

635349

REPORT NUMBER: 214D-MGA-2001-001

V3526

**SAFETY COMPLIANCE TESTING FOR FMVSS 214
SIDE IMPACT PROTECTION
INDICANT**

**Toyota Motor Corporation
2001 Toyota Echo 4 door
NHTSA NUMBER:C15101**

**PREPARED BY:
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December 18, 2000

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF VEHICLE SAFETY COMPLIANCE
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16. Abstract A 55/28 km/h 90° Moving Deformable Barrier INDICANT Compliance Test was conducted on the subject 2001 Toyota Echo 4 door in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-214D-05 Side Impact Protection (except the test was conducted 8 kph (5 mph) faster than the standard specifies) for the determination of FMVSS No. 214 Side Impact Protection. The test was conducted at MGA Research Corporation, in Burlington, Wisconsin, on December 18, 2000. The impact velocity of the Moving Deformable Barrier (MDB) was 61.5 kph, and the ambient temperature at the struck side (driver's) of the vehicle was 22°C. The target vehicle's maximum post test static crush was 326 mm at level 2. The test vehicle's occupant performance is as follows:					
		<u>DRIVER</u>	<u>PASS.</u>		
Left Upper Rib (LUR) Accel., g		64	52		
Left Lower Rib (LLR) Accel., g		78	61		
Lower Spine (T ₁₂) Accel., g		82	86		
Thoracic Trauma Index (TTI)		80	66		
Pelvis (PEV) Accel., g		107	86		
HIC		710	1063		
The doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.					
17. Key Words Compliance Testing FMVSS 214D Side Impact Protection Side Impact Dummy (SID) New Car Assessment Program (NCAP)				18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Adm. Technical Ref. Division, Room 5108 (NAD-52) 400 Seventh Street, S.W. Washington, D.C. 20590	
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SECTION 1
PURPOSE AND TEST PROCEDURE

1.1 PURPOSE

This side impact test is conducted as part of the FY' 2001 test program sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract No. DTNH22-97-C-11033. The purpose of this test was to evaluate side impact protection in a 2001 Toyota Echo 4 door manufactured by Toyota Motor Corporation.

1.2 TEST PROCEDURE

The side impact test was conducted in accordance with the current National Highway Traffic Safety Administration (NHTSA), Office of Vehicle Safety Compliance (OVSC), laboratory test procedure TP-214D-05, dated August 2, 1999 and the corresponding MGA Research Corporation Test Procedure MGA-NHTSA2 with the exception of the test speed, which was at the NCAP High Speed Lateral Impact level (61.2 kph, approximately 8 kph faster than compliance speed). The procedures for receiving, inspection, testing, and reporting of test results are described in the test procedures and are not repeated in this report.

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

SECTION 2

SUMMARY OF SIDE IMPACT TEST

2.1 SUMMARY OF SIDE IMPACT TEST

A model year 2001 Toyota Echo 4 door was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 61.5 km/h. The specified impact velocity range is from 61.1 to 62.7 km/h. The test (target) vehicle was stationary and positioned 63° to the line of forward motion. The weight of the vehicle as tested was 1121.3 kg and the test weight of the MDB was 1362 kg. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on December 18, 2000.

One (1) real-time motion picture camera and nine (9) high-speed motion picture cameras were used to document the impact event. Camera locations and pertinent camera information are documented in the data sheets. Pre- and post-test photographs of the vehicle and Side Impact Dummies (SID's) can be found in Appendix A. Two 50th percentile adult male SID's were placed in the driver and left rear passenger designated seating positions according to instructions specified in the OVSC Side Impact Laboratory Test Procedure dated August 2, 1999. Each SID was instrumented with eleven accelerometers in the following locations:

- Left Upper Rib (LUR) uni-axial accelerometer (Y-axis primary and redundant)
- Left Lower Rib (LLR) uni-axial accelerometer (Y-axis primary and redundant)
- Lower Thoracic Spine (T12) uni-axial accelerometer (Y-axis primary and redundant)
- Pelvic (PEV) section uni-axial accelerometer (Y-axis primary and redundant)
- Head Center of Gravity (CG) tri-axial accelerometers (X, Y, and Z axes)

The test vehicle was instrumented with twenty (20) structural accelerometers and the MDB was instrumented with five (5) accelerometers and two (2) contact switches on the bumper to compare left side to right side bumper impact timing. All data channels were recorded with a fully self contained on-board EME Data Acquisition System. The data was digitally sampled at 10,000 samples per second and processed per Appendix V of the Test Procedure.

2.2 GENERAL COMMENTS

The test vehicle sustained a maximum static crush of 326 mm at level 2, 1200 mm rearward of the left vertical impact point. The driver and passenger SID's, Serial Nos. 036 and 037 respectively, were calibrated just prior to this test. The SID's injury criteria is summarized as follows:

Measurements	Units	Driver	Passenger
Thoracic Trauma Index (TTI)	G's	80	66
Peak Pelvic G's (PEV)	G's	107	86
Head Injury Criteria (HIC)	none	710	1063

Test summaries and post-test observations are presented in Section 3. The vehicle, camera, and occupant measurements are presented in Section 4. Appendix A contains the still photograph prints. Appendix B contains the driver and passenger SID's, vehicle, and MDB response data traces. Appendix C contains the SID's configuration and performance verification data. Appendix D contains the test equipment information.

TEST NOTES

The following accelerometers were not used for this test:

Left Front Door on Centerline
Midrear of Left Front Door
Left Front Door Upper Centerline
Midrear of Left Rear door
Left Rear Door Upper Centerline
Rear Seat Track

SECTION 3
SIDE IMPACT DUMMY (SID) AND VEHICLE TEST DATA

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000

CONVERSION FACTORS USED IN THIS REPORT*

Quantity	Typical Application	Old Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	mile/h	km/h	1.609
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.573
Pressure	Tire Pressure	lbf/in ²	kPa	7.0
Volume	Liquid	gal	liter	3.785
Temperature	General Use	°F	°C	$=(tf - 32)/1.8$
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf/ft	Nm	1.355

*Based on the Recommended Practice in SAE J916, May 85

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000

TEST VEHICLE INFORMATION

TEST VEHICLE OPTIONS

Make	Toyota
Model	Echo
Body Style	4 door
NHTSA No.	C15101
VIN	JTDBT123710124040
Color	Black
Delivery Date	11/29/00
Odometer Reading (mile)	50
Dealer	Wilde Toyota
Transmission	5 speed manual
Final Drive	Front
Number of Cylinders	4
Engine Displacement (L)	1.5
Engine Placement	Lateral

Front Airbags	yes
Side Airbags	no
Power Windows	no
Power Steering	yes
Power Door Locks	no
Tilt Wheel	yes
Air Conditioning	yes
Power Brakes	yes
Disc Brakes, Front	yes
Disc Brakes, Rear	no
Anti-lock Brakes	no
AM/FM/Cassette	yes
Anti-theft System	no
Cruise Control	no

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Motor Corporation
Date of Manufacture	10/00

GVWR (kg)	1345
GAWR Front (kg)	708
GAWR Rear (kg)	660

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	220	220
Cold Pressure (kPa)	220	220
Recommend Tire Size	P175/65R14	P175/65R14
Tire Size on Vehicle	P175/65R14	P175/65R14
Tire Manufacturer	Bridgestone	Bridgestone

Measured Parameter	Front	Rear	Third	Total
Type of Seats	bucket	bench		
Number of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				351.5
Cargo Weight (RCLW) (kg)				11.3

DATA SHEET NO. 1...(continued)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	291.2	185.5		330.7	272.6	
Right	kg	288.5	190.1		291.7	226.3	
Ratio	%	60.7	39.3		55.5	45.5	
Totals	kg	579.7	375.6	955.3	622.4	498.9	1121.3

TARGET TEST WEIGHT CALCULATION*

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	955.3
Weight of 2 P572F Side Impact Dummies	kg	161.4
Rated Cargo/Luggage Weight (RCLW)	kg	11.3
Calculated Vehicle Target Weight (TVTW)	kg	1128.0

*Actual As Tested Weight (ATW) will be TVTW -5/-10 kg

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	633	639	644	653	933
As Tested	mm	619	632	604	620	1034
Fully Loaded	mm	616	630	604	620	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2374
Total Vehicle Length at Left Side	mm	3533
Total Vehicle Length at Centerline	mm	4114
Total Vehicle Length at Right Side	mm	3535
Weight of Ballast in Cargo Area	kg	0
Amount of Stoddard Solvent in Fuel Tank	liters	41.6

TEST VEHICLE VERTICAL IMPACT LINE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2374
Target Impact Point Aft of Front Axle	mm	247
Actual Impact Point Aft of Front Axle	mm	272

DATA SHEET NO. 1...(continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

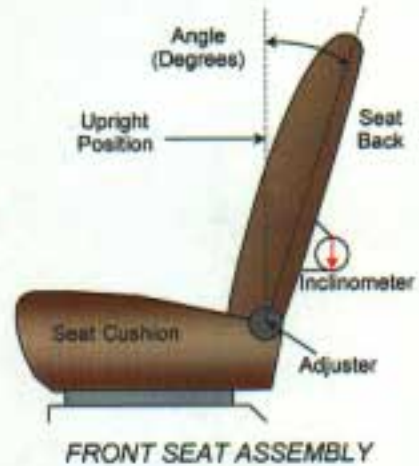
Test Date: December 18, 2000

NORMAL DESIGN RIDING POSITION

The driver's seat back is positioned to the manufacturer's designated angle. The procedure for the seat is as follows: adjust the seat back to the 5th notch rearward of full upright with the first adjustment being #1. The angle shall be 88° from horizontal when measured on the headrest post.

Driver seat back angle: 5th notch rearward, 1st as one, 88.2°

Passenger seat back angle: non-adjustable



SEAT FORE/AFT POSITIONS

The driver's seat is manually adjusted to the 9th notch with the first notch as #1.

Driver seat fore/aft total travel: 240 mm

Rear passenger seat fore/aft total travel: non-adjustable

Driver seat fore/aft position: 9th notch rearward of 17 total, 1st as one

Rear passenger seat fore/aft position: non-adjustable

SEAT BELT UPPER ANCHORAGE

The test vehicle is equipped with adjustable "D" ring anchorage for the driver's seat position. The driver's "D" ring anchorage is placed in the 2nd adjustment position from the top with top as one.

DATA SHEET NO. 1...(continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000

FUEL TANK CAPACITY DATA

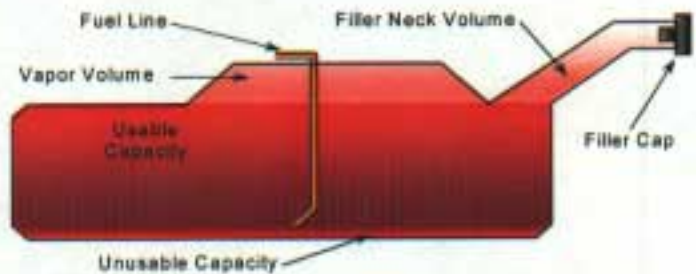
The "Usable Capacity" of the standard equipment fuel tank is: 45 liters

The "Usable Capacity" of any optional equipment fuel tank is: n/a liters

92-94% of "Usable Capacity" for certification to FMVSS 301 requirement: 41.4 - 42.3 liters

Actual amount of Stoddard solvent added to vehicle for certification test: 41.6 liters

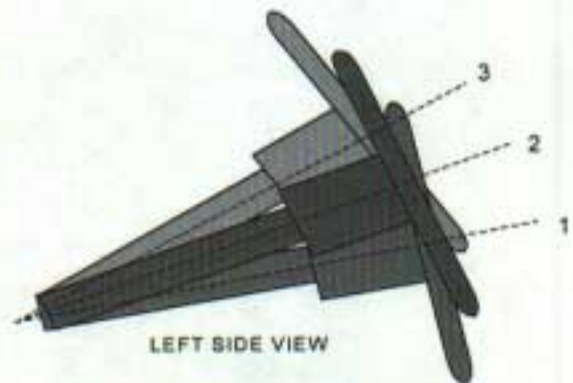
The test vehicle is equipped with an electric fuel pump. The fuel pump will operate with the ignition in the "ON" position.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes, when it is moved through its full range of motion. A square is placed across the rim of the steering wheel, and an inclinometer is placed onto the square and the angle is measured. The steering column was placed in the center position for this test.



STEERING COLUMN ASSEMBLY

DATA SHEET NO. 2

TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	291.2	185.5		330.7	272.6	
Right	kg	288.5	190.1		291.7	226.3	
Weight Ratio	%	60.7	39.3		55.5	45.5	
Totals	kg	579.7	375.6	955.3	622.4	498.9	1121.3

MAXIMUM EXTERIOR STATIC CRUSH

Level	Measured Parameter	Units	Maximum Crush	Above Ground
Level 1	Sill Top Height	mm	191	242
Level 2	Occupant H-Point	mm	326	529
Level 3	Mid Door	mm	292	600
Level 4	Window Sill	mm	236	922
Level 5	Window Top	mm	52	1403
N/A	Maximum Penetration	mm	326	529

INSTRUMENTATION

Driver SID Accelerometers	11
Passenger SID Accelerometers	11
Vehicle Structure Accelerometers	20
MDB Accelerometers	5
Total	47

DATA SHEET NO. 3

MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000

MDB SPECIFICATIONS (mm)

Measurement Description	Length
Overall Width of Framework Carriage	1252
Overall Length Including Honeycomb Face	4115
Wheel base of Framework Carriage	2590
C.G. Location aft of Front Axle	1127

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	395.1	293.8	
Right	kg	385.7	287.4	
Ratio	%	57.3	42.7	
Totals	kg	780.8	581.2	1362.0

SPEED AND IMPACT ANGLE DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	61.5
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.6
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.2

MAXIMUM STATIC CRUSH OF HONEYCOMB FACE (mm)

Vertical Location			From Centerline		Max. Crush
Row	Description	Height	Distance	Direction	
A	Center of Bumper	432	800	Left	97
B	Top of Bumper	533	800	Left	61
C	Mid Level	686	800	Right	27
D	Top of Stack	813	800	Left	171

MDB INSTRUMENTATION AND CAMERAS

Accelerometers	5
Contact Switches	2
High Speed Cameras	2

DATA SHEET NO. 4

POST TEST OBSERVATIONS

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat SID	Rear Seat SID
Dummy Type / Serial No.	SID/036	SID/037
Head Contact	Headrest	C post
Upper Torso Contact	Door trim panel	Door trim panel
Lower Torso Contact	Door trim panel	C post
Left Knee Contact	Door trim panel	Door trim panel
Right Knee Contact	Left knee	Left knee

POST TEST DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Left Side Door Opening	remained closed	remained closed
Right Side Door Opening	remained closed	remained closed
Seat Movement	none	none
Seat Back Failure	none	none

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No failures noted
Sill Separation	None noted
Windshield Damage	Cracked
Window Damage	Left front and rear windows broke
Other Notable Effects	Left front tire flat after impact

AIRBAG DEPLOYMENT

	Driver	Front Passenger	Rear Passenger
Front	no	no	
Side			

MDB LEFT EDGE IMPACT POINT DATA

Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	25 rearward
Vertical Offset	mm	+/-20	2 up

SECTION 4

OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 5

SID INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000

THORAX AND PELVIS PEAK ACCELERATIONS (FIR 100 Filtered)

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Upper Rib (LUR)	Y	G's	64.1	28	26.9	68	51.7	39	12.8	115
Upper Rib (LUR) (R)	Y	G's	*	*	*	*	52.6	39	12.1	115
Lower Rib (LLR)	Y	G's	77.6	32	14.2	68	61.4	38	13.7	115
Lower Rib (LLR) (R)	Y	G's	79.4	32	13.4	68	61.9	38	13.0	114
Lower Spine (T ₁₂)	Y	G's	82.1	31	11.3	61	69.9	39	26.9	61
Lower Spine (T ₁₂) (R)	Y	G's	82.0	31	14.6	61	69.3	39	27.8	61
Pelvis (PEV)	Y	G's	107.0	24	23.7	46	85.8	33	15.9	49
Pelvis (PEV) (R)	Y	G's	109.2	24	23.7	46	87.7	33	15.2	50

THORACIC TRAUMA INDEX (TTI) AND PELVIC ACCELERATION (FIR 100 Filtered)

Location	Driver				Passenger			
	LLR	T ₁₂	TTI(g)	PEV(g)	LLR	T ₁₂	TTI(g)	PEV(g)
Rib, Spine, and Pelvis	77.6	82.1	80	107	61.4	69.9	66	86
Rib, Spine, and Pelvis (R)	79.4	82.0	81	109	61.9	69.3	66	88

HEAD CG PEAK ACCELERATIONS (SAE CLASS 1000 Filtered)

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	9.0	17	28.1	74	12.3	31	32.0	64
Head CG	Y	G's	46.0	47	23.9	59	144.2	50	15.1	42
Head CG	Z	G's	90.6	56	29.2	43	26.9	42	57.4	59
Head CG Resultant		G's	92.6	56			146.8	51		

HEAD INJURY CRITERIA (SAE CLASS 1000 Filtered)

Location	Driver				Passenger			
	HIC	T ¹	T ²	Avg G's	HIC	T ¹	T ²	Avg G's
Head CG	710	42.1	78.1	52.2	1063	47.0	54.2	116.9

Positive Acceleration Polarities: Longitudinal (X) = Forward
 (Conforms to SAE J211) Lateral (Y) = Right
 Vertical (Z) = Down

No Valid Data Collected

DATA SHEET NO. 6

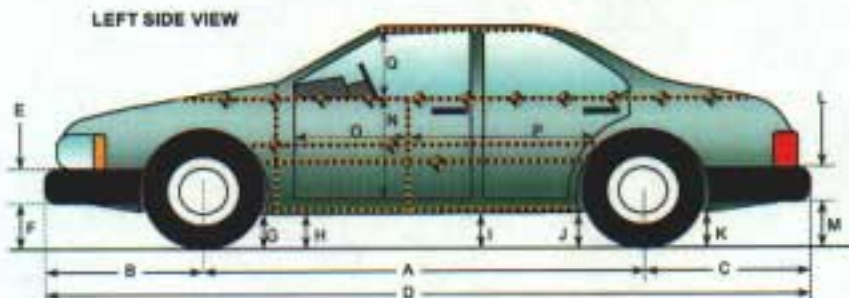
VEHICLE PRE-TEST AND POST-TEST MEASUREMENTS

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000



All Measurements in mm

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2374	2371	3
B	Front Axle to FSOV	800	803	3
C	Rear Axle to RSOV	940	961	21
D	Total Length at Centerline	4114	4135	21
E	Front Bumper Thickness	120	120	0
F	Front Bumper Bottom to Ground	396	340	56
G	Sill Height at Front Wheel Well	142	138	6
H	Sill Height at Front Door Leading Edge	158	204	46
I	Sill Height at "B" Pillar	161	174	13
J1	Sill Height at Rear Wheel Well	144	143	1
J2	Pinch Weld Height at Rear Wheel Well	158	145	13
K	Sill Height Aft of Rear Wheel Well	243	205	38
L	Rear Bumper Thickness	270	270	0
M	Rear Bumper Bottom to Ground	330	346	16
N	Sill Height to Window Bottom Sill	730	655	75
O	Front Door Leading Edge to Impact CL	715	700	15
P	Rear Door Trailing Edge to Impact CL	1067	1008	59
Q	Front Window Opening	460	458	2
R	Right Side Length	3535	3547	12
S	Left Side Length	3533	3459	74
T	Vehicle Width at "B" Post	1660	1412	248

DATA SHEET NO. 7

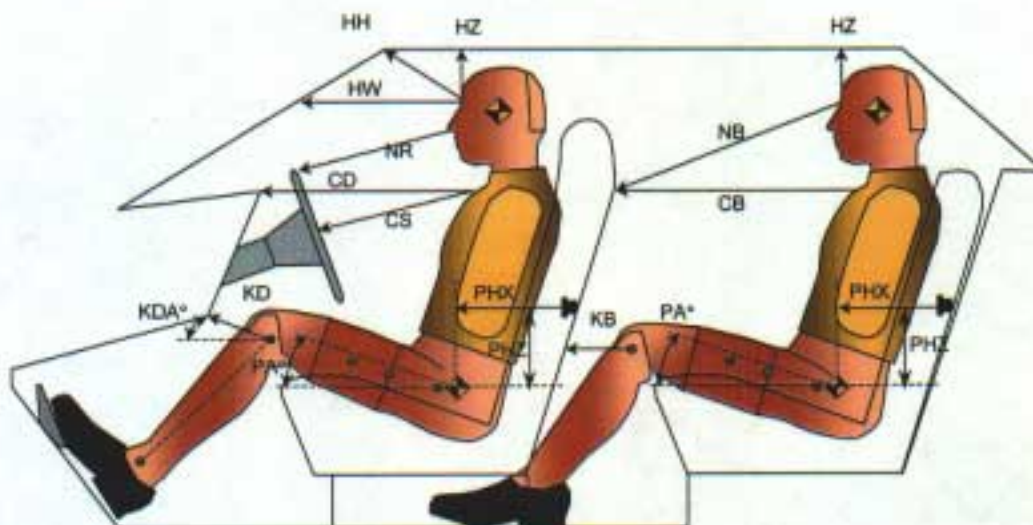
SID LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000



Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length(mm)	Angle(°)	Length(mm)	Angle(°)
HH		Head to Header	358			
HW		Head to Windshield	592			
HZ	HZ	Head to Roof	183		166	
NR	NB	Nose to Rim/Nose to Seatback	521		584	
CD	CB	Chest to Dash or Seatback	609		525	
CS		Chest to Steering Wheel	351			
KDL	KBL	Left Knee to Dash or Seatback	130	21.7	168	0.0
KDR	KBR	Right Knee to Dash or Seatback	184	49.1	176	0.0
PA	PA	Pelvic Angle		23.9		24.2
PHX	PHX	H-Point to Striker (X-Axis)	188		185	
PHZ	PHZ	H-Point to Striker (Z-Axis)	127		286	

DATA SHEET NO. 8

SID LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000



FRONT VIEW OF DUMMY

Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	214	252
HS	Head to Side Window	mm	293	316
AD	Arm to Door	mm	112	66
HD	H-Point to Door	mm	142	141

DATA SHEET NO. 9

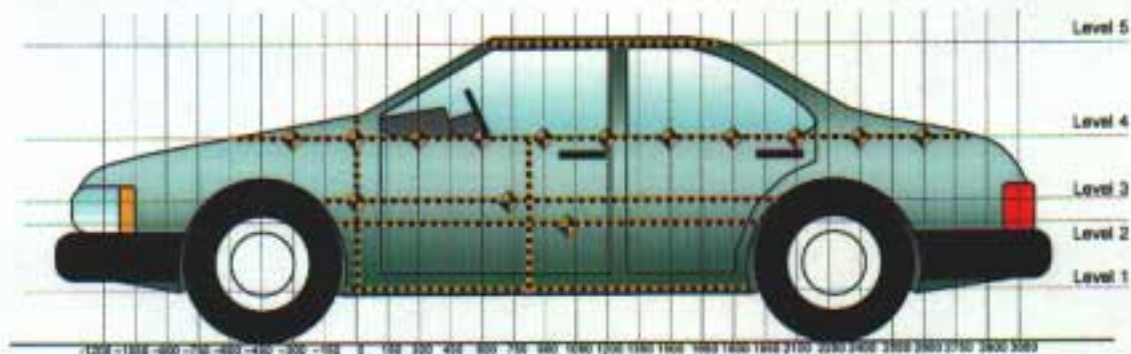
VEHICLE SIDE MEASUREMENTS

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000



All Measurements Shown in mm

LEFT SIDE VIEW

Measurements are taken with vehicle in the as tested condition.

Measurements along the vertical 800 mm.

All measurements below in mm.

Level	Measurement Description	Height Above Ground
5	Window	1403
4	Window Sill	922
3	Mid Door	600
2	Occupant H-Point	529
1	Sill Top	242

DATA SHEET NO. 10

VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600			866					872					6		
-450			839	920				880	922				41	2	
-300				910					924					14	
-150				902					939					37	
0			836	896				992	956				156	60	
150	855	854	850	892		1013	1147	1100	978		158	293	250	86	
300	908	850	847	889		1050	1165	1114	1016		142	315	267	127	
450	909	851	844	885		1057	1151	1131	1051		148	300	287	166	
600	908	847	840	882	1088	1063	1145	1111	1070	1111	155	298	271	188	23
750	907	845	838	882	1078	1067	1145	1110	1067	1110	160	300	272	185	32
900	906	843	835	881	1078	1068	1154	1110	1065	1046	162	311	275	184	-32
1050	907	842	834	881	1078	1098	1151	1113	1075	1090	191	309	279	194	12
1200	906	843	835	883	1075	1072	1169	1127	1119	1127	166	328	292	238	52
1350	907	843	835	885	1076	1067	1146	1100	1091	1070	160	303	285	206	-6
1500	904	842	835	888	1074	1058	1122	1077	1043	994	154	280	242	155	-80
1650	894	834	831	890	1071	1024	1089	1055	950	926	130	255	224	80	-145
1800		829	827	893	1070		1026	1008	883	867		197	181	-10	-203
1950			826	901	1076			948	842	1096			122	-59	20
2100			827	910				894	818				67	-92	
2250			833	920				880	953				47	33	
2400			845	932				874	961				29	29	
2550			860	952				881	967				21	15	
2700			880	977				893	975				13	-2	
2850			908	100				914	991				6	-16	
3000															

Reference plane is parallel to test vehicle longitudinal centerline

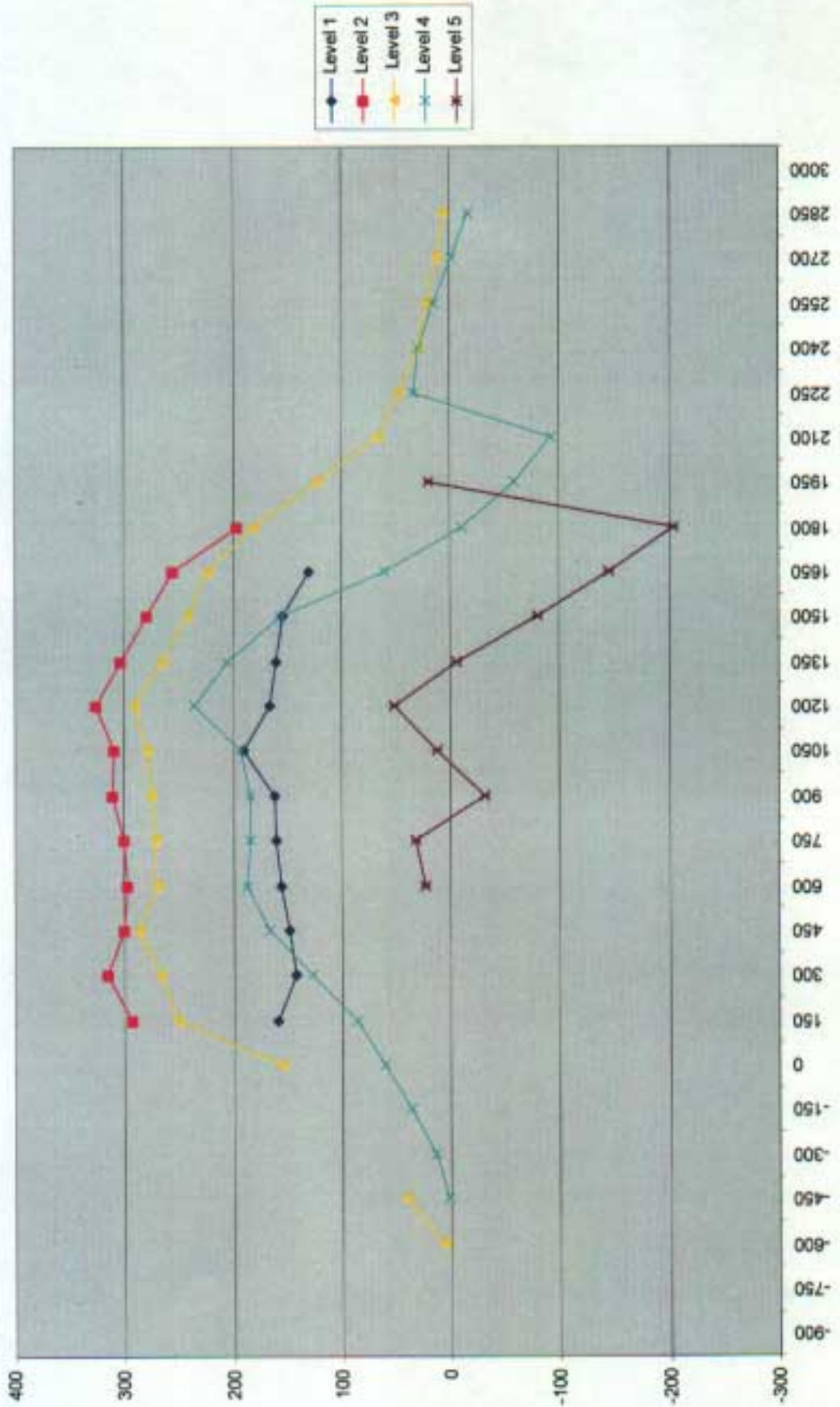
Given dimensions = Reference plane to car body

DATA SHEET NO. 10...(continued)

VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2001/Toyota/Echo/4 door NHTSA No.: C15101

Test Program: FMVSS 214 Test Date: December 18, 2000



DATA SHEET NO. 11

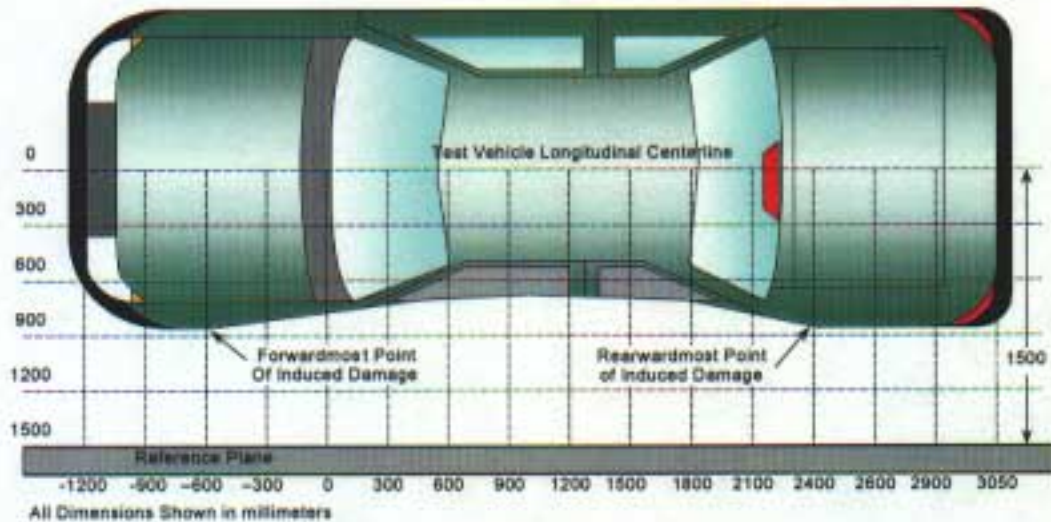
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000



TOP VIEW

Damage Profile Distances

DPD	Distance from Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max Static Crush (mm)
1	2700 mm	4	977	975	-2
2	2086 mm	3	822	900	78
3	1365 mm	2	843	1147	304
4	775 mm	2	844	1147	303
5	169 mm	2	854	1162	308
6	-450 mm	4	920	922	2

Reference plane is parallel to test vehicle longitudinal centerline
 Given dimensions = Reference plane to car body

DATA SHEET NO. 12

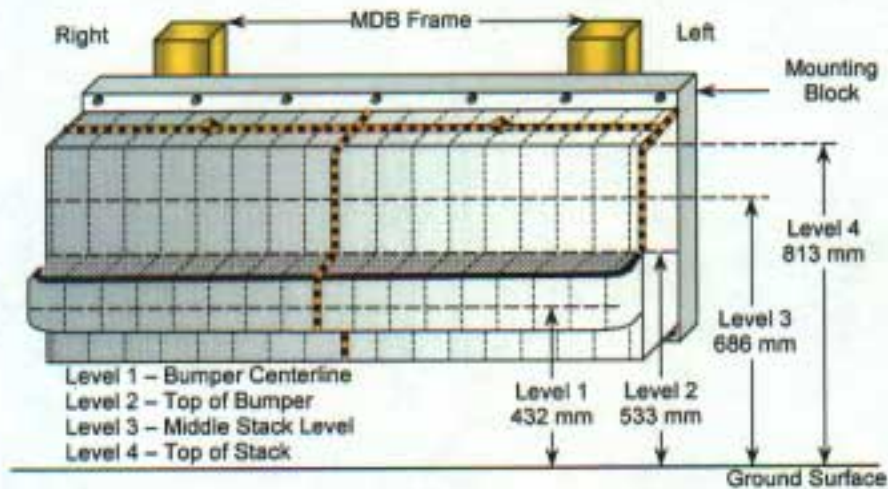
DEFORMABLE BARRIER HONEYCOMB FACE STATIC CRUSH

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000



DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center								C _L	Distance Left of Center							
	800	700	600	500	400	300	200	100		0	100	200	300	400	500	600	700
1	84	81	73	64	57	56	56	55	56	60	62	65	68	71	77	92	97
2	53	48	41	33	28	27	24	24	28	32	36	40	41	41	43	45	61
3	27	9	1	0	3	5	15	7	7	8	9	11	13	16	21	60	25
4	39	11	-6	-5	1	10	27	14	12	19	21	23	26	44	76	121	171

All Dimensions in mm

DATA SHEET NO. 13

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

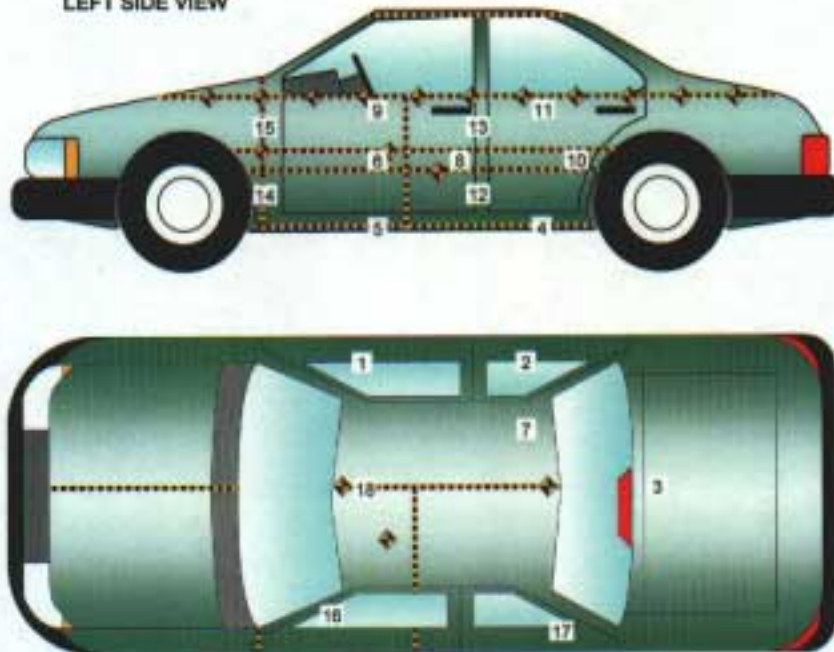
Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000

LEFT SIDE VIEW



No.	Location
1	Right Sill at Front Seat
2	Right Sill at Rear Seat
3	Rear Floorpan Above Axle
4	Left Sill at Rear Seat
5	Left Sill at Front Seat
6	Left Front Door Centerline
7	Right Rear Occupant Compartment
8	Left Front Door Mid-Rear
9	Left Front Door Upper Centerline

No.	Location
10	Left Rear Door Mid-Rear
11	Left Rear Door Upper Centerline
12	Left Lower B-Post
13	Left Middle B-Post
14	Left Lower A-Post
15	Left Middle A-Post
16	Left Front Seat Track
17	Rear Seat Track or Structure
18	Vehicle CG

DATA SHEET NO. 13...(continued)

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000

VEHICLE ACCELEROMETER PEAK DATA AND PRE-TEST LOCATIONS

Loc. No.	Accelerometer Location	Measurements (mm)			Peak Values (G's)				
		X	Y	Z	Axis	Max	Time	Min	Time
1	Right Sill at Front Seat	2280	620	192	X	3.7	67	12.9	12
					Y	27.0	9	4.5	65
					Z	6.2	64	5.9	17
					RES	28.4	9	--	--
2	Right Sill at Rear Seat	1560	620	202	X	6.8	37	9.1	12
					Y	30.0	9	2.8	86
					Z*	0.7	4	6.6	18
					RES	--	--	--	--
3	Rear Floorpan Above Axle	935	-43	450	X	3.8	34	13.8	19
					Y	30.8	9	4.0	86
					Z	15.2	20	13.9	25
					RES	32.1	39	--	--
4	Left Sill at Rear Seat	1567	-620	202	Y	35.7	23	12.4	10
5	Left Sill at Front Seat	2283	-620	189	Y	50.7	14	11.0	18
7	Rear Occupant Compartment	1641	306	275	Y	32.3	35	2.9	86
12	Left B-Post Lower	1844	-679	409	Y	181.9	7	33.4	23
13	Left B-Post Middle	1858	-675	984	Y	152.3	7	17.8	37
14	Left A-Post Lower	2794	-689	372	Y	88.1	5	39.1	23
15	Left A-Post Middle	2877	-728	984	Y	37.2	13	4.2	7
16	Left Front Seat Track	1988	-450	468	Y	77.0	14	50.0	27
18	Vehicle CG	2262	0	346	X	7.0	19	17.8	12
					Y	25.5	9	2.4	118
					Z	11.1	33	13.6	17
					RES	27.2	9	--	--

Reference Points: X - Rear of Vehicle (+ forward)
 Y - Vehicle Centerline (+ to right)
 Z - Ground Plane (+ up)

* No valid data after 26 msec

DATA SHEET NO. 14

MDB ACCELEROMETER LOCATIONS AND DATA SUMMARY

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

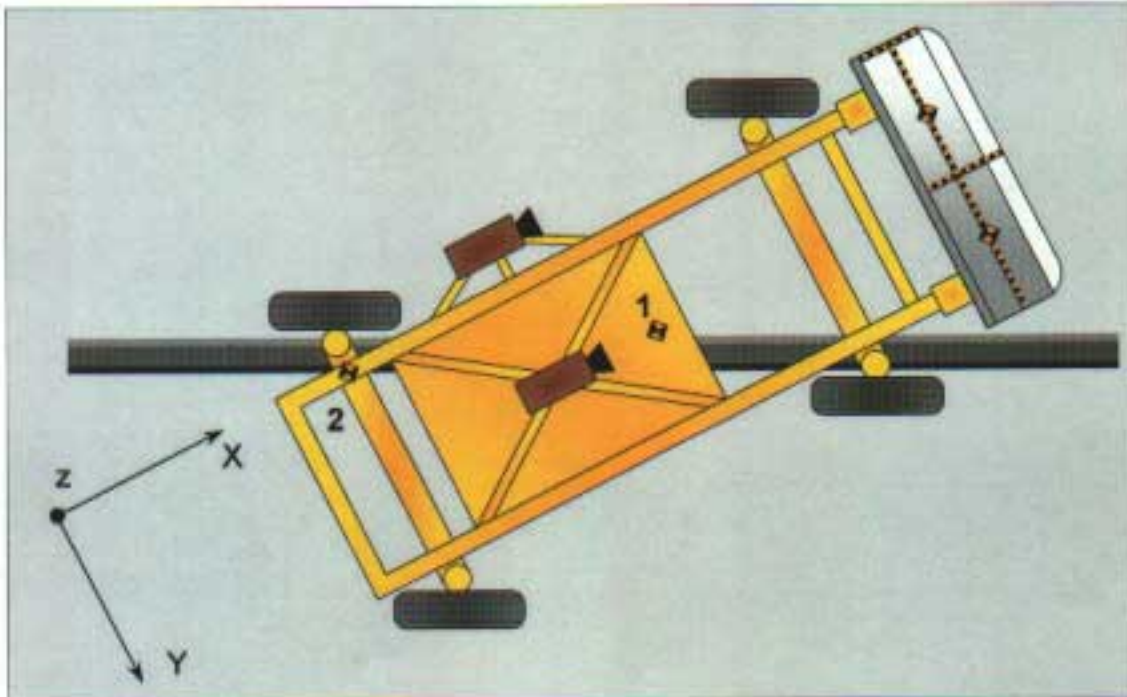
Test Date: December 18, 2000

MDB ACCELEROMETER PEAK DATA AND LOCATIONS

Loc. No.	Accelerometer Location	Measurement (mm)			Peak Values (G's)				
		X	Y	Z	Axis	Max	Time	Min	Time
1	MDB CG	-1092	0	483	X	1.4	119	17.9	40
					Y	2.7	62	7.6	26
					Z*	10.6	13	11.5	17
					RES	--	--	--	--
2	MDB Rear	-2591	-625	622	X	1.7	156	21.2	33
					Y	4.3	27	1.5	135

Reference Points: X - MDB Front Axle (+ forward)
 Y - MDB Centerline (+ to right)
 Z - Ground Plane (+ up)

* No valid data after 30 msec



DATA SHEET NO. 15

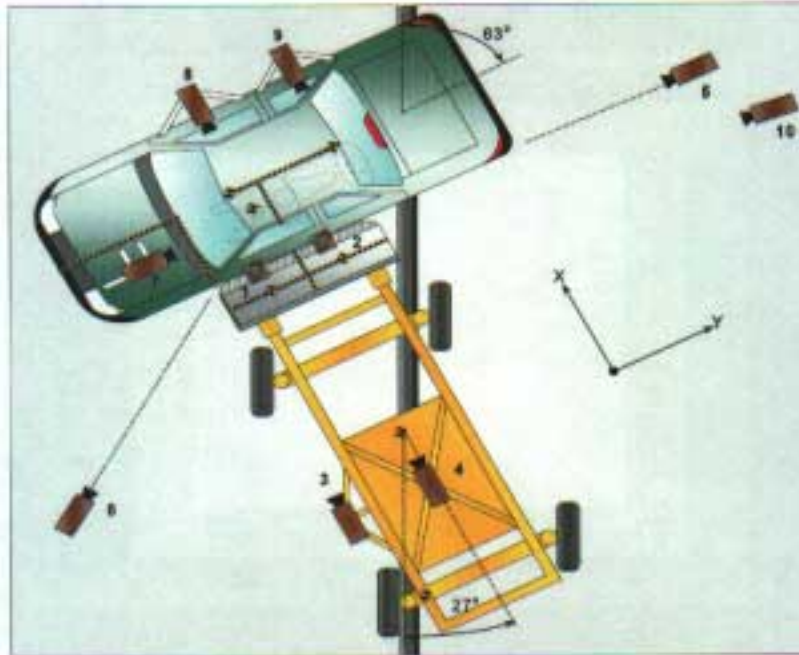
HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000



No.	Camera View	Location (mm)*			Lens (mm)	Film Speed (fps)
		X	Y	Z		
1	Overhead Overall	-230	1170	5000	8	889
2	Overhead Close-up	-630	-270	5000	13	909
3	MDB Onboard, Impact Point Close-up				35	1036
4	MDB Onboard, Centerline of Impact				13	1005
5	Right Side, Ground Level, Overall	-950	10500	1860	25	**
6	Left Side, Ground Level, Overall	-520	-2240	1750	13	1010
7	Vehicle Onboard Front SID, Front				13	1015
8	Vehicle Onboard Front SID, Side				8	1005
9	Vehicle Onboard Rear SID, Side				13	1020
10	Real Time Coverage				10	24

Reference (from impact point):

+X = Forward

+Y = To Right

+Z = Upward From Floor Level

** No Timing Marks

DATA SHEET NO. 16

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000

Test Time: 2:27 PM

Temperature at Time of Impact: 22 °C

Stoddard Solvent Spillage Measurements

- A. From impact until vehicle motion ceases: 0 oz.
(Maximum Allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: 0 oz.
(Maximum Allowable = 5 ounces)
- C. For the following 25 minutes: 0 oz.
(Maximum Allowable = 1 oz./minute)
- D. Spillage Details: None

DATA SHEET NO. 17

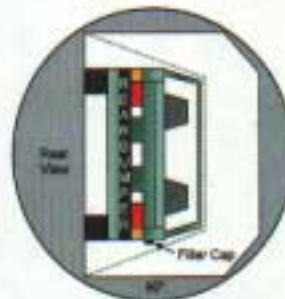
FMVSS 301 STATIC ROLLOVER DATA SHEET

Test Vehicle: 2001/Toyota/Echo/4 door

NHTSA No.: C15101

Test Program: FMVSS 214

Test Date: December 18, 2000



0° TO 90°

90° TO 180°



180° TO 270°

270° TO 360°

1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum)
3. Details of Stoddard Solvent spillage locations:

Rollover Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° TO 90°	168	300	0
90° TO 180°	151	300	0
180° TO 270°	139	300	0
270° TO 360°	158	300	0

APPENDIX A
PHOTOGRAPHS

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Photo No. A-52 - Rollover 360°	A-52



Photo No. A-1 - Pre-Test Front View of Test Vehicle



Photo No. A-2 - Post-Test Front View of Test Vehicle

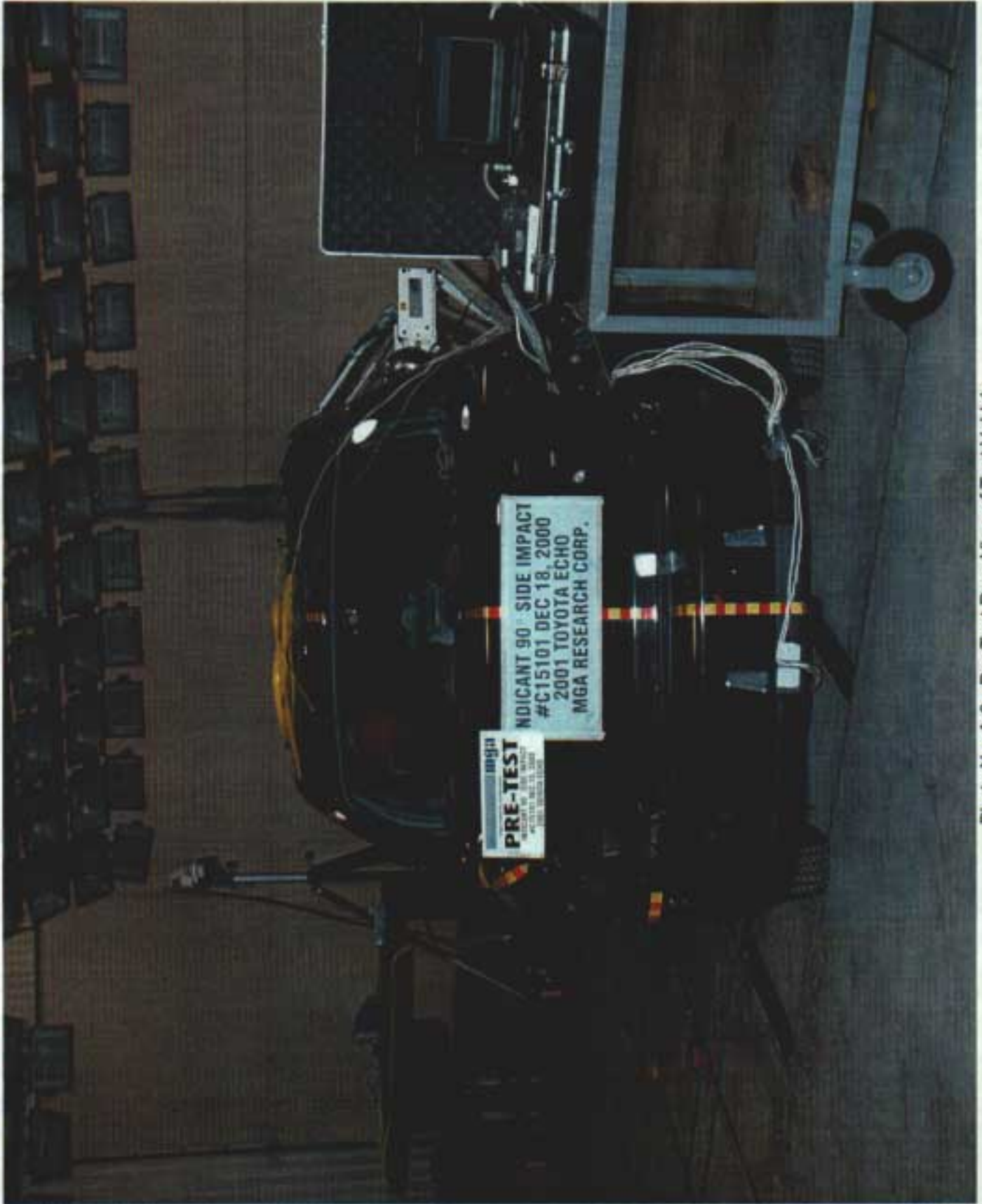


Photo No. A-3 - Pre-Test Rear View of Test Vehicle



Photo No. A-4 - Post-Test Rear View of Test Vehicle

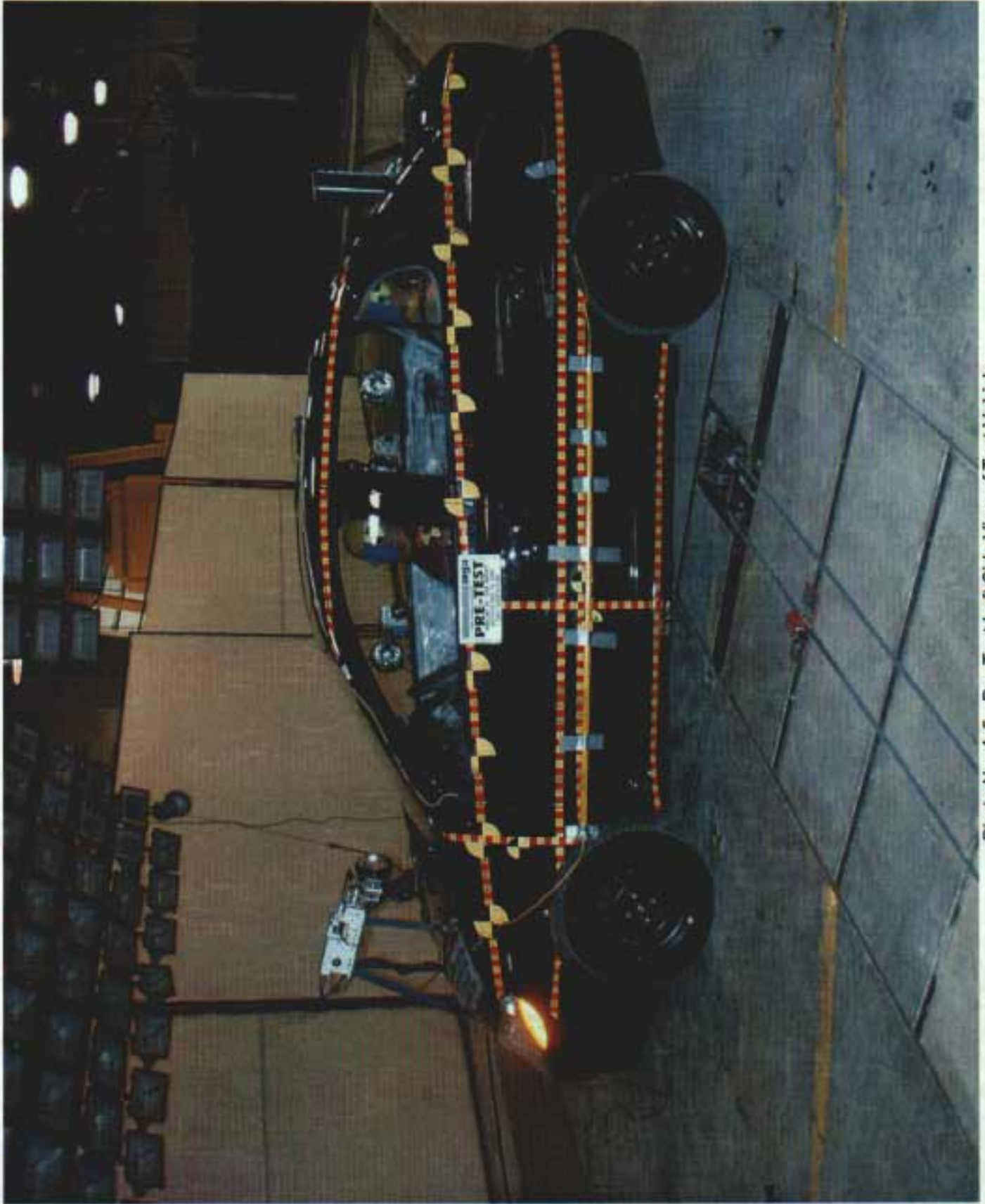


Photo No. A-5 - Pre-Test Left Side View of Test Vehicle



Photo No. A-6 - Post-Test Left Side View of Test Vehicle

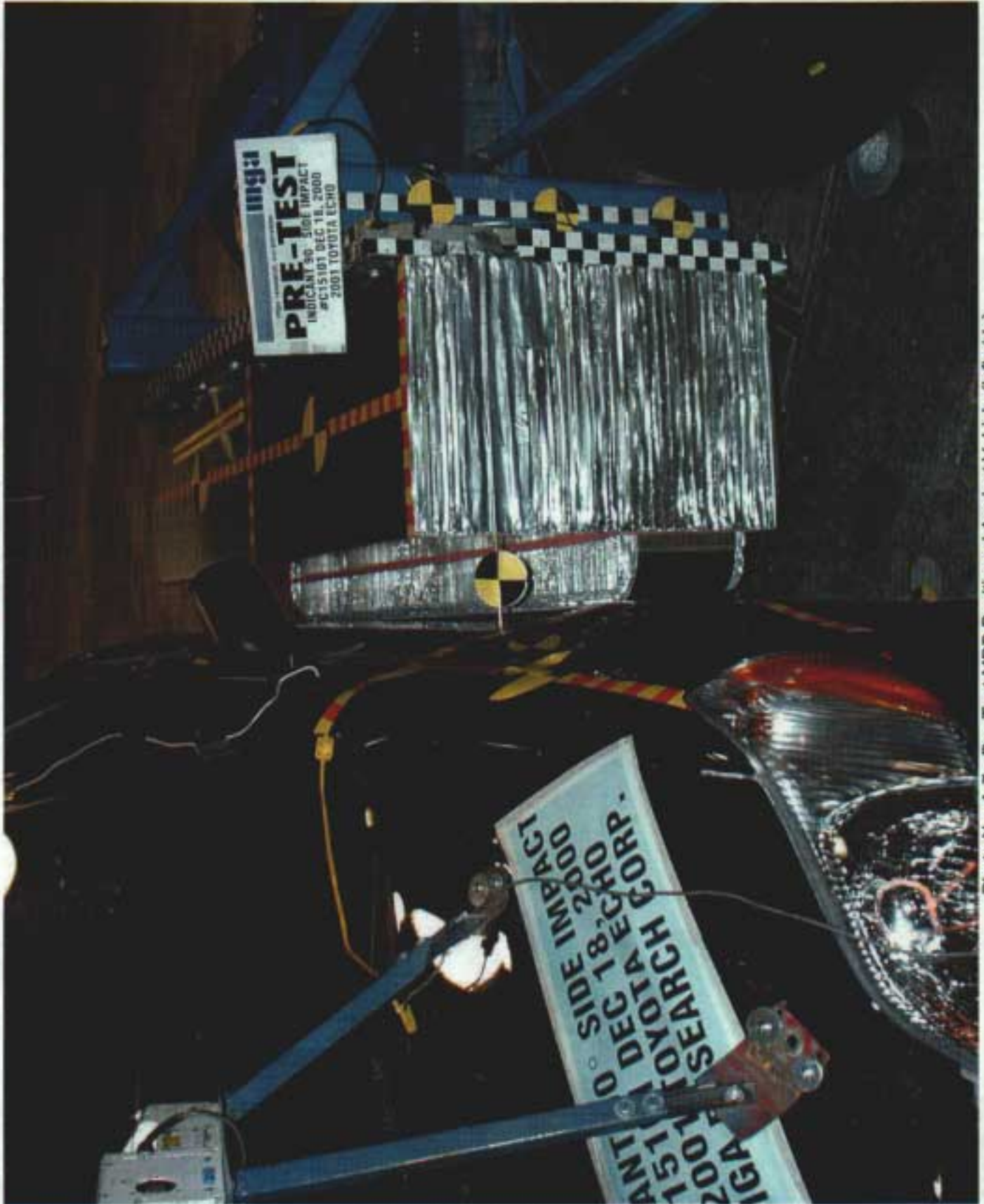


Photo No. A-7 - Pre-Test MDB Positioned Against Vehicle (left side)

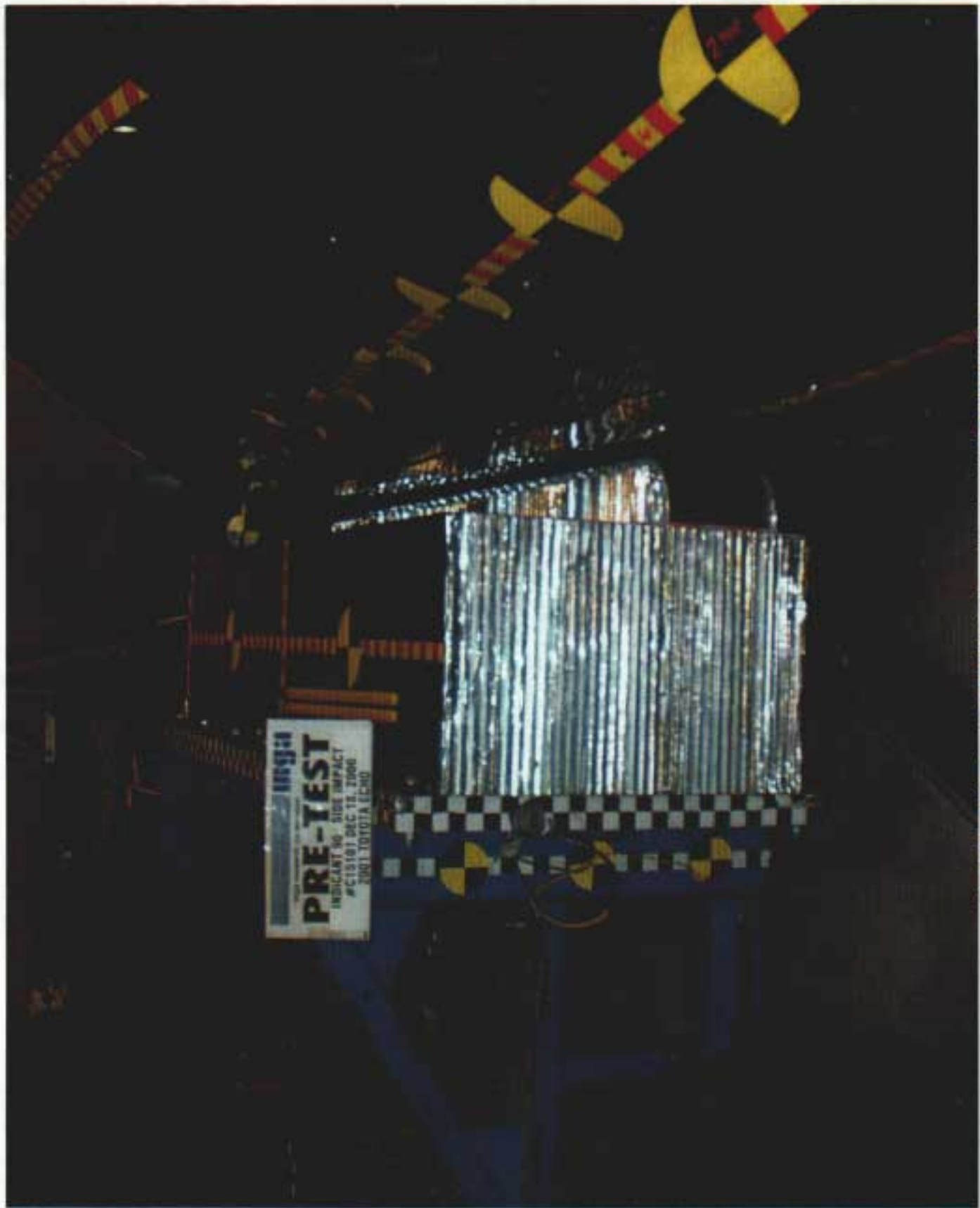


Photo No. A-8 - Pre-Test MDB Positioned Against Vehicle (right side)

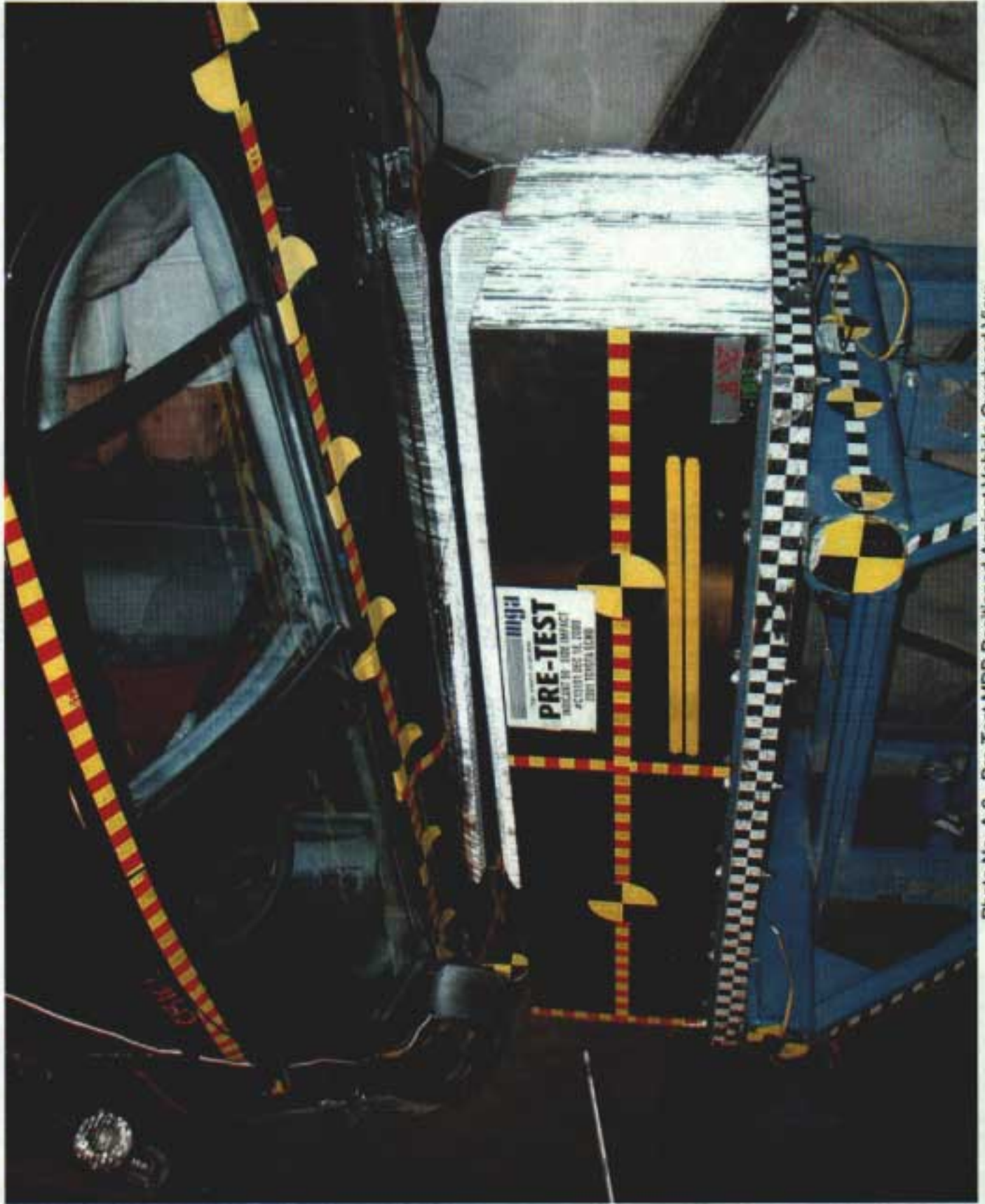


Photo No. A-9 - Pre-Test MDB Positioned Against Vehicle Overhead View



Photo No. A-10 - Post-Test MDB and Vehicle (left side)

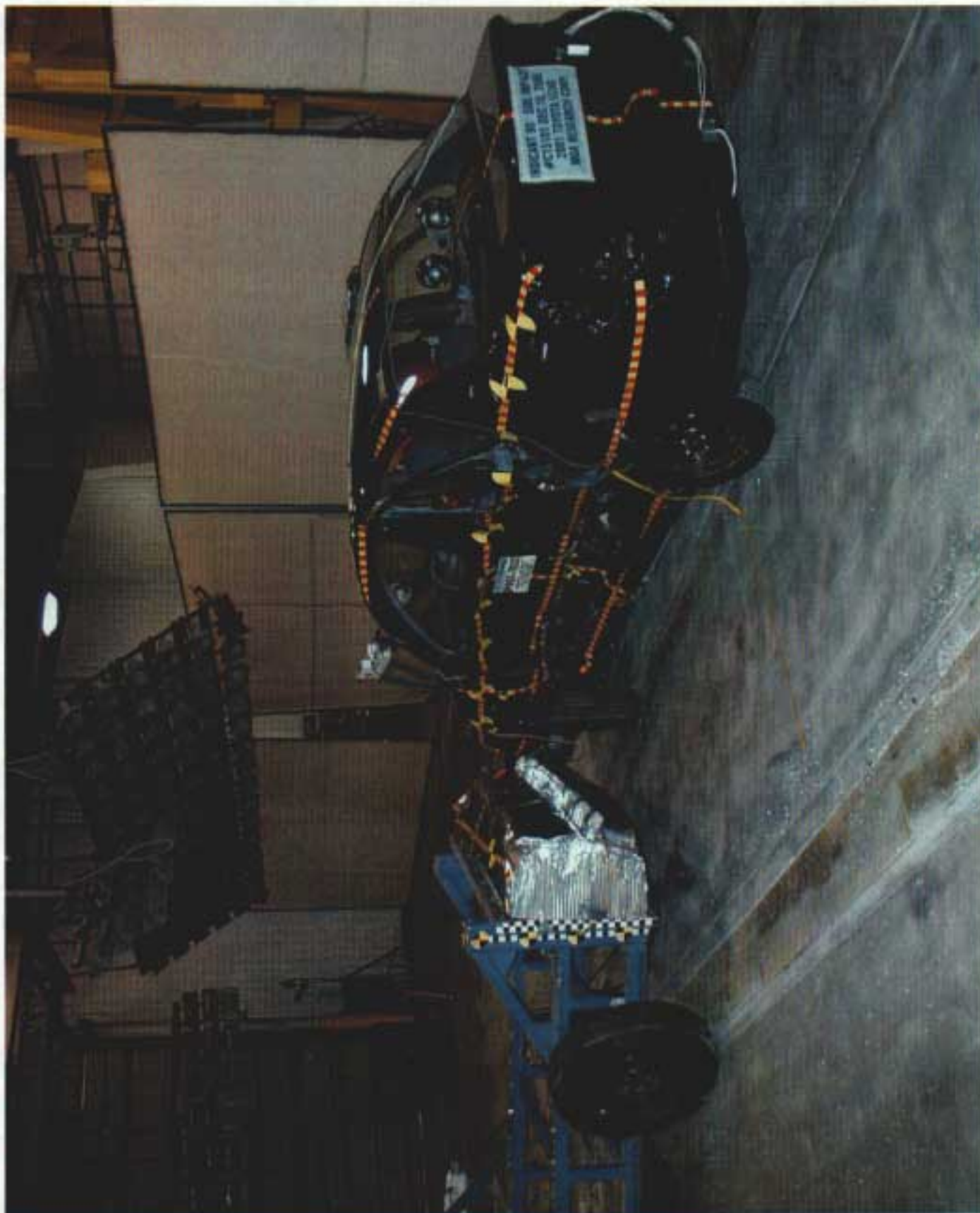


Photo No. A-11 - Post-Test MDB and Vehicle (right side)



