REPORT NUMBER: SLED-MGA-2001-006

CHILD RESTRAINT SYSTEM IN DYNAMIC SLED TEST

TEST NUMBER: H01252

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

August 16, 2001

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
400 SEVENTH STREET, SW, ROOM 5311
WASHINGTON, D.C. 20590

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-01-D-12005.

Prepared by: _____ Date: _____
Chad Gadberry, Project Engineer

Reviewed by: _____ Date: _____
David Winkelbauer, Facility Director

FINAL REPORT ACCEPTED BY:

_____
Manager, New Car Assessment Program

_____
Date of Acceptance

_____
COTR, NCAP Frontal Impact Program

_____
Date of Acceptance

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SECTION 1

PURPOSE AND TEST PROCEDURE

1.1 PURPOSE

This dynamic sled testing is part of the FY' 01 New Car Assessment Program (NCAP) sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract Number DTNH22-01-D-12005. The purpose of this test is to obtain child seat research data for frontal dynamic testing.

1.2 TEST PROCEDURE

This frontal dynamic sled test was conducted in accordance with the child restraint test procedure provided by the Office of Crashworthiness Standards (OCS), New Car Assessment Program (NCAP).

The test was conducted at MGA Research Corporation on August 16, 2001 at a speed of 55.7 kph (34.6 mph). The FMVSS No. 213 sled pulse was used as a crash pulse. The requirements specified in the FMVSS No. 213 were also followed.

The bench seat contained one anthropomorphic test device (ATD). One (1) Part 572P 3 year old ATD was instrumented with head, chest, and pelvic tri-axial accelerometers, and upper and lower neck load cells. The child ATD was positioned according to the child seat manufacturer's instructions. The data was digitally sampled at 10,000 samples per second and processed per Section IP11 of the Laboratory Test Procedure.

SECTION 2

CHILD RESTRAINT INFORMATION

Test No: H01252 Test Date: August 16, 2001

Child Restraint Type (forward-facing, rear-facing, booster)	Forward-Facing
LATCH or NON-LATCH	Non-Latch
Child Restraint Manufacturer	Century
Child Restraint Model	Smart Move
Child Restraint Age Limits	Toddler
Child Restraint Weight Limits (Forward) (kg)	18.1
Child Restraint Weight Limits (Rearward) (kg)	13.6
Weight of Child Restraint (kg)	8.6

SECTION 3

POST-TEST OBSERVATIONS

Test No: H01252 Test Date: August 16, 2001

Child Seat	Century Smart Move
Belt Fraying	No
Stress Marks	No
Cracks	No
Buckle Stress	No
Latch Hooks	No

SECTION 4

HYBRID III 3 YEAR OLD ATD INJURY CRITERIA AND SENSOR DATA

Test No: H01252 Test Date: August 16, 2001

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Left Rear Passenger			
			Max	Time	Min	Time
Head CG	X	G's	29.8	201	51.8	95
Head CG	Y	G's	10.5	99	41.5	95
Head CG	Z	G's	46.6	76	0.8	19
Head CG Resultant	N/A	G's	75.4	95		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Left Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	G's	15.3	219	38.4	58
Chest CG	Y	G's	5.8	54	6.1	86
Chest CG	Z	G's	9.2	114	20.0	92
Chest CG Resultant	N/A	G's	40.3	58		

SEAT BELT SENSOR PEAK VALUES

Location	Axis	Units	Left Rear Passenger			
			Max	Time	Min	Time
Tether Belt	N/A	Newtons	1951	71		
Shoulder Belt	N/A	Newtons	108	63		
Lap Belt	N/A	Newtons	4833	68		

HEAD INJURY CRITERIA (HIC)

Location	Left Rear Passenger			
	HIC	Avg G's	T^1	T^2
Head CG Primary (36 msec)	523	46.2	65.7	101.7
Head CG Primary (15 msec)	234	47.5	70.7	85.7

CHEST CLIP (3 MSEC)

Location	Left Rear Passenger		
	Clip	T^1	T^2
Chest CG Primary	38.9	56.7	59.7

HYBRID III 3 YEAR OLD ATD INJURY CRITERIA AND SENSOR DATA...(continued)

Test No: H01252 Test Date: August 16, 2001

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	Left Rear Passenger			
			Max	Time	Min	Time
Pelvis	X	G's	19.9	148	51.2	54
Pelvis	Y	G's	4.8	146	12.2	92
Pelvis	Z	G's	8.4	127	31.1	92

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Left Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	75	185	712	111
Neck Force	Y	Newtons	146	206	147	117
Neck Force	Z	Newtons	1225	74	123	220
Neck Moment	X	Nm	7.1	75	9.8	107
Neck Moment	Y	Nm	3.6	181	10.5	55
Neck Moment	Z	Nm	8.4	219	3.4	184

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Left Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	171	189	1074	107
Neck Force	Y	Newtons	131	207	219	113
Neck Force	Z	Newtons	680	74	53	107
Neck Moment	X	Nm	15.9	207	26.5	118
Neck Moment	Y	Nm	103.1	112	10.0	191
Neck Moment	Z	Nm	8.2	240	14.5	104

CHEST PEAK DISPLACEMENTS

Location	Axis	Units	Left Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	mm			*	*

* No Valid Data Collected

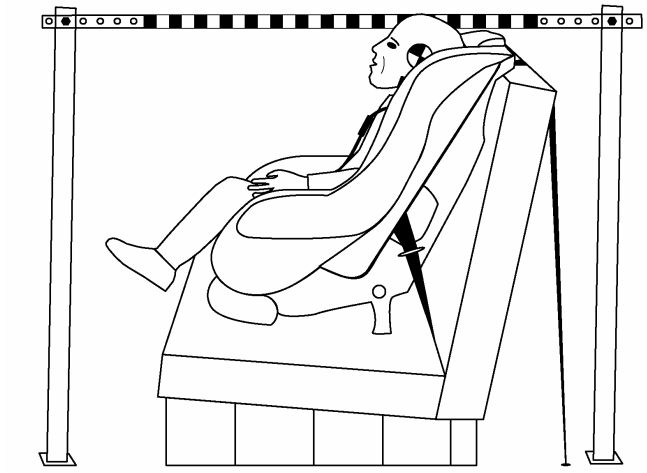
SECTION 5

SLED TEST SET-UP

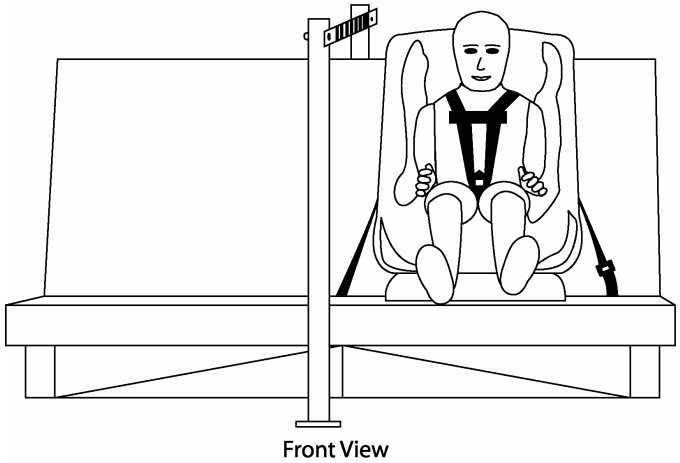
Test No: H01252 Test Date: August 16, 2001

An FMVSS 213 test bench was fixtured on the sled in order to simulate a frontal impact. One child seat was placed on the bench and fastened in a manner suggested in the owner=s manual of the child seat. Modifications were made to the bench to accommodate the top tether and, if installed on the child seat, lower anchors. A row of inch-reference tape was placed on the sled to make it possible to obtain dummy excursion measurements.

Pre-Test Infant & Car Seat Positions



Left Side View



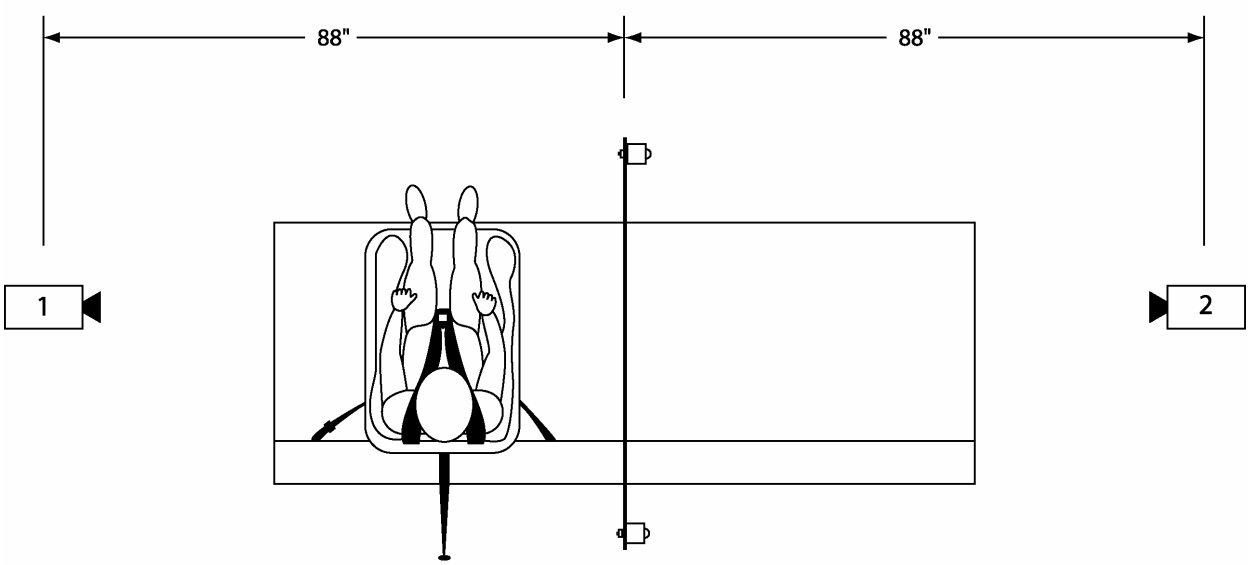
Front View

SECTION 6

CAMERA LOCATION

Test No: H01252 Test Date: August 16, 2001

There were two cameras mounted onto the sled carriage for views of the left and right side of the child seat.



Top View

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PHOTOGRAPHS

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Photo 1 - Pre-Test Front View

Photo 2 - Post-Test Front View

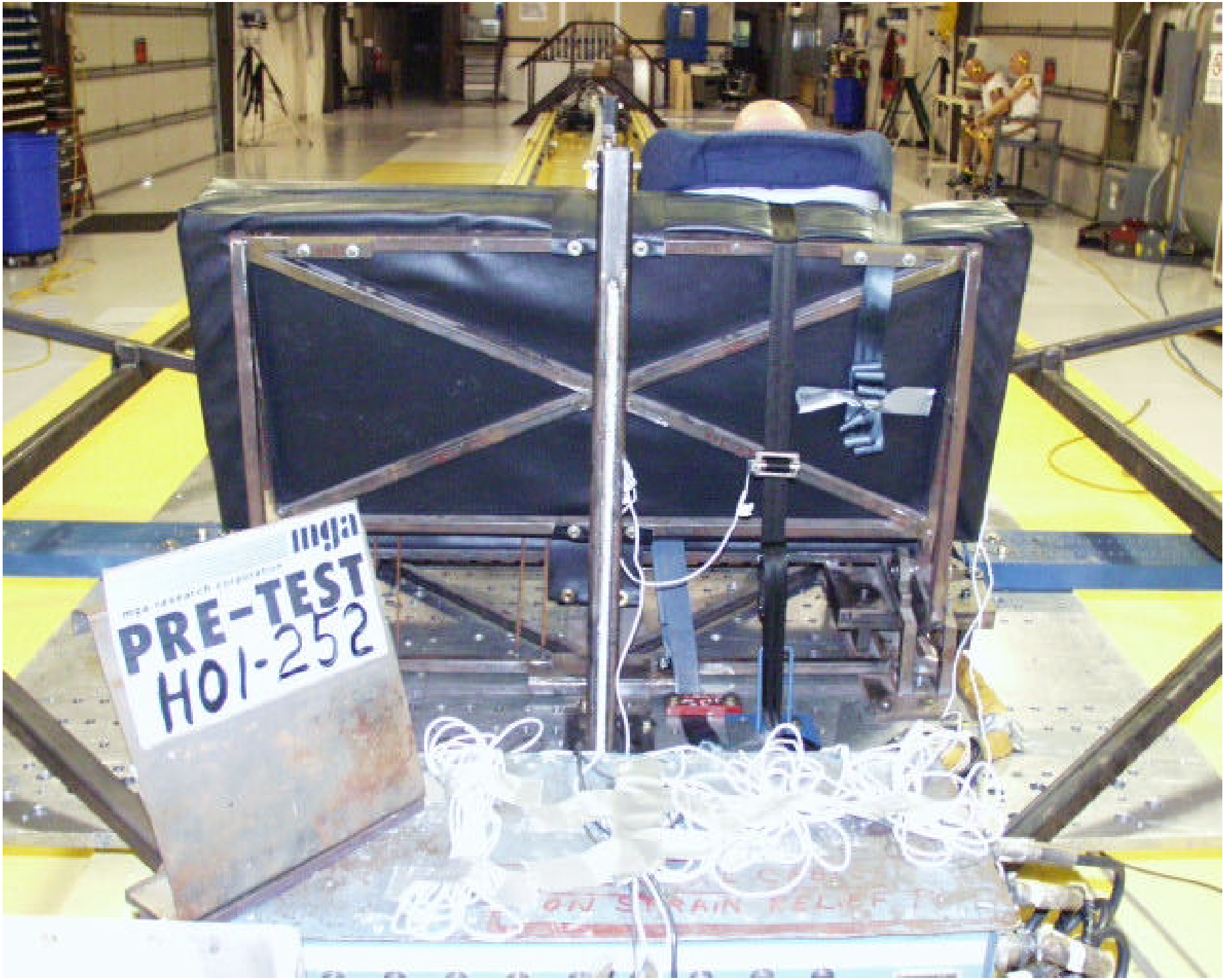


Photo 3 - Pre-Test Rear View

Photo 4 - Post-Test Rear View

Photo 5 - Pre-Test Left Side View

Photo 6 - Post-Test Left Side View

Photo 7 - Pre-Test Right Side View

Photo 8 - Post-Test Right Side View

Photo 9 - Pre-Test Fixture

Photo 10 - Post-Test Fixture

Photo 11 – Post-Test Front View of Child Seat

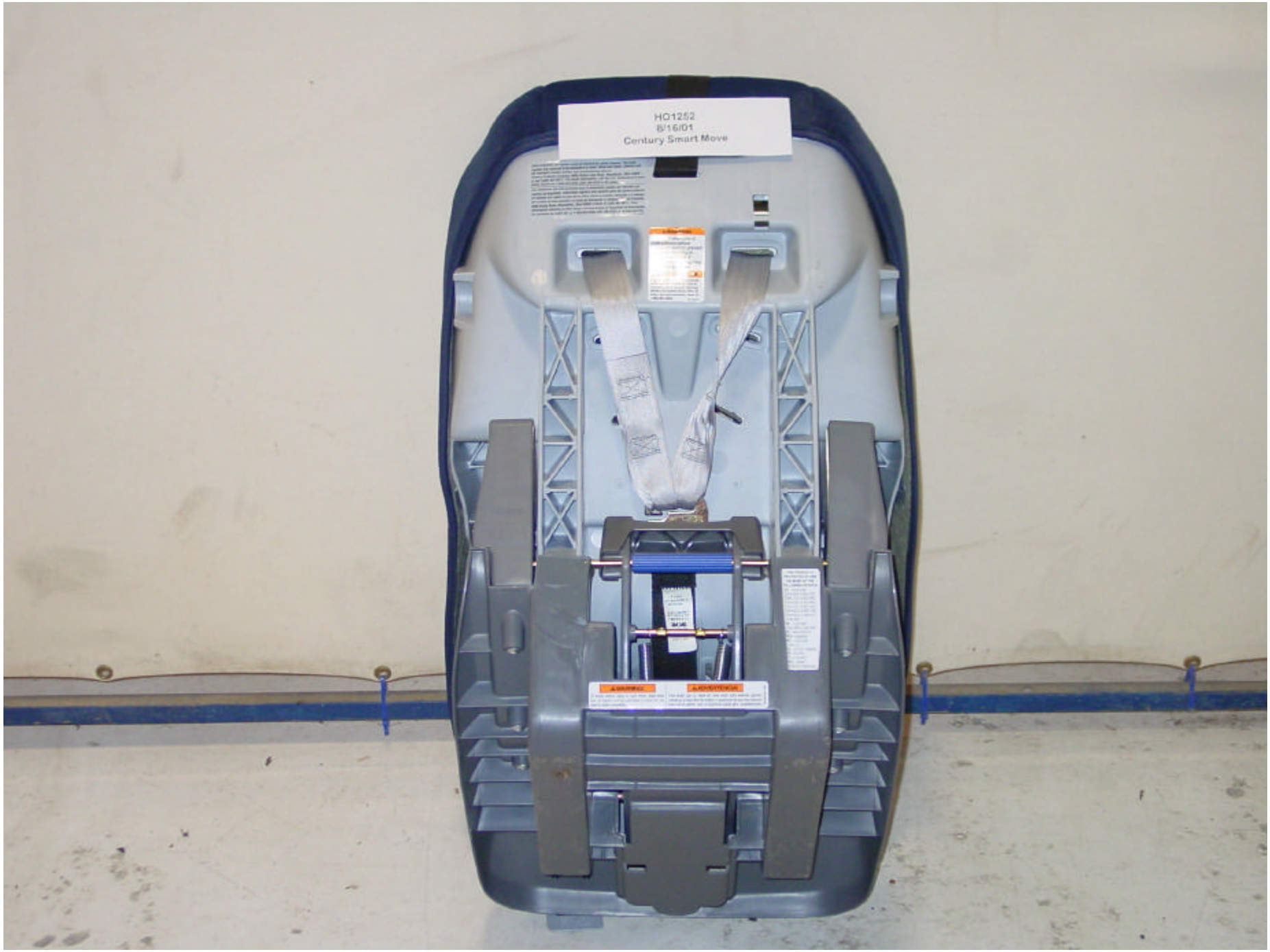


Photo 12 – Post-Test Rear View of Child Seat

Photo 13 – Post-Test Left View of Child Seat

Photo 14 – Post-Test Right View of Child Seat

SECTION 8
DATA PLOTS

TABLE OF DATA PLOTS

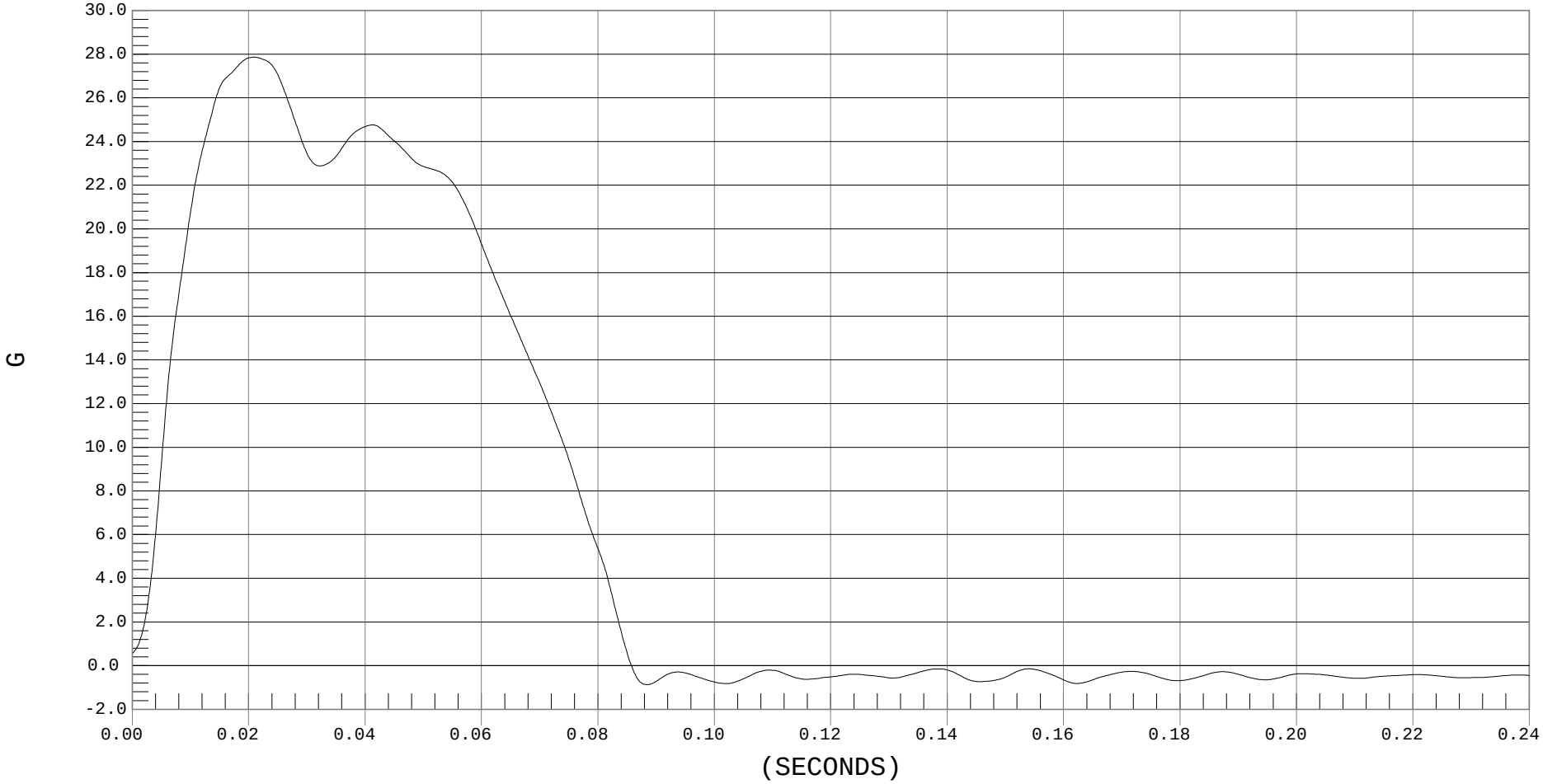
SLED X ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 60

