

**Vehicle Research and Test Center
1996 Chrysler Concord 4-door
into a Deformable Load Cell Barrier
TRC Inc. Test Number: 041021-1**

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**Prepared for:
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Section 1.0

Purpose and Test Procedure

Purpose

This test was conducted for National Highway Traffic Safety Administration (NHTSA) and Vehicle Research and Test Center (VRTC) by Transportation Research Center Inc. (TRC Inc). The purpose of this test was to determine the vehicle response of the subject vehicle, a 1996 Chrysler Concord 4-door.

Test Procedure

This test was conducted per VRTC instructions. Data was obtained relative to FMVSS 208, “Occupant Crash Protection”.

The test vehicle was instrumented with two (2) accelerometers to measure longitudinal axis accelerations; two (2) accelerometers to measure lateral axis accelerations and two (2) accelerometers to measure vertical axis accelerations. The vehicle's specified impact velocity range was 55.5 to 57.1 km/h. The vehicle impacted a deformable load cell barrier equipped with one hundred thirty-four (134) load cells and covered by a Plascor deformable barrier face.

The 146 data channels were digitally sampled and recorded at 12,500 samples per second and processed per the NHTSA Laboratory Test Procedure.

The crash event was recorded by one (1) real-time panning motion picture camera and six (6) high-speed digital motion picture cameras operating at 1000 frames per second.

The vehicle data is summarized in Section 2.0. The vehicle and camera measurements are presented in Section 3.0. Appendix A contains the still photographic prints. Appendix B contains the vehicle and barrier data plots. Appendix C contains miscellaneous test information. Appendix D contains an INSIA report that was the basis for the Structural Measurements presented in Table 9 of this report.

Section 2.0

Impact Test Summary

Test Results Summary

This 35 mph deformable load cell barrier test was conducted by TRC Inc. on October 21, 2004.

The test vehicle, a 1996 Chrysler Concord 4-door, was equipped with a 6-cylinder engine, automatic transmission, power steering, and power brakes. The vehicle's test weight was 1787.6 kg. The vehicle's fuel system contained 63.4 liters of Stoddard for the test. The vehicle's impact speed was 56.2 km/h. The vehicle's maximum static crush was 570 mm.

Data Acquisition Explanations

The passenger airbag fire circuits, PABETA and PABETB, did not record a fire event during the test.

Table 1 Crash Test Summary

Test type:	Deformable load cell barrier
Test date:	10/21/04
Test time:	11:46
Ambient temperature:	21° C
Vehicle:	1996 Chrysler Concord 4-door
Vehicle test weight:	1787.6 kg
Impact angle: ¹	0°
Impact velocity: ²	Primary = 56.2 km/h Secondary = 56.2 km/h
Maximum static crush:	570 mm
Average rebound:	360 mm
Number of cameras:	
High-speed digital	6
Real-time	1

¹ With respect to tow track centerline.

² Speed trap measurement ($\pm .08$ km/h accuracy)

Table 2 Test Vehicle Information

Vehicle manufacturer:	DaimlerChrysler Corporation		
Make/model:	Chrysler/Concord		
VIN:	1C3HD56F6TF136977		
Model year:	1996		
Body style:	4-door		
Color:	White		
Engine data:			
Type:	V		
Cylinders:	6		
Displacement:	3.5 liters		
Transmission data:	<u>4</u> Speed, ___ Manual, <u>X</u> Automatic, <u>X</u> FWD, ___ RWD, ___ 4WD		
Date vehicle received:	10/20/04		
Odometer reading:	47,597 miles		
Dealer's name and address:	Vehicle provided by VRTC		
<u>Accessories:</u>			
Power steering	Yes	Automatic transmission	Yes
Power brakes	Yes	Automatic speed control	Yes
Power seats	Driver only	Tilting steering wheel	Yes
Power windows	Yes	Telescoping steering wheel	No
Tinted glass	Yes	Air conditioning	Yes
Radio	Yes	Anti-skid brake	No
Clock	Yes	Rear window defroster	Yes
Other	None		
<u>Certification data from vehicle's label:</u>			
Vehicle manufactured by:	DaimlerChrysler Corporation		
Date of manufacture:	02/96		
VIN:	1C3HD56F6TF136977		
GVWR:	2120 kg	(4673 lbs.)	
GAWR: Front:	1213 kg	(2673 lbs.)	
Rear:	930 kg	(2050 lbs.)	

Table 2 Test Vehicle Information, continued

Tires on vehicle (mfr., line, size): Goodyear, Eagle GA, P225/60R16

Tire pressure with maximum
capacity vehicle load:

Front:	300 kPa
Rear:	300 kPa

Spare tire (mfr., line, size): Goodyear, Temp, T135/80D15

Type of seats:	Front:	Bucket
	Rear:	Bench

Type of front seat backs: Power

Maximum width: 1905 mm

Wheelbase: 2870 mm

Location of "Recommended Tire Pressure" label:

Left front door

Data from vehicle's "Recommended Tire Pressure" label:

Recommended tire size: P205/70R15

Recommended cold

tire pressure:	Front:	32 psi	(220 kPa)
tire pressure:	Rear:	32 psi	(220 kPa)

Seating capacity:	Front:	2
	Mid:	0
	Rear:	3
	Total:	5

Vehicle capacity weight: 392 kg

Test vehicle attitude:

Pre-test attitude:	LF	733 mm;	RF	735 mm;	LR	715 mm;	RR	725 mm
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Post-test attitude:	LF	833 mm;	RF	840 mm;	LR	725 mm;	RR	715 mm
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Table 2 Test Vehicle Information, continued

Test vehicle's target test weight:¹

Front	1078.8	kg
Rear	708.8	kg
Total	1787.6	kg

Weight of test vehicle:

Right front	526.4	kg	Right rear	354.2	kg
Left front	550.8	kg	Left rear	356.2	kg
Total front weight	1077.2	kg	(60.3% of total vehicle weight)		
Total rear weight	710.4	kg	(39.7% of total vehicle weight)		
Total test weight	1787.6	kg			

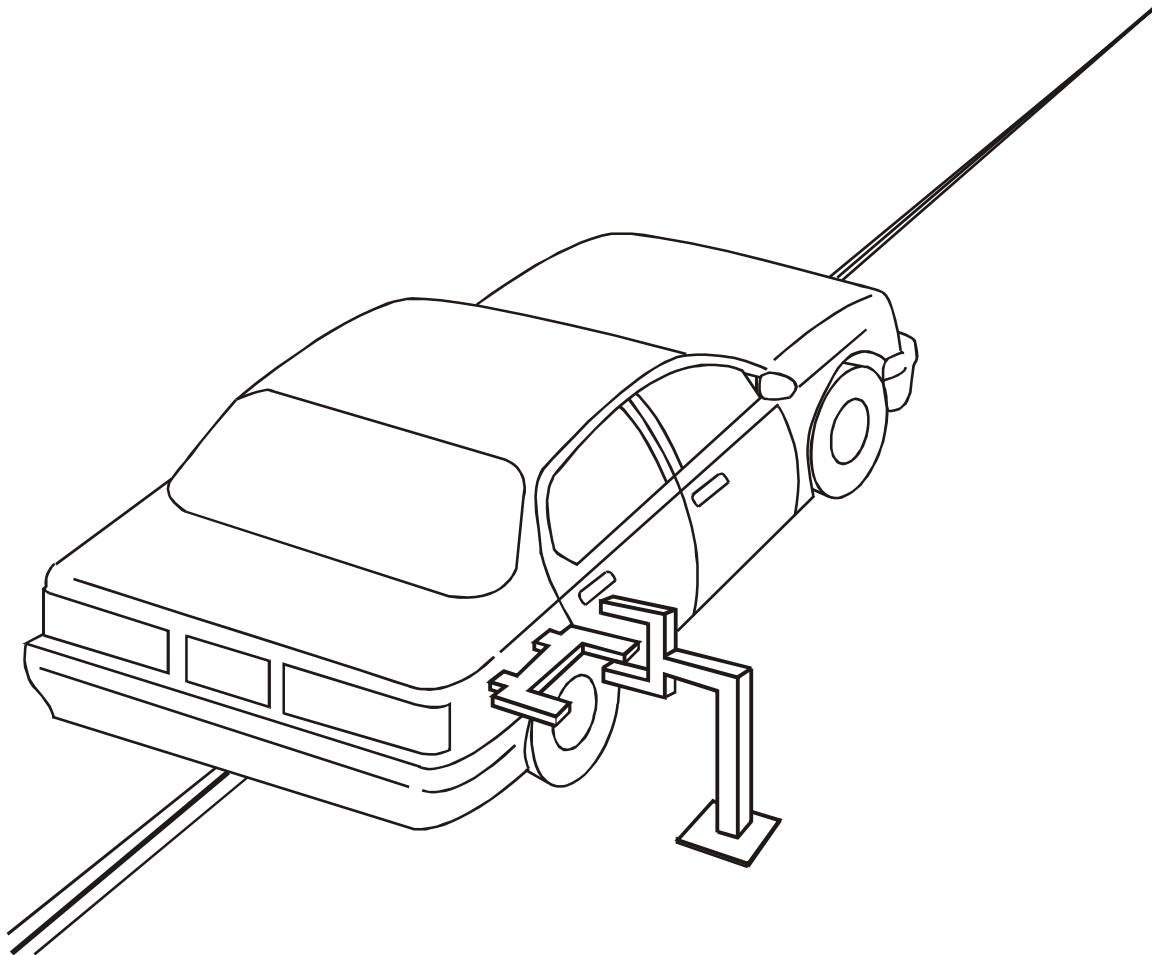
Location of vehicle center of gravity:	1139 mm rearward of front axle centerline
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Weight of ballast secured in vehicle:	192 kg
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Components removed to meet target test weight:	Trunk lid, rear fascia, weather stripping at trunk, 4 hub caps, 2 rear interior door panels.
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¹ Target test weight provided by VRTC.

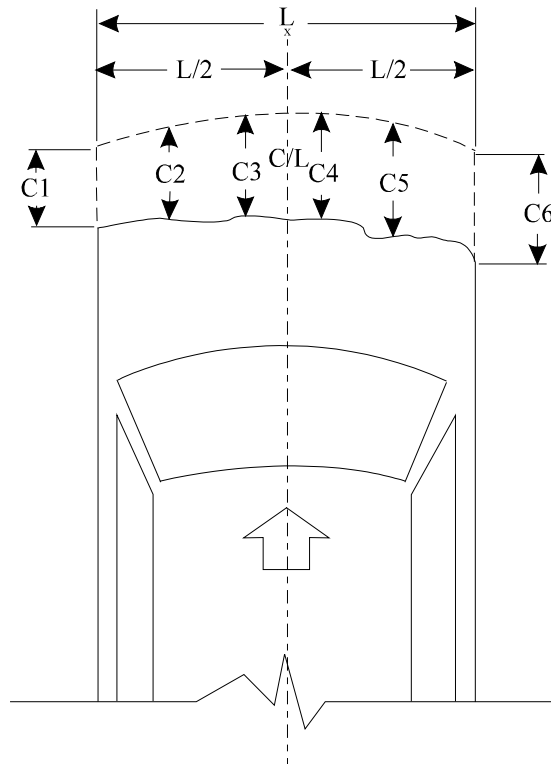
Figure 1 Impact Velocity Measurement System



The final vane clears the final emitter/receiver pair 50 mm before impact.

The vanes have 610 mm spacing.

Figure 2 Vehicle Crush

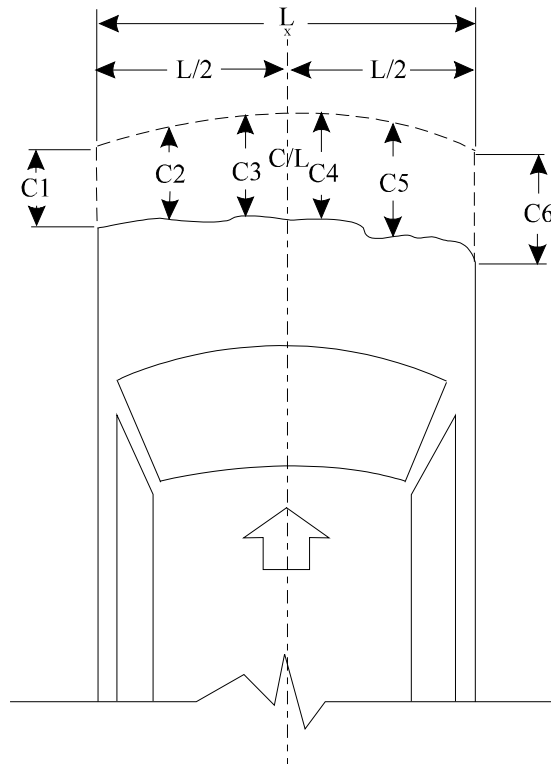


Notes: L is pre-test length of contact surface.
C1 through C6 are spaced equally apart.
CL is vehicle centerline.
Measured with bumper fascia.

Vehicle: 1996 Chrysler Concord 4-door

	Pre-test	Post-test	Crush
L	1524 mm		
C1	4926 mm	4578 mm	348 mm
C2	5056 mm	4588 mm	468 mm
C3	5106 mm	4602 mm	504 mm
C4	5106 mm	4594 mm	512 mm
C5	5056 mm	4558 mm	498 mm
C6	4926 mm	4538 mm	388 mm
CL	5121 mm	4600 mm	521 mm

Figure 2 Vehicle Crush, continued



Notes: L is pre-test length of contact surface.
C1 through C6 are spaced equally apart.
CL is vehicle centerline.
Measured without bumper fascia.

