

REPORT NUMBER: 201-CAL-05-01

**SAFETY COMPLIANCE TESTING FOR FMVSS 201
OCCUPANT PROTECTION IN INTERIOR IMPACT**

**TOYOTA MOTOR CORPORATION
2005 SCION XB**

NHTSA NUMBER: C55105

GD TEST NUMBER: 8655-F201-29

**CALSPAN
TRANSPORTATION SCIENCES CENTER
P.O. BOX 400
BUFFALO, NEW YORK 14225**



Test Date: June 1, 2005

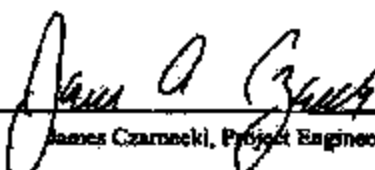
FINAL REPORT

PREPARED FOR:

**U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance
Mail Code: NVS-220, Room 6111
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Washington, DC 20590**

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15. <i>Supplementary Notes</i>					
16. <i>Abstract</i> Compliance tests were conducted on the subject vehicle, a 2005 Scion xB in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure TP-201-02 for determination of FMVSS 201 compliance. Test failures identified were as follows: None					
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SECTION 1

PURPOSE AND TEST PROCEDURE

This head impact compliance test is part of the FMVSS 201, Occupant Protection in Interior Impact, Test Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-01-C-01025. The purpose of this impact compliance test was to determine whether the subject vehicle, a 2005 Scion xB, NHTSA No. C35105, meets the performance requirements of FMVSS 201, Occupant Protection in Interior Impact. The compliance test was conducted using the requirements found in the OVSC Laboratory Test Procedure No. TP-201-02 dated March 3, 1989.

SECTION 2

SUMMARY OF OCCUPANT PROTECTION IN INTERIOR IMPACTS

A 2005 Scion xB, NHTSA No. C55105, was impacted at various locations throughout its instrument cluster/dash panel and seat back area by a 15 lb, 6.5 inch diameter steel headform. A total of four (4) impacts were performed in this test series. The target area impacts were chosen by the NHTSA Contracting Officer's Technical Representative (COTR). The four (4) chosen impact points were:

Seat Back / Head Restraint Area

Instrument Panel Cluster Area

Airbag Cover / Dash Panel Area (2 impacts)

The selected impact areas on the test vehicle appeared to comply with the performance requirements of FMVSS 201.

The 6.5 inch diameter steel headform weighed 15 lb and had an accelerometer mounted along the centerline of the head.

One (1) channel of data for each target impact test was recorded on a Keyser-Threde data acquisition system. Data plots can be found in Appendix C along with still photographs can be found in Appendix A of this report.

To document each target area impact test, one digital camera picture was taken pre- and post-test at various locations to view the headform contact with the selected target areas.

TEST VEHICLE RECEIVING INSPECTION DATA SHEET

VEHICLE YEAR/MAKE/MODEL/STYLE:	2005 Scion xB
NHTSA NO.:	C55105
VIN:	JTLKT334254011280
DATE OF MANUFACTURE:	11/04 (SEE CERTIFICATION LABEL)
COLOR:	Green
ODOMETER READING:	90
LABORATORY:	Calspan
TEST DATE:	June 1, 2005

NUMBER OF SEATING POSITIONS:

FRONT: 2 REAR: 3

INSTRUMENT PANEL:

NOTE UNUSUAL FEATURES: None

TYPE OF FRONT SEATS:

BENCH: - BUCKET: X SPLIT BACKS: -

TYPE OF HEAD RESTRAINTS:

FIXED: - ADJUSTABLE: X

VEHICLE EQUIPPED WITH ARMRESTS?

NO: - YES: X NUMBER: 4

LOCATION: Front and rear door panels

VEHICLE EQUIPPED WITH SUN VISORS?

NO: - YES: X

VEHICLE EQUIPPED WITH INTERIOR DOOR LATCHES?

NO: - YES: X NUMBER: 2

LOCATION: Glove Box and Center Storage Box

HEADFORM IMPACT TEST RESULTS INSTRUMENT PANEL

VEHICLE YEAR/MAKE/MODEL/STYLE:	2005 Scion xB
NHTSA NO.:	C55105
VIN:	JTLKT334254011280
DATE OF MANUFACTURE:	11/04 (SEE CERTIFICATION LABEL)
COLOR:	Green
ODOMETER READING:	90
LABORATORY:	Calspan
TEST DATE:	June 1, 2005

IMPACT LOCATION AND NUMBER				VELOCITY (mph)	PEAK ACCELERATION (3 ms Clp) Gs
NUMBER	X (Inches)	Y (Inches)	ANGLE (degrees)		
IP1 - Center dash above radio	27.25	-10.5	-38	11.59	57.32
IP2 - Below left corner of airbag	29.5	-2.0	-47	11.49	45.84
IP3 - Below right corner of airbag	29.25	7.25	-47	11.55	37.80

REFERENCE POINT: Seating Reference Position (SgRP) on front outboard passenger designated seating position is the reference point (x positive forward of SgRP and y positive right of SgRP).

REMARKS:

HEADFORM IMPACT TEST RESULTS **SEAT BACKS**

VEHICLE YEAR/MAKE/MODEL/STYLE:	2005 Scion xB
NHTSA NO.:	C55105
VIN:	JTLKT334234011280
DATE OF MANUFACTURE:	11/04 (SBB CERTIFICATION LABEL)
COLOR:	Green
ODOMETER READING:	90
LABORATORY:	Calspan
TEST DATE:	June 1, 2005

IMPACT LOCATION AND NUMBER				VELOCITY (mph)	PEAK ACCELERATION (3 ms Clip) Gs
NUMBER	X (Inches)	Y (Inches)	ANGLE (degrees)		
SB1 - Seat Back	17.0	0	-20	14.5	32.07

REFERENCE POINT: SgRP on rear outboard passenger designated seating position is the reference point (x positive forward of SgRP and y positive right of SgRP).

SUN VISOR AND ARMREST EVALUATION

VEHICLE YEAR/MAKE/MODEL/STYLE:	2005 Scion xB
NHTSA NO.:	C55105
VIN:	JTLKT334254011280
DATE OF MANUFACTURE:	11/04 (SEE CERTIFICATION LABEL)
COLOR:	Green
ODOMETER READING:	90
LABORATORY:	Calspan
TEST DATE:	June 1, 2005

SUN VISOR INFORMATION:

- Are sun visors constructed of or covered with energy absorbing material?

YES (PASS): X NO (FAIL): -

- Are any edges statically contactable by a spherical 6.5 inch diameter headform of radius less than 0.125 inch?

YES (FAIL): - NO (PASS): X

ARMREST INFORMATION:

A. FIXED ARMREST

- Is it constructed of energy absorbing material with the capability of laterally deflecting 2 inches without contacting any underlying rigid material?

YES: N/A

NO: N/A

- Is it constructed of energy absorbing material that deflects or collapses within 1.25 inches of the rigid test panel surface without contacting underlying rigid material between 0.50 and 1.25 inches from the panel which has a vertical height of less than 1 inch?

YES: N/A

NO: N/A

- Does it provide adequate pelvic area impact protection?

YES: X

NO: -

- Does it meet at least one of the criteria No. 1 to 3?

YES (PASS): X

NO (FAIL): -

B. FOLDING ARMREST

Is it made of or covered with energy absorbing material? Or does it meet at least one of the criteria No. 1 to 3?

YES (PASS): X

NO (FAIL): -

DOOR LATCH EVALUATION

VEHICLE YEAR/MAKE/MODEL/STYLE:	2005 Scion xB
NHTSA NO.:	C55105
VIN:	JTLKT334254011280
DATE OF MANUFACTURE:	11/04 (SEE CERTIFICATION LABEL)
COLOR:	Green
ODOMETER READING:	90
LABORATORY:	Calspan
TEST DATE:	June 1, 2005

LATCH ENGAGEMENT INTERFERENCE

DESCRIPTION OF LATCH LOCATION	NO LOAD	10G HORIZONTAL TRANSVERSE	10G VERTICAL	30G HORIZONTAL LONGITUDINAL
Glove Box	Pass	Pass	Pass	Pass
Center Storage Box	Pass	Pass	Pass	Pass

(APPENDIX B CONTAINS CALCULATION SHEETS WHICH ARE BASED ON MANUFACTURER'S DATA)

SUMMARY OF RESULTS

VEHICLE YEAR/MAKE/MODEL/STYLE:	2005 Scion xB
NHTSA NO.:	C55105
VIN:	JTLKT334254011280
DATE OF MANUFACTURE:	11/04 (SEE CERTIFICATION LABEL)
COLOR:	Green
ODOMETER READING:	90
LABORATORY:	Calspan
TEST DATE:	June 1, 2005

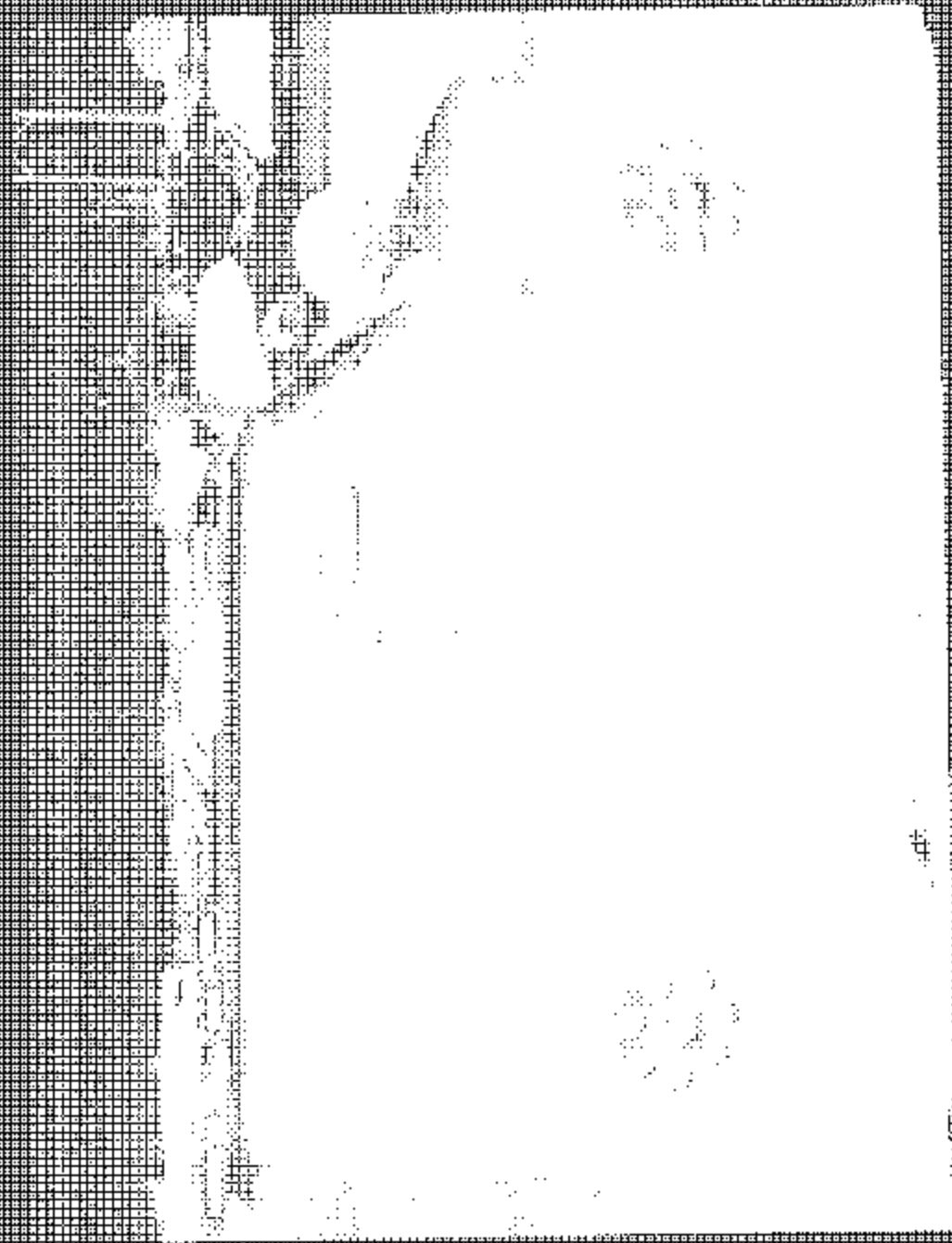
	NUMBER OF IMPACTS	PASS/FAIL
INSTRUMENT PANEL	3	Pass
SEAT BACK	1	Pass
SUN VISORS	N/A	Pass
ARMRESTS	N/A	Pass
INTERIOR COMPARTMENT DOORS	N/A	Pass

REMARKS:

