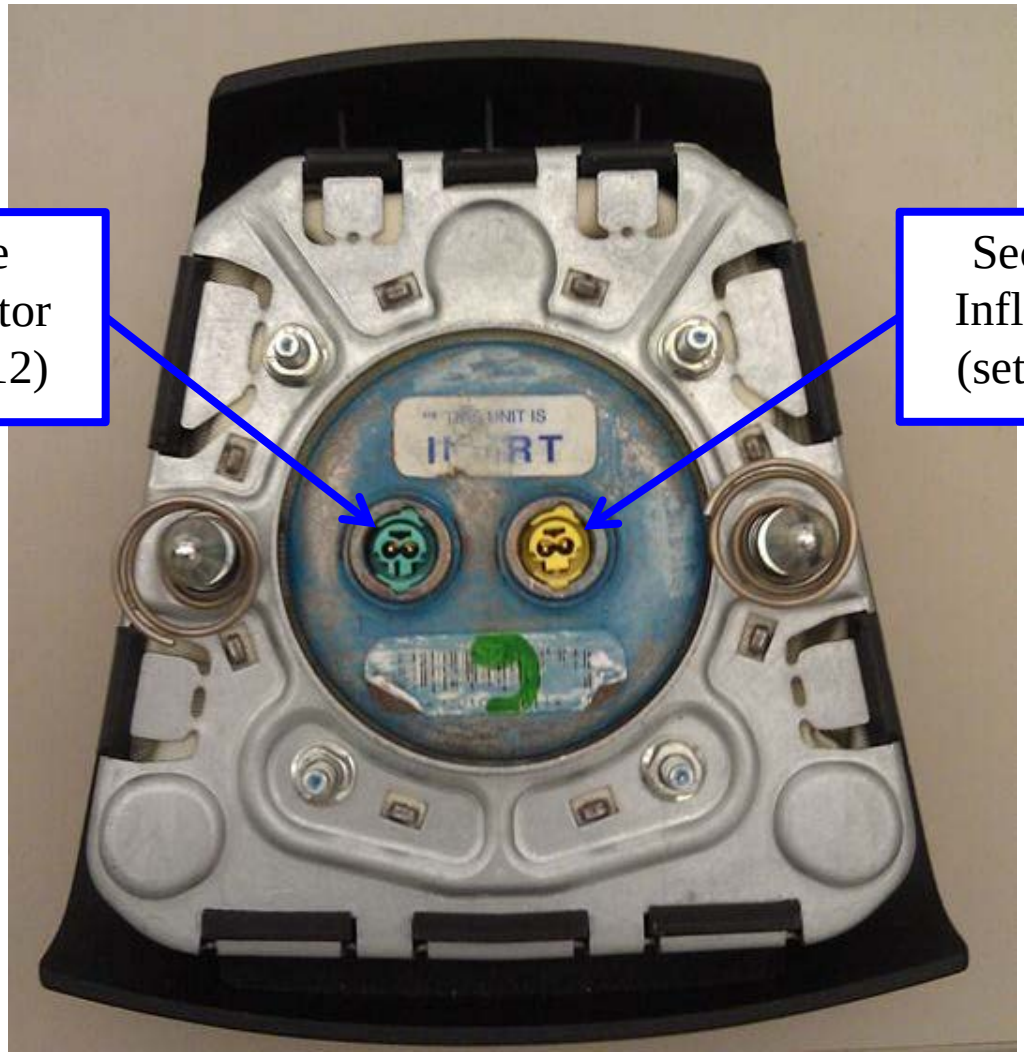


**Responsibility:** Takata

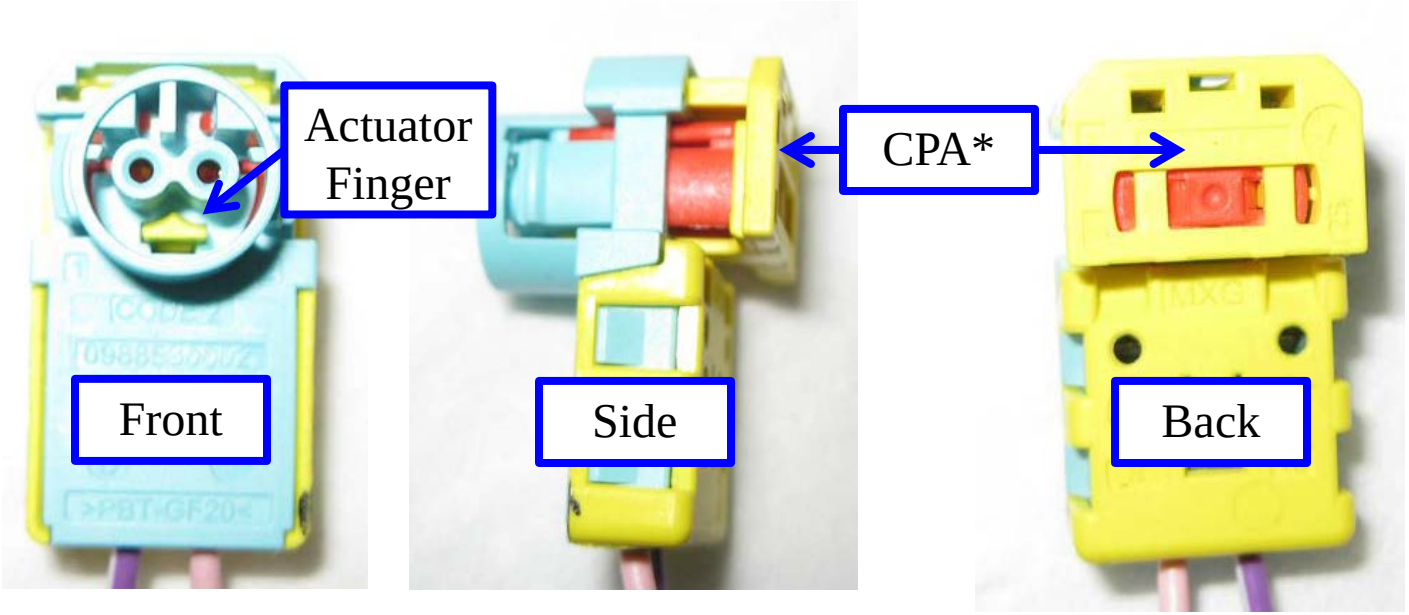
**Potential Field Action Category:** Safety