Vehicle: 1996 Chrysler Concord 4-door

	Pre-test	Post-test	Crush
L	1195 mm		
C1	4851 mm	4678 mm	173 mm
C2	4991 mm	4645 mm	346 mm
C3	5016 mm	4726 mm	290 mm
C4	5021 mm	4706 mm	315 mm
C5	4991 mm	4626 mm	365 mm
C6	4871 mm	4534 mm	337 mm
CL	5026 mm	4663 mm	363 mm

Figure 3 Vehicle Accelerometer Placement

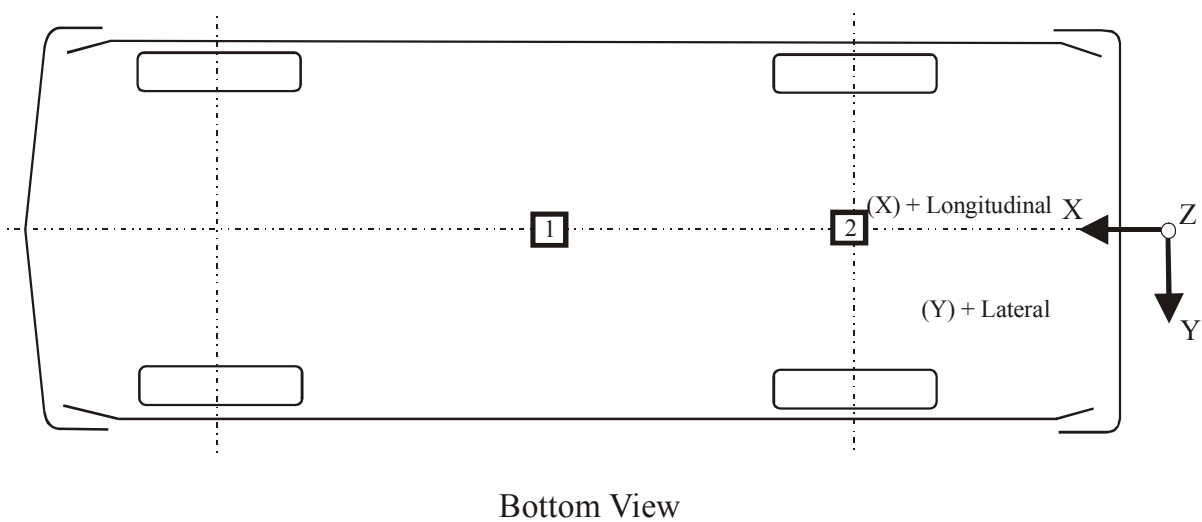
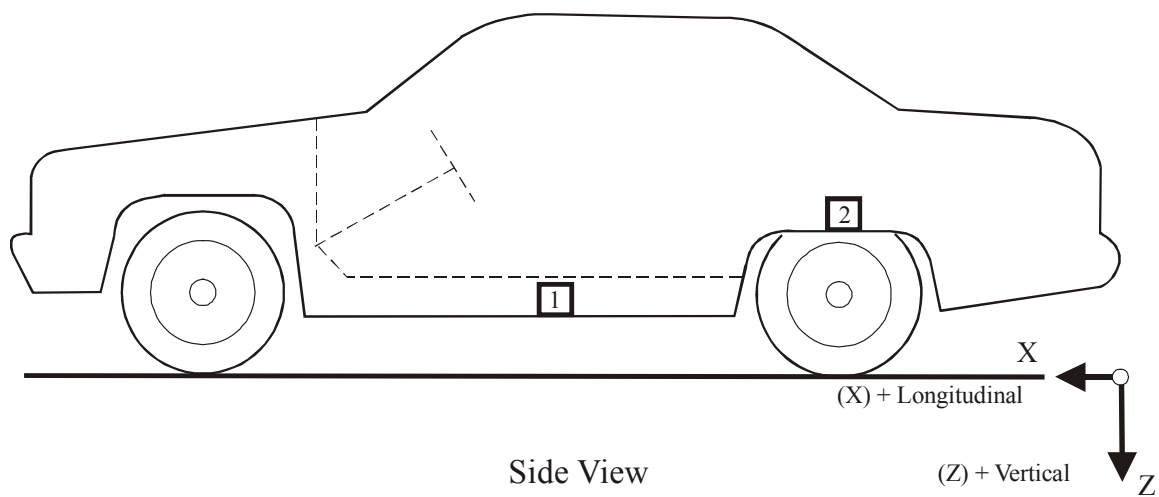


Table 3 Vehicle Accelerometer Locations and Data Summary, continued

Accel. No.	Location	Coordinates (millimeters)			Positive Direction		Negative Direction	
		X*	Y*	Z*	Max. (g)	Time (ms)	Max. (g)	Time (ms)
1	Vehicle Center of Gravity	2740	60	-540				
	Longitudinal X				7.7	34.5	65.4	74.2
	Lateral Y				45.6	78.6	31.0	84.0
	Vertical Z				42.0	63.3	51.2	75.7
	Resultant				77.9	75.1		
2	Rear Deck	190	0	-569				
	Longitudinal X				36.3	106.0	79.8	85.7
	Lateral Y				5.0	111.3	6.5	80.0
	Vertical Z				8.1	114.5	13.7	91.0
	Resultant				79.9	85.7		

*Reference: X = Rear Bumper (+ Forward)

Y = Vehicle Centerline (+ To Right)

Z = Ground Level (+ Down)

All measurements accurate to within ± 3 mm.

Table 4 Post-Impact Data

Door opening:

	<u>Left</u>	<u>Right</u>
Front	Easy	Easy
Rear	Easy	Easy

Seat back failure:

Left	None
Right	None

Seat track shift:

Left	None
Right	None

Glazing damage:

Front windshield broken

Other notable impact effects:

None

Figure 4 Load Cell Barrier Mnemonics

Row	Column															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
9						LC0906	LC0907	LC0908	LC0909	LC0910	LC0911					
8	LC0801	LC0802	LC0803	LC0804	LC0805	LC0806	LC0807	LC0808	LC0809	LC0810	LC0811	LC0812	LC0813	LC0814	LC0815	LC0816
7	LC0701	LC0702	LC0703	LC0704	LC0705	LC0706	LC0707	LC0708	LC0709	LC0710	LC0711	LC0712	LC0713	LC0714	LC0715	LC0716
6	LC0601	LC0602	LC0603	LC0604	LC0605	LC0606	LC0607	LC0608	LC0609	LC0610	LC0611	LC0612	LC0613	LC0614	LC0615	LC0616
5	LC0501	LC0502	LC0503	LC0504	LC0505	LC0506	LC0507	LC0508	LC0509	LC0510	LC0511	LC0512	LC0513	LC0514	LC0515	LC0516
4	LC0401	LC0402	LC0403	LC0404	LC0405	LC0406	LC0407	LC0408	LC0409	LC0410	LC0411	LC0412	LC0413	LC0414	LC0415	LC0416
3	LC0301	LC0302	LC0303	LC0304	LC0305	LC0306	LC0307	LC0308	LC0309	LC0310	LC0311	LC0312	LC0313	LC0314	LC0315	LC0316
2	LC0201	LC0202	LC0203	LC0204	LC0205	LC0206	LC0207	LC0208	LC0209	LC0210	LC0211	LC0212	LC0213	LC0214	LC0215	LC0216
1	LC0101	LC0102	LC0103	LC0104	LC0105	LC0106	LC0107	LC0108	LC0109	LC0110	LC0111	LC0112	LC0113	LC0114	LC0115	LC0116

Figure 5 Load Cell Barrier Configuration

					109	044	134	115	110	064					
133	039	085	059	116	013	119	107	095	103	129	058	126	108	025	070
027	111	072	106	056	114	068	157	049	131	018	084	062	078	127	021
036	052	010	034	026	022	030	016	035	092	043	076	001	087	096	015
090	065	079	055	031	054	050	089	130	082	083	123	032	121	009	037
040	007	071	094	067	086	118	101	073	047	099	080	097	048	061	005
125	004	051	042	011	117	066	045	077	029	100	102	091	012	017	081
120	063	124	093	046	122	002	060	105	020	069	041	112	074	128	075
053	008	028	038	003	014	024	006	132	023	033	019	113	098	104	088

LOAD CELL SERIAL NUMBERS



Track C/L

Table 5 Load Cell Barrier Data Summary

Location	Column	Positive Direction		Negative Direction	
		Max. (N)	Time (ms)	Max. (N)	Time (ms)
Load Cell Row 1	1	354	5.5	-720	88.5
	2	88	2.3	-924	81.8
	3	102	209.8	-4,061	86.2
	4	155	192.9	-1,755	86.4
	5	245	193.3	-6,812	87.0
	6	200	184.9	-3,527	86.4
	7	47	-2.1	-6,275	27.2
	8	112	199.1	-2,313	86.7
	9	76	186.7	-6,409	85.0
	10	9	-3.1	-4,413	39.4
	11	56	180.5	-3,657	42.7
	12	142	191.3	-3,416	57.8
	13	337	188.9	-3,073	57.8
	14	26	-0.4	-4,410	53.9
	15	24	1.0	-1,766	57.8
	16	551	13.3	-1,566	101.3

Table 5 Load Cell Barrier Data Summary, continued

Location	Column	Positive Direction		Negative Direction	
		Max. (N)	Time (ms)	Max. (N)	Time (ms)
Load Cell Row 2	1	161	6.0	-490	36.4
	2	103	5.7	-2,076	45.9
	3	23	-8.6	-1,267	21.2
	4	12	-1.2	-4,735	20.6
	5	61	159.4	-11,570	48.2
	6	244	4.6	-11,324	40.2
	7	57	0.5	-12,711	42.3
	8	59	-0.6	-18,305	60.3
	9	41	-0.7	-18,947	60.9
	10	82	-1.0	-11,489	40.6
	11	94	-0.7	-12,831	37.7
	12	190	3.9	-8,850	82.3
	13	26	-5.9	-6,277	83.5
	14	91	4.2	-1,718	89.8
	15	48	4.5	-977	94.2
	16	128	13.1	-775	38.1

Table 5 Load Cell Barrier Data Summary, continued

Location	Column	Positive Direction		Negative Direction	
		Max. (N)	Time (ms)	Max. (N)	Time (ms)
Load Cell Row 3	1	64	3.0	-2,586	63.2
	2	135	6.2	-677	37.5
	3	175	5.5	-4,011	37.9
	4	247	5.8	-4,958	40.6
	5	671	22.3	-21,044	41.4
	6	233	3.4	-27,355	41.5
	7	244	-0.2	-28,943	36.2
	8	97	-0.2	-27,915	36.5
	9	184	-1.3	-30,340	37.2
	10	252	-1.0	-29,408	36.4
	11	37	1.4	-23,727	39.7
	12	193	0.0	-34,242	44.1
	13	84	3.8	-14,982	49.9
	14	135	4.6	-7,288	21.4
	15	49	4.5	-3,382	37.3
	16	29	2.2	-857	37.8

Table 5 Load Cell Barrier Data Summary, continued

Location	Column	Positive Direction		Negative Direction	
		Max. (N)	Time (ms)	Max. (N)	Time (ms)
Load Cell Row 4	1	73	100.3	-965	62.3
	2	149	6.6	-184	12.6
	3	225	6.2	-3,457	59.7
	4	263	6.1	-9,122	37.9
	5	242	5.4	-2,247	40.0
	6	315	5.6	-14,368	43.7
	7	208	3.7	-17,045	43.1
	8	217	3.5	-14,191	38.5
	9	137	3.4	-13,414	38.2
	10	59	-0.2	-15,514	39.5
	11	103	3.1	-12,048	44.4
	12	164	4.3	-5,257	44.9
	13	148	4.5	-3,777	36.8
	14	79	4.5	-5,256	62.6
	15	12	176.0	-6,869	63.6
	16	92	177.2	-916	57.4

Table 5 Load Cell Barrier Data Summary, continued

Location	Column	Positive Direction		Negative Direction	
		Max. (N)	Time (ms)	Max. (N)	Time (ms)
Load Cell Row 5	1	240	100.0	-1,041	62.4
	2	155	7.2	-168	12.8
	3	202	6.3	-6,401	62.4
	4	203	6.2	-689	37.8
	5	19	-1.9	-8,509	37.1
	6	271	5.5	-4,916	35.7
	7	283	5.4	-8,357	33.0
	8	236	4.7	-5,282	37.5
	9	243	4.8	-10,164	39.6
	10	215	4.6	-5,302	41.6
	11	153	4.4	-6,067	38.2
	12	153	4.6	-8,445	36.8
	13	115	4.7	-6,696	37.7
	14	90	4.6	-1,760	37.0
	15	78	73.3	-36	258.7
	16	202	176.8	-942	62.0

Table 5 Load Cell Barrier Data Summary, continued

Location	Column	Positive Direction		Negative Direction	
		Max. (N)	Time (ms)	Max. (N)	Time (ms)
Load Cell Row 6	1	256	101.4	-750	62.2
	2	124	7.4	-161	12.7
	3	172	6.9	-155	13.0
	4	234	7.0	-147	13.3
	5	219	6.2	-694	38.4
	6	247	6.1	-818	39.0
	7	210	5.5	-2,203	38.2
	8	49	216.4	-4,416	40.2
	9	193	5.0	-5,049	43.4
	10	179	4.9	-4,121	44.3
	11	151	4.7	-4,920	45.3
	12	116	4.6	-245	27.8
	13	106	57.1	-38	155.1
	14	53	4.6	-245	46.1
	15	36	4.7	-133	45.5
	16	73	26.4	-708	63.4