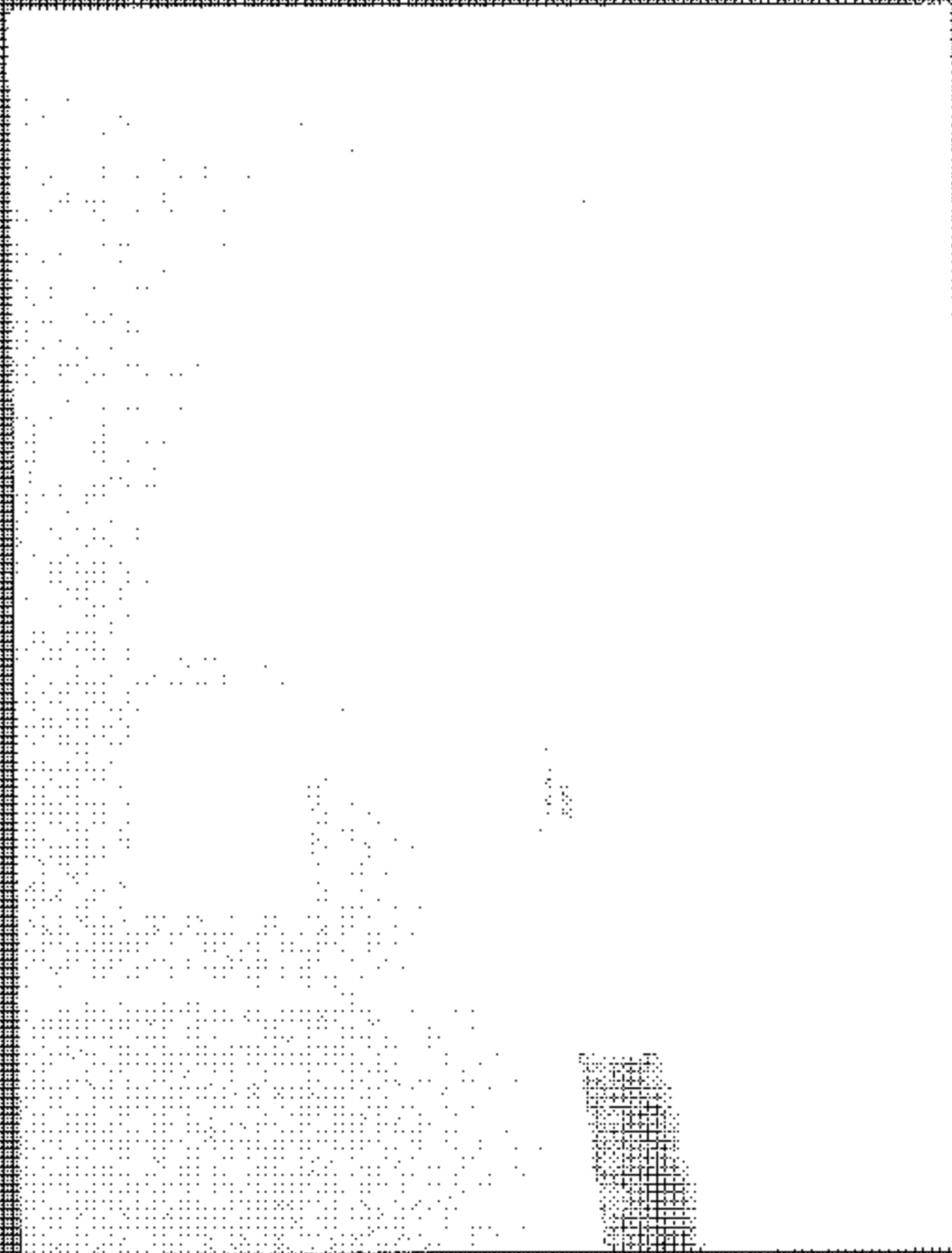
APPENDIX A
PHOTOGRAPHS

PHOTOGRAPHS

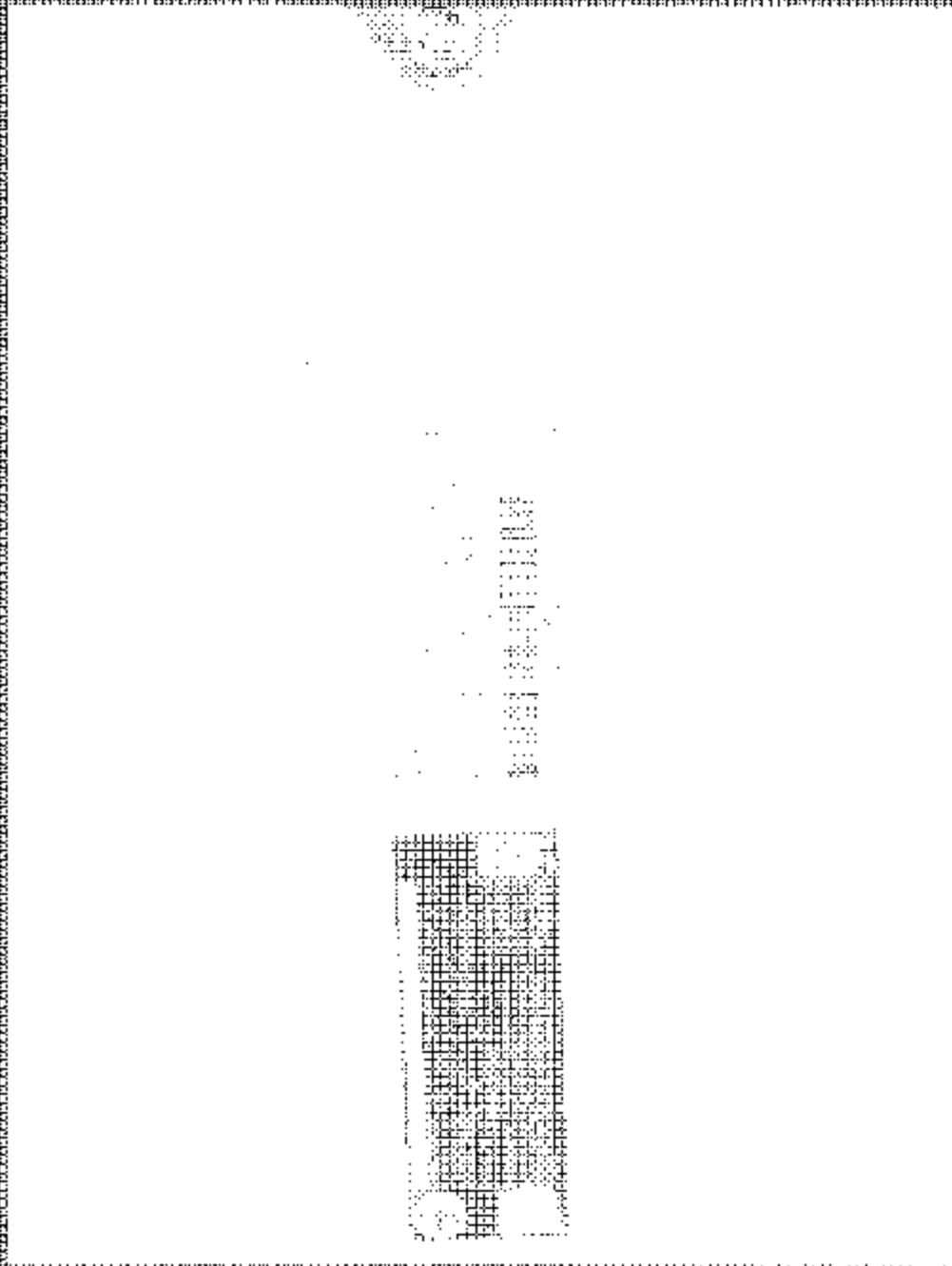
FIGURE	VIEW
A-1	LEFT SIDE VIEW OF VEHICLE
A-2	RIGHT SIDE VIEW OF VEHICLE
A-3	3/4 FRONTAL VIEW FROM LEFT SIDE OF VEHICLE
A-4	3/4 REAR VIEW FROM RIGHT SIDE OF VEHICLE
A-5	VEHICLE'S CERTIFICATION LABEL
A-6	VEHICLE'S TIRE INFORMATION LABEL
A-7	SUN VISOR CONSTRUCTION
A-8	ARMREST LEFT FRONT DOOR
A-9	ARMREST LEFT REAR DOOR
A-10	INSTRUMENT PANEL
A-11	INSTRUMENT PANEL IMPACT ZONE PRE-TEST
A-12	INSTRUMENT PANEL IMPACT ZONE POST-TEST
A-13	INSTRUMENT PANEL LEFT SIDE AIRBAG COVER IMPACT PRE-TEST
A-14	INSTRUMENT PANEL LEFT SIDE AIRBAG COVER IMPACT POST-TEST
A-15	INSTRUMENT PANEL RIGHT SIDE AIRBAG COVER IMPACT PRE-TEST
A-16	INSTRUMENT PANEL RIGHT SIDE AIRBAG COVER IMPACT POST-TEST
A-17	INSTRUMENT PANEL ABOVE CENTER CLUSTER RADIO IMPACT PRE-TEST
A-18	INSTRUMENT PANEL ABOVE CENTER CLUSTER RADIO IMPACT POST-TEST
A-19	HEAD RESTRAINT
A-20	HEAD RESTRAINT IMPACT AREA PRE-TEST
A-21	HEAD RESTRAINT IMPACT AREA POST-TEST



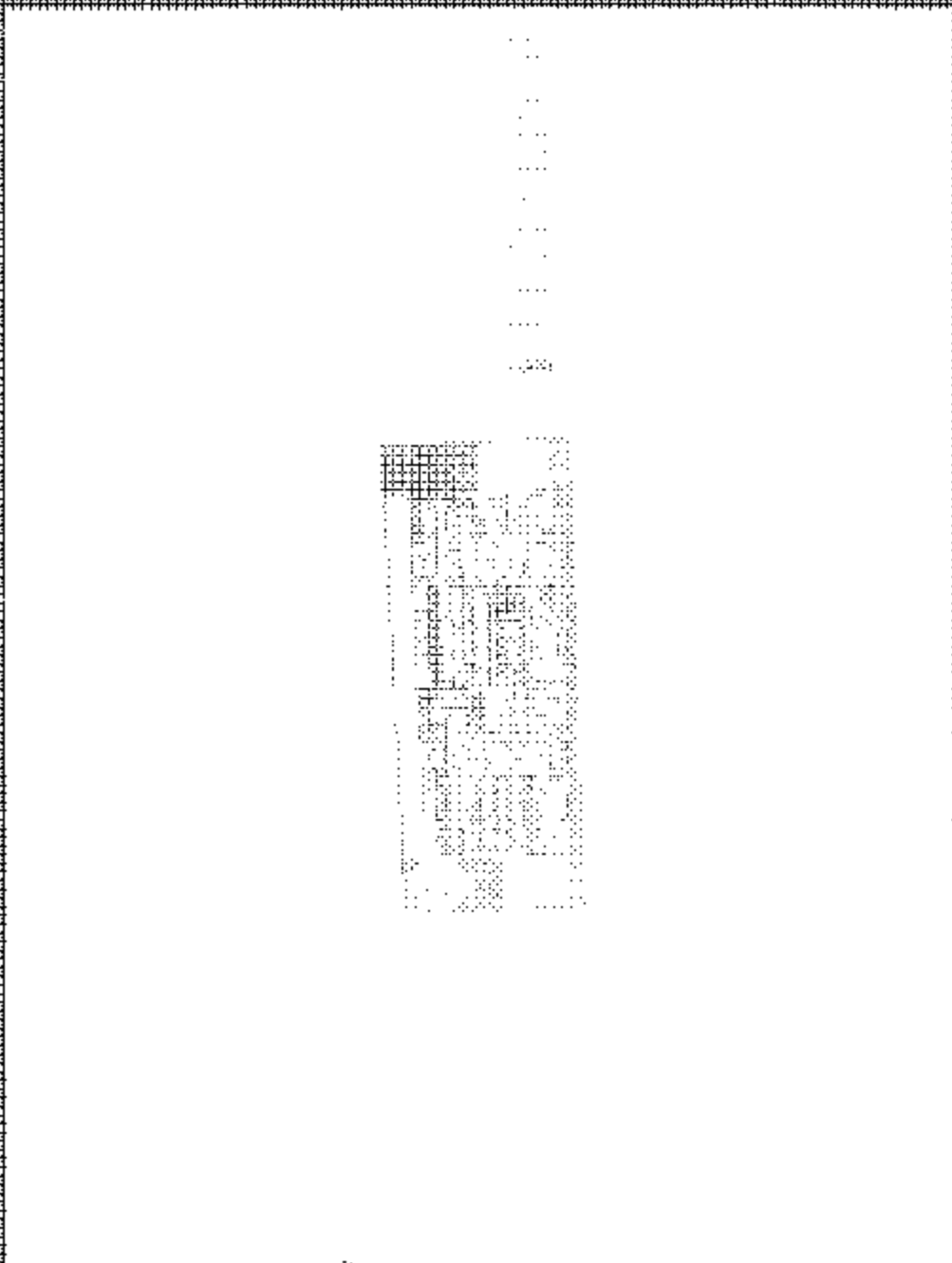
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Form 4-57 - VEHICLE IDENTIFICATION LABEL