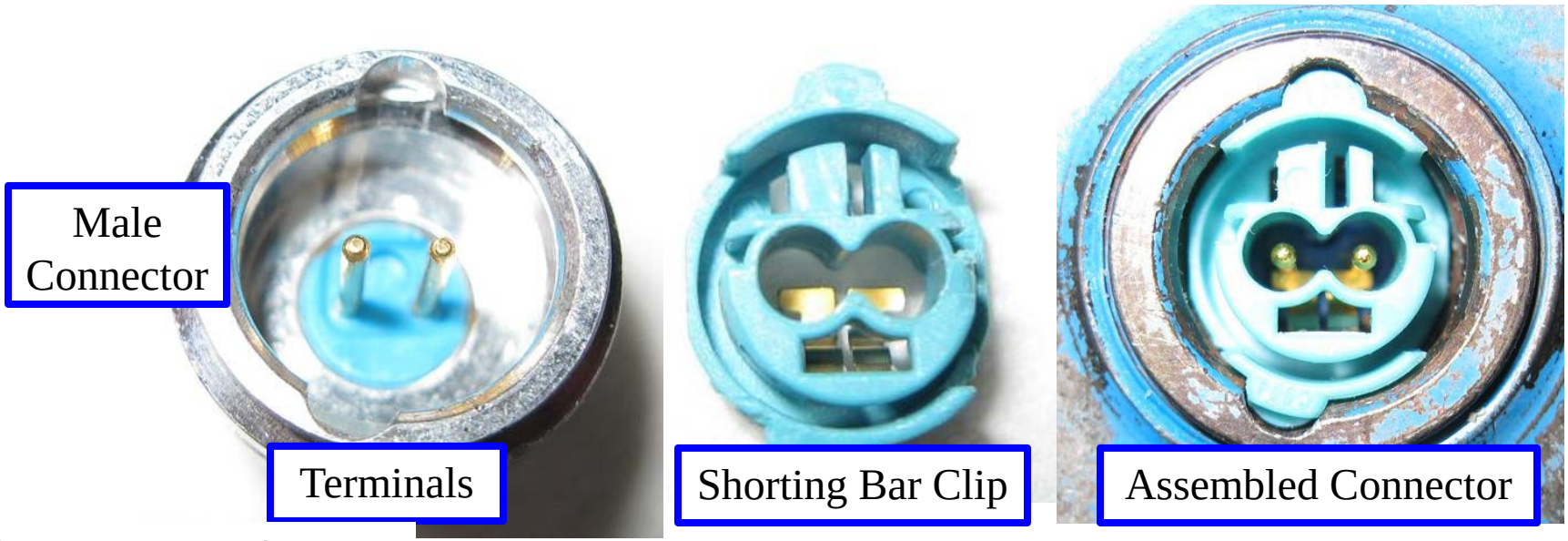
**Potential Field Remedy:** Replace the clockspring.

# *Primary and Secondary Stage Inflator Connectors*



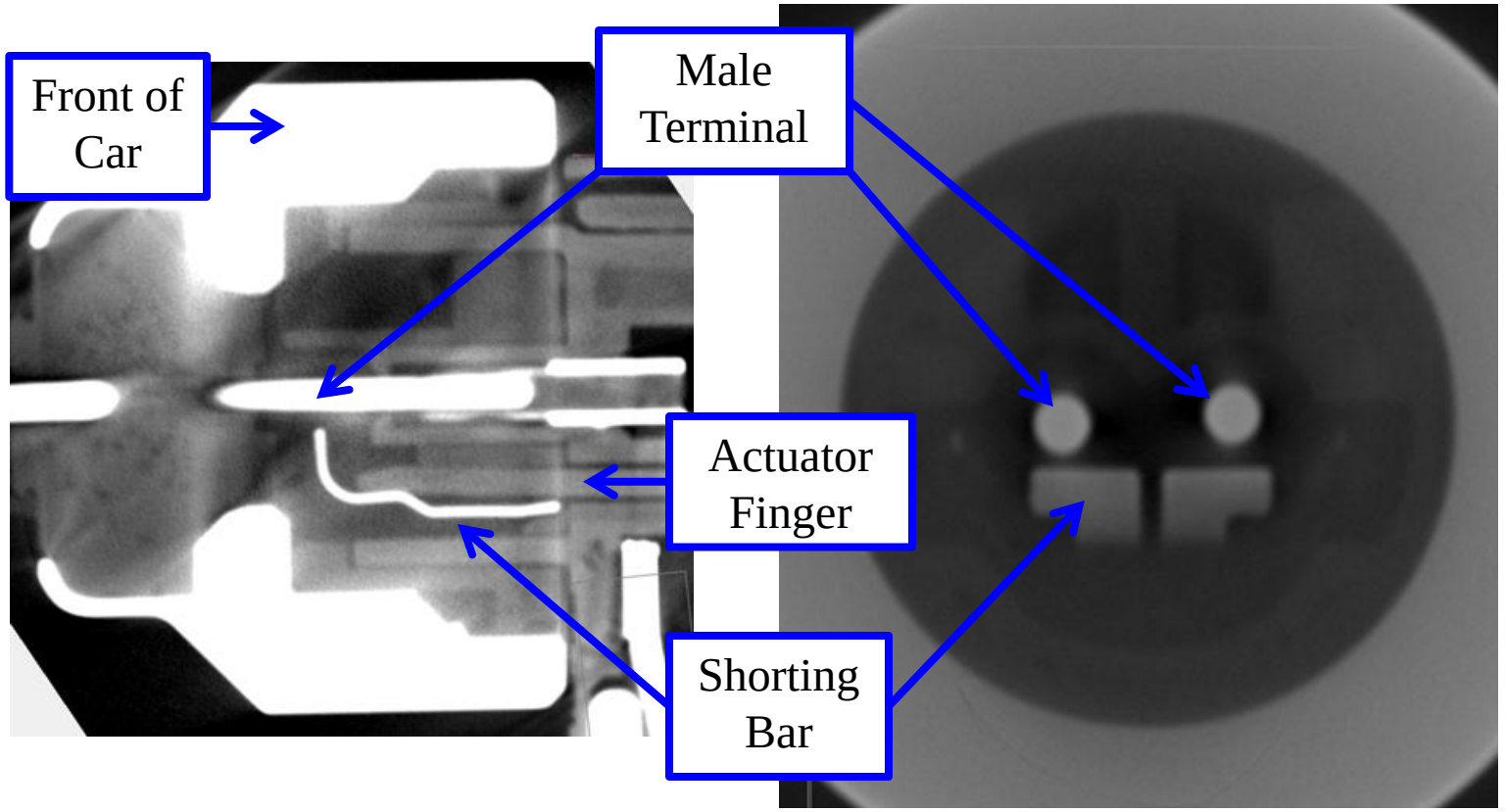
# 2012 Female and Male Connectors




*Connector Position Assurance

# *X-Rays of Assembled Male and Female Connector Shorting Bar Retracted*

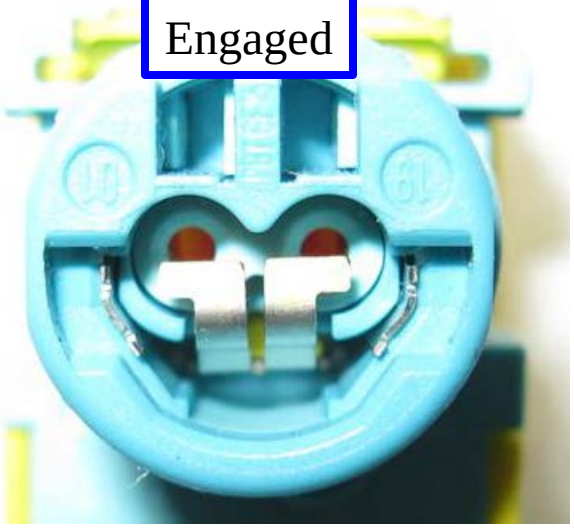


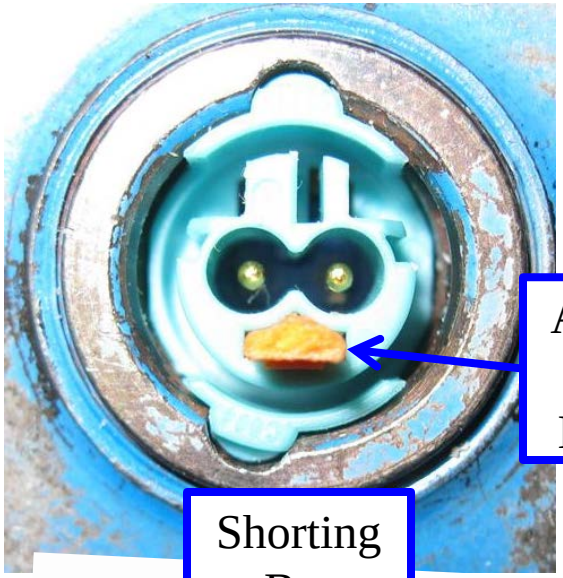
# *Male Connector - Retracting the Shorting Bar*