1 SLED X ACCELERATION, H01252AF.A01

Ymin = -.87 G @ 0.0883 SECONDS, Ymax = 27.86 G @ 0.0209 SECONDS



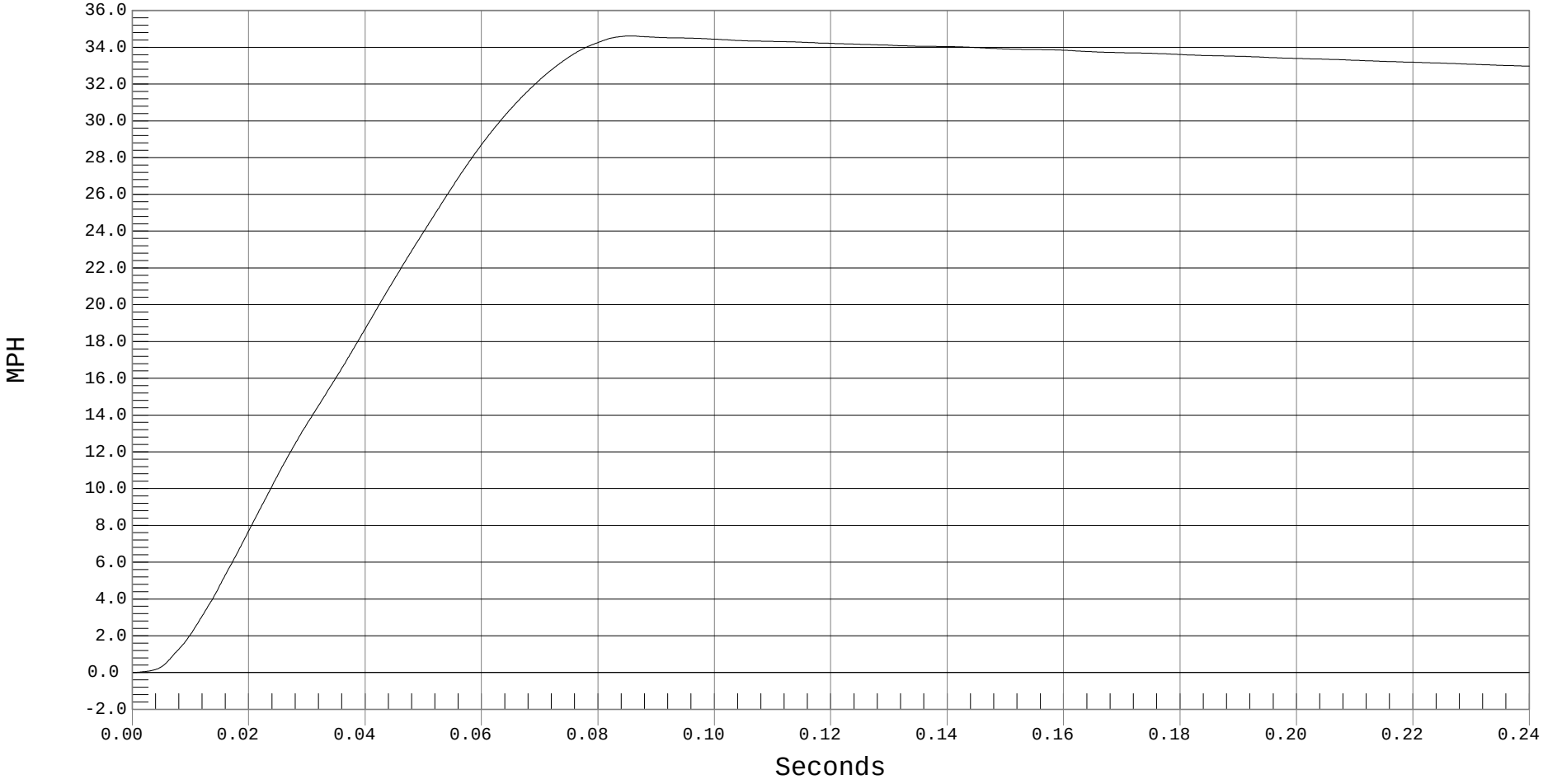
SLED X VELOCITY

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 180

1 SLED X VELOCITY, H01252AI.V01

Ymin = 0 MPH @ 0.0000 Seconds, Ymax = 34.61 MPH @ 0.0855 Seconds



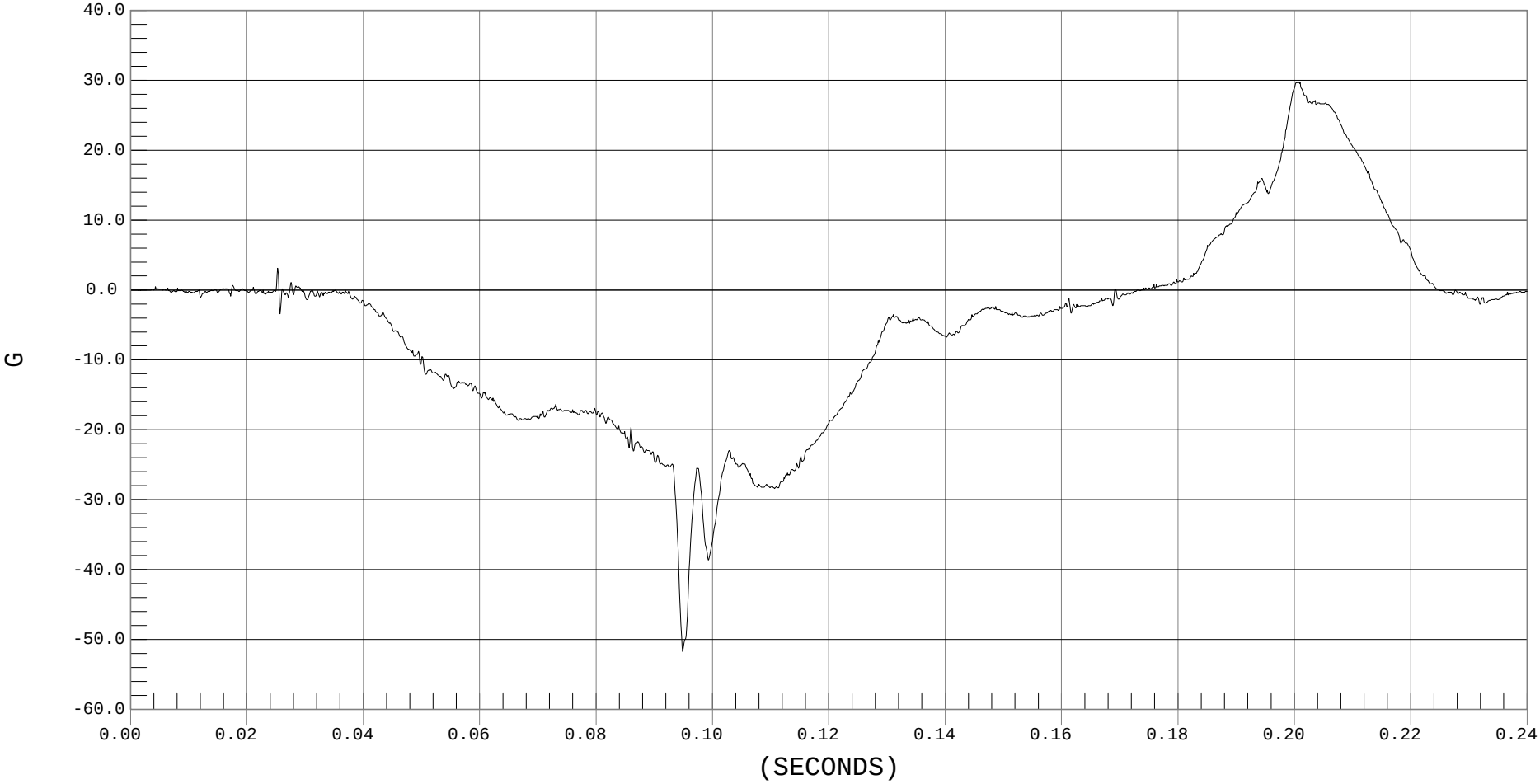
HEAD X ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 1000

1 HEAD X, H01252AT.A03

Ymin = -51.76 G @ 0.0948 SECONDS, Ymax = 29.76 G @ 0.2007 SECONDS



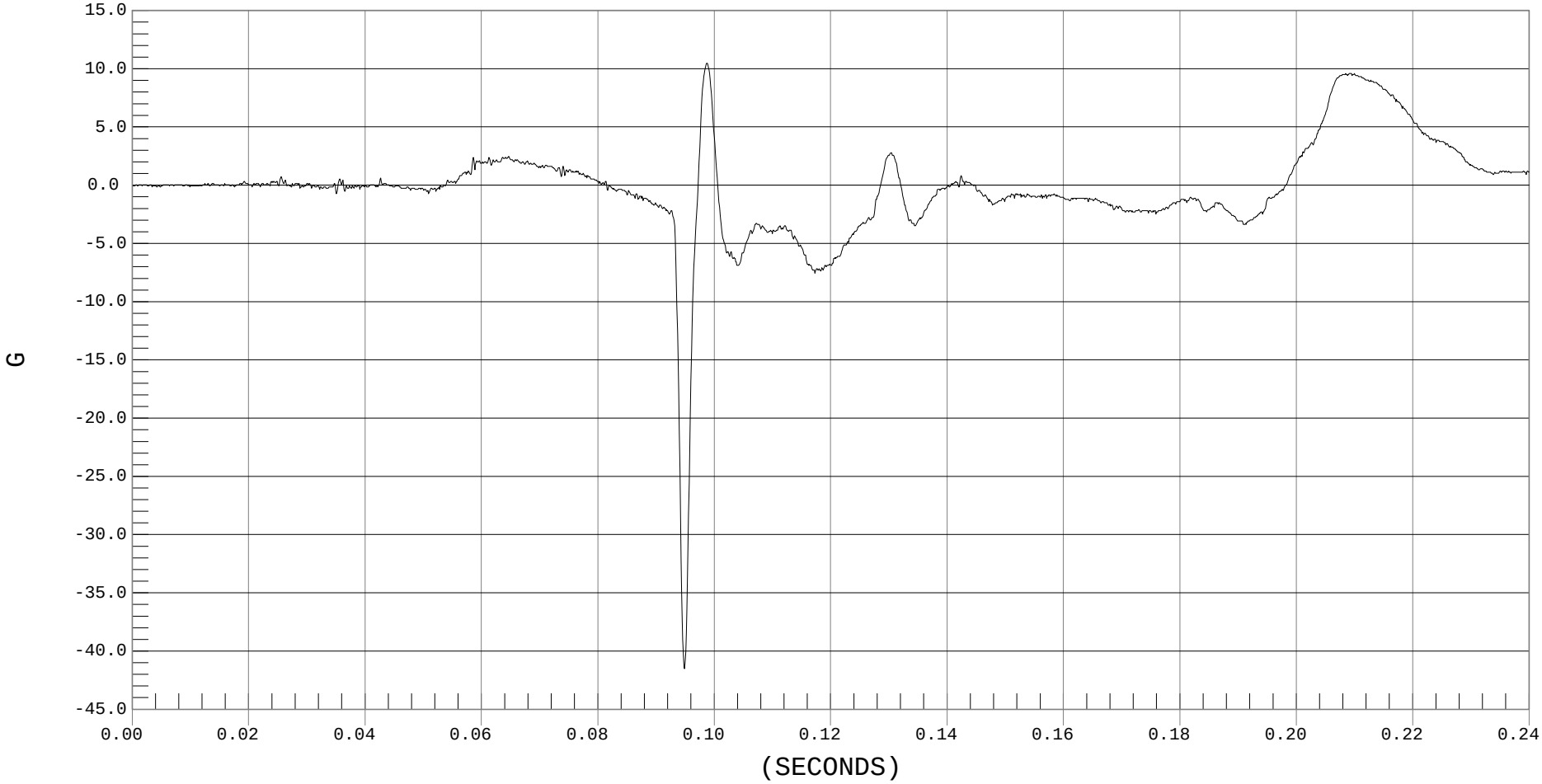
HEAD Y ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 1000

1 HEAD Y, H01252AT.A05

Ymin = -41.52 G @ 0.0948 SECONDS, Ymax = 10.48 G @ 0.0986 SECONDS



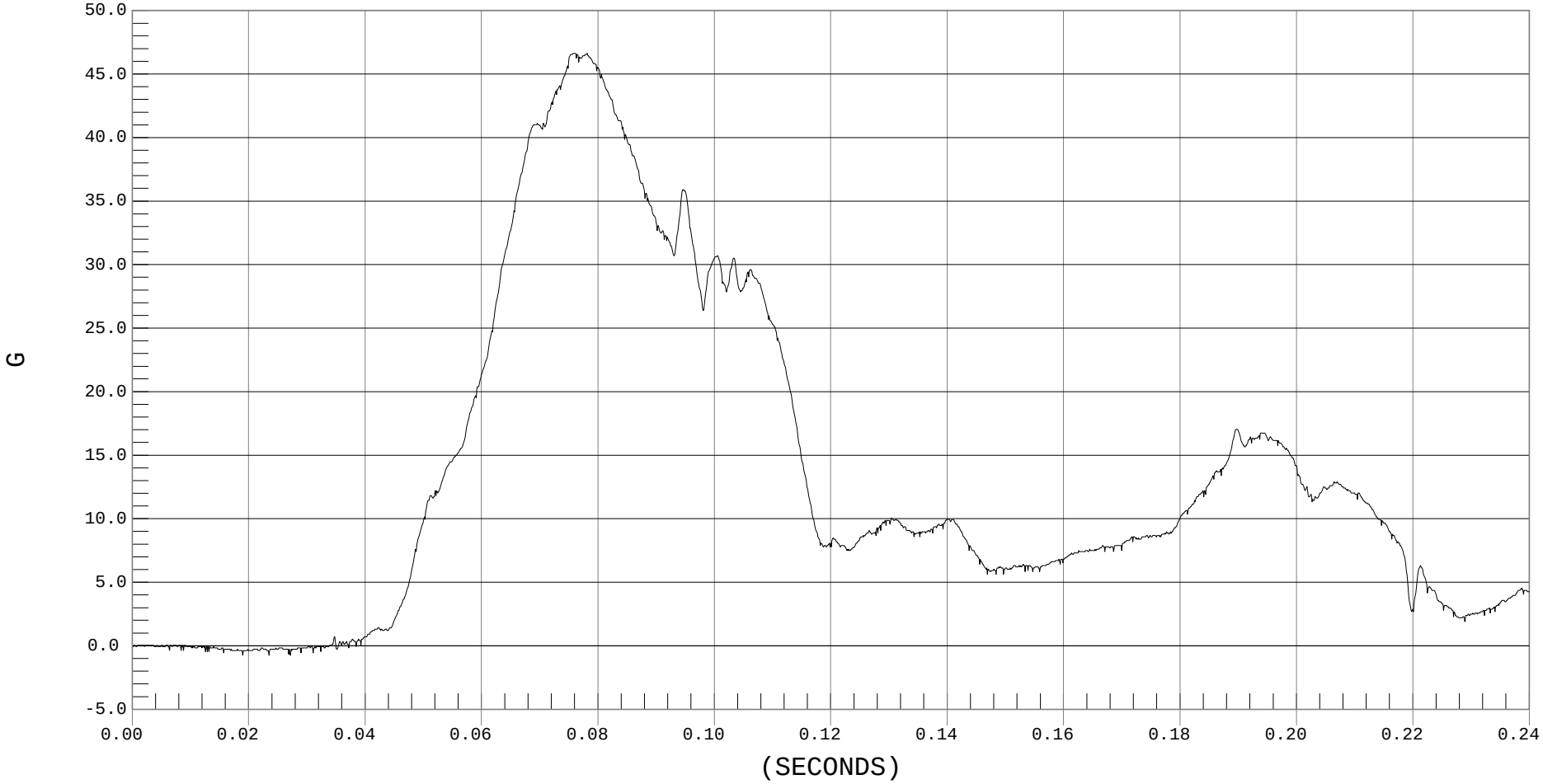
HEAD Z ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 1000

1 HEAD Z, H01252AT.A06

Ymin = -.76 G @ 0.0189 SECONDS, Ymax = 46.63 G @ 0.0756 SECONDS



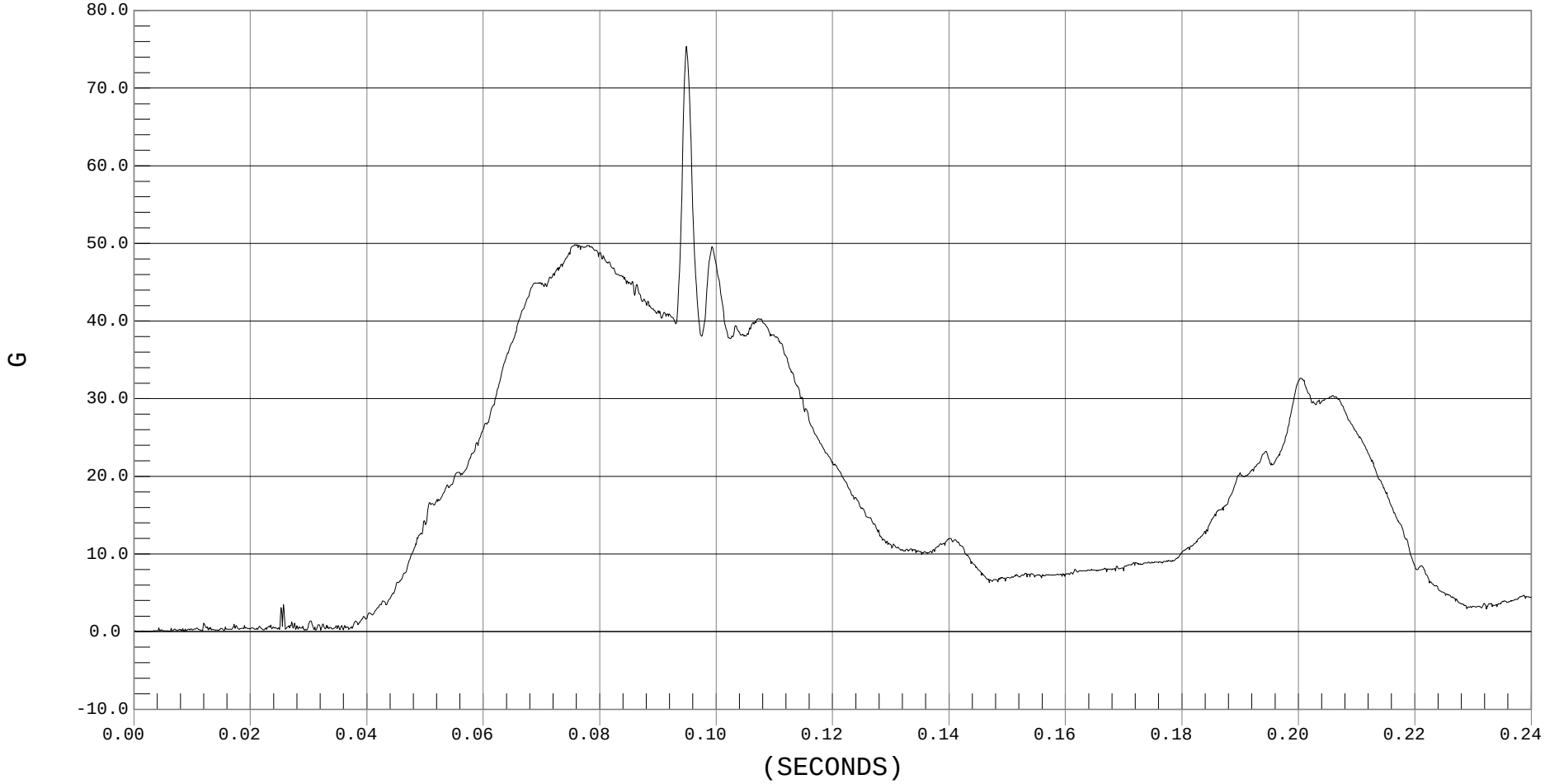
HEAD RESULTANT ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 1000

