HS No. 637089

REPORT NUMBER: 221-MGA-03-005

SAFETY COMPLIANCE TESTING FOR FMVSS NO. 221 SCHOOL BUS BODY JOINT STRENGTH RETEST OF JOINT #6

American Transportation Corporation
2003 ATC IC3S530 School Bus
NHTSA No.: C30902

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

Final Report Date: December 19, 2003

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
400 SEVENTH STREET, SW, ROOM 6115 (NVS-220)
WASHINGTON, D.C. 20590

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared by: _____ Date: December 19, 2003
John Roberts, Project Engineer

Reviewed by: _____ Date: December 19, 2003
Michael Janovicz, Program Manager

FINAL REPORT ACCEPTED BY:

Amanda Prescott

January 5, 2004
Date of Acceptance

Entered in CORS
4/23/04

Technical Report Documentation Page

1. Report No. 221-MGA-03-005	*2. Government Accession No.*	*3. Recipient's Catalog No.*	
4. Title and Subtitle Final Report of FMVSS 221 Compliance Testing of 2003 American Transportation Corp IC3S530 School Bus NHTSA No.:C30902		*5. Report Date* December 19, 2003 *6. Performing Organization Code* MGA	
7. Author(s) John Roberts, Project Engineer Michael Janovicz, Project Manager		*8. Performing Organization Report No.* 221-MGA-03-005	
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		*10. Work Unit No.* *11. Contract or Grant No.* DTNH22-02-D-01057	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Enforcement Office of Vehicle Safety Compliance (NVS-220) 400 Seventh St., S.W. Room 6115 Washington, D.C. 20590		*13. Type of Report and Period Covered* Final Report 12/9/03 to 12/19/03 *14. Sponsoring Agency Code* NVS-220	
15. Supplementary Notes			
16. Abstract Compliance tests were conducted on the subject 2003 American Transportation Corp IC3S530 School Bus, NHTSA No. C30902 in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-221-02 for the determination of FMVSS 221 compliance. TEST FAILURES: ALSCM685BSV failed to meet the minimum load requirements			
17. Key Words Compliance Testing Safety Engineering FMVSS 221		*18. Distribution Statement* Copies of this report are available from: NHTSA Technical Information Services (TIS) Room 5108, (NPO-230) 400 Seventh Street, S.W. Washington, D.C. 20590 (202) 366-4946	
19. Security Classif. (of this report) Unclassified	*20. Security Classif. (of this page)* Unclassified	*21. No. of Pages* 23	22. Price

Form DOT F1700.7 (8-72)

TABLE OF CONTENTS

SECTION 1
PURPOSE OF COMPLIANCE TEST

Tests were conducted on a MY2003 American Transportation Corp IC3S530 School Bus, NHTSA No. C30902, in accordance with the specifications of the Office of Vehicle Safety Compliance (OVSC) Test Procedures TP-221-02 to determine compliance to the requirements of Federal Motor Vehicle Safety Standards (FMVSS) 221, "School Bus Body Joint Strength".

This program is sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-02-D-01057.

SECTION 2
TEST PROCEDURE

The MY2003 American Transportation Corp IC3S530 School Bus, NHTSA No. C30902, was subjected to FMVSS 221 testing on December 9, 2003.

The joint samples were selected in conjunction with the Contract Officer's Technical Representative (COTR). Six 12 x 48 inch samples were selected. They were removed from the bus using a metal shear and/or SawzAll type of cutter.

After each sample area had been removed from the bus, the sample was cut to the specific dimensions. Each specimen was carefully shaped to the final size using supports as specified in FMVSS 221. Additionally, temperature monitoring stickers were placed at the specified locations of each sample to ensure the sample temperature did not exceed 140°F during the shaping operation.

The samples were tested using the MGA 50,000 pound tensile tester. The force applied was measured directly at the upper clamp. The upper clamp was attached to the load cell and the lower clamp was attached to the load frame.

The gripping devices were fabricated from 3" x 3" angle iron. Slots were milled on the face that mounted to the machine, in order to allow for fore and aft movement of the clamps. This allowed the specimens to be fixtured so that the axis of the test specimen coincided with the centerline axis of the tensile tester heads.

The test specimen was inserted in between the grips, and the grips were then bolted together using 7 size ½" bolts. The bolts were inserted through one grip, through the test specimen, and then through the other grip. This prevented any slipping of the test sample in the grips, while fully distributing the clamping force across the entire end width of the test sample. Post test examination of the specimens indicated that no load was applied to the clamp mounting holes.

The rate of load application was ¼ inch per minute. The force and displacement were recorded and displacement vs. time was plotted to monitor the displacement rate.

SECTION 3

TEST DATA SUMMARY

One sample was tested for this vehicle. The sample was selected from the Roof Interior rear.

Joint Location	Maximum Load (N)	60% of Material Strength (N)	PASS/FAIL
Roof Interior (6) Retest	23,178.2	25,067.9	FAIL

The maximum forces measured, and the displacement rate used, are provided in Section 7.