REDACTED INFORMATION



PLEASE ALSO SEE V. 18 OF CONSTRUCTION

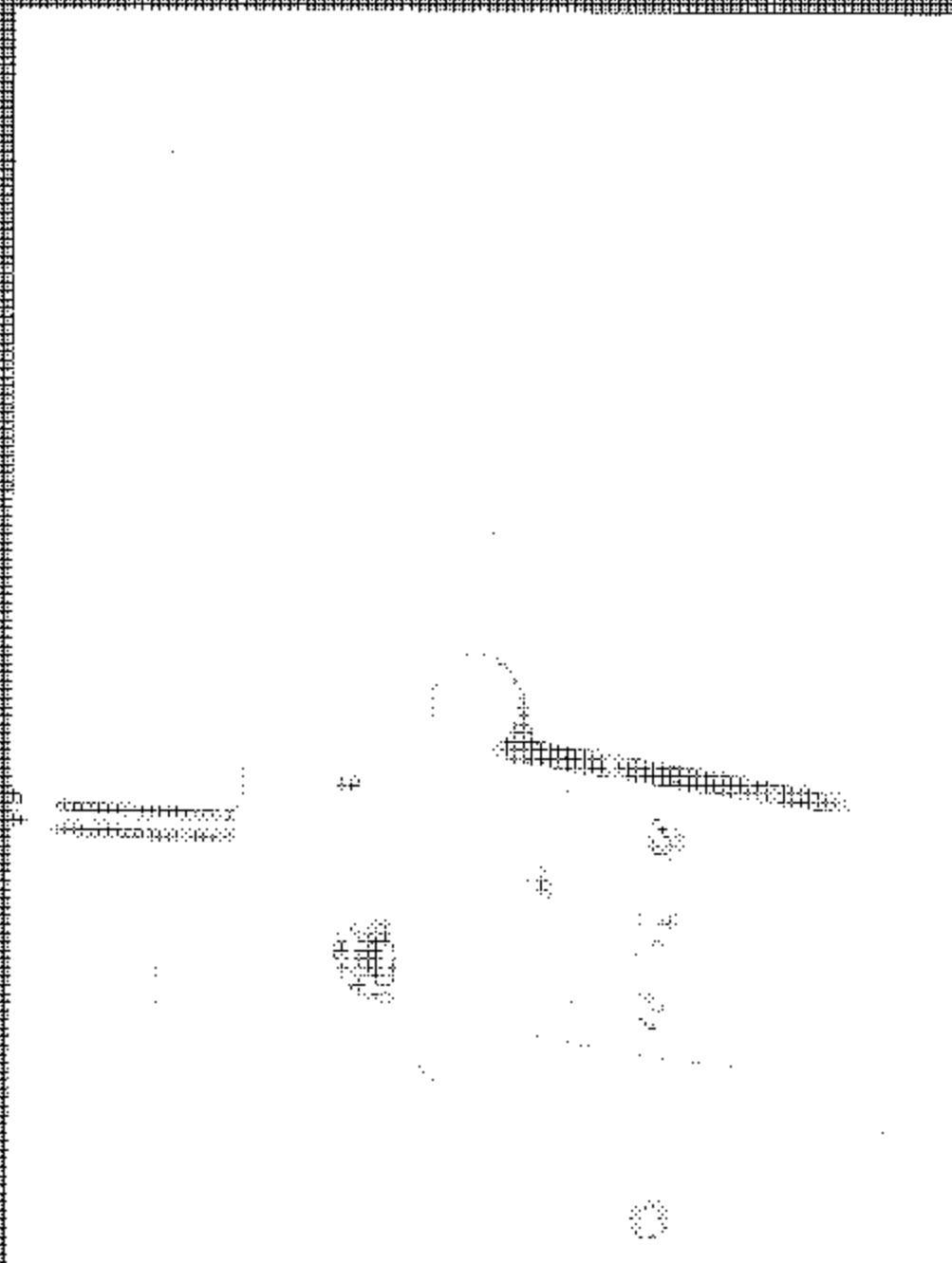


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Figure 103 - Laboratory Light Micrograph

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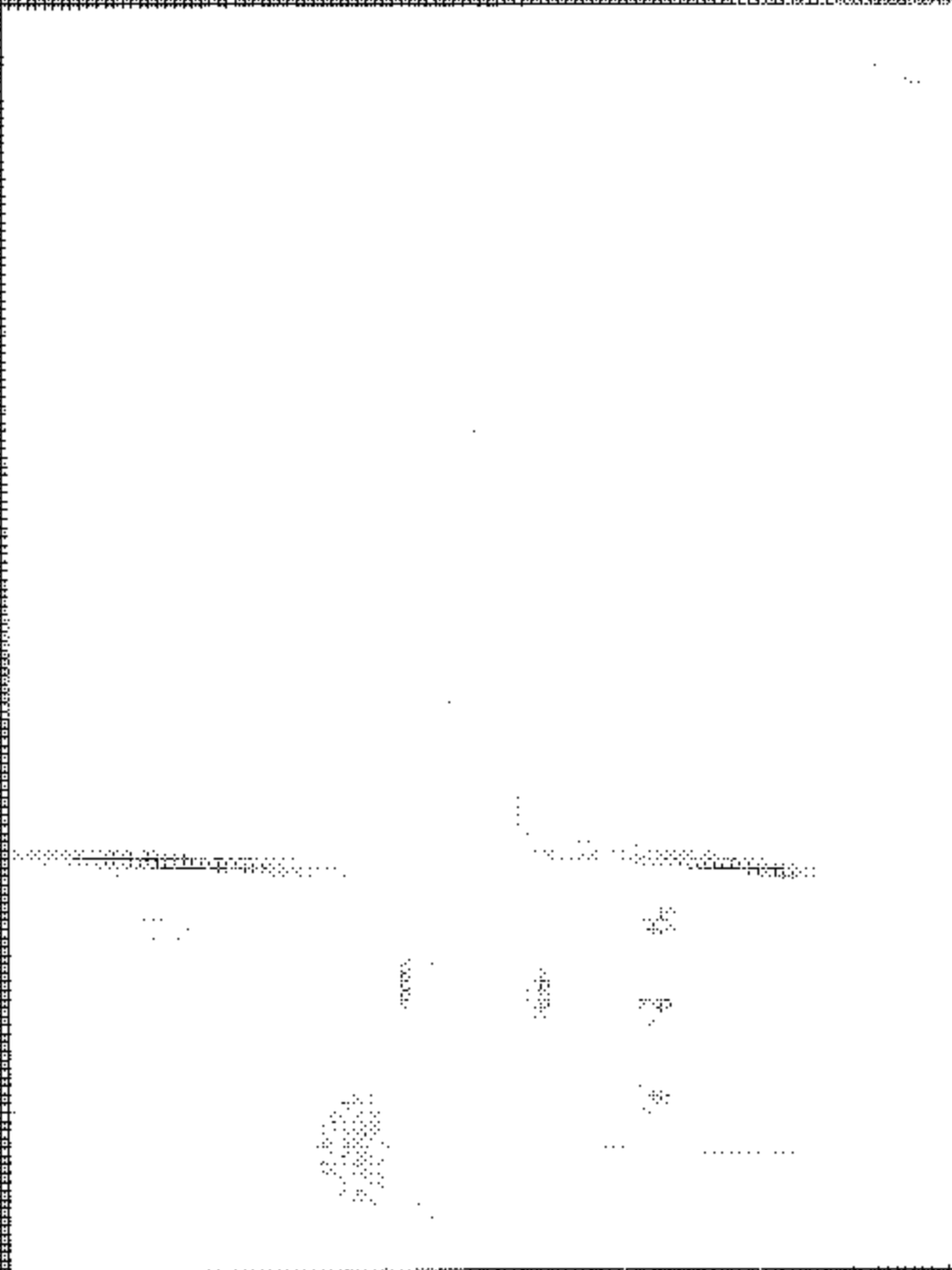


Figure A.10 - DISTRIBUITION OF THE PRODUCT OF THE TWO FACTORS

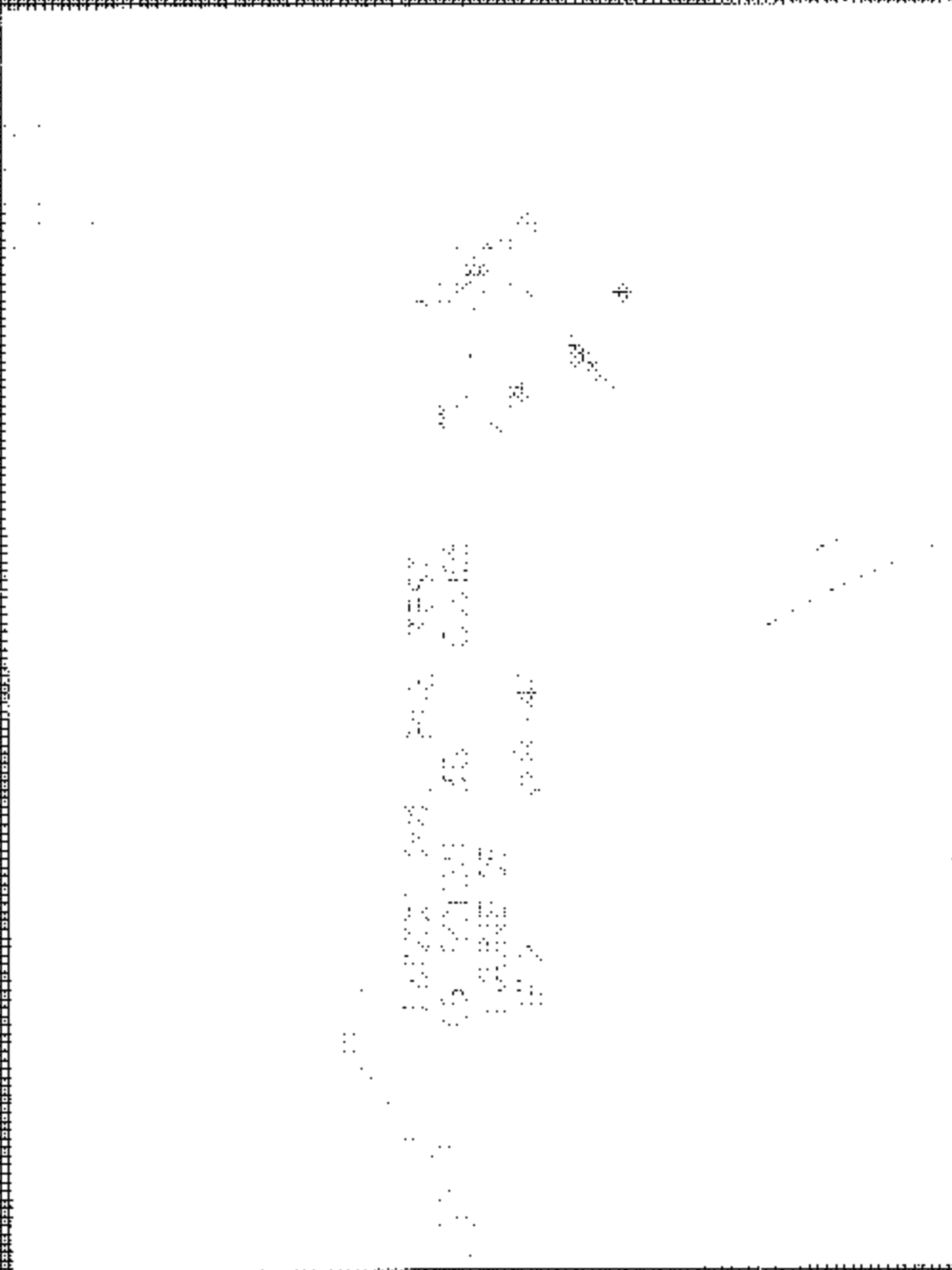


Figure 1. A large, irregularly shaped object, possibly a piece of debris or a large rock, with a rough, textured surface. The object is positioned in the center of the frame. The background is dark and grainy, suggesting a night-time or low-light environment. The image is framed by a thick black border.