Photo No. A-12 - Post-Test MDB and Overhead View

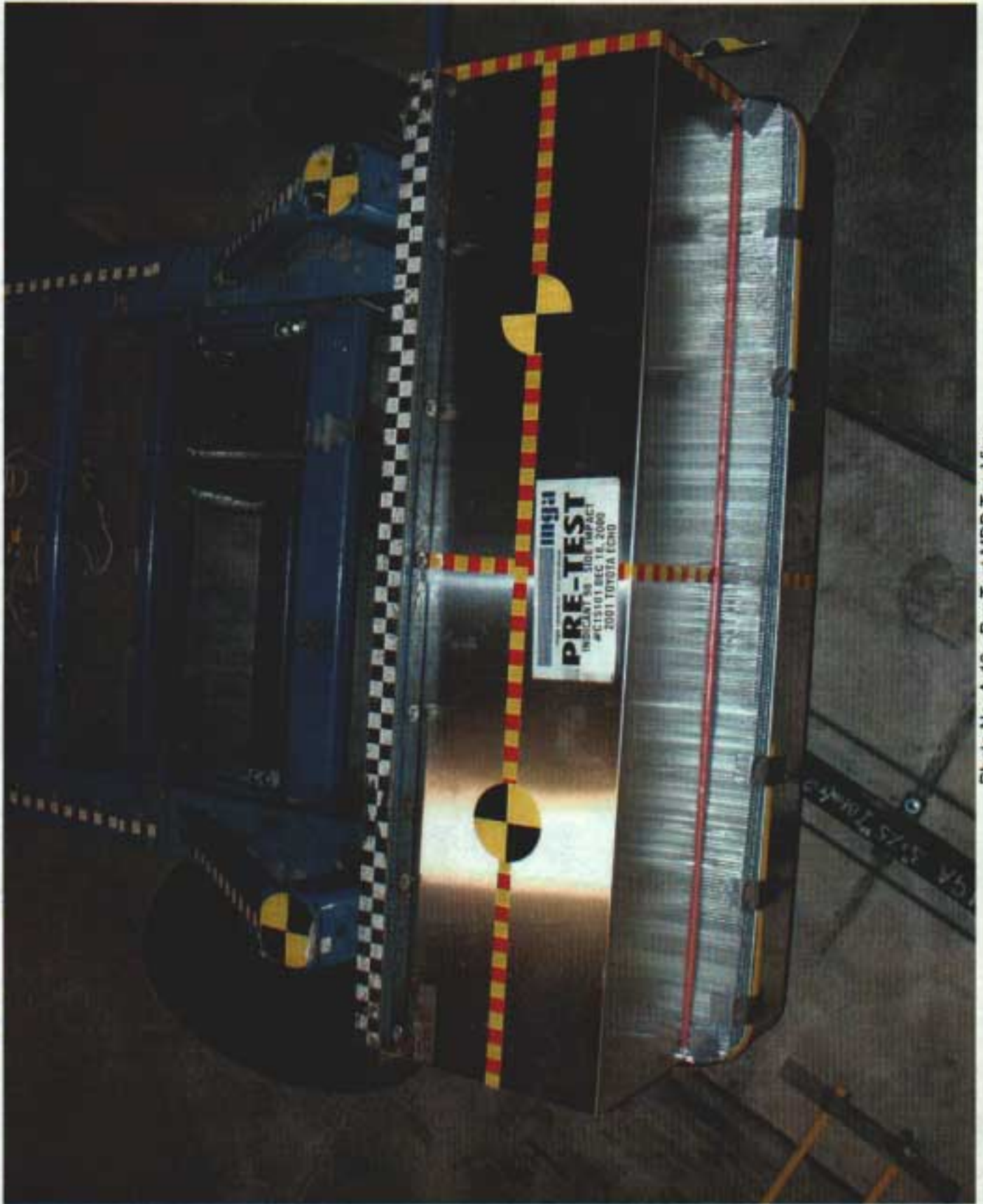
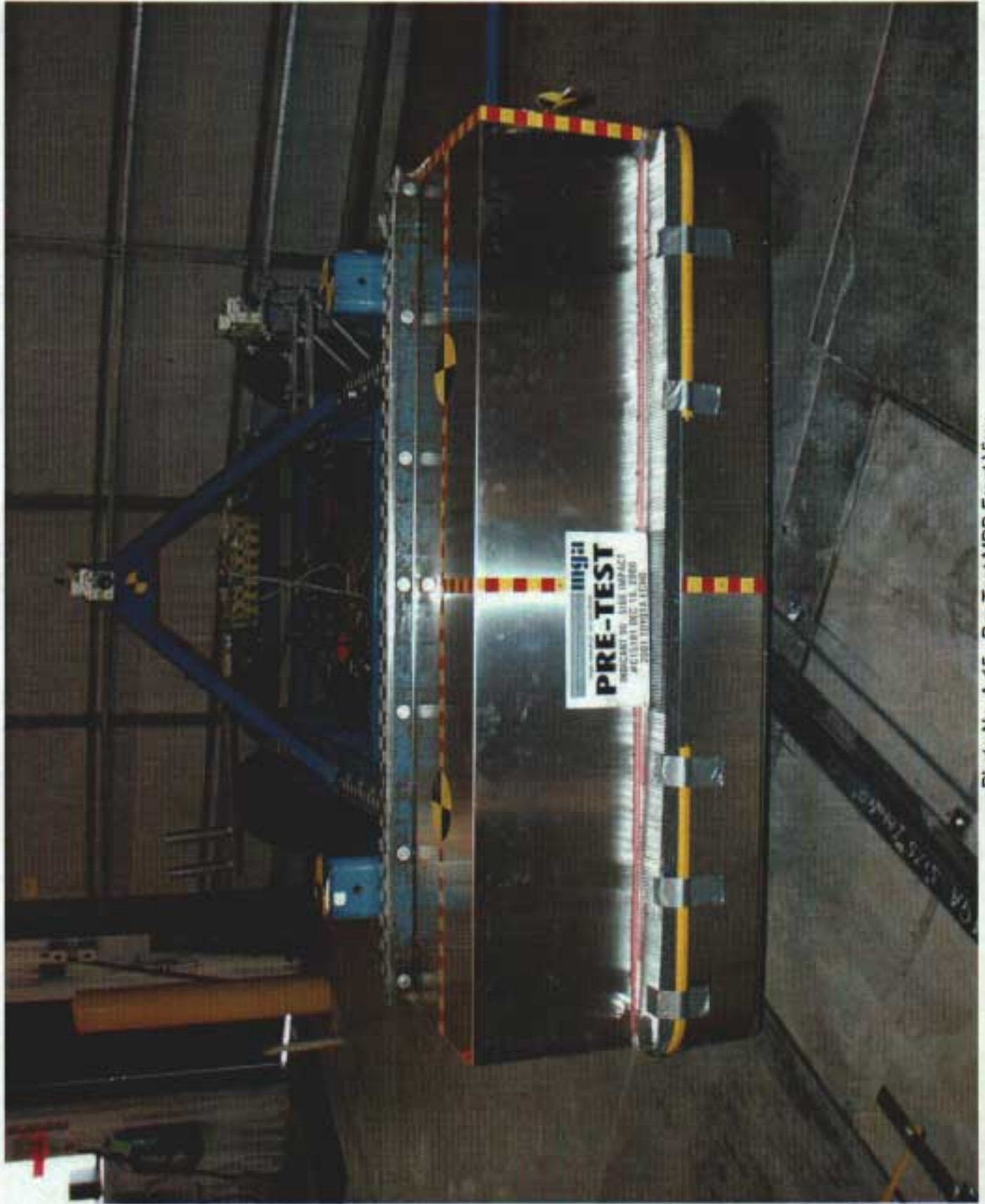


Photo No. A-13 - Pre-Test MDB Top View



A-14

Photo No. A-14 - Post-Test MDB Top View



A-15

Photo No. A-15 - Pre-Test MDB Front View

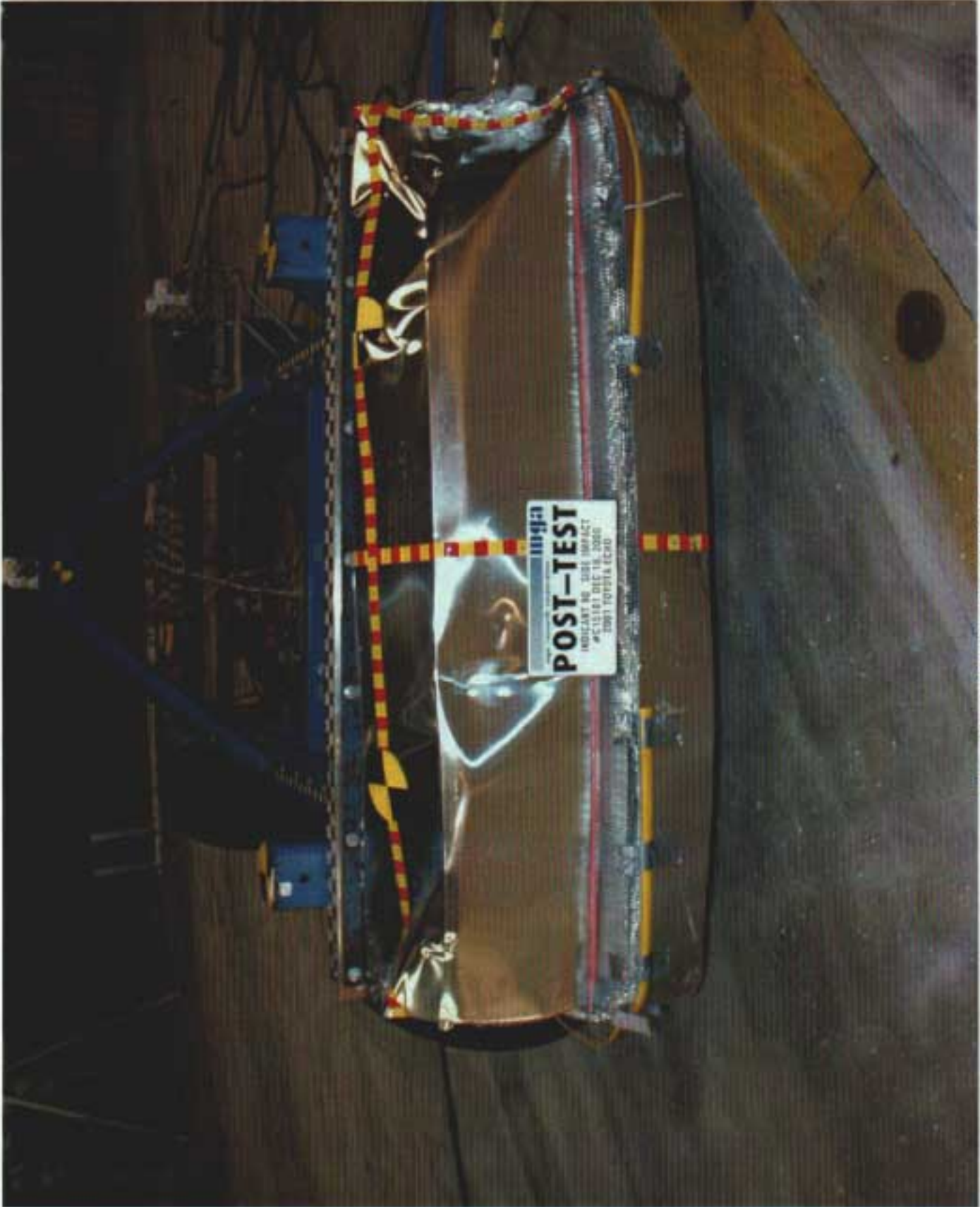
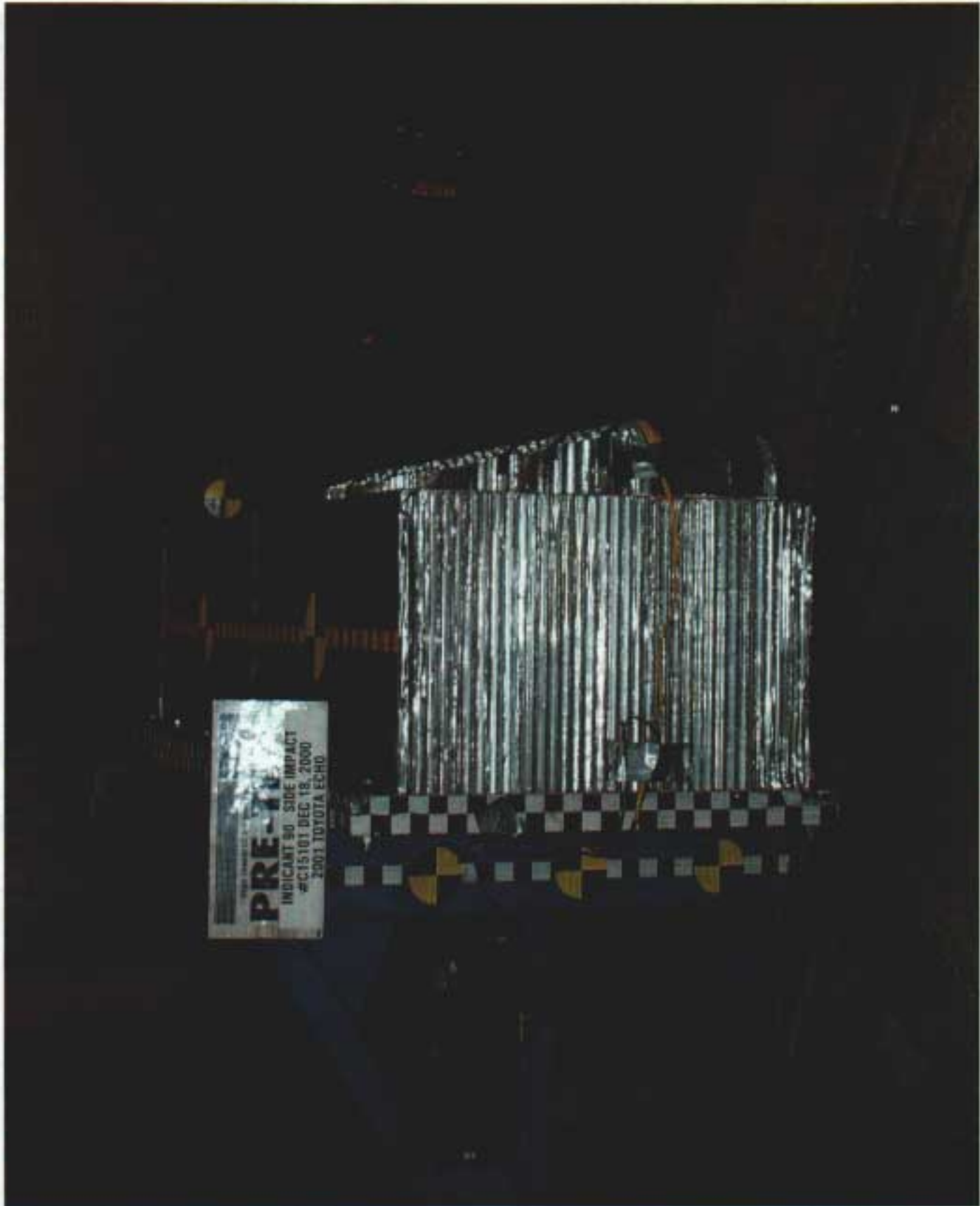


Photo No. A-16 - Post-Test MDB Front View

A-16



PRE-TEST
INDICANT 90 - SIDE IMPACT
#C15101 DEC 18, 2000
2001 TOYOTA ECHO

Photo No. A-17 - Pre-Test MDB Right Side View



Photo No. A-18 - Post-Test MDB Right Side View



PRE-TEST
INDICANT 90 SIDE IMPACT
#C15191 DEC 18, 2000
2001 TOYOTA ECHO

Photo No. A-19 - Pre-Test MDB Left Side View



Photo No. A-20 - Post-Test MDB Left Side View

A-20



Photo No. A-21 - Pre-Test Driver Dummy Right Side View



Photo No. A-22 - Post-Test Driver Dummy Right Side View



Photo No. A-23 - Pre-Test Driver Dummy Left Side View

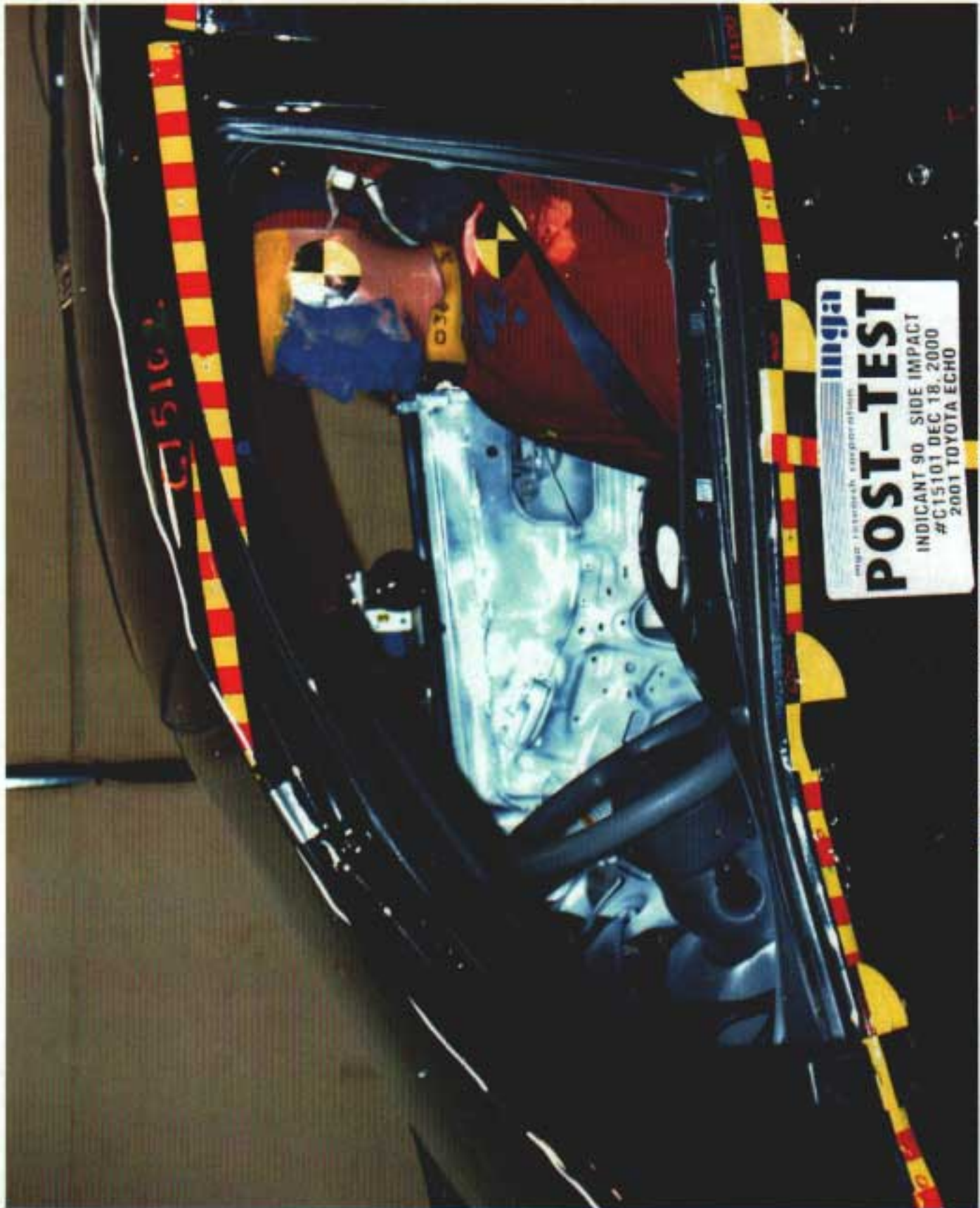


Photo No. A-24 - Post-Test Driver Dummy Left Side View



Photo No. A-25 - Pre-Test Driver Dummy Left Side View (Door Open)

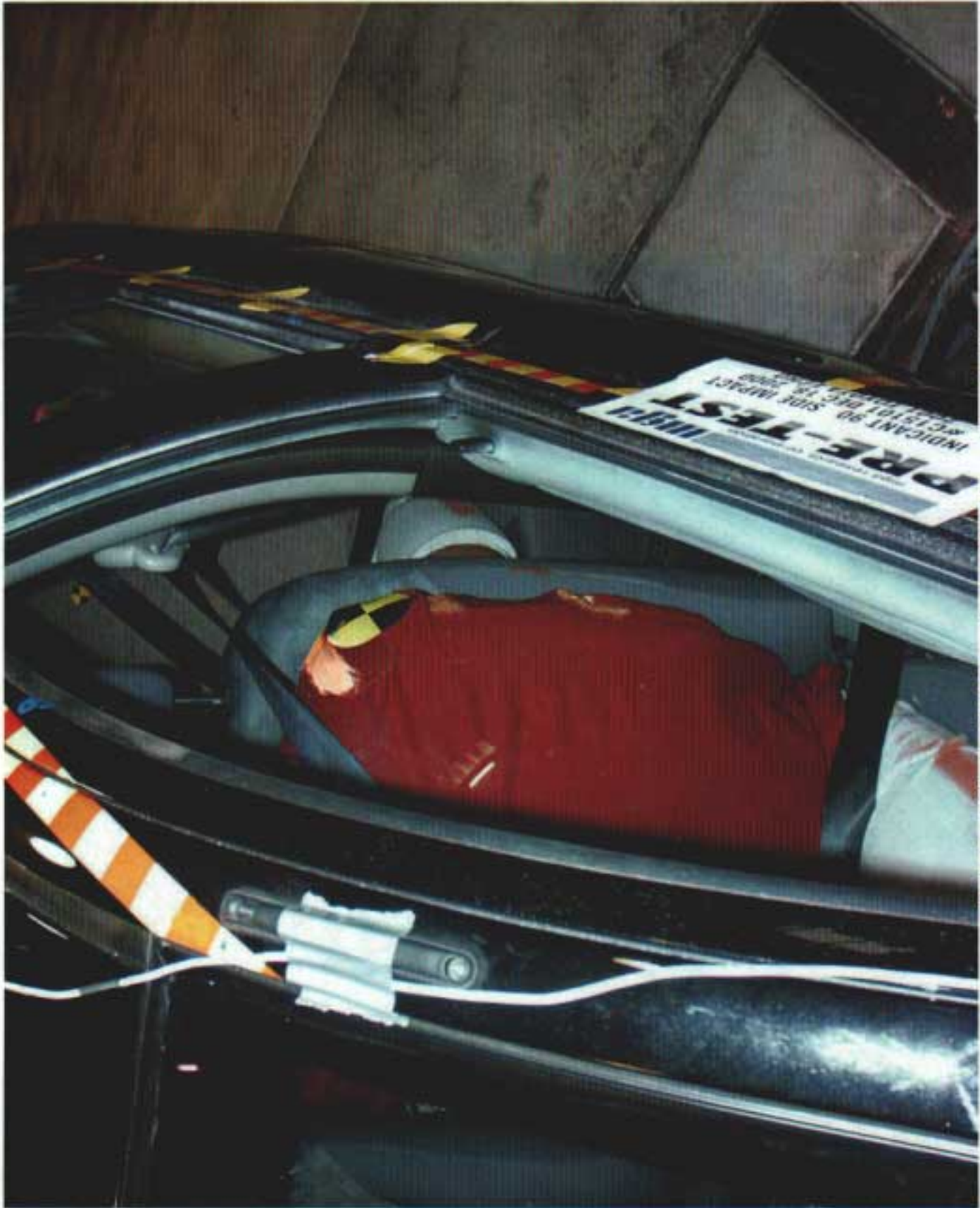


Photo No. A-26 - Pre-Test Driver Dummy Shoulder and Door Top View

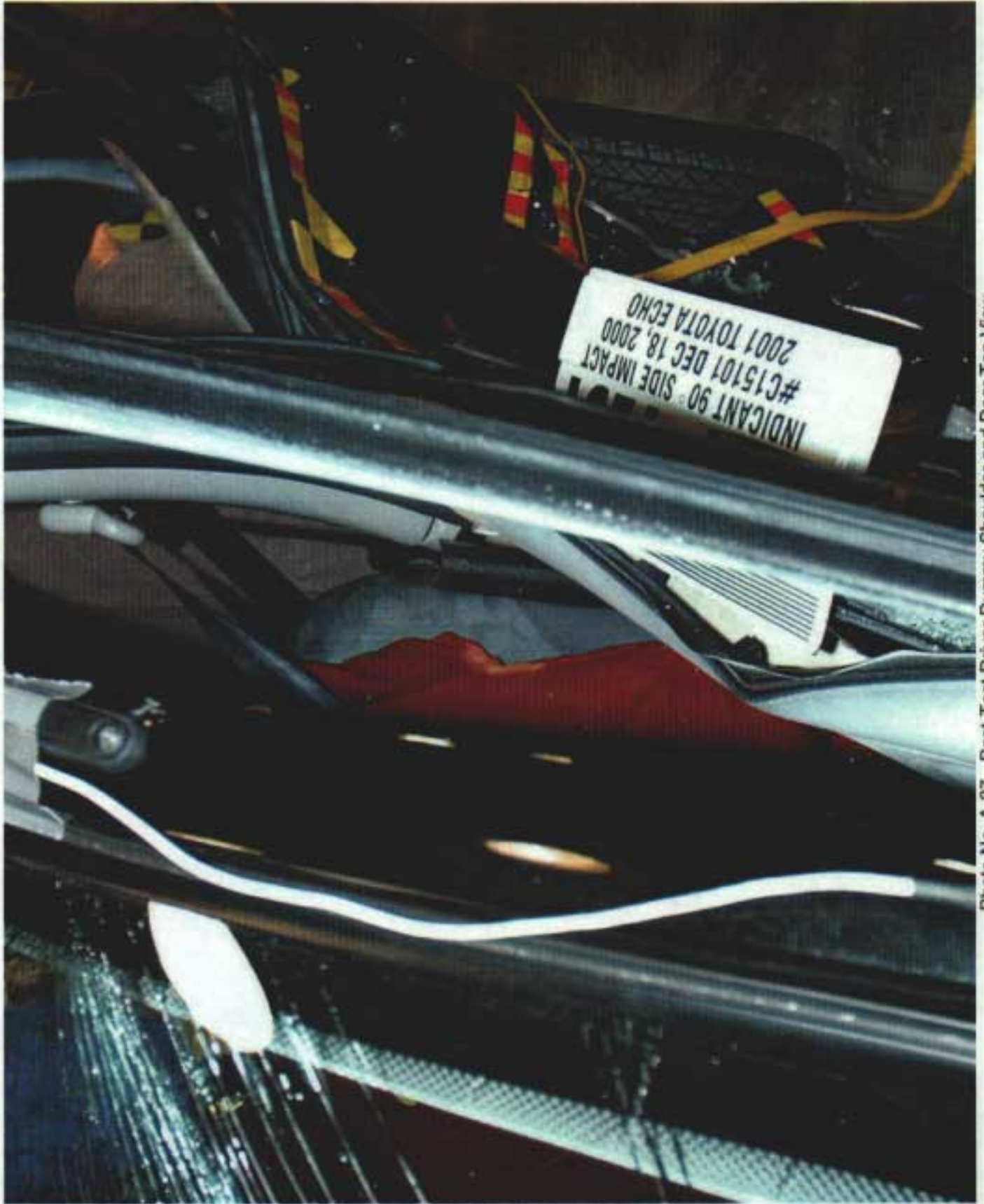


Photo No. A-27 - Post-Test Driver Dummy Shoulder and Door Top View

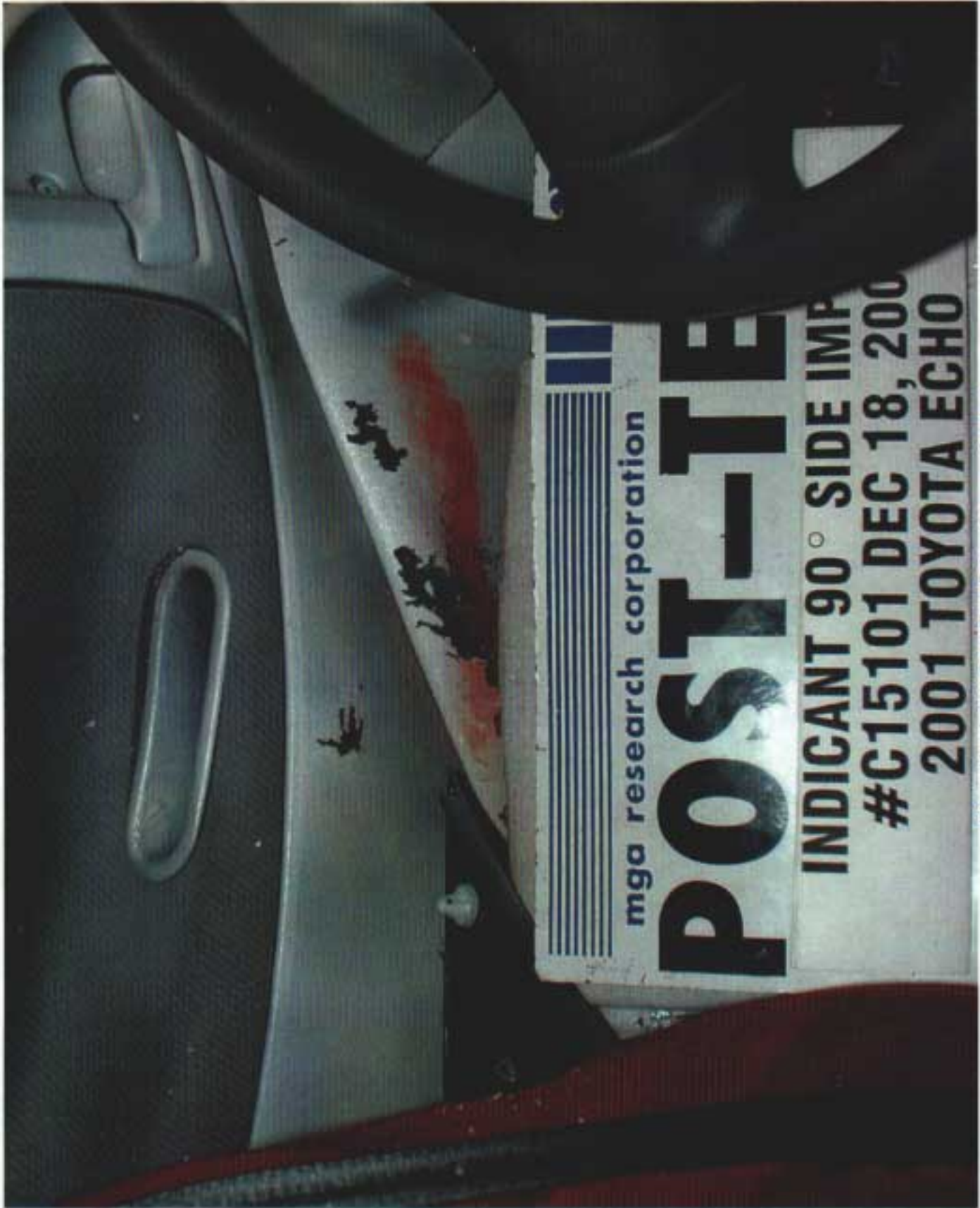


Photo No. A-28 - Post-Test Driver Dummy Contact



Photo No. A-29 - Post-Test Driver Dummy Contact



Photo No. A-30 - Post-Test Driver Dummy Contact

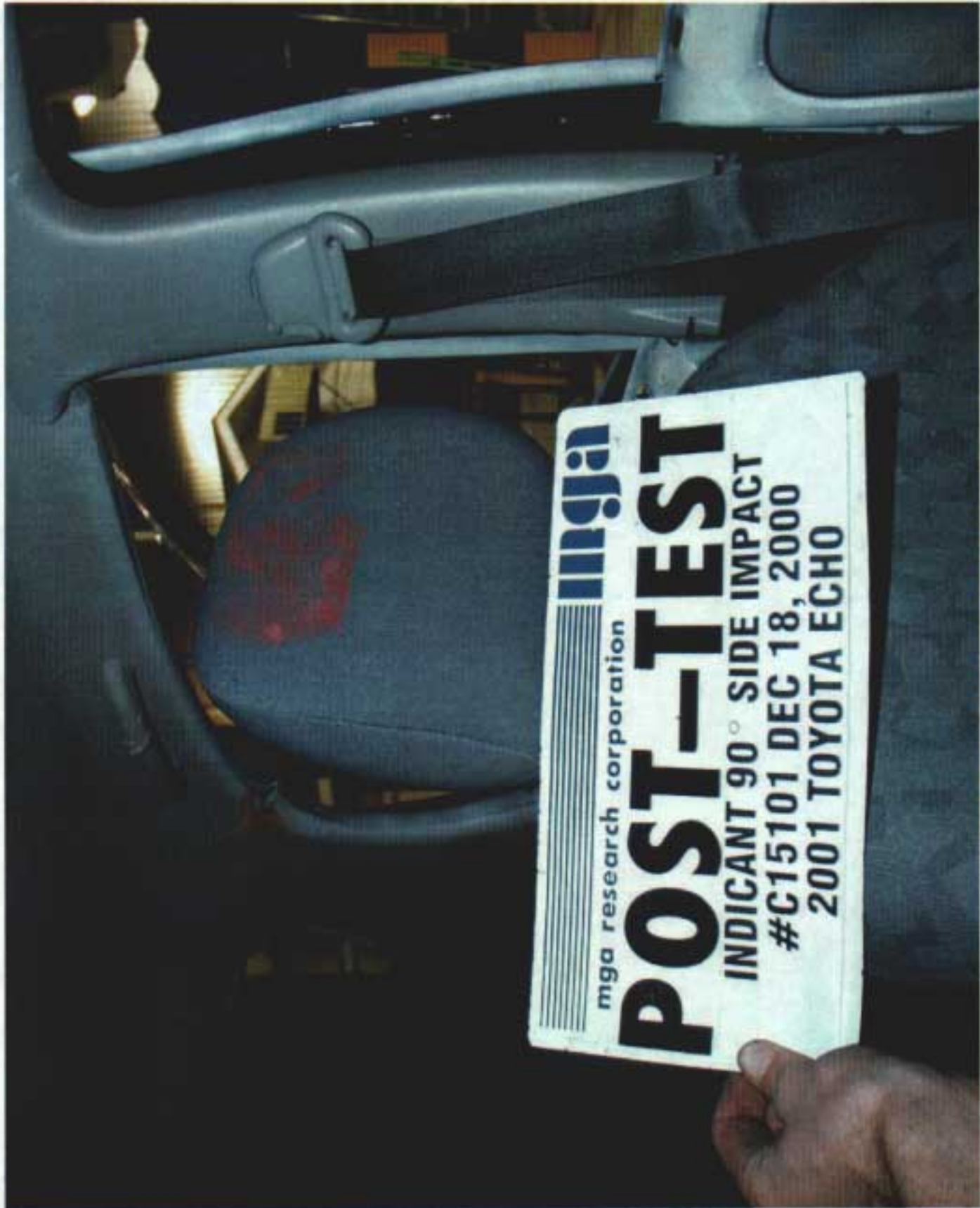


Photo No. A-31 - Post-Test Driver Dummy Head Contact



Photo No. A-32 - Pre-Test Passenger Dummy Right Side View



Photo No. A-33 - Post-Test Passenger Dummy Right Side View



Photo No. A-34 - Pre-Test Passenger Dummy Left Side View



Photo No. A-35 - Post-Test Passenger Dummy Left Side View



Photo No. A-36 - Pre-Test Passenger Dummy Left Side View (Door Open)



Photo No. A-37 - Pre-Test Passenger Dummy Shoulder and Door Top View

A-37

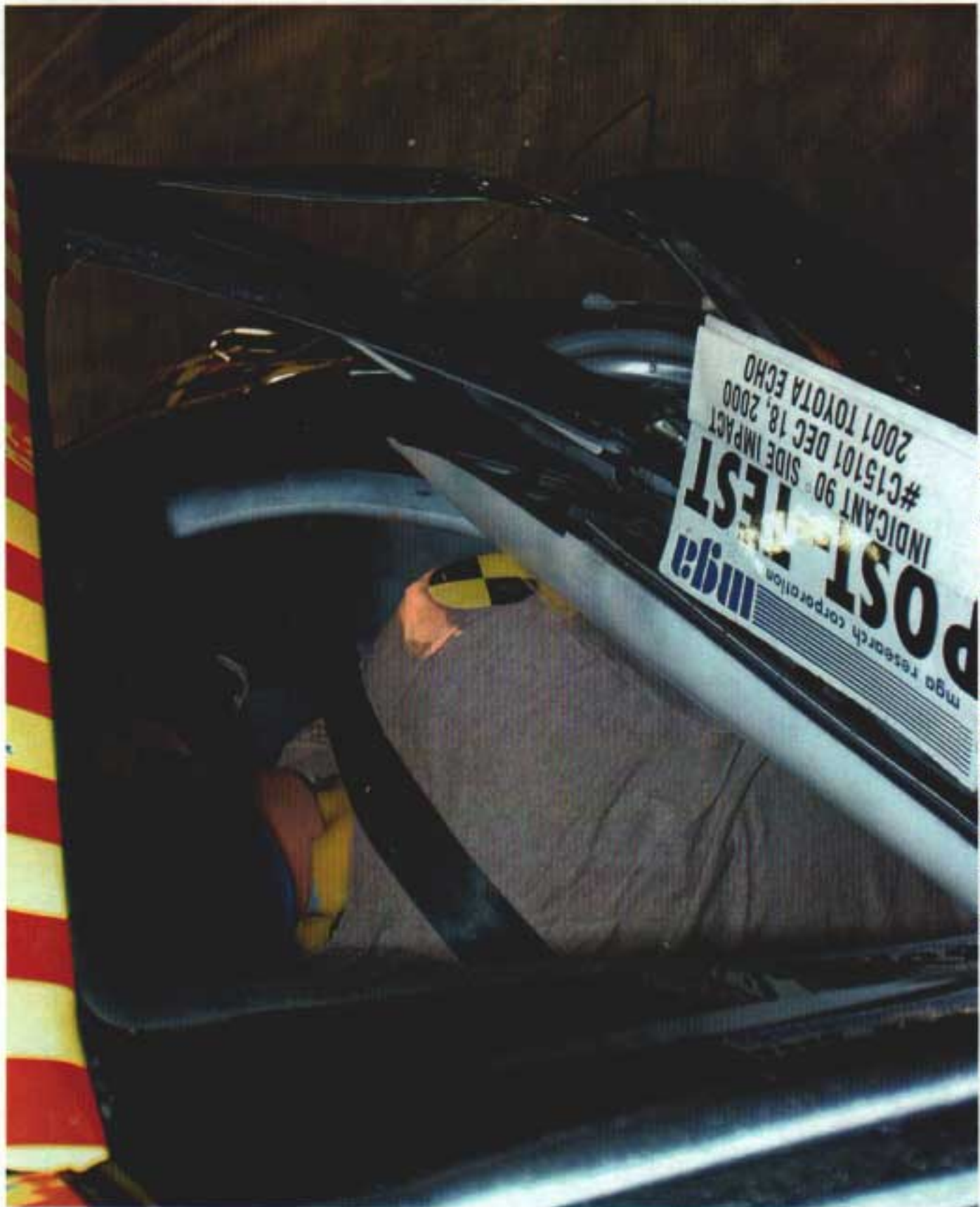


Photo No. A-38 - Post-Test Passenger Dummy Shoulder and Door Top View

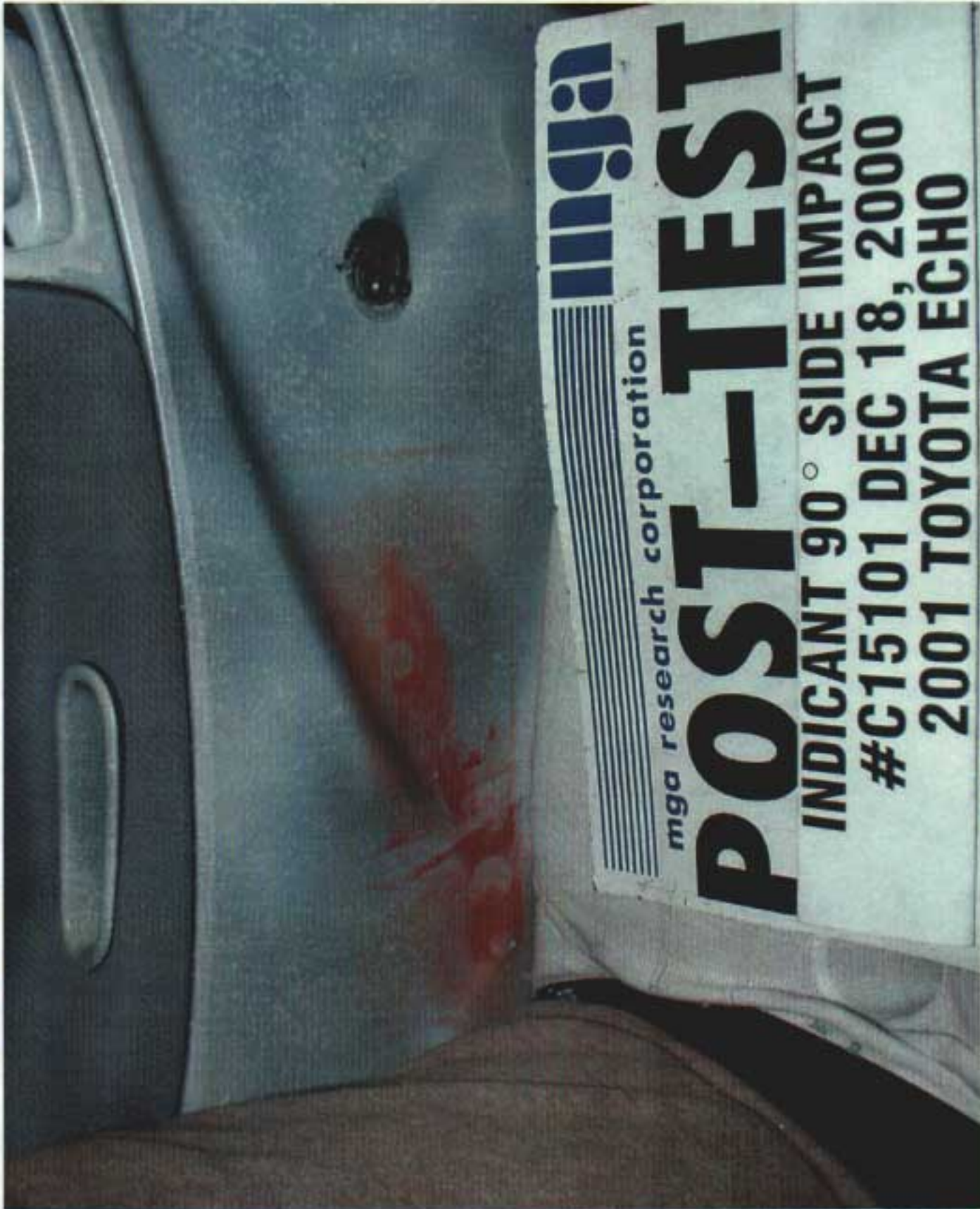


Photo No. A-39 - Post-Test Passenger Dummy Contact



Photo No. A-40 - Post-Test Passenger Dummy Contact

A-40

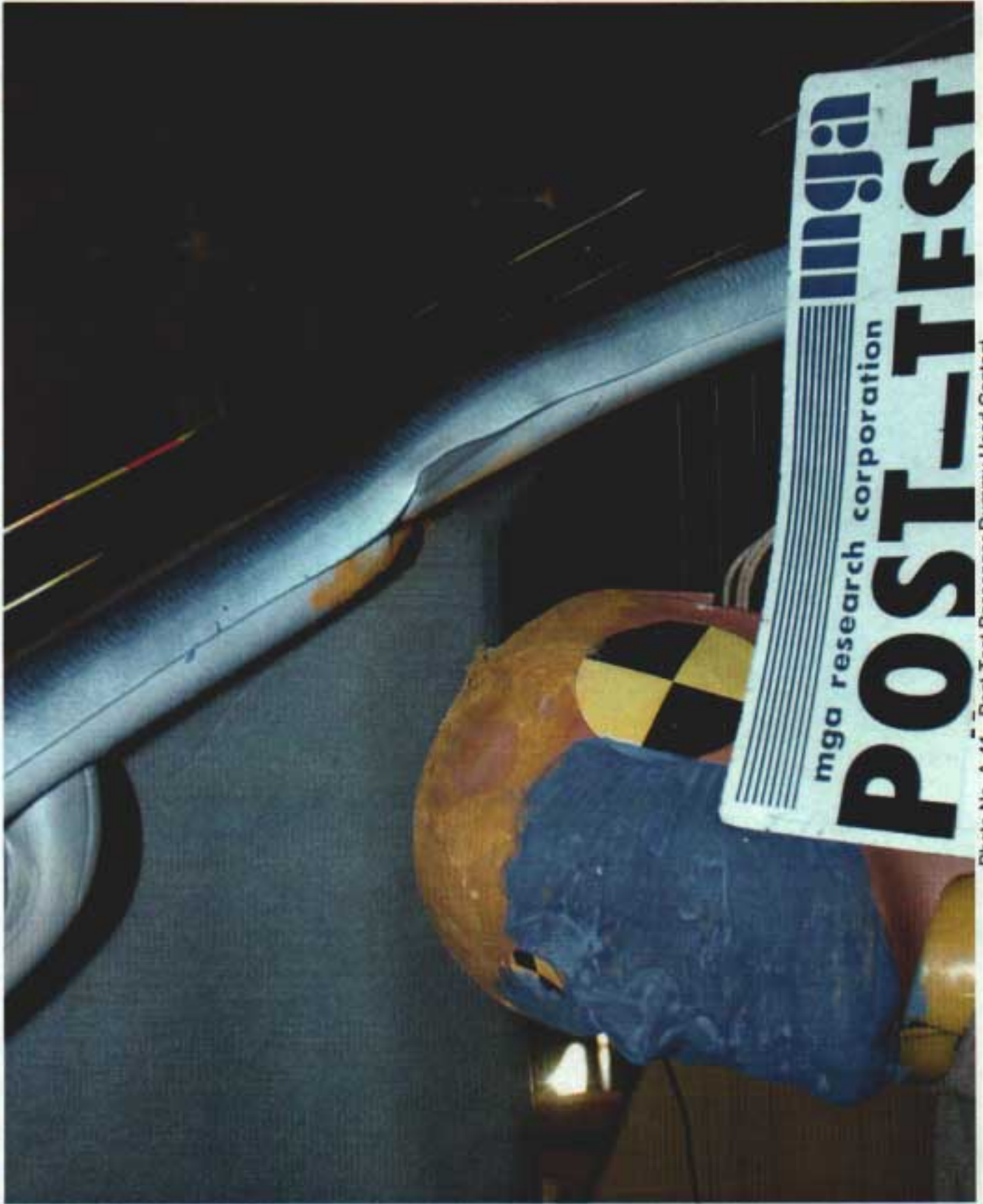


Photo No. A-41 - Post-Test Passenger Dummy Head Contact



Photo No. A-42 - Post-Test Passenger Dummy Head Contact

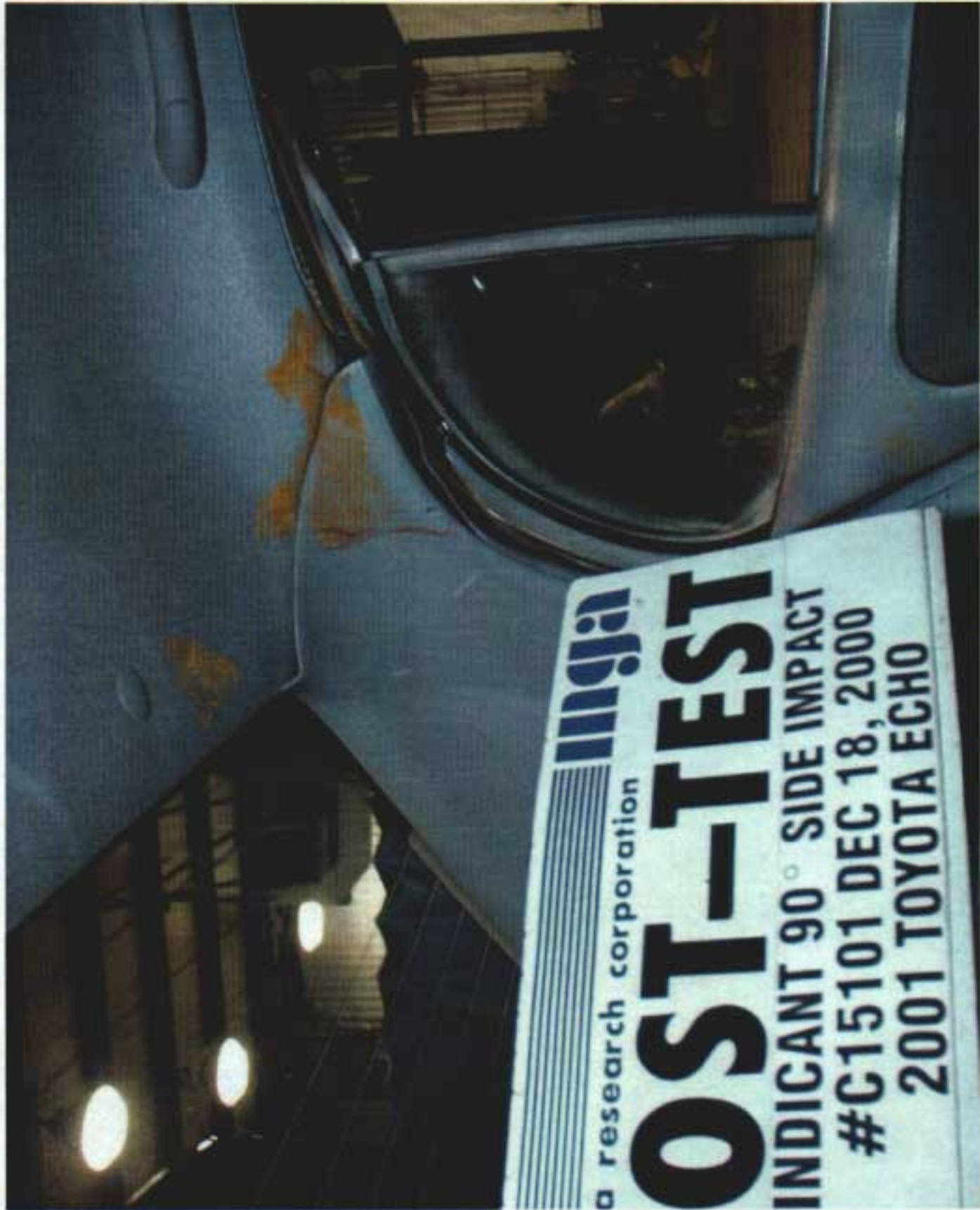


Photo No. A-43 - Post-Test Passenger Dummy Head Contact

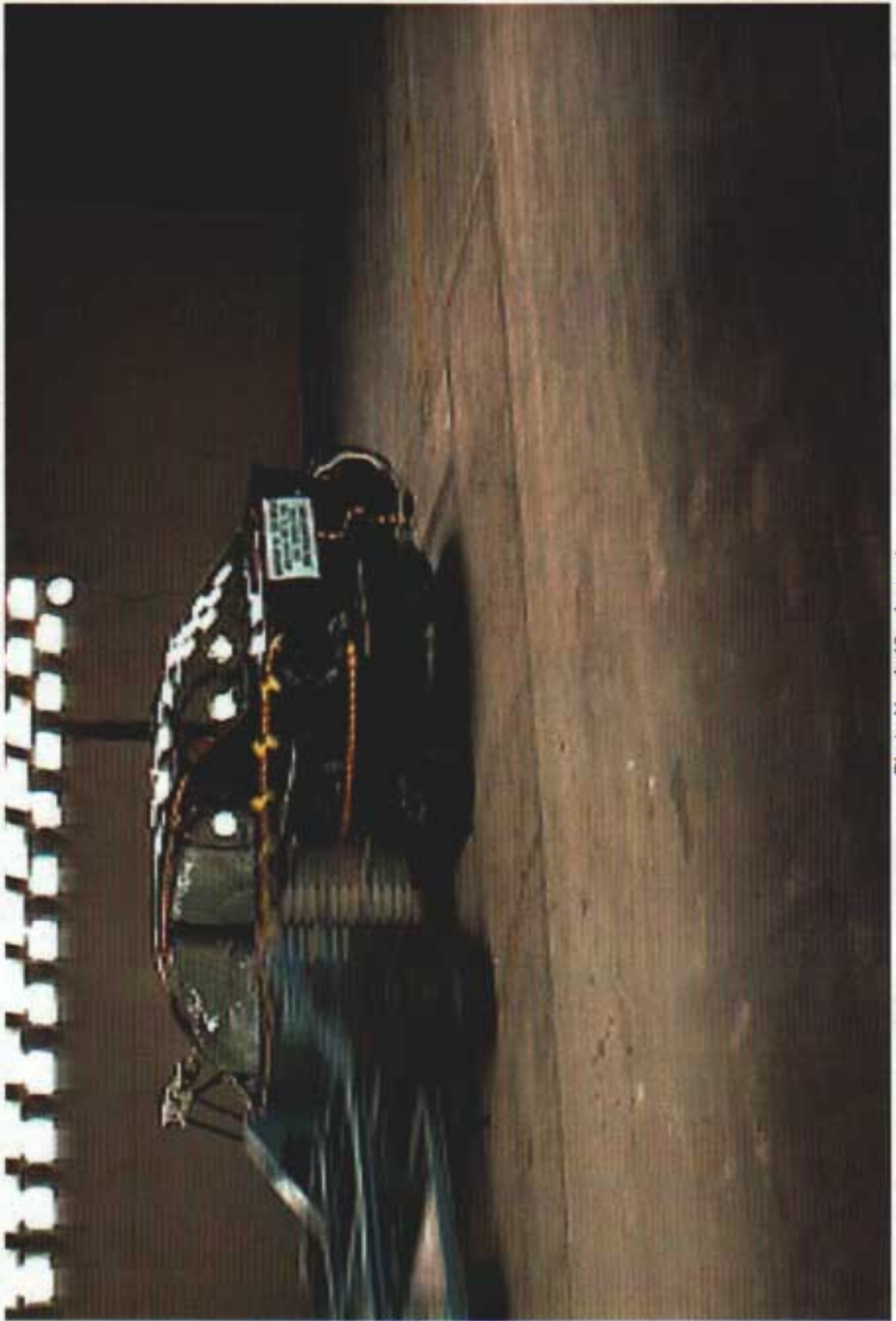


Photo No. A-44 - Pre-Test Left Front Impact Point on Vehicle



A-45

Photo No. A-45 - Post-Test Left Front Impact Point on Vehicle



A-46

Photo No. A-46 - Impact

TOYOTA

READ BY: TOYOTA MOTOR CORPORATION 10/00
OWNER: 209 YD15 GAMR FR 1550LB RR 1455LB
THIS VEHICLE CONFORMS TO ALL APPLICABLE
FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON
THE DATE OF MANUFACTURE SHOWN ABOVE. PASS CAR
JTDBT123710124040



C/TR: 209 YD15 MODEL: NCP12L-BEMOKA
A/TH: -01A/C150 MADE IN JAPAN
NO. 151

BA4790773

Photo No. A-47 - Vehicle Certification Label

TIRE - LOADING INFORMATION
 VEHICLE CAPACITY WEIGHT : 351kg (775lbs)
 OCCUPANTS : FRT. 2 RR. 3 TOTAL 5
 TIRE SIZE : P175/65R14 81S
 SPARE TIRE : T115/70D14 88M
 COLD TIRE PRESSURES : kPa (psi)
 P175/65R14 81S : FRT.220(32), RR.220(32)
 SPARE TIRE : 420(60)
 SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION
CHARGE MAXIMALE DU VEHICULE : 351kg (775LIVRES)
 PERSONNES : AVANT 2 ARRIERE 3 TOTAL 5
 DIMENSION DES PNEUS : P175/65R14 81S
 PNEU DE RECHANGE : T115/70D14 88M
 PRESSION DE PNEUS : kPa(LB/PO²)
 P175/65R14 81S : AVANT 220(32), ARRIERE 220(32)
 PNEU DE RECHANGE : 420(60)
 POUR DE PLUS AMPLES DETAILS, VOIR LE MANUEL DU PROPRIETAIRE

52091

6W

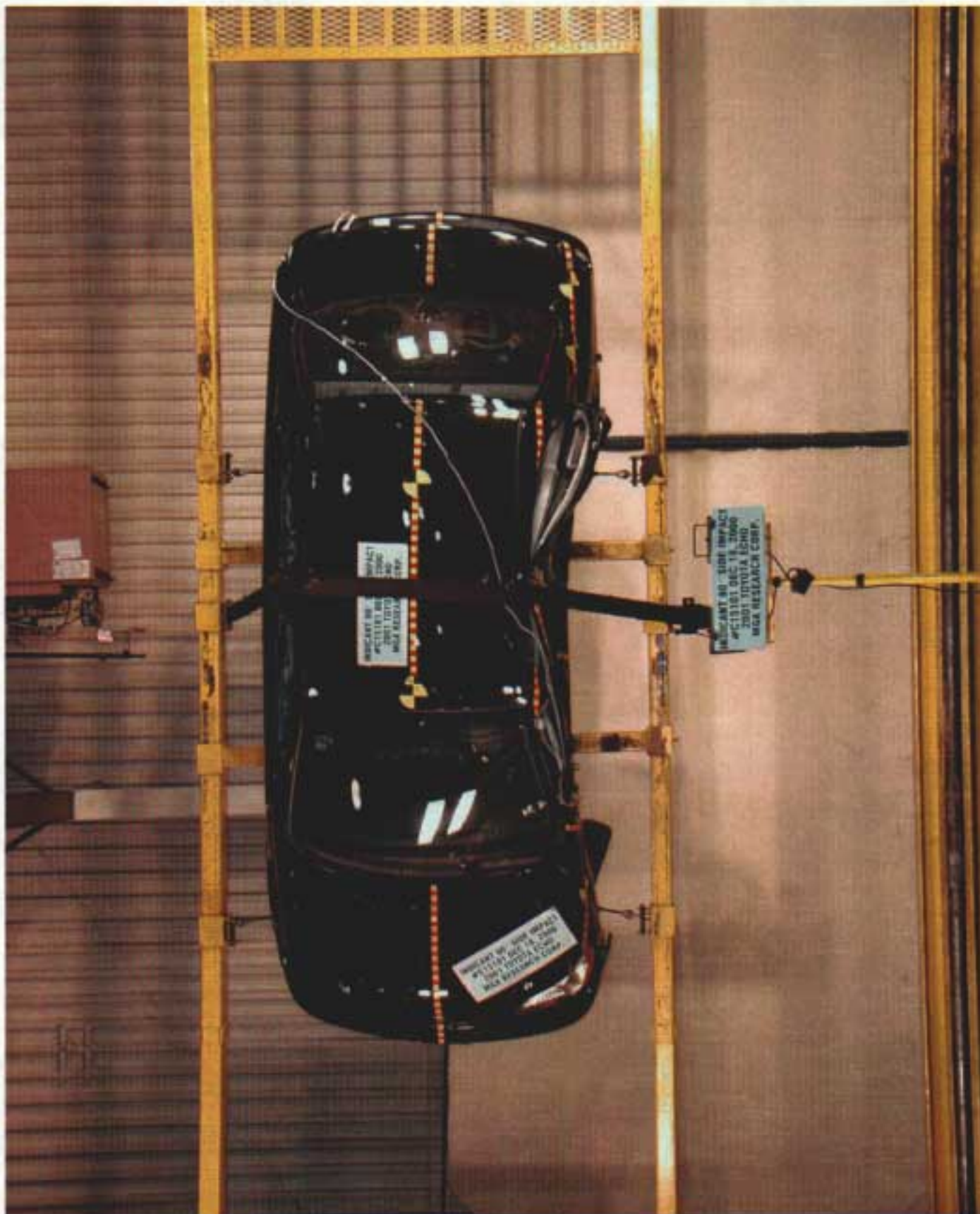


Photo No. A-49 - Rollover 90°

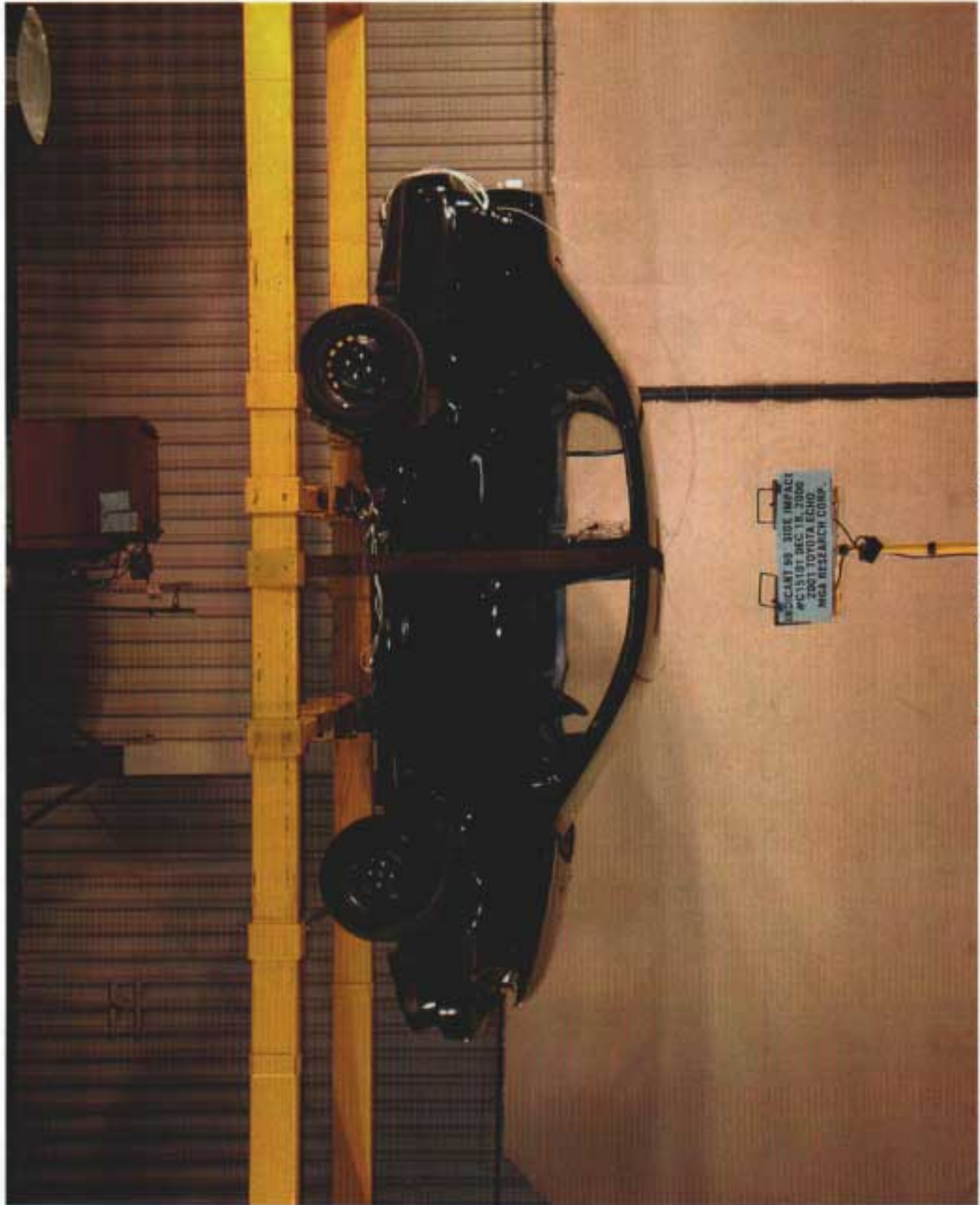
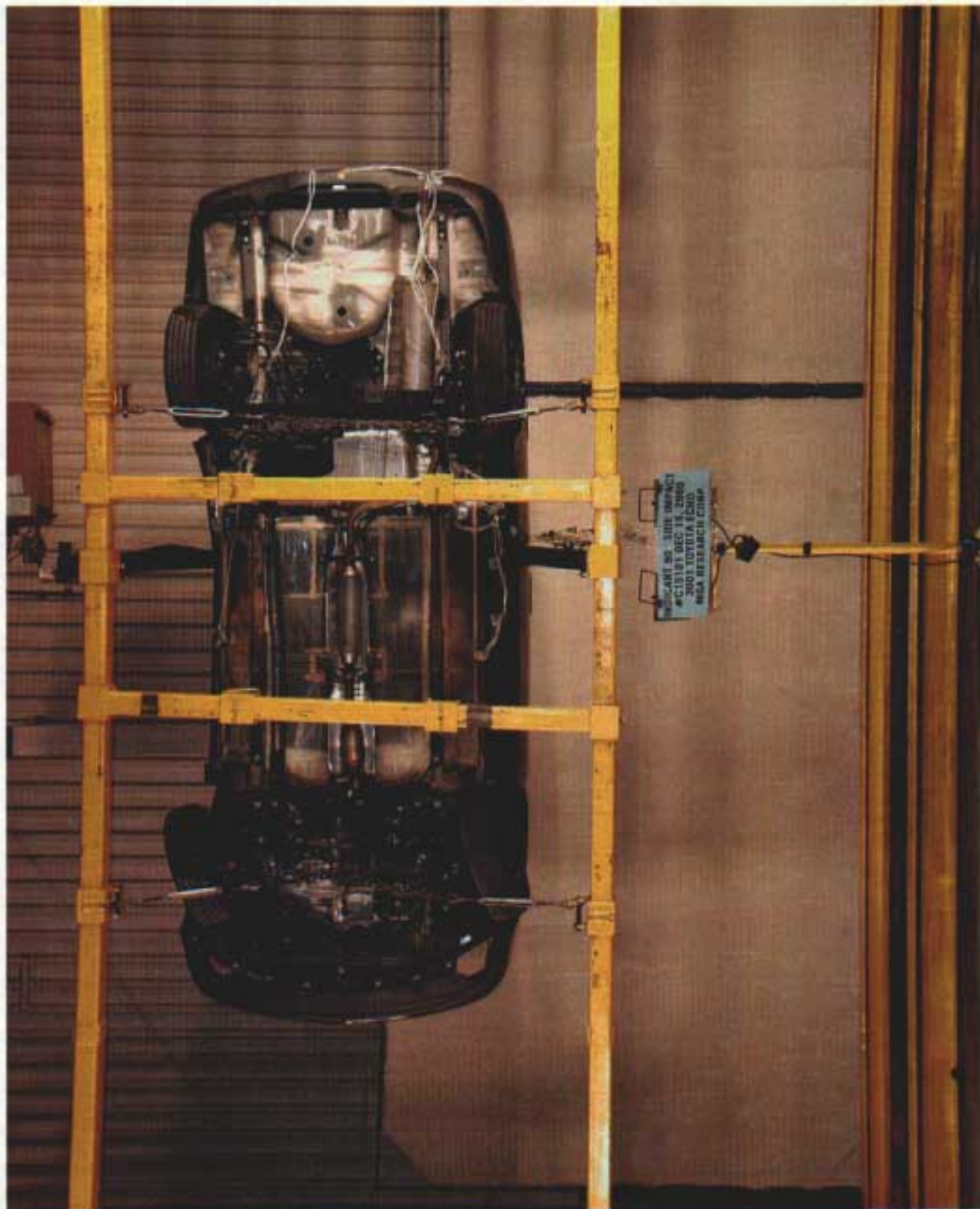


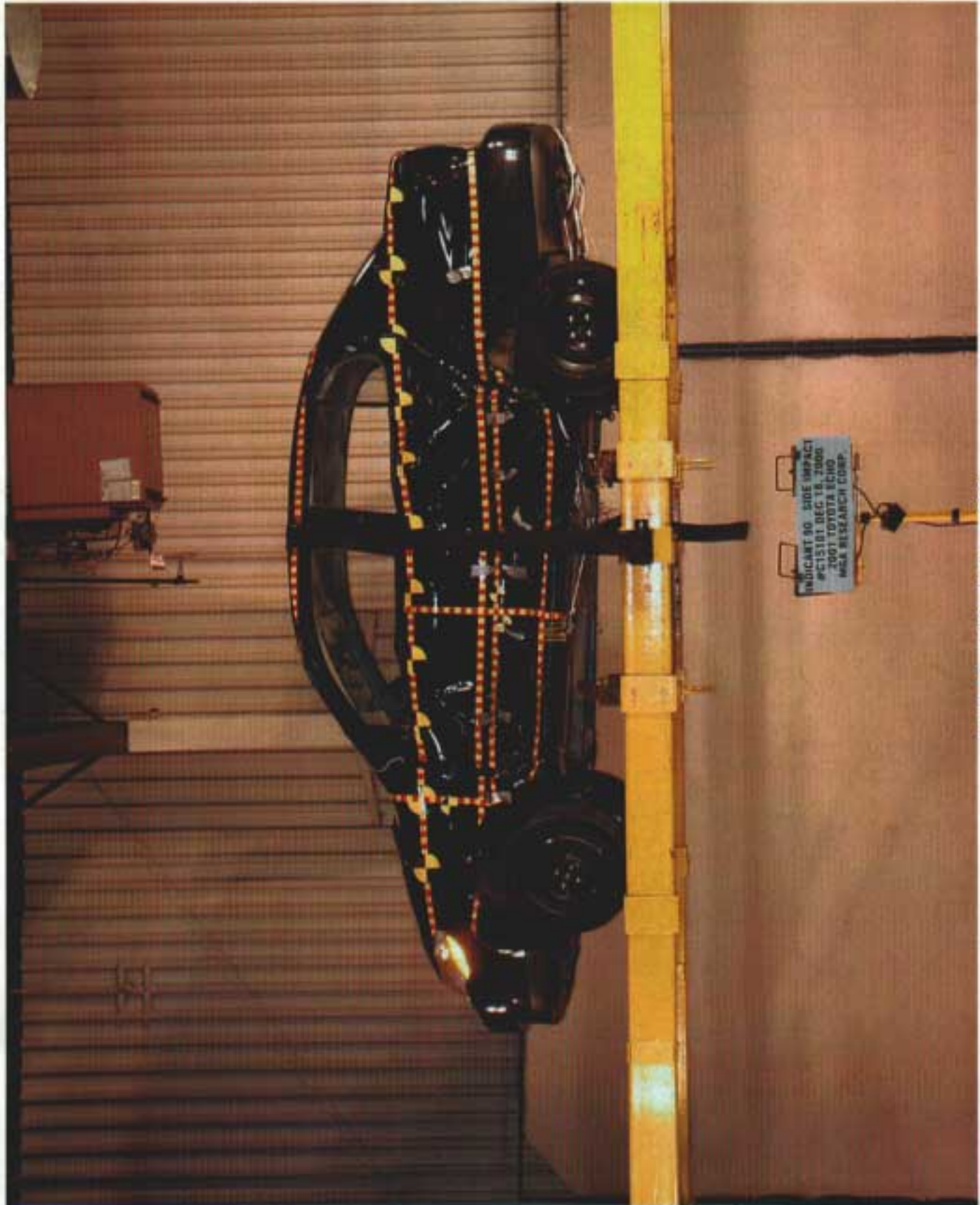
Photo No. A-50 - Rollover 180°

A-50



A-51

Photo No. A-51 - Rollover 270°



INDICANT 90 - SIDE IMPACT
#CT15181 DEC 18, 2000
2001 TOYOTA ECHO
MIRA RESEARCH CORP.

Photo No. A-52 - Rollover 360°

APPENDIX B

SID, VEHICLE, AND MDB RESPONSE DATA

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* No Valid Data After Approximately 26 msec.

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* No Valid Data After Approximately 30 msec.