Front of Male Connector

Shorting Bar Engaged

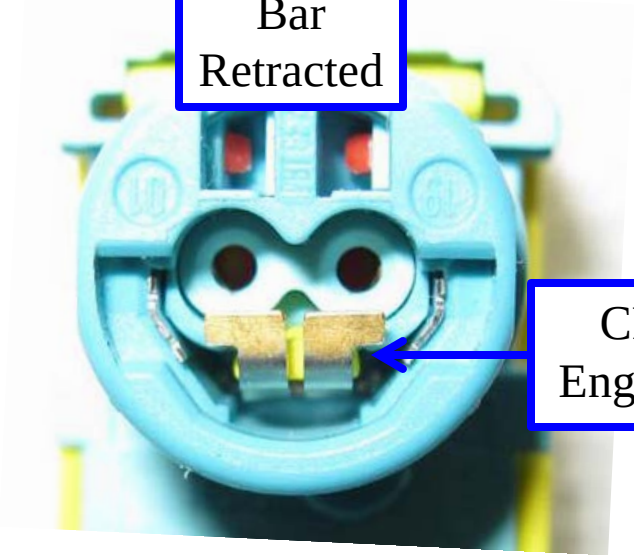
Back of Shorting Bar Clip





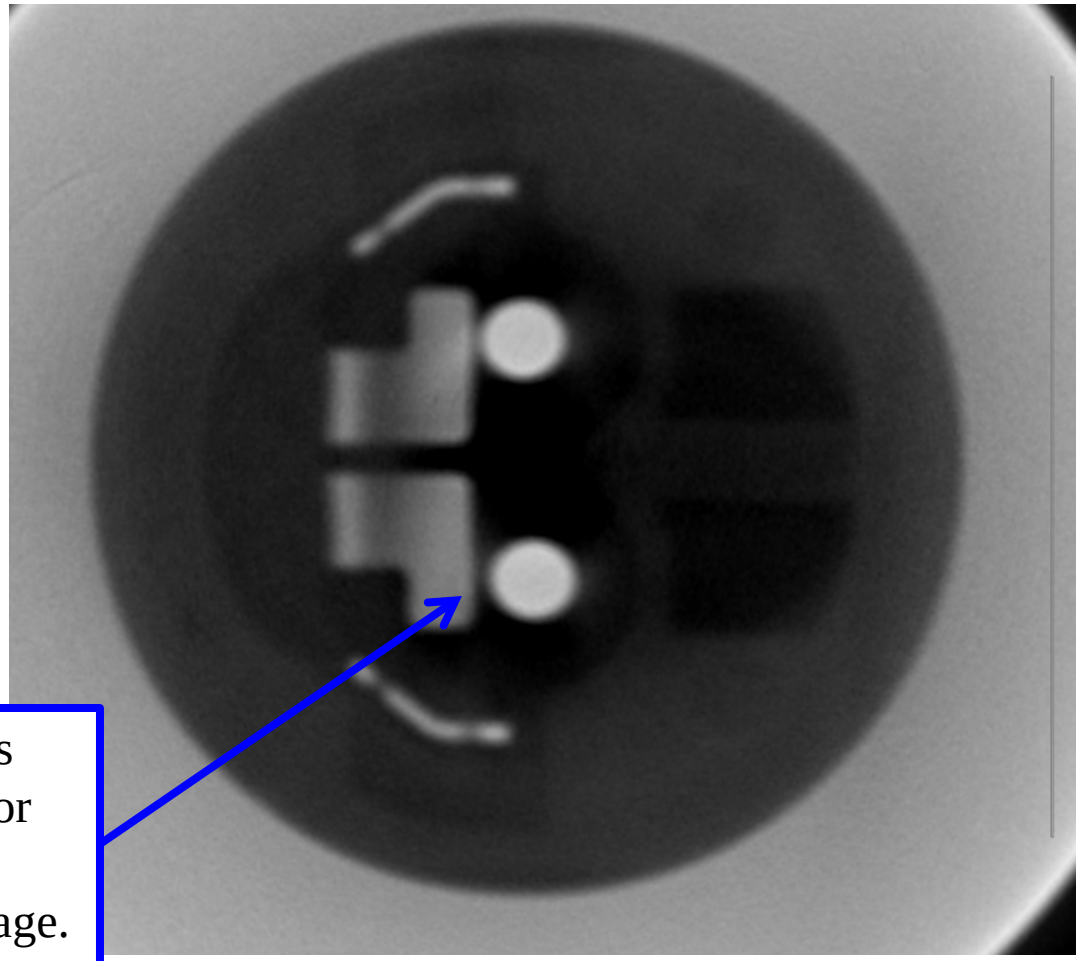
Actuator Finger Inserted

Shorting Bar Retracted



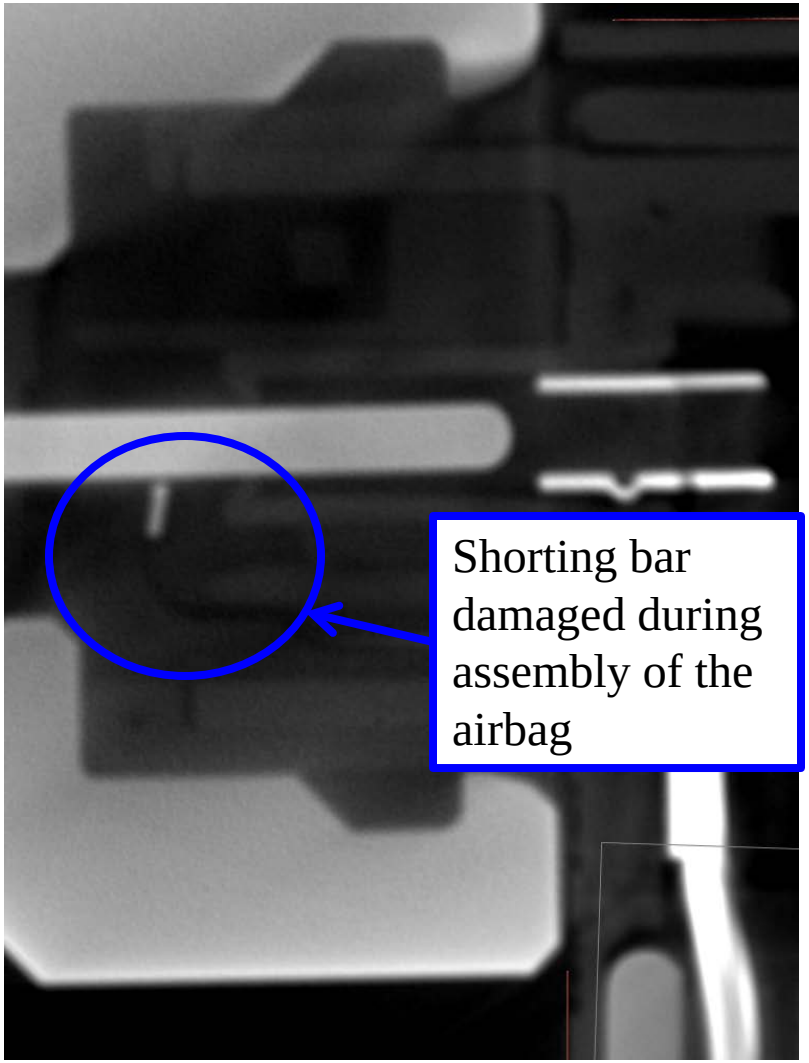