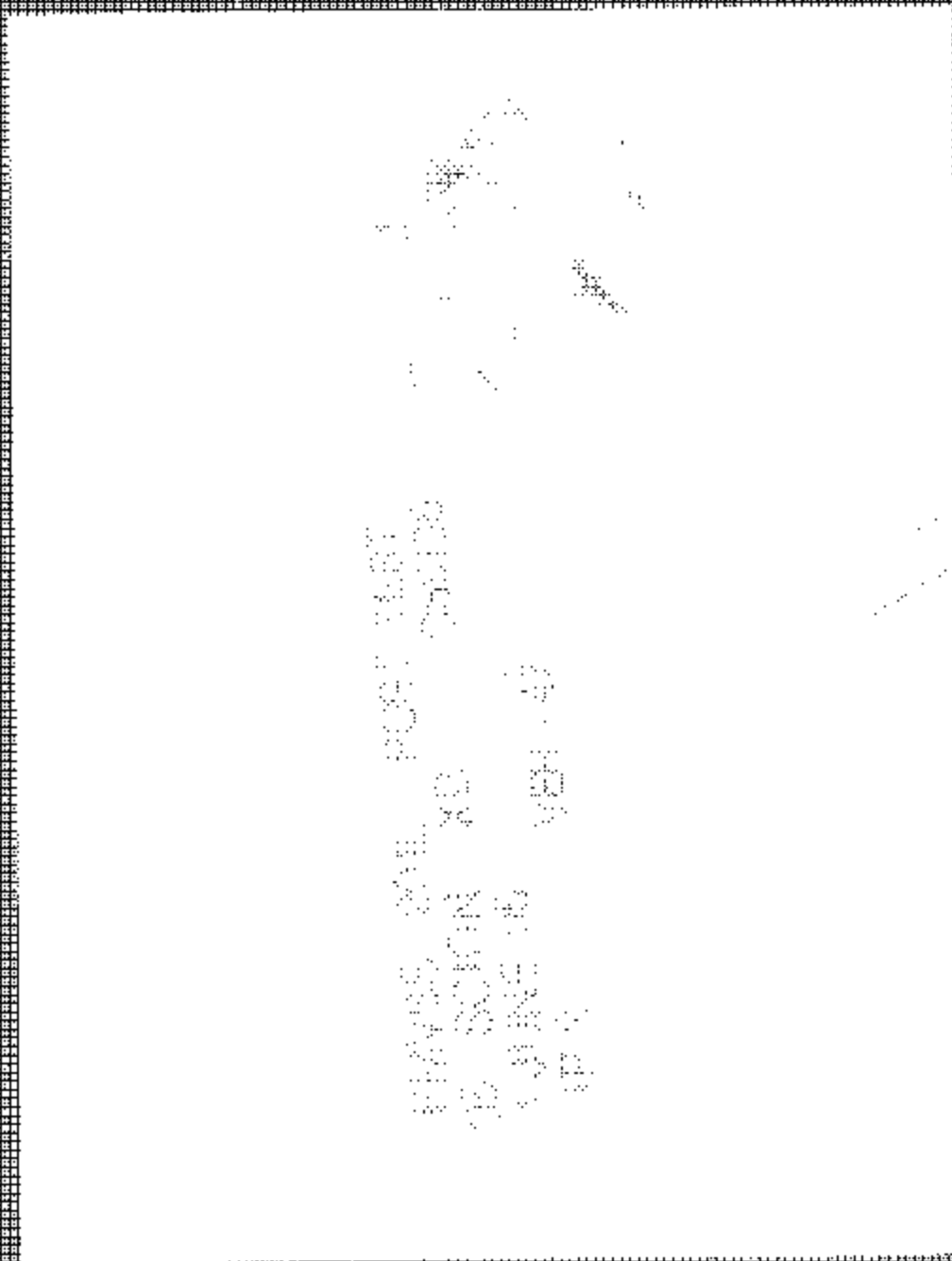
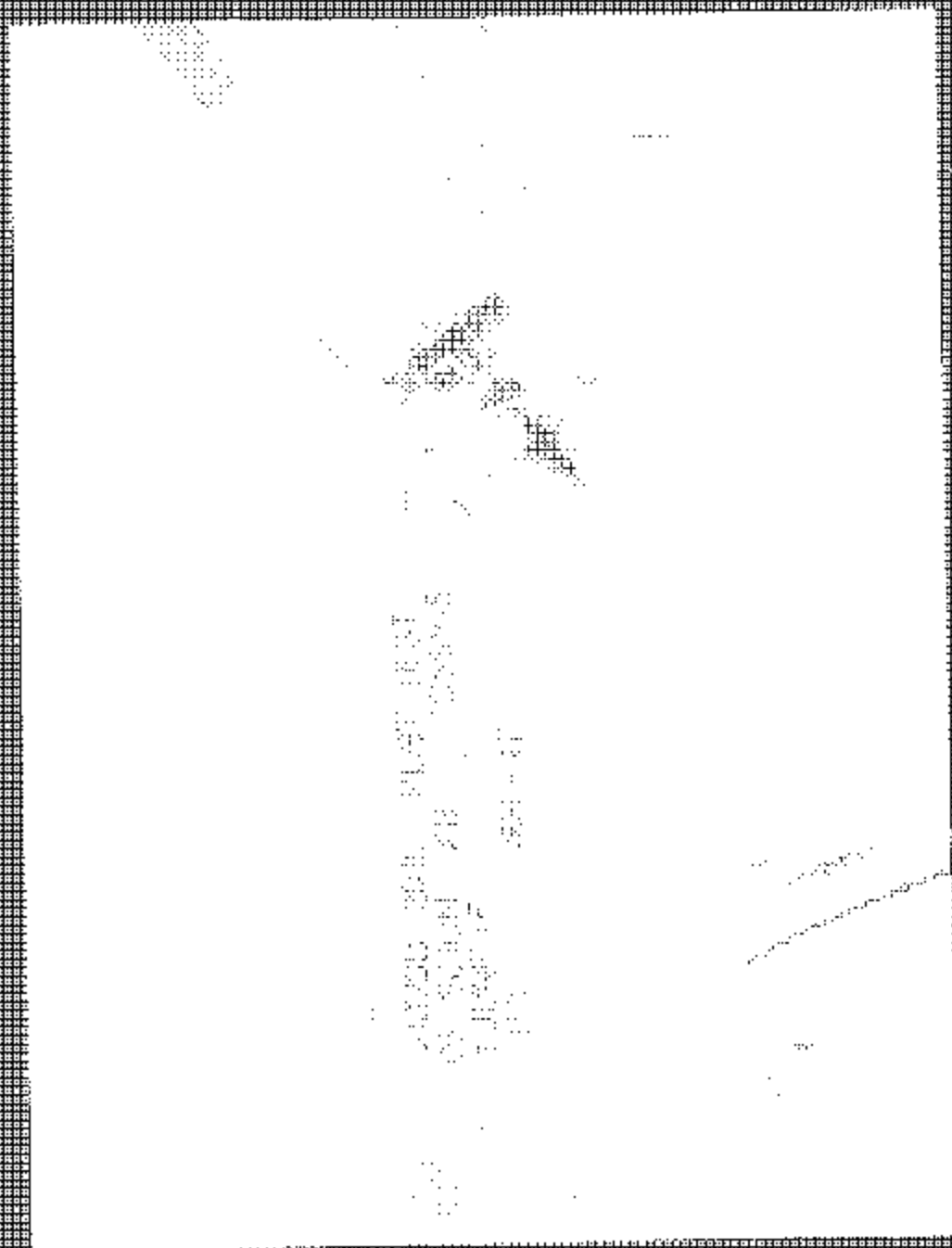


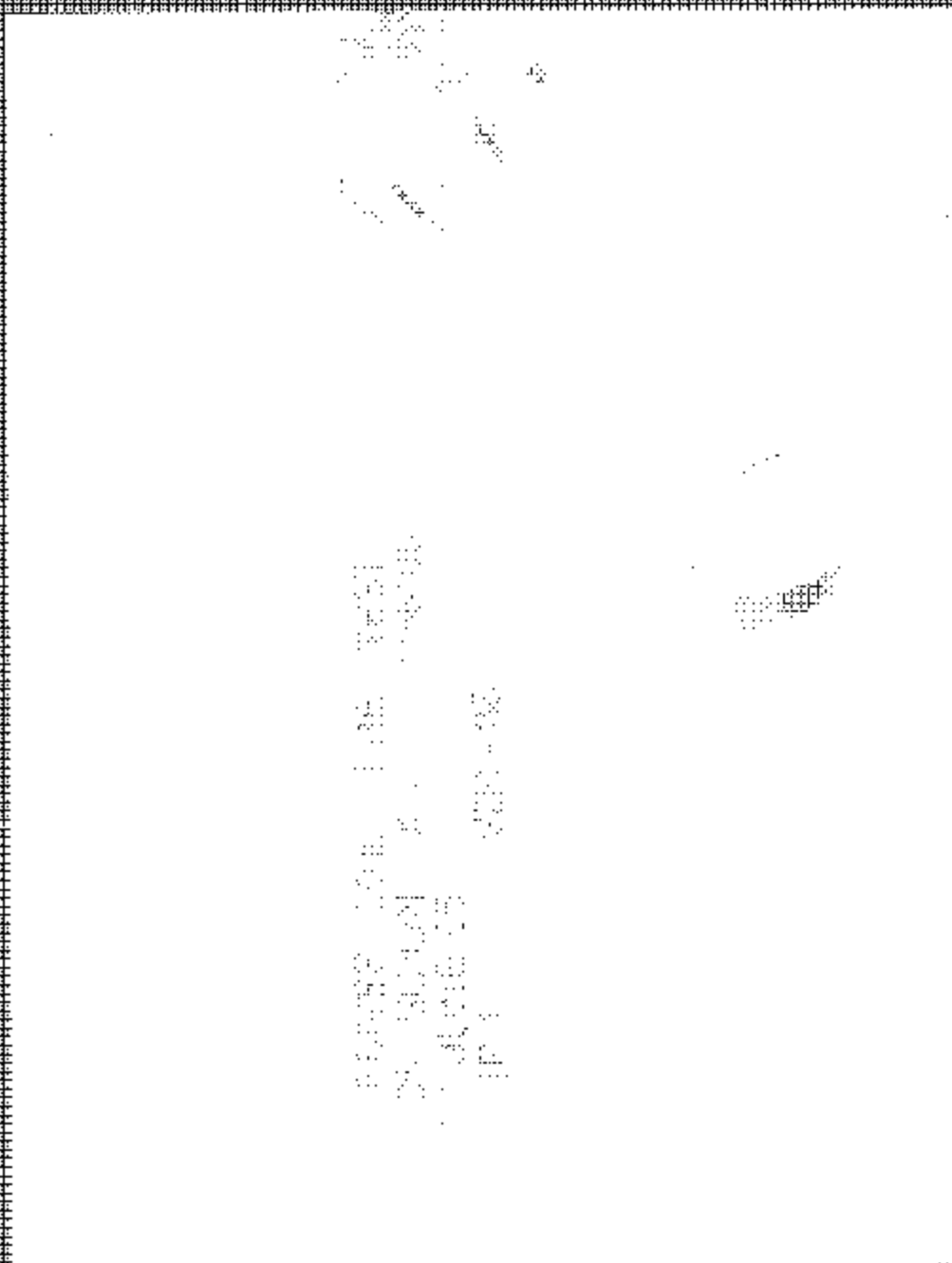
Figure 3-1-1: POSTTESTING RESULTS FOR THE AIRBORNE VEHICLE POST-TEST



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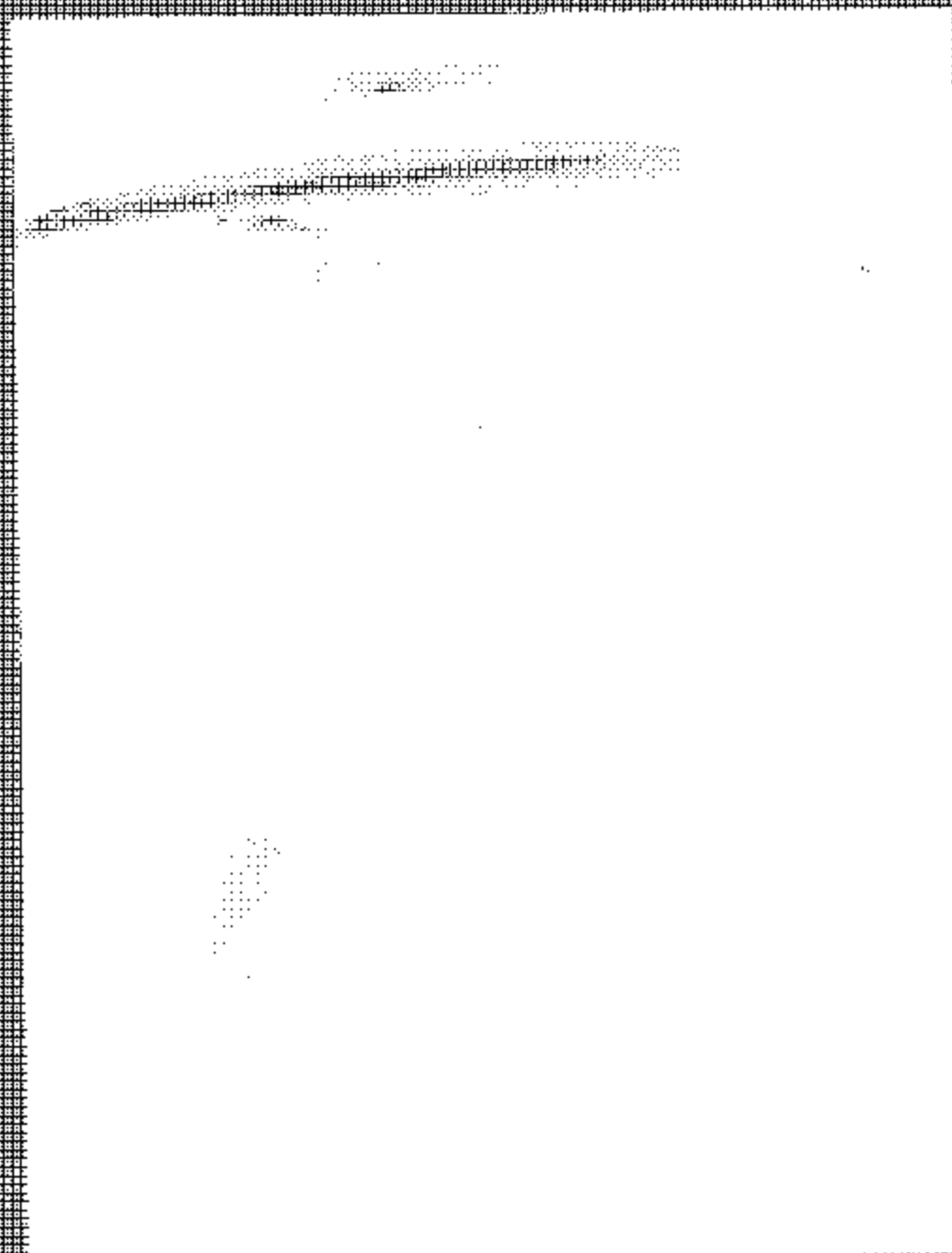