The photographs taken from the samples are provided in Sections 6 and 8.

SECTION 4
COMPLIANCE TEST DATA

The following data sheets document the results of FMVSS 221 testing on the MY2003 American Transportation Corp IC3S530 School Bus, NHTSA No. C30902.

DATA SHEET 1
ADINMISTRATIVE DATA SHEET

Test Vehicle:	**2003 American Transportation Corp IC3S530 School Bus**	NHTSA No.:	**C30902**
Test Lab:	**MGA Research-Wisconsin Operations**	Test Date:	**12/9/03**

INCOMPLETE VEHICLE (IF APPLICABLE)

Manufacturer:	
Model:	
VIN:	
Build Date:	
Certification Date:	

COMPLETED VEHICLE (SCHOOL BUS)

Manufacturer:	American Transportation Corporation
Make/Model:	School Bus/IC3S530
VIN:	4DRBRABN73B955119
NHTSA No.:	C30902
Color:	Yellow
GVWR:	12,474 kg / 27,500 lbs
Build Date:	10/02
Certification Date:	10/02

DATES

Vehicle Receipt:	November 4, 2002
Start of Compliance Test:	December 9, 2003
Completion of Compliance Test:	December 9, 2003

COMPLIANCE TEST:
All tests were performed in accordance with the references outlined in TP-221-02.

Recorded By: _____

Approved By: _____ Date: December 19, 2003

DATA SHEET 2

SUMMARY OF DATA

Test Vehicle: **2003 American Transportation Corp IC3S530 School Bus** NHTSA No.: **C30902**

Test Lab: **MGA Research-Wisconsin Operations** Test Date: **12/9/03**

Joint Specimen Identification	Joint Location Description and (Number)	Joint Load Reqmt (N) (60%)	Max. Load at Joint Separation (N)	Calculated Material Strength (N)	PASS/FAIL
ALSCMI685BSV	Roof Interior (6) Retest	25,067.9	23,178.2	41,779.8	FAIL

Comments: NONE

Recorded By: 

Approved By: 

Date: December 19, 2003

DATA SHEET 3

JOINT STRENGTH WHEN ASTM MATERIAL PROPERTIES ARE KNOWN

Test Vehicle:	**2003 American Transportation Corp IC3S530 School Bus**	NHTSA No.:	**C30902**
Test Lab:	**MGA Research-Wisconsin Operations**	Test Date:	**12/9/03**

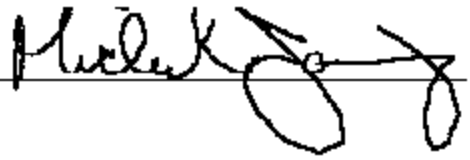
Specimen Description:	Roof Interior (6)
Joint Number:	ALSCMI685BSV

	Weaker Member	Stronger Member
Material	---	---
Tensile Strength (MPa)	310.2	---
Gage/Thickness (mm)	22 / .759	---
Fastener Holes (No./Diameter – mm.)	5 / 4.089	---
Net Area (Sq. mm.)	138.7	---
Material Strength (N)	41,779.8	---
60% of Material Strength (N)	25,067.9	---
Maximum Load From Tensile Test of Joint (N)	23,178.2	---
PASS/FAIL	FAIL	---

1. Screw Spacing 38 mm

Comments: American Transportation Corp. provided material properties but not the specific material type.

Recorded By: 

Approved By: 

Date: December 19, 2003

SECTION 5

INSTRUMENTATION AND EQUIPMENT LIST

Test Vehicle: **2003 American Transportation Corp fC3S530 School Bus** NHTSA No.: **C30902**