** No Valid Data Collected

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FIR Filtered:

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* No Valid Data Collected

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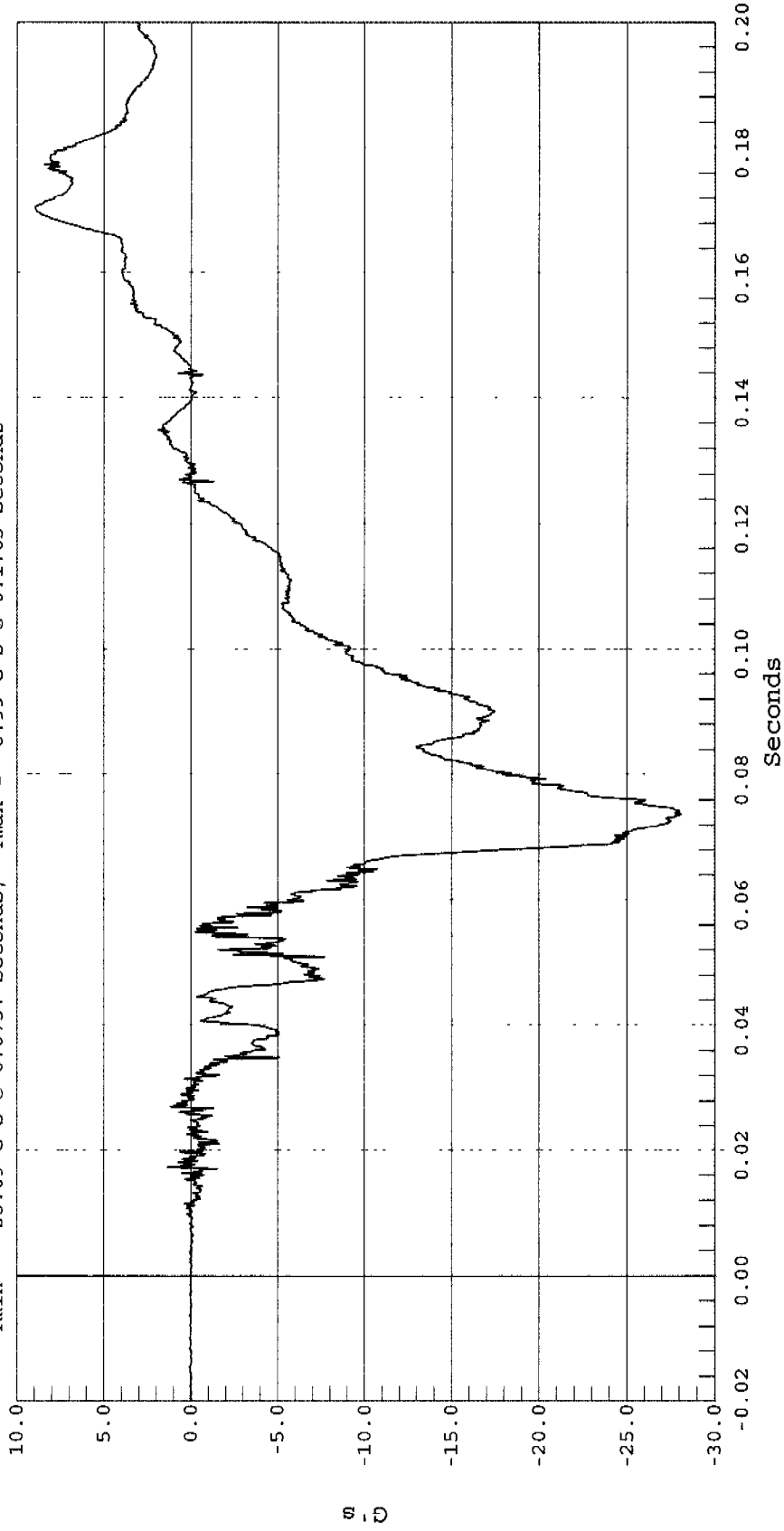


DRIVER HEAD X ACCELERATION

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 1000

1 DRIVER HEAD X, B00102AT.A02

Ymin = -28.09 G's @ 0.0737 Seconds, Ymax = 8.99 G's @ 0.1703 Seconds



DRIVER HEAD Y ACCELERATION

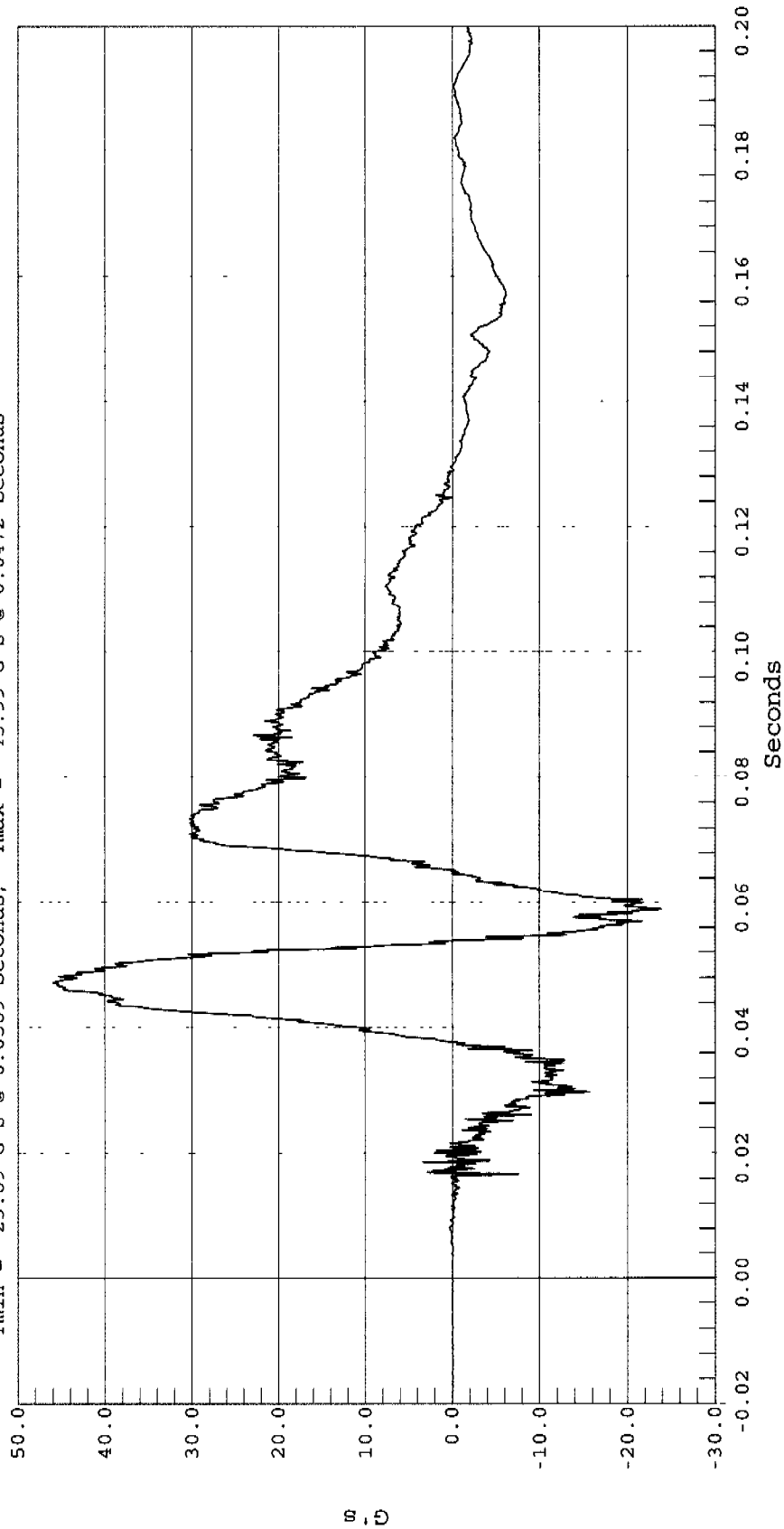
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 1000

1 DRIVER HEAD Y, B00102AT.A03



Ymin = -23.89 G's @ 0.0589 Seconds, Ymax = 45.99 G's @ 0.0472 Seconds



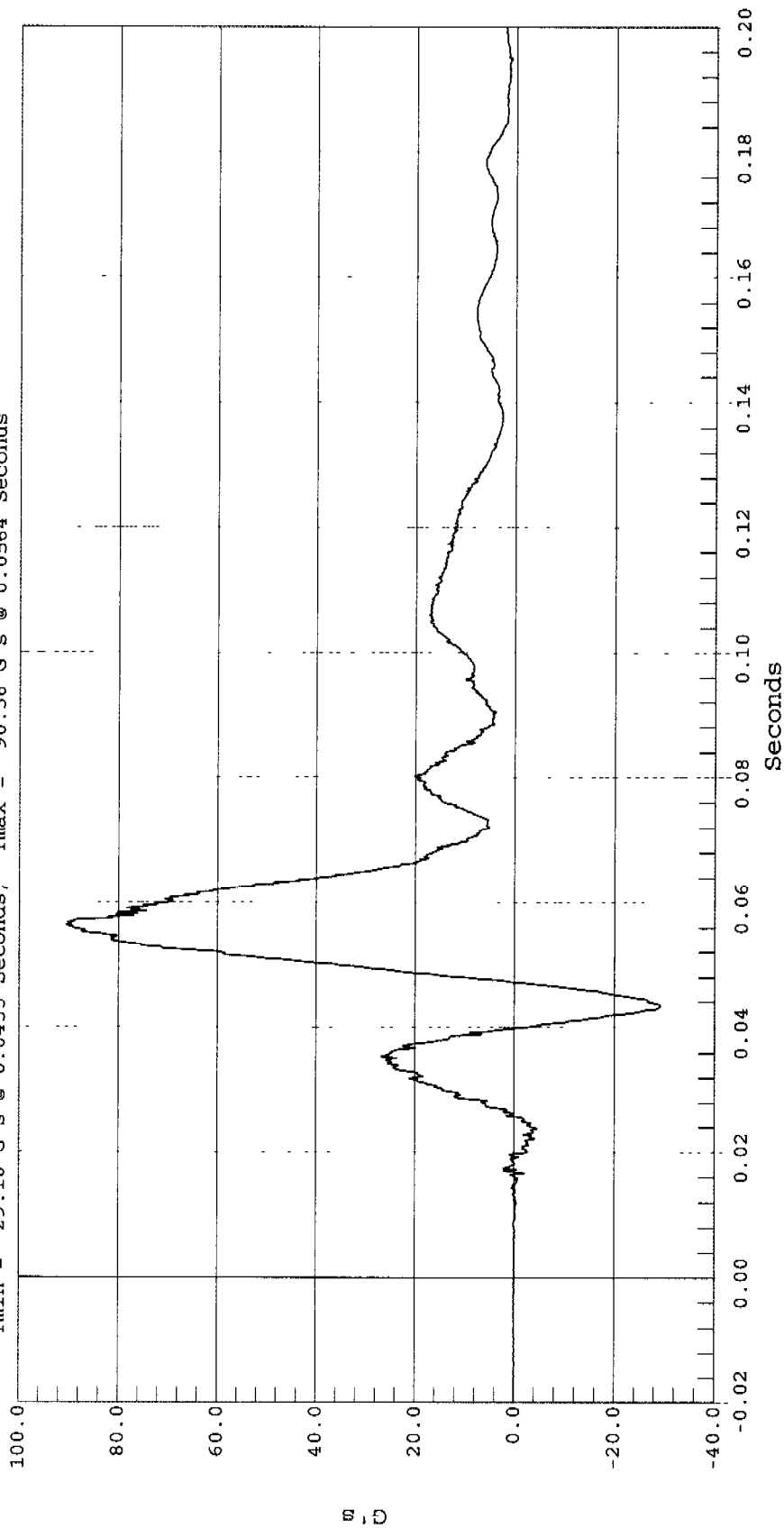
DRIVER HEAD Z ACCELERATION

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 1000

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

1 DRIVER HEAD Z, B00102AT.A01

Ymin = -29.18 G's @ 0.0433 Seconds, Ymax = 90.56 G's @ 0.0564 Seconds



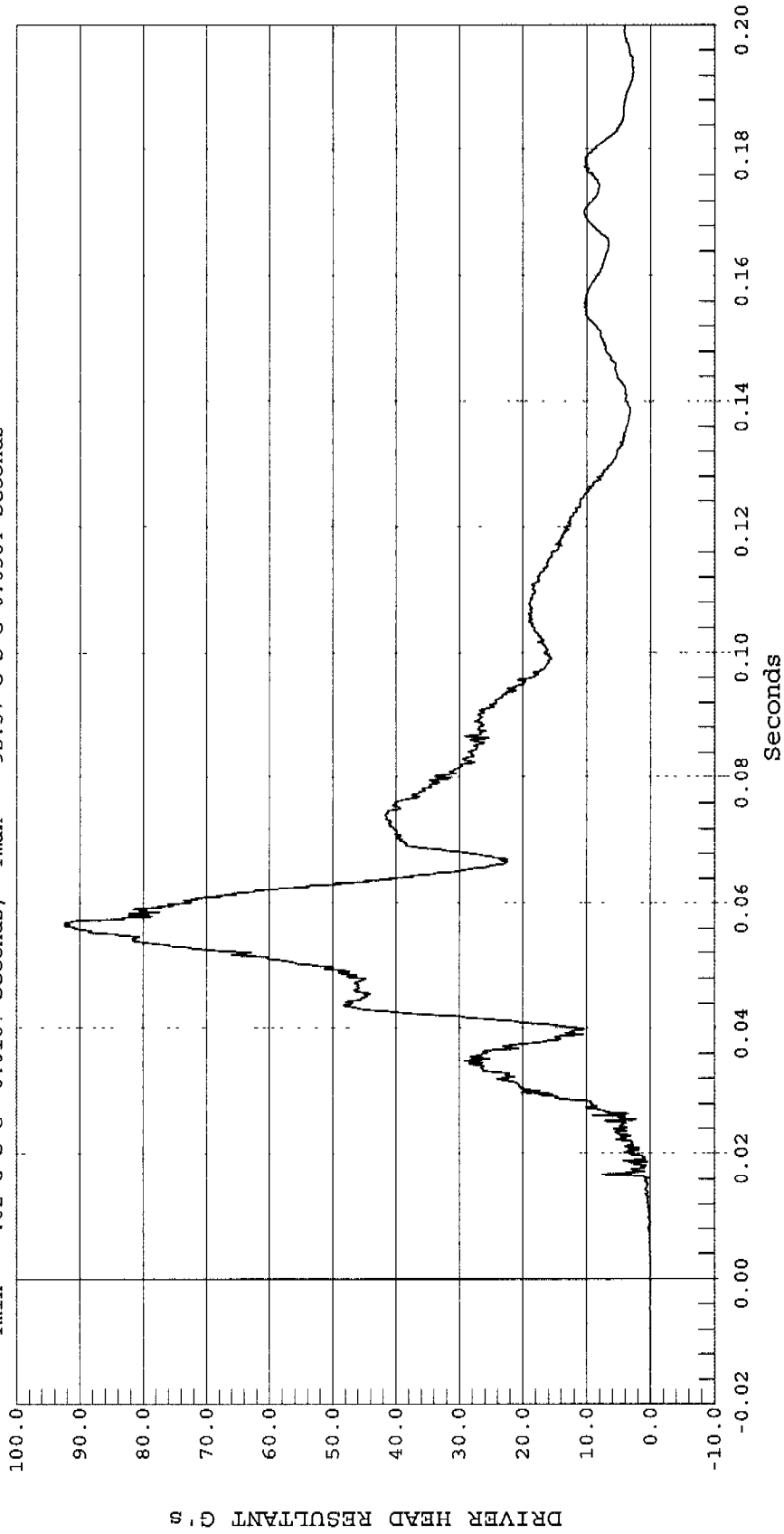


DRIVER HEAD RESULTANT ACCELERATION

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 1000

1 DRIVER HEAD RESULTANT, B00102AV.A01

Ymin = .02 G's @ -0.0167 Seconds, Ymax = 92.57 G's @ 0.0564 Seconds



DRIVER UPPER RIB Y VELOCITY

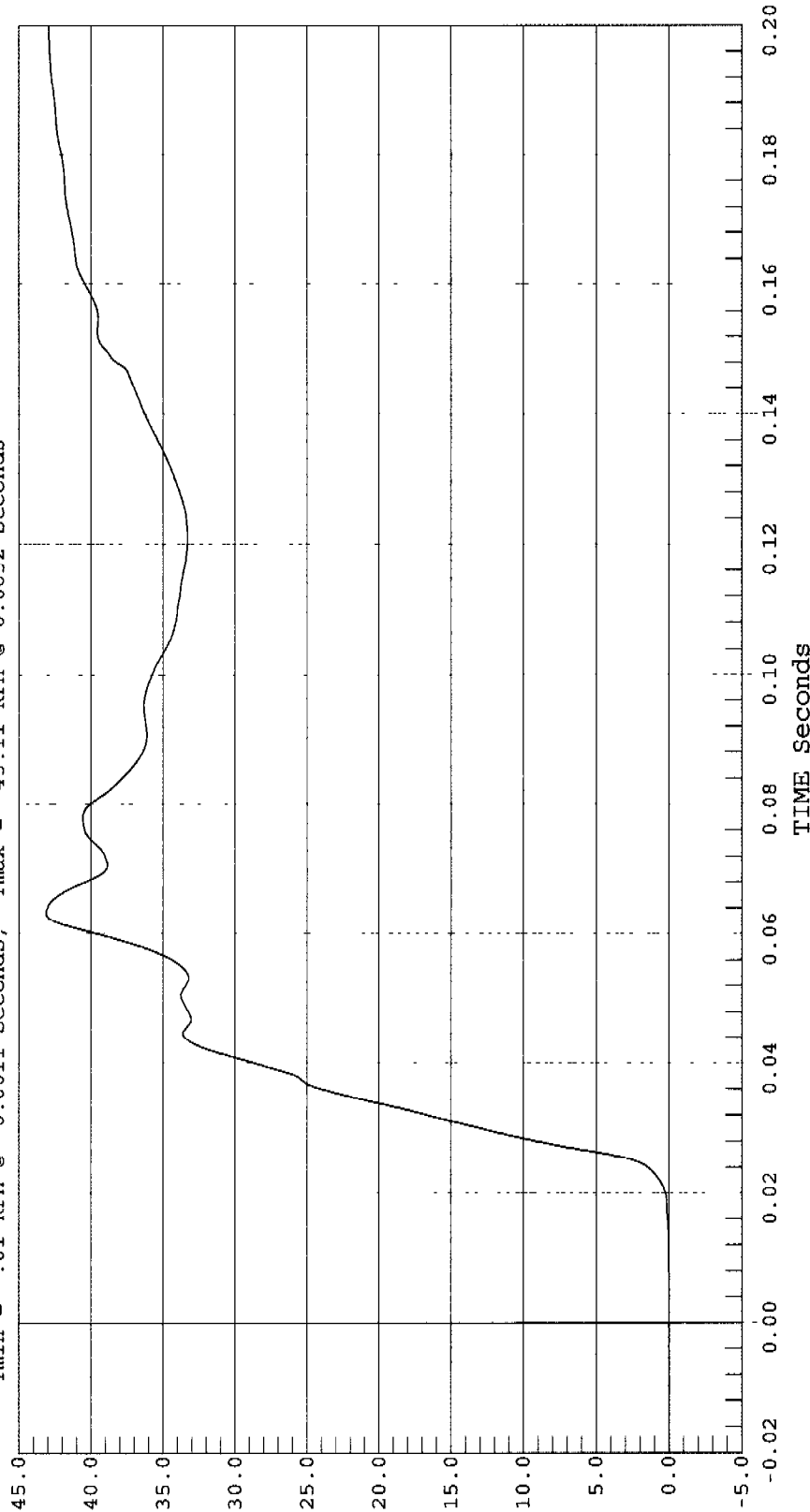
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180

1 DRIVER UPPER RIB Y VELOCITY, B00102AI.V04



Ymin = -.01 KPH @ -0.0011 Seconds, Ymax = 43.11 KPH @ 0.0632 Seconds



DRIVER UPPER RIB Y VELOCITY KPH

DRIVER LOWER RIB Y VELOCITY

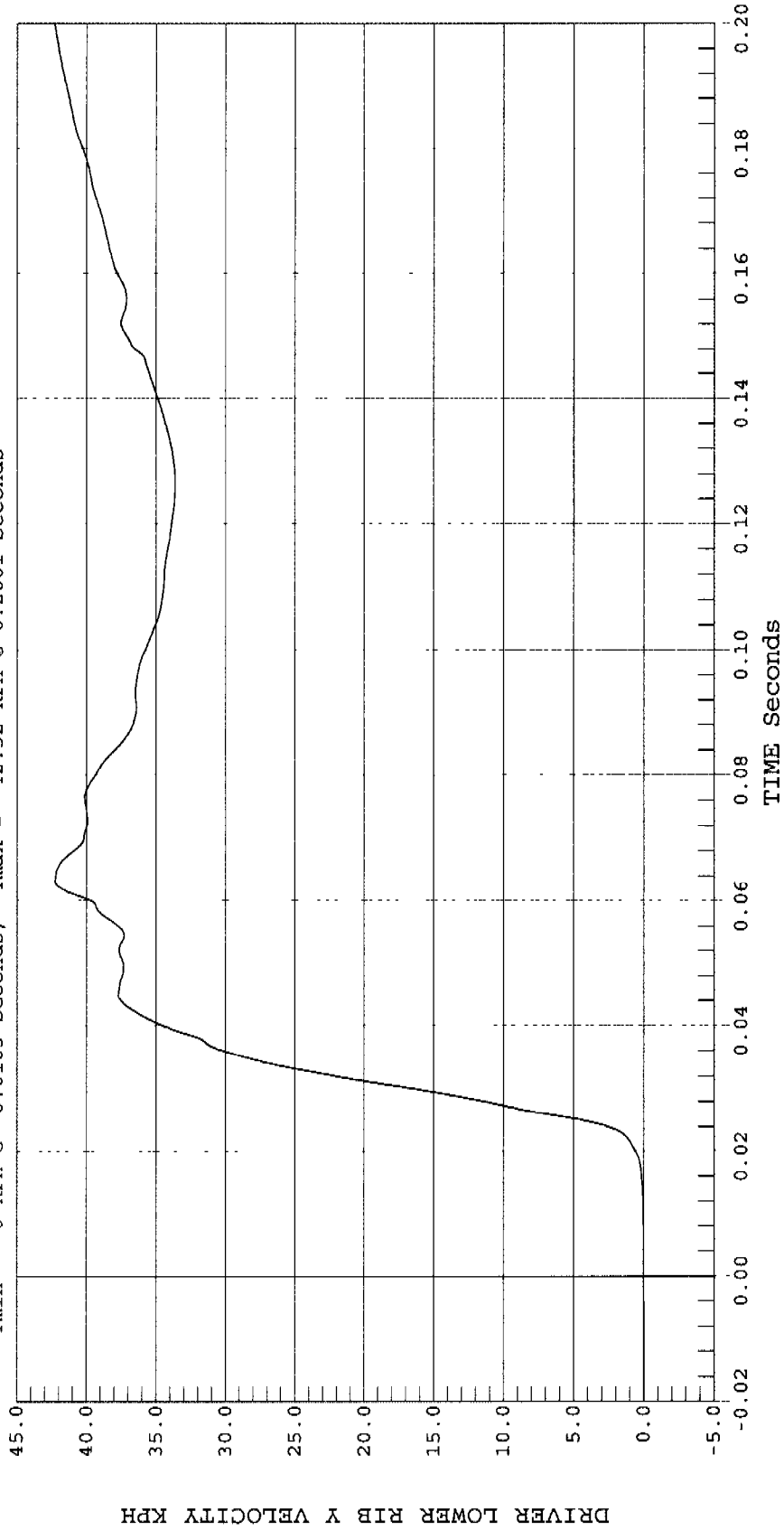
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180

1 DRIVER LOWER RIB Y VELOCITY, B00102AI.V05



Ymin = 0 KPH @ -0.0183 Seconds, Ymax = 42.32 KPH @ 0.2001 Seconds



DRIVER LOWER SPINE Y VELOCITY

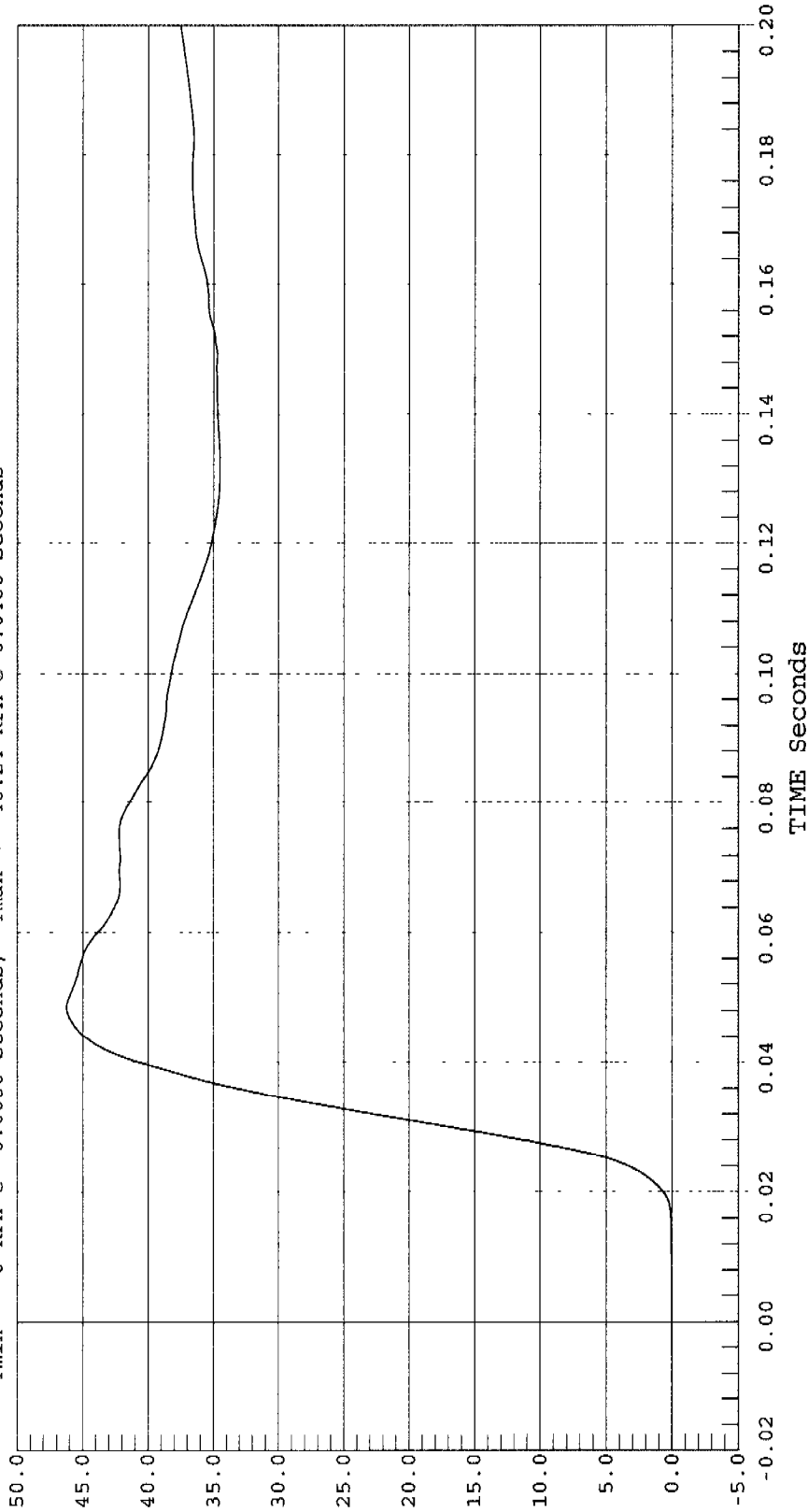
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

1 DRIVER LOWER SPINE Y VELOCITY, B00102AI.V06



Ymin = 0 KPH @ -0.0080 Seconds, Ymax = 46.24 KPH @ 0.0486 Seconds



DRIVER LOWER SPINE Y VELOCITY KPH

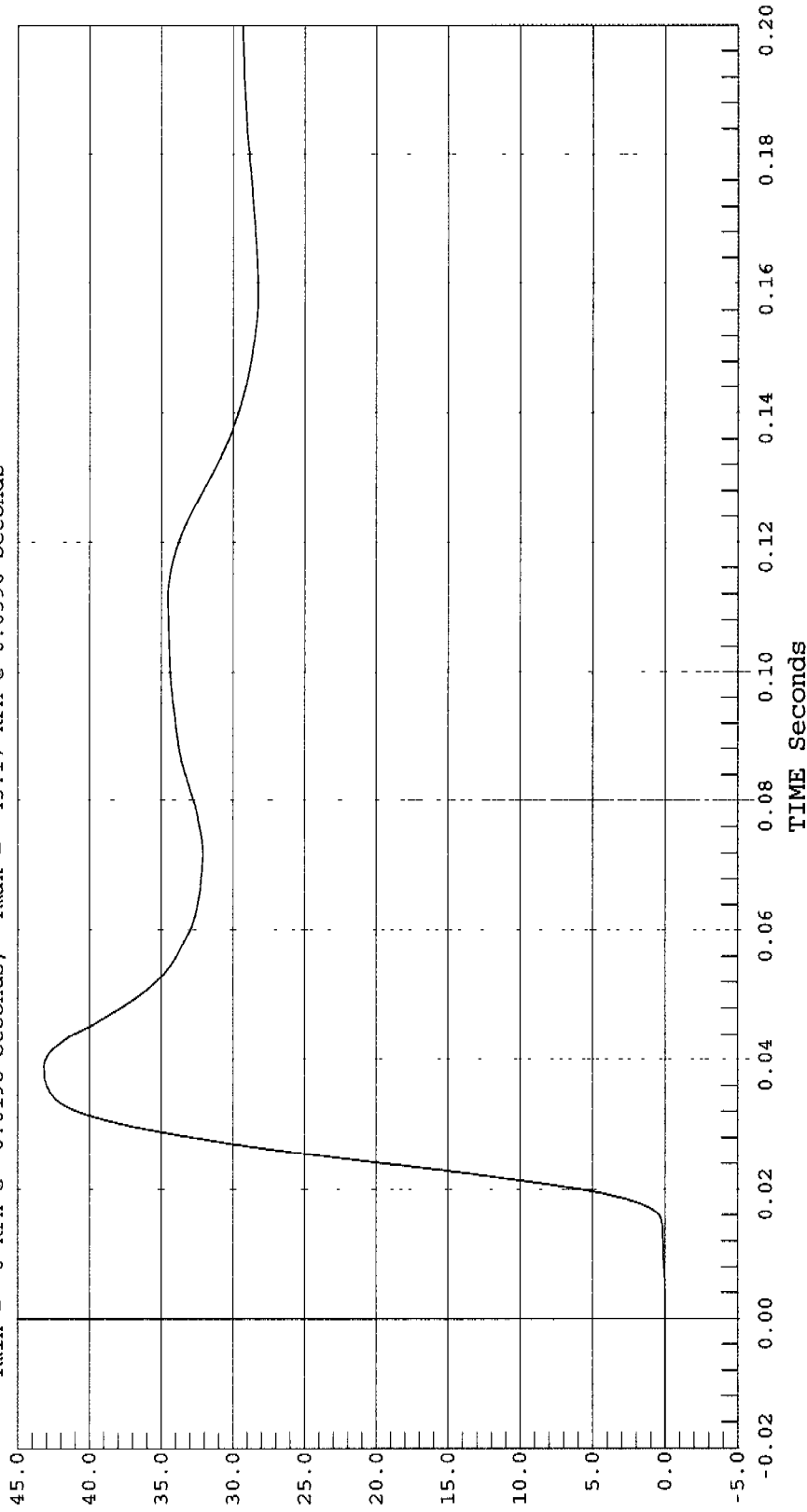


DRIVER PELVIS Y VELOCITY

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180

1 DRIVER PELVIS Y VELOCITY, B00102AI.V07

Ymin = 0 KPH @ -0.0198 Seconds, Ymax = 43.17 KPH @ 0.0390 Seconds



DRIVER PELVIS Y VELOCITY KPH

REAR PASSENGER HEAD X VELOCITY

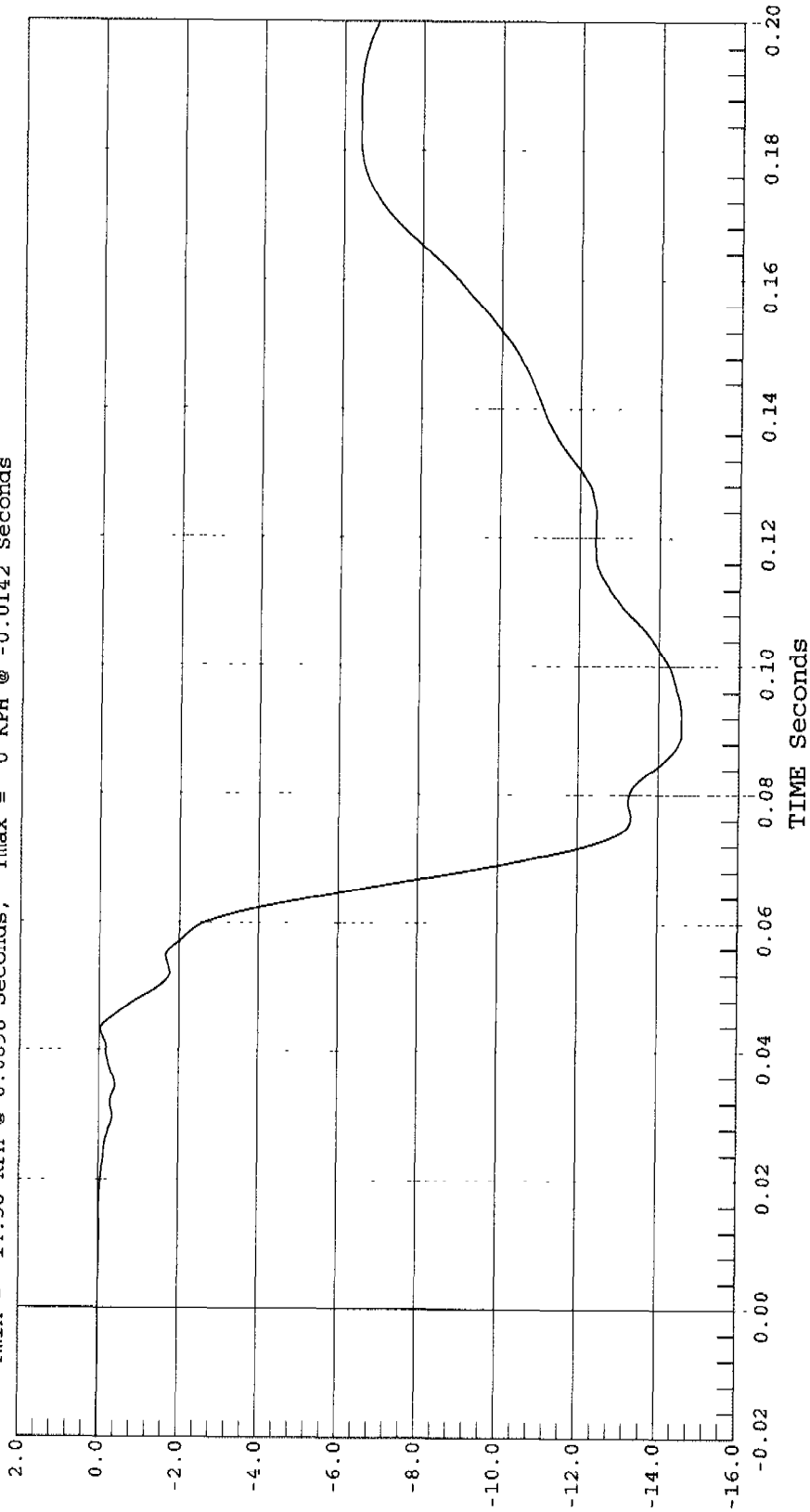
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180

1 REAR PASSENGER HEAD X VELOCITY, B00102AI.V08



Ymin = -14.58 KPH @ 0.0898 Seconds, Ymax = 0 KPH @ -0.0142 Seconds



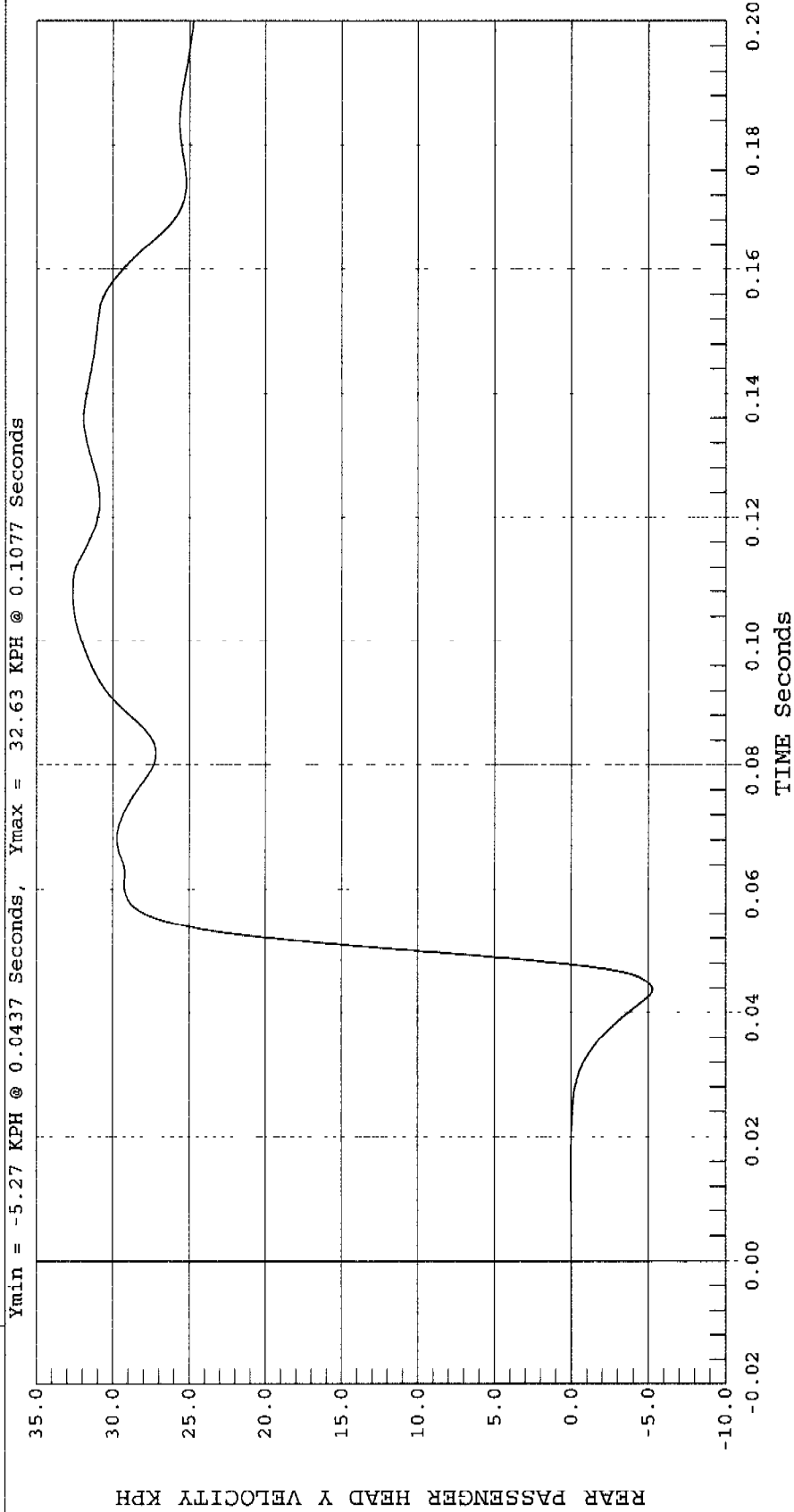
REAR PASSENGER HEAD X VELOCITY KPH

REAR PASSENGER HEAD Y VELOCITY

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180



1 REAR PASSENGER HEAD Y VELOCITY, B00102AI.V09



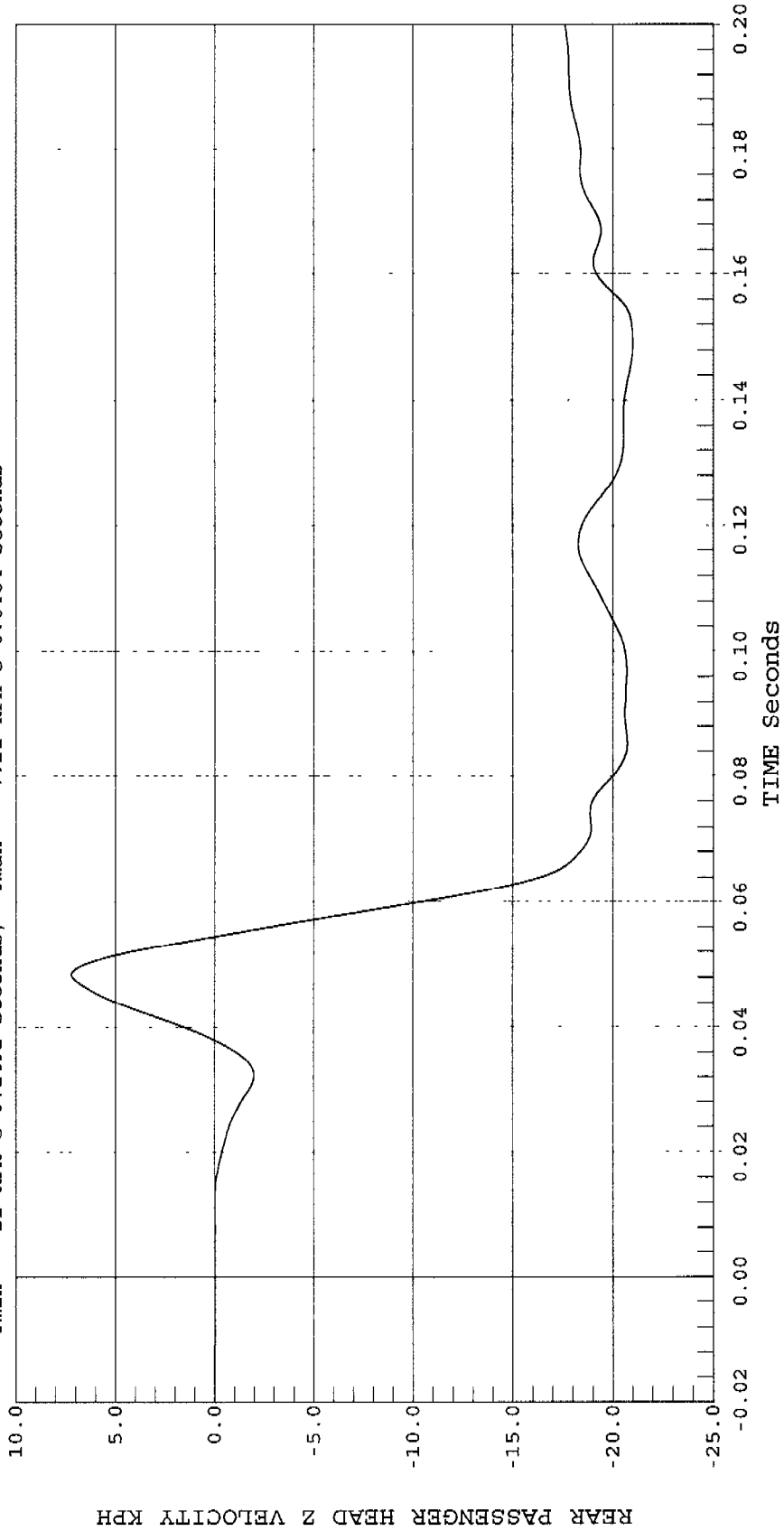
REAR PASSENGER HEAD Z VELOCITY

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180



1 REAR PASSENGER HEAD Z VELOCITY, B00102AI.V10

Ymin = -21 KPH @ 0.1492 Seconds, Ymax = 7.21 KPH @ 0.0484 Seconds



REAR PASSENGER UPPER RIB Y ACCELERATION

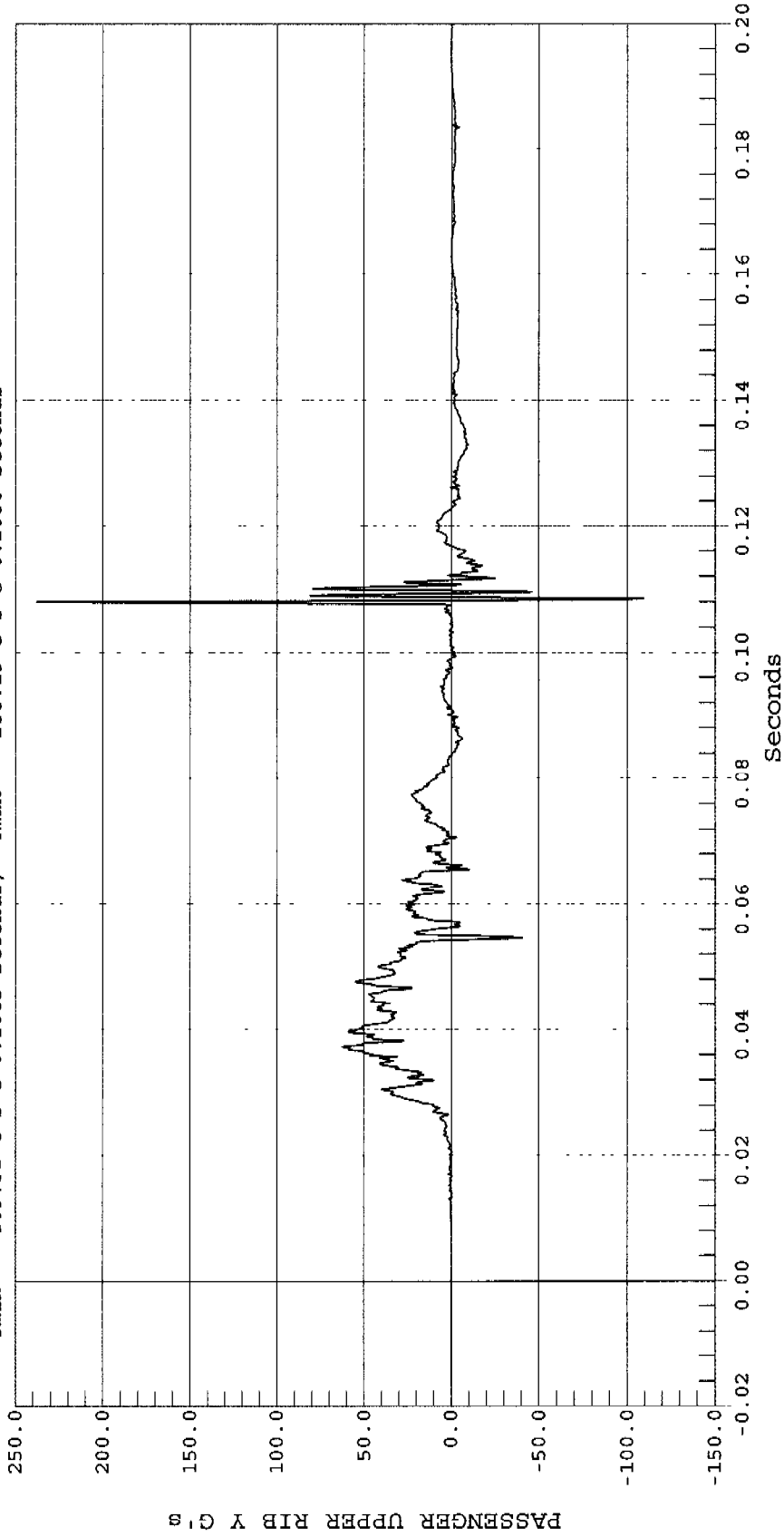
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 1000

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

1 PASSENGER UPPER RIB Y, B00102AT.A11



Ymir = -109.51 G's @ 0.1085 Seconds, Ymax = 238.19 G's @ 0.1080 Seconds



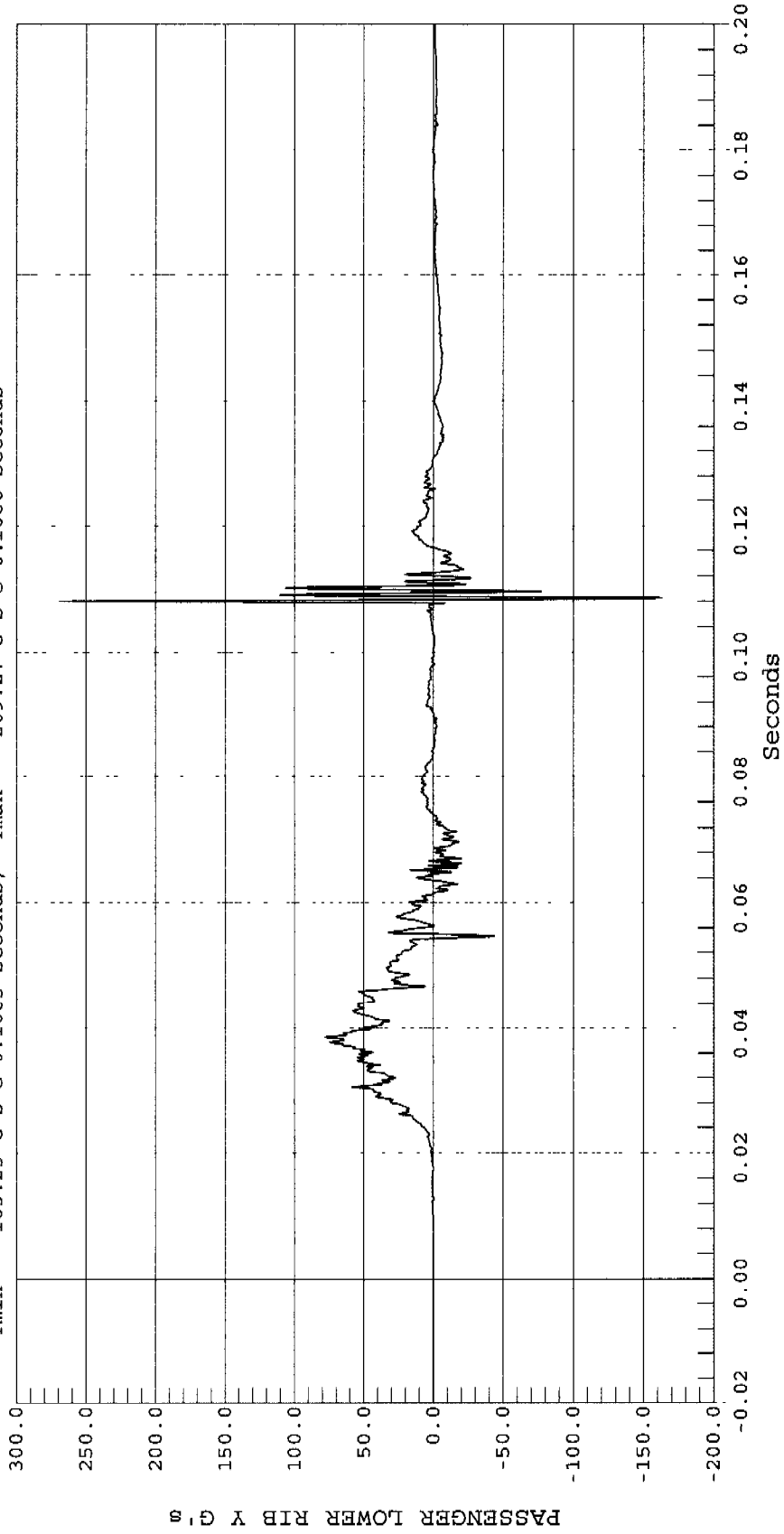


REAR PASSENGER LOWER RIB Y ACCELERATION

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 1000

— 1 PASSENGER LOWER RIB Y, B00102AT.A12

Ymin = -163.25 G's @ 0.1085 Seconds, Ymax = 269.27 G's @ 0.1080 Seconds



REAR PASSENGER LOWER SPINE Y ACCELERATION

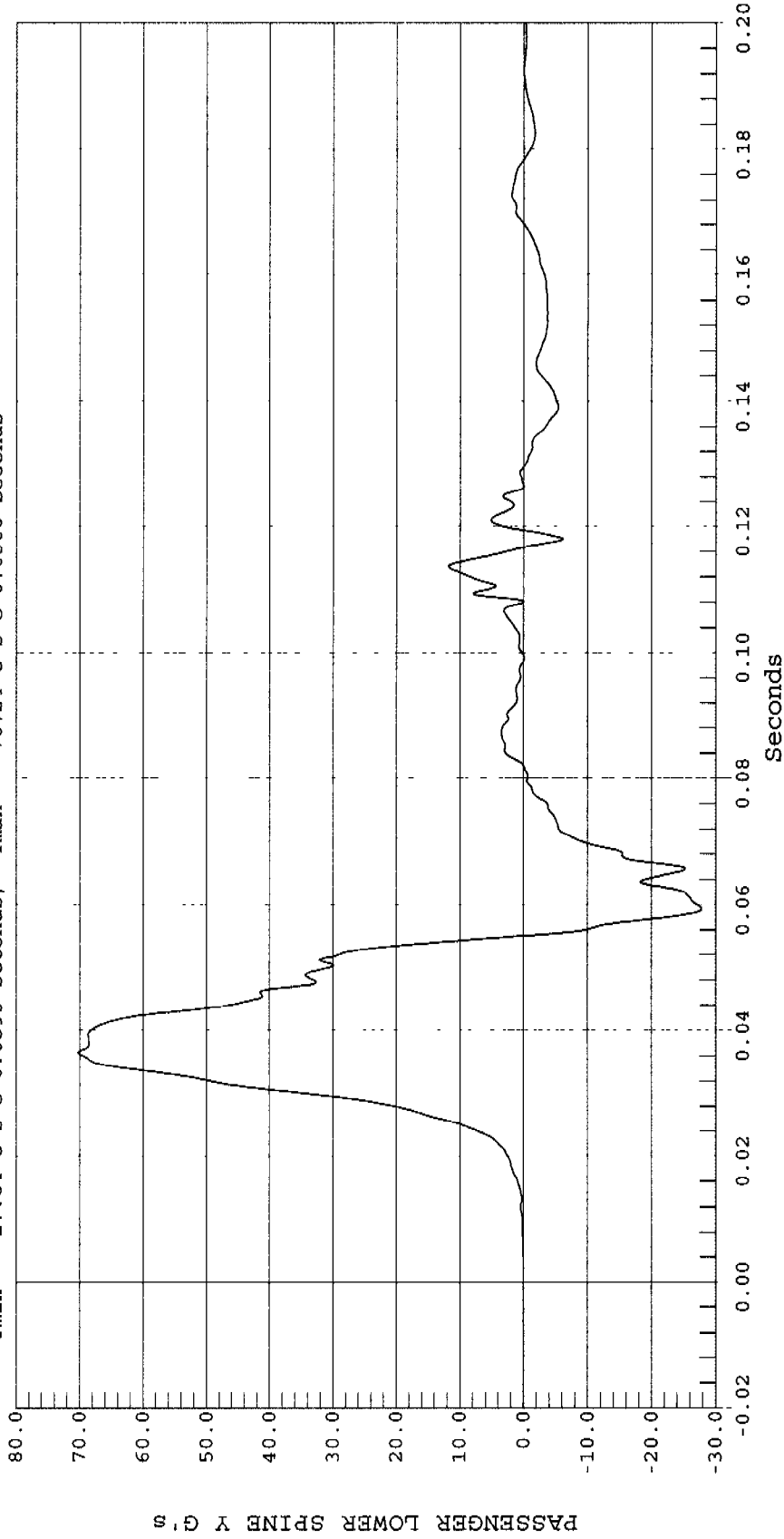
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180

— 1 PASSENGER LOWER SPINE Y, B00102AF.A13



Ymin = -27.84 G's @ 0.0593 Seconds, Ymax = 70.24 G's @ 0.0366 Seconds



REAR PASSENGER PELVIS Y ACCELERATION

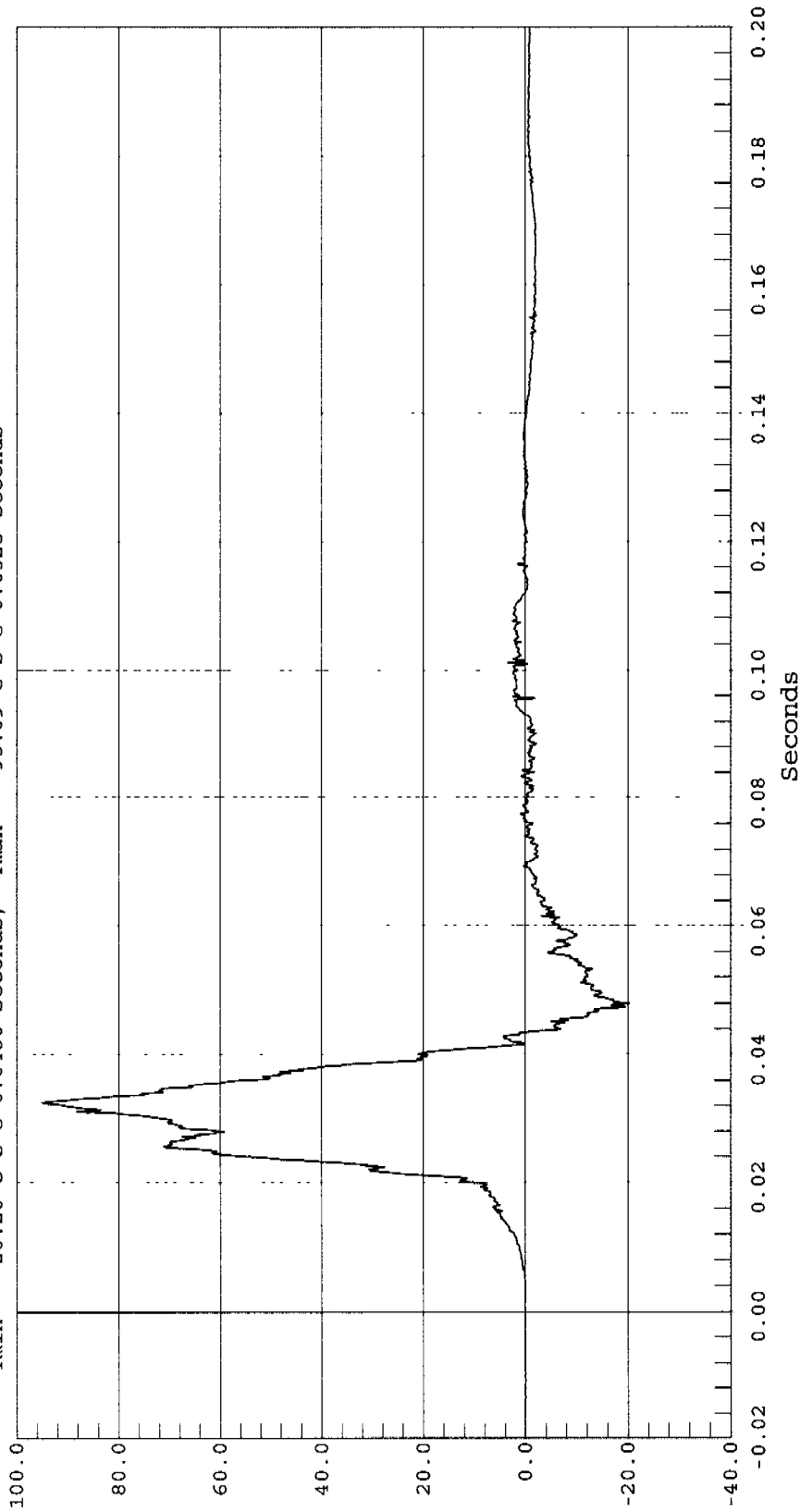
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 1000

1 PASSENGER PELVIS Y, B00102AT.A14



Ymin = -20.28 G's @ 0.0480 Seconds, Ymax = 95.09 G's @ 0.0325 Seconds





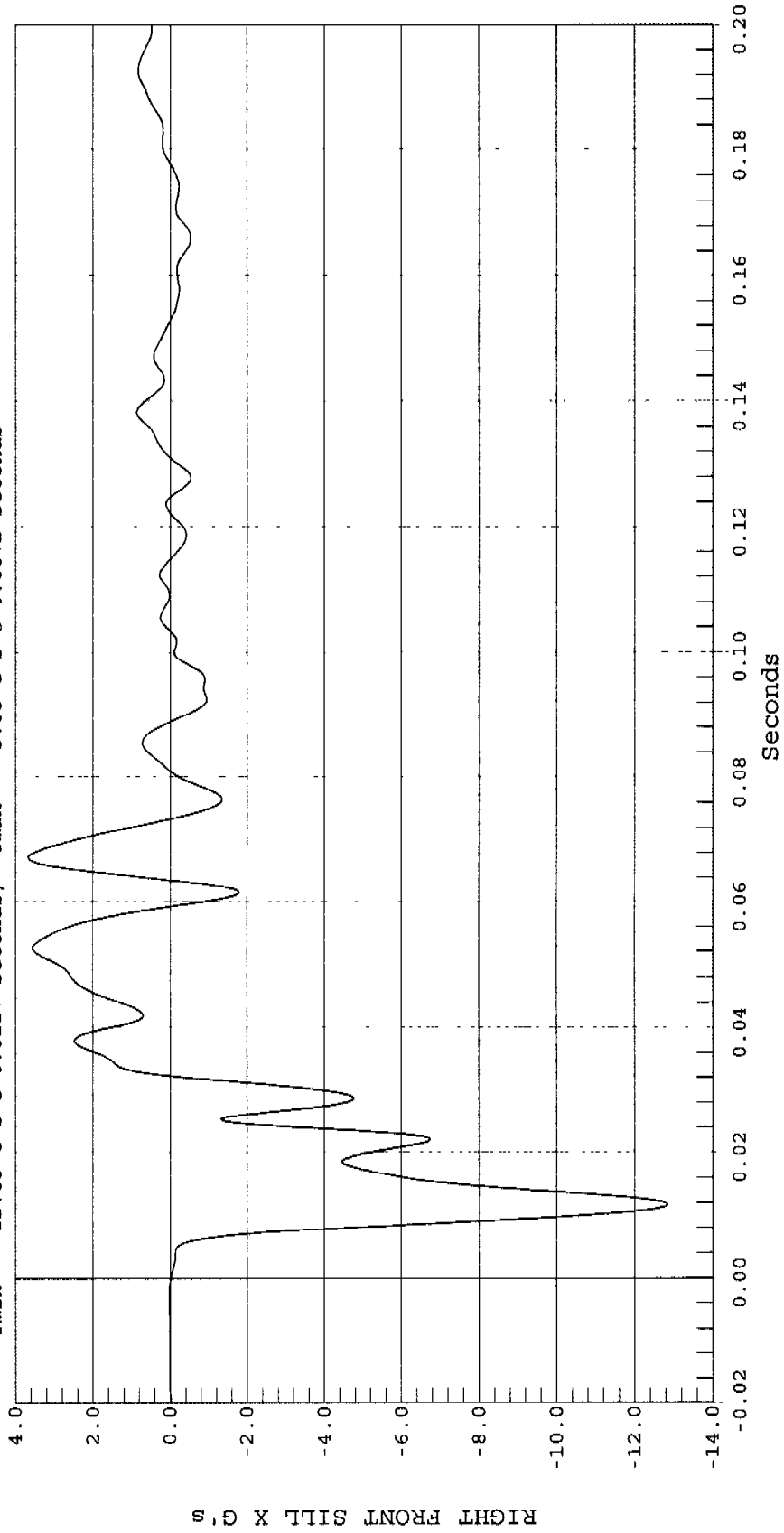
RIGHT SIDE SILL AT FRONT SEAT X ACCELERATION

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 60

1 RIGHT FRONT SILL X, B00102AF.A15

Ymin = -12.85 G's @ 0.0117 Seconds, Ymax = 3.68 G's @ 0.0672 Seconds



RIGHT SIDE SILL AT FRONT SEAT Y ACCELERATION

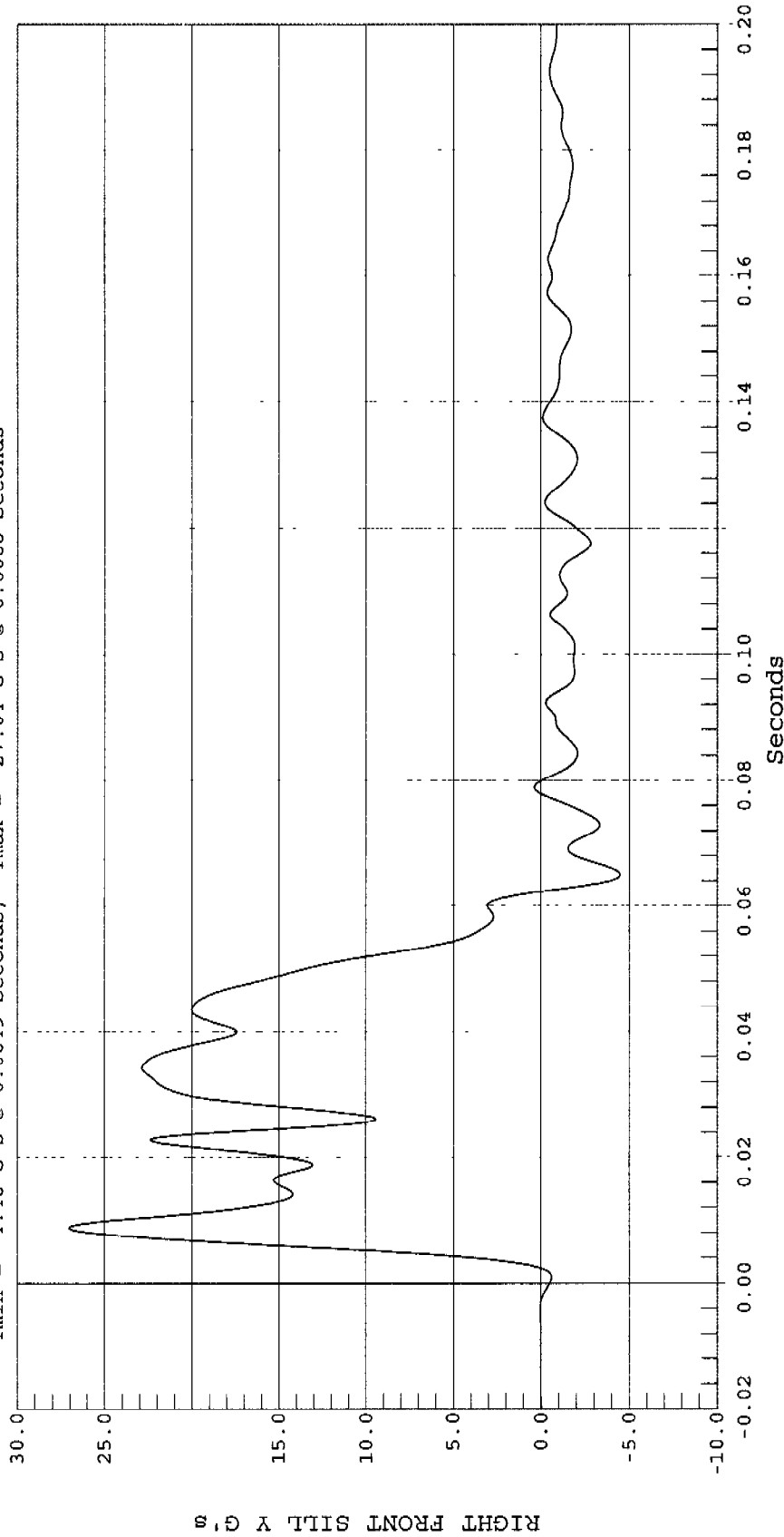
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 60

1 RIGHT FRONT SILL Y, B00102AF.A16



Ymin = -4.48 G's @ 0.0649 Seconds, Ymax = 27.04 G's @ 0.0088 Seconds



RIGHT FRONT SILL Y G's

RIGHT SIDE SILL AT FRONT SEAT Z ACCELERATION

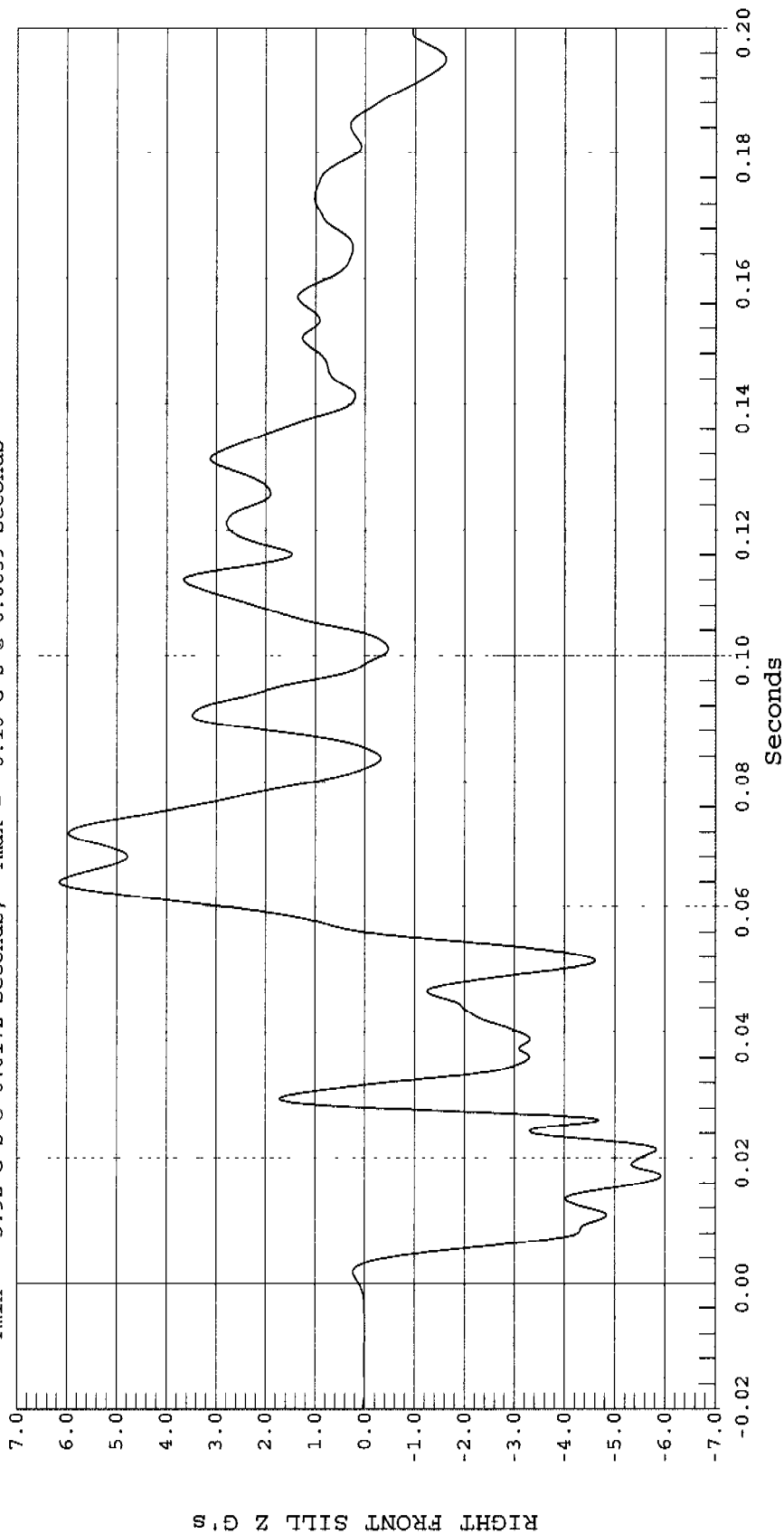
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 60

1 RIGHT FRONT SILL Z, B00102AF.A17



Ymin = -5.92 G's @ 0.0172 Seconds, Ymax = 6.16 G's @ 0.0639 Seconds



RIGHT SIDE SILL, AT FRONT SEAT RESULTANT ACCELERATION

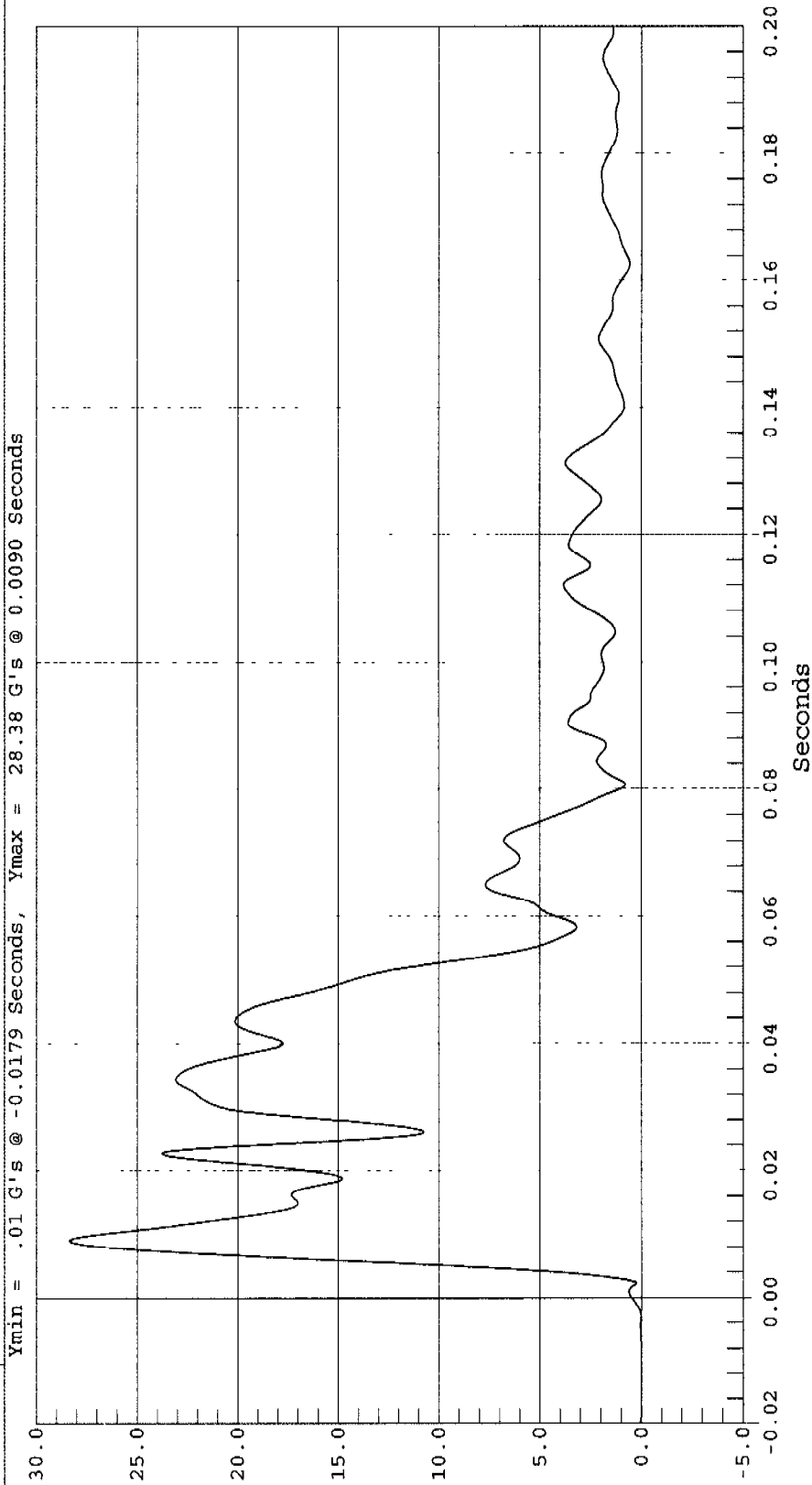
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 60