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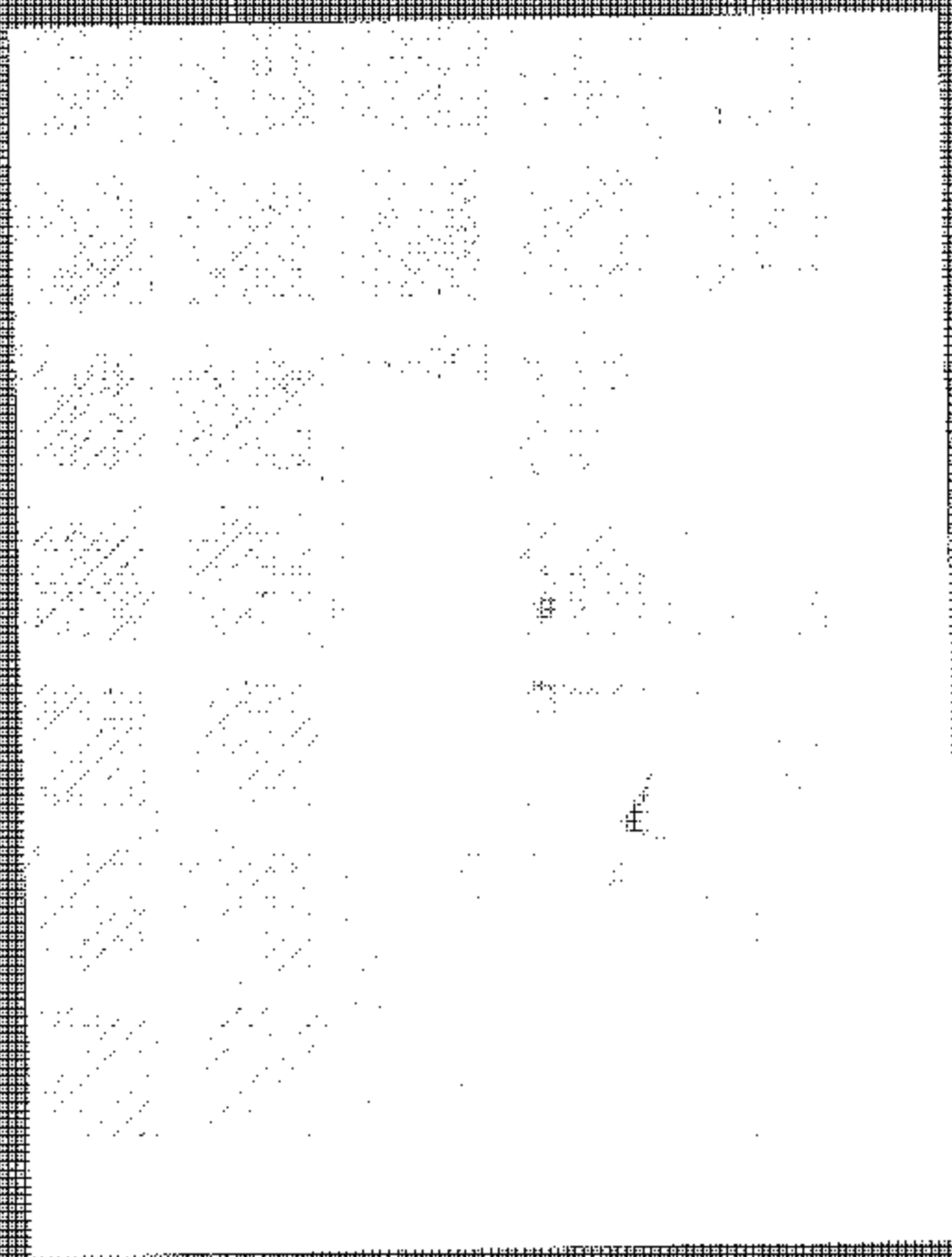
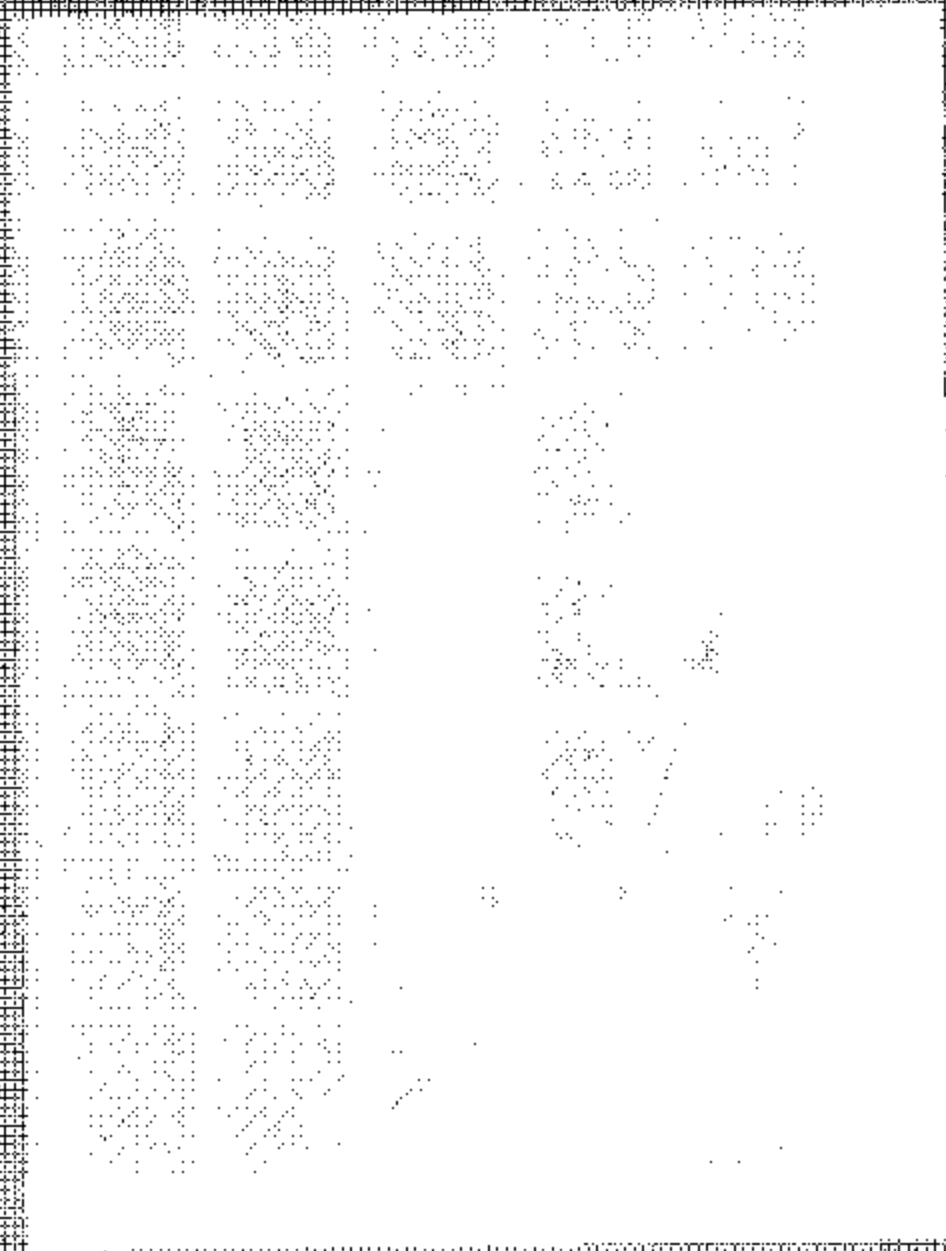


Figure 4.20. Head Rest Position and Head Rest



APPENDIX B

INTERIOR COMPARTMENT DOOR CALCULATIONS

FMVSS No. 201
Latch Component Analysis Information

Attachment 5
Form 5
Page 1 of 5

Latch component inertial analysis information for each interior compartment door assembly located in an instrument panel, adjacent to a designated seating position in accordance with the procedure described in section 5 of SAE Recommended Practice J839b, "Passenger Car Side Door Latch System."

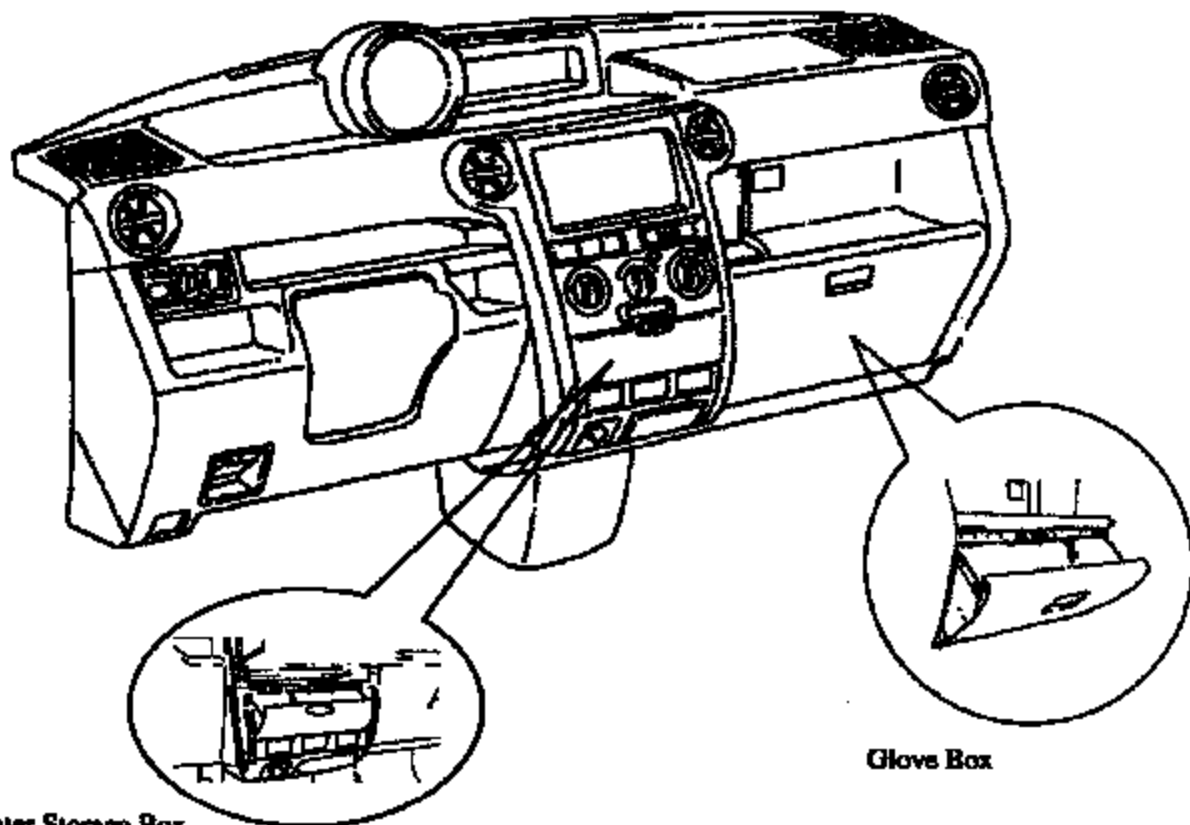
Such data shall include:

