REPORT NUMBER: 220-MGA-2011-002

SAFETY COMPLIANCE TESTING FOR FMVSS NO. 220 SCHOOL BUS ROLLOVER PROTECTION

2011 GIRARDIN MICRO BIRD SCHOOL BUS
NHTSA NO.: CB0903

PREPARED BY:
MGA RESEARCH CORPORATION
5000 WARREN ROAD
BURLINGTON, WI 53105

TEST DATE: NOVEMBER 2, 2011

FINAL REPORT DATE: JANUARY 4, 2012

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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Prepared by: _____ Date: January 4, 2012
Eric Peschman, Project Engineer

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FINAL REPORT ACCEPTED BY:

Edward E. Chan

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Technical Report Documentation Page

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4. Title and Subtitle Final Report of FMVSS 220 Compliance Testing of 2011 Girardin Micro Bird School Bus NHTSA No.: CB0903		*5. Report Date* November 22, 2011 *6. Performing Organization Code* MGA	
7. Author(s) Eric Peschman, Project Engineer Michael Janovicz, Program Manager		*8. Performing Organization Report No.* 220-MGA-2011-002	
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12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Enforcement Office of Vehicle Safety Compliance Mail Code: NVS-220 1200 New Jersey Avenue, S.E. Washington, D.C. 20590		*13. Type of Report and Period Covered* Final Report January 4, 2012 *14. Sponsoring Agency Code* NVS-220	
15. Supplementary Notes			
16. Abstract Compliance tests were conducted on the subject 2011 Girardin Micro Bird School Bus NHTSA No.: CB0903, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-220-02 for the determination of FMVSS 220 compliance. Test failures were as follows: None.			
17. Key Words Compliance Testing Safety Engineering FMVSS 220		*18. Distribution Statement* Copies of this report are available from: NHTSA Technical Information Services (TIS) Mail Code: NPO-411 1200 New Jersey Avenue, S.E. Washington, D.C. 20590 Fax No.: (202) 493-2833 E-mail: tis@dot.gov	
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Form DOT F1700.7 (8-72)

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SECTION 1

PURPOSE OF COMPLIANCE TEST

Tests were conducted on a 2011 Girardin Micro Bird School Bus NHTSA No.: CB0903, in accordance with the specifications of the Office of Vehicle Safety Compliance (OVSC) Test Procedure, TP-220-02, to determine compliance to the requirements of Federal Motor Vehicle Safety Standards (FMVSS) 220, “School Bus Rollover Protection”.

This program is sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No.: DTNH22-08-D-00075.

SECTION 2

TEST DATA SUMMARY

Based on the tests performed, the 2011 Girardin Micro Bird School Bus, NHTSA No.: CB0903 appears to meet the requirements of FMVSS 220. The ambient temperature during testing was 19° C.

TEST RESULTS

S4.a	The downward vertical movement of any point on the application plate shall not exceed 130 mm.	**PASS**
S4.b	Each emergency exit shall be capable of:	
	Unlatching per FMVSS 217	N/A
	Opening per FMVSS 217	N/A

Comments: The rear emergency exit was damaged during previous FMVSS 301 testing performed on the vehicle; therefore, the unlatching and opening efforts are not applicable.

SECTION 3
COMPLIANCE TEST DATA

The following data sheets document the results of testing on the 2011 Girardin Micro Bird School Bus, NHTSA No. CB0903.

DATA SHEET 1

VEHICLE INFORMATION

Test Vehicle: **2011 Girardin Micro Bird School Bus** NHTSA No.: **CB0903**
Test Lab: **MGA Research Corporation** Test Date: **11/02/11**

Contract No.:	DTNH22-08-D-00075
Laboratory Name:	MGA Research Corporation

INCOMPLETE VEHICLE

Manufacturer:	Ford Motor Company
Model:	Bus
VIN:	1FDEE3FLXBDA10617
Certification Date:	09/10

COMPLETED VEHICLE (SCHOOL BUS)

Manufacturer:	Girardin
Make/Model:	Micro Bird
VIN:	1FDEE3FLXBDA10617
NHTSA No.:	CB0903
Color:	Yellow
GVWR:	5,216 kg / 11,500 lbs
Build Date:	11/10
Certification Date:	11/10

DATES

Vehicle Receipt:	12/09/10
Start of Compliance Test:	11/02/11
Completion of Compliance Test:	11/02/11

Comments: All tests were performed in accordance with the references outlined in: TP-220-02.

DATA SHEET 1 (CONTINUED)

VEHICLE INFORMATION

SCHOOL BUS UNLOADED VEHICLE WEIGHT (UVW)

	Units	As Delivered (UVW) (Axle)		
		Front	Rear	Total
Left	kg	653.2	1,152.2	
Right	kg	687.2	1,195.2	
Ratio	%	36.3	63.7	
Totals	kg	1,340.4	2,347.4	3,687.8

SCHOOL BUS ROOF AND APPLICATION PLATE DATA

Dimensions	School Bus Roof	Calculated Roof Plate	Actual Roof Plate
Length (mm):	4,648	4,343	4,572
Width (mm):	2,185	914	914

Note: The vehicle was centered laterally and longitudinally under the roof load application plate.