Table 5 Load Cell Barrier Data Summary, continued

Location	Column	Positive Direction		Negative Direction	
		Max. (N)	Time (ms)	Max. (N)	Time (ms)
Load Cell Row 7	1	161	101.4	-600	63.6
	2	184	57.9	-51	13.4
	3	161	21.7	-173	13.5
	4	182	21.8	-147	13.8
	5	28	-1.2	-2,196	36.6
	6	203	21.3	-182	14.2
	7	176	6.7	-235	14.4
	8	149	5.8	-1,647	45.1
	9	161	5.6	-2,574	44.9
	10	137	5.4	-1,903	46.2
	11	127	5.0	-213	46.8
	12	101	4.8	-247	46.7
	13	402	138.6	-1,355	46.0
	14	126	72.8	-43	195.5
	15	45	73.2	-102	46.2
	16	336	26.2	-501	46.6

Table 5 Load Cell Barrier Data Summary, continued

Location	Column	Positive Direction		Negative Direction	
		Max. (N)	Time (ms)	Max. (N)	Time (ms)
Load Cell Row 8	1	821	35.0	-231	70.0
	2	37	0.4	-2,579	63.3
	3	19	1.2	-808	47.8
	4	33	0.8	-889	47.2
	5	213	101.4	-787	14.9
	6	98	192.8	-937	30.0
	7	196	309.9	-1,253	44.8
	8	103	190.8	-1,314	45.4
	9	40	-2.3	-1,393	45.9
	10	14	191.7	-1,553	46.2
	11	12	-14.8	-1,325	46.2
	12	74	148.6	-1,041	46.5
	13	14	1.0	-908	46.5
	14	40	0.9	-973	46.4
	15	36	38.2	-641	46.9
	16	727	38.3	-34	180.3

Table 5 Load Cell Barrier Data Summary, continued

Location	Column	Positive Direction		Negative Direction	
		Max. (N)	Time (ms)	Max. (N)	Time (ms)
Load Cell Row 9	6	188	22.2	-187	16.2
	7	225	22.3	-190	16.1
	8	190	22.3	-198	16.4
	9	107	22.4	-257	28.9
	10	95	22.9	-241	16.2
	11	35	23.2	-210	28.7

Section 3.0

Vehicle, Barrier, and Camera Measurements

Table 6 Fuel System Data

Vehicle year/make/ model/body style:	1996/Chrysler/Concord/4-door
Fuel system capacity:	68.1 liters (from owner's manual)
Usable capacity:	N/A liters
Test volume range:	N/A liters to N/A liters (92% to 94% of usable)
Actual test volume:	63.4 liters
Test fluid type:	Stoddard
Specific gravity:	0.764
Kinematic viscosity:	0.99 centistoke
Test fluid color:	Purple
Did electric fuel pump operate with ignition switch "on" and the engine not operating?	No
Details of fuel system:	The fuel tank is located center of vehicle behind rear seat. The fuel filler neck runs through the right rear wheel well. The fuel filler cap is located in the right rear quarter panel. The fuel lines run along the inside of the right frame rail.

Figure 6 Pre-Test And Post-Test Measurement Points

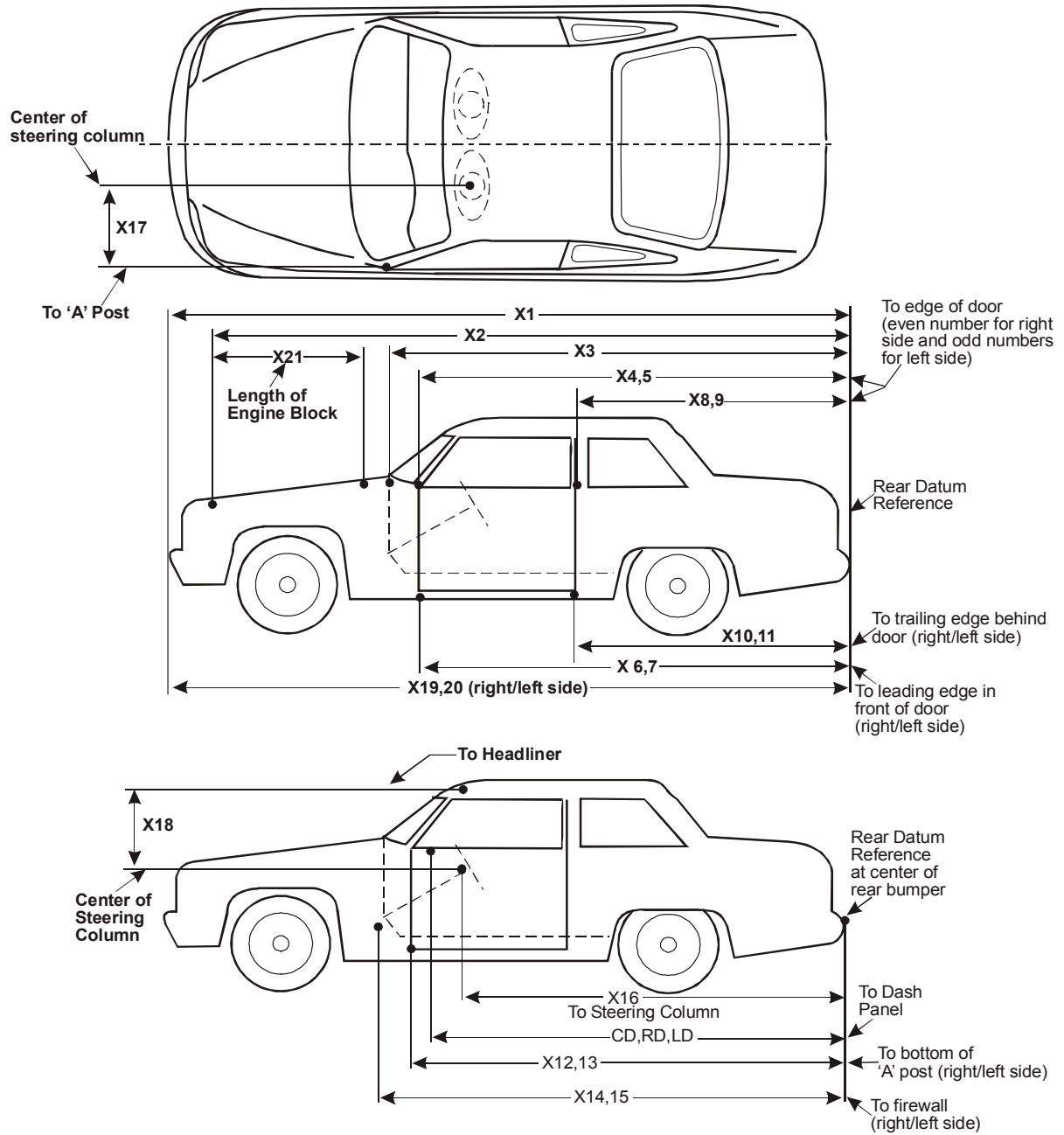


Table 7 Impacted Vehicle Measurements

Vehicle Make/Model: 1996 Chrysler Concord 4-door

Test Number: 041021-1

No.	Type of measurement	Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	5121	4600	521
X2	Rear Surface of Vehicle to Front of Engine Block	4486	4228	258
X3	Rear Surface of Vehicle to Firewall	4046	4032	14
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	3498	3487	11
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	3507	3501	6
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	3228	3435	-207
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	3435	3456	-21
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	2426	2416	10
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	2436	2429	7
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	2416	2424	-8
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	2426	2446	-20
X12	Rear Surface of Vehicle to Bottom of " A " Post on Right Side	3436	3421	15
X13	Rear Surface of Vehicle to Bottom of " A " Post on Left Side	3441	3437	4
X14	Rear Surface of Vehicle to Firewall-Right Side	4076	4018	58
X15	Rear Surface of Vehicle to Firewall-Left Side	4076	4041	35
X16	Rear Surface of Vehicle to Steering Wheel Center	3041	2971	70
X17	Center of Steering Column to " A " Post	320	270	50
X18	Center of Steering Column to Headliner	370	403	-33
X19	Rear Surface of Vehicle to Right Side of Front Bumper	4926	4538	388
X20	Rear Surface of Vehicle to Left Side of Front Bumper	4926	4578	348
X21	Length of Engine Block	550	550	0

All measurements are in millimeters.

Table 8 Vehicle Structural Measurements¹

	Elements	Pre-Test
1	Total Length	5121
2	Total Width	1905
3	Bumper Top Height	500
4	Bumper Bottom Height	403
5	Longitudinal Member Top Height	502
6	Longitudinal Member Bottom Height	407
7	Distance Between Longitudinal Members	1016
7'	Longitudinal Member Width	65
8	Engine Top Height	854
9	Engine Bottom Height	173
10	Engine and Gearbox Width	570
11	Front Bumper - Engine Distance	512
12	Front Shock Absorber Fixing Height	879
13	Bonnet Leading Edge Height	674
14	Front Shock Absorber Fixing Width	1160
15	Front Bumper - Front Axle Distance	1150
16	Front Axle - A Pillar Distance	540
17	A Pillar - B Pillar Distance	1040
18	B Pillar - Rear Axle Distance	1300
19	B Pillar - C Pillar Distance	1065
20	Roof Sill Bottom Height	1268
21	Roof Sill Top Height	1313
22	Floor Sill Bottom Height	309
23	Floor Sill Top Height	353

All distance measurements are in millimeters.

¹ Taken from INSIA report, “Structural Survey of Cars, Methodology of the Main Resistant Elements in the Car Body”, March 1999. This report is included in Appendix E.

Table 9 Frontal Profile Measurements

Bottom of Front Bumper

Pre-Test				Post-Test			Difference		
Index	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm
1	4926	-760	-450	4572	-755	-495	354	-5	45
2	5056	-458	-457	4629	-455	-559	427	-3	102
3	5106	-158	-455	4646	-158	-583	460	0	128
4	5106	158	-453	4638	160	-590	468	-2	137
5	5056	465	-451	4601	465	-560	455	0	109
6	4926	760	-451	4526	763	-490	400	-3	39

Top of Front Bumper

Pre-Test				Post-Test			Difference ¹		
Index	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm
1	4926	-768	-520	4512	-770	-545	414	2	25
2	5056	-460	-518	4583	-458	-605	473	-2	87
3	5106	-156	-520	4592	-165	-635	514	9	115
4	5106	160	-520	4581	165	-630	525	-5	110
5	5056	470	-520	4553	473	-600	503	-3	80
6	4926	770	-516	4473	787	-520	453	-17	4

Center of Grill

Pre-Test				Post-Test			Difference ²		
Index	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm
1	4828	-742	-625	N/A ³	N/A ³	N/A ³	N/A ³	N/A ³	N/A ³
2	4941	-455	-614	N/A ³	N/A ³	N/A ³	N/A ³	N/A ³	N/A ³
3	5036	-145	-616	4490	-140	-640	546	-5	24
4	5046	150	-611	4476	158	-645	570	-8	34
5	4941	460	-619	N/A ³	N/A ³	N/A ³	N/A ³	N/A ³	N/A ³
6	4826	745	-630	N/A ³	N/A ³	N/A ³	N/A ³	N/A ³	N/A ³

Front of Hood

Pre-Test				Post-Test			Difference		
Index	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm
1	4801	-724	-684	4460	-683	-805	341	-41	121
2	4921	-432	-671	4476	-400	-715	445	-32	44
3	4981	-146	-678	4532	-147	-695	449	1	17
4	4981	152	-676	4527	155	-690	454	-3	14
5	4916	445	-671	4496	420	-705	420	25	34
6	4801	732	-681	4446	703	-763	355	29	82

¹ The difference for points 1, 2, 5, and 6, measured at the top of front bumper, are included in the NHTSA Database Submission as Damage Profile Distance 1, 2, 5, and 6.

² The difference for points 3, 4, measured at the center of grill, are included in the NHTSA Database Submission as Damage Profile Distance 3, 4.