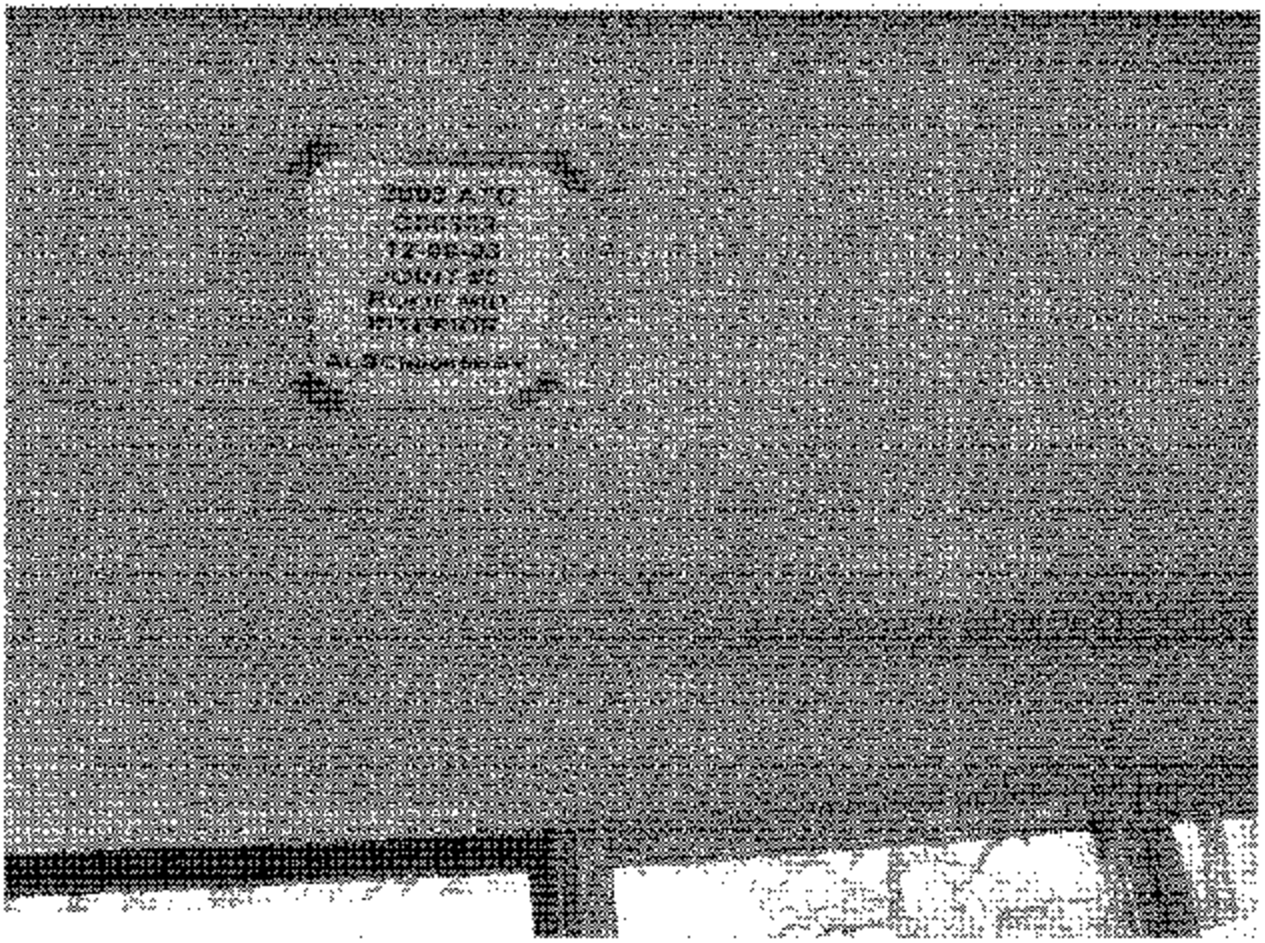
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **12/9/03**

Equipment	Description	Model/Serial No.	Cal. Date	Next Cal. Date
Computer	HP	Vectra / US03263612	---	---
A/D Interface	Metrabyte	DAS-1802	---	---
Load Cell	Interface	138773	6/19/03	12/19/03
L near Potentiometer	Ametek	17167	Each Usage	---
Digital Caliper	Mitutoyo	CD-6"GS/ 0004174	10/18/03	10/18/04
Steel Tape	Stanley	Powerlock / 149	11/24/03	5/24/04
Temp. Recorder	Dickson	TR320 / 03039010	2/1/03	2/1/04
Temp. Stickers	McMaster-Carr	60°C 5952K21	One Time Usage	---