CPA Engaged

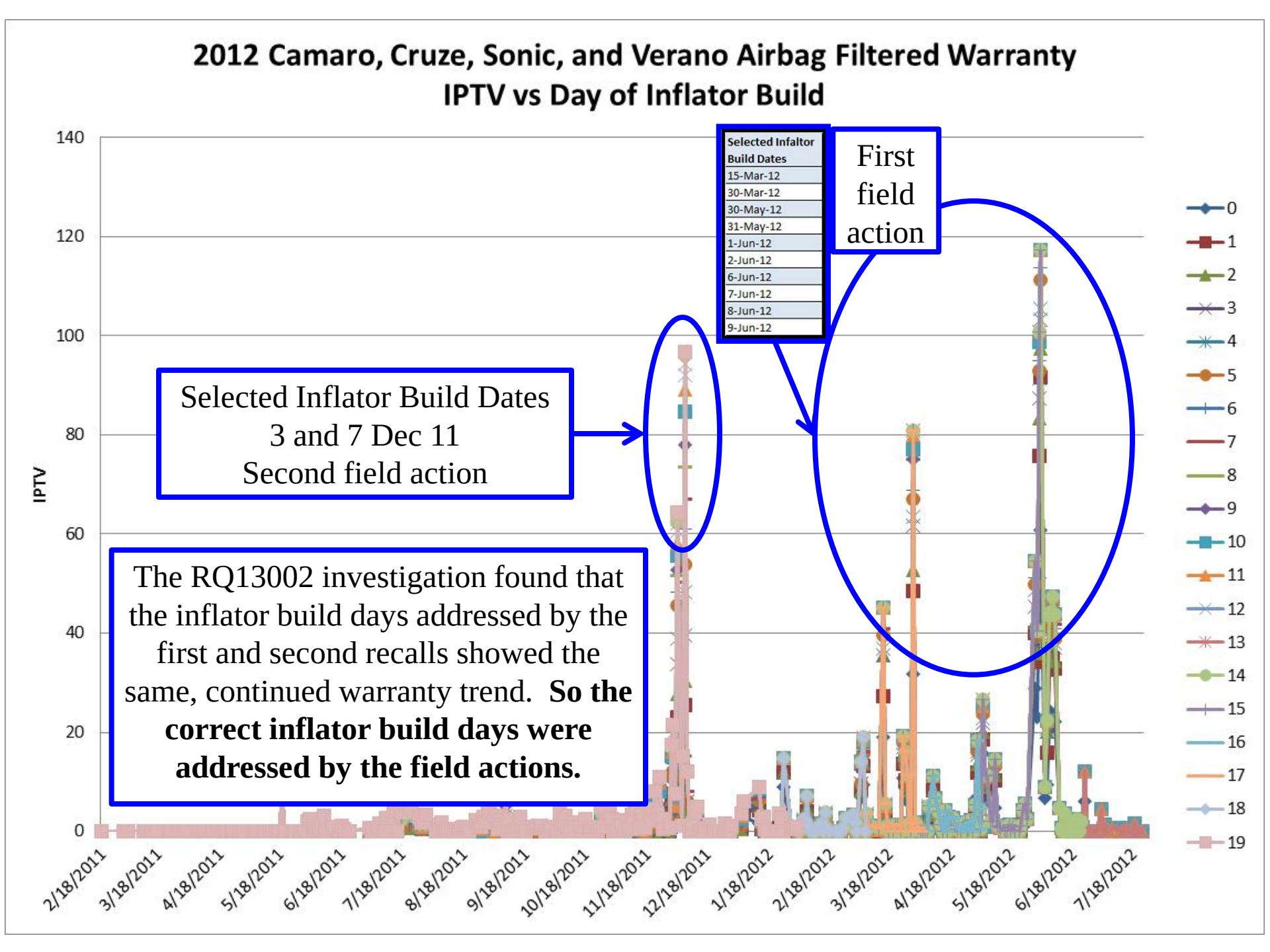
# *X-Rays of Assembled Male and Female Connector Shorting Bar Damaged*



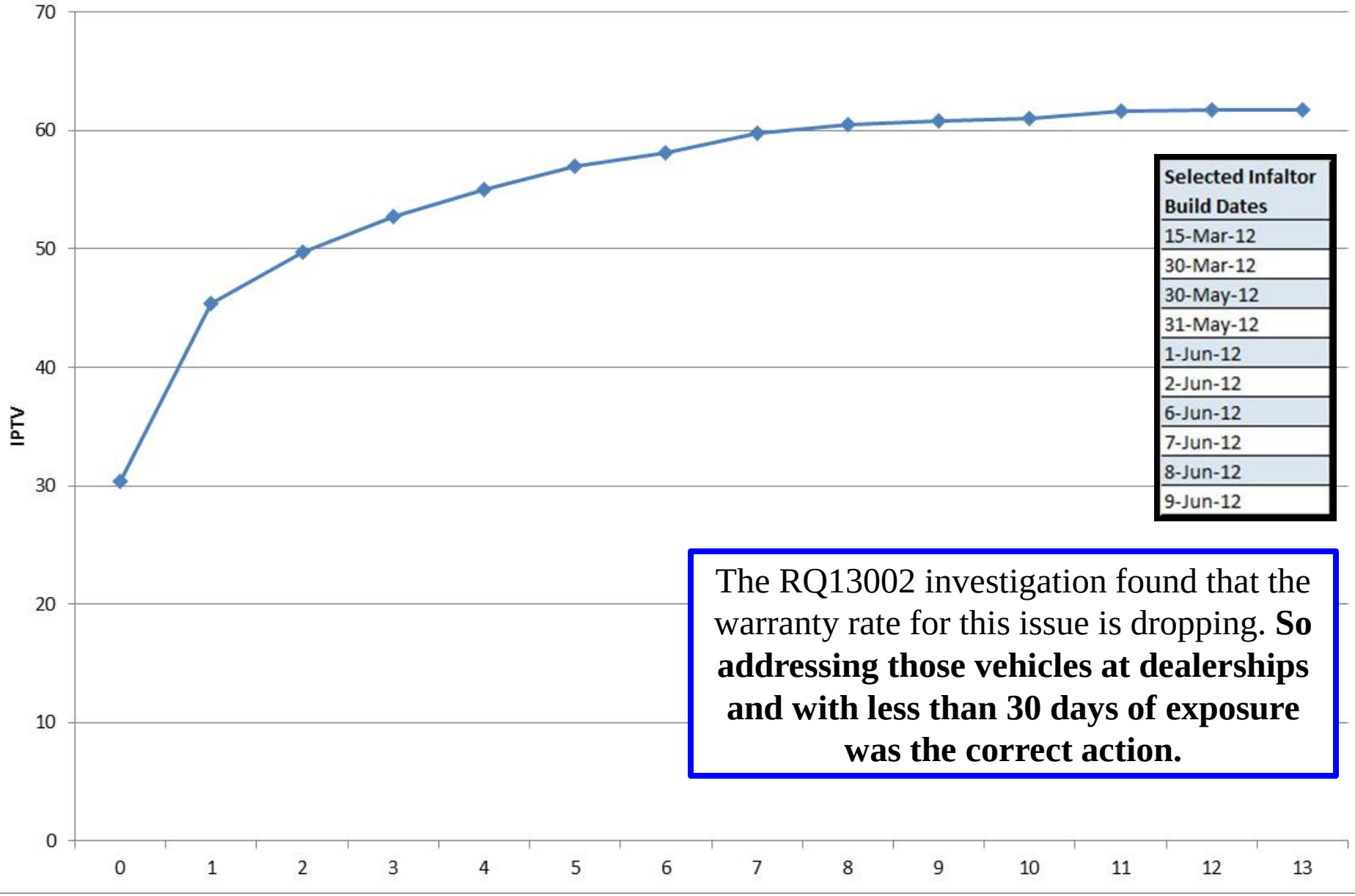
Movement in this damaged connector could short the associated airbag stage.