2005 model Scion xB

Instrument Panel Assembly

A:Center Storage Box
B:Glove Box

Page 2-3
Page 4-5



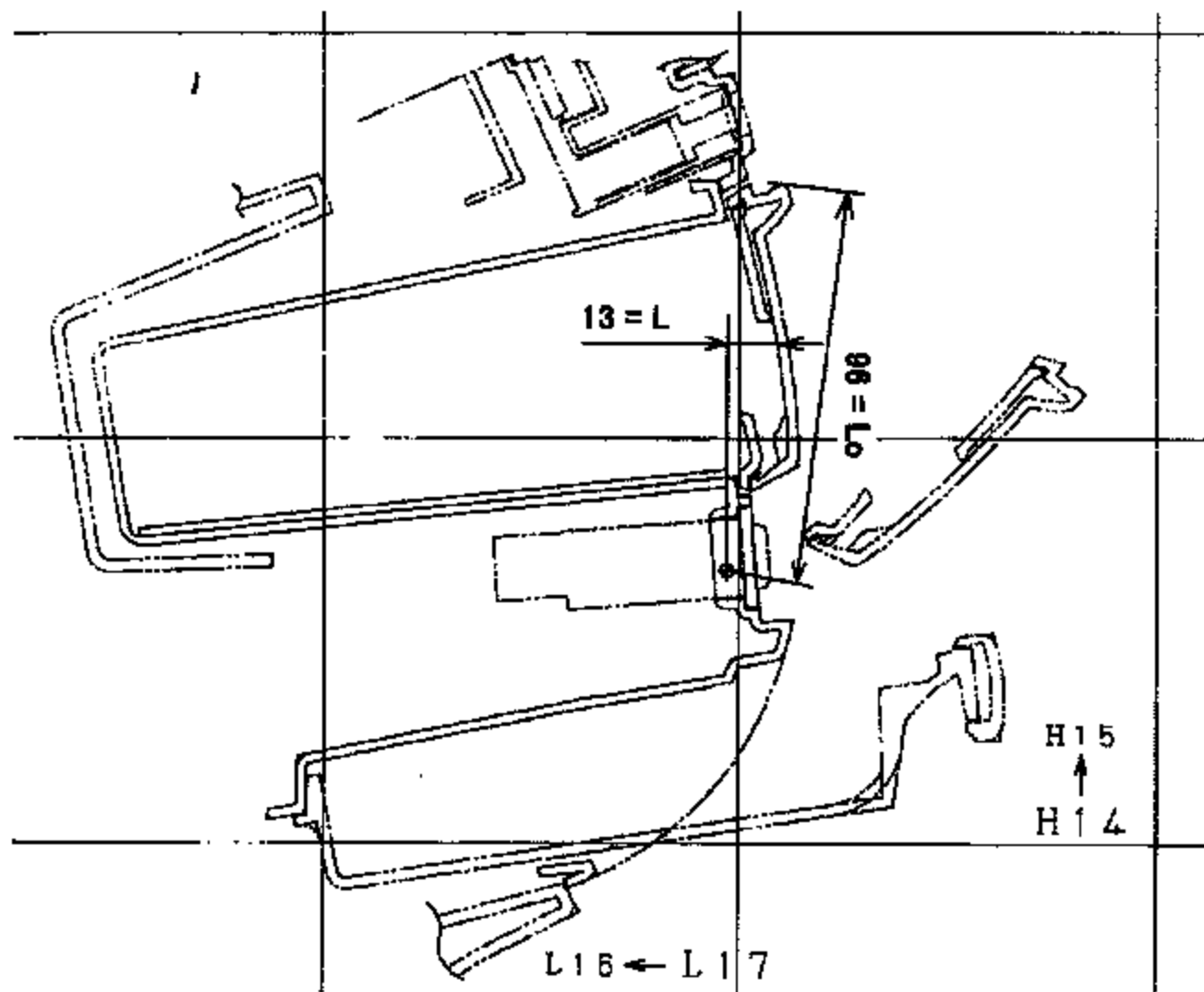
Center Storage Box

Glove Box

**A: CENTER STORAGE BOX
FMVSS201 INTERIOR COMPARTMENT DOOR CALCULATION**

Attachment 5
Form 5
Page 2 of 5

1. Geometric details of the latch/lock configuration.



M : Moment of the door assy received to open direction.
W : Weight of the door assy

1) 10G Down Direction

$$M = WL + G_zWL$$

$$G_z = 10$$

$$M = 11WL = 11 \times 0.98 \times 13 \\ = 140.1 \text{ Nmm}$$

$$L = 13 \text{ (mm)}$$

$$L_o = 98 \text{ (mm)}$$

$$W = 100(g) \cdot 0.98(N)$$

F10 : Force of the door received by M to open Direction

$$F10 = M/L_o = 140.1/98 = 1.5 \text{ N}$$

The force to open the door controlled by spring is 5.39 ± 0.98 (more than 4.41N).

$$4.41 > 1.5 = F10$$

The door does not open due to F10.

2) Rear Direction 48km/h

We made the impact test to confirm that this door does not have failure.

Test Method :

impacting the vehicle perpendicularly into a fixed collision barrier at
a forward longitudinal velocity of 48km/h.

Test Result :

#1 : no failure

So, This door will remain closed after this test.

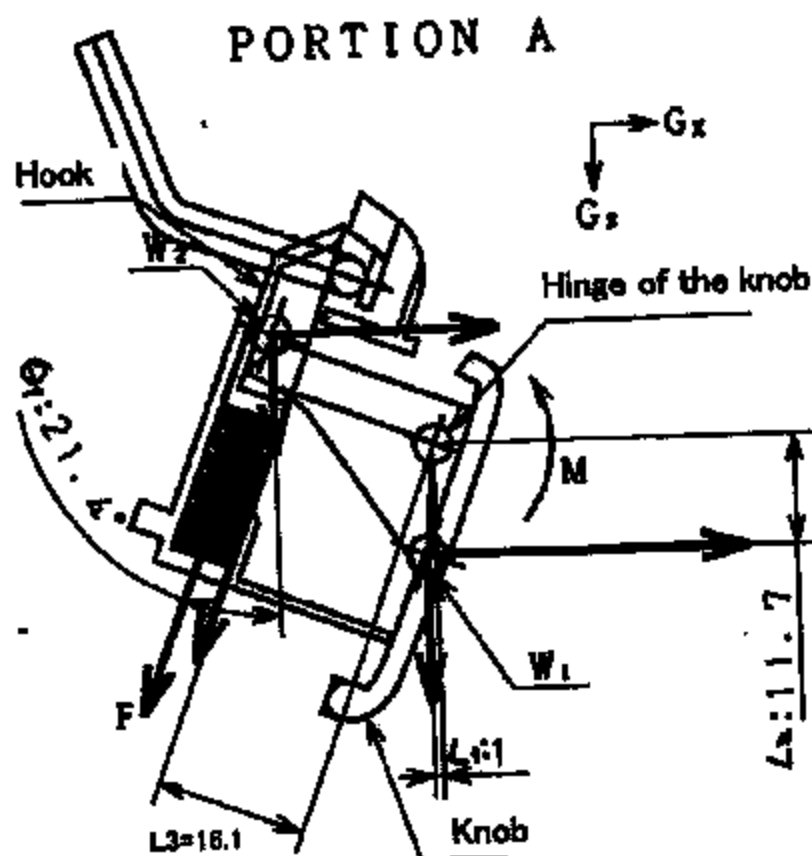
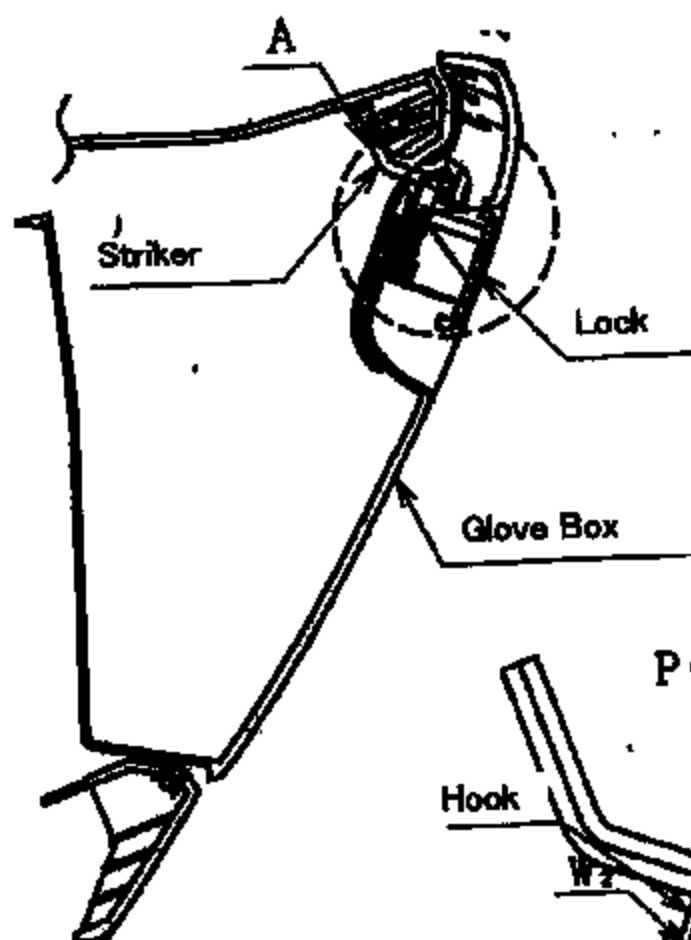
3) 10G Right & Left Direction

No Moment to open direction.

B: GLOVE BOX
FMVSS201 INTERIOR COMPARTMENT DOOR CALCULATION

Attachment 5
 Form 5
 Page 4 of 5

1. Geometric details of the latch/lock configuration.



Calculation results on "Glove box"
 M : Moment of the knob received to open direction.

W1 : Weight of the lock knob
W2 : Weight of the Hook

1) 10G Down Direction

$$M = W_1 L_1 + G_2 W_1 L_1$$

$$G_2 = 1.0$$

$$M = 1.1 W_1 L_1$$

$$= 1.1 \times (0.0115 \times 9.8) \times 1.1$$

$$= 1.24 \text{ Nmm}$$

F10 : Force of the Hook received by M to Down Direction

$$F = \frac{M}{L_2} + W_2 \cos \theta_1 + G_2 W_2 \cos \theta_1$$

$$= \frac{1.24}{11.7} + (0.00189 \times 9.8) \times \cos 21.6^\circ + 1.0 \times (0.00189 \times 9.8) \times \cos 21.6^\circ$$

$$= 0.27 \text{ N}$$

The Hook needs to move 8.6mm to release the Lock.
On that occasion, The Force of the Hook received by Spring is 4.40N.
 $4.40 > 0.27 = F10$
The Lock does not open due to F10.



Attachment 5
Form 5
Page 5 of 5

L1=1(mm)
L2=11.7(mm)
L3=16.1(mm)
W1=0.0115(kg)
W2=0.00189(kg)
F0=4.4 (N)

2) 30G Rear Direction

$$M = W_1 L_1 + G_2 W_1 L_2$$

$$G_2 = 3.0$$

$$M = W_1 (L_1 + 3.0 L_2)$$

$$= (0.0115 \times 9.8) \times (1.1 + 3.0 \times 11.7)$$

$$= 39.6 \text{ Nmm}$$

F30 : Force of the Hook received by M to Rear

$$F = \frac{M}{L_2} + W_2 \cos \theta_1 - G_2 W_2 \sin \theta_1$$

$$= \frac{39.6}{16.1} + (0.00189 \times 9.8) \times \cos 21.6^\circ - 3.0 \times (0.00189 \times 9.8) \times \sin 21.6^\circ$$

$$= 1.96 \text{ N}$$

The Hook needs to move 8.6mm to release the Lock.
On that occasion, The Force of the Hook received by Spring is 4.40N.
 $4.40 > 1.96 = F30$
The Lock does not open due to F30.

3) 10G Right & Left Direction

No Moment to open direction.

4) 30G Front Direction

The Box & lock knob will not receive force to open.

Result : The Box will remain closed.

APPENDIX C

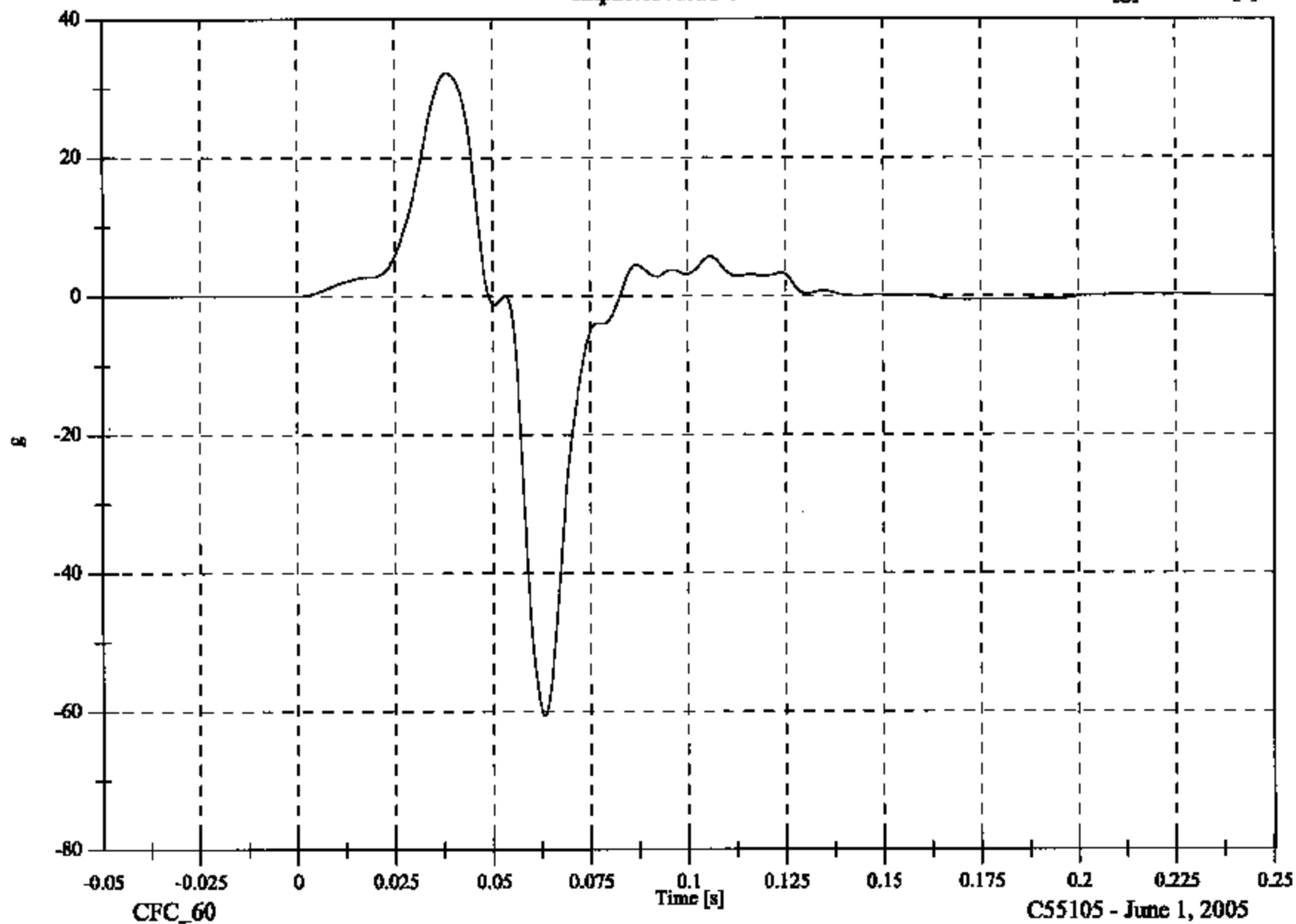
DATA PLOTS

FMVSS 201 Linear Impact - 2005 Scion xB - IP1 -38 Degrees

Impactor Headform Ax

Max: 32.3 [g] at 0.038 [s]