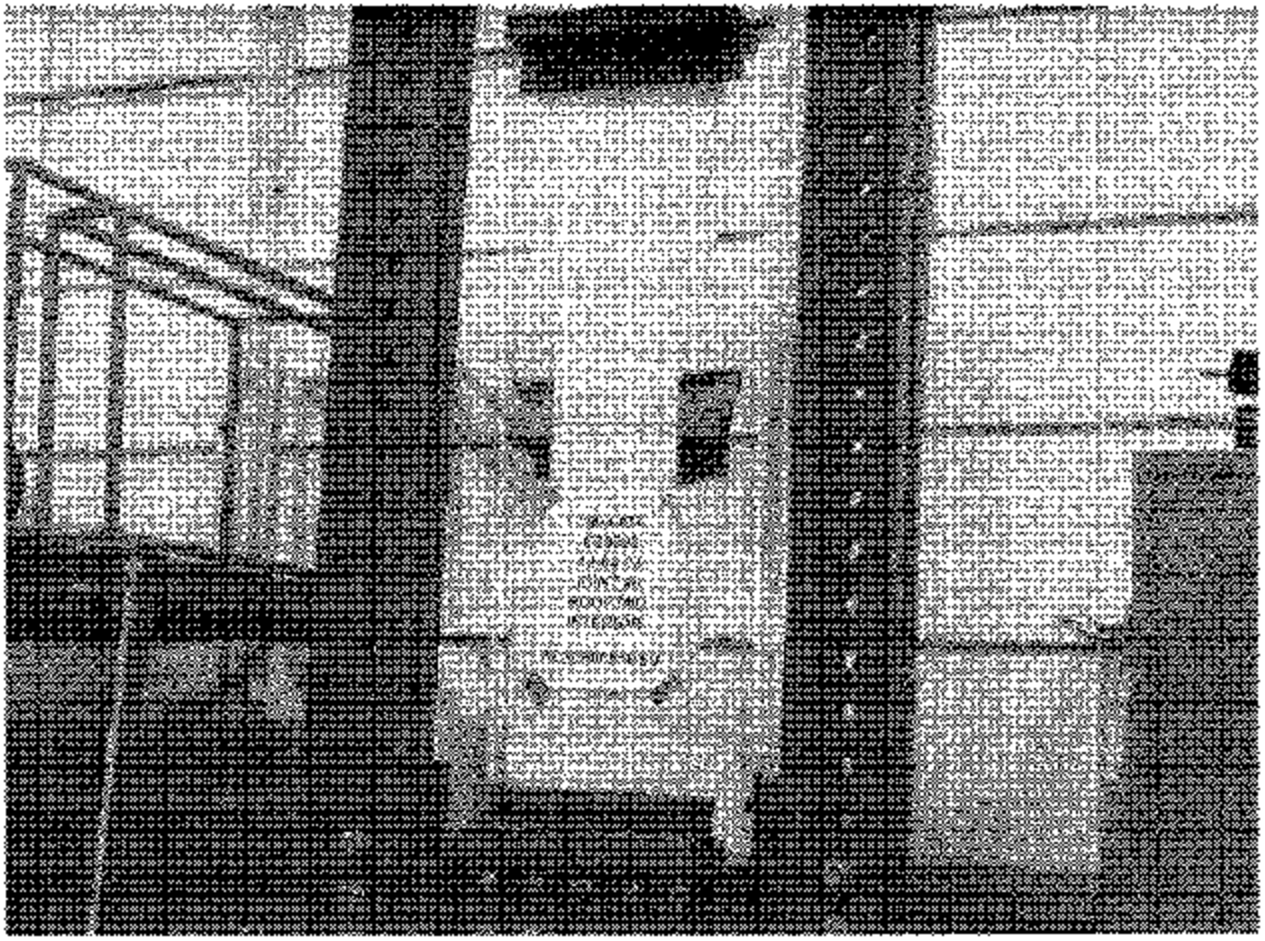
SECTION 6

PHOTOGRAPHS

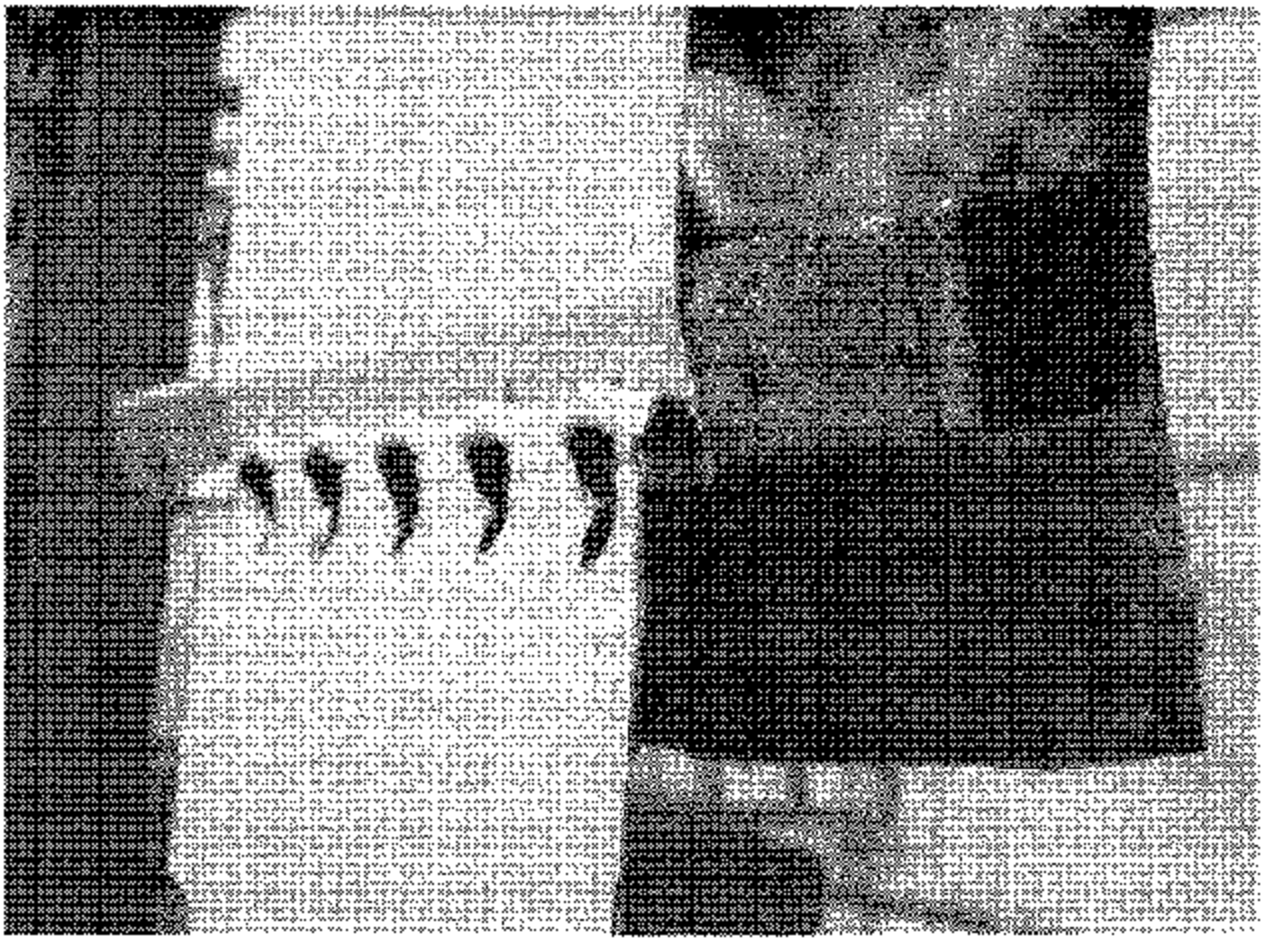
TABLE OF PHOTOGRAPHS