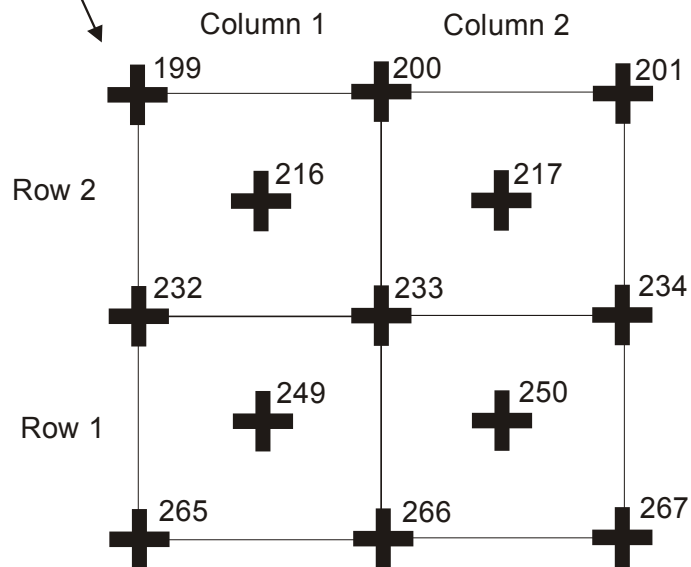
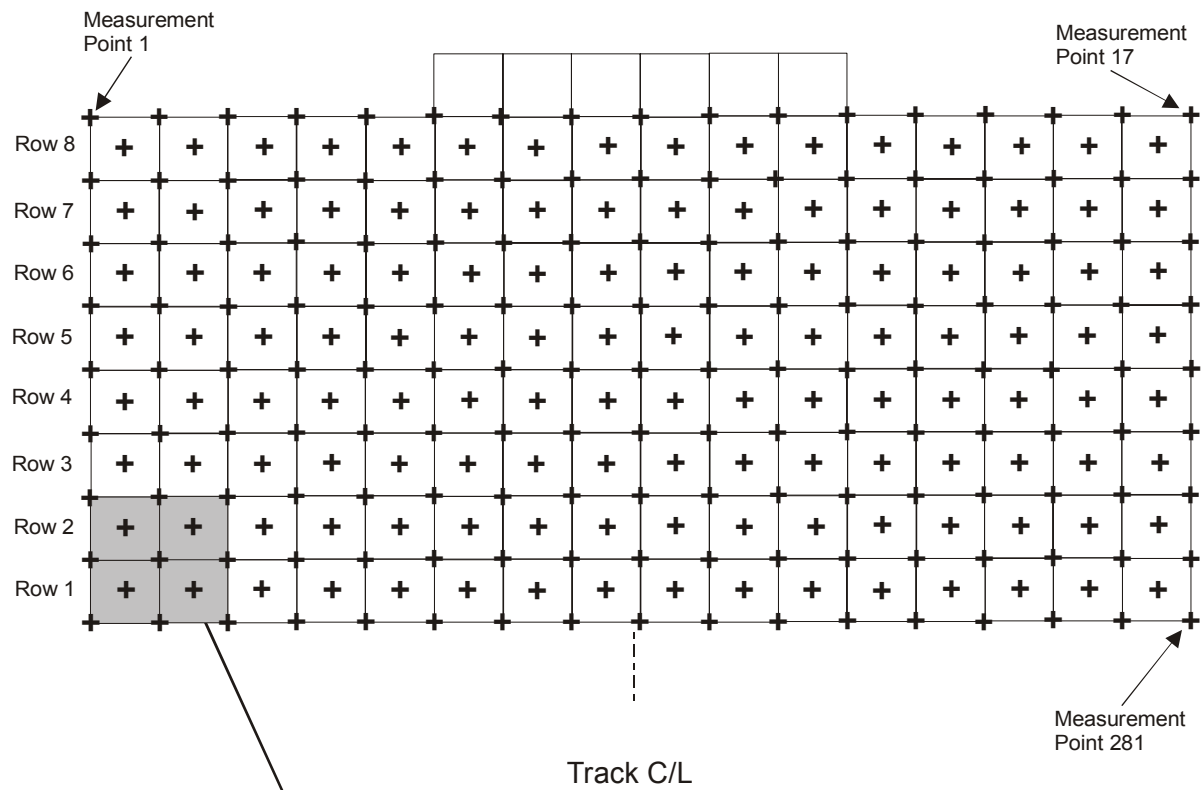
³ Measurement point could not located post-test.

Table 10 Additional Requested Measurements

Type of measurement	
Height of the lowest edge of the bottom row of load cells	130 mm
Height of lowest structure on test vehicle	175 mm
Mid-hood height of test vehicle	840 mm
Height of test vehicle hood 2 feet rearward of front bumper	835 mm

Test vehicle impact point deviation: Vehicle 22 mm right and 1 mm high on impact.

Figure 7 Deformable Barrier Face Measurement Point Placement



Example of Faro Measurement Point Placement

Table 11 Deformable Barrier Measurements

Load Cell Row	Measurement Point Location	Measurement Point Location	Crush (mm)
Row 1	Bottom corner of load cell	265	3
	Bottom corner of load cell	266	1
	Bottom corner of load cell	267	2
	Bottom corner of load cell	268	5
	Bottom corner of load cell	269	4
	Bottom corner of load cell	270	8
	Bottom corner of load cell	271	16
	Bottom corner of load cell	272	15
	Bottom corner of load cell	273	24
	Bottom corner of load cell	274	33
	Bottom corner of load cell	275	35
	Bottom corner of load cell	276	19
	Bottom corner of load cell	277	3
	Bottom corner of load cell	278	3
	Bottom corner of load cell	279	1
	Bottom corner of load cell	280	0
	Bottom corner of load cell	281	0
	Center of load cell	249	1
	Center of load cell	250	1
	Center of load cell	251	2
	Center of load cell	252	5
	Center of load cell	253	20
	Center of load cell	254	10
	Center of load cell	255	11
	Center of load cell	256	25
	Center of load cell	257	38
	Center of load cell	258	50
	Center of load cell	259	40
	Center of load cell	260	4
	Center of load cell	261	14
	Center of load cell	262	1
	Center of load cell	263	0
	Center of load cell	264	0

Table 11 Deformable Barrier Measurements, continued

Load Cell Row	Measurement Point Location	Measurement Point Number	Crush (mm)
Row 2	Bottom corner of load cell	232	3
	Bottom corner of load cell	233	3
	Bottom corner of load cell	234	1
	Bottom corner of load cell	235	10
	Bottom corner of load cell	236	30
	Bottom corner of load cell	237	59
	Bottom corner of load cell	238	89
	Bottom corner of load cell	239	118
	Bottom corner of load cell	240	132
	Bottom corner of load cell	241	132
	Bottom corner of load cell	242	98
	Bottom corner of load cell	243	106
	Bottom corner of load cell	244	44
	Bottom corner of load cell	245	2
	Bottom corner of load cell	246	0
	Bottom corner of load cell	247	5
	Bottom corner of load cell	248	-1
	Center of load cell	216	1
	Center of load cell	217	2
	Center of load cell	218	44
	Center of load cell	219	133
	Center of load cell	220	150
	Center of load cell	221	91
	Center of load cell	222	108
	Center of load cell	223	134
	Center of load cell	224	143
	Center of load cell	225	109
	Center of load cell	226	98
	Center of load cell	227	58
	Center of load cell	228	10
	Center of load cell	229	5
	Center of load cell	230	14
	Center of load cell	231	0

Table 11 Deformable Barrier Measurements, continued

Load Cell Row	Measurement Point Location	Measurement Point Number	Crush (mm)
Row 3	Bottom corner of load cell	199	1
	Bottom corner of load cell	200	1
	Bottom corner of load cell	201	13
	Bottom corner of load cell	202	94
	Bottom corner of load cell	203	152
	Bottom corner of load cell	204	153
	Bottom corner of load cell	205	165
	Bottom corner of load cell	206	169
	Bottom corner of load cell	207	168
	Bottom corner of load cell	208	160
	Bottom corner of load cell	209	166
	Bottom corner of load cell	210	158
	Bottom corner of load cell	211	154
	Bottom corner of load cell	212	47
	Bottom corner of load cell	213	6
	Bottom corner of load cell	214	1
	Bottom corner of load cell	215	-1
	Center of load cell	183	1
	Center of load cell	184	4
	Center of load cell	185	33
	Center of load cell	186	87
	Center of load cell	187	147
	Center of load cell	188	149
	Center of load cell	189	158
	Center of load cell	190	169
	Center of load cell	191	167
	Center of load cell	192	162
	Center of load cell	193	149
	Center of load cell	194	143
	Center of load cell	195	143
	Center of load cell	196	55
	Center of load cell	197	28
	Center of load cell	198	-1

Table 11 Deformable Barrier Measurements, continued

Load Cell Row	Measurement Point Location	Measurement Point Number	Crush (mm)
Row 4	Bottom corner of load cell	166	1
	Bottom corner of load cell	167	2
	Bottom corner of load cell	168	66
	Bottom corner of load cell	169	44
	Bottom corner of load cell	170	56
	Bottom corner of load cell	171	145
	Bottom corner of load cell	172	159
	Bottom corner of load cell	173	160
	Bottom corner of load cell	174	182
	Bottom corner of load cell	175	177
	Bottom corner of load cell	176	175
	Bottom corner of load cell	177	163
	Bottom corner of load cell	178	143
	Bottom corner of load cell	179	80
	Bottom corner of load cell	180	40
	Bottom corner of load cell	181	7
	Bottom corner of load cell	182	-5
	Center of load cell	150	1
	Center of load cell	151	34
	Center of load cell	152	59
	Center of load cell	153	38
	Center of load cell	154	26
	Center of load cell	155	97
	Center of load cell	156	113
	Center of load cell	157	77
	Center of load cell	158	48
	Center of load cell	159	54
	Center of load cell	160	84
	Center of load cell	161	44
	Center of load cell	162	30
	Center of load cell	163	17
	Center of load cell	164	28
	Center of load cell	165	2

Table 11 Deformable Barrier Measurements, continued

Load Cell Row	Measurement Point Location	Measurement Point Number	Crush (mm)
Row 5	Bottom corner of load cell	133	0
	Bottom corner of load cell	134	23
	Bottom corner of load cell	135	119
	Bottom corner of load cell	136	100
	Bottom corner of load cell	137	37
	Bottom corner of load cell	138	76
	Bottom corner of load cell	139	132
	Bottom corner of load cell	140	123
	Bottom corner of load cell	141	36
	Bottom corner of load cell	142	58
	Bottom corner of load cell	143	122
	Bottom corner of load cell	144	128
	Bottom corner of load cell	145	75
	Bottom corner of load cell	146	78
	Bottom corner of load cell	147	-9
	Bottom corner of load cell	148	14
	Bottom corner of load cell	149	3
	Center of load cell	117	4
	Center of load cell	118	26
	Center of load cell	119	N/A ¹
	Center of load cell	120	61
	Center of load cell	121	25
	Center of load cell	122	40
	Center of load cell	123	59
	Center of load cell	124	76
	Center of load cell	125	77
	Center of load cell	126	68
	Center of load cell	127	45
	Center of load cell	128	62
	Center of load cell	129	20
	Center of load cell	130	20
	Center of load cell	131	21
	Center of load cell	132	6

¹ Measurement point could not be located post-test.

Table 11 Deformable Barrier Measurements, continued

Load Cell Row	Measurement Point Location	Measurement Point Number	Crush (mm)
Row 6	Bottom corner of load cell	100	1
	Bottom corner of load cell	101	26
	Bottom corner of load cell	102	N/A ¹
	Bottom corner of load cell	103	3
	Bottom corner of load cell	104	2
	Bottom corner of load cell	105	3
	Bottom corner of load cell	106	14
	Bottom corner of load cell	107	25
	Bottom corner of load cell	108	40
	Bottom corner of load cell	109	35
	Bottom corner of load cell	110	21
	Bottom corner of load cell	111	19
	Bottom corner of load cell	112	0
	Bottom corner of load cell	113	-1
	Bottom corner of load cell	114	-1
	Bottom corner of load cell	115	-1
	Bottom corner of load cell	116	-2
	Center of load cell	84	1
	Center of load cell	85	19
	Center of load cell	86	3
	Center of load cell	87	23
	Center of load cell	88	23
	Center of load cell	89	8
	Center of load cell	90	12
	Center of load cell	91	7
	Center of load cell	92	13
	Center of load cell	93	7
	Center of load cell	94	12
	Center of load cell	95	24
	Center of load cell	96	4
	Center of load cell	97	1
	Center of load cell	98	-2
	Center of load cell	99	-2

¹ Measurement point could not be located post-test.

Table 11 Deformable Barrier Measurements, continued

Load Cell Row	Measurement Point Location	Measurement Point Number	Crush (mm)
Row 7	Bottom corner of load cell	67	1
	Bottom corner of load cell	68	1
	Bottom corner of load cell	69	1
	Bottom corner of load cell	70	1
	Bottom corner of load cell	71	2
	Bottom corner of load cell	72	3
	Bottom corner of load cell	73	36
	Bottom corner of load cell	74	27
	Bottom corner of load cell	75	29
	Bottom corner of load cell	76	40
	Bottom corner of load cell	77	1
	Bottom corner of load cell	78	0
	Bottom corner of load cell	79	-1
	Bottom corner of load cell	80	-2
	Bottom corner of load cell	81	-2
	Bottom corner of load cell	82	-3
	Bottom corner of load cell	83	-3
	Center of load cell	51	0
	Center of load cell	52	1
	Center of load cell	53	1
	Center of load cell	54	1
	Center of load cell	55	1
	Center of load cell	56	2
	Center of load cell	57	2
	Center of load cell	58	1
	Center of load cell	59	1
	Center of load cell	60	1
	Center of load cell	61	0
	Center of load cell	62	-1
	Center of load cell	63	-1
	Center of load cell	64	-2
	Center of load cell	65	-2
	Center of load cell	66	-3

Table 11 Deformable Barrier Measurements, continued

Load Cell Row	Measurement Point Location	Measurement Point Number	Crush (mm)
Row 8	Bottom corner of load cell	34	0
	Bottom corner of load cell	35	1
	Bottom corner of load cell	36	1
	Bottom corner of load cell	37	1
	Bottom corner of load cell	38	1
	Bottom corner of load cell	39	1
	Bottom corner of load cell	40	1
	Bottom corner of load cell	41	1
	Bottom corner of load cell	42	1
	Bottom corner of load cell	43	1
	Bottom corner of load cell	44	0
	Bottom corner of load cell	45	0
	Bottom corner of load cell	46	-1
	Bottom corner of load cell	47	-2
	Bottom corner of load cell	48	-3
	Bottom corner of load cell	49	-4
	Bottom corner of load cell	50	-5
	Center of load cell	18	0
	Center of load cell	19	1
	Center of load cell	20	1
	Center of load cell	21	1
	Center of load cell	22	1
	Center of load cell	23	2
	Center of load cell	24	2
	Center of load cell	25	1
	Center of load cell	26	1
	Center of load cell	27	1
	Center of load cell	28	-1
	Center of load cell	29	-1
	Center of load cell	30	-2
	Center of load cell	31	-3
	Center of load cell	32	-3
	Center of load cell	33	-4

Table 11 Deformable Barrier Measurements, continued

Load Cell Row	Measurement Point Location	Measurement Point Number	Crush (mm)
Row 8	Top corner of load cell	1	2
	Top corner of load cell	2	1
	Top corner of load cell	3	2
	Top corner of load cell	4	1
	Top corner of load cell	5	0
	Top corner of load cell	6	2
	Top corner of load cell	7	2
	Top corner of load cell	8	1
	Top corner of load cell	9	0
	Top corner of load cell	10	-1
	Top corner of load cell	11	0
	Top corner of load cell	12	-1
	Top corner of load cell	13	-1
	Top corner of load cell	14	-1
	Top corner of load cell	15	-2
	Top corner of load cell	16	-3
	Top corner of load cell	17	-4