School Bus Has: X Rigid Frame; __ Unibody

Components Removed From Vehicle Before Testing: Strobe lights, marker lights, and roof vent

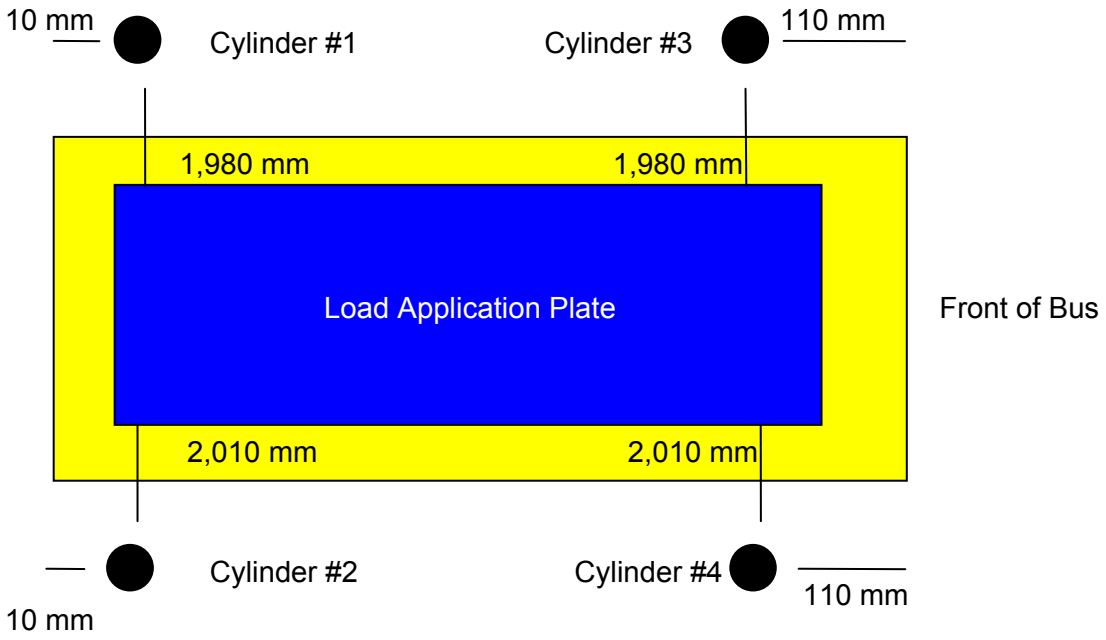
DATA SHEET 1 (CONTINUED)

VEHICLE INFORMATION

LINEAR DISPLACEMENT TRANSDUCER LOCATION

Description	LF	RF	LR	RR
Perpendicular Distance from closest corner of load application plate (mm)	110	110	10	10
From closest outside edge of load application plate (mm)	1,980	2,010	1,980	2,010

Note: LR = Left Rear, RR = Right Rear, LF = Left Front, and RF = Right Front



Comments: Horizontal lasers were used at each roof corner to show individual crush at each corner. Tape was placed on the bus sidewall at the nearest point to the roof corners. This tape was marked at each indicated point of interest during the profile. These marks were measured with a calibrated steel rule at the conclusion of the testing. These are used as the delivered displacement values. Displacement transducers were also used at the cylinders. The measurements in reference to the nearest bus corner can give triangulation coordinates. These measurements are used as secondary to the laser measurements.

Recorded By: _____

Approved By: _____ Date: 11/02/11

DATA SHEET 2

FORCE APPLICATION AND DEFLECTION INFORMATION

Test Vehicle: **2011 Girardin Micro Bird School Bus** NHTSA No.: **CB0903**
Test Lab: **MGA Research Corporation** Test Date: **11/02/11**

FORCE APPLICATION PLATE LOAD CALCULATION

Unloaded Delivered Weight (UVW):	3,687.8 kg
Calculated Test Load = 1.5 * UVW:	5,531.7 kg (54,243 N)
Range of Test Load (-1% to -3%):	5,476.4 kg to 5,365.7 kg (53,701 N – 52,616 N)

FORCE APPLICATION PLATE LOAD

		Pre-load		Maximum Load		Deflection B-A (mm)
		Displacement A (mm)	Load (N)	Displacement B (mm)	Load (N)	
Cylinder	1 (LR)	1	399.8	37	12,873	36
	2 (RR)	3	238.3	102	13,576	99
	3 (LF)	0	448.9	2	12,774	2
	4 (RF)	2	474.3	104	13,430	102
Total Load			1,561.3		52,653	

FORCE APPLICATION PLATE DEFLECTION

		Pre-load	Maximum Load	Deflection B-A (mm)	Deflection ≤ 130 mm?	
		Displacement A (mm)	Displacement B (mm)		Yes - Pass	No - Fail
Corner of Bus Force Application Plate	1 (LR)	2	-5	7	PASS	
	2 (RR)	3	36	33	PASS	
	3 (LF)	1	9	8	PASS	
	4 (RF)	1	56	55	PASS	
Average Deflection				26		

Note: LR = Left Rear, RR = Right Rear, LF = Left Front, and RF = Right Front

Comments: Deflection at each corner of the required force application plate area was measured with the use of laser indicators positioned near the four most outboard corners of the vehicle's roof.

Recorded By: _____

Approved By: _____ Date: 11/02/11

DATA SHEET 3

FORCE AND OPENING AREA TEST OF EMERGENCY EXITS

Test Vehicle: **2011 Girardin Micro Bird School Bus** NHTSA No.: **CB0903**
Test Lab: **MGA Research Corporation** Test Date: **11/02/11**

		Yes - Pass	No - Fail
Can all exits be manually released and extended by a single person without tools, remote controls, and without the engine running?		N/A	N/A
Is emergency exit door releasable from inside the school bus?	BEFORE LOAD:	N/A	N/A
	MAXIMUM LOAD:	N/A	N/A
	AFTER LOAD:	N/A	N/A
Is emergency exit door releasable from outside the school bus?	BEFORE LOAD:	N/A	N/A
	MAXIMUM LOAD:	N/A	N/A
	AFTER LOAD:	N/A	N/A

Note: BEFORE, MAXIMUM & AFTER LOAD, refer to the time when the assessment was made relative to load being applied to the school bus roof with the force application plate.