1 HEAD RESULTANT ACCELERATION, H01252AV.A03

Ymin = .05 G @ 0.0010 SECONDS, Ymax = 75.4 G @ 0.0948 SECONDS



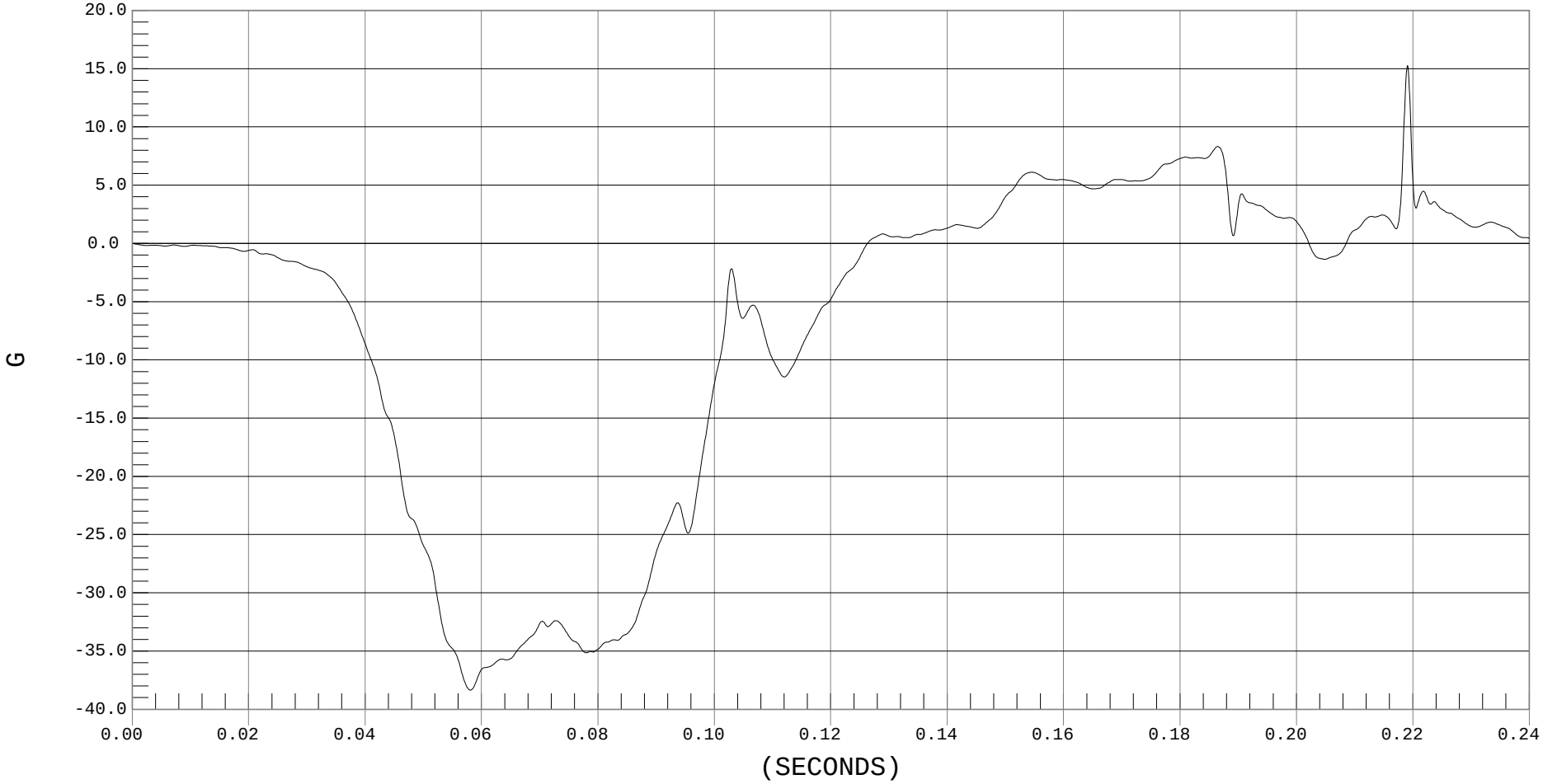
CHEST X ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 180

1 CHEST X, H01252AF.A08

Ymin = -38.35 G @ 0.0580 SECONDS, Ymax = 15.28 G @ 0.2190 SECONDS



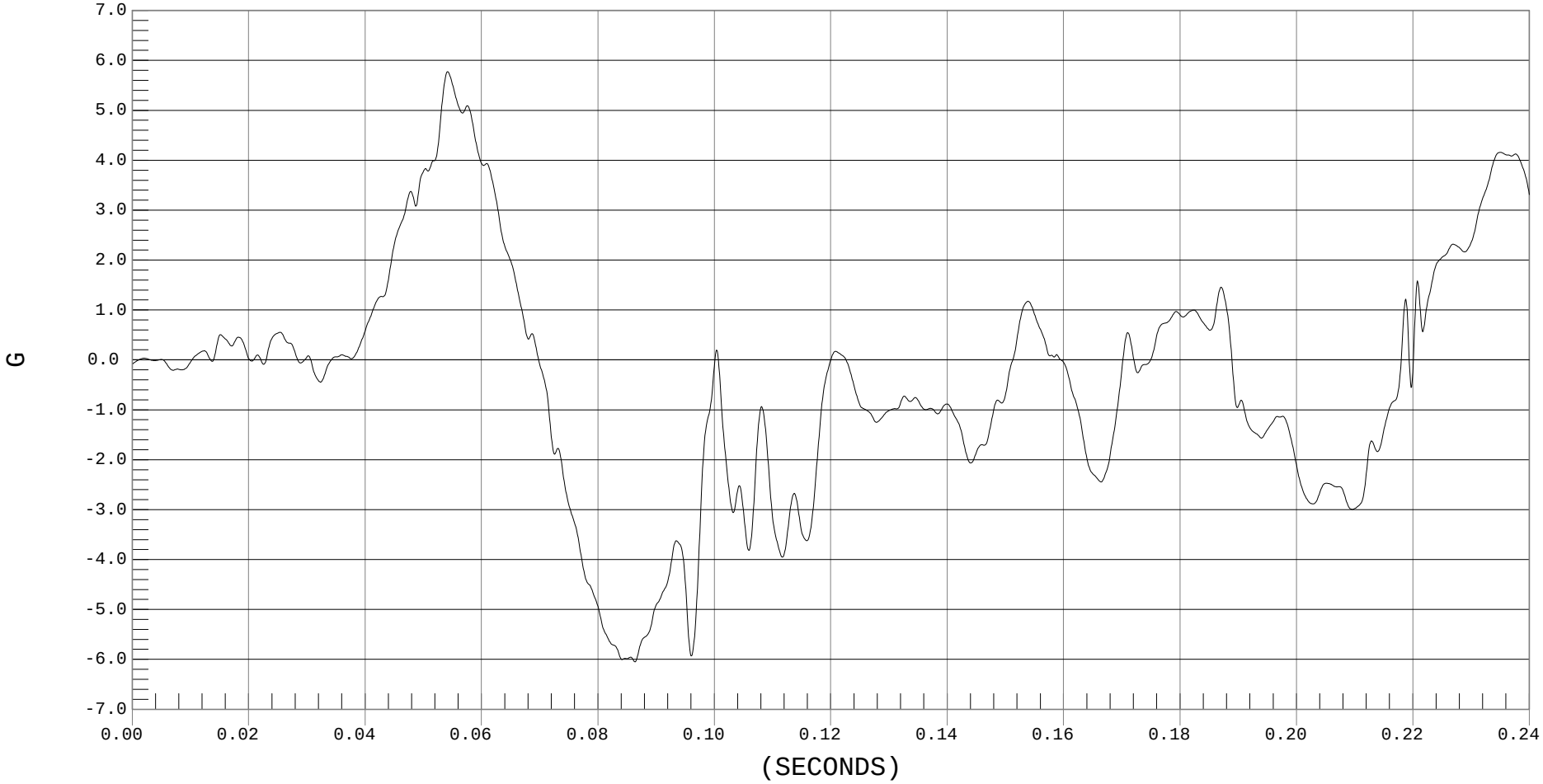
CHEST Y ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 180

1 CHEST Y, H01252AF.A09

Ymin = -6.05 G @ 0.0863 SECONDS, Ymax = 5.77 G @ 0.0541 SECONDS



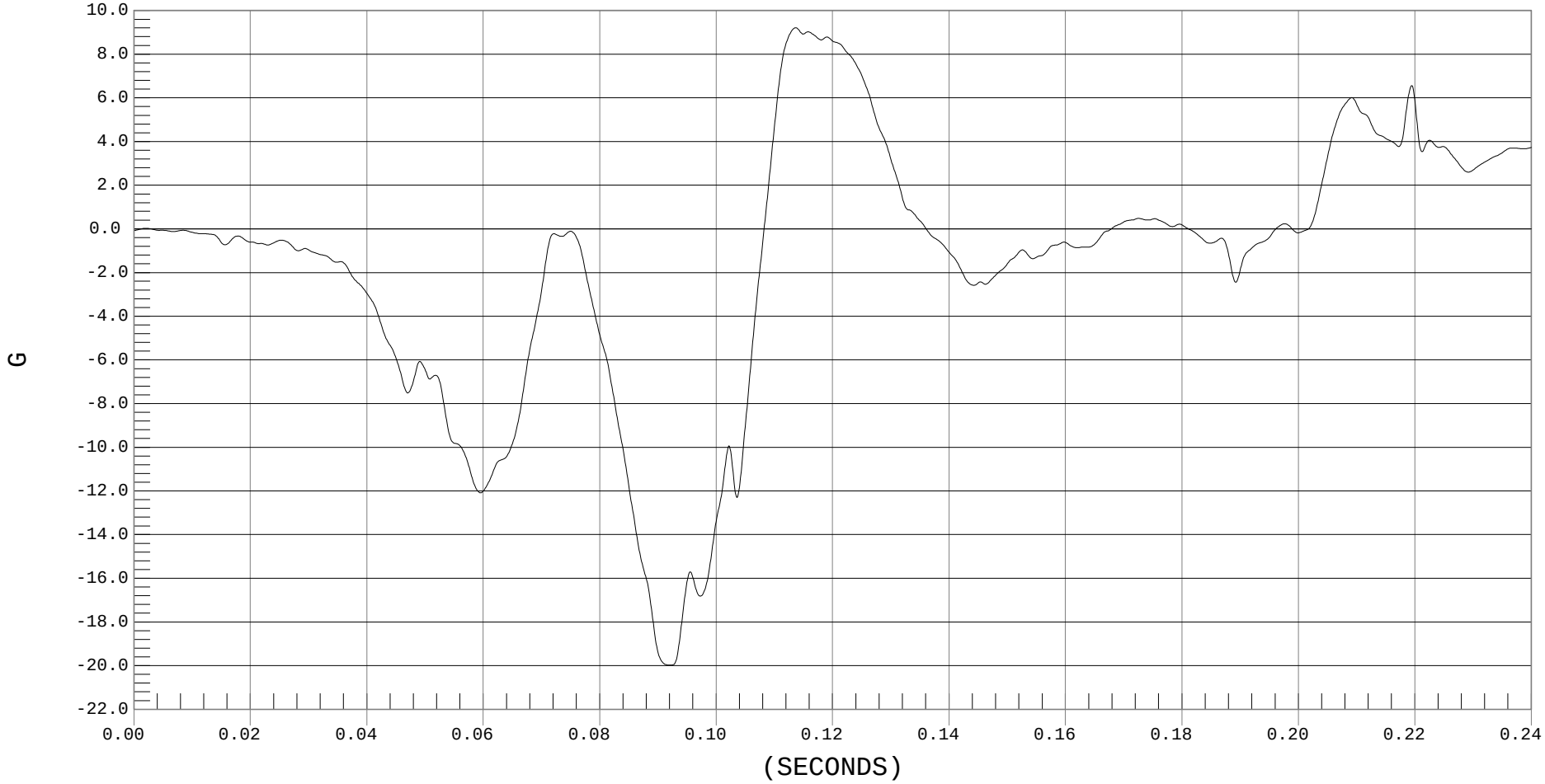
CHEST Z ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 180

1 CHEST Z, H01252AF.A12

Ymin = -19.98 G @ 0.0918 SECONDS, Ymax = 9.21 G @ 0.1136 SECONDS



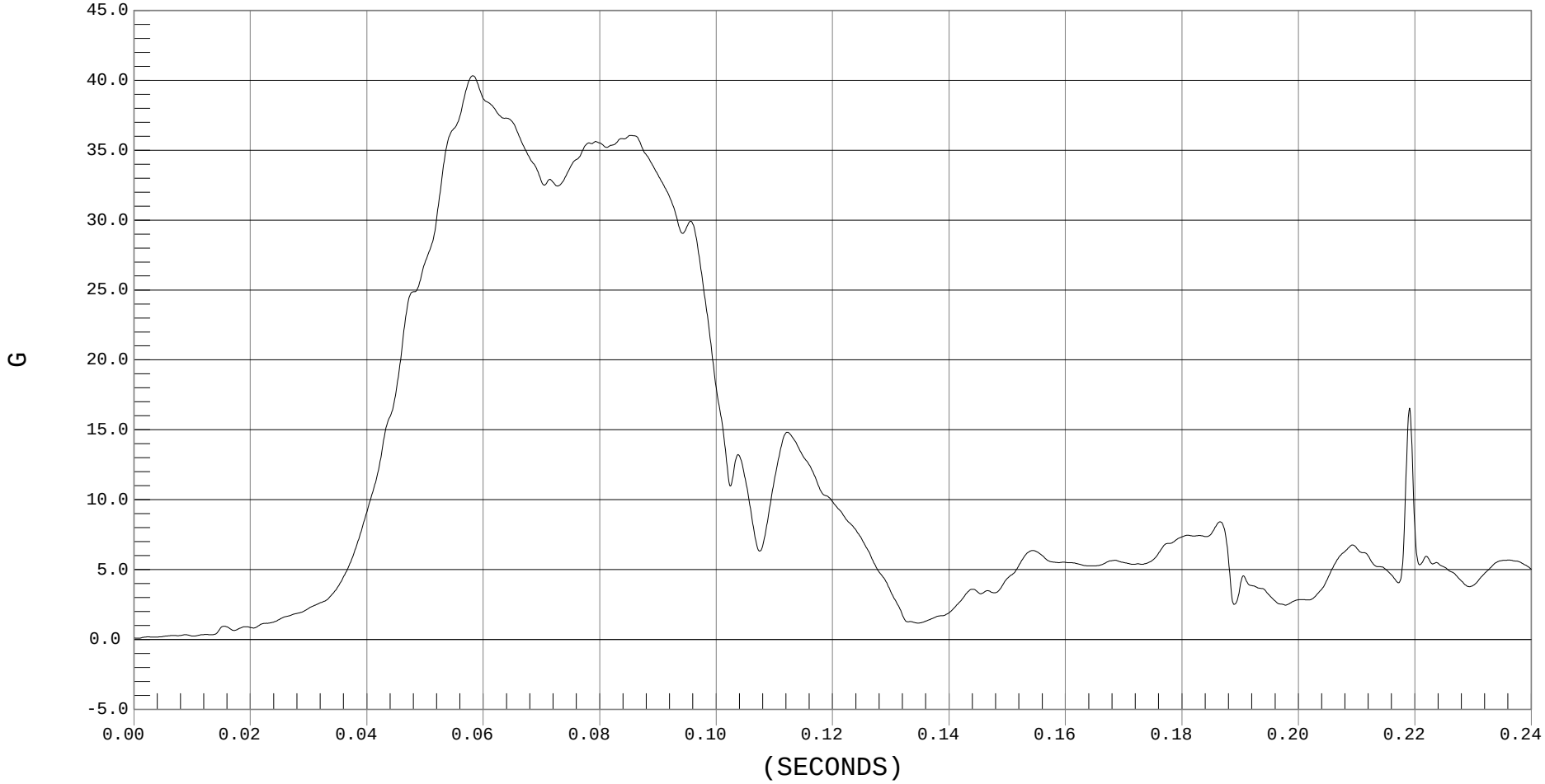
CHEST RESULTANT ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 180

1 CHEST RESULTANT ACCELERATION, H01252AV.A08

Ymin = .08 G @ 0.0006 SECONDS, Ymax = 40.33 G @ 0.0581 SECONDS



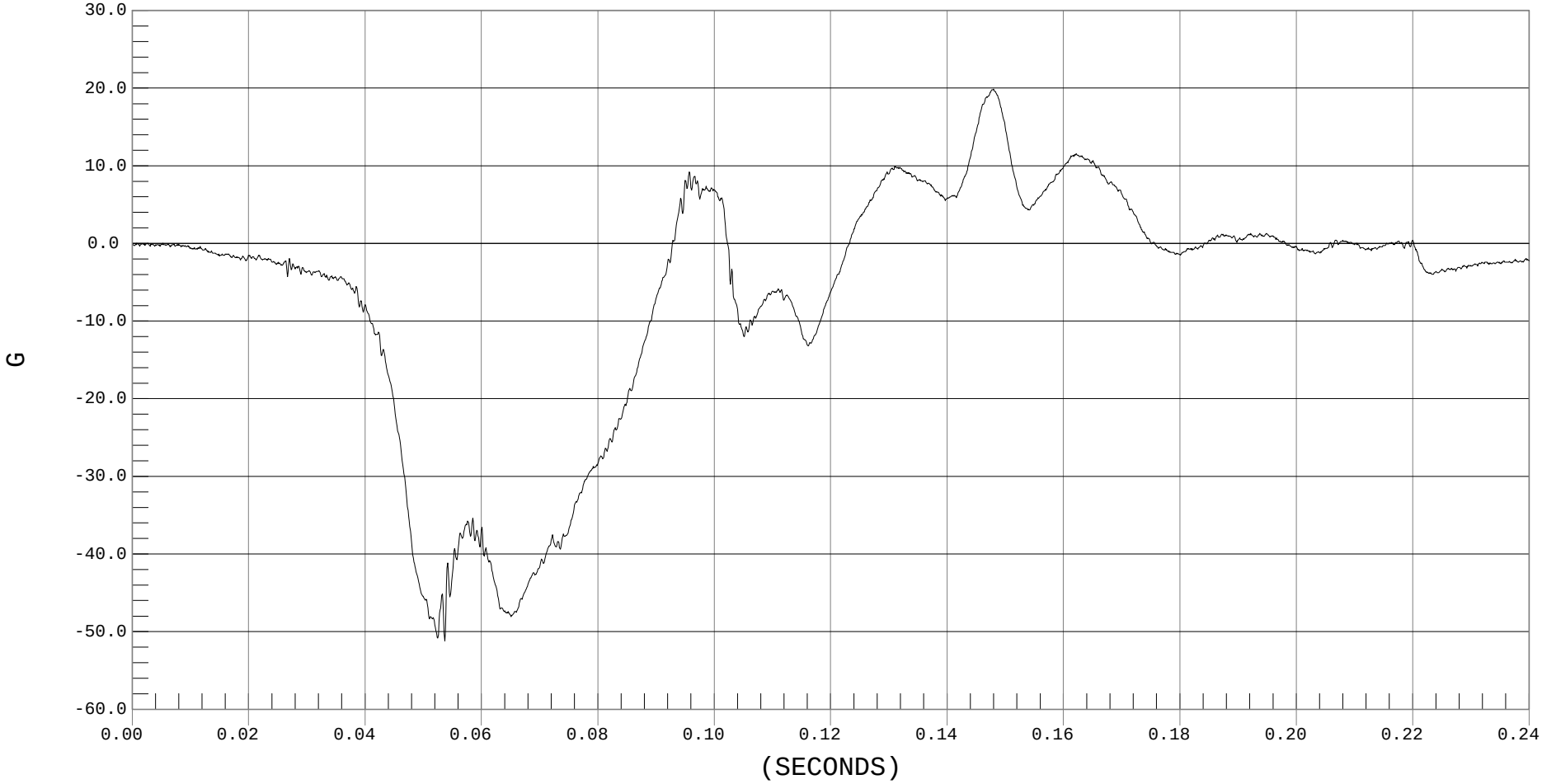
PELVIS X ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 1000

1 PELVIS X, H01252AT.A27

Ymin = -51.21 G @ 0.0536 SECONDS, Ymax = 19.88 G @ 0.1479 SECONDS



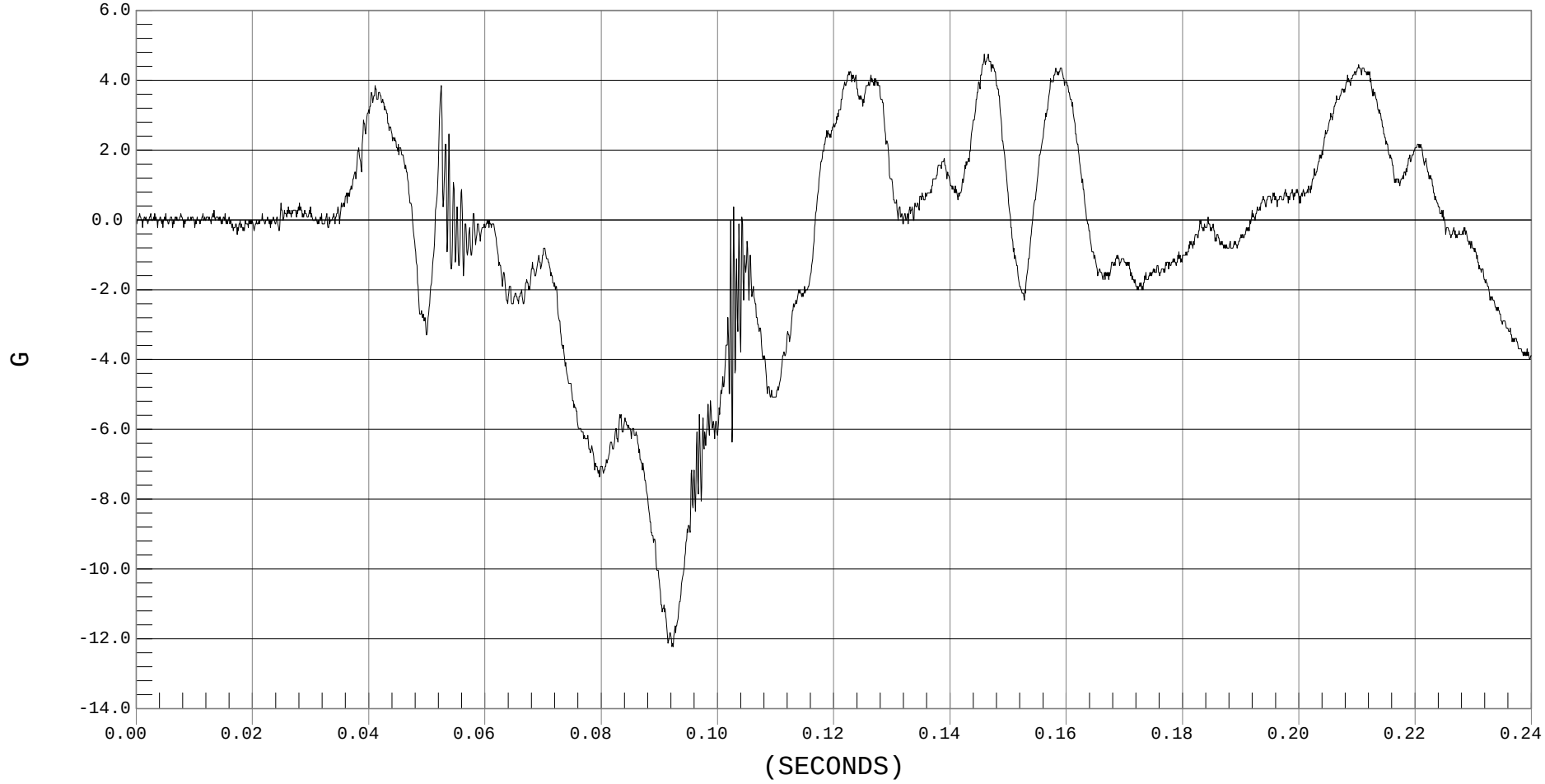
PELVIS Y ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 1000

