

**EA94-005 CHRYSLER MINIVAN  
LIFTGATE LATCH FAILURE**

**INVESTIGATION REVIEW**



COPY OF MATERIALS  
SHOWN TO CHRYSLER OFFICIALS;  
NOVEMBER 17, 1994

# **EA94-005 CHRYSLER MINIVAN LIFTGATE LATCH FAILURE**

## **DOOR LATCH SPECIFICATIONS**

- **FMVSS No. 206 (SIDE DOORS) REQUIRES: (1) PRIMARY AND SECONDARY LATCH POSITIONS (2) NON-SEPARATION UNDER TRANSVERSE LOAD OF 2000 LBS. ON PRIMARY AND 1000 LBS. ON SECONDARY (3) NON-SEPARATION UNDER LONGITUDINAL LOAD OF 2500 LBS. ON PRIMARY AND 1000 LBS. ON SECONDARY. NO REQUIREMENT FOR LIFTGATE LATCH.**
- **CHRYSLER SPECIFICATION FOR REAR HATCH: (1) ONLY ONE LATCH POSITION (2) TRANSVERSE DIRECTION- 750 LBS. (3) NO REQUIREMENTS FOR THE LONGITUDINAL DIRECTION.**
- **FORD AEROSTAR AND GM APV SPECIFICATIONS: (1) PRIMARY AND SECONDARY LATCH POSITIONS (2) NON-SEPARATION UNDER LOADS THAT EQUAL OR EXCEED STANDARD 206 REQUIREMENTS FOR BOTH THE LATERAL AND LONGITUDINAL DIRECTIONS. THE FORD LATCH IS ENCLOSED IN A METAL CASE, AND THE APV INCORPORATES TWO LATCHES ONE ON EACH SIDE OF THE LIFTGATE.**
- **MOST OTHER PEER MINIVANS AS WELL AS STATION WAGONS INCORPORATE PRIMARY AND SECONDARY LATCH POSITIONS.**

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## **TESTING (STATIC)**

- **ODI STATIC TESTING OF CHRYSLER AND PEER MINIVANS (FMVSS 206)**
  - **CHRYSLER MINIVANS, FORD AEROSTAR, CHEVROLET LUMINA APV, TOYOTA PREVIA MITSUBISHI EXPO, VOLKSWAGEN EURO VAN, MAZDA MPV, NISSAN QUEST, AND MERCURY VILLAGER WERE ALL TESTED AGAINST FMVSS No. 206.**
  - **PRE 1989 CHRYSLER MINIVANS HAVE NO LONGITUDINAL RETENTION CAPABILITY (NO UPSET HEAD ON STRIKER).**
  - **ONLY CHRYSLER MINIVAN LATCHES HAD FAILURE LOADS BELOW THE FMVSS 206 REQUIREMENT FOR THE TRANSVERSE DIRECTION ( A MEAN OF 1300 LBS., 700 LBS BELOW THE 206 REQUIREMENT). THE MODIFIED LATCH FOR 1995 MODELS PASSED THE REQUIREMENT IN THE TRANSVERSE DIRECTION (2202 LBS).**
  - **MAZDA MPV LATCHES HAD FAILURE LOADS BELOW THE FMVSS 206 REQUIREMENT FOR THE LONGITUDINAL DIRECTION ( A MEAN OF 1885 LBS., 615 LBS. BELOW THE 206 REQUIREMENT). TOYOTA PREVIA MARGINALLY FAILED AT 2437 LBS.**

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## **TESTING (STATIC)**

- **STATIC TESTING (MODIFIED LATERAL FMVSS 206)**
  - **GOAL WAS TO DUPLICATE THE FORK BOLT-DETENT LEVER BYPASS FAILURE SEEN IN THE FIELD**
  - **LATCH WAS TESTED AT ANGLES BETWEEN +90 AND -90 DEGREES.**
  - **THE 1991-1993 CHRYSLER MINIVAN WAS THE WORST PERFORMER IN ALL BUT THE -90 DEGREES DIRECTION AMONG ALL THE LATCHES TESTED. THIS DIRECTION IS SIMILAR TO A RIGHT-SIDE IMPACT TO THE VEHICLE.**
  - **THE DAMAGE PATTERN SEEN IN THE REAL WORLD WAS DUPLICATED IN +90 DEGREES DIRECTION. THE FORK BOLT AND DETENT LEVER BYPASSED EACH OTHER AND THE RESTRICTOR SLIPPED BEFORE ANY SIGNIFICANT BENDING HAD OCCURRED.**
  - **CHRYSLER'S TEST RESULTS COINCIDE WITH ODI'S TEST RESULTS.**