— 1 RIGHT SIDE SILL AT FRONT SEAT RESULTANT ACCELERATION, B00102AV.A15



RIGHT SIDE SILL AT FRONT SEAT RESULTANT ACCELERATION



RIGHT SIDE SILL AT REAR SEAT X VELOCITY

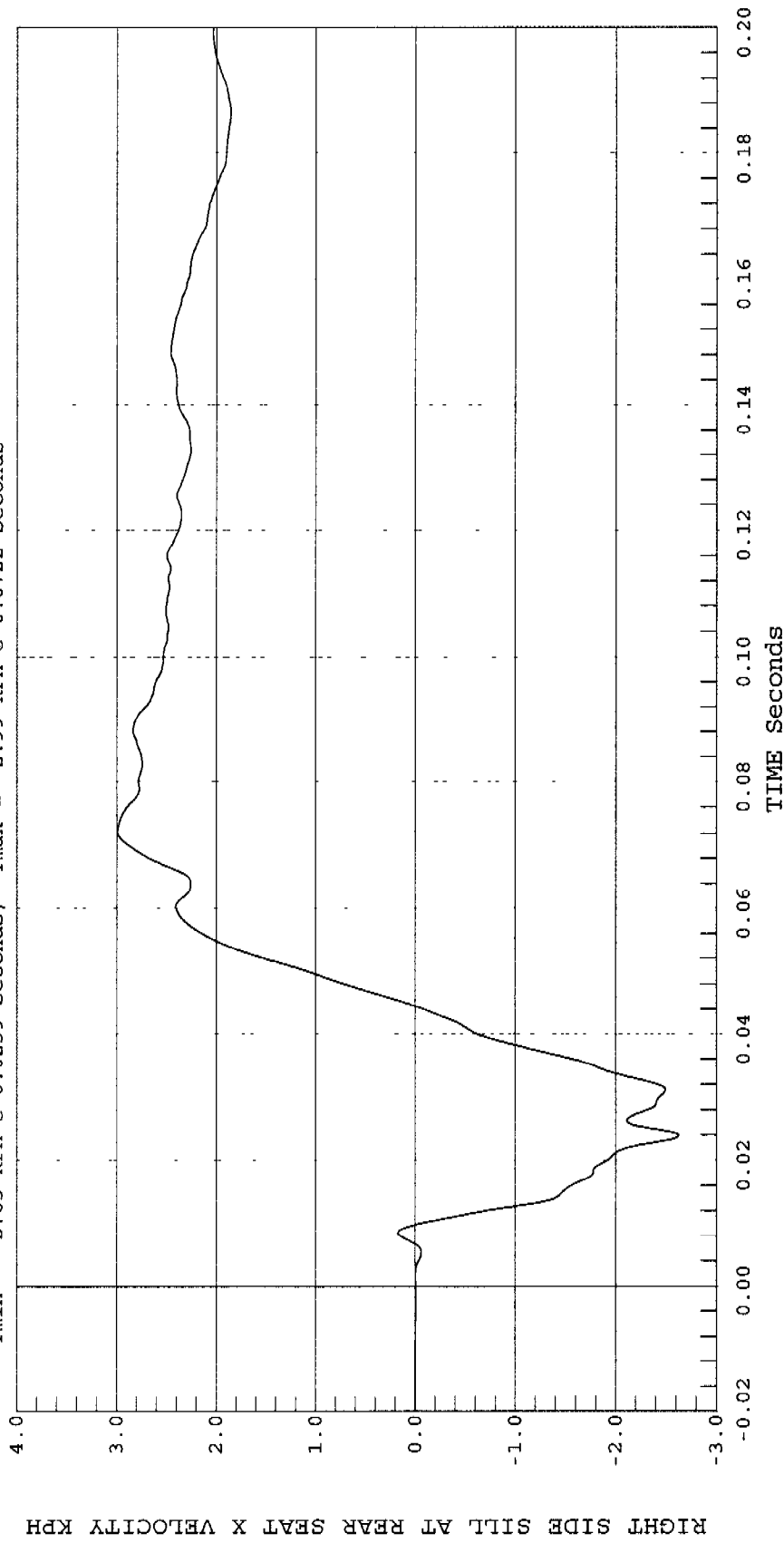
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180

1 RIGHT SIDE SILL AT REAR SEAT X VELOCITY, B00102AI.V18



Ymin = -2.63 KPH @ 0.0239 Seconds, Ymax = 2.99 KPH @ 0.0722 Seconds



RIGHT SIDE SILL AT REAR SEAT Y VELOCITY

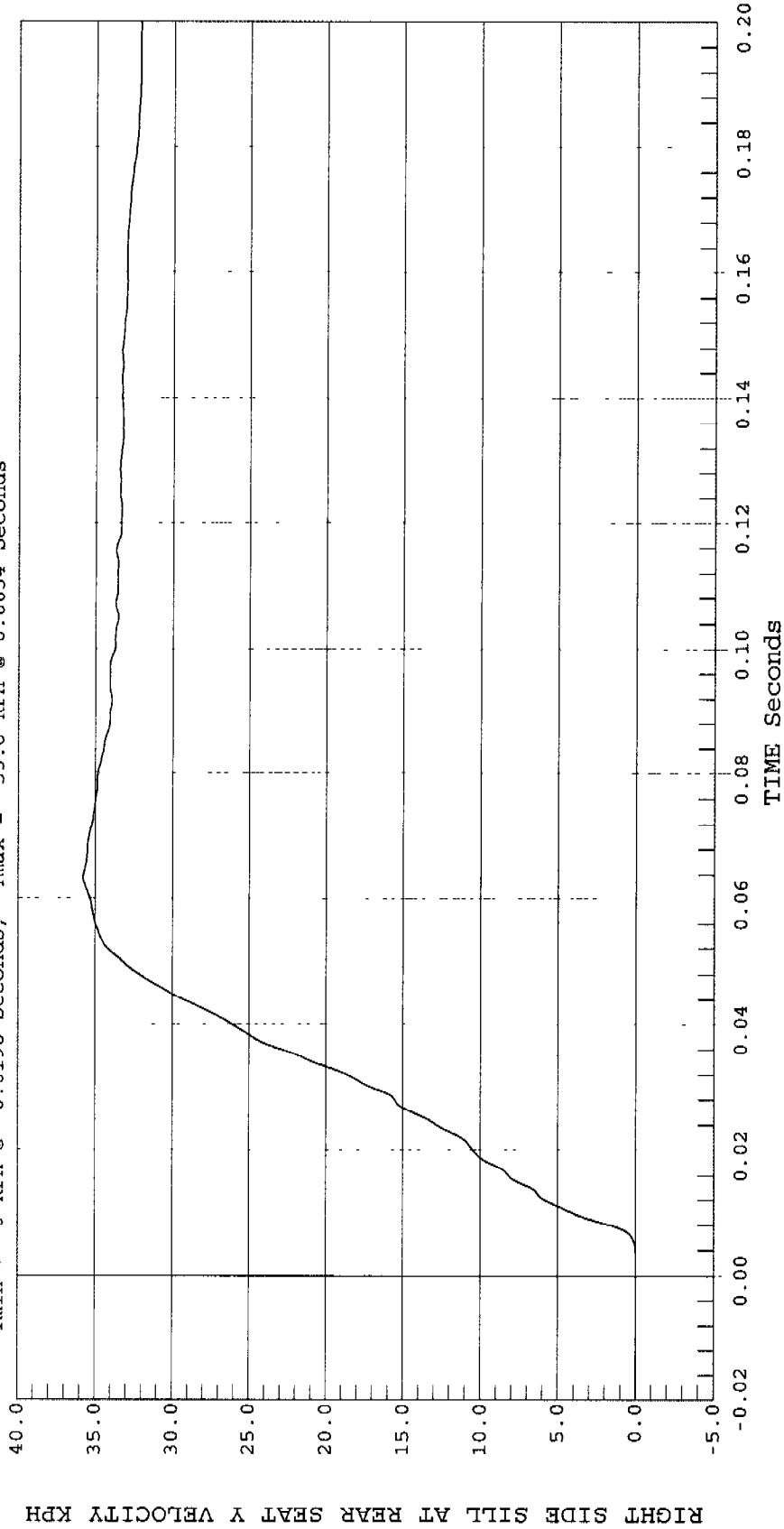
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C151.01)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180



1 RIGHT SIDE SILL AT REAR SEAT Y VELOCITY, B00102AI.V19

Ymin = 0 KPH @ -0.0198 Seconds, Ymax = 35.8 KPH @ 0.0634 Seconds



RIGHT SIDE SILL AT REAR SEAT Z VELOCITY (QD AFTER 26 MSEC)

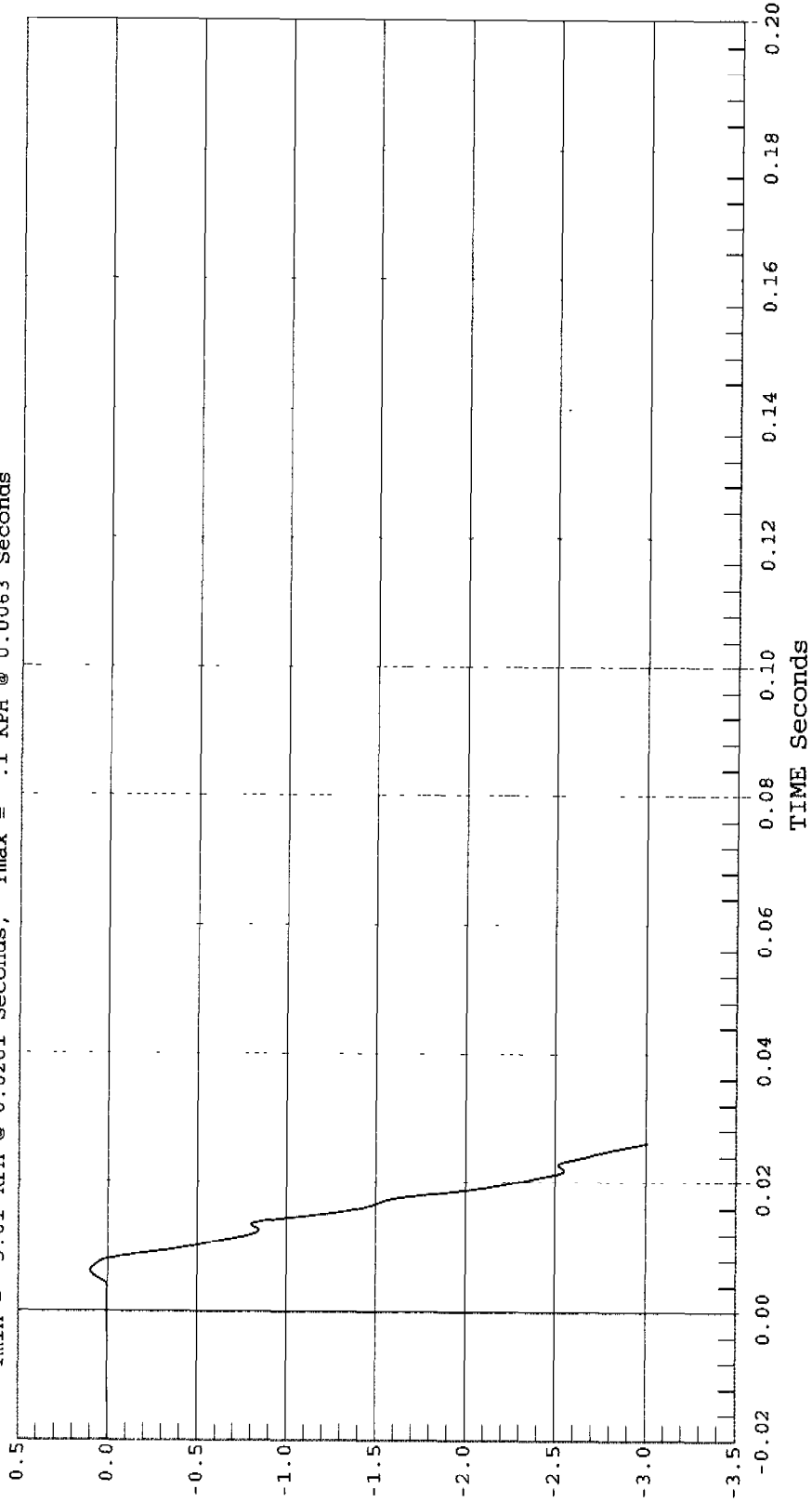
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180

1 RIGHT SIDE SILL AT REAR SEAT Z VELOCITY, B00102AI.V20



Ymin = -3.01 KPH @ 0.0261 Seconds, Ymax = .1 KPH @ 0.0063 Seconds



RIGHT SIDE SILL AT REAR SEAT Z VELOCITY KPH

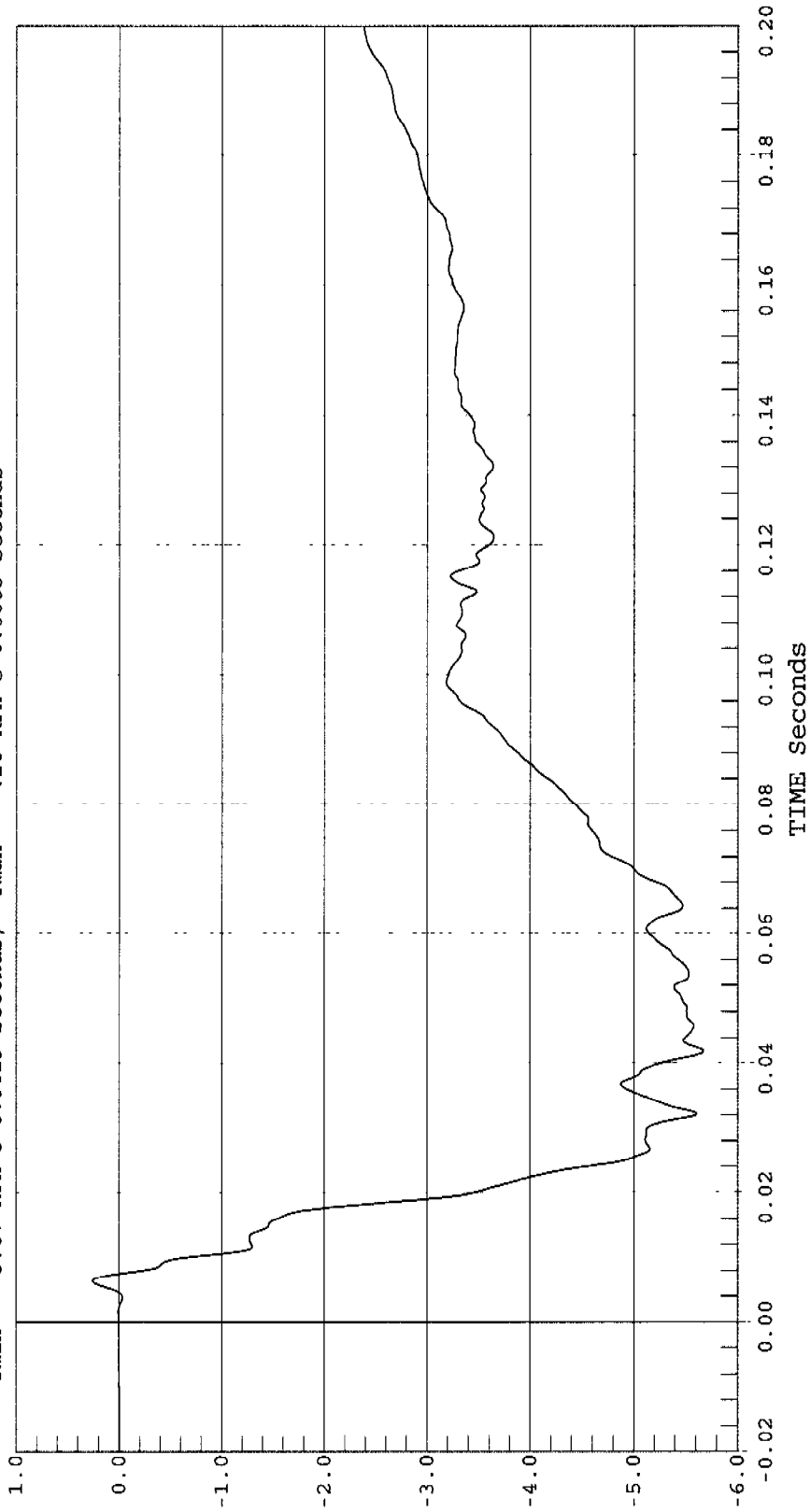
REAR FLOORPAN ABOVE AXLE X VELOCITY

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180



1 REAR FLOORPAN ABOVE AXLE X VELOCITY, B00102AI.V23

Ymin = -5.67 KPH @ 0.0419 Seconds, Ymax = .26 KPH @ 0.0063 Seconds



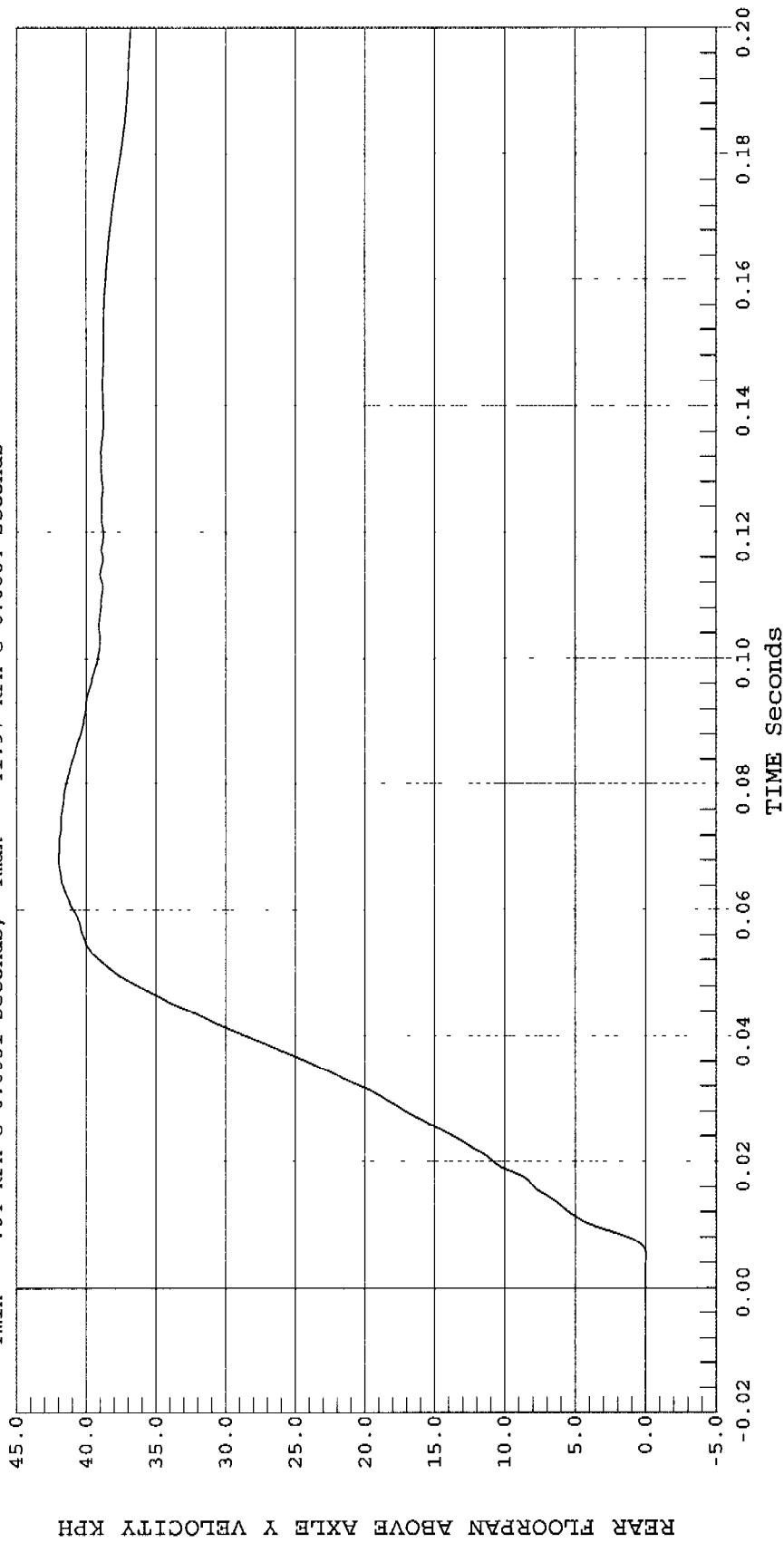
REAR FLOORPAN ABOVE AXLE Y VELOCITY

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180



1 REAR FLOORPAN ABOVE AXLE Y VELOCITY, B00102AI.V24

Ymin = -.04 KPH @ 0.0051 Seconds, Ymax = 41.97 KPH @ 0.0684 Seconds



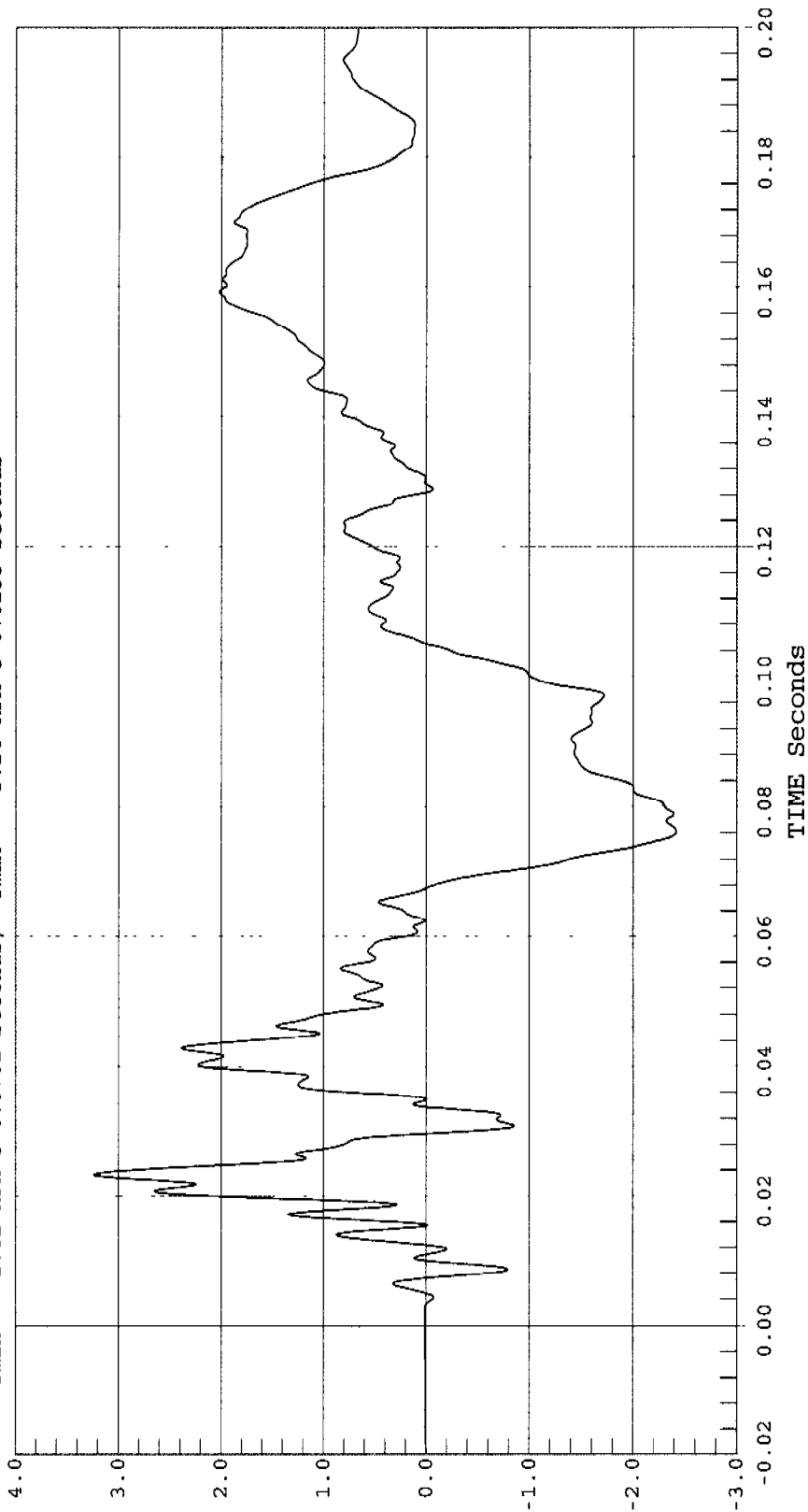


REAR FLOORPAN ABOVE AXLE Z VELOCITY

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180

1 REAR FLOORPAN ABOVE AXLE Z VELOCITY, B00102AI.V25

Ymin = -2.42 KPH @ 0.0762 Seconds, Ymax = 3.24 KPH @ 0.0233 Seconds



REAR FLOORPAN ABOVE AXLE Z VELOCITY KPH

LEFT SIDE SILL AT FRONT SEAT Y ACCELERATION

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 60

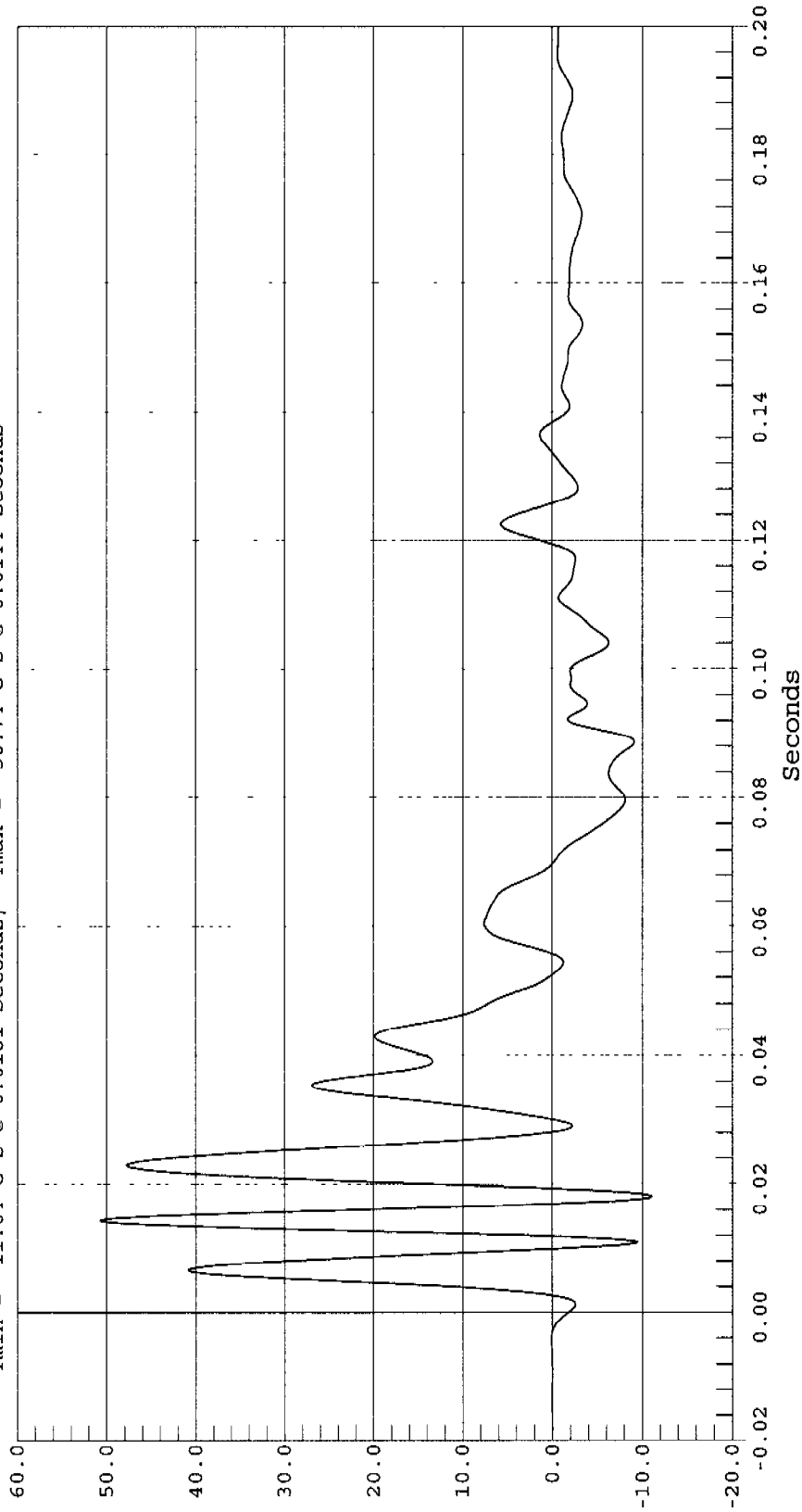
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)

Other Info:

1 LEFT FRONT SILL Y, B00102AF.A21



Ymin = -11.04 G's @ 0.0181 Seconds, Ymax = 50.74 G's @ 0.0144 Seconds



LEFT FRONT SILL Y G'S

LEFT SIDE SILL AT REAR SEAT Y ACCELERATION

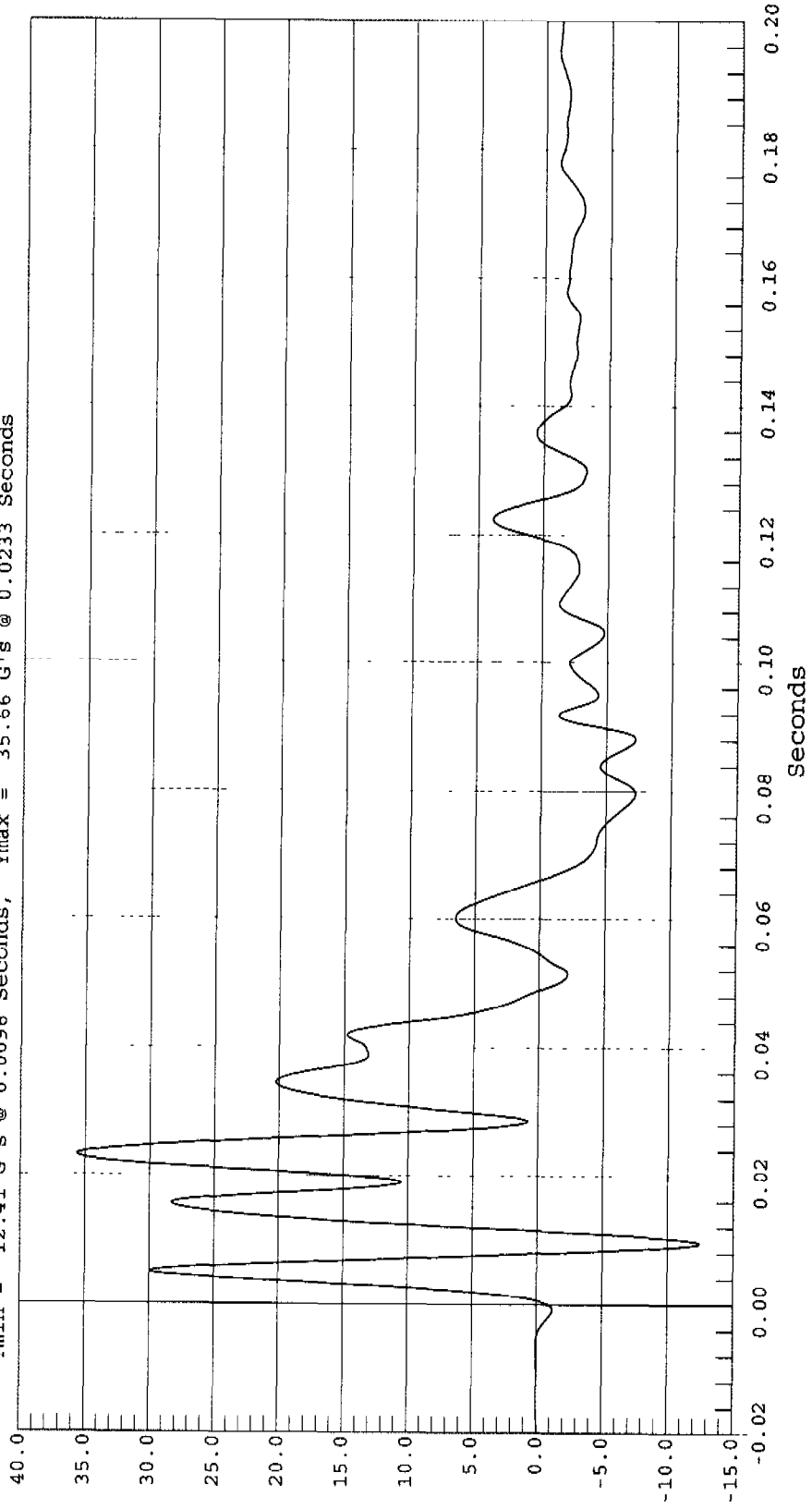
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 60

— 1 LEFT REAR SILL Y, B00102AF.A22



Ymin = -12.41 G's @ 0.0096 Seconds, Ymax = 35.66 G's @ 0.0233 Seconds



RIGHT REAR OCCUPANT COMPARTMENT Y ACCELERATION

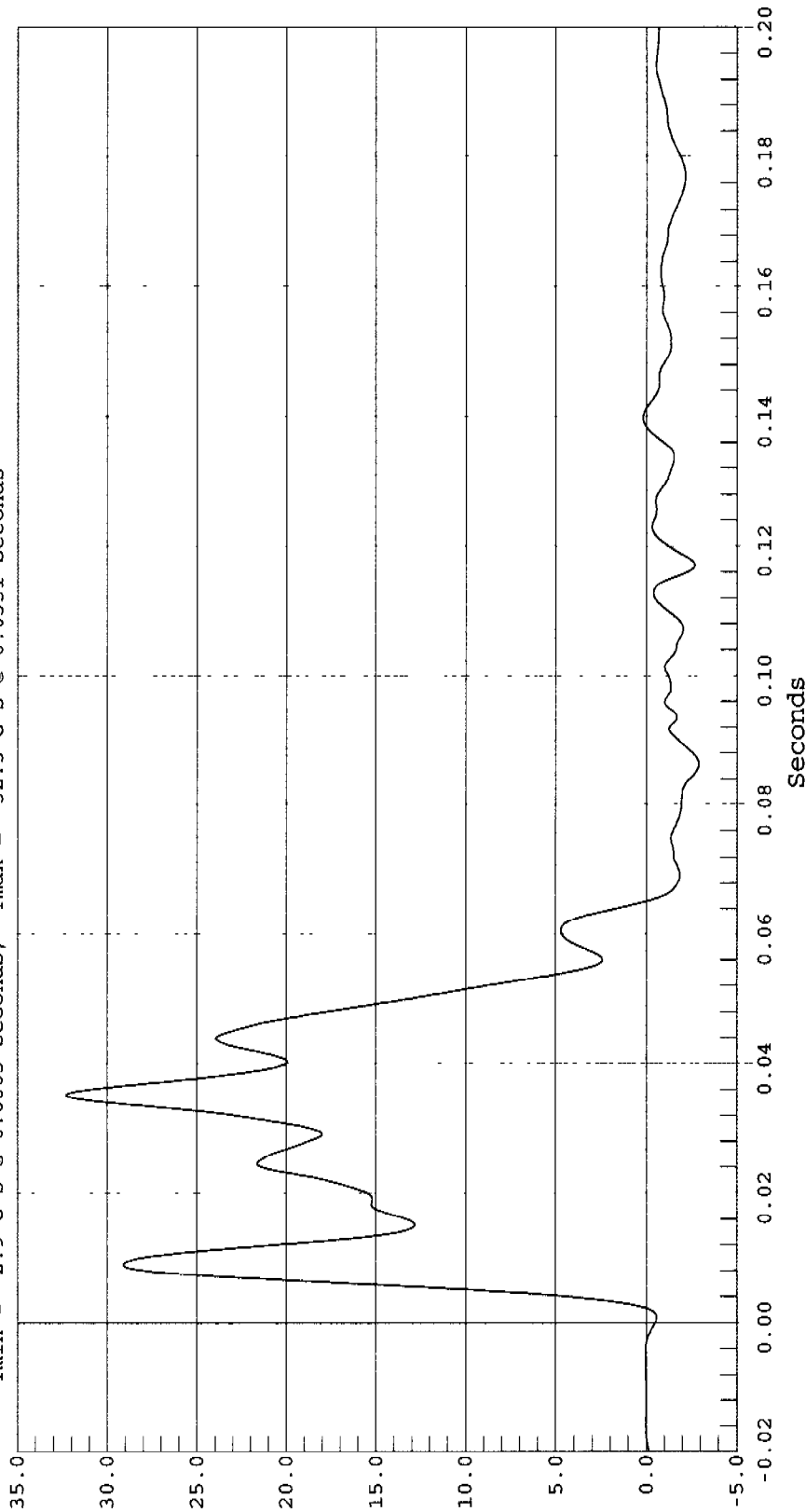
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 60

1 RIGHT REAR OCCUPANT COMPARTMENT Y, B00102AF.A31



Ymin = -2.9 G's @ 0.0863 Seconds, Ymax = 32.3 G's @ 0.0351 Seconds



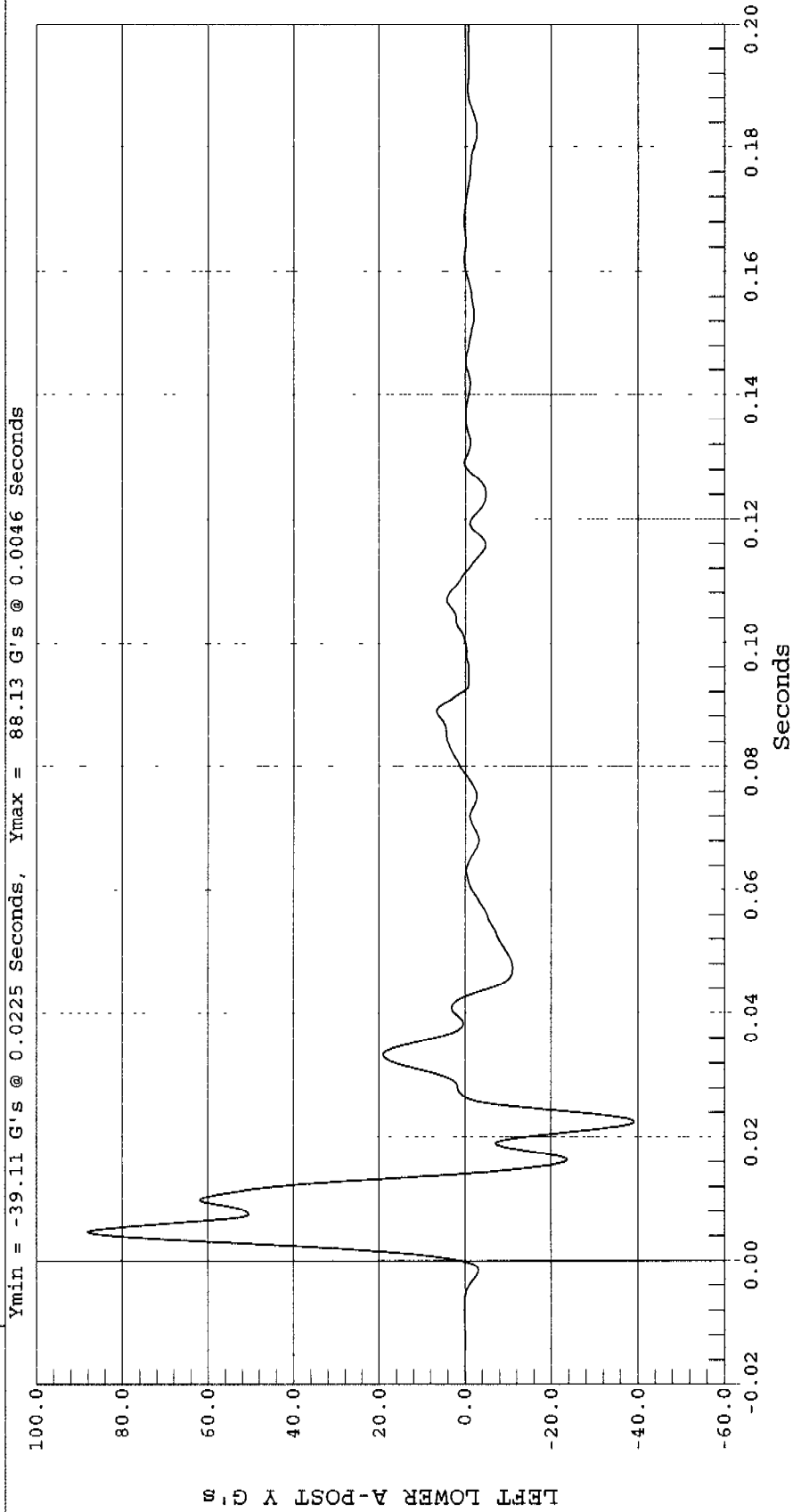
RIGHT REAR OCCUPANT COMPARTMENT Y G's

LEFT LOWER A-POST Y ACCELERATION

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 60

— 1 LEFT LOWER A-POST Y, B00102AF.A27



LEFT MID A-POST Y ACCELERATION

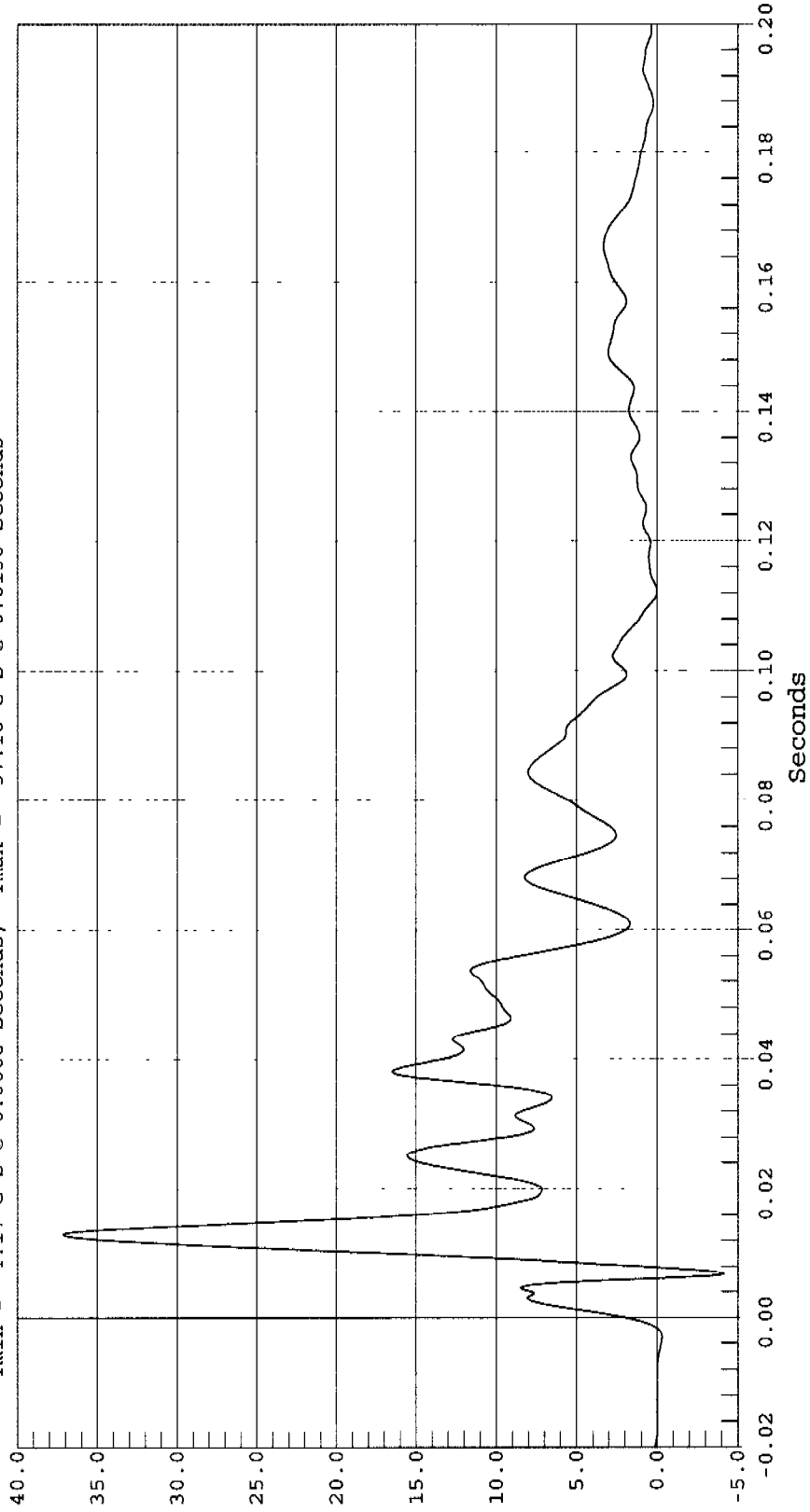
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 60

1 LEFT MID A-POST Y, B00102AF.A26



Ymin = -4.17 G's @ 0.0068 Seconds, Ymax = 37.16 G's @ 0.0130 Seconds



LEFT MID A-POST Y G's

Seconds

LEFT LOWER B-POST Y ACCELERATION

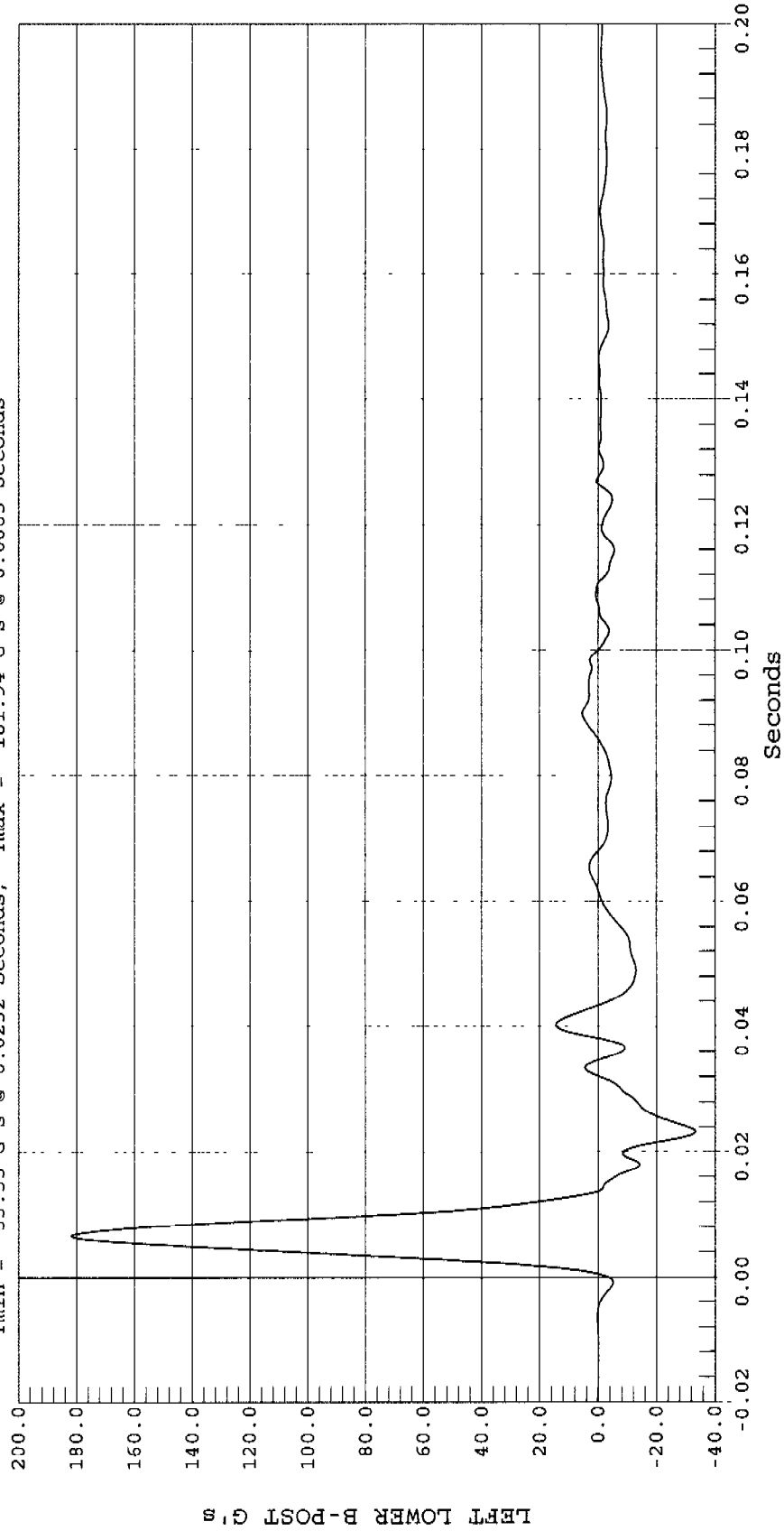
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 60



1 LEFT LOWER B-POST, B00102AF.A29

Ymin = -33.35 G's @ 0.0232 Seconds, Ymax = 181.94 G's @ 0.0065 Seconds



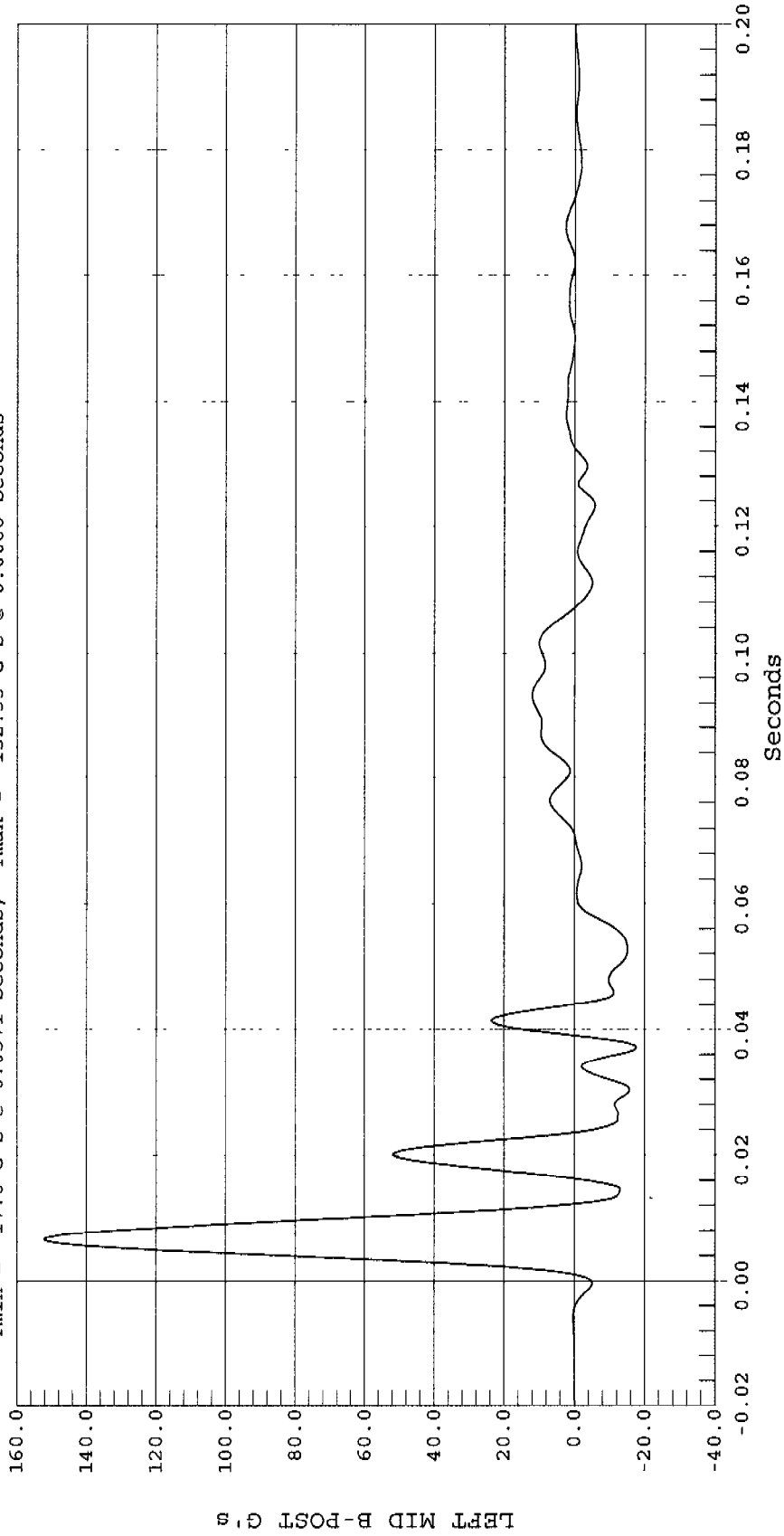
LEFT MID B-POST Y ACCELERATION

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 60



1 LEFT MID B-POST, B00102AF.A28

Ymin = -17.6 G's @ 0.0371 Seconds, Ymax = 152.33 G's @ 0.0066 Seconds



LEFT DRIVER SEAT TRACK Y ACCELERATION

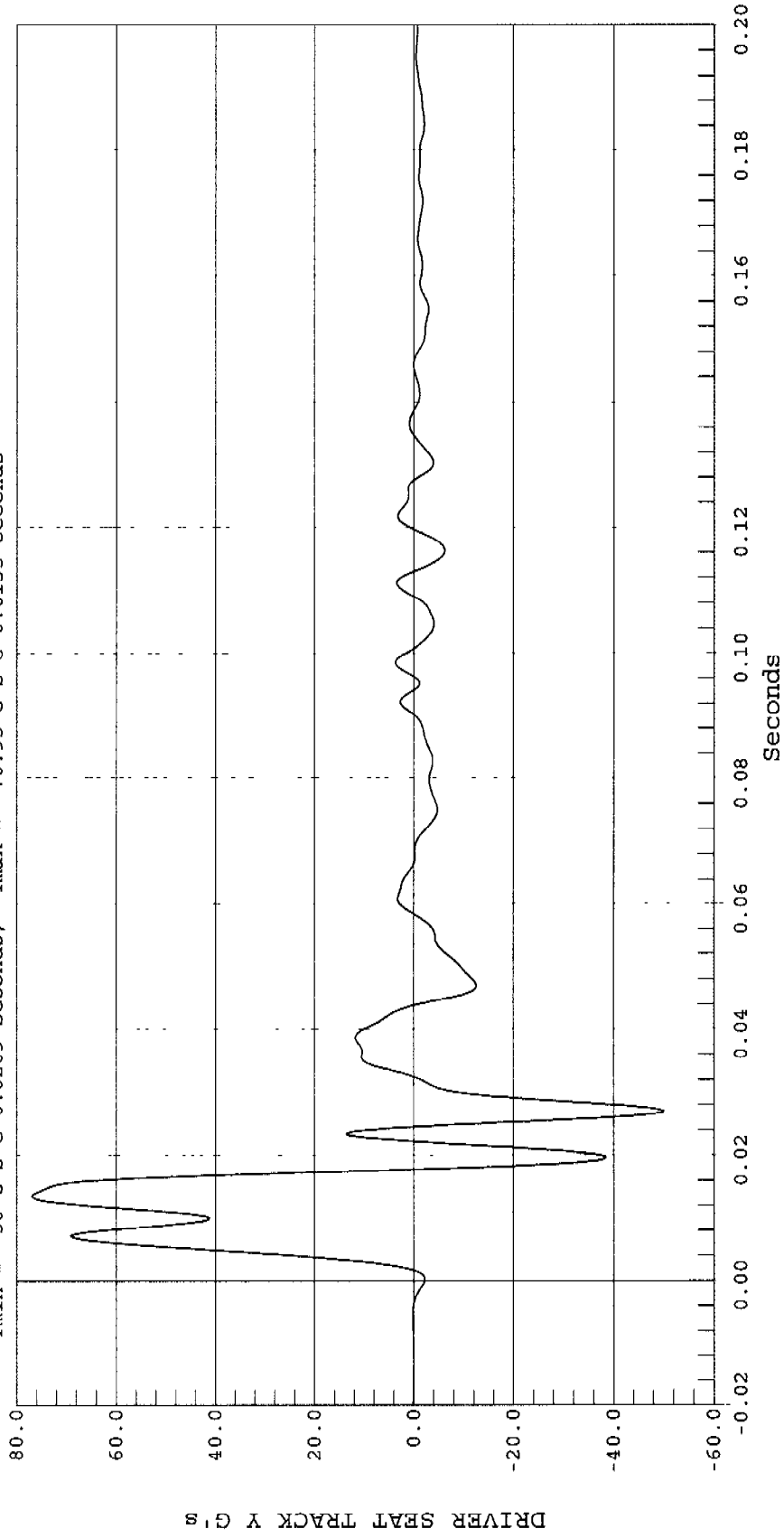
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 60

— 1 DRIVER SEAT TRACK Y, B00102AF.A30



Ymin = -50 G's @ 0.0269 Seconds, Ymax = 76.95 G's @ 0.0135 Seconds





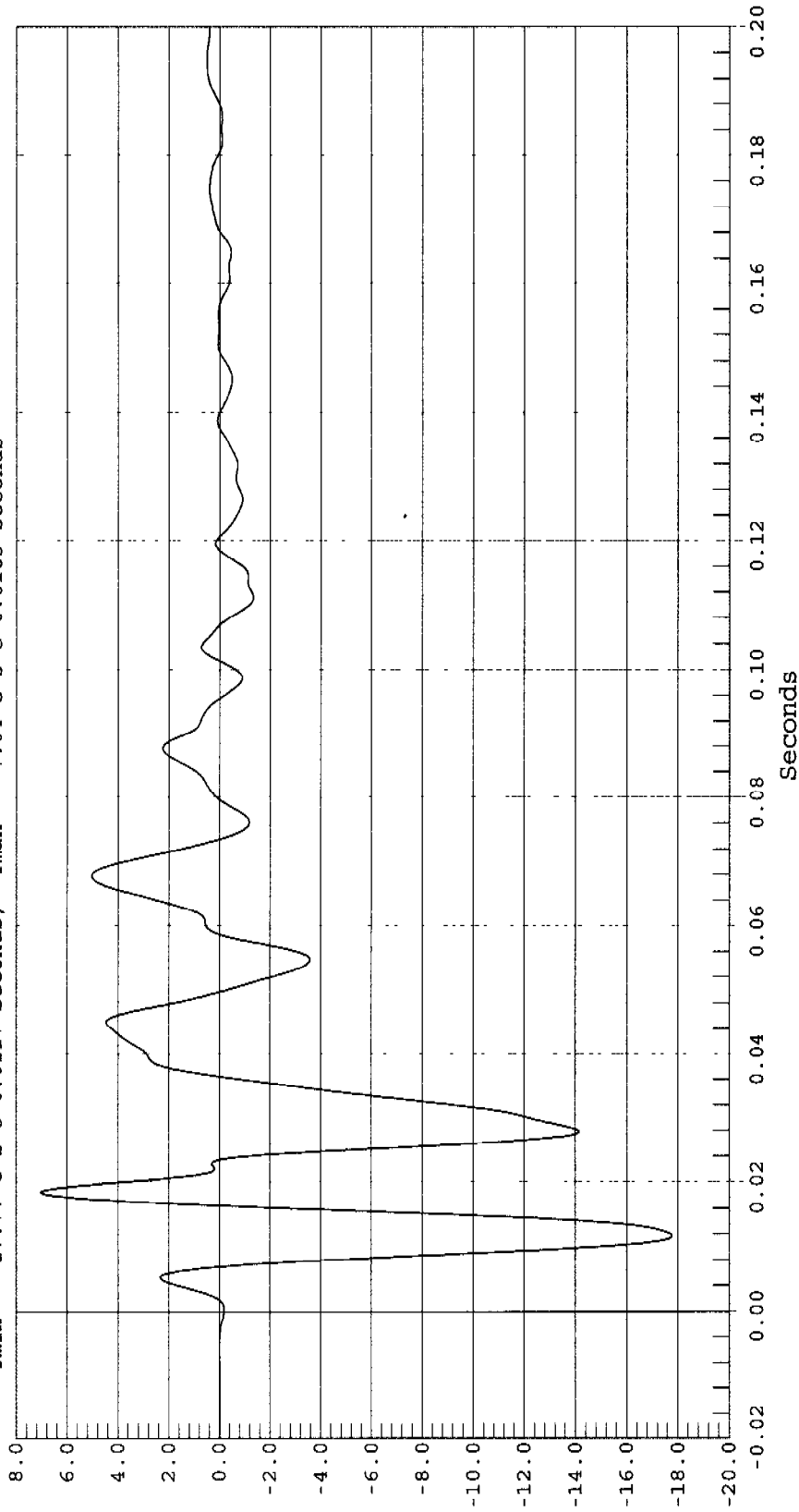
VEHICLE CG X ACCELERATION

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 60

1 VEHICLE CG X, B00102AF.A33

Ymin = -17.77 G's @ 0.0117 Seconds, Ymax = 7.04 G's @ 0.0185 Seconds



VEHICLE CG X G's

Seconds

VEHICLE CG Y ACCELERATION

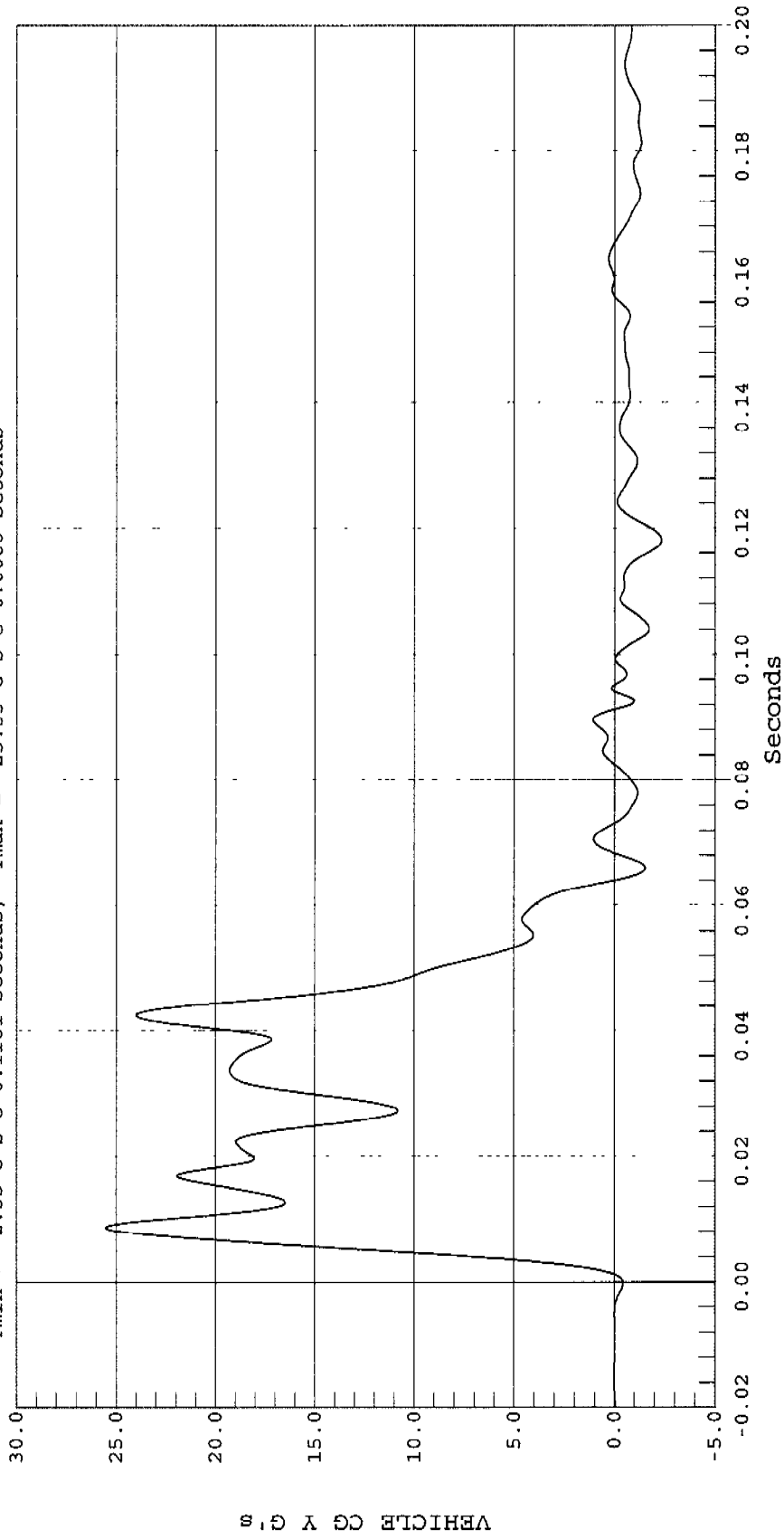
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 60

1 VEHICLE CG Y, B00102AF.A34



Ymin = -2.35 G's @ 0.1181 Seconds, Ymax = 25.53 G's @ 0.0086 Seconds





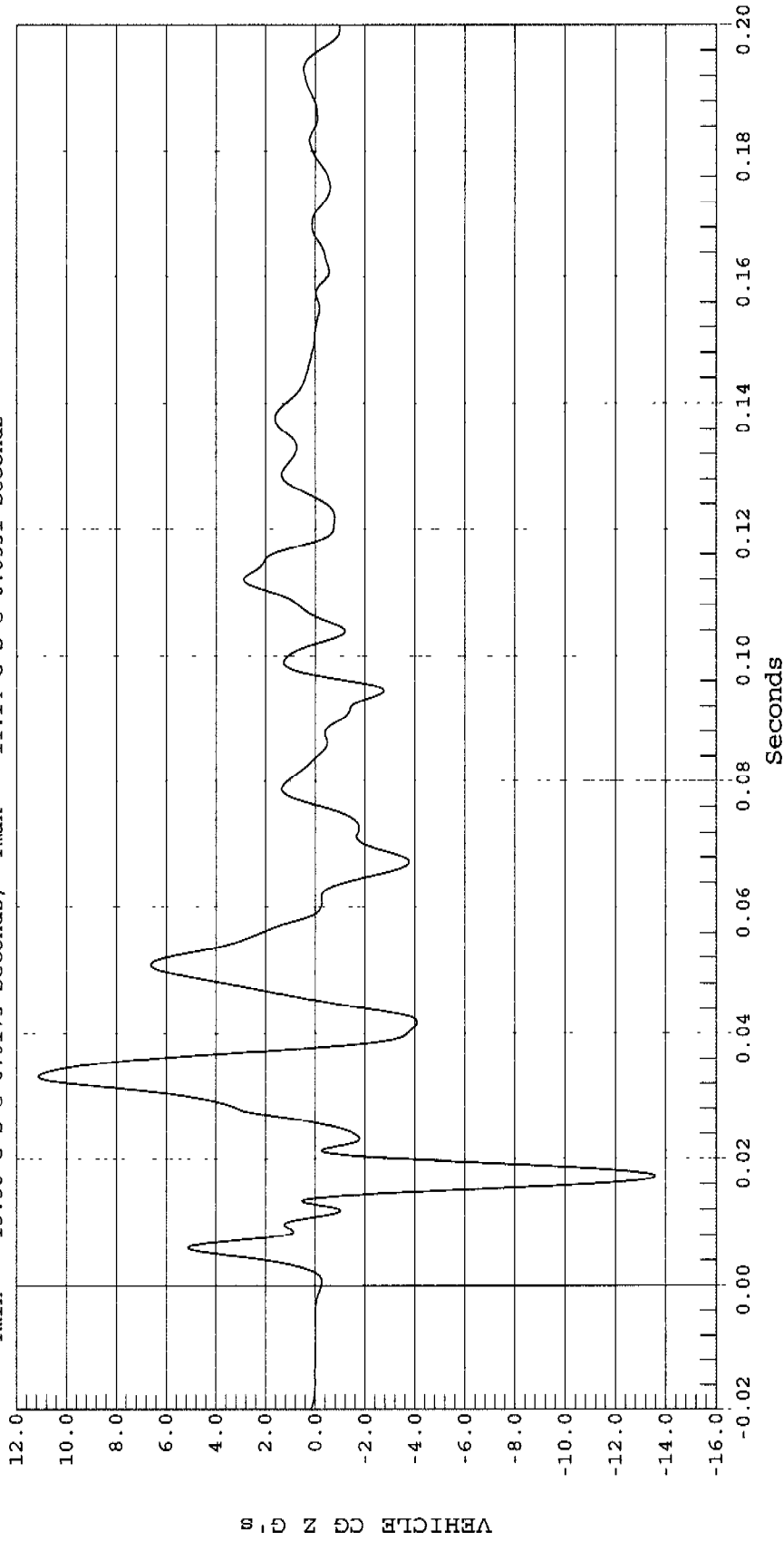
VEHICLE CG Z ACCELERATION

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 60

— 1 VEHICLE CG Z, B00102AF.A35

Ymin = -13.58 G's @ 0.0173 Seconds, Ymax = 11.14 G's @ 0.0331 Seconds



VEHICLE CG RESULTANT ACCELERATION

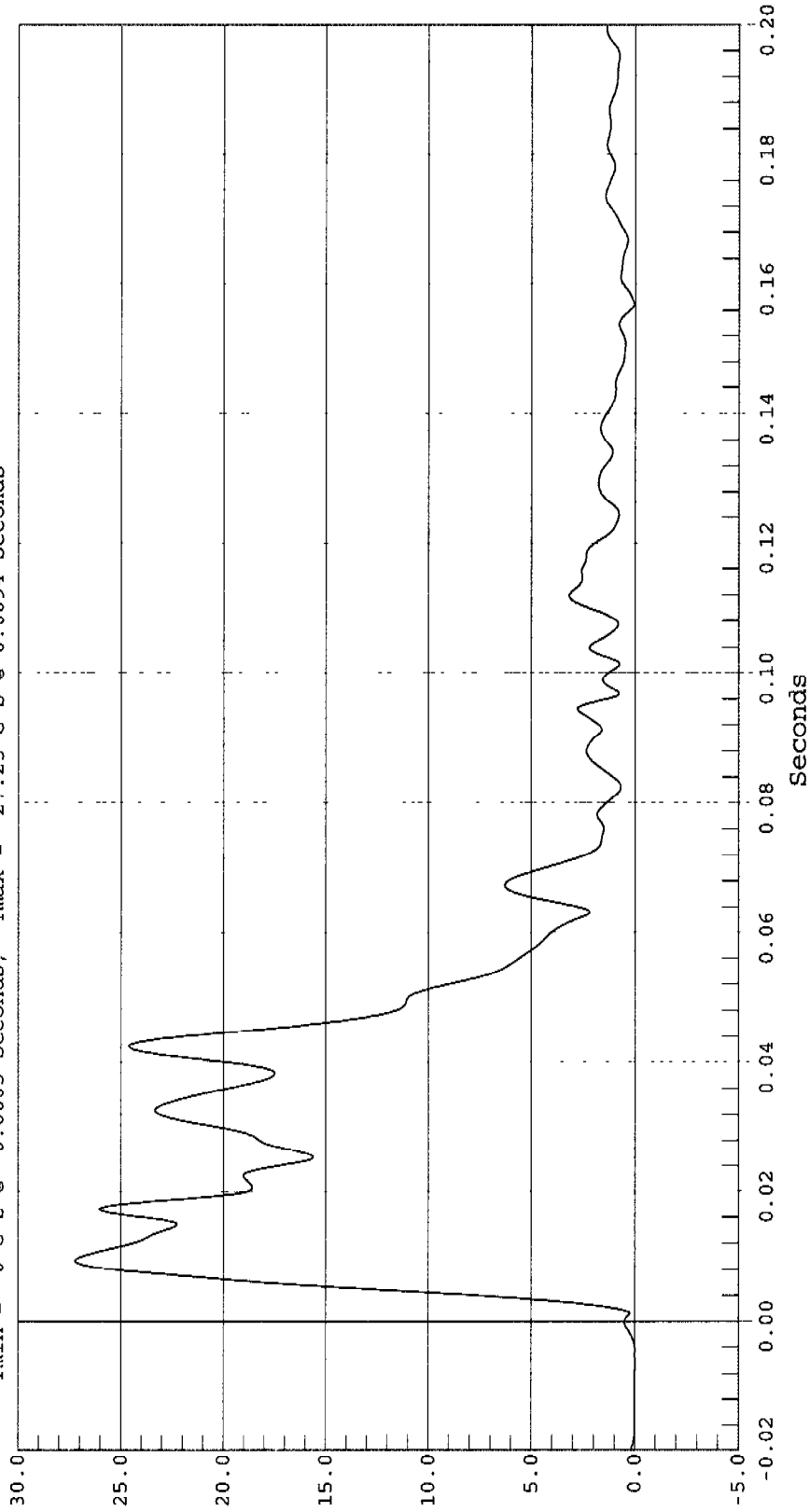
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 60

1 VEHICLE CG RESULTANT ACCELERATION, B00102AV.A33



Ymin = 0 G's @ -0.0065 Seconds, Ymax = 27.23 G's @ 0.0094 Seconds



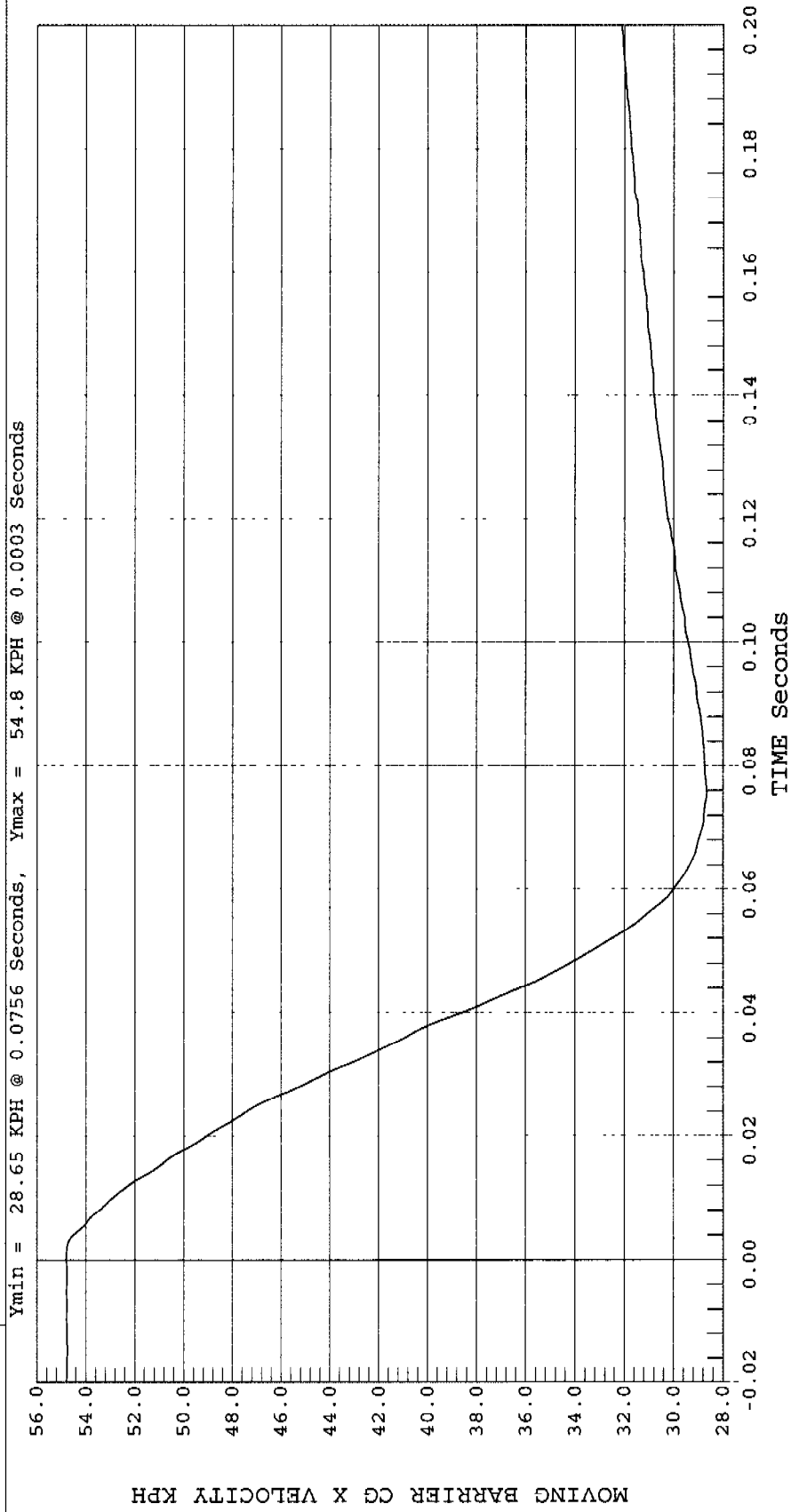
VEHICLE CG RESULTANT ACCELERATION G's



MOVING BARRIER CG X VELOCITY

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180

1 MOVING BARRIER CG X VELOCITY, C00102AI.V02



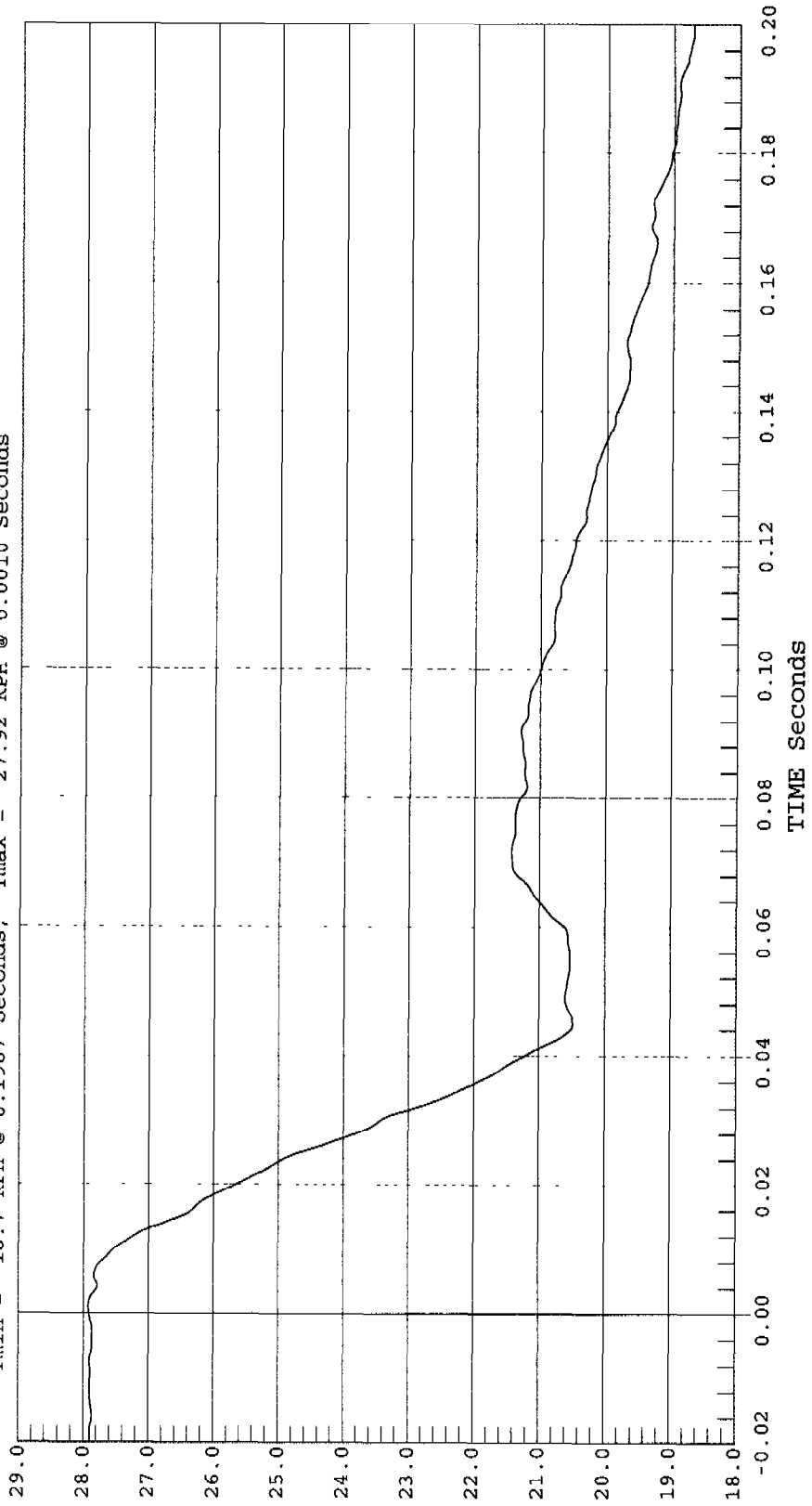
MOVING BARRIER CG Y VELOCITY

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180



1 MOVING BARRIER CG Y VELOCITY, C00102AI.V08

Ymin = 18.7 KPH @ 0.1987 Seconds, Ymax = 27.92 KPH @ 0.0010 Seconds



MOVING BARRIER CG Y VELOCITY KPH

MOVING BARRIER CG Z VELOCITY (QD AFTER 30 MSEC)

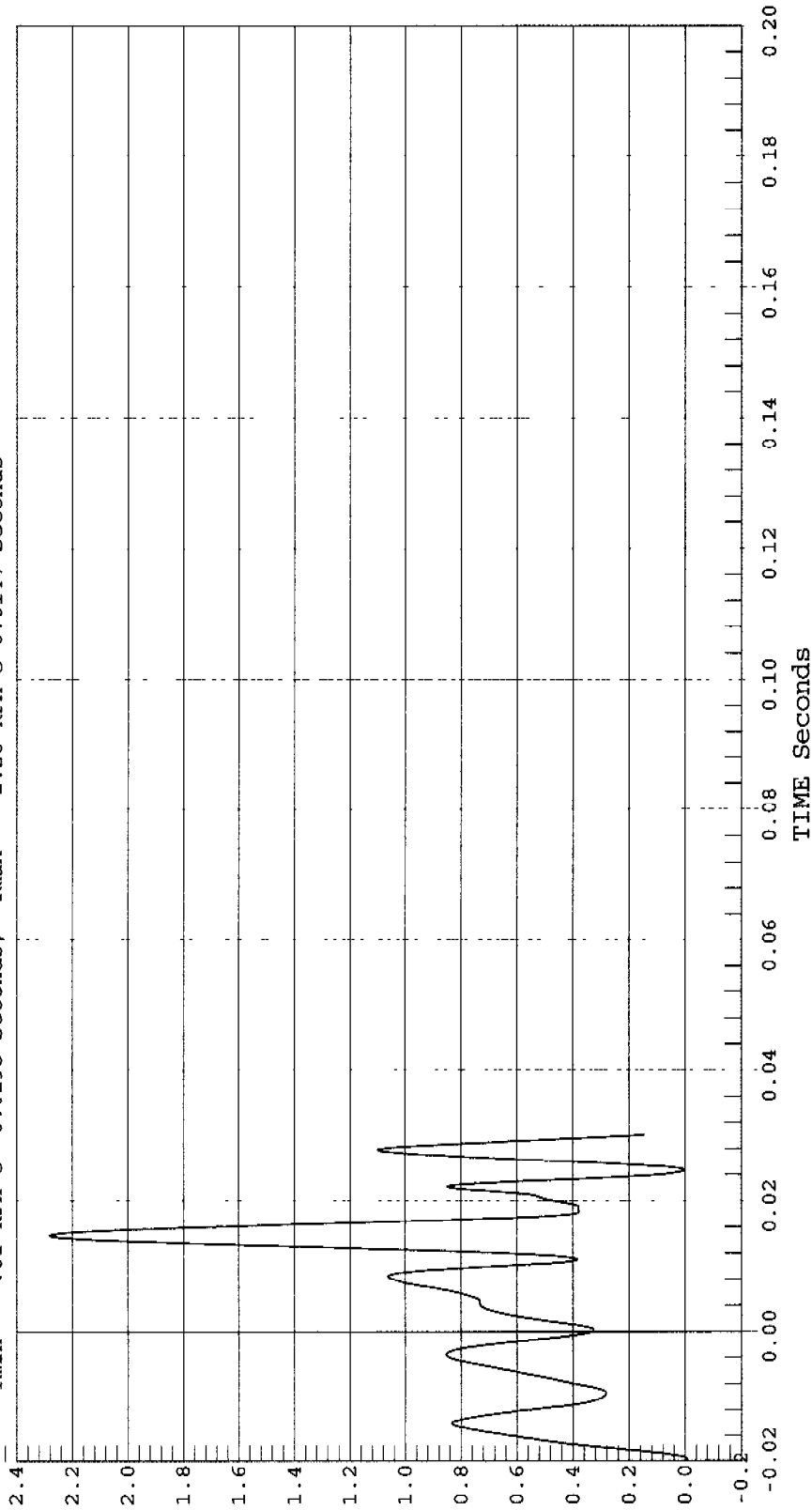
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180

1 MOVING BARRIER CG Z VELOCITY, C00102AI.V04



Ymin = -.01 KPH @ -0.0195 Seconds, Ymax = 2.28 KPH @ 0.0147 Seconds



MOVING BARRIER REAR AXLE X VELOCITY

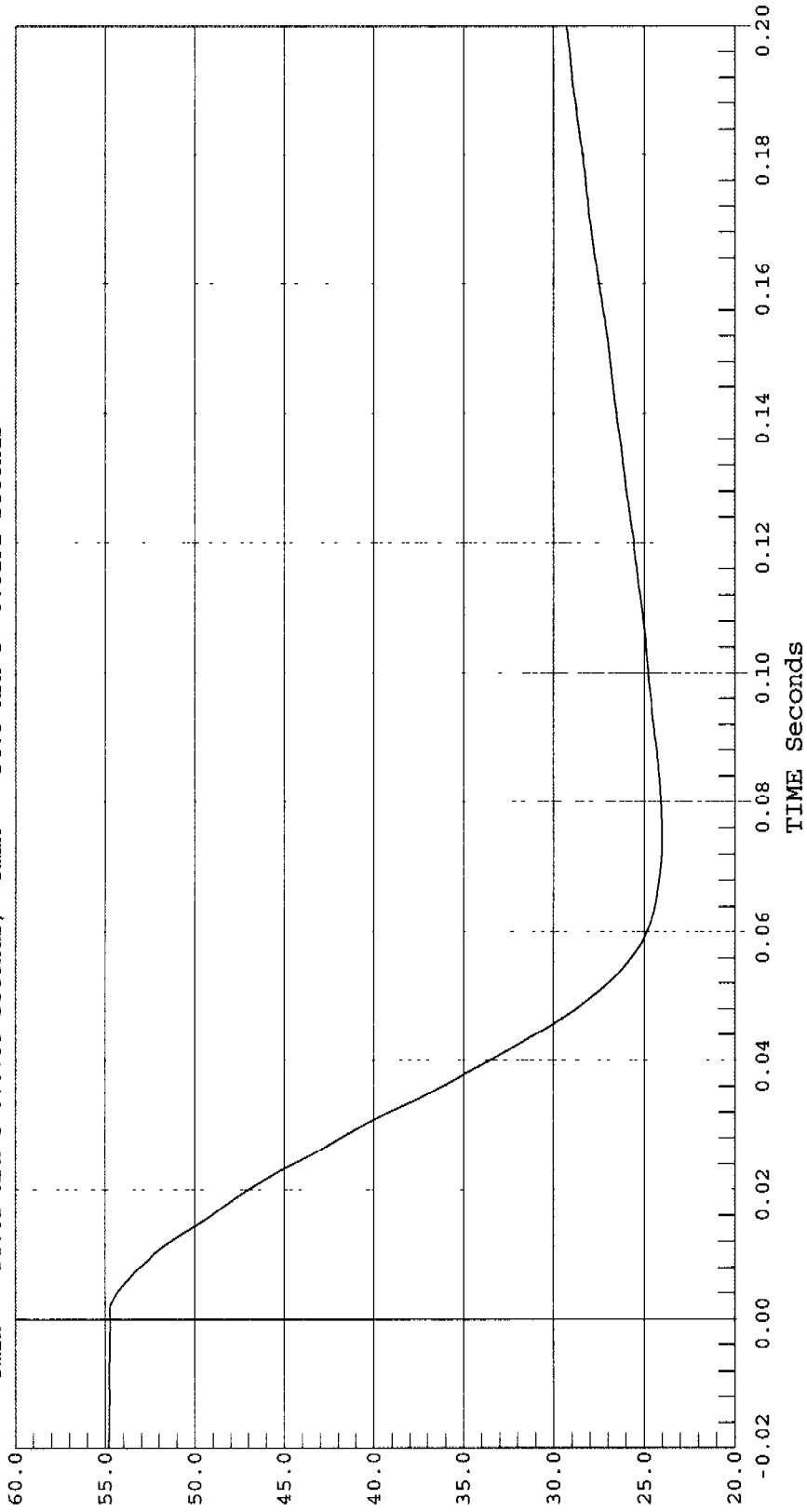
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180

1 MOVING BARRIER REAR AXLE X VELOCITY, C00102AI.V05



Ymin = 24.02 KPH @ 0.0759 Seconds, Ymax = 54.8 KPH @ -0.0192 Seconds



MOVING BARRIER REAR AXLE X VELOCITY KPH

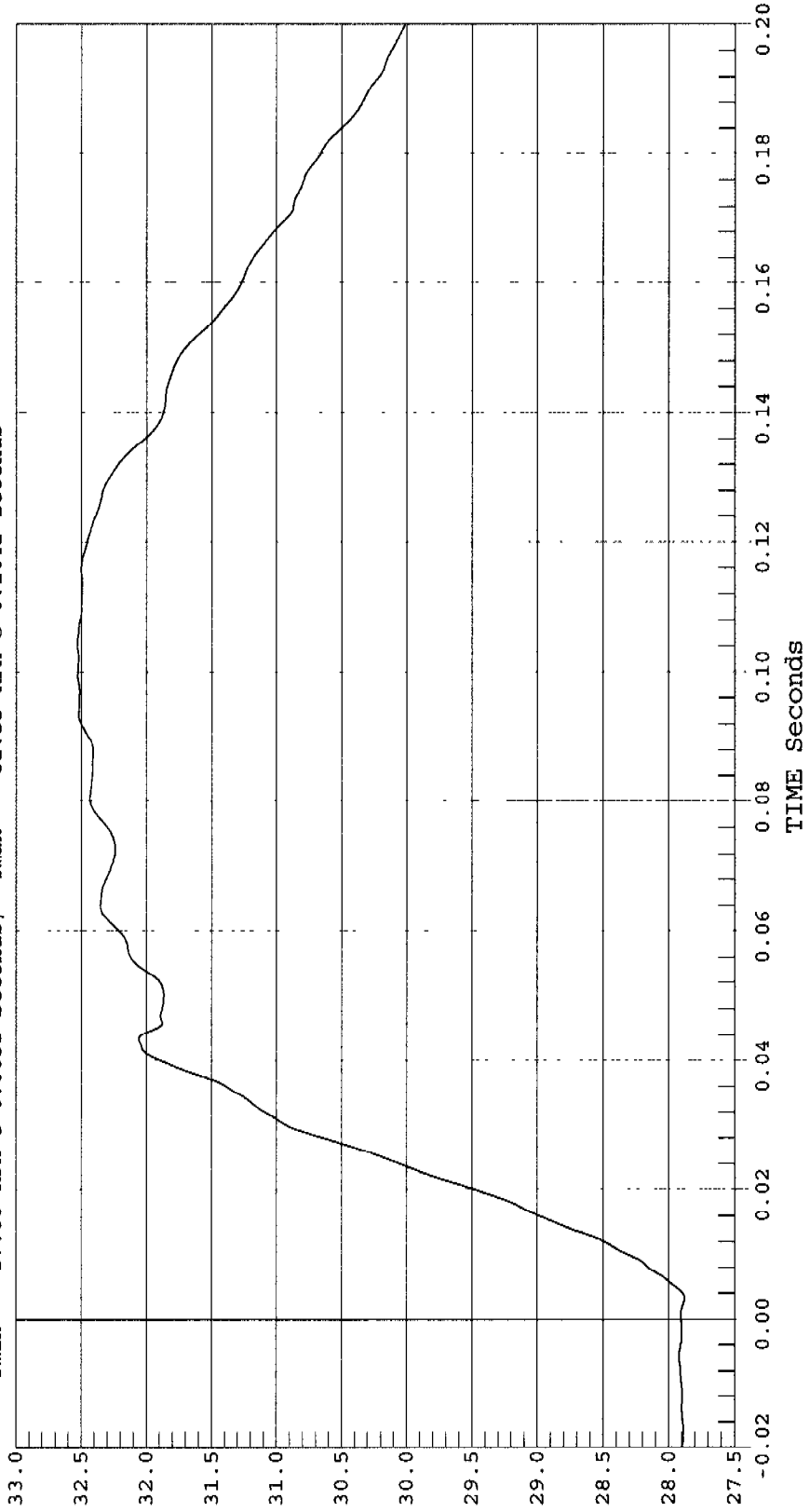
MOVING BARRIER REAR AXLE Y VELOCITY

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180



1 MOVING BARRIER REAR AXLE Y VELOCITY, C00102AI.V06

Ymin = 27.88 KPH @ 0.0032 Seconds, Ymax = 32.53 KPH @ 0.1042 Seconds



MOVING BARRIER REAR AXLE Y VELOCITY KPH

TIME Seconds

RIGHT BARRIER CONTACT

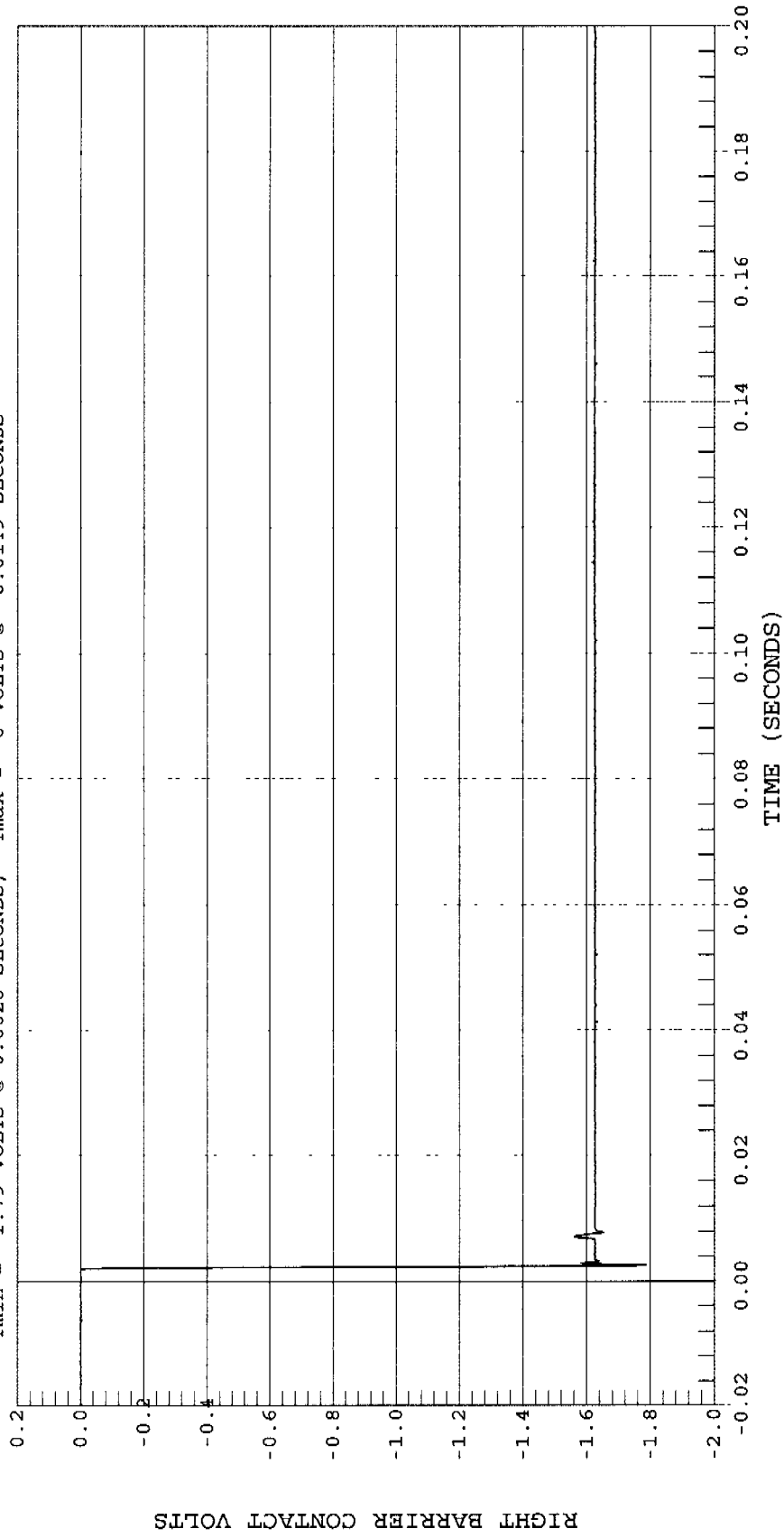
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 1000



1 RIGHT BARRIER CONTACT, C001020T.O10

Ymin = -1.79 VOLTS @ 0.0026 SECONDS, Ymax = 0 VOLTS @ -0.0149 SECONDS



DRIVER LOWER RIB REDUNDANT Y ACCELERATION

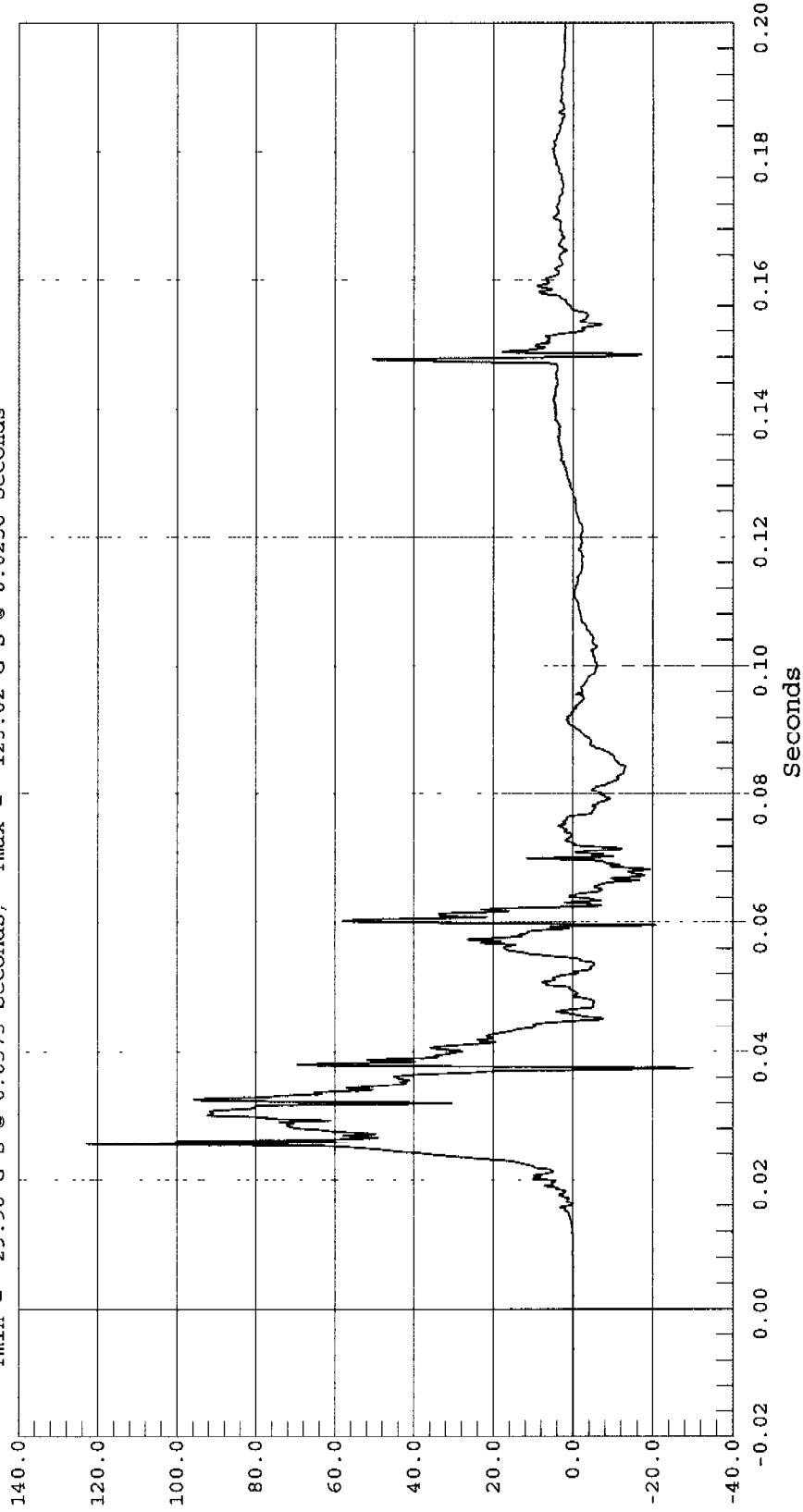
Test Date: 12-18-00
Speed: 38.2 MEH, 61.5 KPH
Filter Class: 1000

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

1 DRIVER LOWER RIB Yr, B00102AT.A42



Ymin = -29.98 G's @ 0.0375 Seconds, Ymax = 123.02 G's @ 0.0256 Seconds



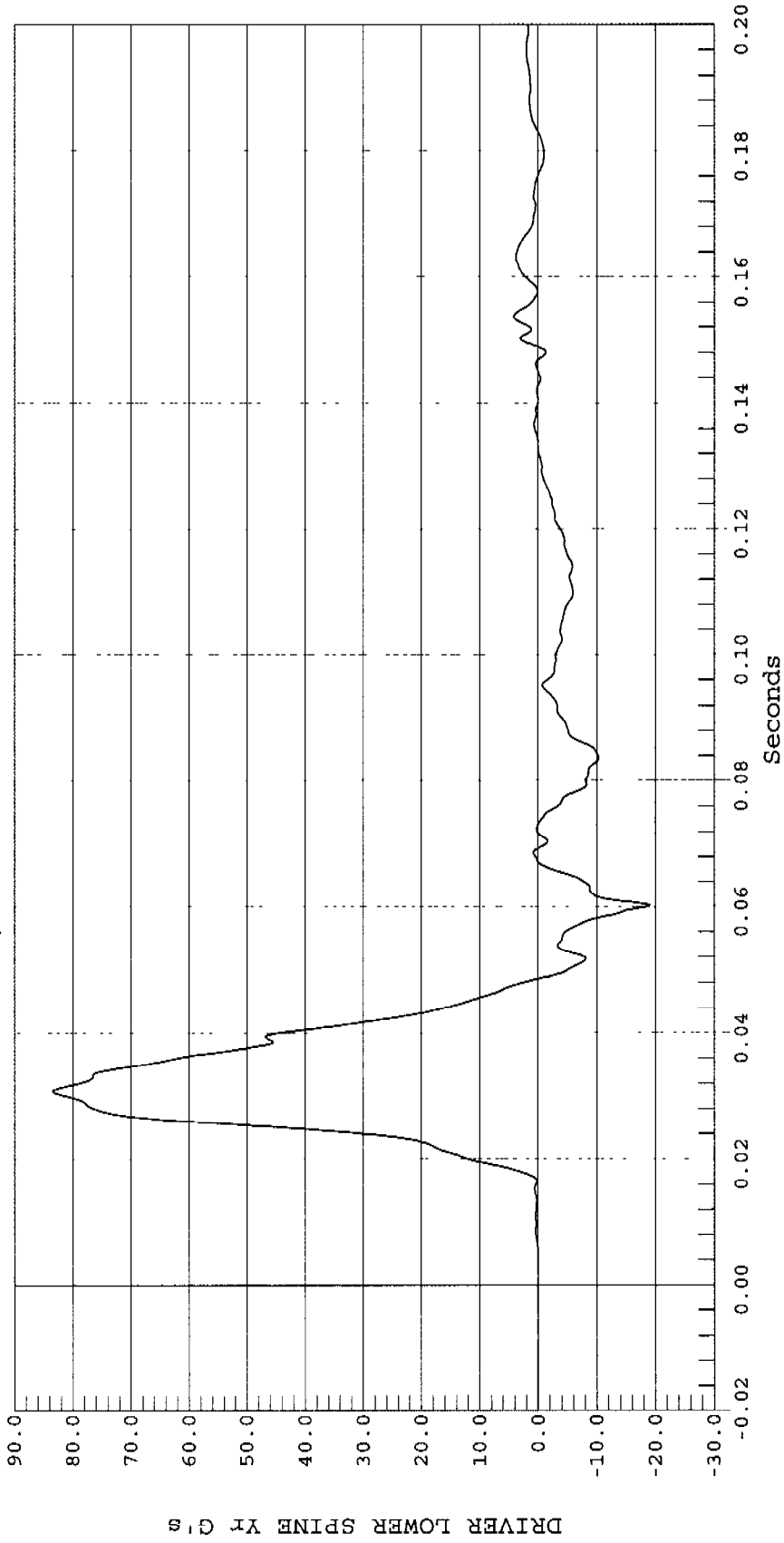


DRIVER LOWER SPINE REDUNDANT Y ACCELERATION

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180

1 DRIVER LOWER SPINE Yr, B00102AF.A43

Ymin = -19 G's @ 0.0602 Seconds, Ymax = 83.46 G's @ 0.0308 Seconds



DRIVER PELVIS REDUNDANT Y ACCELERATION

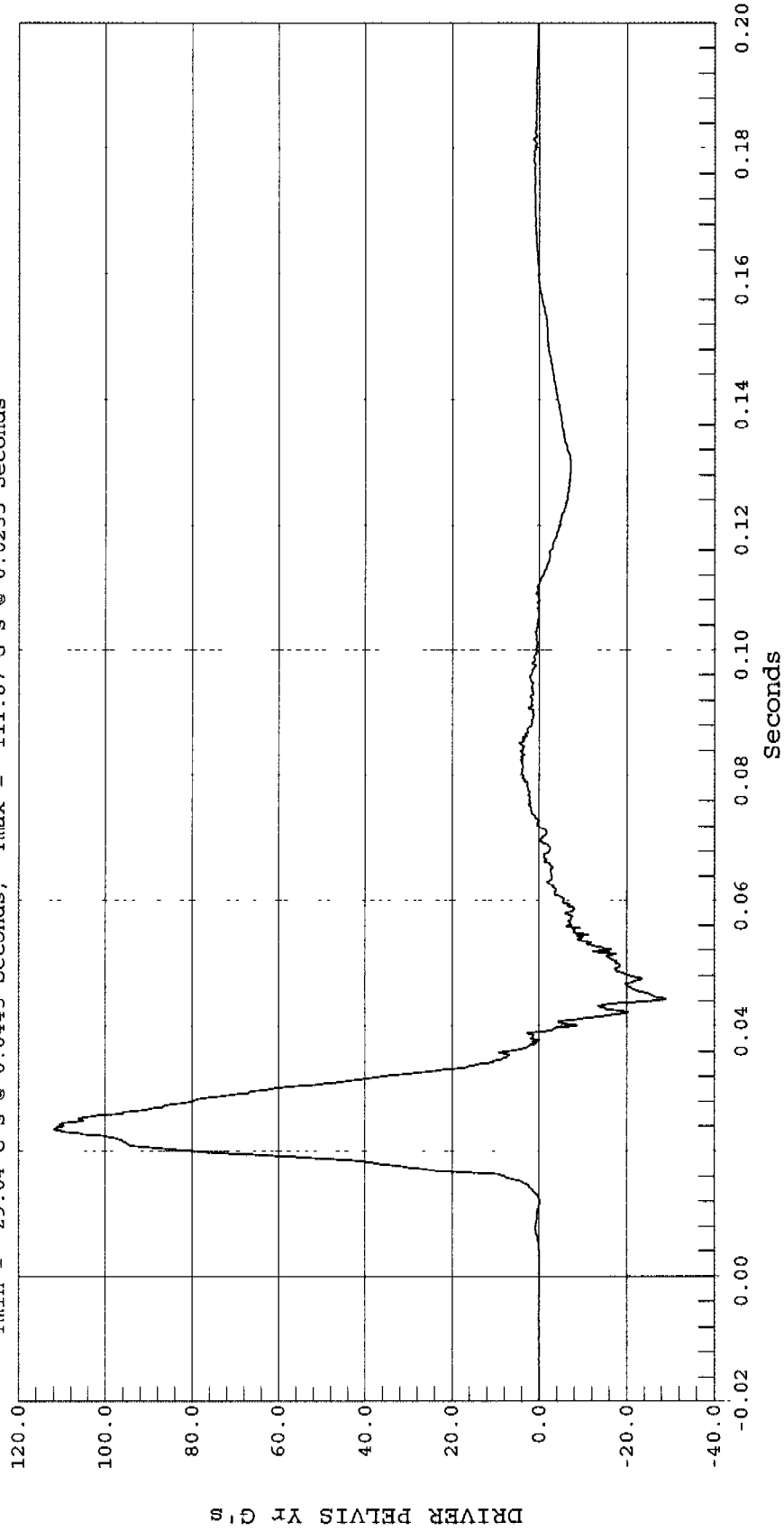
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 1000

1 DRIVER PELVIS Yr, B00102AT.A44



Ymin = -29.04 G's @ 0.0443 Seconds, Ymax = 111.87 G's @ 0.0235 Seconds

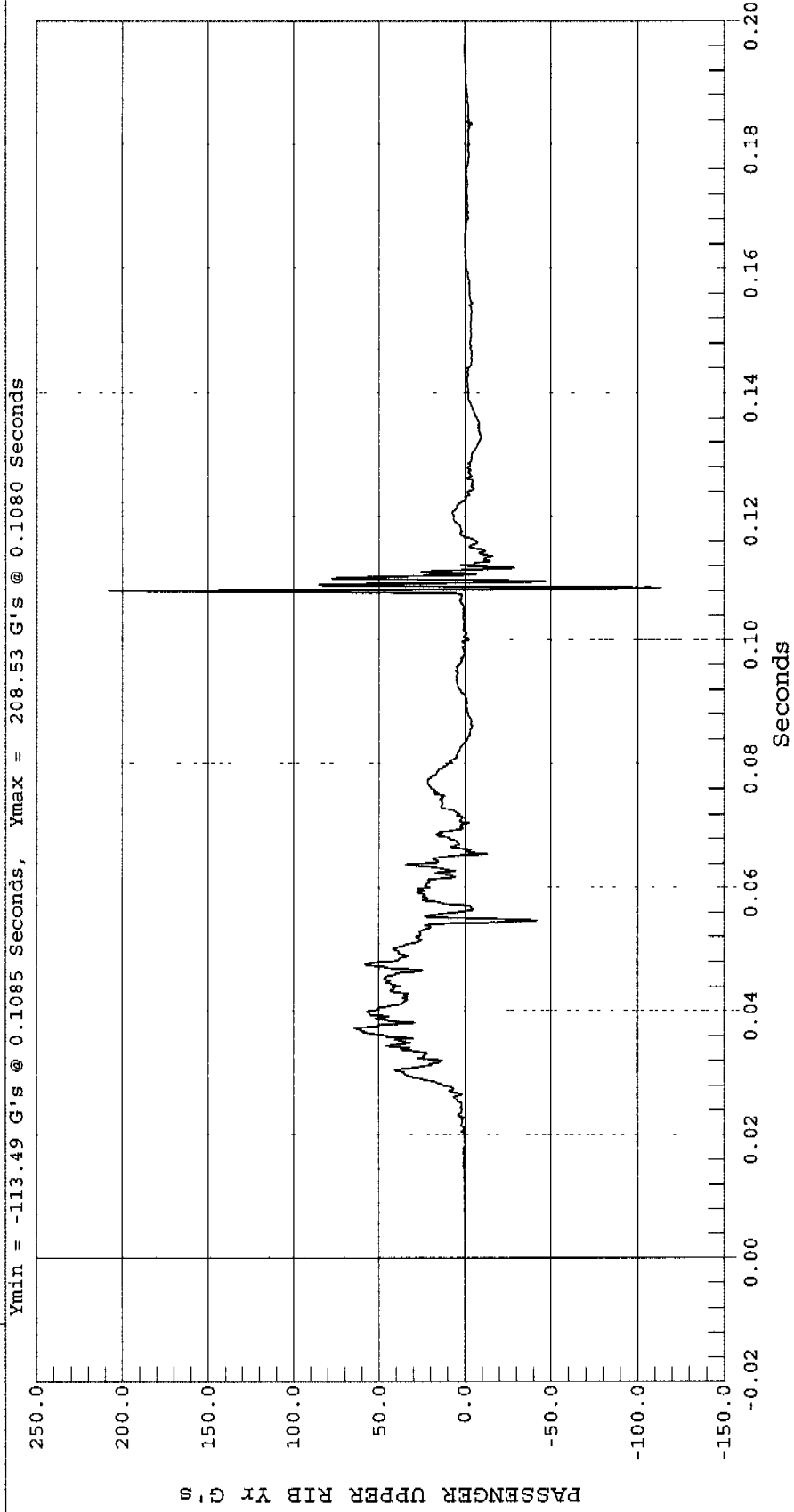




PASSENGER UPPER RIB REDUNDANT Y ACCELERATION

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 1000

1 PASSENGER UPPER RIB Yr, B00102AT.A45



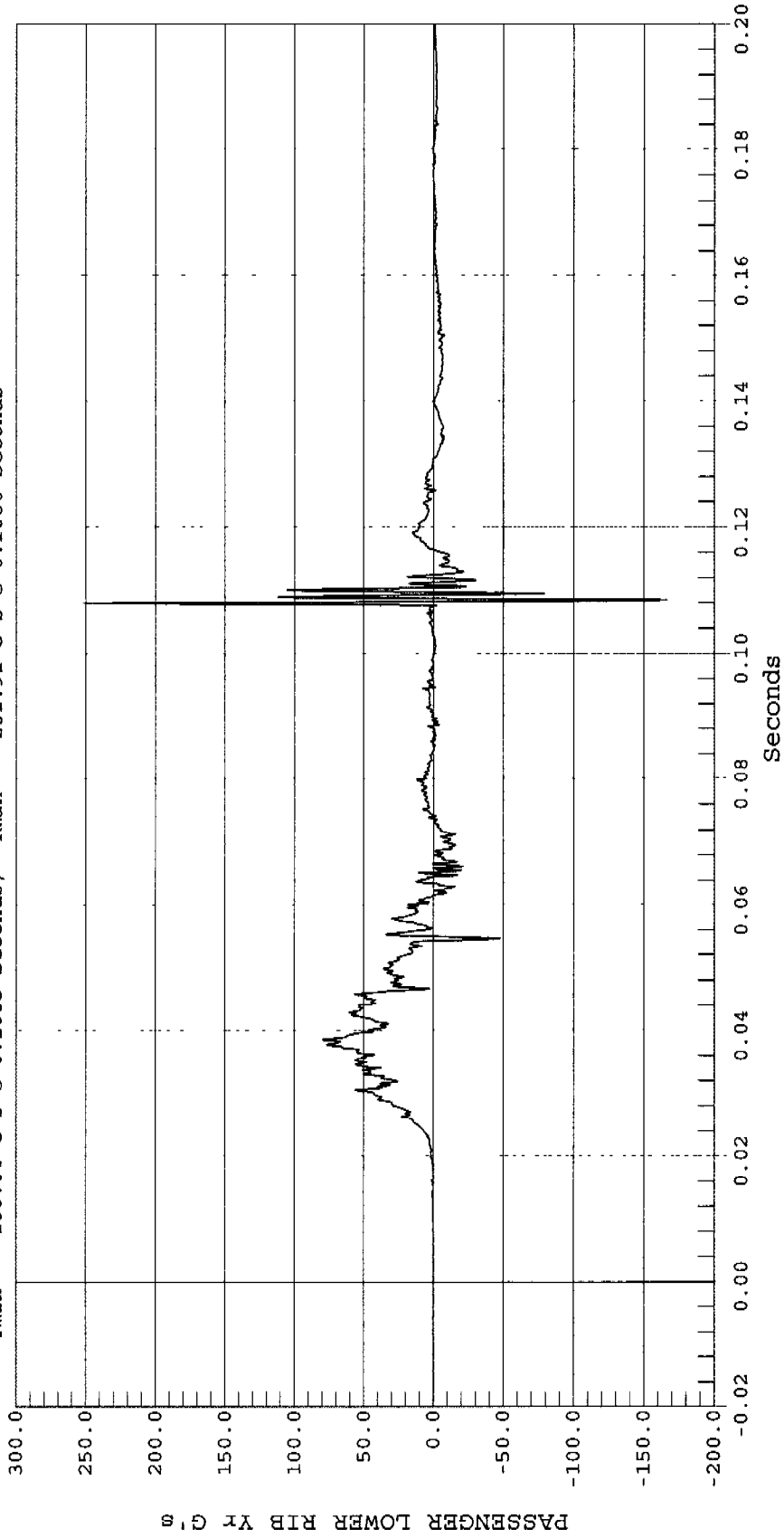
PASSENGER LOWER RIB REDUNDANT Y ACCELERATION

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECEO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 1000

1 PASSENGER LOWER RIB Yr, B00102AT.A46



Ymin = -166.64 G's @ 0.1085 Seconds, Ymax = 251.91 G's @ 0.1080 Seconds



PASSENGER LOWER SPINE REDUNDANT Y ACCELERATION

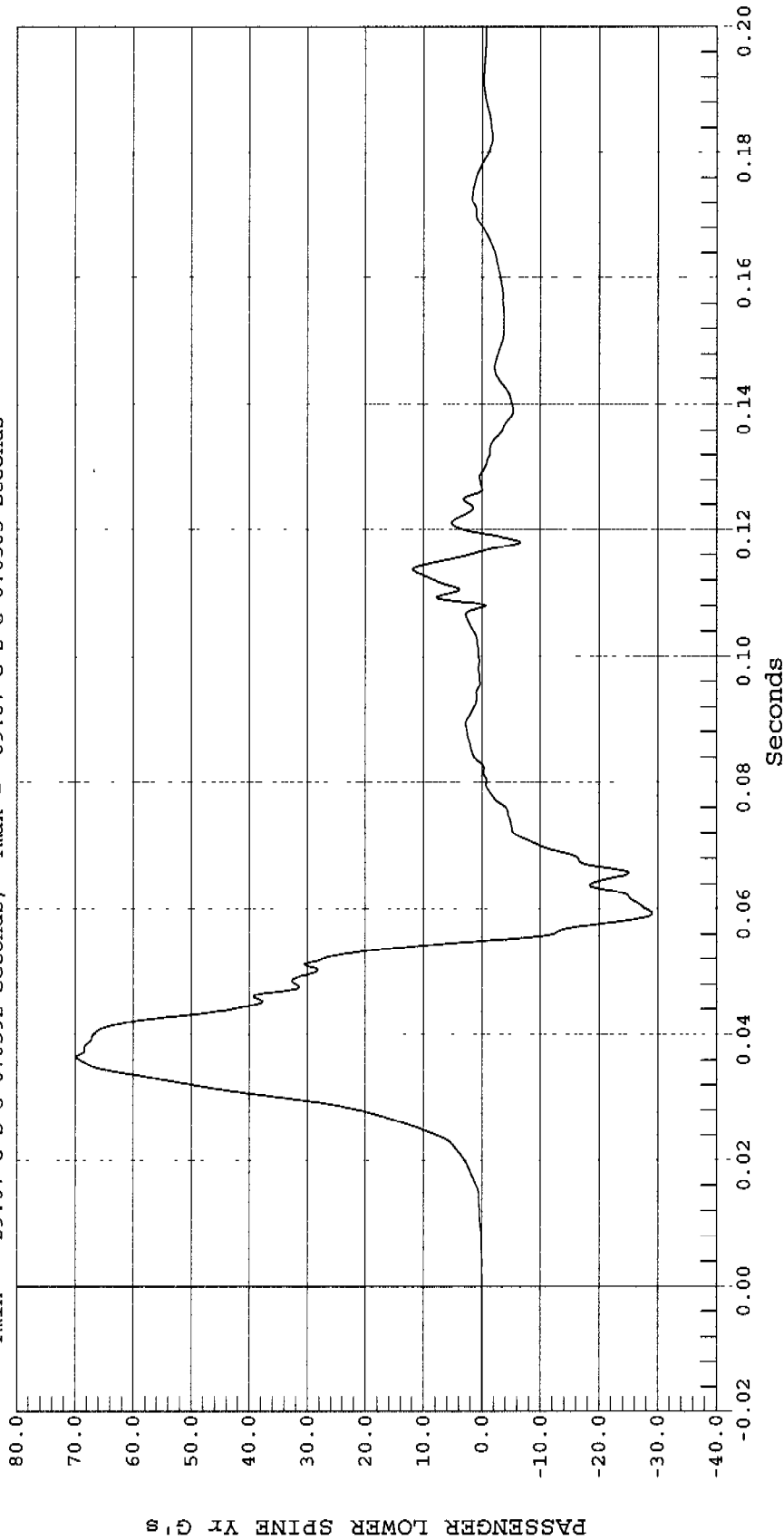
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 180

1 PASSENGER LOWER SPINE Yr, B00102AF.A47



Ymin = -29.07 G's @ 0.0592 Seconds, Ymax = 69.87 G's @ 0.0365 Seconds



PASSENGER PELVIS REDUNDANT Y ACCELERATION

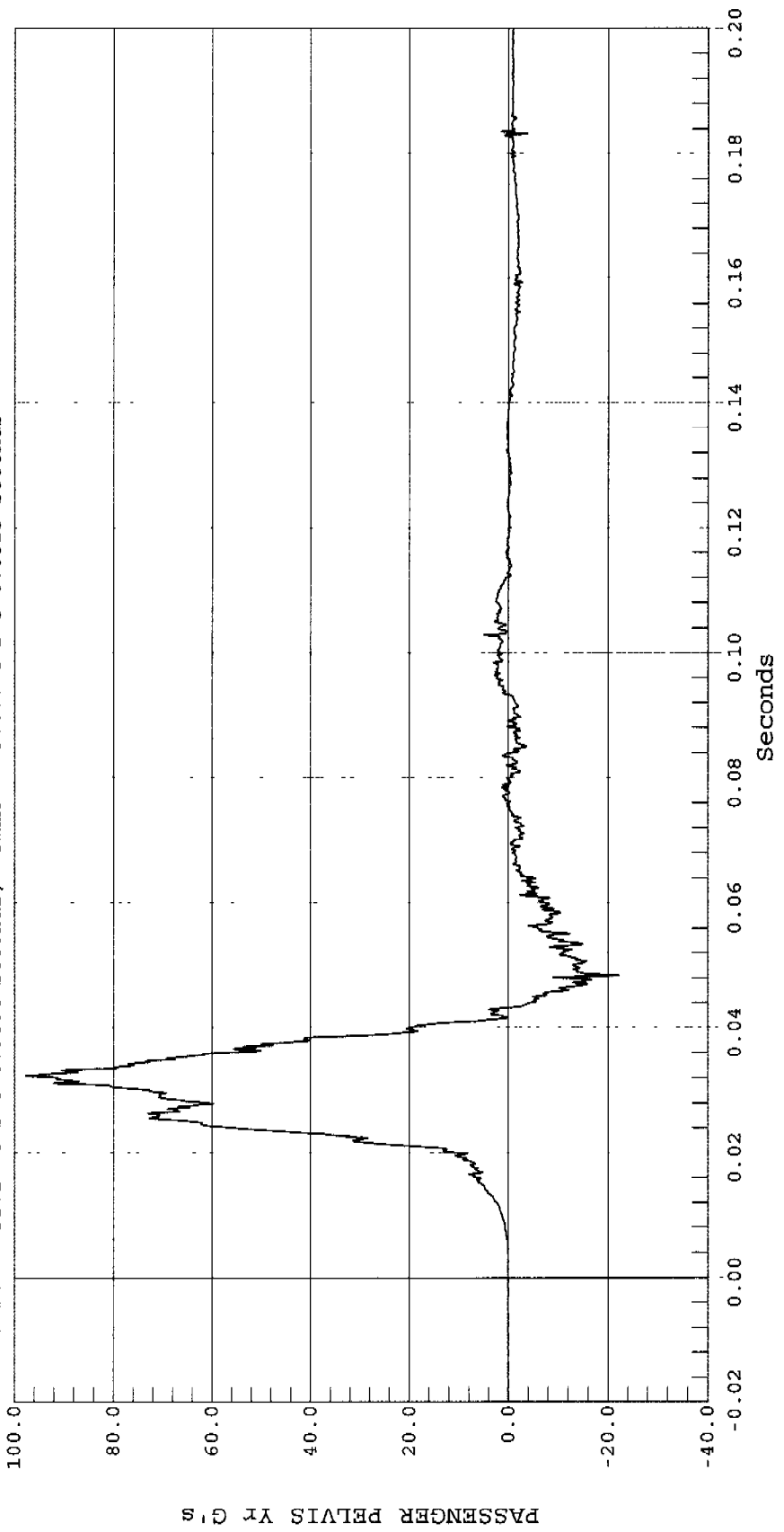
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Filter Class: 1000

1 PASSENGER PELVIS Yr, B00102AT.A48



Ymin = -22.27 G's @ 0.0484 Seconds, Ymax = 97.77 G's @ 0.0323 Seconds



DRIVER UPPER RIB Y ACCELERATION

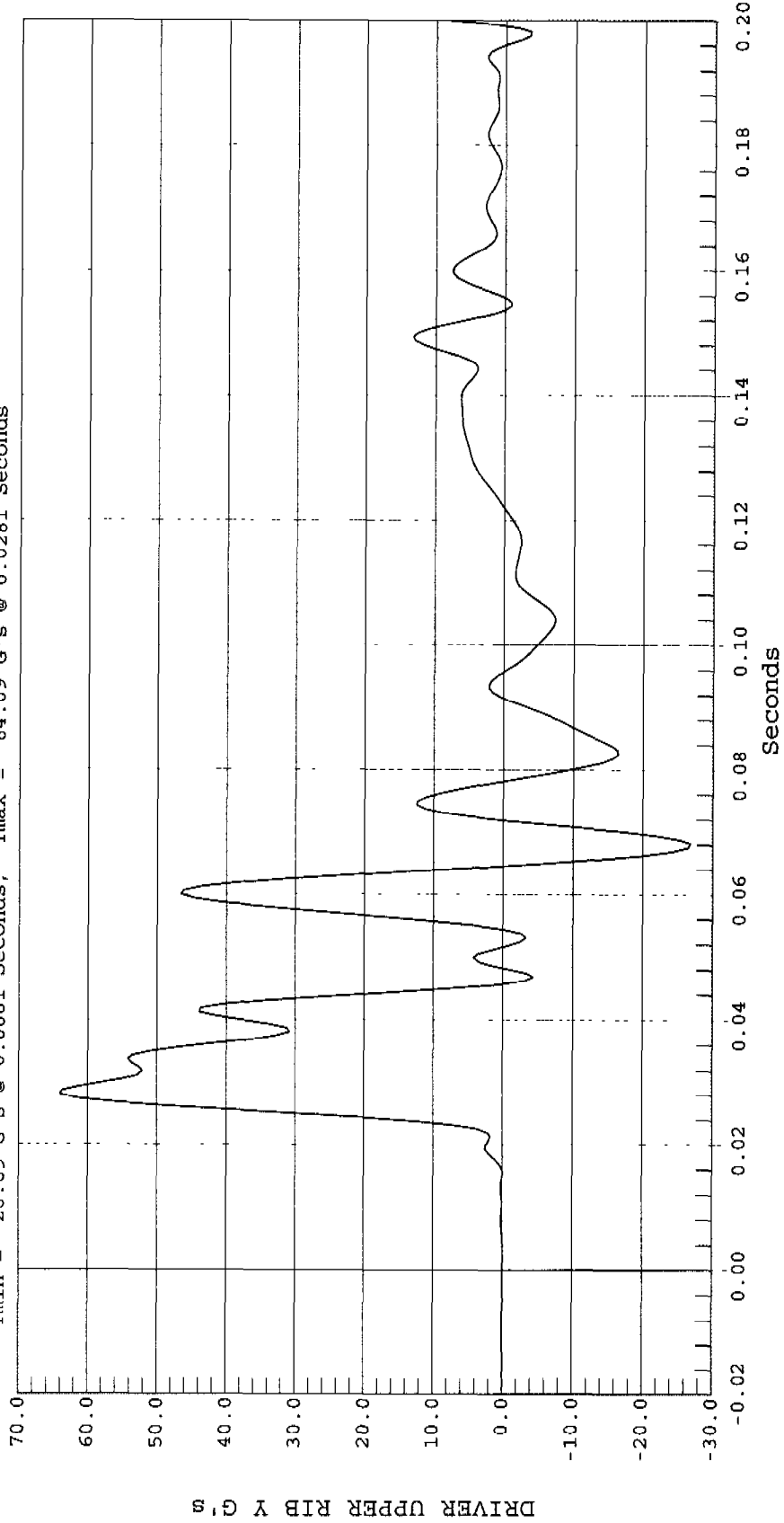
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Fir Filtered

1 DRIVER UPPER RIB Y, B00102FI.R04



Ymin = -26.89 G's @ 0.0681 Seconds, Ymax = 64.09 G's @ 0.0281 Seconds



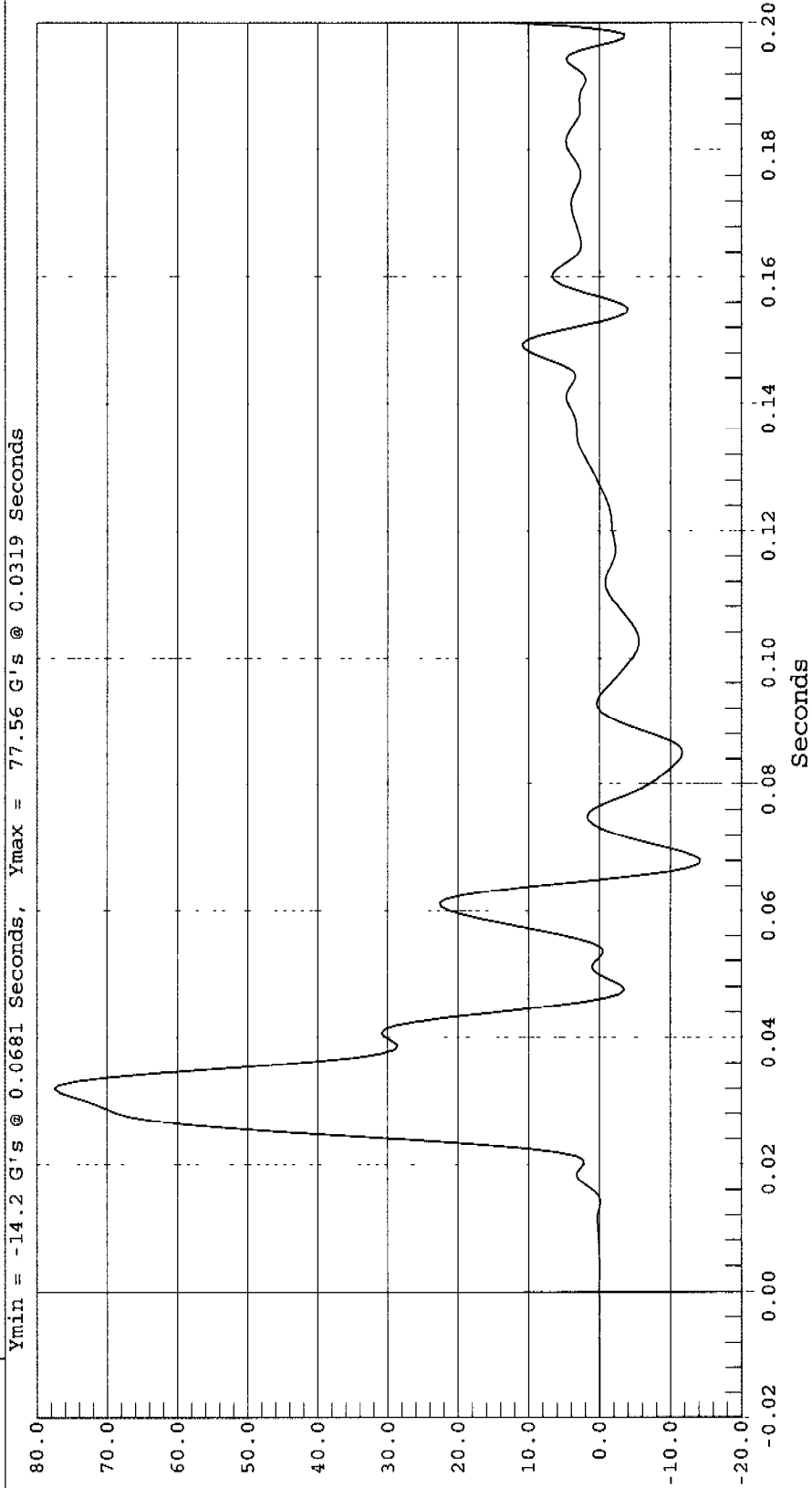


DRIVER LOWER RIB Y ACCELERATION

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Fir Filtered

1 DRIVER LOWER RIB Y, B00102FI.R05



DRIVER LOWER RIB Y G's

DRIVER LOWER SPINE Y ACCELERATION

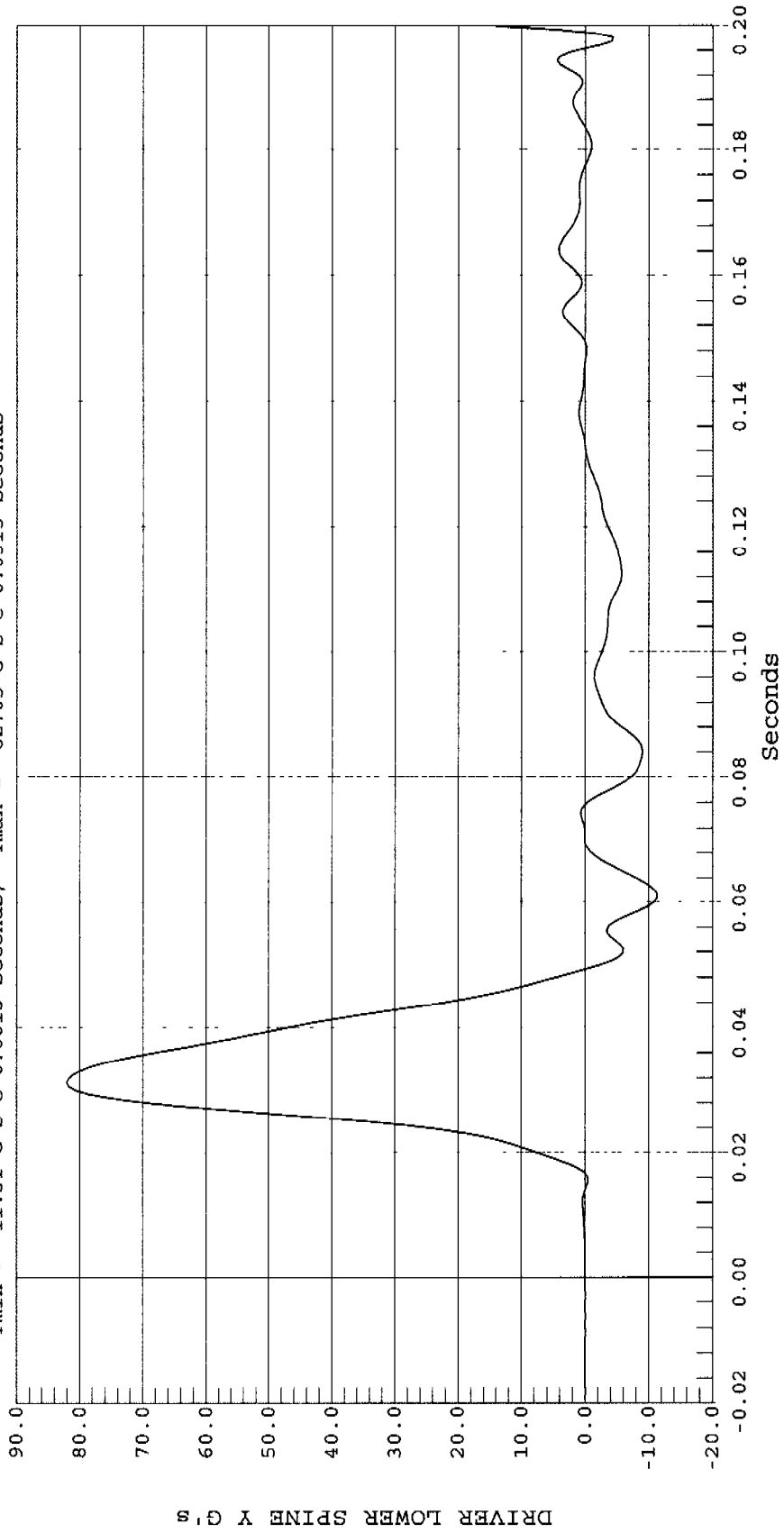
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Fir Filtered

1 DRIVER LOWER SPINE Y, B00102FI.R06



Ymin = -11.31 G's @ 0.0613 Seconds, Ymax = 82.05 G's @ 0.0313 Seconds



DRIVER LOWER SPINE Y G's



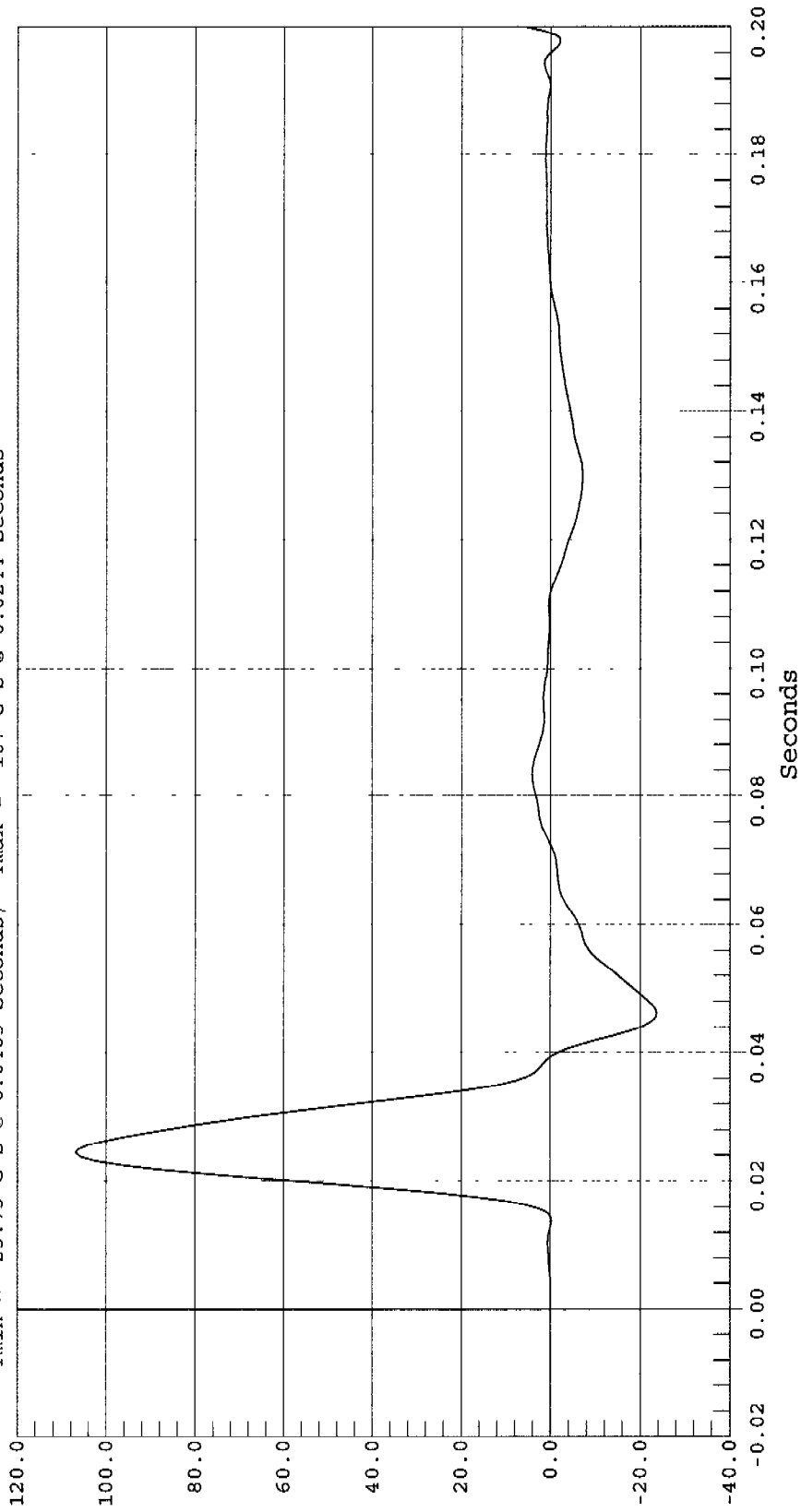
DRIVER PELVIS Y ACCELERATION

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Fir Filtered

1 DRIVER PELVIS Y, B00102FI.R07

Ymin = -23.73 G's @ 0.0463 Seconds, Ymax = 107 G's @ 0.0244 Seconds



DRIVER PELVIS Y G's

Seconds

REAR PASSENGER UPPER RIB Y ACCELERATION

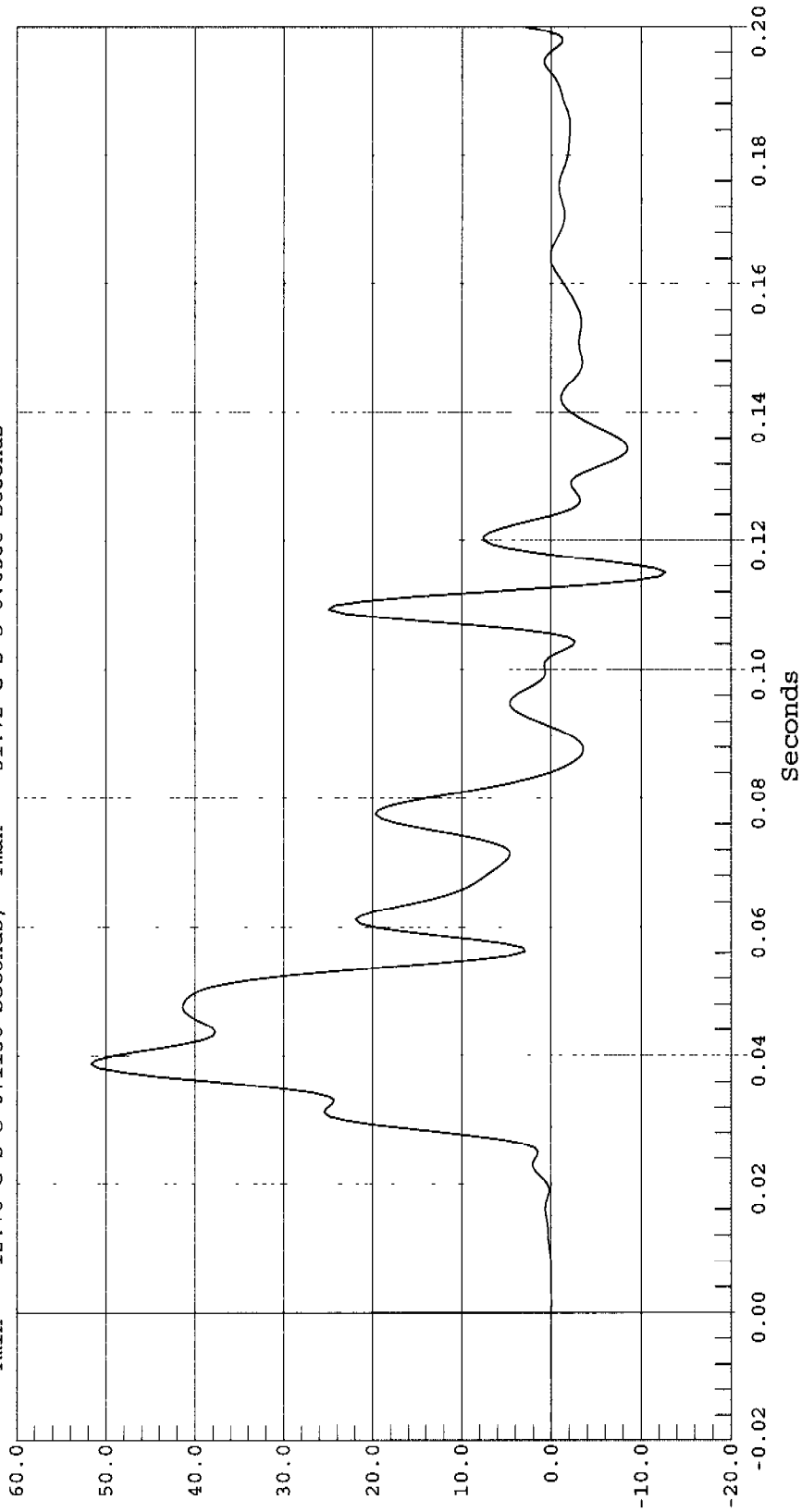
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Fir Filtered

— 1 PASSENGER UPPER RIB Y, B00102FI.R11



Ymin = -12.76 G's @ 0.1150 Seconds, Ymax = 51.72 G's @ 0.0388 Seconds



PASSENGER UPPER RIB Y G's

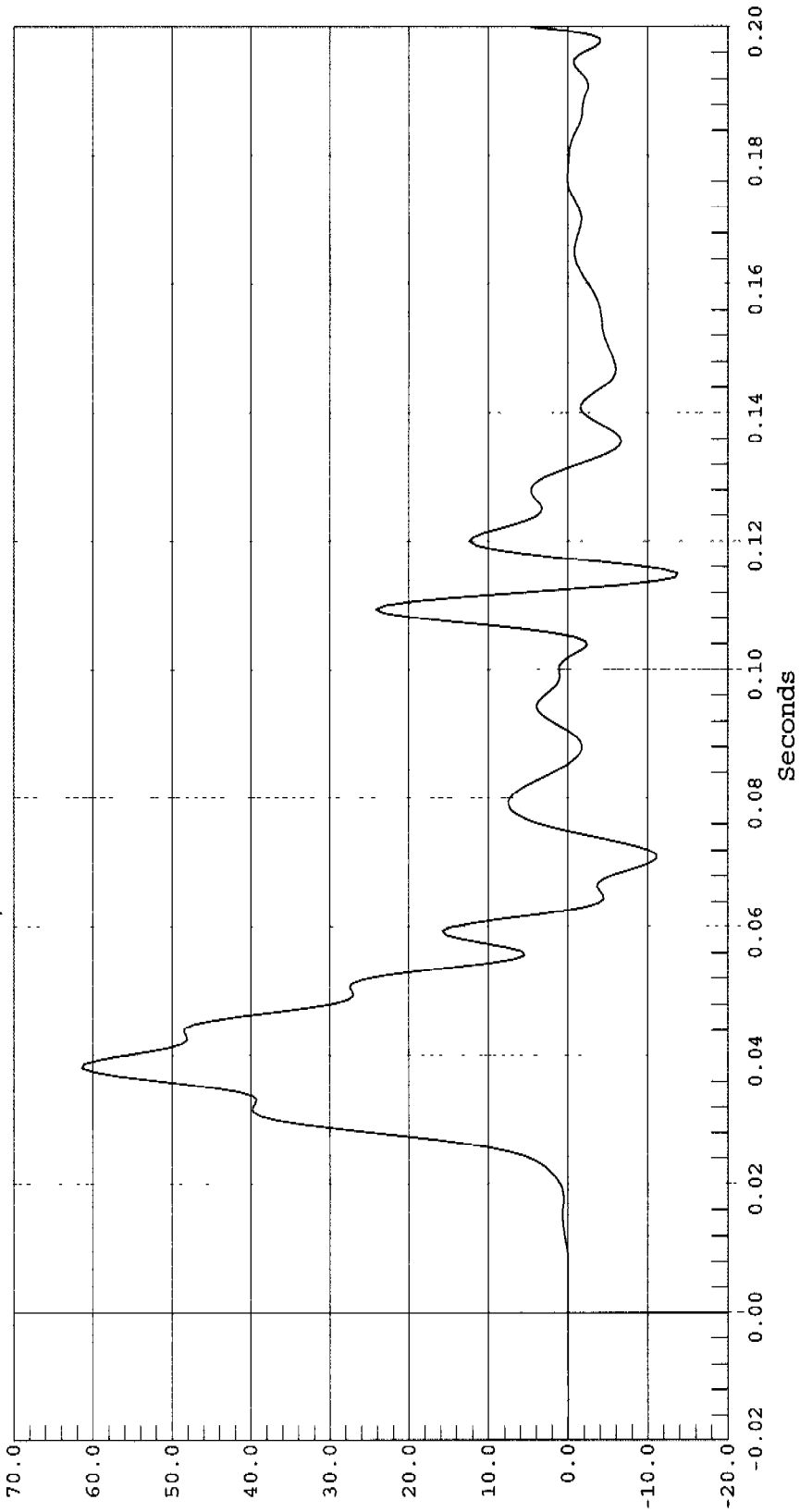


REAR PASSENGER LOWER RIB Y ACCELERATION

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Fir Filtered

1 PASSENGER LOWER RIB Y, B00102FT.R12

Ymin = -13.71 G's @ 0.1150 Seconds, Ymax = 61.44 G's @ 0.0381 Seconds



PASSENGER LOWER RIB Y G's

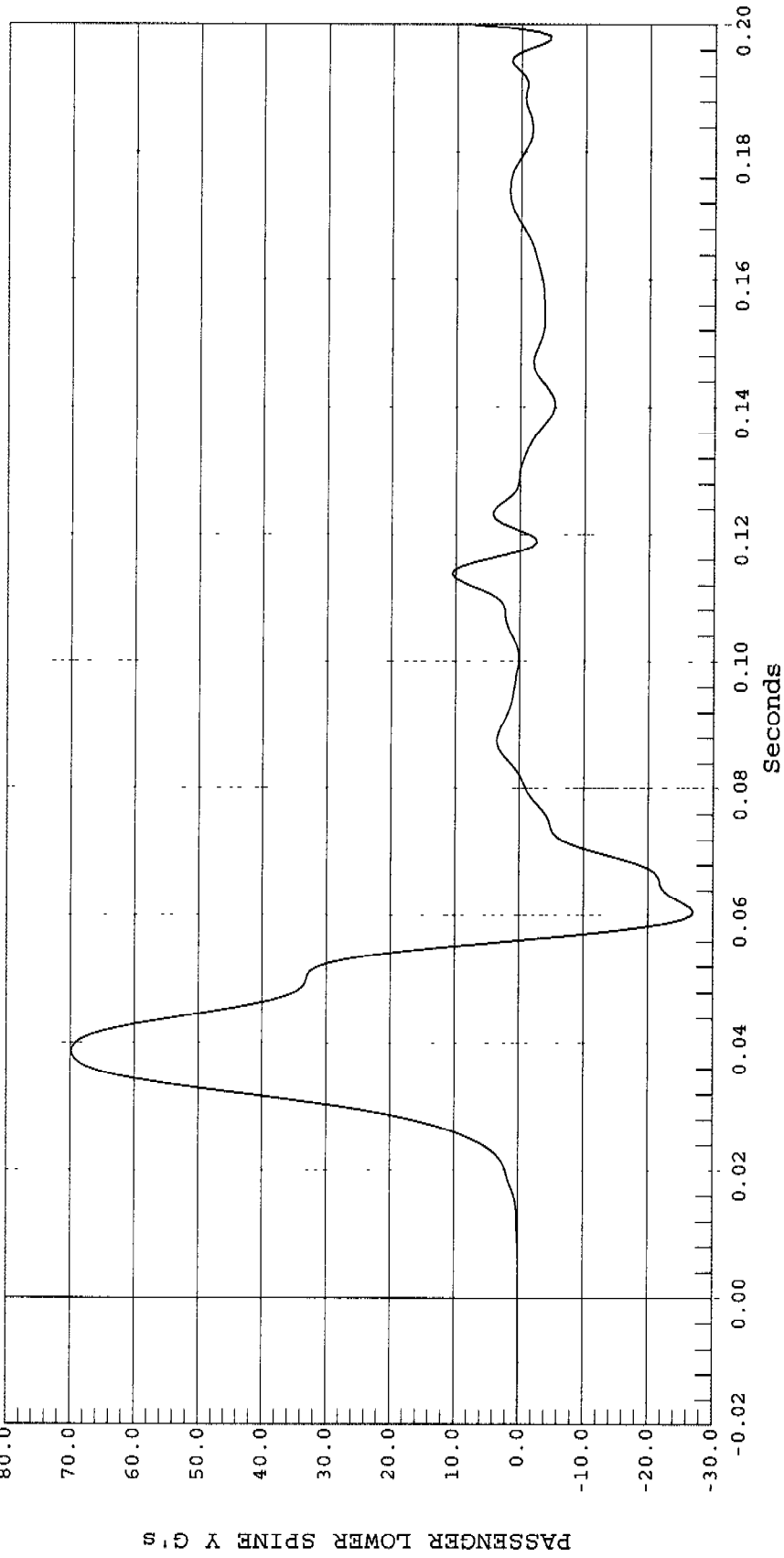
REAR PASSENGER LOWER SPINE Y ACCELERATION

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Fir Filtered



1 PASSENGER LOWER SPINE Y, B00102FI.R13

Ymin = -26.93 G's @ 0.0606 Seconds, Ymax = 69.86 G's @ 0.0388 Seconds



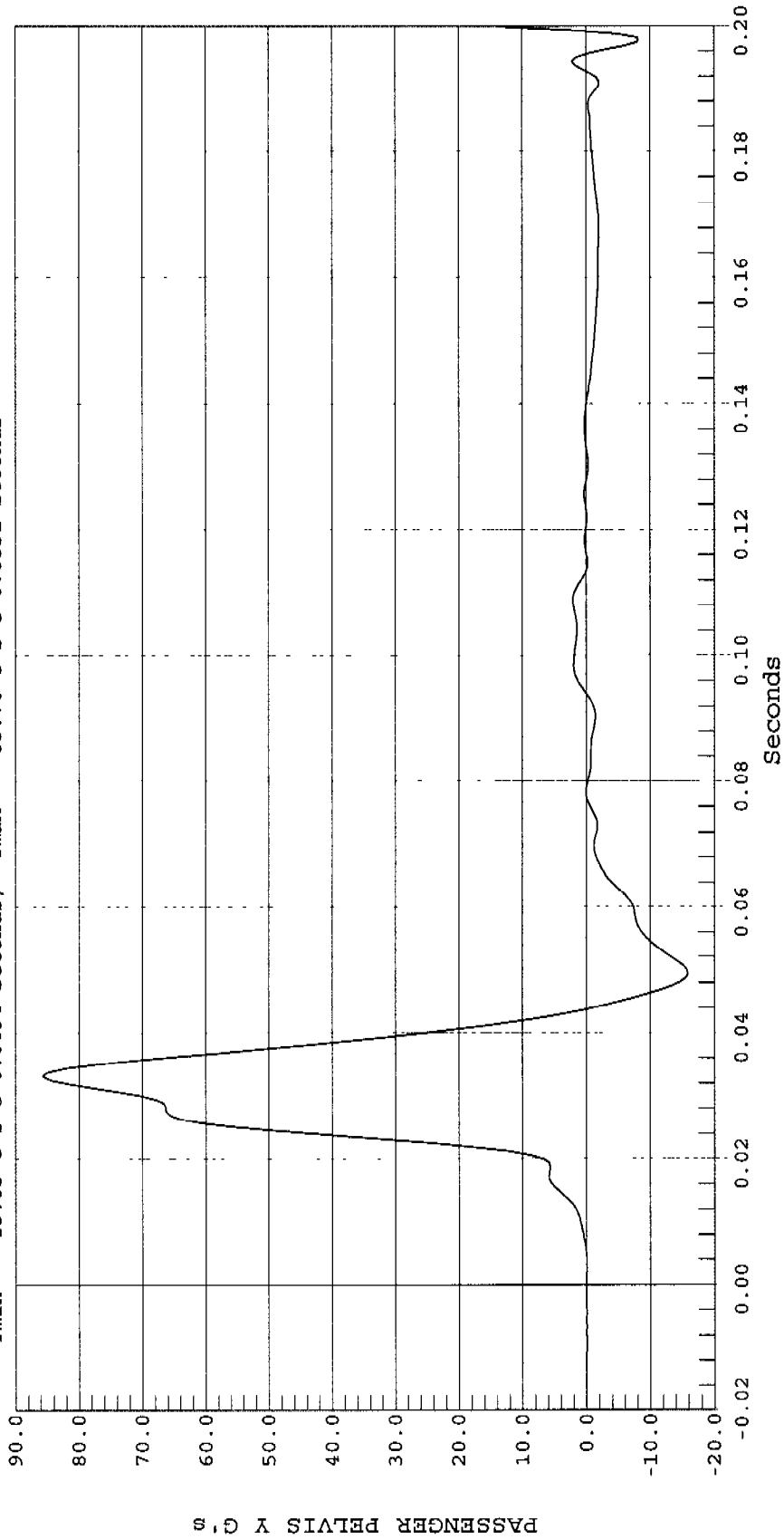


REAR PASSENGER PELVIS Y ACCELERATION

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Fir Filtered

1 PASSENGER PELVIS Y, B00102FI.R14

Ymin = -15.85 G's @ 0.0494 Seconds, Ymax = 85.76 G's @ 0.0331 Seconds



DRIVER UPPER RIB REDUNDANT Y ACCELERATION
NO VALID DATA COLLECTED

DRIVER LOWER RIB REDUNDANT Y VELOCITY

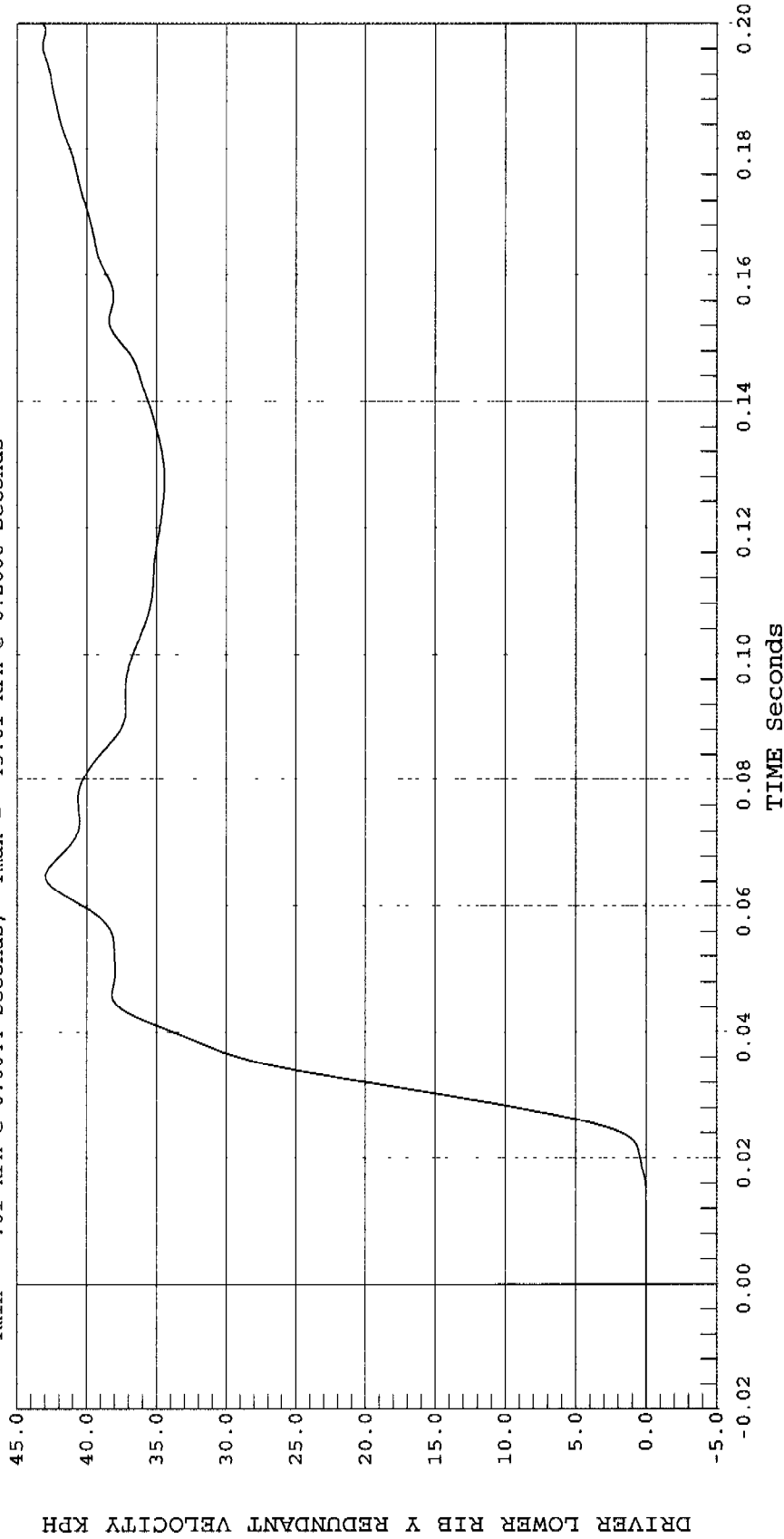
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Fir Filtered



1 DRIVER LOWER RIB Y REDUNDANT VELOCITY, B00102FI.V42

Ymin = -.01 KPH @ 0.0044 Seconds, Ymax = 43.61 KPH @ 0.2006 Seconds





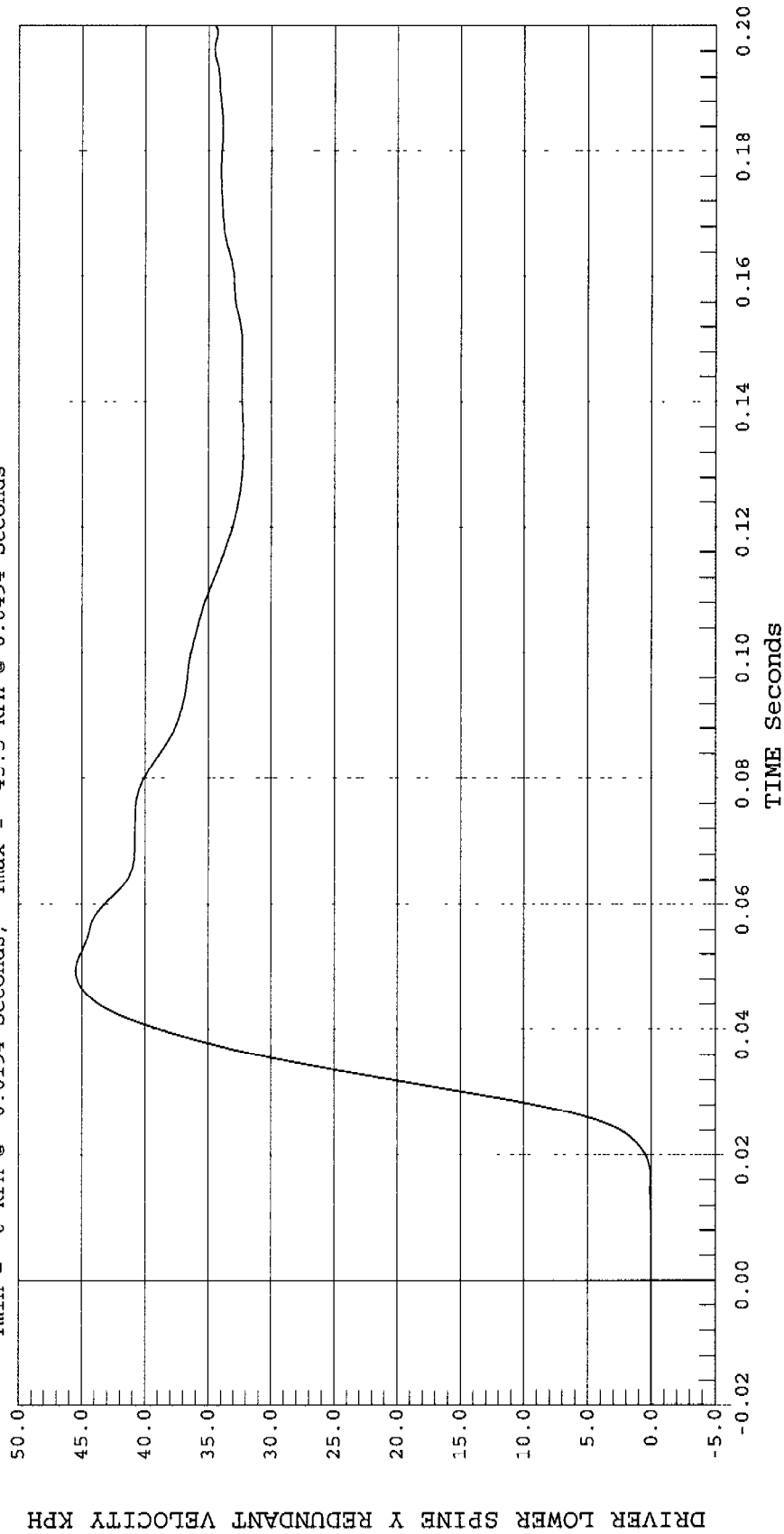
DRIVER LOWER SPINE REDUNDANT Y VELOCITY

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Fir Filtered

1 DRIVER LOWER SPINE Y REDUNDANT VELOCITY, B00102FI.V43

Ymin = 0 KPH @ -0.0194 Seconds, Ymax = 45.5 KPH @ 0.0494 Seconds



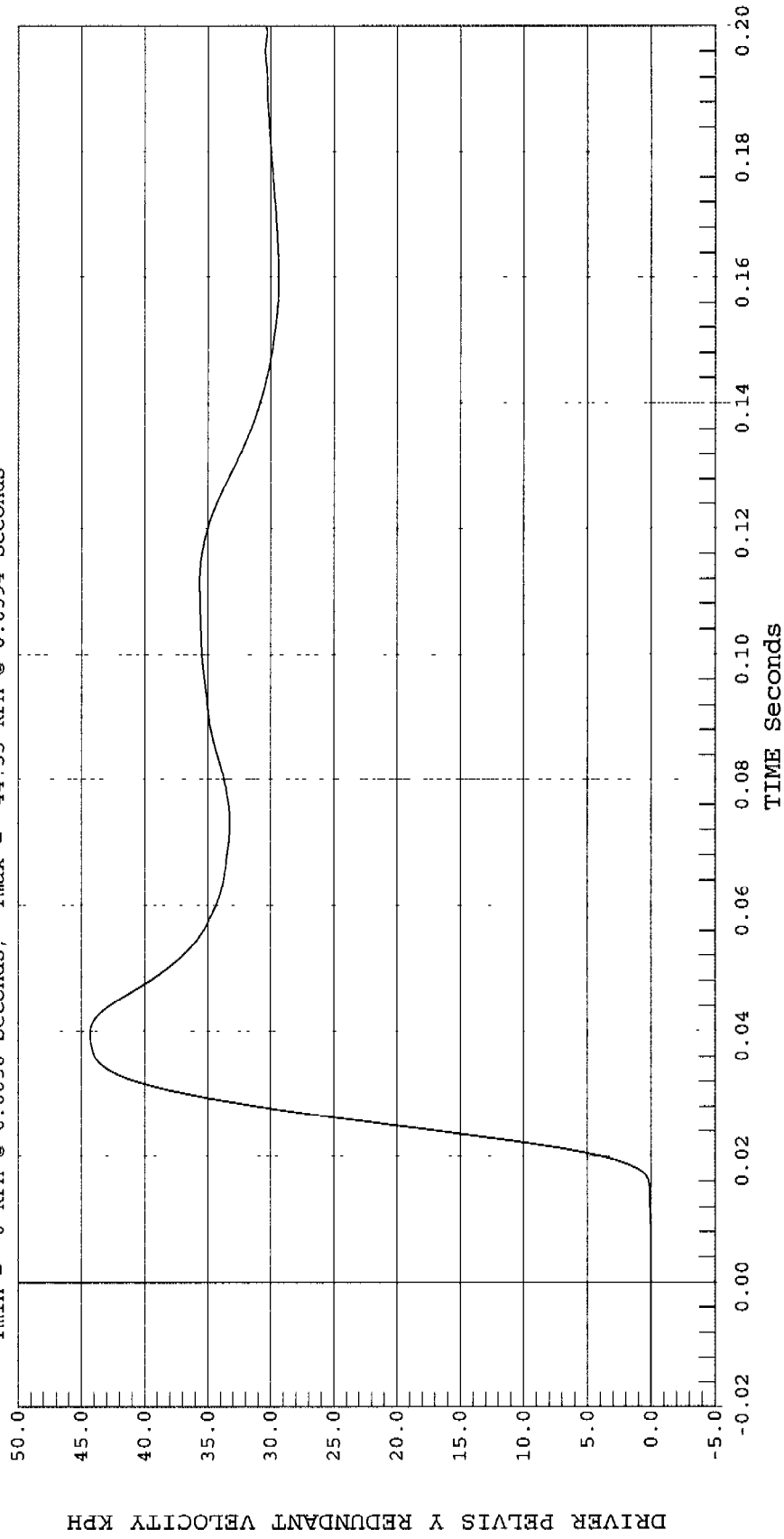
DRIVER PELVIS REDUNDANT Y VELOCITY

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Fir Filtered



1 DRIVER PELVIS Y REDUNDANT VELOCITY, B00102FI.V44

Ymin = 0 KPH @ 0.0038 Seconds, Ymax = 44.33 KPH @ 0.0394 Seconds



REAR PASSENGER UPPER RIB REDUNDANT Y VELOCITY

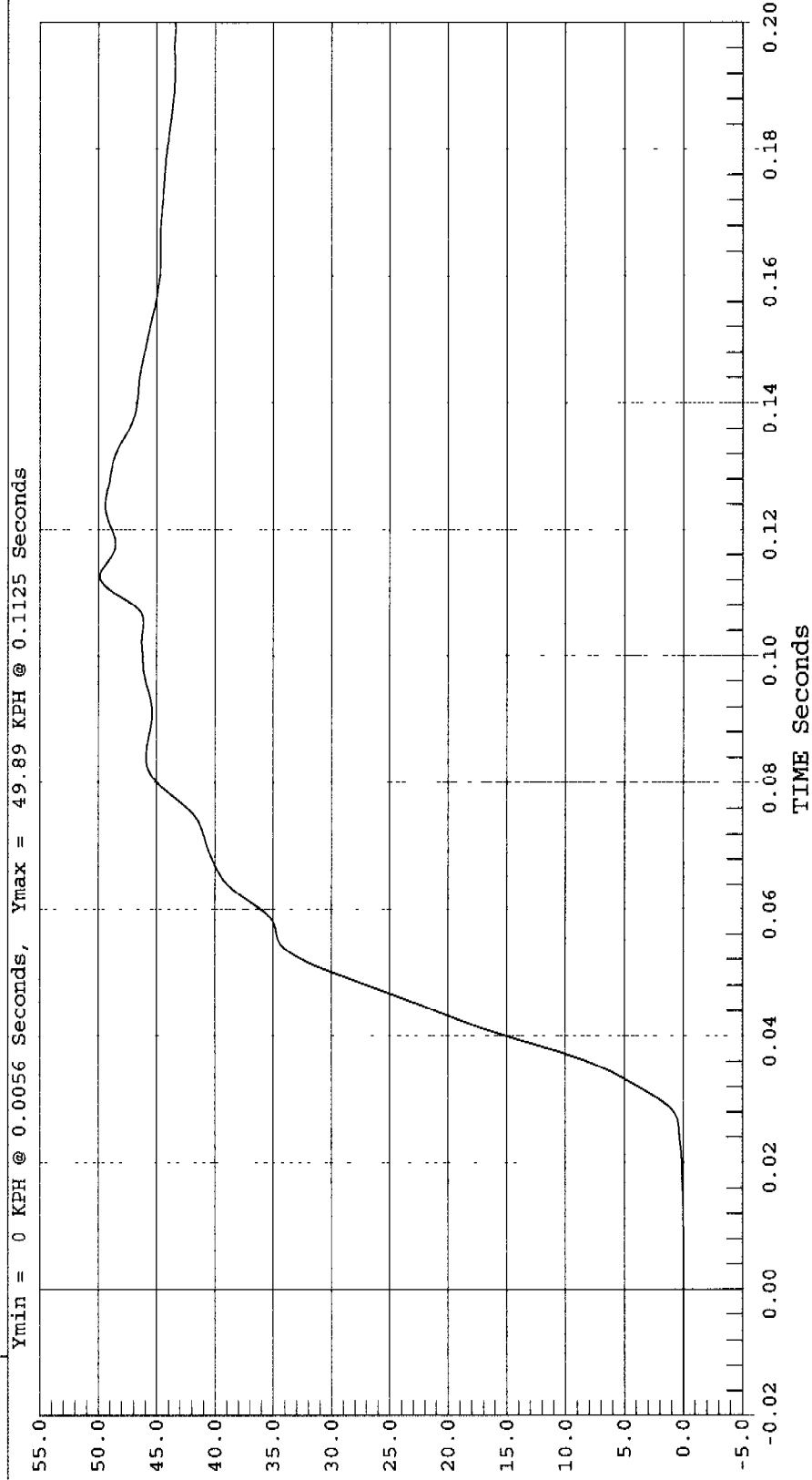
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Fir Filtered

1 REAR PASSENGER UPPER RIB Y REDUNDANT VELOCITY, B00102FI.V45



REAR PASSENGER UPPER RIB Y REDUNDANT VELOCITY KPH



REAR PASSENGER LOWER RIB REDUNDANT Y VELOCITY

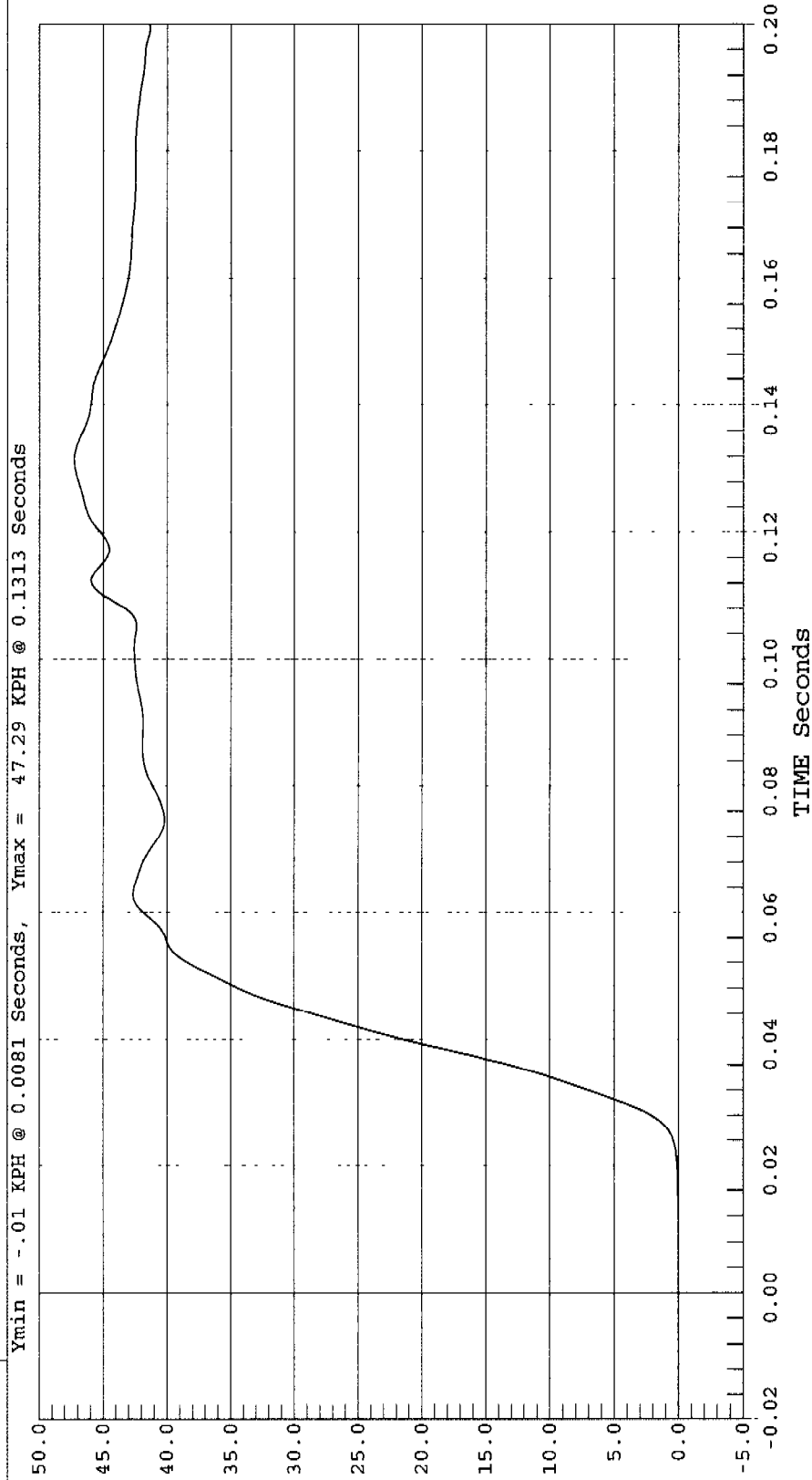
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Fir Filtered

1 REAR PASSENGER LOWER RIB Y REDUNDANT VELOCITY, B00102FI.V46



REAR PASSENGER LOWER RIB Y REDUNDANT VELOCITY KPH



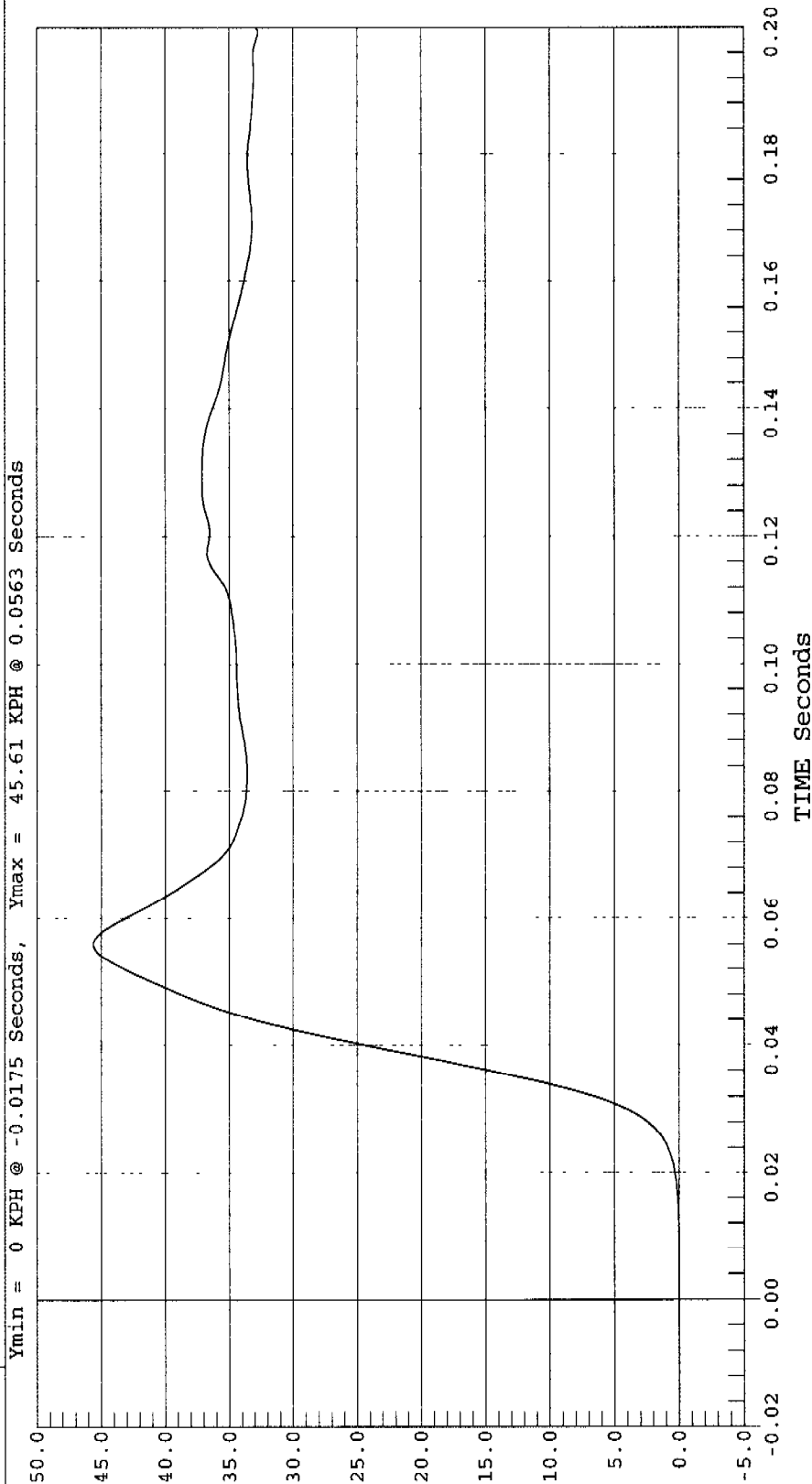
REAR PASSENGER LOWER SPINE REDUNDANT Y VELOCITY

Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:
Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Fir Filtered



1 REAR PASSENGER LOWER SPINE Y REDUNDANT VELOCITY, B00102FI.V47

REAR PASSENGER LOWER SPINE Y REDUNDANT VELOCITY KPH



REAR PASSENGER PELVIS REDUNDANT Y VELOCITY

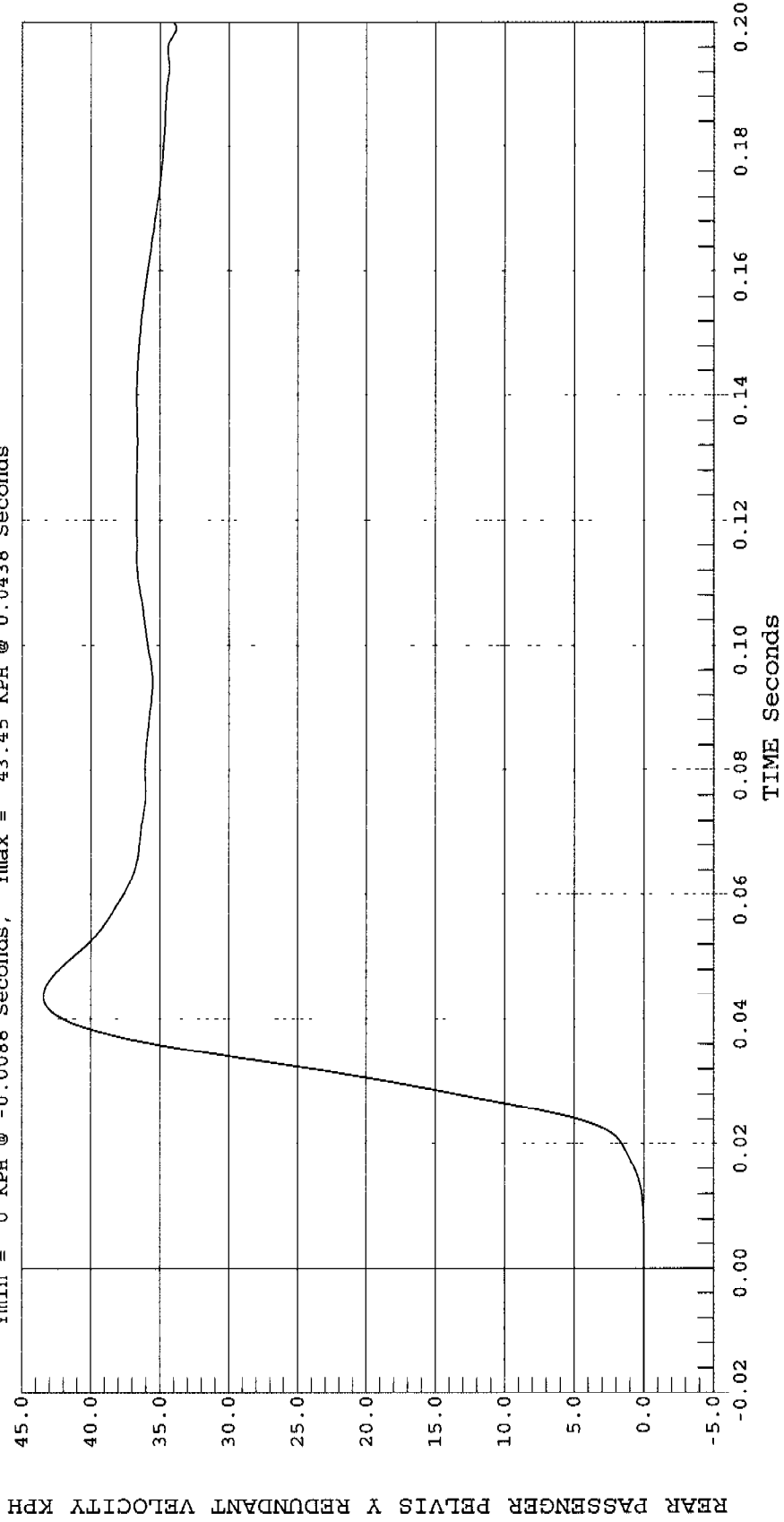
Test Desc.: INDICANT 90 DEG. SIDE IMPACT
Component: 2001 TOYOTA ECHO 4 DOOR (C15101)
Other Info:

Test Date: 12-18-00
Speed: 38.2 MPH, 61.5 KPH
Fir Filtered



1 REAR PASSENGER PELVIS Y REDUNDANT VELOCITY, B00102FI.V48

Ymin = 0 KPH @ -0.0088 Seconds, Ymax = 43.45 KPH @ 0.0438 Seconds



REAR PASSENGER PELVIS Y REDUNDANT VELOCITY KPH

APPENDIX C

SID CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION DATA SUMMARY
 SIDE IMPACT DUMMY (SID)
 CONFIGURED TO LEFT/RIGHT SIDE IMPACT

Report Date: 1/5/01

Technician: Tim Michnay

Calibration Date: 12/6/00 - 12/7/00

Test No.: D00152/D00153

Test Parameter	Specification	Dummy Serial Number: 036		Dummy Serial Number: 037	
		Pre-Test	Post-Test	Pre-Test	Post-Test
SH-Seated Height (mm)	889 – 909	901	901	901	901
RH-Rib Height (mm)	501 – 521	505	505	511	511
HP-Hip Pivot Height (mm)	99 ref.	99	99	99	99
RD-Rib from Back Line (mm)	229 – 241	234	234	236	236
KV-Knee Pivot from Back Line (mm)	511 – 526	520	520	520	520
SW-Knee Pivot to Floor (mm)	490 – 505	496	496	494	494
HW-Hip Width (mm)	356 - 391	372	372	380	380
Thorax Impact					
Temperature (°C)	18.9 – 25.5	20.0°	21.5°	21.1°	21.4°
Relative Humidity (%)	10 – 70	22%	22%	26%	22%
Probe Speed (m/s)	4.27 – 4.33	4.27	4.28	4.27	4.29
Upper Rib (g's)	37 – 46	46	43	45	42
Lower Rib (g's)	37 – 46	46	45	46	46
Lower Spine (g's)	15 – 22	20	20	21	20
Pelvis Impact					
Temperature (°C)	18.9 – 25.5	20.0°	21.5°	21.1°	21.4°
Relative Humidity (%)	10 – 70	22%	22%	26%	22%
Probe Speed (m/s)	4.27 – 4.33	4.28	4.28	4.29	4.30
Pelvis (g's)	40 - 60	40	46	45	47

REMARKS:

CERTIFICATION DATA

Dummy Serial Number: 036

Calibration Test Results Summary

Dummy Serial Number: 036

Pre-Test Calibration

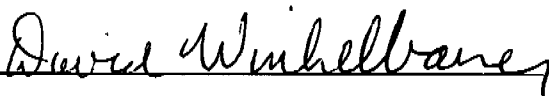
External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Dummy Serial Number: 036
Date of Verification: 12/6/00
Test Number: D00152

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH-Seated Height (mm)	889 – 909	901
RH-Rib Height (mm)	501 – 521	505
HP-Hip Pivot Height (mm)	99 ref.	99
RD-Rib From Back Line (mm)	229 - 241	234
KV-Knee Pivot From Back Line (mm)	511 – 526	520
SW-Knee Pivot to Floor (mm)	490 – 505	496
HW – Hip Width (mm)	356 – 391	372

Technician: 

Approved By: 

MGA RESEARCH CORPORATION
 THORACIC SHOCK ABSORBER TEST
 SIDE IMPACT DUMMY (SID)

Date: 12/5/00
 Dummy Serial Number: 036
 Test Number: D001526/7/8

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature (°C)		18.9 – 25.5	21.0
Relative Humidity (%)		10 – 70	22%
Velocity 3.05 m/s	Force (N)	836 – 1125	854
	Displacement (mm)	30 – 35	31
Velocity 4.27 m/s	Force (N)	1730 – 2099	1794
	Displacement (mm)	32 – 37	35
Velocity 6.1 m/s	Force (N)	3741 – 4448	3772
	Displacement (mm)	33 – 40	37

TEST MEETS SPECIFICATIONS

Technician: 

Approved By: 

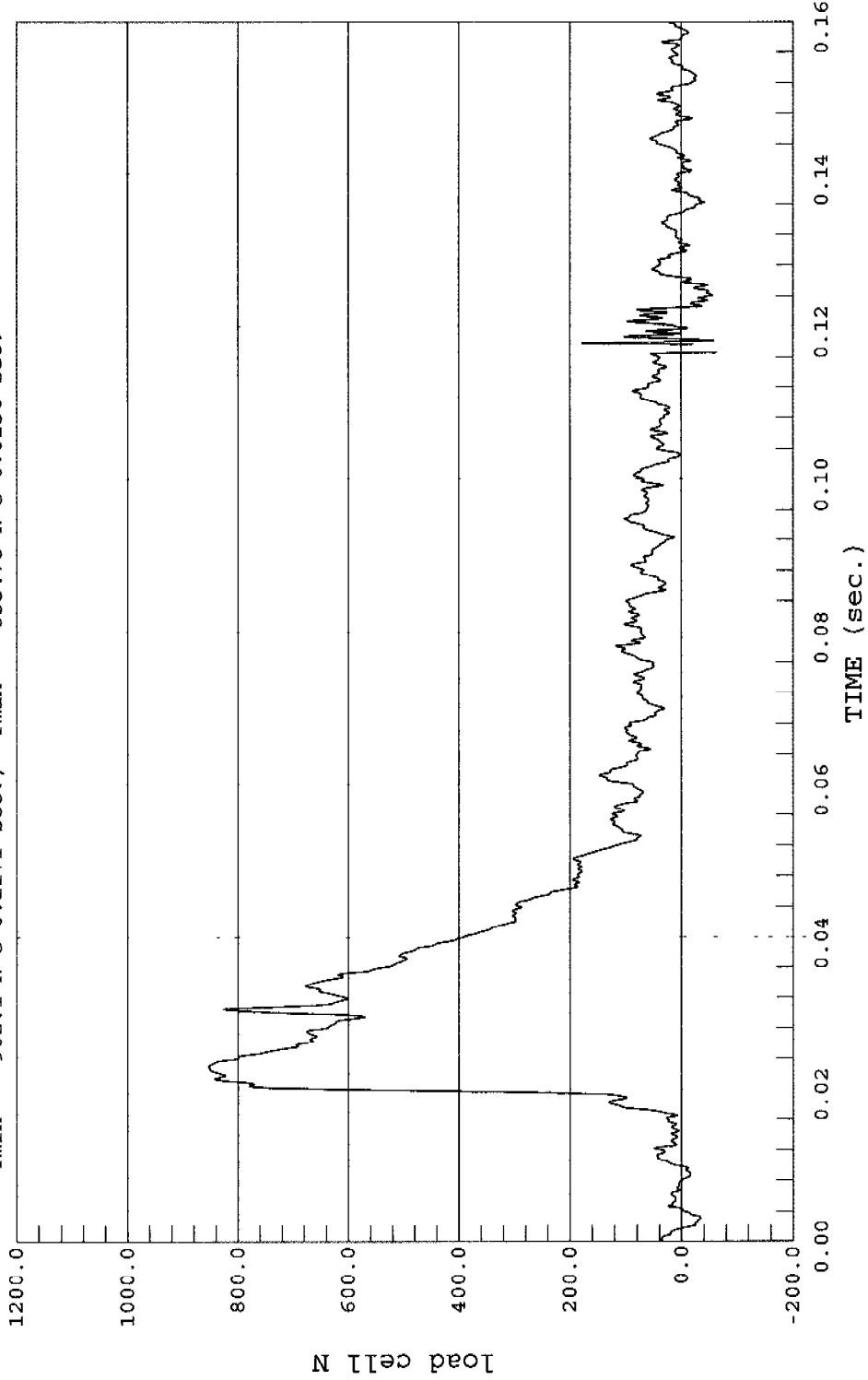
PEAK FORCE

Test Desc.: Dummy Calibration - Dampener Impact Test Date: 12-05-00
Component: Dummy #036 Speed: 10.00 FT/SEC, 3.05 M/SEC



— 1 load cell, D00526ff.f04

Ymin = -962.1 N @ 0.1171 sec., Ymax = 853.78 N @ 0.0230 sec.



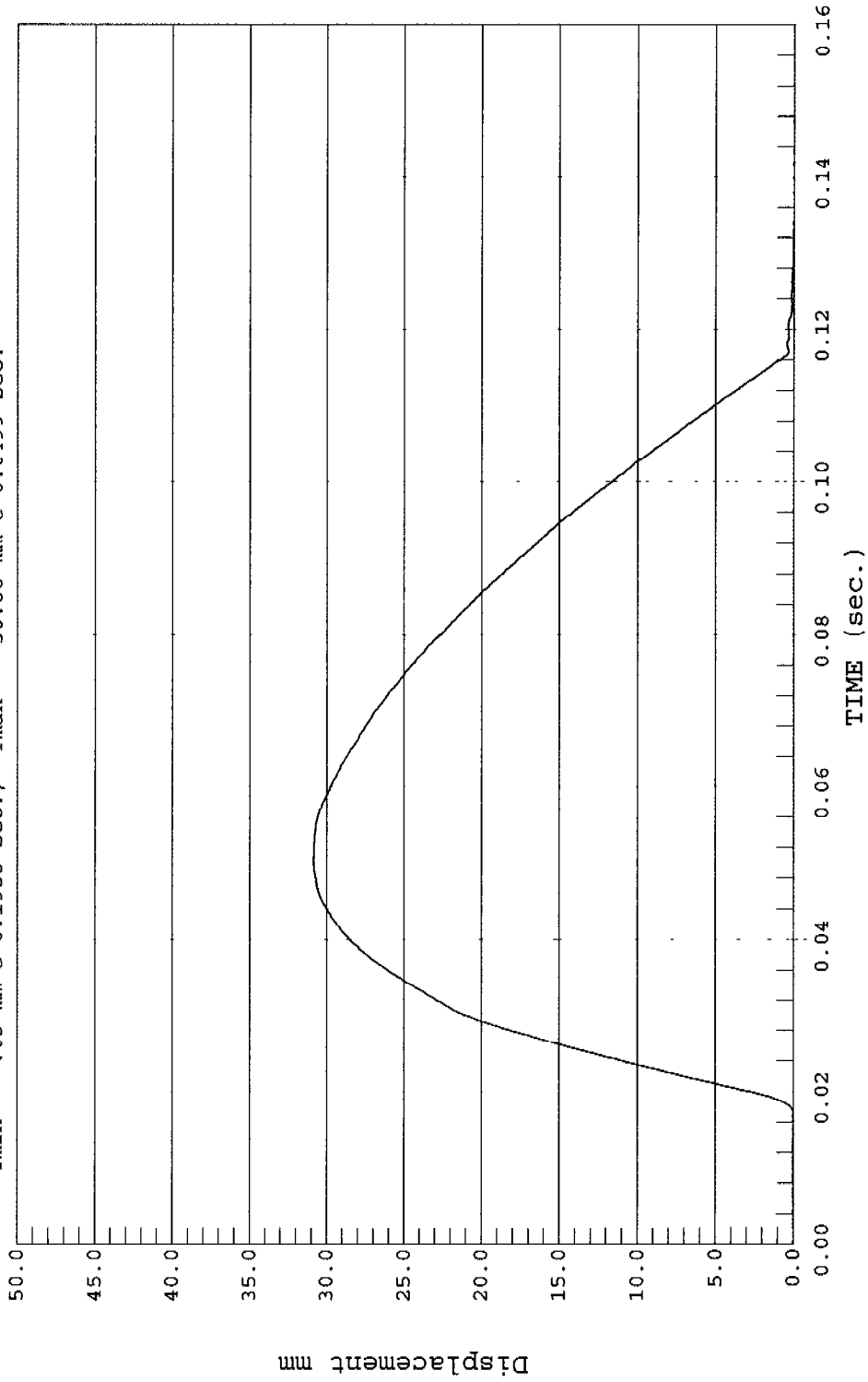
PEAK DISPLACEMENT

Test Desc.: Dummy Calibration - Dampener Impact Test Date: 12-05-00
Component: Dummy #036 Speed: 10.00 FT/SEC, 3.05 M/SEC



1 Displacement, D00526DF.D05

Ymin = -.05 mm @ 0.1955 sec., Ymax = 30.86 mm @ 0.0499 sec.



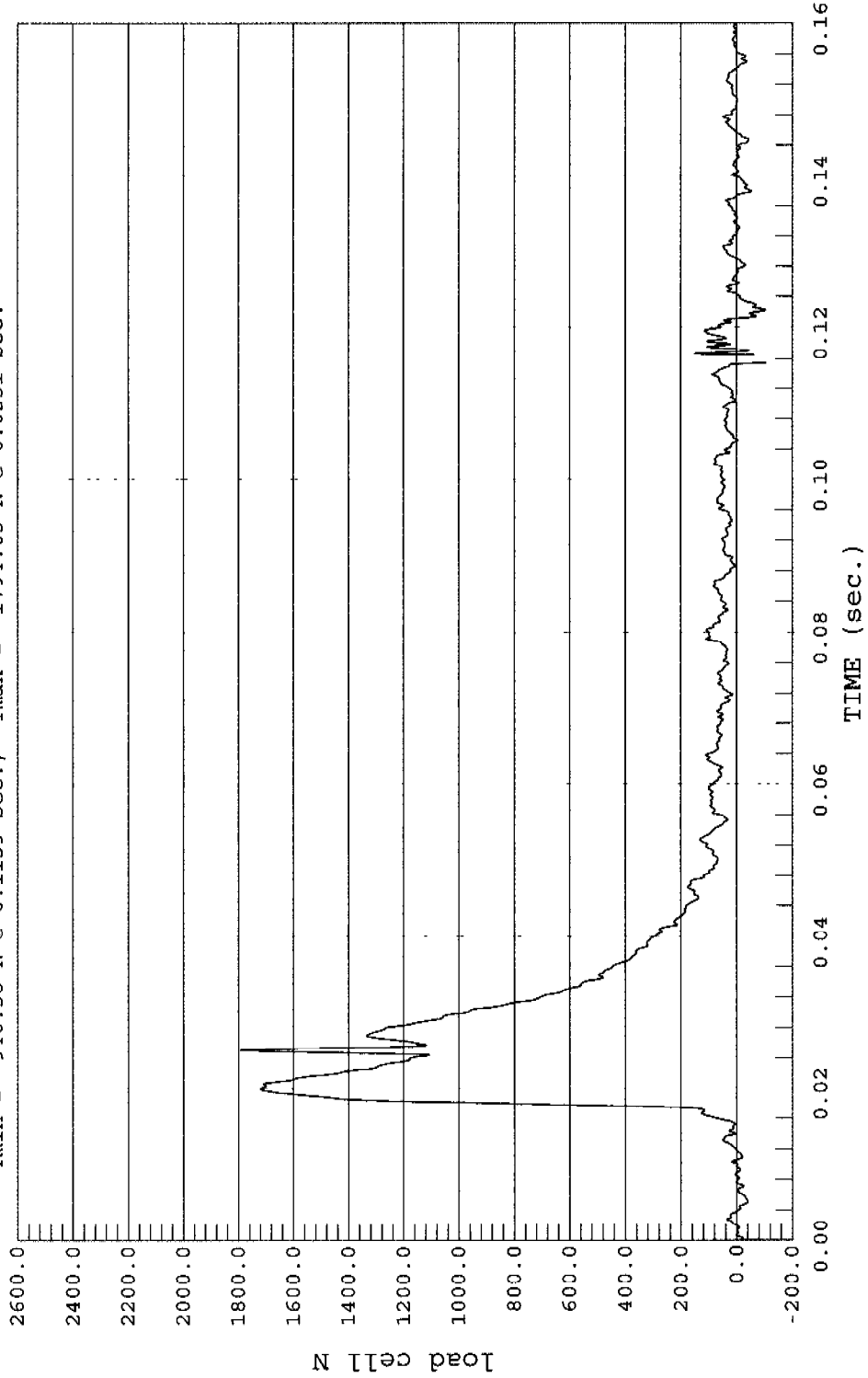
PEAK FORCE

Test Desc.: Dummy Calibration - Dampener Impact Test Date: 12-05-00
Component: Dummy #036 Speed: 14.00 FT/SEC, 4.27 M/SEC



1 load cell, D00527ff.f04

Ymin = -940.38 N @ 0.1159 sec., Ymax = 1794.03 N @ 0.0251 sec.



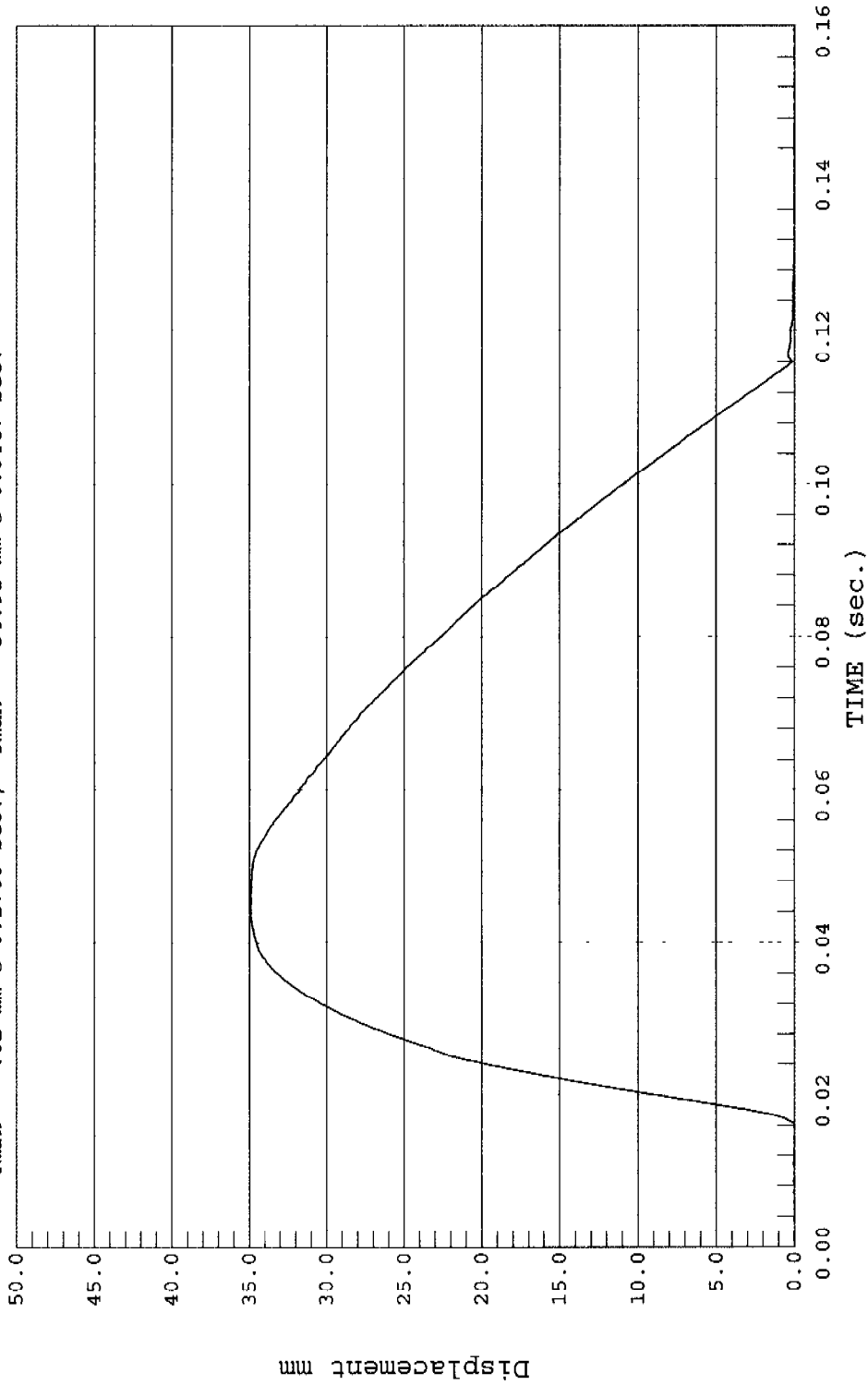
PEAK DISPLACEMENT

Test Desc.: Dummy Calibration - Dampener Impact Test Date: 12-05-00
Component: Dummy #036 Speed: 14.00 FT/SEC, 4.27 M/SEC



— 1 Displacement, D00527DF.D05

Ymin = -.02 mm @ 0.1760 sec., Ymax = 34.91 mm @ 0.0447 sec.



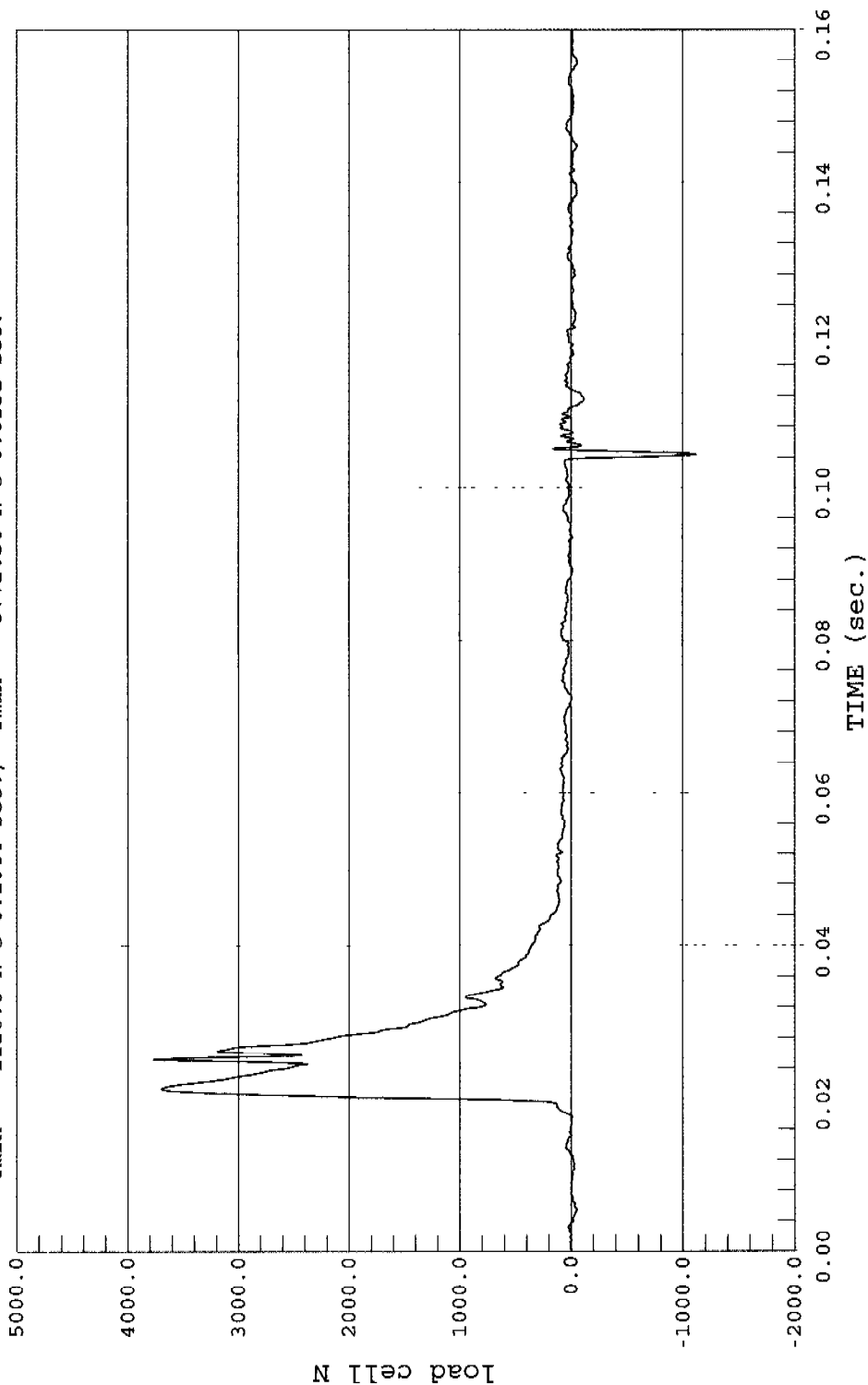
PEAK FORCE

Test Desc.: Dummy Calibration - Dampener Impact Test Date: 12-05-00
Component: Dummy #036 Speed: 20.00 FT/SEC, 6.10 M/SEC



1 load cell, D00528ff.f04

Ymin = -1116.8 N @ 0.1044 sec., Ymax = 3771.56 N @ 0.0251 sec.



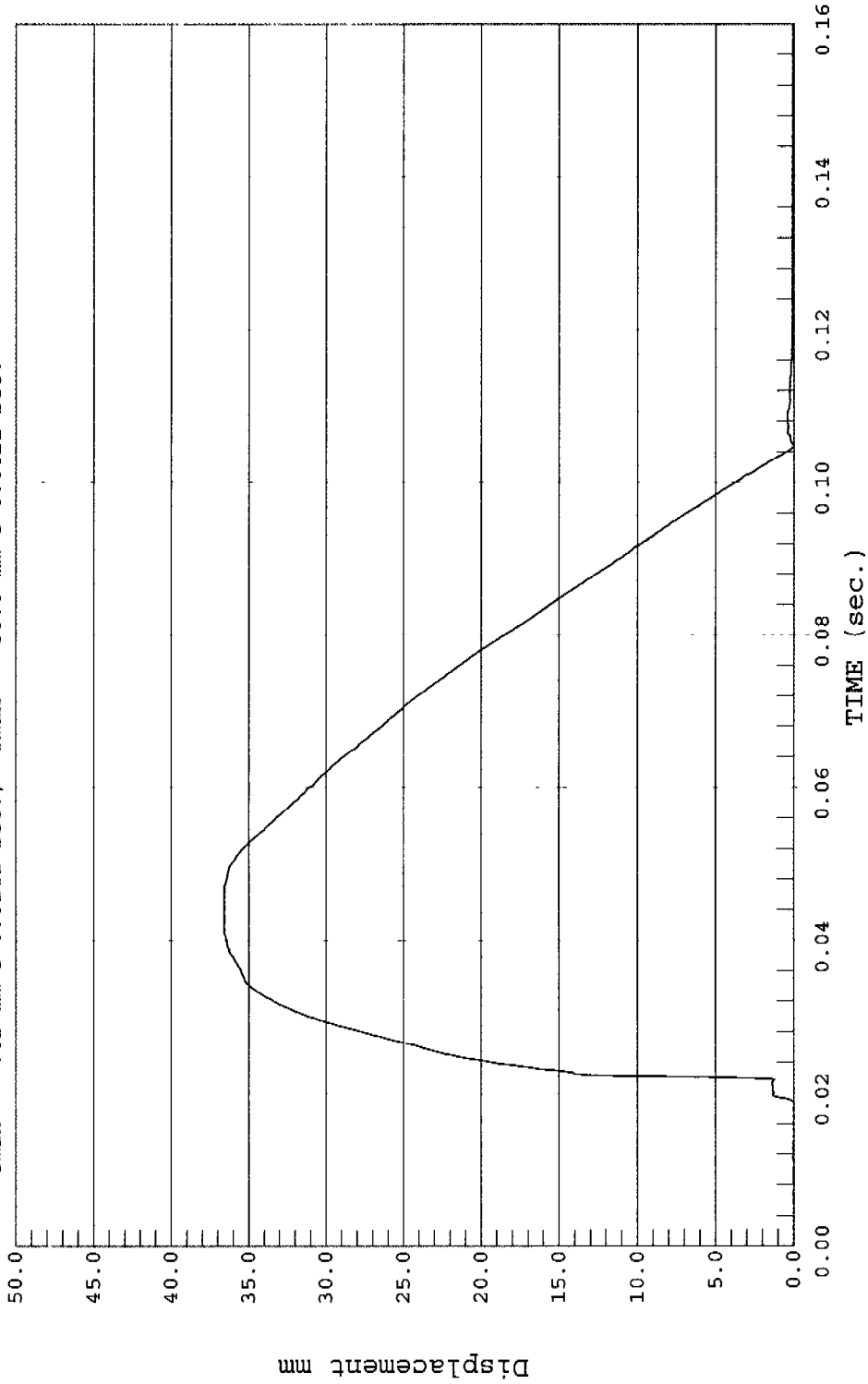
PEAK DISPLACEMENT

Test Desc.: Dummy Calibration - Dampener Impact Test Date: 12-05-00
Component: Dummy #036 Speed: 20.00 FT/SEC, 6.10 M/SEC



1 Displacement, D00528DF.D05

Ymin = -.02 mm @ 0.0141 sec., Ymax = 36.6 mm @ 0.0411 sec.



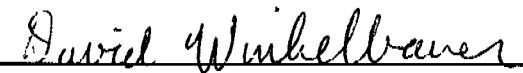
MGA RESEARCH CORPORATION
THORAX IMPACT TEST
SIDE IMPACT DUMMY (SID)

Date: 12/6/00
Dummy Serial Number: 036
Test Number: D001522

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	18.9 – 25.5	20.0°
Relative Humidity (%)	10 – 70	22%
Probe Speed (m/s)	4.27 – 4.33	4.27
Upper Rib (g's)	37 – 46	46
Lower Rib (g's)	37 – 46	46
Lower Spine (g's)	15 - 22	20

TEST MEETS SPECIFICATIONS

Technician: 

Approved By: 

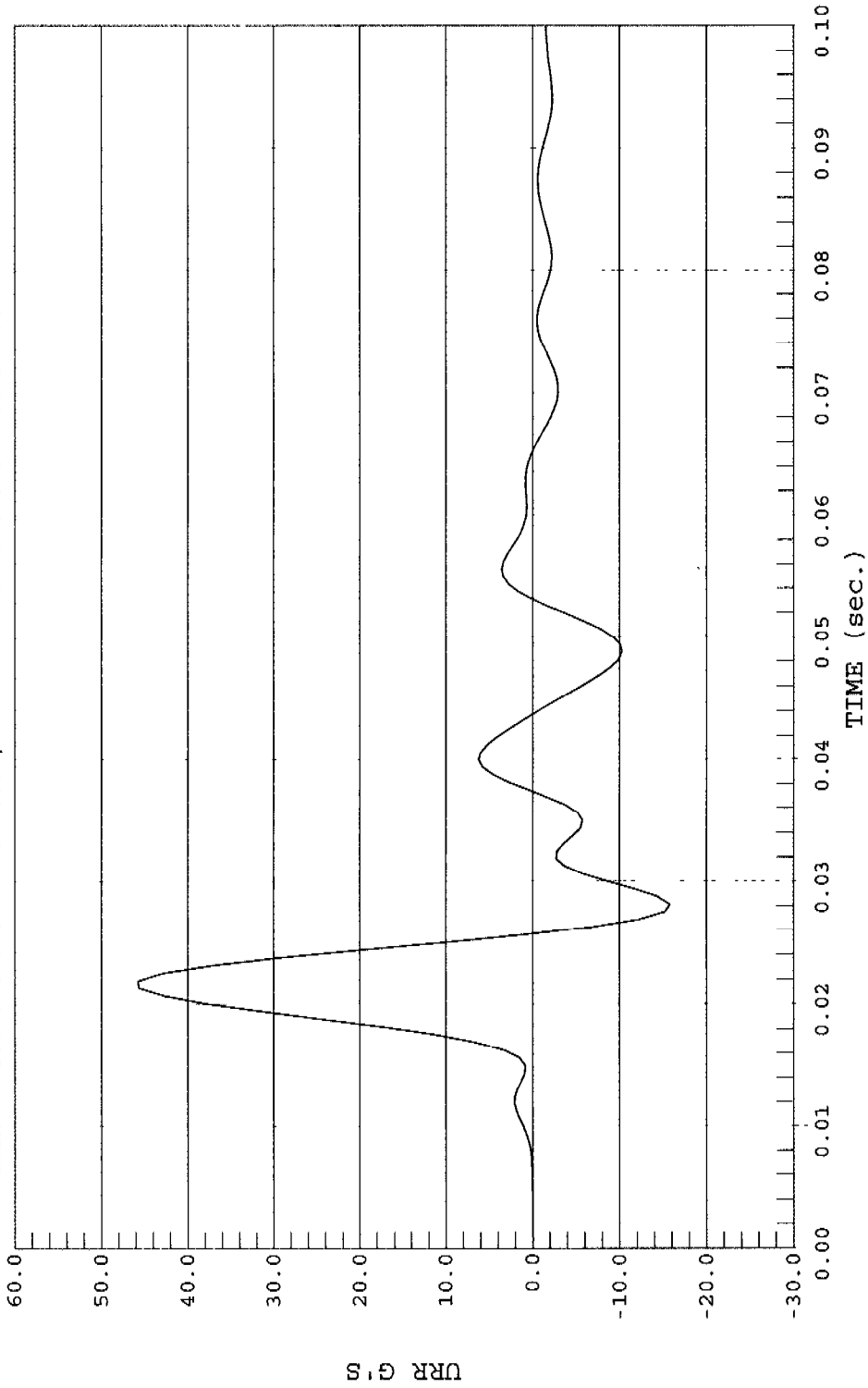
UPPER RIB ACCELERATION

Test Desc.: Dummy Calibration - Thorax Impact Test Date: 12-06-00
Component: Dummy #036 Speed: 14.00 FT/SEC, 4.27 M/SEC



1 URR, D00522FI.R08

Ymin = -15.75 G'S @ 0.0281 sec., Ymax = 45.75 G'S @ 0.0219 sec.



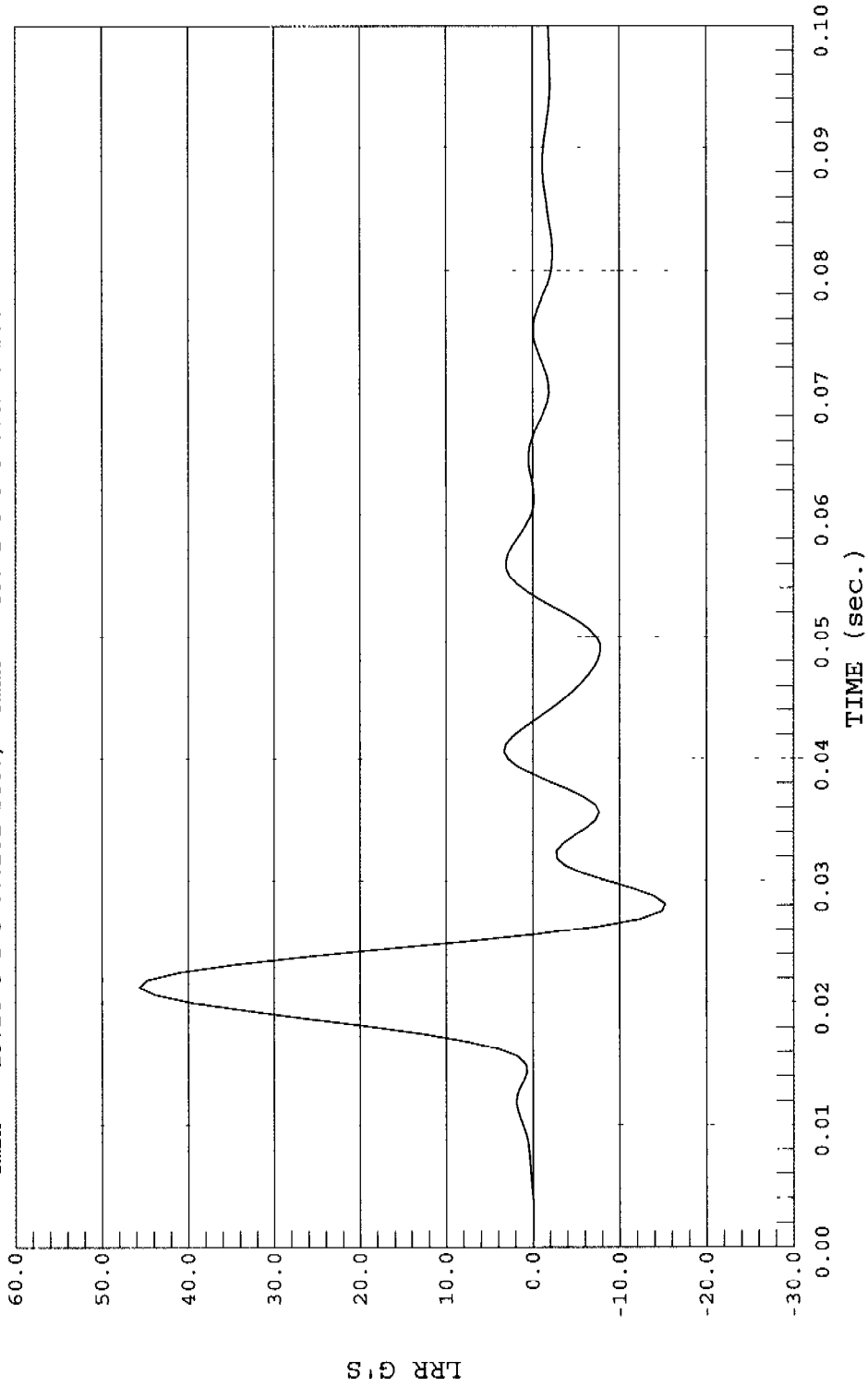
LOWER RIB ACCELERATION

Test Desc.: Dummy Calibration - Thorax Impact Test Date: 12-06-00
Component: Dummy #036 Speed: 14.00 FT/SEC, 4.27 M/SEC



1 LRR, D00522FI.R09

Ymin = -15.24 G'S @ 0.0281 sec., Ymax = 45.72 G'S @ 0.0213 sec.



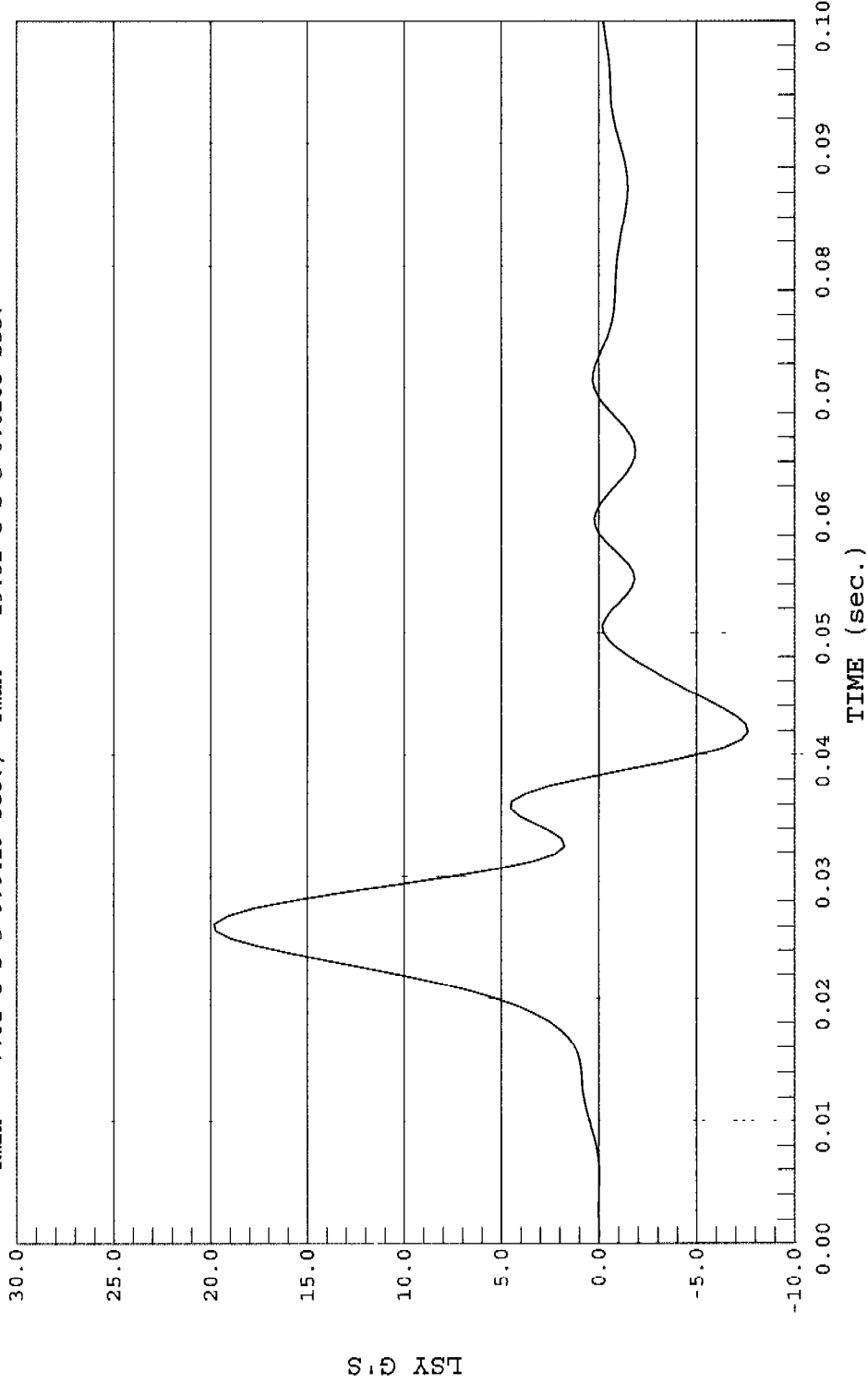
LOWER SPINE ACCELERATION

Test Desc.: Dummy Calibration - Thorax Impact Test Date: 12-06-00
Component: Dummy #036 Speed: 14.00 FT/SEC, 4.27 M/SEC

1 LSY, D00522FI.R10



Ymin = -7.61 G'S @ 0.0419 sec., Ymax = 19.82 G'S @ 0.0263 sec.



MGA RESEARCH CORPORATION
PELVIS IMPACT TEST
SIDE IMPACT DUMMY (SID)

Date: 12/6/00
Dummy Serial Number: 036
Test Number: D001523

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	18.9 – 25.5	20.0°
Relative Humidity (%)	10 – 70	22%
Probe Speed (m/s)	4.27 – 4.33	4.28
Pelvis Acceleration (g's)	40 – 60	40

TEST MEETS SPECIFICATIONS

Technician: 

Approved By: 

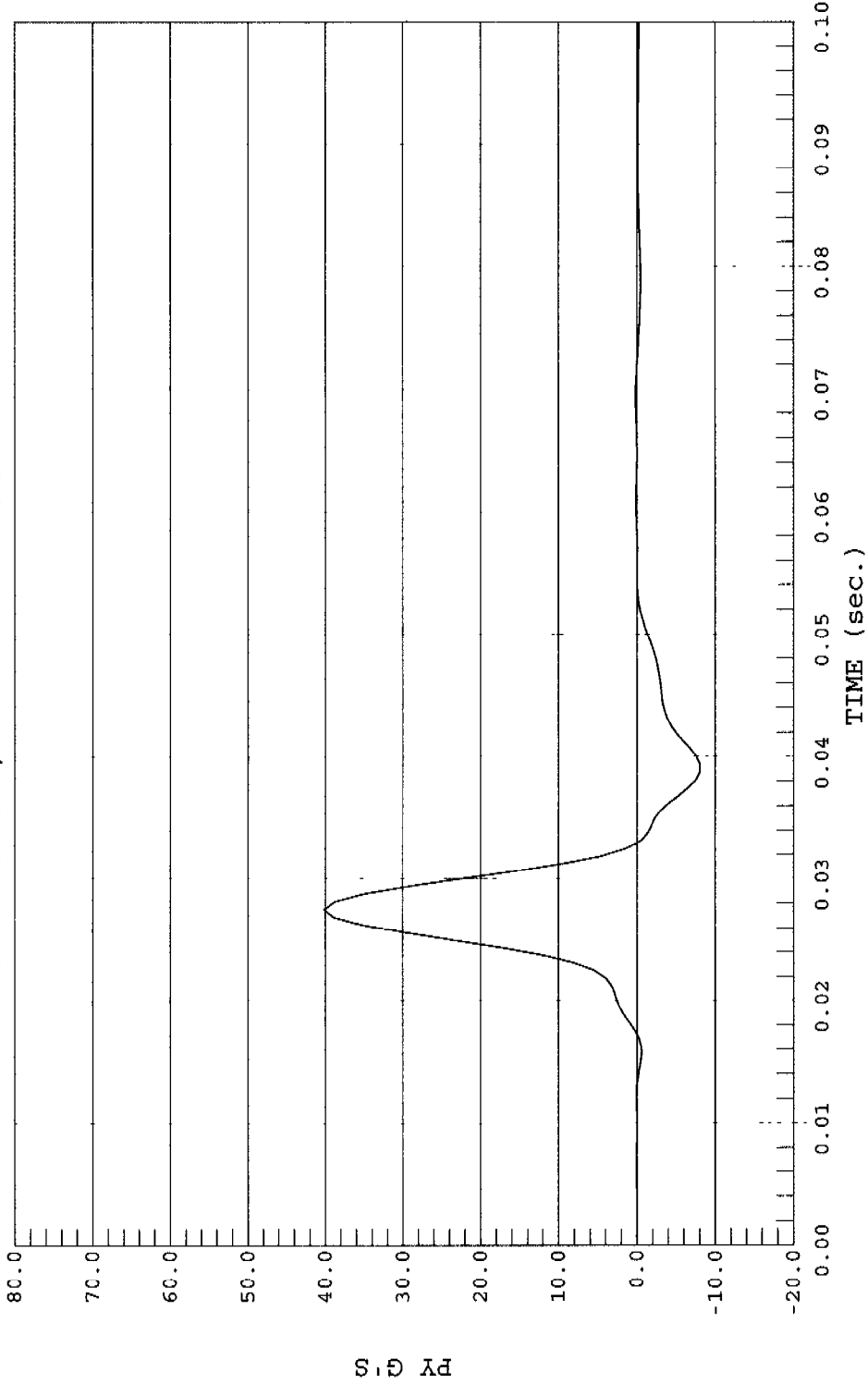
PELVIS ACCELERATION

Test Desc.: Dummy Calibration - Pelvis Impact Test Date: 12-06-00
Component: Dummy #036 Speed: 14.05 FT/SEC, 4.28 M/SEC



1 PY, D00523FI.R11

Ymin = -8.08 G'S @ 0.0394 sec., Ymax = 40.21 G'S @ 0.0275 sec.




MGA RESEARCH CORPORATION
ABDOMINAL COMPRESSION TEST (PRELOAD = 10 LBS)
SIDE IMPACT DUMMY (SID)

Date: 12/5/00
Dummy Serial Number: 036
Test Number: D001524

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	18.9 – 25.5	21.3°
Relative Humidity (%)	10 – 70	24%
Force @ 12.7 mm	104 – 162	147
Force @ 19 mm	163 – 222	201
Force @ 25.4 mm	222 – 280	273
Force @ 33 mm	325 - 391	372

TEST MEETS SPECIFICATIONS

Technician: 

Approved By: 

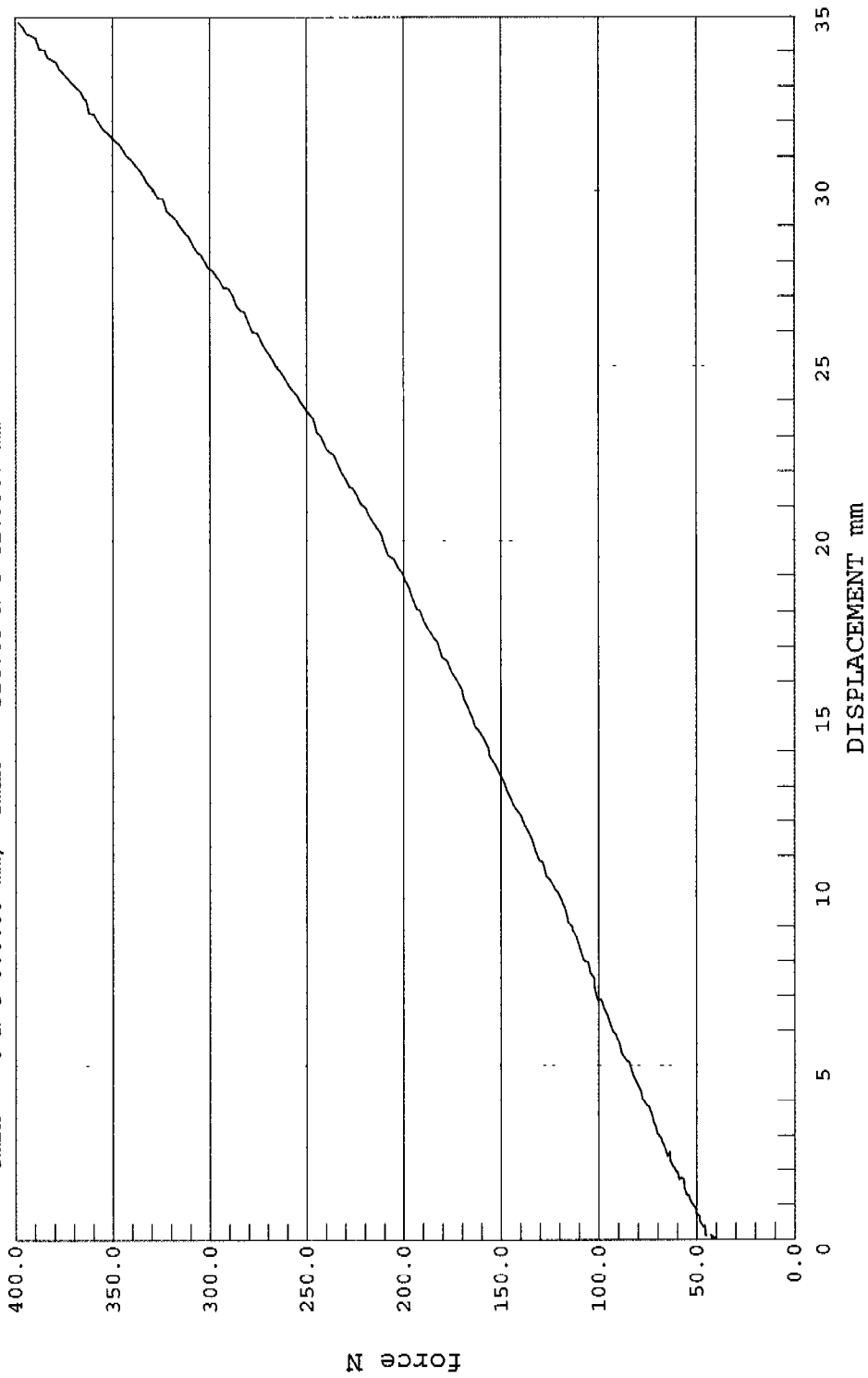
ABDOMEN COMPRESSION

Test Desc.: DUMMY CALIBRATION - ABDOMEN COMPRESSION Test Date: 12-05-00
Component: DUMMY # 036 Speed: 0.00 FT/SEC, 0.00 M/SEC



1 force, D00524FC.F16

Ymin = 0 N @ 0.0000 mm, Ymax = 524.65 N @ 42.3567 mm

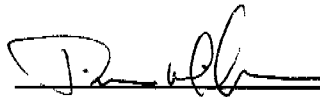



MGA RESEARCH CORPORATION
LUMBAR FLEXION TEST
SIDE IMPACT DUMMY (SID)

Date: 12/5/00
Dummy Serial Number: 036
Test Number: D001525

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	18.9 – 25.5	21.4°
Relative Humidity (%)	10 – 70	26%
Force @ 0°	0 – 26.7	0
Force @ 20°	97.9 – 151.2	123.8
Force @ 30°	151.2 – 204.6	180.0
Force @ 40°	204.6 – 258.0	244.2
Return Angle	12° maximum	2°

TEST MEETS SPECIFICATIONS

Technician: 

Approved By: 

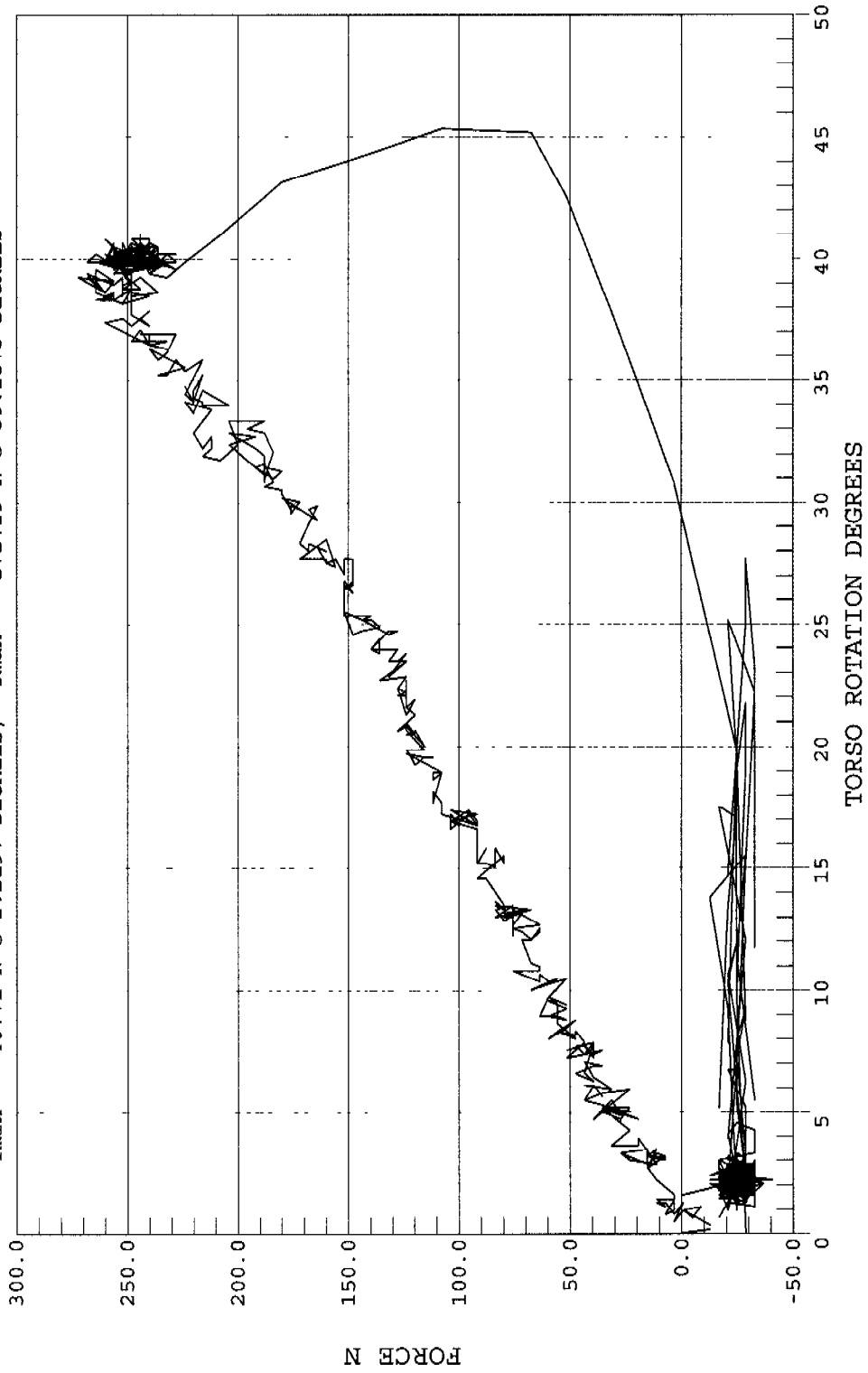
LUMBAR FLEXION

Test Desc.: DUMMY CALIBRATION - LUMBAR FLEXION
Component: DUMMY # 036
Test Date: 12-05-00
Speed: 0.00 FT/SEC, 0.00 M/SEC



1 FORCE, D00525FC.F14

Ymin = -40.71 N @ 2.2197 DEGREES, Ymax = 272.29 N @ 39.2573 DEGREES



DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Dummy Serial Number: 036

Inspected By: Tim Michnay

Date: 12/6/00

<u>Part</u>	<u>Items Checked</u>	<u>Comments</u>
Skin	visual inspection	OK
Head	visual, ballast, accelerometer mount	OK
Neck	visual	OK
Spine box	visual, ballast, weldment, accelerometer mount	OK
Rib cage	visual, measure	OK
Sternum	visual	OK
Lumbar spine	visual	OK
Abdomen	visual	OK
Pelvis	visual, palpate, accelerometer mount	OK
Upper legs	visual	OK
Knees	visual	OK
Lower legs	visual, range of motion	OK
Ankles	visual, range of motion	OK
Feet	visual, range of motion	OK
Joints	1 to 2 g range	OK
Other		

Notes (include component/problem/action/reason):

CERTIFICATION DATA

Dummy Serial Number: 037

Calibration Test Results Summary

Dummy Serial Number: 037

Pre-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Dummy Serial Number: 037
Date of Verification: 12/7/00
Test Number: D00153

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH-Seated Height (mm)	889 – 909	901
RH-Rib Height (mm)	501 – 521	511
HP-Hip Pivot Height (mm)	99 ref.	99
RD-Rib From Back Line (mm)	229 - 241	236
KV-Knee Pivot From Back Line (mm)	511 – 526	520
SW-Knee Pivot to Floor (mm)	490 – 505	494
HW – Hip Width (mm)	356 – 391	380

Technician: 

Approved By: David Winhelbauer

MGA RESEARCH CORPORATION
 THORACIC SHOCK ABSORBER TEST
 SIDE IMPACT DUMMY (SID)

Date: 12/5/00
 Dummy Serial Number: 037
 Test Number: D001536/7/8

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature (°C)		18.9 – 25.5	21.0°
Relative Humidity (%)		10 – 70	22%
Velocity 3.05 m/s	Force (N)	836 – 1125	991
	Displacement (mm)	30 – 35	31
Velocity 4.27 m/s	Force (N)	1730 – 2099	1740
	Displacement (mm)	32 – 37	34
Velocity 6.1 m/s	Force (N)	3741 – 4448	3810
	Displacement (mm)	33 – 40	38

TEST MEETS SPECIFICATIONS

Technician: 

Approved By: David Winkelbauer

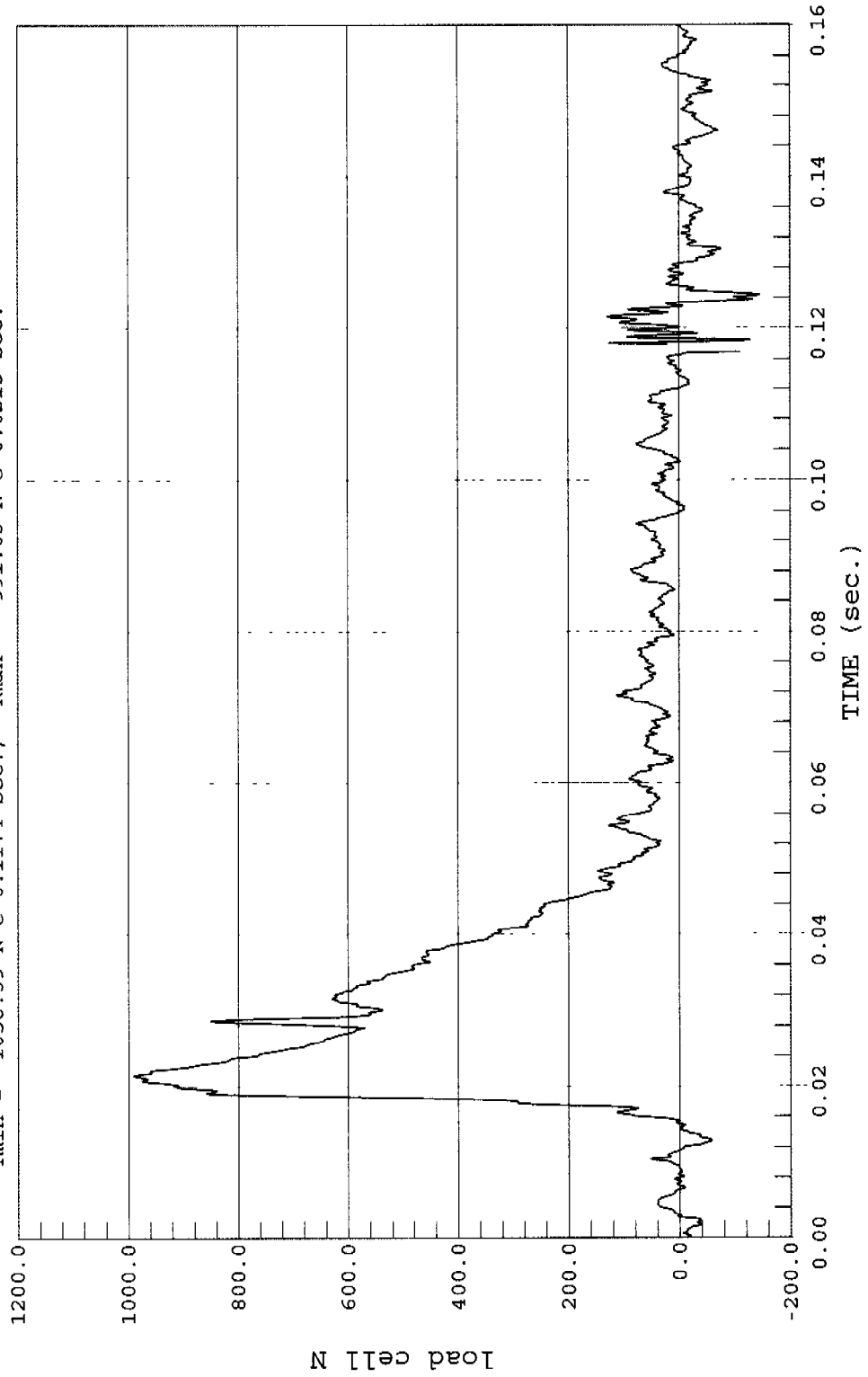
PEAK FORCE

Test Desc.: Dummy Calibration - Dampener Impact
Component: Dummy #037
Test Date: 12-05-00
Speed: 10.00 FT/SEC, 3.05 M/SEC



— 1 load cell, D00536ff.f04

Ymin = -1058.59 N @ 0.1174 sec., Ymax = 991.05 N @ 0.0215 sec.



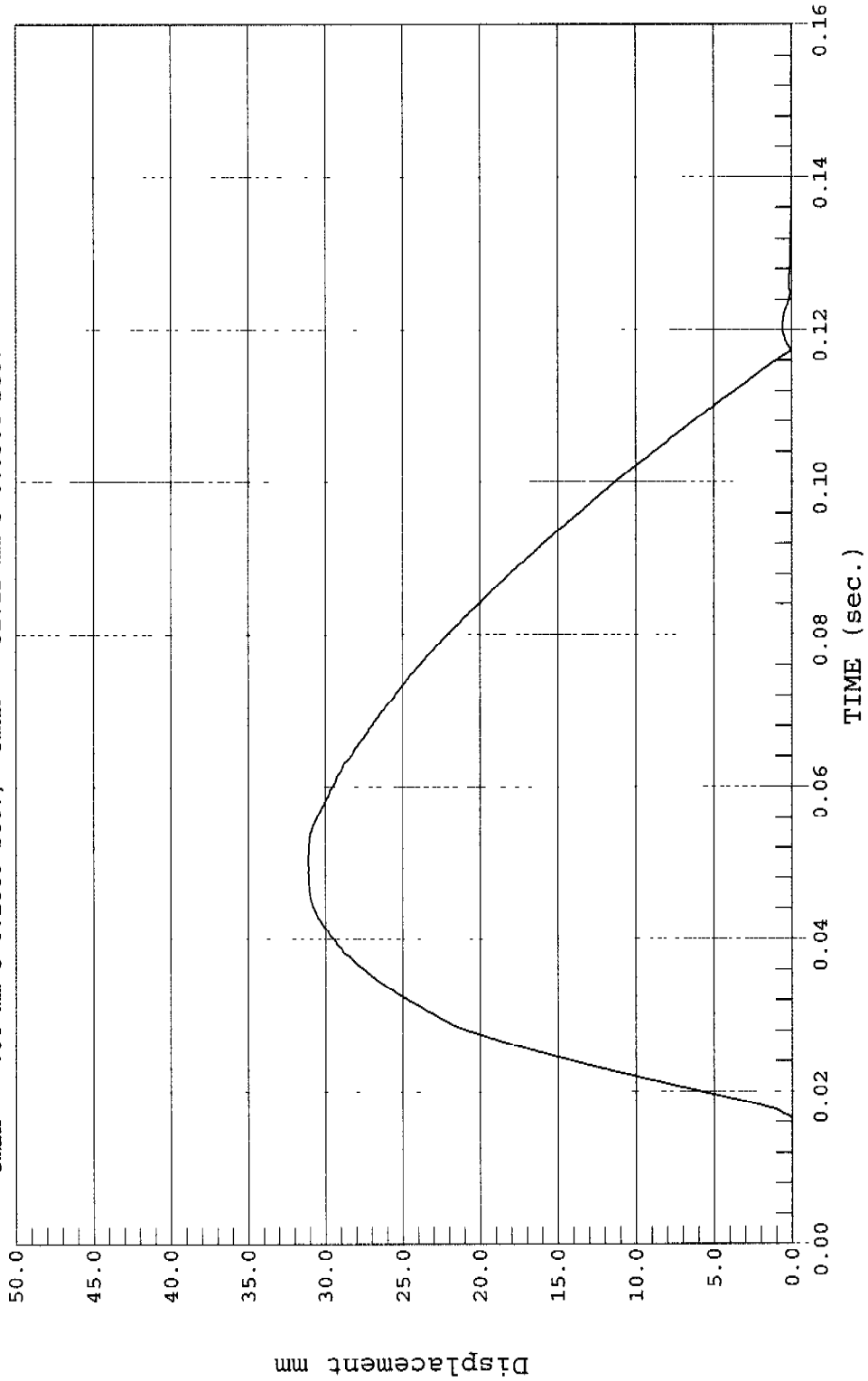
PEAK DISPLACEMENT

Test Desc.: Dummy Calibration - Dampener Impact Test Date: 12-05-00
Component: Dummy #037 Speed: 10.00 FT/SEC, 3.05 M/SEC



1 Displacement, D00536DF.D05

Ymin = -.04 mm @ 0.1886 sec., Ymax = 31.12 mm @ 0.0504 sec.



PEAK FORCE

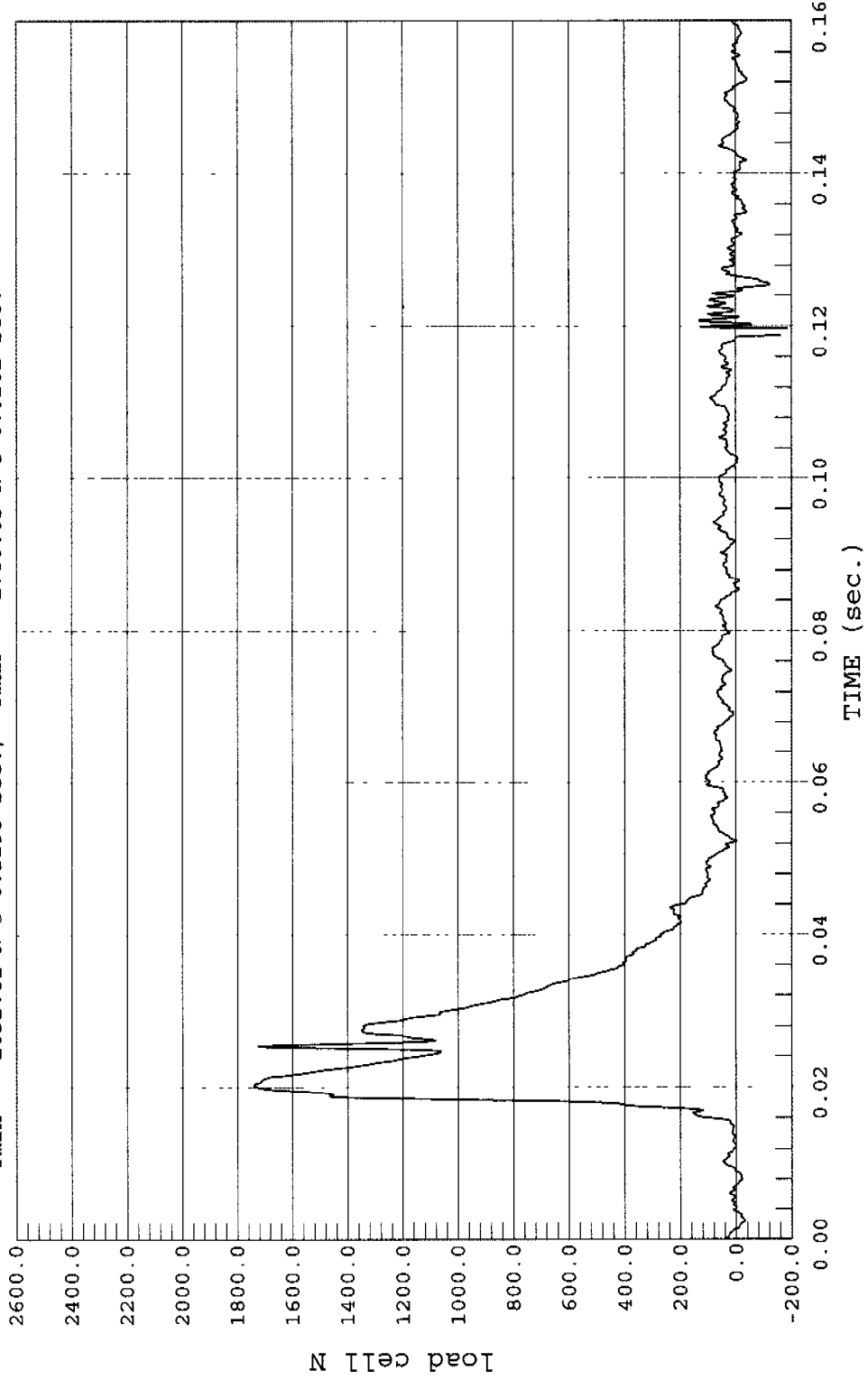
Test Desc.: Dummy Calibration - Dampener Impact
Component: Dummy #037

Test Date: 12-05-00
Speed: 14.00 FT/SEC, 4.27 M/SEC



1 load cell, D00537ff.f04

Ymin = -1032.81 N @ 0.1193 sec., Ymax = 1740.03 N @ 0.0202 sec.



PEAK DISPLACEMENT

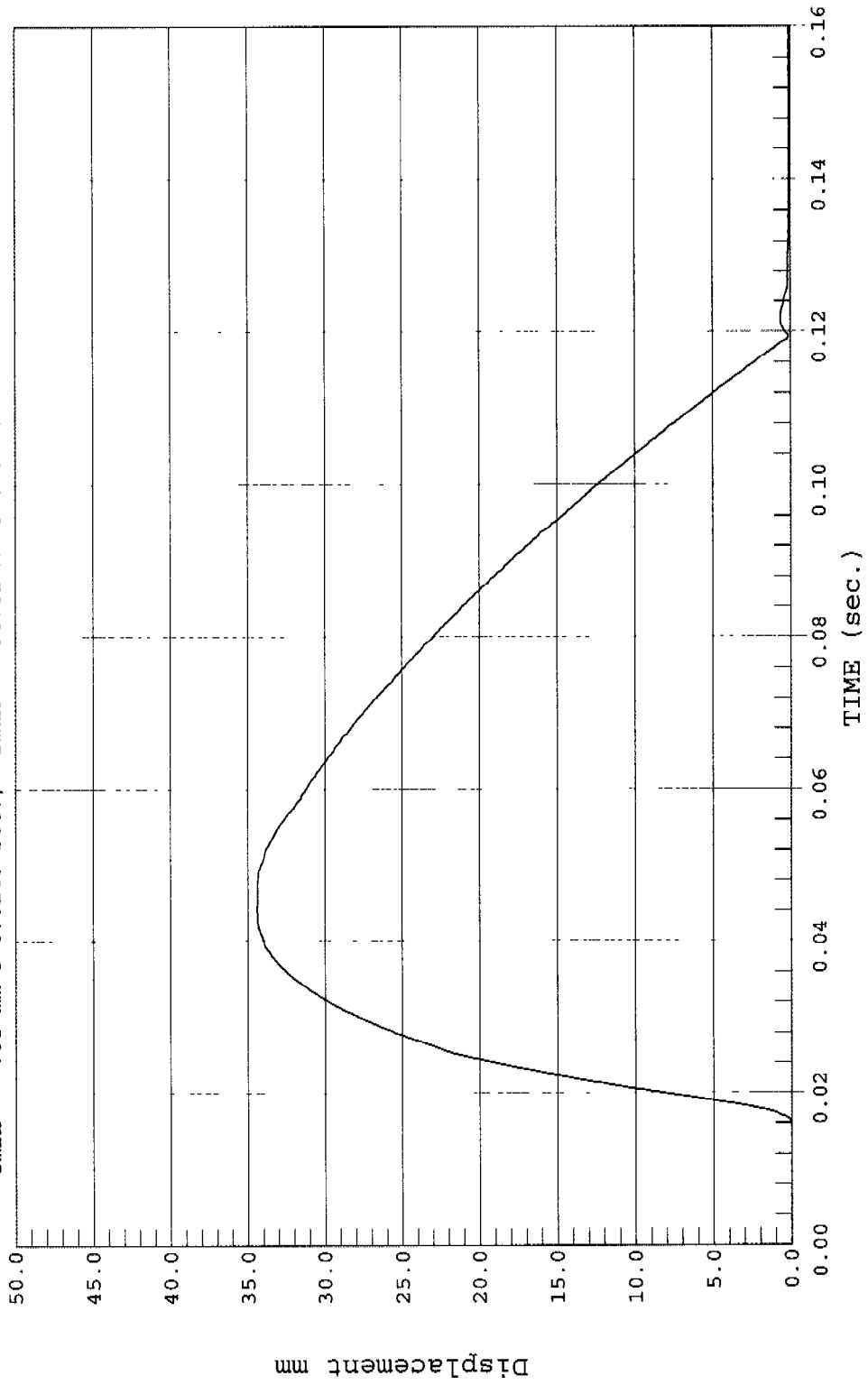
Test Desc.: Dummy Calibration - Dampener Impact
Component: Dummy #037

Test Date: 12-05-00
Speed: 14.00 FT/SEC, 4.27 M/SEC



1 Displacement, D00537DF.D05

Ymin = -.04 mm @ 0.0148 sec., Ymax = 34.41 mm @ 0.0440 sec.



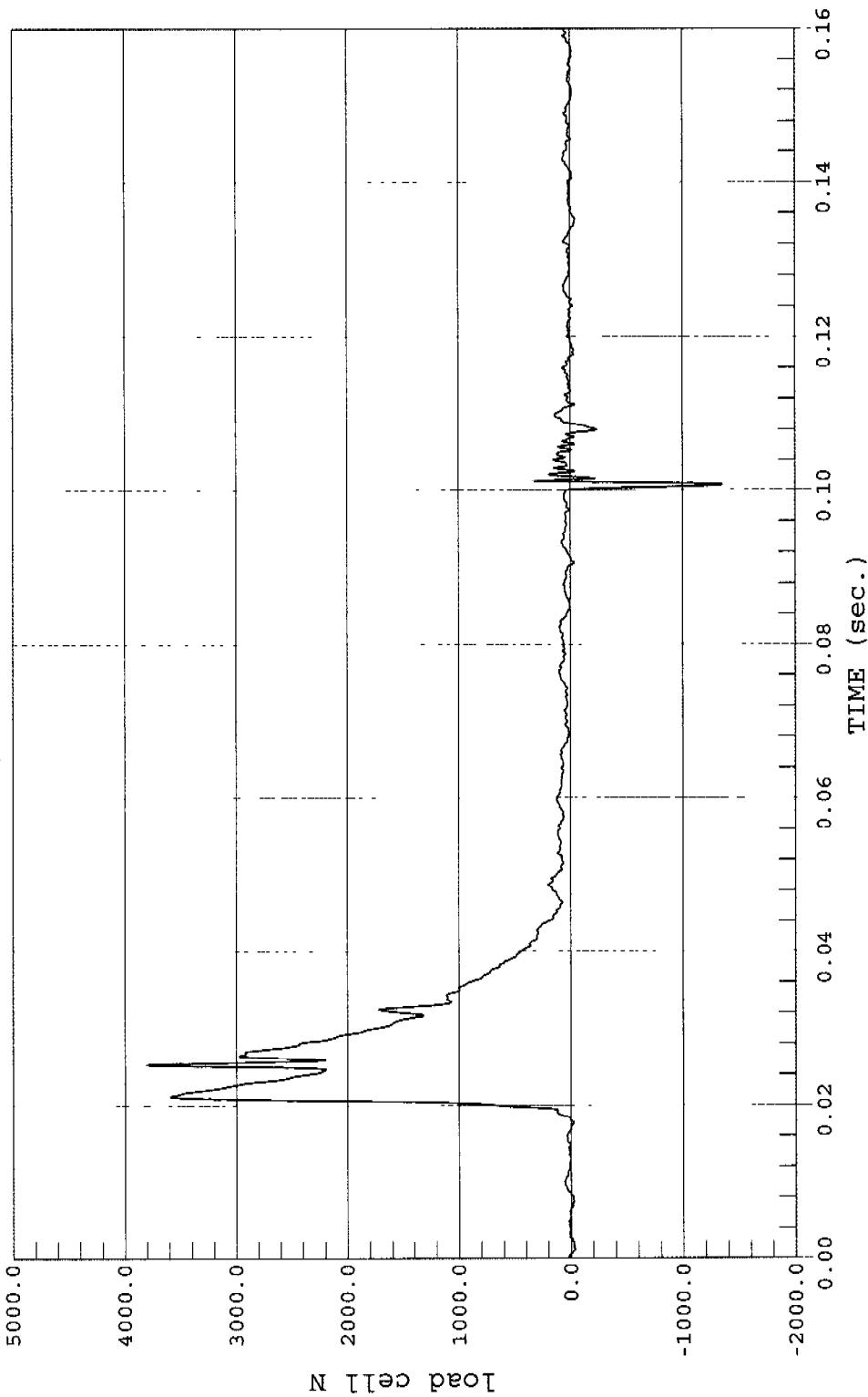
PEAK FORCE

Test Desc.: Dummy Calibration - Dampener Impact
Component: Dummy #037
Test Date: 12-05-00
Speed: 20.00 FT/SEC, 6.10 M/SEC



1 load cell, D00538ff.f04

Ymin = -1352.08 N @ 0.1007 sec., Ymax = 3810.09 N @ 0.0253 sec.



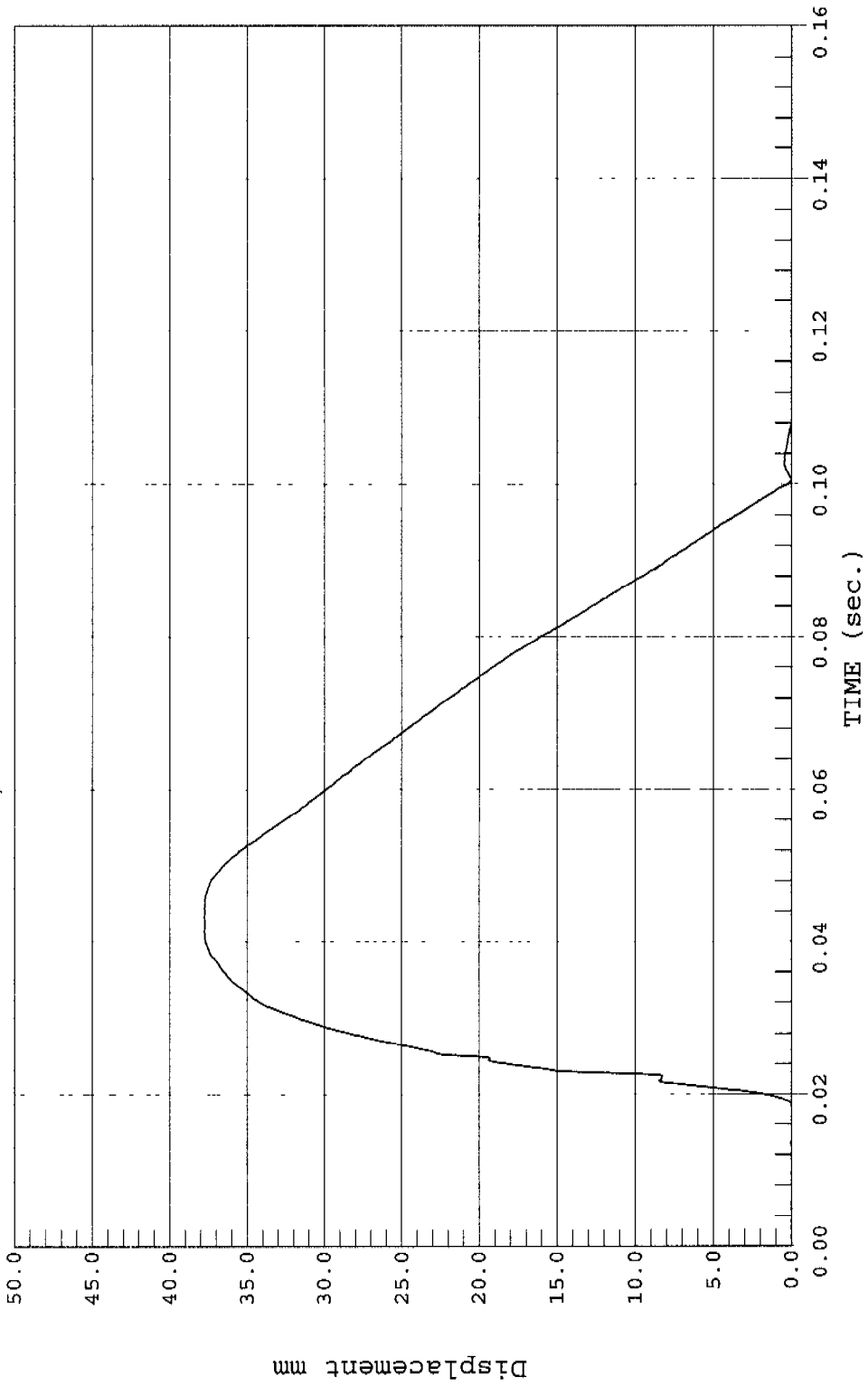
PEAK DISPLACEMENT

Test Desc.: Dummy Calibration - Dampener Impact
Component: Dummy #037
Test Date: 12-05-00
Speed: 20.00 FT/SEC, 6.10 M/SEC



1 Displacement, D00538DF.D05

Ymin = -.22 mm @ 0.1198 sec., Ymax = 37.76 mm @ 0.0433 sec.



MGA RESEARCH CORPORATION
THORAX IMPACT TEST
SIDE IMPACT DUMMY (SID)

Date: 12/7/00
Dummy Serial Number: 037
Test Number: D001532

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	18.9 – 25.5	21.1°
Relative Humidity (%)	10 – 70	26%
Probe Speed (m/s)	4.27 – 4.33	4.27
Upper Rib (g's)	37 – 46	45
Lower Rib (g's)	37 – 46	46
Lower Spine (g's)	15 - 22	21

TEST MEETS SPECIFICATIONS

Technician: 

Approved By: David Wibelbauer

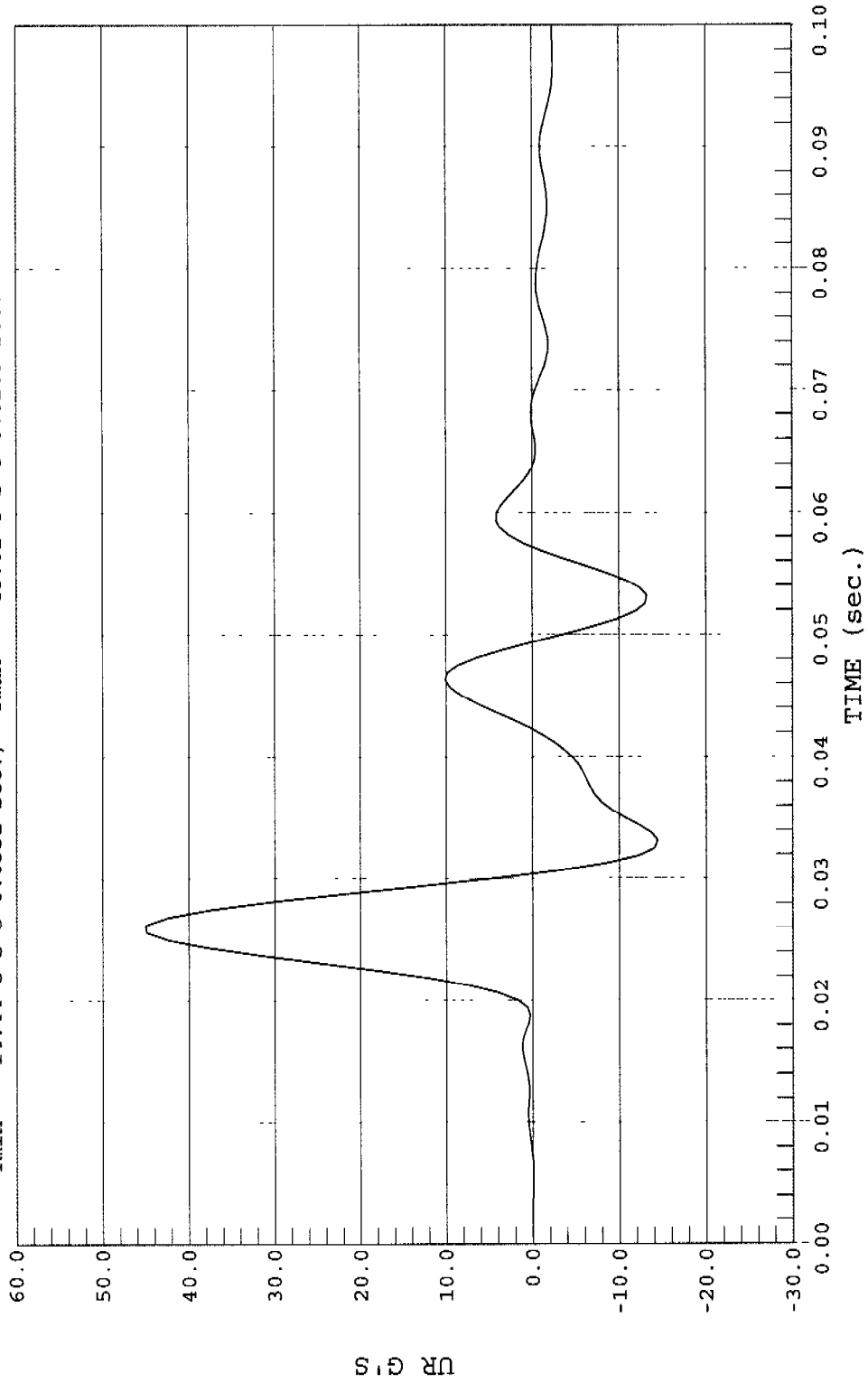
UPPER RIB ACCELERATION

Test Desc.: Dummy Calibration - Thorax Impact Test Date: 12-07-00
Component: Dummy #037 Speed: 14.01 FT/SEC, 4.27 M/SEC



1 UR, D00532FI.R08

Ymin = -14.44 G'S @ 0.0331 sec., Ymax = 45.01 G'S @ 0.0263 sec.



LOWER RIB ACCELERATION

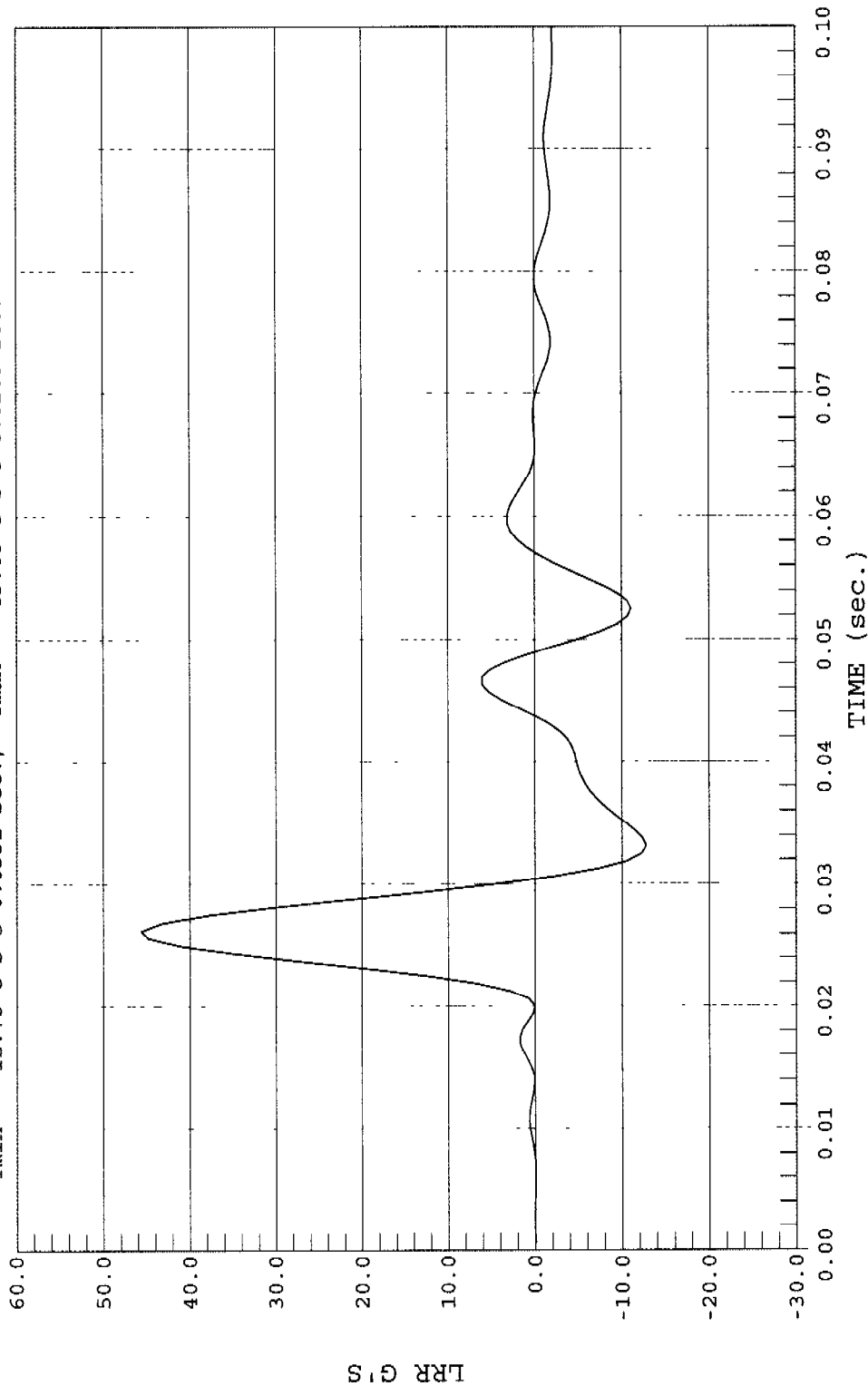
Test Desc.: Dummy Calibration - Thorax Impact
Speed: 14.01 FT/SEC, 4.27 M/SEC

Component: Dummy #037

1 LRR, D00532FT.R09



Ymin = -12.73 G'S @ 0.0331 sec., Ymax = 45.63 G'S @ 0.0263 sec.



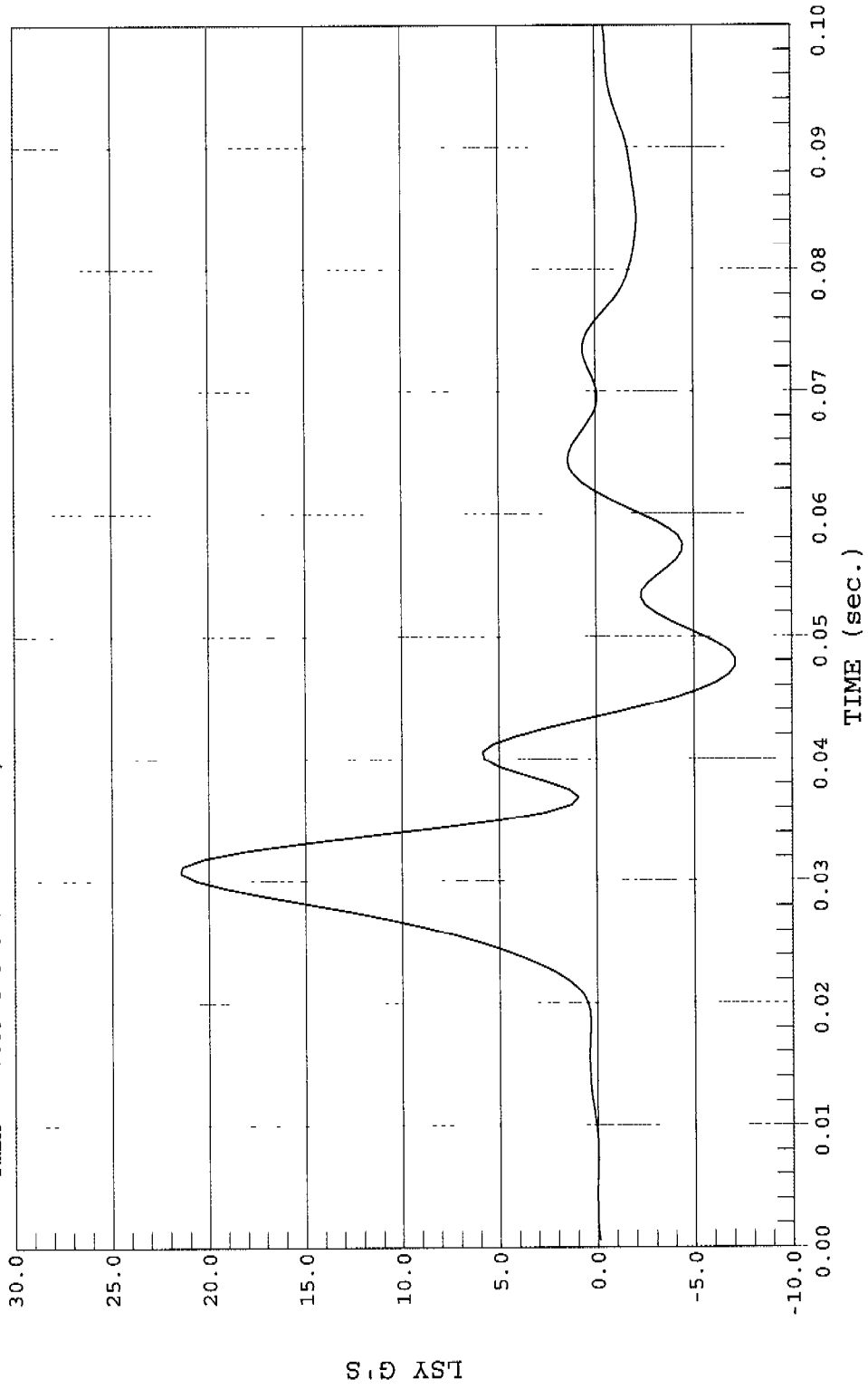
LOWER SPINE ACCELERATION

Test Desc.: Dummy Calibration - Thorax Impact Test Date: 12-07-00
Component: Dummy #037 Speed: 14.01 FT/SEC, 4.27 M/SEC



1 LSY, D00532FI.R10

Ymin = -7.09 G'S @ 0.0481 sec., Ymax = 21.45 G'S @ 0.0306 sec.



MGA RESEARCH CORPORATION
PELVIS IMPACT TEST
SIDE IMPACT DUMMY (SID)

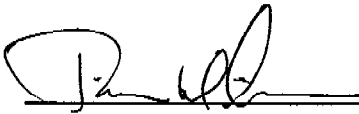
Date: 12/7/00

Dummy Serial Number: 037

Test Number: D01533

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	18.9 – 25.5	21.1
Relative Humidity (%)	10 – 70	26%
Probe Speed (m/s)	4.27 – 4.33	4.29
Pelvis Acceleration (g's)	40 – 60	45

TEST MEETS SPECIFICATIONS

Technician: 

Approved By: David Winkelbauer

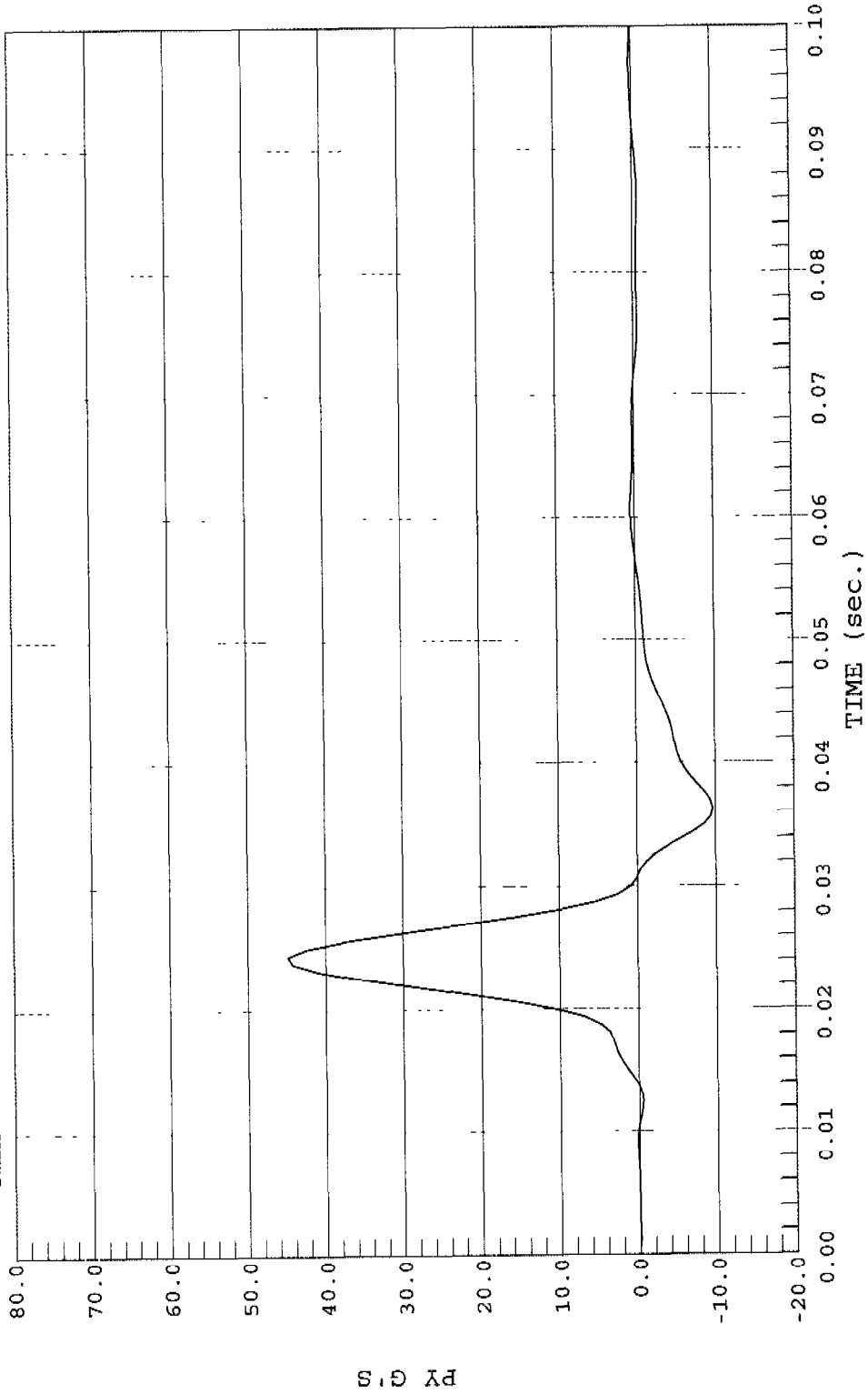
PELVIS ACCELERATION

Test Desc.: Dummy Calibration - Pelvis Impact
Component: Dummy #037
Test Date: 12-07-00
Speed: 14.06 FT/SEC, 4.29 M/SEC



1 PY, D00533FI.R11

Ymin = -9.66 G'S @ 0.0363 sec., Ymax = 44.82 G'S @ 0.0244 sec.




MGA RESEARCH CORPORATION
ABDOMINAL COMPRESSION TEST (PRELOAD = 10 LBS)
SIDE IMPACT DUMMY (SID)

Date: 12/5/00
Dummy Serial Number: 037
Test Number: D001534

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	18.9 – 25.5	21.3°
Relative Humidity (%)	10 – 70	24%
Force @ 12.7 mm	104 – 162	135
Force @ 19 mm	163 – 222	185
Force @ 25.4 mm	222 – 280	246
Force @ 33 mm	325 - 391	353

TEST MEETS SPECIFICATIONS

Technician: 

Approved By: 

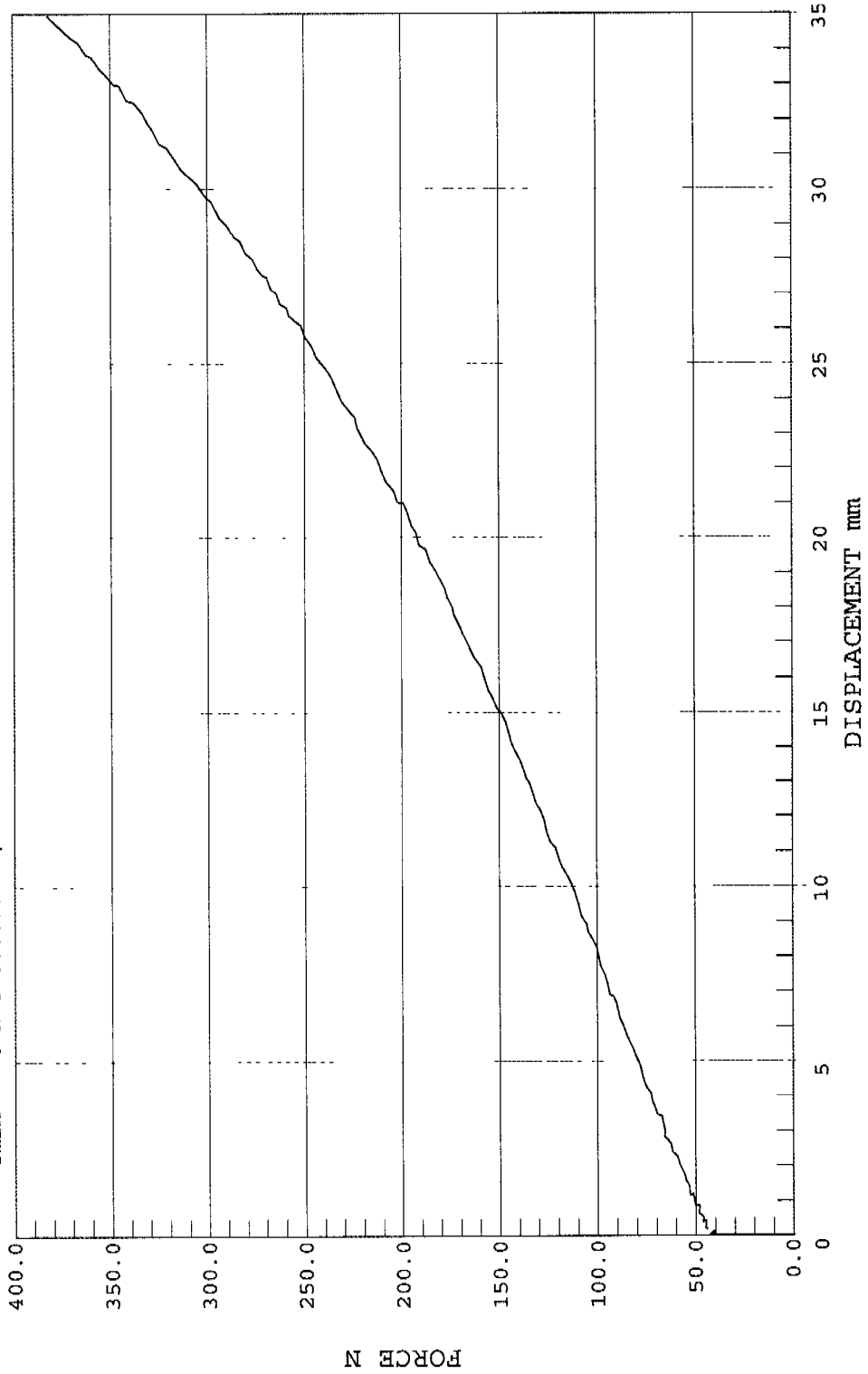
ABDOMEN COMPRESSION

Test Desc.: DUMMY CALIBRATION - ABDOMEN COMPRESSION Test Date: 12-05-00
Component: DUMMY # 037 Speed: 0.00 FT/SEC, 0.00 M/SEC



1 FORCE, D00534FC.F16

Ymin = 0 N @ 0.0000 mm, Ymax = 530.25 N @ 43.1262 mm

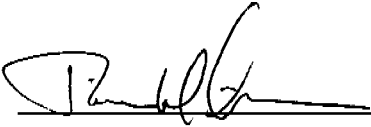


MGA RESEARCH CORPORATION
LUMBAR FLEXION TEST
SIDE IMPACT DUMMY (SID)

Date: 12/5/00
Dummy Serial Number: 037
Test Number: D001535

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	18.9 – 25.5	21.5°
Relative Humidity (%)	10 – 70	25%
Force @ 0°	0 – 26.7	0
Force @ 20°	97.9 – 151.2	107.8
Force @ 30°	151.2 – 204.6	159.9
Force @ 40°	204.6 – 258.0	216.1
Return Angle	12° maximum	6°

TEST MEETS SPECIFICATIONS

Technician: 

Approved By: David Winkelbauer

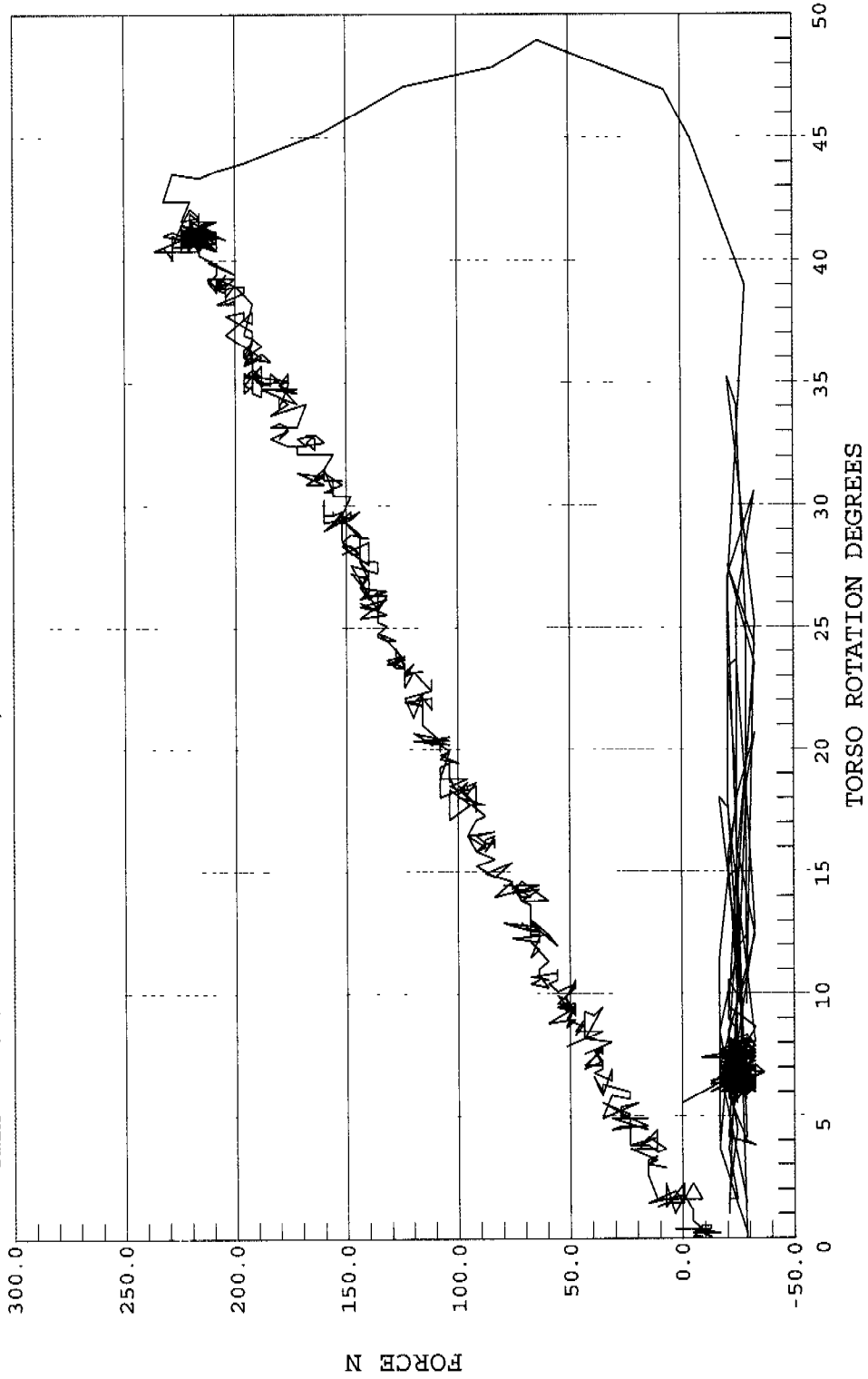


LUMBAR FLEXION

Test Desc.: DUMMY CALIBRATION - LUMBAR FLEXION
Component: DUMMY # 037
Test Date: 12-05-00
Speed: 0.00 FT/SEC, 0.00 M/SEC

1 FORCE, D00535FC.F14

Ymin = -40.67 N @ -9.0021 DEGREES, Ymax = 236.17 N @ 40.3814 DEGREES



DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Dummy Serial Number: 037

Inspected By: Tim Michnay

Date: 12/7/00

<u>Part</u>	<u>Items Checked</u>	<u>Comments</u>
Skin	visual inspection	OK
Head	visual, ballast, accelerometer mount	OK
Neck	visual	OK
Spine box	visual, ballast, weldment, accelerometer mount	OK
Rib cage	visual, measure	OK
Sternum	visual	OK
Lumbar spine	visual	OK
Abdomen	visual	OK
Pelvis	visual, palpate, accelerometer mount	OK
Upper legs	visual	OK
Knees	visual	OK
Lower legs	visual, range of motion	OK
Ankles	visual, range of motion	OK
Feet	visual, range of motion	OK
Joints	1 to 2 g range	OK
Other		

Notes (include component/problem/action/reason):

CERTIFICATION DATA

Dummy Serial Number: 036

Calibration Test Results Summary

Dummy Serial Number: 036

Post-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Dummy Serial Number: 036
Date of Verification: 12/19/00
Test Number: D00156

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH-Seated Height (mm)	889 – 909	901
RH-Rib Height (mm)	501 – 521	505
HP-Hip Pivot Height (mm)	99 ref.	99
RD-Rib From Back Line (mm)	229 - 241	234
KV-Knee Pivot From Back Line (mm)	511 – 526	520
SW-Knee Pivot to Floor (mm)	490 – 505	496
HW – Hip Width (mm)	356 – 391	372

Technician: 

Approved By: David Winkelbauer

MGA RESEARCH CORPORATION
THORAX IMPACT TEST
SIDE IMPACT DUMMY (SID)

Date: 12/19/00


Dummy Serial Number: 036

Test Number: D001562

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	18.9 – 25.5	21.5°
Relative Humidity (%)	10 – 70	22%
Probe Speed (m/s)	4.27 – 4.33	4.28
Upper Rib (g's)	37 – 46	43
Lower Rib (g's)	37 – 46	45
Lower Spine (g's)	15 - 22	20

TEST MEETS SPECIFICATIONS

Technician: 

Approved By: 

UPPER RIB ACCELERATION

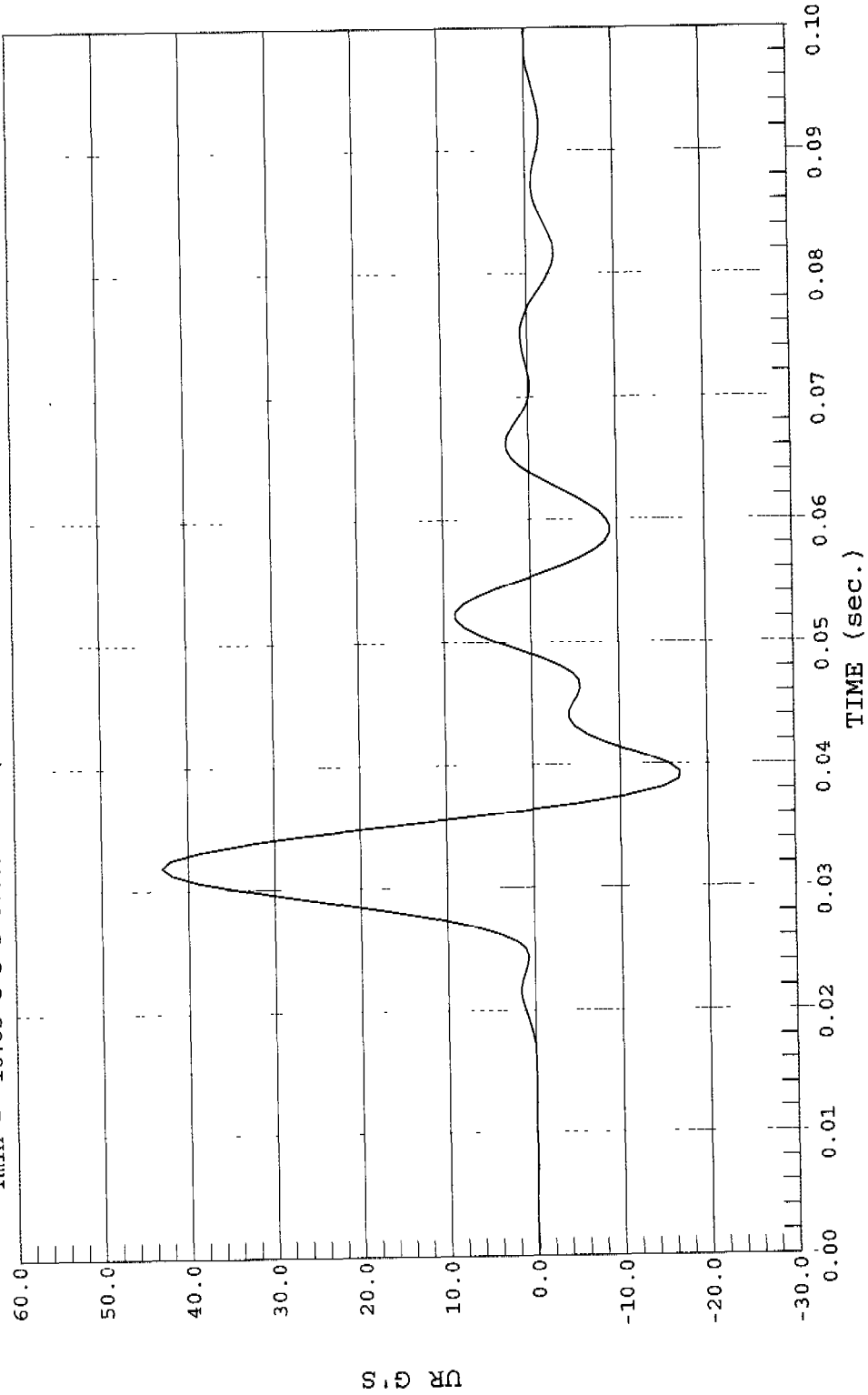
Test Date: 12-19-00
Speed: 14.03 FT/SEC, 4.28 M/SEC

Test Desc.: Dummy Calibration - Thorax Impact
Component: Dummy #036



1 UR, D00562FI.R08

Ymin = -16.85 G'S @ 0.0394 sec., Ymax = 43.11 G'S @ 0.0319 sec.



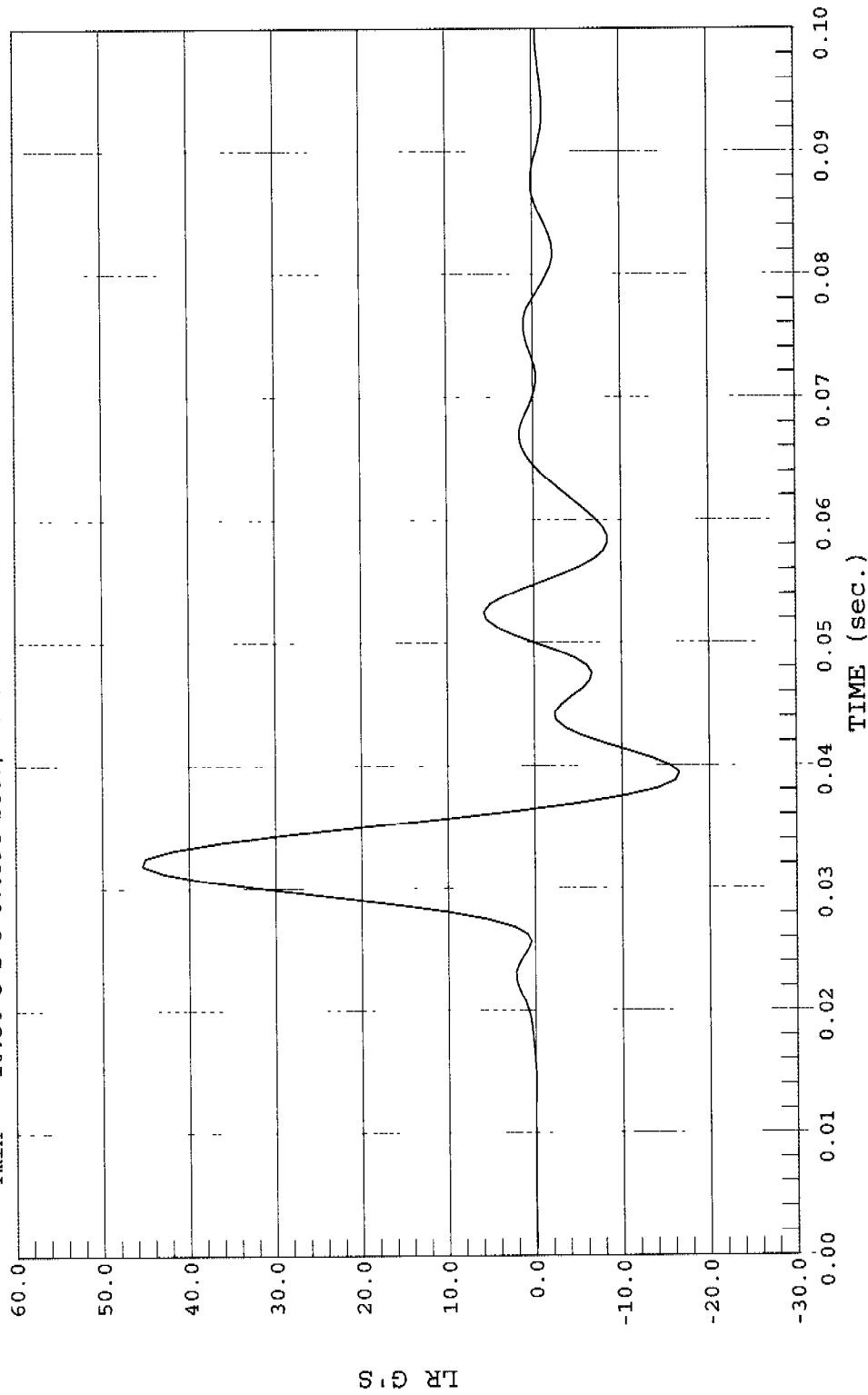
LOWER RIB ACCELERATION

Test Desc.: Dummy Calibration - Thorax Impact Test Date: 12-19-00
Component: Dummy #036 Speed: 14.03 FT/SEC, 4.28 M/SEC



1 LR, D00562FI.R09

Ymin = -16.54 G'S @ 0.0394 sec., Ymax = 45.39 G'S @ 0.0319 sec.



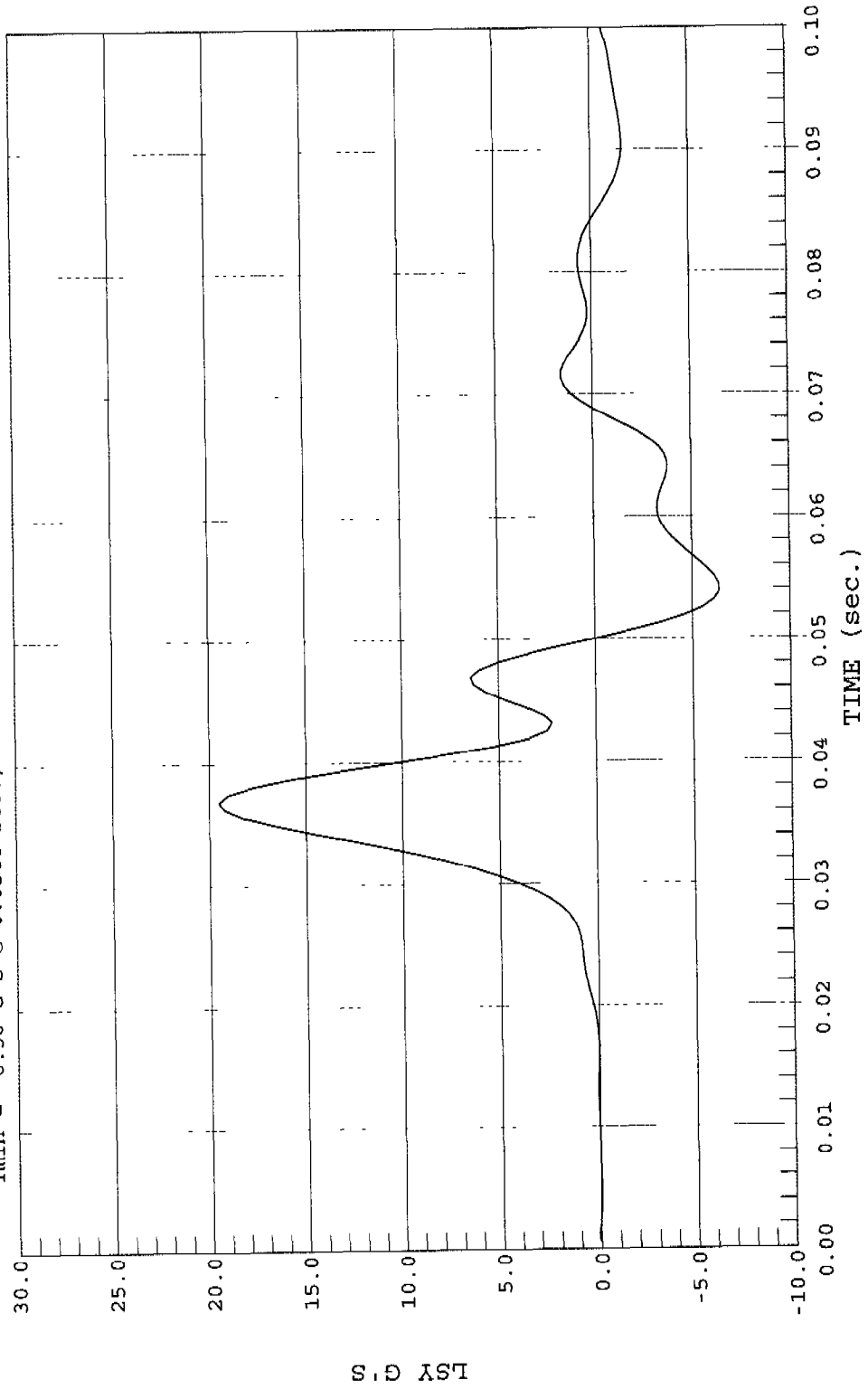
LOWER SPINE ACCELERATION

Test Desc.: Dummy Calibration - Thorax Impact
Component: Dummy #036
Test Date: 12-19-00
Speed: 14.03 FT/SEC, 4.28 M/SEC



1 LSY, D00562FI.R10

Ymin = -6.36 G'S @ 0.0544 sec., Ymax = 19.53 G'S @ 0.0369 sec.



MGA RESEARCH CORPORATION
PELVIS IMPACT TEST
SIDE IMPACT DUMMY (SID)

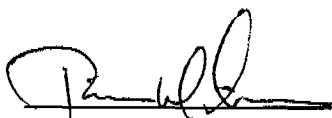
Date: 12/19/00

Dummy Serial Number: 036

Test Number: D001563

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	18.9 – 25.5	21.5°
Relative Humidity (%)	10 – 70	22%
Probe Speed (m/s)	4.27 – 4.33	4.28
Pelvis Acceleration (g's)	40 – 60	46

TEST MEETS SPECIFICATIONS

Technician: 

Approved By: David Winkelbauer

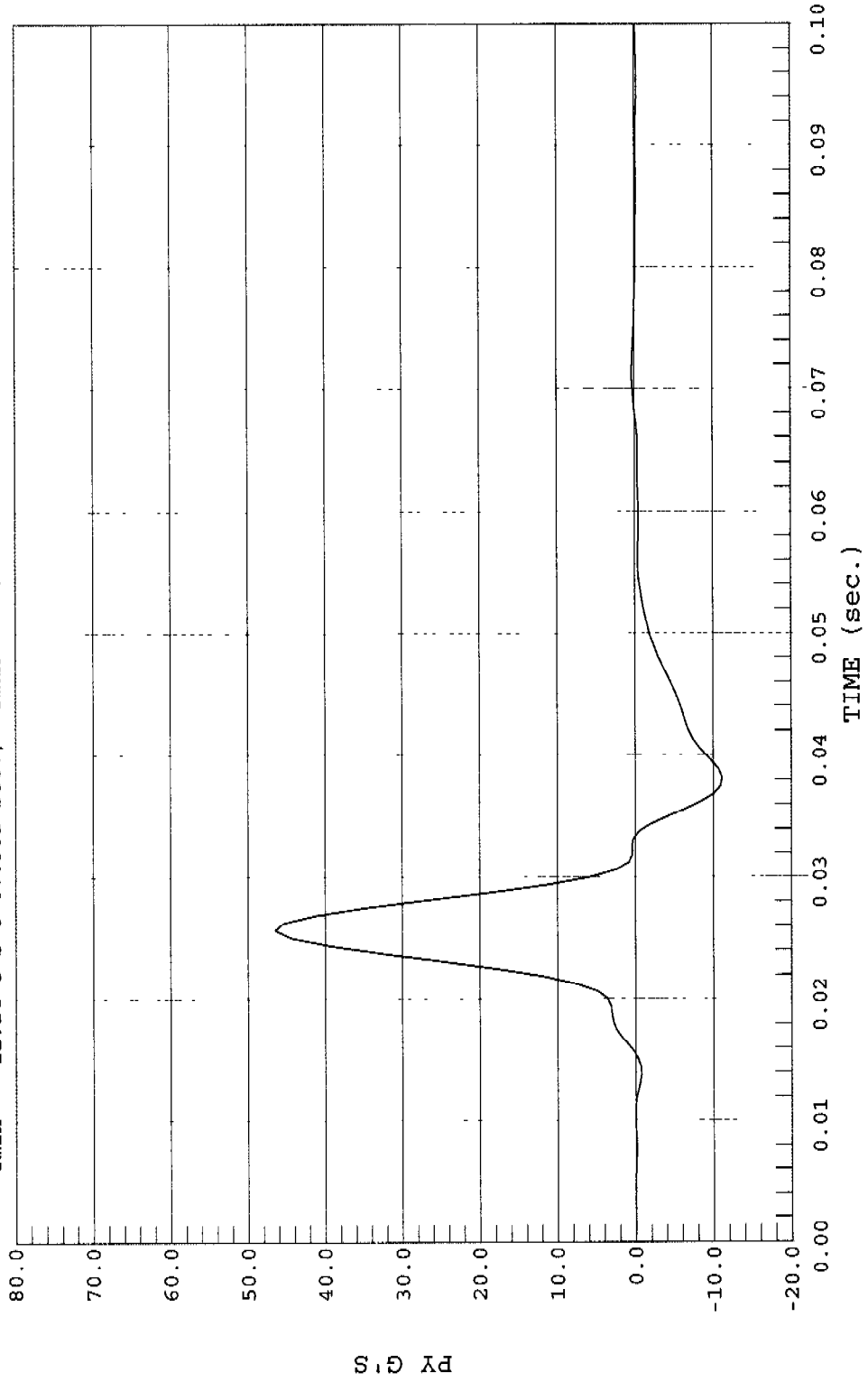
PELVIS ACCELERATION

Test Desc.: Dummy Calibration - Pelvis Impact
Component: Dummy #036
Test Date: 12-19-00
Speed: 14.06 FT/SEC, 4.28 M/SEC



1 PY, D00563FI.R11

Ymin = -11.14 G'S @ 0.0381 sec., Ymax = 46.47 G'S @ 0.0256 sec.



MGA RESEARCH CORPORATION
ABDOMINAL COMPRESSION TEST (PRELOAD = 10 LBS)
SIDE IMPACT DUMMY (SID)

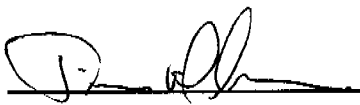
Date: 12/19/00

Dummy Serial Number: 036

Test Number: D001564

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	18.9 – 25.5	21.5°
Relative Humidity (%)	10 – 70	24%
Force @ 12.7 mm	104 – 162	144
Force @ 19 mm	163 – 222	197
Force @ 25.4 mm	222 – 280	267
Force @ 33 mm	325 - 391	356

TEST MEETS SPECIFICATIONS

Technician: 

Approved By: David W. Wuehler

MGA RESEARCH CORPORATION
LUMBAR FLEXION TEST
SIDE IMPACT DUMMY (SID)

Date: 12/19/00

Dummy Serial Number: 036

Test Number: D001565

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	18.9 – 25.5	21.5°
Relative Humidity (%)	10 – 70	24%
Force @ 0°	0 – 26.7	0
Force @ 20°	97.9 – 151.2	101.4
Force @ 30°	151.2 – 204.6	169.5
Force @ 40°	204.6 – 258.0	233.7
Return Angle	12° maximum	2°

TEST MEETS SPECIFICATIONS

Technician: 

Approved By: 

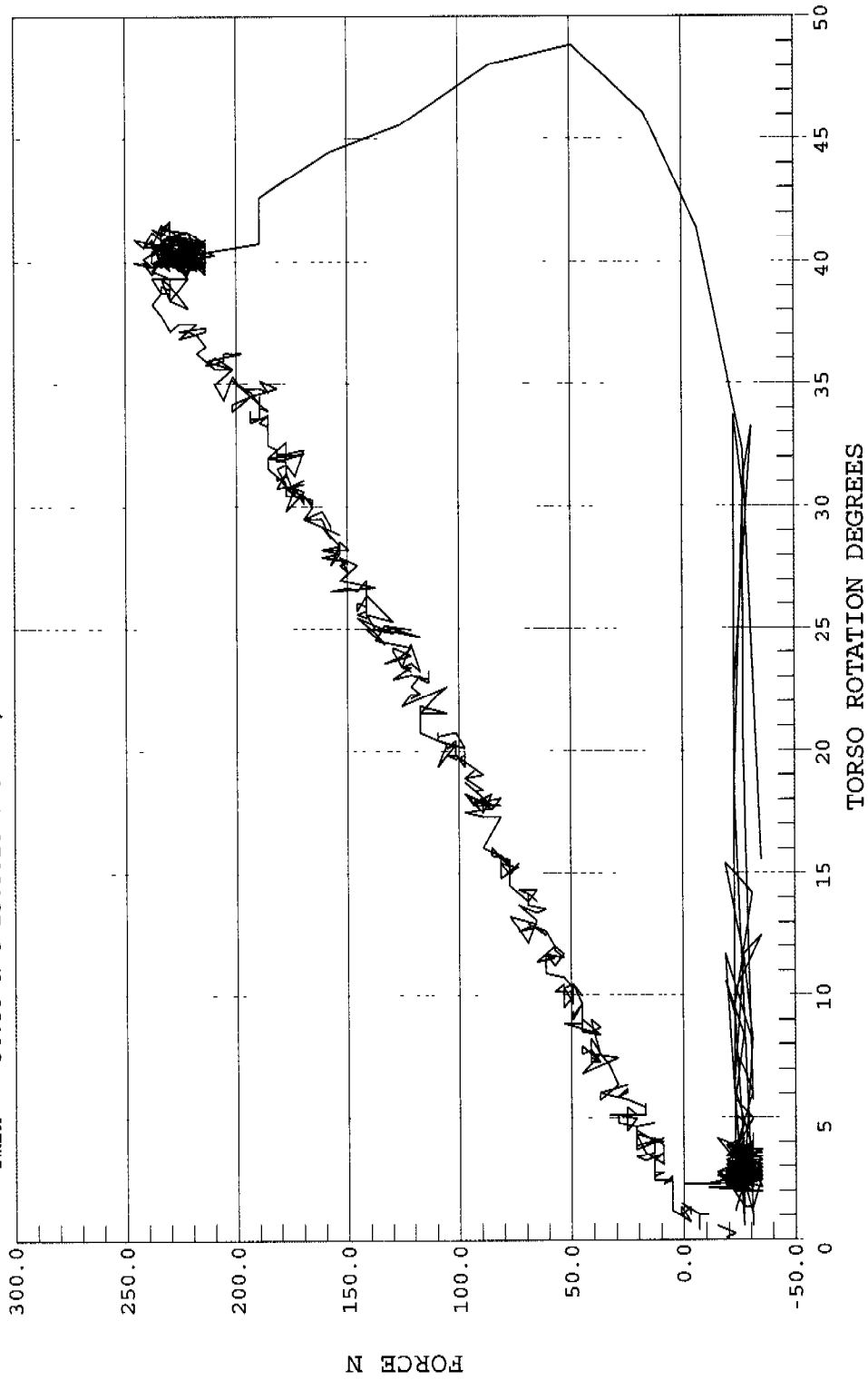


LUMBAR FLEXION

Test Desc.: DUMMY CALIBRATION - LUMBAR FLEXION
Component: DUMMY # 036
Test Date: 12-19-00
Speed: 0.00 FT/SEC, 0.00 M/SEC

1 FORCE, D00565FC.F14

Ymin = -34.99 N @ 15.5814 DEGREES, Ymax = 245.72 N @ 39.9606 DEGREES



DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Dummy Serial Number: 036

Inspected By: Tim Michnay

Date: 12/19/00

<u>Part</u>	<u>Items Checked</u>	<u>Comments</u>
Skin	visual inspection	OK
Head	visual, ballast, accelerometer mount	OK
Neck	visual	*
Spine box	visual, ballast, weldment, accelerometer mount	OK
Rib cage	visual, measure	OK
Sternum	visual	OK
Lumbar spine	visual	OK
Abdomen	visual	OK
Pelvis	visual, palpate, accelerometer mount	OK
Upper legs	visual	OK
Knees	visual	OK
Lower legs	visual, range of motion	OK
Ankles	visual, range of motion	OK
Feet	visual, range of motion	OK
Joints	1 to 2 g range	OK
Other		

Notes (include component/problem/action/reason):

* Rubber delaminating from metal. Neck replaced.

CERTIFICATION DATA

Dummy Serial Number: 037

Calibration Test Results Summary

Dummy Serial Number: 037

Post-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Dummy Serial Number: 037
Date of Verification: 12/19/00
Test Number: D00157

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH-Seated Height (mm)	889 – 909	901
RH-Rib Height (mm)	501 – 521	511
HP-Hip Pivot Height (mm)	99 ref.	99
RD-Rib From Back Line (mm)	229 - 241	236
KV-Knee Pivot From Back Line (mm)	511 – 526	520
SW-Knee Pivot to Floor (mm)	490 – 505	494
HW – Hip Width (mm)	356 – 391	380

Technician: 

Approved By: 

MGA RESEARCH CORPORATION
THORAX IMPACT TEST
SIDE IMPACT DUMMY (SID)

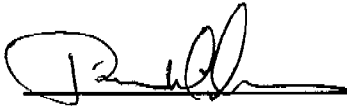
Date: 12/19/00

Dummy Serial Number: 037

Test Number: D01572

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	18.9 – 25.5	21.4°
Relative Humidity (%)	10 – 70	22%
Probe Speed (m/s)	4.27 – 4.33	4.29
Upper Rib (g's)	37 – 46	42
Lower Rib (g's)	37 – 46	46
Lower Spine (g's)	15 - 22	20

TEST MEETS SPECIFICATIONS

Technician: 

Approved By: 

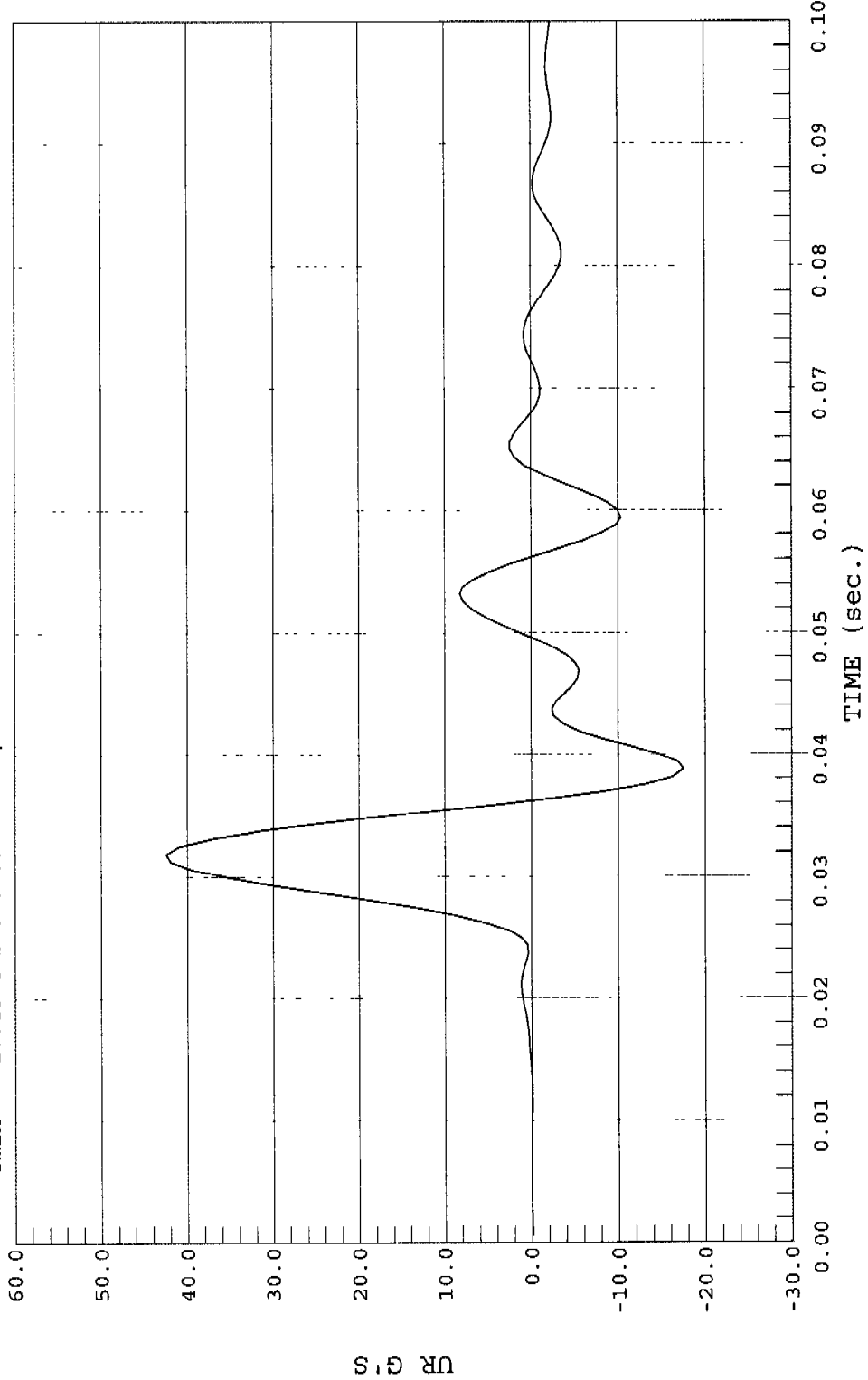
UPPER RIB ACCELERATION

Test Desc.: Dummy Calibration - Thorax Impact Test Date: 12-19-00
Component: Dummy #037 Speed: 14.08 FT/SEC, 4.29 M/SEC



— 1 UR, D00572FI.R08

Ymin = -17.48 G'S @ 0.0388 sec., Ymax = 42.49 G'S @ 0.0319 sec.



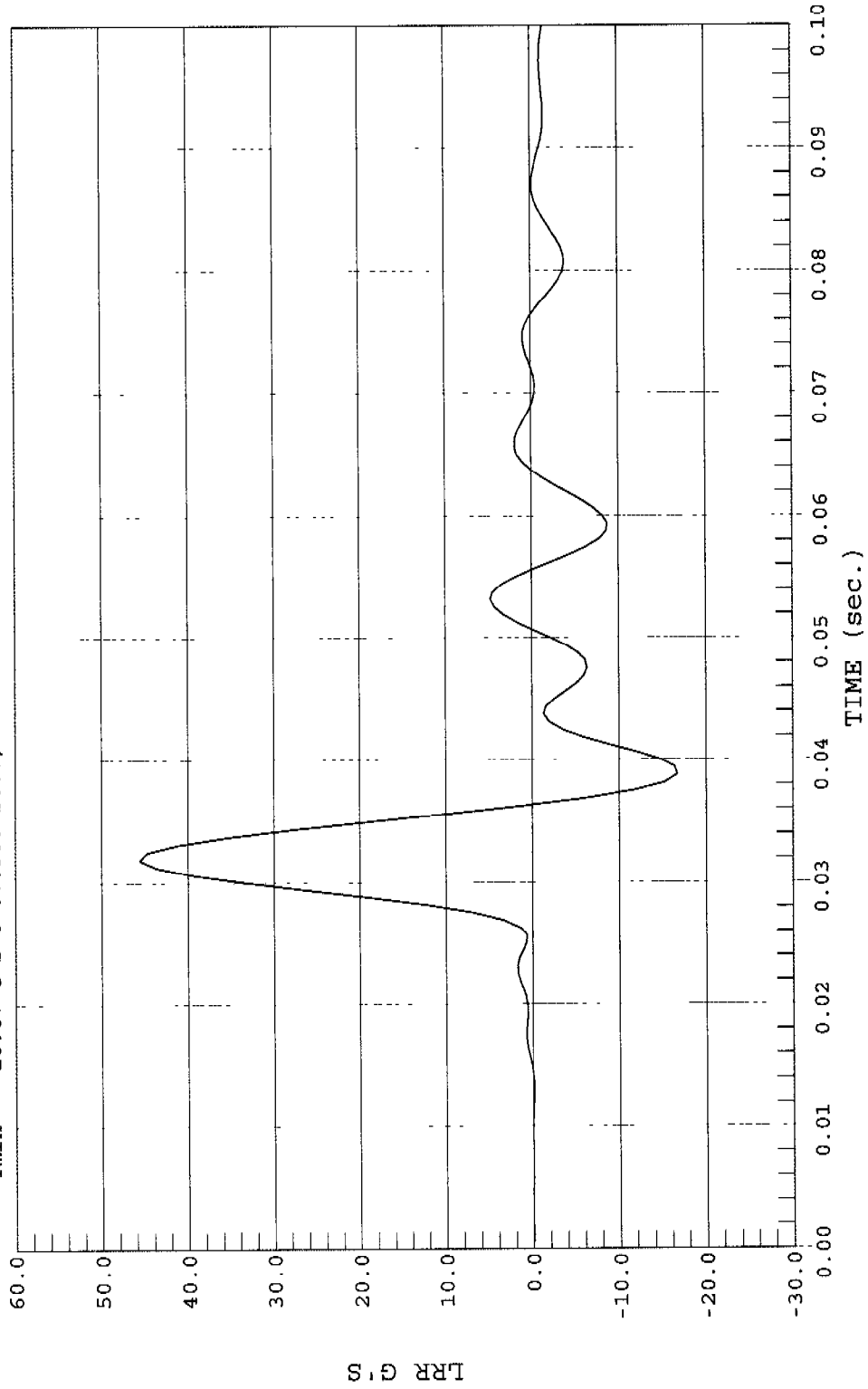
LOWER RIB ACCELERATION

Test Desc.: Dummy Calibration - Thorax Impact Test Date: 12-19-00
Component: Dummy #037 Speed: 14.08 FT/SEC, 4.29 M/SEC



1 LRR, D00572FI.R09

Ymin = -16.67 G'S @ 0.0388 sec., Ymax = 45.61 G'S @ 0.0319 sec.



LOWER SPINE ACCELERATION

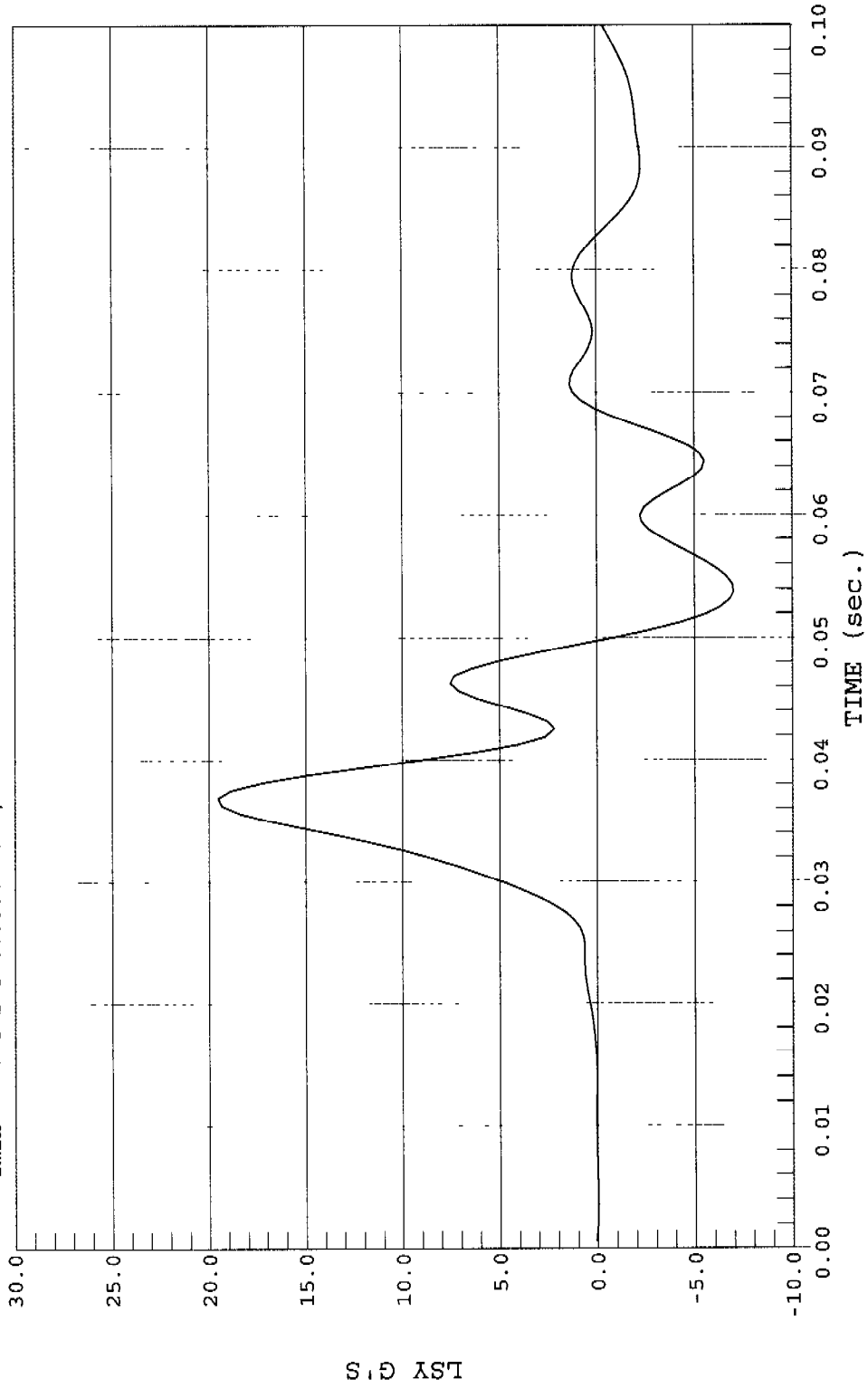
Test Desc.: Dummy Calibration - Thorax Impact
Component: Dummy #037

Test Date: 12-19-00
Speed: 14.08 FT/SEC, 4.29 M/SEC



1 LSY, D00572FI.R10

Ymin = -7 G'S @ 0.0538 sec., Ymax = 19.56 G'S @ 0.0369 sec.



MGA RESEARCH CORPORATION
PELVIS IMPACT TEST
SIDE IMPACT DUMMY (SID)

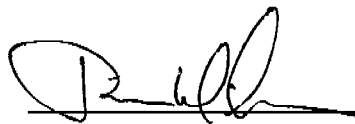
Date: 12/19/00

Dummy Serial Number: 037

Test Number: D001573

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	18.9 – 25.5	21.4°
Relative Humidity (%)	10 – 70	22%
Probe Speed (m/s)	4.27 – 4.33	4.30
Pelvis Acceleration (g's)	40 – 60	47

TEST MEETS SPECIFICATIONS

Technician: 

Approved By: David Winkelbauer

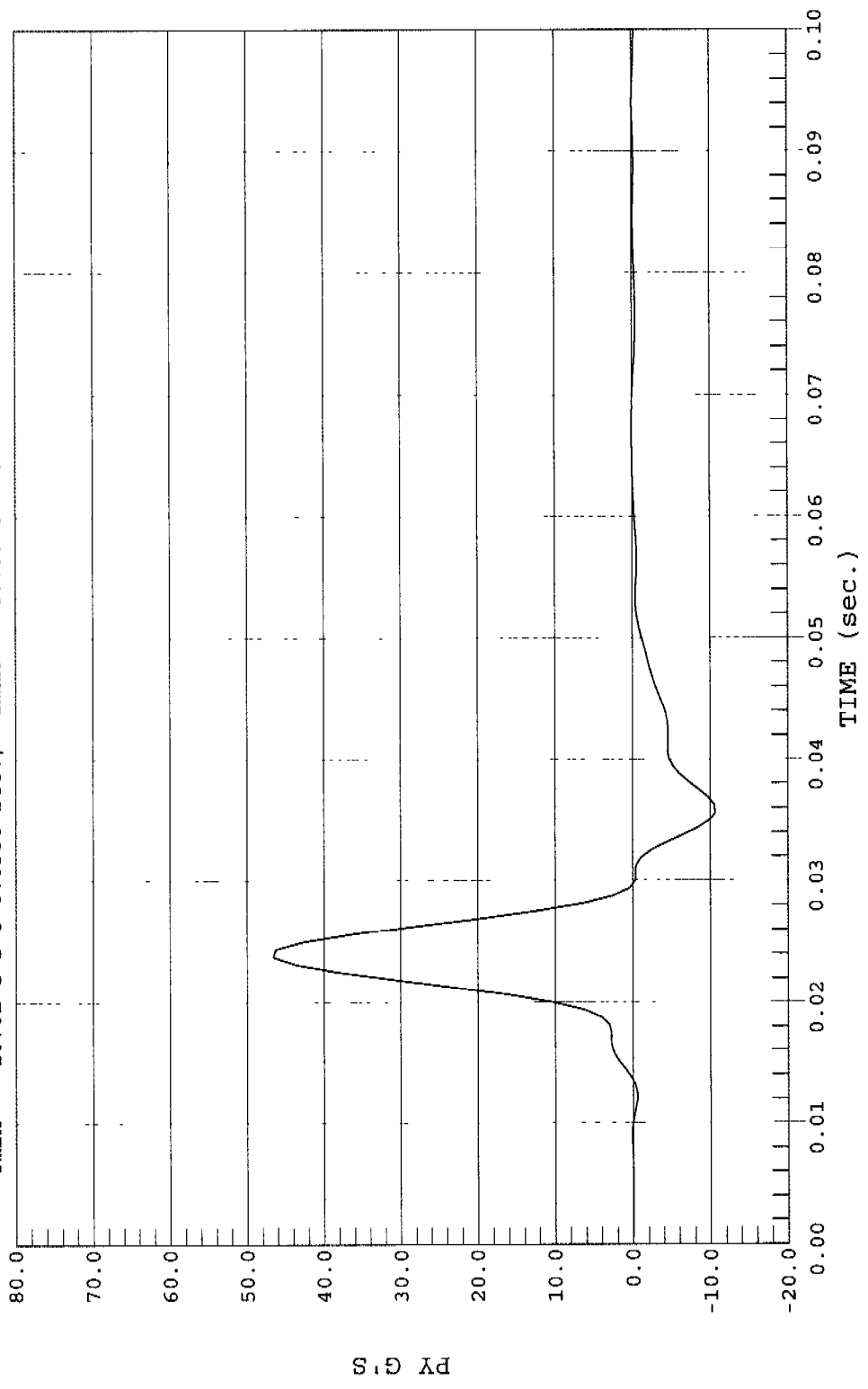
PELVIS ACCELERATION

Test Desc.: Dummy Calibration - Pelvis Impact Test Date: 12-19-00
Component: Dummy #037 Speed: 14.10 FT/SEC, 4.30 M/SEC



1 PY, D00573FI.R11

Ymin = -10.61 G'S @ 0.0356 sec., Ymax = 46.55 G'S @ 0.0238 sec.



MGA RESEARCH CORPORATION
ABDOMINAL COMPRESSION TEST (PRELOAD = 10 LBS)
SIDE IMPACT DUMMY (SID)

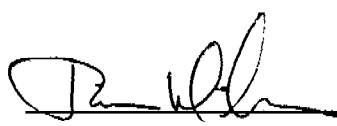
Date: 12/19/00

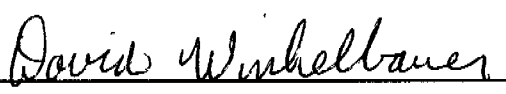
Dummy Serial Number: 037

Test Number: D001574

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	18.9 – 25.5	21.4°
Relative Humidity (%)	10 – 70	24%
Force @ 12.7 mm	104 – 162	135
Force @ 19 mm	163 – 222	185
Force @ 25.4 mm	222 – 280	244
Force @ 33 mm	325 - 391	336

TEST MEETS SPECIFICATIONS

Technician: 

Approved By: 

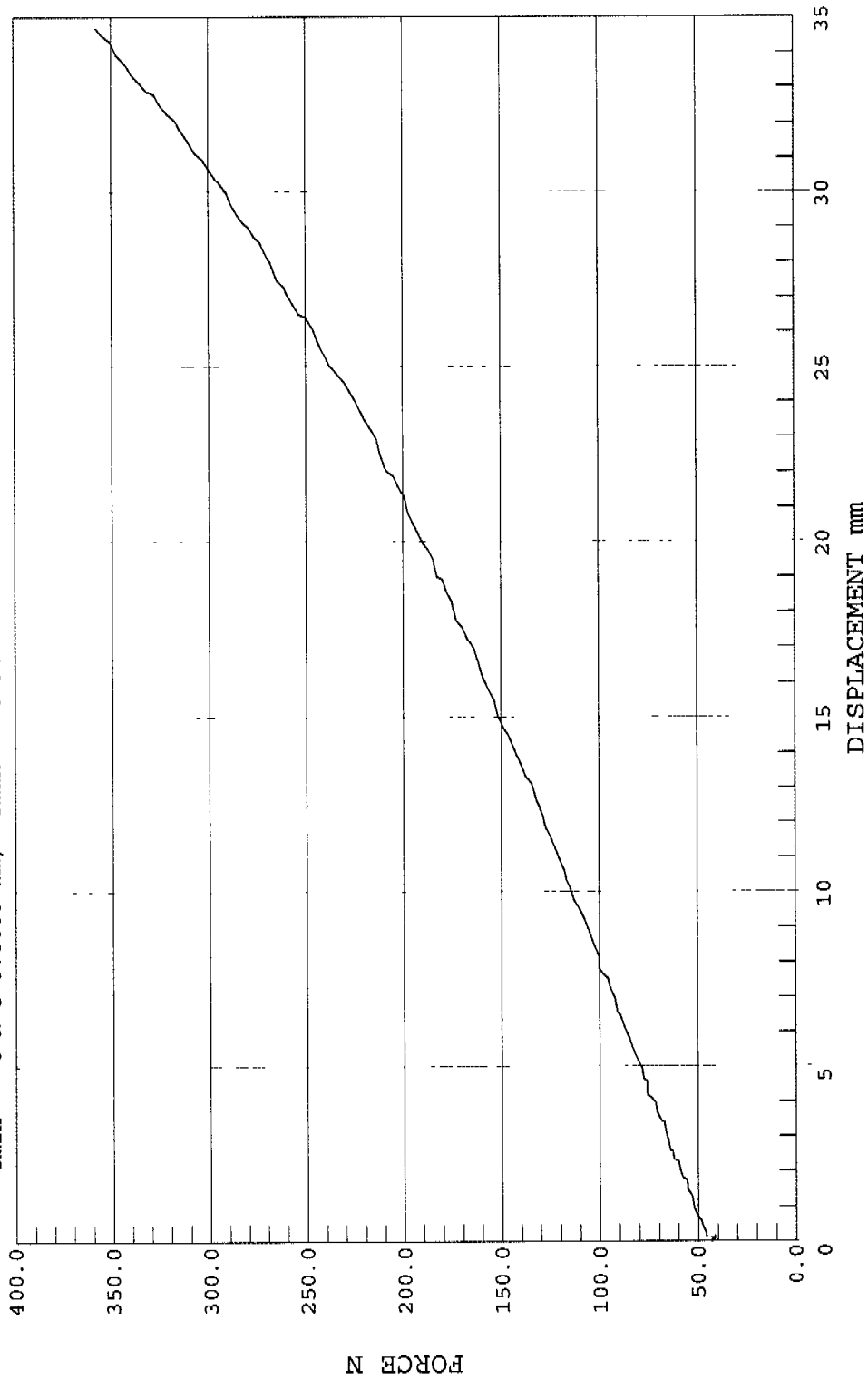
ABDOMEN COMPRESSION

Test Desc.: DUMMY CALIBRATION - ABDOMEN COMPRESSION Test Date: 12-19-00
Component: DUMMY # 037 Speed: 0.00 FT/SEC, 0.00 M/SEC



— 1 FORCE, D00574FC.F16

Ymin = 0 N @ 0.0000 mm, Ymax = 529.11 N @ 44.3655 mm



MGA RESEARCH CORPORATION
LUMBAR FLEXION TEST
SIDE IMPACT DUMMY (SID)

Date: 12/19/00

Dummy Serial Number: 037

Test Number: D001575

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	18.9 – 25.5	21.4°
Relative Humidity (%)	10 – 70	24%
Force @ 0°	0 – 26.7	0
Force @ 20°	97.9 – 151.2	110.0
Force @ 30°	151.2 – 204.6	182.3
Force @ 40°	204.6 – 258.0	250.5
Return Angle	12° maximum	5°

TEST MEETS SPECIFICATIONS

Technician: 

Approved By: 

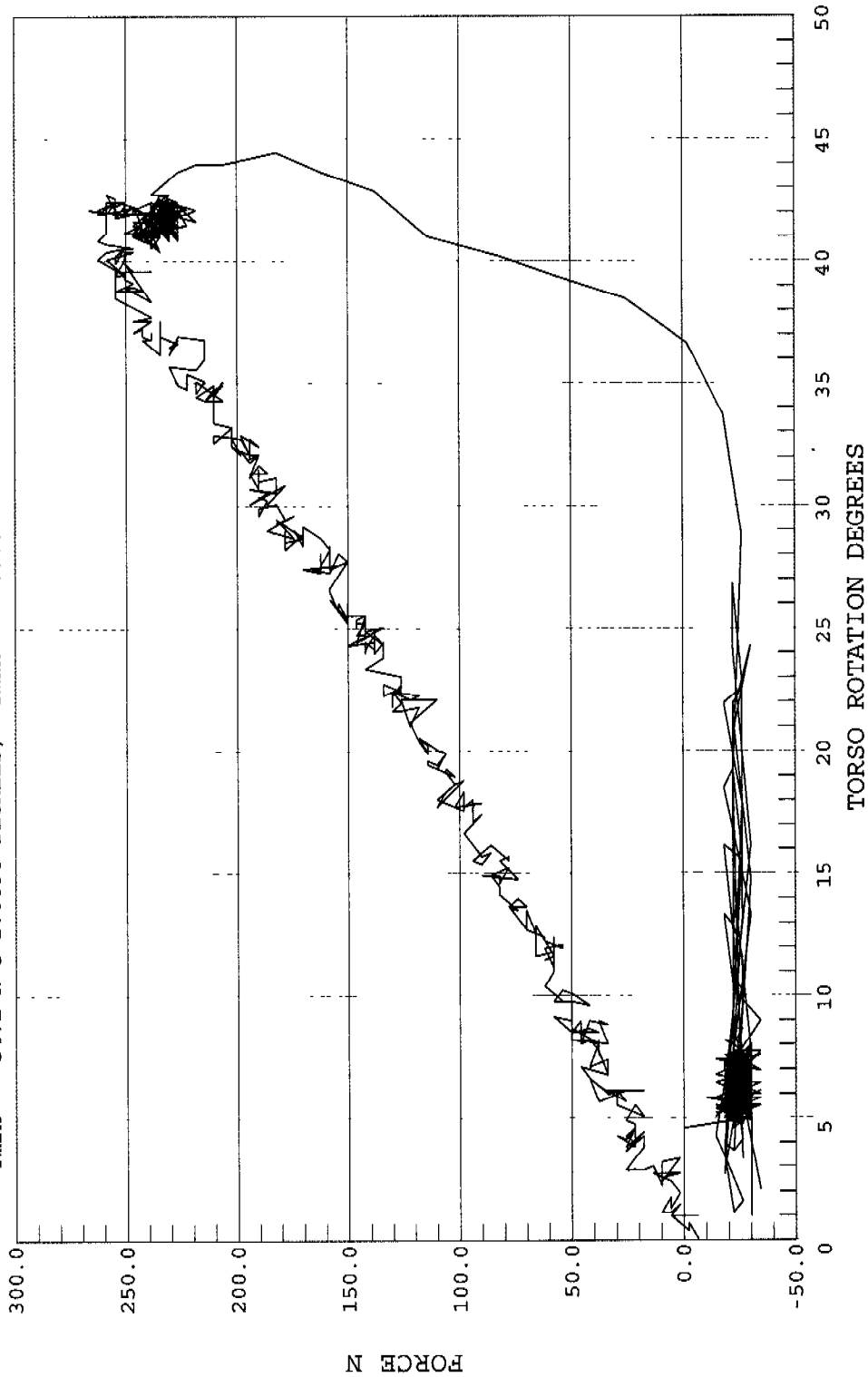


LUMBAR FLEXION

Test Desc.: DUMMY CALIBRATION - LUMBAR FLEXION
Component: DUMMY # 037
Test Date: 12-19-00
Speed: 0.00 FT/SEC, 0.00 M/SEC

— 1 FORCE, D00575FC.F14

Ymin = -34.2 N @ 2.0895 DEGREES, Ymax = 266.53 N @ 42.0964 DEGREES



DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Dummy Serial Number: 037

Inspected By: Tim Michnay

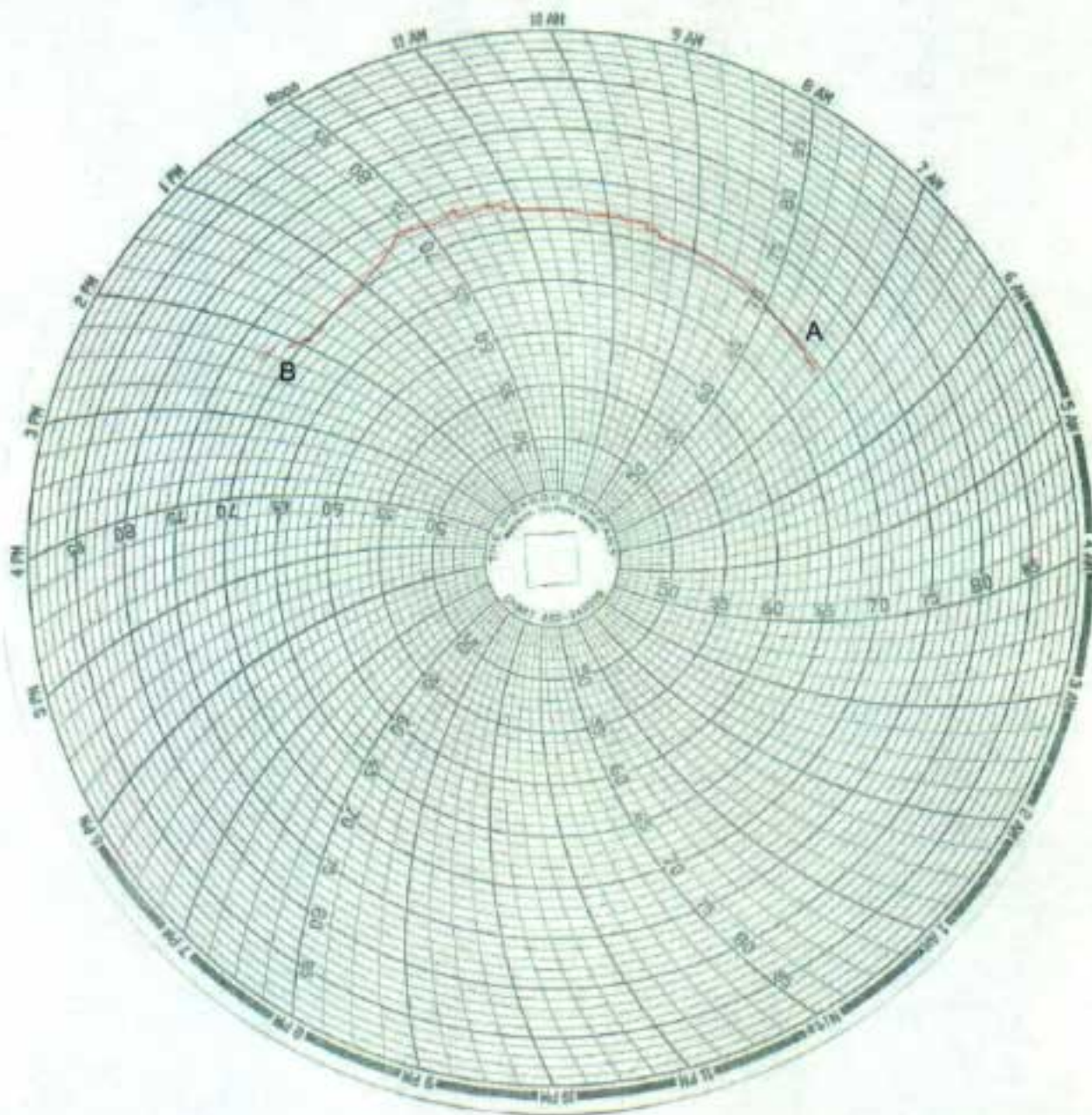
Date: 12/19/00

<u>Part</u>	<u>Items Checked</u>	<u>Comments</u>
Skin	visual inspection	OK
Head	visual, ballast, accelerometer mount	OK
Neck	visual	*
Spine box	visual, ballast, weldment, accelerometer mount	OK
Rib cage	visual, measure	OK
Sternum	visual	OK
Lumbar spine	visual	OK
Abdomen	visual	OK
Pelvis	visual, palpate, accelerometer mount	OK
Upper legs	visual	OK
Knees	visual	OK
Lower legs	visual, range of motion	OK
Ankles	visual, range of motion	OK
Feet	visual, range of motion	OK
Joints	1 to 2 g range	OK
Other		

Notes (include component/problem/action/reason):

* Rubber delaminating from metal. Neck replaced.

VEHICLE AND DUMMY TEMPERATURE



A = Dummies installed in vehicle at 7:22 a.m.

B = Test conducted at 2:27 p.m.

APPENDIX D
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

DUMMY AND VEHICLE CALIBRATION DATA

	INSTRUMENTS FOR DRIVER DUMMY NO. 036		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib Y	J33416	Endevco	11/16/00
Lower Rib Y	J11361	Endevco	10/3/00
Lower Spine Y	AMP12	Endevco	11/17/00
Pelvis Y	J10411	Endevco	10/2/00
Upper Rib Redundant Y	AHTB2	Endevco	11/16/00
Lower Rib Redundant Y	J12465	Endevco	10/3/00
Lower Spine Redundant Y	AGWA4	Endevco	11/17/00
Pelvis Redundant Y	ALEC1	Endevco	10/2/00
Head Center of Gravity X	ACC81	Endevco	10/3/00
Head Center of Gravity Y	AMTB8	Endevco	10/3/00
Head Center of Gravity Z	AP1Y1	Endevco	10/3/00

	INSTRUMENTS FOR PASSENGER DUMMY NO. 037		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib Y	AN8M6	Endevco	11/17/00
Lower Rib Y	ALEJ1	Endevco	10/2/00
Lower Spine Y	ALDY8	Endevco	11/17/00
Pelvis Y	AGP28	Endevco	8/31/00
Upper Rib Redundant Y	AN8P9	Endevco	11/17/00
Lower Rib Redundant Y	ALDP3	Endevco	10/2/00
Lower Spine Redundant Y	AP0E1	Endevco	11/17/00
Pelvis Redundant Y	AJ8T5	Endevco	8/31/00
Head Center of Gravity X	ALFP1	Endevco	9/19/00
Head Center of Gravity Y	AP179	Endevco	9/19/00
Head Center of Gravity Z	AHTY4	Endevco	9/19/00

VEHICLE INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Moving Barrier CG X	E10-F10	Entran	9/12/00
Moving Barrier CG Y	D05-R08	Entran	9/12/00
Moving Barrier CG Z	K16-X06	Entran	9/12/00
Moving Barrier Rear Axle X	K19-A15	Entran	7/11/00
Moving Barrier Rear Axle Y	G13-F10	Entran	8/14/00
Left Mid A-Post Y	C18-G12	Entran	8/8/00
Left Lower A-Post Y	G01-J12	Entran	9/12/00
Left Mid B-Post Y	I25-J02	Entran	9/14/00
Left Lower B-Post Y	F07-A14	Entran	8/18/00
Rear Floorpan Above Axle X	I25-F05	Entran	11/15/00
Rear Floorpan Above Axle Y	F11-G09	Entran	9/14/00
Rear Floorpan Above Axle Z	F20-G11	Entran	9/14/00
Driver Seat Track Y	F18-G13	Entran	10/4/00
Right Side Sill at Front Seat X	I25-F10	Entran	11/15/00
Right Side Sill at Front Seat Y	I25-F12	Entran	11/15/00
Right Side Sill at Front Seat Z	G13-B14	Entran	9/14/00
Right Side Sill at Rear Seat X	D06-A03	Entran	8/15/00
Right Side Sill at Rear Seat Y	C14-Z07	Entran	8/15/00
Right Side Sill at Rear Seat Z	C05-Z13	Entran	8/15/00
Left Side Sill at Front Seat Y	I25-F14	Entran	11/15/00
Left Side Sill at Rear Seat Y	I25-F03	Entran	11/15/00
Right Rear Occupant Compartment Y	A09-G02	Entran	9/12/00
Vehicle CG X	I18-E02	Entran	8/18/00
Vehicle CG Y	J16-F02	Entran	11/17/00
Vehicle CG Z	H02-J04	Entran	9/14/00

Note: All Endevco accelerometers are Model No. 7264-2000

All Entran accelerometers are Model No. EGE-72