1 PELVIS Y, H01252AT.A28

Ymin = -12.23 G @ 0.0921 SECONDS, Ymax = 4.75 G @ 0.1458 SECONDS



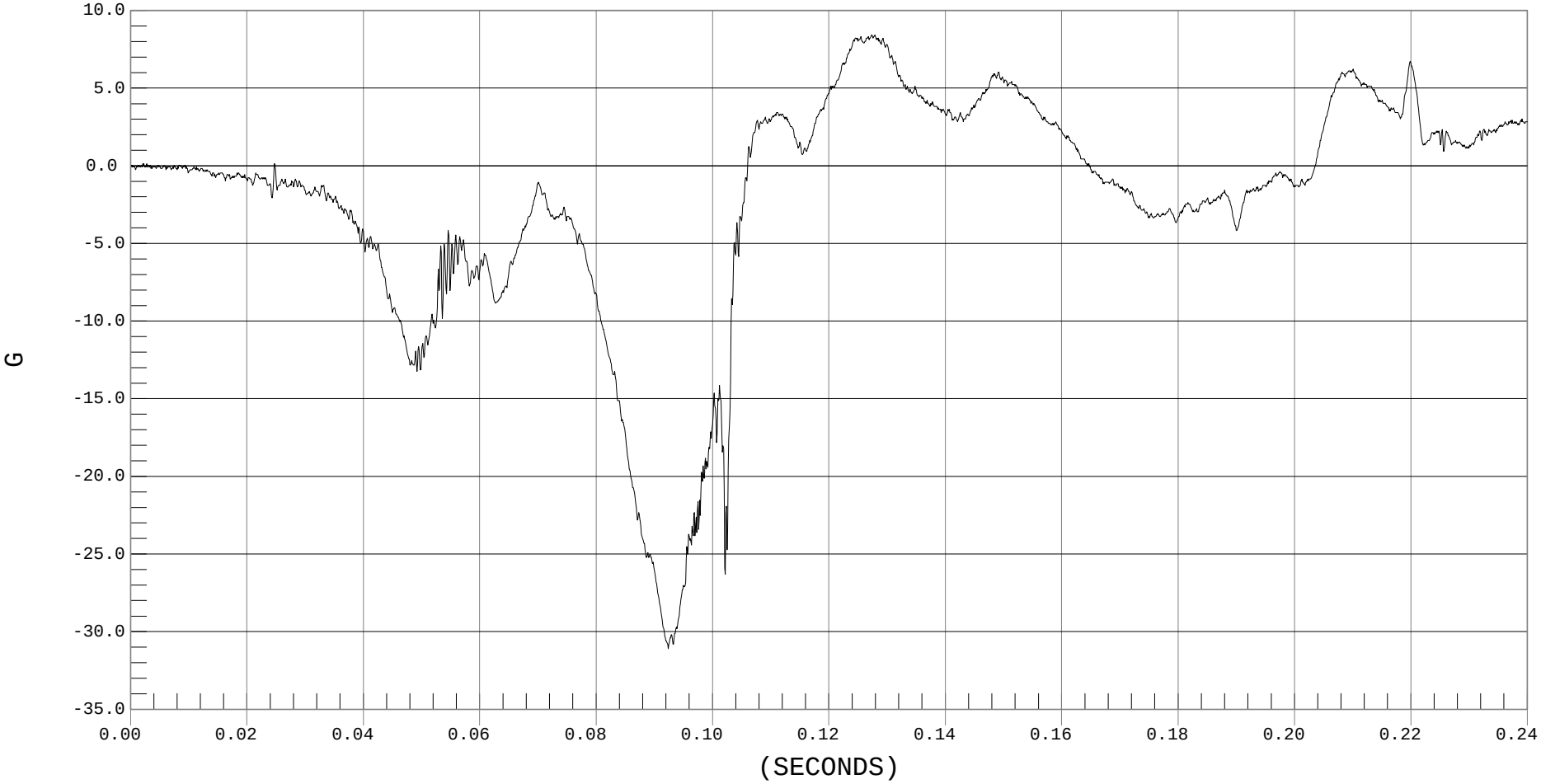
PELVIS Z ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 1000