Sample #6 Marked on Bus Before Cutout



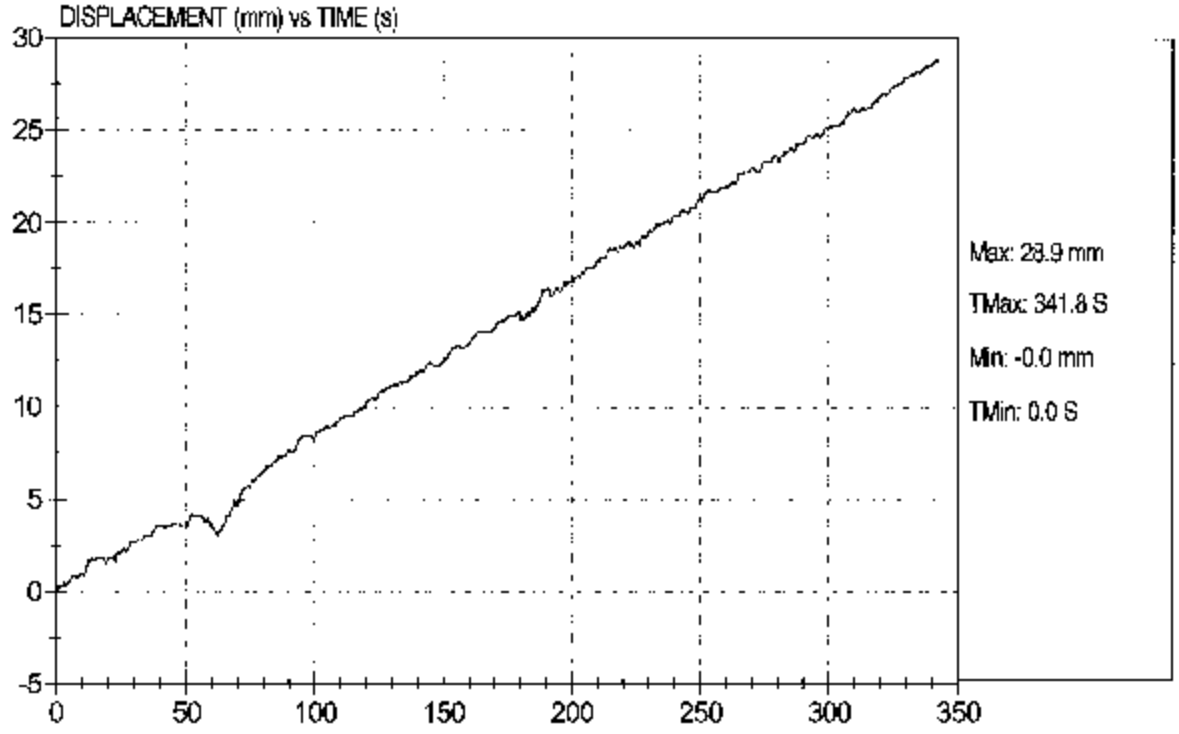
Sample #6 Installed in Test Machine (Pre-Test)