# *X-Rays of Assembled Male and Female Connector Shorting Bar Damaged*




2012 Camaro, Cruze, Sonic, and Verano Airbag Filtered Warranty
IPTV vs Day of Inflator Build
IPTV
140
120
100
80
60
40
20
0
2/18/2011
3/18/2011
4/18/2011
5/18/2011
6/18/2011
7/18/2011
8/18/2011
9/18/2011
10/18/2011
11/18/2011
12/18/2011
1/18/2012
2/18/2012
3/18/2012
4/18/2012
5/18/2012
6/18/2012
7/18/2012
Selected Infaltor Build Dates
15-Mar-12
30-Mar-12
30-May-12
31-May-12
1-Jun-12
2-Jun-12
6-Jun-12
7-Jun-12
8-Jun-12
9-Jun-12
First field action
Selected Inflator Build Dates 3 and 7 Dec 11 Second field action
The RQ13002 investigation found that the inflator build days addressed by the first and second recalls showed the same, continued warranty trend. So the correct inflator build days were addressed by the field actions.
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19

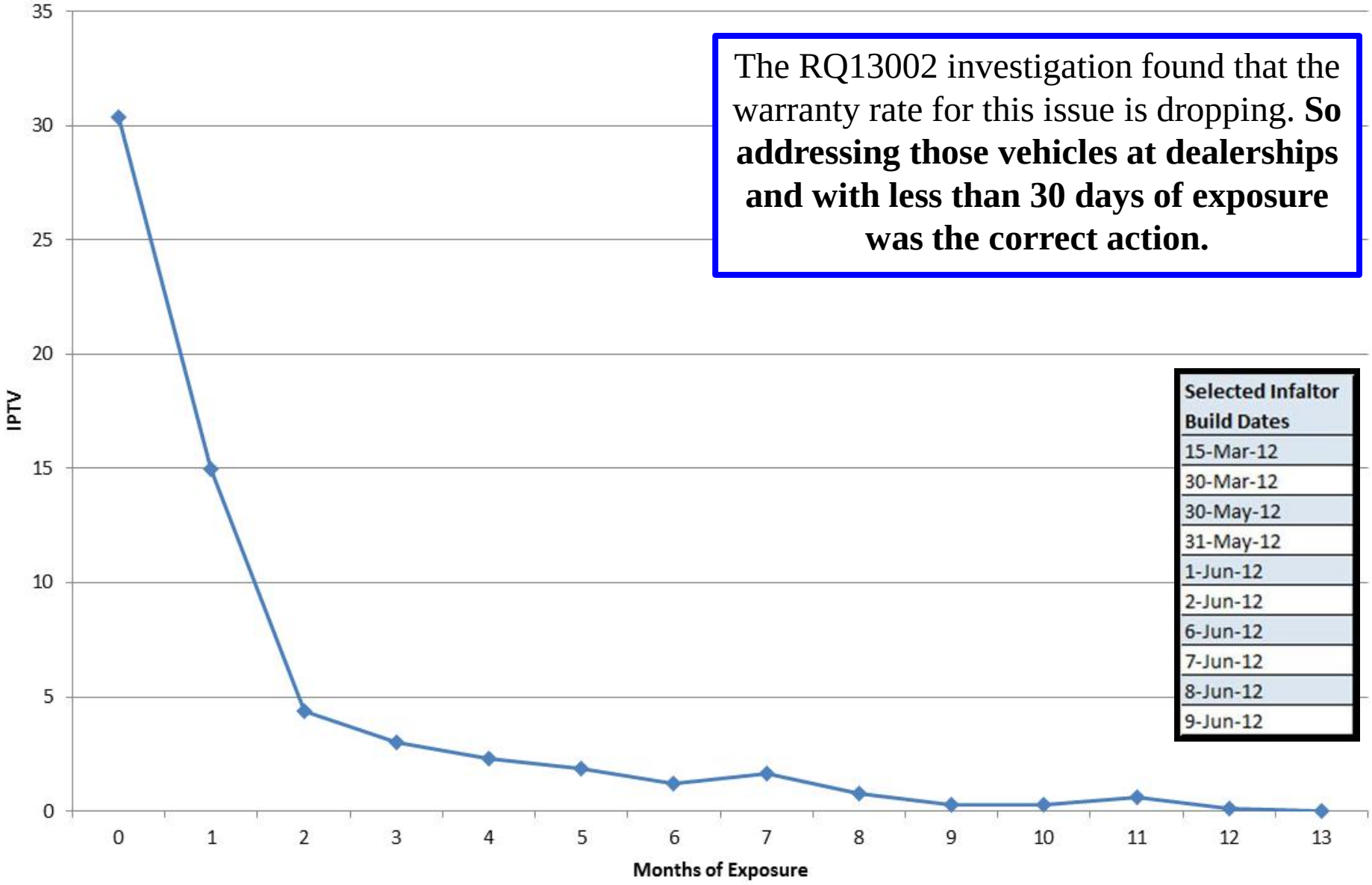
# 2012 Camaro, Cruze, Sonic, and Verano Airbag Filtered Warranty
# Cumulative IPTV for N120261 Inflator Build Dates




| Selected Infaltor Build Dates |
|---|
| 15-Mar-12 |
| 30-Mar-12 |
| 30-May-12 |
| 31-May-12 |
| 1-Jun-12 |
| 2-Jun-12 |
| 6-Jun-12 |
| 7-Jun-12 |
| 8-Jun-12 |
| 9-Jun-12 |

The RQ13002 investigation found that the warranty rate for this issue is dropping. **So addressing those vehicles at dealerships and with less than 30 days of exposure was the correct action.**