Figure 8 Camera Positions

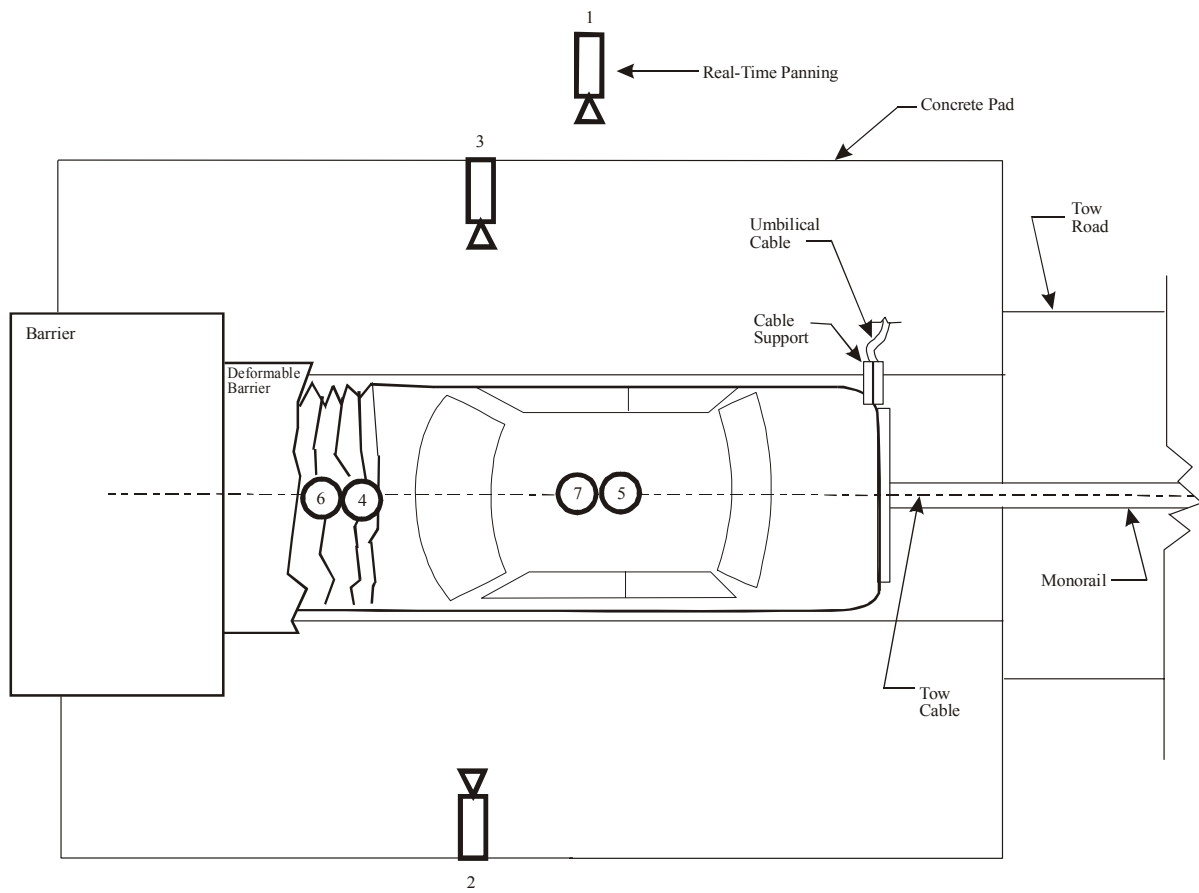


Table 12 Camera Information

Camera Number	Location	Type	Lens (mm)	Speed (frames/s)	Purpose of Camera Data
1	Panning/documentary	Panasonic	Zoom	30	Vehicle dynamics
2	Left side perpendicular	Visario	13	1000	Vehicle dynamics
3	Right side perpendicular	Visario	13	1000	Vehicle dynamics
4	Overhead tight	Visario	50	1000	Vehicle crush
5	Overhead wide	Visario	12.5	1000	Vehicle crush
6	Underbody tight	Visario	25	1000	Vehicle crush
7	Underbody wide	Visario	13	1000	Vehicle crush