Min: -60.6 [g] at 0.063 [s]

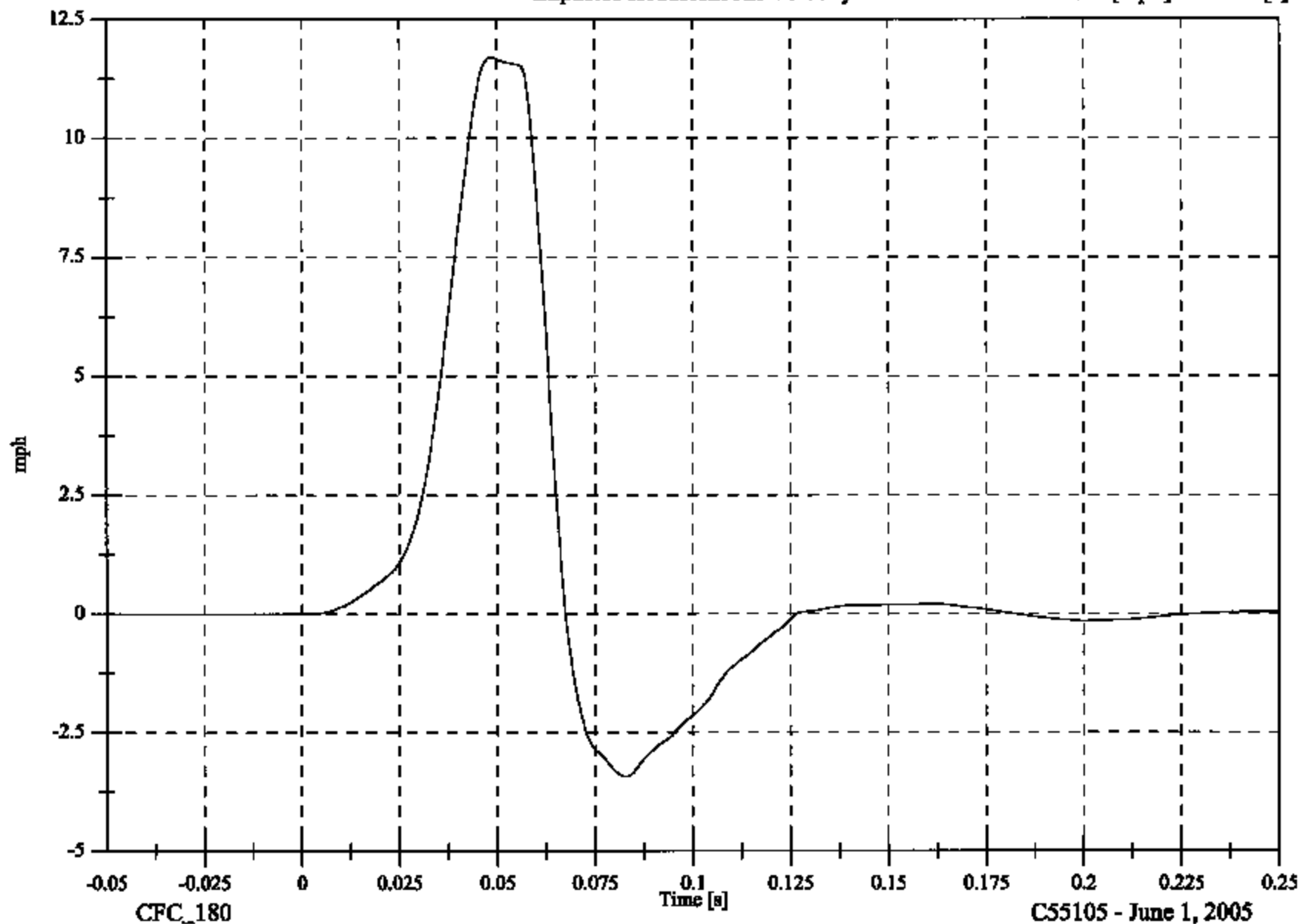


FMVSS 201 Linear Impact - 2005 Scion xB - IP1 -38 Degrees

Impactor Headform Ax Velocity

Max: 11.7 [mph] at 0.048 [s]

Min: -3.4 [mph] at 0.083 [s]



C55105 IP1 IMPACT PLOT #2

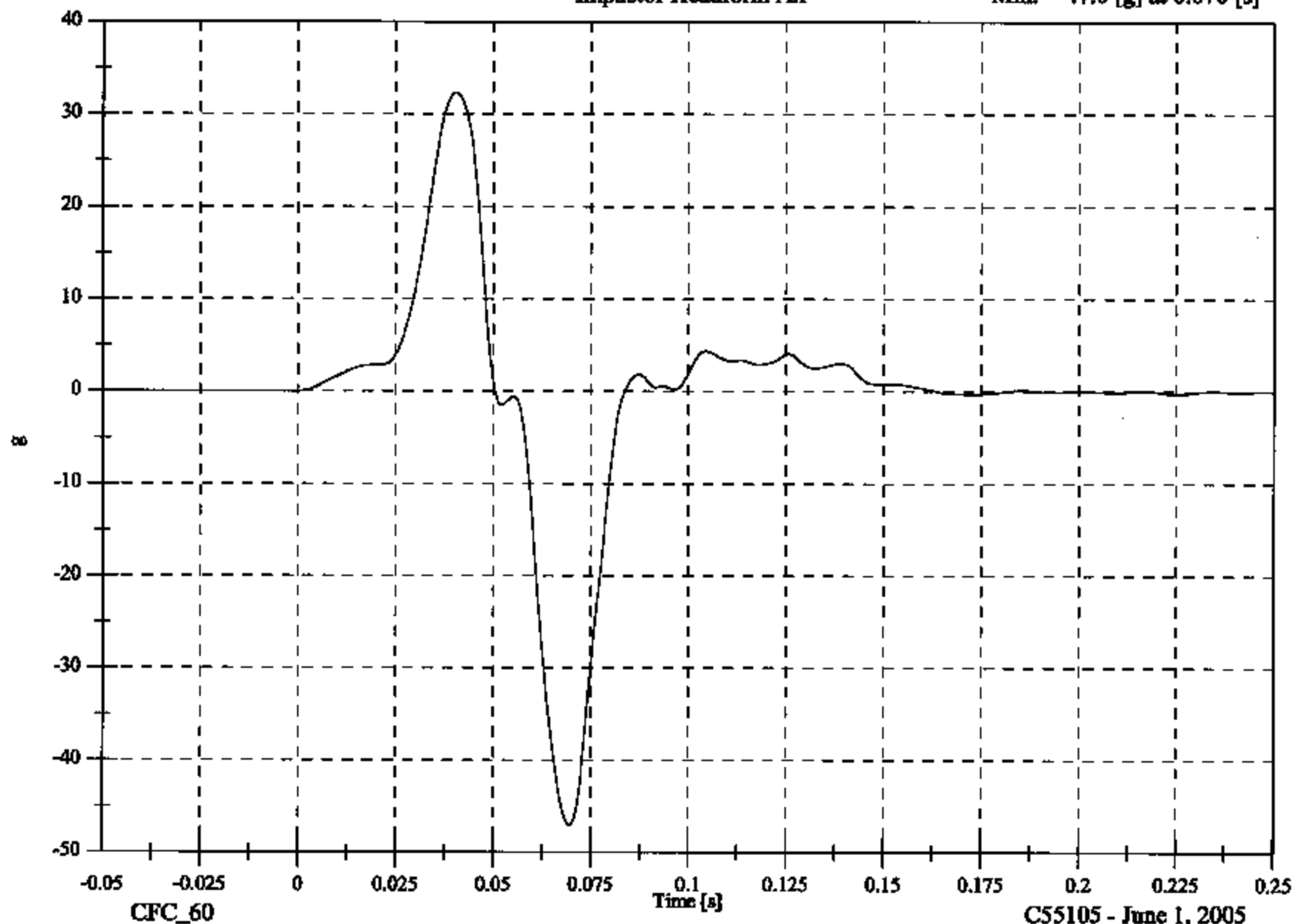
8655-F201-29

FMVSS 201 Linear Impact - 2005 Scion xB - IP2 -47 Degrees

Impactor Headform Ax

Max: 32.3 [g] at 0.040 [s]

Min: -47.0 [g] at 0.070 [s]



C55105 IP2 IMPACT PLOT #1

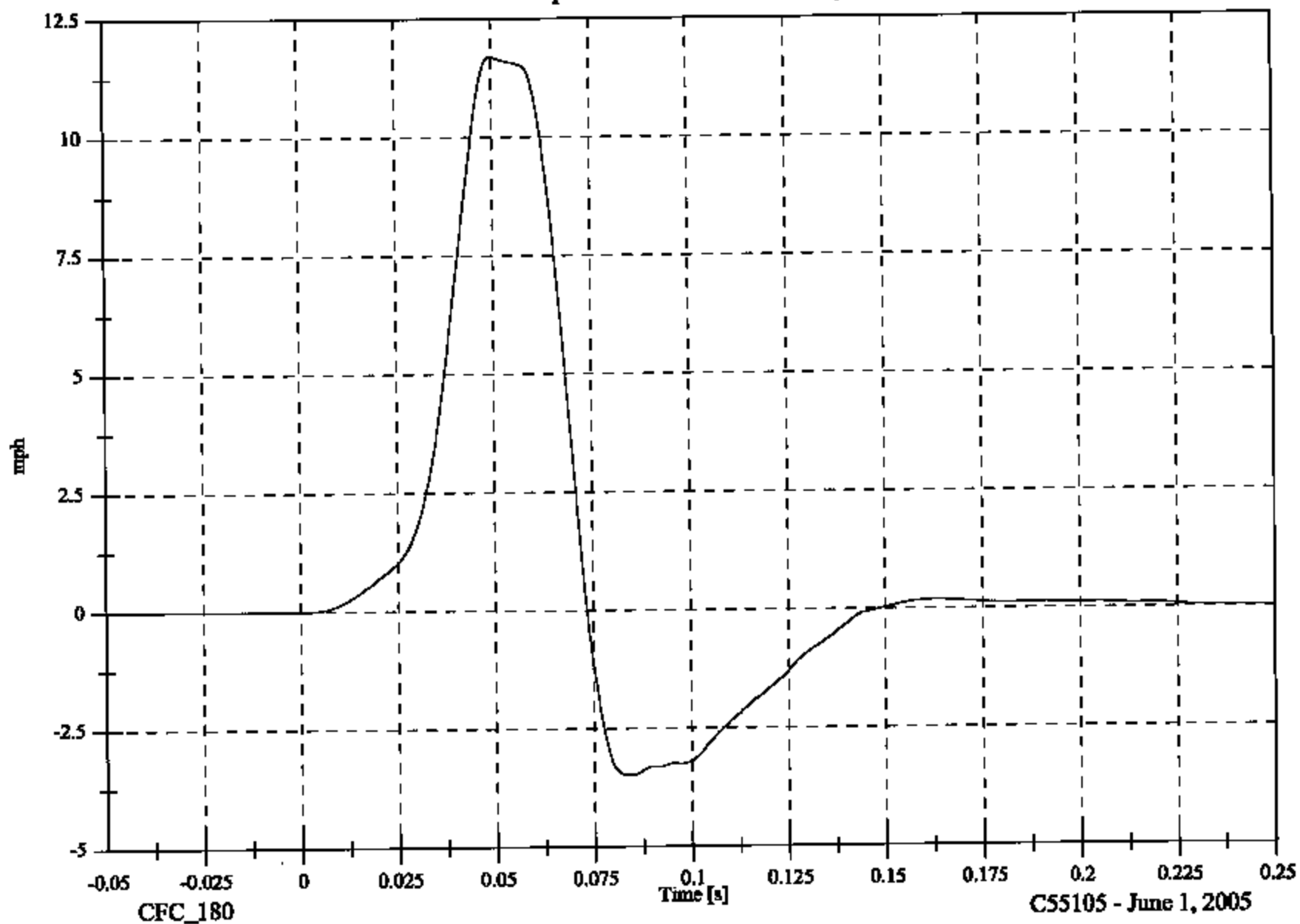
8655-P201-29

FMVSS 201 Linear Impact - 2005 Scion xB - IP2 -47 Degrees

Impactor Headform Ax Velocity

Max: 11.7 [mph] at 0.050 [s]