# 2012 Camaro, Cruze, Sonic, and Verano Airbag Filtered Warranty Incremental IPTV for N120261 Inflator Build Dates

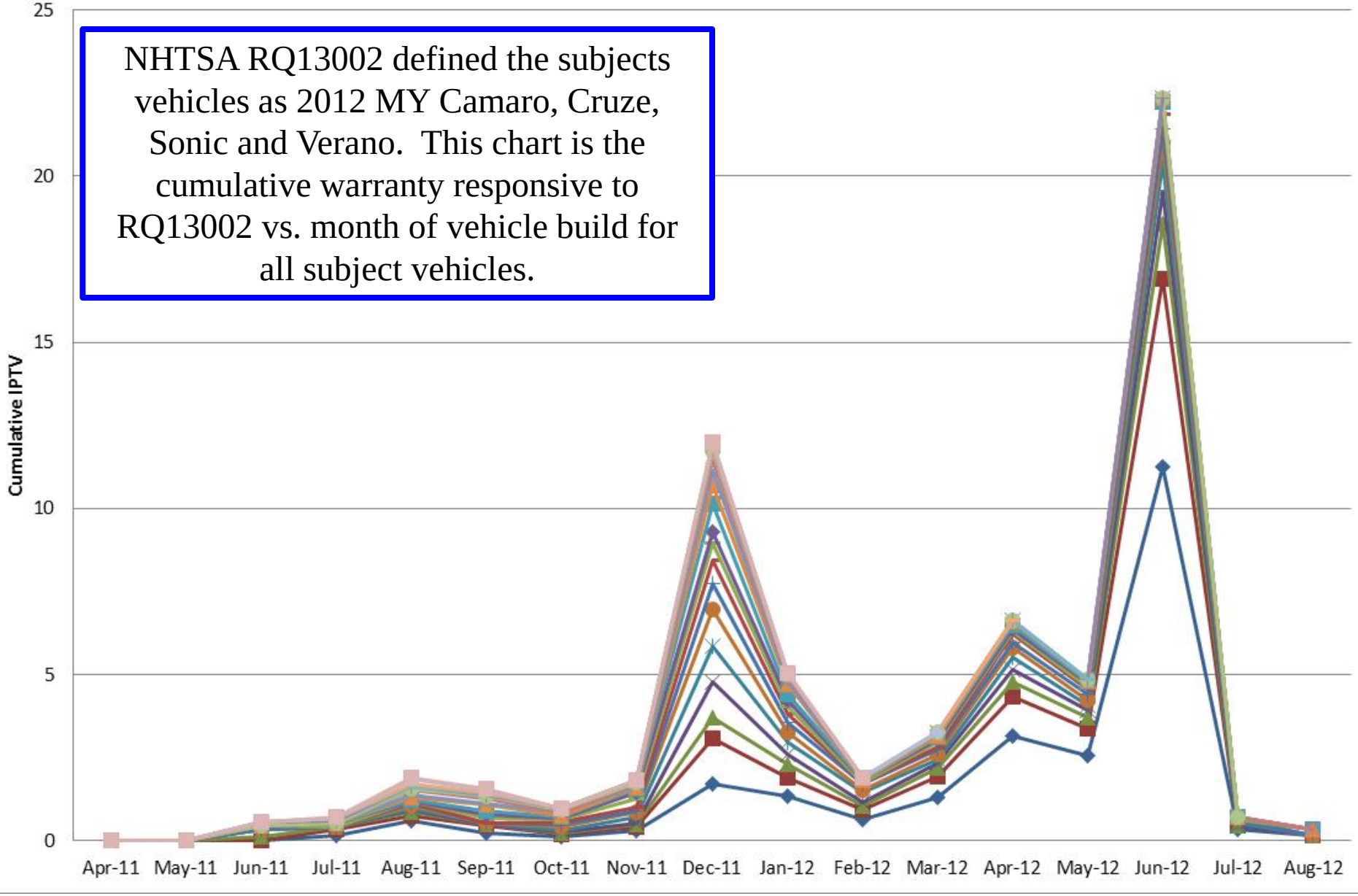



The RQ13002 investigation found that the warranty rate for this issue is dropping. **So addressing those vehicles at dealerships and with less than 30 days of exposure was the correct action.**

| Selected Infaltor Build Dates |
|---|
| 15-Mar-12 |
| 30-Mar-12 |
| 30-May-12 |
| 31-May-12 |
| 1-Jun-12 |
| 2-Jun-12 |
| 6-Jun-12 |
| 7-Jun-12 |
| 8-Jun-12 |
| 9-Jun-12 |

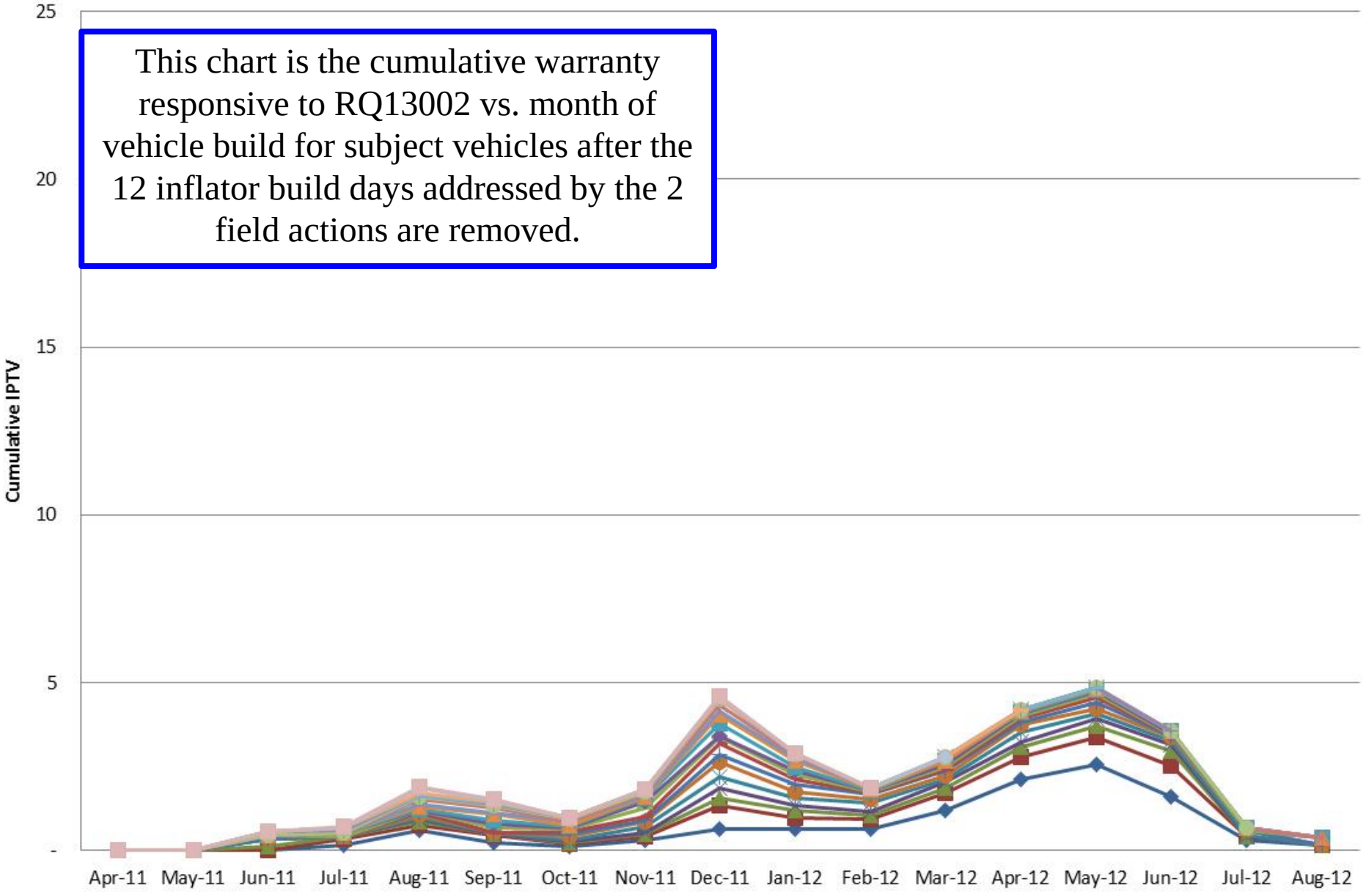
# 2012 Camaro, Cruze, Sonic, and Verano Airbag Filtered Warranty IPTV vs Month of Vehicle Build