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## TESTING (DYNAMIC, LEFT REAR QUARTER PANEL, MOVING DEFORMABLE BARRIER, MDB)

TEST NO.	MODEL	IMPACT SPEED	IMPACT DIRECTION	IMPACTING OBJECT	HATCH OPENED	EJECTION	REAR SEAT
1	'87 CARAVAN	33.6 MPH	26.4 DEG. FORWARD	3600 lb MDB	YES	2 DUMMIES	BENT
2	'91 CARAVAN	30.2 MPH	26.4 DEG. FORWARD	3600 lb MDB	NO	NO EJECTIONS	BENT
3	'91 CARAVAN	31.1 MPH	15 DEG. REARWARD	3600 lb MDB	YES	1 DUMMY	BENT
4	'91 AEROSTAR	31.1 MPH	15 DEG. REARWARD	3600 lb MDB	NO	NO EJECTIONS	OK
5	'91 MAZDA MPV	31.2 MPH	15 DEG. REARWARD	3600 lb MDB	NO	NO EJECTIONS	OK
6	'95 LATCH	31.1 MPH	15 DEG. REARWARD	3600 lb MDB	NO	NO EJECTIONS	BENT

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## **CONCLUSIONS**

- **ANNECTODAL CASES**
  - **AT LOW AND MODERATE IMPACT SPEEDS, LIFTGATE OPENS AND OCCUPANTS ARE EJECTED.**
  - **LIFTGATE LATCHES EXHIBIT A COMMON FAILURE MODE ( FORK BOLT-DETENT LEVER BYPASS).**
  
- **FARS DATA**
  - **CHRYSLER EJECTION RATE FOR KNOWN EJECTION PATHS IS TWICE THAT OF ALL OTHER MINIVANS.**
  - **75% OF EJECTIONS ARE CODED UNDER UNKNOWN EJECTION PATHS. ANALYSIS OF THESE UNKNOWN CASES INDICATES THAT MANY MAY BE LIFTGATE FATAL EJECTIONS.**
  
- **NASS DATA**
  - **LIFTGATES OPEN DURING LOW AND MODERATE IMPACT SEVERITY.**
  - **LIFTGATE LATCH FAILURE ACCOUNTS FOR THE MAJORITY OF THE FAILURE MODES IN CHRYSLER MINIVANS.**
  - **CRASH SEVERITY IS LESS ON CHRYSLER VEHICLES.**

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## **CONCLUSIONS (CONT.)**

- **STATIC COMPONENT TESTS**
  - **CHRYSLER'S DESIGN CRITERIA FOR THE LIFTGATE LATCH ARE LOWER THAN PEER AND FMVSS 206 STANDARDS**
  - **ONLY CHRYSLER MINIVAN LATCHES FAILED THE FMVSS 206 REQUIREMENT IN THE TRANSVERSE DIRECTION.**
  
- **DYNAMIC TESTS**
  - **AT A MODERATE SPEED IMPACT (30 MPH), CHRYSLER MINIVANS RESULT IN LIFTGATE LATCH FAILURE AND OCCUPANT EJECTIONS.**
  - **UNDER THE SAME TEST CONDITIONS, PEER VEHICLES' LIFTGATES REMAINED CLOSED.**
  
- **LATCH DESIGN**
  - **CHRYSLER HAS BEEN MODIFYING THE LATCH/STIKER MECHANISM SINCE JANUARY OF 1988.**
  - **THE LATEST MODIFICATION IMPROVES THE STRENGTH OF THE LATCH BY 50% AND IS CURRENTLY BEING USED IS 1995 MODEL YEAR VEHICLES. IT COULD ALSO BE USED IN 1991 THROUGH 1994 MODEL YEAR VEHICLES.**
  - **THE INCREASED STRENGTH IN THE 1995 LATCH WAS DEMONSTRATED IN BOTH COMPONENT AND CRASH TESTS.**
  
- **THE LATCH FAILURE IS A SAFETY DEFECT THAT INVOLVES CHILDREN.** 