Appendix A

Photographs



Figure A-1 Pre-Test Front View

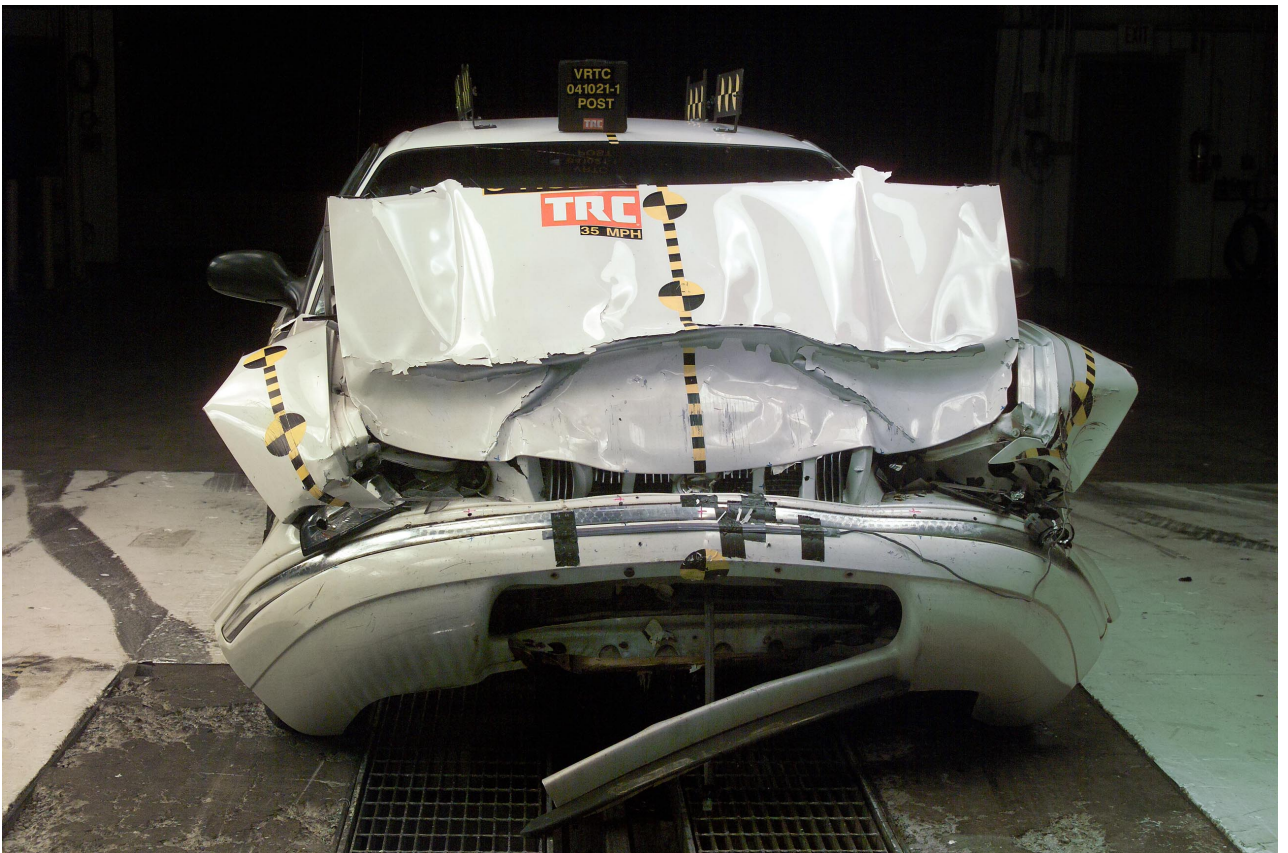


Figure A-2 Post-Test Front View



Figure A-3 Pre-Test Left Front View



Figure A-4 Post-Test Left Front View



Figure A-5 Pre-Test Left Side View



Figure A-6 Post-Test Left Side View



Figure A-7 Pre-Test Right Rear View



Figure A-8 Post-Test Right Rear View



Figure A-9 Pre-Test Right Side View



Figure A-10 Post-Test Right Side View

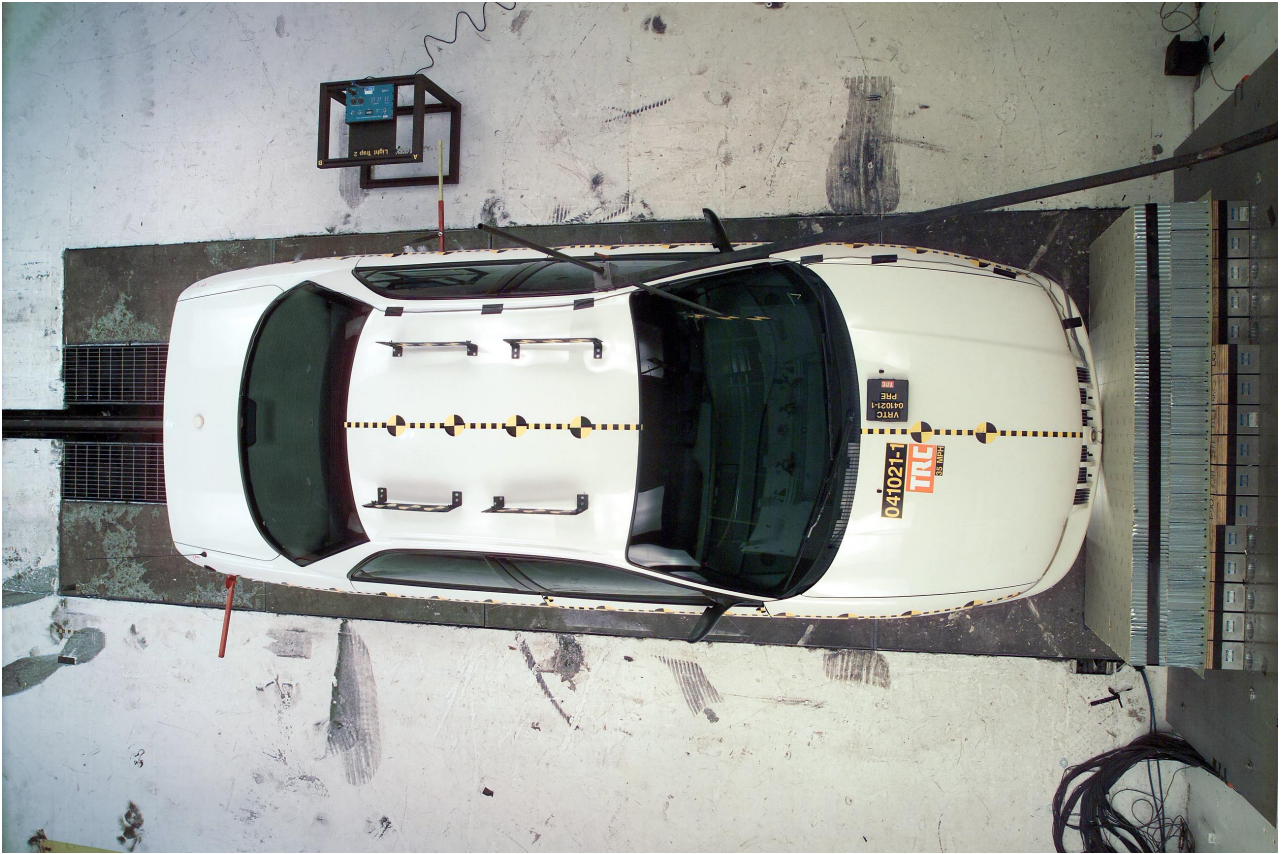


Figure A-11 Pre-Test Overhead View

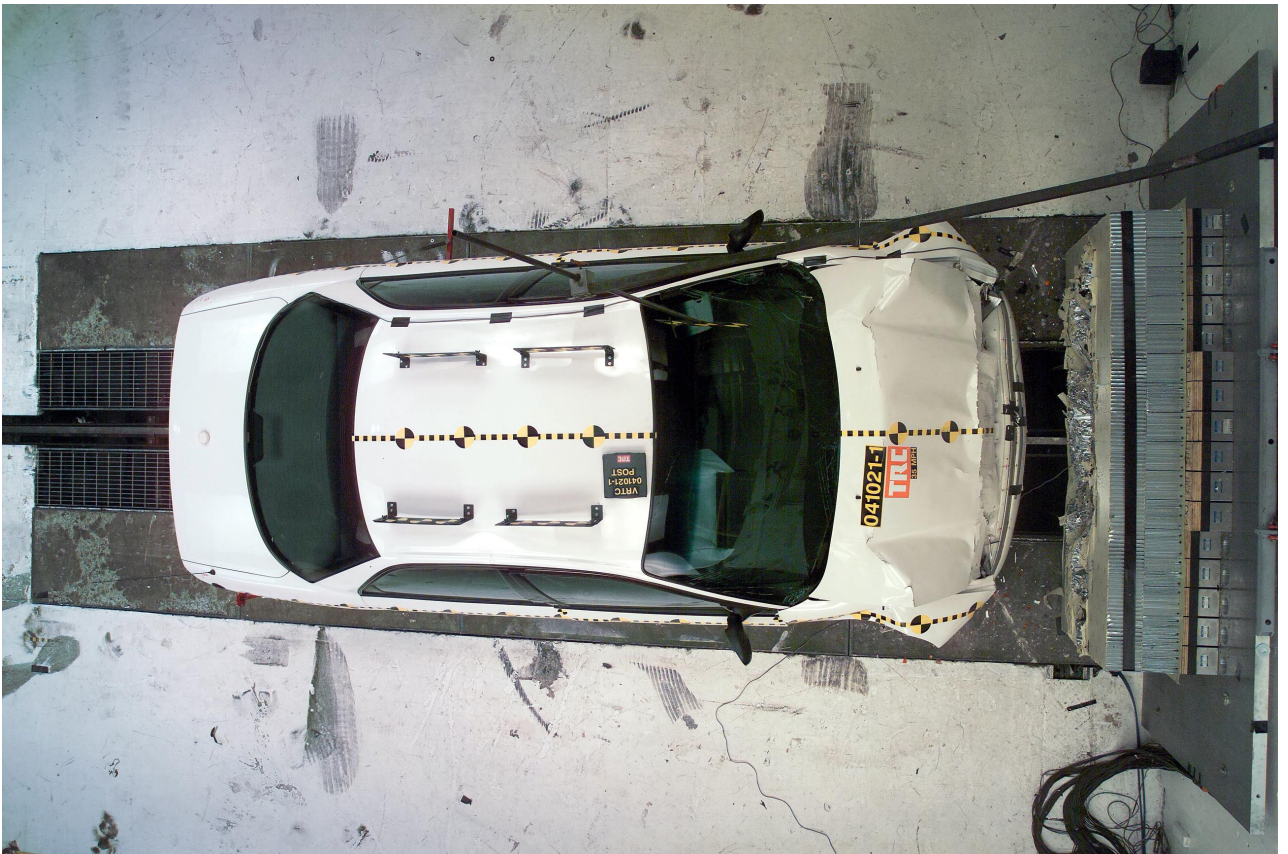