Comments: None

Recorded By: _____

Approved By: _____ Date: 11/02/11

DATA SHEET 4

FORCE AND OPENING AREA TEST OF EMERGENCY EXITS (INTERIOR)

Test Vehicle: **2011 Girardin Micro Bird School Bus** NHTSA No.: **CB0903**
Test Lab: **MGA Research Corporation** Test Date: **11/02/11**

FORCE TO RELEASE (UNLATCH) THE EMERGENCY EXITS

Exit Location	BEFORE LOAD (N)	Force ≤ 178 N?		MAXIMUM LOAD (N)	Force ≤ 178 N?		AFTER LOAD (N)	Force ≤ 178 N?		Type of Motion
		Yes - Pass	No - Fail		Yes - Pass	No - Fail		Yes - Pass	No - Fail	
Rear Door	N/A			N/A			N/A			N/A Does Not Latch
	N/A			N/A			N/A			
	N/A			N/A			N/A			
	Average: N/A			Average: N/A			Average: N/A			

FORCE TO EXTEND (OPEN) THE EMERGENCY EXITS

Exit Location	BEFORE LOAD (N)	Force ≤ 178 N?		MAXIMUM LOAD (N)	Force ≤ 178 N?		AFTER LOAD (N)	Force ≤ 178 N?		Type of Motion
		Yes - Pass	No - Fail		Yes - Pass	No - Fail		Yes - Pass	No - Fail	
Rear Door	N/A			N/A			N/A			N/A Does Not Latch
	N/A			N/A			N/A			
	N/A			N/A			N/A			
	Average: N/A			Average: N/A			Average: N/A			

Note: BEFORE, MAXIMUM & AFTER LOAD, refer to the time when the assessment was made relative to load being applied to the school bus roof with the force application plate.

Comments: None

Recorded By: _____

Approved By: _____ Date: 11/02/11

DATA SHEET 5

FORCE AND OPENING AREA TEST OF EMERGENCY EXITS (EXTERIOR)

Test Vehicle: **2011 Girardin Micro Bird School Bus** NHTSA No.: **CB0903**
Test Lab: **MGA Research Corporation** Test Date: **11/02/11**

FORCE TO RELEASE (UNLATCH) THE EMERGENCY EXITS

Exit Location	BEFORE LOAD (N)	Force ≤ 178 N?		MAXIMUM LOAD (N)	Force ≤ 178 N?		AFTER LOAD (N)	Force ≤ 178 N?		Type of Motion
		Yes - Pass	No - Fail		Yes - Pass	No - Fail		Yes - Pass	No - Fail	
Rear Door	N/A			N/A			N/A			N/A Does Not Latch
	N/A			N/A			N/A			
	N/A			N/A			N/A			
	Average: N/A			Average: N/A			Average: N/A			

FORCE TO EXTEND (OPEN) THE EMERGENCY EXITS

Exit Location	BEFORE LOAD (N)	Force ≤ 178 N?		MAXIMUM LOAD (N)	Force ≤ 178 N?		AFTER LOAD (N)	Force ≤ 178 N?		Type of Motion
		Yes - Pass	No - Fail		Yes - Pass	No - Fail		Yes - Pass	No - Fail	
Rear Door	N/A			N/A			N/A			N/A Does Not Latch
	N/A			N/A			N/A			
	N/A			N/A			N/A			
	Average: N/A			Average: N/A			Average: N/A			

Note: BEFORE, MAXIMUM & AFTER LOAD, refer to the time when the assessment was made relative to load being applied to the school bus roof with the force application plate.

Comments: None

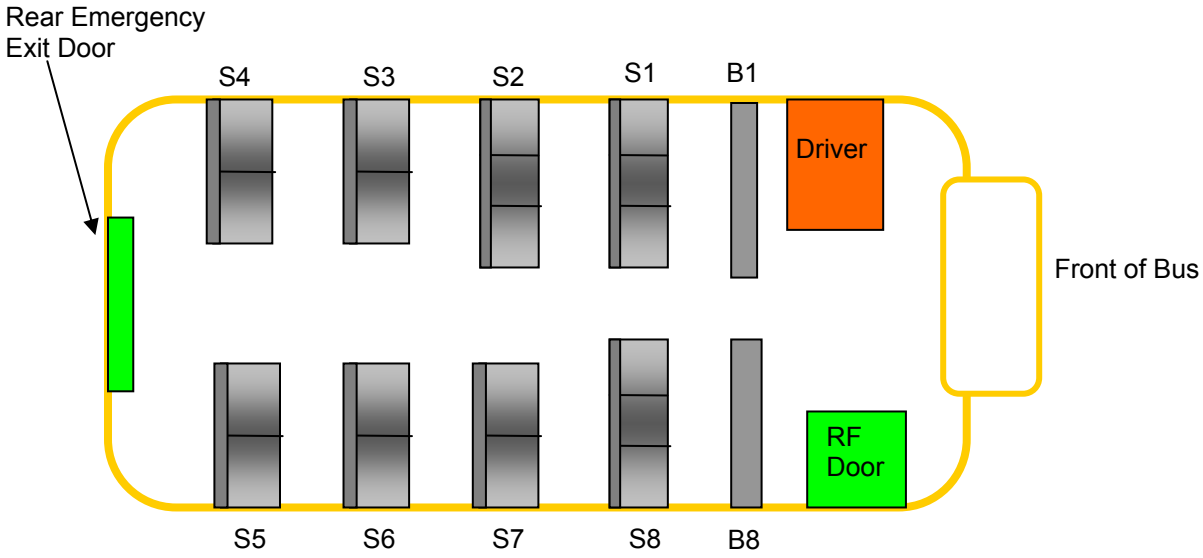
Recorded By: _____

Approved By: _____ Date: 11/02/11

DATA SHEET 6

EMERGENCY EXIT MEASUREMENTS

Test Vehicle: **2011 Girardin Micro Bird School Bus** NHTSA No.: **CB0903**
Test Lab: **MGA Research Corporation** Test Date: **11/02/11**



		Height (mm)	Width (mm)	Required Test Form (Ellipsoid or Parallelepiped)	Opening allowed unobstructed passage of the test form?	
					Yes – Pass	No – Fail
1	Rear Door	1,330	840	Parallelepiped		

Comments: Not applicable per COTR.

Recorded By: _____

Approved By: _____ Date: 11/02/11

SECTION 4

INSTRUMENTATION AND EQUIPMENT LIST

Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Steel Tape	Stanley	Power Lock	604	08/04/11	02/16/12
Cylinder #1 Load Cell	Interface	1220AF-50K-B	315453	10/26/11	04/26/12
Cylinder #1 Displacement Pot.	Ametek	P-40A	0108-27166	09/02/11	03/02/12
Cylinder #2 Load Cell	Interface	1220AF-50K-B	321811	10/26/11	04/26/12
Cylinder #2 Displacement Pot.	Ametek	P-40A	0304-21633	09/02/11	03/02/12
Cylinder #3 Load Cell	Interface	1220AF-50K-B	326710	10/26/11	04/26/12
Cylinder #3 Displacement Pot.	Ametek	P-40A	0108-27168	09/02/11	03/02/12
Cylinder #4 Load Cell	Interface	1220AF-50K-B	321788	10/26/11	04/26/12
Cylinder #4 Displacement Pot.	Ametek	P-40A	0108-27167	09/02/11	03/02/12
Force Gauge	Wagner	FDK-60	18109	09/08/11	03/08/12
Inclinometer	Digital Protractor	Pro 360	006	When Used	When Used

SECTION 5

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Frontal View of School Bus Before Testing (as received by MGA)

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Frontal View of School Bus After Testing

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Rear View of School Bus Before Testing (as received by MGA)

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Rear View of School Bus After Testing

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Full View of Left Side of School Bus Before Testing (as received by MGA)

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Full View of Right Side of School Bus Before Testing (as received by MGA)

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Full View of Right Side of School Bus After Testing

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Left Front ¾ View of School Bus Before Testing (as received by MGA)

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Left Front ¾ View of School Bus After Testing

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Right Front ¾ View of School Bus Before Testing (as received by MGA)

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Right Front ¾ View of School Bus After Testing

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Left Rear ¾ View of School Bus Before Testing (as received by MGA)

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Left Rear ¾ View of School Bus After Testing

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Right Rear ¾ View of School Bus Before Testing (as received by MGA)

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Right Rear ¾ View of School Bus After Testing

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Loading Device Placed Against Bus's Roof at Beginning of Test (Right Front)

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Loading Device Placed Against Bus's Roof at Maximum Load Condition (Right Front)

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Loading Device Placed Against Bus's Roof at Beginning of Test (Right Rear)

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Loading Device Placed Against Bus's Roof at Maximum Load Condition (Right Rear)

Backup Roof Deflection Measuring Device at Maximum Load Condition (Left Front)

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Backup Roof Deflection Measuring Device at Maximum Load Condition (Left Rear)

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Backup Roof Deflection Measuring Device at Maximum Load Condition (Right Front)

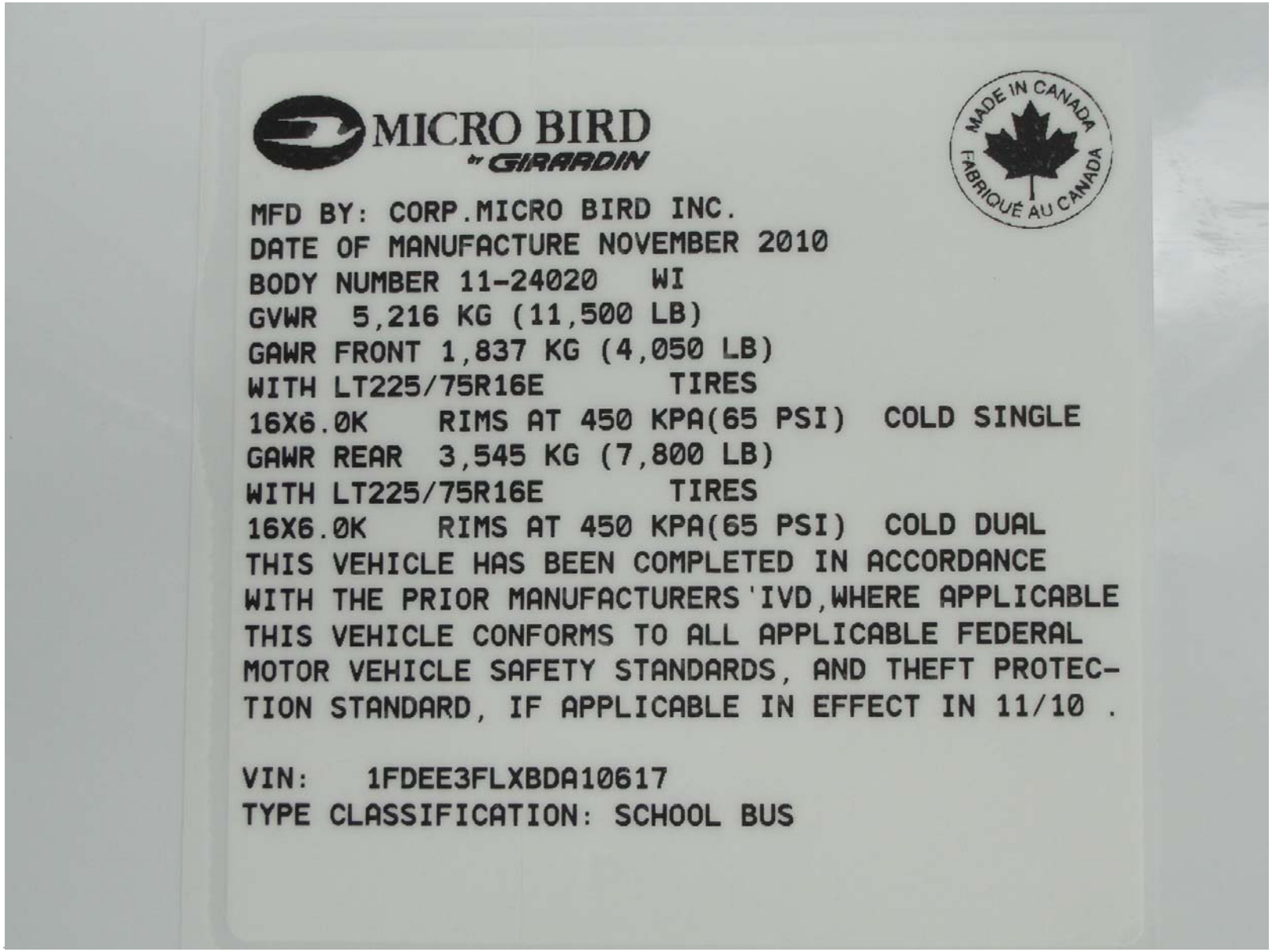
Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Backup Roof Deflection Measuring Device at Maximum Load Condition (Right Rear)

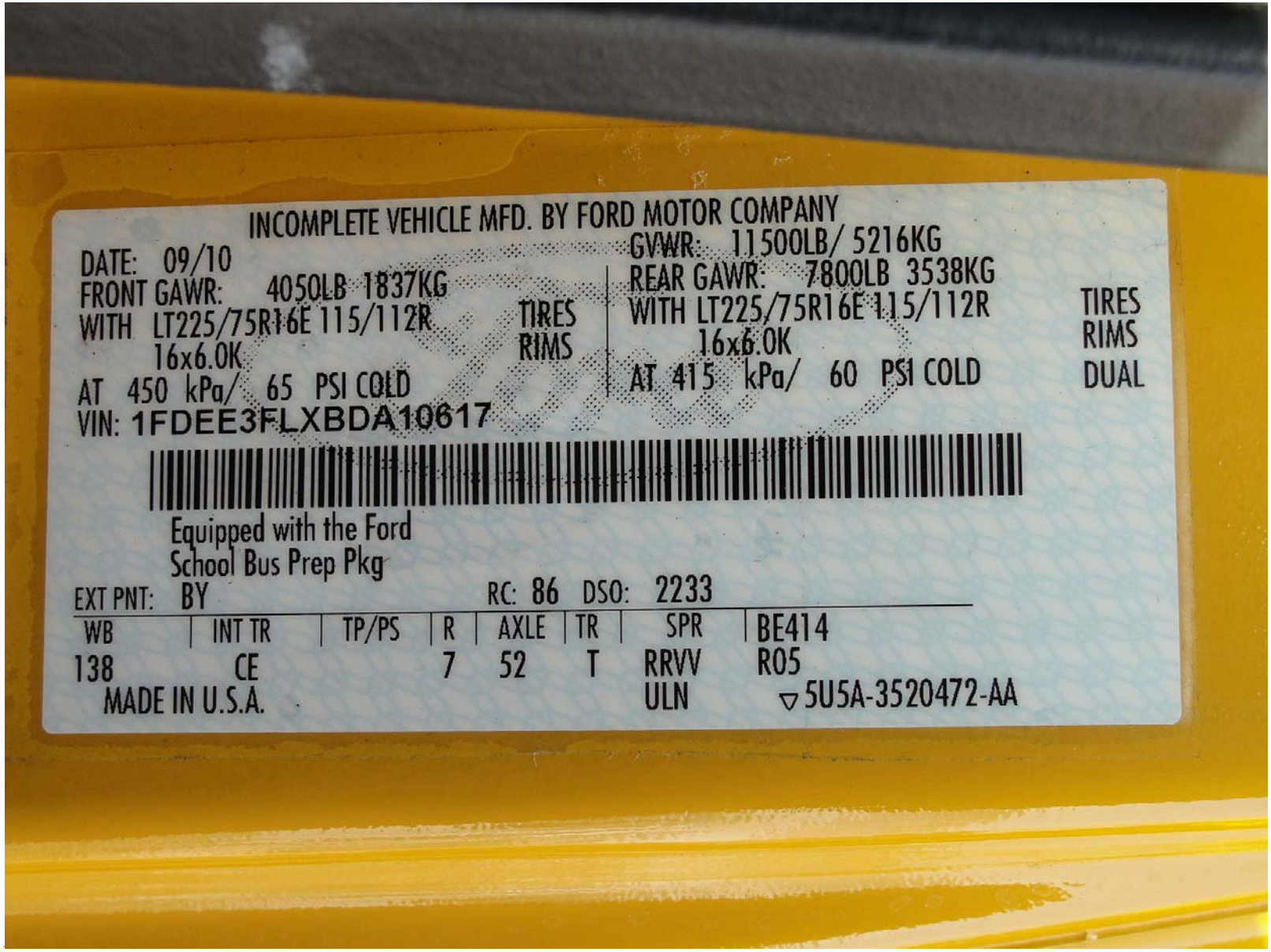
Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Date:	**11/02/11**

Roof, After Removal of Loading Device, Viewed From the Bus Exterior

Roof, After Removal of Loading Device, Viewed From the Bus Interior



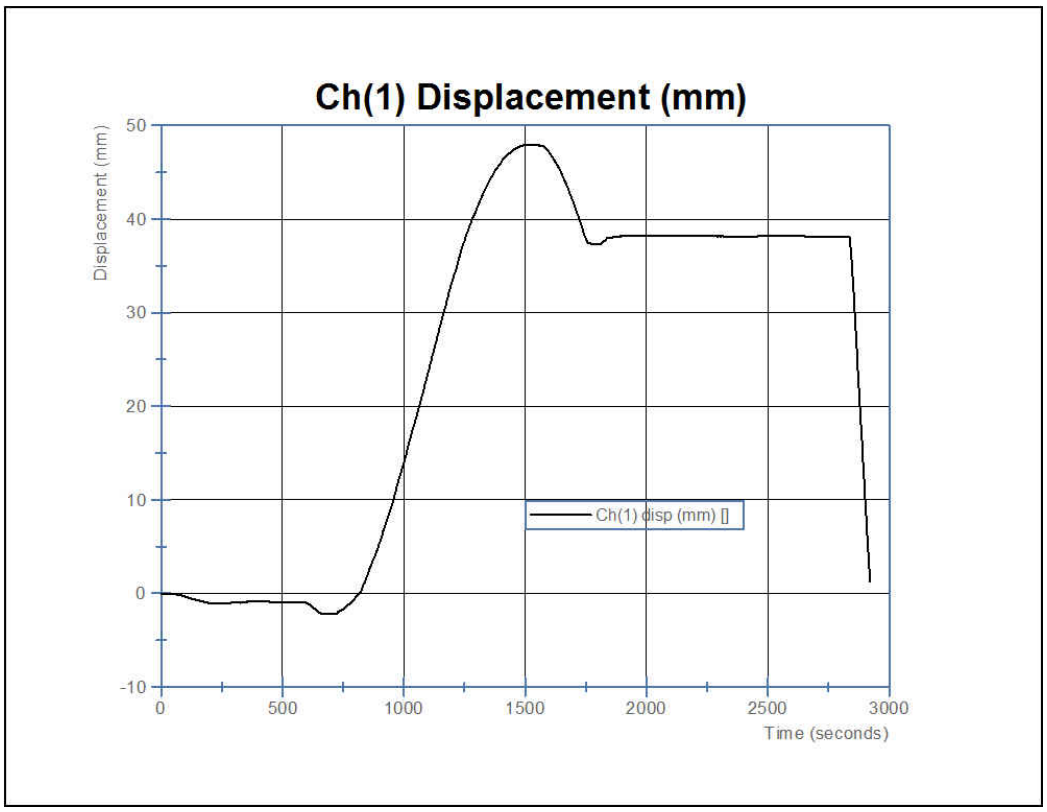
Certification Label and Tire Placard

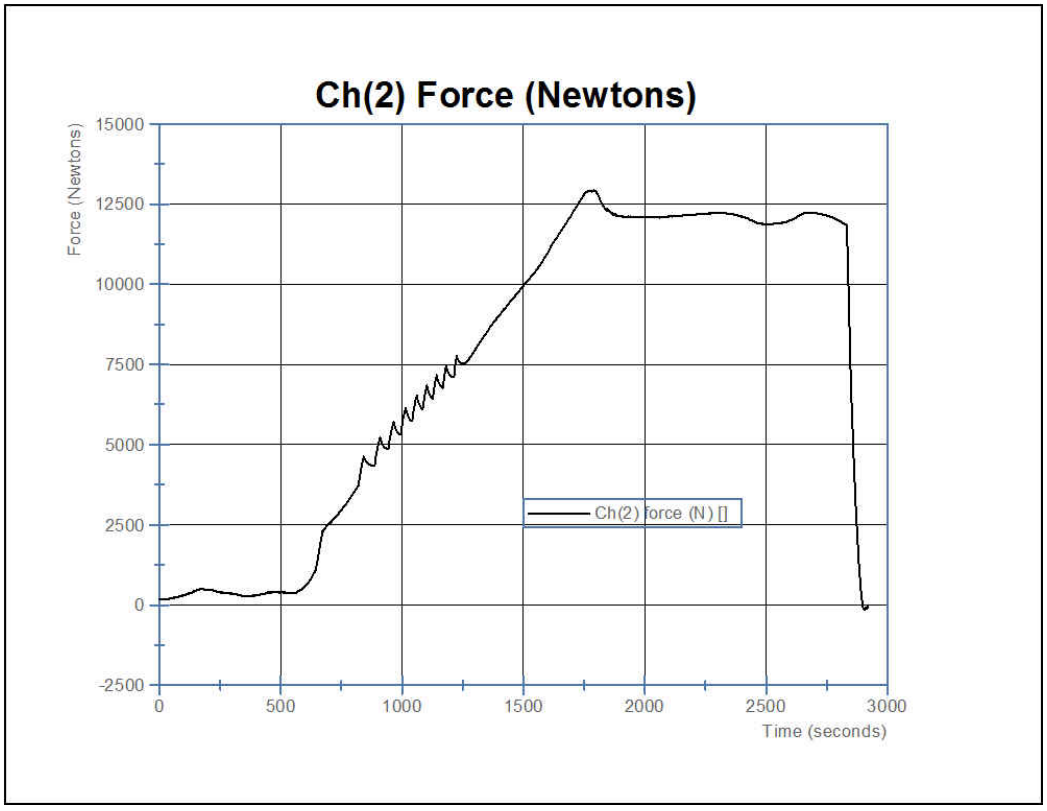


Incomplete Vehicle Label

SECTION 6

TEST PLOTS





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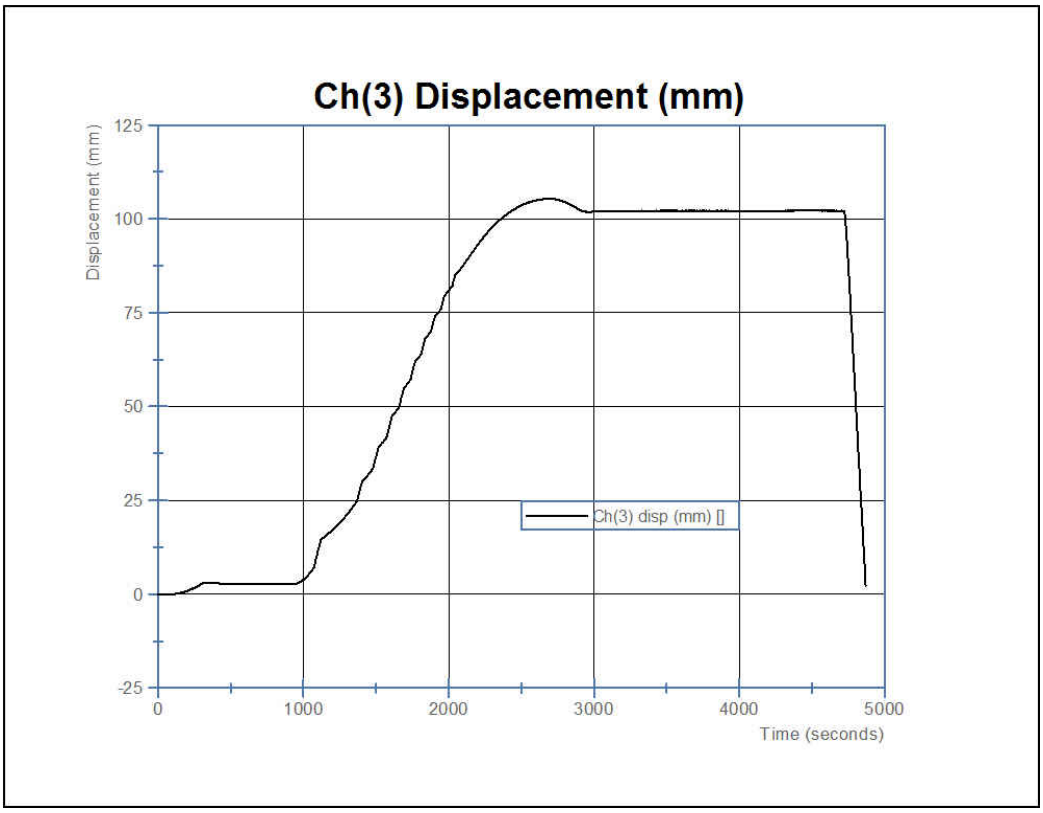
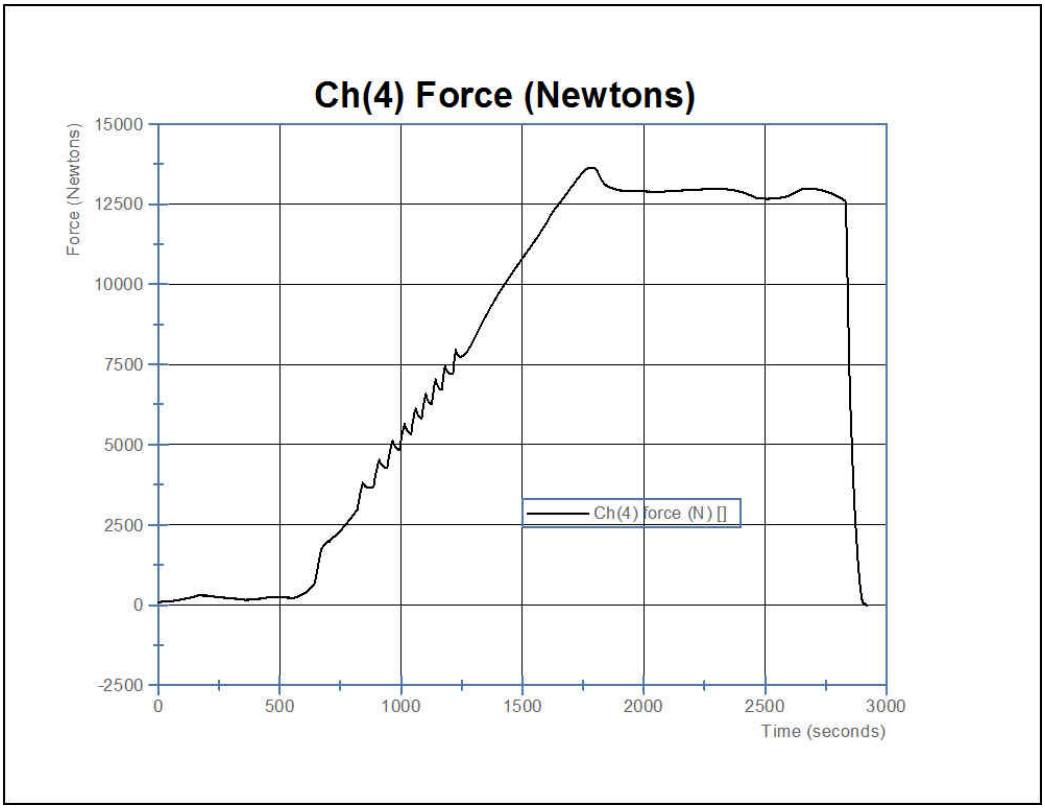
TEST PLOTS





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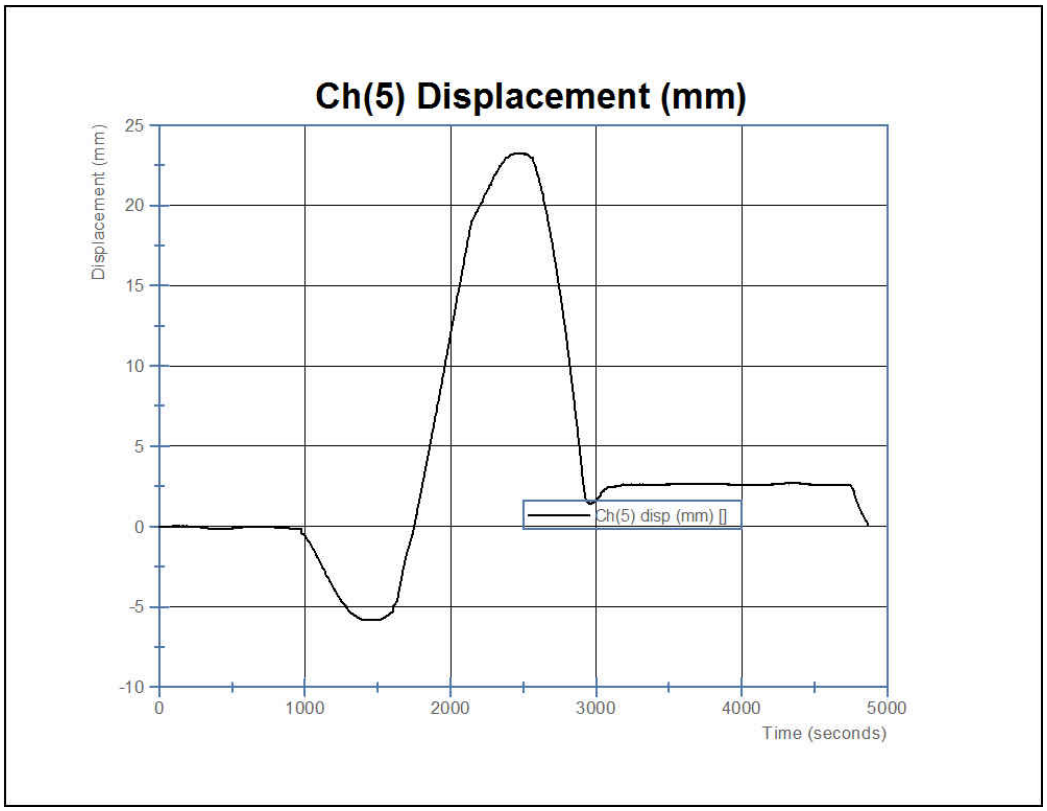

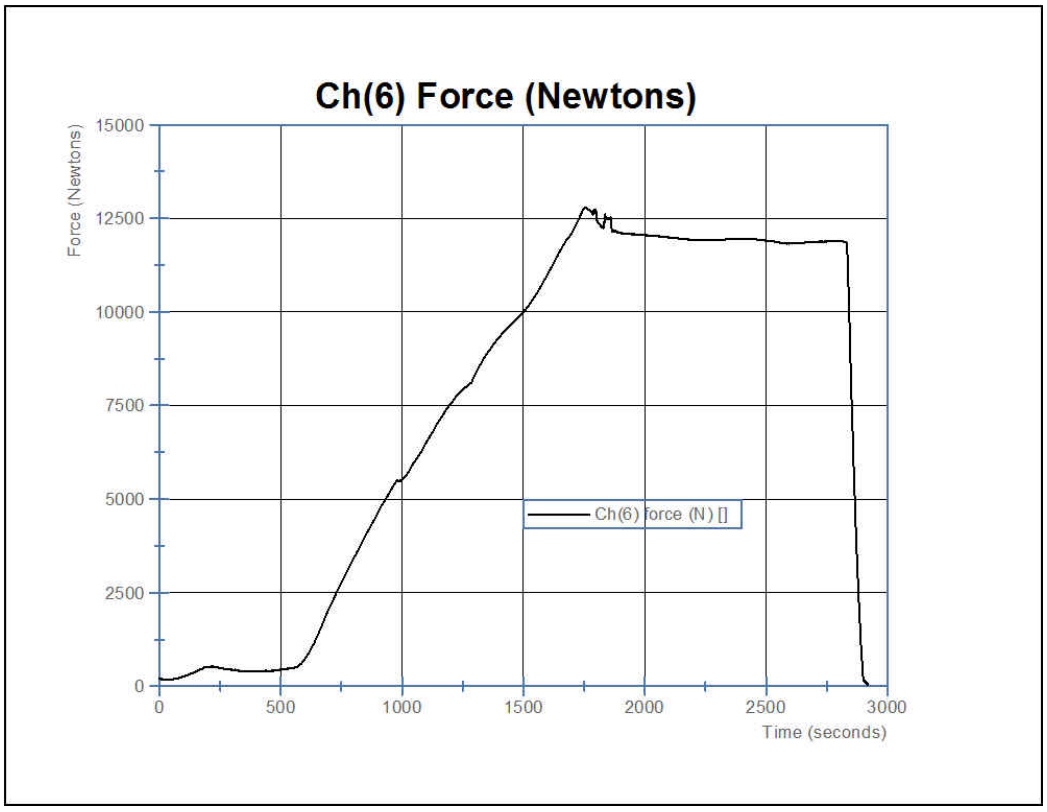

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TEST PLOTS