

REPORT NUMBER: SLED-MGA-2001-005

**CHILD RESTRAINT SYSTEM IN
DYNAMIC SLED TEST**

TEST NUMBER: H01251

**PREPARED BY:
MGA RESEARCH CORPORATION
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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.

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Date: _____

Reviewed by: _____
David Winkelbauer, Facility Director

Date: _____

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 56.2 kph (34.9 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: H01251

Test Date: August 16, 2001

Child Restraint Type (forward-facing, rear-facing, booster)	Forward-Facing
LATCH or NON-LATCH	Non-Latch
Child Restraint Manufacturer	Cosco
Child Restraint Model	Olympian Overhead Shield
Child Restraint Age Limits	Toddler
Child Restraint Weight Limits (kg)	18.1
Weight of Child Restraint (kg)	6.4

SECTION 3
POST-TEST OBSERVATIONS

Test No: H01251

Test Date: August 16, 2001

Child Seat	Cosco Olympian Overhead Shield
Belt Fraying	No
Stress Marks	Yes, minor stress marks at vehicle belt pass-through
Cracks	No
Buckle Stress	No
Latch Hooks	No

SECTION 4

HYBRID III 3 YEAR OLD ATD INJURY CRITERIA AND SENSOR DATA

Test No: H01251

Test Date: August 16, 2001

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Left Rear Passenger			
			Max	Time	Min	Time
Head CG	X	G's	45.5	198	49.5	101
Head CG	Y	G's	2.8	114	7.1	91
Head CG	Z	G's	52.7	76	3.6	42
Head CG Resultant	N/A	G's	59.8	98		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Left Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	G's	18.3	210	38.0	49
Chest CG	Y	G's	4.3	209	8.4	109
Chest CG	Z	G's	10.2	201	20.9	100
Chest CG Resultant	N/A	G's	41.3	49		

SEAT BELT SENSOR PEAK VALUES

Location	Axis	Units	Left Rear Passenger			
			Max	Time	Min	Time
Tether Belt	N/A	Newtons	1422	83		
Shoulder Belt	N/A	Newtons	121	89		
Lap Belt	N/A	Newtons	4550	75		

HEAD INJURY CRITERIA (HIC)

Location	Left Rear Passenger			
	HIC	Avg G's	T ¹	T ²
Head CG Primary (36 msec)	683	51.4	67.8	103.8
Head CG Primary (15 msec)	321	54.0	69.6	84.6

CHEST CLIP (3 MSEC)

Location	Left Rear Passenger		
	Clip	T ¹	T ²
Chest CG Primary	39.0	47.5	50.5

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

Test No: H01251

Test Date: August 16, 2001

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	Left Rear Passenger			
			Max	Time	Min	Time
Pelvis	X	G's	23.7	153	53.9	47
Pelvis	Y	G's	4.2	150	8.3	86
Pelvis	Z	G's	11.7	202	31.4	99

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Left Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	56	237	633	97
Neck Force	Y	Newtons	29	240	137	90
Neck Force	Z	Newtons	1381	77	119	42
Neck Moment	X	Nm	3.3	198	7.1	93
Neck Moment	Y	Nm	9.2	116	11.3	58
Neck Moment	Z	Nm	4.0	128	2.5	189

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Left Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	402	195	826	81
Neck Force	Y	Newtons	138	101	269	80
Neck Force	Z	Newtons	*	*	*	*
Neck Moment	X	Nm	4.7	242	28.7	92
Neck Moment	Y	Nm	98.4	106	19.3	195
Neck Moment	Z	Nm	2.4	49	12.0	92

CHEST PEAK DISPLACEMENTS

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

* No Valid Data Collected

SECTION 5

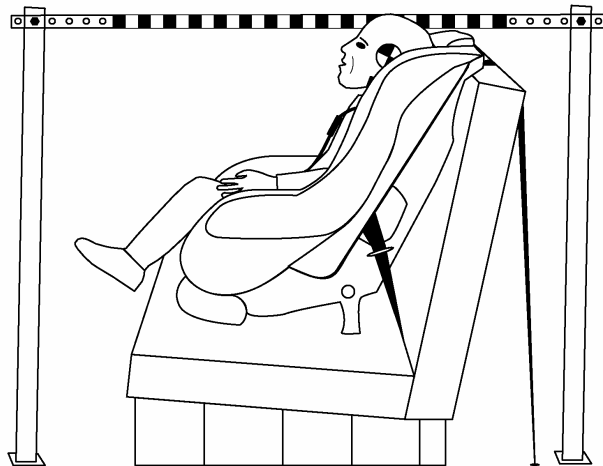
SLED TEST SET-UP

Test No: H01251

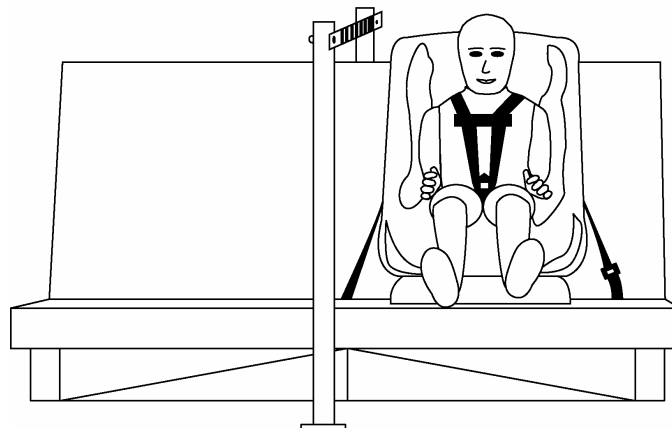
Test Date: August 16, 2001

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



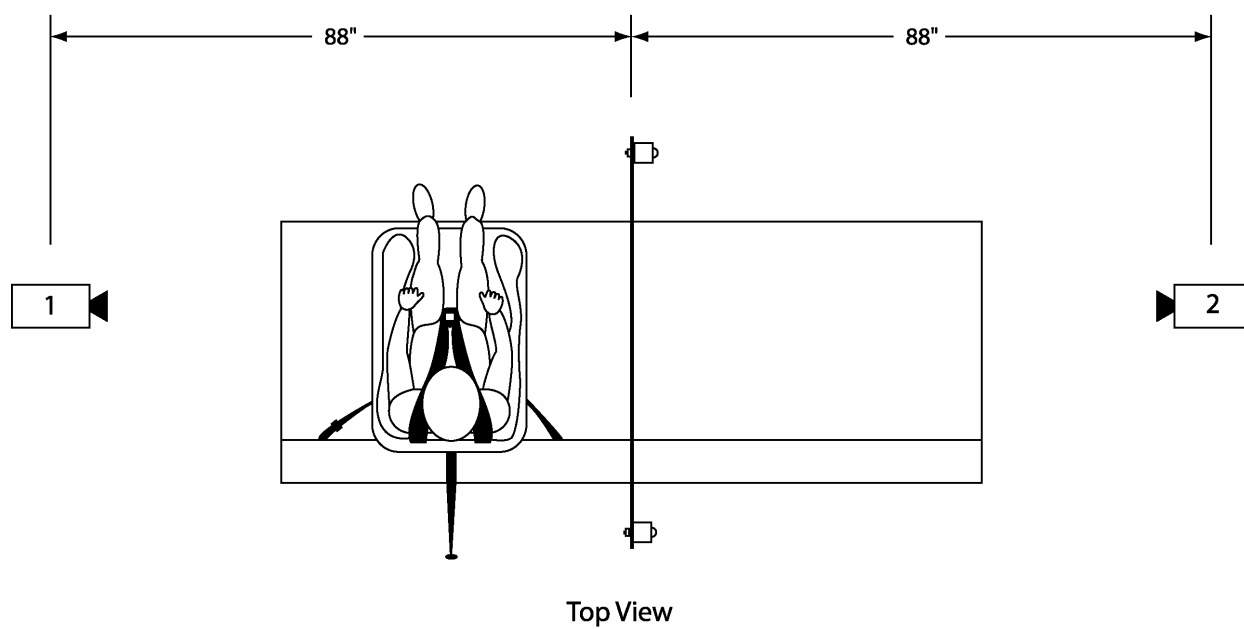
Front View

SECTION 6
CAMERA LOCATION

Test No: H01251

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.



SECTION 7
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Photo 1 - Pre-Test Front View



Photo 2 - Post-Test Front View

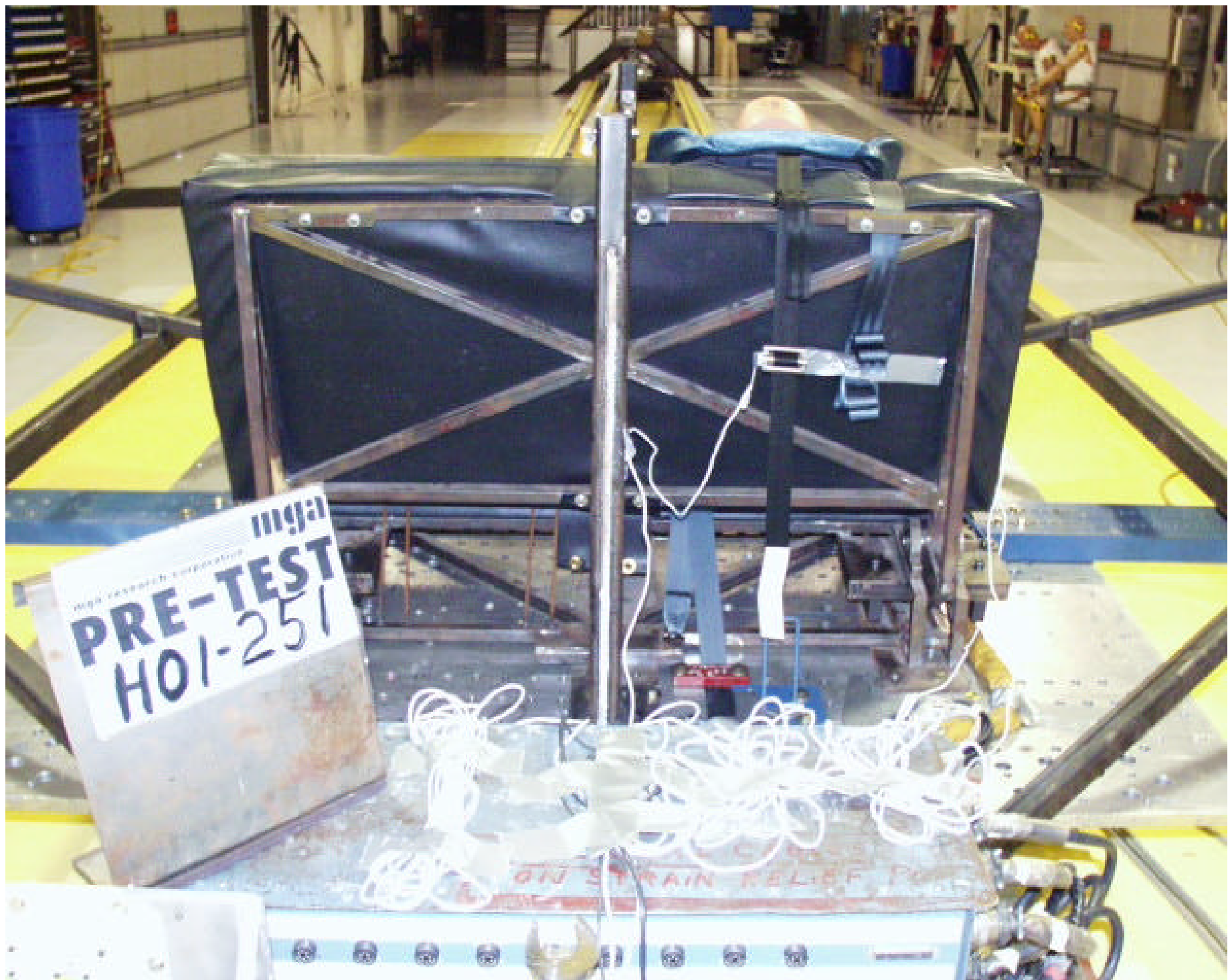


Photo 3 - Pre-Test Rear View

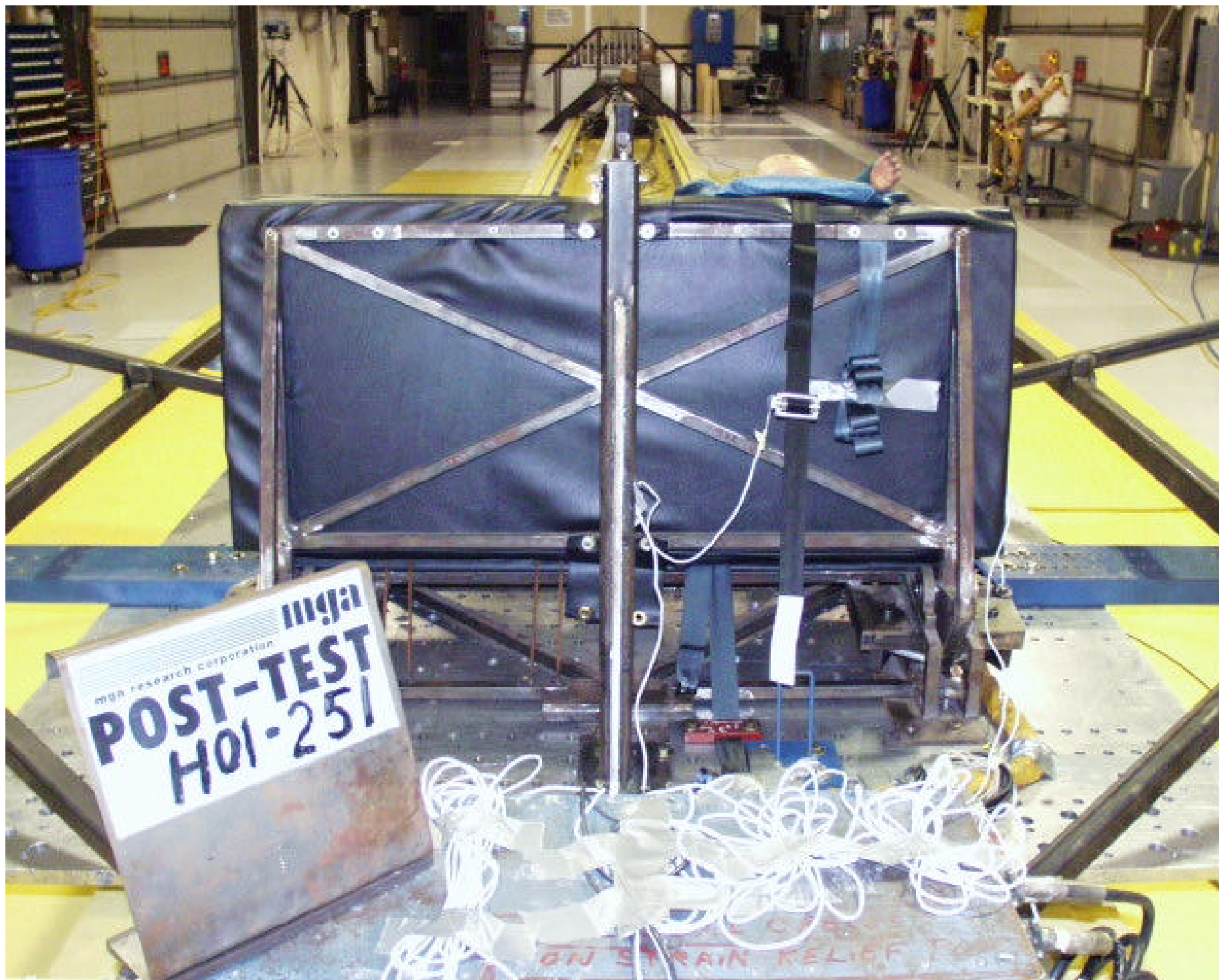


Photo 4 - Post-Test Rear View



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

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* No Valid Data Collected



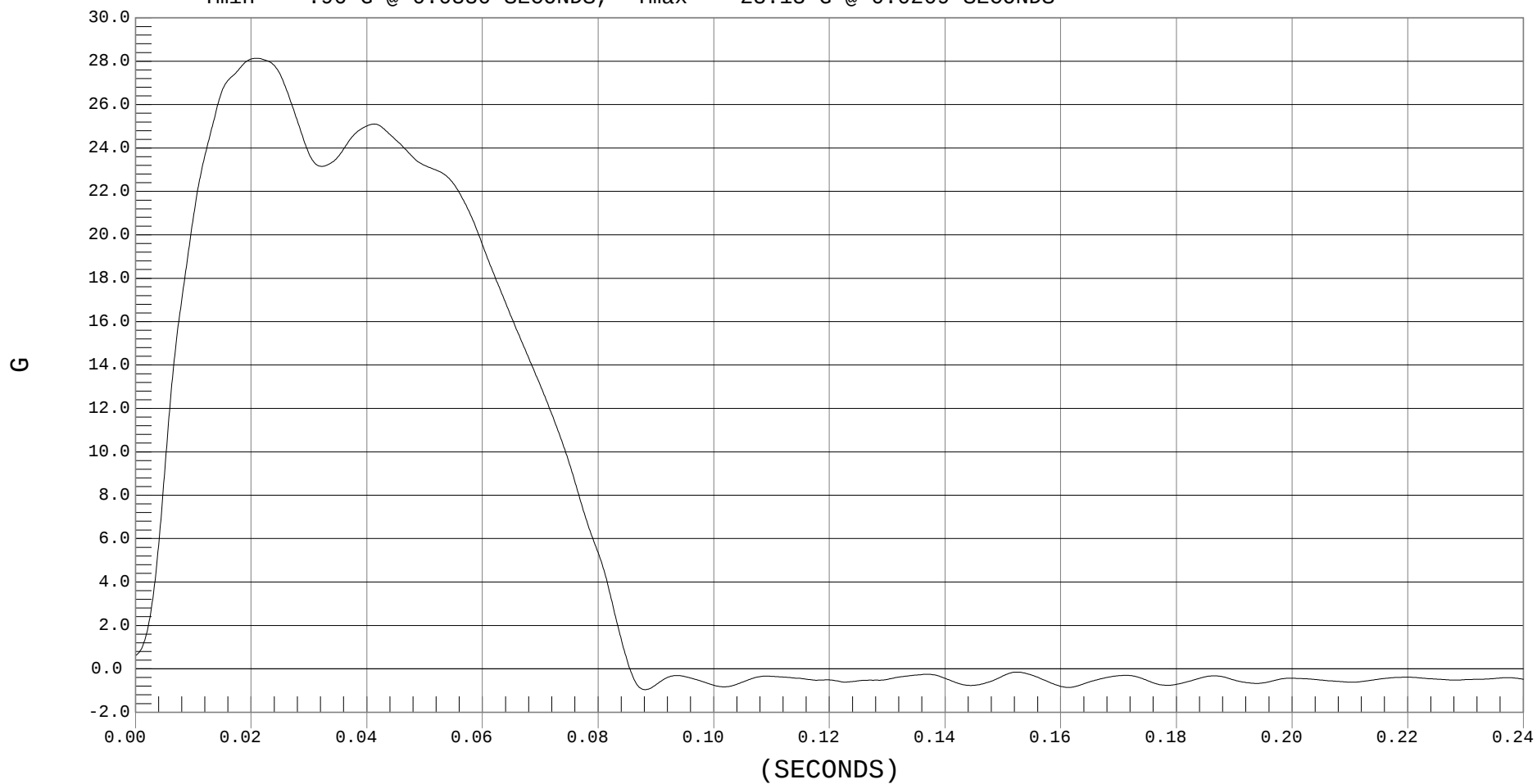
SLED X ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 SLED X ACCELERATION, H01251AF.A01

Ymin = -.96 G @ 0.0880 SECONDS, Ymax = 28.13 G @ 0.0209 SECONDS





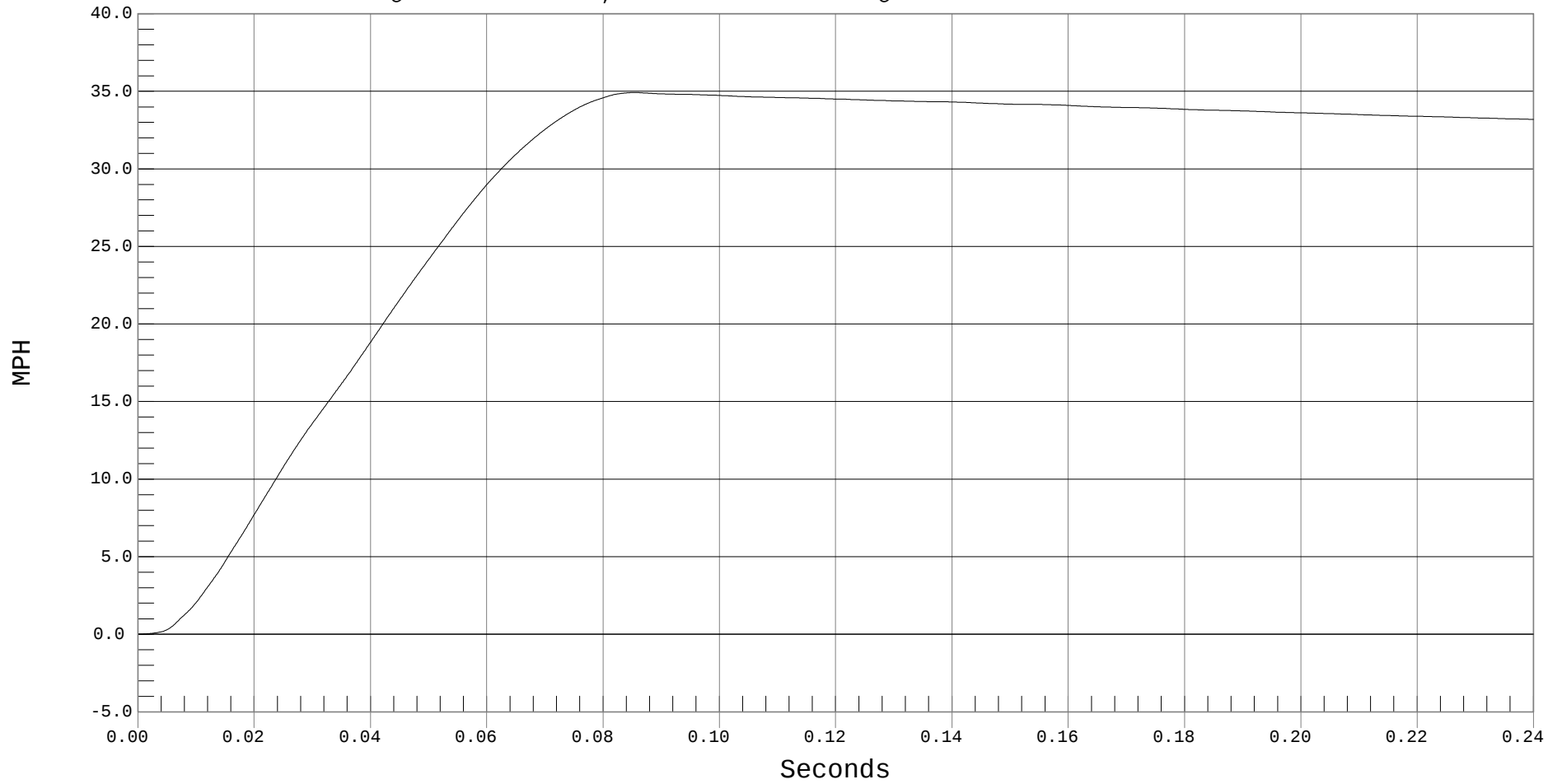
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Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 SLED X VELOCITY, H01251AI.V01

Ymin = 0 MPH @ 0.0000 Seconds, Ymax = 34.92 MPH @ 0.0853 Seconds





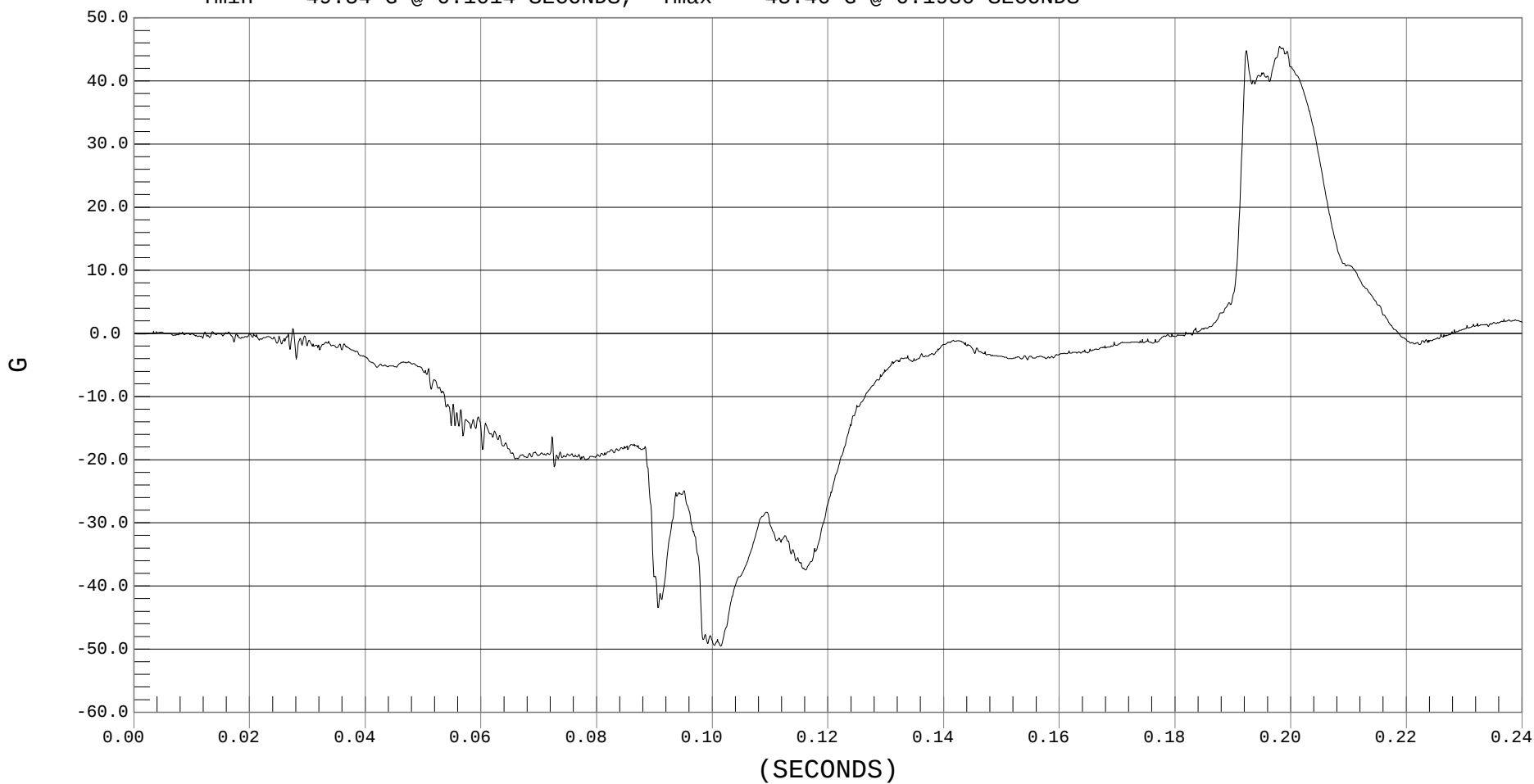
HEAD X ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 HEAD X, H01251AT.A03

Ymin = -49.54 G @ 0.1014 SECONDS, Ymax = 45.46 G @ 0.1980 SECONDS





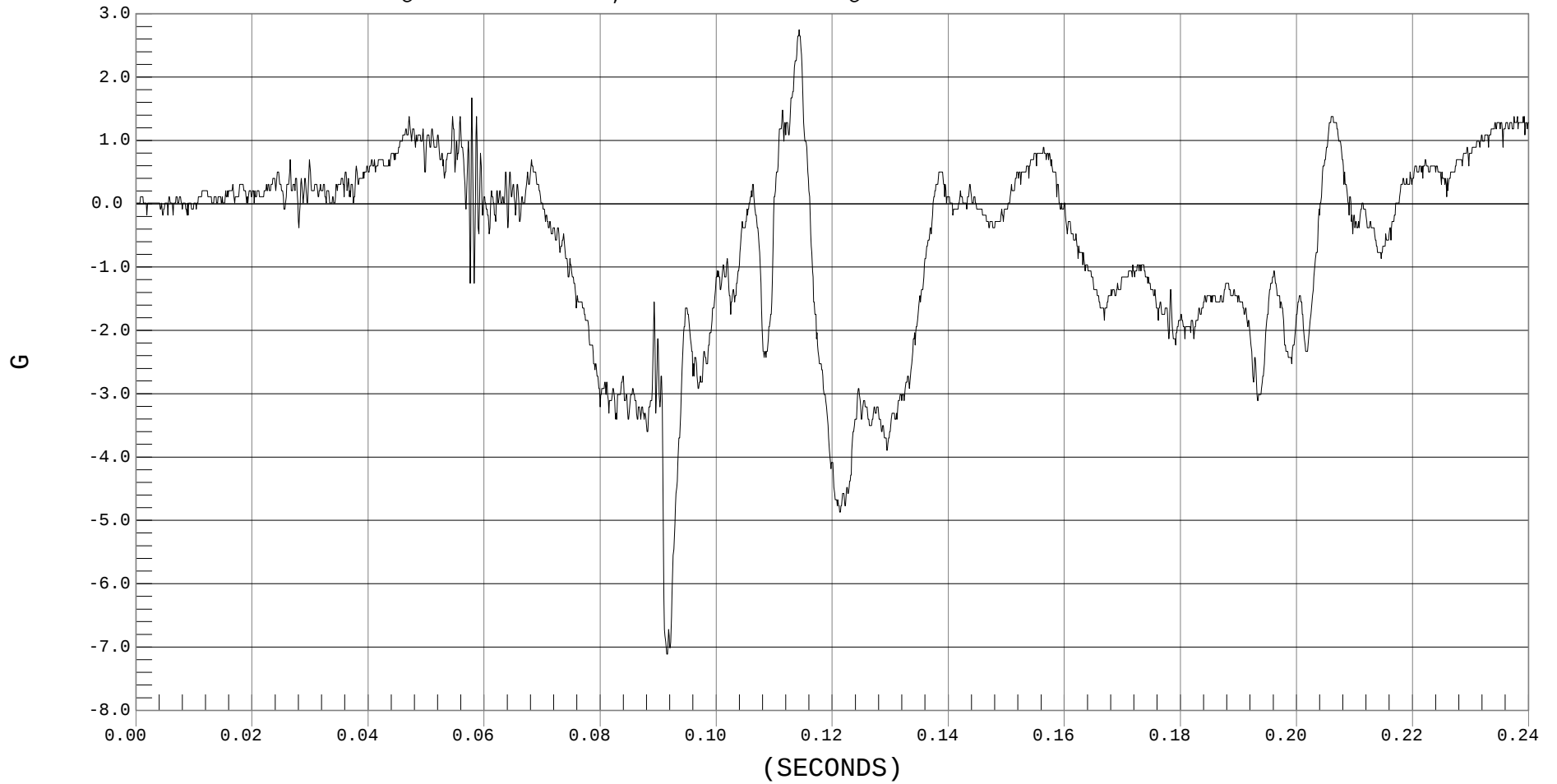
HEAD Y ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 HEAD Y, H01251AT.A05

Ymin = -7.11 G @ 0.0914 SECONDS, Ymax = 2.75 G @ 0.1142 SECONDS





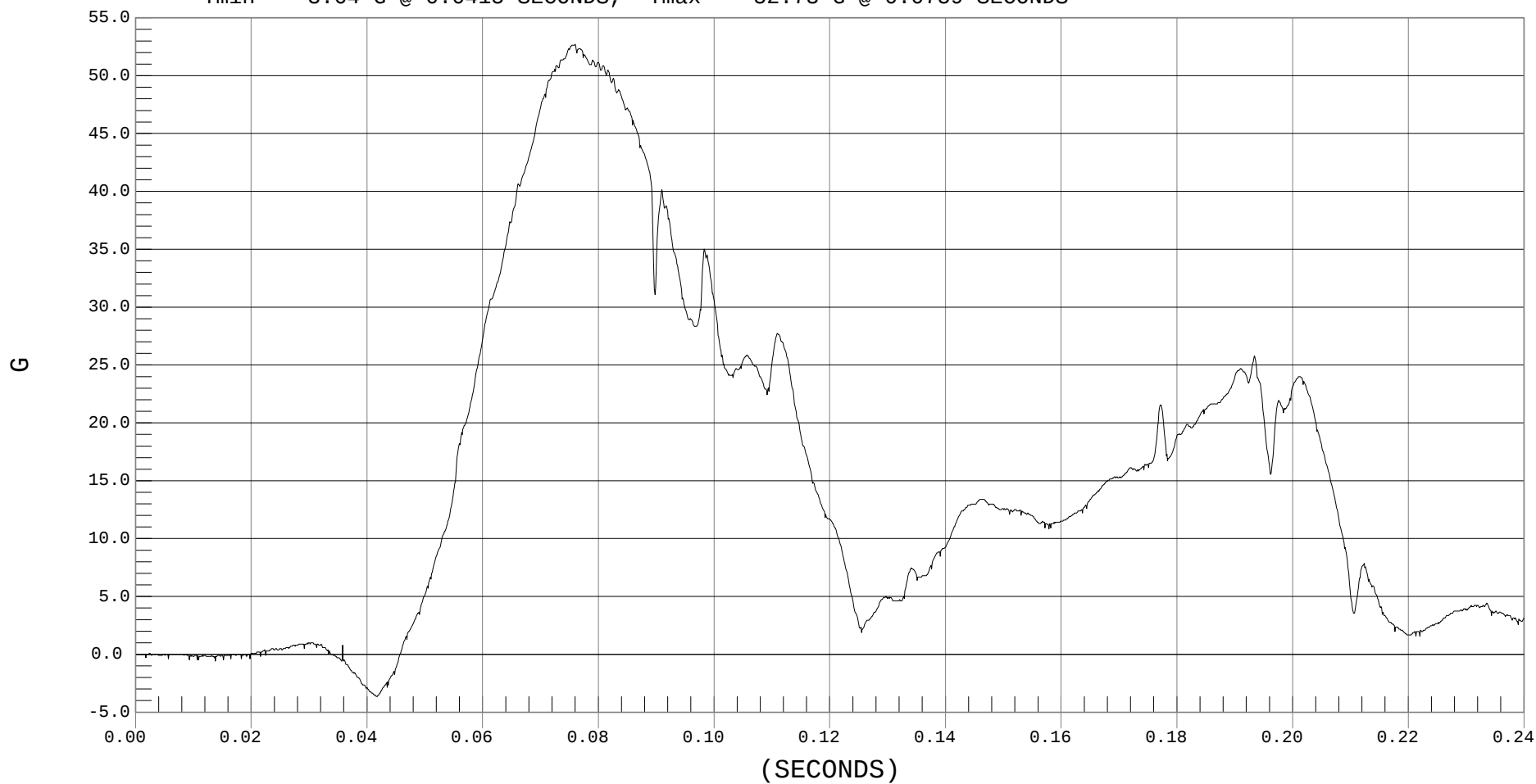
HEAD Z ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 HEAD Z, H01251AT.A06

Ymin = -3.64 G @ 0.0415 SECONDS, Ymax = 52.73 G @ 0.0759 SECONDS





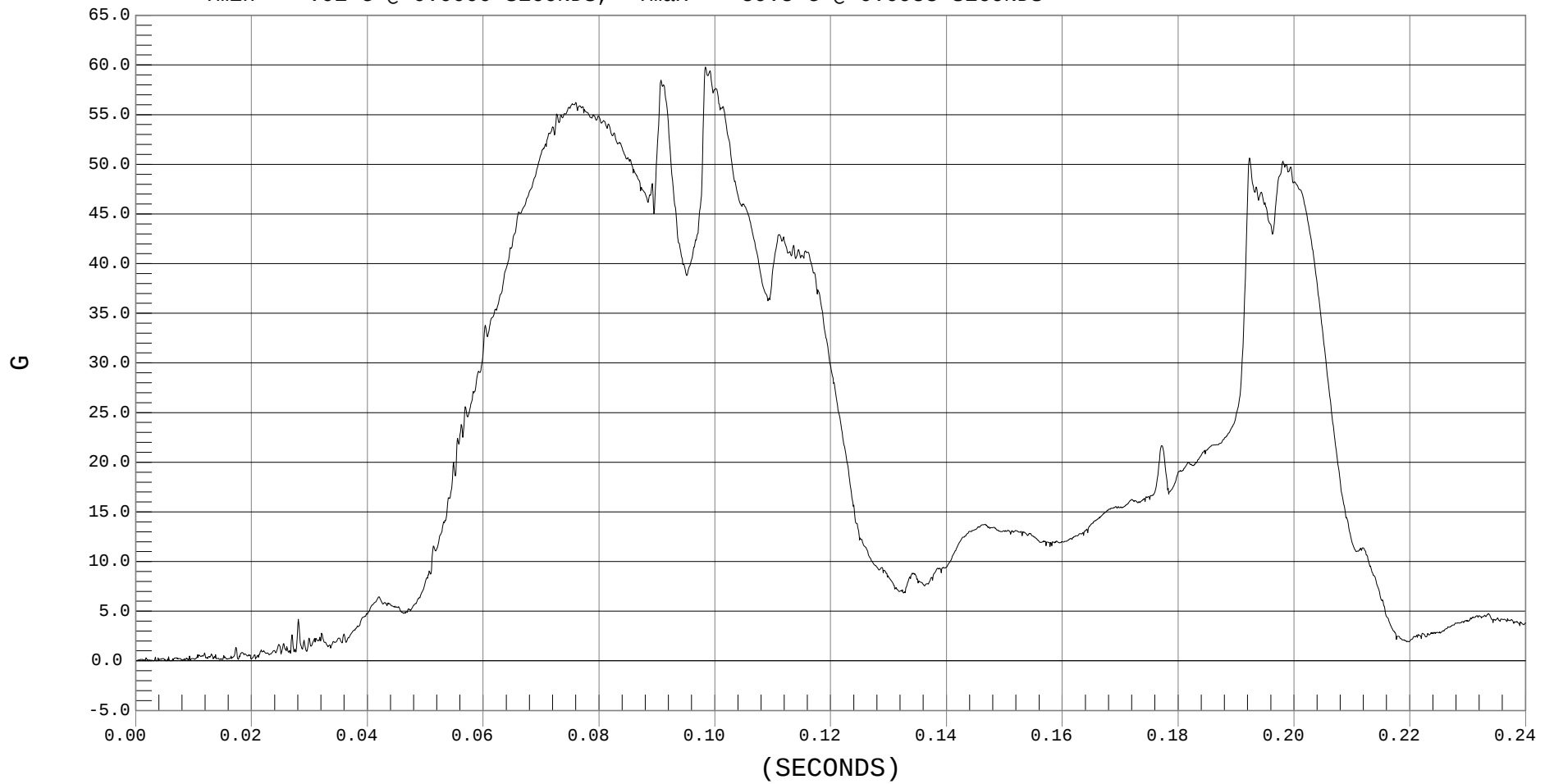
HEAD RESULTANT ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 HEAD RESULTANT ACCELERATION, H01251AV.A03

Ymin = .01 G @ 0.0000 SECONDS, Ymax = 59.8 G @ 0.0983 SECONDS





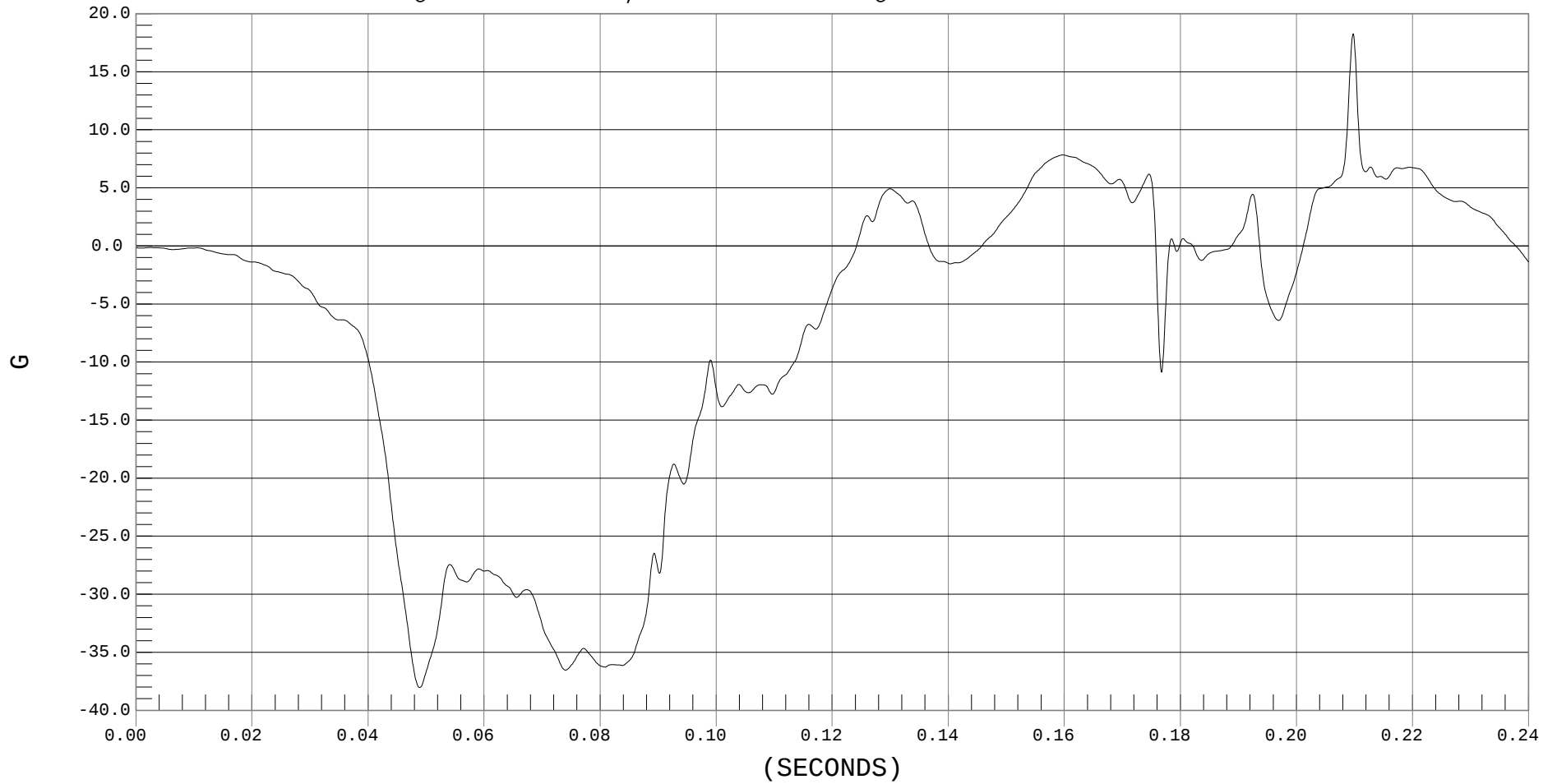
CHEST X ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 CHEST X, H01251AF.A08

Ymin = -38.04 G @ 0.0488 SECONDS, Ymax = 18.28 G @ 0.2097 SECONDS





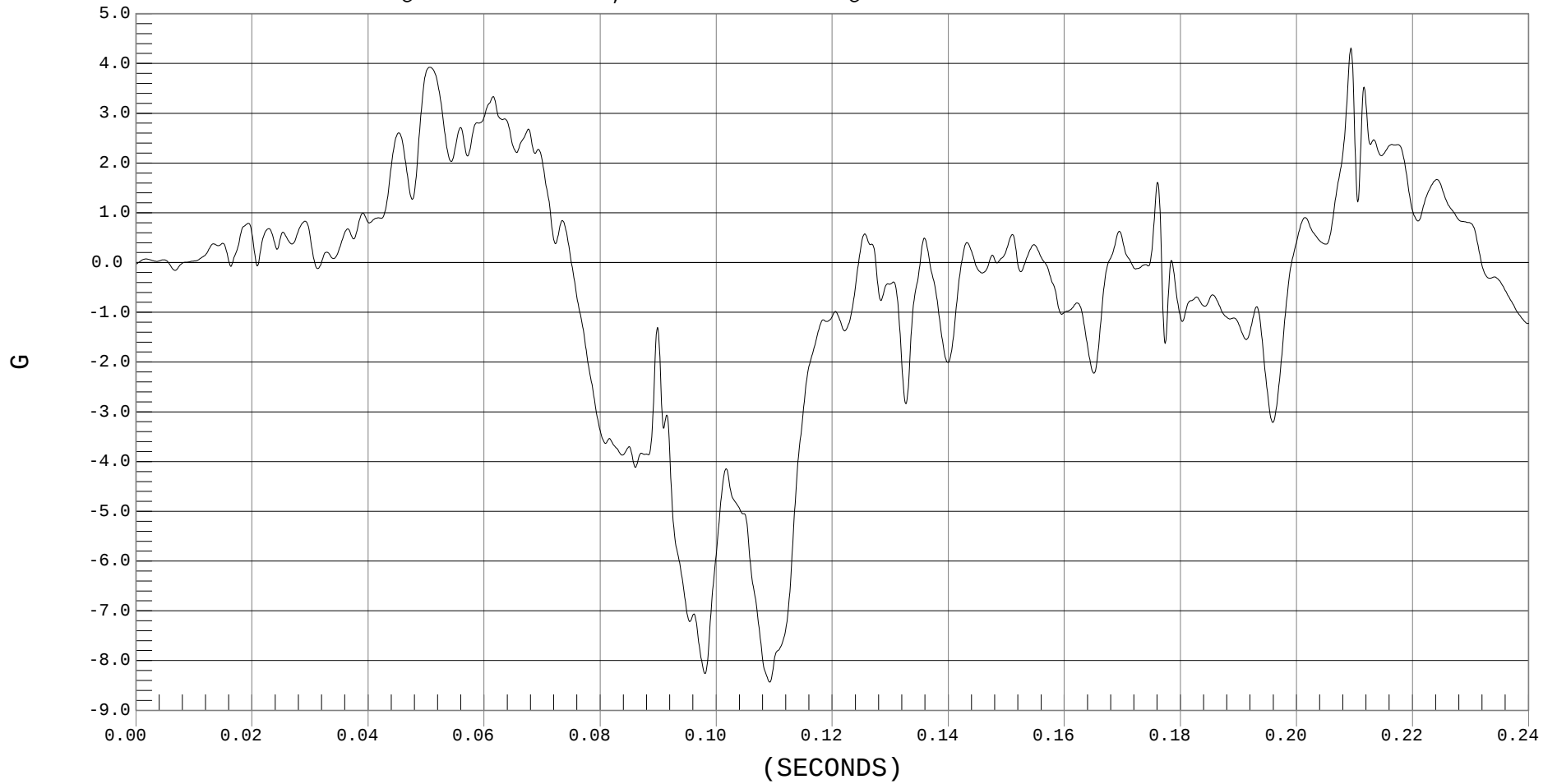
CHEST Y ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 CHEST Y, H01251AF.A09

Ymin = -8.43 G @ 0.1091 SECONDS, Ymax = 4.31 G @ 0.2093 SECONDS





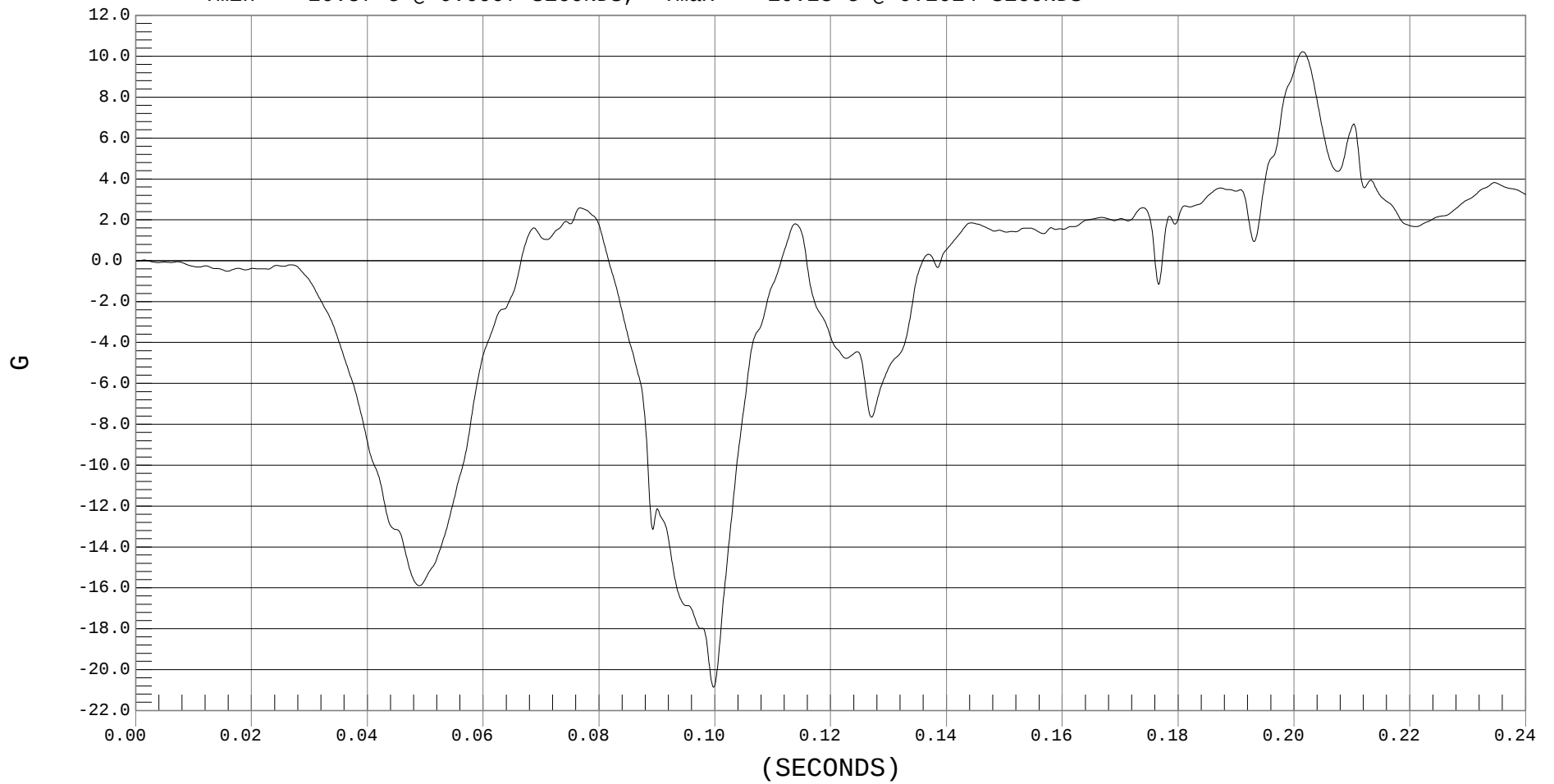
CHEST Z ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 CHEST Z, H01251AF.A12

Ymin = -20.87 G @ 0.0997 SECONDS, Ymax = 10.23 G @ 0.2014 SECONDS





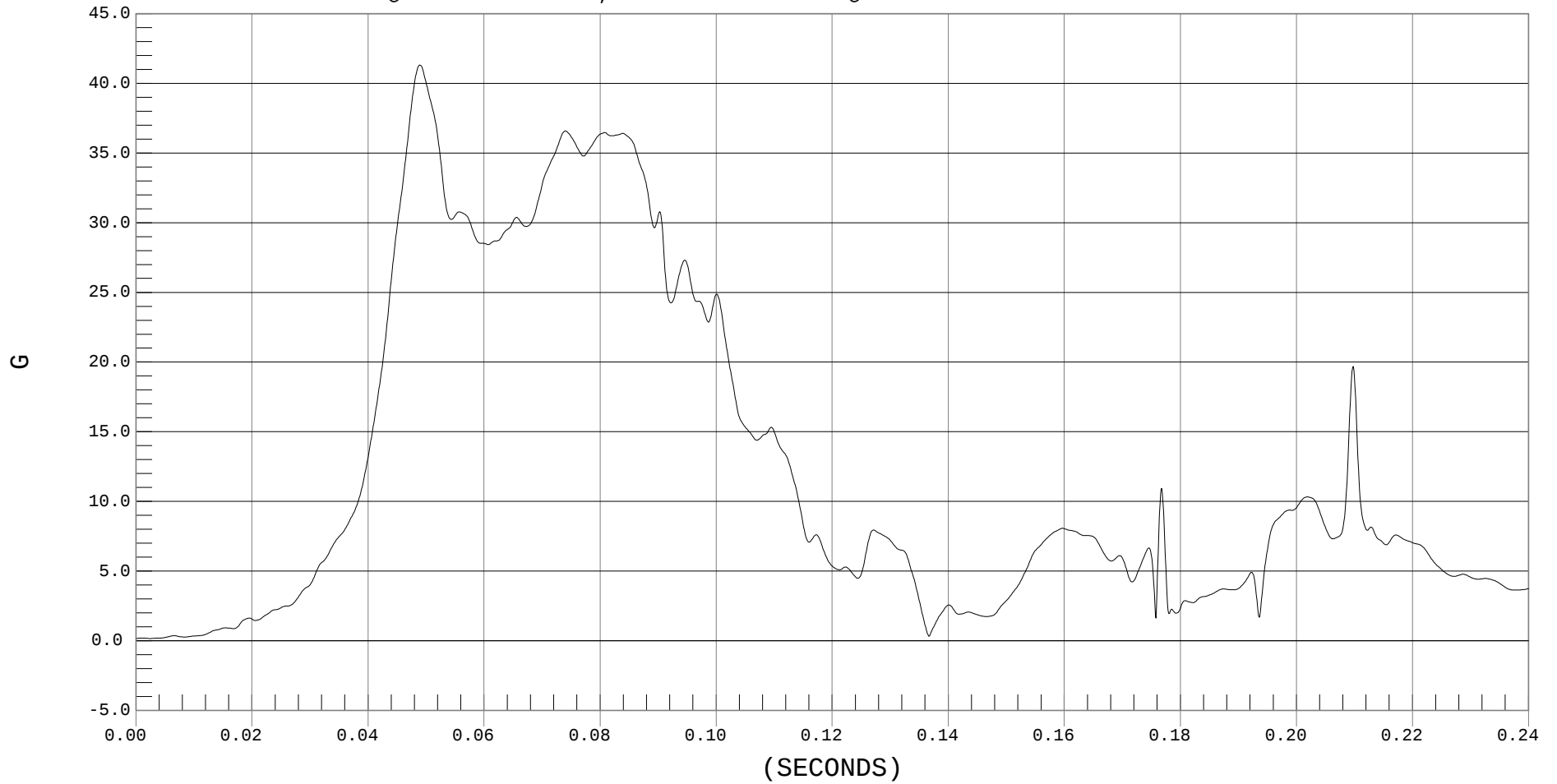
CHEST RESULTANT ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 CHEST RESULTANT ACCELERATION, H01251AV.A08

Ymin = .15 G @ 0.0023 SECONDS, Ymax = 41.32 G @ 0.0488 SECONDS





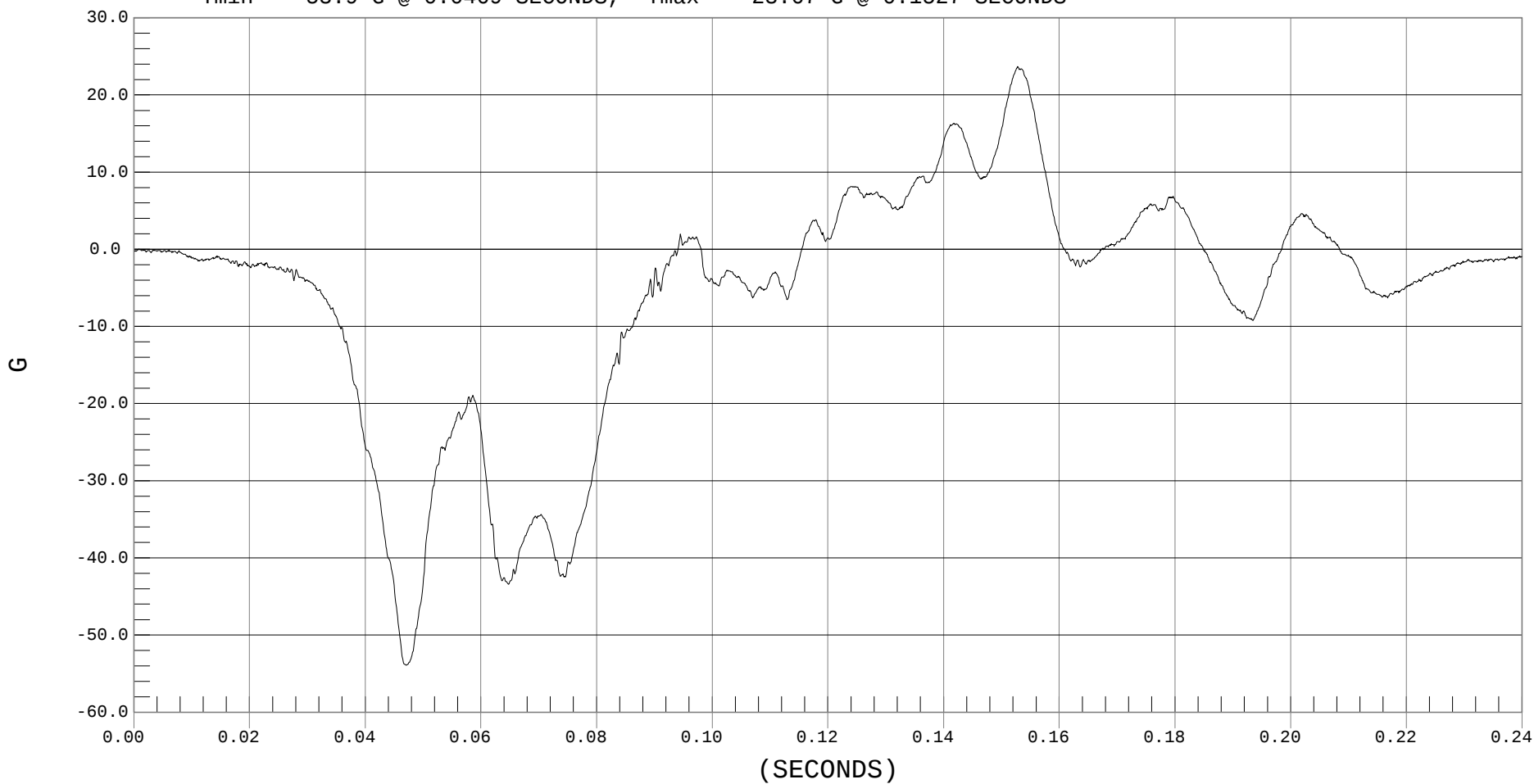
PELVIS X ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 PELVIS X, H01251AT.A27

Ymin = -53.9 G @ 0.0469 SECONDS, Ymax = 23.67 G @ 0.1527 SECONDS





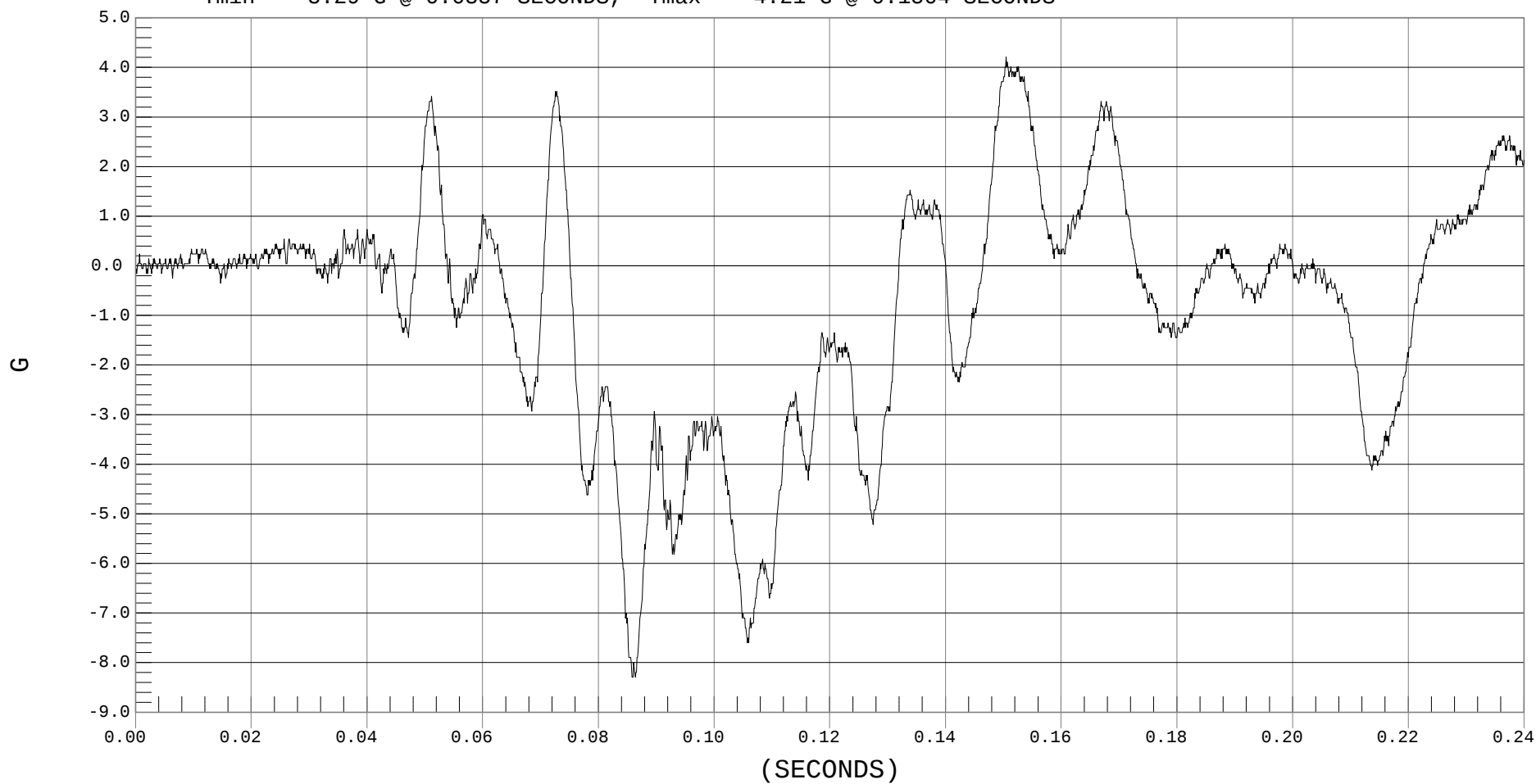
PELVIS Y ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 PELVIS Y, H01251AT.A28

Ymin = -8.29 G @ 0.0857 SECONDS, Ymax = 4.21 G @ 0.1504 SECONDS





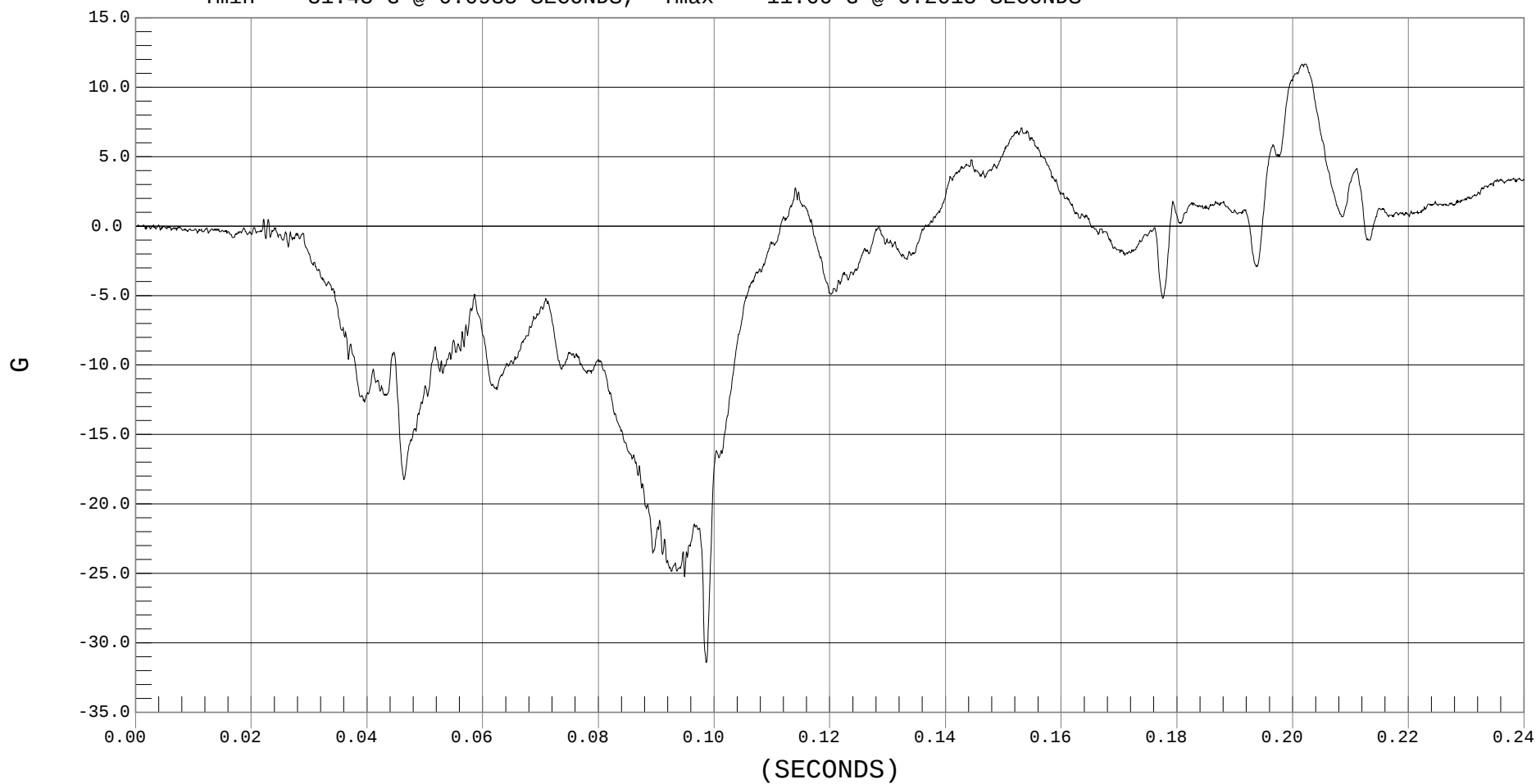
PELVIS Z ACCELERATION

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 PELVIS Z, H01251AT.A29

Ymin = -31.43 G @ 0.0985 SECONDS, Ymax = 11.66 G @ 0.2015 SECONDS





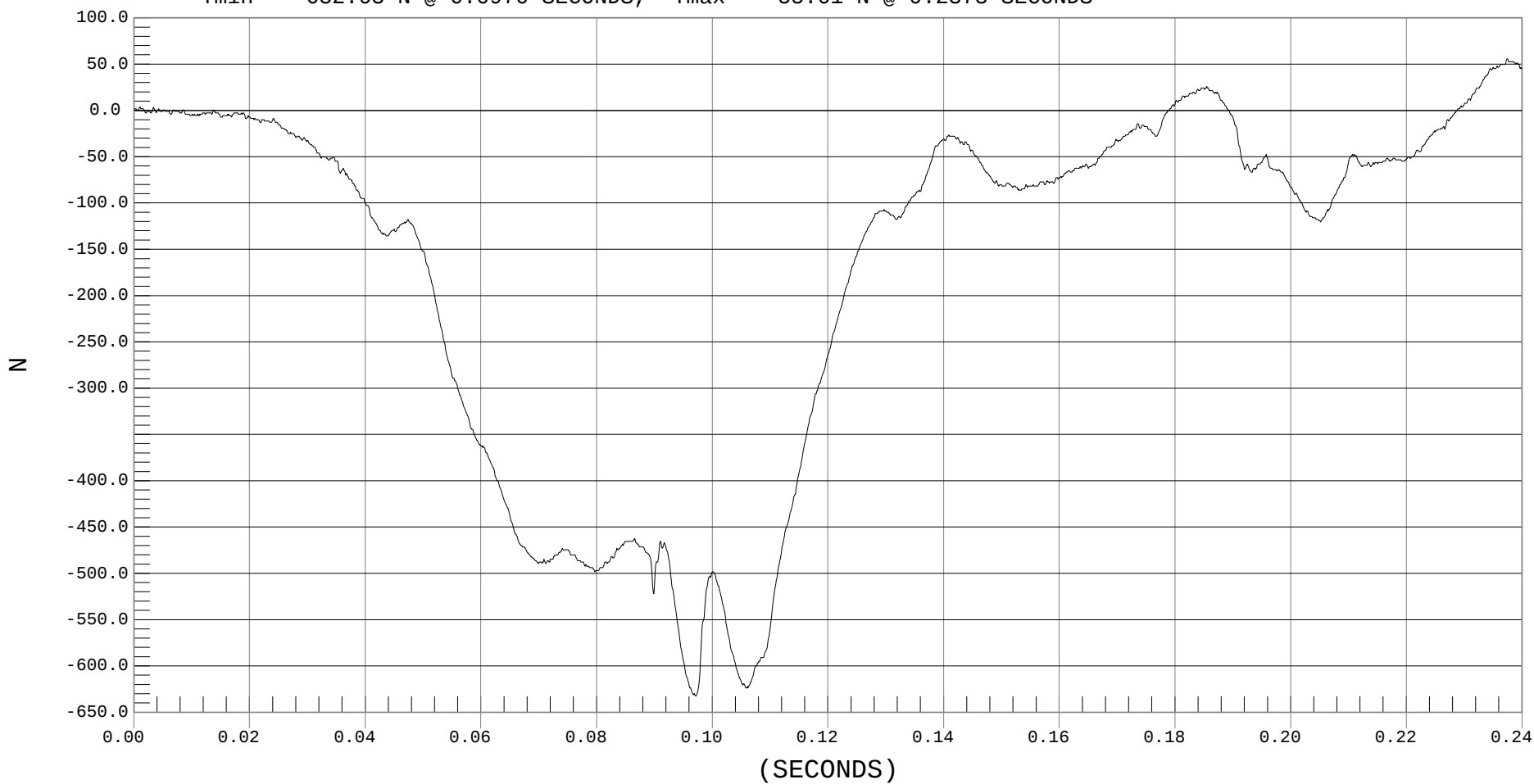
UPPER NECK FORCE X

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 UPPER NECK FX, H01251FT.F13

Ymin = -632.63 N @ 0.0970 SECONDS, Ymax = 55.61 N @ 0.2373 SECONDS





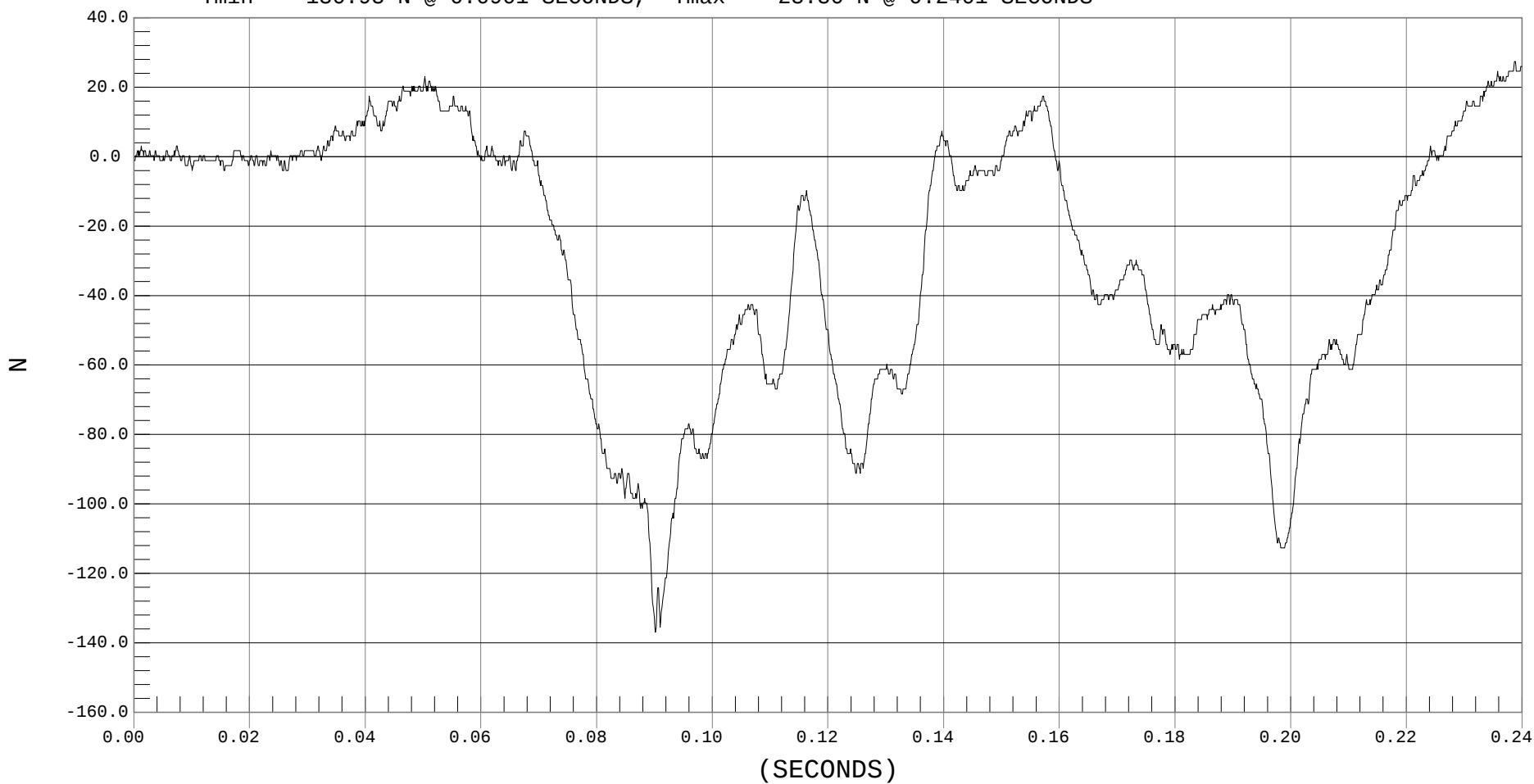
UPPER NECK FORCE Y

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 UPPER NECK FY, H01251FT.F14

Ymin = -136.98 N @ 0.0901 SECONDS, Ymax = 28.86 N @ 0.2401 SECONDS





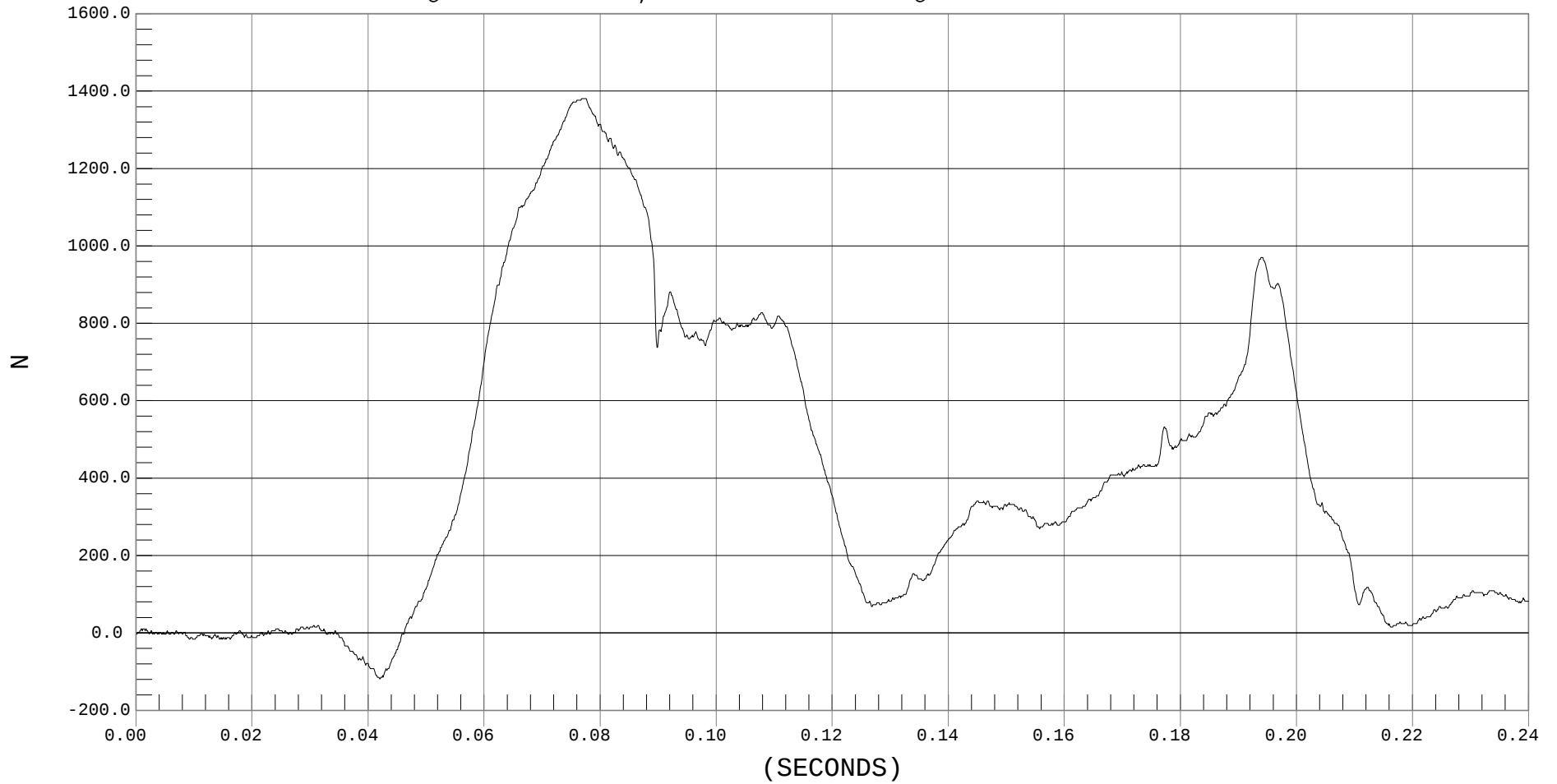
UPPER NECK FORCE Z

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 UPPER NECK FZ, H01251FT.F15

Ymin = -118.92 N @ 0.0419 SECONDS, Ymax = 1380.78 N @ 0.0767 SECONDS





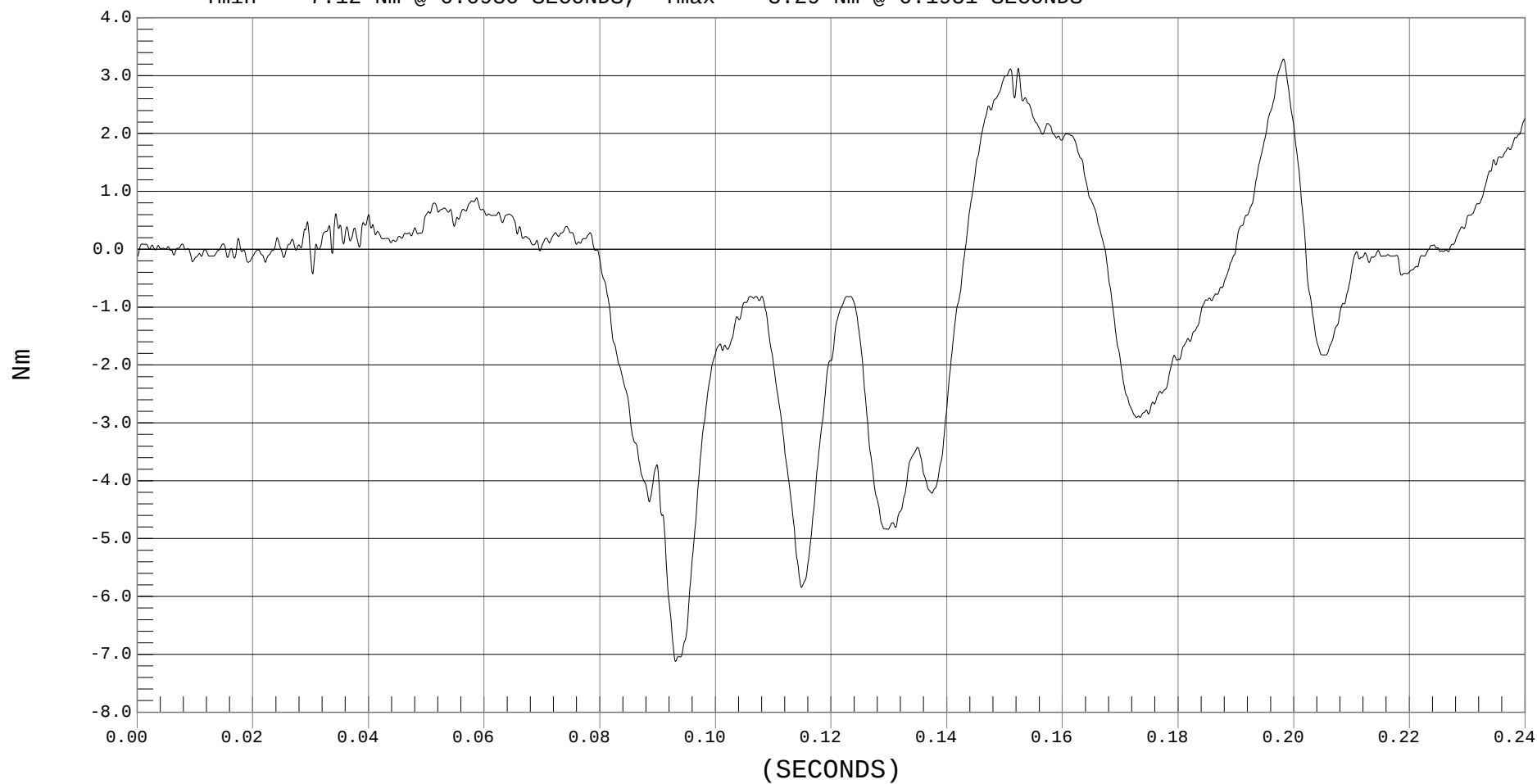
UPPER NECK MOMENT X

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 UPPER NECK MX, H01251MF.M16

Ymin = -7.12 Nm @ 0.0930 SECONDS, Ymax = 3.29 Nm @ 0.1981 SECONDS





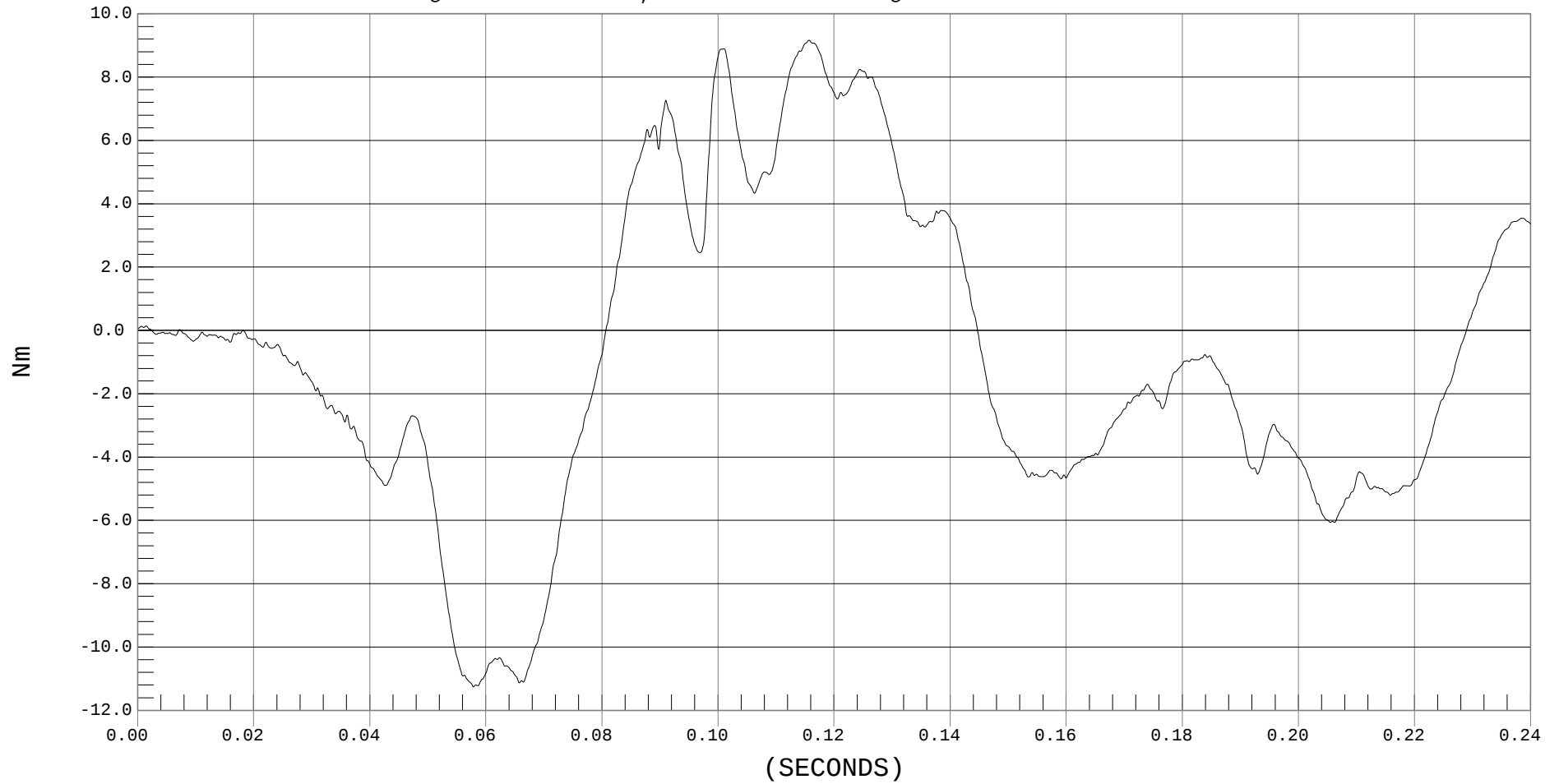
UPPER NECK MOMENT Y

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 UPPER NECK MY, H01251MF.M17

Ymin = -11.26 Nm @ 0.0578 SECONDS, Ymax = 9.16 Nm @ 0.1156 SECONDS





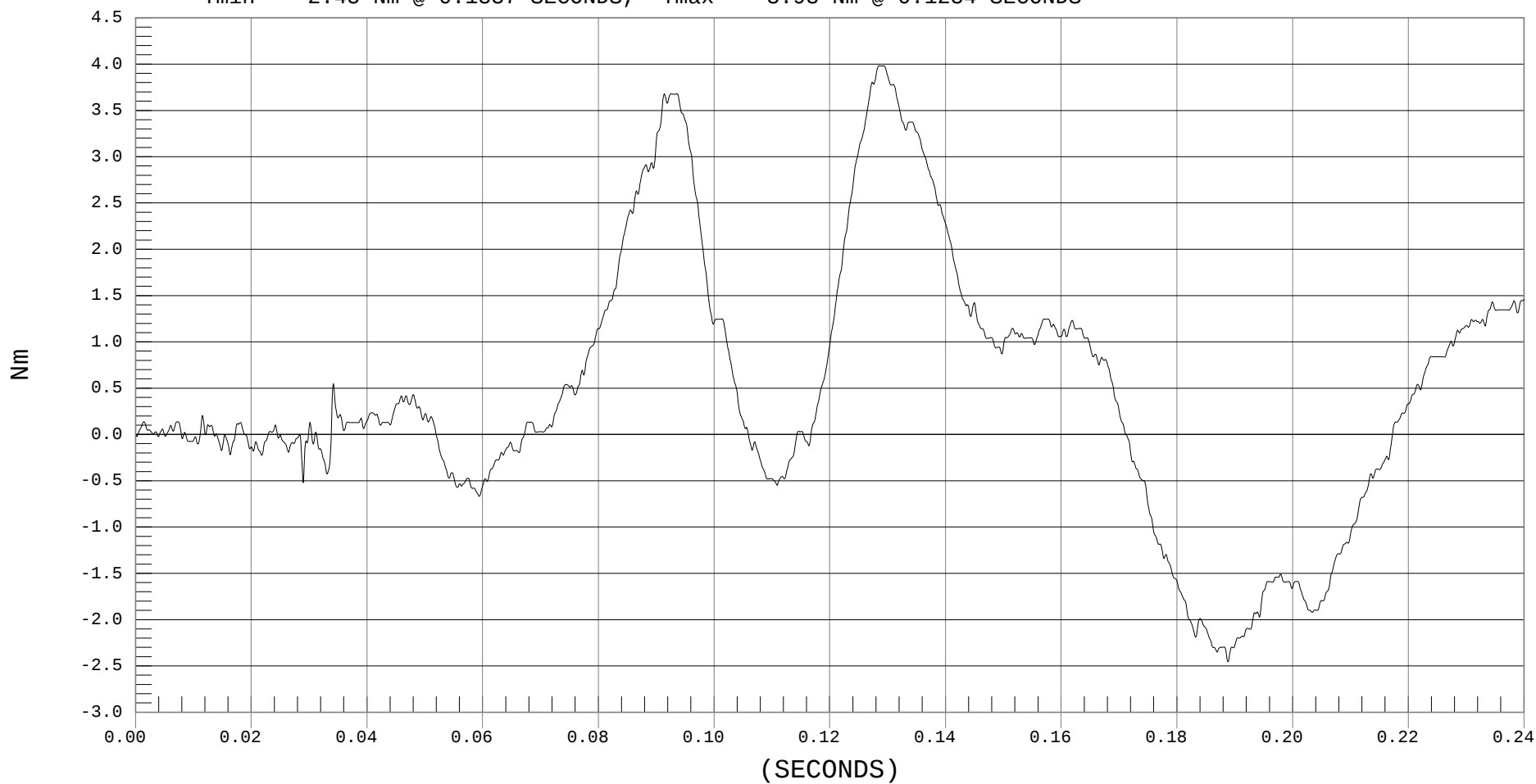
UPPER NECK MOMENT Z

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

1 UPPER NECK MZ, H01251MF.M18

Ymin = -2.45 Nm @ 0.1887 SECONDS, Ymax = 3.98 Nm @ 0.1284 SECONDS





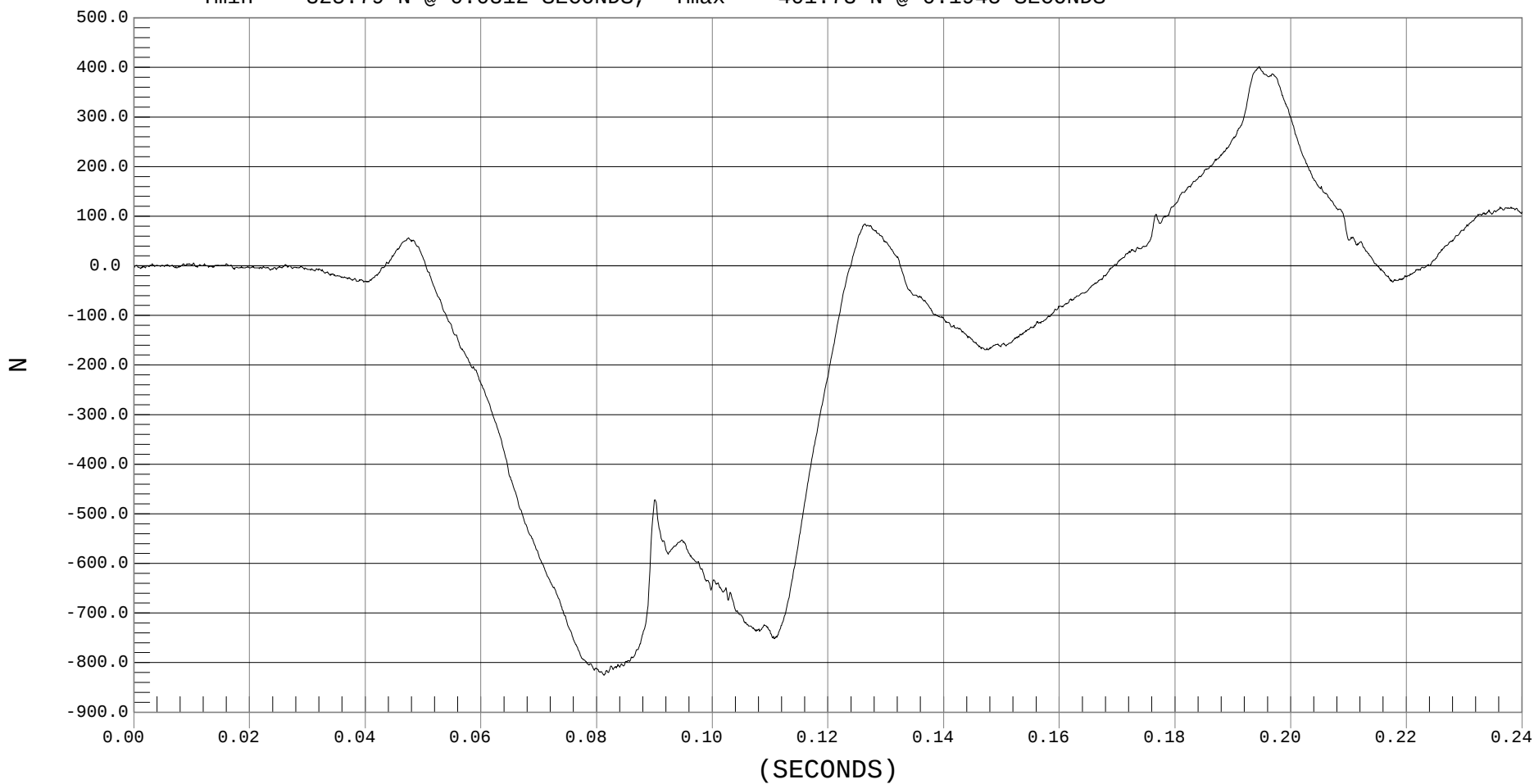
LOWER NECK FORCE X

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 LOWER NECK FX, H01251FT.F21

Ymin = -825.79 N @ 0.0812 SECONDS, Ymax = 401.73 N @ 0.1945 SECONDS





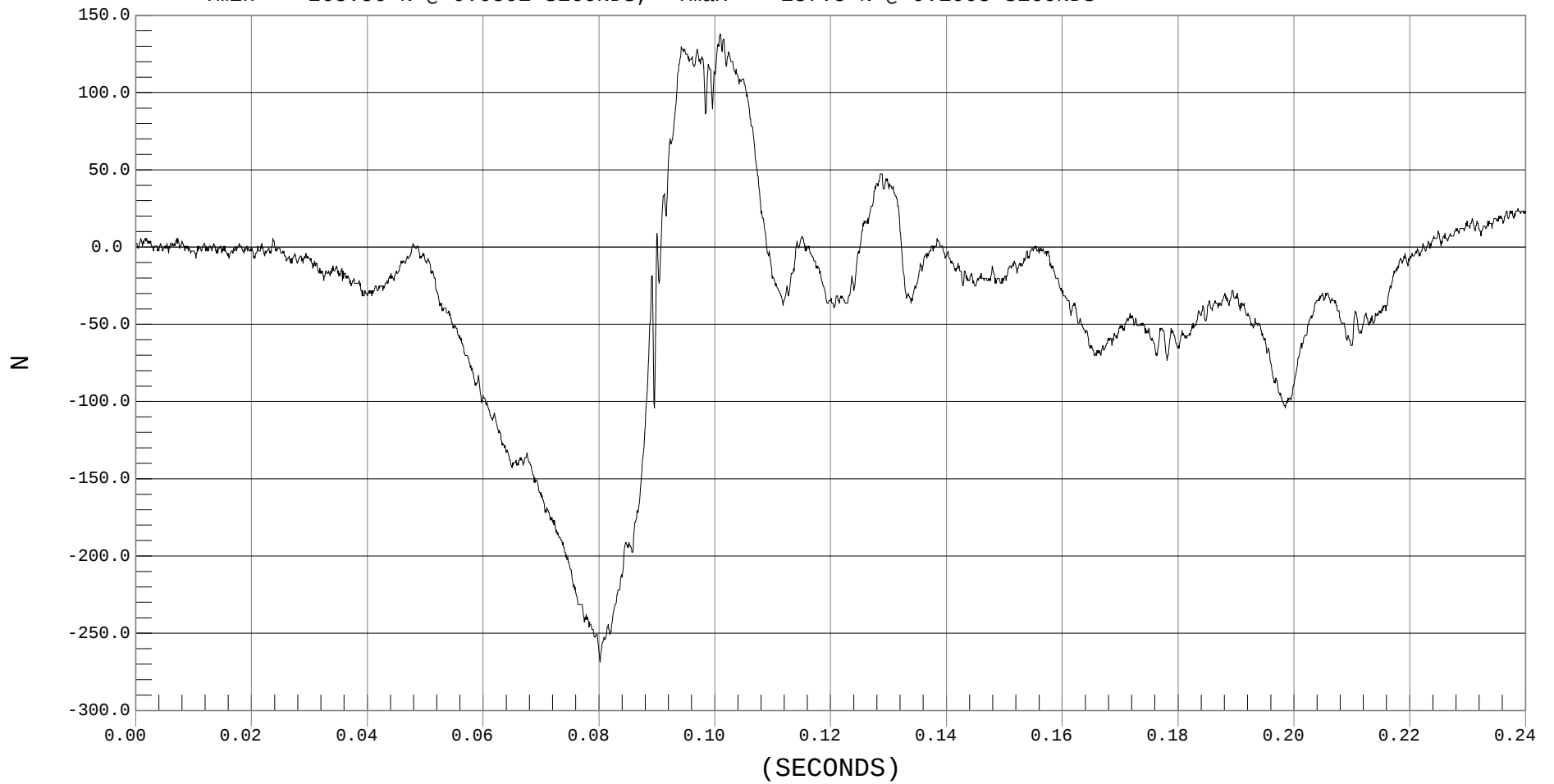
LOWER NECK FORCE Y

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 LOWER NECK FY, H01251FT.F22

Ymin = -268.56 N @ 0.0801 SECONDS, Ymax = 137.8 N @ 0.1008 SECONDS



LOWER NECK FORCE Z
NO VALID DATA COLLECTED



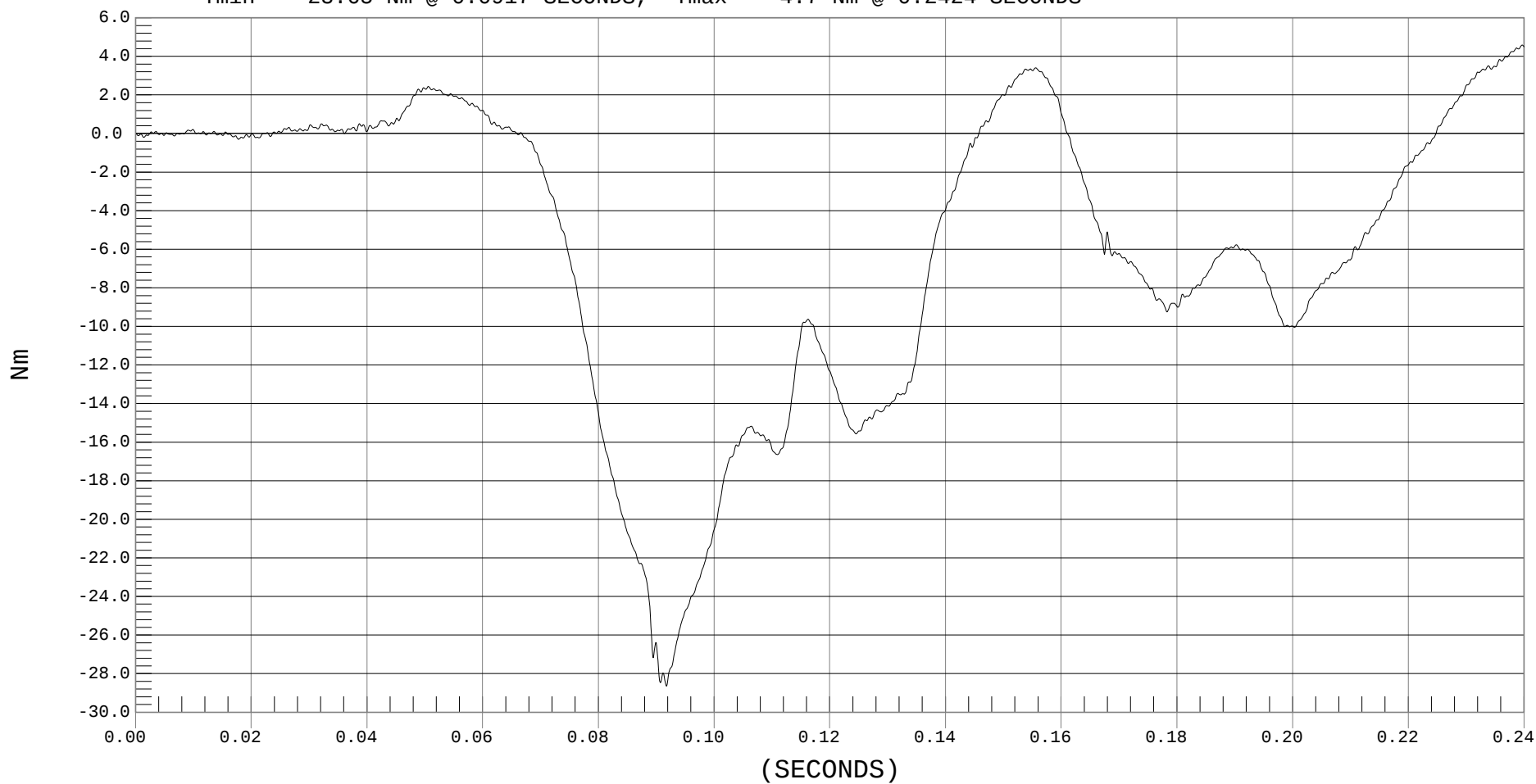
LOWER NECK MOMENT X

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 LOWER NECK MX, H01251MF.M24

Ymin = -28.65 Nm @ 0.0917 SECONDS, Ymax = 4.7 Nm @ 0.2424 SECONDS





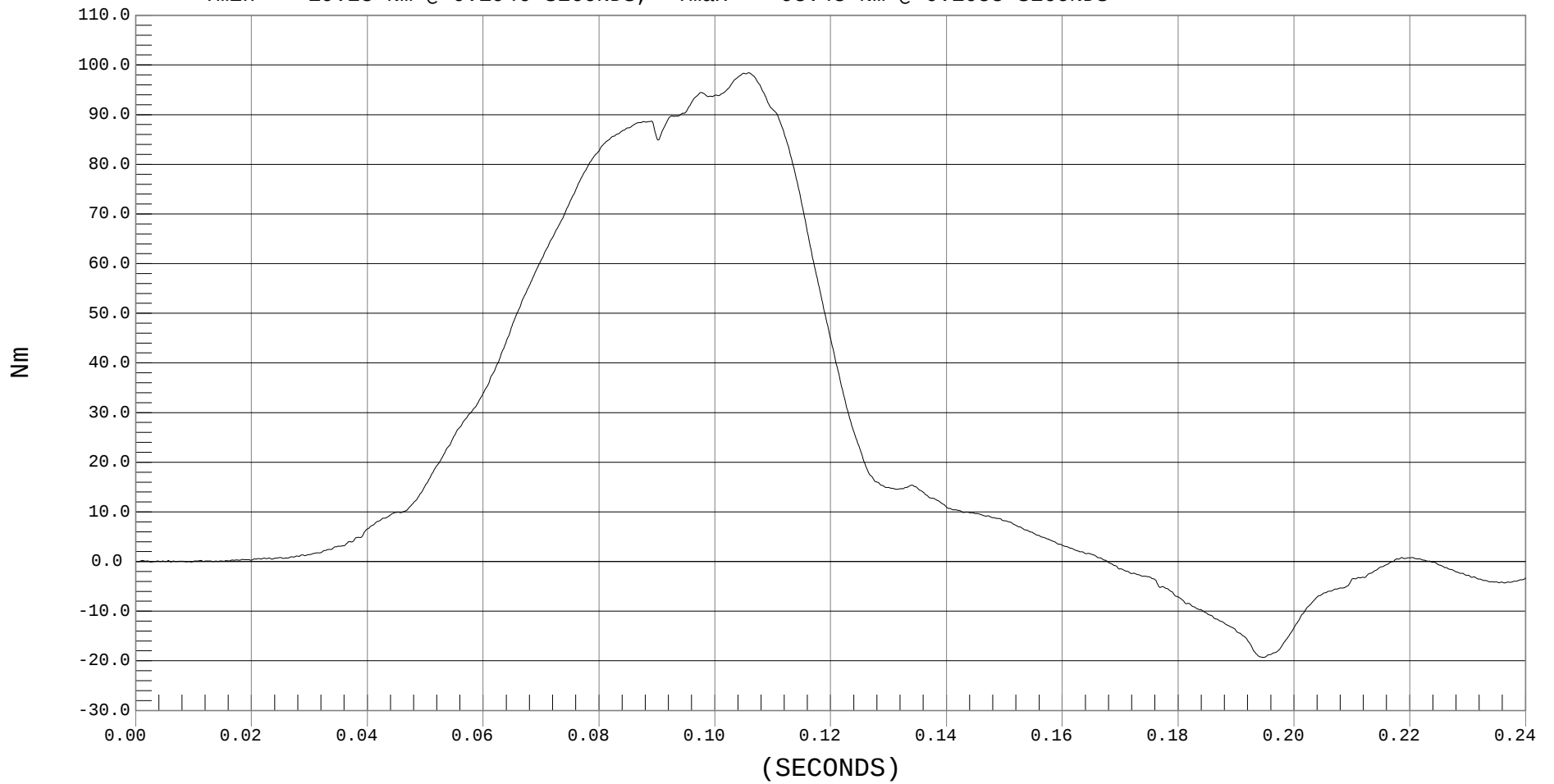
LOWER NECK MOMENT Y

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 LOWER NECK MY, H01251MF.M25

Ymin = -19.28 Nm @ 0.1946 SECONDS, Ymax = 98.43 Nm @ 0.1058 SECONDS





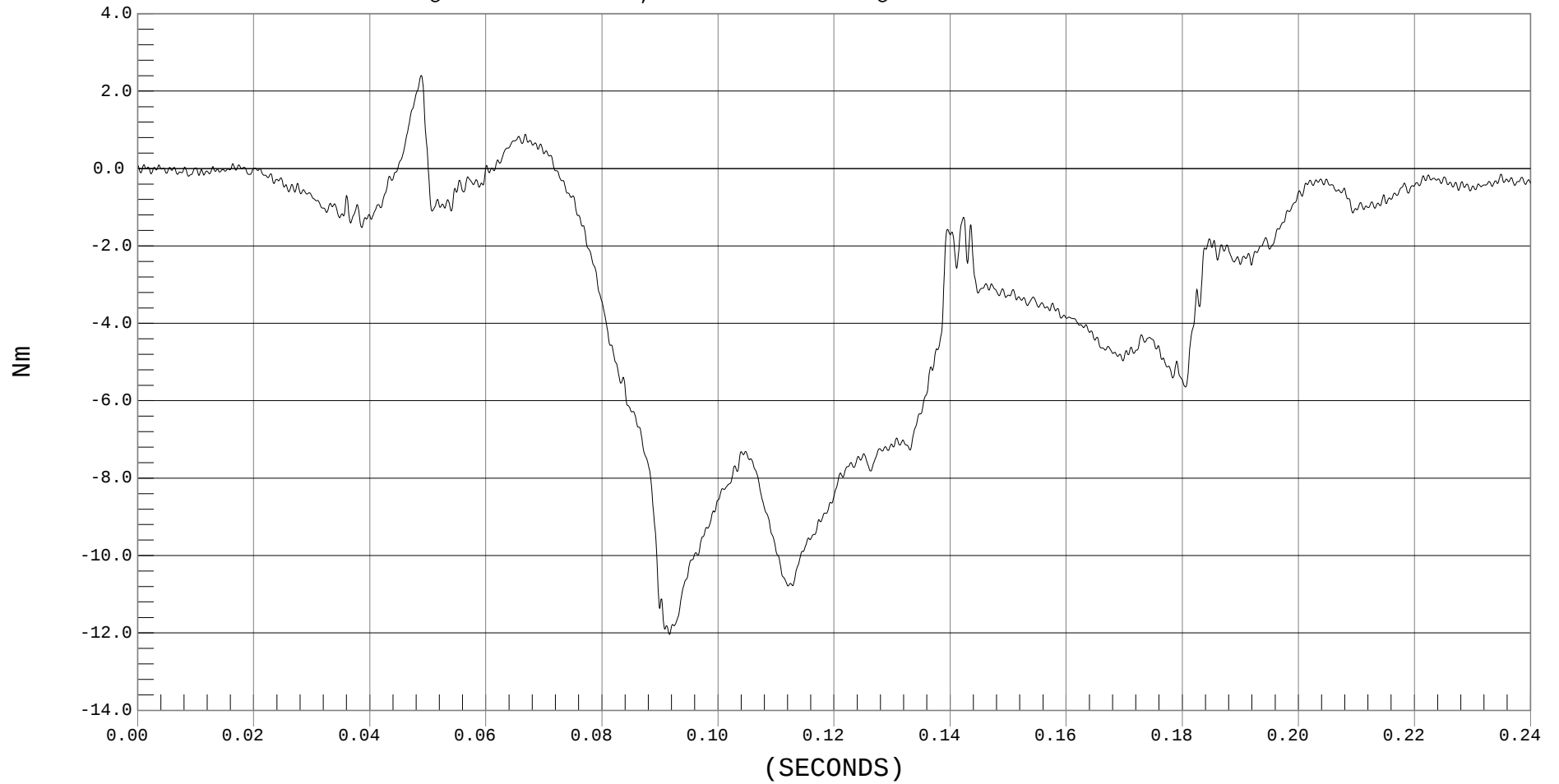
LOWER NECK MOMENT Z

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 LOWER NECK MZ, H01251MF.M26

Ymin = -12.04 Nm @ 0.0915 SECONDS, Ymax = 2.4 Nm @ 0.0488 SECONDS





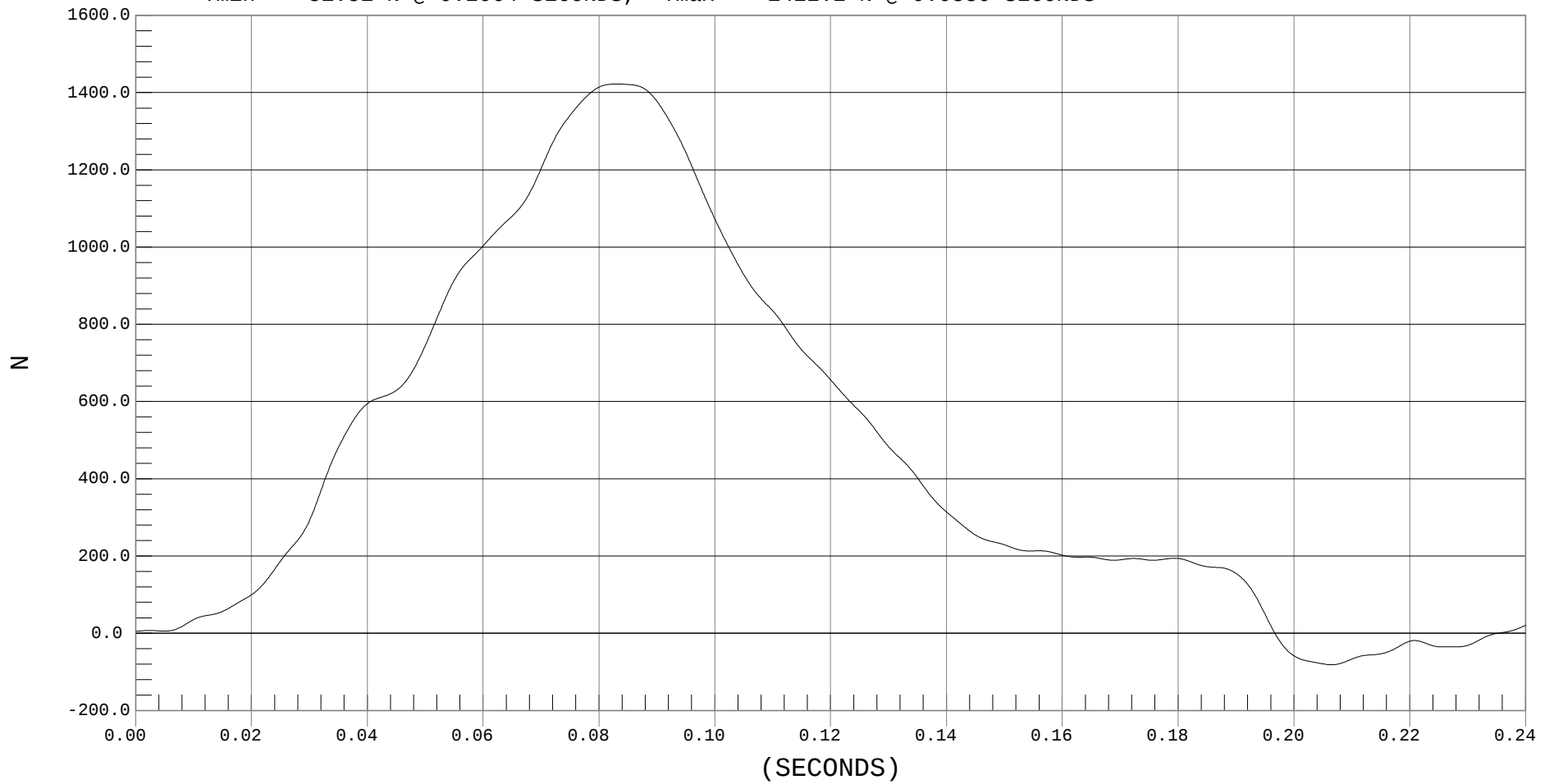
TETHER BELT FORCE

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 TETHER BELT, H01251FF.F19

Ymin = -81.51 N @ 0.2064 SECONDS, Ymax = 1422.2 N @ 0.0830 SECONDS





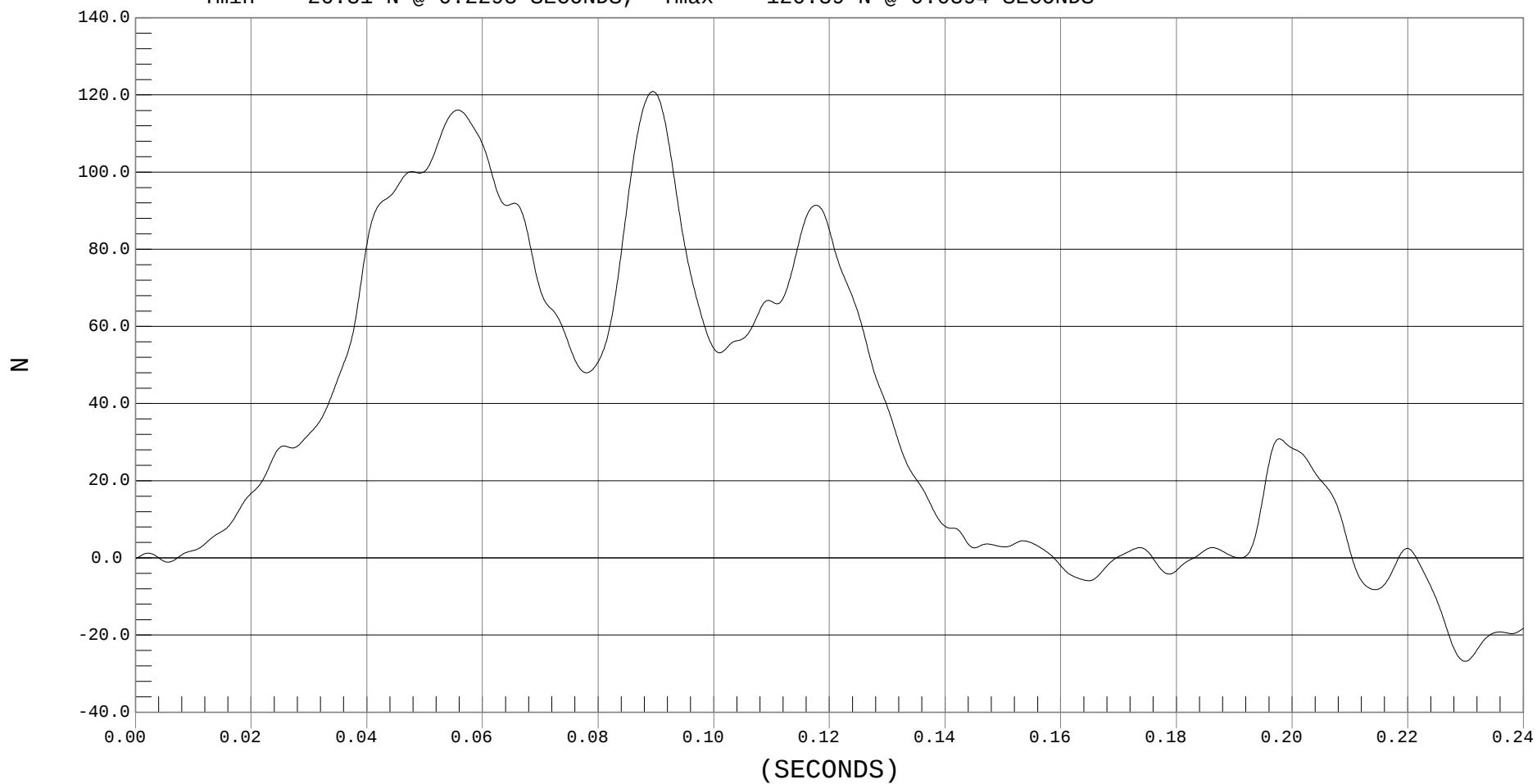
SHOULDER BELT FORCE

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 SHOULDER BELT, H01251FF.F31

Ymin = -26.81 N @ 0.2298 SECONDS, Ymax = 120.89 N @ 0.0894 SECONDS





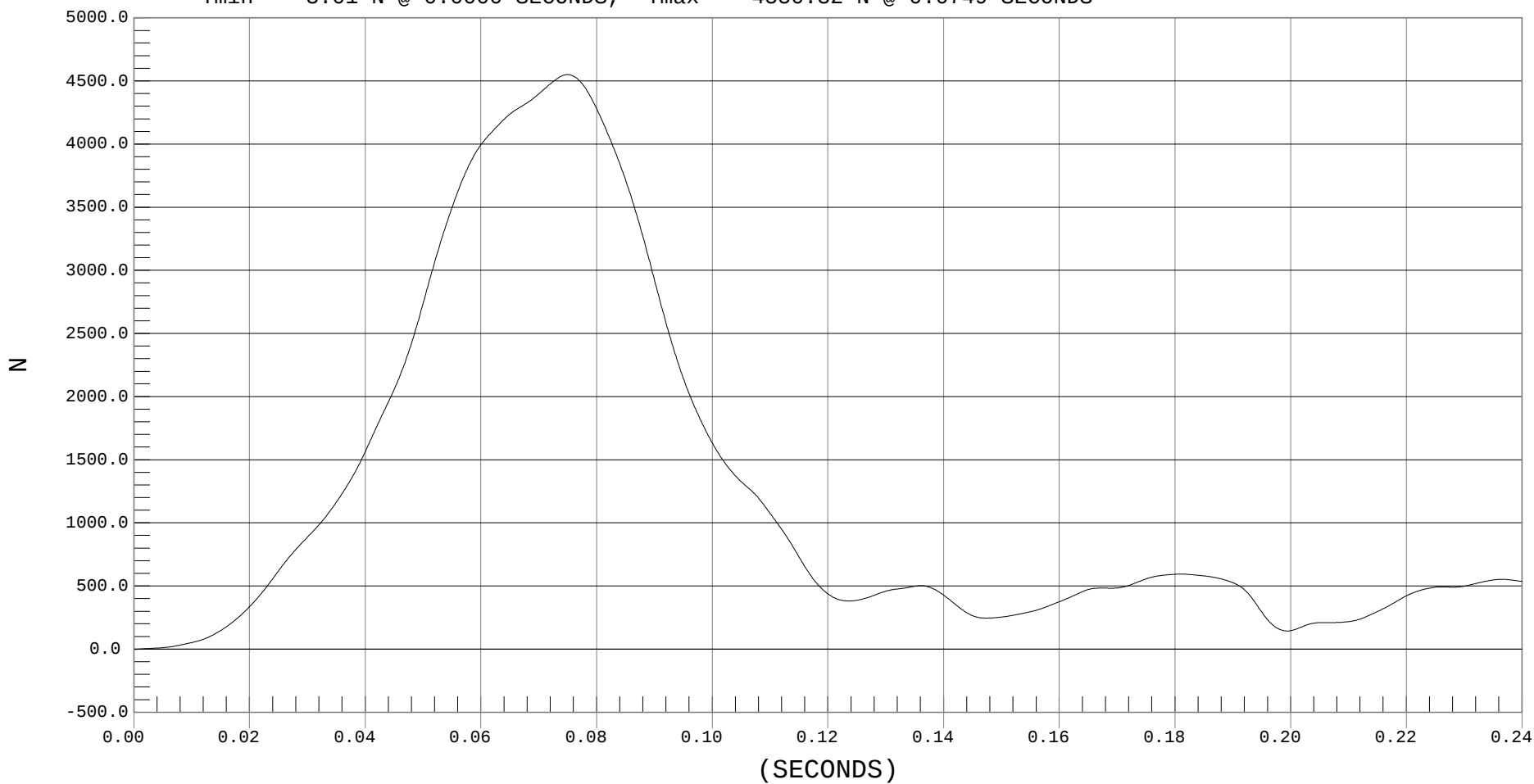
LAP BELT FORCE

Test Desc.: FMVSS 213 34-35 MPH (H01251)
Component: COSCO OLYMPIAN OVERHEAD SHIELD
Other Info:

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

— 1 LAP BELT, H01251FF.F32

Ymin = -3.01 N @ 0.0000 SECONDS, Ymax = 4550.32 N @ 0.0749 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: _____



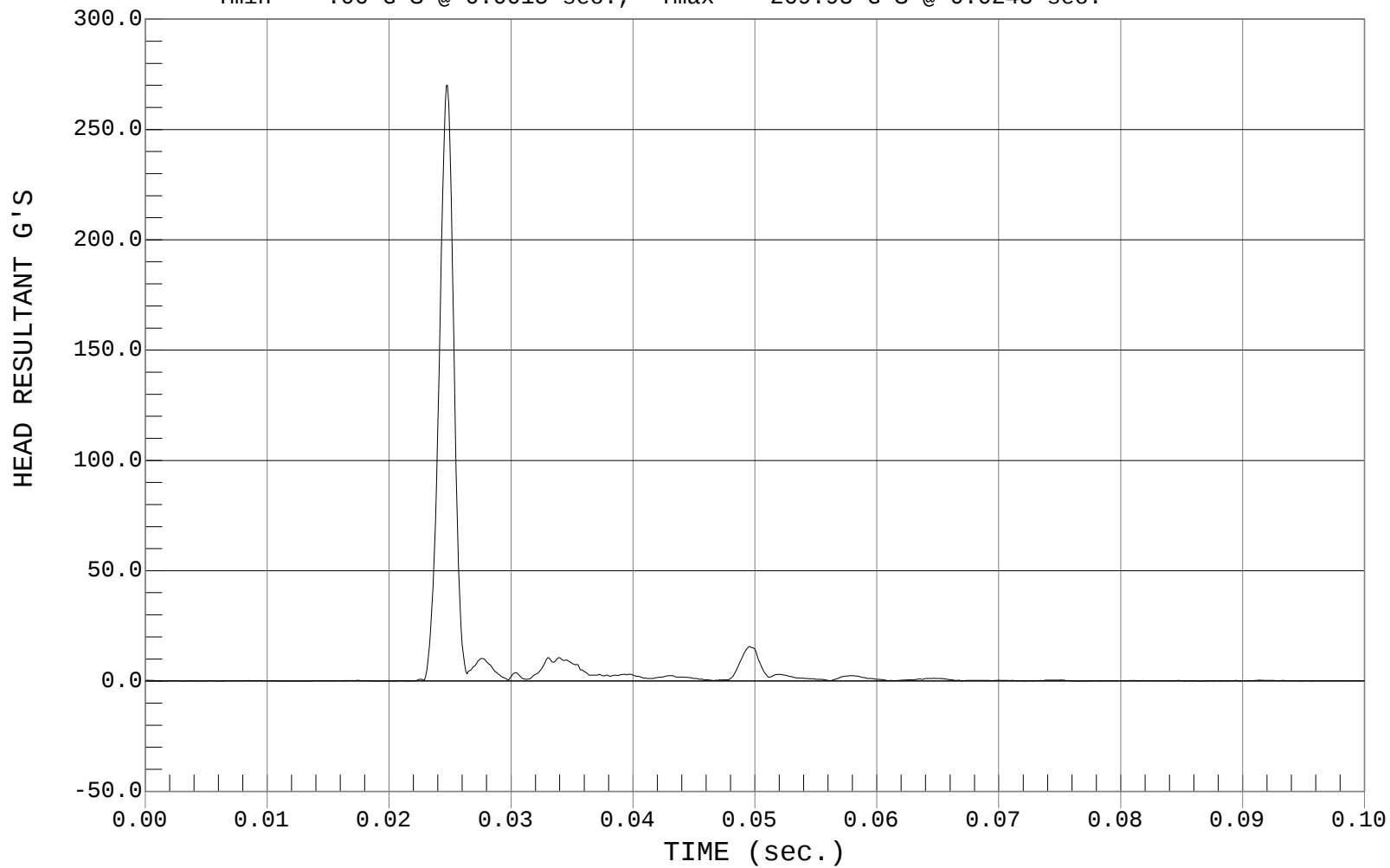
PEAK RESULTANT ACCELERATION

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.





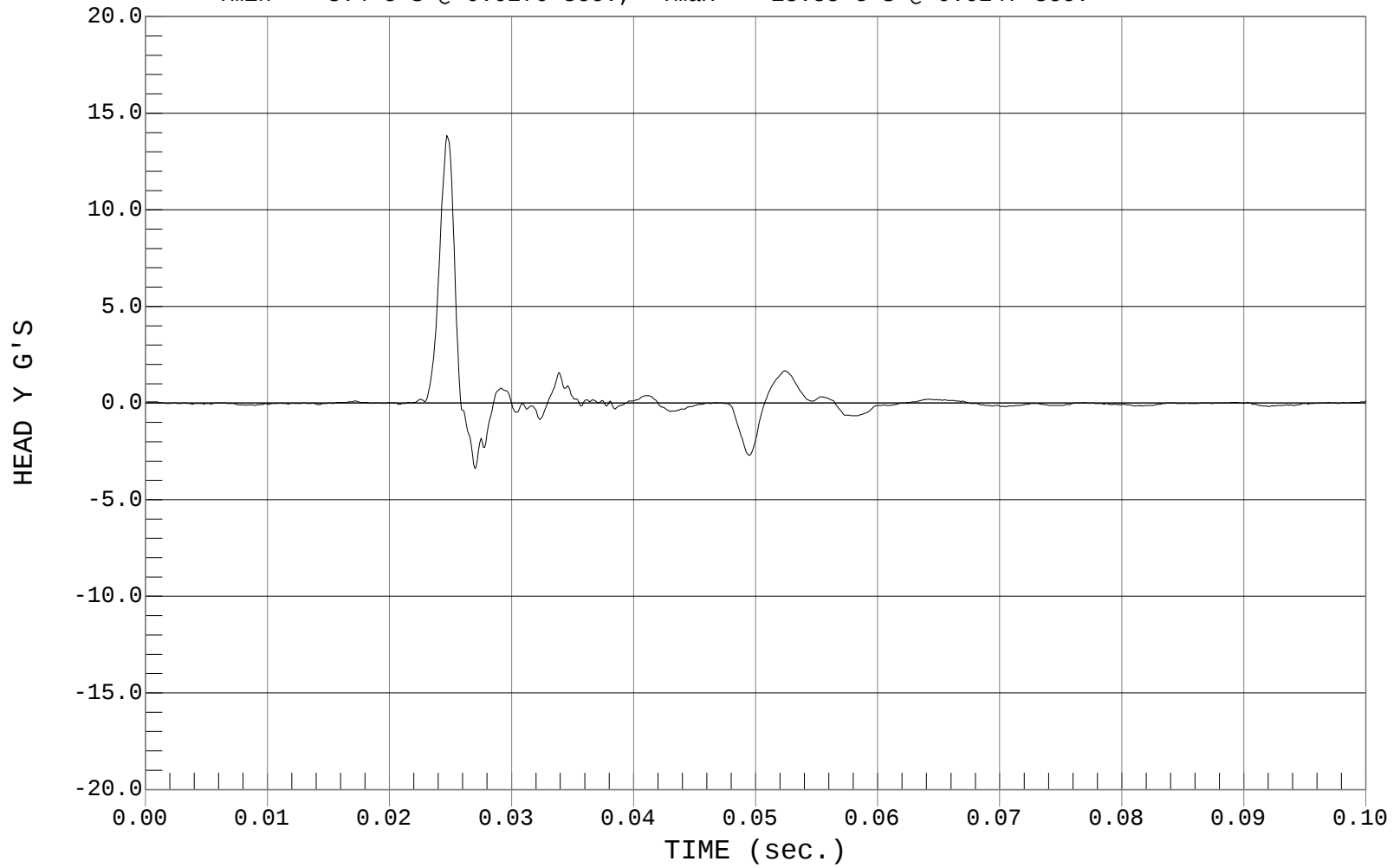
PEAK LATERAL ACCELARATION

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.



MGA RESEARCH CORPORATION
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: _____



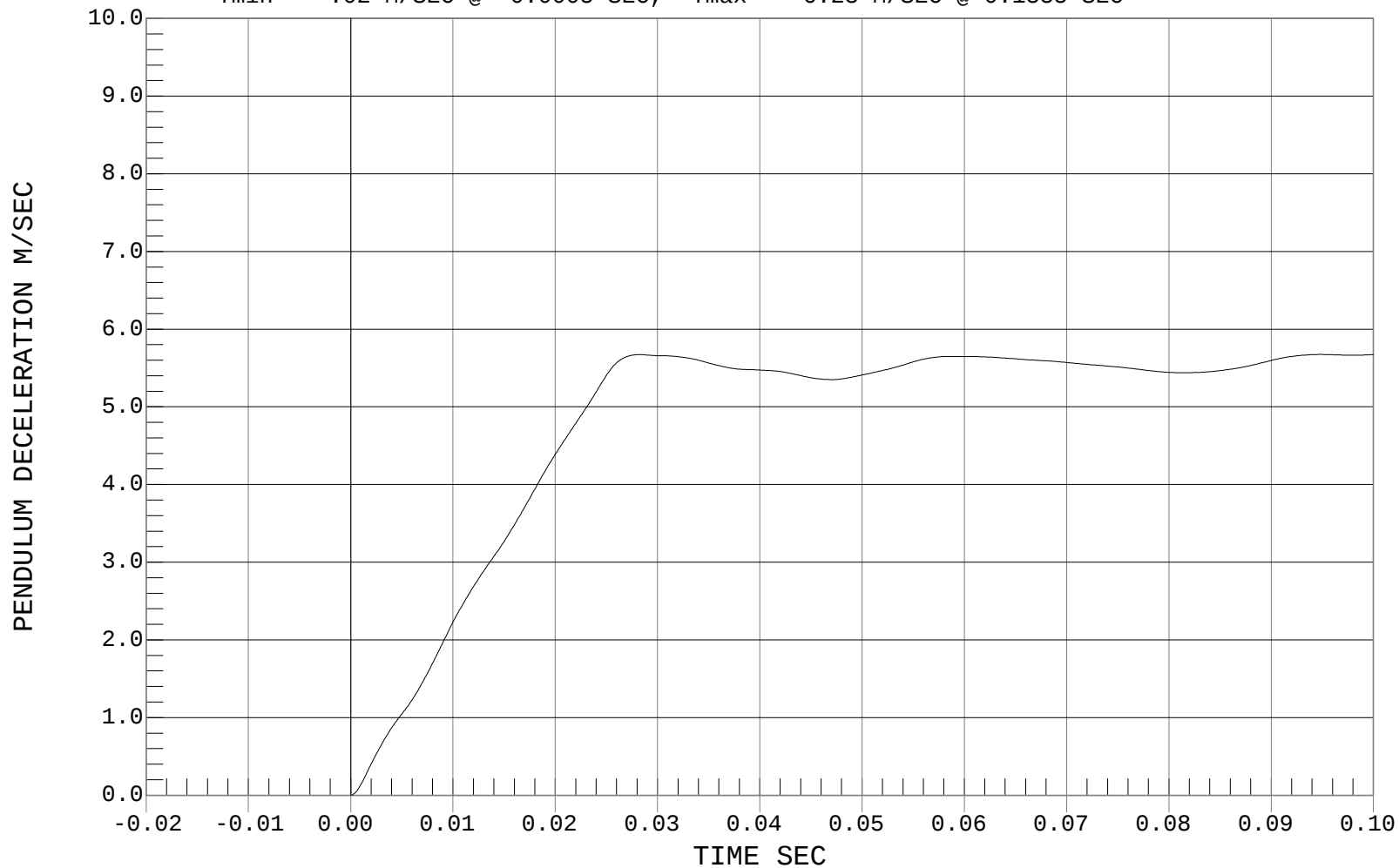
PENDULUM DECELERATION

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





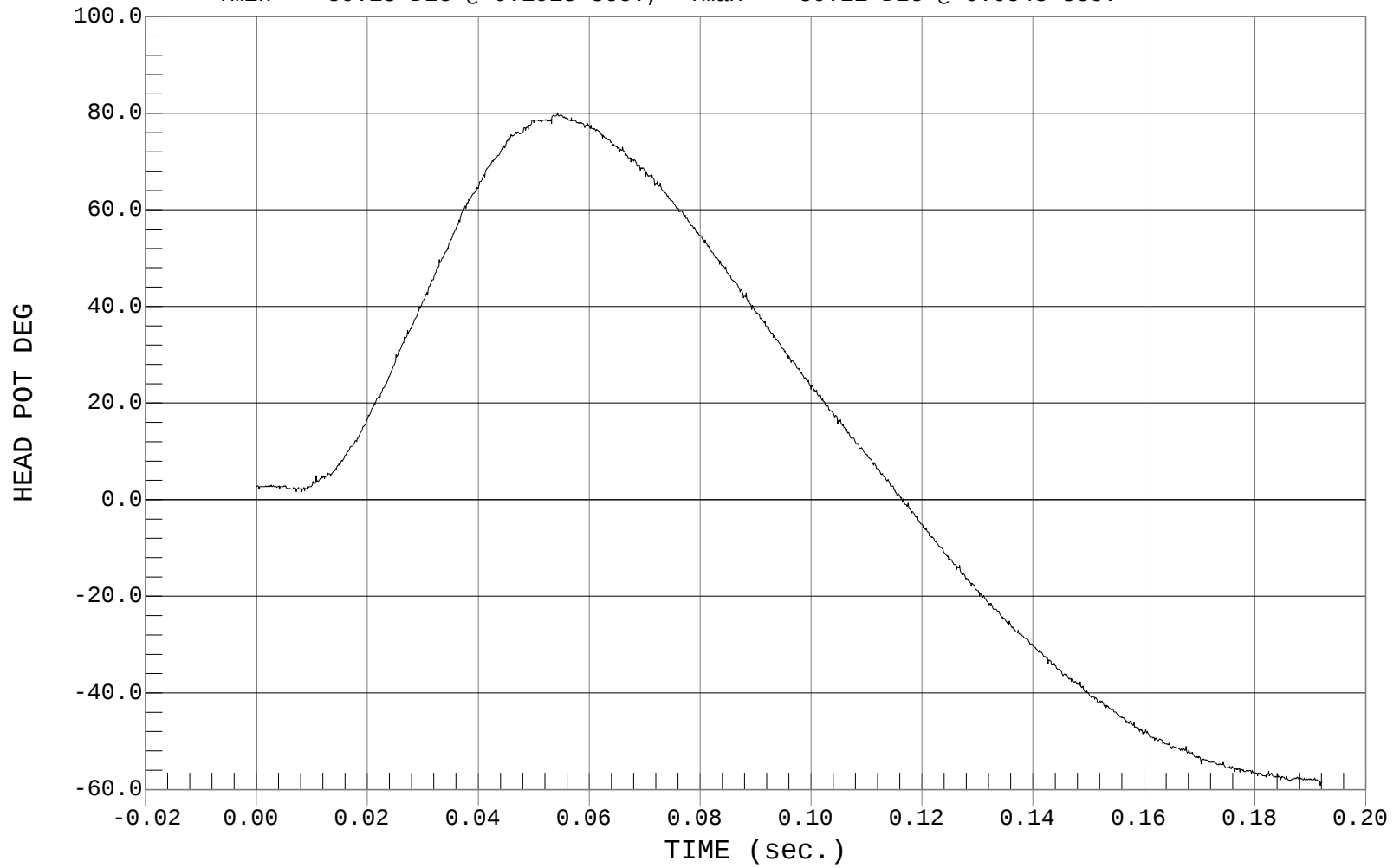
NECK ROTATION

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.