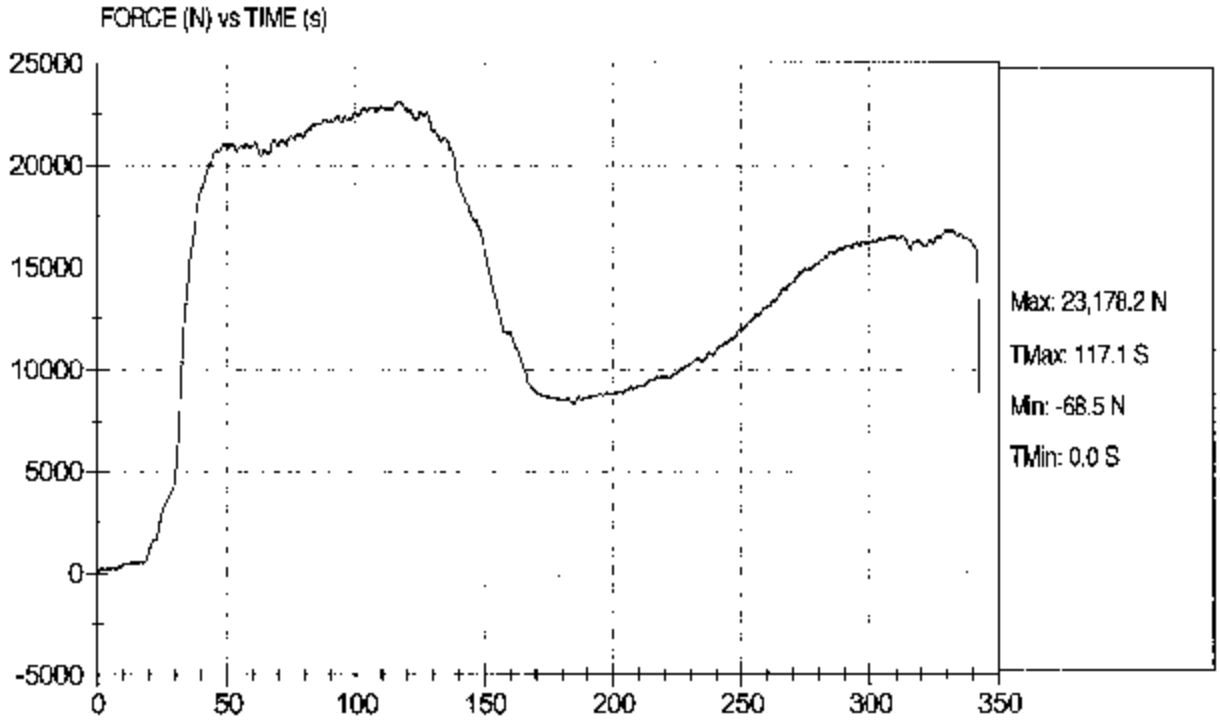


Sample #6 Post-Test Separation

SECTION 7
TEST PLOTS

TABLE OF TEST PLOTS

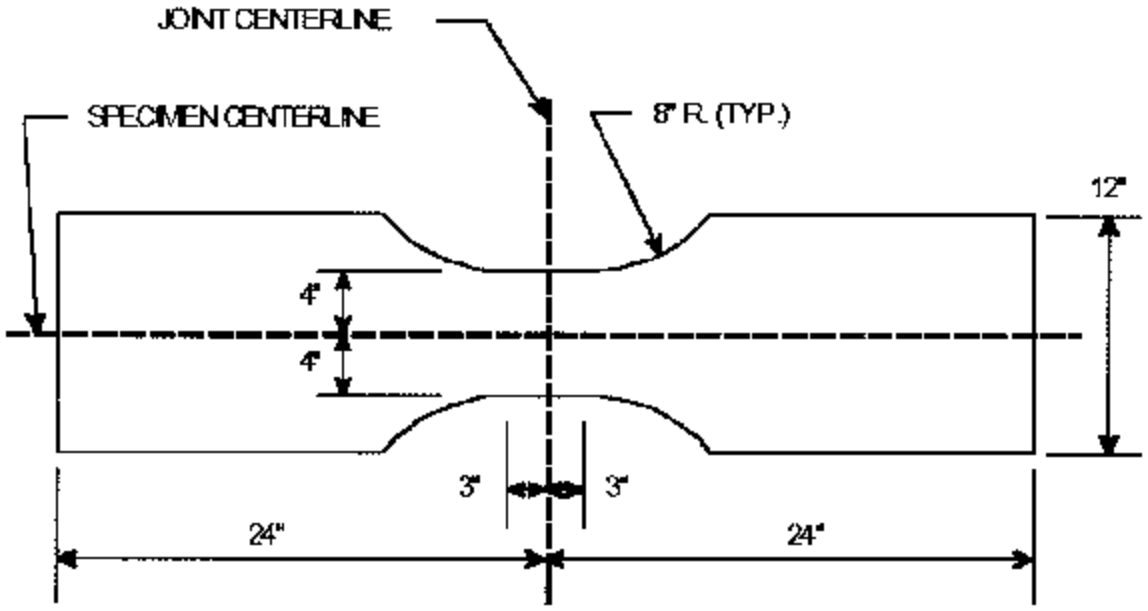

DISPLACEMENT (mm) vs TIME (s)
30
25
20
15
10
5
0
-5
0
50
100
150
200
250
300
350
Max: 28.9 mm
TMax: 341.8 S
Min: -0.0 mm
TMin: 0.0 S