1 PELVIS Z, H01252AT.A29

Ymin = -31.11 G @ 0.0923 SECONDS, Ymax = 8.42 G @ 0.1272 SECONDS



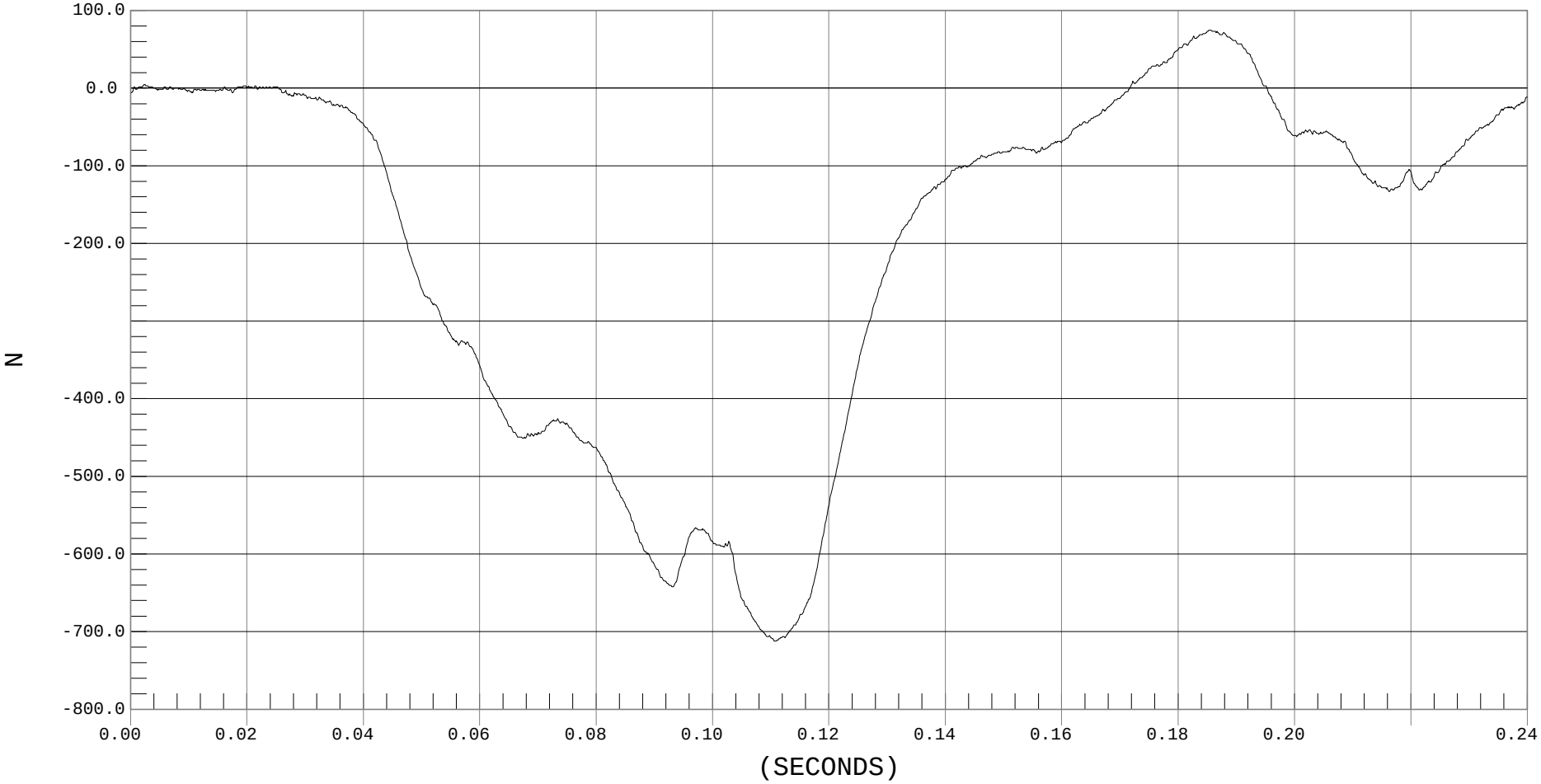
UPPER NECK FORCE X

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 1000

1 UPPER NECK FX, H01252FT.F13

Ymin = -712.23 N @ 0.1105 SECONDS, Ymax = 74.69 N @ 0.1852 SECONDS



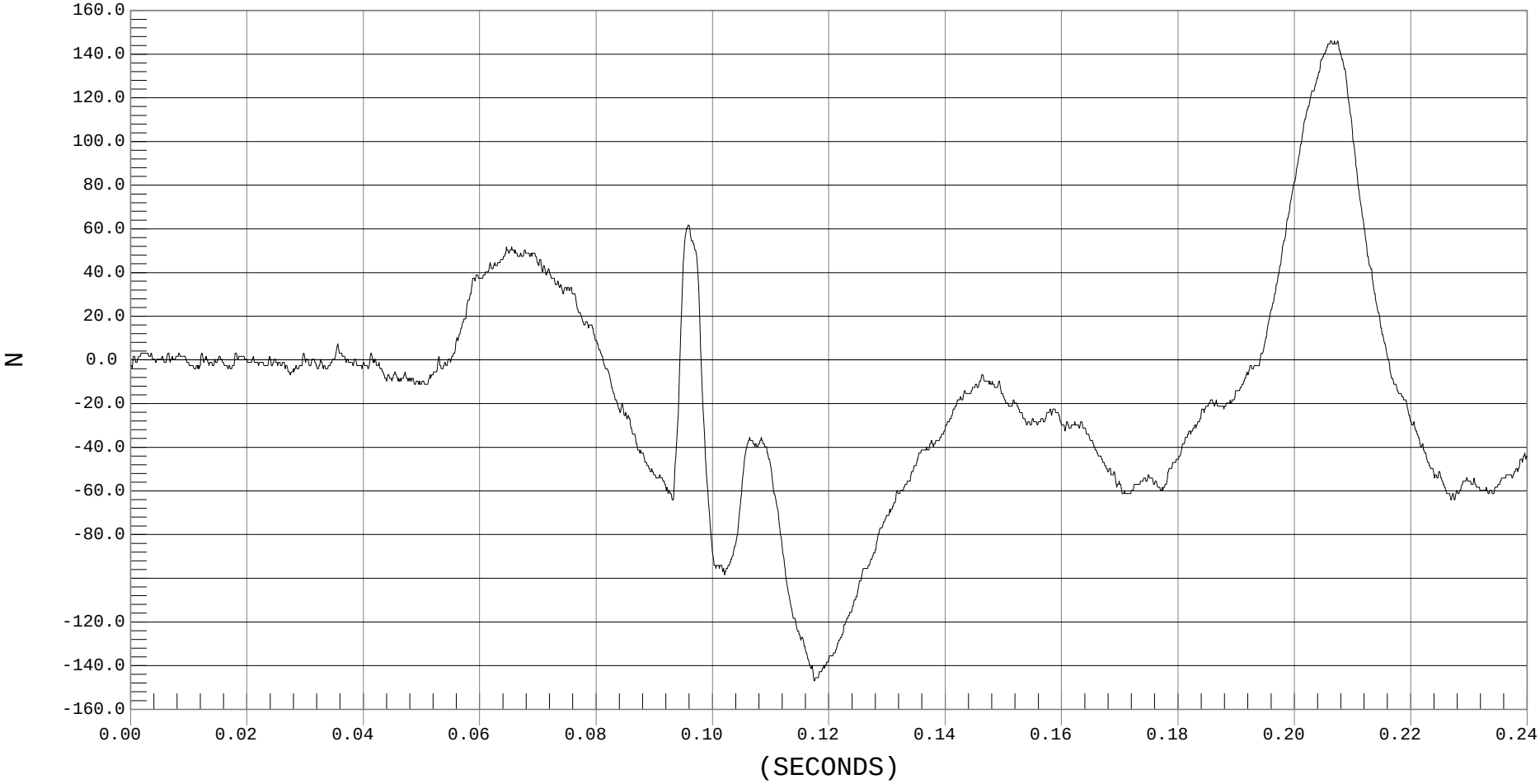
UPPER NECK FORCE Y

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 1000

1 UPPER NECK FY, H01252FT.F14

Ymin = -147.01 N @ 0.1174 SECONDS, Ymax = 146.08 N @ 0.2061 SECONDS



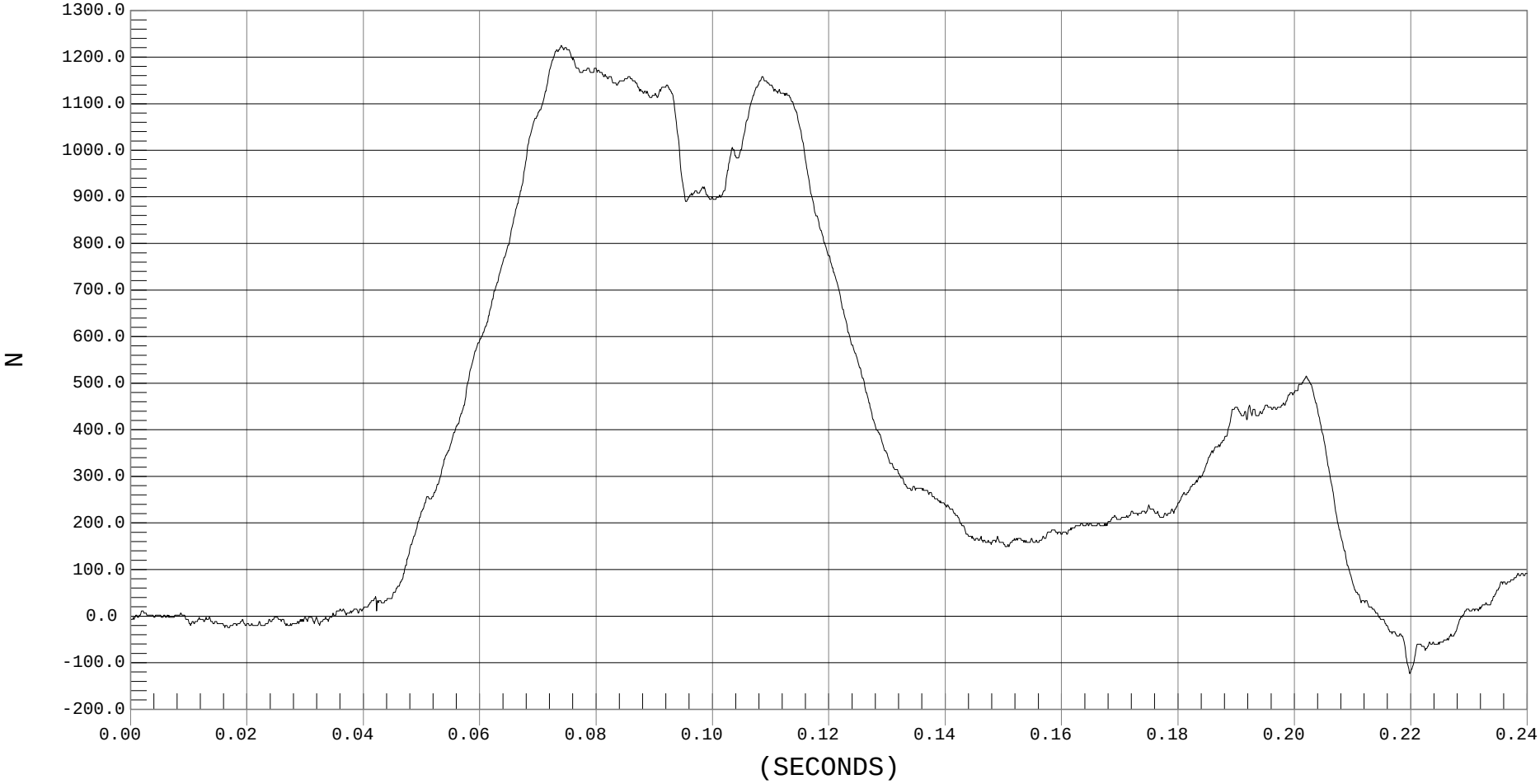
UPPER NECK FORCE Z

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 1000

1 UPPER NECK FZ, H01252FT.F15

Ymin = -123 N @ 0.2197 SECONDS, Ymax = 1224.89 N @ 0.0739 SECONDS



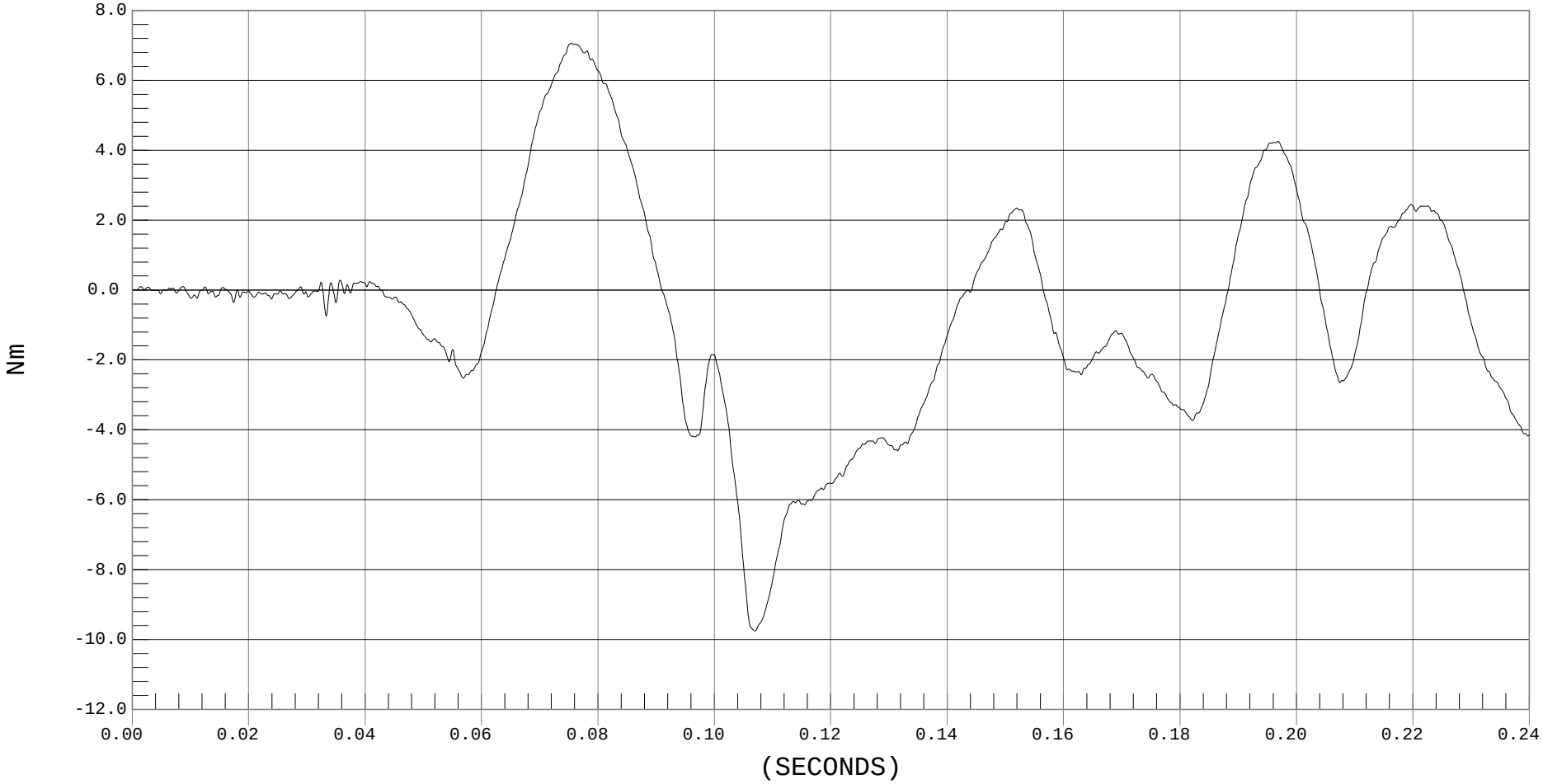
UPPER NECK MOMENT X

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 600

1 UPPER NECK MX, H01252MF.M16

Ymin = -9.76 Nm @ 0.1069 SECONDS, Ymax = 7.06 Nm @ 0.0753 SECONDS



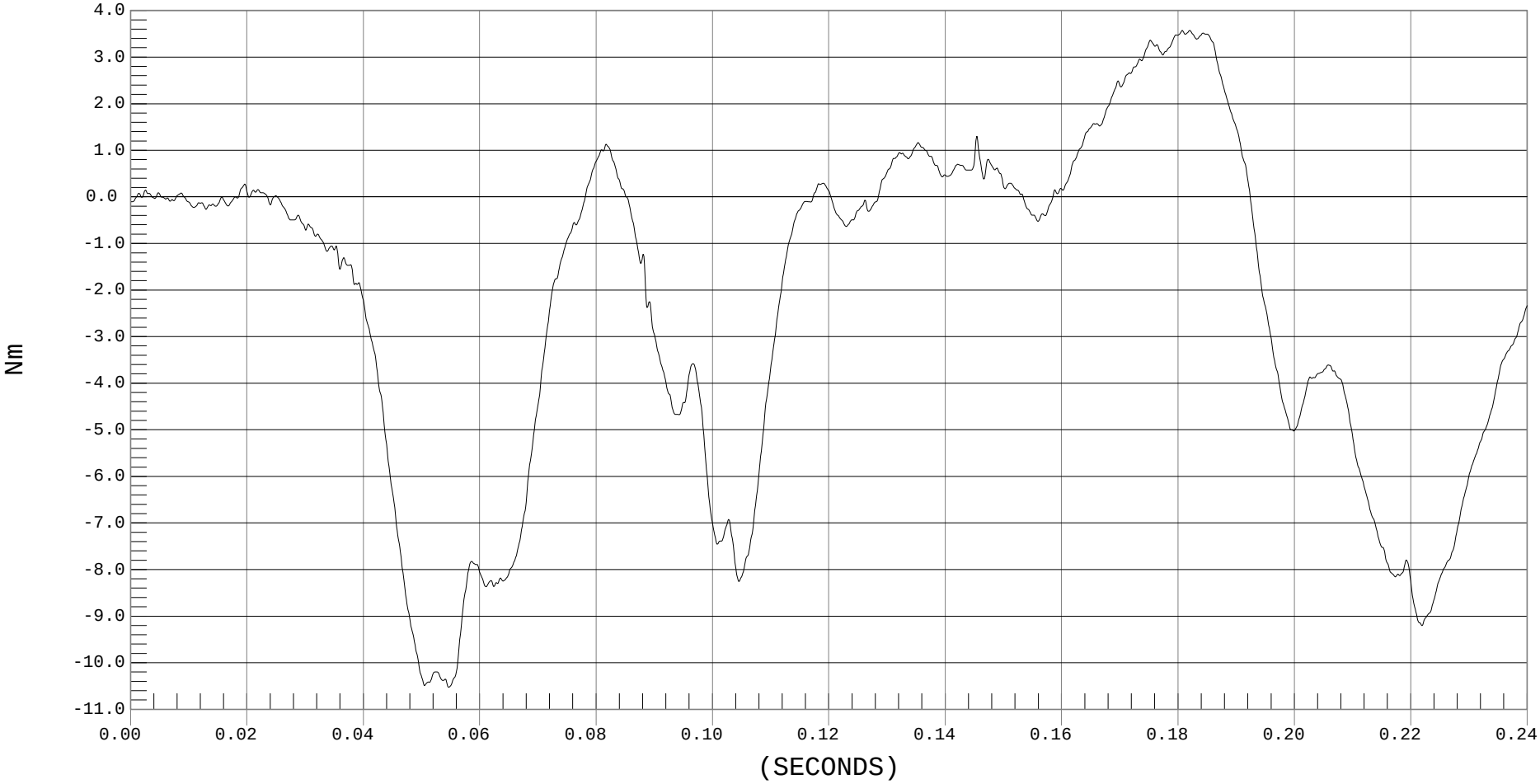
UPPER NECK MOMENT Y

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 600

1 UPPER NECK MY, H01252MF.M17

Ymin = -10.53 Nm @ 0.0546 SECONDS, Ymax = 3.57 Nm @ 0.1806 SECONDS



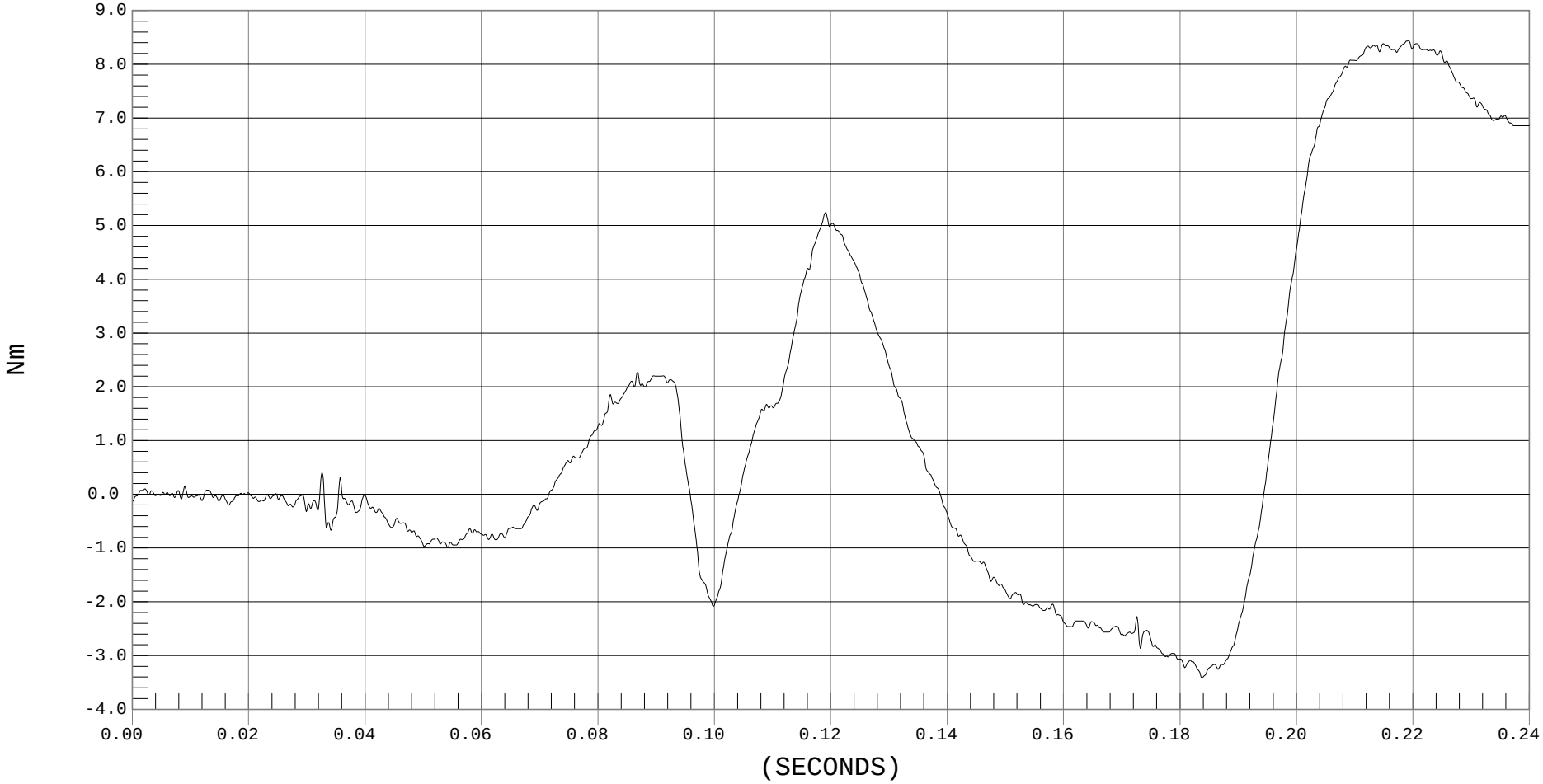
UPPER NECK MOMENT Z

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 600

1 UPPER NECK MZ, H01252MF.M18

Ymin = -3.42 Nm @ 0.1837 SECONDS, Ymax = 8.44 Nm @ 0.2192 SECONDS



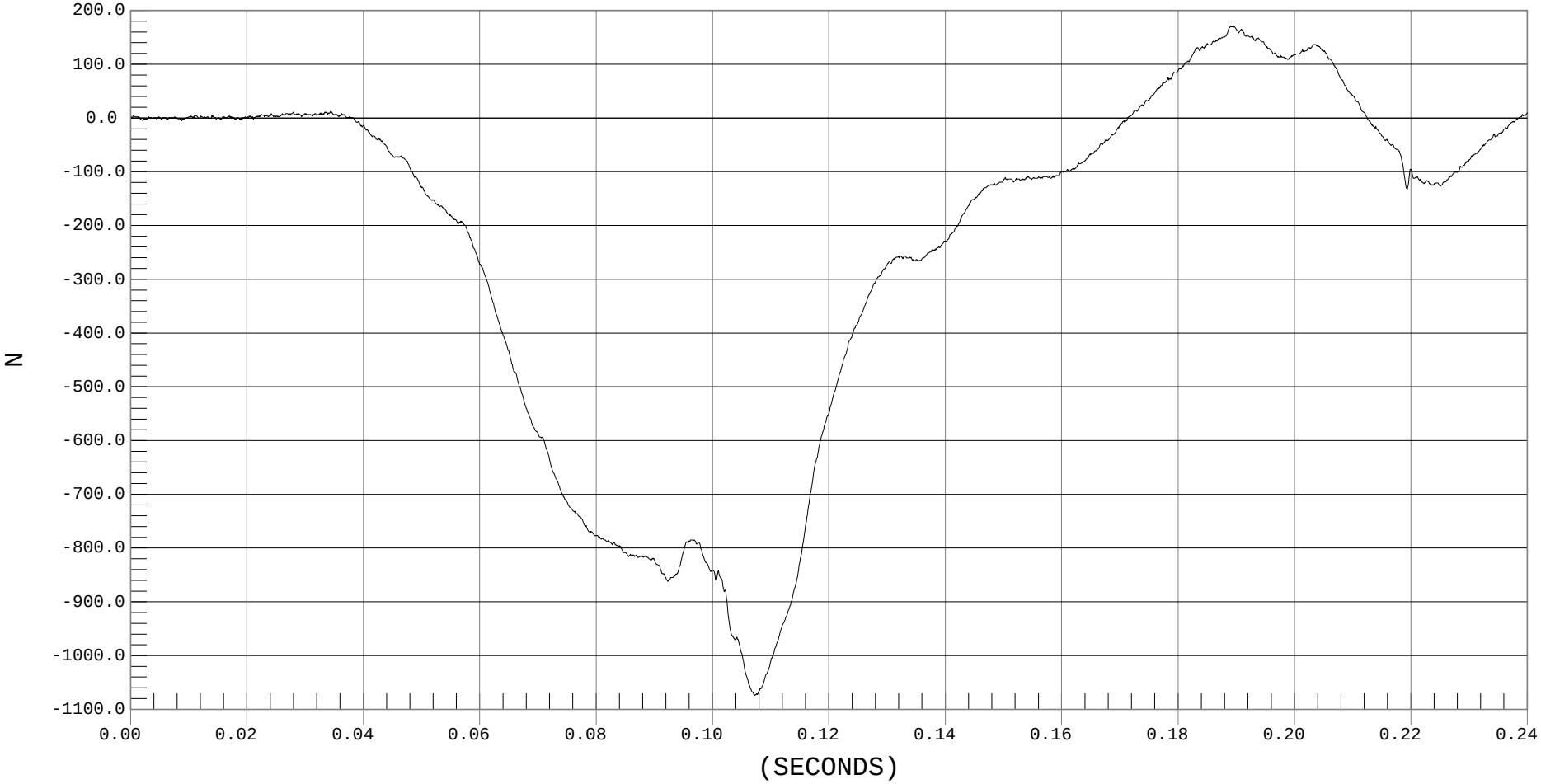
LOWER NECK FORCE X

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 1000

1 LOWER NECK FX, H01252FT.F21

Ymin = -1073.95 N @ 0.1072 SECONDS, Ymax = 171.2 N @ 0.1889 SECONDS



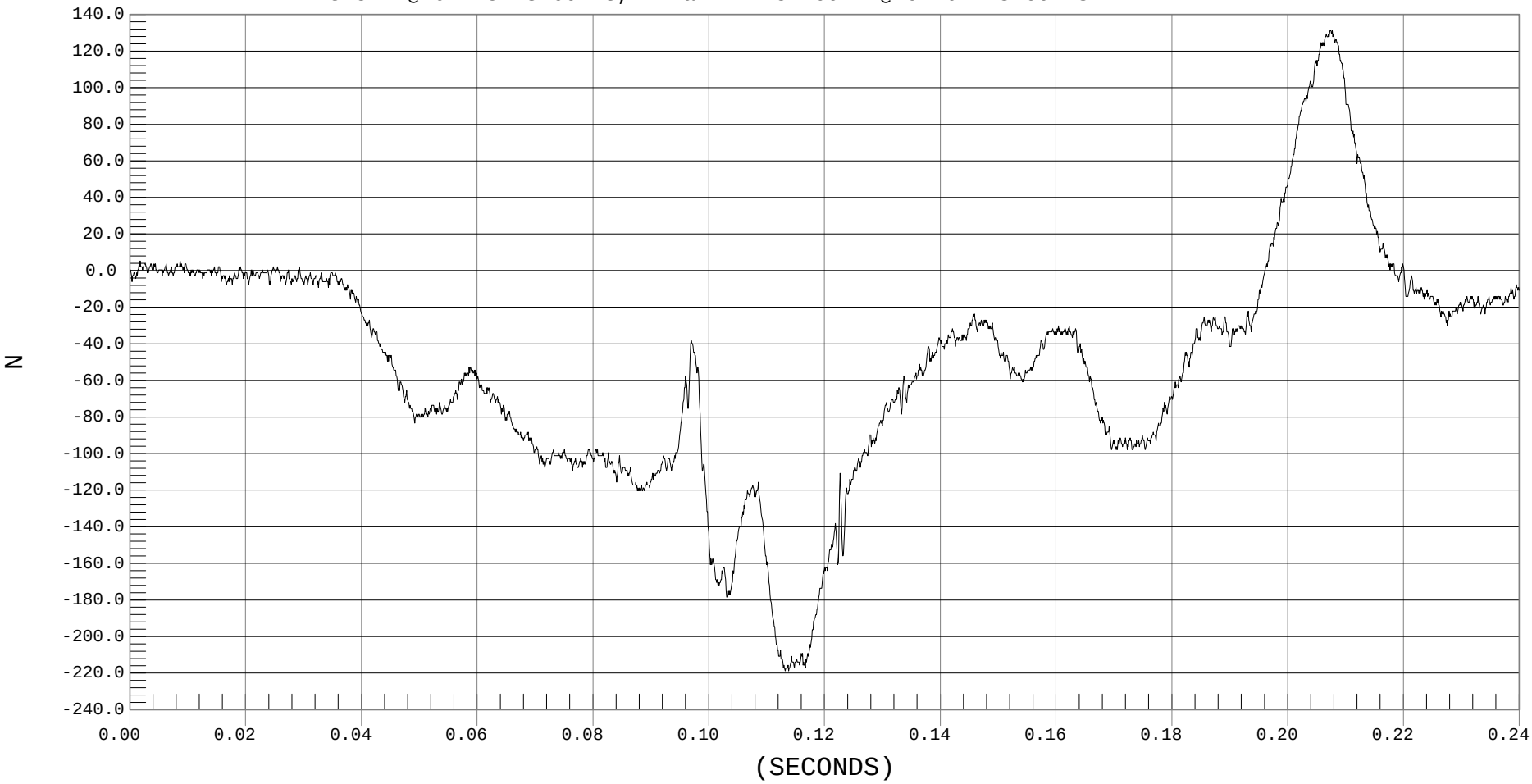
LOWER NECK FORCE Y

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 1000

1 LOWER NECK FY, H01252FT.F22

Ymin = -218.8 N @ 0.1131 SECONDS, Ymax = 131.09 N @ 0.2072 SECONDS



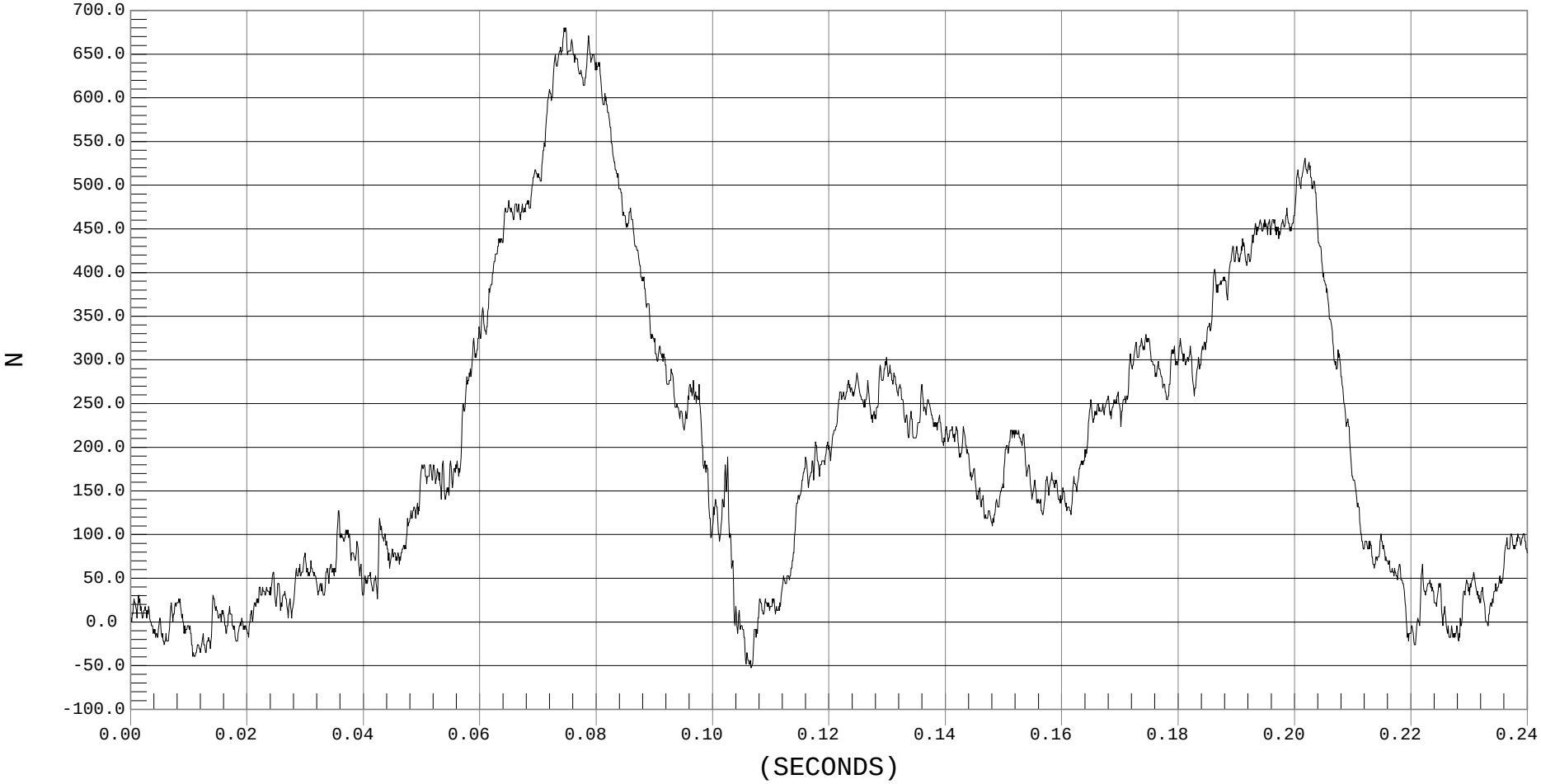
LOWER NECK FORCE Z

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 1000