Figure A-12 Post-Test Overhead View

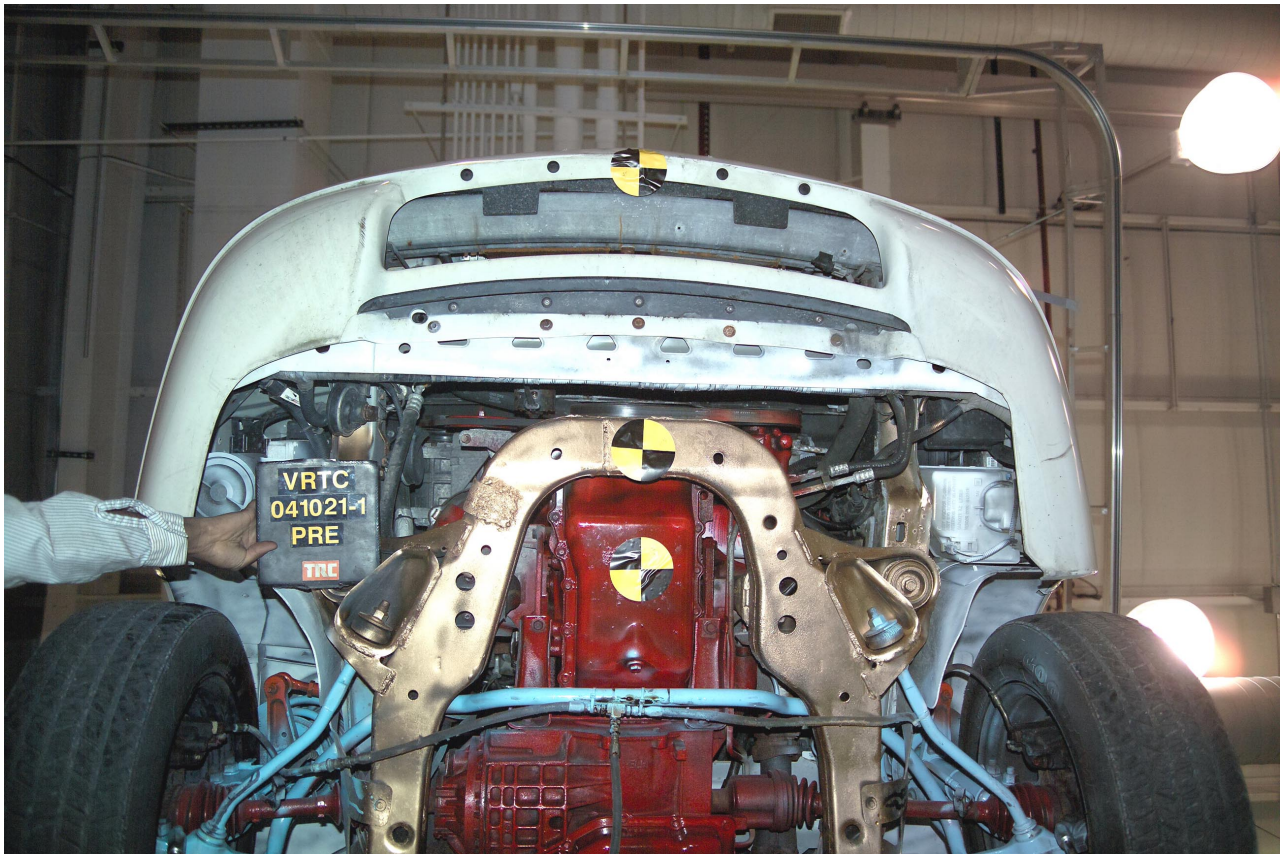


Figure A-13 Pre-Test Front Underbody View

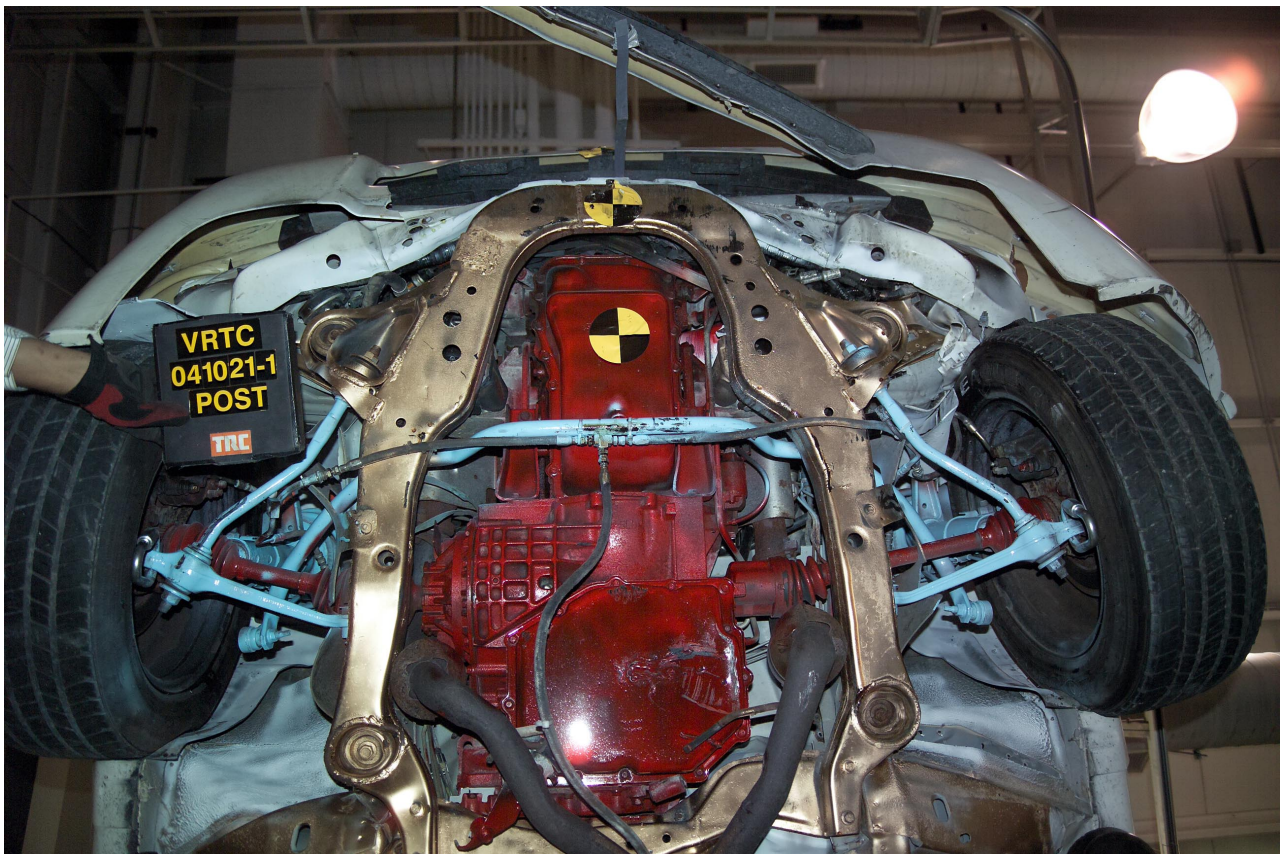


Figure A-14 Post-Test Front Underbody View

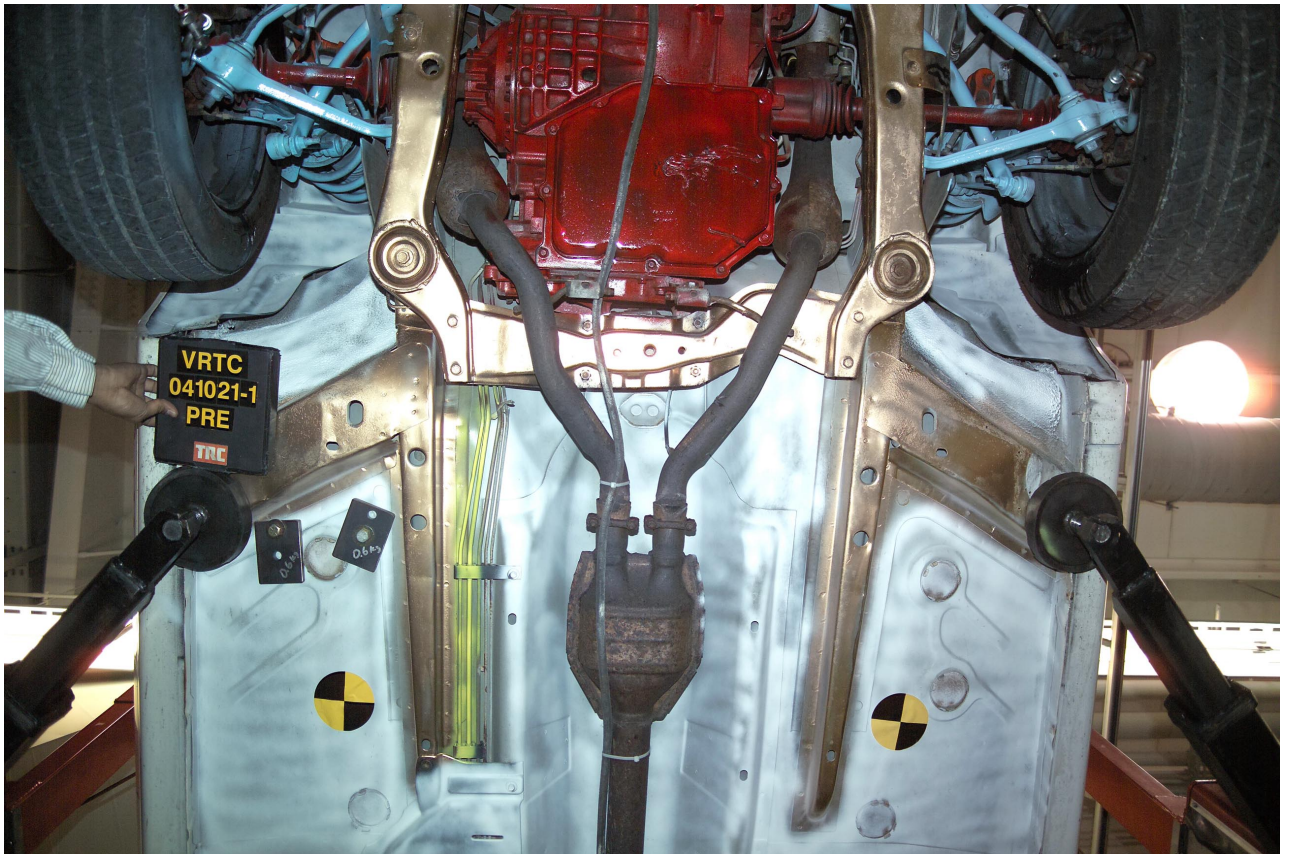


Figure A-15 Pre-Test Front Mid Underbody View

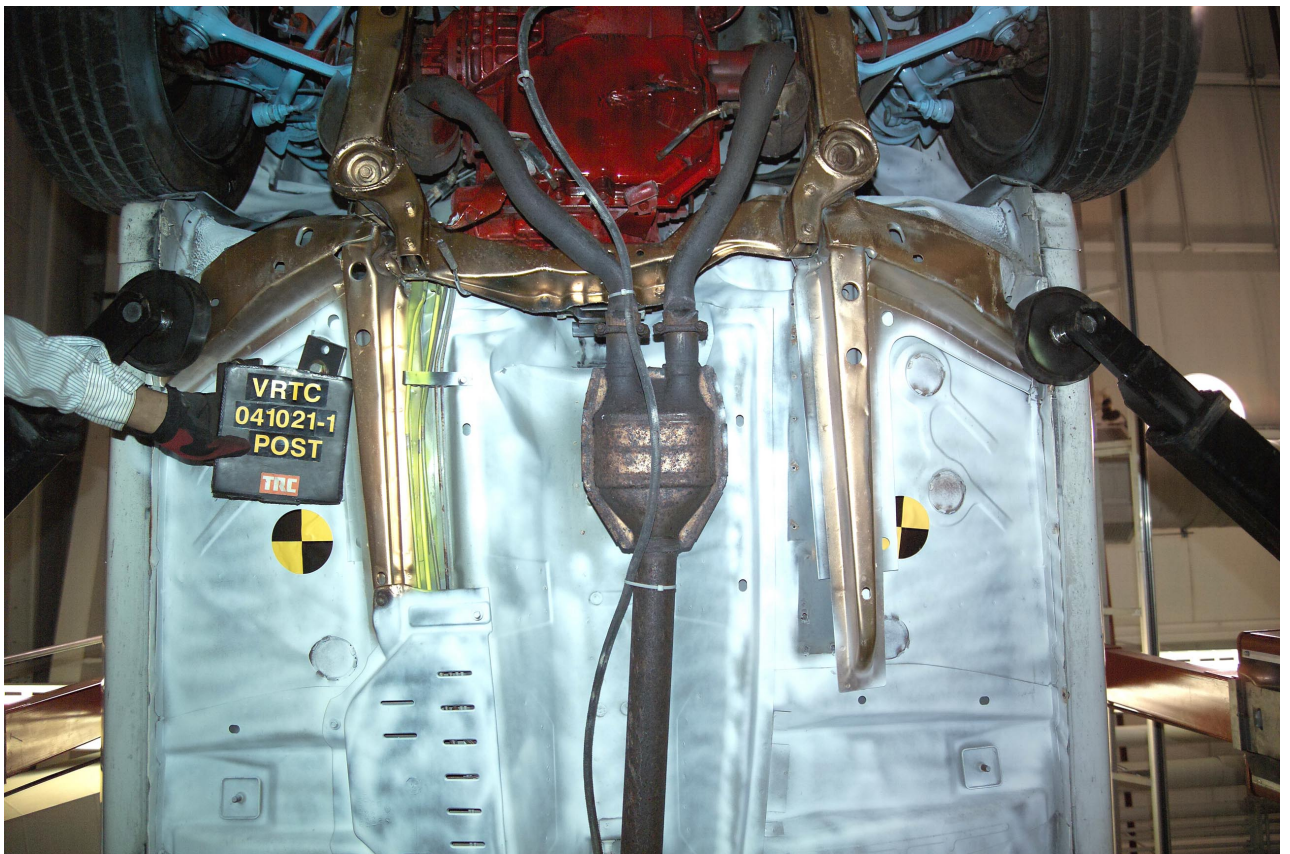


Figure A-16 Post-Test Front Mid Underbody View



Figure A-17 Pre-Test Mid Underbody View

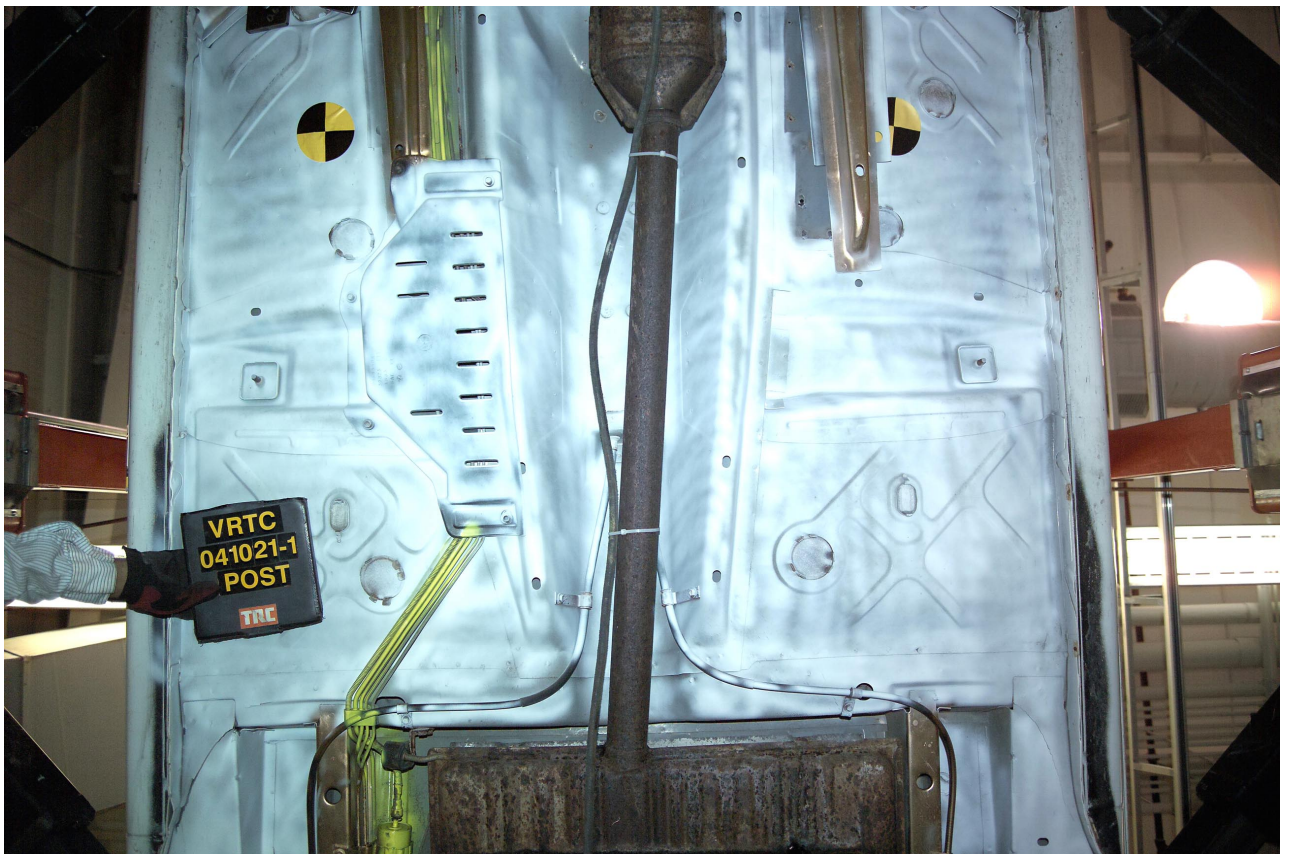


Figure A-18 Post-Test Mid Underbody View

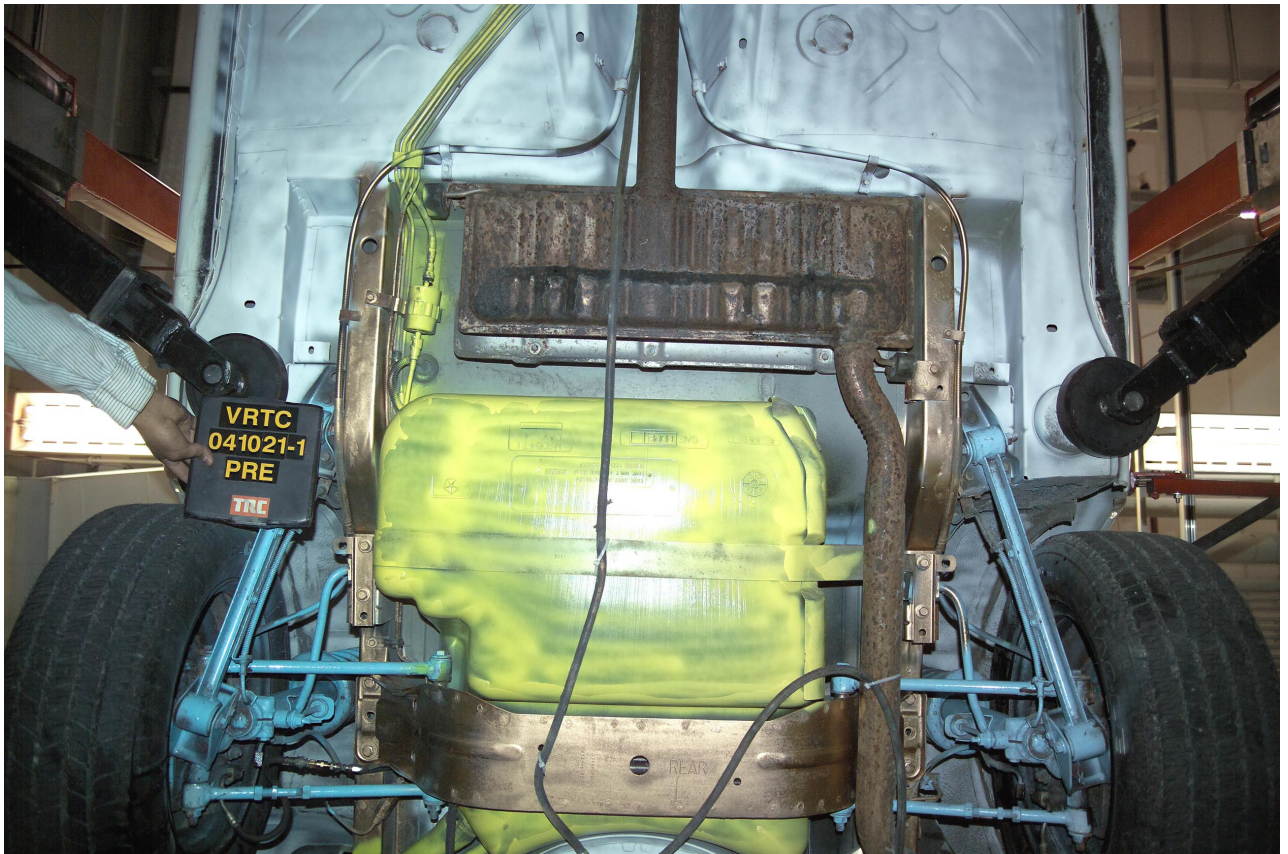