FORCE (N) vs TIME (s)
25000
20000
15000
10000
5000
0
-5000
0
50
100
150
200
250
300
350
Max: 23,178.2 N
TMax: 117.1 S
Min: -68.5 N
TMin: 0.0 S

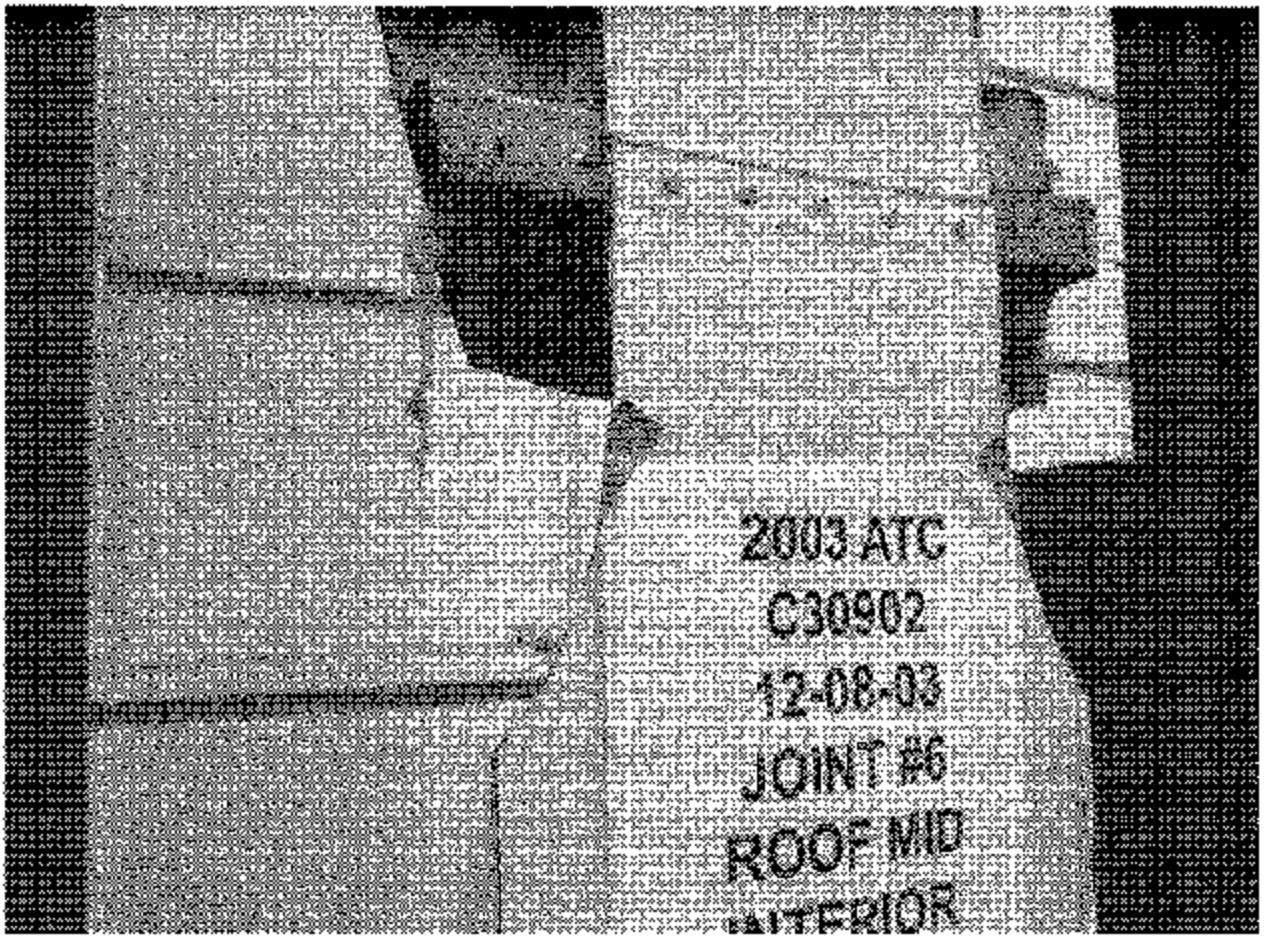
SECTION 8

JOINT CONFIGURATIONS

DIMENSION REQUIREMENTS OF BODY PANEL SPECIMEN
WHOSE JOINT SEGMENT IS 8 INCHES LONG

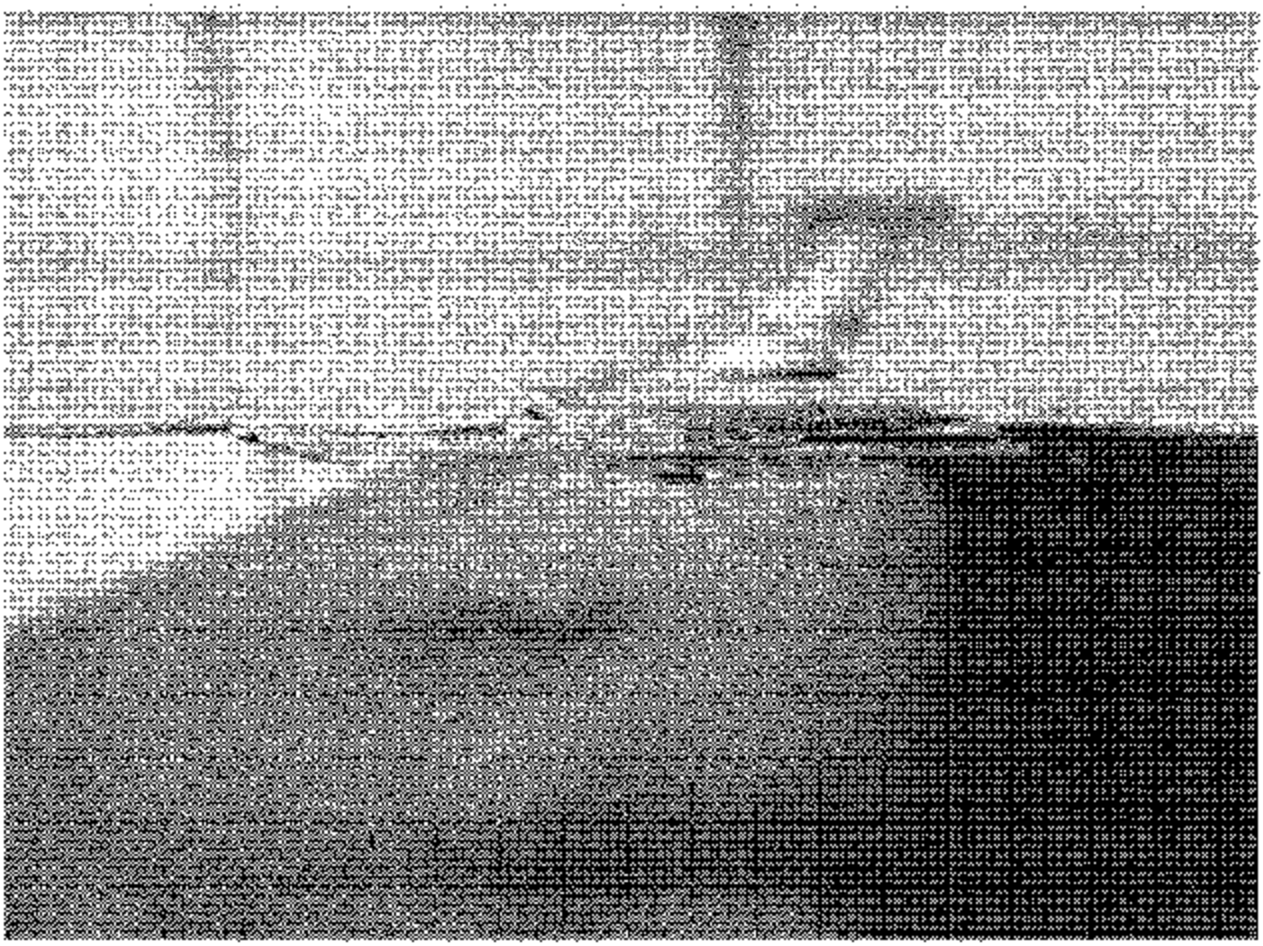


Typical Test Sample Configuration



Front View of Joint #6

Test Vehicle: **2003 ATC IC3S530 School Bus**
Procedure: **FMVSS 221** NHTSA No.: **C30902**



End View of Joint #6

SECTION 9

LABORATORY NOTICE OF TEST FAILURE TO OVSC

RETEST OF DIFFERENT PANEL SAME LOCATION

Test Procedure:	FMVSS 221	Test Date:	December 9, 2003
Test Vehicle:	2003 ATC	Test Lab:	MGA Research Corp.
NHTSA No.:	C30902	Project Engineer:	Michael Janovicz
Contract No.:	DTNH22-02-D-01057	Delivery Order No.:	Contract
MFR.:	ATC	VIN:	4DRBRABN73B955119
Build Date:	12/02		

TEST FAILURE DESCRIPTION

Roof panel ALSCMI685BSV failed to meet load requirement of 25,922 newtons when tensile tested as described in 49 CFR 571.221.

FMVSS REQUIREMENTS DESCRIPTION

Paragraph S.5: "When tested in accordance with the procedure of S6, each body panel joint shall be capable of holding the body panel to the member to which it is joined when subjected to a force of 60% of the tensile strength of the weakest joined body panel determined pursuant to S6.2."

Remarks: No remarks.

Notification to NHTSA (COTR): Amanda Prescott

Date: December 9 , 2003

By: