

V 2893

TTD #1 TESTING

20.9 KPH INSTRUMENTED BARRIER (MDB) TO STATIONARY BARRIER IMPACT TEST

TEST NO. 1

MDB IMPACT ANGLE: 60°
MDB WHEEL CRAB ANGLE: 19°

CONTRACT NO. DTRS-57-95-C-00010

MGA RESEARCH CORPORATION
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: February 27, 1997

Report Date: January 9, 1998

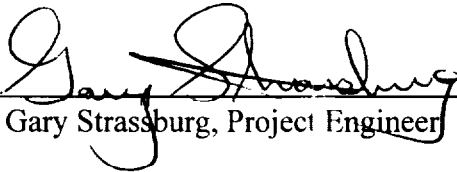
FINAL REPORT

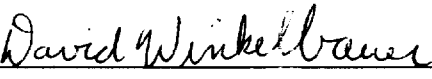
Prepared For:

U.S. DEPARTMENT OF TRANSPORTATION
VOLPE NATIONAL TRANSPORTATION SYSTEMS CENTER
55 BROADWAY, KENDALL SQUARE
CAMBRIDGE, MA 02142

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Prepared By: 
Gary Strassburg, Project Engineer

Approved By: 
David Winkelbauer, Deputy Facility Director

Approval Date: 6/25/98

FINAL REPORT ACCEPTED BY (OVSC):

Accepted By: _____

Acceptance Date: _____

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SECTION I
INTRODUCTION

The purpose of this report is to document the results of a dynamic impact test performed with an instrumented moving barrier. This testing was part of a series of full scale tests as outlined in contract DTRS-57-95-C-00010, TTD #1 (see table below). The test results reported here are for Test No. 1 of a series of four tests, utilizing various impact velocities and angles, that were conducted for this project. Previously, two demonstration tests were conducted that are referred to as Demonstration Test No. 1 and 2. The objective of this testing was to determine the feasibility of using an instrumented barrier face to determine local forces induced on an impacted vehicle during a side impact event. Additionally, it is to determine the dynamic force and displacement characteristics of the aluminum deformable barrier face used for FMVSS 214 D testing. Due to the volume of data generated with this test, Appendix A (data and still photographs) is presented as an entirely separate document in a three-ring binder. Data plots from load cells that experienced less than 667.2 Newtons and data plots from displacement transducers that measured less than 2 mm were omitted from this report.

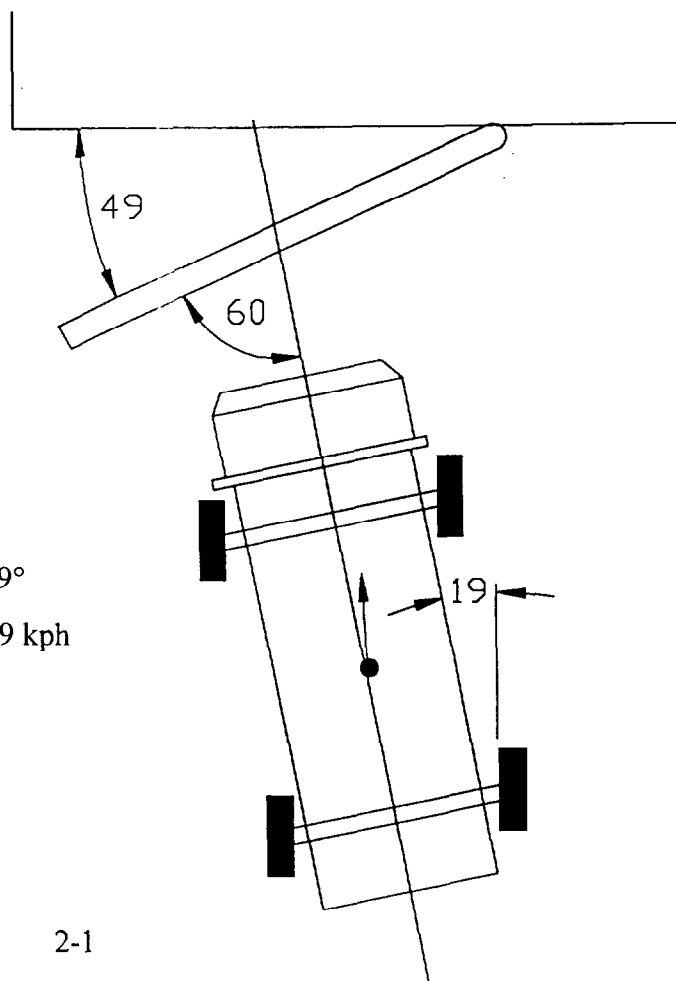
Test	MDB Towing Velocity	MDB Impact Angle	MDB Crab Angle
Demonstration 1	41.5 kph	90°	26°
Demonstration 2	32.2 kph	60°	19°
Test No. 1	20.9 kph	60°	19°
Test No. 2	37.8 kph	60°	19°
Test No. 3	47.95 kph	75°	23°
Test No. 4	54.7 kph	90°	27°

SECTION 2
TEST SUMMARY

The modified FMVSS 214 D moving barrier with a Plascor FMVSS 214 D deformable barrier face was crabbed 19° to the left. It was towed at 20.9 kph into a rigid barrier situated 49° from perpendicular to the moving barriers longitudinal direction of travel. That is 30° from perpendicular (left barrier face to contact rigid barrier first) to the front surface of the deformable barrier face. The test was conducted February 27, 1997 at the MGA Research Corporation Proving Grounds and Crash Test Center in Burlington, Wisconsin. 182 channels of data were recorded during the impact event, 44 deformable barrier face displacements, forces from 44 triaxial barrier face load cells (X, Y, and Z axis), 5 moving barrier accelerations and barrier contact. The test was documented with seven high speed cameras.

The parameters for this dynamic test into a stationary barrier were as follows:

MDB Impact Angle: 60°
MDB Wheel Crab Angle: 19°
MDB Towing Velocity: 20.9 kph



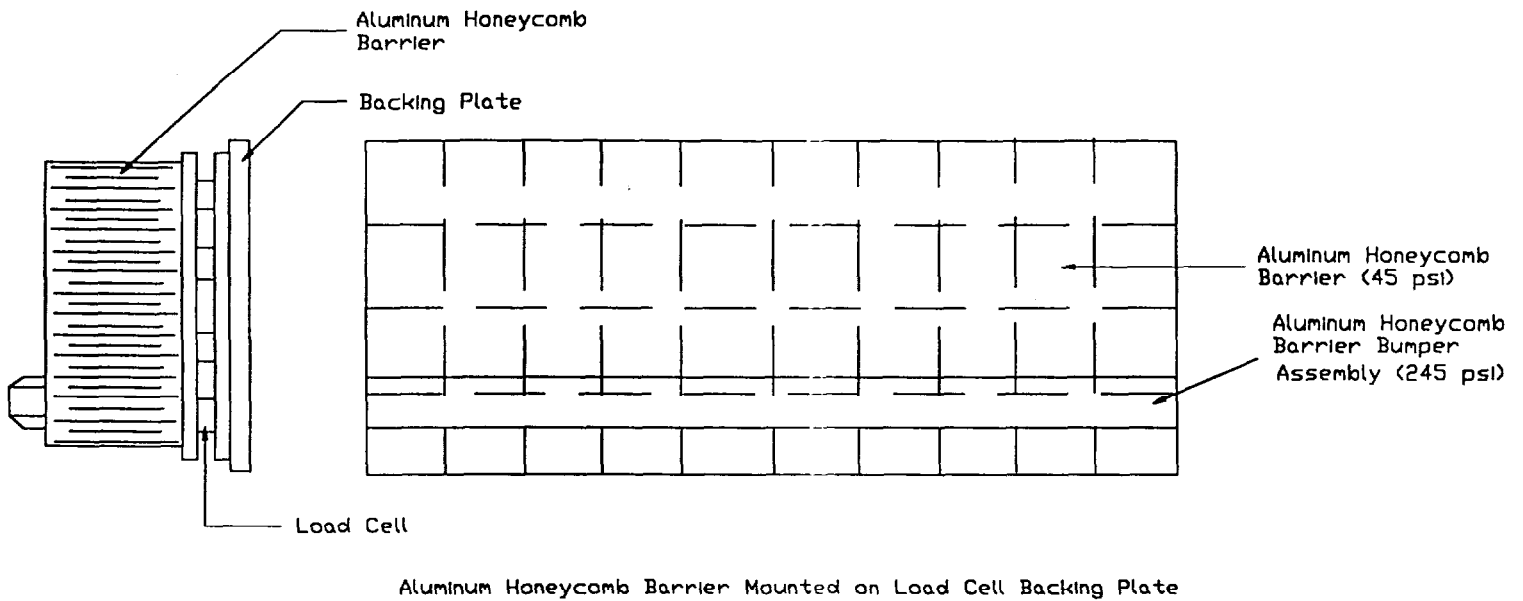
SECTION 3
BARRIER INFORMATION

The instrumented moving deformable barrier (MDB) is an extension of the FMVSS 214 Dynamic Barrier used for crash testing. The barrier has been modified to include an array of 44 triaxial load cells located behind the honeycomb front face. The barrier also includes 44 string potentiometers to measure the displacements of the front face of the honey comb structure. A report detailing the design of the moving deformable barrier has been submitted for this project.

Previous to this test, the MDB was modified to meet the center of gravity requirements specified by FMVSS 214D. For completeness, the properties of the MDB, as well as the FMVSS 214D requirements are listed in the following table:

Moving Deformable Barrier		
Specification	FMVSS 214D Requirements	MDB
CGx (mm)	1098 - 1148	1101.7
CGy (mm)	-32.8 - 17.4	-1.8
CGz (mm)	475 - 525	514.8
Ix (kgm ²)	482.6 - 533.4	537.6
Iy (kgm ²)	2149.9 - 2376.2	3159.1
Iz (kgm ²)	2443.4 - 2700.6	3518.4
Total Weight (kg)	1356.5 - 1365.5	1358.9

LOAD CELL AND DISPLACEMENT MEASUREMENT DESIGNATION AND CONFIGURATION

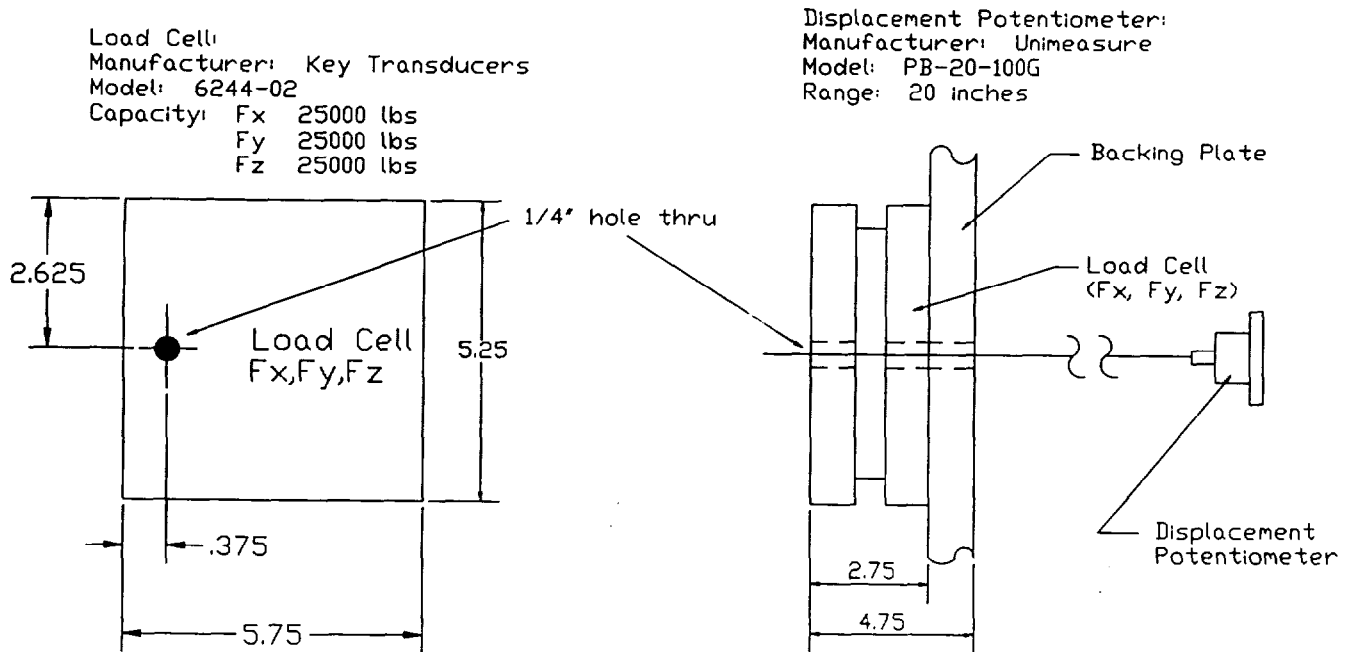


Load Cell and Displacement Measurement Designation

1	5	9	13	17	21	25	29	33	37	41
2	6	10	14	18	22	26	30	34	38	42
3	7	11	15	19	23	27	31	35	39	43
4	8	12	16	20	24	28	32	36	40	44

As viewed from front of barrier face

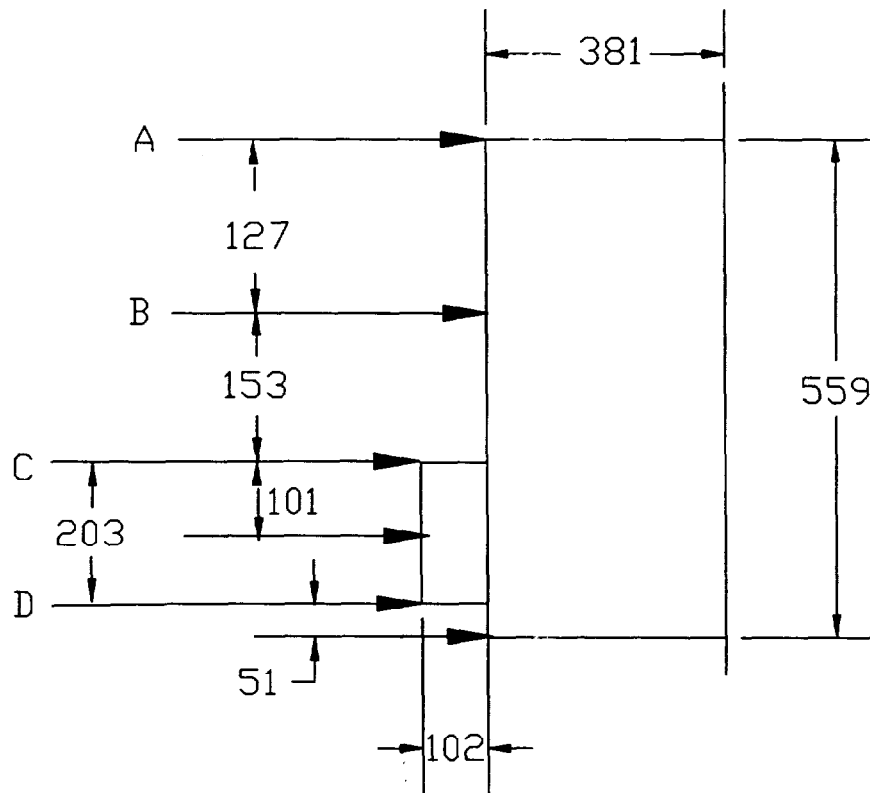
LOAD CELL AND DISPLACEMENT MEASUREMENT DESIGNATION AND CONFIGURATION



SECTION 4
TEST NO. 1 DATA

The load cell triaxial forces and dynamic displacements recorded during this test are presented in this section along with static barrier face crush measurements.

POST-TEST STATIC DEFORMATION (MM)



POST-TEST STATIC DEFORMATION (mm)

	-800	-700	-600	-500	-400	-300	-200	-100	0	100	200	300	400	500	600	700	800
A	1	1	1	1	1	1	1	0	0	0	0	1	1	4	22	50	105
B	1	1	1	1	1	1	1	1	1	1	1	1	1	0	22	58	108
C	-1	0	0	-1	-1	-1	-1	0	2	0	0	1	3	5	51	107	140
D	7	-3	-2	-1	-1	-1	-1	0	0	0	0	0	96	41	91	142	176

RIGHT

LEFT

BARRIER FACE LOAD CELL MAXIMUM VALUES

Load Cell	Negative Maximum (N)						Positive Maximum (N)					
	X	Time (msec.)	Y	Time (msec.)	Z	Time (msec.)	X	Time (msec.)	Y	Time (msec.)	Z	Time (msec.)
LC #1	-241	6	*	*	-128	199	633	199	*	*	123	159
LC #2	-189	167	-165	100	-112	50	155	97	128	94	124	124
LC #3	-278	139	-99	101	-722	33	144	63	112	96	408	147
LC #4	-943	46	-578	100	-291	45	842	100	932	46	291	53
LC #5	-1504	71	-662	73	-384	25	882	126	244	129	510	99
LC #6	-2443	86	-1420	68	-474	34	187	15	765	126	504	108
LC #7	-379	116	-196	89	-554	42	86	180	198	127	394	128
LC #8	-1229	35	-786	26	-167	56	844	106	355	80	228	157
LC #9	-563	68	-345	70	-522	135	361	128	132	127	431	198
LC #10	-955	116	-631	36	-64	57	540	120	489	136	106	124
LC #11	-809	56	-187	26	-854	162	653	49	224	137	648	121
LC #12	-567	55	-730	37	-172	105	212	81	538	121	179	14
LC #13	-472	189	-463	140	-326	56	603	49	372	48	165	97
LC #14	-410	55	-360	56	-399	57	217	13	254	96	213	186
LC #15	-494	56	-149	189	-298	56	581	48	235	48	124	96
LC #16	-487	56	-395	55	-288	55	235	102	130	96	181	181
LC #17	-495	172	-219	4	-223	51	330	180	204	179	311	107

* No valid data collected

BARRIER FACE LOAD CELL MAXIMUM VALUES

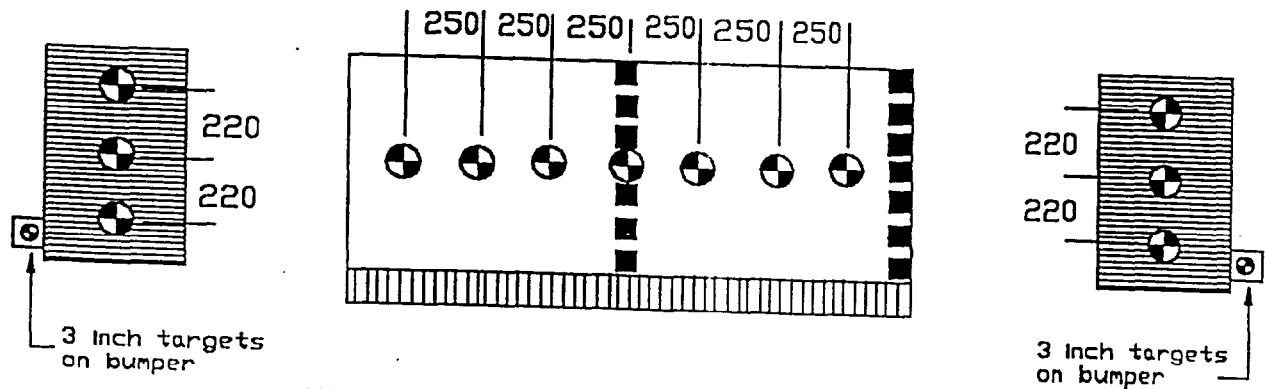
Load Cell	Negative Maximum (N)						Positive Maximum (N)					
	X	Time (msec.)	Y	Time (msec.)	Z	Time (msec.)	X	Time (msec.)	Y	Time (msec.)	Z	Time (msec.)
LC #18	-348	22	-173	121	-265	117	261	180	160	75	155	180
LC #19	-124	188	-164	117	-171	36	158	62	191	186	319	86
LC #20	-355	107	-158	57	-392	173	128	182	112	101	158	63
LC #21	-215	139	-198	189	-379	116	160	89	221	180	173	123
LC #22	-2777	58	-936	187	-368	191	1940	161	814	40	289	123
LC #23	-128	83	-161	161	-892	196	131	146	377	88	822	83
LC #24	-1573	65	-547	26	-131	67	770	131	278	184	59	47
LC #25	-203	23	-130	172	-1386	83	1354	94	233	63	435	64
LC #26	-1663	89	-119	50	-123	49	1802	173	79	180	73	125
LC #27	-85	101	-292	71	-733	151	167	80	246	121	971	180
LC #28	-147	38	*	*	-283	108	119	108	*	*	307	103
LC #29	-123	21	-150	154	-1473	67	385	163	95	180	982	163
LC #30	-2451	67	-1097	123	-193	146	1891	164	959	170	299	112
LC #31	-3084	76	-1302	77	-300	44	195	168	327	104	638	101
LC #32	-5019	87	-1882	83	-1136	188	217	198	168	110	1142	194
LC #33	-238	51	-130	38	-445	37	395	192	105	108	521	192
LC #34	-624	69	-410	67	-69	68	478	135	299	175	211	92

* No valid data collected

BARRIER FACE LOAD CELL MAXIMUM VALUES

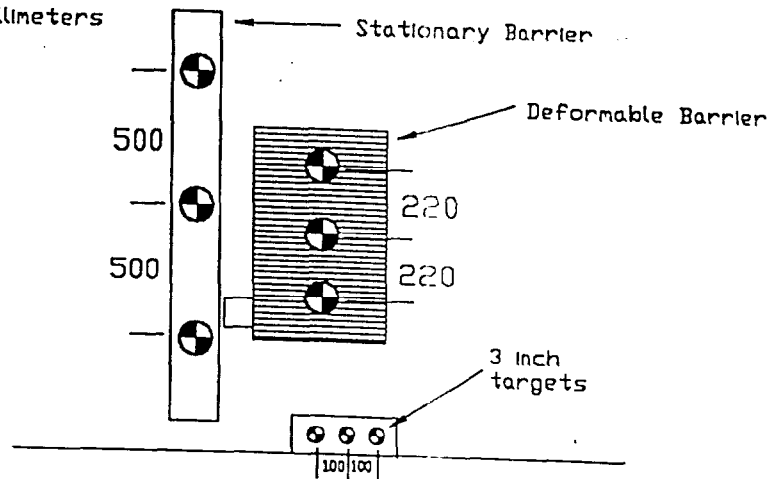
Load Cell	Minimum (N)						Maximum (N)					
	X	Time (msec.)	Y	Time (msec.)	Z	Time (msec.)	X	Time (msec.)	Y	Time (msec.)	Z	Time (msec.)
LC #35	-3684	64	-177	80	-102	152	81	167	10	0	685	68
LC #36	-6137	79	-1121	94	-280	39	75	184	96	9	422	79
LC #37	-1673	92	-226	75	-183	100	75	1	279	99	129	192
LC #38	-9405	91	-2323	82	-228	45	90	182	574	114	334	83
LC #39	-9804	58	-603	43	-259	28	186	166	364	112	401	73
LC #40	-8059	14	-1196	42	-416	30	125	167	67	150	1147	74
LC #41	-6813	91	-1875	80	-1036	114	-291	210	615	133	103	6
LC #42	-7289	41	-1850	75	-623	105	92	163	161	119	562	50
LC #43	-7978	29	-3555	59	-368	107	164	144	1086	143	1344	72
LC #44	-6272	6	-1688	12	-1346	102	545	148	218	119	1534	42

PHOTOGRAPHIC TARGET LOCATIONS



All Targets 5' unless otherwise noted

All dimensions in millimeters



PHOTOGRAPHIC COVERAGE

Location	Coordinates			Angle	Lens (mm)	Speed (fps)
	X	Y	Z			
Left Barrier Impact Low	-2710	-2340	730	90°	25	1020
Left Barrier Impact High	-1290	-940	1840	90°	13	1005
Right Front Close-up	4710	6730	790	90°	35	1015
Right Overall	-700	9500	1155	90°	13	1010
Top Wide	-190	1360	5200	N/A	8	885
Top Front Half	710	1360	5050	N/A	13	1015
Pit	920	1360	-3155	N/A	13	995

V2893

APPENDIX A
DATA AND STILL PHOTOGRAPHS

TTD #1 TESTING
TEST NO. 1



TEST DATE: FEBRUARY 27, 1997

TEST DATA

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* No valid data collected

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DATA NOT INCLUDED IN REPORT

String Potentiometers With a Value Less Than 2 mm		
Data Plot	Negative Peak Displacement (mm)	Positive Peak Displacement (mm)
String Pot 1	-.136	.43
String Pot 2	-.165	.66
String Pot 3	-.48	.72
String Pot 4	-.99	1.56
String Pot 5	-.39	.79
String Pot 6	-1.10	1.37
String Pot 7	-.22	.39
String Pot 8	-.39	.42
String Pot 9	-.60	.86
String Pot 10	-.24	.54
String Pot 11	-.13	.85
String Pot 12	.03	.23
String Pot 13	-.08	.82
String Pot 14	-.47	.78
String Pot 15	-.087	.56
String Pot 16	-.34	.68
String Pot 17	-.036	.50
String Pot 18	-.088	1.02
String Pot 19	-.12	.51
String Pot 20	-.51	1.34
String Pot 21	-.23	.45
String Pot 22	-.15	.65
String Pot 23	-.11	.75
String Pot 24	-.64	1.53

DATA NOT INCLUDED IN REPORT

Data Plot	Negative Peak Displacement (mm)	Positive Peak Displacement (mm)
String Pot 25	-.109	.44
String Pot 26	-.77	1.45
String Pot 27	-.117	1.44
String Pot 28	-.63	1.75
String Pot 30	-.14	1.31
String Pot 31	-.28	1.48
String Pot 33	-.22	.60
Load Cells With A Force Value Less Than 667.2 Newtons (150 lbs.)		
Data Plot	Maximum Negative Value (N)	Maximum Positive Value (N)
LC #1 FX	-241	633
LC #2 FX	-189	155
LC #3 FX	-278	144
LC #7 FX	-379	95
LC #9 FX	-563	361
LC #12 FX	-567	212
LC #13 FX	-472	603
LC #14 FX	-410	217
LC #15 FX	-494	581
LC #16 FX	-487	259
LC #17 FX	-495	376
LC #18 FX	-348	261
LC #19 FX	-124	158
LC #20 FX	-355	128
LC #21 FX	-215	160
LC #23 FX	-128	131
LC #27 FX	-85	167

DATA NOT INCLUDED IN REPORT

Data Plot	Maximum Negative Value (N)	Maximum Positive Value (N)
LC #28 FX	-147	119
LC #29 FX	-123	385
LC #33 FX	-238	395
LC #34 FX	-634	478
LC #2 FY	-165	172
LC #3 FY	-99	112
LC #5 FY	-662	244
LC #7 FY	-196	198
LC #9 FY	-345	132
LC #10 FY	-631	489
LC #11 FY	-187	224
LC #13 FY	-463	372
LC #14 FY	-356	254
LC #15 FY	-149	235
LC #16 FY	-395	178
LC #17 FY	-219	220
LC #18 FY	-173	160
LC #19 FY	-164	191
LC #20 FY	-158	196
LC #21 FY	-198	221
LC #23 FY	-161	377
LC #24 FY	-547	278
LC #25 FY	-157	233
LC #26 FY	-119	79
LC #27 FY	-292	246
LC #29 FY	-150	95

DATA NOT INCLUDED IN REPORT

Data Plot	Maximum Negative Value (N)	Maximum Positive Value (N)
LC #30 FY	-1097	959
LC #31 FY	-1302	327
LC #33 FY	-130	151
LC #34 FY	-410	299
LC #37 FY	-226	279
LC #39 FY	-603	364
LC #1 FZ	-128	144
LC #2 FZ	-112	124
LC #4 FZ	-291	291
LC #5 FZ	-384	510
LC #6 FZ	-474	504
LC #7 FZ	-554	394
LC #8 FZ	-167	228
LC #9 FZ	-522	431
LC #10 FZ	-64	106
LC #12 FZ	-172	222
LC #13 FZ	-326	165
LC #14 FZ	-399	213
LC #15 FZ	-298	206
LC #16 FZ	-288	259
LC #17 FZ	-223	311
LC #18 FZ	-265	182
LC #19 FZ	-171	319
LC #20 FZ	-392	378
LC #21 FZ	-379	173

DATA NOT INCLUDED IN REPORT

Data Plot	Maximum Negative Value (N)	Maximum Positive Value (N)
LC #22 FZ	-368	289
LC #24 FZ	-131	59
LC #26 FZ	-123	73
LC #28 FZ	-283	307
LC #30 FZ	-193	299
LC #33 FZ	-445	629
LC #34 FZ	-69	211
LC #36 FZ	-280	422
LC #37 FZ	-183	129
LC #38 FZ	-228	334
LC #39 FZ	-259	401
LC #42 FZ	-623	562

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -2.56 MM at 61 msec

Maximum = 3.22 MM at 148 msec

STRING POT 29

1 _____ C970310F.029 Filterclass (30)

120

100

80

60

40

20

0

MM

19

18

17

16

15

14

13

12

11

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09

08

07

06

05

04

03

02

01

0

MCA Research
08-03-1997 17:06

TIME (seconds)

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -.34 MM at 44 msec Maximum = 2.81 MM at 101 msec

STRING POT 32

1 _____ C970310F D32 Filterclass (30)

120

100

80

60

40

20

0

MM

0 .01 .02 .03 .04 .05 .06 .07 .08 .09 .1 .11 .12 .13 .14 .15 .16 .17 .18 .19

TIME (seconds)

MGA Research
08-03-1997 17:06

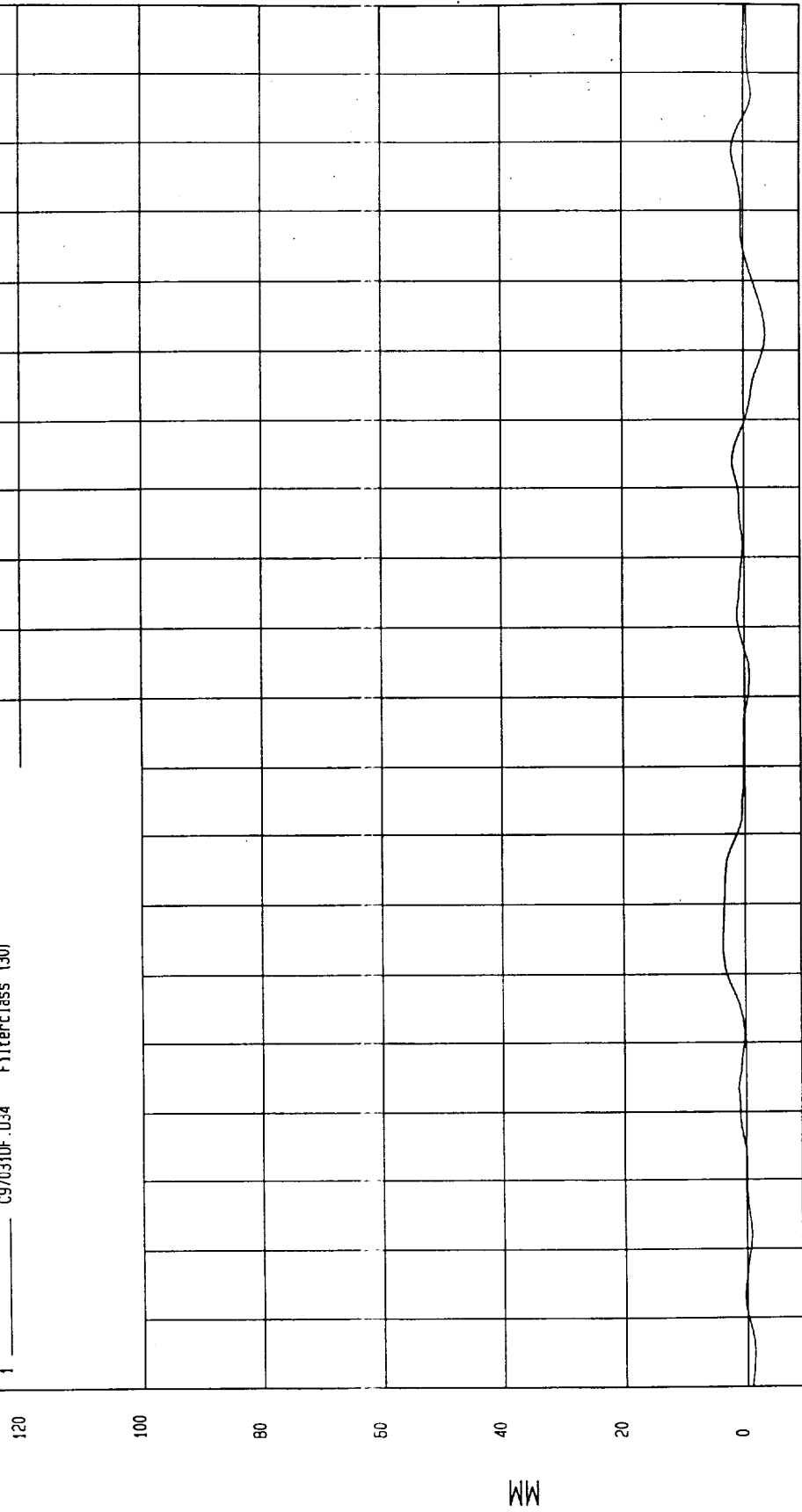
TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -3.56 MM at 152 msec Maximum = 3.62 MM at 64 msec

STRING POT 34

1 C970310F.034 Filterclass (30)



MGA Research
08-03-1997 17:07

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -.36 MM at 7 msec Maximum = 2.25 MM at 118 msec

STRING POT 35

1 _____ C970310F.035 Filterclass (30)

120

100

80

60

40

20

0

MM

19

18

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16

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01

0

TIME (seconds)

MCA Research
08-03-1997 17:07

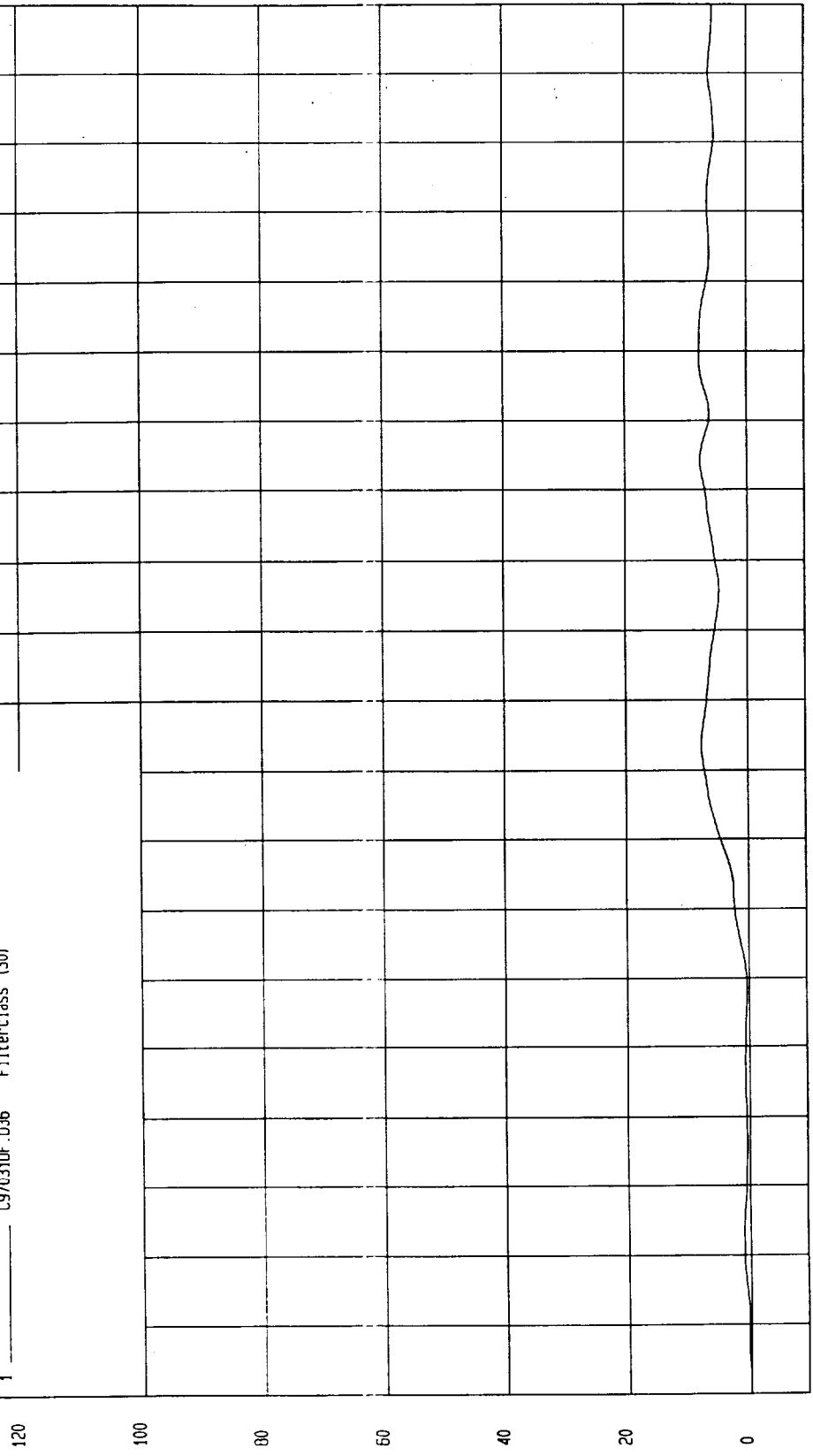
TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -17 MM at -16 msec Maximum = 7.85 MM at 149 msec

STRING POT 36

1 C970310F.D36 Filterclass (30)



TIME (seconds)

MCA Research
08-03-1997 17:07

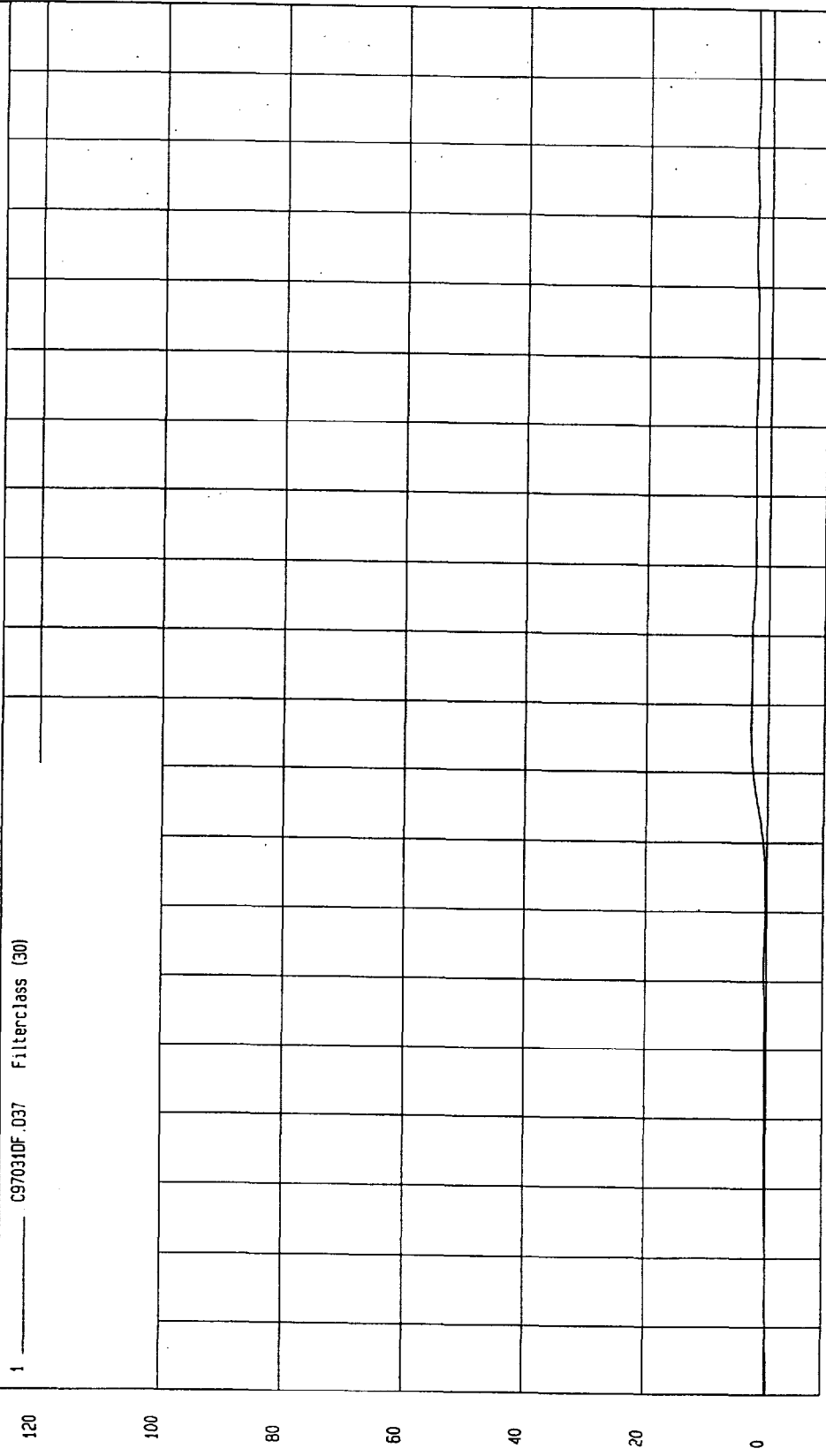
TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -.27 MM at 4 msec Maximum = 2.85 MM at 98 msec

STRING POT 37

1 ——— C970310F .037 Filterclass (30)



WCA Research
08-03-1997 17.07

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -6.05E-02 MM at -3 msec Maximum = 10.65 MM at 98 msec

STRING POT 38

1 C970310F.038 Filterclass (30)

120

100

80

60

40

20

0

MM

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MCA Research
08-03-1997 17:07

TIME (seconds)

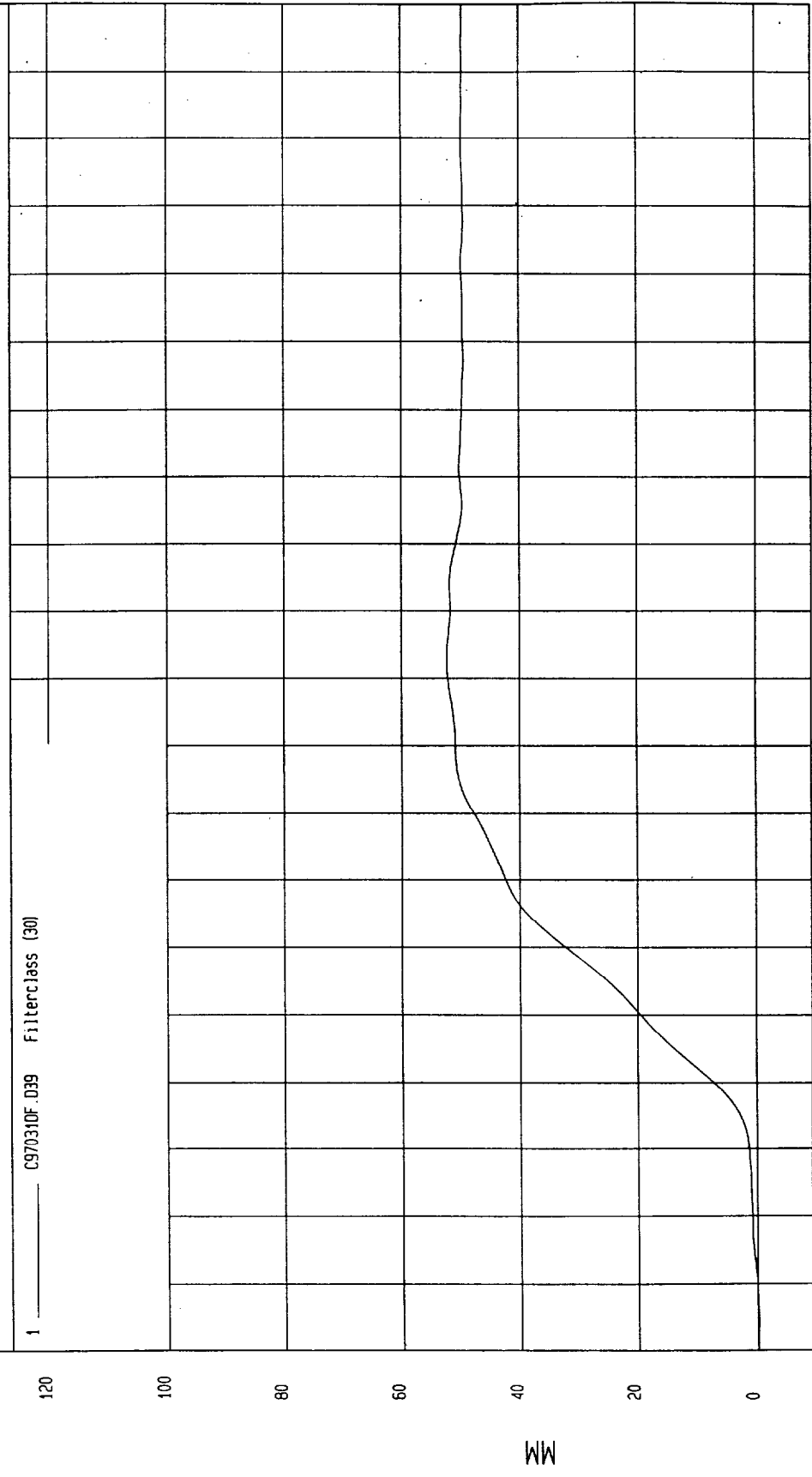
TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = - .22 MM at -7 msec Maximum = 52.36 MM at 102 msec

STRING POT 39

1 C970310F.039 Filterclass (30)



MCA Research
08-03-1997 17:07

TEST: TEST #1 19/60 CART/BARRIER

TEST DATE: 02-27-1997

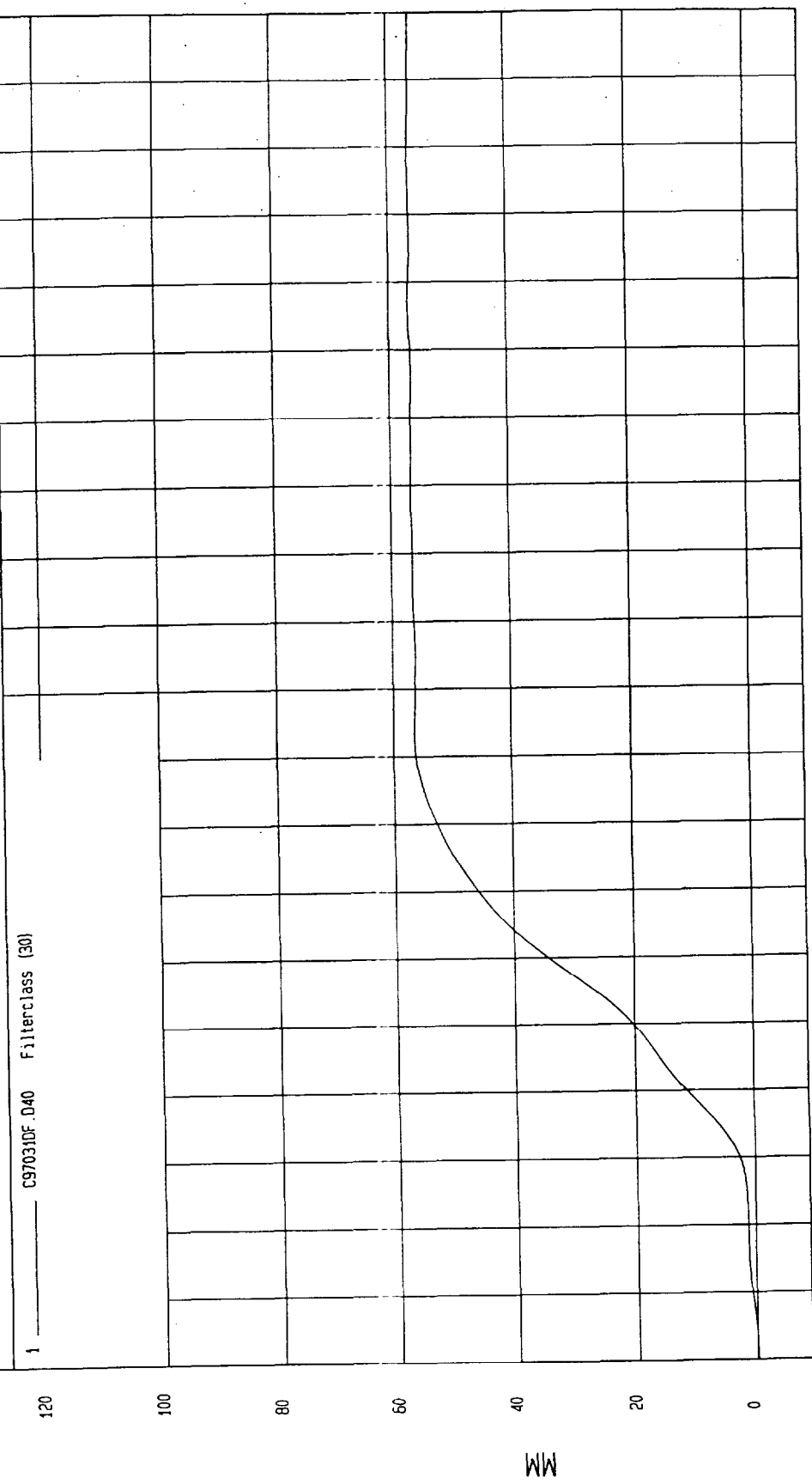
SPEED: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 DEFORMABLE BARRIER

Maximum = 56.88 MM at 157 msec

Minimum = -.15 MM at 0 msec

STRING POT 40



TIME (seconds)

MSA Research
08-03-1997 17:07

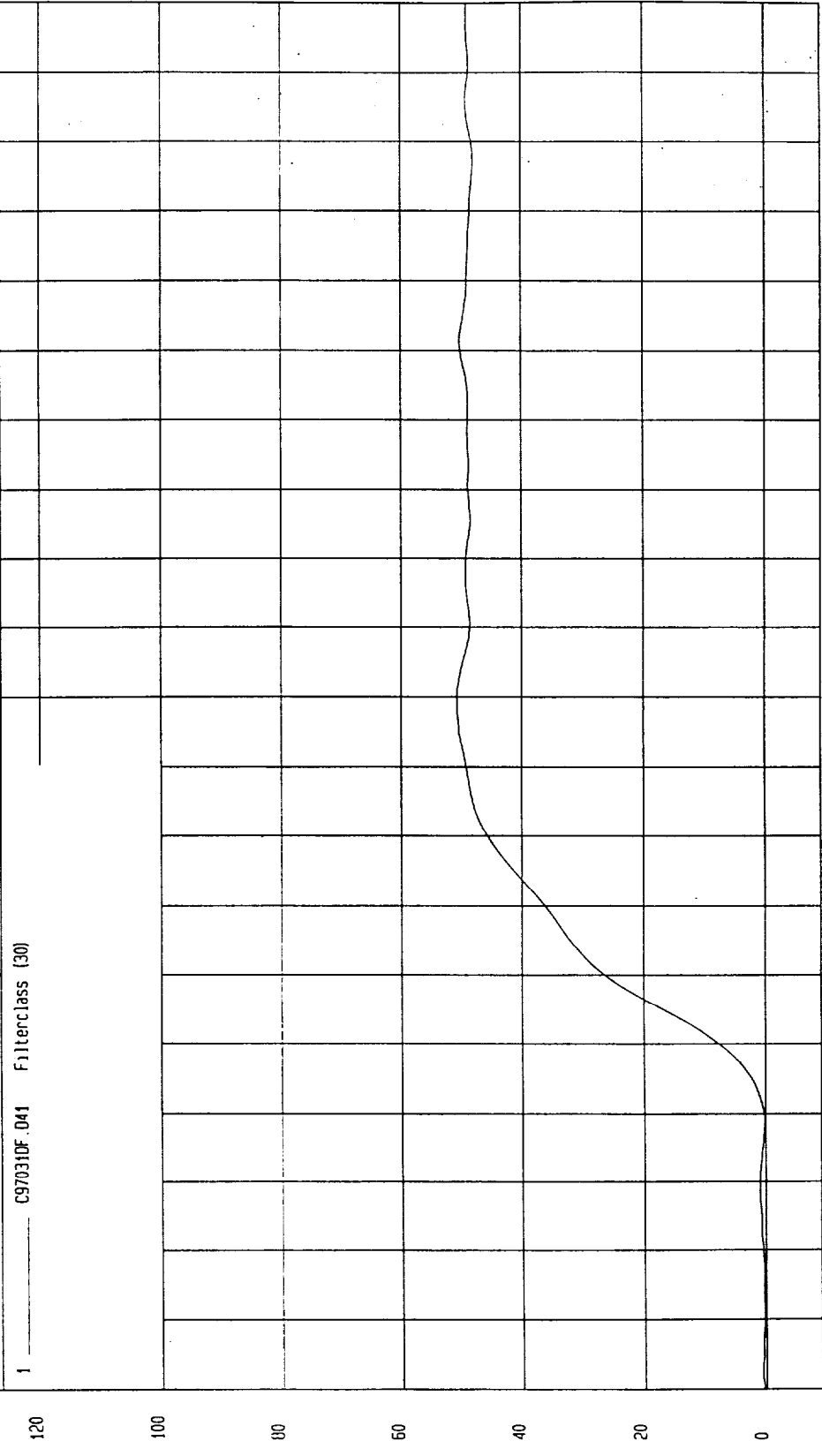
TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -.33 MM at -14 msec Maximum = 50.81 MM at 99 msec

STRING POT 41

1 C97031DF.041 Filterclass (30)



MCA Research
08-03-1997 17:07

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

SPEED: 13 MPH 20.9 KPH

Maximum = 67.41 MM at 178 msec

Minimum = -1.42 MM at -20 msec

STRING POT 42

1 _____ C970310F .042 Filterclass (30)

120

100

80

60

40

20

0

MM

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01

0

MGA Research
08-03-1997 17:08

TIME (seconds)

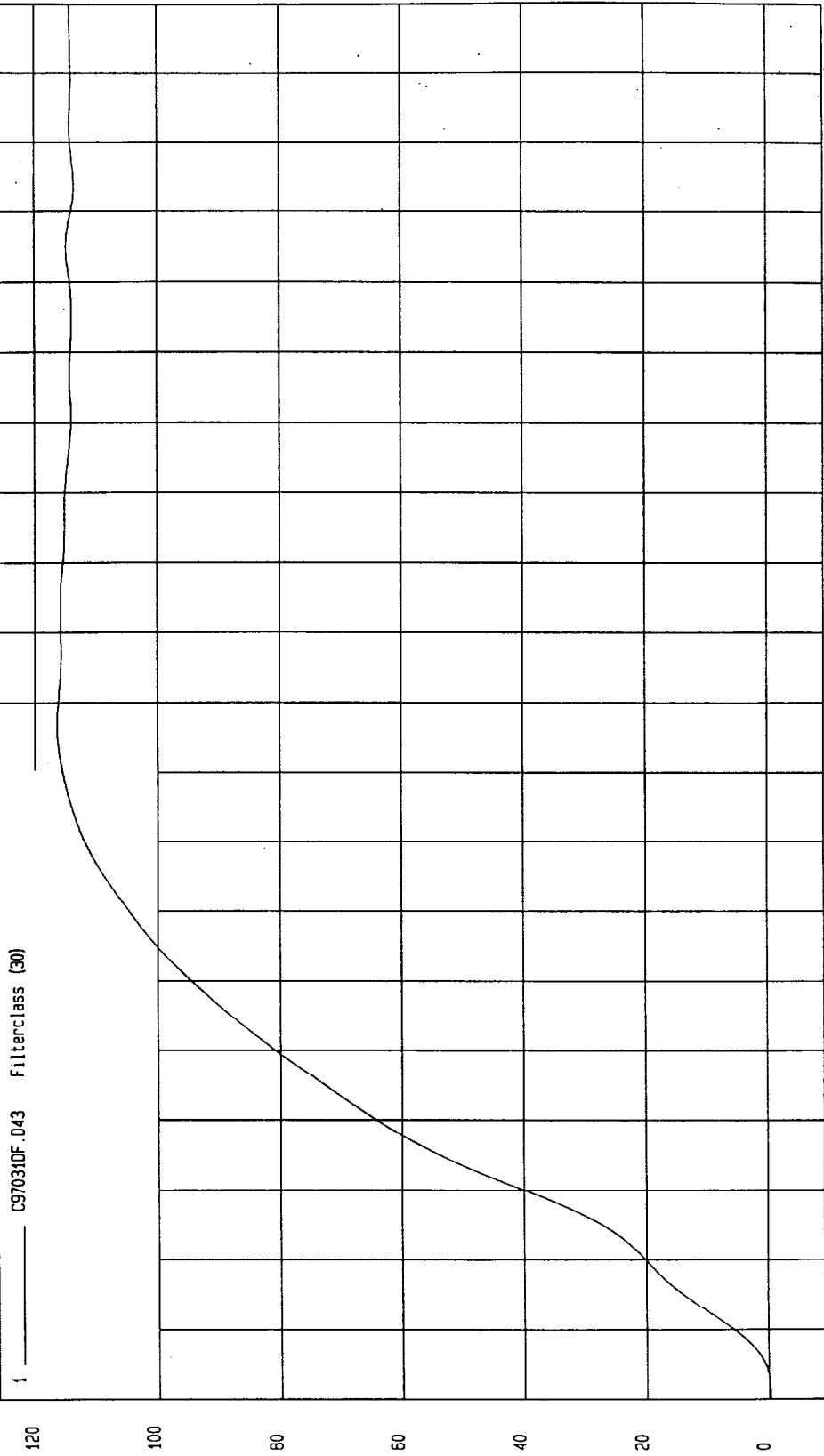
TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = - 27 MM at 0 msec Maximum = 116.49 MM at 97 msec

STRING POT 43

1 C970310F.043 Filterclass (30)



MCA Research
08-03-1997 17:08

TIME (seconds)

MM

TEST: TEST #1 19/60 CART/BARRIER

TEST DATE: 02-27-1997

SPEED: 13 MPH 20.9 KPH

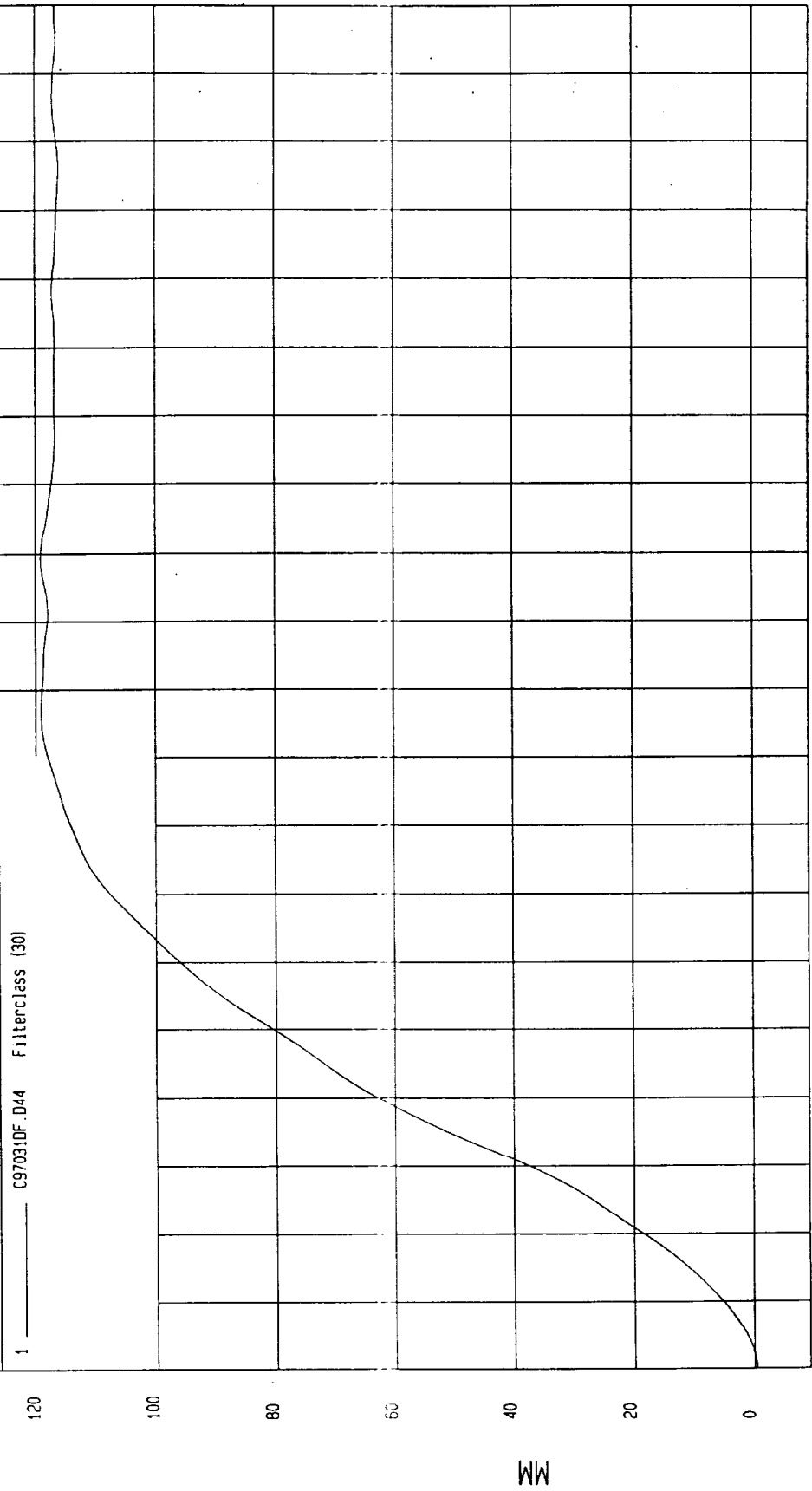
COMPONENT: FMVSS 214 DEFORMABLE BARRIER

Maximum = 119.14 MM at 97 msec

Minimum = -46 MM at -1 msec

STRING POT 44

1 C970310F.D44 Filterclass (30)



MCA Research
08-03-1997 17:08

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 842.39 N at 100 msec

Minimum = -943.13 N at 46 msec

LC #4 FX

1 _____ 897031FM.F14 Filterclass (60)

2000

0

-2000

-4000

-6000

-8000

-10000

N

19

18

17

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03

02

01

0

TIME (SECONDS)

MGA Research
03-27-1998 11:24

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier

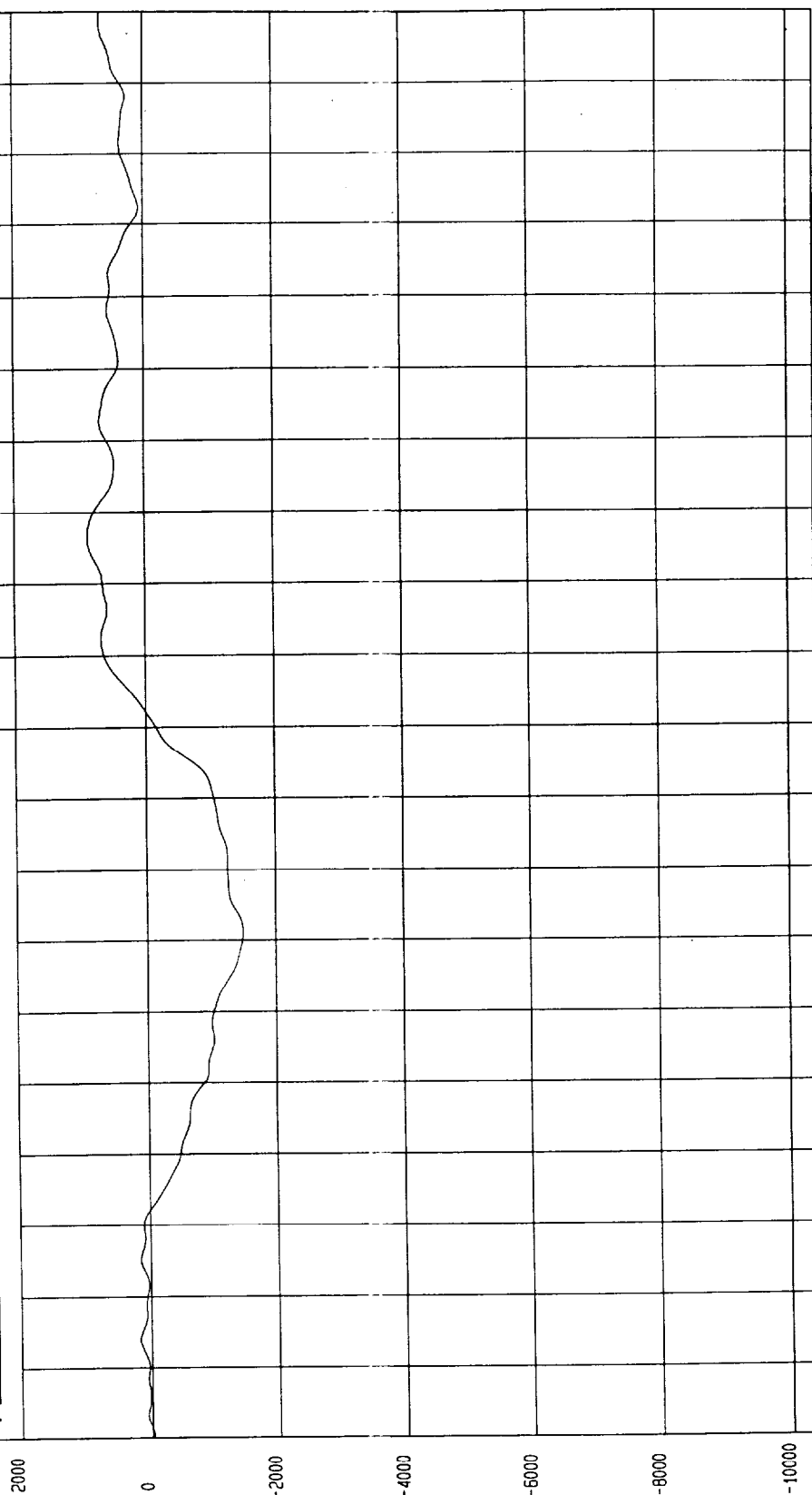
Speed: 13 MPH 20.9 KPH

Minimum = -1503.98 N at 71 msec

Maximum = 882.27 N at 126 msec

LC #5 FX

1 _____ 897031FM.F17 Filterclass (60)



TIME (SECONDS)

MCA Research
03-27-1998 11:25

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 186.81 N at 15 msec

Minimum = -2442.63 N at 86 msec

LC #6 FX

1 897031FM.F20 Filterclass (60)

2000

0

-2000

-4000

-6000

-8000

-10000

N

19

18

17

16

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14

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10

09

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07

06

05

04

03

02

01

0

TIME (SECONDS)

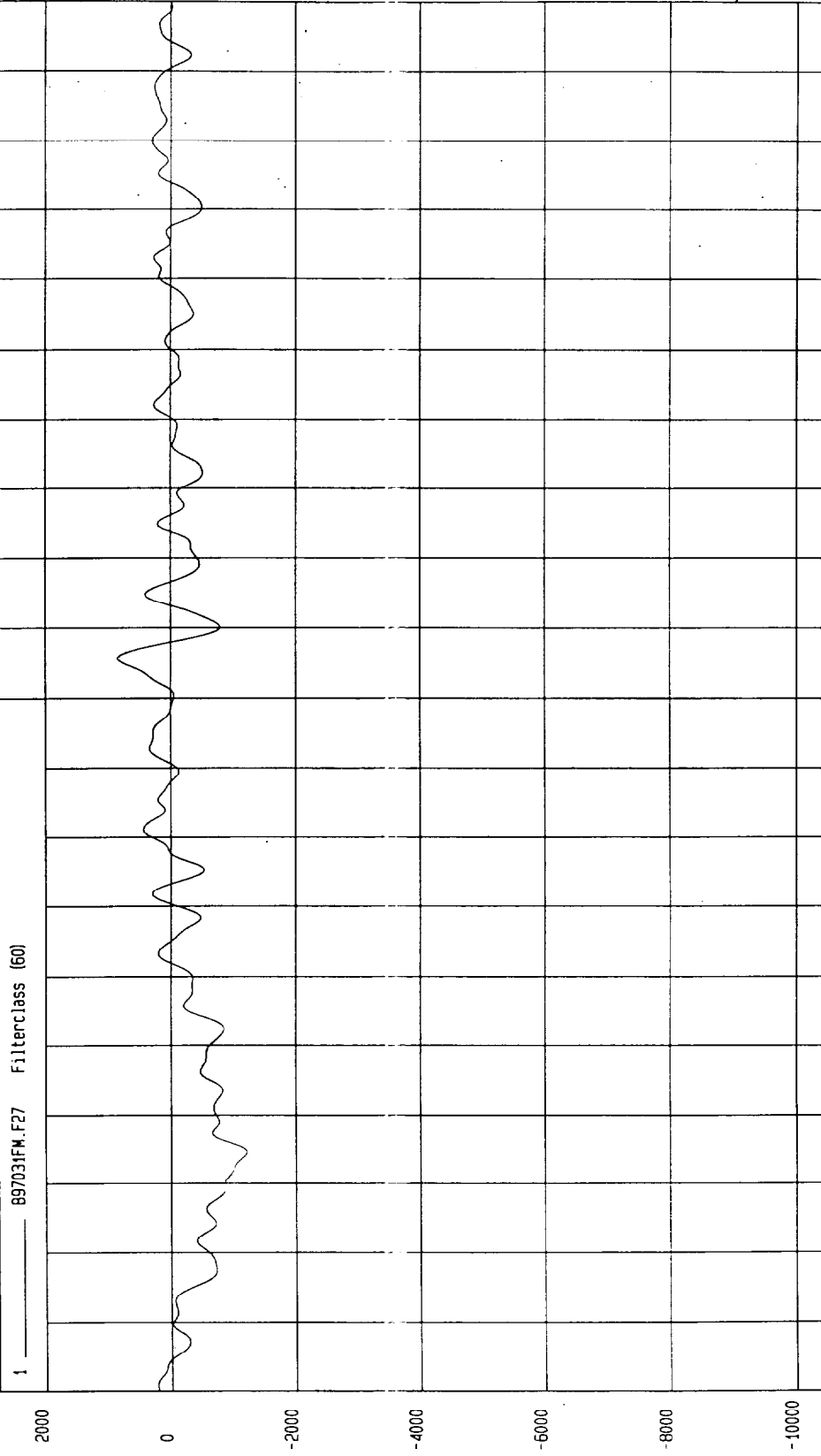
MCA Research
03-27-1998 11:25

TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

Minimum = -1229.42 N at 35 msec Maximum = 843.67 N at 106 msec

LC #8 FX



TIME (SECONDS)

19
18
17
16
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14
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12
11
1
09
08
07
06
05
04
03
02
01
0

MGA Research
03-27-1998 11:26

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

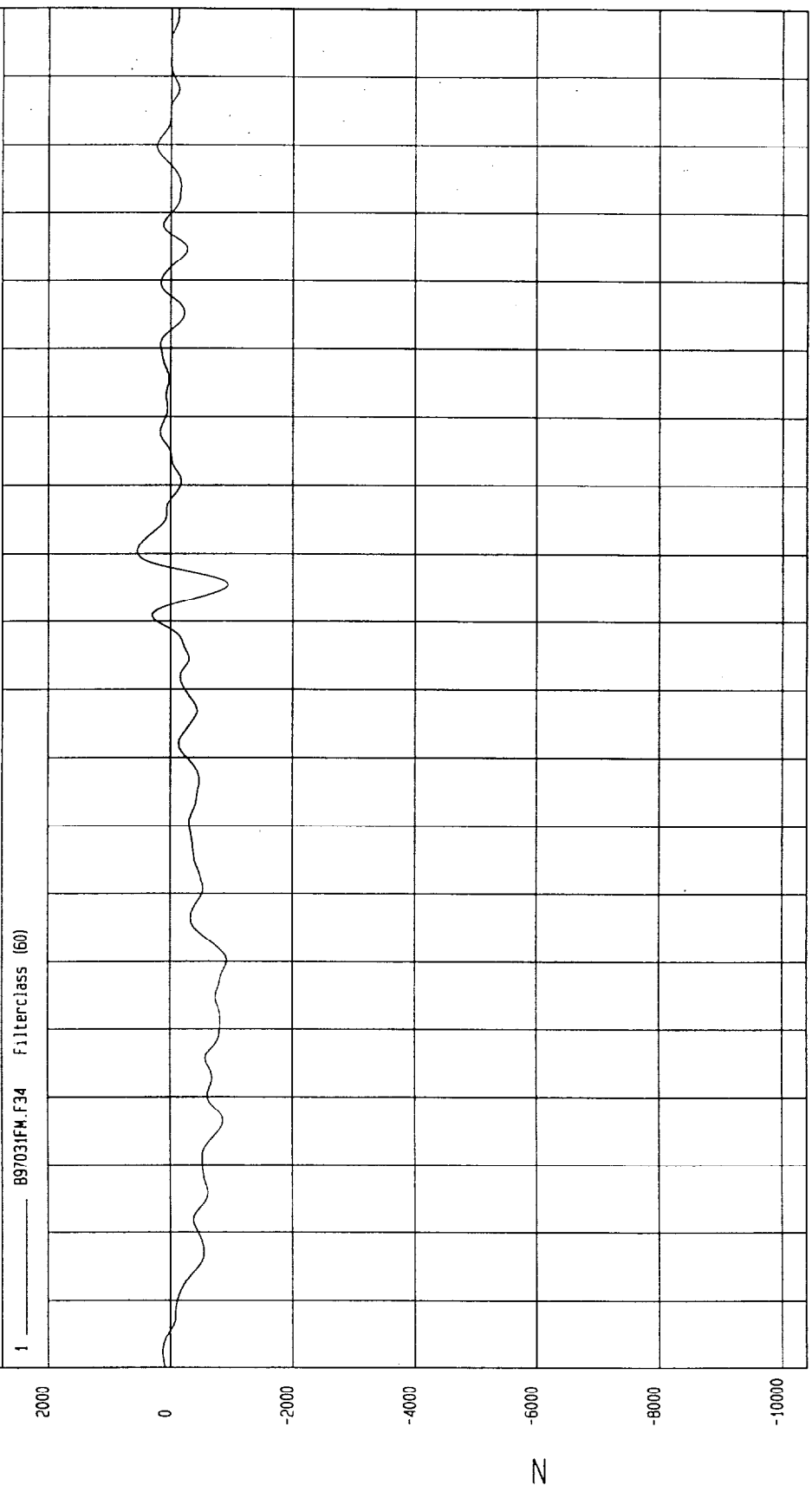
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 540.10 N at 120 msec

Minimum = -955.41 N at 116 msec

LC #10 FX

1 _____ B97031FM.F34 Filterclass (60)



TIME (SECONDS)

MGA Research
03-27-1998 11:27

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

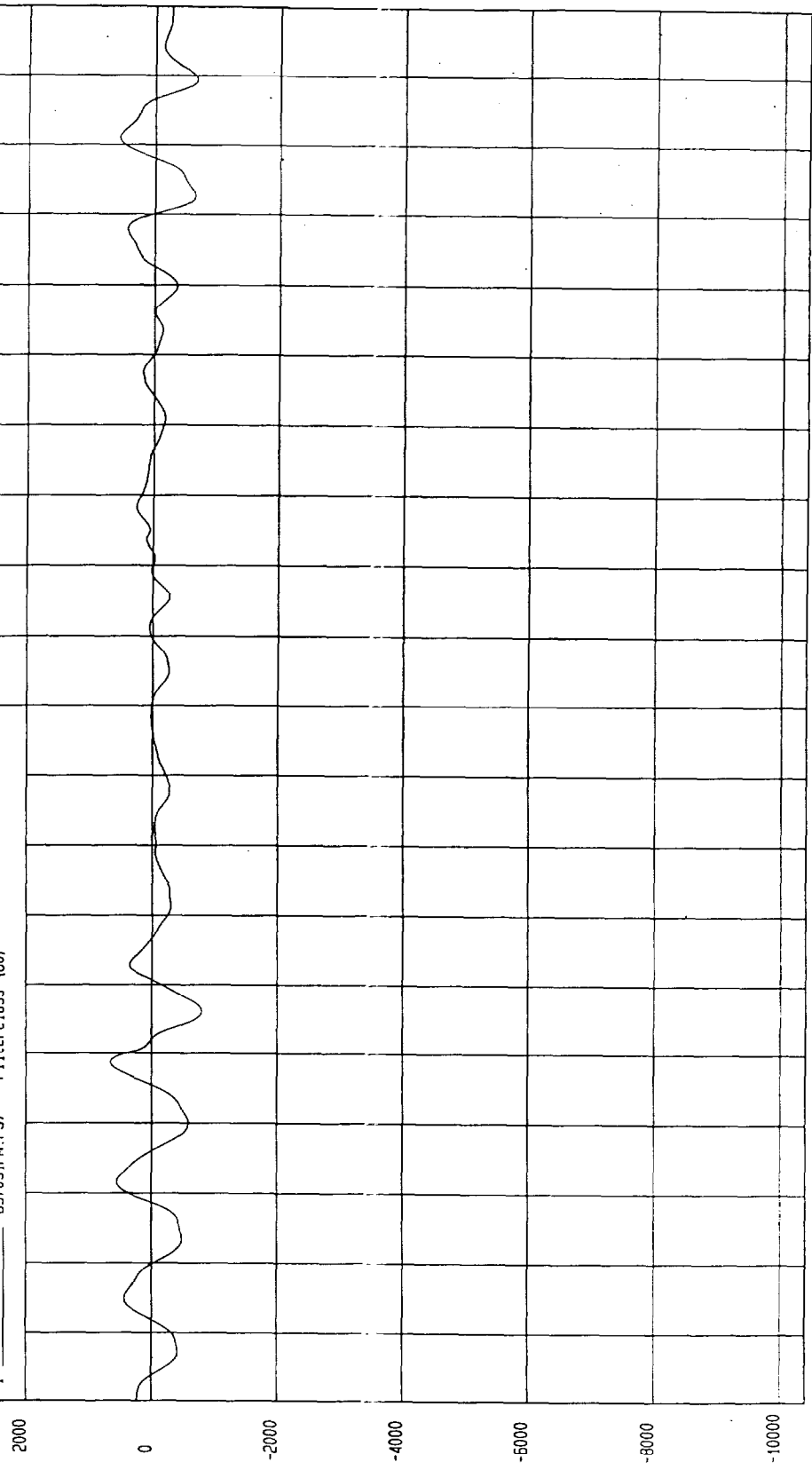
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 653.25 N at 49 msec

Minimum = -809.38 N at 56 msec

LC #11 FX

1 897031FM.F37 Filterclass (60)



MOA Research
03-21-1998 11: 27

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier

Speed: 13 MPH 20.9 KPH

Minimum = -2776.51 N at 58 msec

Maximum = 1939.81 N at 161 msec

LC #22 FX

1 B97031FM.F72 Filterclass (60)

2000

0

-2000

-4000

-6000

-8000

-10000

N

0

19

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

TIME (SECONDS)

MGA Research
03-27-1998 11:31

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

SPEED: 13 MPH 20.9 KPH

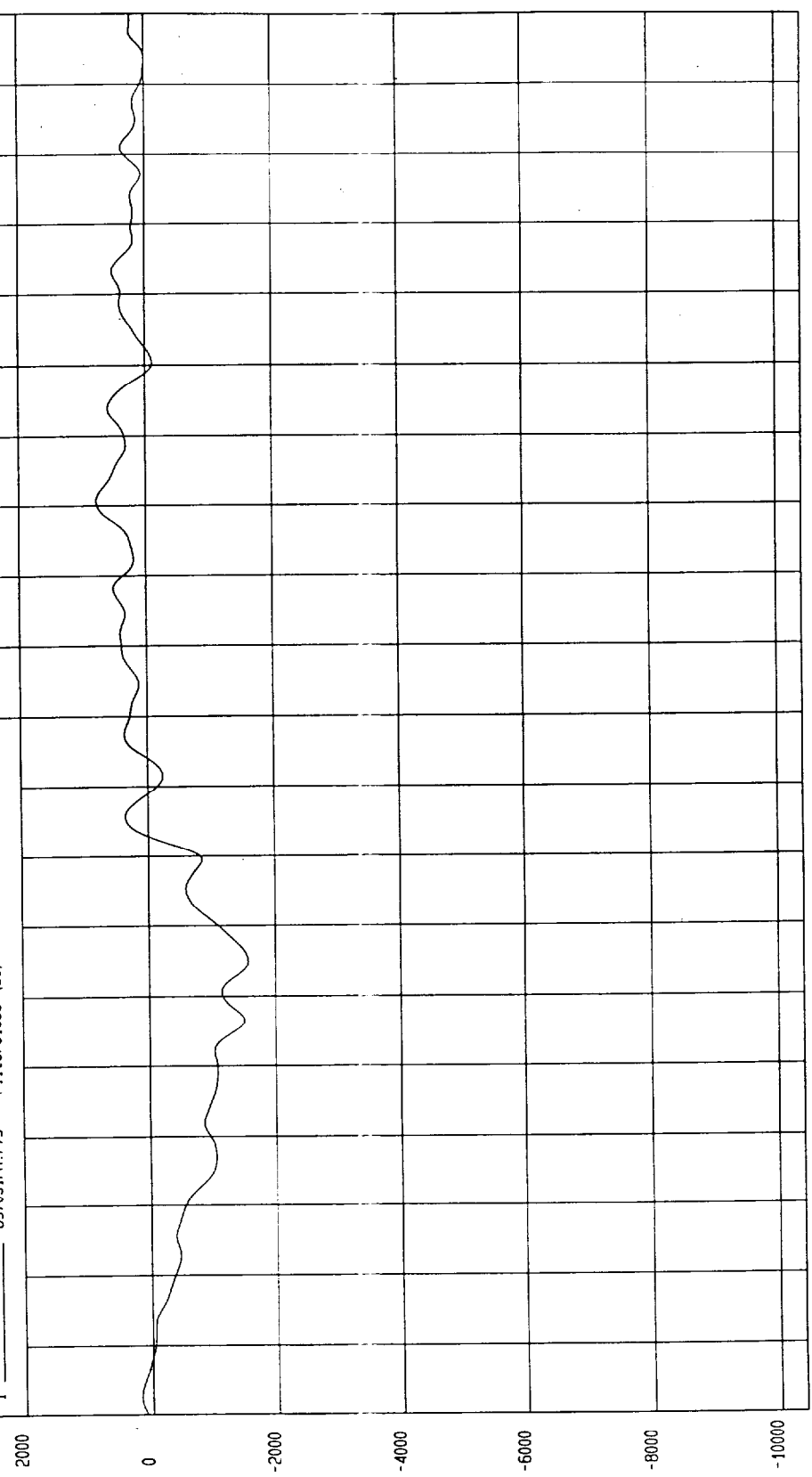
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 769.60 N at 131 msec

Minimum = -1573.00 N at 65 msec

LC #24 FX

1 ——— B97031FM.F79 Filterclass (60)



MGA Research
03-27-1998 11:32

TIME (SECONDS)

N

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

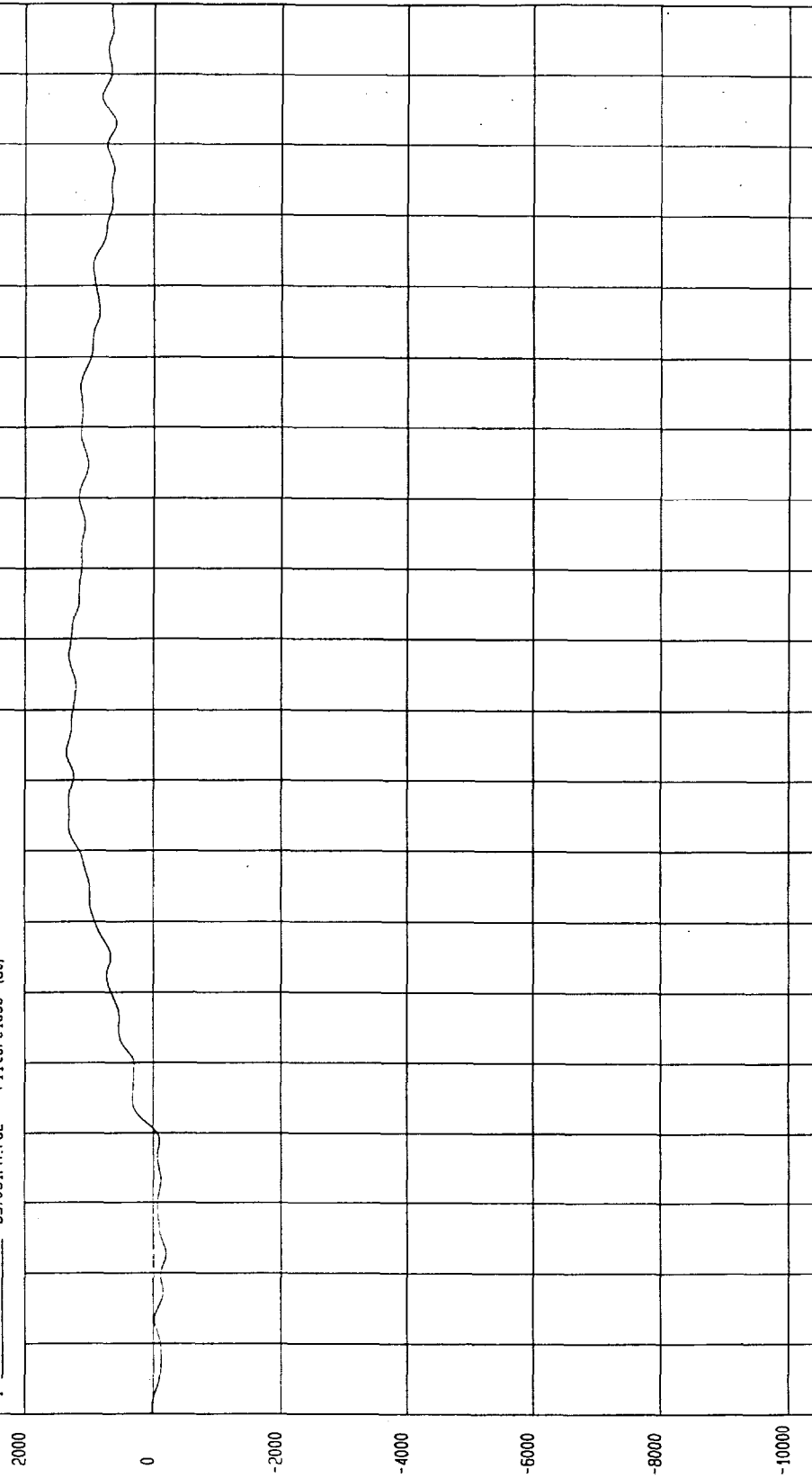
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 1353.94 N at 94 msec

Minimum = -203.17 N at 23 msec

LC #25 FX

1 ——— B97031FM.F02 Filterclass (60)



MSA Research
03-27-1998 11:32

TIME (SECONDS)

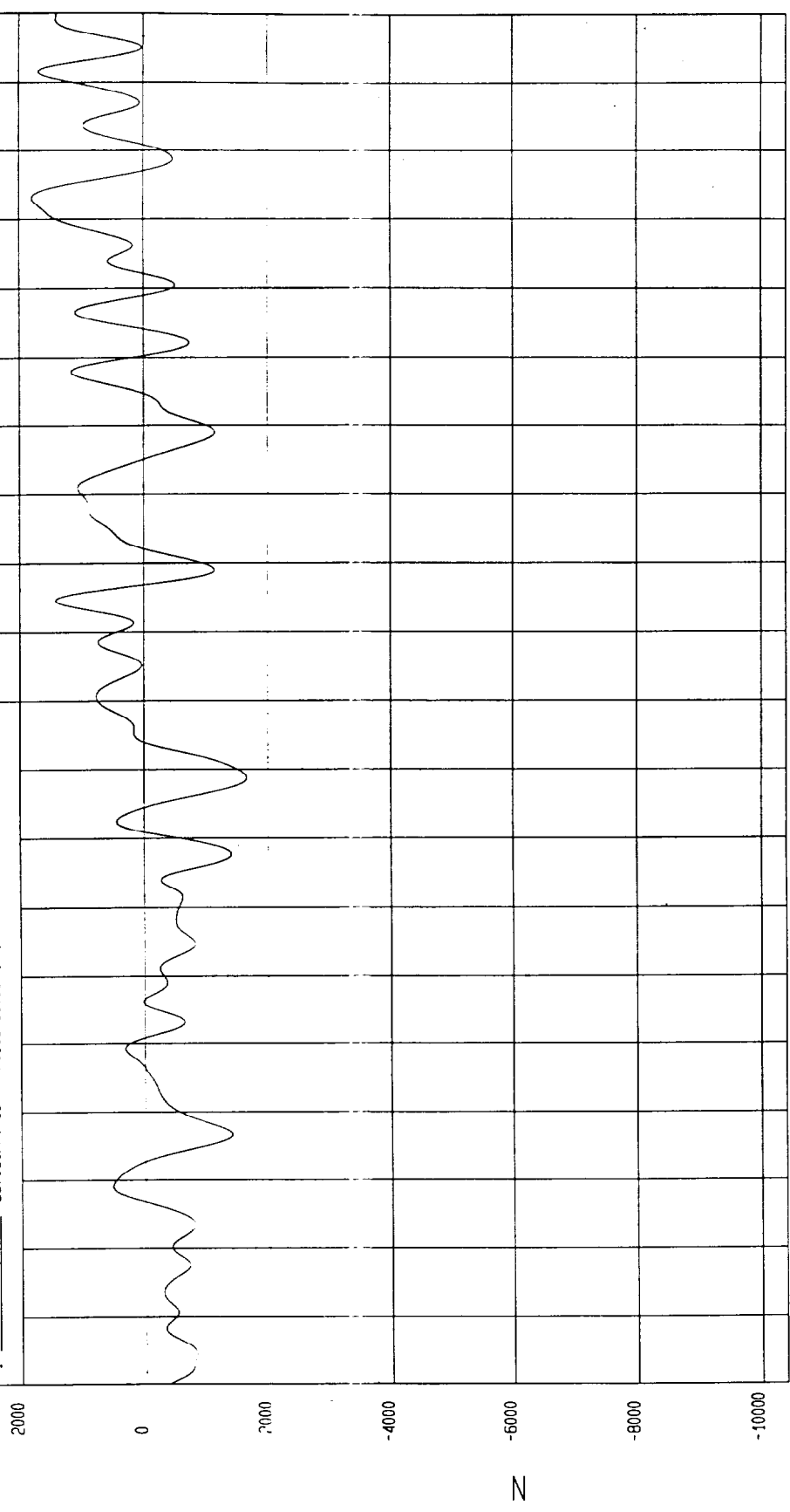
TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

Minimum = -1662.9 N at 89 msec Maximum = 1959.53 N at -20 msec

LC #26 FX

1 ——— B97031FM.F86 Filterclass (60)



MGA Research
03-27-1998 11:32

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

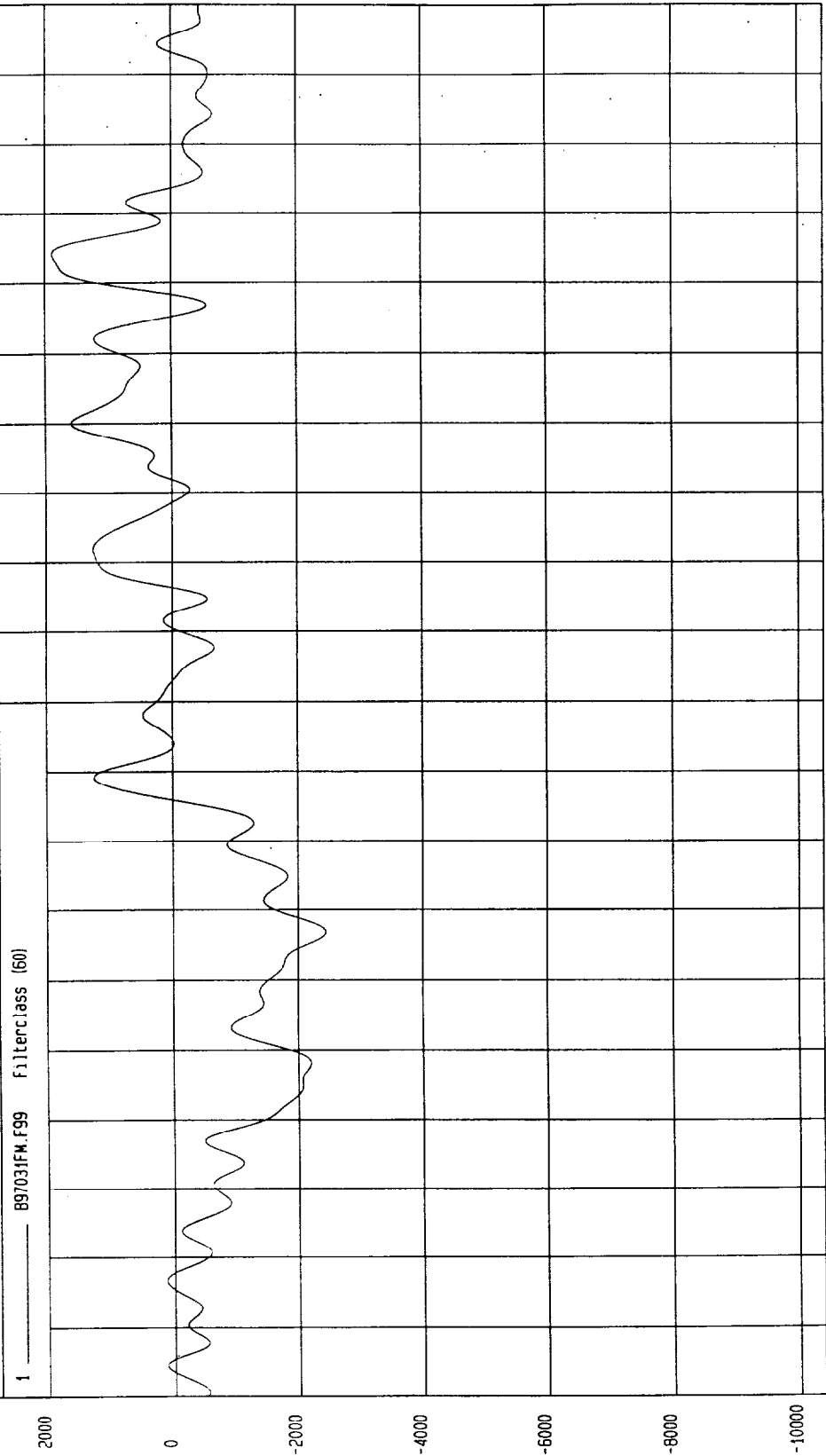
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 1890.76 N at 164 msec

Minimum = -2451.09 N at 67 msec

LC #30 FX

1 897031FM.F99 Filterclass (60)



MGA Research
03-27-1998 11:23

TIME (SECONDS)

N

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

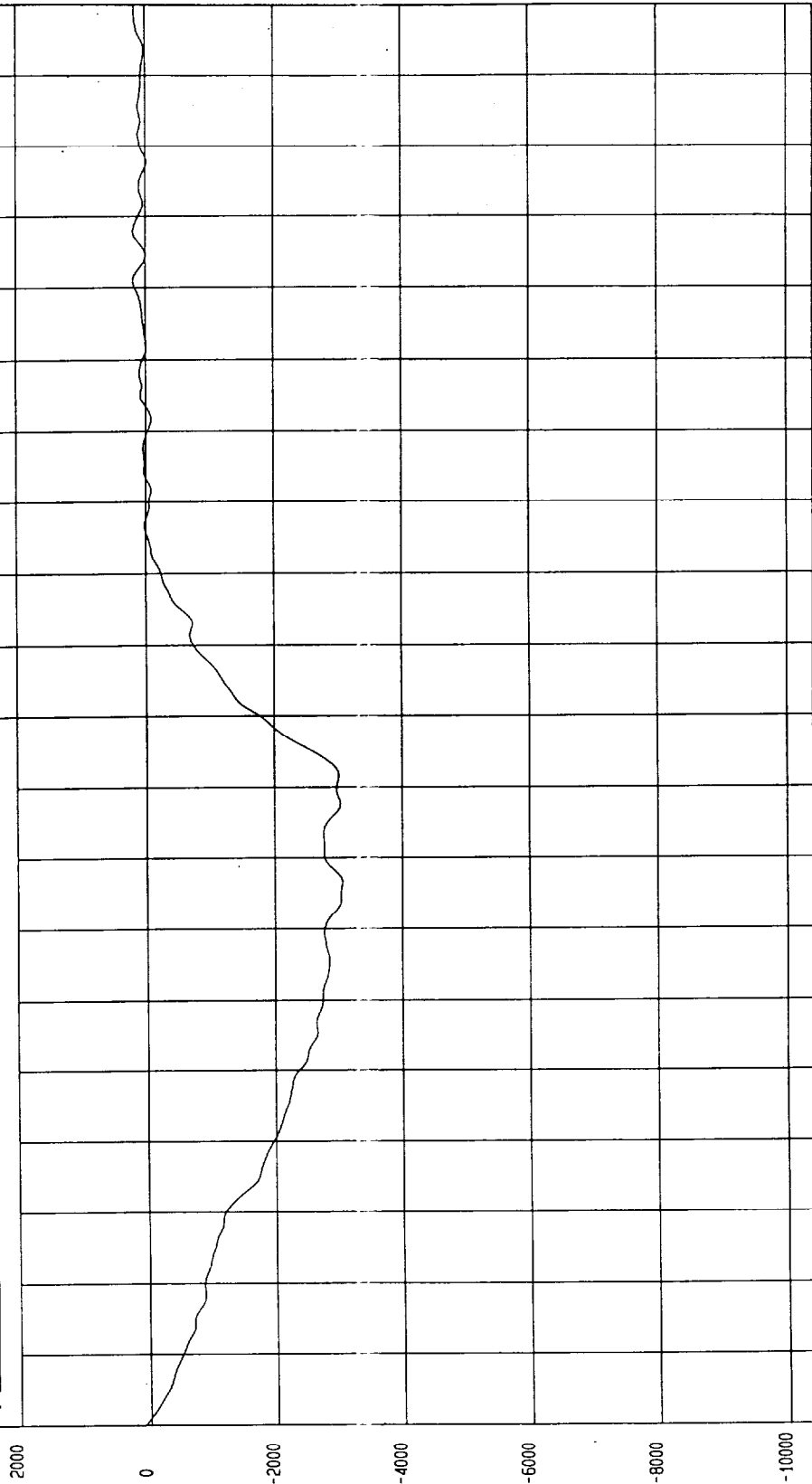
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 213.41 N at -20 msec

Minimum = -3083.50 N at 76 msec

LC #31 FX

1 ——— B97031VM.V02 Filterclass (60)



MGA Research
03-27-1998 11:34

TIME (SECONDS)

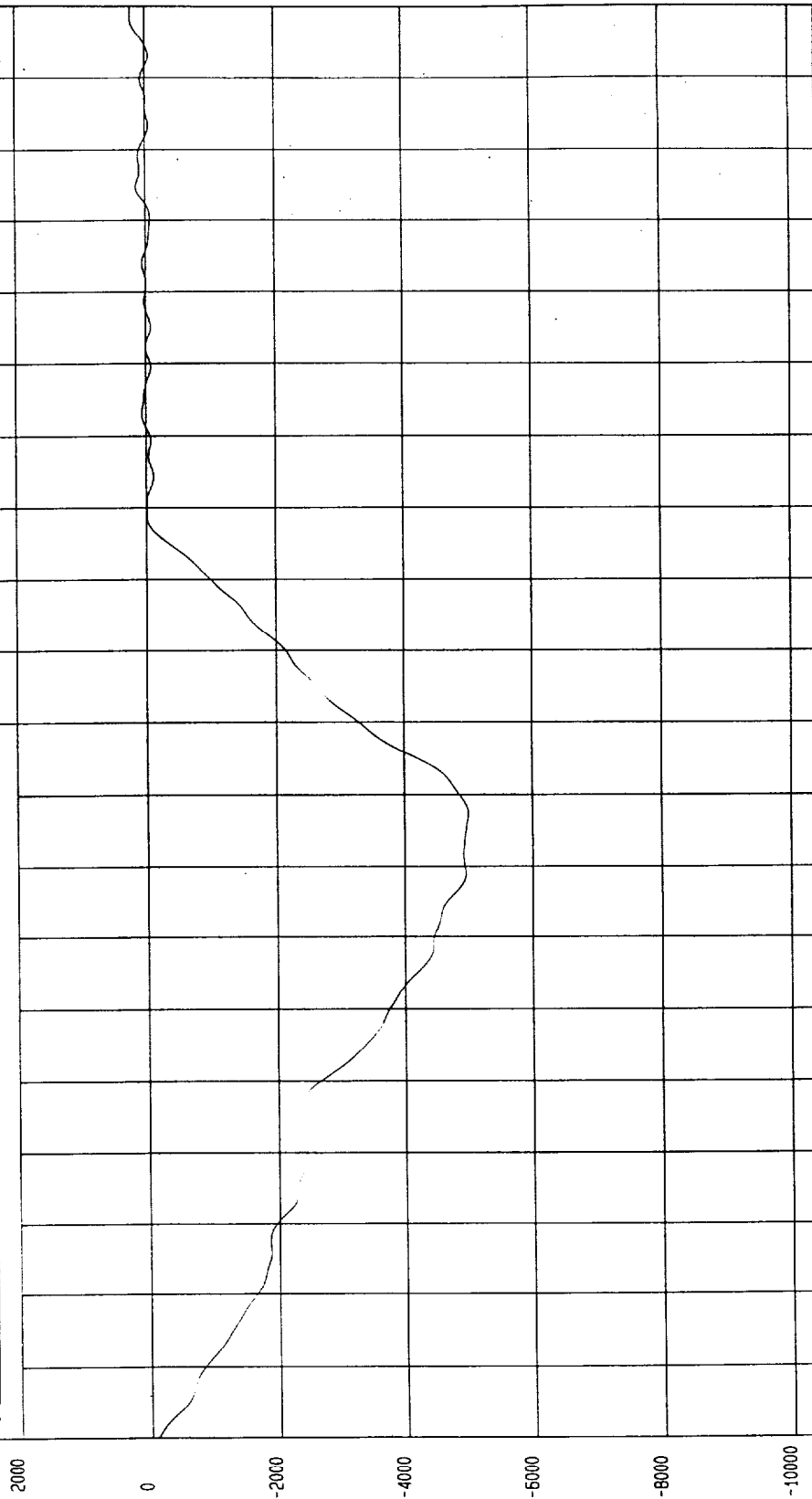
TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -5018.81 N at 87 msec Maximum = 217.19 N at 198 msec

LC #32 FX

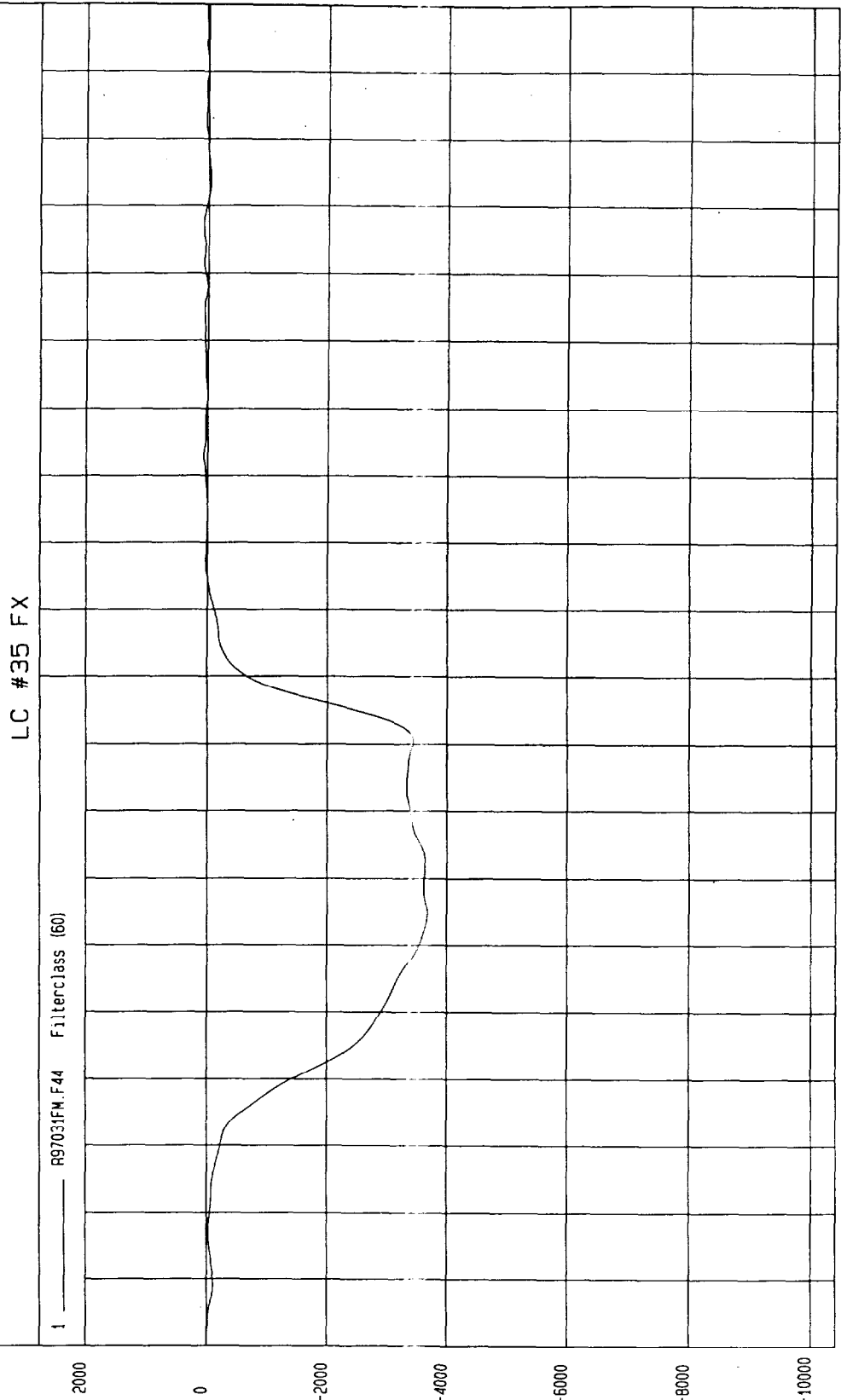
1 C97031FM.F47 Filterclass (60)



TIME (seconds)

MCA Research
03-16-1998 13:55

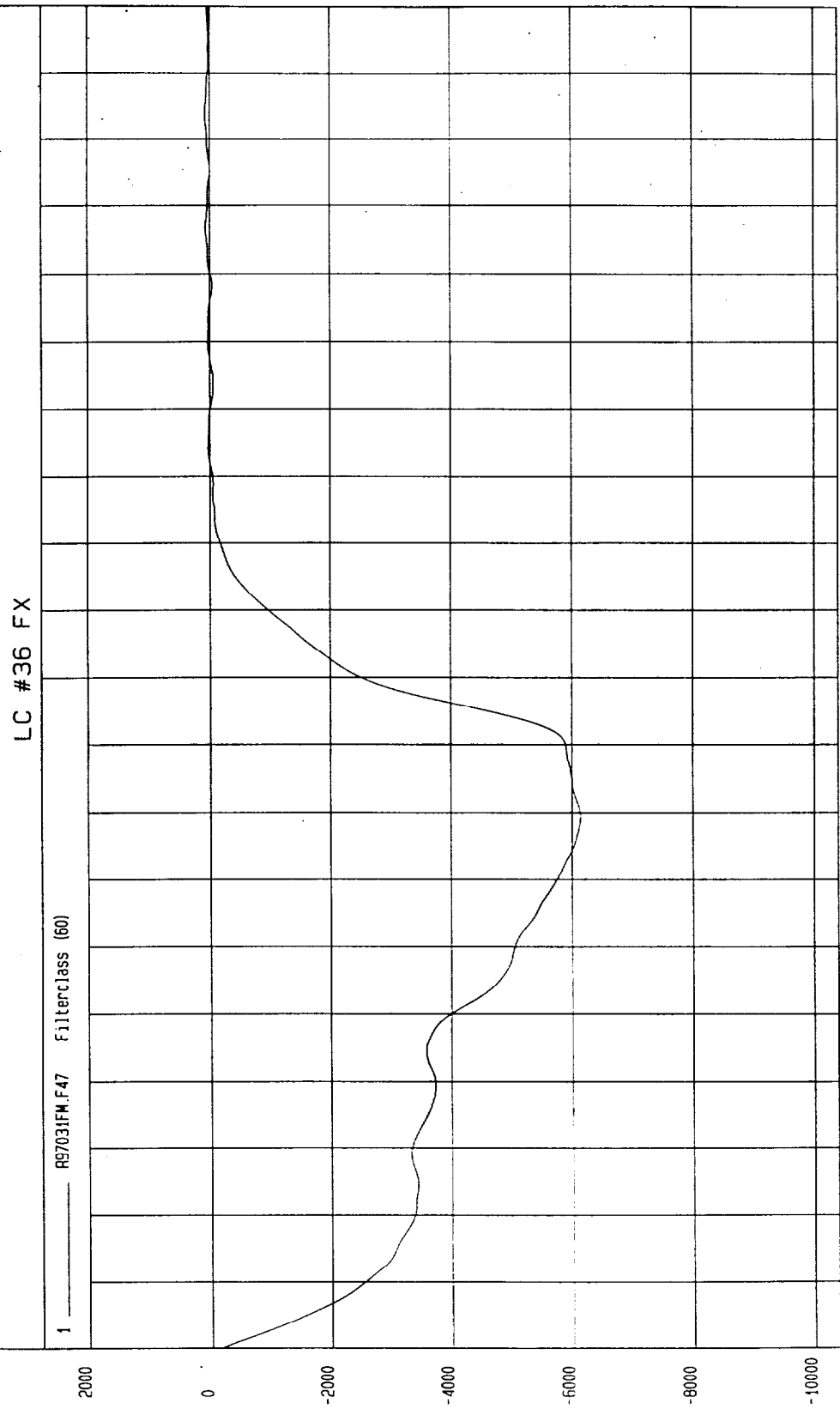
TEST: Test #1 19/60 Cart/Barrier	TEST DATE: 02-27-1997
COMPONENT: FMVSS 214 Deformable Barrier	Speed: 13 MPH 20.9 KPH
Minimum = -3684.11 N at 64 msec	Maximum = 80.55 N at 167 msec



TIME (SECONDS)

MGA Research
03-16-1998 13:42

TEST: Test #1 19/60 Cart/Barrier	TEST DATE: 02-27-1997
COMPONENT: FMVSS 214 Deformable Barrier	Speed: 13 MPH 20.9 KPH
Minimum = -6136.79 N at 79 msec	Maximum = 74.62 N at 184 msec



TIME (SECONDS)

MCA Research
03-16-1998 13:43

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

SPEED: 13 MPH 20.9 KPH

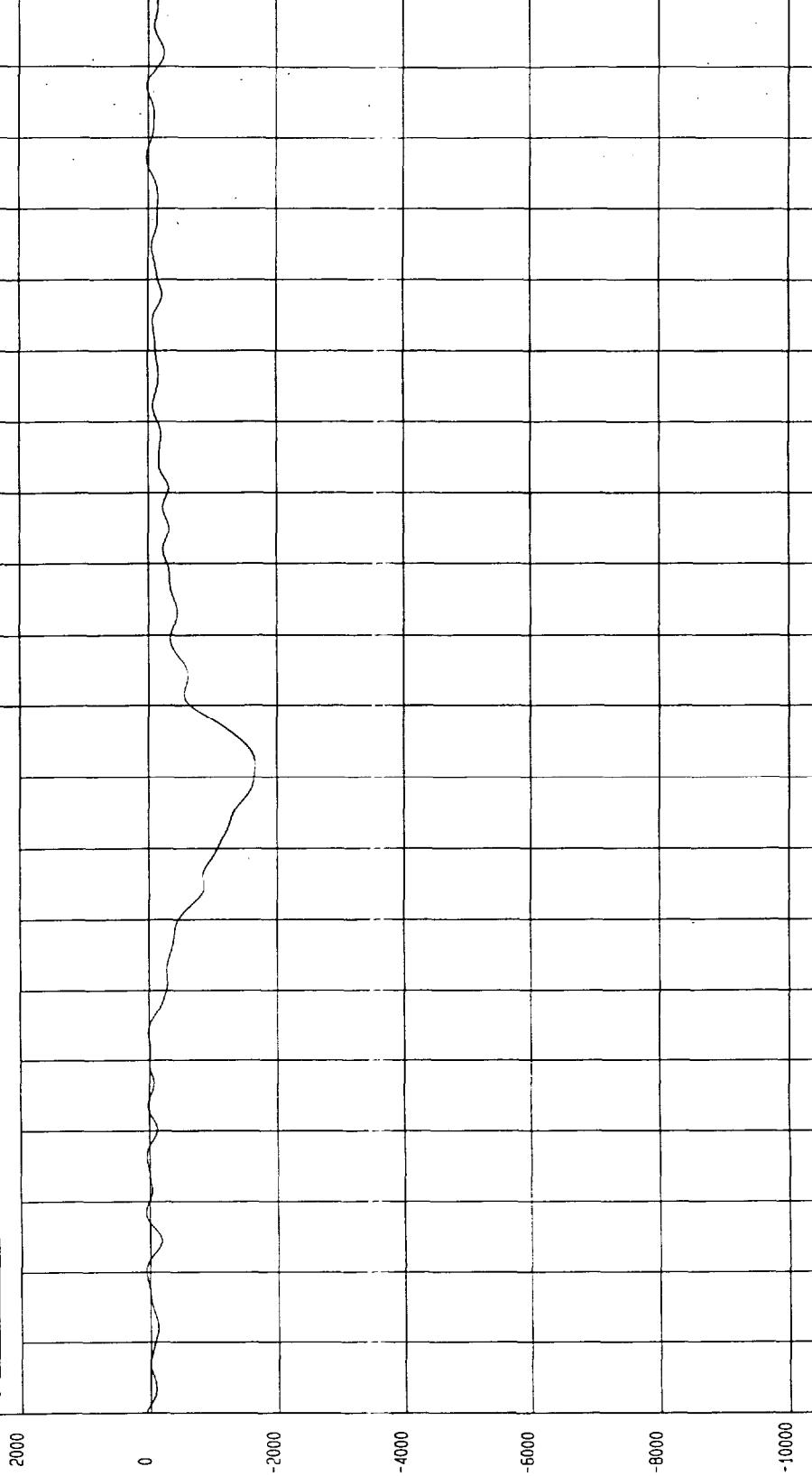
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 82.94 N at -1 msec

Minimum = -1672.57 N at 92 msec

LC #37 FX

1 ——— R97031FM.F50 Filterclass (60)



MCA Research
03-16-1998 13:43

TIME (SECONDS)

N

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

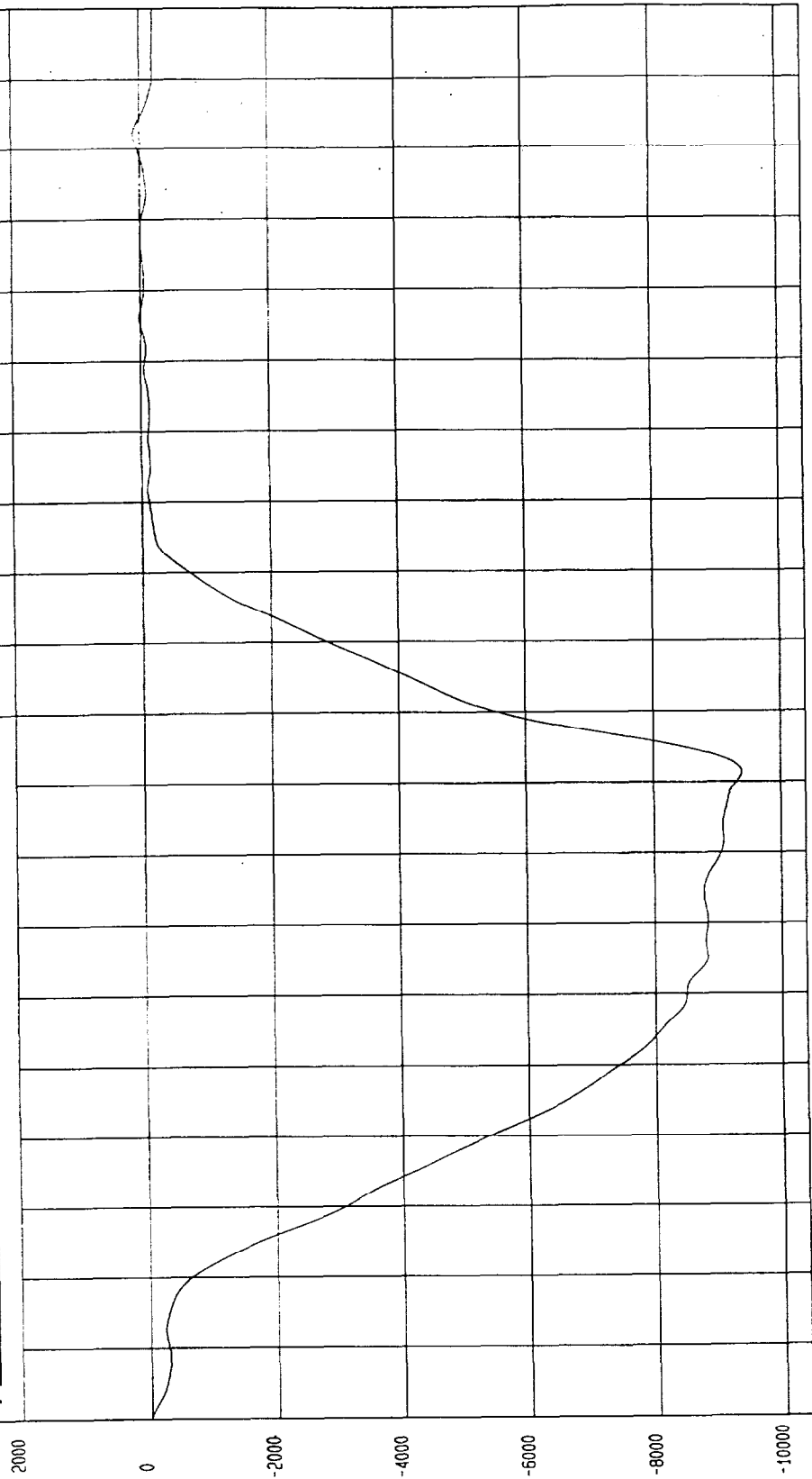
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 90.28 N at 182 msec

Minimum = -9404.98 N at 91 msec

LC #38 FX

1 R97031FM.F53 Filterclass (60)



MSA Research
03-16-1998 13.43

TIME (SECONDS)

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

SPEED: 13 MPH 20.9 KPH

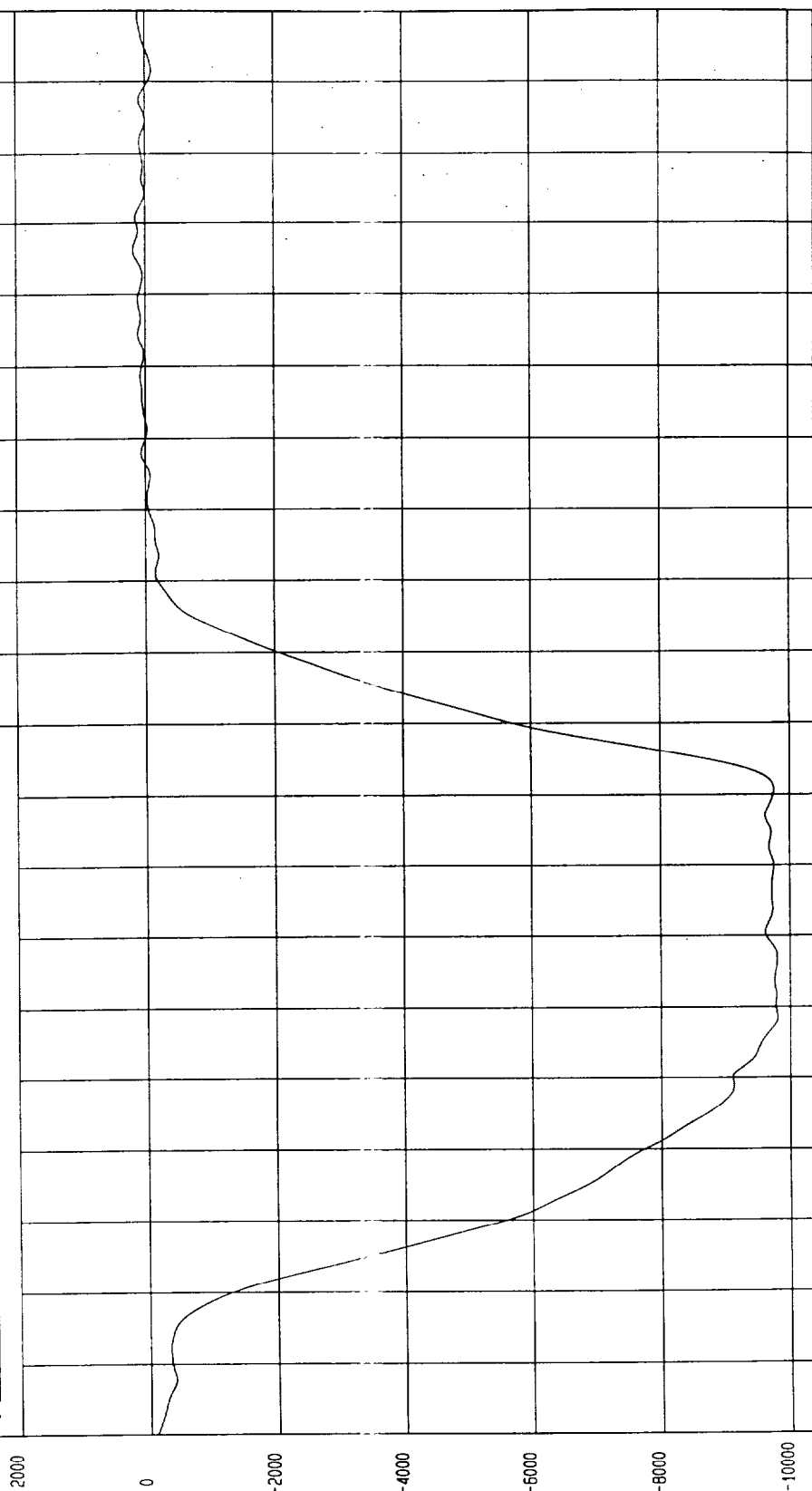
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 185.92 N at 166 msec

Minimum = -9803.95 N at 58 msec

LC #39 FX

1 ——— R97031FM.F56 Filterclass (60)



MCA Research
03-16-1998 13.44

TIME (SECONDS)

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

SPEED: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 237.90 N at -3 msec

Minimum = -8059.05 N at 14 msec

LC #40 FX

1 R97031FM.F60 Filterclass (60)



NCA Research
03-16-1998 13.44

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

Minimum = -6812.50 N at 91 msec

Maximum = 84.46 N at -14 msec

LC #41 FX

1 — R97031FM.F63 Filterclass (60)

2000

0

N

-2000

-4000

-6000

-8000

-10000

0

0.01

0.02

0.03

0.04

0.05

0.06

0.07

0.08

0.09

0.10

0.11

0.12

0.13

0.14

0.15

0.16

0.17

0.18

0.19

TIME (SECONDS)

MCA Research
03-16-1998 13:44

TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

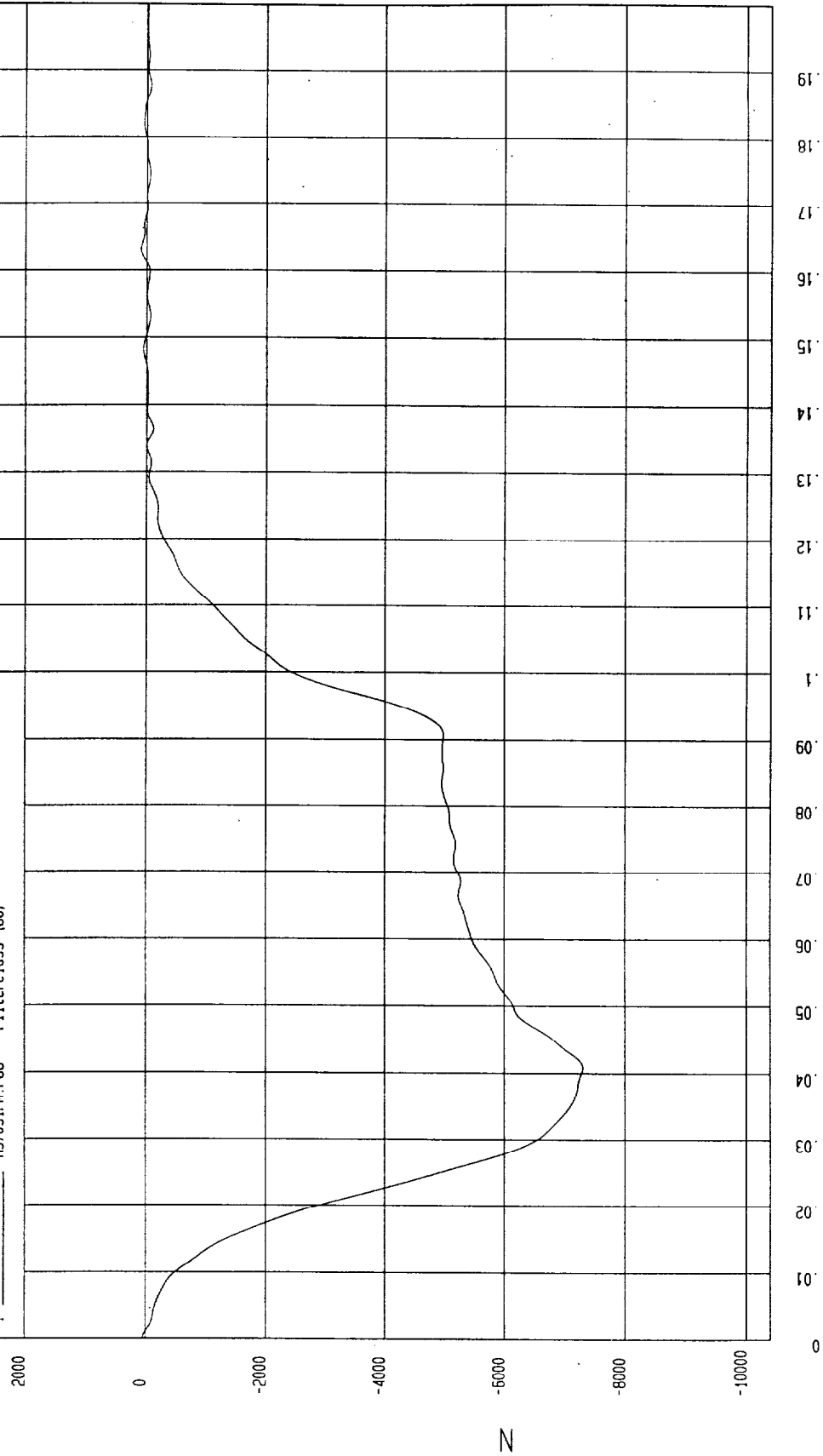
COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

Minimum = -7289.30 N at 41 msec

Maximum = 91.66 N at 163 msec

LC #42 FX

1 ——— R97031FM.F66 Filterclass (60)



TIME (SECONDS)

MGA Research
03-16-1998 13: 45

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier

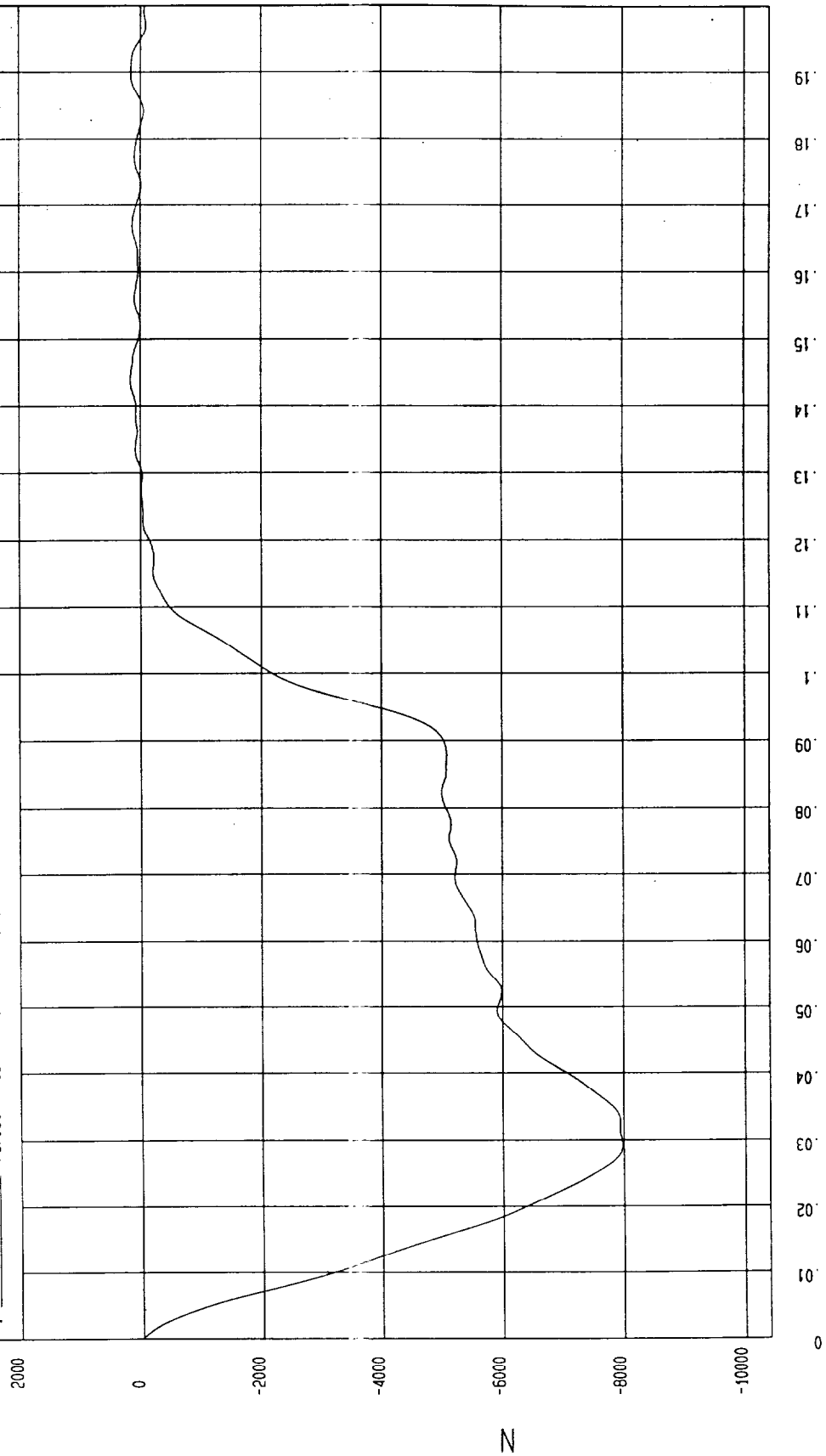
Speed: 13 MPH 20.9 KPH

Minimum = -7978.08 N at 29 msec

Maximum = 163.80 N at 144 msec

LC #43 FX

1 _____ R97031FM.F69 Filterclass (60)



TIME (SECONDS)

MCA Research
03-16-1998 13:45

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier

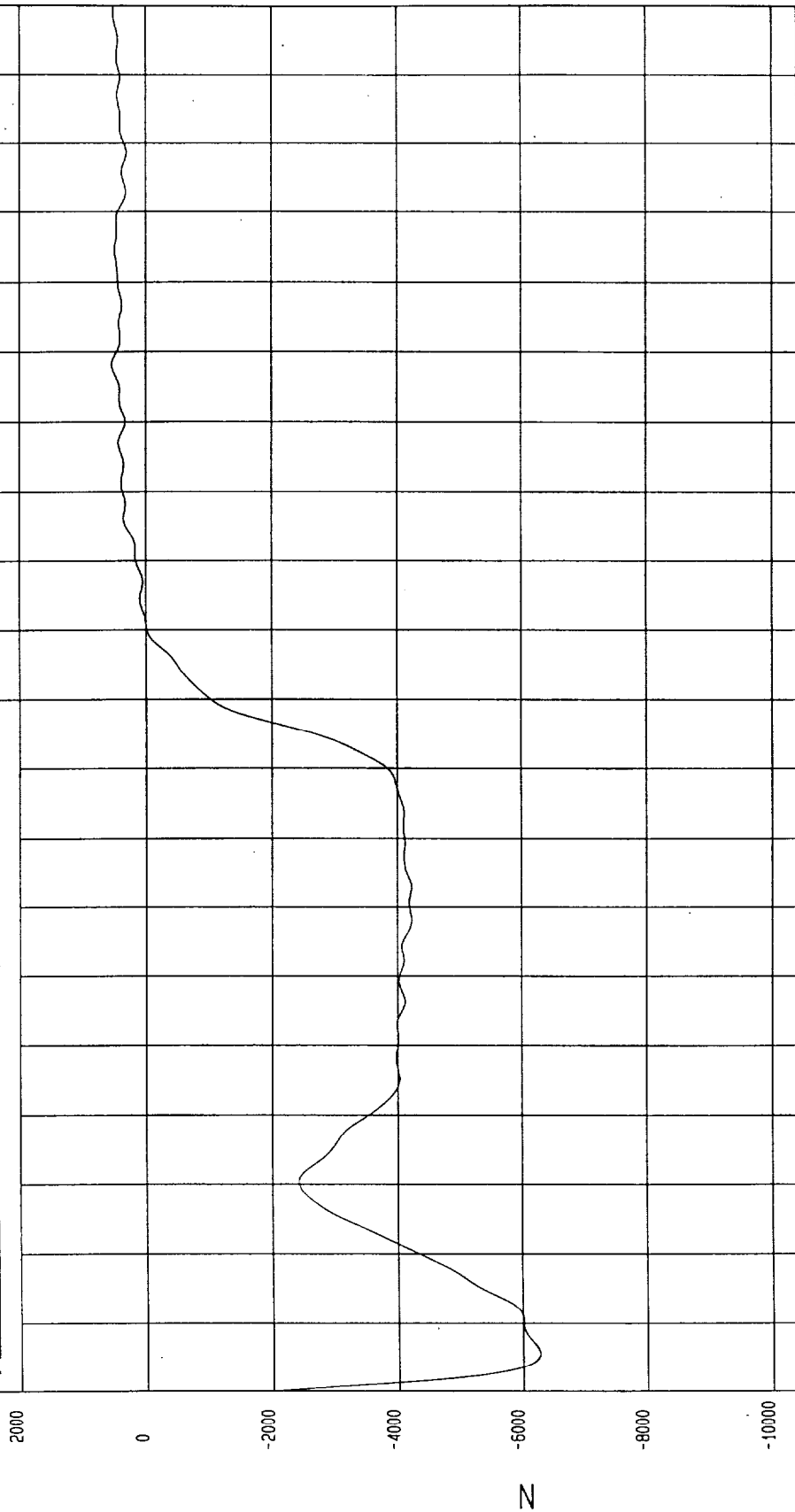
Speed: 13 MPH 20.9 KPH

Minimum = -6271.49 N at 6 msec

Maximum = 545.05 N at 148 msec

LC #44 FX

1 _____ A97031FM.F72 Filterclass (60)

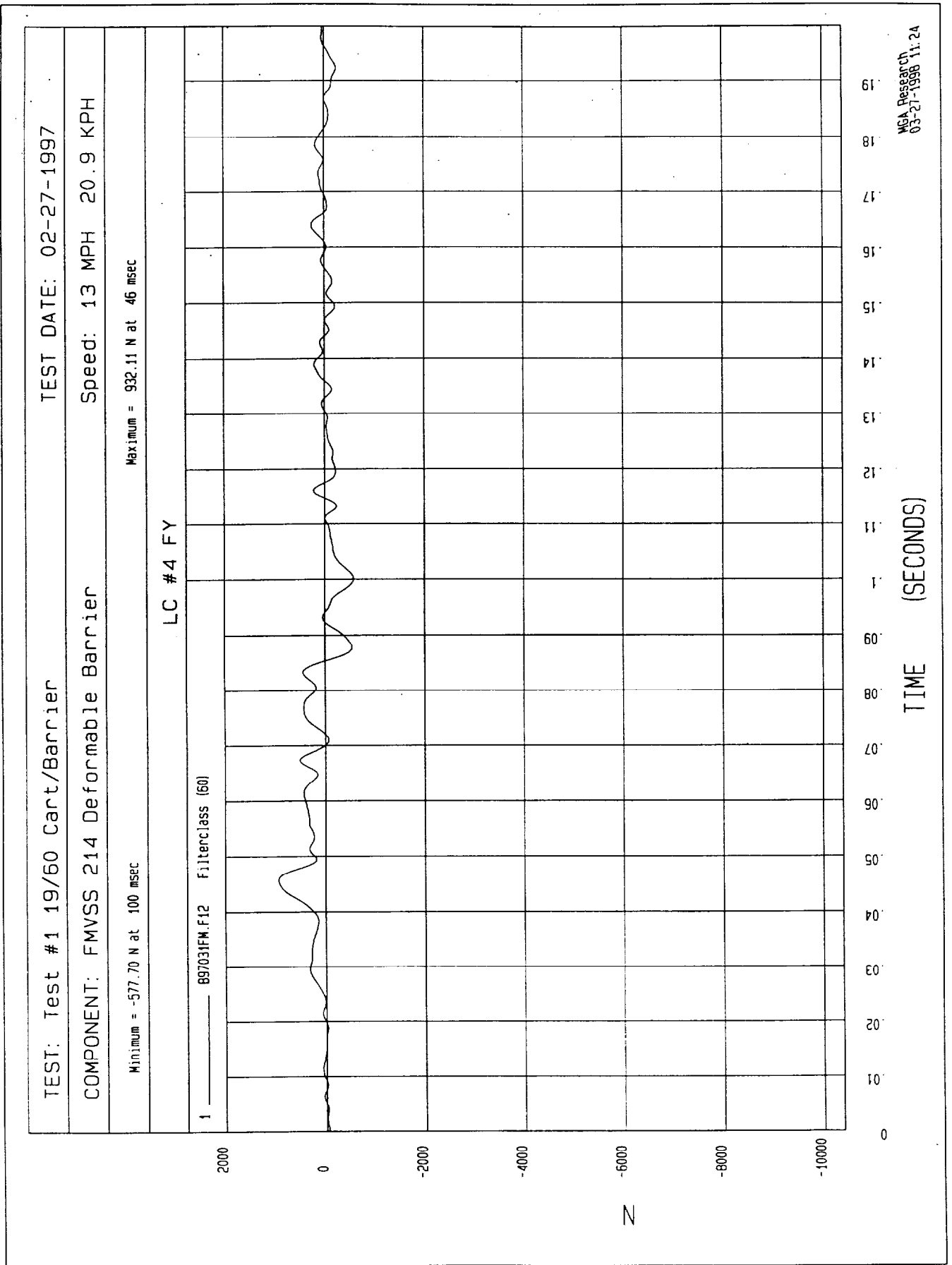


MCA Research
03-16-1998 13.45

TIME (SECONDS)

LC #1 FY

NO VALID DATA COLLECTED



TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

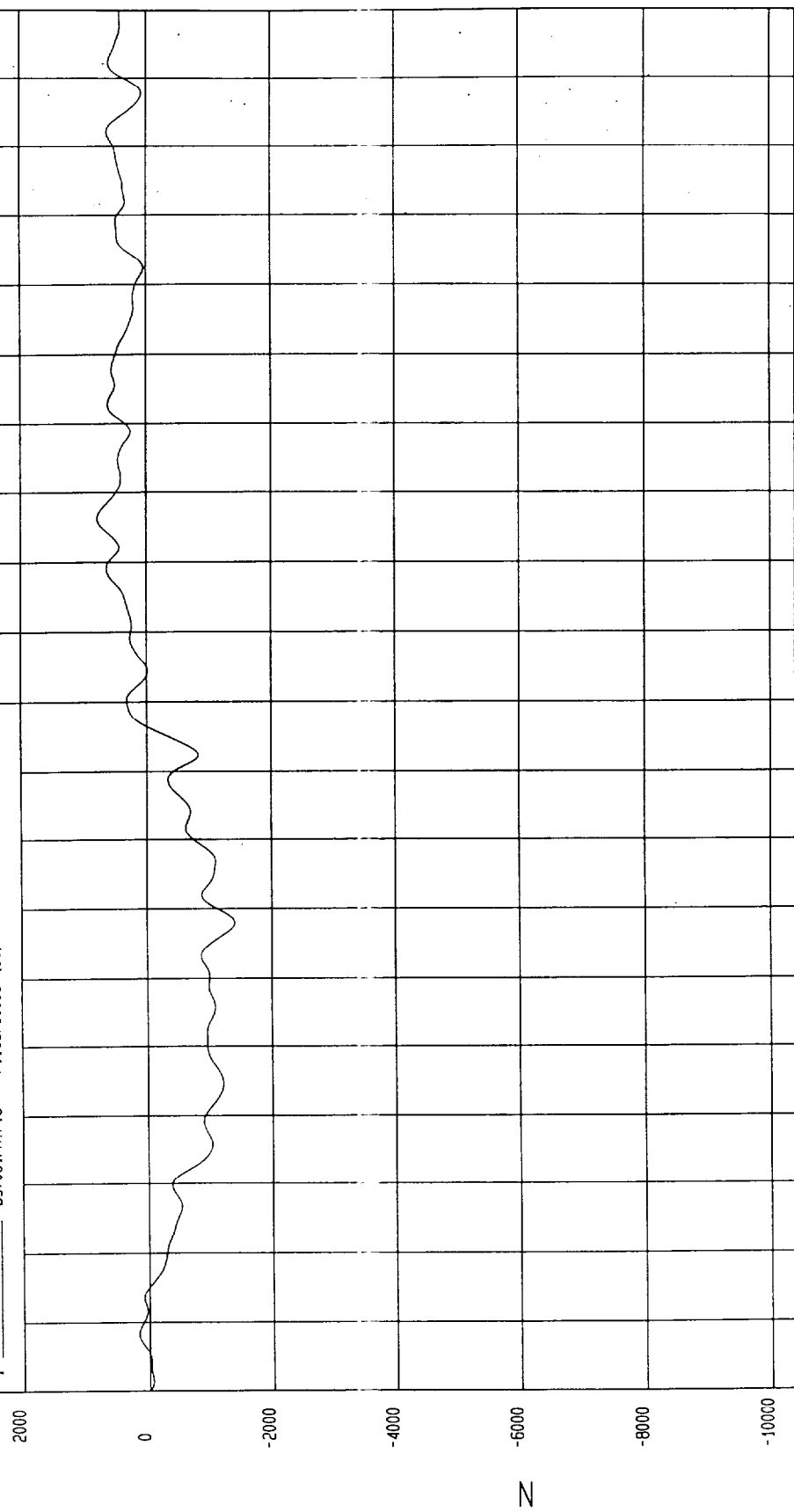
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 765.01 N at 126 msec

Minimum = -1420.13 N at 68 msec

LC #6 FY

1 _____ B97031FM.F18 Filterclass (60)



MGA Research
03-27-1998 11:25

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier

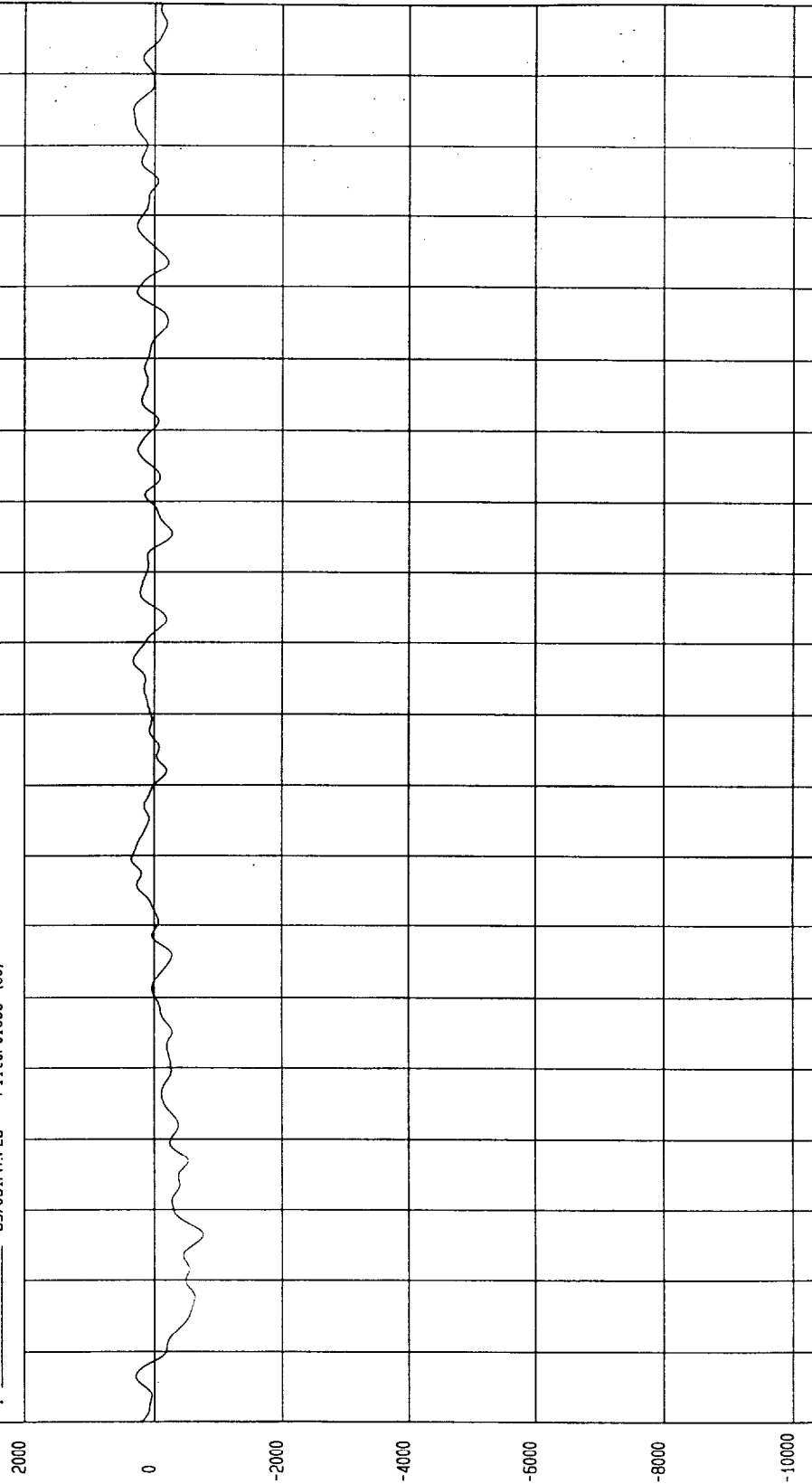
Speed: 13 MPH 20.9 KPH

Minimum = -785.72 N at 26 msec

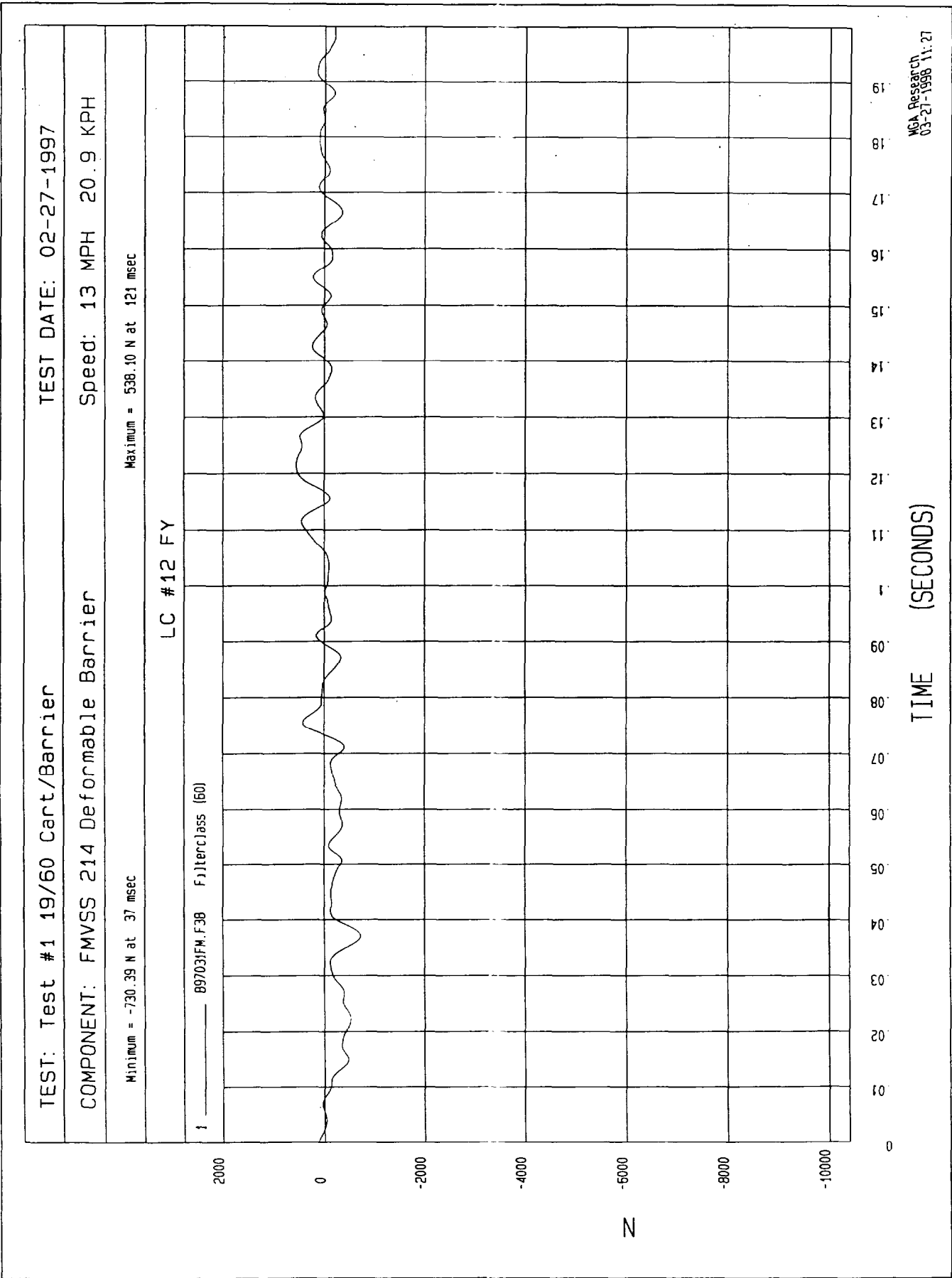
Maximum = 357.12 N at -2 msec

LC #8 FY

1 ——— B97031FM.F25 Filterclass (60)



MCA Research
03-27-1998 11:26



TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

SPEED: 13 MPH 20.9 KPH

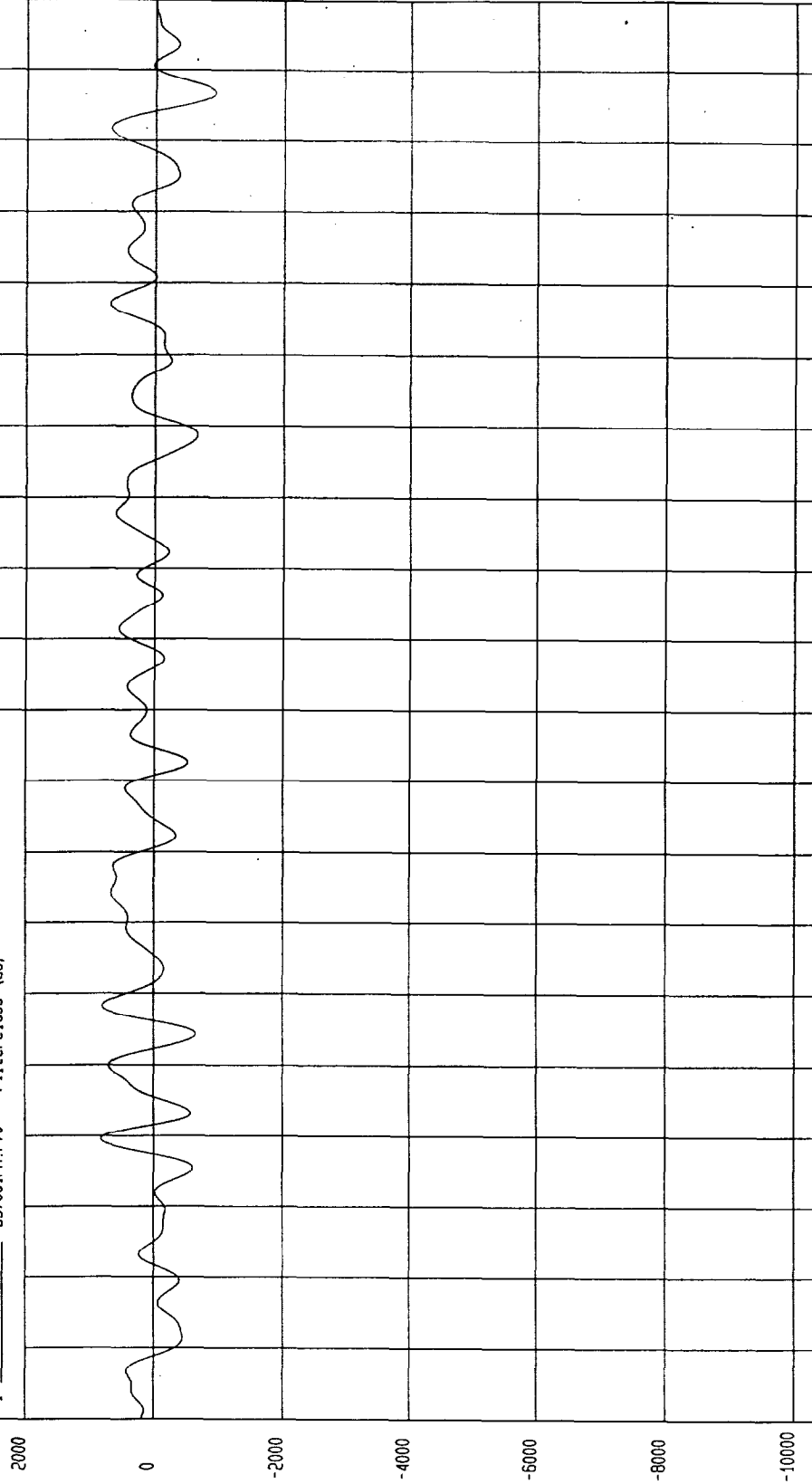
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 813.55 N at 40 msec

Minimum = -936.10 N at 187 msec

LC #22 FY

1 ——— B97031FM.F70 Filterclass (60)



MCA Research
03-27-1998 11:31

TIME (SECONDS)

LC #28 FY

NO VALID DATA COLLECTED

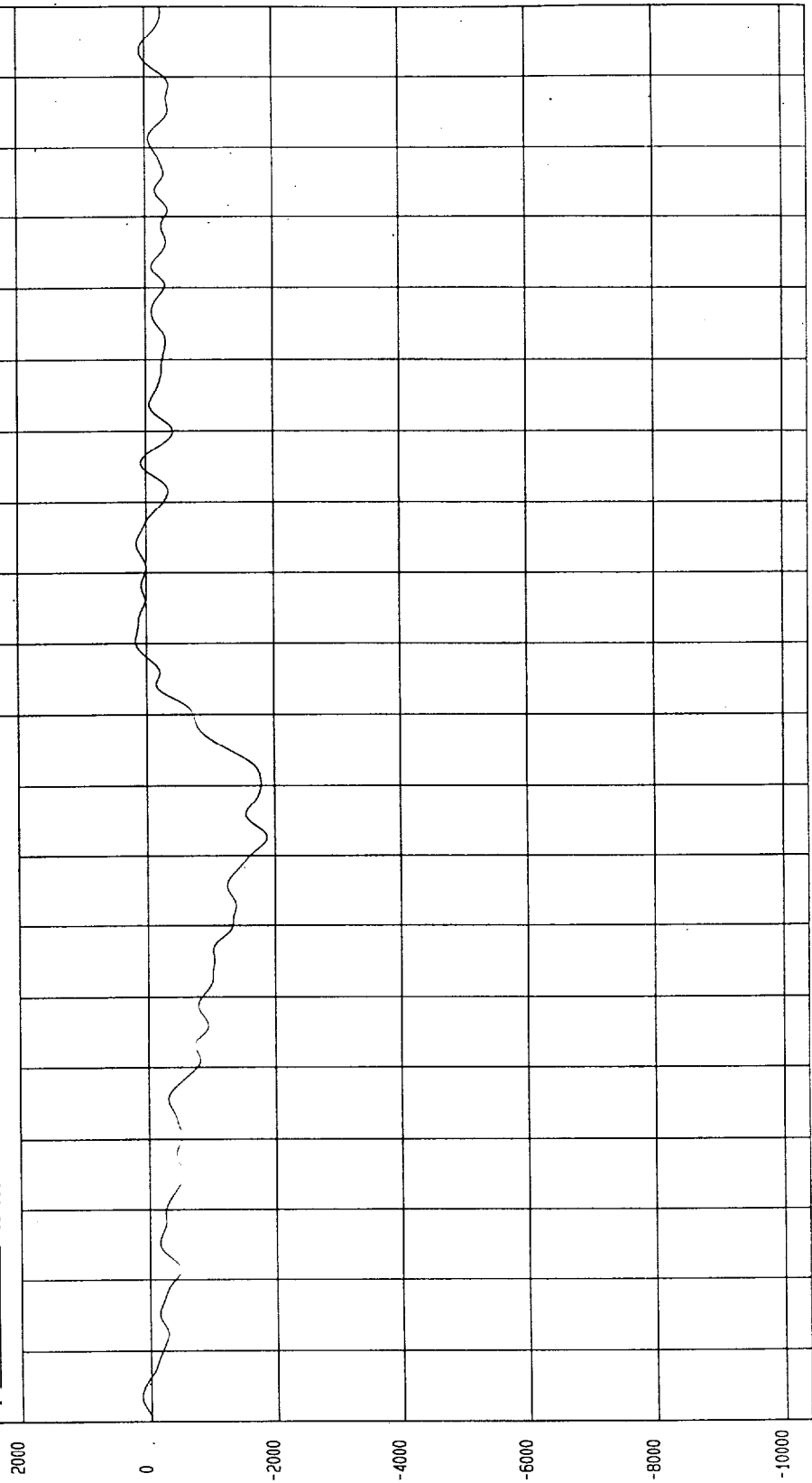
TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -1881.63 N at 83 msec Maximum = 230.25 N at -20 msec

LC #32 FY

1 _____ C97031FM.F45 Filterclass (60)



MGA Research
03-16-1998 13:55

TIME (seconds)

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

SPEED: 13 MPH 20.9 KPH

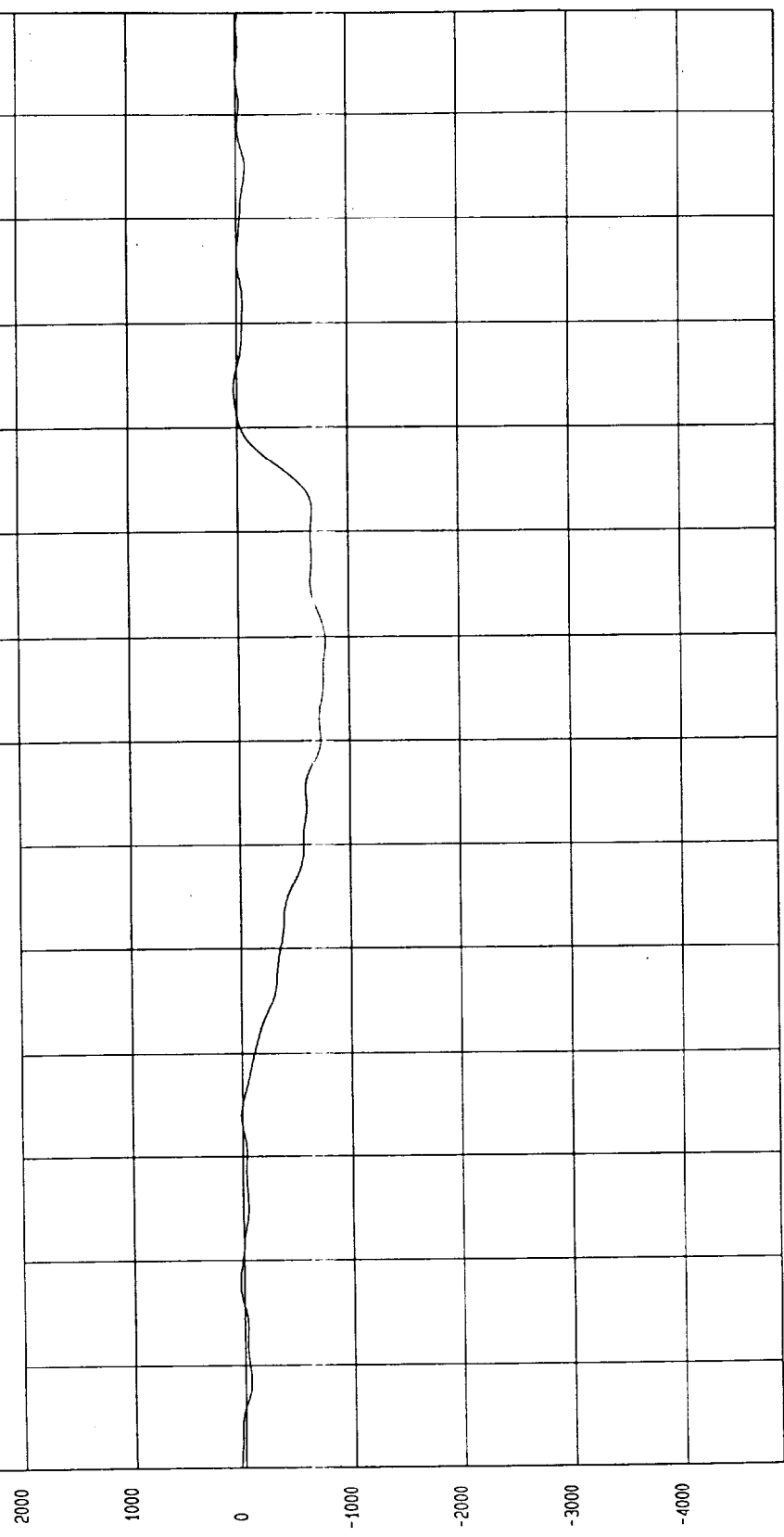
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 42.48 N at 0 msec

Minimum = -785.74 N at 80 msec

LC #35 FY

1 _____ R97031FM.F42 Filterclass (60)



MGA Research
03-30-1998 16:53

TIME (SECONDS)

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

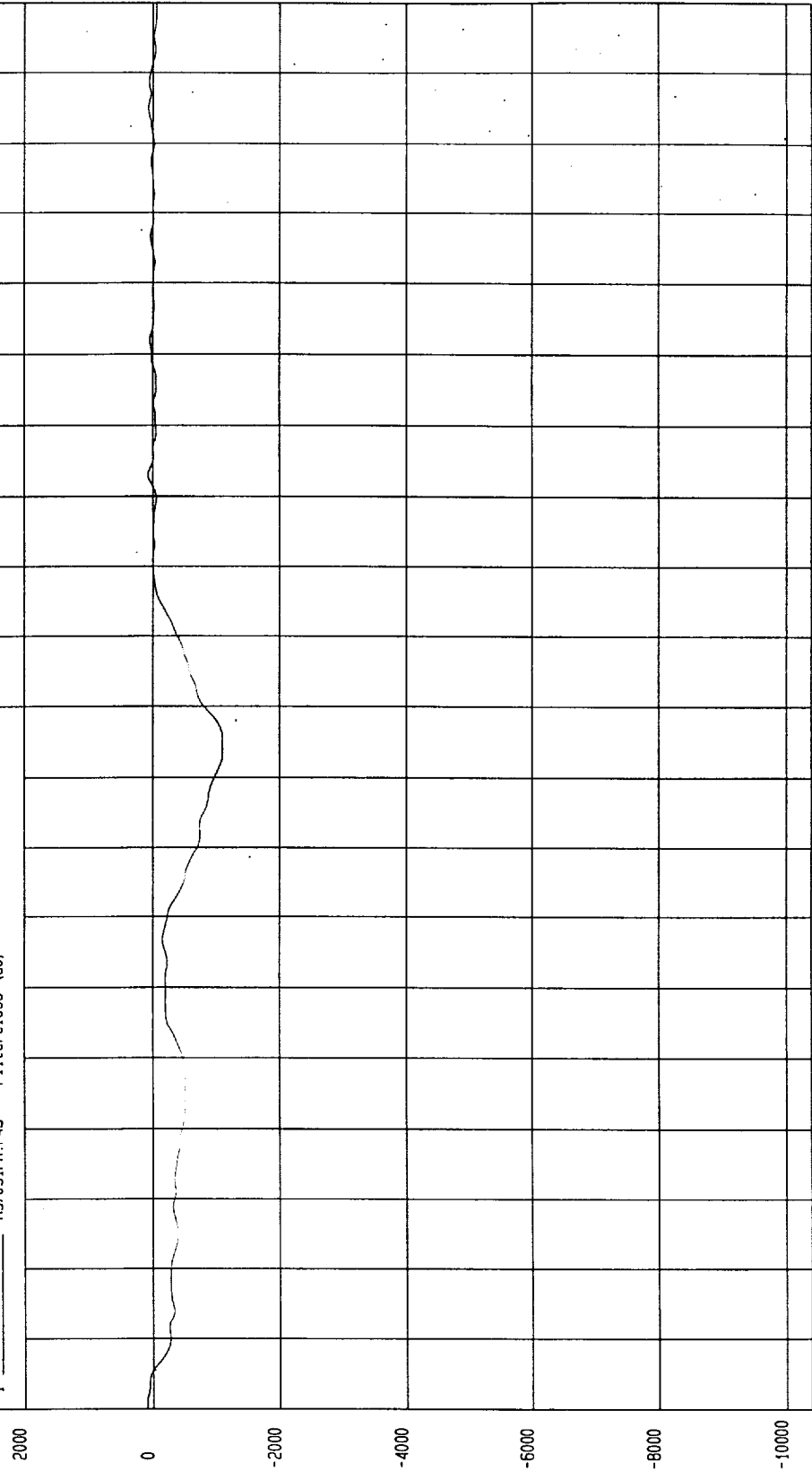
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 109.08 N at -20 msec

Minimum = -1121.18 N at 94 msec

LC #36 FY

1 _____ P97031FM.F45 Filterclass (60)



NCA Research
03-16-1996 13.42

TIME (SECONDS)

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

SPEED: 13 MPH 20.9 KPH

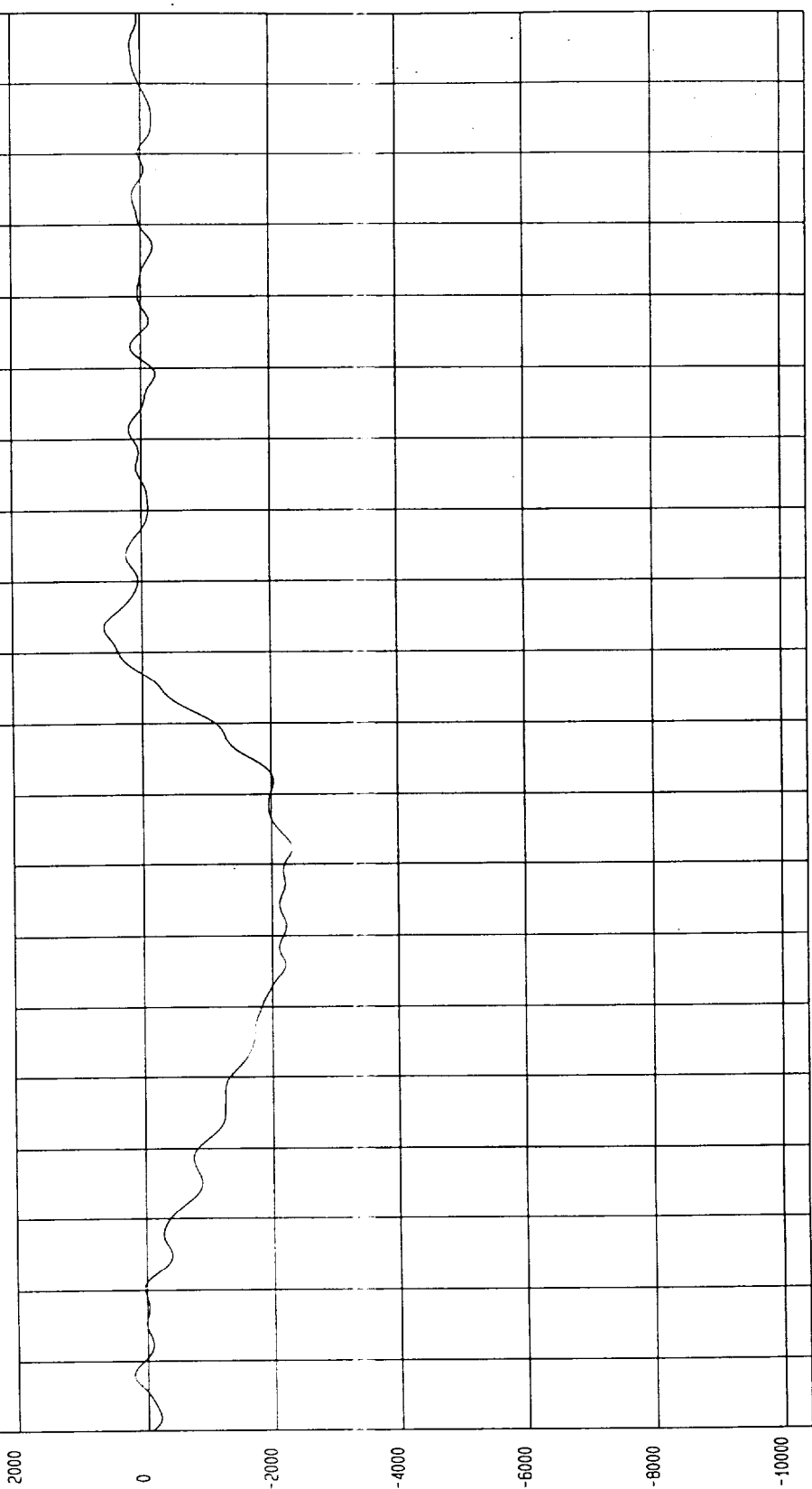
COMPONENT: FMVSS 214 Deformable Barrier

Minimum = -2323.27 N at 82 msec

Maximum = 574.37 N at 114 msec

LC #38 FY

1 R97031FM.F51 Filterclass (60)



MGA Research
03-16-1998 13:43

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

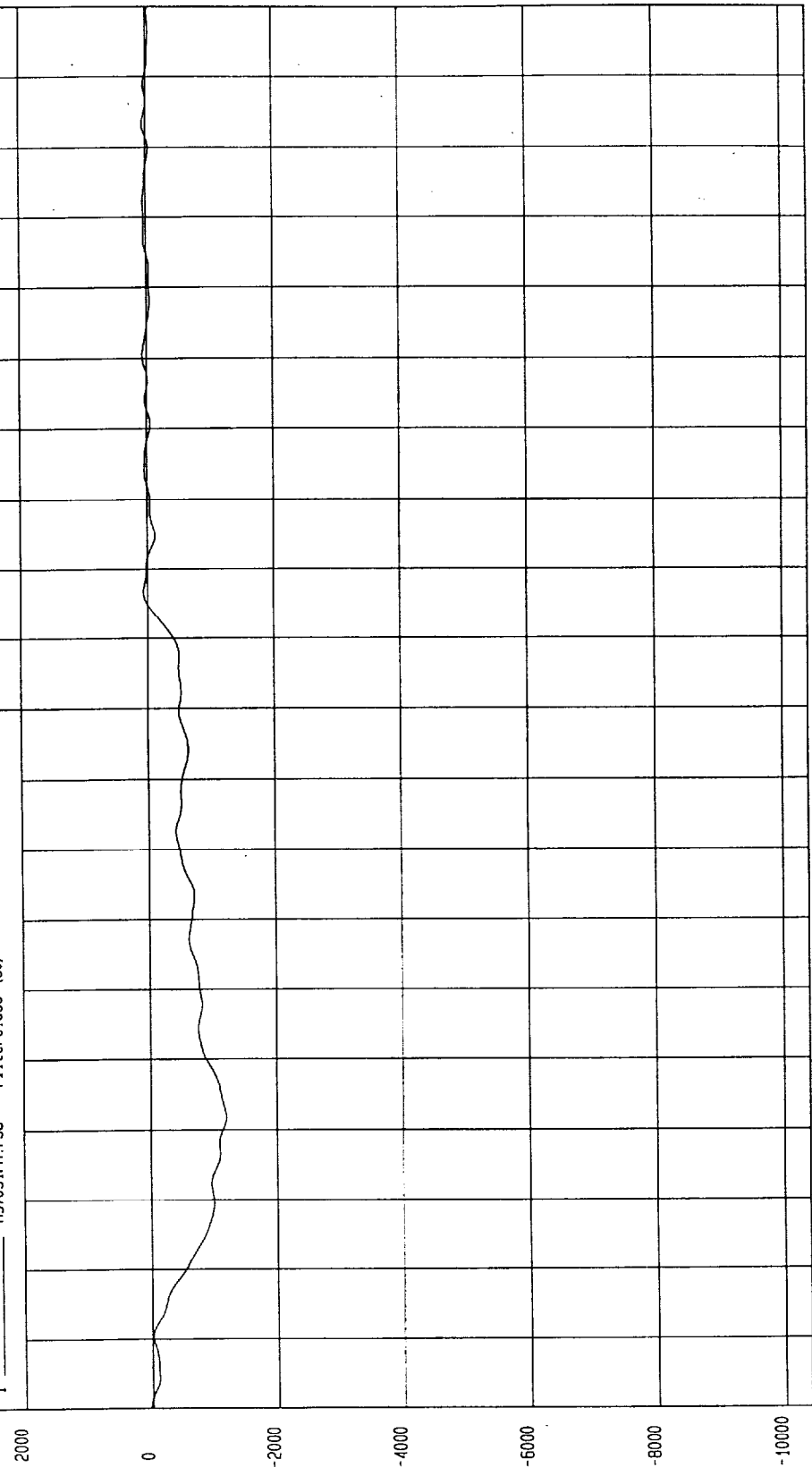
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 67.41 N at 150 msec

Minimum = -1196.27 N at 42 msec

LC #40 FY

1 R97031FM.F58 Filterclass (60)



NGA Research
03-16-1998 13.44

TIME (SECONDS)

N

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

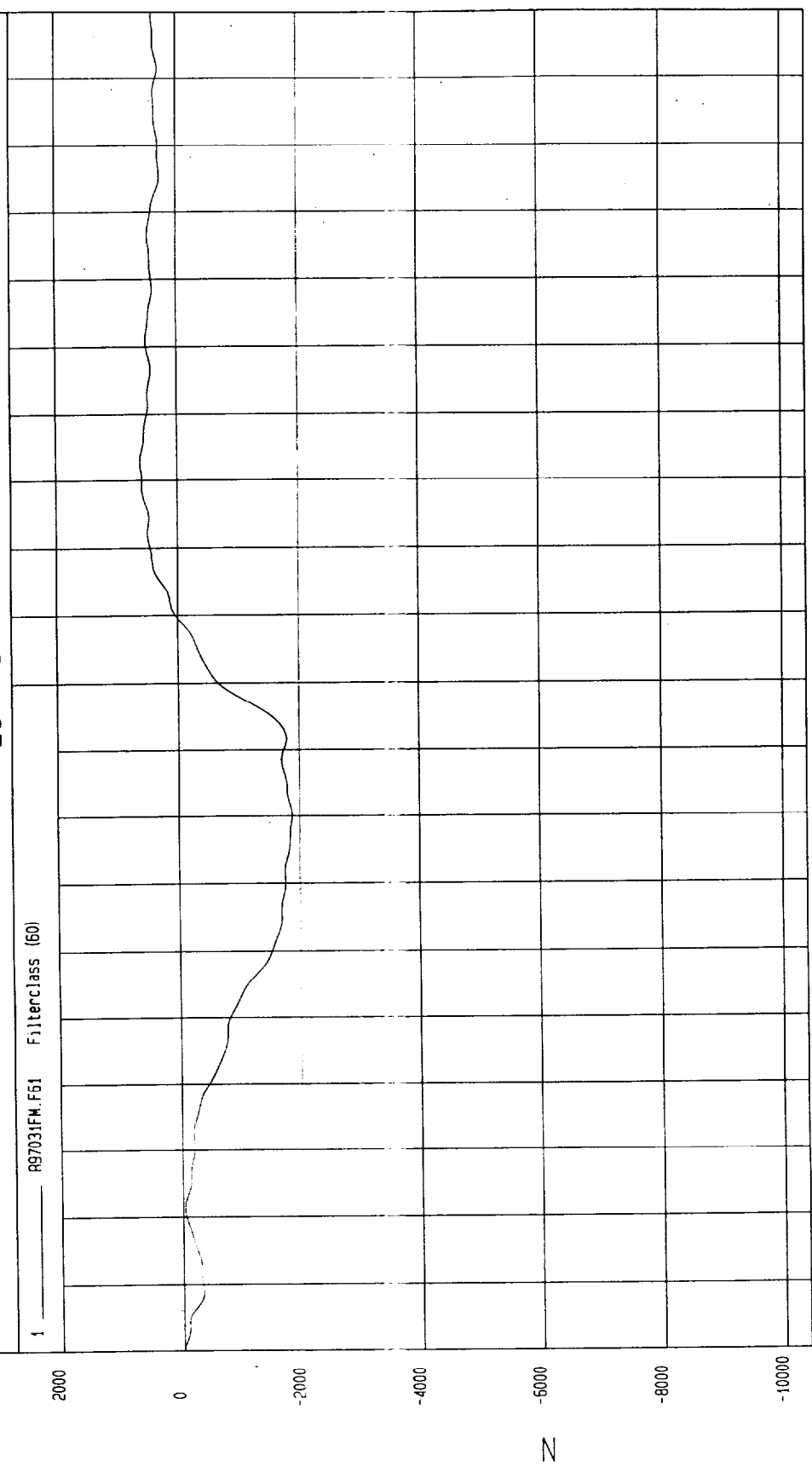
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 615.19 N at 133 msec

Minimum = -1875.43 N at 80 msec

LC #41 FY

1 _____ RS7031FM.F51 Filterclass (60)



NCA Research
03-16-1998 13.44

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

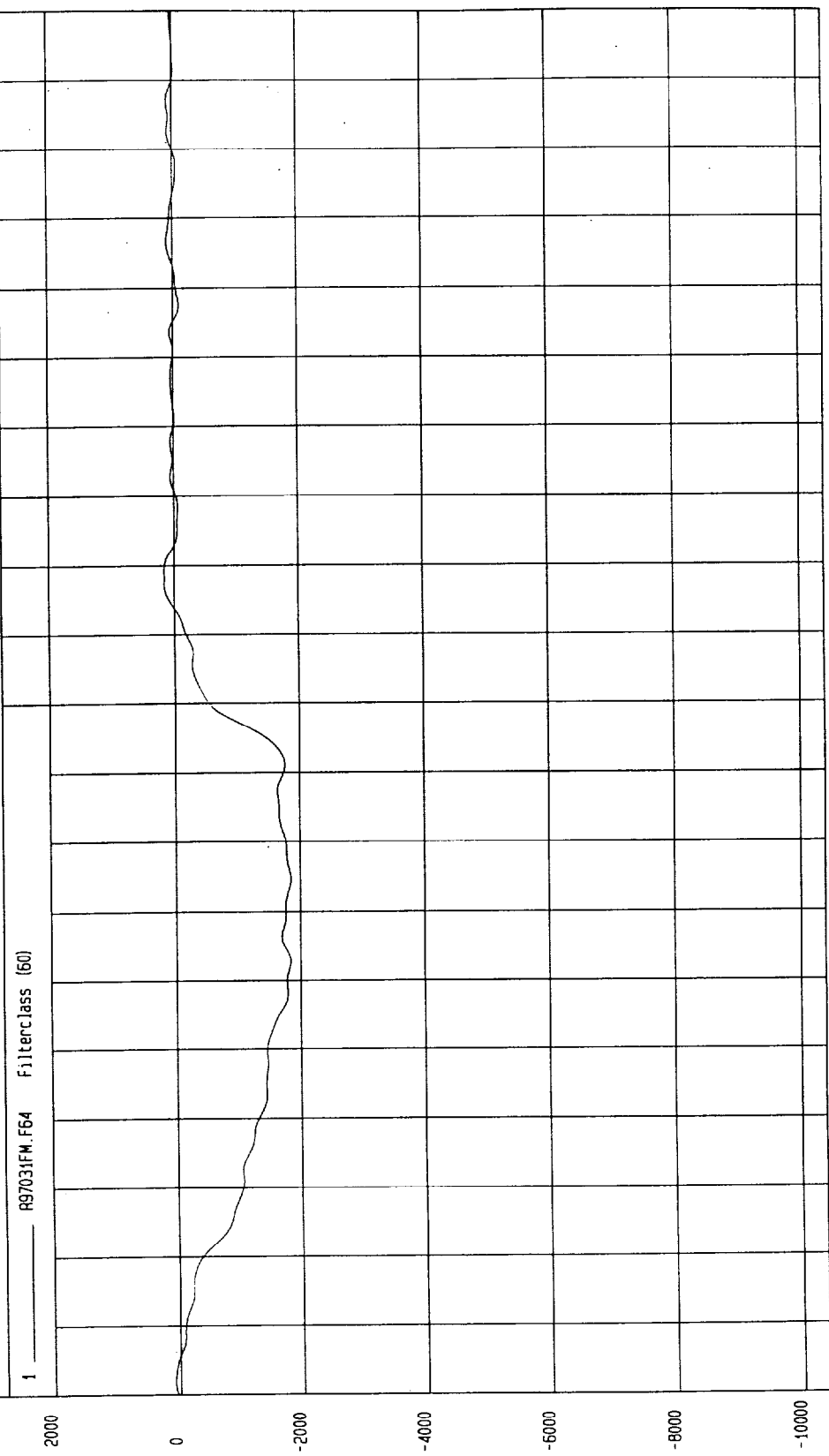
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 160.54 N at 119 msec

Minimum = -1850.19 N at 75 msec

LC #42 FY

1 R97031FM.F64 Filterclass (60)



MGA Research
03-16-1998 13:44

TIME (SECONDS)

N

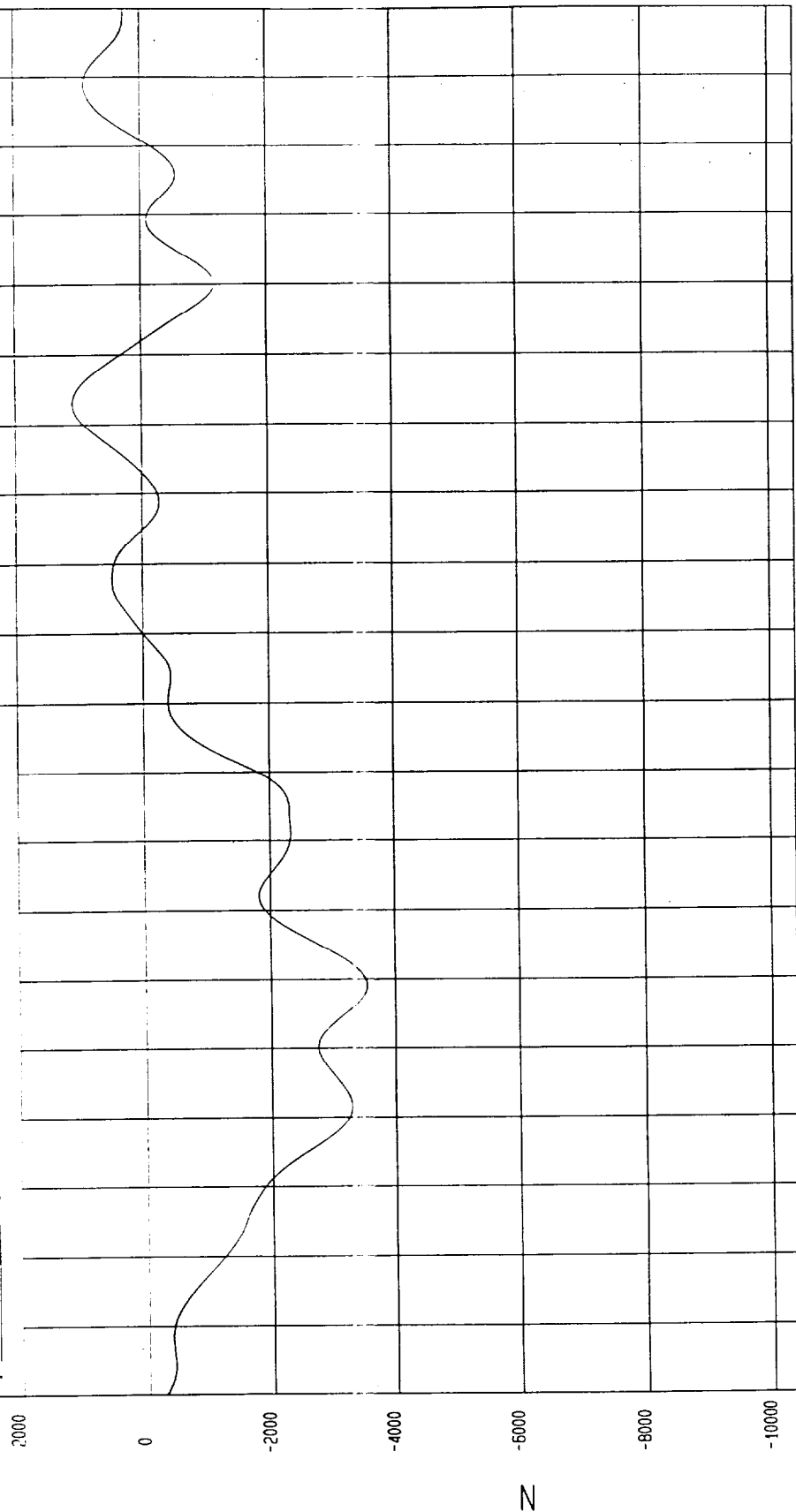
TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

Minimum = -3555.15 N at 59 msec Maximum = 1087.81 N at 143 msec

LC #43 FY

1 R97031FM.F67 Filterclass (20)



MGA Research
03-16-1998 13:45

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

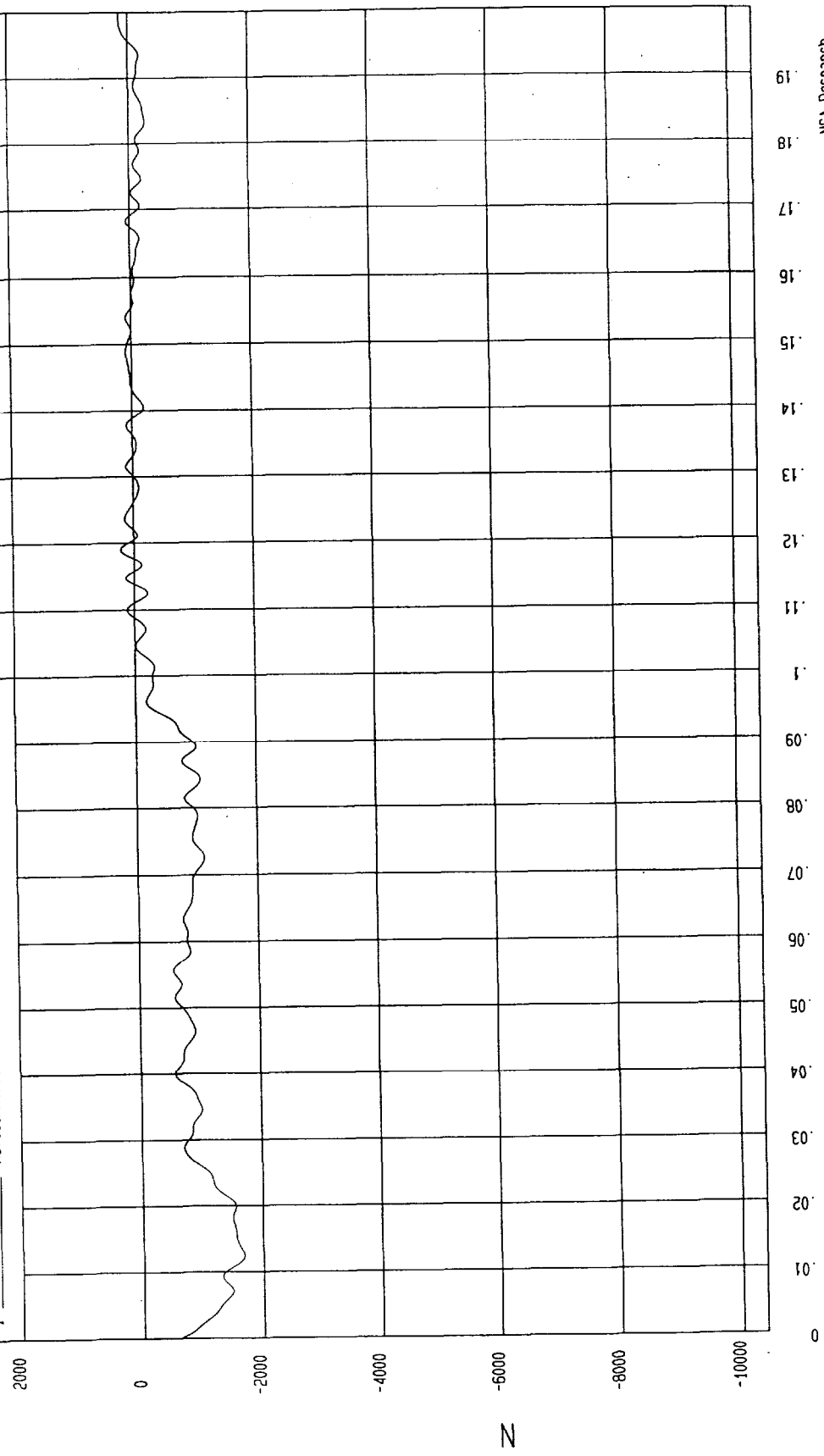
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 317.25 N at -19 msec

Minimum = -1688.02 N at 12 msec

LC #44 FY

1 R97031FM.F70 Filterclass (60)



MCA Research
03-16-1998 13.45

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 407.72 N at 147 msec

Minimum = -721.79 N at 33 msec

LC #3 FZ

1 ——— B97031FM.F09 Filterclass (50)

2000

0

-2000

-4000

-6000

-8000

-10000

N

19

18

17

16

15

14

13

12

11

10

09

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07

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05

04

03

02

01

0

TIME (SECONDS)

WCA Research
03-21-1998 11:24

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

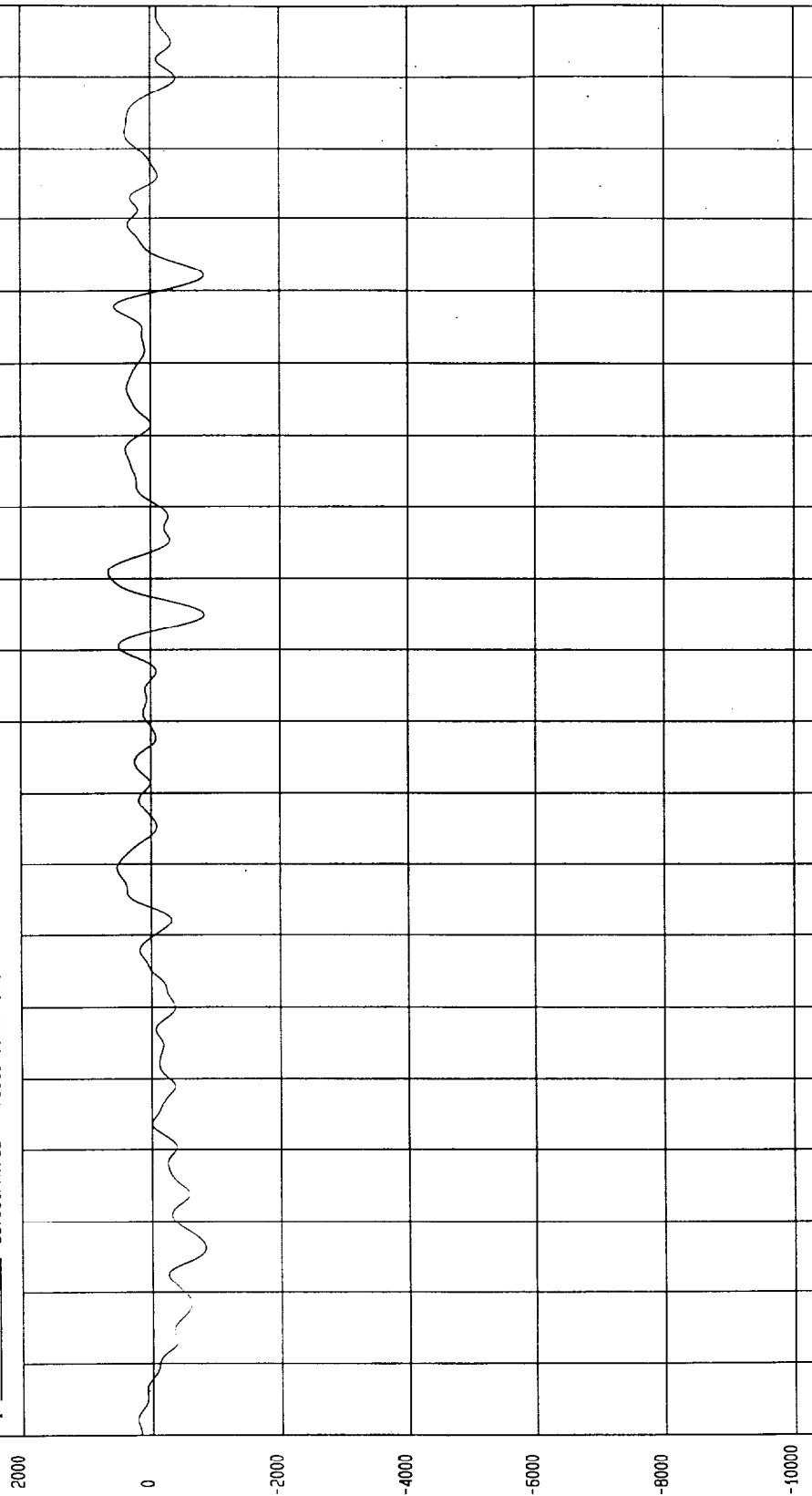
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 647.58 N at 121 msec

Minimum = -853.80 N at 162 msec

LC #11 FZ

1 ——— B97031FM.F36 Filterclass (50)



MCA Research
03-27-1998 11.27

TIME (SECONDS)

N

TEST: Test #1 19/60 Cart/Barrier

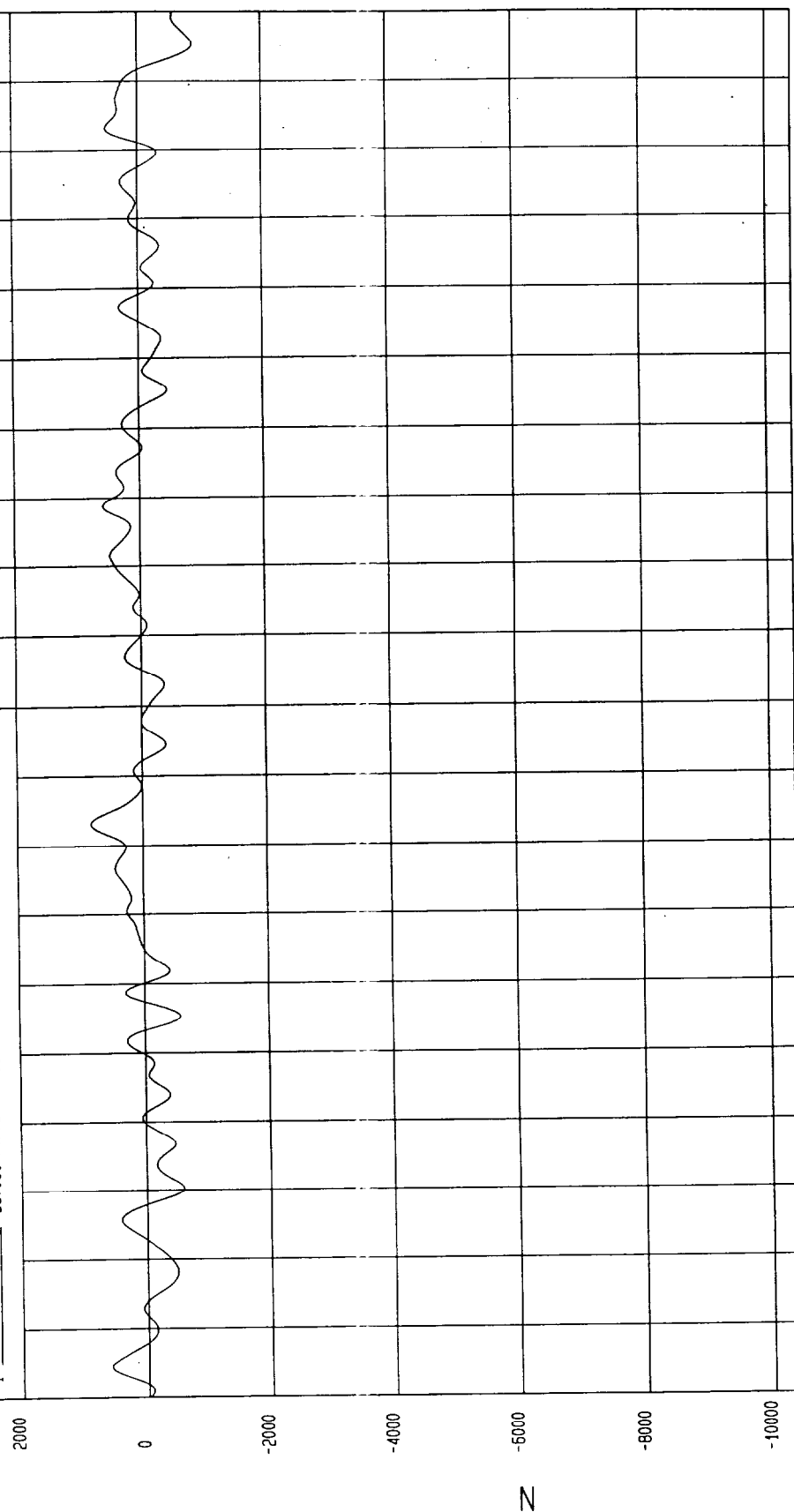
Speed: 13 MPH 20.9 KPH

Maximum = 822.25 N at 83 msec

Minimum = -1012.17 N at -20 msec

LC #23 FZ

1 ——— 897031FM.F75 Filterclass (50)



MGA Research
03-21-1998 11:31

TIME (SECONDS)

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

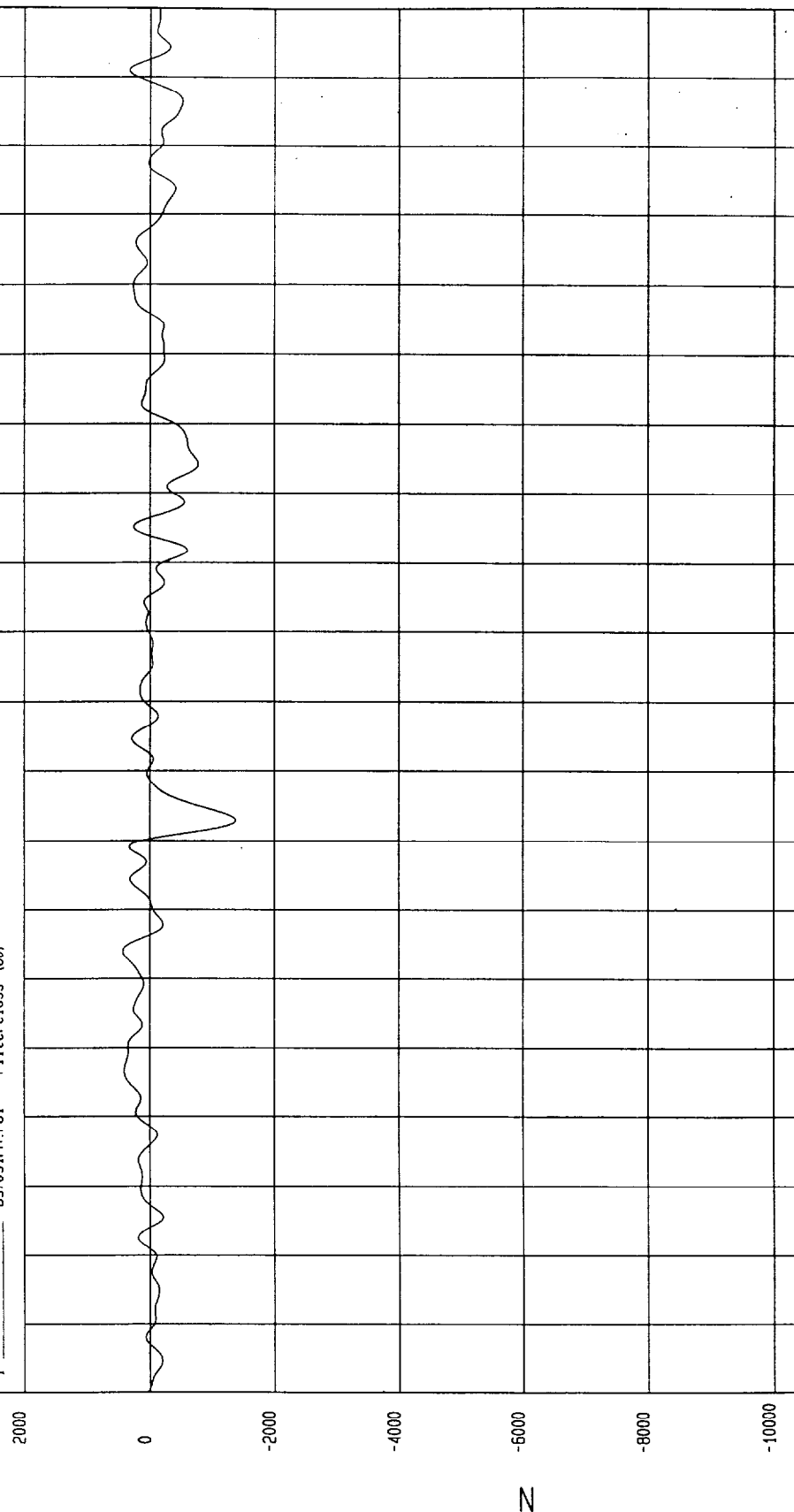
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 434.89 N at 64 msec

Minimum = -1385.92 N at 83 msec

LC #25 FZ

1 B97031FM.FBI Filterclass (60)



MCA Research
03-27-1998 11:32

TIME (SECONDS)

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

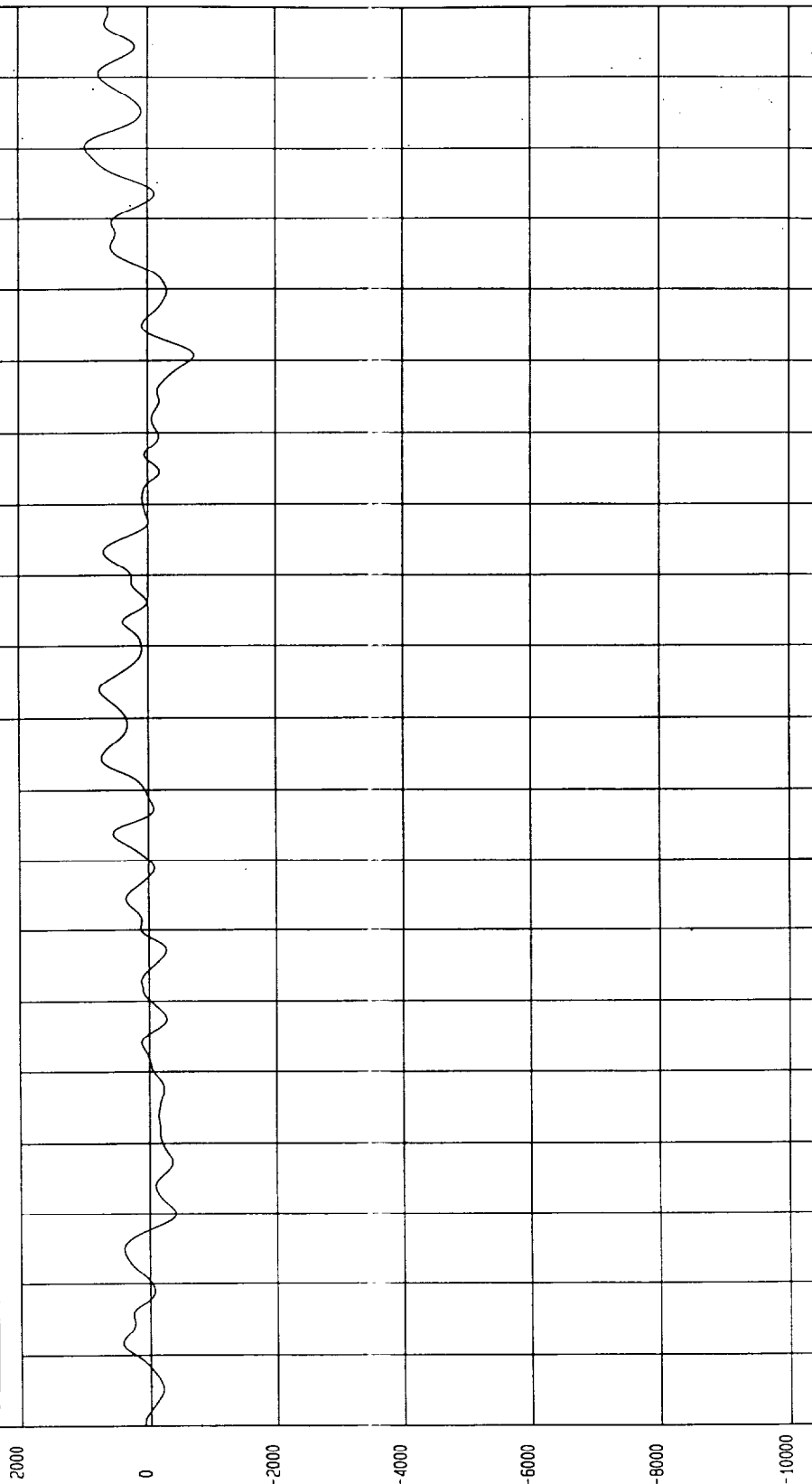
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 971.18 N at 180 msec

Minimum = -733.31 N at 151 msec

LC #27 FZ

1 897031FM.F88 Filterclass (60)



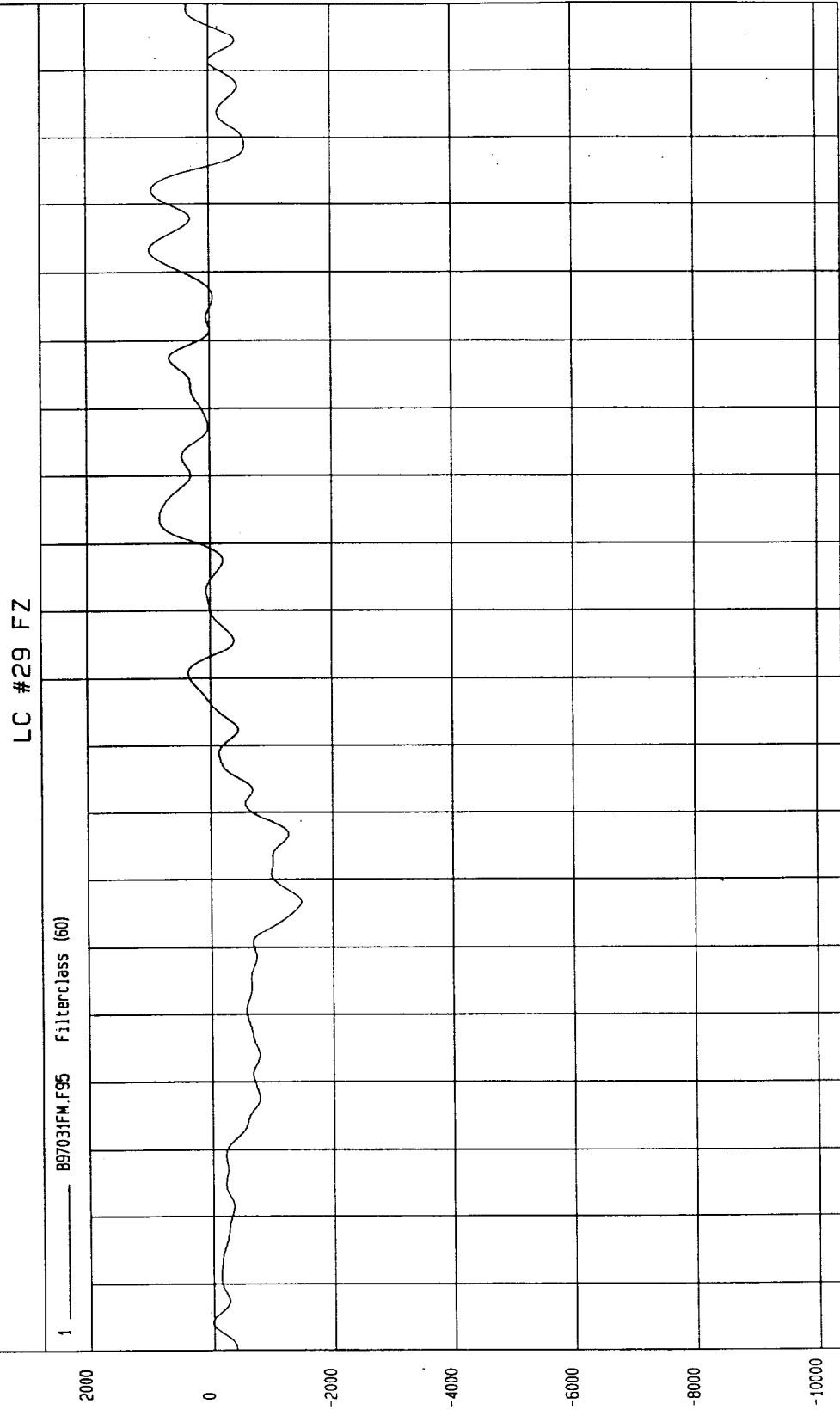
WGA Research
03-27-1998 11:33

TIME (SECONDS)

TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

Minimum = -1473.02 N at 67 msec Maximum = 981.68 N at 163 msec



TIME (SECONDS)

MGA Research
03-27-1998 11:33

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 638.35 N at 101 msec

Minimum = -299.51 N at 44 msec

LC #31 FZ

1 897031VM.V01 Filterclass (60)

2000

0

-2000

-4000

-6000

-8000

-10000

N

19

18

17

16

15

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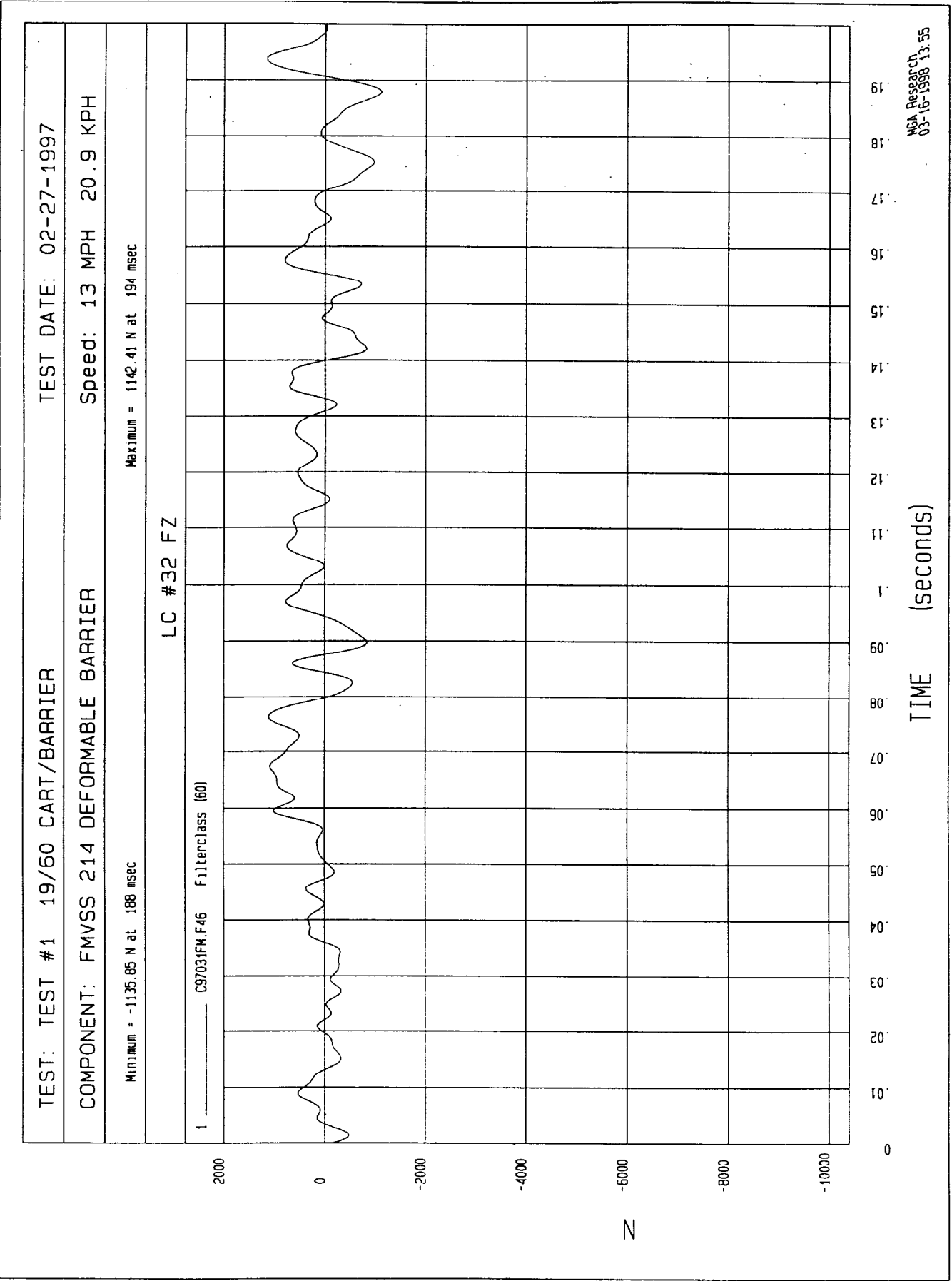
02

01

0

TIME (SECONDS)

MCA Research
03-27-1998 11:34



TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

SPEED: 13 MPH 20.9 KPH

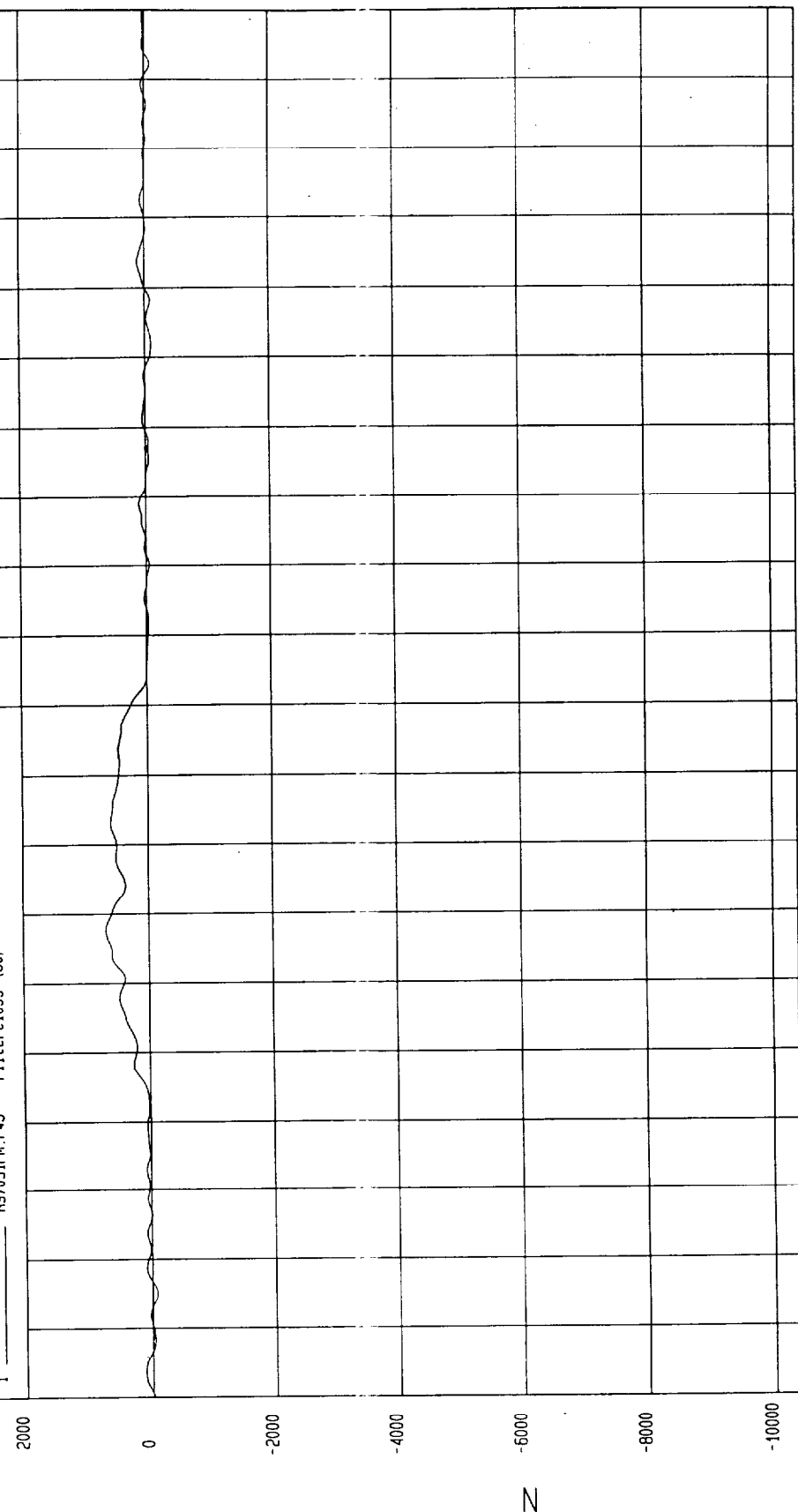
COMPONENT: FMVSS 214 Deformable Barrier

Minimum = -121.56 N at -2 msec

Maximum = 685.13 N at 68 msec

LC #35 FZ

1 _____ R97031FM.F43 Filterclass (60)



MCA Research
03-16-1998 13:42

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

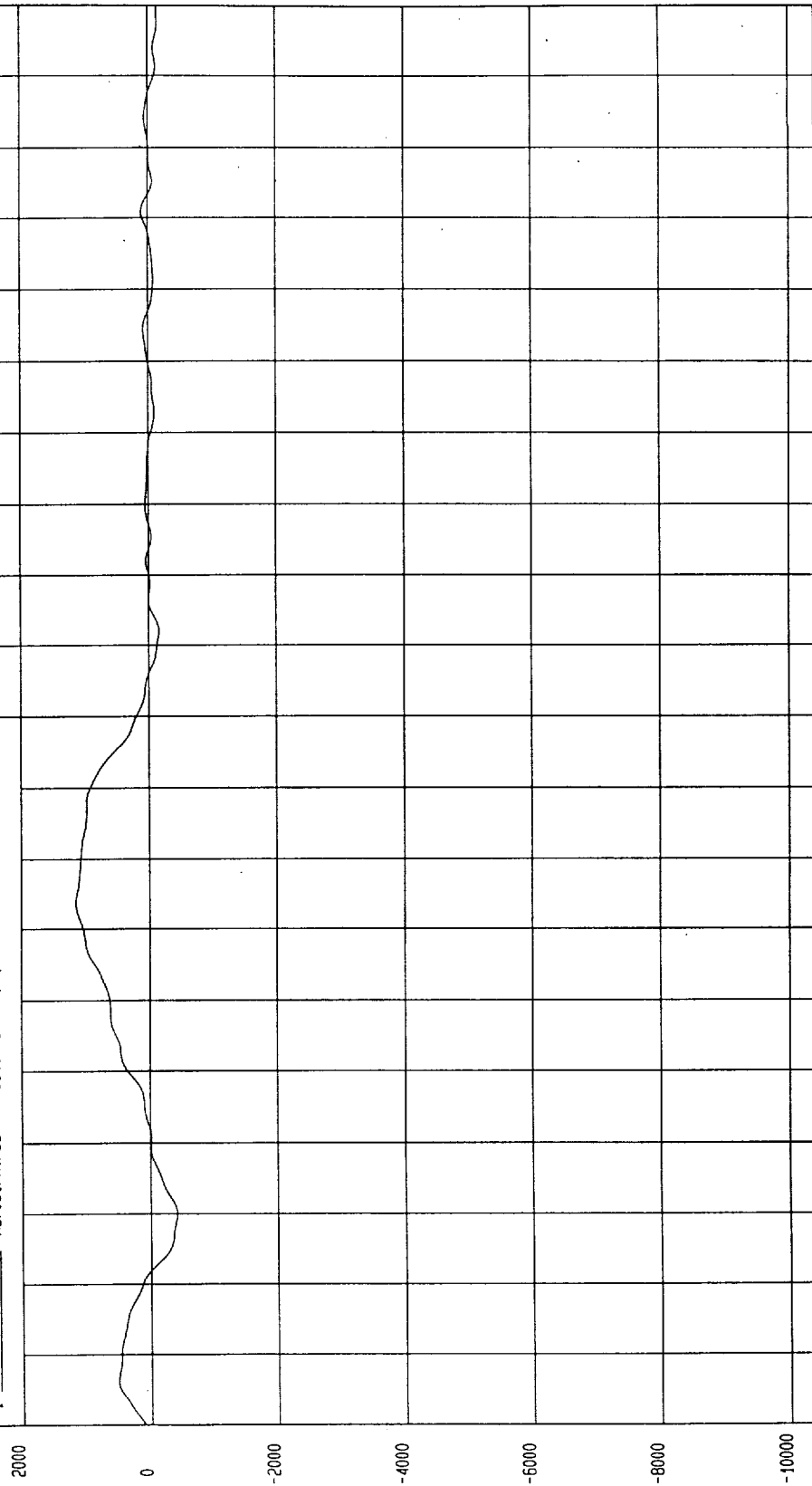
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 1147.26 N at 74 msec

Minimum = -415.98 N at 30 msec

LC #40 FZ

1 R97031FM.F59 Filterclass (60)



MGA Research
03-16-1998 13:44

TIME (SECONDS)

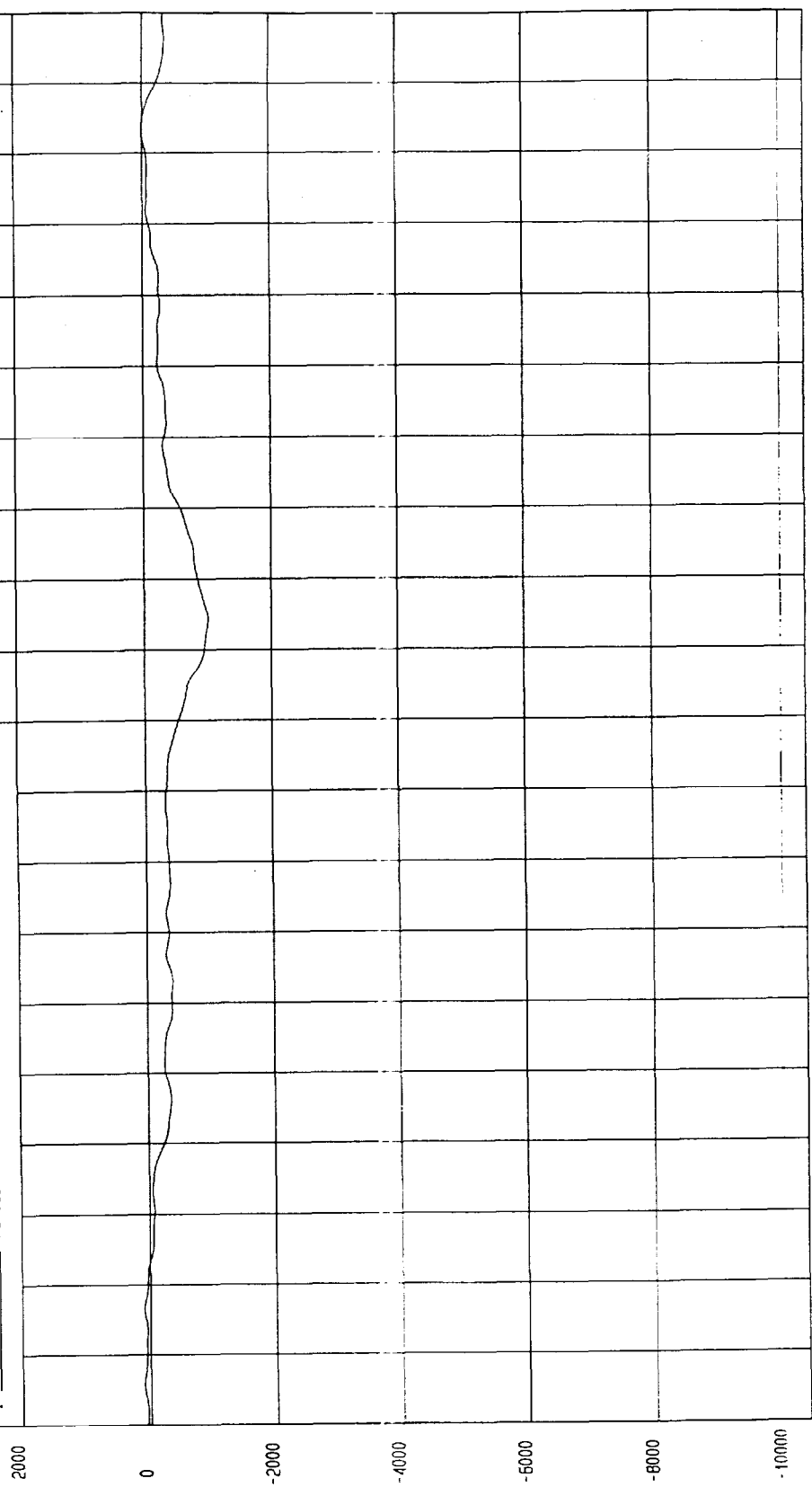
TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

Minimum = -1035.83 N at 114 msec Maximum = 103.02 N at 6 msec

LC #41 FZ

1 A97031FM.F62 Filterclass (60)



TIME (SECONDS)

WGA Research
03-16-1998 13:44

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

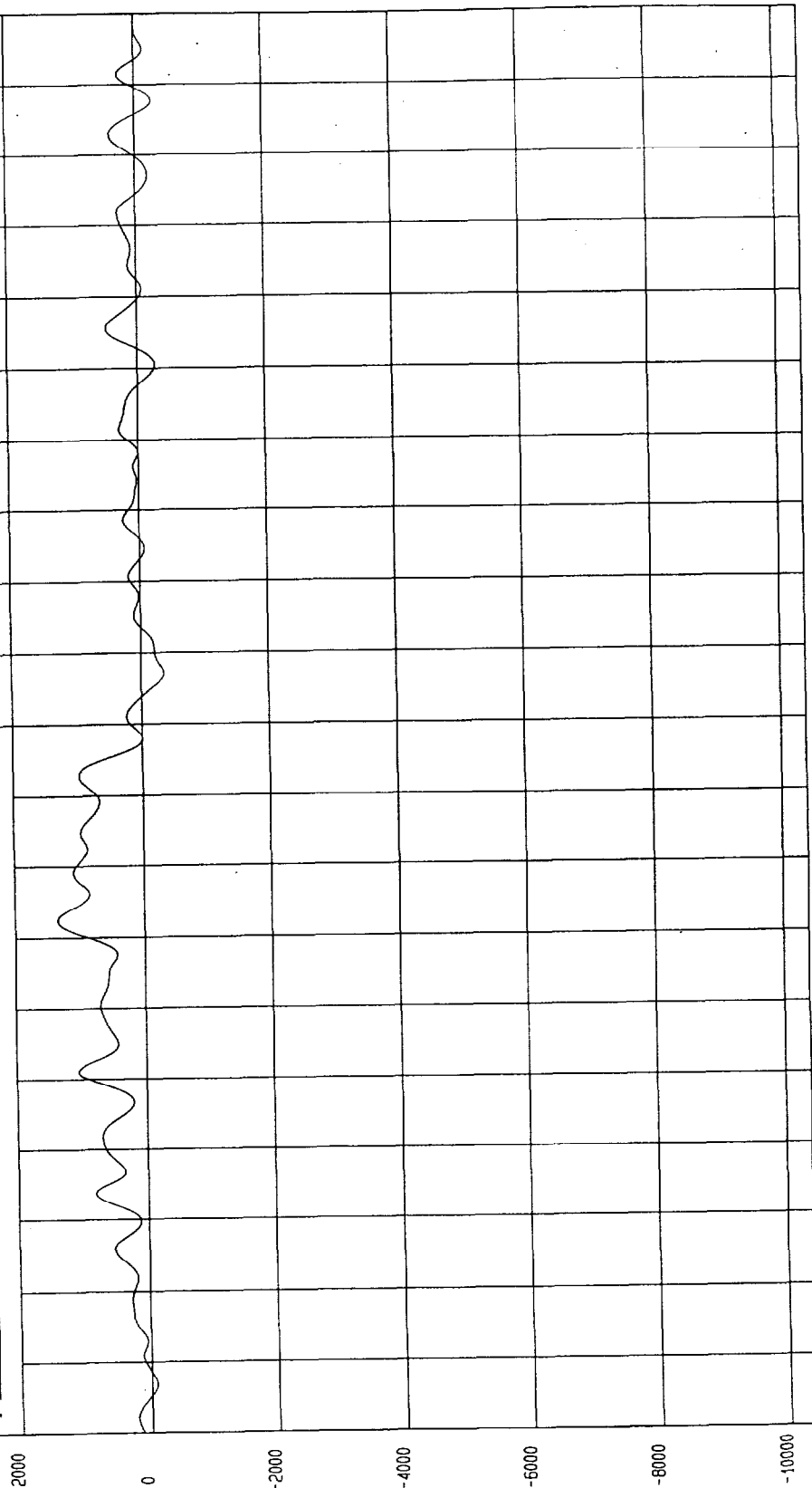
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 1344.21 N at 72 msec

Minimum = -367.87 N at 107 msec

LC #43 FZ

1 R97031FM.F68 Filterclass (60)



WCA Research
03-16-1998 13.45

TIME (SECONDS)

TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

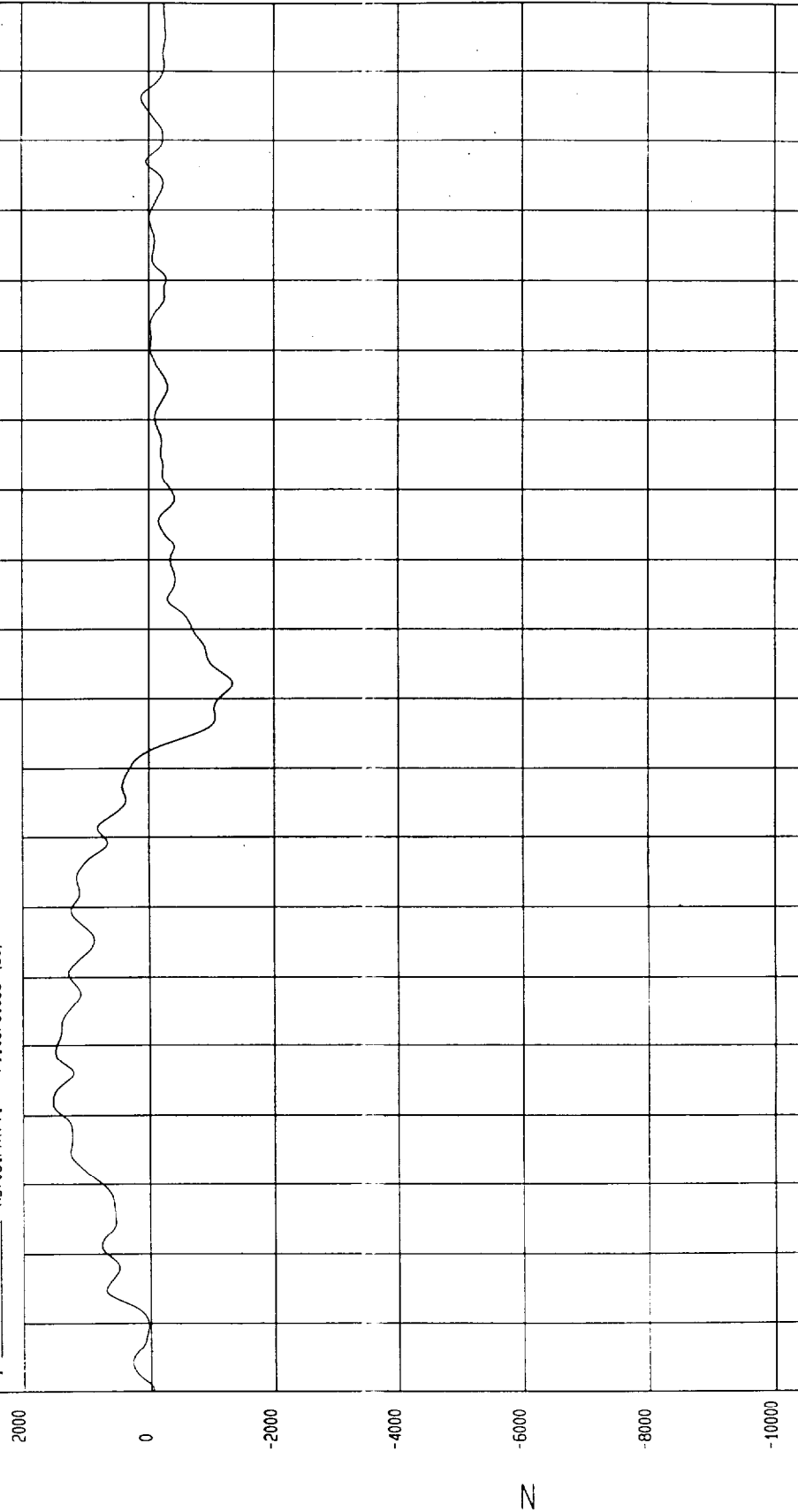
COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

Minimum = -1345.45 N at 102 msec

Maximum = 1533.72 N at 42 msec

LC #44 FZ

1 P97031FM.F71 Filterclass (60)



MGA Research
03-16-1998 13:45

TIME (SECONDS)

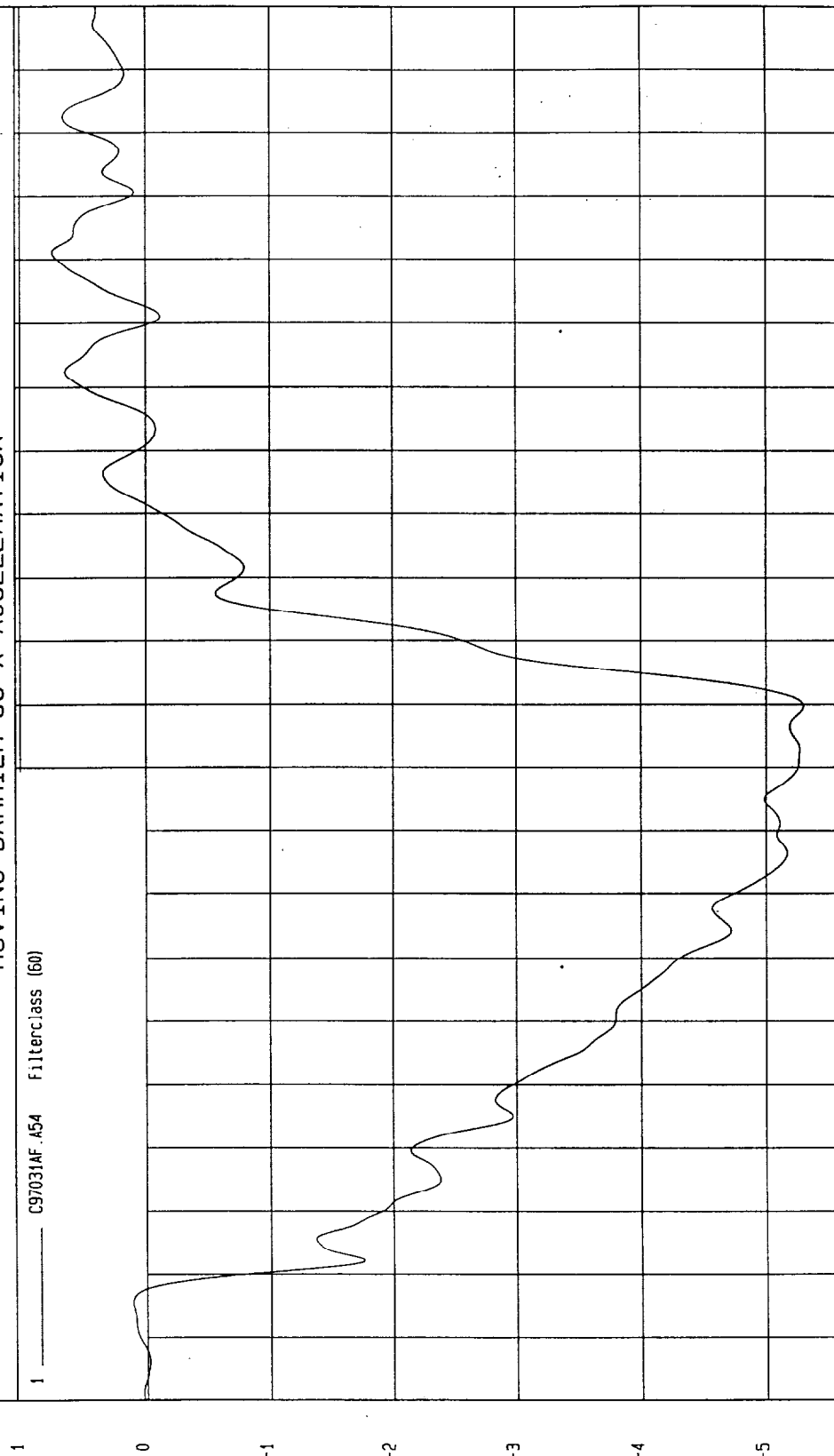
TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -5.30 G'S at 90 msec Maximum = .73 G'S at 161 msec

MOVING BARRIER CG X ACCELERATION

1 _____ C97031AF A54 Filterclass (60)



NCA Research
01-24-1998 13.01

TEST: TEST #1 19/60 CART/BARRIER

TEST DATE: 02-27-1997

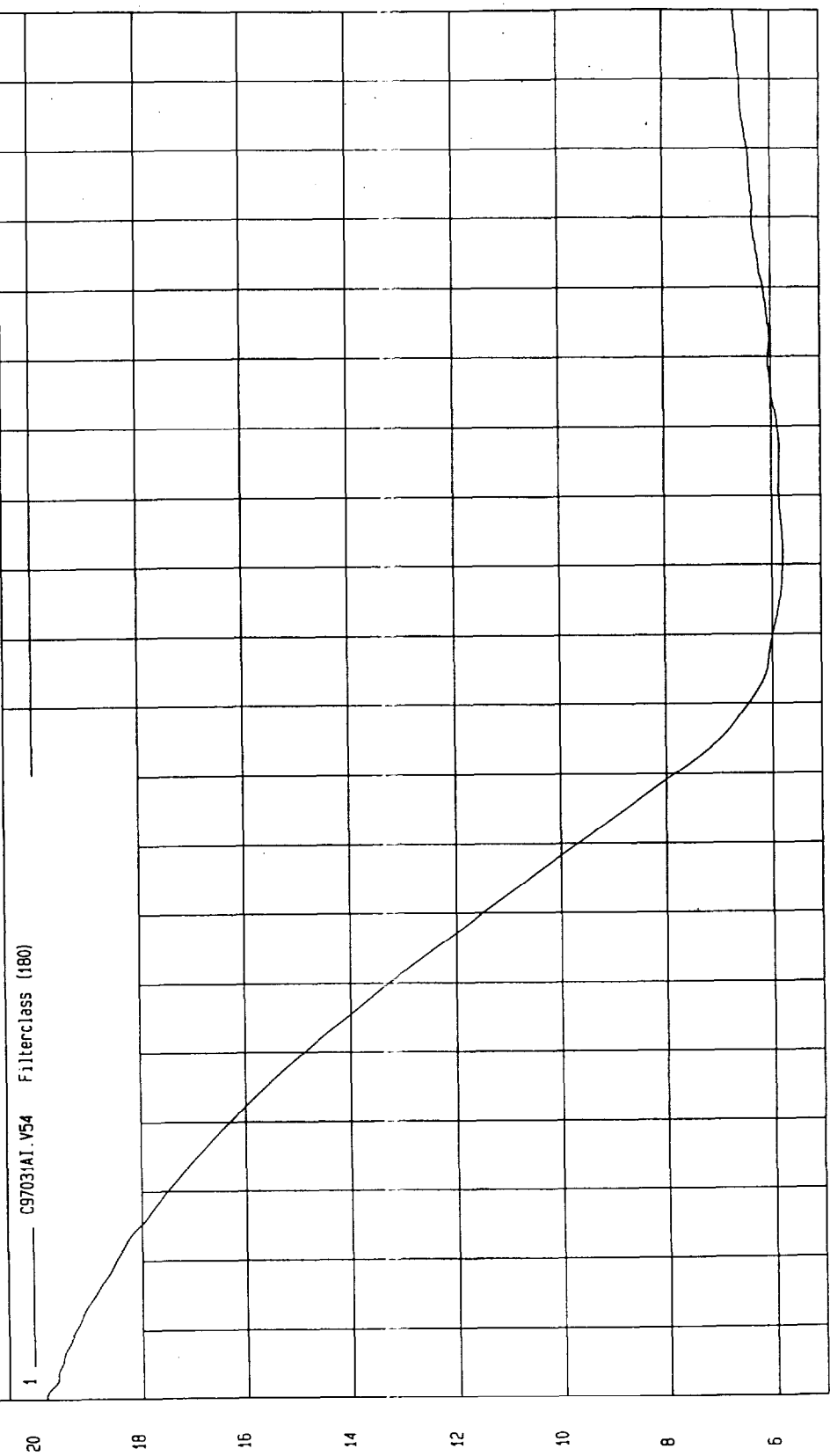
SPEED: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 DEFORMABLE BARRIER

Minimum = 5.79 KPH at 122 msec

Maximum = 19.82 KPH at 0 msec

MOVING BARRIER CG X VELOCITY



NCA Research
07-12-1997 14:54

TEST: TEST #1 19/60 CART/BARRIER

TEST DATE: 02-27-1997

SPEED: 13 MPH 20.9 KPH

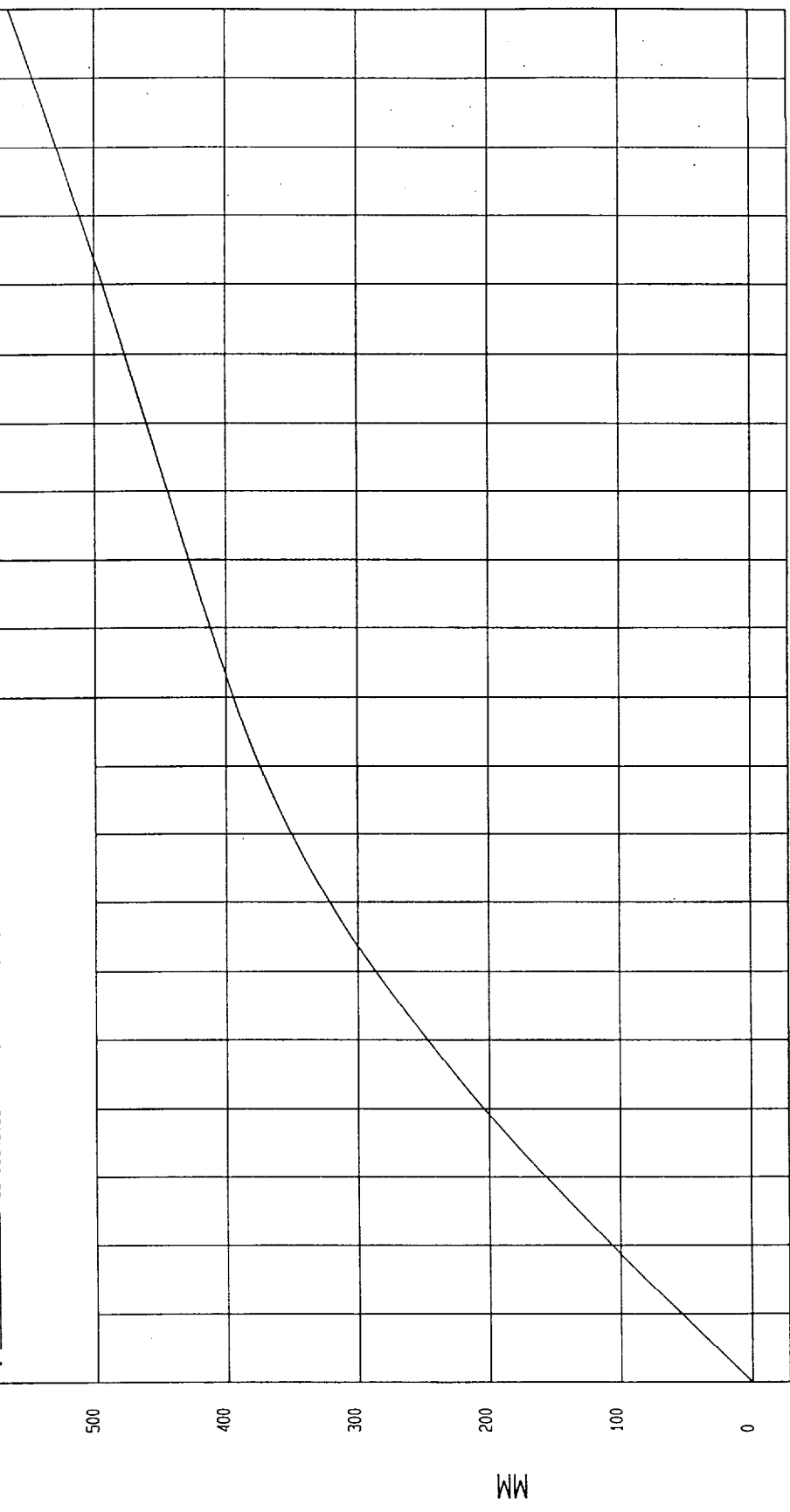
COMPONENT: FMVSS 214 DEFORMABLE BARRIER

Maximum = 565.16 MM at 200 msec

Minimum = 0 MM at 0 msec

MOVING BARRIER CG X DISPLACEMENT

1 _____ C97031A1.D54 Filterclass (180)



TIME Seconds

WCA Research
07-12-1997 14:54

TEST: TEST #1 19/60 CART/BARRIER

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

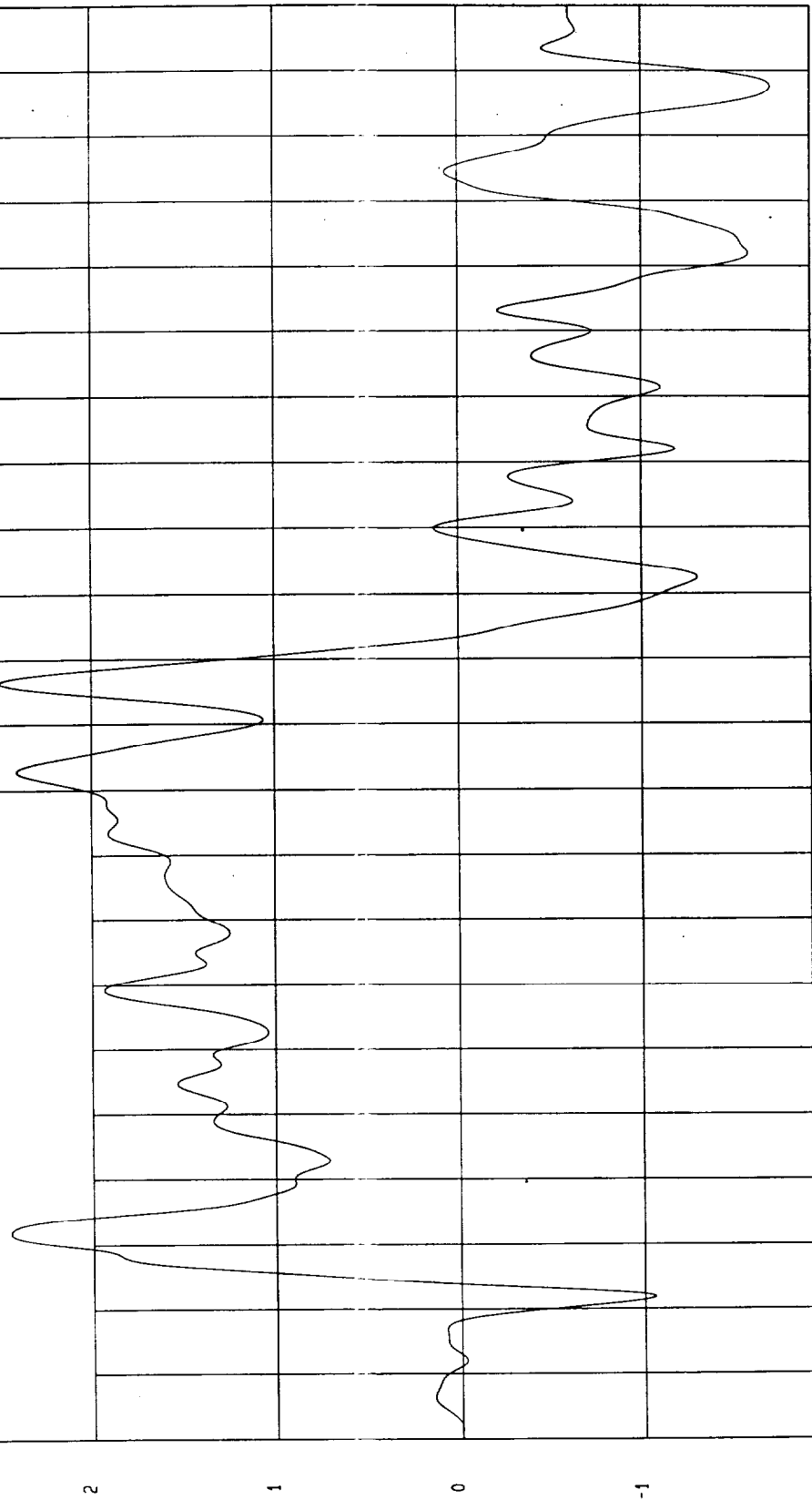
COMPONENT: FMVSS 214 DEFORMABLE BARRIER

Maximum = 2.49 G'S at 96 msec

Minimum = -1.69 G'S at 188 msec

MOVING BARRIER CG Y ACCELERATION

1 ——— C97031AF.A55 Filterclass (50)



MCA Research
01-24-1998 13.02

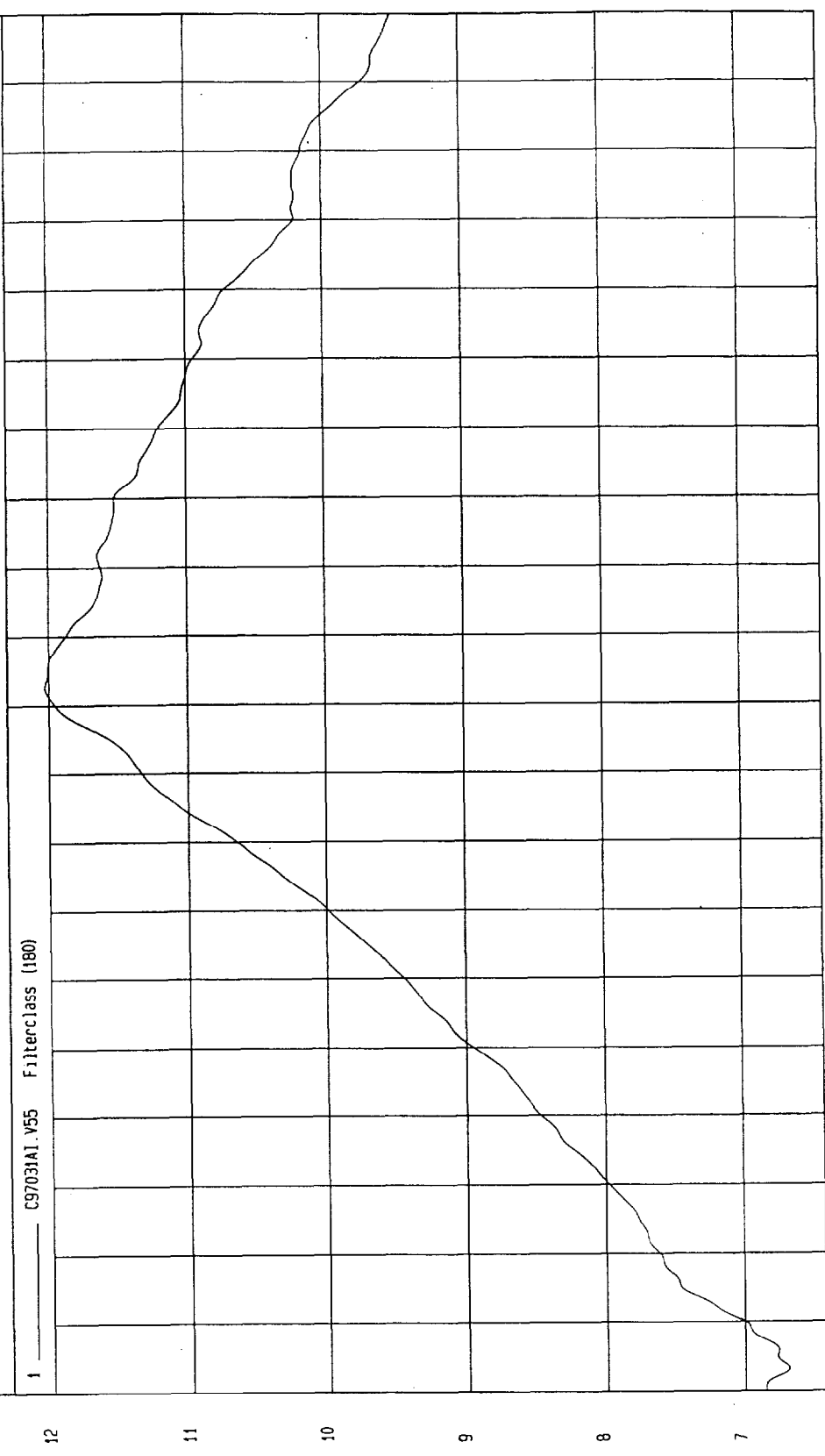
TIME (seconds)

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = 6.67 KPH at 3 msec Maximum = 12.02 KPH at 103 msec

MOVING BARRIER CG Y VELOCITY



TIME Seconds

MCA Research
07-12-1997 14:54

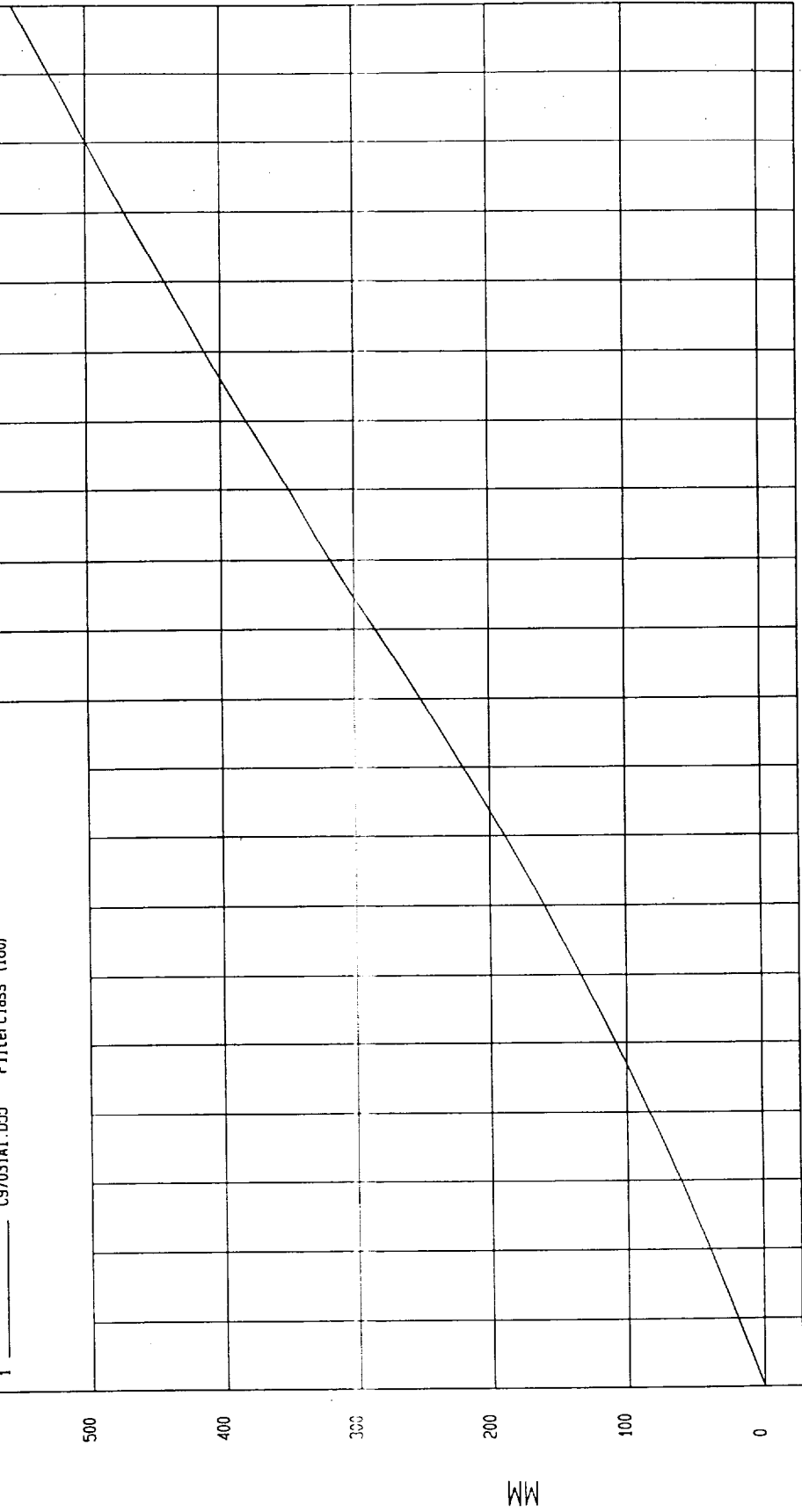
TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = 0 MM at 0 msec Maximum = 553.69 MM at 200 msec

MOVING BARRIER CG Y DISPLACEMENT

1 _____ C97031AT.D55 Filterclass (180)



MCA Research
07-12-1997 14:55

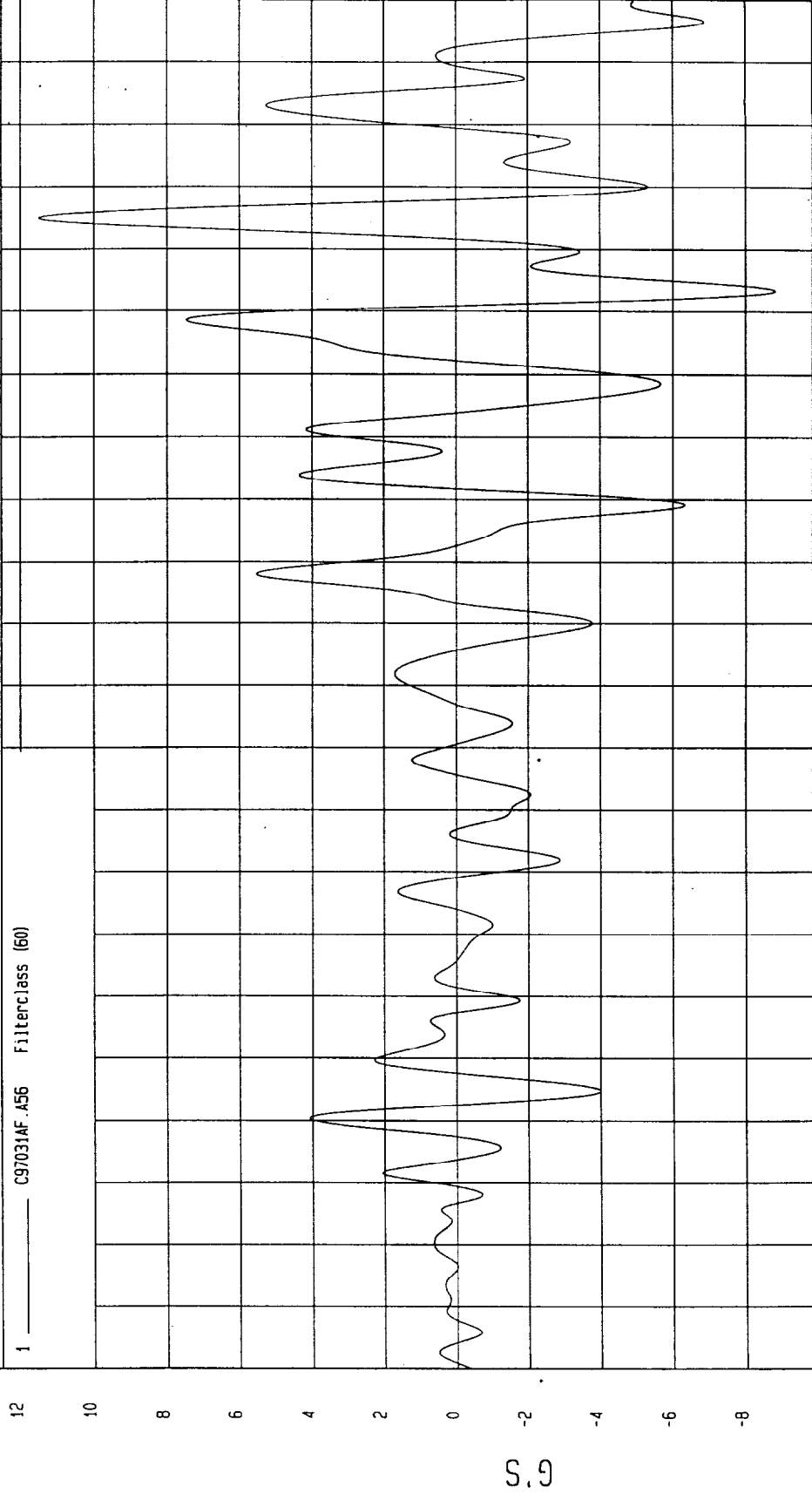
TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -8.80 G'S at 153 msec
Maximum = 11.49 G'S at 165 msec

MOVING BARRIER CG Z ACCELERATION

1 _____ C97031AF.A56 Filterclass (60)



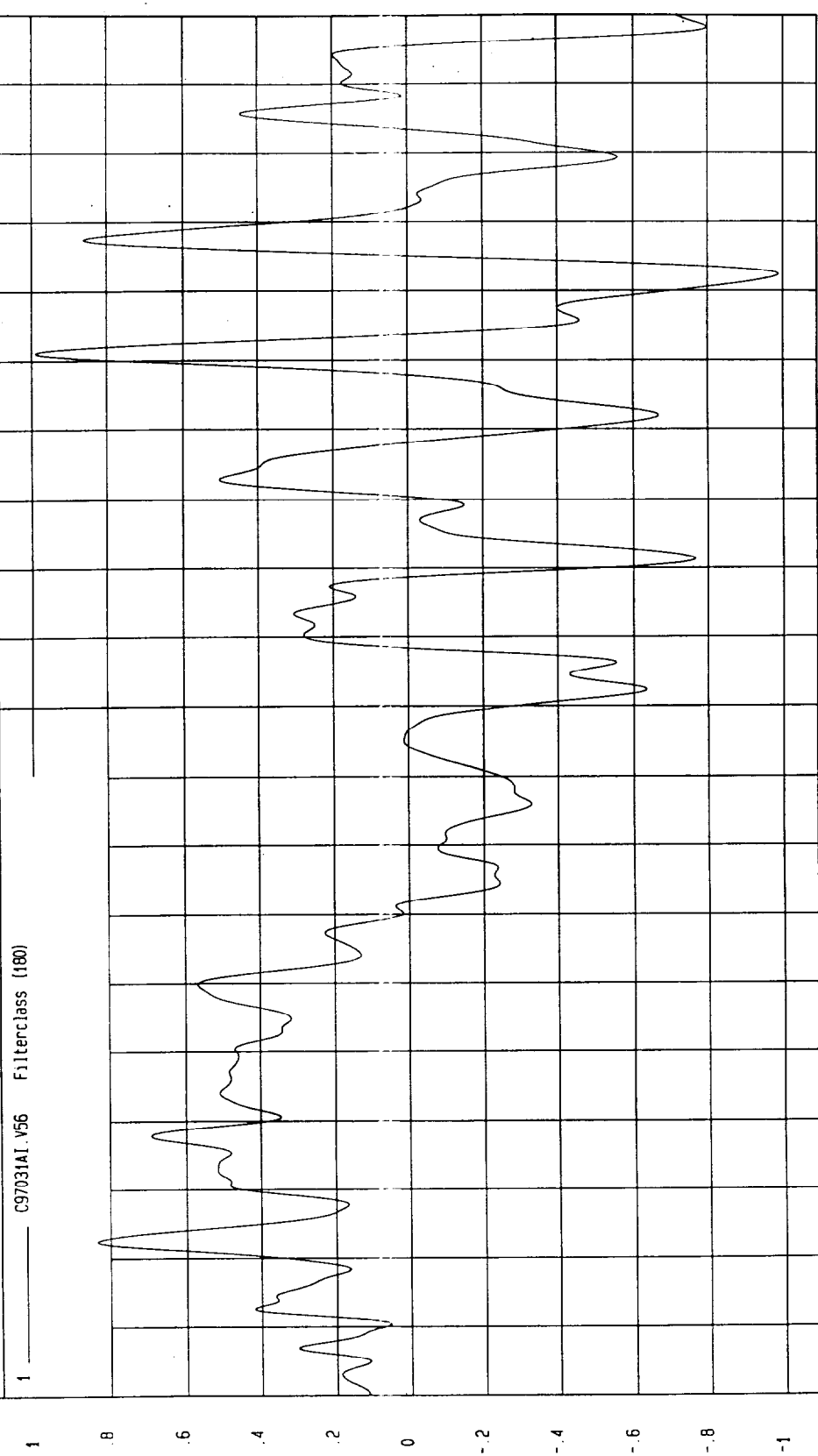
TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -.98 KPH at 162 msec Maximum = .99 KPH at 151 msec

MOVING BARRIER CG Z VELOCITY

1 ——— C97031A1.V56 Filterclass (180)



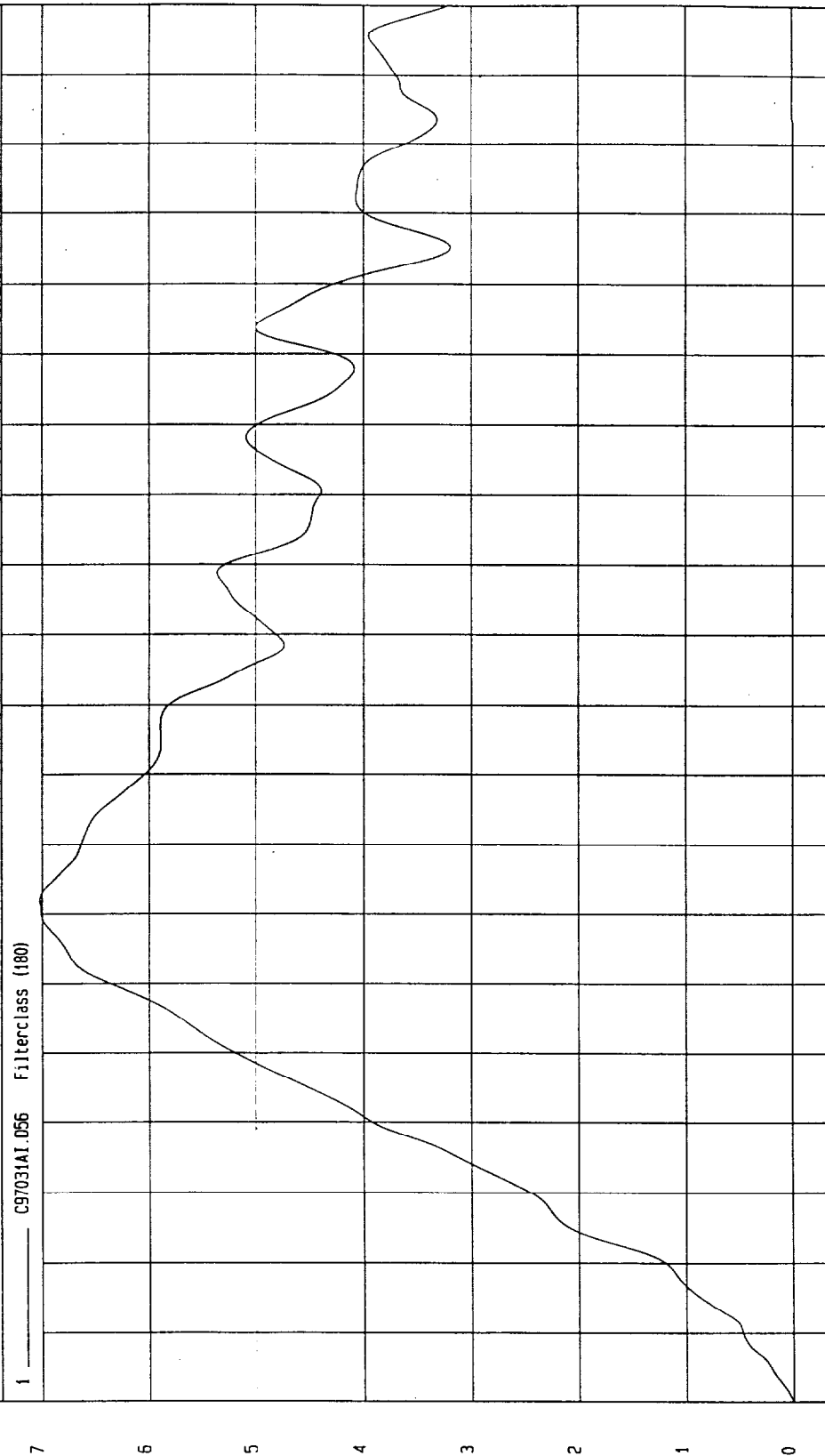
WCA Research
01-12-1997 14:54

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = 0 MM at 0 msec Maximum = 7.02 MM at 72 msec

MOVING BARRIER CG Z DISPLACEMENT



TIME Seconds

MCA Research
07-12-1997 14:55

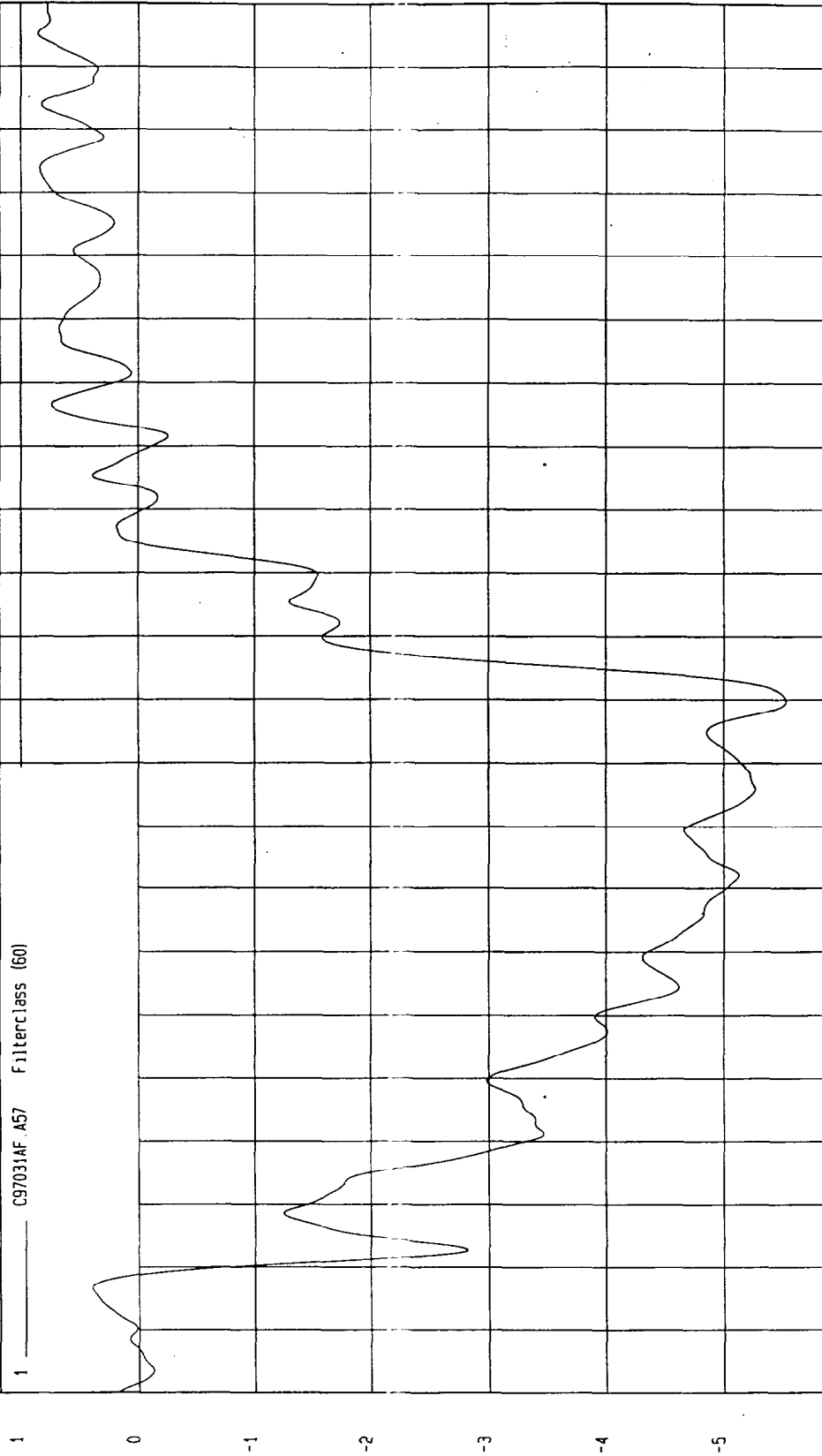
TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -5.52 G'S at 90 msec Maximum = .85 G'S at 195 msec

MOVING BARRIER REAR AXLE X ACCELERATION

1 — C97031AF A57 Filterclass (60)



MCA Research
01-24-1998 13:02

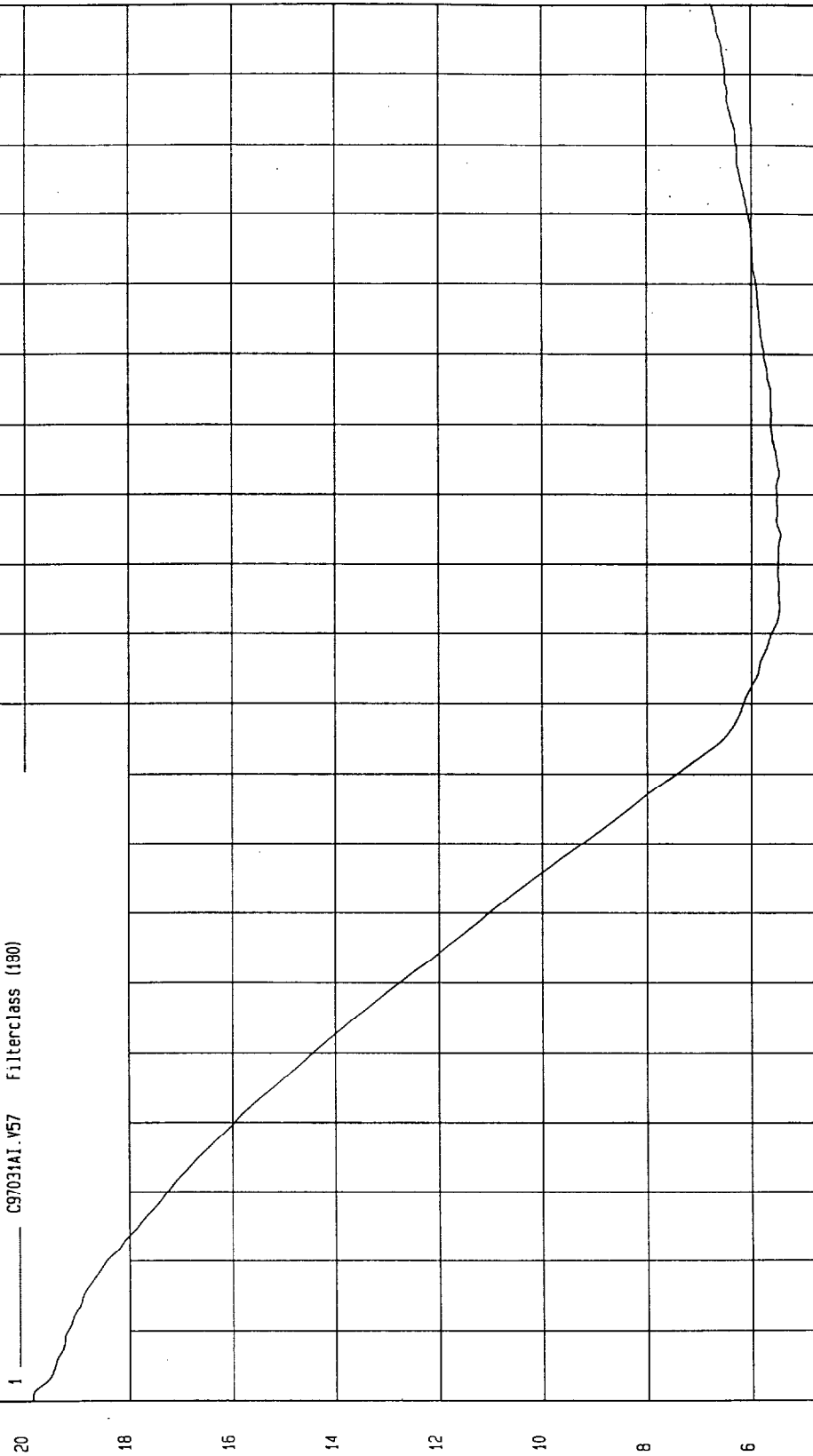
TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = 5.44 KPH at 124 msec Maximum = 19.88 KPH at 1 msec

MOVING BARRIER REAR AXLE X VELOCITY

1 C97031A1.V57 Filterclass (180)



MCA Research
01-12-1997 14:54

TIME Seconds

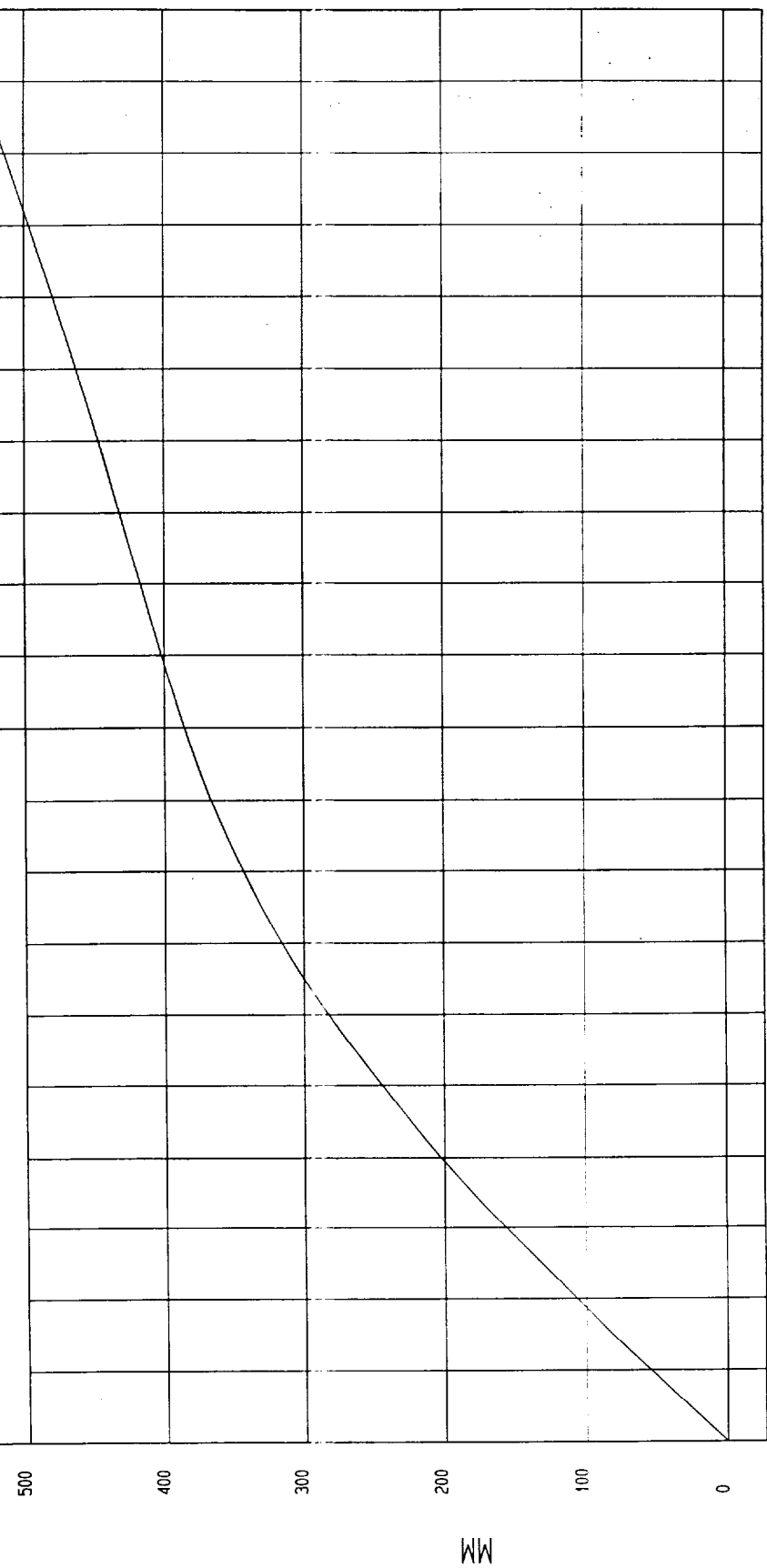
TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = 0 MM at 0 msec Maximum = 549.58 MM at 200 msec

MOVING BARRIER REAR AXLE X DISPLACEMENT

1 _____ C97031A1.057 Filterclass (180)



MSA Research
07-12-1997 14:55

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

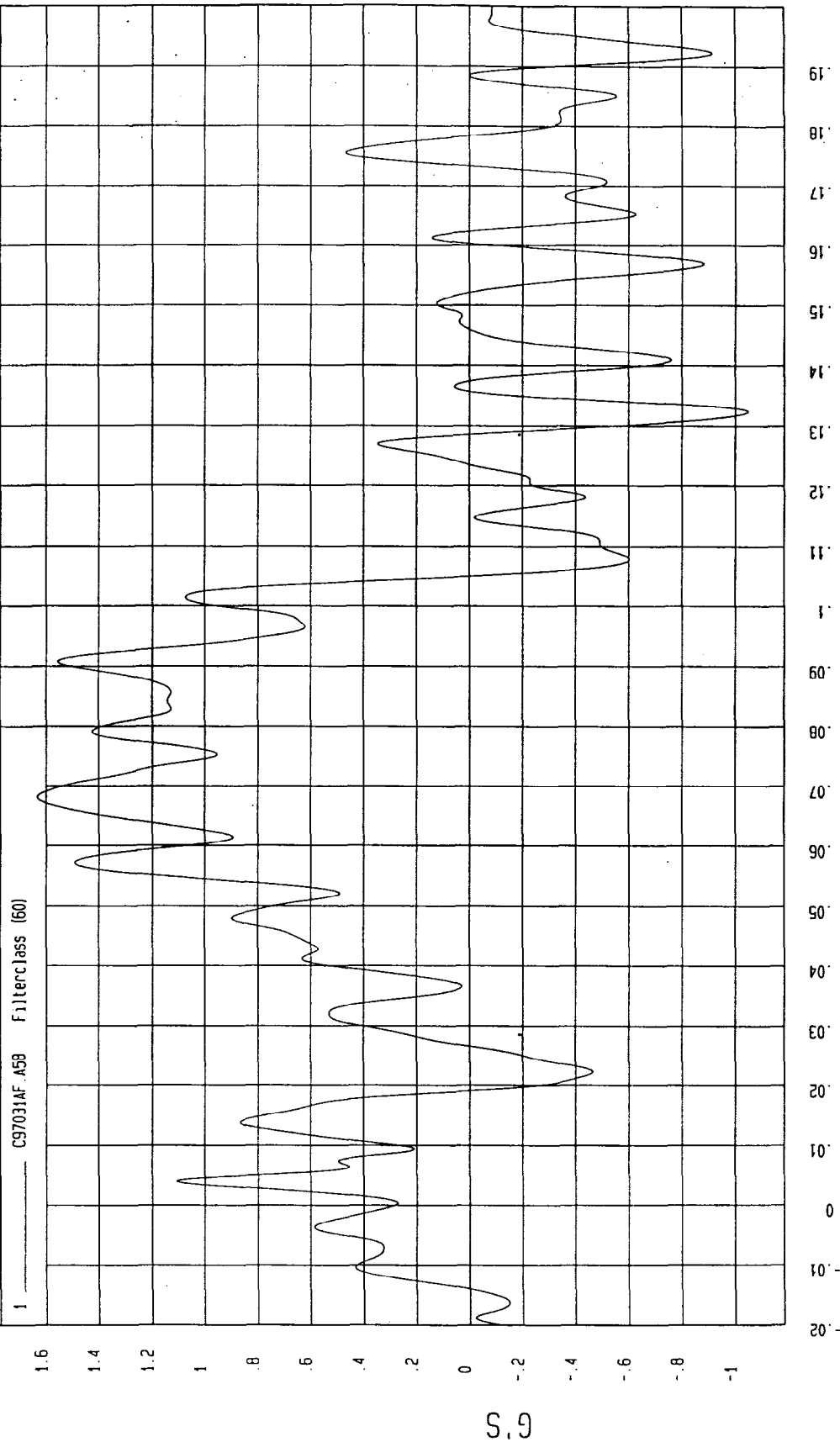
SPEED: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 DEFORMABLE BARRIER

Maximum = 1.63 G'S at 68 msec

Minimum = -1.04 G'S at 132 msec

MOVING BARRIER REAR AXLE Y ACCELERATION



MCA Research
01-24-1998 13:02

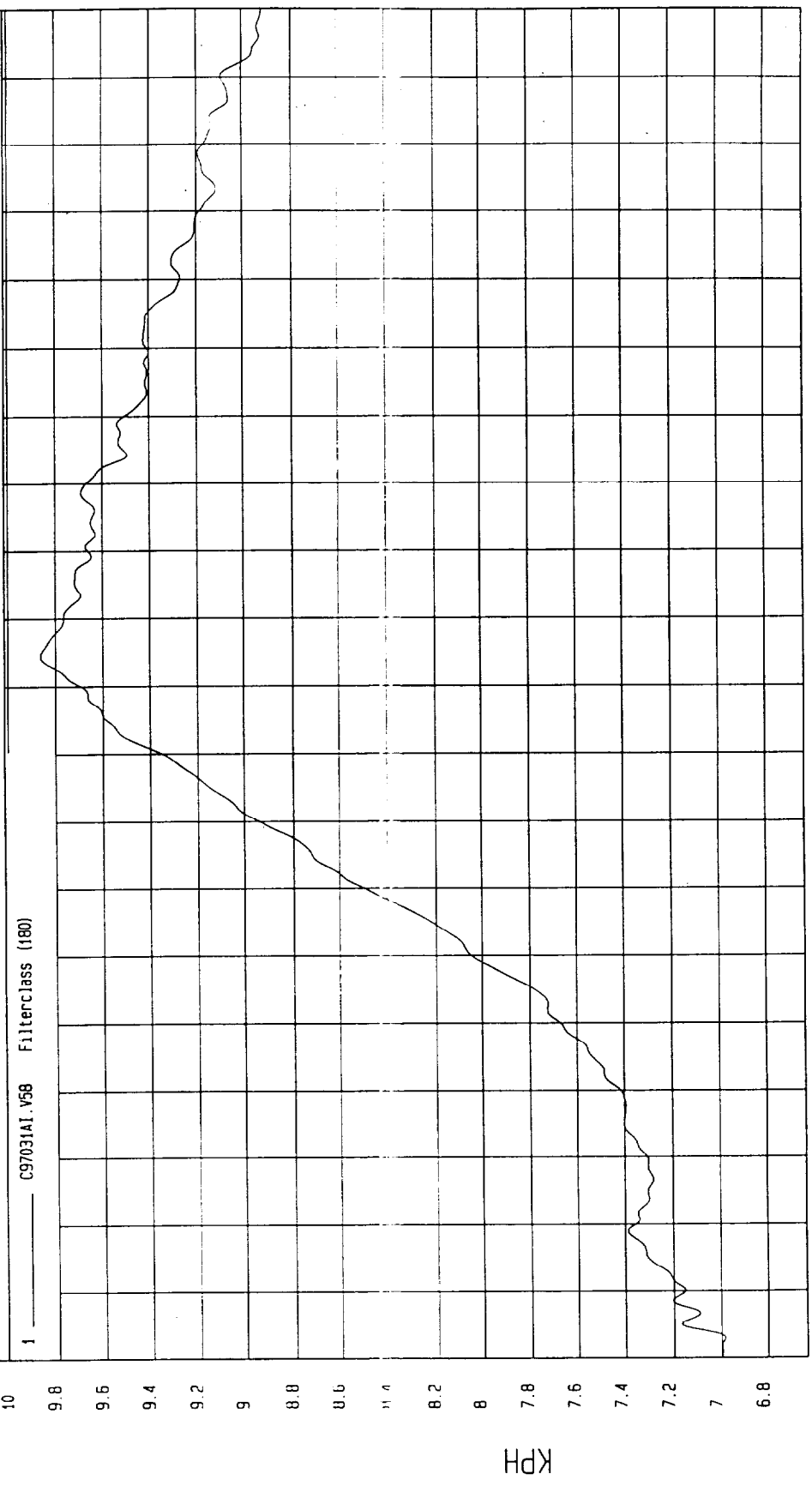
TIME (seconds)

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = 6.79 KPH at -13 msec Maximum = 9.86 KPH at 104 msec

MOVING BARRIER REAR AXLE Y VELOCITY



MCA Research
01-12-1997 14:54

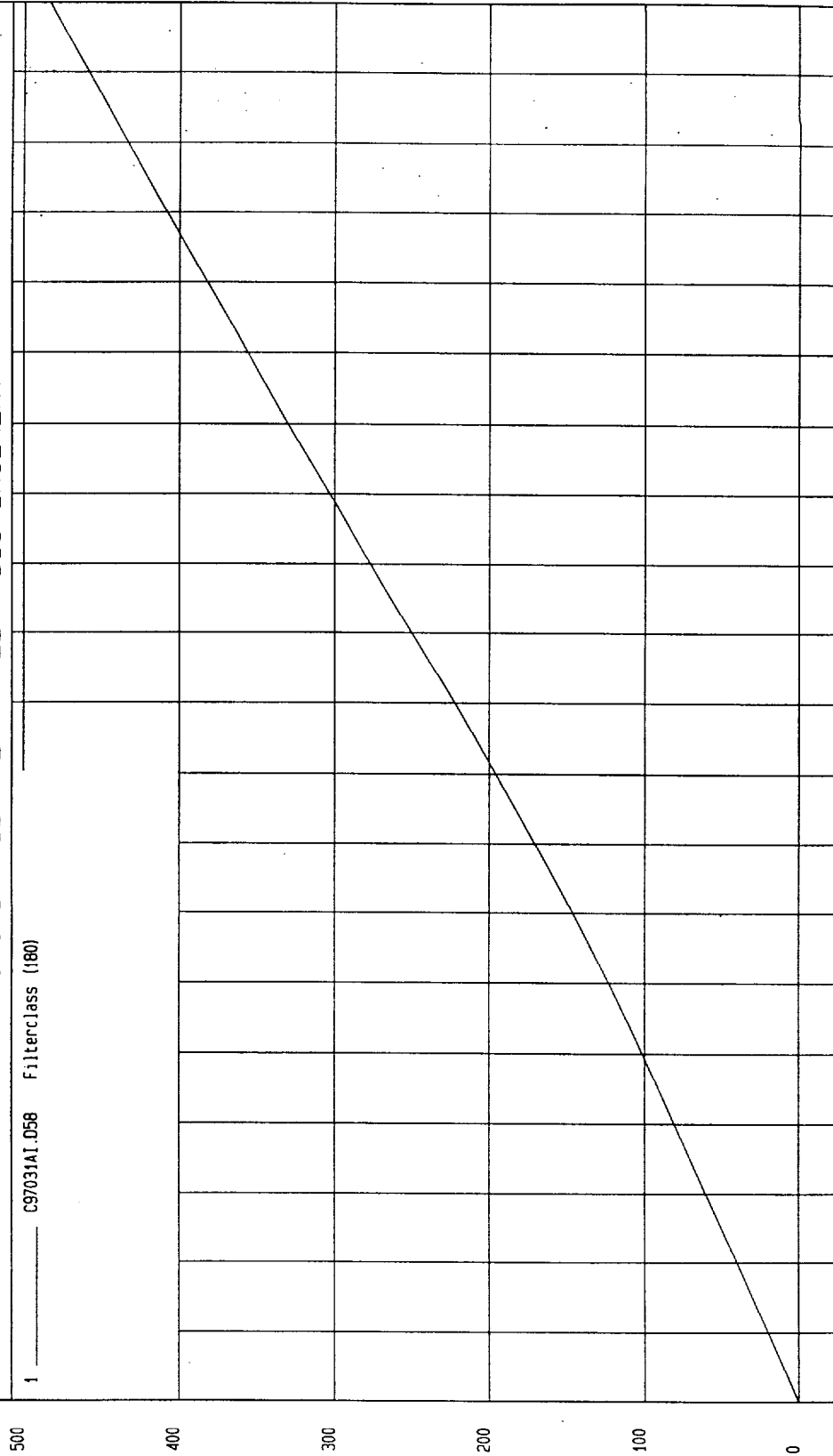
TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = 0 MM at 0 msec Maximum = 483.25 MM at 200 msec

MOVING BARRIER REAR AXLE Y DISPLACEMENT

1 _____ C97031A1.D58 Filterclass (180)



WCA Research
07-12-1997 14:55

TEST: TEST #1 19/60 CART/BARRIER

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 DEFORMABLE BARRIER

STRINGPOT DISPLACEMENT-ROW #1

- 1 _____ C970310F .029 STRING POT 29
- 2 _____ C970310F .033 STRING POT 33
- 3 _____ C970310F .037 STRING POT 37
- 4 _____ C970310F .041 STRING POT 41

120

100

80

60

40

20

0

MM

MCA Research
01-28-1998 13.10

TIME (seconds)

19

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

0

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

X AXIS FORCES - ROW #1

- 1 ——— B97031FM.F56 LC #29 FX
- 2 - - - - C97031FM.F50 LC #33 FX
- 3 - R97031FM.F50 LC #37 FX
- 4 ——— R97031FM.F53 LC #41 FX

2000

0

-2000

-4000

-6000

-8000

-10000

N

0

0.1

0.2

0.3

0.4

0.5

0.6

0.7

0.8

0.9

1

1.1

1.2

1.3

TIME (SECONDS)

NCA Research
03-19-1998 15.07

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

SPEED: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

Minimum = -8170.00 N at 91 msec

Maximum = 148.46 N at -2 msec

SUMMED X AXIS FORCES - ROW #1



TIME (SECONDS)

0 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13

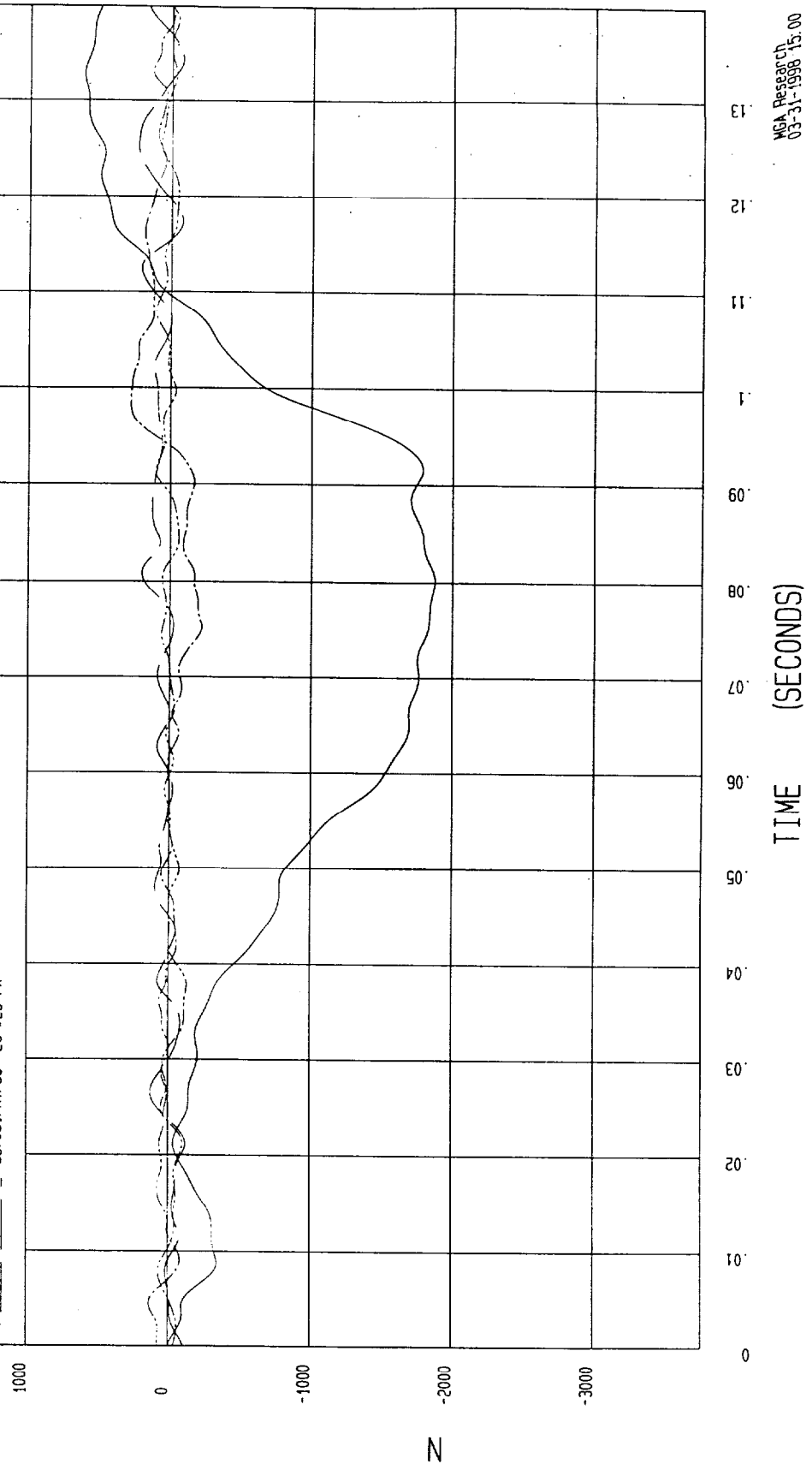
WGA Research
03-19-1998 14.18

TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

Y AXIS FORCES - ROW #1

- 1 ——— R97031FM.F61 LC #41 FY
- 2 ——— R97031FM.F48 LC #37 FY
- 3 - - - - C97031FM.F48 LC #33 FY
- 4 - - - - B97031FM.F96 LC #29 FX



MGA Research
03-31-1998 15:00

TEST DATE: 02-27-1997

TEST: Test #1 19/60 Cart/Barrier

Speed: 13 MPH 20.9 KPH

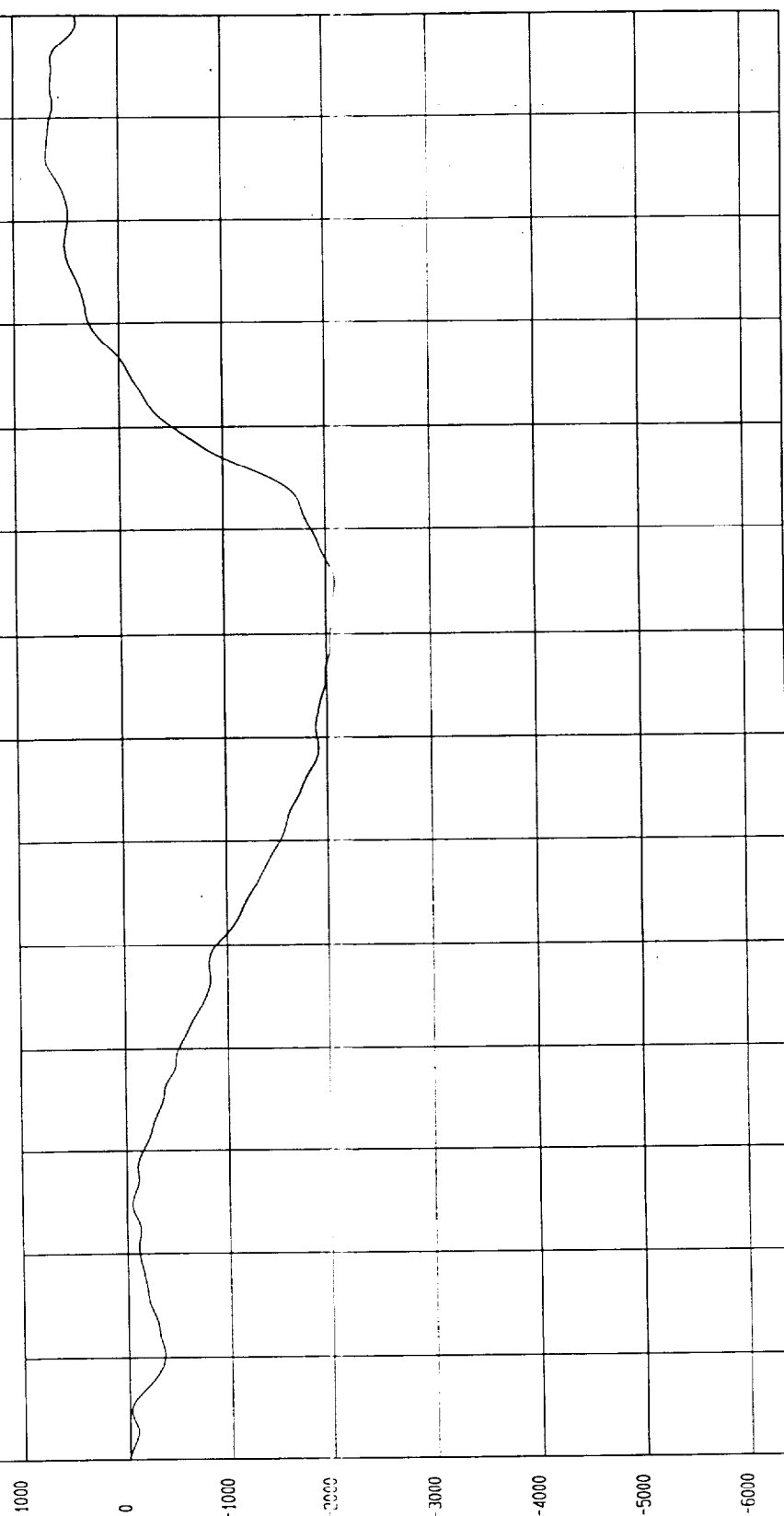
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 687.05 N at 126 msec

Minimum = -2085.70 N at 85 msec

SUMMED Y AXIS FORCES - ROW #1

1 ——— R97031FM.R01 Filterclass (60)



MCA Research
03-30-1998 17:14

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

STRINGPOT DISPLACEMENT-ROW #2

- 1 ——— C970310F .030 STRING POT 30
- 2 ——— C970310F .034 STRING POT 34
- 3 - - - - C970310F .038 STRING POT 38
- 4 - - - - C970310F .042 STRING POT 42

120

100

80

60

40

20

0

MM

0

10

20

30

40

50

60

70

80

90

100

110

120

130

140

150

160

170

180

190

TIME (seconds)

NCA Research
01-24-1998 13:10

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

X AXIS FORCES - ROW #2

- 1 ——— B97031FM, F99 LC #30 FX
- 2 ——— C97031FM, F53 LC #34 FX
- 3 ——— R97031FM, F53 LC #38 FX
- 4 ——— R97031FM, F66 LC #42 FX

2000

0

-1000

-4000

-6000

-8000

-10000

N

0

0.01

0.02

0.03

0.04

0.05

0.06

0.07

0.08

0.09

0.1

0.11

0.12

0.13

TIME (SECONDS)

MGA Research
03-19-1998 15.06

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

SPEED: 13 MPH 20.9 KPH

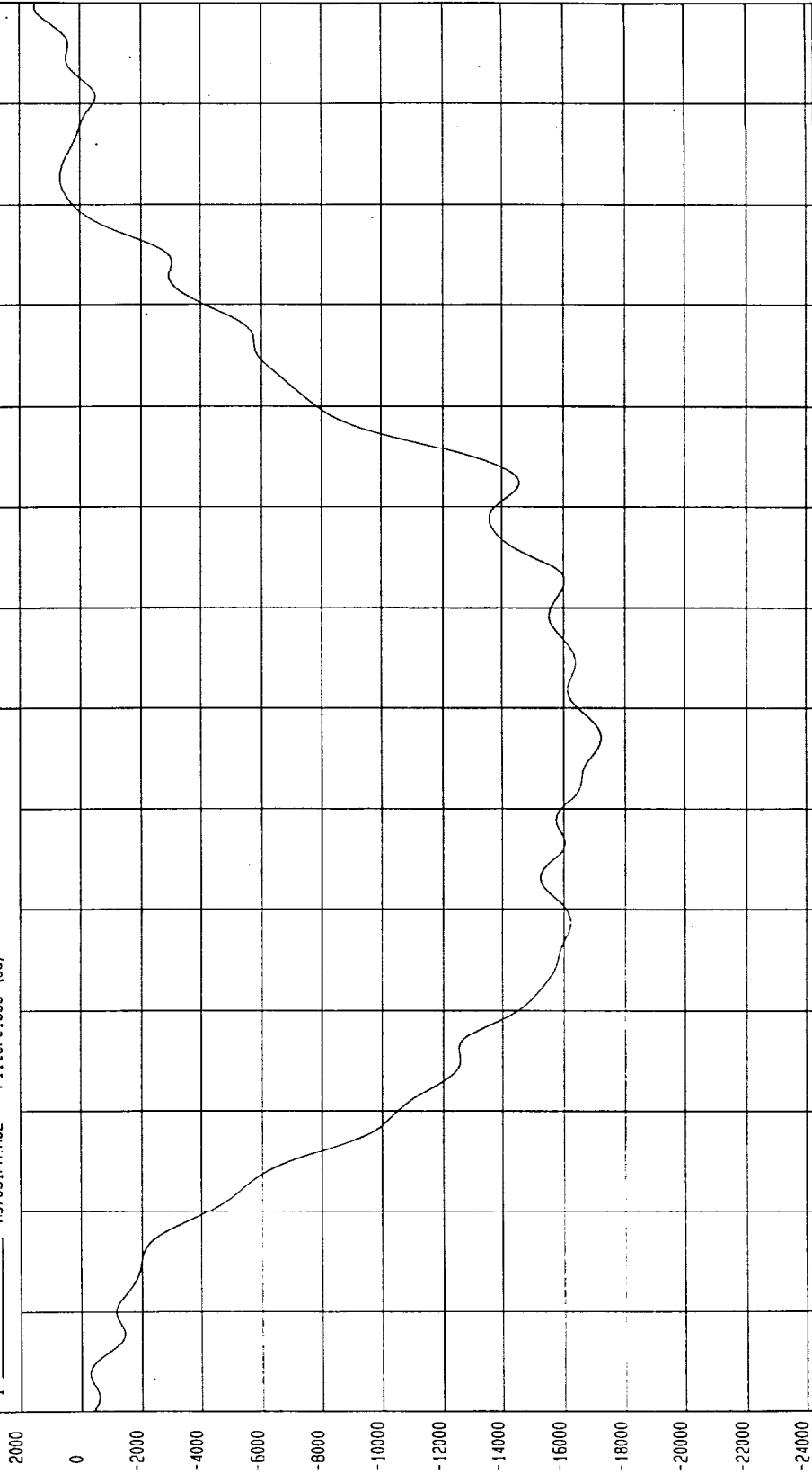
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 2058.81 N at 164 msec

Minimum = -17196.1 N at 67 msec

SUMMED X AXIS FORCES - ROW #2

1 — R97031FM R02 Filterclass (60)



MGA Research
03-19-1998 14:18

TEST: Test #1 19/60 Cart/Barrier

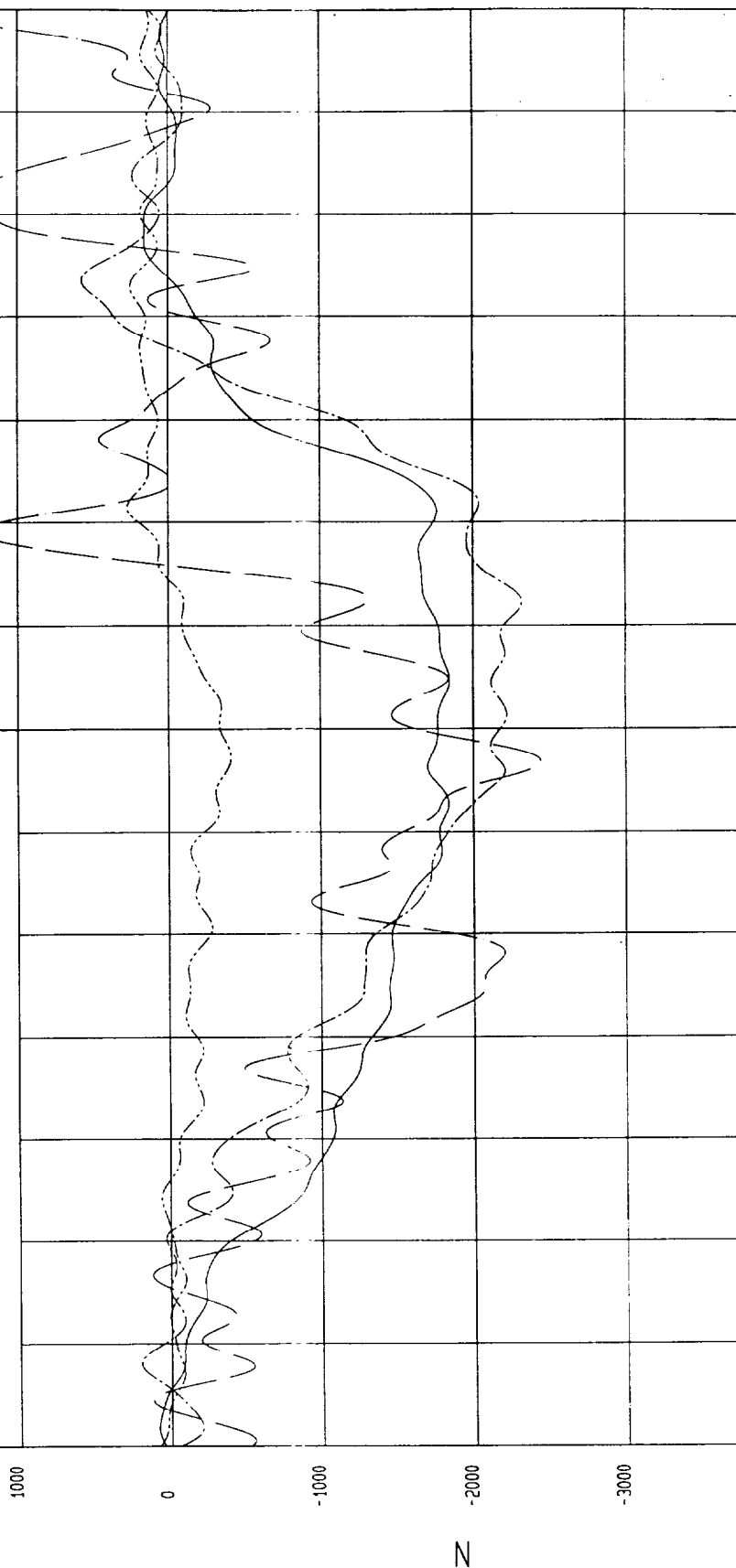
TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

Y AXIS FORCES - ROW #2

- 1 _____ R97031FM.F64 LC #42 FY
- 2 _____ R97031FM.F51 LC #38 FY
- 3 _____ C97031FM.F51 LC #34 FY
- 4 _____ B97031FM.F99 LC #30 FX



TIME (SECONDS)

MCA Research
03-31-1998 14.59

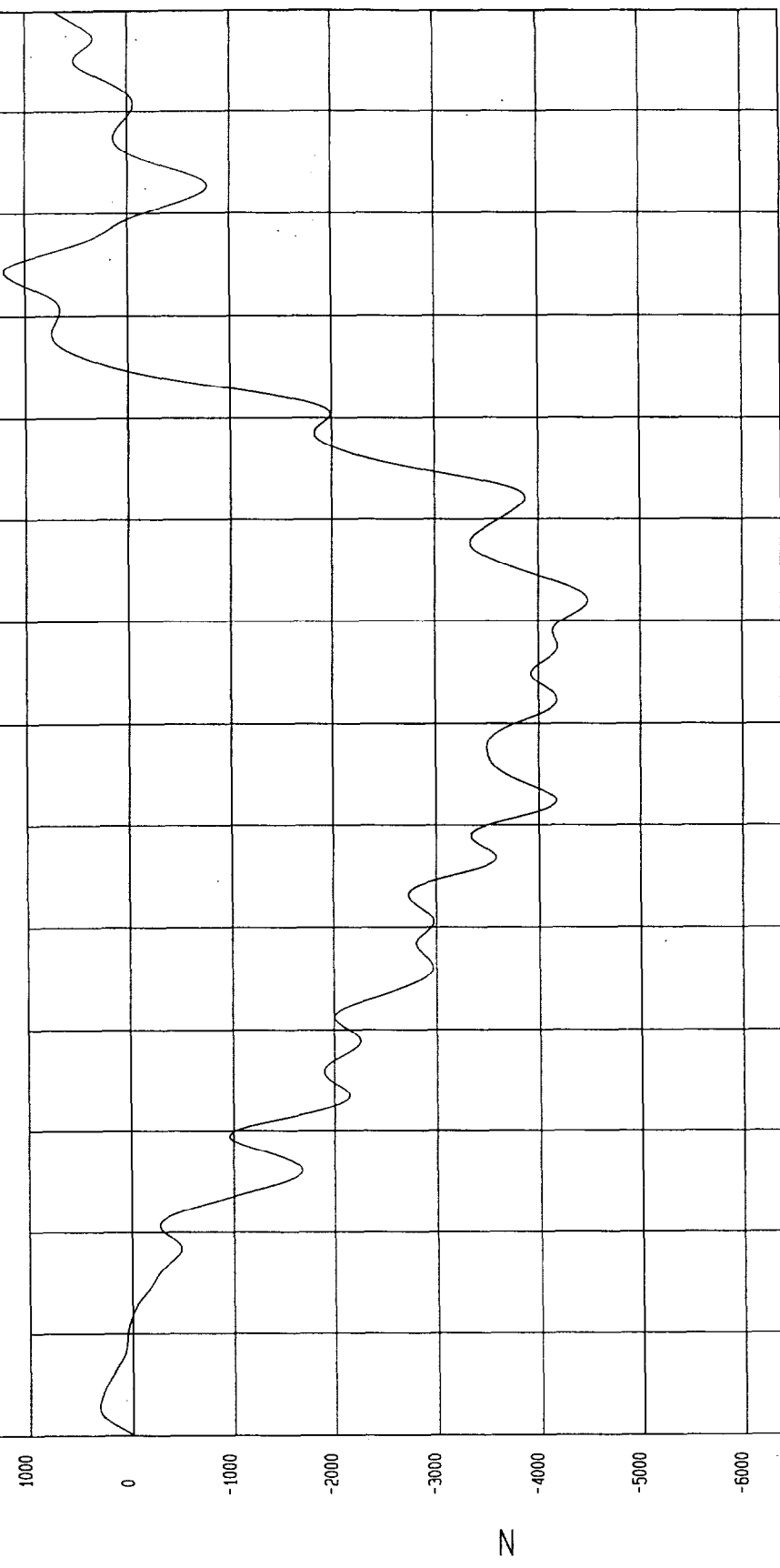
TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

Minimum = -4491.03 N at 82 msec Maximum = 1204.60 N at 114 msec

SUMMED Y AXIS FORCES - ROW #2

1 _____ R97031FM.R02 Filterclass (60)

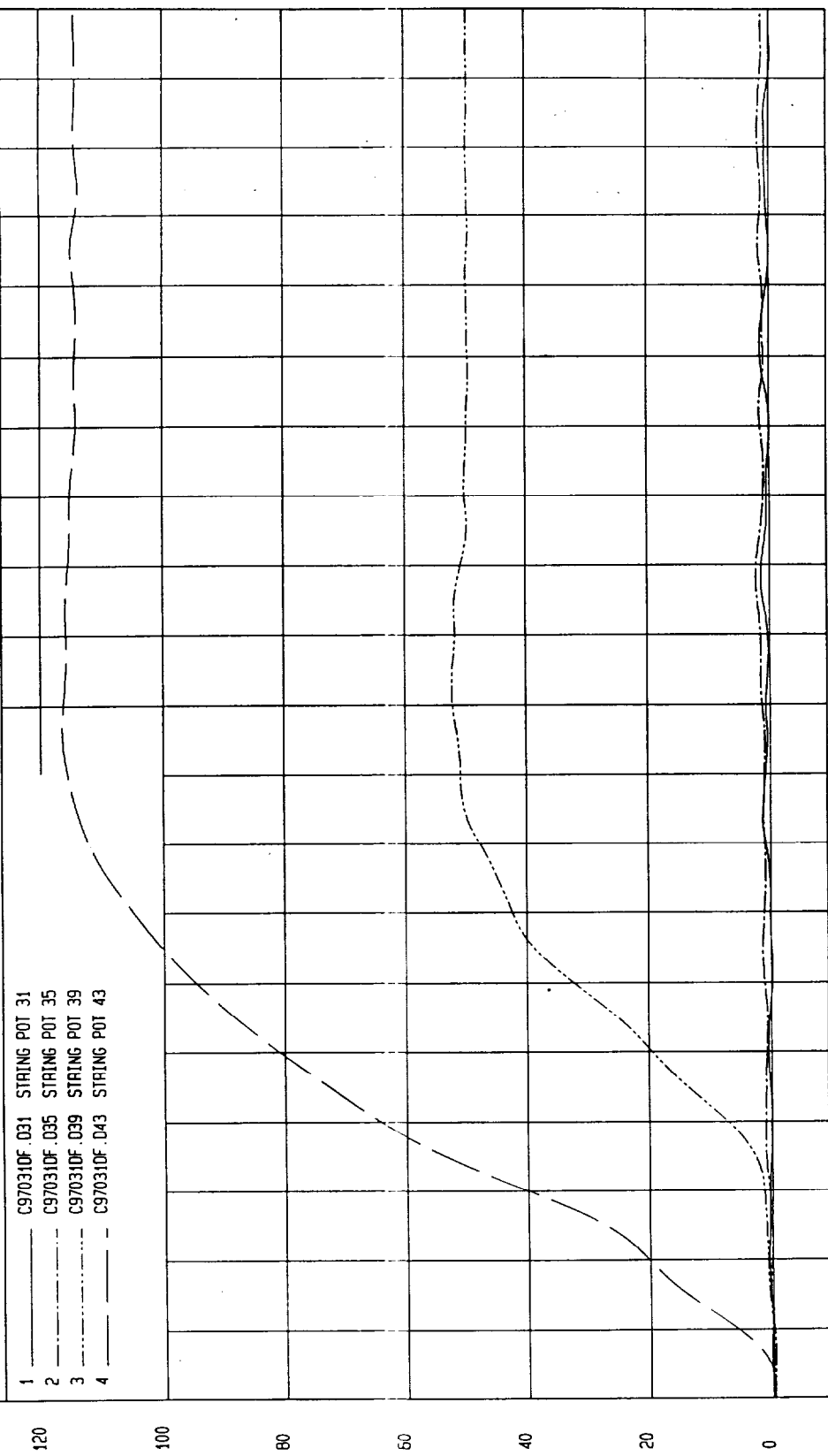


MSA Research
03-30-1996 11:15

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

STRINGPOT DISPLACEMENT-ROW #3



MGA Research
01-24-1998 13:11

TEST: Test #1 19/60 Cant/Barrier

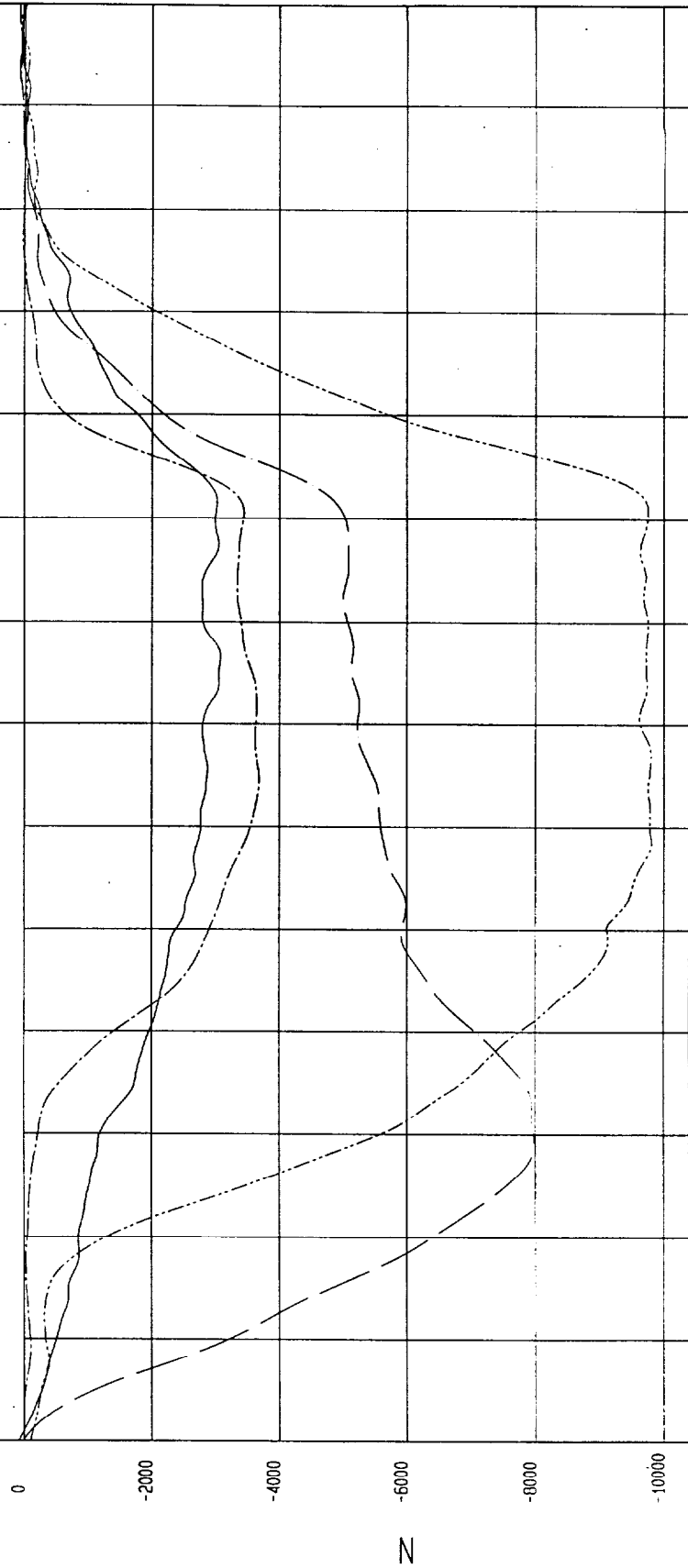
TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

X AXIS FORCES - ROW #3

- 1 ——— B97031VM.V02 LC #31 FX
- 2 ——— R97031FM.F44 LC #35 FX
- 3 ——— R97031FM.F56 LC #39 FX
- 4 ——— R97031FM.F69 LC #43 FX



MGA Research
03-19-1998 15:05

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

SPEED: 13 MPH 20.9 KPH

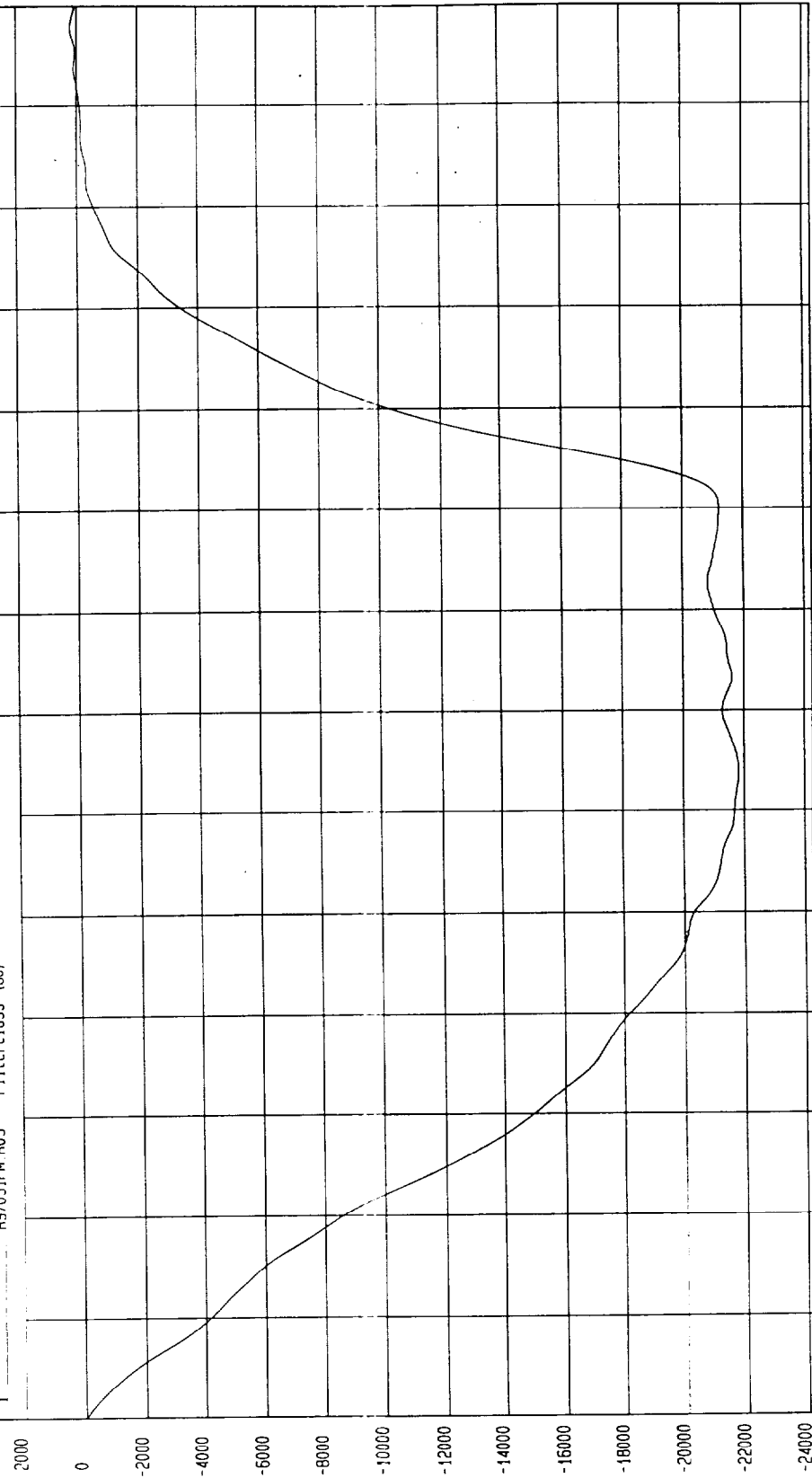
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 551.63 N at 167 msec

Minimum = -21821.57 N at 64 msec

SUMMED X AXIS FORCES - ROW #3

1 R97031FM R03 FilterClass (60)



MCA Research
03-19-1998 14:19

TEST: Test #1 19/60 Cart/Barrier

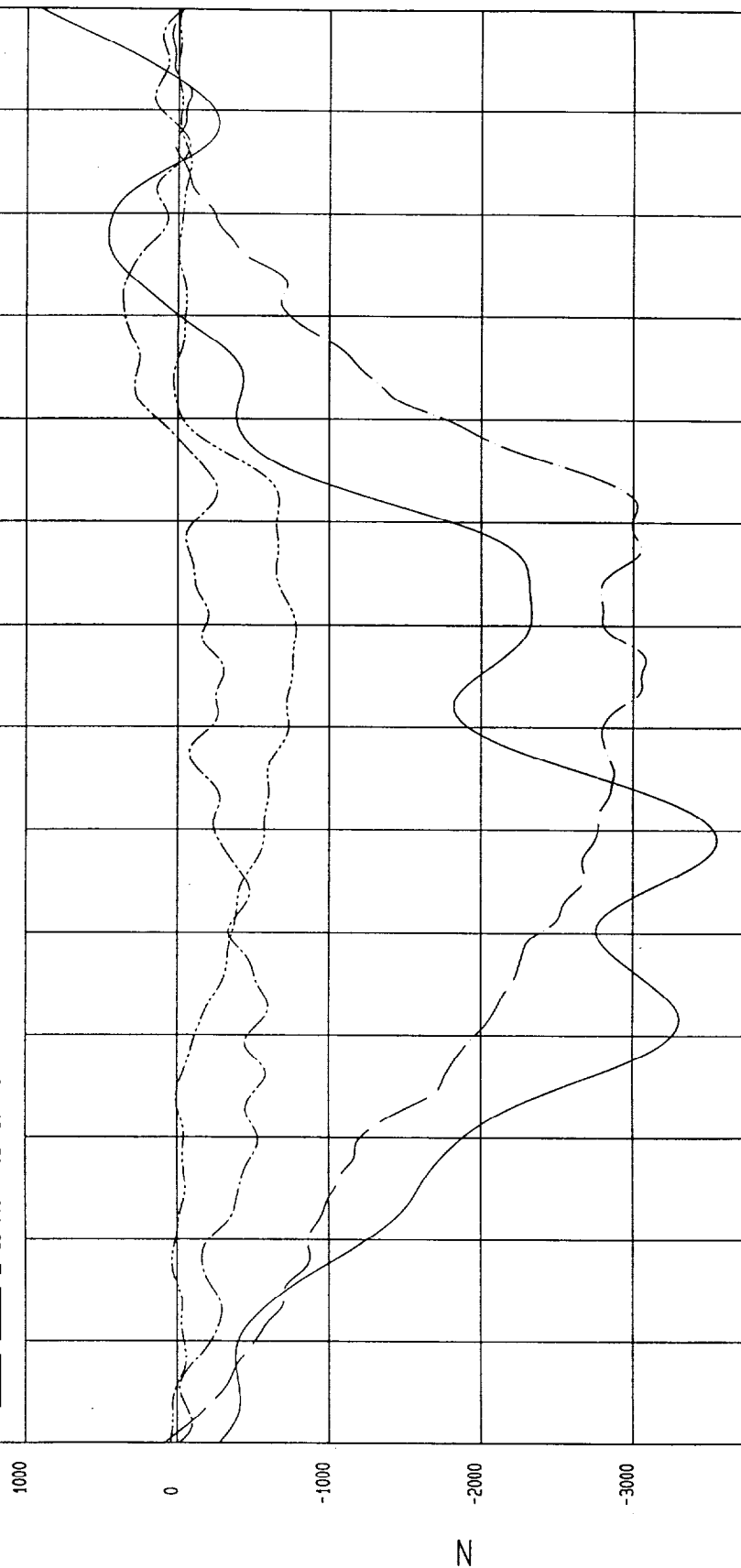
TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier

Speed: 13 MPH 20.9 KPH

Y AXIS FORCES - ROW #3

- 1 ——— R97031FM.F67 LC #43 FY
- 2 - - - - R97031FM.F54 LC #39 FY
- 3 - - - - R97031FM.F42 LC #35 FY
- 4 - - - - R97031VM.V02 LC #31 FX



TIME (SECONDS)

MCA Research
03-31-1998 14:56

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

SPEED: 13 MPH 20.9 KPH

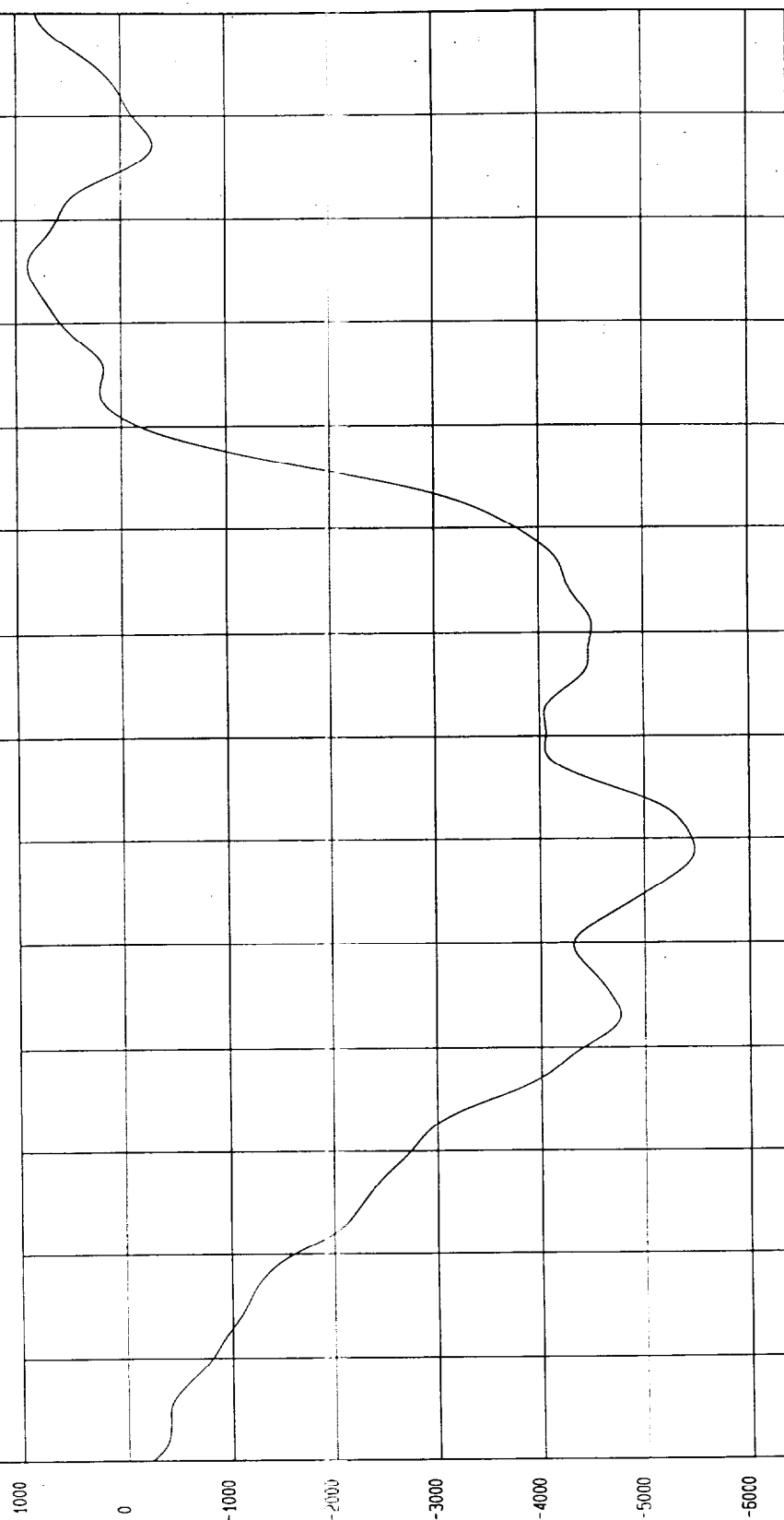
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 910.55 N at 187 msec

Minimum = -5475.55 N at 59 msec

SUMMED Y AXIS FORCES - ROW #3

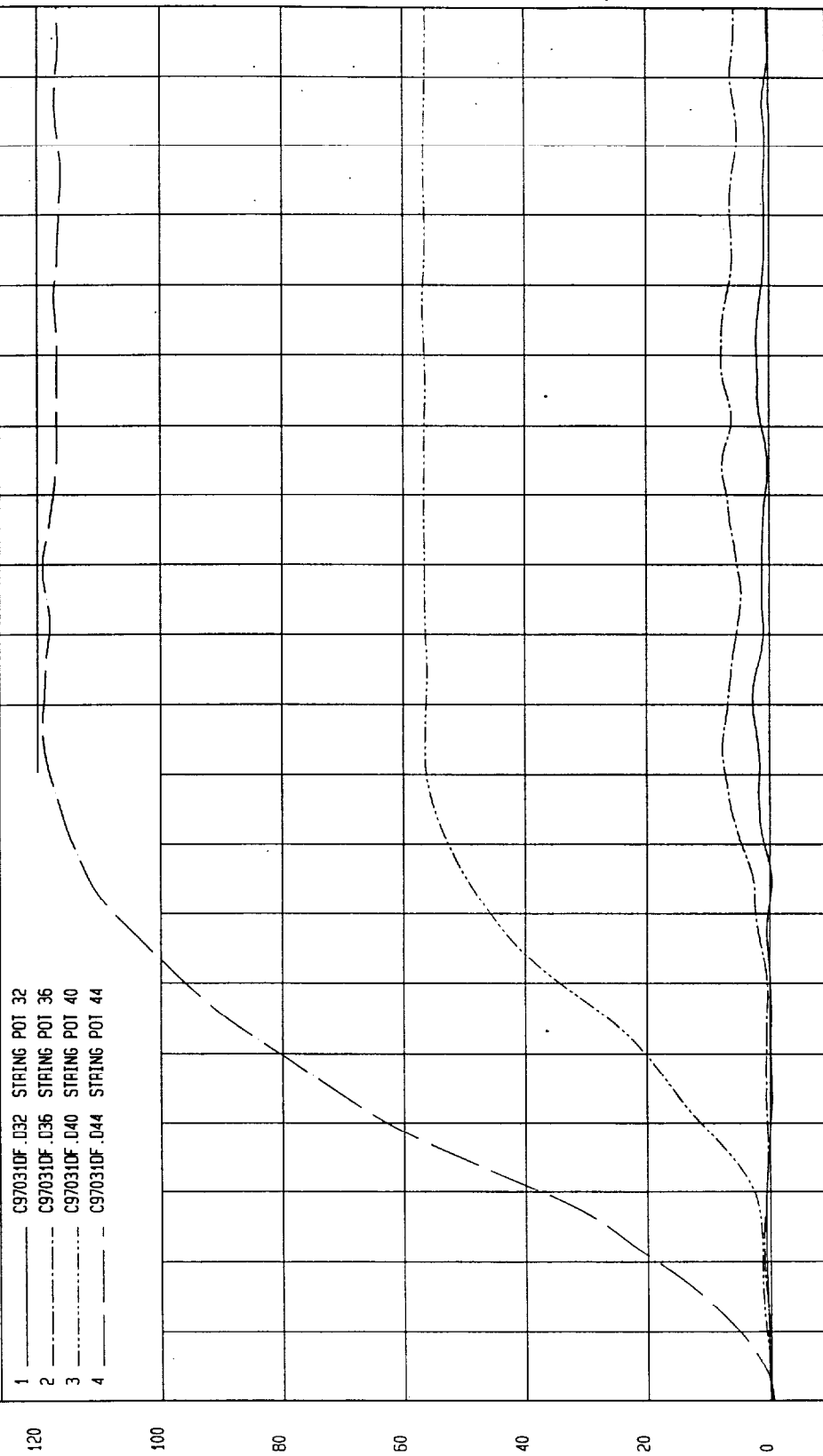
1 — R9703(FM R03 Filterclass (20)



MGA Research
03-30-1998 17:15

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997
 COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

STRINGPOT DISPLACEMENT-ROW #4



MGA Research
 01-24-1998 13:11

TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

SPEED: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

X AXIS FORCES - ROW #4

- 1 ——— C97031FM.F47 LC #32 FX
- 2 ——— R97031FM.F47 LC #36 FX
- 3 - - - - R97031FM.F60 LC #40 FX
- 4 ——— R97031FM.F72 LC #44 FX

2000

0

-2000

-4000

-6000

-8000

-10000

N

13

12

11

10

9

8

7

6

5

4

3

2

1

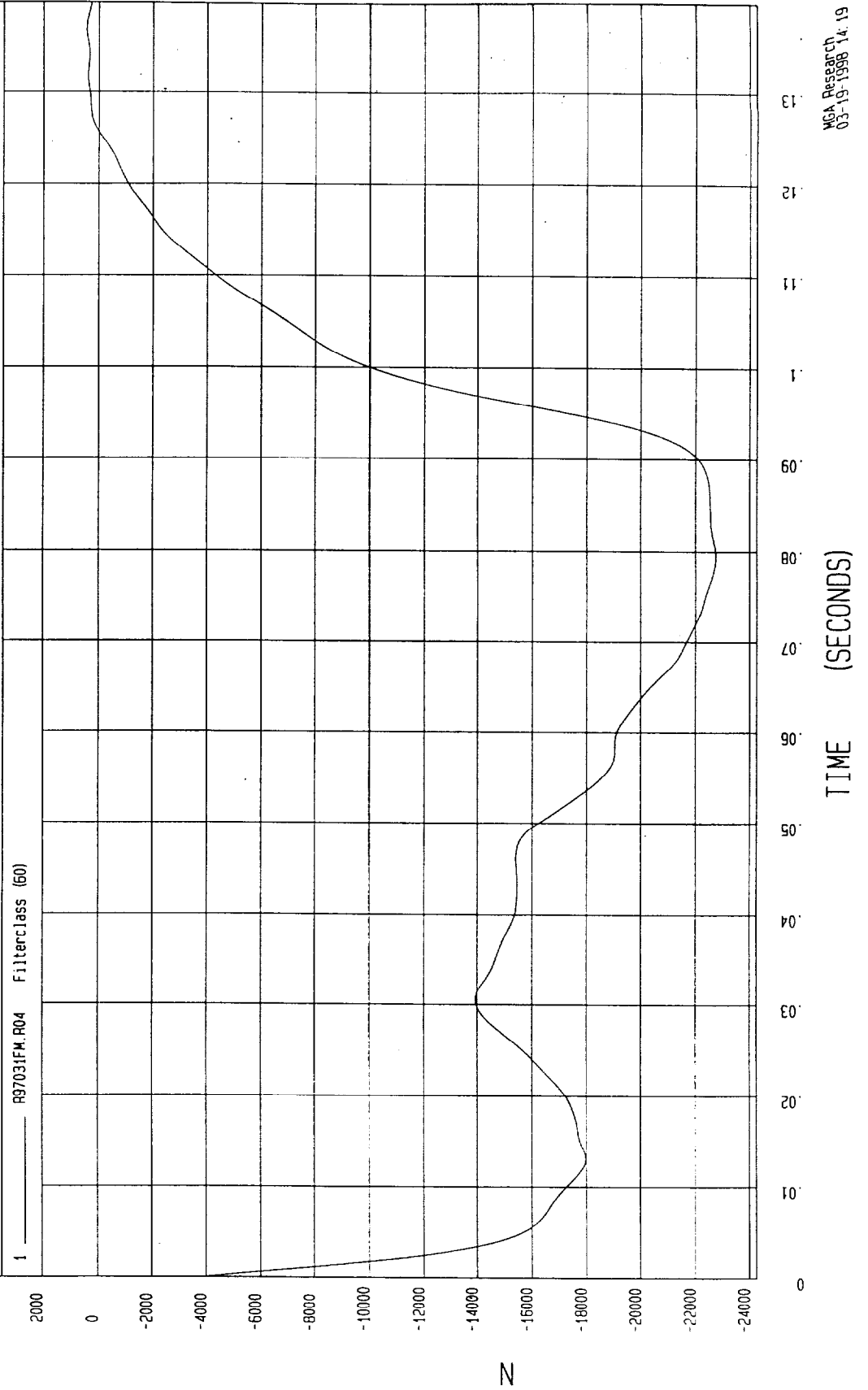
0

TIME (SECONDS)

MGA Research
03-19-1998 15:04

TEST: Test #1 19/60 Cart/Barrier	TEST DATE: 02-27-1997
COMPONENT: FMVSS 214 Deformable Barrier	Speed: 13 MPH 20.9 KPH
Minimum = -22753.93 N at 79 msec	Maximum = 795.22 N at 199 msec

SUMMED X AXIS FORCES - ROW #4

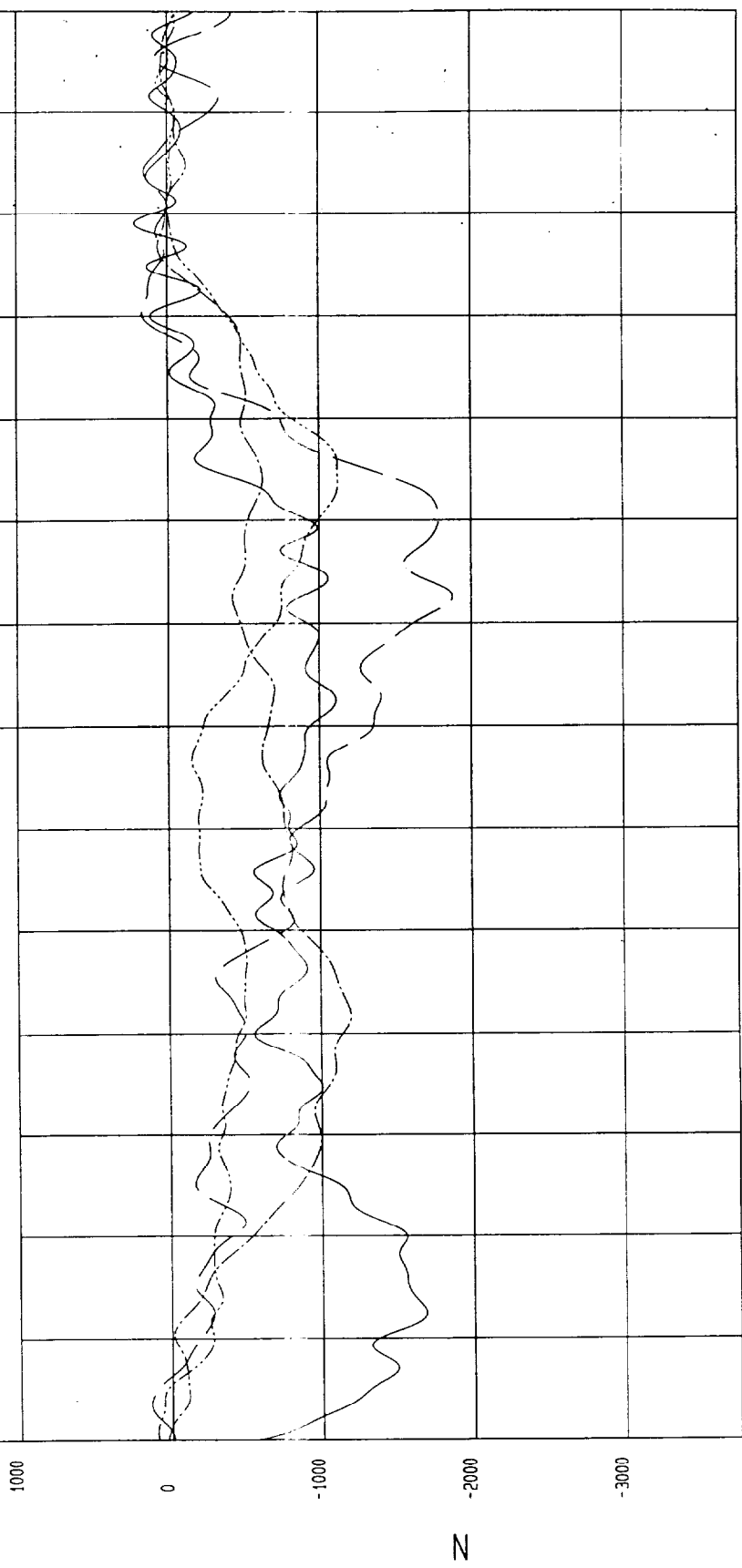


TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Y AXIS FORCES - ROW #4

- 1 ——— R97031FM.F70 LC #44 FY
- 2 ——— R97031FM.F58 LC #40 FY
- 3 - - - - R97031FM.F45 LC #36 FY
- 4 ——— C97031FM.F45 LC #32 FY



TIME (seconds)

0 10 20 30 40 50 60 70 80 90 100 110 120 130

NCA Research
03-31-1998 14:57

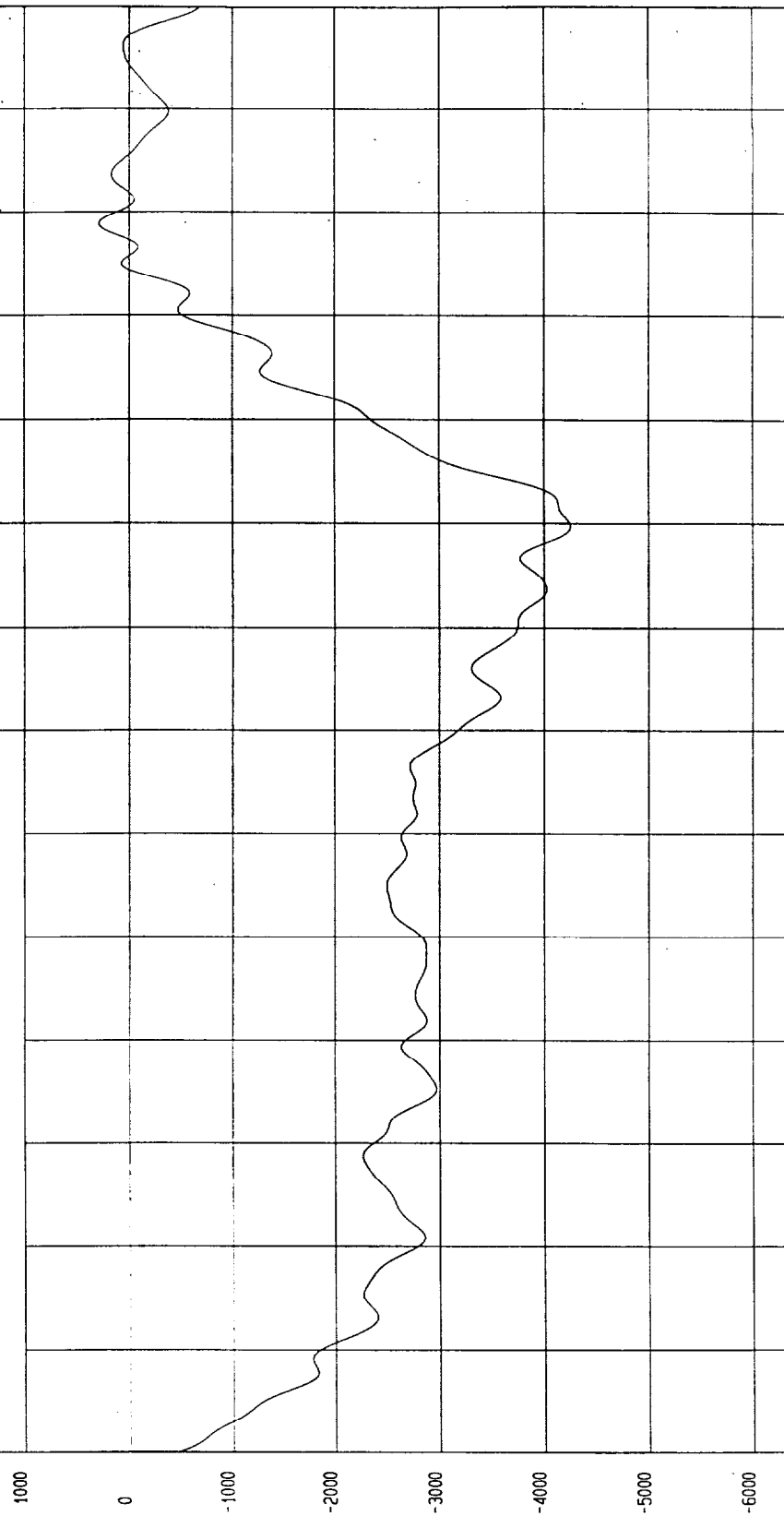
TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

Minimum = -4254.27 N at 90 msec
Maximum = 542.16 N at -20 msec

SUMMED Y AXIS FORCES - ROW #4

1 _____ R97031FM R04 Filterclass (60)



NCA Research
03-30-1998 17.15

TEST: TEST #1 19/60 CART/BARRIER

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 DEFORMABLE BARRIER

STRINGPOT DISPLACEMENT-COLUMN #8

- 1 _____ C970310F .029 STRING POT 29
- 2 _____ C970310F .030 STRING POT 30
- 3 _____ C970310F .031 STRING POT 31
- 4 _____ C970310F .032 STRING POT 32

120

100

80

60

40

20

0

MM

19

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

0

TIME (seconds)

MCA Research
01-24-1998 13:07

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

X AXIS FORCES - COLUMN #8

- 1 ——— B97031FM.F96 LC #29 FX
- 2 - - - - B97031FM.F99 LC #30 FX
- 3 - B97031VM.V02 LC #31 FX
- 4 - - - - CS7031FM.F47 LC #32 FX

2000

0

-2000

-4000

-6000

-8000

-10000

N

0

0.01

0.02

0.03

0.04

0.05

0.06

0.07

0.08

0.09

0.1

0.11

0.12

0.13

TIME (seconds)

MGA Research
03-19-1998 14:39

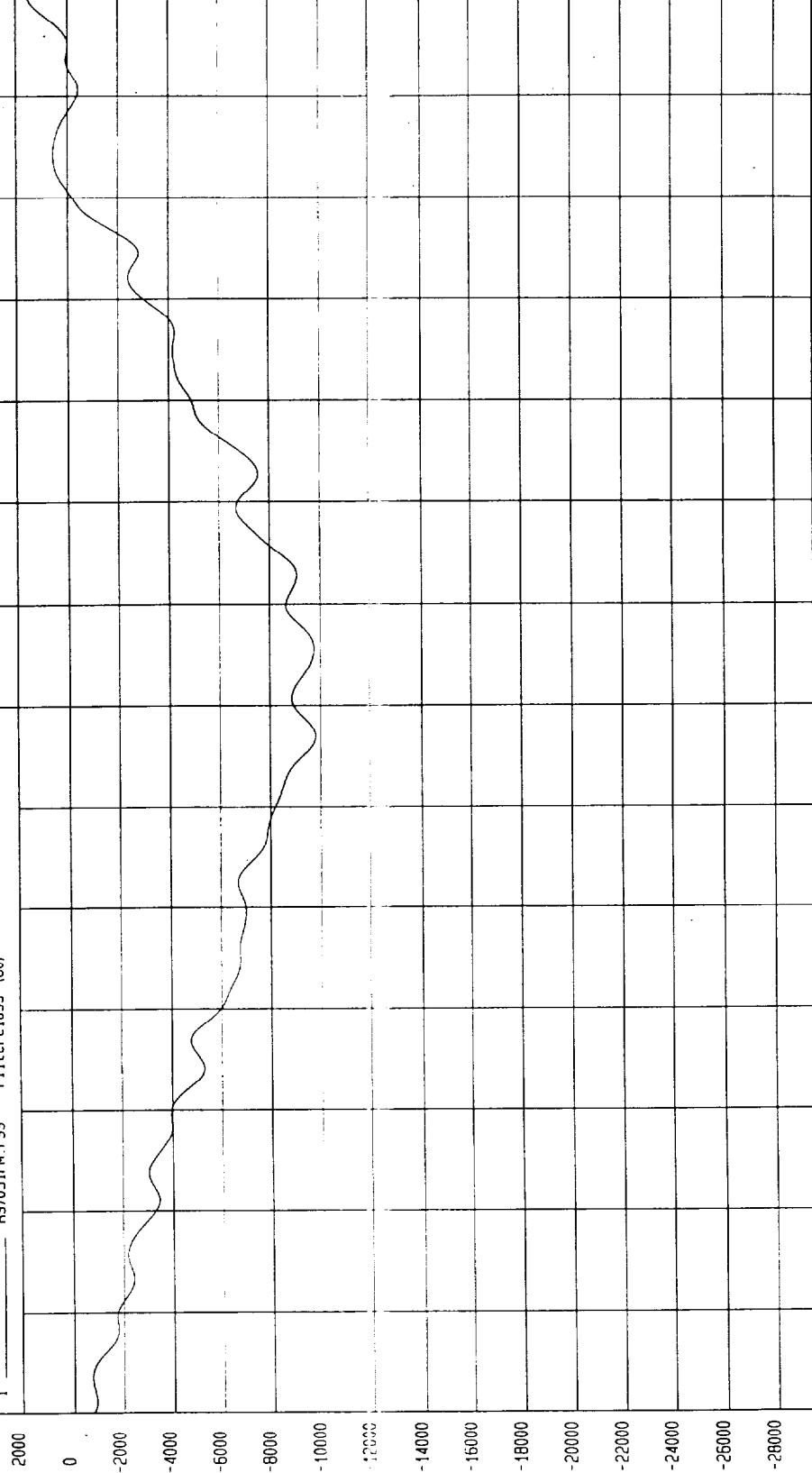
TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -9790.78 N at 67 msec Maximum = 2191.86 N at 163 msec

SUMMED X AXIS FORCES - COLUMN #8

1 R97031FM.F99 Filterclass (60)



MCA Research
03-19-1998 14: 21

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

SPEED: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 DEFORMABLE BARRIER

Y AXIS FORCES - COLUMN #8

- 1 ——— BS7031FM.F94 LC #29 FY
- 2 - - - - BS7031FM.F97 LC #30 FY
- 3 - BS7031VM.V10 LC #31 FY
- 4 ——— CS7031FM.F45 LC #32 FY

2000

1000

0

-1000

-2000

-3000

-4000

N

13

12

11

10

09

08

07

06

05

04

03

02

01

0

TIME (seconds)

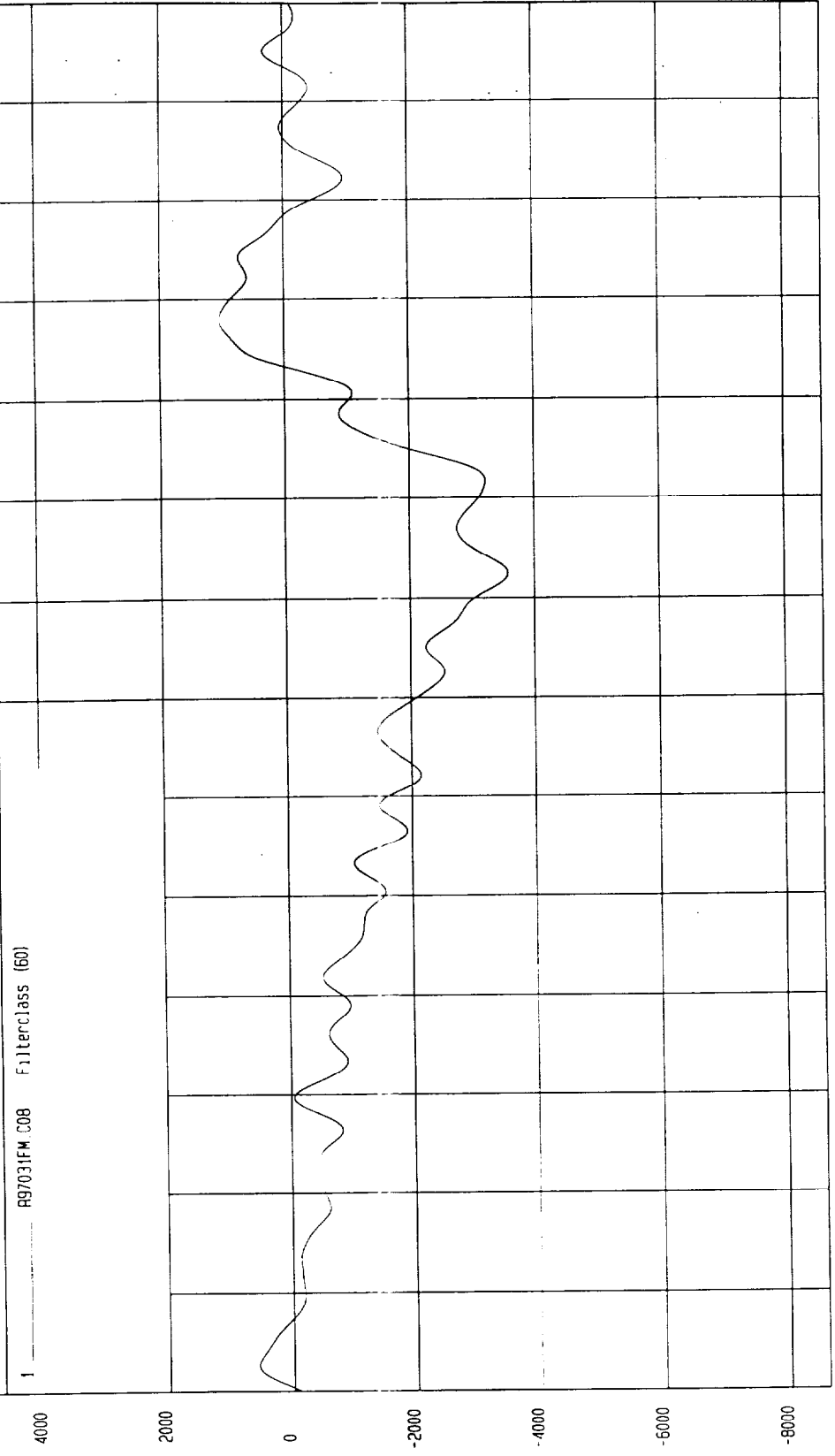
MCA Research
03-19-1998 14:45

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -3570.33 N at 82 msec Maximum = 1035.03 N at 108 msec

SUMMED Y AXIS FORCES - COLUMN #8



TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

STRINGPOT DISPLACEMENT-COLUMN #9

- 1 _____ C970310F .033 STRING POT 33
- 2 _____ C970310F .034 STRING POT 34
- 3 _____ C970310F .035 STRING POT 35
- 4 _____ C970310F .036 STRING POT 36

120

100

80

60

40

20

0

MM

19

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

0

TIME (seconds)

NCA Research
01-24-1998 13.05

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

X AXIS FORCES - COLUMN #9

- 1 ——— C97031FM.F50 LC #33 FX
- 2 - - - - C97031FM.F53 LC #34 FX
- 3 - R97031FM.F44 LC #35 FX
- 4 - - - - R97031FM.F47 LC #36 FX

2000

0

-2000

-4000

-6000

-8000

-10000

N

0

10

20

30

40

50

60

70

80

90

1

11

12

13

TIME (SECONDS)

MGA Research
03-19-1998 14:36

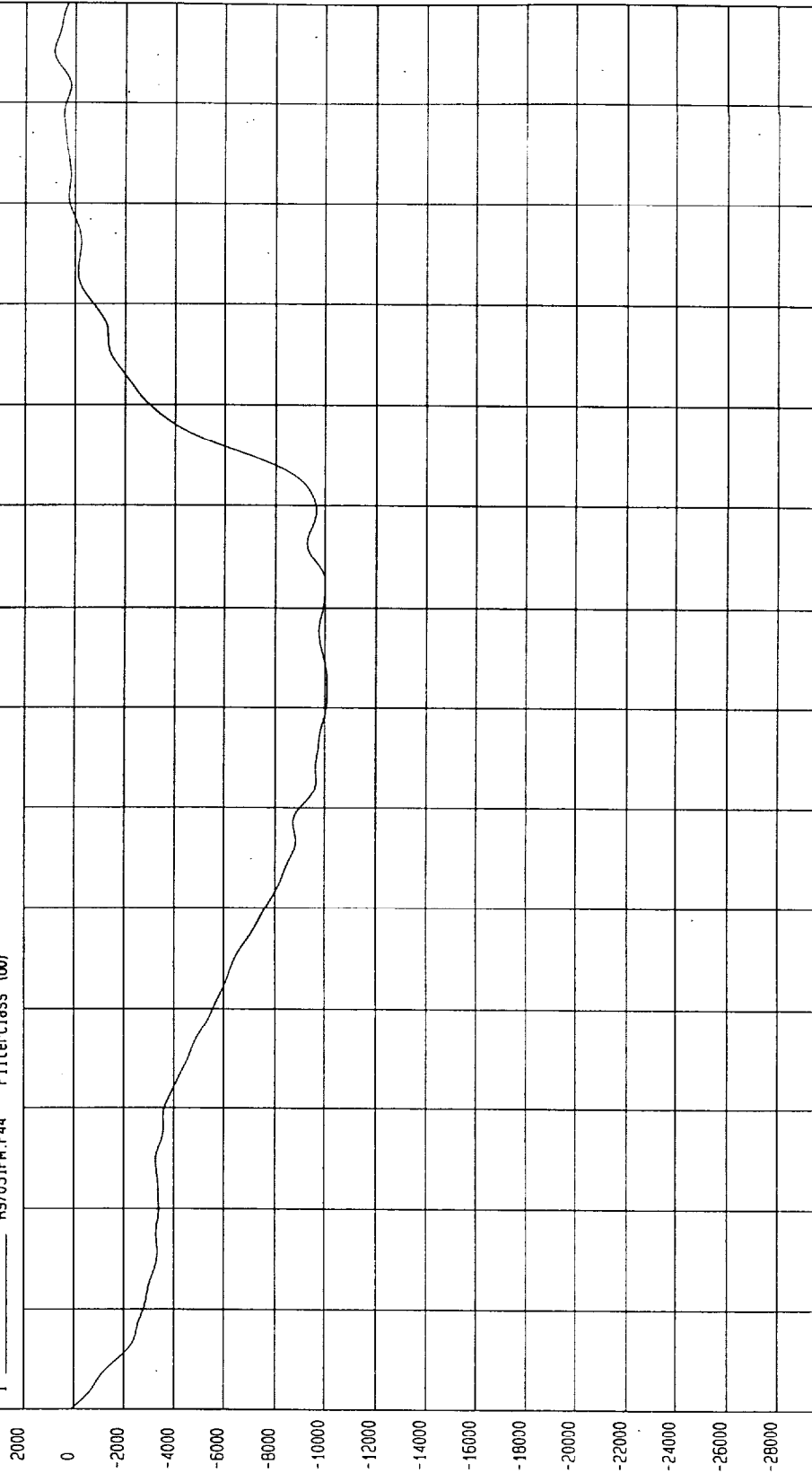
TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -10088.49 N at 73 msec Maximum = 853.98 N at 135 msec

SUMMED X AXIS FORCES - COLUMN #9

1 R97031FM.F44 Filterclass (60)



MCA Research
03-19-1998 14.18

TEST: Test #1 19/60 Cant/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

Y AXIS FORCES - COLUMN #9

- 1 C97031FM.F48 LC #33 FY
- 2 C97031FM.F51 LC #34 FY
- 3 R97031FM.F42 LC #35 FY
- 4 R97031FM.F45 LC #36 FY

2000

1000

0

-1000

-2000

-3000

-4000

N

13

12

11

10

09

08

07

06

05

04

03

02

01

0

TIME (SECONDS)

MGA Research
03-19-1998 14.43

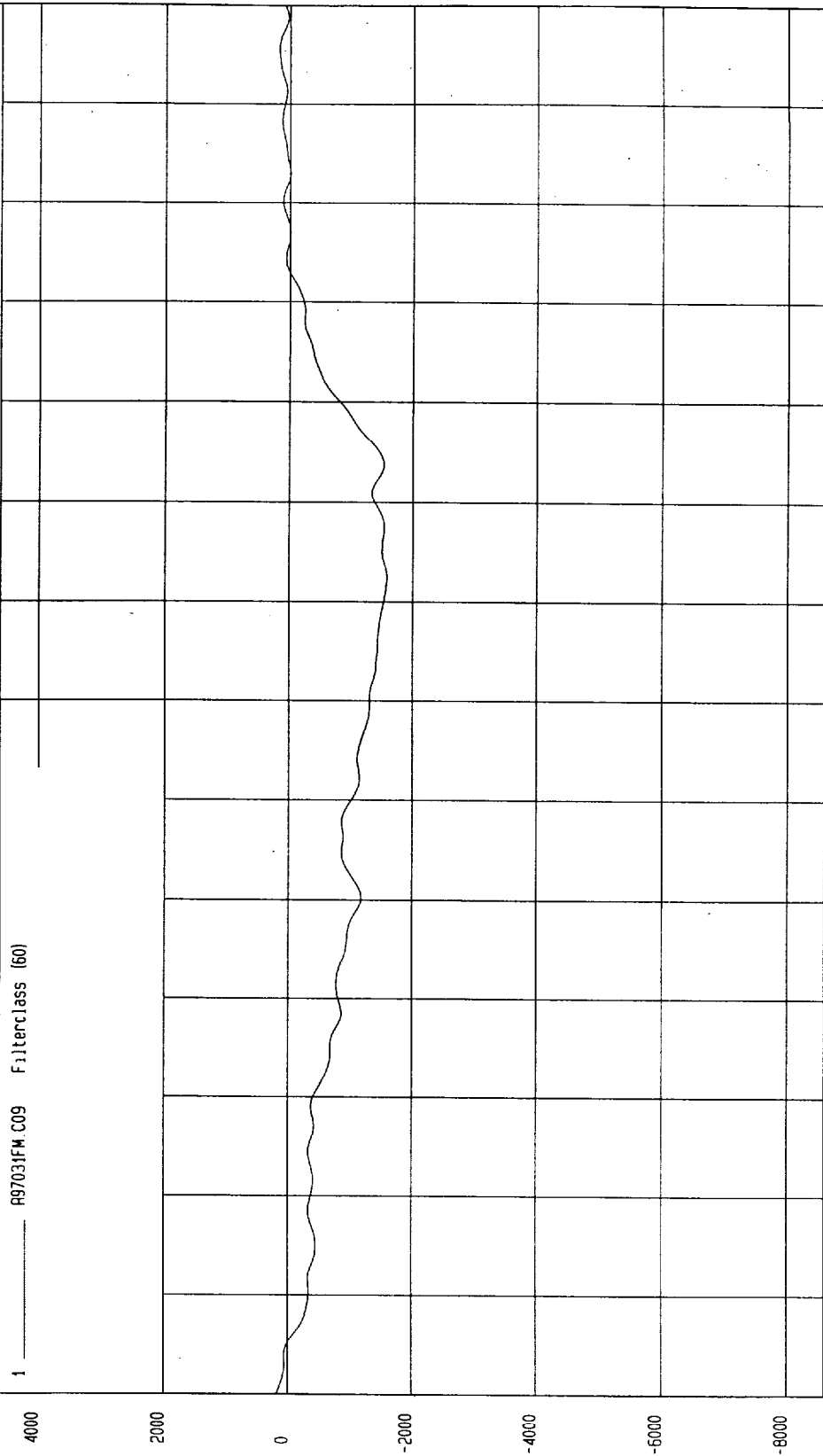
TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

Minimum = -1586.77 N at 82 msec Maximum = 316.96 N at 175 msec

SUMMED Y AXIS FORCES - COLUMN #9

1 ——— R97031FM.C09 Filterclass (60)



MCA Research
03-19-1998 14:27

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

SPEED: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 DEFORMABLE BARRIER

STRINGPOT DISPLACEMENT-COLUMN #10

- 1 — C970310F .037 STRING POT 37
- 2 - - C970310F .038 STRING POT 38
- 3 - - C970310F .039 STRING POT 39
- 4 - - C970310F .040 STRING POT 40

120

100

80

60

40

20

0

MM

19

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

0

TIME (seconds)

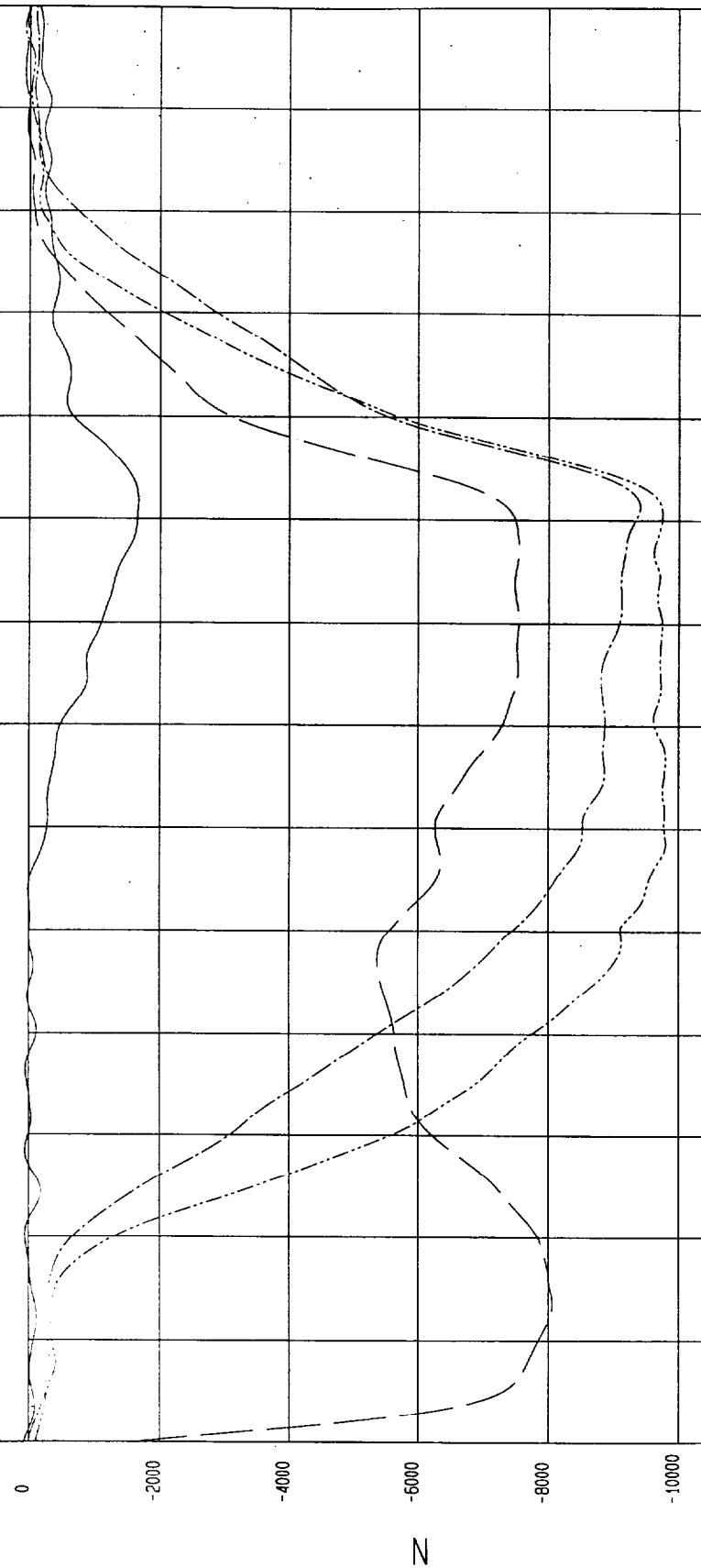
MCA Research
01-24-1998 13.05

TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

X AXIS FORCES - COLUMN #10

- 1 ——— R97031FM.F50 LC #37 FX
- 2 ——— R97031FM.F53 LC #38 FX
- 3 ——— R97031FM.F56 LC #39 FX
- 4 ——— R97031FM.F60 LC #40 FX

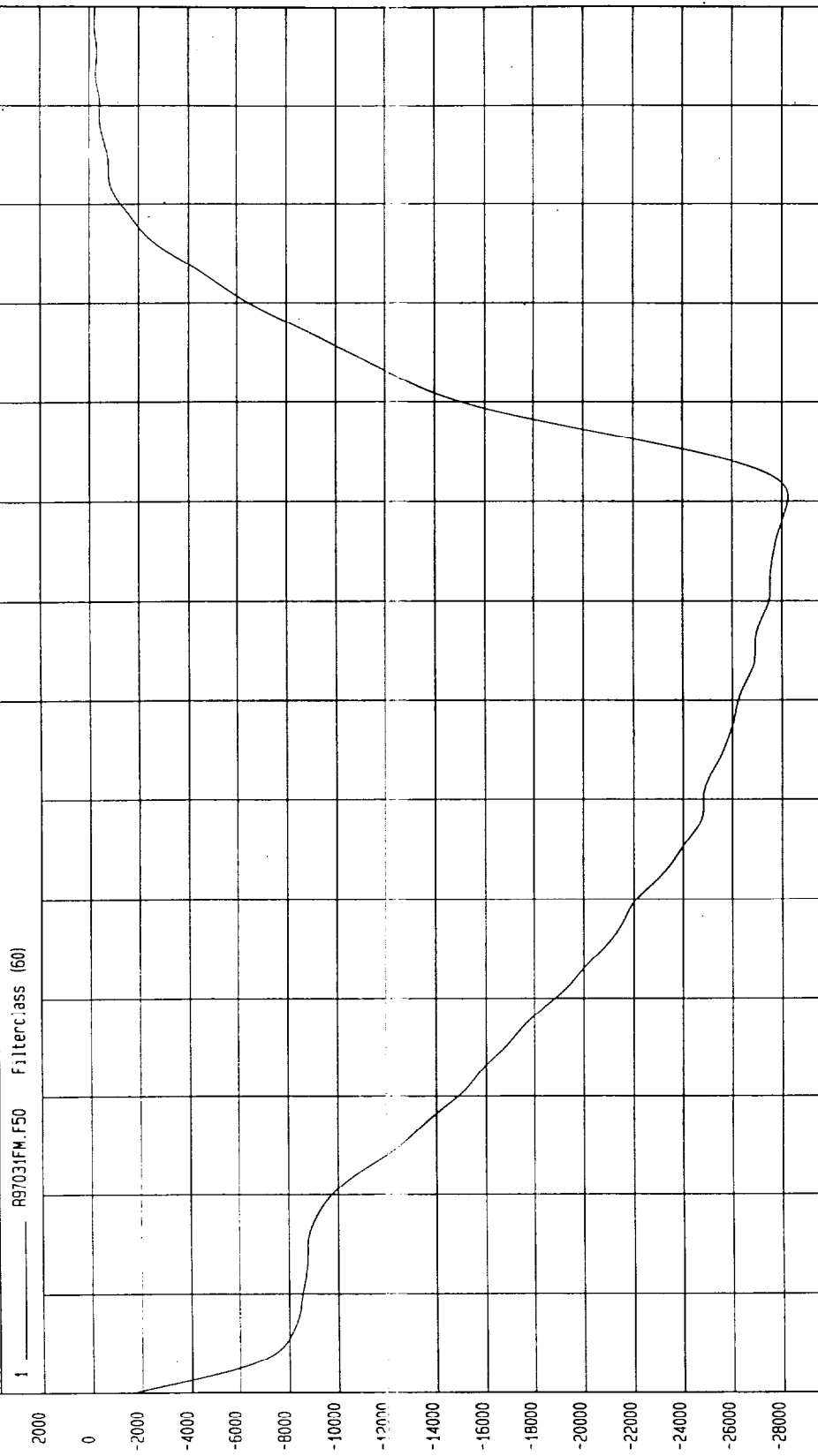


TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

Minimum = -28235.53 N at 90 msec Maximum = 215.18 N at 166 msec

SUMMED X AXIS FORCES - COLUMN #10



TIME (SECONDS)

13
12
11
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0

WGA Research
03-19-1998 14:18

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

Y AXIS FORCES - COLUMN #10

- 1 ——— R97031FM.F48 LC #37 FY
- 2 - - - - R97031FM.F51 LC #38 FY
- 3 - - - - R97031FM.F54 LC #39 FY
- 4 - - - - R97031FM.F58 LC #40 FY

2000

1000

0

-1000

-2000

-3000

-4000

N

0

10

20

30

40

50

60

70

80

90

100

110

120

130

TIME (SECONDS)

NSA Research
03-19-1998 14.23

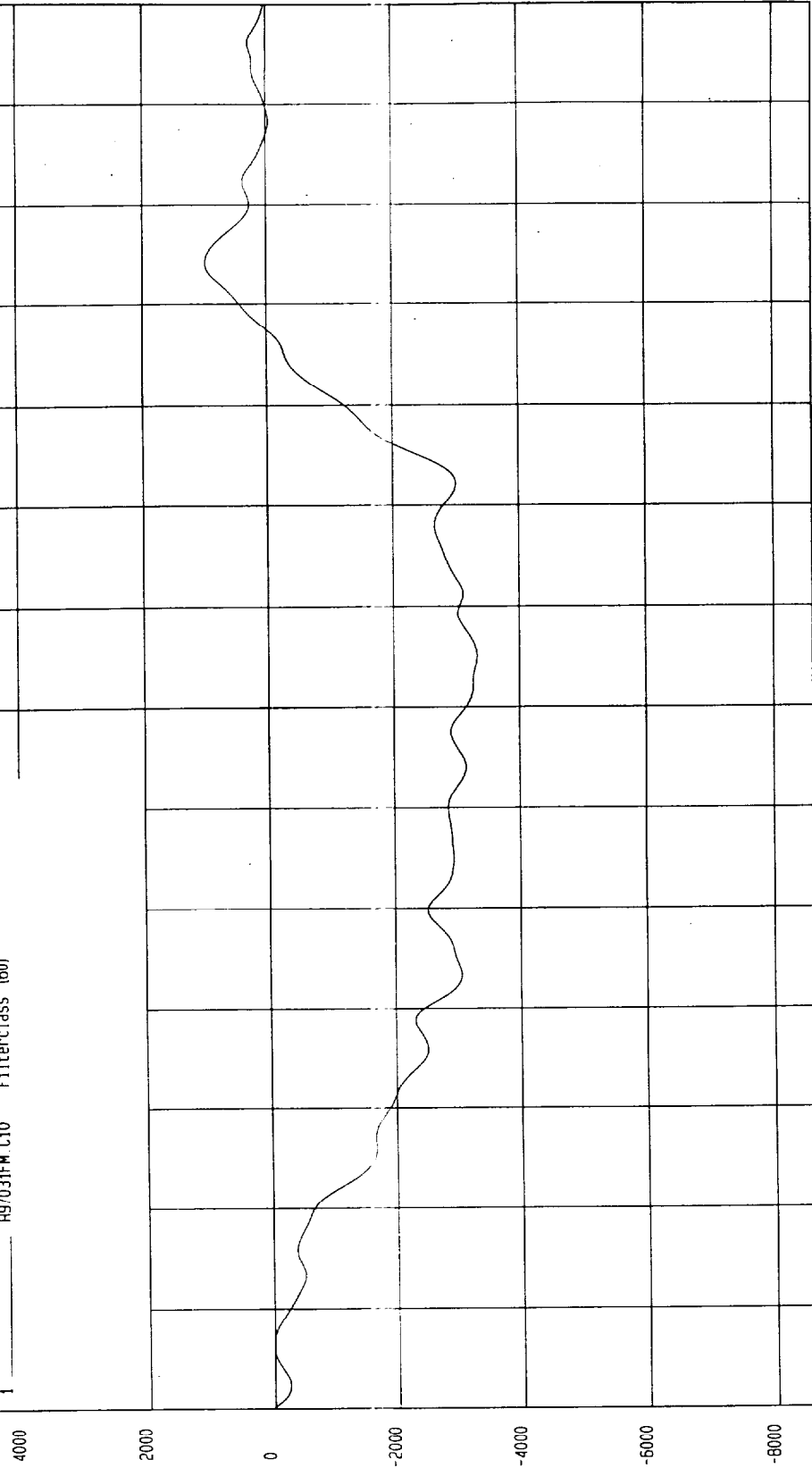
TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

Minimum = -3320.36 N at 75 msec Maximum = 976.22 N at 114 msec

SUMMED Y AXIS FORCES - COLUMN #10

1 A97031FM.C10 Filterclass (60)



MGA Research
03-19-1998 14: 27

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

STRINGPOT DISPLACEMENT-COLUMN #11

- 1 CS7031DF .041 STRING POT 41
- 2 CS7031DF .042 STRING POT 42
- 3 CS7031DF .043 STRING POT 43
- 4 CS7031DF .044 STRING POT 44

120

100

80

60

40

20

0

MM

0

01

02

03

04

05

06

07

08

09

1

11

12

13

14

15

16

17

18

19

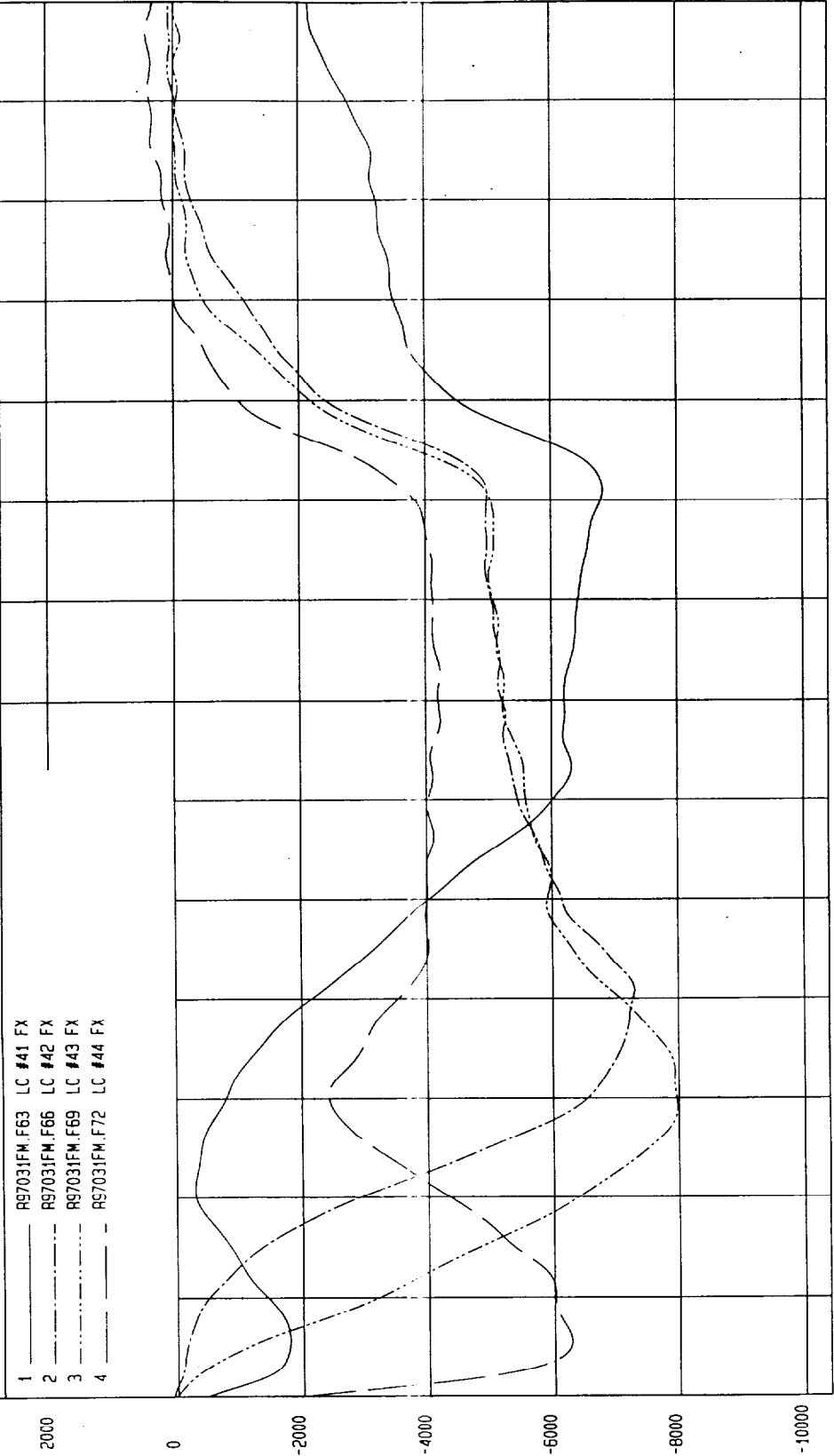
TIME (seconds)

WCA Research
01-24-1998 13:05

TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

X AXIS FORCES - COLUMN #11



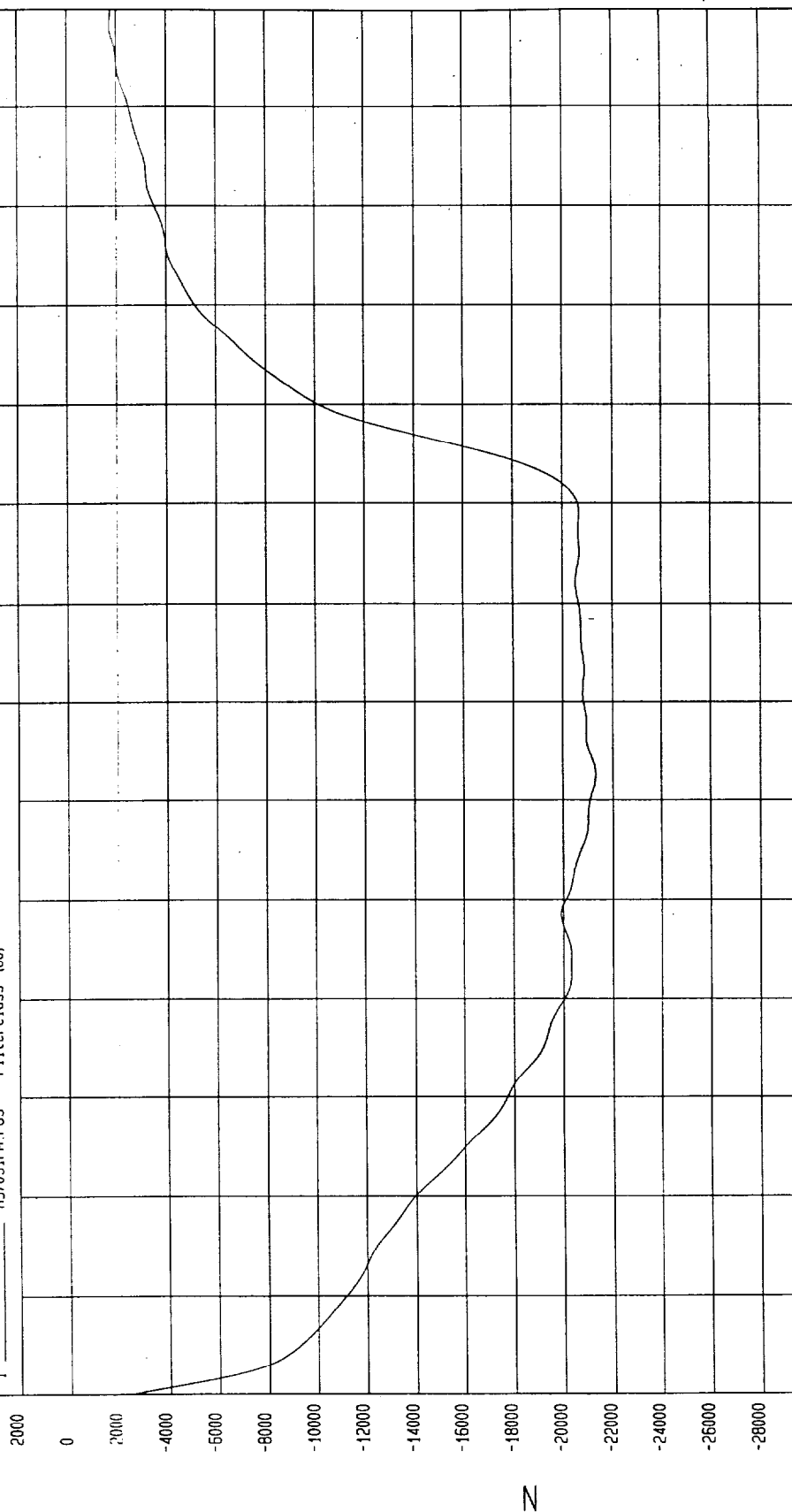
TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

Minimum = -21310.97 N at 63 msec Maximum = 389.21 N at -3 msec

SUMMED X AXIS FORCES - COLUMN #11

1 _____ R97031FM F63 Filterclass (60)



TEST: Test #1 19/60 Cart/Barrier

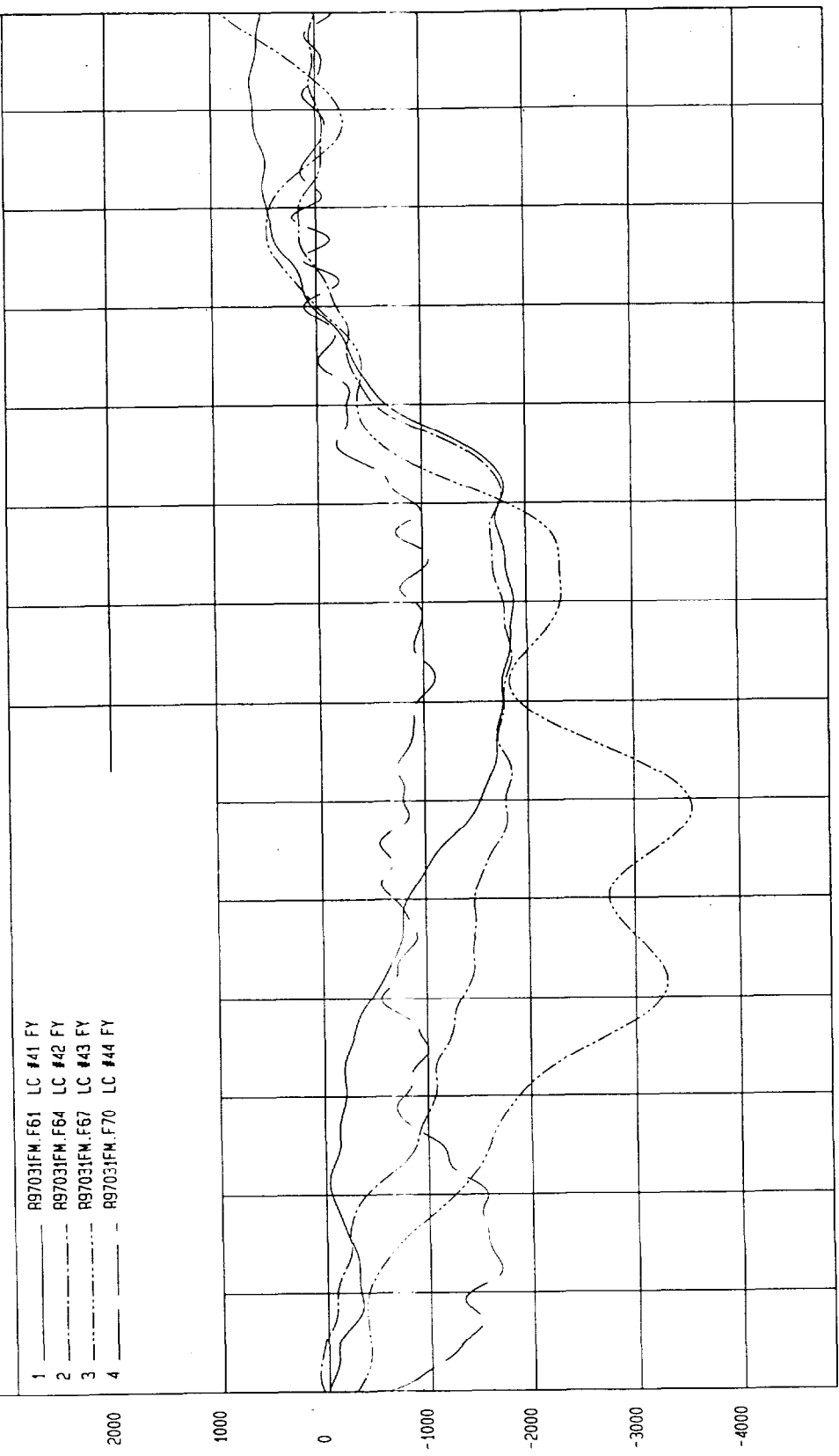
TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

Y AXIS FORCES - COLUMN #11

- 1 ——— R97031FM.F61 LC #41 FY
- 2 ——— R97031FM.F64 LC #42 FY
- 3 - - - - R97031FM.F67 LC #43 FY
- 4 - - - - R97031FM.F70 LC #44 FY



TIME (SECONDS)

MSA Research
03-19-1998 14:23

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

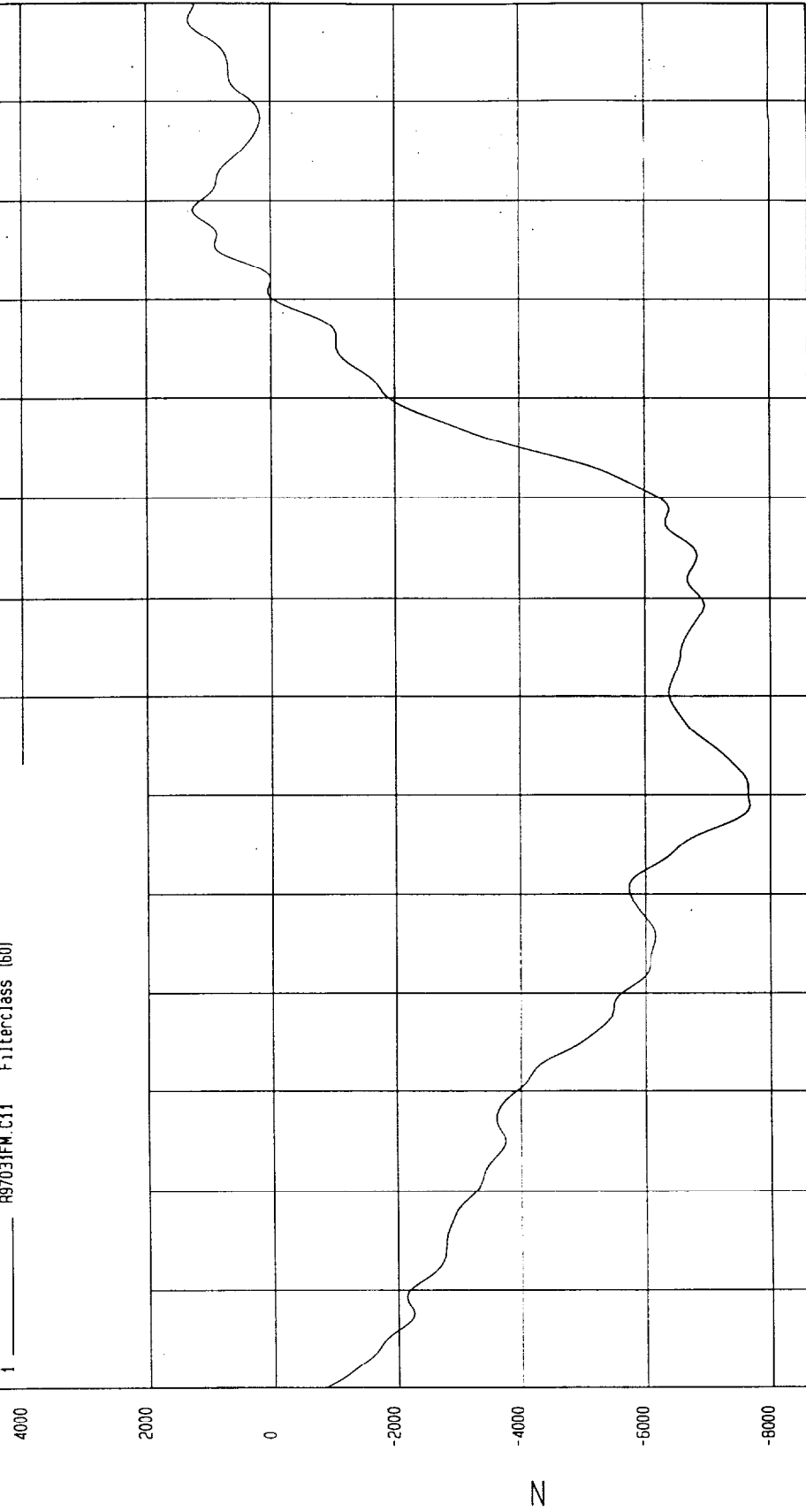
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 1594.83 N at 144 msec

Minimum = -7663.77 N at 59 msec

SUMMED Y AXIS FORCES - COLUMN #11

1 _____ R9703JFM.C11 Filterclass (60)



MGA Research
03-19-1998 14: 28

TIME (SECONDS)

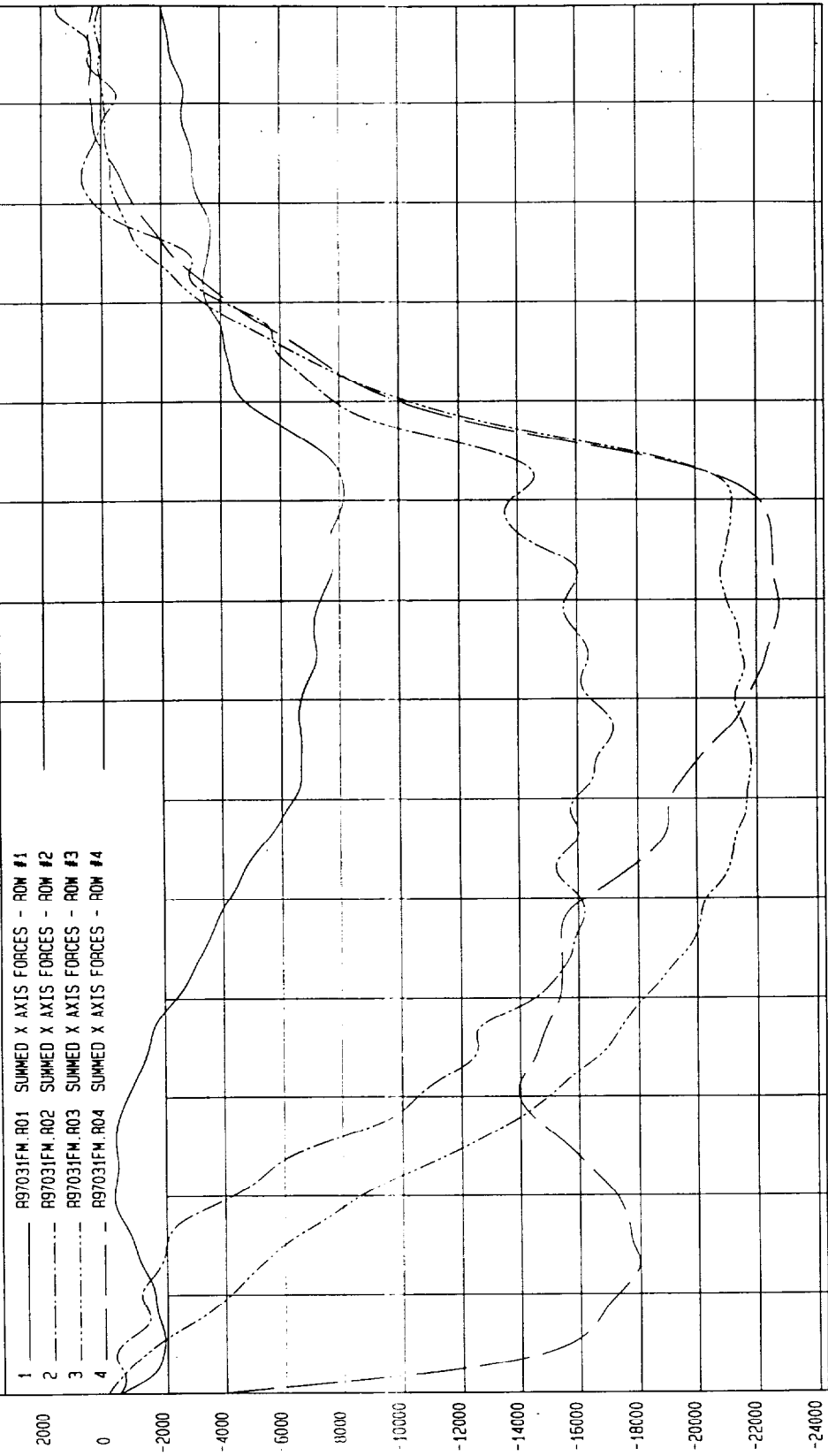
TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

SUMMED X AXIS FORCES - ROWS



TIME (SECONDS)

MGA Research
03-19-1998 14:52

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

SUMMED X AXIS FORCES - COLUMNS

- 1 R97031FM F99 SUMMED X AXIS FORCES - COLUMN #8
- 2 R97031FM F44 SUMMED X AXIS FORCES - COLUMN #9
- 3 R97031FM F50 SUMMED X AXIS FORCES - COLUMN #10
- 4 R97031FM F63 SUMMED X AXIS FORCES - COLUMN #11

2000

0

-2000

-4000

-6000

-8000

-10000

-12000

-14000

-16000

-18000

-20000

-22000

-24000

-26000

-28000

N

0

10

20

30

40

50

60

70

80

90

100

110

120

130

TIME (SECONDS)

MGA Research
03-19-1998 14:55

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

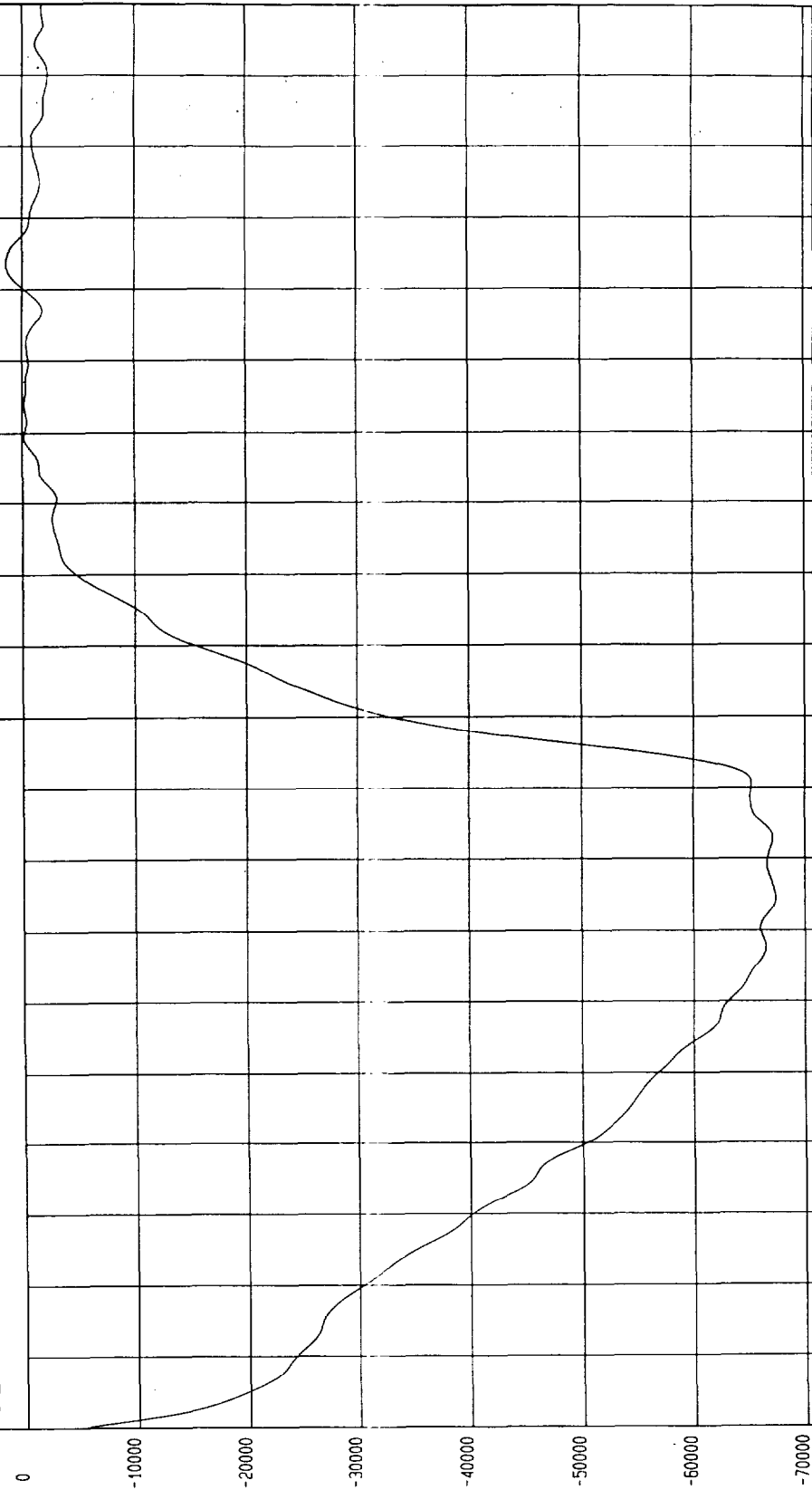
COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 1469.91 N at 164 msec

Minimum = -67403.03 N at 74 msec

TOTAL X AXIS FORCES

1 ——— P97031FM.T01 Filterclass (60)



TIME (SECONDS)

MGA Research
03-19-1998 14:58

TEST: Test #1 19/60 Cart/Barrier

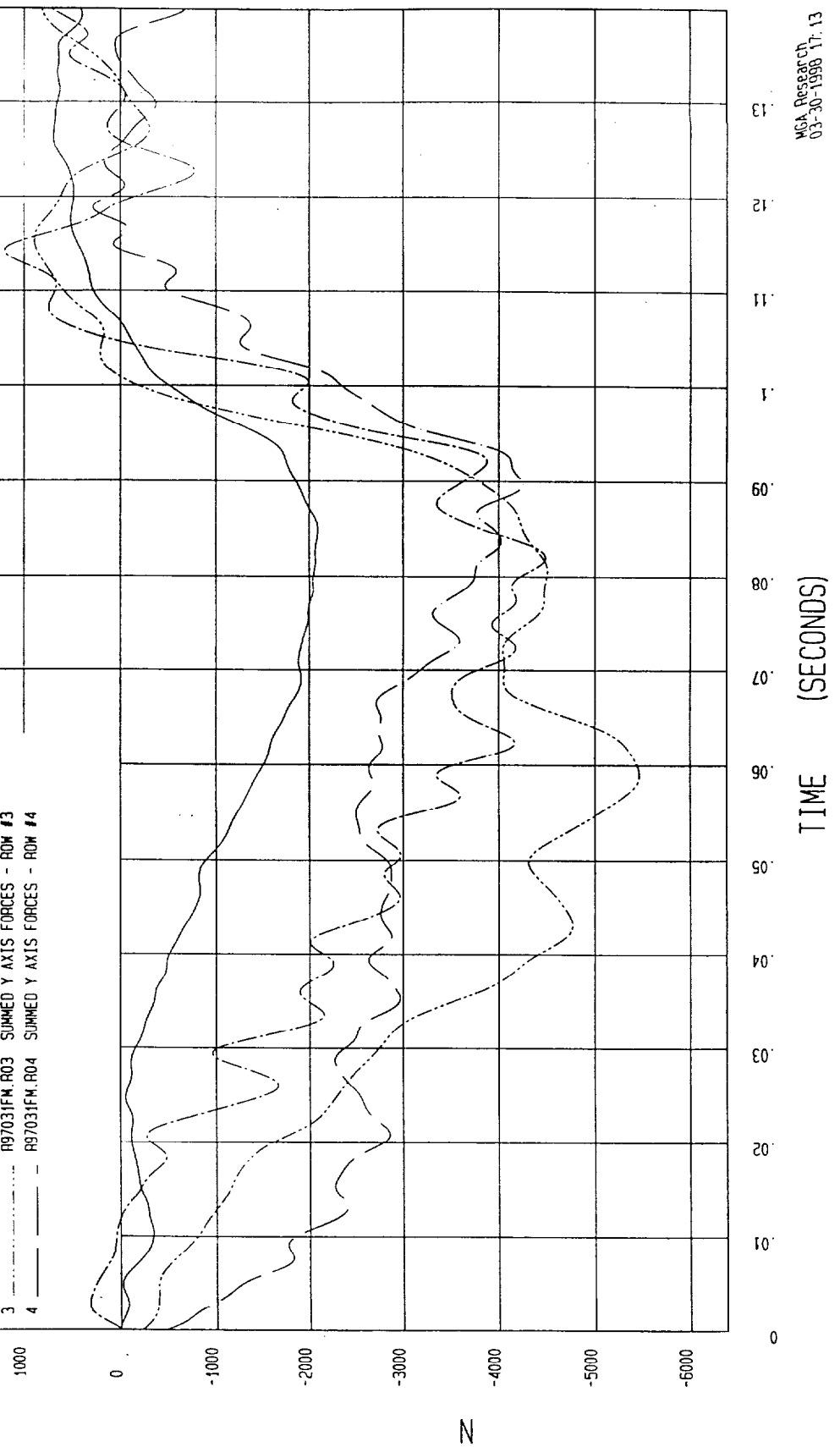
TEST DATE: 02-27-1997

Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

SUMMED Y AXIS FORCES - ROWS

- 1 R97031FM.R01 SUMMED Y AXIS FORCES - ROW #1
- 2 R97031FM.R02 SUMMED Y AXIS FORCES - ROW #2
- 3 R97031FM.R03 SUMMED Y AXIS FORCES - ROW #3
- 4 R97031FM.R04 SUMMED Y AXIS FORCES - ROW #4



MGA Research
03-30-1998 17:13

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

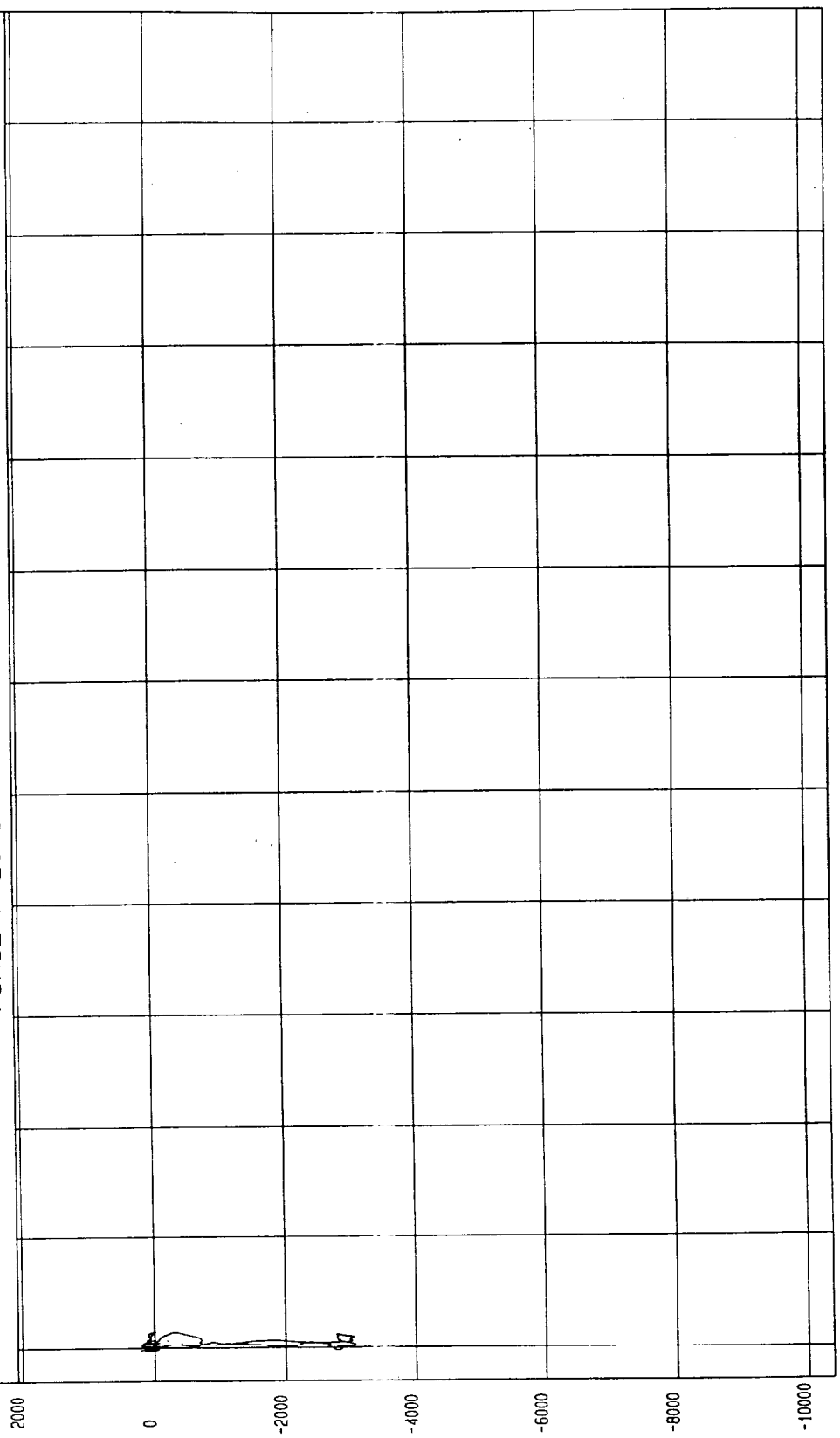
COMPONENT: FMVSS 214 Deformable Barrier

Speed: 13 MPH 20.9 KPH

Minimum = -3083.50 N at 0 MM

Maximum = 213.41 N at 0 MM

FORCE X LOAD CELL #31 VS STRINGPOT #31



LC #31 FX N

STRING POT 31 MM

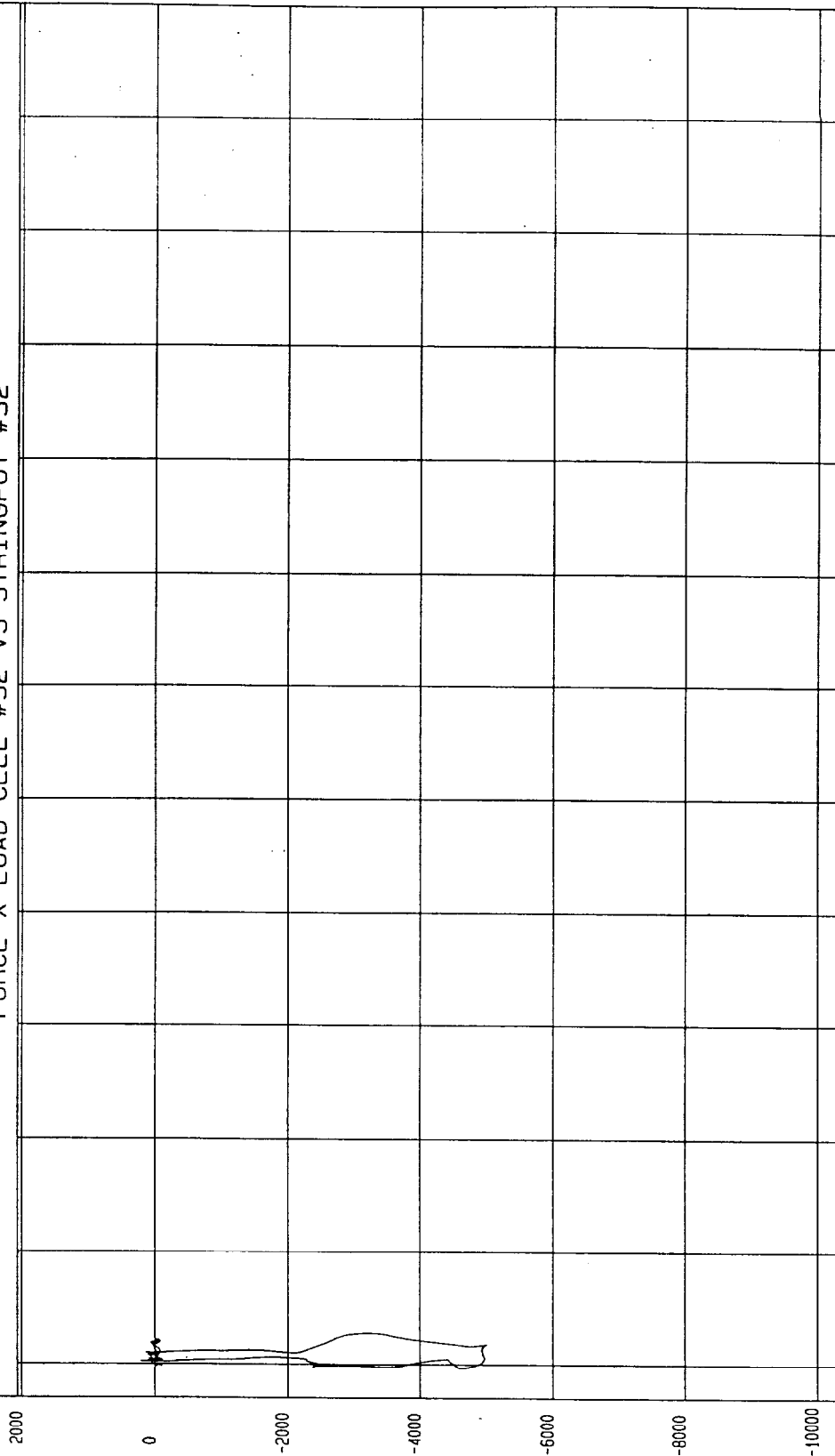
MGA Research
03-27-1998 14:39

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -5018.01 N at 2 MM Maximum = 217.19 N at 0 MM

FORCE X LOAD CELL #32 VS STRINGPOT #32



MGA Research
03-27-1998 14:39

STRING POT 32 MM

TEST: TEST #1 19/60 CART/BARRIER

TEST DATE: 02-27-1997

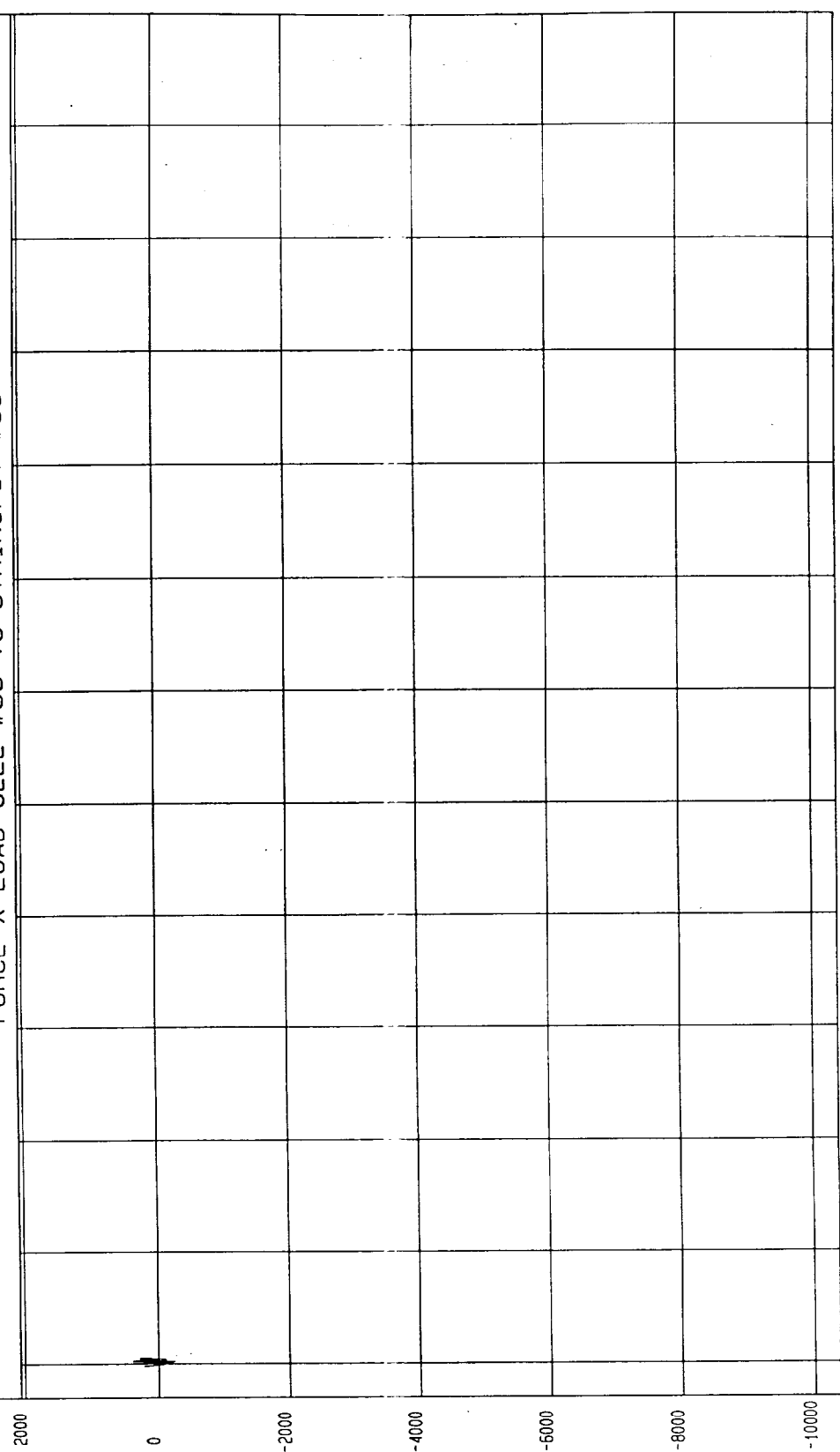
SPEED: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 DEFORMABLE BARRIER

Maximum = 395.18 N at 0 MM

Minimum = -230.24 N at 0 MM

FORCE X LOAD CELL #33 VS STRINGPOT #33



STRING POT 33 MM

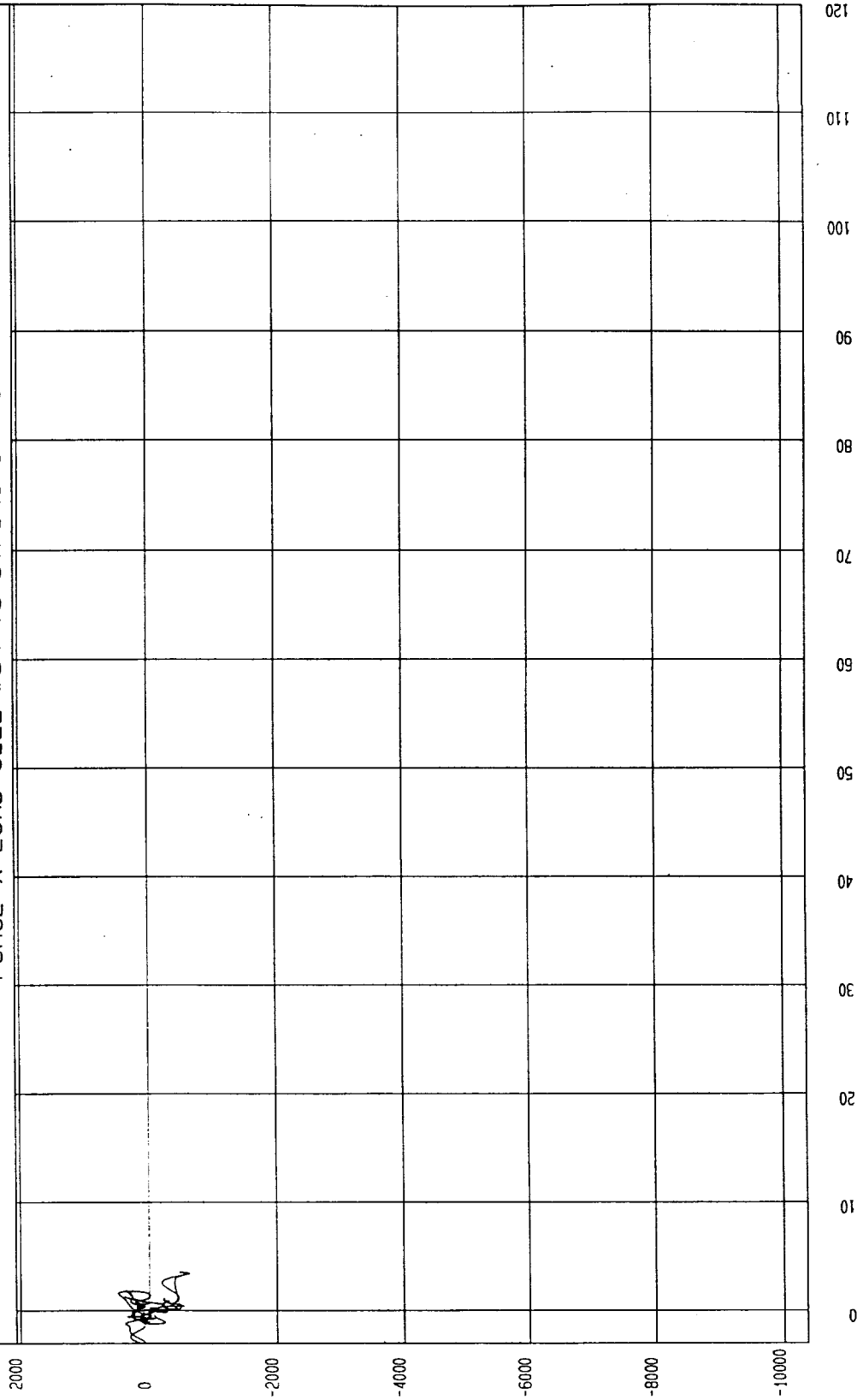
MGA Research
03-27-1998 14:39

TEST: TEST #1 19/60 CART/BARRIER TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 DEFORMABLE BARRIER Speed: 13 MPH 20.9 KPH

Minimum = -634.39 N at 3 MM Maximum = 478.42 N at 2 MM

FORCE X LOAD CELL #34 VS STRINGPOT #34



LC #34 FX N

STRING POT 34 MM

MGA Research
03-27-1998 14:39

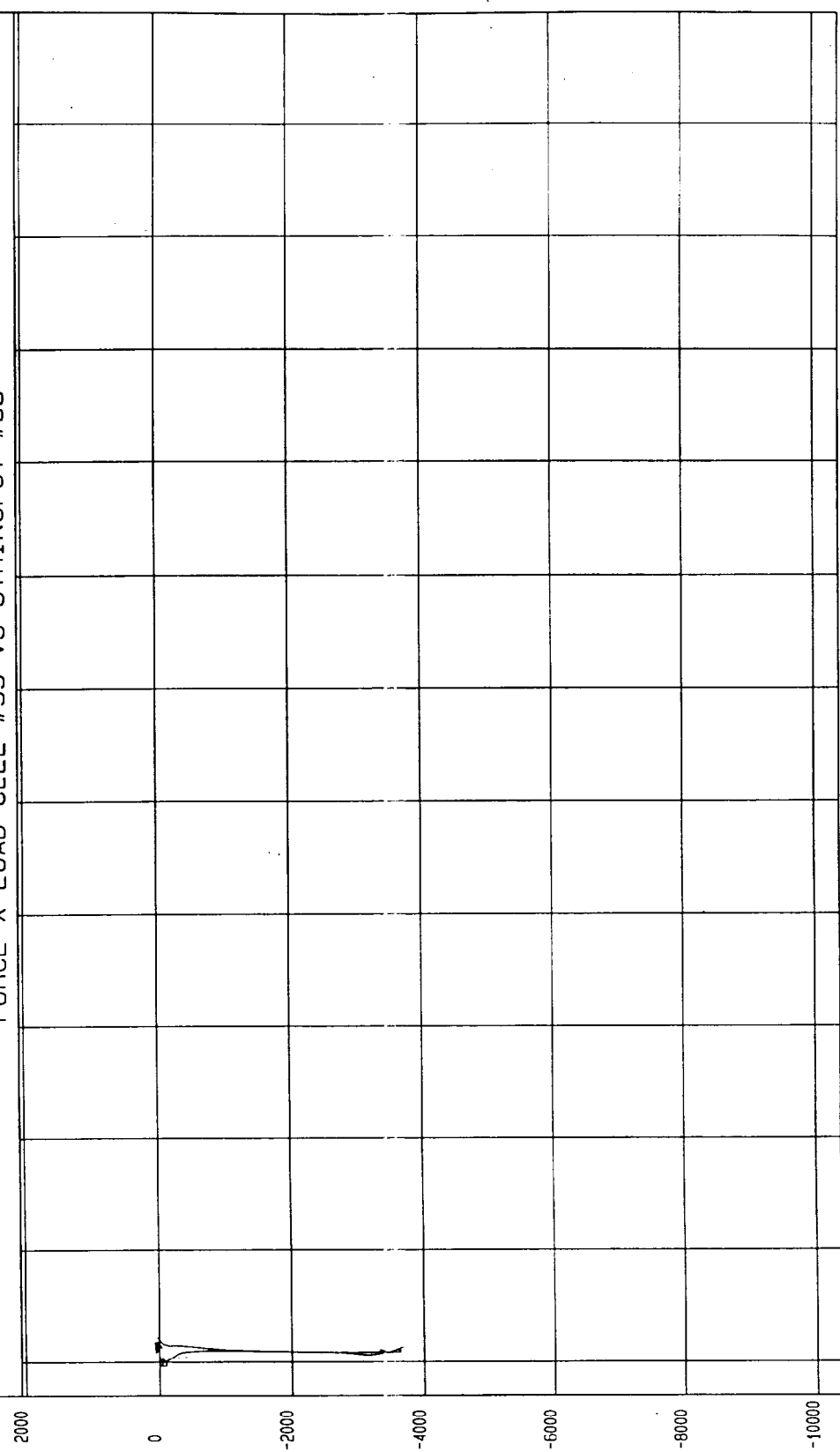
TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

Minimum = -3684.11 N at 1 MM

Maximum = 80.55 N at 2 MM

FORCE X LOAD CELL #35 VS STRINGPOT #35



LC #35 FX N

MGA Research
03-27-1998 14:39

STRING POT 35 MM

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

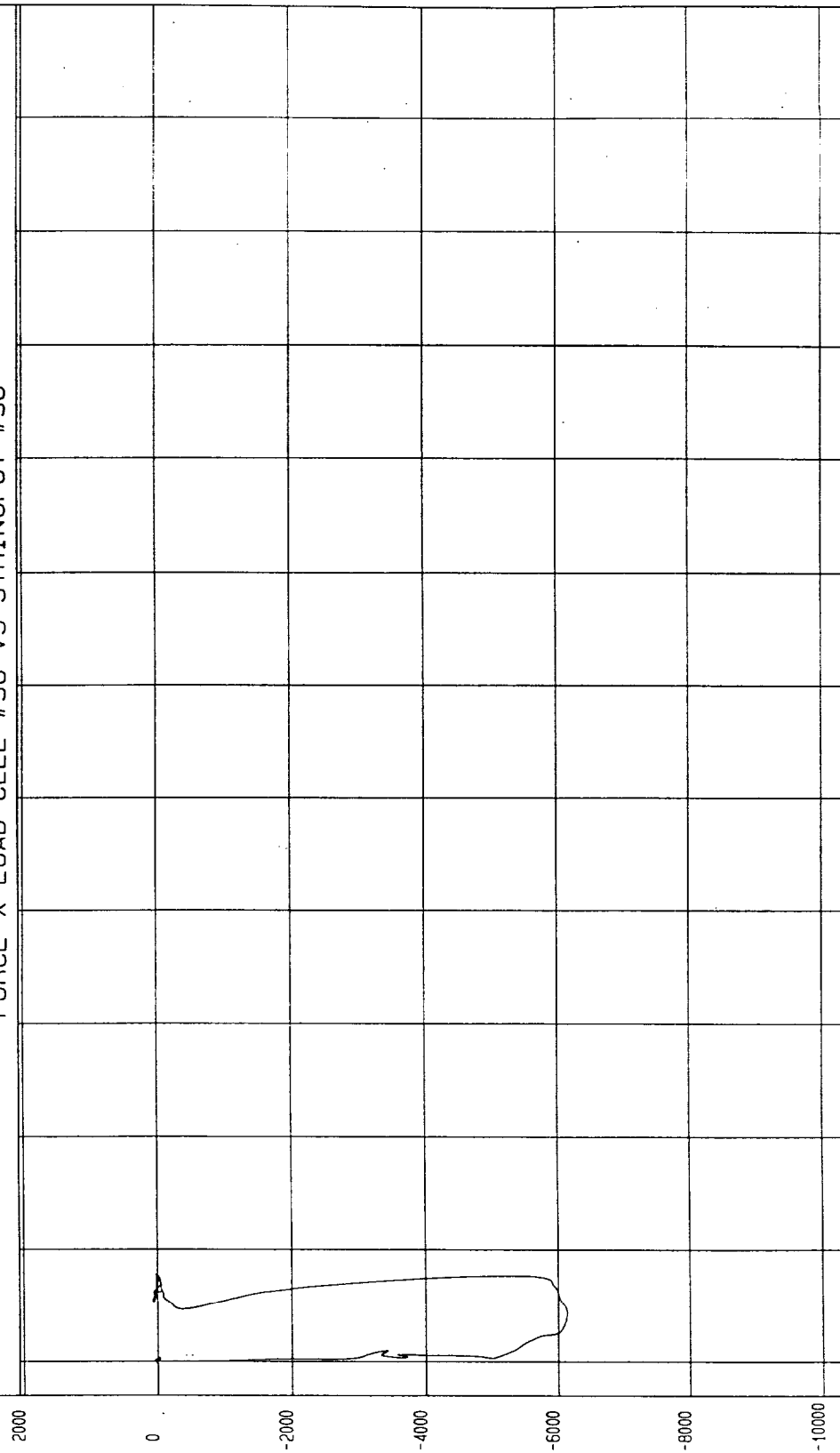
COMPONENT: FMVSS 214 Deformable Barrier

Speed: 13 MPH 20.9 KPH

Minimum = -6136.79 N at 4 MM

Maximum = 74.62 N at 5 MM

FORCE X LOAD CELL #36 VS STRINGPOT #36



STRING POT 36 MM

MGA Research
03-31-1998 14:39

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

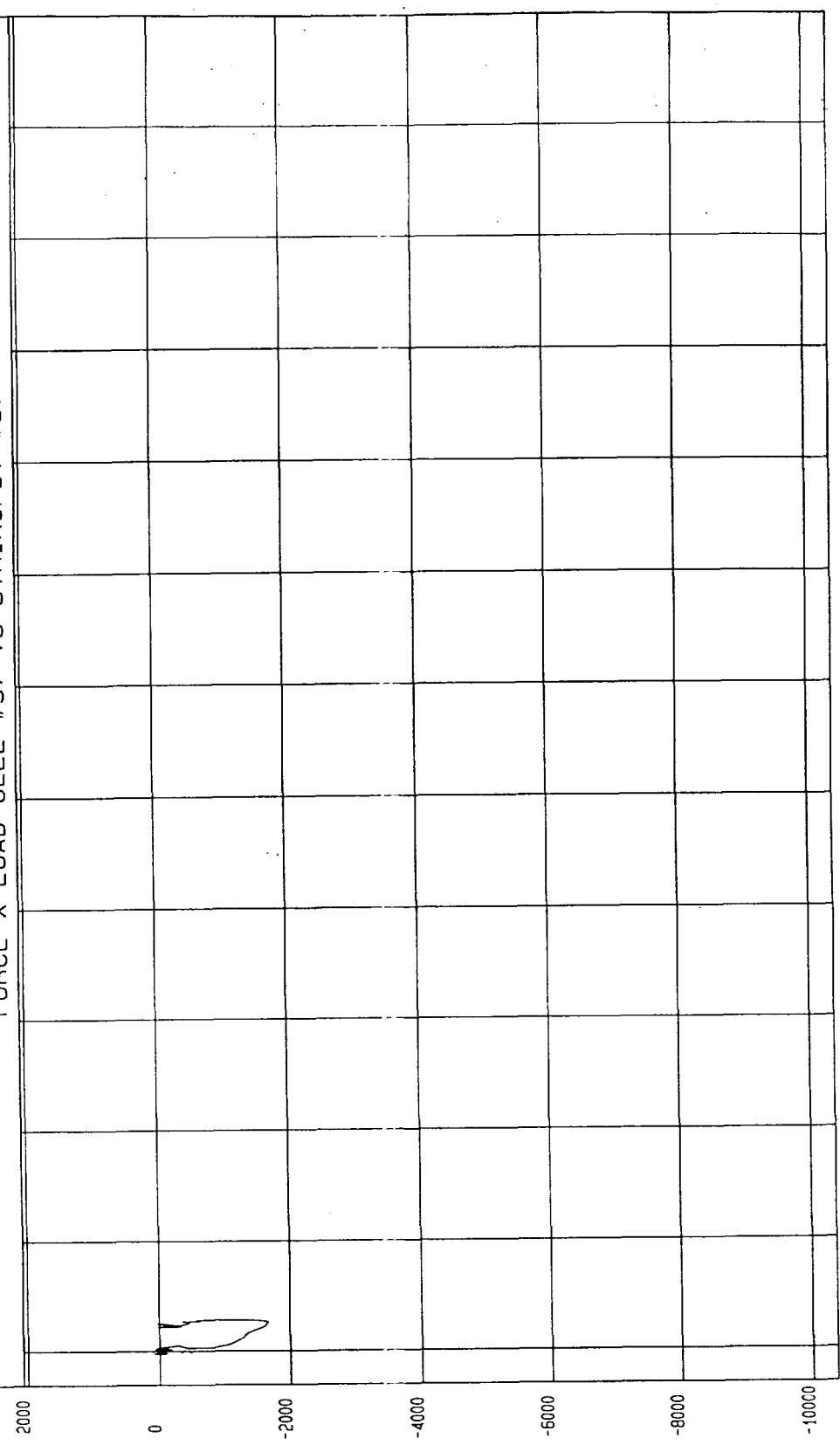
COMPONENT: FMVSS 214 Deformable Barrier

Speed: 13 MPH 20.9 KPH

Minimum = -1672.57 N at 3 MM

Maximum = 82.94 N at 0 MM

FORCE X LOAD CELL #37 VS STRINGPOT #37



LC #37 FX N

MGA Research
03-27-1998 14:40

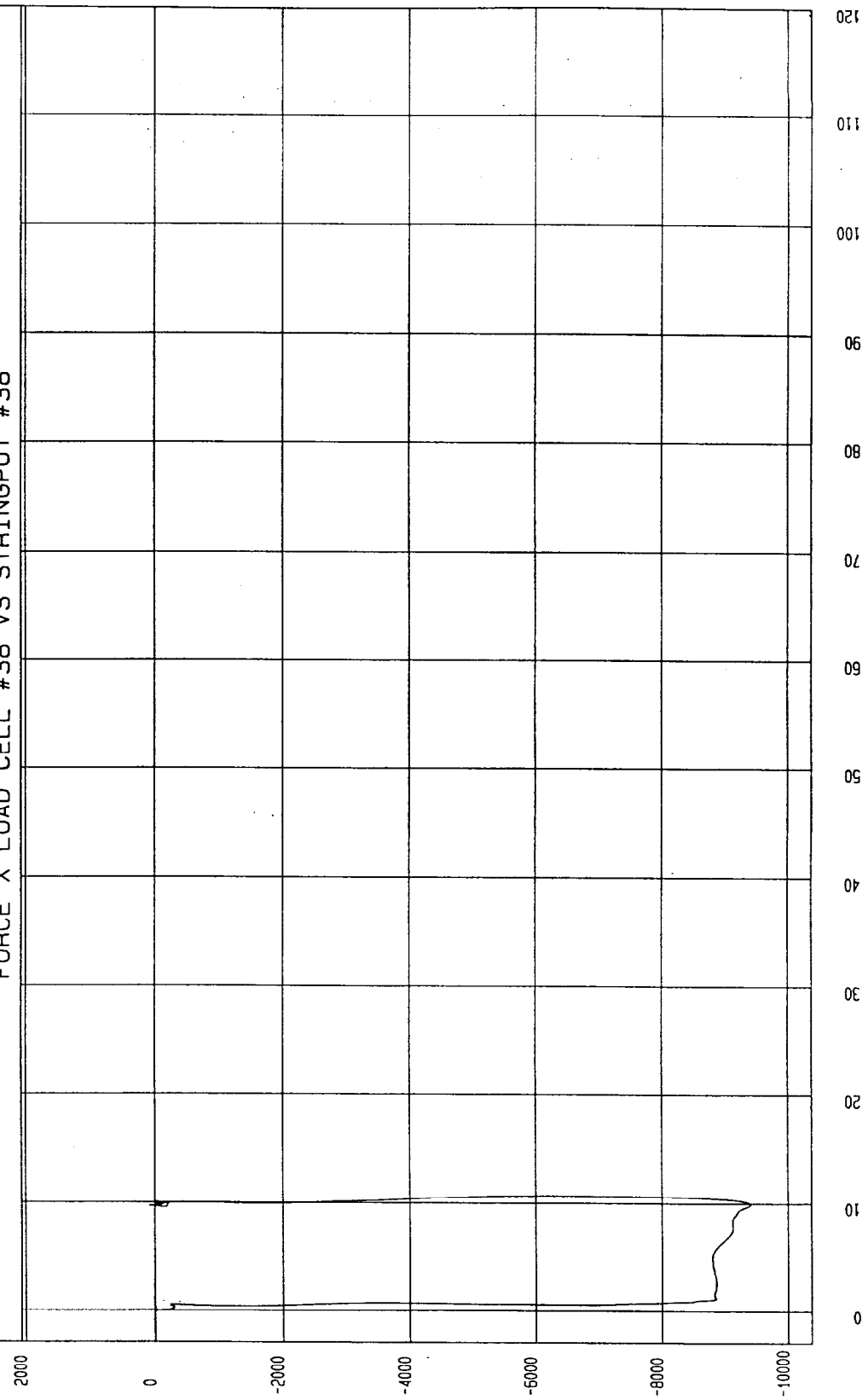
STRING POT 37 MM

TEST: Test #1 19/60 Cart/Barrier TEST DATE: 02-27-1997

COMPONENT: FMVSS 214 Deformable Barrier Speed: 13 MPH 20.9 KPH

Minimum = -9404.98 N at 10 MM Maximum = 90.28 N at 10 MM

FORCE X LOAD CELL #38 VS STRINGPOT #38



STRING POT 38 MM

MGA Research
03-27-1998 14:40

LC #38 FX N

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

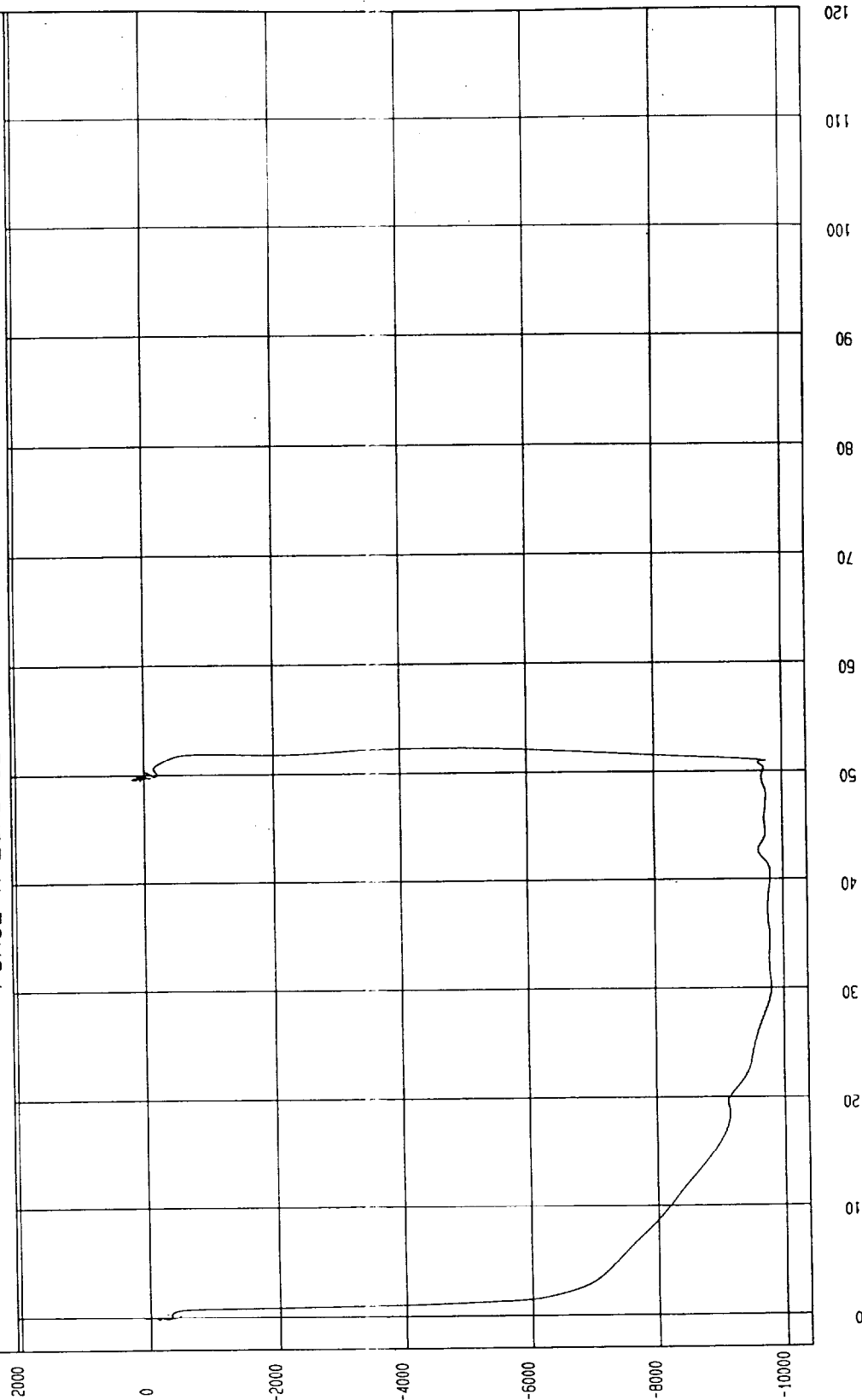
Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 185.92 N at 50 MM

Minimum = -9803.95 N at 30 MM

FORCE X LOAD CELL #39 VS STRINGPOT #39



MGA Research
03-27-1998 14: 40

STRING POT 39 MM

LC #39 FX N

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

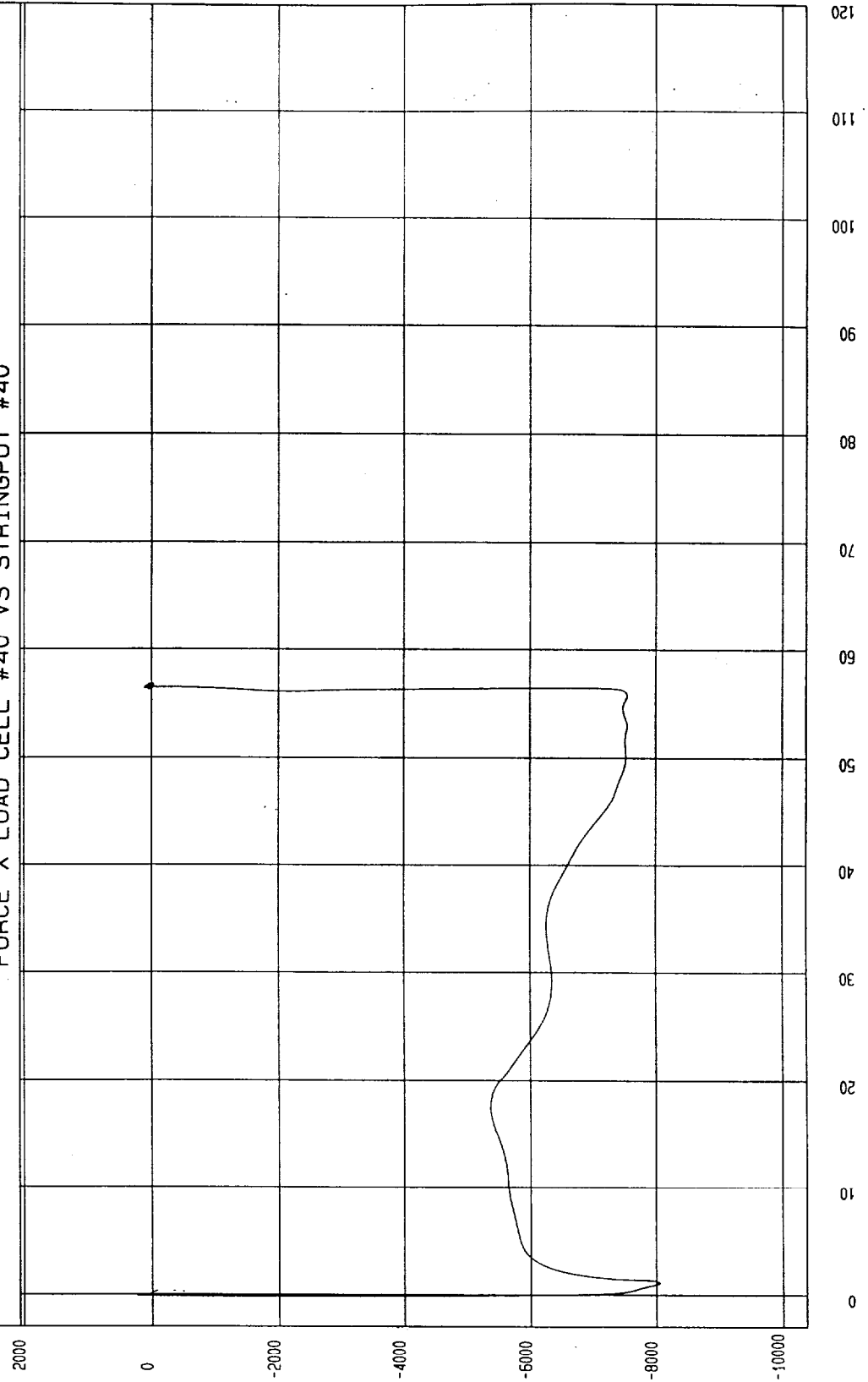
COMPONENT: FMVSS 214 Deformable Barrier

Speed: 13 MPH 20.9 KPH

Minimum = -8059.05 N at 1 MM

Maximum = 237.90 N at 0 MM

FORCE X LOAD CELL #40 VS STRINGPOT #40



STRING POT 40 MM

NCA Research
03-27-1998 14.40

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

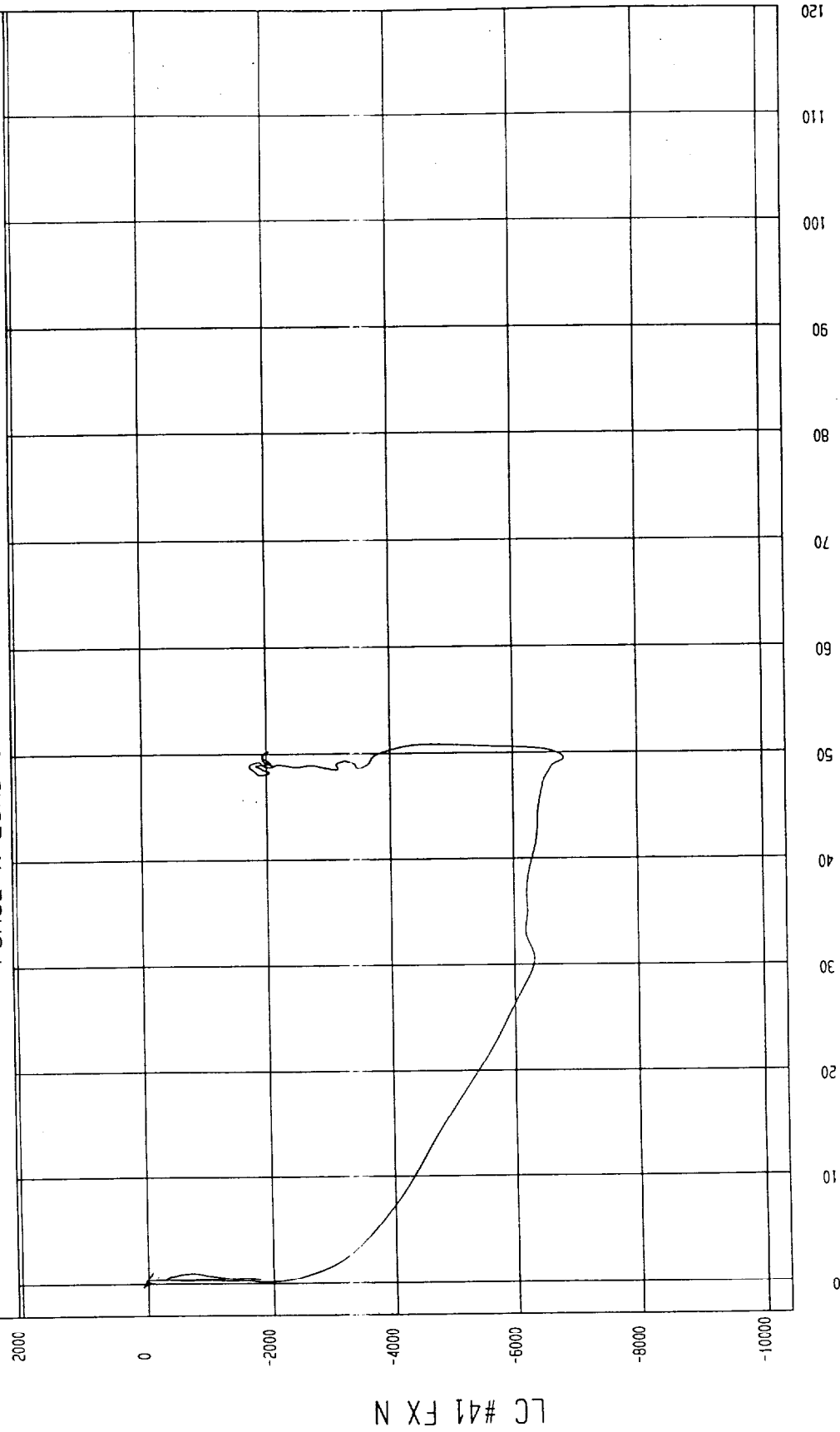
Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 84.46 N at 0 MM

Minimum = -6812.50 N at 49 MM

FORCE X LOAD CELL #41 VS STRINGPOT #41



MCA Research
03-27-1998 14.40

STRING POT 41 MM

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

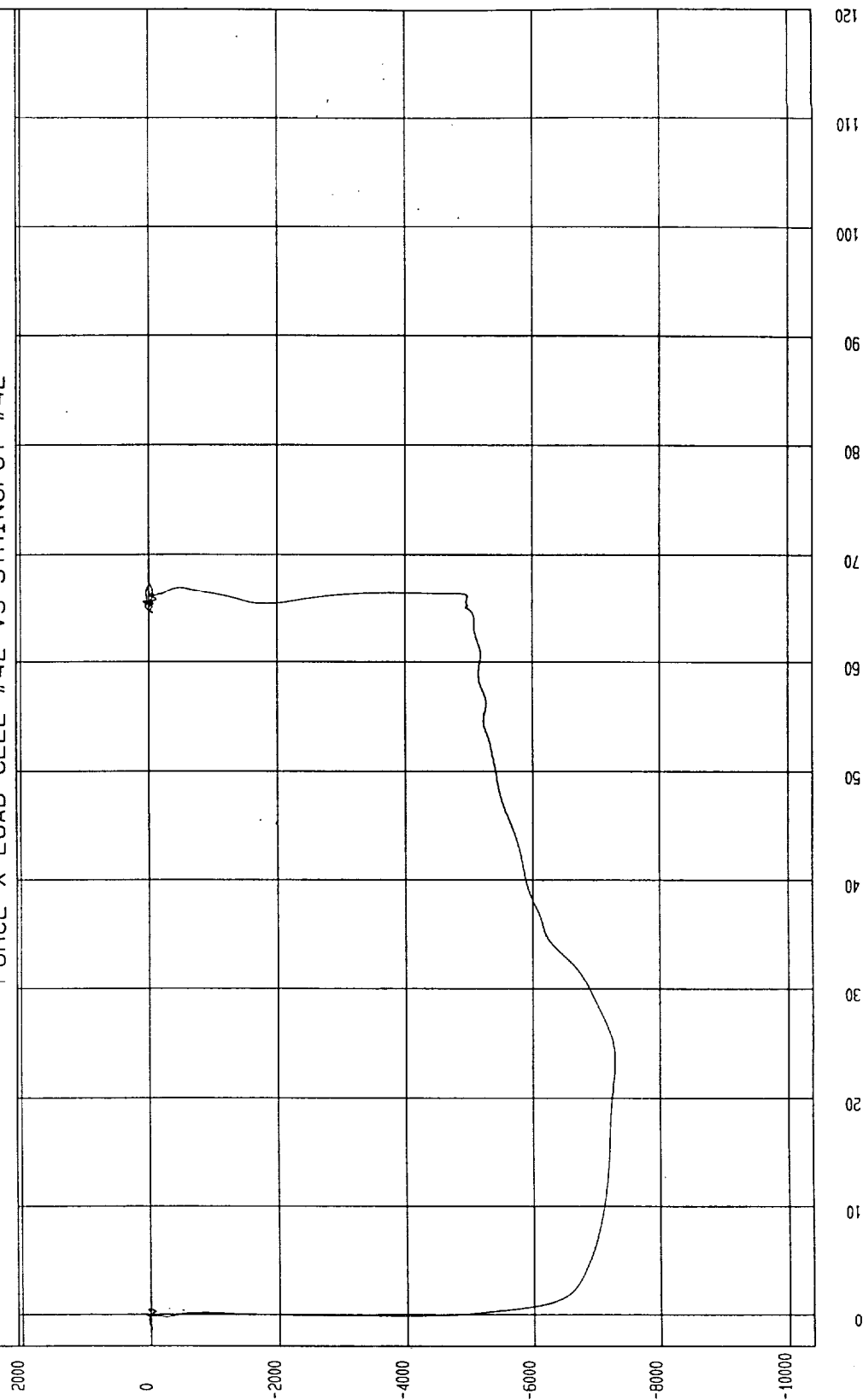
Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 91.66 N at 66 MM

Minimum = -7289.30 N at 23 MM

FORCE X LOAD CELL #42 VS STRINGPOT #42



STRING POT 42 MM

MCA Research
03-27-1998 14:40

LC #42 FX N

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

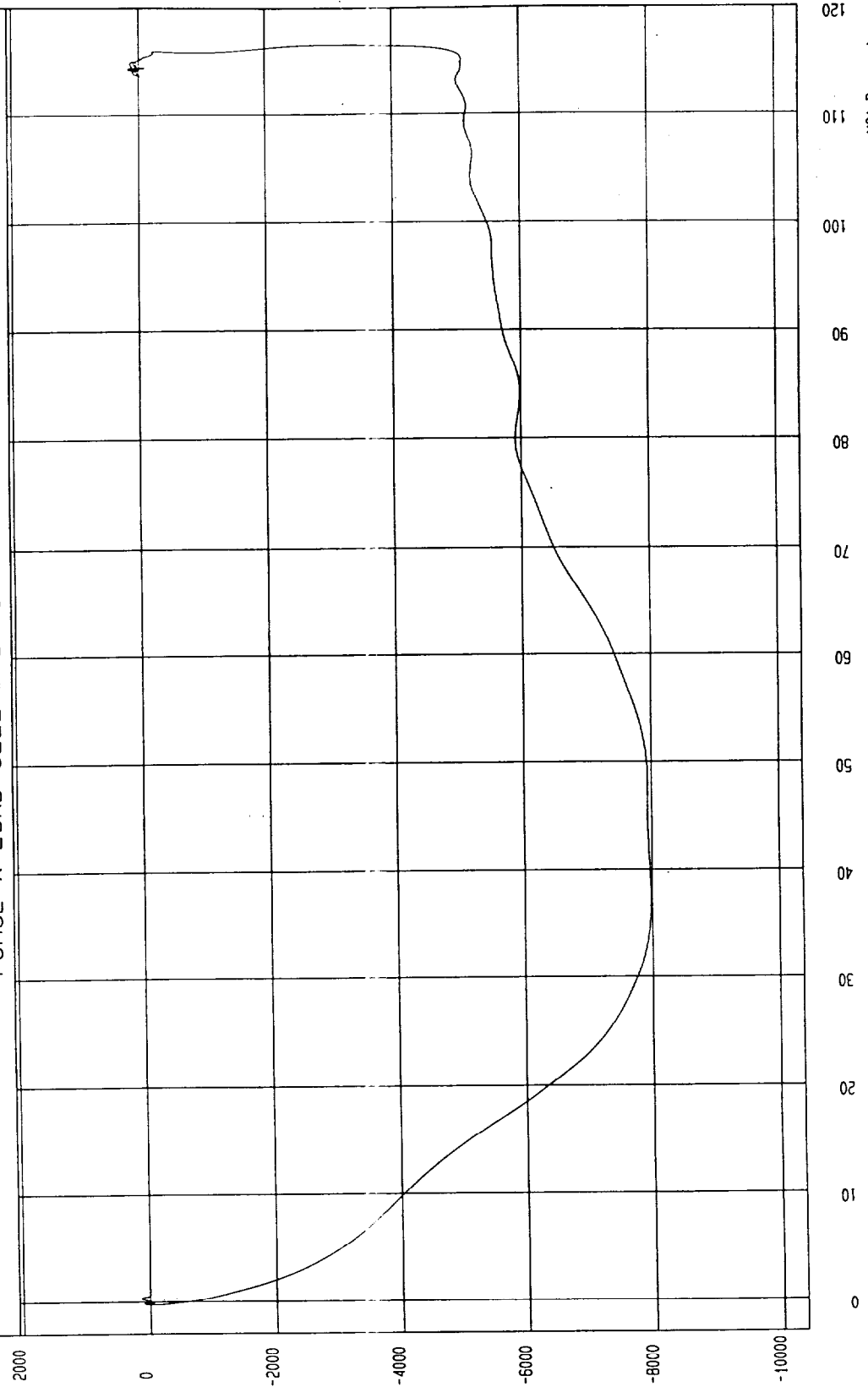
Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 163.80 N at 114 MM

Minimum = -7978.08 N at 37 MM

FORCE X LOAD CELL #43 VS STRINGPOT #43

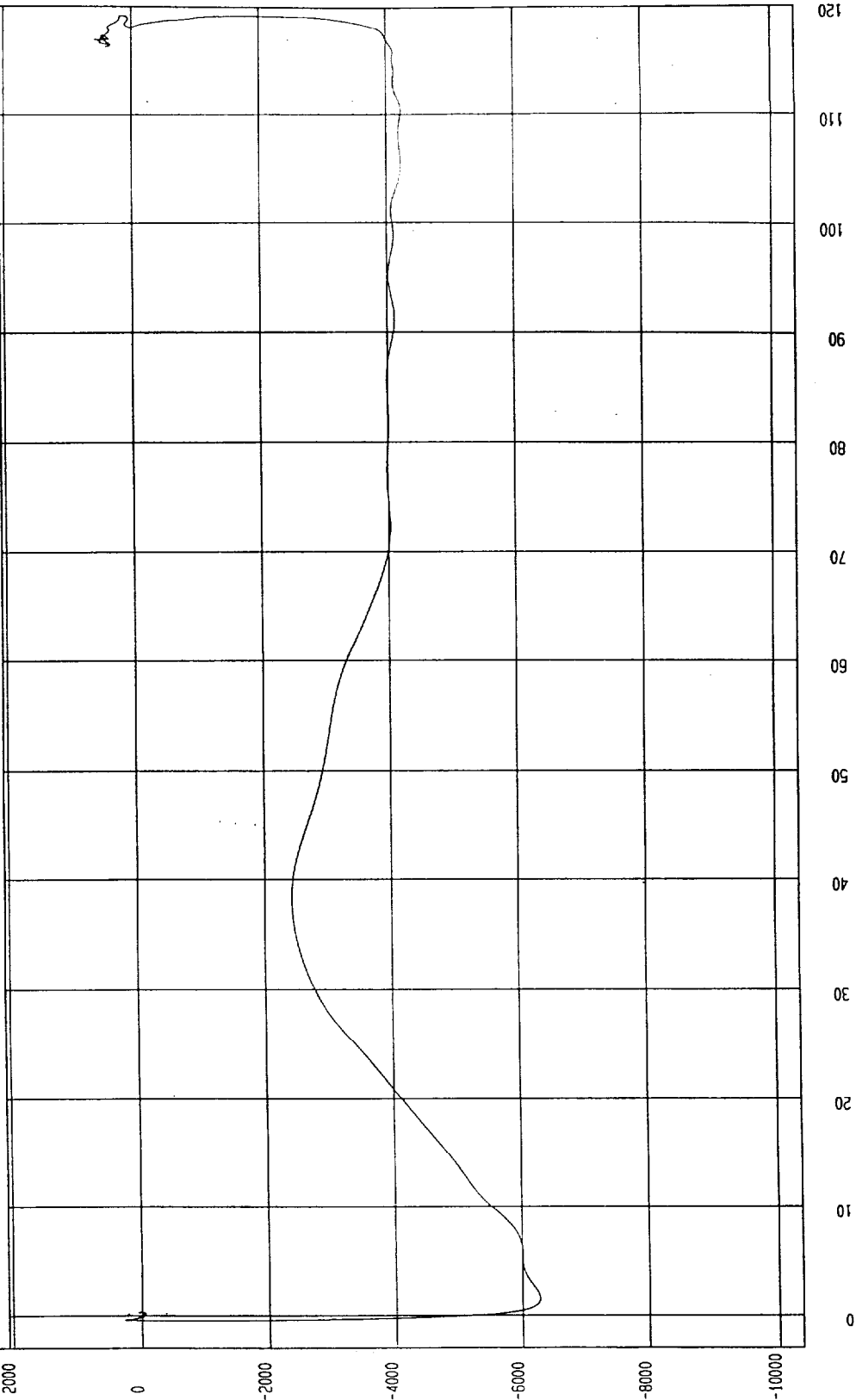


STRING POT 43 MM

MGA Research
03-27-1998 14:40

LC #43 FX N

TEST: Test #1 19/60 Cart/Barrier	TEST DATE: 02-27-1997
COMPONENT: FMVSS 214 Deformable Barrier	Speed: 13 MPH 20.9 KPH
Minimum = -6271.49 N at 1 MM	Maximum = 545.05 N at 117 MM
FORCE X LOAD CELL #44 VS STRINGPOT #44	



STRING POT 44 MM

MGA Research
03-27-1998 14:40

LC #44 FX N

TEST: TEST #1 19/60 CART/BARRIER

TEST DATE: 02-27-1997

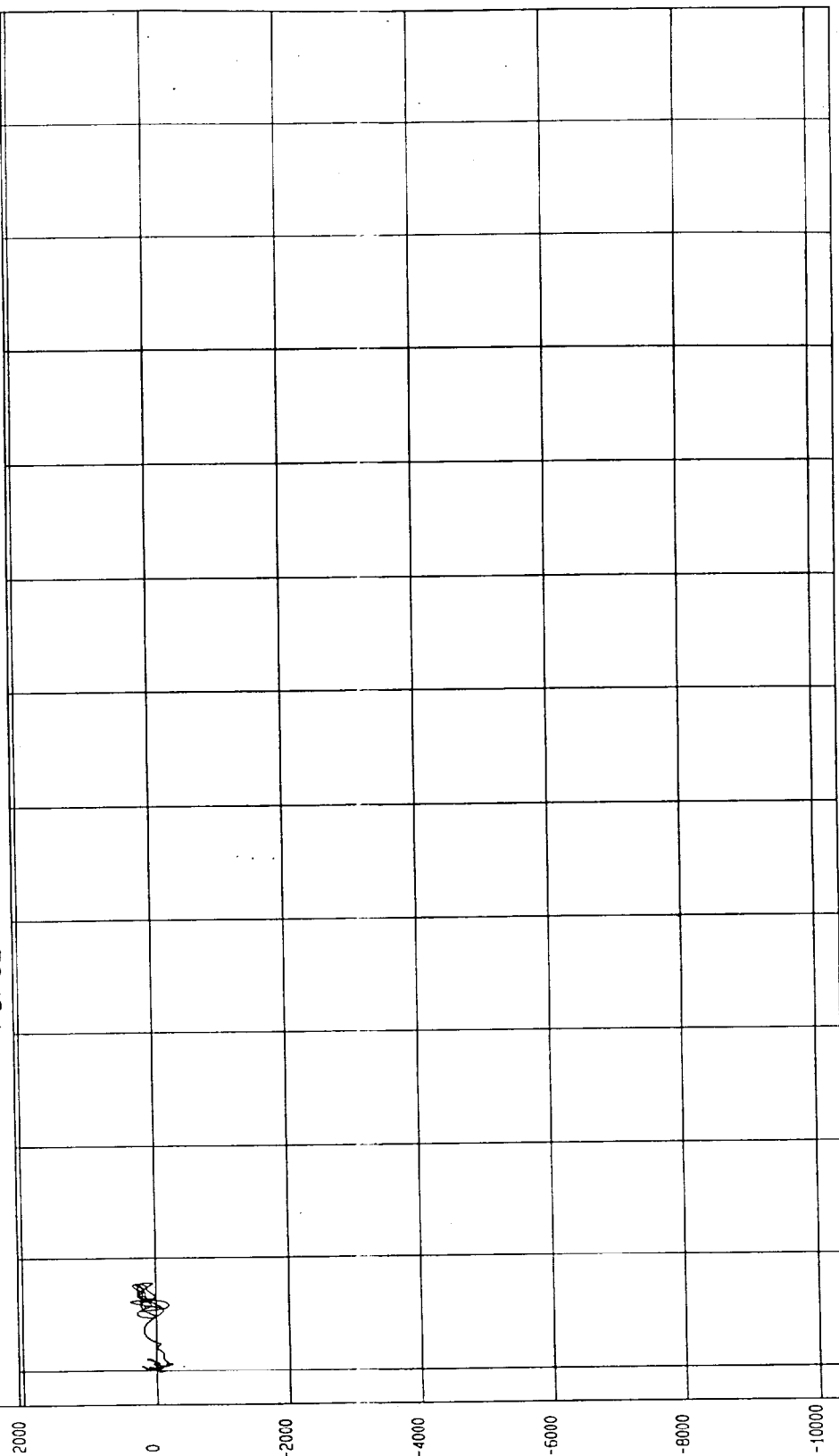
Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 DEFORMABLE BARRIER

Maximum = 395.18 N at 6 MM

Minimum = -238.24 N at 1 MM

FORCE X LOAD CELL #33 VS STRINGPOT #36



LC #33 FX N

MGA Research
03-31-1998 14:39

STRING POT 36 MM

TEST: TEST #1 19/60 CART/BARRIER

TEST DATE: 02-27-1997

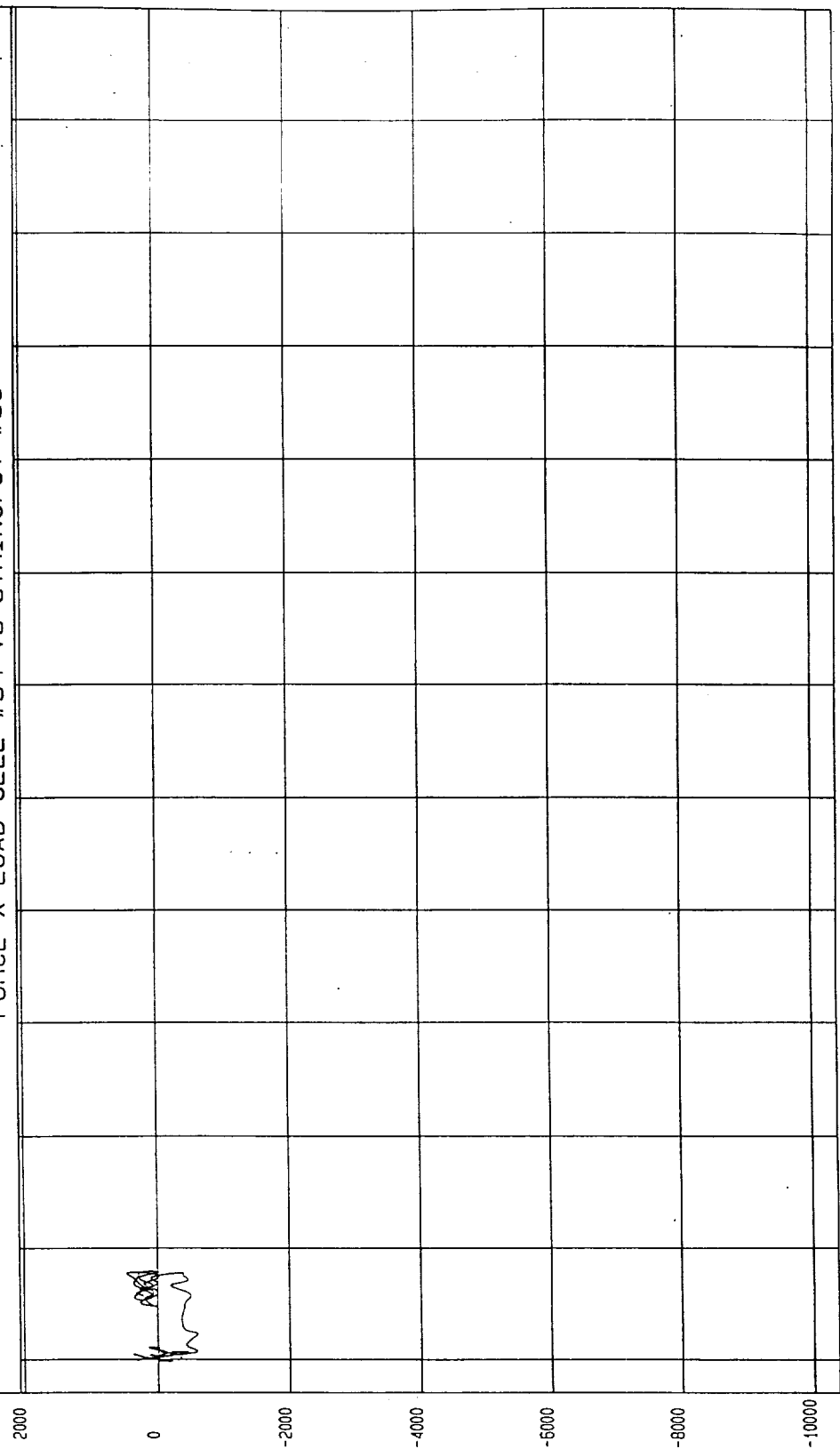
Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 DEFORMABLE BARRIER

Maximum = 478.42 N at 8 MM

Minimum = -634.39 N at 2 MM

FORCE X LOAD CELL #34 VS STRINGPOT #36



LC #34 FX N

STRING POT 36 MM

MCA Research
03-31-1998 14:39

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

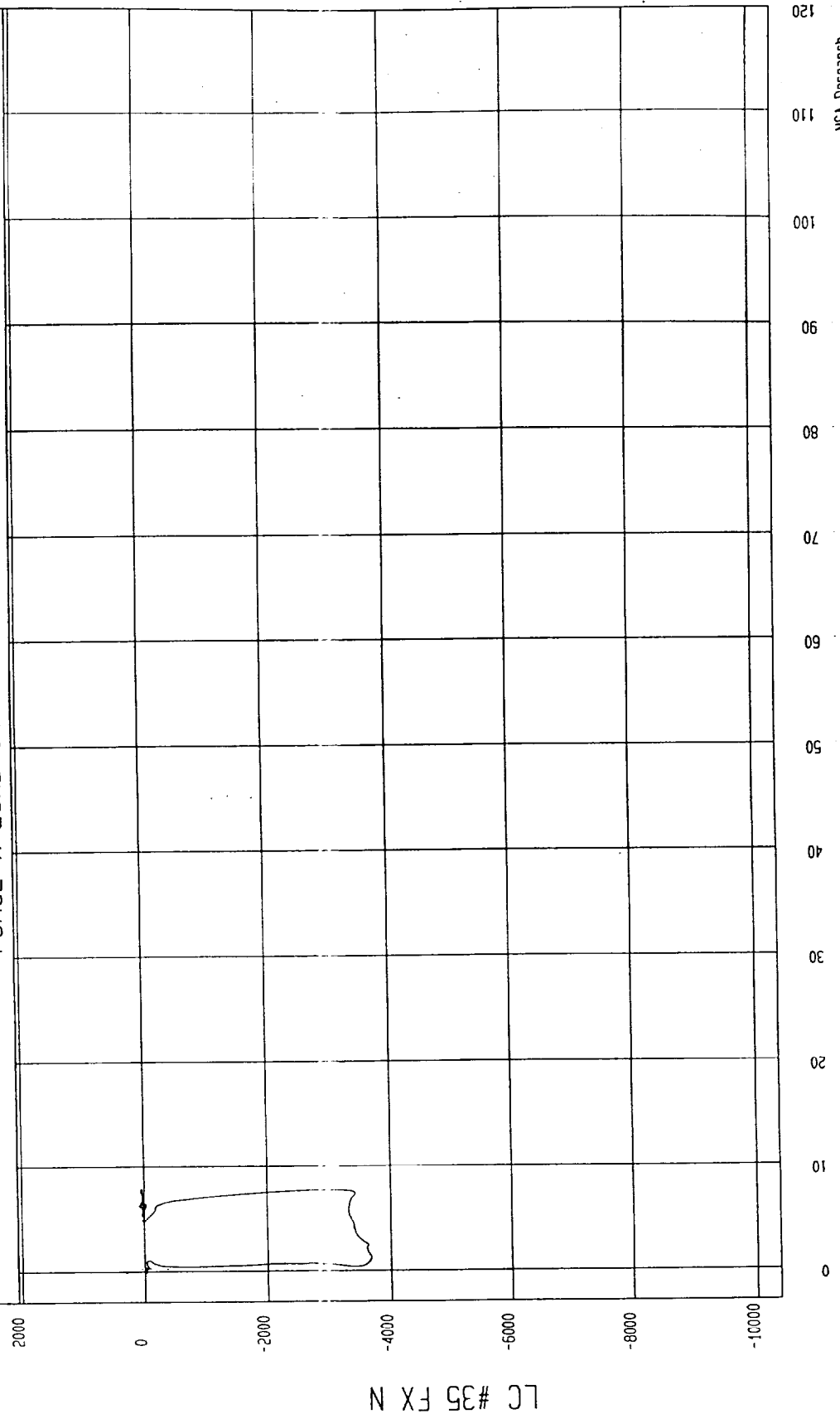
Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 80.55 N at 6 MM

Minimum = -3684.11 N at 1 MM

FORCE X LOAD CELL #35 VS STRINGPOT #36



MGA Research
03-31-1998 14:39

STRING POT 36 MM

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

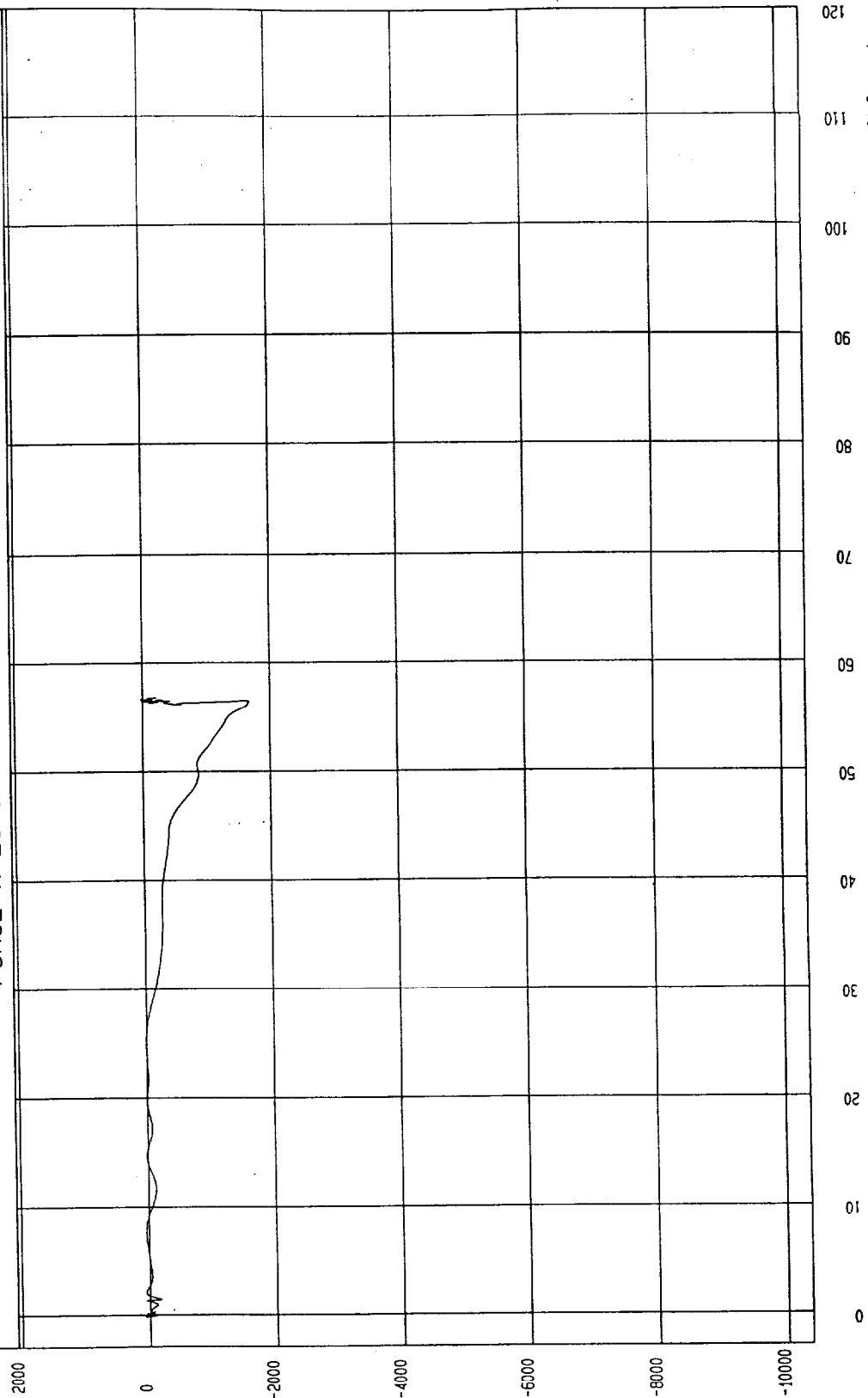
Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 82.94 N at 0 MM

Minimum = -1672.57 N at 57 MM

FORCE X LOAD CELL #37 VS STRINGPOT #40



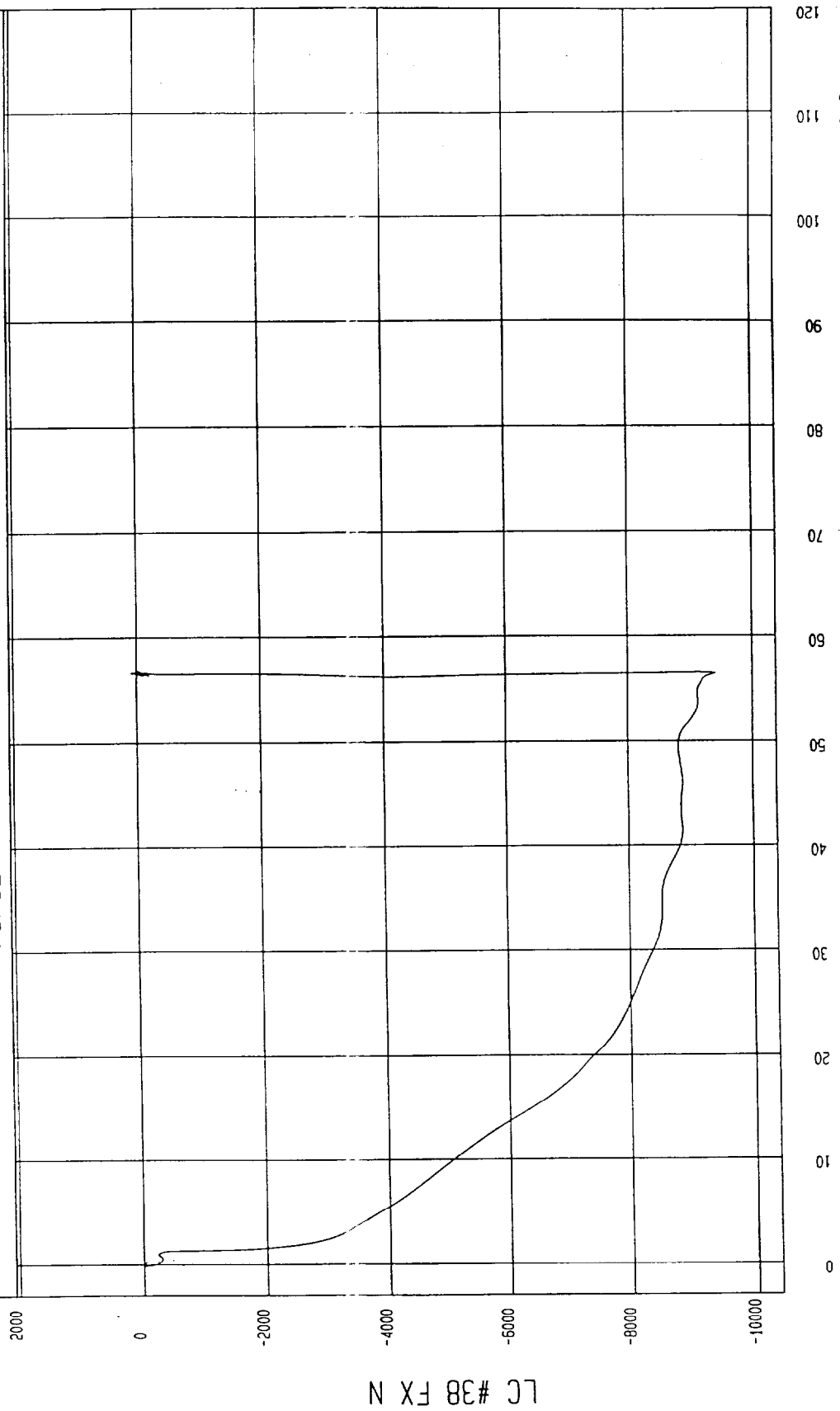
LC #37 FX N

STRING POT 40 MM

MGA Research
03-31-1998 14:39

TEST: Test #1 19/60 Cart/Barrier	TEST DATE: 02-27-1997
COMPONENT: FMVSS 214 Deformable Barrier	Speed: 13 MPH 20.9 KPH
Minimum = -9404.98 N at 56 MM	Maximum = 90.28 N at 57 MM

FORCE X LOAD CELL #38 VS STRINGPOT #40

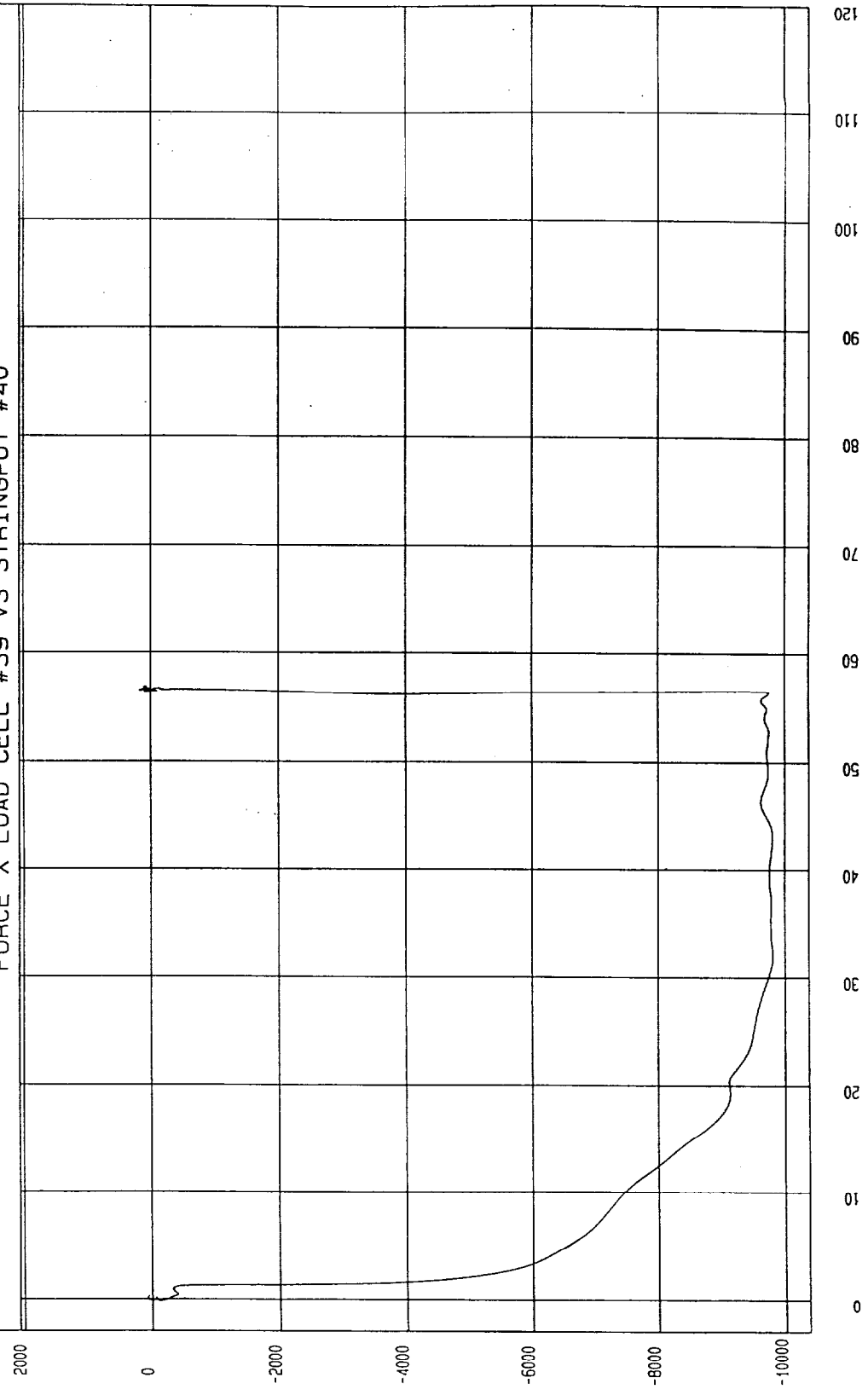


STRING POT 40 MM

MGA Research
03-31-1998 14:40

TEST: Test #1 19/60 Cart/Barrier	TEST DATE: 02-27-1997
COMPONENT: FMVSS 214 Deformable Barrier	Speed: 13 MPH 20.9 KPH
Minimum = -9803.95 N at 32 MM	
Maximum = 185.92 N at 57 MM	

FORCE X LOAD CELL #39 VS STRINGPOT #40



MGA Research
03-31-1998 14:40

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

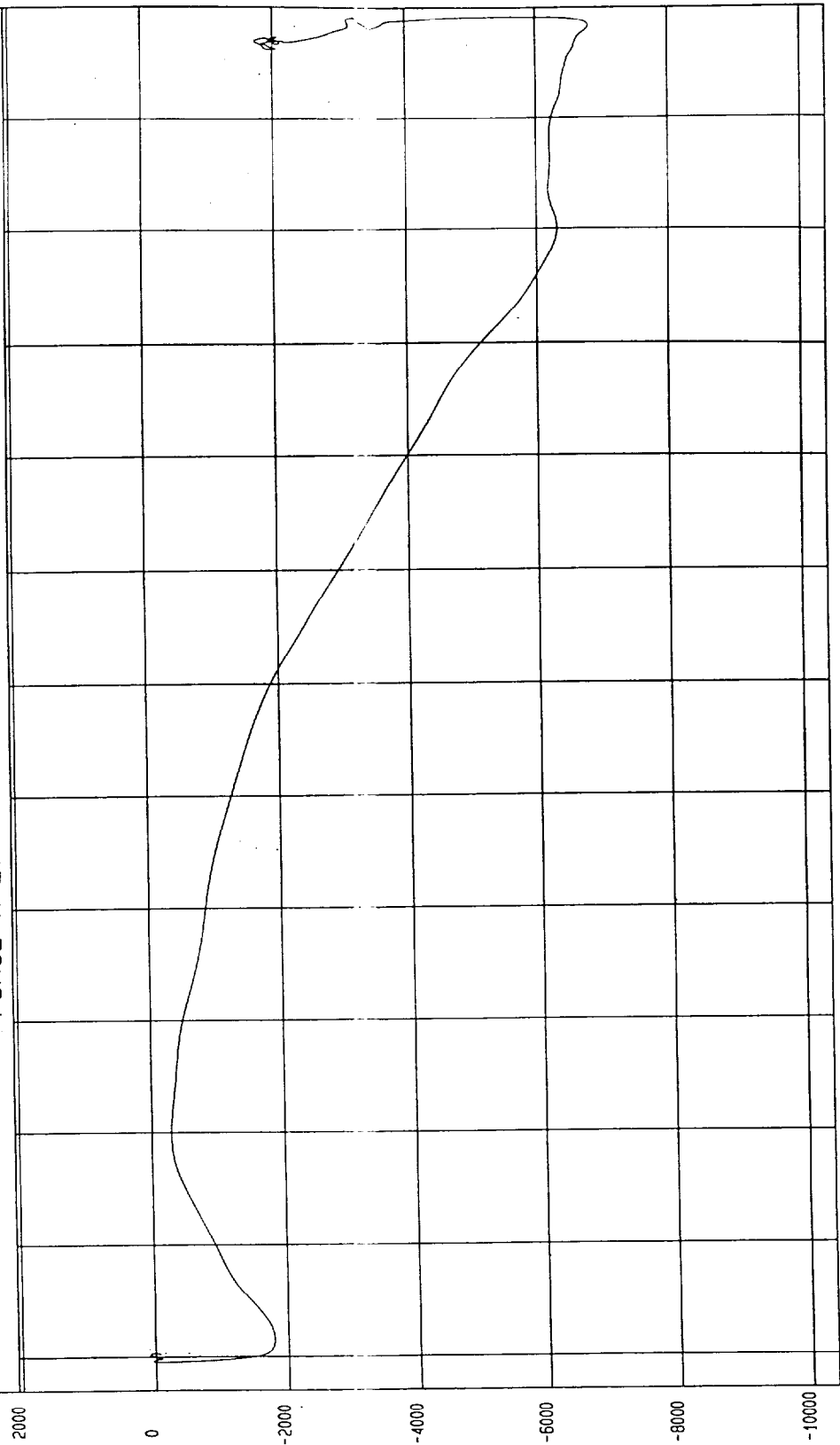
SPEED: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 84.46 N at 0 MM

Minimum = -6812.50 N at 118 MM

FORCE X LOAD CELL #41 VS STRINGPOT #44

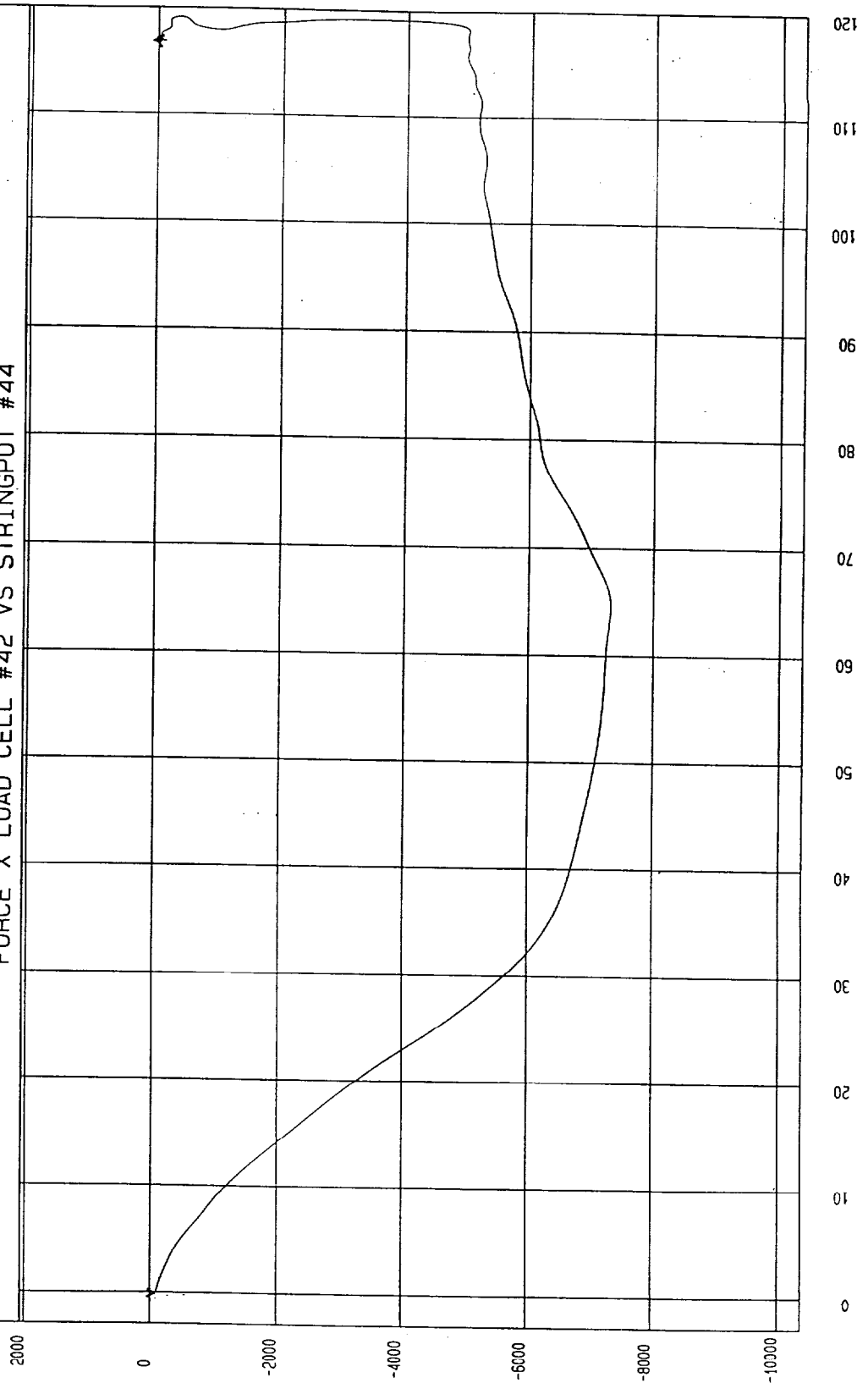


MGA Research
03-31-1998 14:40

STRING POT 44 MM

TEST: Test #1 19/60 Cart/Barrier	TEST DATE: 02-27-1997
COMPONENT: FMVSS 214 Deformable Barrier	Speed: 13 MPH 20.9 KPH
Minimum = -7289.30 N at 64 MM	Maximum = 91.66 N at 117 MM

FORCE X LOAD CELL #42 VS STRINGPOT #44



MGA Research
03-31-1998 14:41

TEST: Test #1 19/60 Cart/Barrier

TEST DATE: 02-27-1997

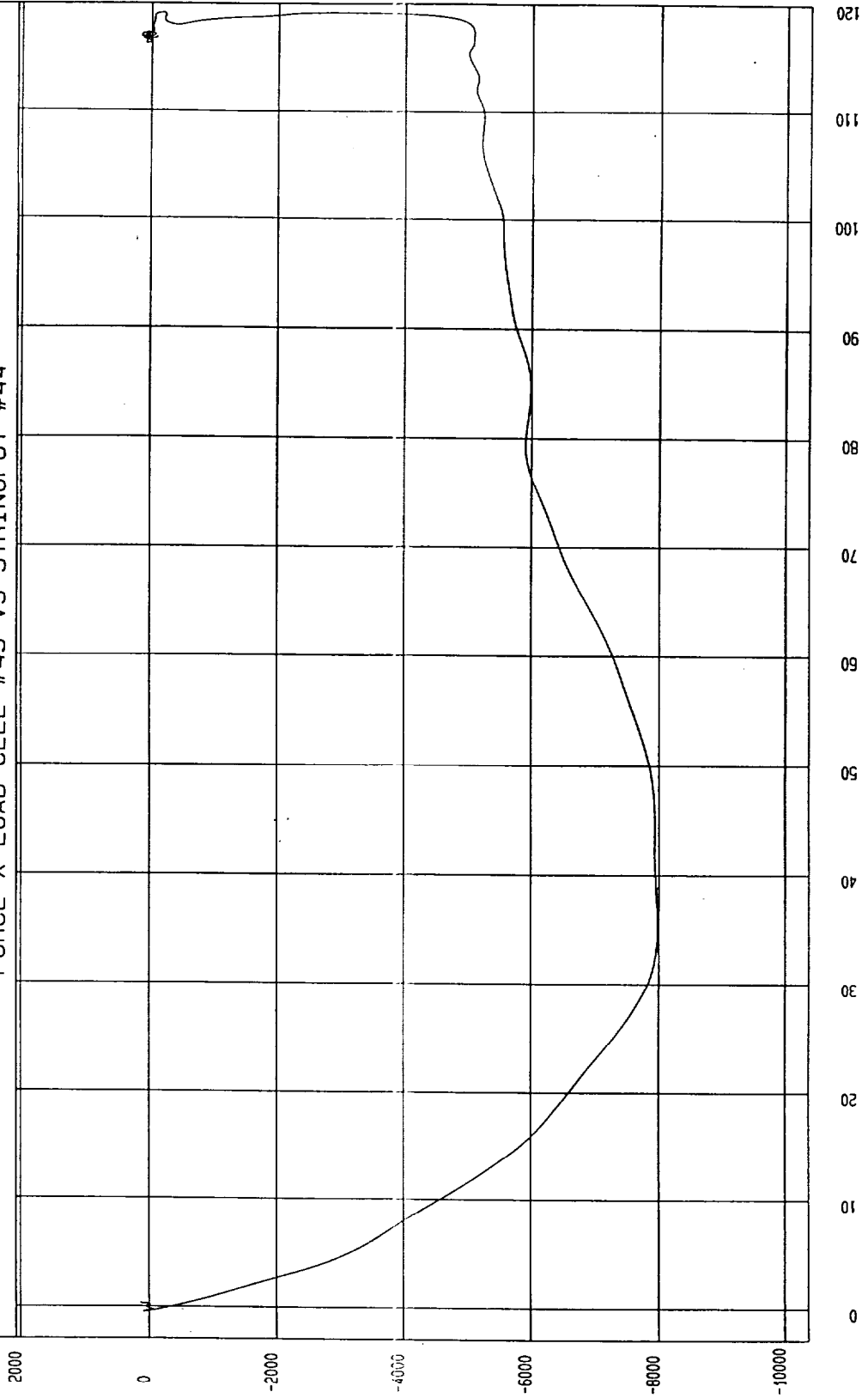
Speed: 13 MPH 20.9 KPH

COMPONENT: FMVSS 214 Deformable Barrier

Maximum = 163.80 N at 117 MM

Minimum = -7978.08 N at 35 MM

FORCE X LOAD CELL #43 VS STRINGPOT #44



MGA Research
03-31-1998 14: 41

STRING POT 44 MM

LC #43 FX N

PHOTOGRAPHS

