

OICA/Alliance Head Restraint Backset Measurement Study

Head Restraint GTR IWG
12-14 September 2006

Purpose

- Provide NHTSA data to support Alliance and OICA position that measuring the head restraint backset from the seating reference point (“R” point) is more reliable and eliminates much of the variability associated with measurements from the “H” point.

Test Program

- Compare backset measurements using FMVSS 202a procedure (TP-202a) to an Alliance proposed method starting at the "R" point
- 10 seats x 2 methods x 4 repetitions = 80 tests
- Testing began July 17 and was completed July 31 at MGA, Troy, Michigan.
- 3 Seats retested by August 28

Seats Tested

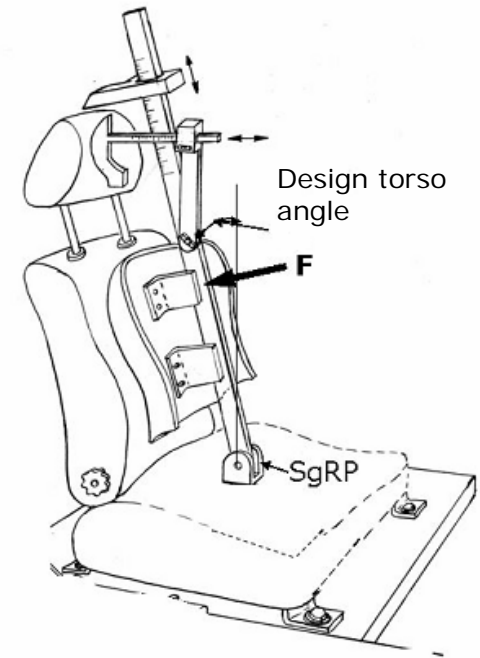
Dodge Caravan (Cloth)
Dodge Caravan (Leather)
Jeep Grand Cherokee
Chrysler 300
Ford Focus
Ford Explorer
Hummer H3
Chevrolet Trail Blazer
Toyota Camry (Cloth)
Toyota Camry (Leather)
VW Jetta

Test Setups

□ TP-202a



□ "R" point method



MGA FMVSS 202a Setup



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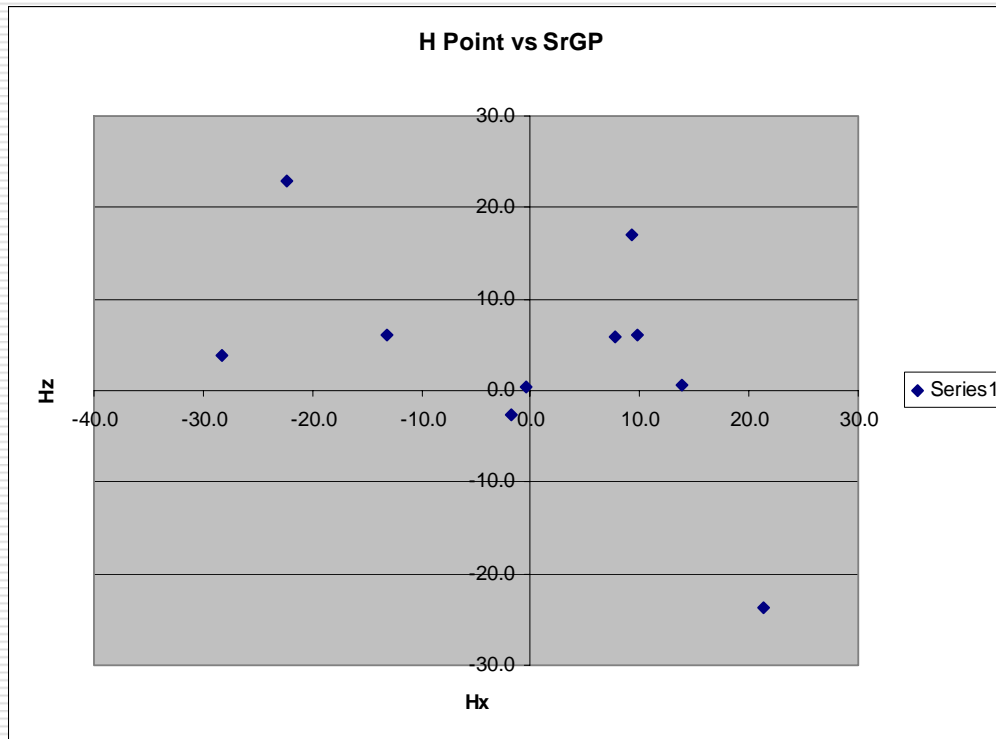
MGA Initial "R" Point Test Setup



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Test Results and Conclusions

- Using TP-202a, we validated that “H” points and “R” points are different.



Test Results and Conclusions

- The two methods produce significantly different backset measurements.

	Backset (202a)	Backset SgRP	Backset H vs R
Ford Focus	37.3	20.8	16.5
Ford Explorer	58.0	48.5	9.5
GM Hummer H3	41.8	47.1	-5.3
Toyota Camry Cloth	47.3	24.8	22.5
Toyota Camry Leather	47.3	17.6	29.8
Chevy Trail Blazer	86.0	66.3	19.8
Dodge Caravan Cloth	52.8	20.3	32.5
Dodge Caravan Leather	57.8	28.8	29.0
Chrysler 300	87.0	112.3	-25.3
VW Jetta	41.8	22.8	19.0

Test Results and Conclusions

- Reduced variability with “R” point method vs TP-202a was not demonstrated in the initial series of tests due to erroneous interpretation by MGA of the measurement procedure.

	Backset StDev		Height StDev	
	H	R	H	R
Ford Focus	1.26	0.96	1.26	1.89
Ford Explorer	1.63	1.91	0.82	2.38
GM Hummer H3	2.22	3.56	1.73	0.82
Toyota Camry Cloth	2.06	5.19	0.96	3.11
Toyota Camry Leather	2.22	9.68	0.82	6.95
Chevy Trail Blazer	2.16	4.35	1.83	1.29
Dodge Caravan Cloth	2.99	6.18	1.83	2.65
Dodge Caravan Leather	2.99	2.75	2.45	0.82
Chrysler 300	4.24	6.9	2.52	2.99
VW Jetta	2.22	8.85	1.29	3.59
	2.399	5.033	1.551	2.649

Test Results and Conclusions

- Some outliers in the data affecting “R” point method
 - Camry Cloth & Leather
 - Caravan Cloth
 - VW Jetta
- TP-202a has been refined by ICBC, IIHS, & NHTSA over the years.
- Alliance “R” point method is its first try.
 - MGA interpretation of Alliance measurement concept was not equivalent.

Retest 3 Seats

With refined "R" point process and fixture.

- Focus, Hummer & Caravan Cloth
- CMM measurements to match "H" point data accuracy
- Modified "FMVSS 207" load frame to locate backset probe as in HRMD

MGA "R" Point Test Setup #2



Retest 3 Seats

With refined "R" point process and fixture

□ Backset "202a" vs "R" point #2

	Backset (202a)	Backset SgRP	Backset H vs R
Ford Focus	37.3	21.0	16.3
GM Hummer H3	41.8	46.8	-5.0
Dodge Caravan Cloth	52.8	23.0	29.8

□ Repeatability

	Backset StDev		Height StDev	
	H	R	H	R
Ford Focus	1.26	1	1.26	0.6
GM Hummer H3	2.22	2.8	1.73	0.5
Dodge Caravan Cloth	2.99	1.2	1.83	0
	2.16	1.67	1.61	0.37

Retest Results and Conclusions

- ❑ Confirmed that 202a and "R" point methods give significantly different backset & height results due to "H" point variability around the seating reference point ("R" point)
- ❑ "R" point method reduces repeatability variability
- ❑ Backpan force to achieve design torso angle may vary:

	Backpan Force	
	Ave	StDev
Ford Focus	291.8	59.9
GM Hummer H3	0.0	0.0
Dodge Caravan Cloth	385.5	28.1

Recommendations

- Adopt “R” point method for FMVSS 202a and the GTR for auditing compliance.
- Do not use backpan concept to “force” the seatback into the design angle
- Adopt following procedure for seat back recliners with discrete positions:
 1. Place seatback in notch closest to the design angle
 2. Measure backset and height at that notch position