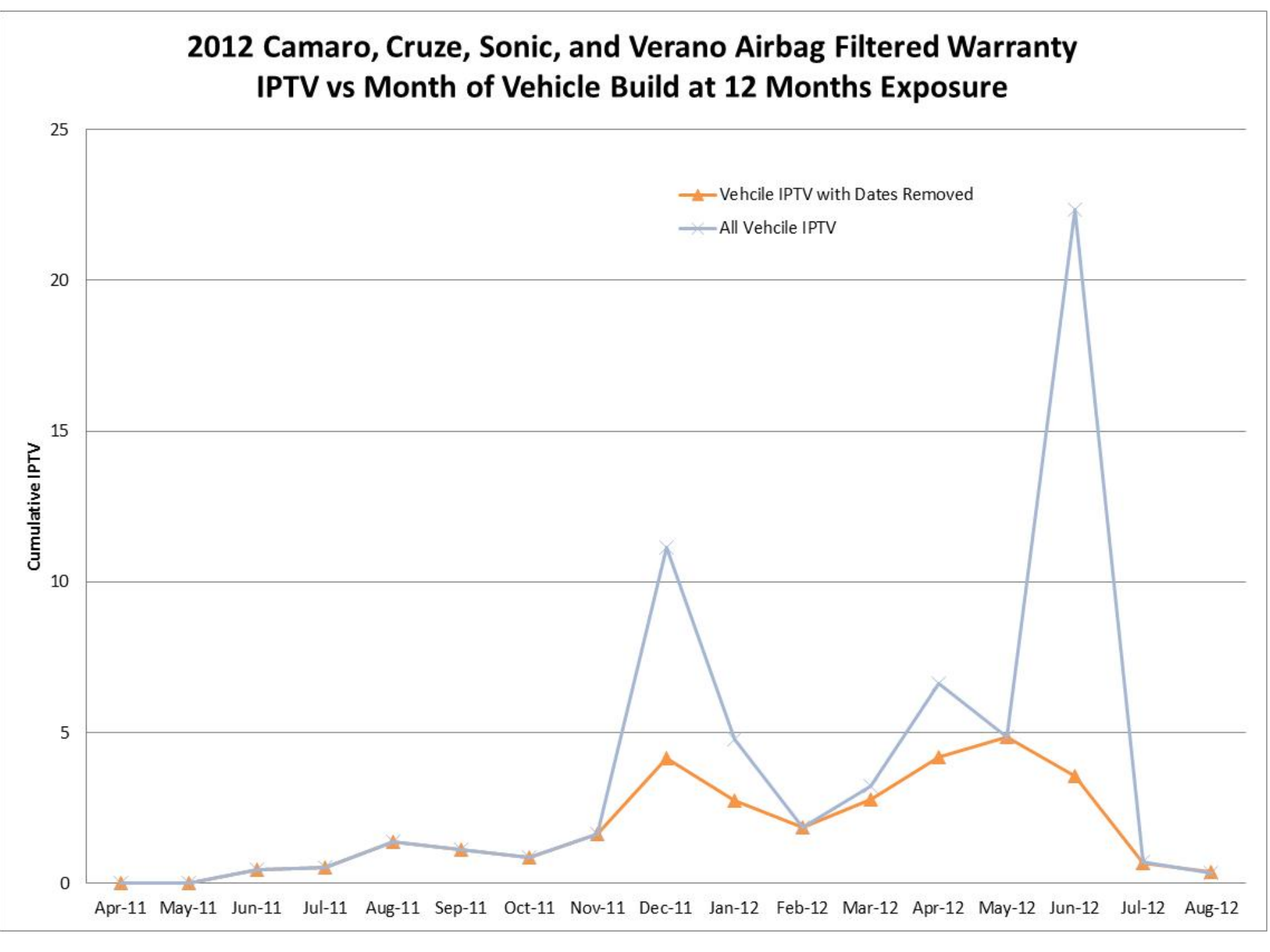
NHTSA RQ13002 defined the subjects vehicles as 2012 MY Camaro, Cruze, Sonic and Verano. This chart is the cumulative warranty responsive to RQ13002 vs. month of vehicle build for all subject vehicles.



# 2012 Camaro, Cruze, Sonic, and Verano Airbag Filtered Warranty
# IPTV vs Month of Vehicle Build After Removal of 12 Days

This chart is the cumulative warranty responsive to RQ13002 vs. month of vehicle build for subject vehicles after the 12 inflator build days addressed by the 2 field actions are removed.




2012 Camaro, Cruze, Sonic, and Verano Airbag Filtered Warranty
IPTV vs Month of Vehicle Build at 12 Months Exposure
Cumulative IPTV
25
20
15
10
5
0
Vehcile IPTV with Dates Removed
All Vehcile IPTV
Apr-11
May-11
Jun-11
Jul-11
Aug-11
Sep-11
Oct-11
Nov-11
Dec-11
Jan-12
Feb-12
Mar-12
Apr-12
May-12
Jun-12
Jul-12
Aug-12

# *Shorting Bar Issue*

## *Summary from the Response*

- ***The circumstances of the shorting bar issue, and the recent warranty data, show the risk to motor vehicle safety for the subject vehicles to be very low for the following reasons.***
  - Warranty data show that the recalls targeted the appropriate vehicle population. This is demonstrated by the low warranty rate which is seen in the non-recalled vehicles
    - For the first recall, 12V522, which included some vehicles built in April, May and June of 2012, the issue occurred very early in the vehicle's service. In fact, many of the vehicles were repaired before they were delivered to customers. In addition, since the recall, there has been a low rate of warranty for the subject condition (0.5 IPTV) for non-recalled vehicles manufactured in these months. The rate of claims has declined over time.
    - For the second recall, 13V023, which involved vehicles built in December 2011 and January 2012, GM recalled all vehicles built with inflators from the two suspect inflator build days. Since the recall, there has been a low rate of warranty claims for the subject condition (0.4 IPTV) for non-recalled vehicles manufactured in these months. The rate of claims has declined over time.
    - Since the recalls, the warranty rate for the subject condition in the non-recalled subject vehicles is only 0.2 IPTV for the entire 2012 Model Year.

# *Shorting Bar Issue*
## *Summary from the Response*

- ***Continued***
  - If the shorting bar contacts the terminal in the connector, the airbag warning light will illuminate. The warning light is an overt signal to the operator that the airbag needs to be serviced. The light remains on in front of the operator to warn the operator of the condition.
  - For most of the subject vehicles, a "SERVICE AIRBAG" message will appear in the Driver Information Center (DIC).
  - The OnStar vehicle diagnostic report, which is a monthly email communication from OnStar, will remind the vehicle owner that the airbag warning light is on and that the vehicle needs to be serviced. On Star service is provided at no charge for the first six months of vehicle ownership.
  - The subject vehicles are under warranty. There is no reason for a vehicle owner to hesitate to bring the vehicle in for service when the airbag light is illuminated.
  - NHTSA did not send any VOQ's related to this issue to GM. GM conducted a search for VOQ's and found none.
  - There have been no reported crashes or injuries related to this condition.
  - Of the GM reports which GM sent with its partial response on August 2, 2013, which occurred at a low rate of 0.5 IPTV, it should be noted that over half of these could not be definitively attributed to the shorting bar issue. Some of these reports are likely to have involved an airbag light illuminating with no impact on airbag performance.
- ***Therefore, the risk to motor vehicle safety in the subject vehicles which were not recalled is extremely low.***

# RQ13-002

# GM

# 8/16/2013

# Q10

# Public Production Line F

# Controls and Poka-yokes

The following slides show up controls and Pokayoke from Line Line F PSDI-X.