Min: -3.5 [mph] at 0.085 [s]

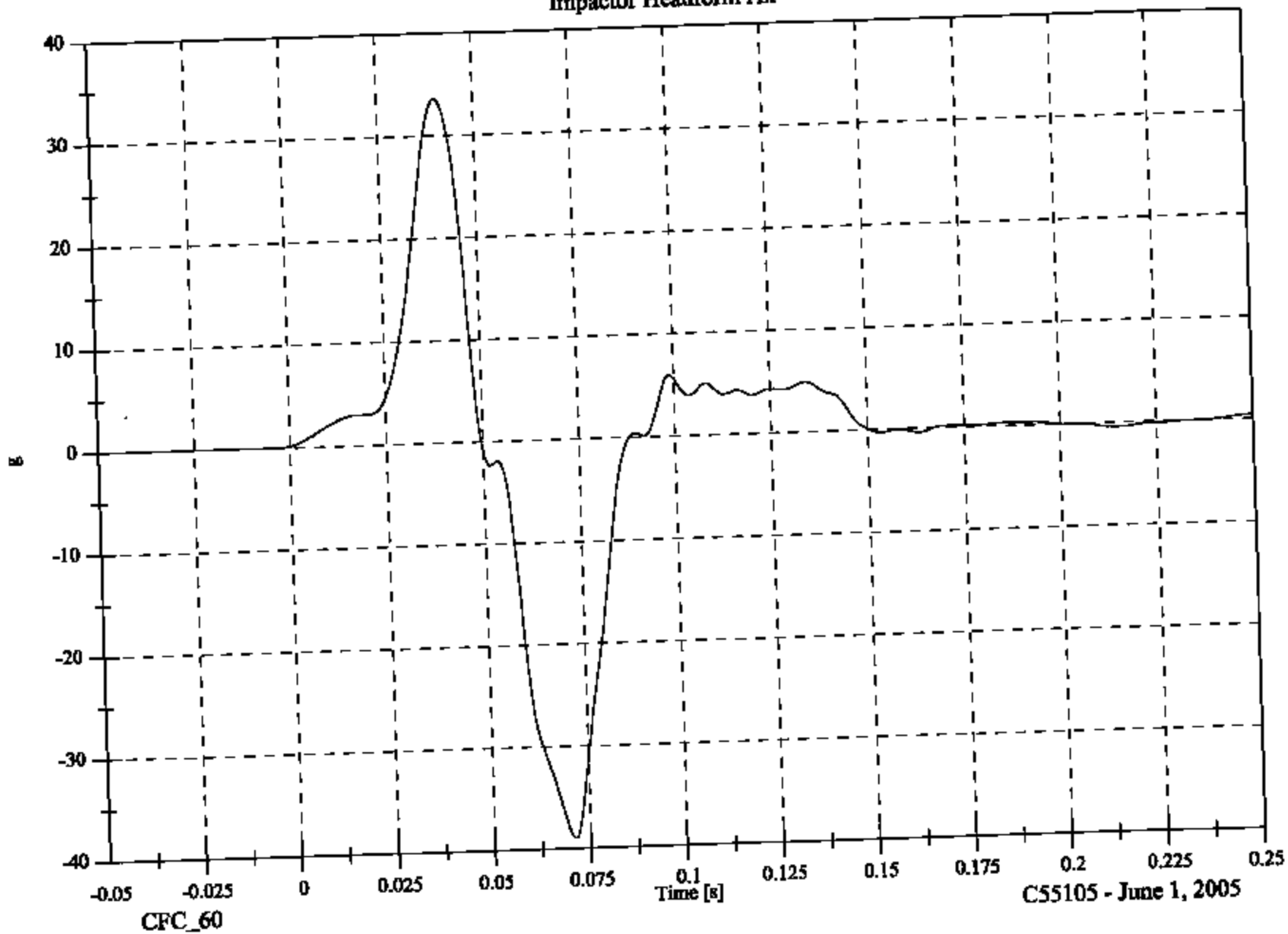


C55105 IP2 IMPACT PLOT #2

8655-F201-29

FMVSS 201 Linear Impact - 2005 Scion xB - IP3 -47 Degrees
Impactor Headform Ax

Max: 33.6 [g] at 0.040 [s]
Min: -39.0 [g] at 0.071 [s]



C55105 IP3 IMPACT PLOT #1

8655-F201-29

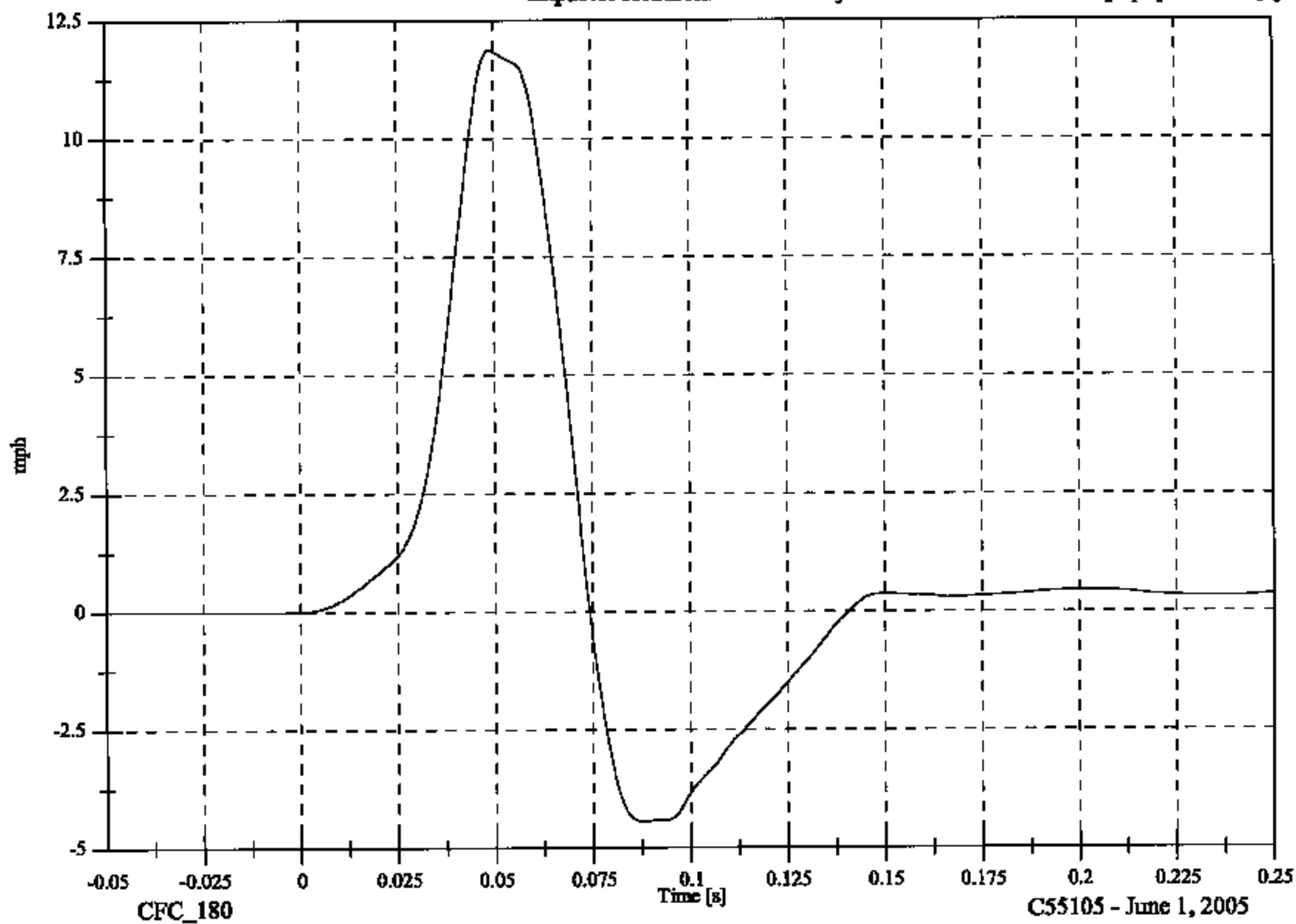
C55105 - June 1, 2005

FMVSS 201 Linear Impact - 2005 Scion xB - IP3 -47 Degrees

Impactor Headform Ax Velocity

Max: 11.9 [mph] at 0.049 [s]

Min: -4.5 [mph] at 0.088 [s]



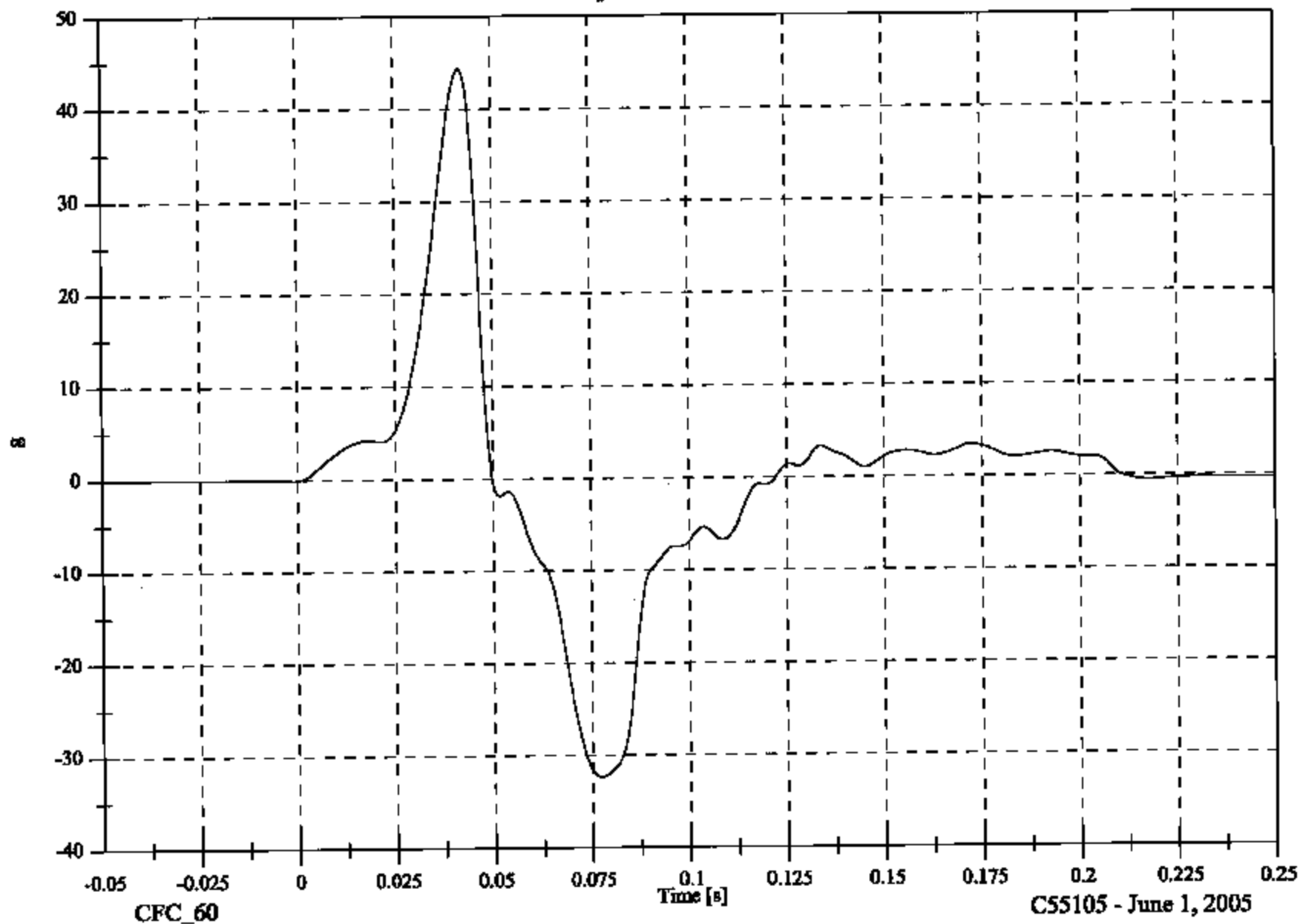
C55105 IP3 IMPACT PLOT #2

R655-F201-29

FMVSS 201 Linear Impact - 2005 Scion xB - Seat Back -20 Degrees
Impactor Headform Ax

Max: 44.3 [g] at 0.042 [s]

Min: -32.3 [g] at 0.077 [s]



C55105 SEATBACK IMPACT PLOT #1

8655-F201-29

FMVSS 201 Linear Impact - 2005 Scion xB - Seat Back -20 Degrees
Impactor Headform Ax Velocity

Max: 14.6 [mph] at 0.049 [s]
Min: -4.3 [mph] at 0.122 [s]