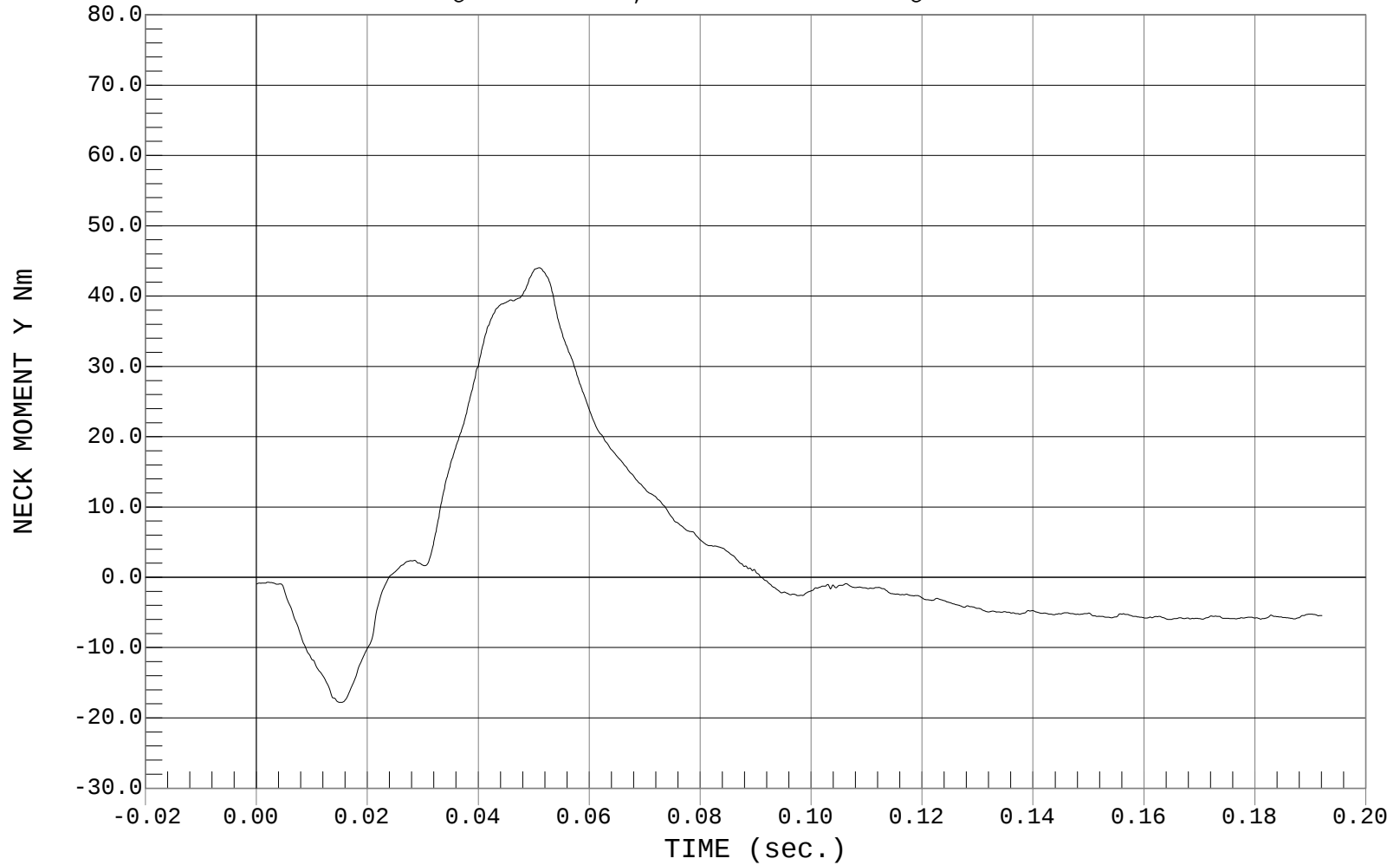
OCCIPITAL MOMENT

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: _____



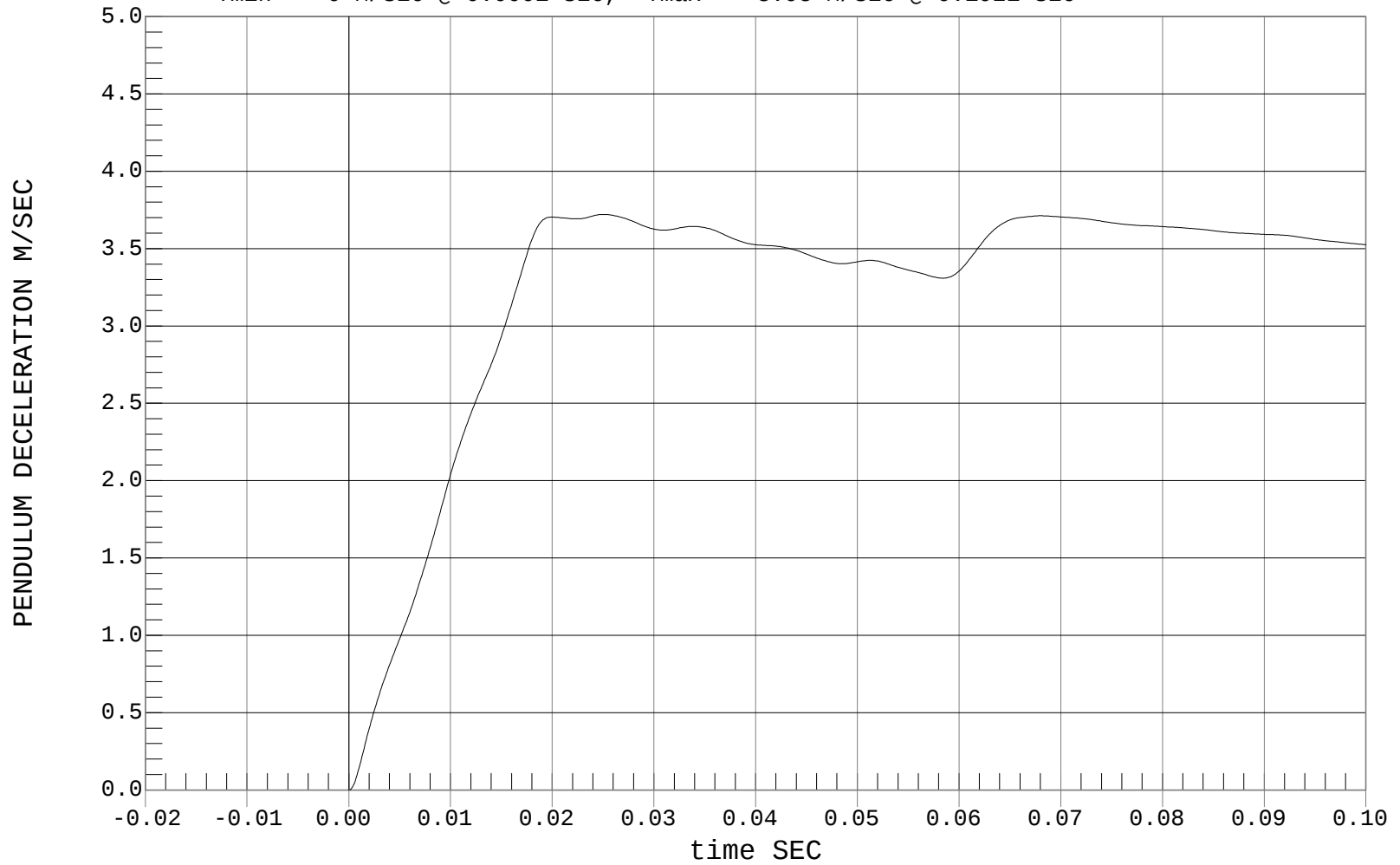
PENDULUM DECELERATION

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





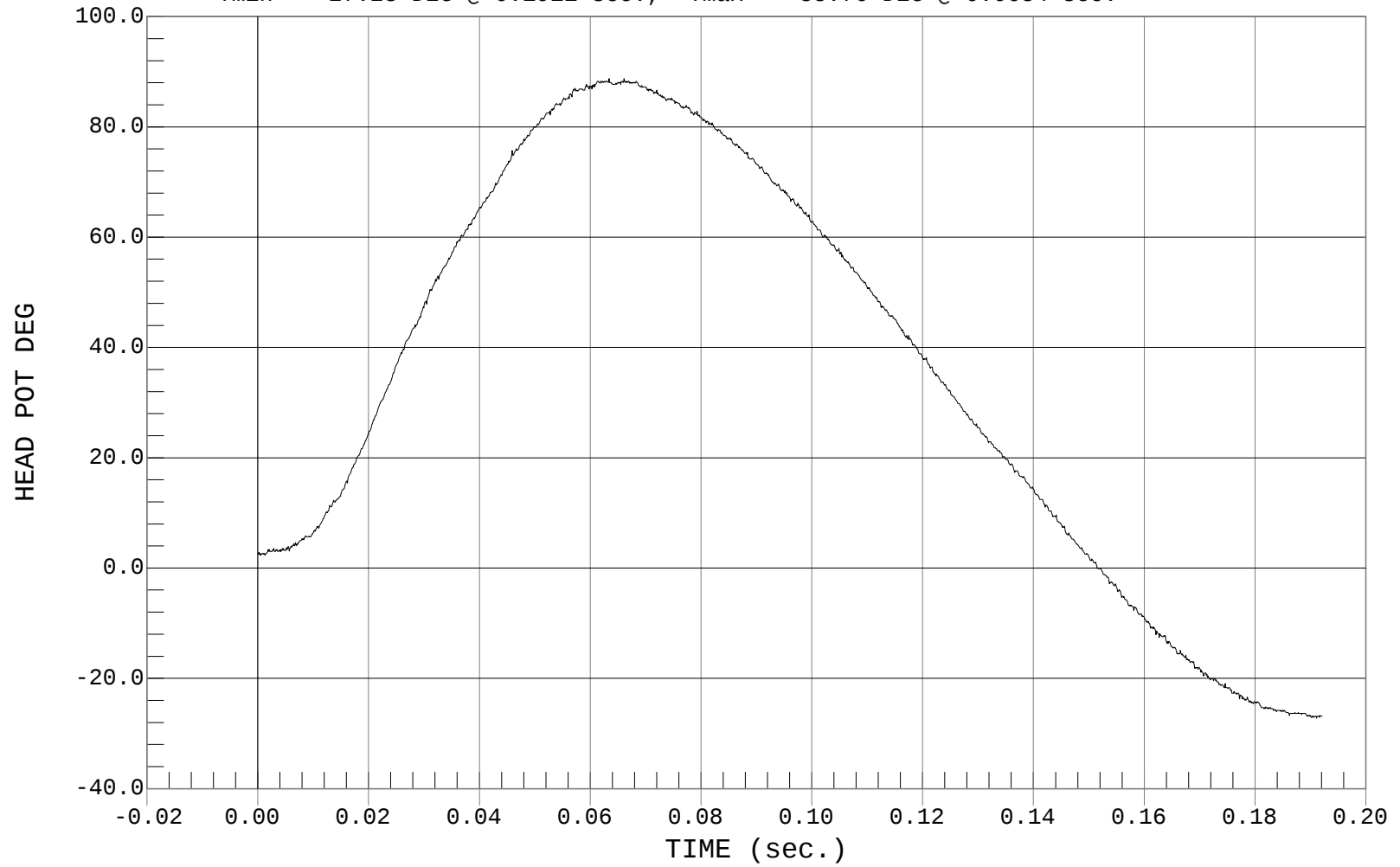
NECK ROTATION

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.





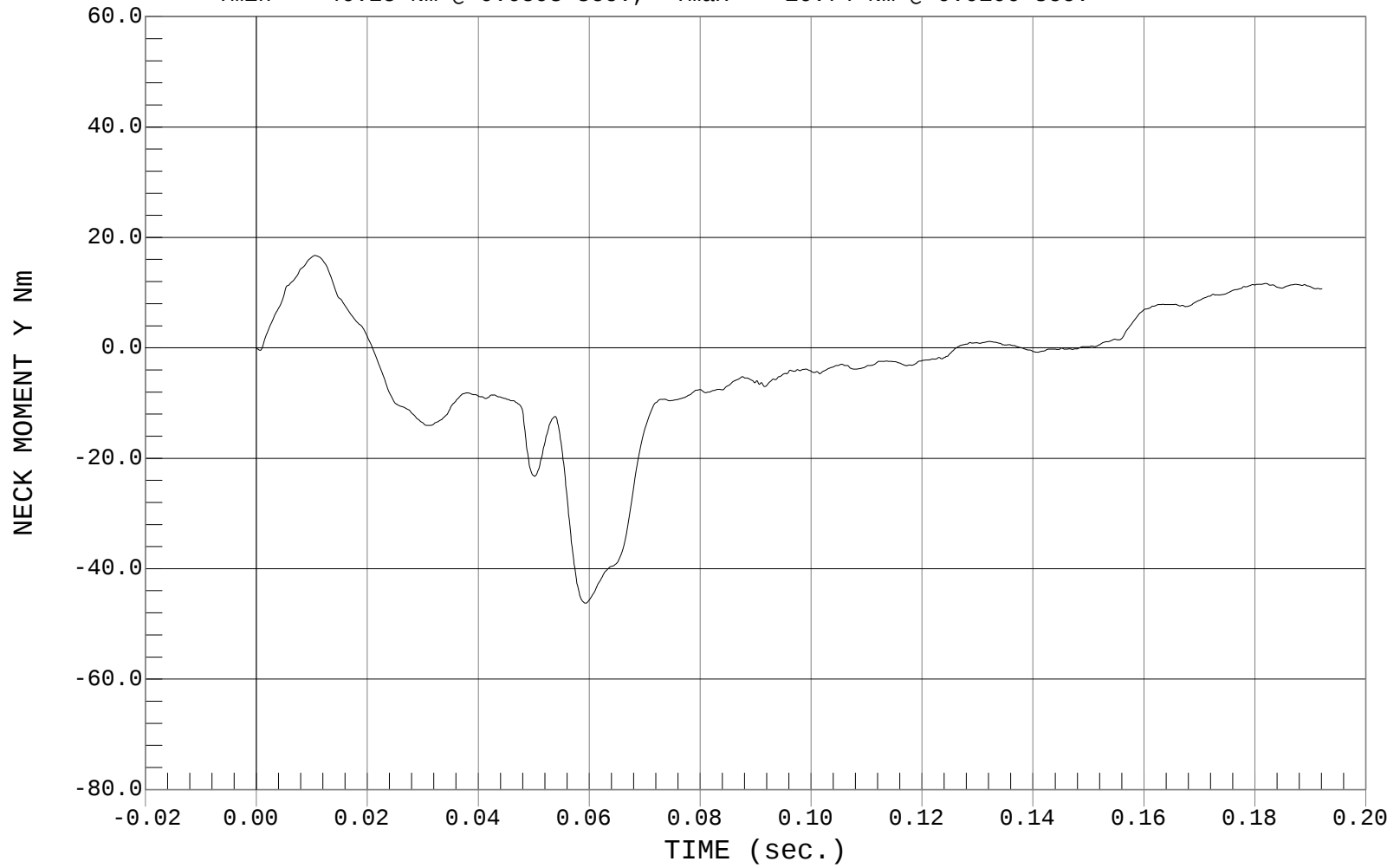
OCCIPITAL MOMENT

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.



MGA RESEARCH CORPORATION
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: _____



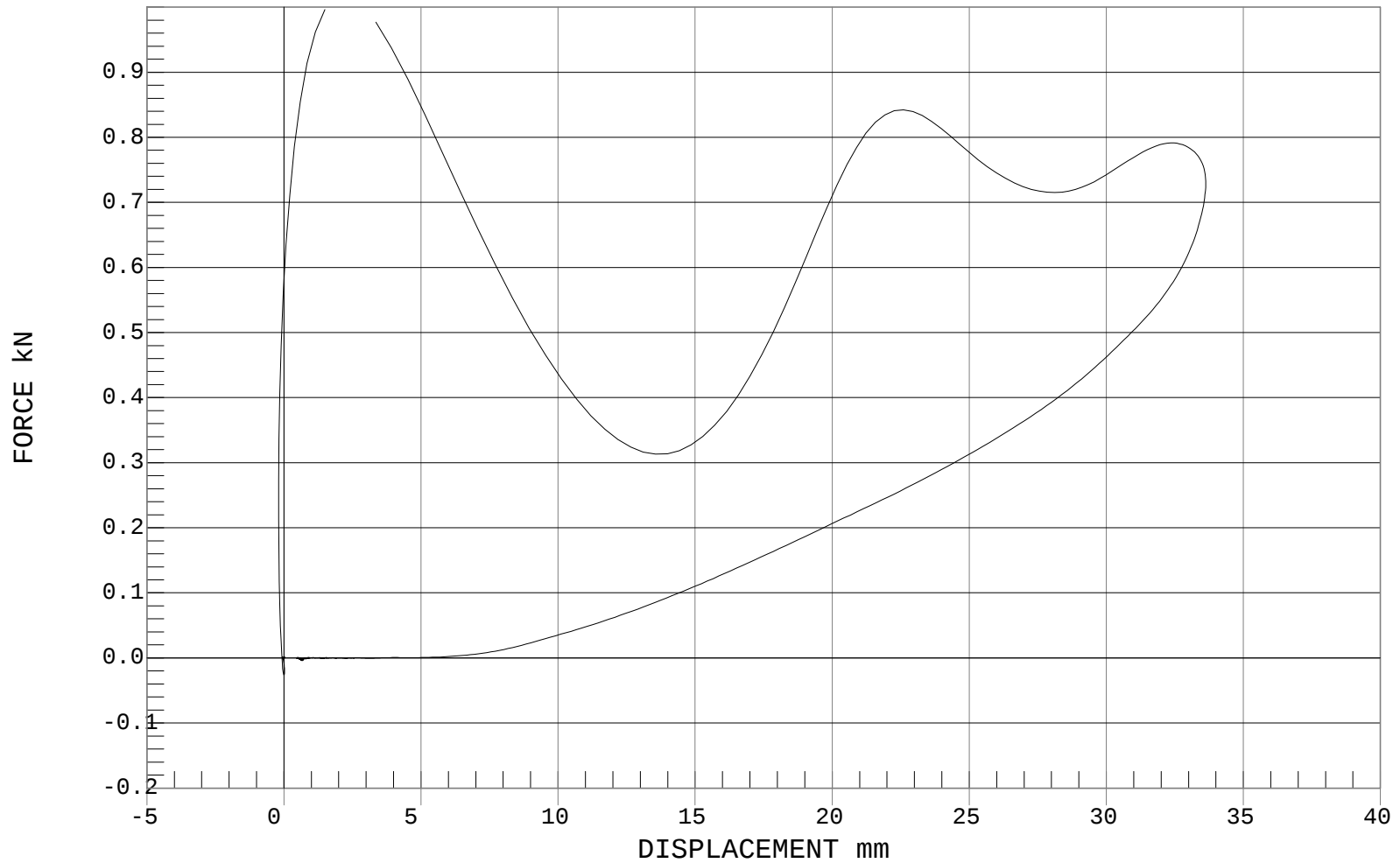
THORAX IMPACT

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

<u>Part</u>	<u>Items Checked</u>	<u>Comments</u>
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