1 LOWER NECK FZ, H01252FT.F23

Ymin = -52.58 N @ 0.1065 SECONDS, Ymax = 680 N @ 0.0744 SECONDS



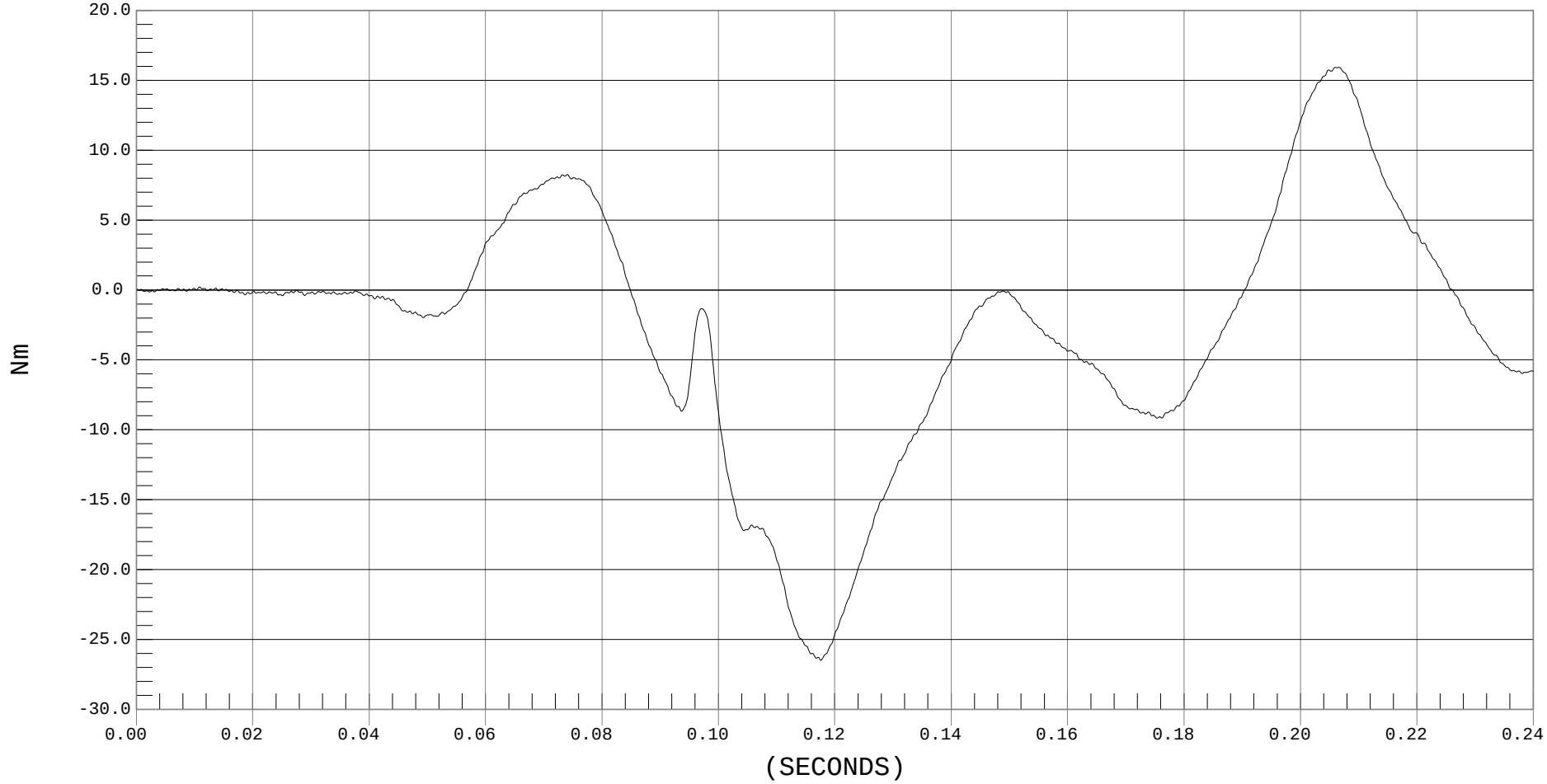
LOWER NECK MOMENT X

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 600

1 LOWER NECK MX, H01252MF.M24

Ymin = -26.49 Nm @ 0.1175 SECONDS, Ymax = 15.94 Nm @ 0.2065 SECONDS



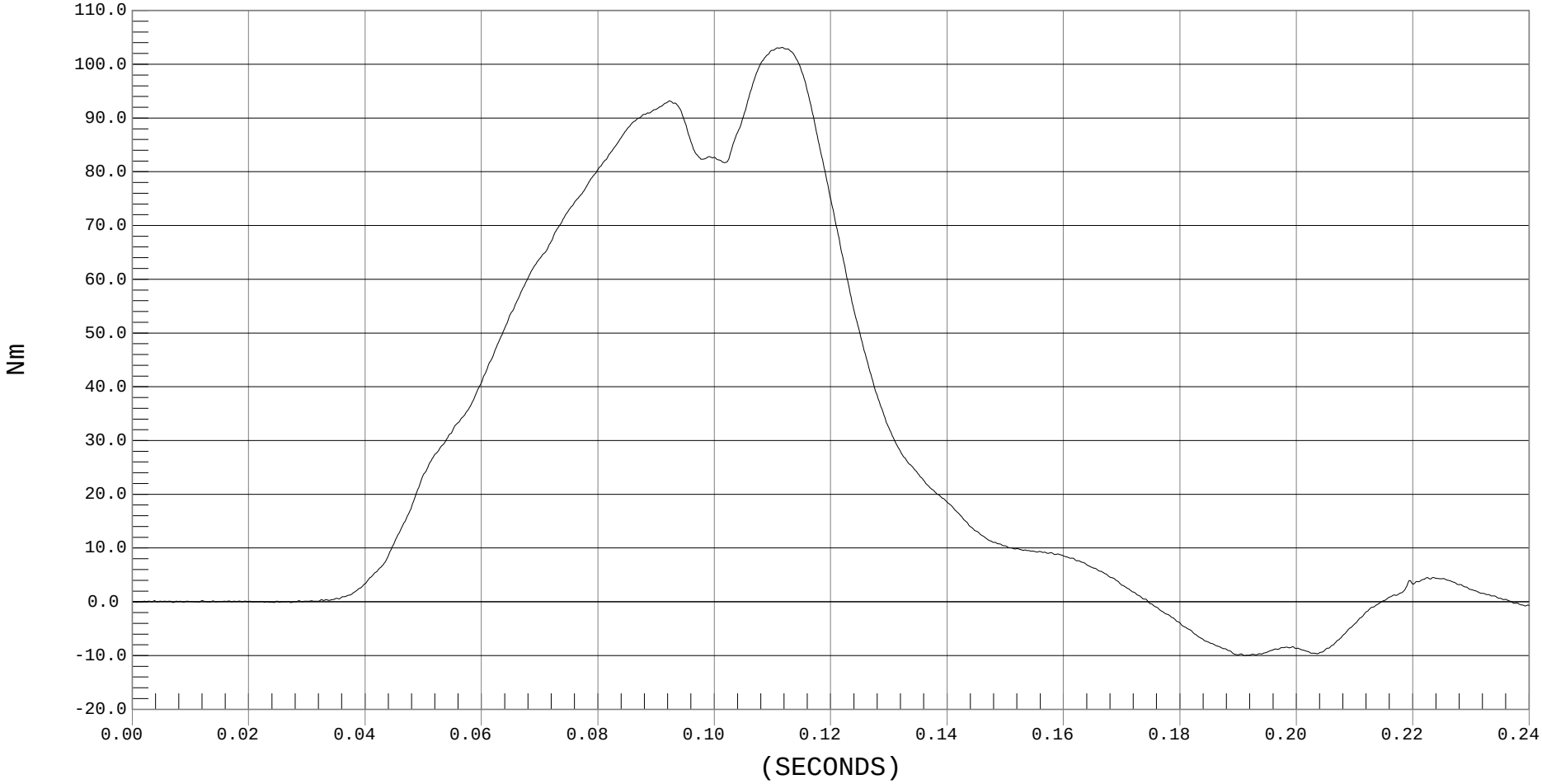
LOWER NECK MOMENT Y

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 600

1 LOWER NECK MY, H01252MF.M25

Ymin = -10.01 Nm @ 0.1910 SECONDS, Ymax = 103.12 Nm @ 0.1116 SECONDS



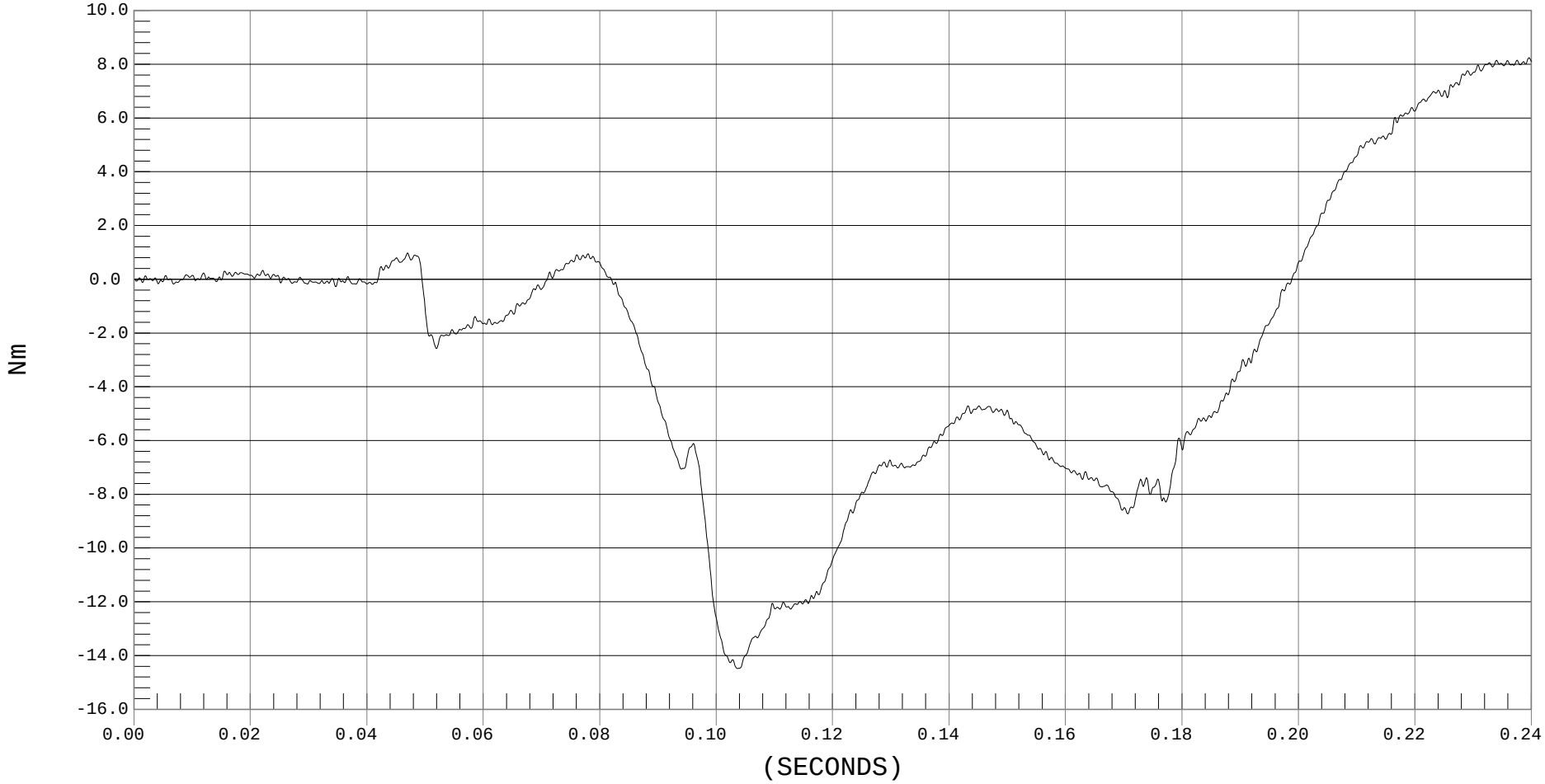
LOWER NECK MOMENT Z

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 600

1 LOWER NECK MZ, H01252MF.M26

Ymin = -14.48 Nm @ 0.1036 SECONDS, Ymax = 8.24 Nm @ 0.2395 SECONDS



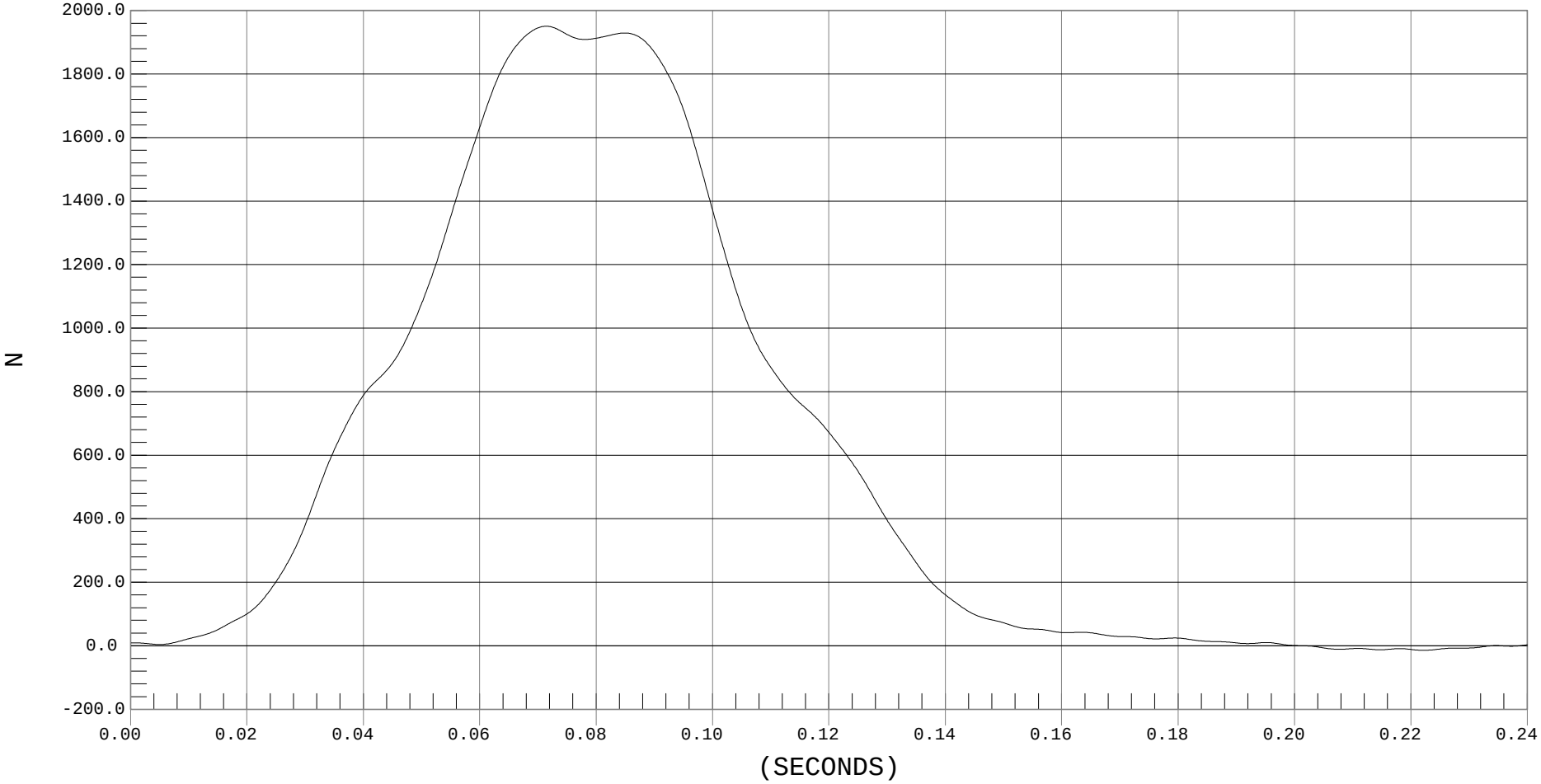
TETHER BELT FORCE

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 60

1 TETHER BELT, H01252FF.F19

Ymin = -14.52 N @ 0.2220 SECONDS, Ymax = 1950.51 N @ 0.0713 SECONDS



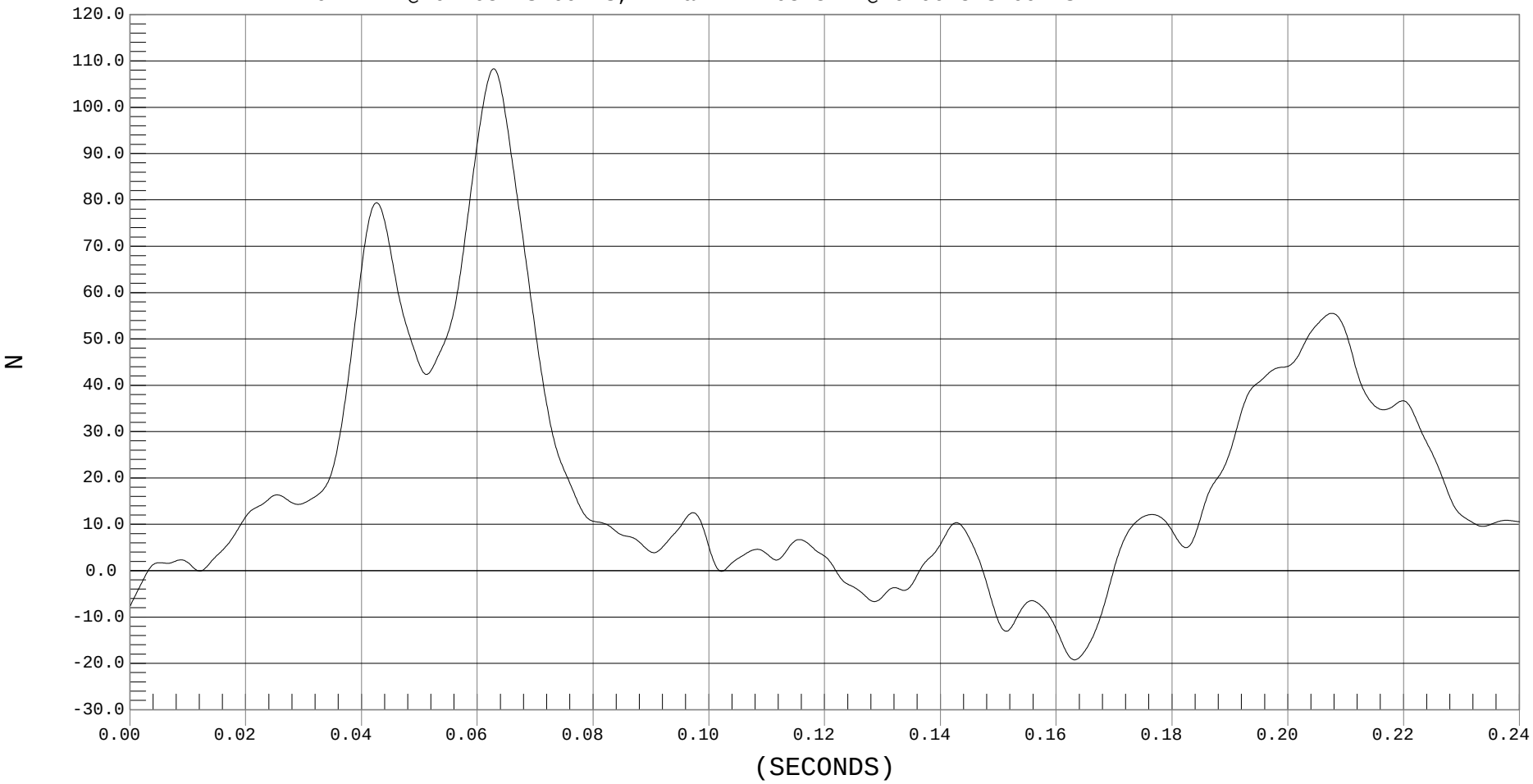
SHOULDER BELT FORCE

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 60

1 SHOULDER BELT, H01252FF.F31

Ymin = -19.24 N @ 0.1631 SECONDS, Ymax = 108.3 N @ 0.0628 SECONDS



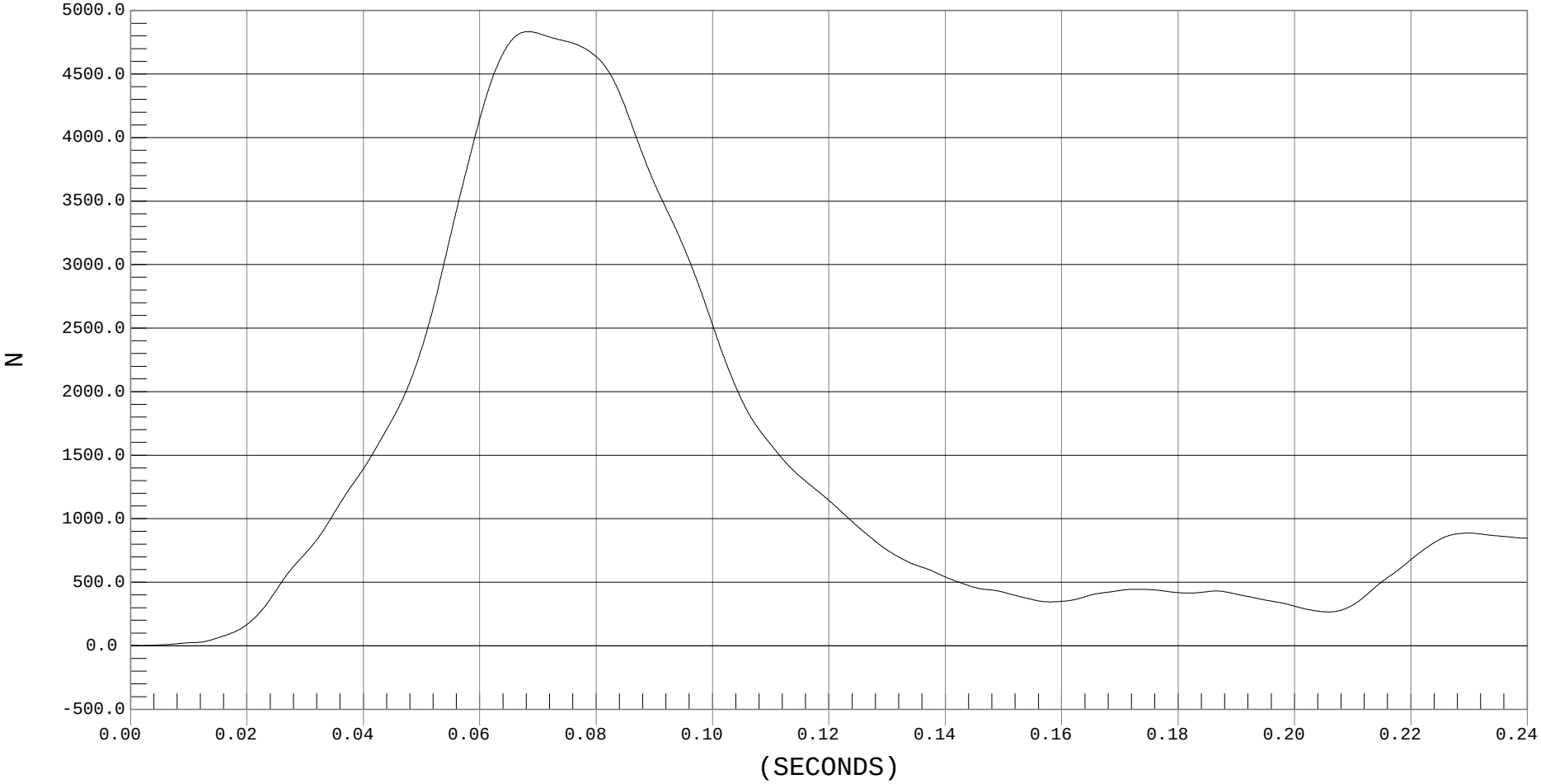
LAP BELT FORCE

Test Desc.: FMVSS 213 34-35 MPH (H01252)
Component: CENTURY SMART MOVE
Other Info:

Test Date: 08-16-01
Speed: 0.0 MPH, 0.0 KPH
Filter Class: 60

1 LAP BELT, H01252FF.F32

Ymin = 2.11 N @ 0.0017 SECONDS, Ymax = 4833.34 N @ 0.0682 SECONDS



SECTION 9

CHILD DUMMY CALIBRATION DATA TRACES AND TABLES

CERTIFICATION DATA

Dummy Serial Number: 139

Calibration Test Results Summary

Dummy Serial Number: 139

Pre-Test Calibration

Head Drop Test:	The head passed all drop test requirements.
Neck Flexion Test:	The neck passed all flexion test requirements.
Neck Extension Test:	The neck passes all extension test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Torso Flexion:	The torso passed all flexion test requirements.