30 Pages Submitted To The Office Of Chief Counsel With A Request For Confidential Treatment

# RQ13-002

# GM

# 8/16/2013

# Q11

# Public CP Linea F SU PSDI-X GM Delta GSV Rev 20D

Confidential Excel Workbook Submitted To The Office Of Chief Counsel With A Request For Confidential Treatment

# RQ13-002

# GM

# 8/16/2013

# Q11

# Public CP Linea V SU PSDI-X GM Delta GSV Rev 4B

Confidential Excel Workbook Submitted To The Office Of Chief Counsel With A Request For Confidential Treatment

# RQ13-002

# GM

# 8/16/2013

# Q11

# Public GM Intermittent issue PSDI-X update 10 26 12

TAKATA

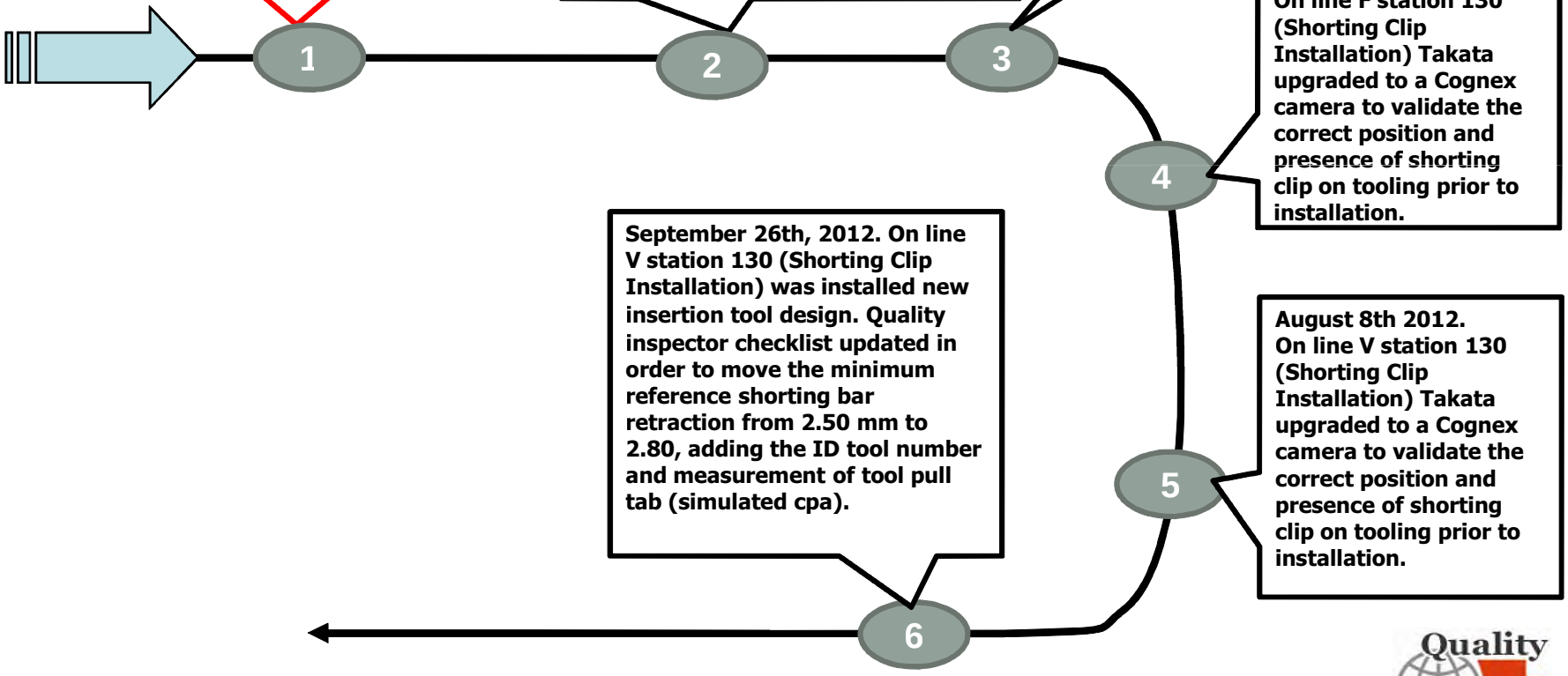
# PSDI-X GM 2448636-AB Intermittent Issue

Quality First

June 13th, 2012. GM reported to Takata (Monclova plant) that Lordstown assembly plant found 15 DAB in a row with low resistance (Airbag Light On). Inflator used on this module PSDI-X GM P/N 2448636-AB produced on line F.

June 16th, 2012. Takata replaced the primary stage installation tool with a revised tool matching the secondary stage dimensional and design intent on line F. The tool was validated by checking 10 pieces per hour and at beginning each shift and change over . Acceptance criteria was to verify no marks on shorting bar during assembly process. This frequency perform until July 15th.

July 16th 2012. After finding no damage during previous frequency, Takata reduced inspection 5 Pieces at the beginning of each shift and 5 at change over per QA checklist.




August 1st 2012.
On line F station 130 (Shorting Clip Installation) Takata upgraded to a Cognex camera to validate the correct position and presence of shorting clip on tooling prior to installation.

September 26th, 2012. On line V station 130 (Shorting Clip Installation) was installed new insertion tool design. Quality inspector checklist updated in order to move the minimum reference shorting bar retraction from 2.50 mm to 2.80, adding the ID tool number and measurement of tool pull tab (simulated cpa).

August 8th 2012.
On line V station 130 (Shorting Clip Installation) Takata upgraded to a Cognex camera to validate the correct position and presence of shorting clip on tooling prior to installation.

Quality First

# Root Cause (Snake chart point 2)

Examination of the manufacturing process found that the shorting bar was not fully retracted during insertion process resulting in interference/contact between initiator pins and shorting bar. Additional comparisons were made to secondary stage (no reported issues) and a 0.3 mm shorter difference in tab (simulated cpa) length was detected in the insertion tool itself.

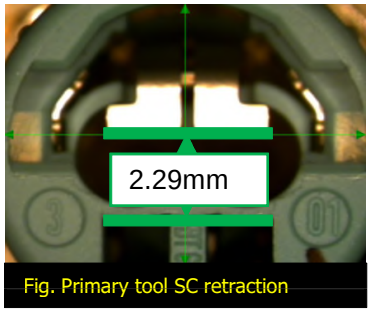


Fig. Primary tool SC retraction

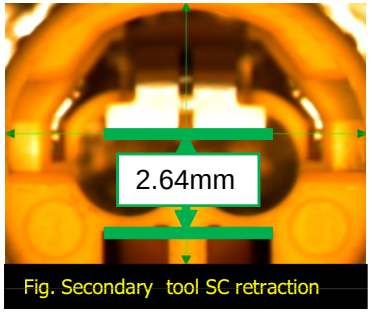


Fig. Secondary tool SC retraction

On approximately May 25th, the primary shorting clip installation tooling was detected to be damaged and repaired by plant maintenance changing the effect work point of the tool. This tool was not covered by normal equipment preventative maintenance plan, so no documentation was kept.

On June 16th the primary stage installation tool was replaced with a dimensional revised tool. This new tool matched the secondary stage tool for dimensional and design intent.

| Insertion Tool | Dimension | Drawing | Dimensional |
|---|---|---|---|
| PSDI-X 130-08-0 Green SC | | 0.255 (6.47 mm) | 0.236 (5.99 mm) |
| PSDI-X 130-09-0 Yellow SC | Tab Length | 0.255 (6.47 mm) | 0.250 (6.38 mm) |
| | | | |
| | | | |
| **Insertion Tool** | **Dimension** | **Drawing** | **Dimensional** |
| PSDI-X 130-08-0 Green SC | Tab Length | 0.255 (6.47 mm) | 0.250 (6.35 mm) |

**6-16-12 Replacement tool**

Quality First

Nine Pages Submitted To The Office Of Chief Counsel With A Request For Confidential Treatment