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 3 YEAR OLD

Date: 6/22/01

Dummy Serial Number: 139

Test Number: D01911

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	18.9 – 25.6	21.5
Relative Humidity (%)	10 – 70	45
Peak Resultant Acceleration	250 – 280 g's	270
Peak Lateral Acceleration	± 15 g's	14
Is Acceleration Curve Unimodal	within 10% of peak	Yes

TEST MEETS SPECIFICATIONS

Technician: _____

Approved By: _____

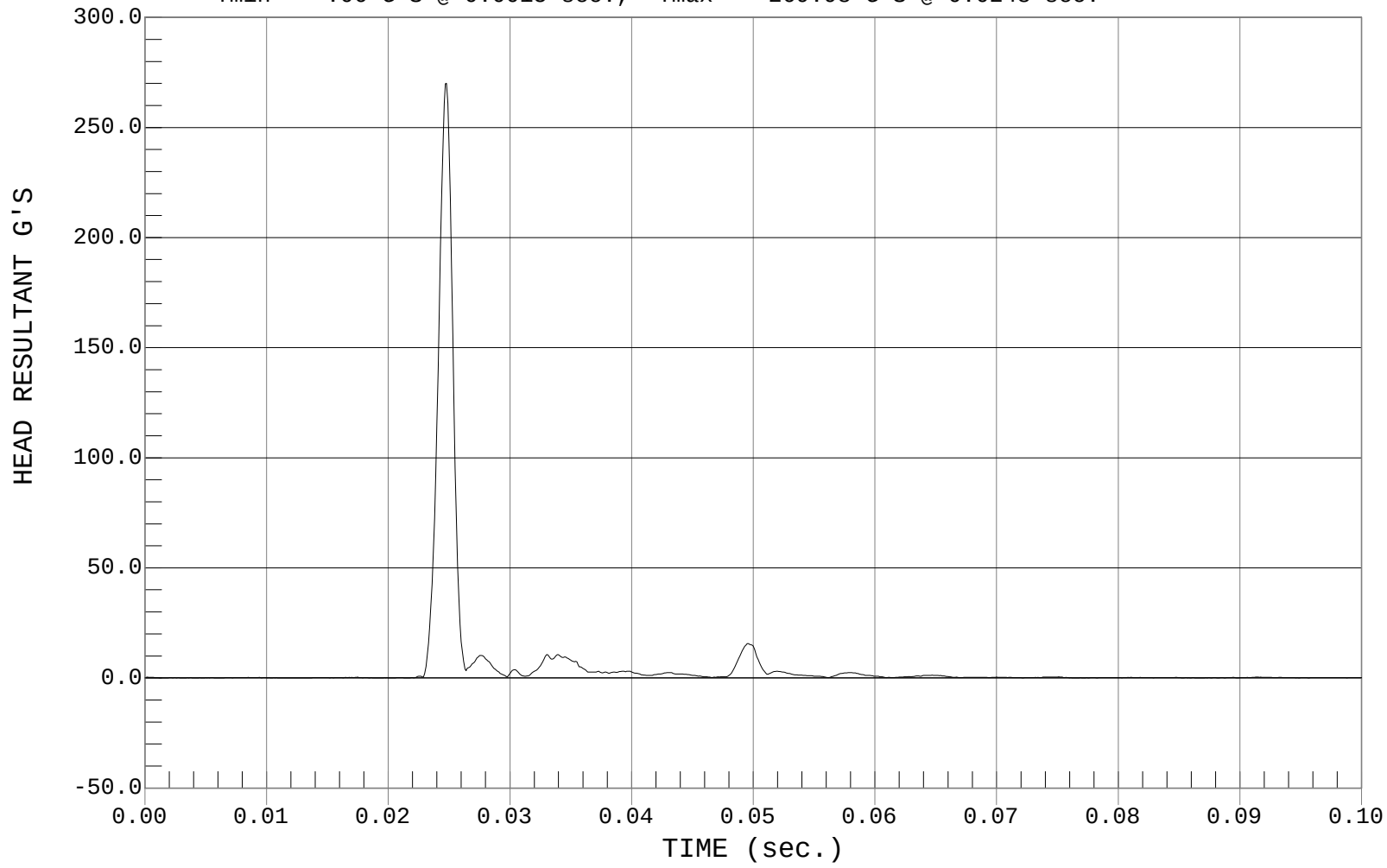
PEAK RESULTANT ACCELERATION

Test Desc.: Dummy Calibration - Head Drop
Component: Dummy #139

Test Date: 06-22-01
Speed: 0.00 FT/SEC, 0.00 M/SEC

1 HEAD RESULTANT, D01911AV.A01

Ymin = .06 G'S @ 0.0015 sec., Ymax = 269.98 G'S @ 0.0248 sec.



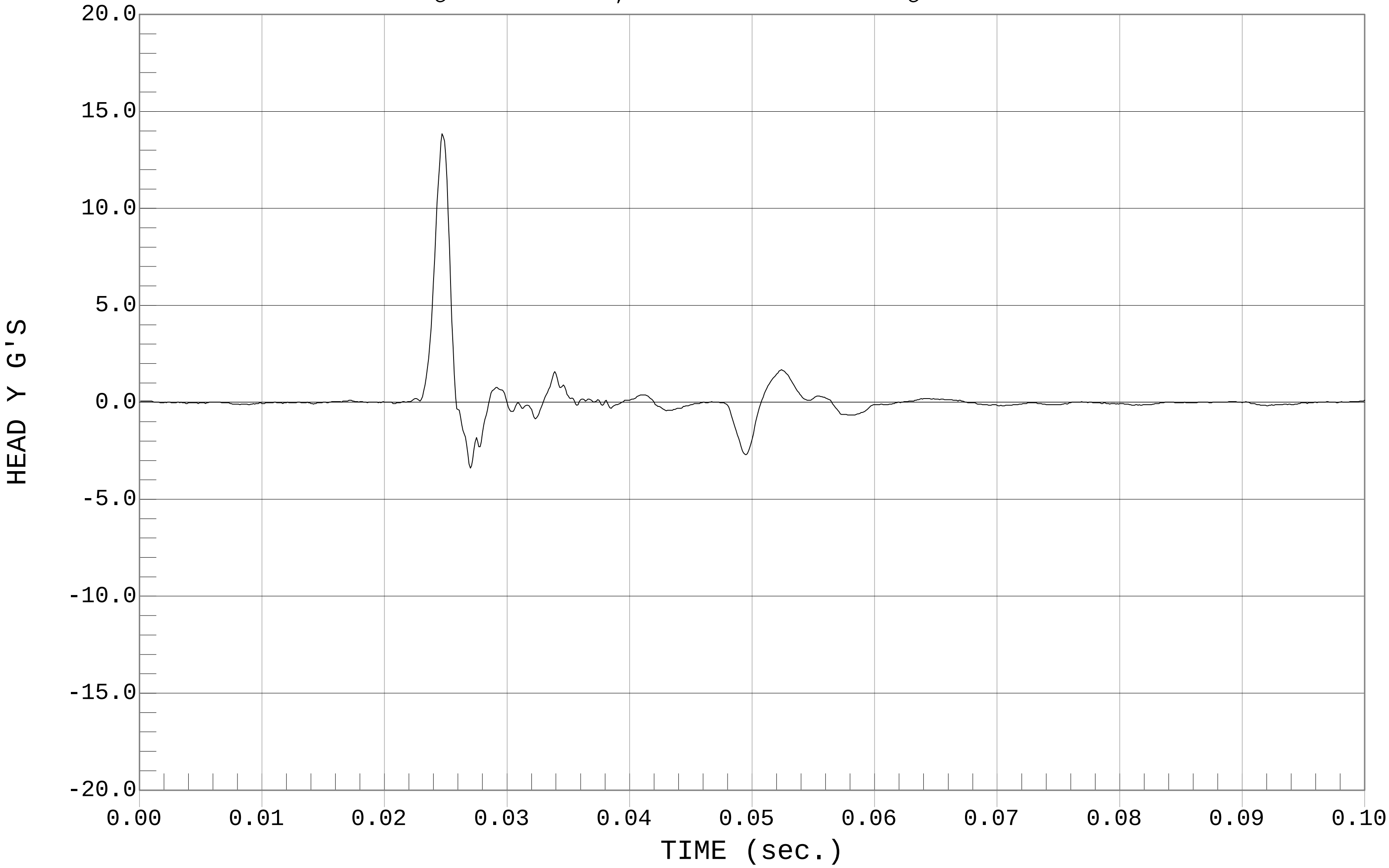
PEAK LATERAL ACCELRATION

Test Desc.: Dummy Calibration - Head Drop
Component: Dummy #139

Test Date: 06-22-01
Speed: 0.00 FT/SEC, 0.00 M/SEC

1 HEAD Y, D01911AR.A02

Ymin = -3.4 G'S @ 0.0270 sec., Ymax = 13.85 G'S @ 0.0247 sec.



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NECK FLEXION TEST

HYBRID III 3 YEAR OLD

Date: 6/22/01

Dummy Serial Number: 139

Test Number: D01912

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature (°C)		20.6 – 22.2	21.5
Relative Humidity (%)		10 – 70	48
Pendulum Speed		5.4 – 5.6 m/sec	5.5
Pendulum Deceleration	10 ms	2.0 – 2.7 m/sec	2.3
	15 ms	3.0 – 4.0 m/sec	3.3
	20 ms	4.0 – 5.1 m/sec	4.4
D Plane Rotation	Max.	70 – 82 deg	80
Moment About Occipital Condyle	Max.	42.0 – 53.0 Nm	44.0
Positive Moment – Time Curve Decay to 10 Nm		60.0 – 80.0 ms from Time Zero	69.7

TEST MEETS SPECIFICATIONS

Technician: _____

Approved By: _____

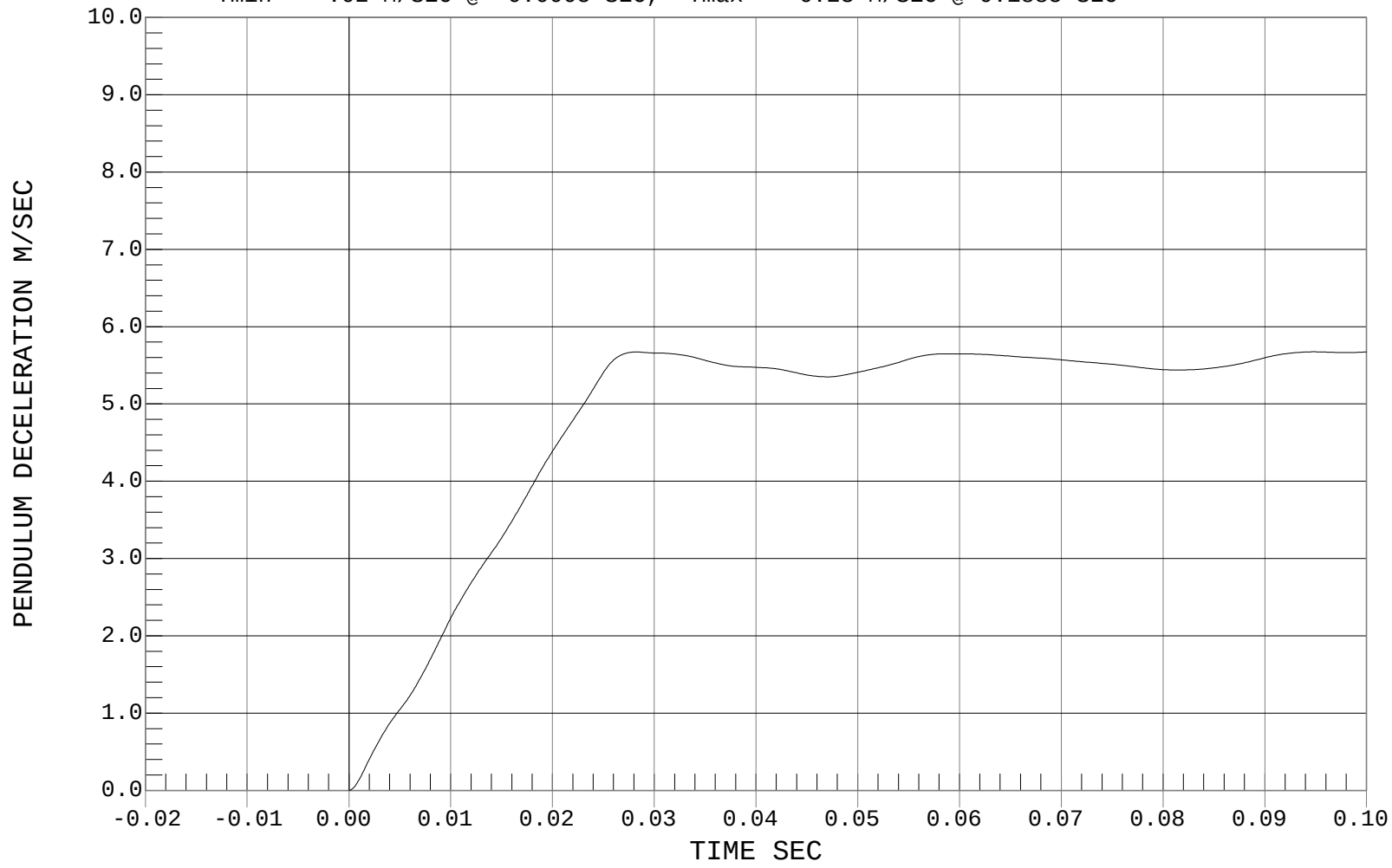
PENDULUM DECELERATION

Test Desc.: Dummy Calibration - Neck Flexion
Component: Dummy #139

Test Date: 06-22-01
Speed: 18.00 FT/SEC, 5.49 M/SEC

1 PENDULUM DECELERATION, D01912AI.V04

Ymin = -.02 M/SEC @ -0.0005 SEC, Ymax = 6.23 M/SEC @ 0.1885 SEC



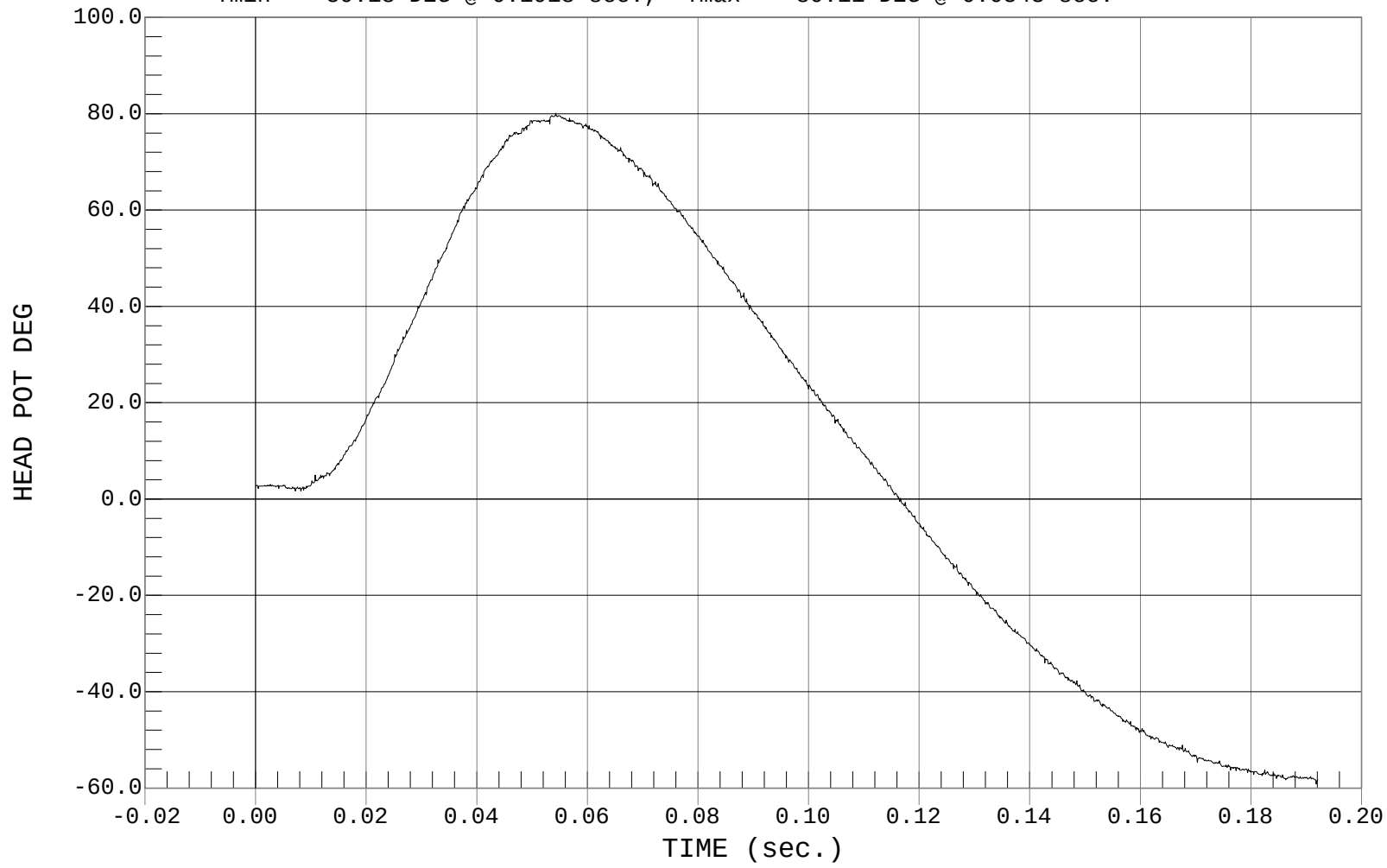
NECK ROTATION

Test Desc.: Dummy Calibration - Neck Flexion
Component: Dummy #139

Test Date: 06-22-01
Speed: 18.00 FT/SEC, 5.49 M/SEC

1 HEAD POT, D01912DU.D05

Ymin = -59.18 DEG @ 0.1918 sec., Ymax = 80.11 DEG @ 0.0543 sec.



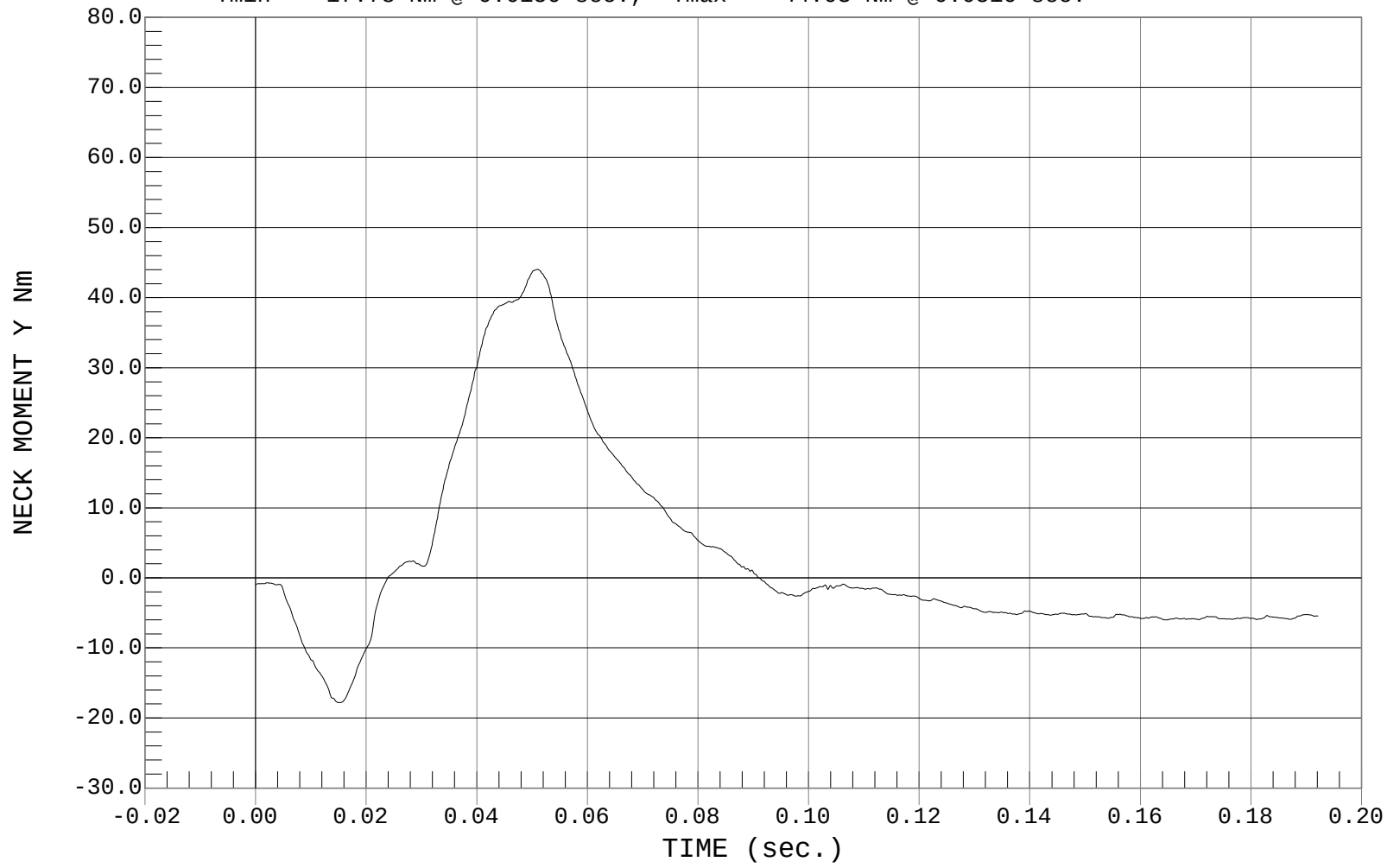
OCCIPITAL MOMENT

Test Desc.: Dummy Calibration - Neck Flexion
Component: Dummy #139

Test Date: 06-22-01
Speed: 18.00 FT/SEC, 5.49 M/SEC

1 NECK MOMENT Y, D01912MF.M01

Ymin = -17.78 Nm @ 0.0150 sec., Ymax = 44.03 Nm @ 0.0510 sec.



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 3 YEAR OLD

Date: 6/22/01

Dummy Serial Number: 139

Test Number: D01913

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature (°C)		20.6 – 22.2	21.5
Relative Humidity (%)		10 – 70	48
Pendulum Speed		3.55 – 3.75 m/sec	3.66
Pendulum Deceleration	6 msec	1.0 – 1.4 m/sec	1.2
	10 msec	1.9 – 2.5 m/sec	2.1
	14 msec	2.8 – 3.5 m/sec	2.8
D Plane Rotation	Max.	83 – 93 deg.	89
Moment About Occipital Condyle	Min.	-53.3 – 43.7 Nm	-46.3
Negative Moment – Time Curve Decay Time to -10 Nm		60.0 – 80.0 ms from Time Zero	71.7

TEST MEETS SPECIFICATIONS

Technician: _____

Approved By: _____

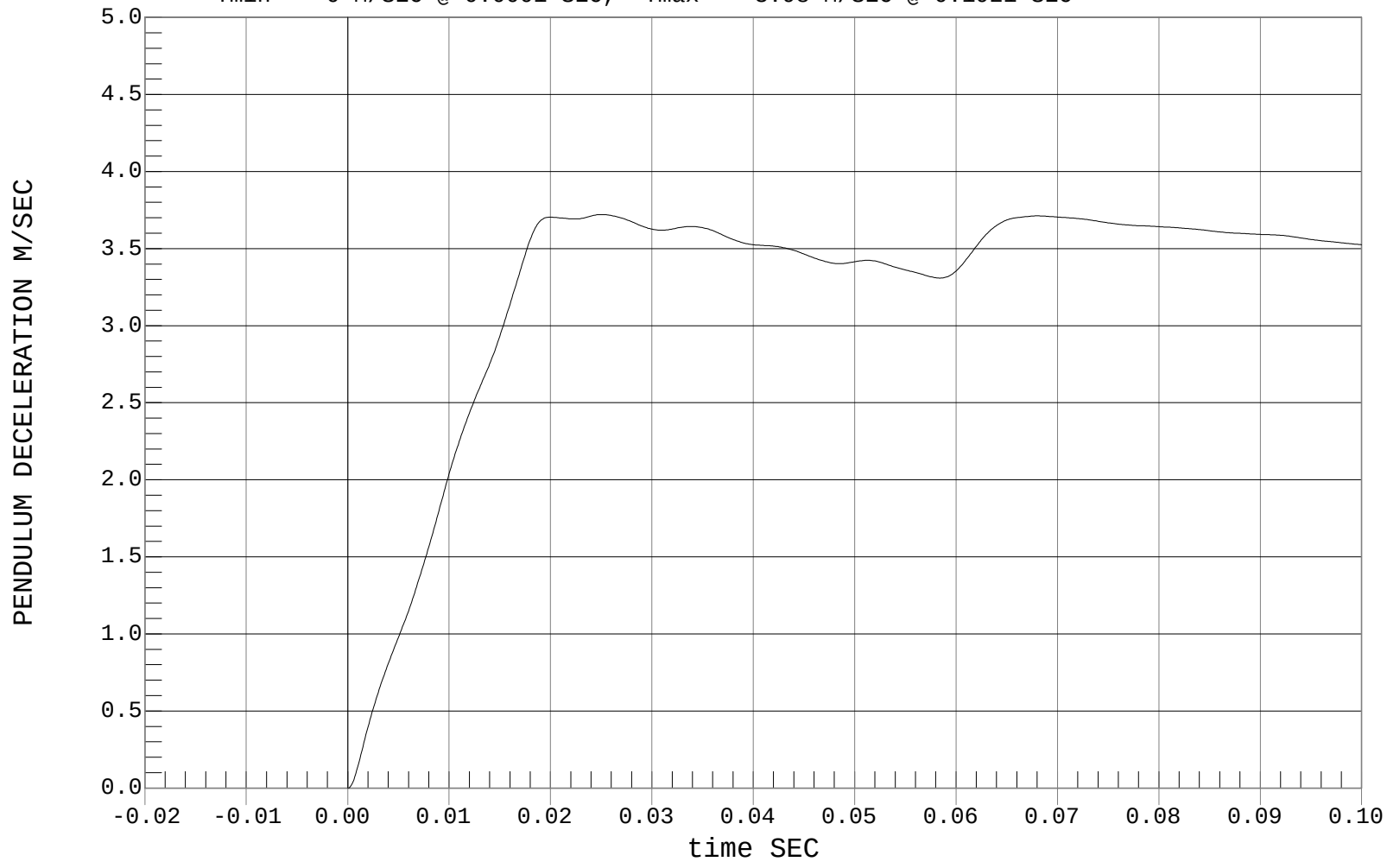
PENDULUM DECELERATION

Test Desc.: Dummy Calibration - Neck Extension
Component: Dummy #139

Test Date: 06-22-01
Speed: 12.00 FT/SEC, 3.66 M/SEC

1 PENDULUM DECELERATION, D01913AI.V04

Ymin = 0 M/SEC @ 0.0001 SEC, Ymax = 3.98 M/SEC @ 0.1921 SEC



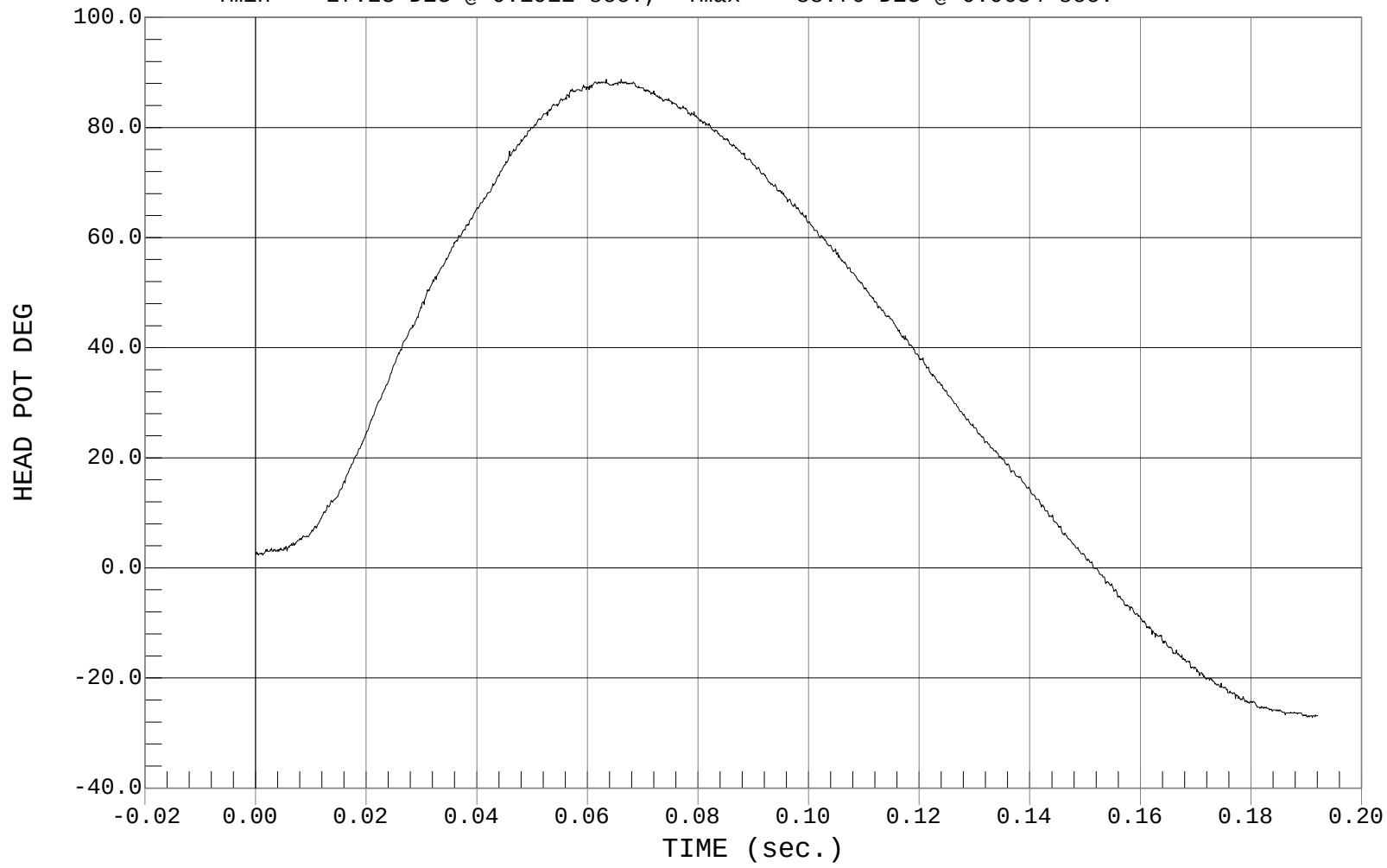
NECK ROTATION

Test Desc.: Dummy Calibration - Neck Extension
Component: Dummy #139

Test Date: 06-22-01
Speed: 12.00 FT/SEC, 3.66 M/SEC

1 HEAD POT, D01913DU.D05

Ymin = -27.23 DEG @ 0.1911 sec., Ymax = 88.76 DEG @ 0.0634 sec.



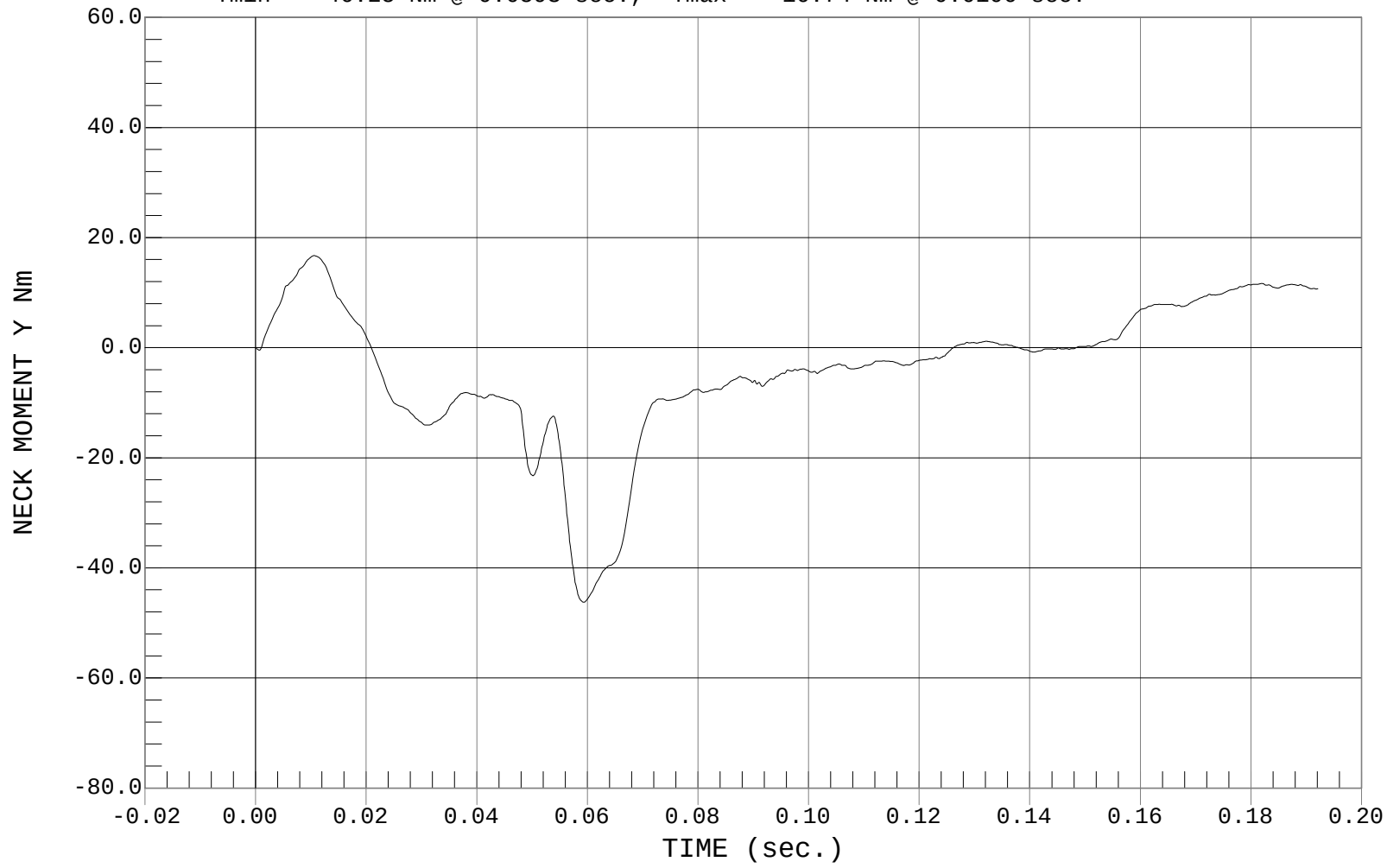
OCCIPITAL MOMENT

Test Desc.: Dummy Calibration - Neck Extension
Component: Dummy #139

Test Date: 06-22-01
Speed: 12.00 FT/SEC, 3.66 M/SEC

1 NECK MOMENT Y, D01913MF.M01

Ymin = -46.25 Nm @ 0.0593 sec., Ymax = 16.74 Nm @ 0.0106 sec.



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THORAX IMPACT TEST

HYBRID III 3 YEAR OLD

Date: 6/22/01

Dummy Serial Number: 139

Test Number: D01914

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	20.6 – 22.2	21.6
Relative Humidity (%)	10 – 70%	45
Probe Speed (m/s)	5.9 – 6.1 m/sec	6.0
Peak Deflection	32 – 38 mm	34
Peak Resistive Force Within Deflection Corridor	.68 - .81 KN	.78
Internal Hysteresis	65 – 85%	72
Max Force 12.5 mm- 32mm Deflection	Max .86 KN	.84

TEST MEETS SPECIFICATIONS

Technician: _____

Approved By: _____

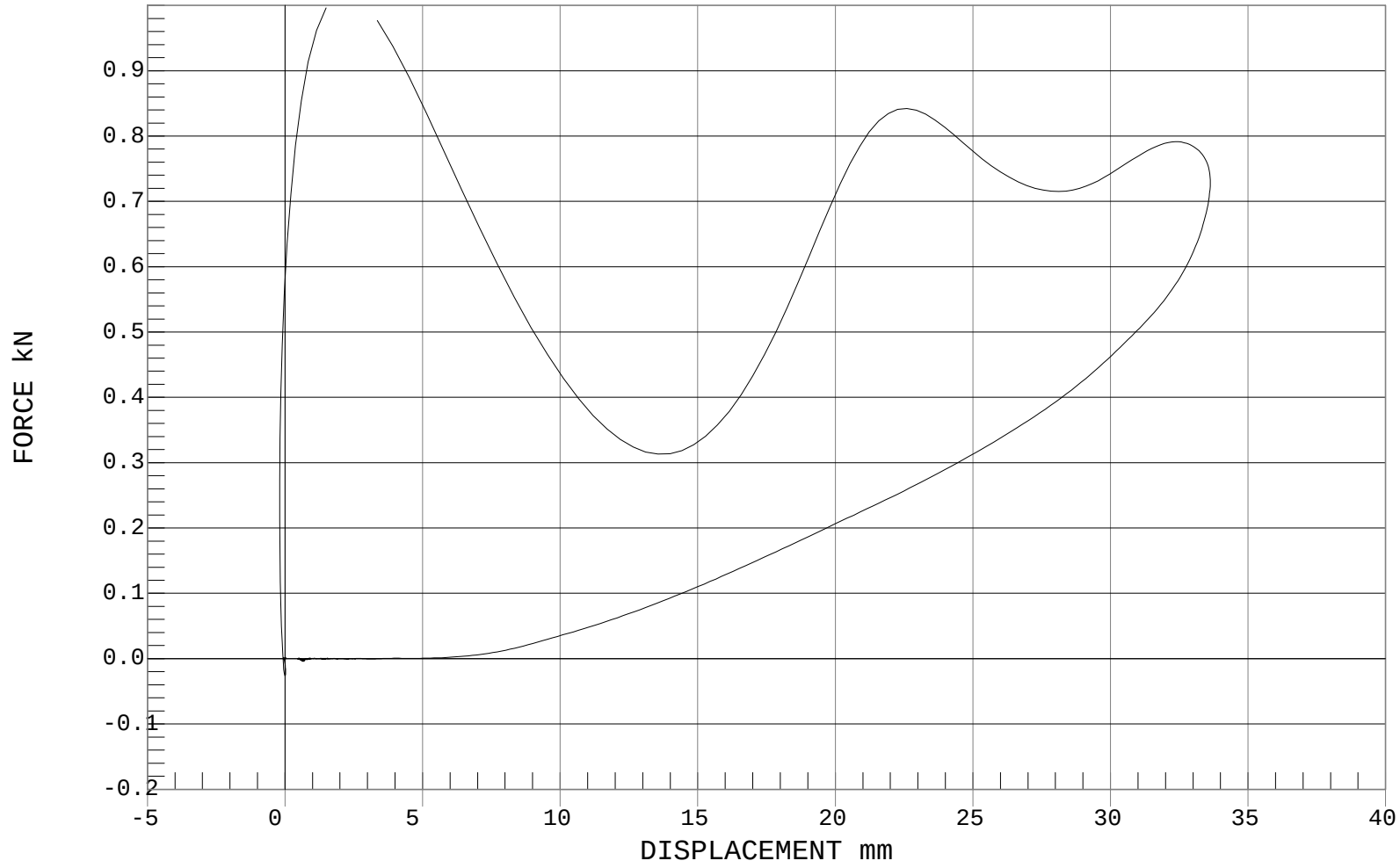
THORAX IMPACT

Test Desc.: Dummy Calibration - Chest Impact
Component: Dummy #139

Test Date: 06-22-01
Speed: 19.72 FT/SEC, 6.01 M/SEC

1 FORCE, D01914CH.FVD

Ymin = -.03 kN @ 0.0003 mm, Ymax = 1.02 kN @ 2.3281 mm



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 3 YEAR OLD

Date: 6/22/01

Dummy Serial Number: 139

Test Number: D01915

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature (°C)	18.9 – 25.6	21.6
Relative Humidity (%)	10 – 70	46
Force @ 45°	130 – 180 N	167
Initial Angle (deg)	0 – 15	6
Return Angle (deg)	0 – 10	4

TEST MEETS SPECIFICATIONS

Technician: _____

Approved By: _____

DUMMY INSPECTION CHECKLIST

Type: Hybrid III 3 year old

Dummy Serial Number: 139

Inspected By: Tim Michnay

Date: 6/22/01

Part	Items Checked	Comments
Skin	visual inspection	OK
Head	visual, ballast, accelerometer mount	OK
Neck	visual, cable torque, nodding blocks	OK
Clavicles	visual, bumpers, range of motion	OK
Arms/Hands	visual, bumpers, range of motion	OK
Spine box	visual, ballast, weldment, accelerometer mount	OK
Rib cage	visual, measure, stiffeners	OK
Sternum	visual, bumpers	OK
Lumbar spine	visual, cable torque	OK
Abdomen	visual	OK
Pelvis	visual, palpate, accelerometer mount	OK
Upper legs	visual, load cell bolts	OK
Knees	visual, stops, inserts, sliders	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):

SECTION 10

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION

	SERIAL NO.	MANUFACTUERER	CALIBRATION DATE
Head X	AJ7F6	Endevco	6/20/01
Head Y	J19843	Endevco	6/20/01
Head Z	J19244	Endevco	6/20/01
Chest X	AJ7F7	Endevco	6/20/01
Chest Y	AJ454	Endevco	6/20/01
Chest Z	J23757	Endevco	6/20/01
Pelvis X	AJ8C0	Endevco	6/20/01
Pelvis Y	J14189	Endevco	6/20/01
Pelvis Z	J23943	Endevco	6/20/01
Upper Neck Force X	114	FTSS	6/20/01
Upper Neck Force Y	114	FTSS	6/20/01
Upper Neck Force Z	114	FTSS	6/20/01
Upper Neck Moment X	114	FTSS	6/20/01
Upper Neck Moment Y	114	FTSS	6/20/01
Upper Neck Moment Z	114	FTSS	6/20/01
Lower Neck Force X	119	FTSS	6/20/01
Lower Neck Force Y	119	FTSS	6/20/01
Lower Neck Force Z	119	FTSS	6/20/01
Lower Neck Moment X	119	FTSS	6/20/01
Lower Neck Moment Y	119	FTSS	6/20/01
Lower Neck Moment Z	119	FTSS	6/20/01
Chest Deflection Gauge	139	Servo	7/11/01
Lap Belt Load Cell	192	Denton	5/03/01
Shoulder Belt Load Cell	191	Denton	5/14/01
Tether Load Cell	190	Entran	5/14/01
Sled Carriage Accelerometer	764077	Sensotec	4/14/01
Sled Carriage Accelerometer (R)	764058	Sensotec	4/14/01