Figure A-19 Pre-Test Rear Mid Underbody View

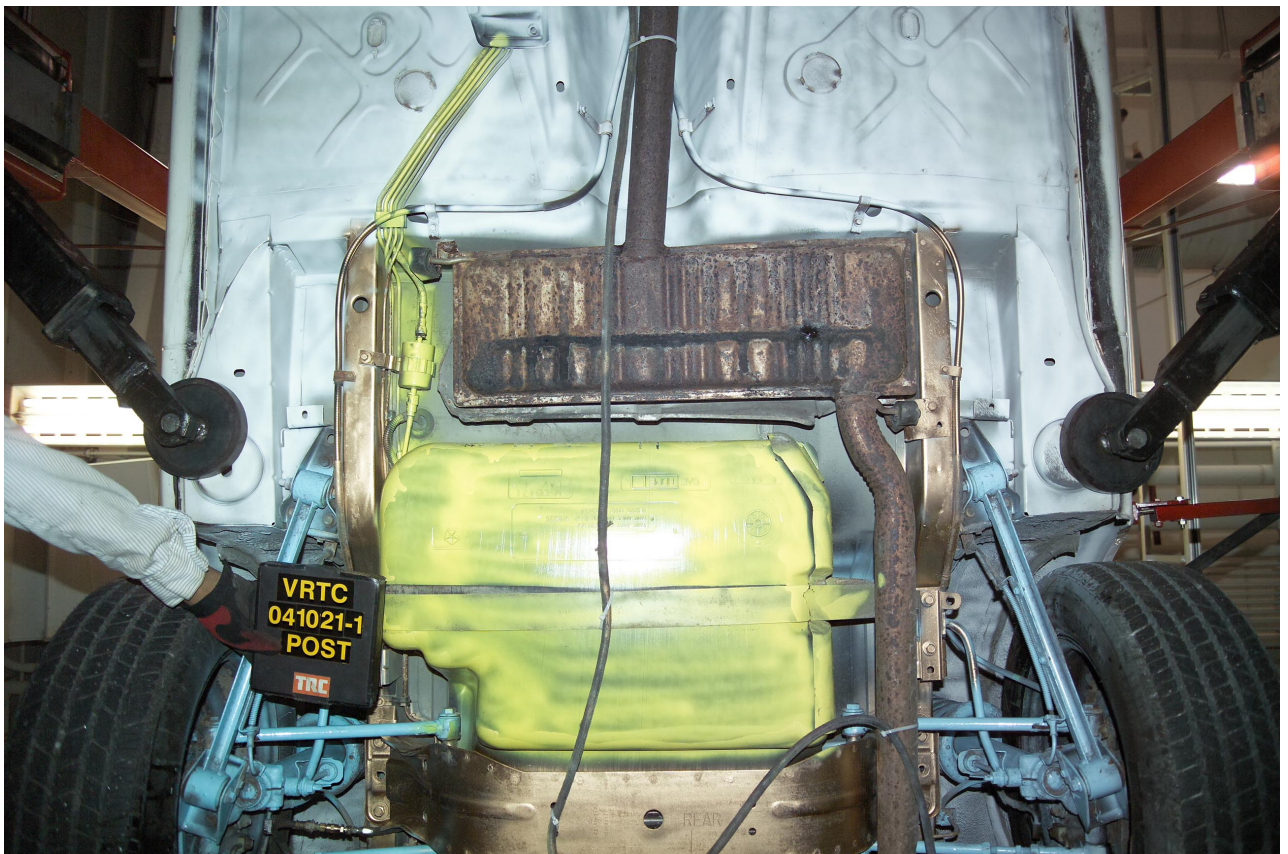


Figure A-20 Post-Test Rear Mid Underbody View

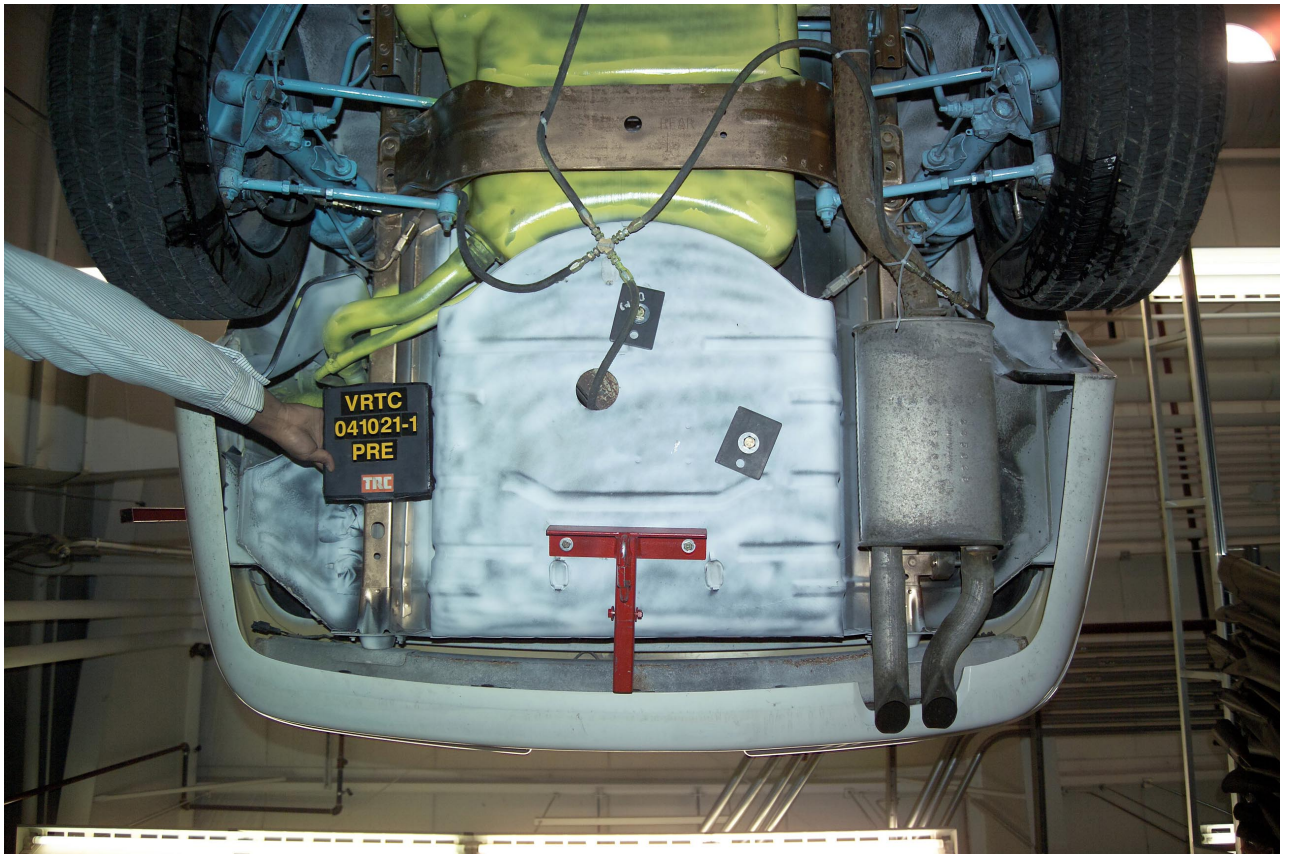


Figure A-21 Pre-Test Rear Underbody View

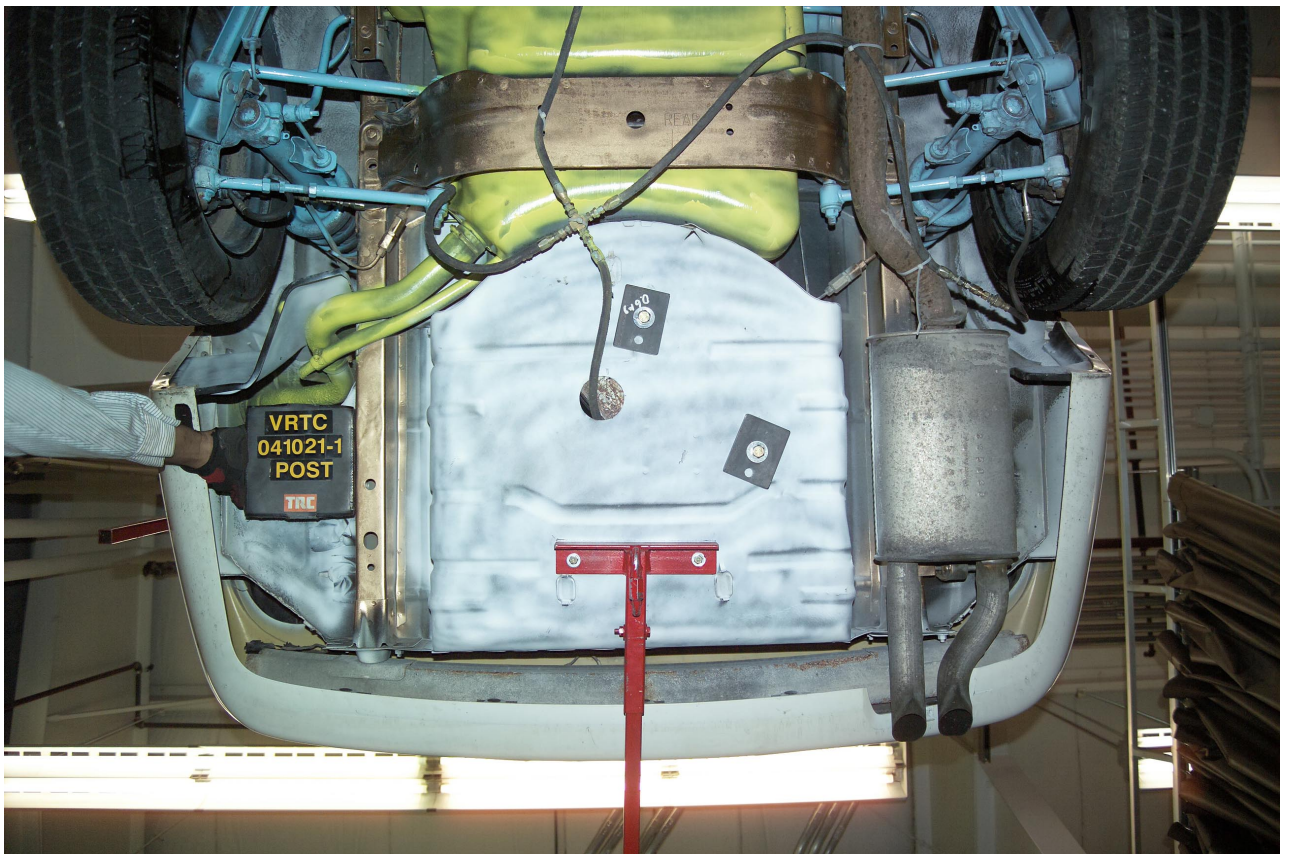


Figure A-22 Post-Test Rear Underbody View

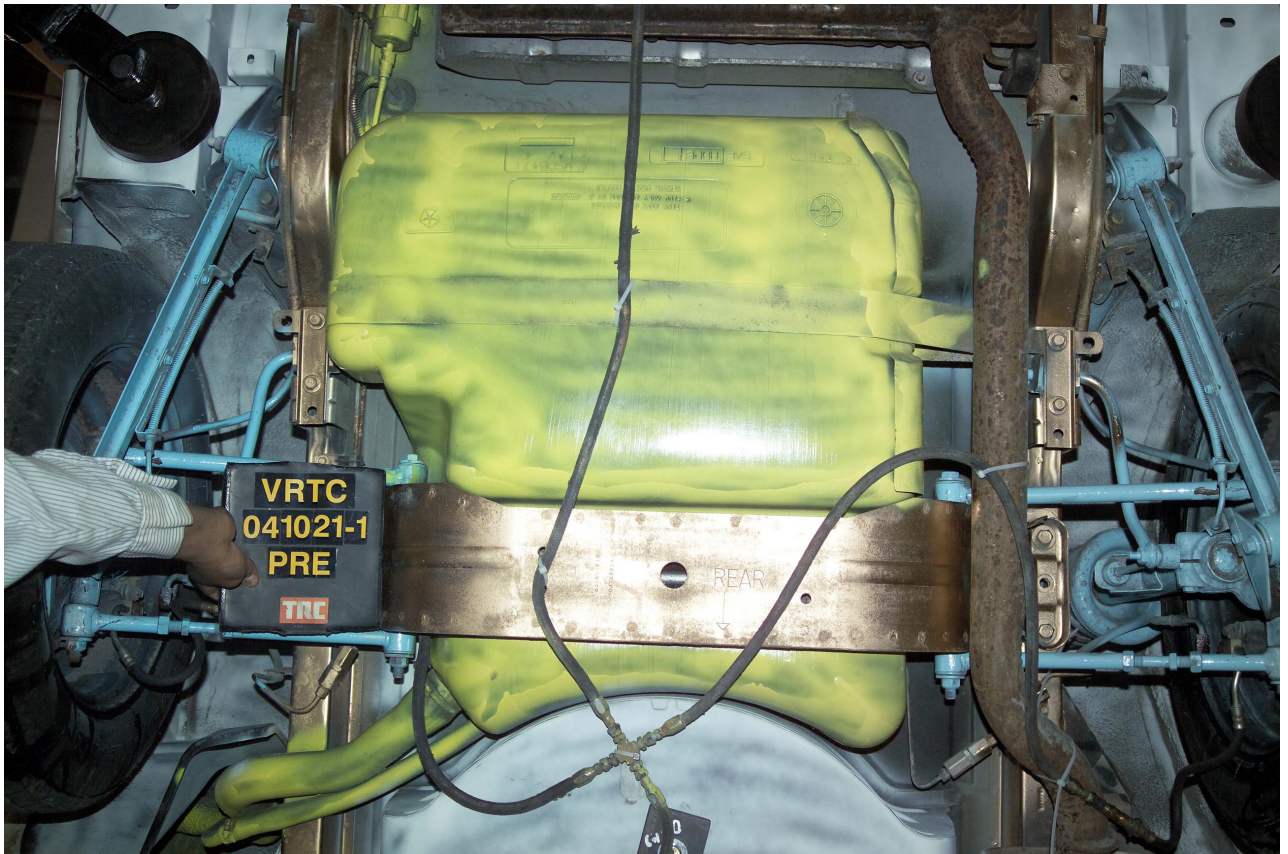


Figure A-23 Pre-Test Fuel Tank View

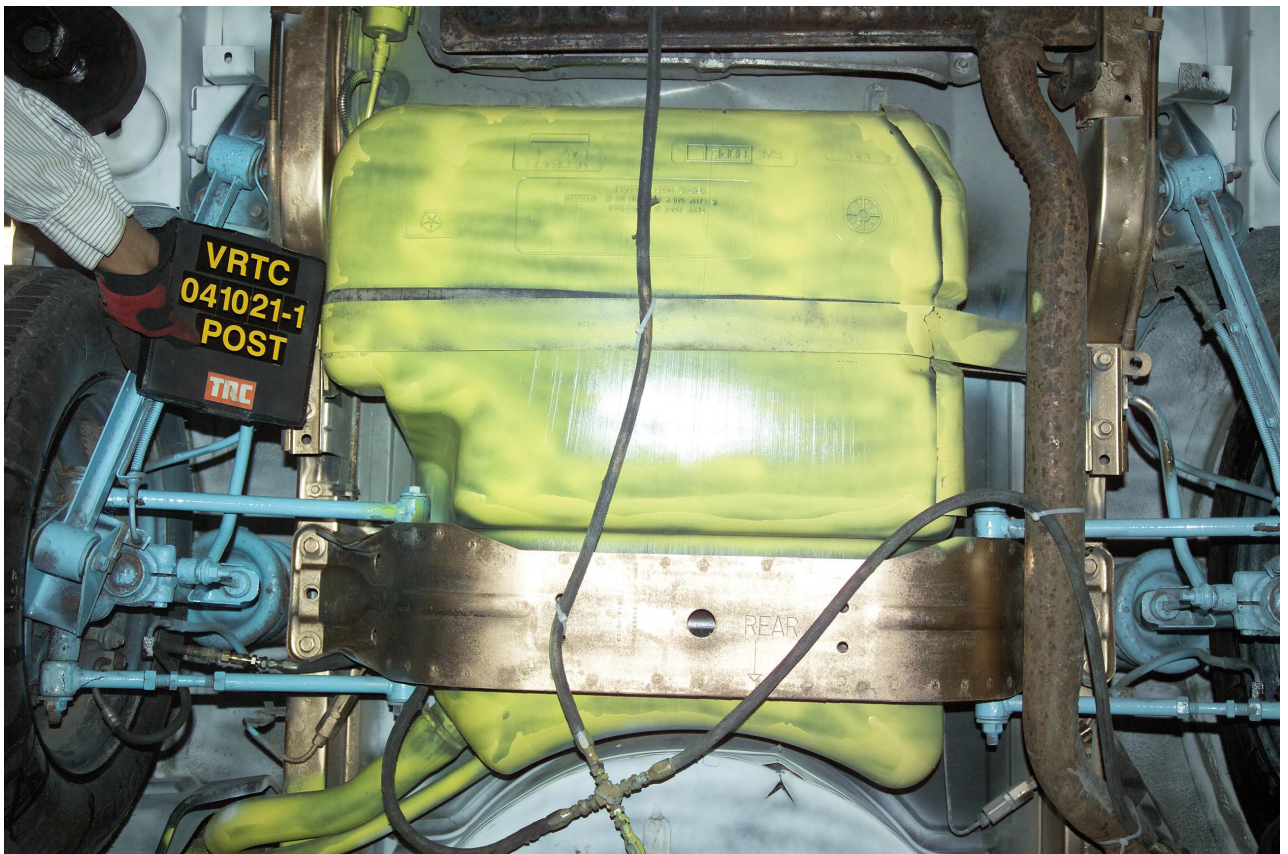


Figure A-24 Post-Test Fuel Tank View



Figure A-25 Pre-Test Fuel Filler Neck View



Figure A-26 Post-Test Fuel Filler Neck View

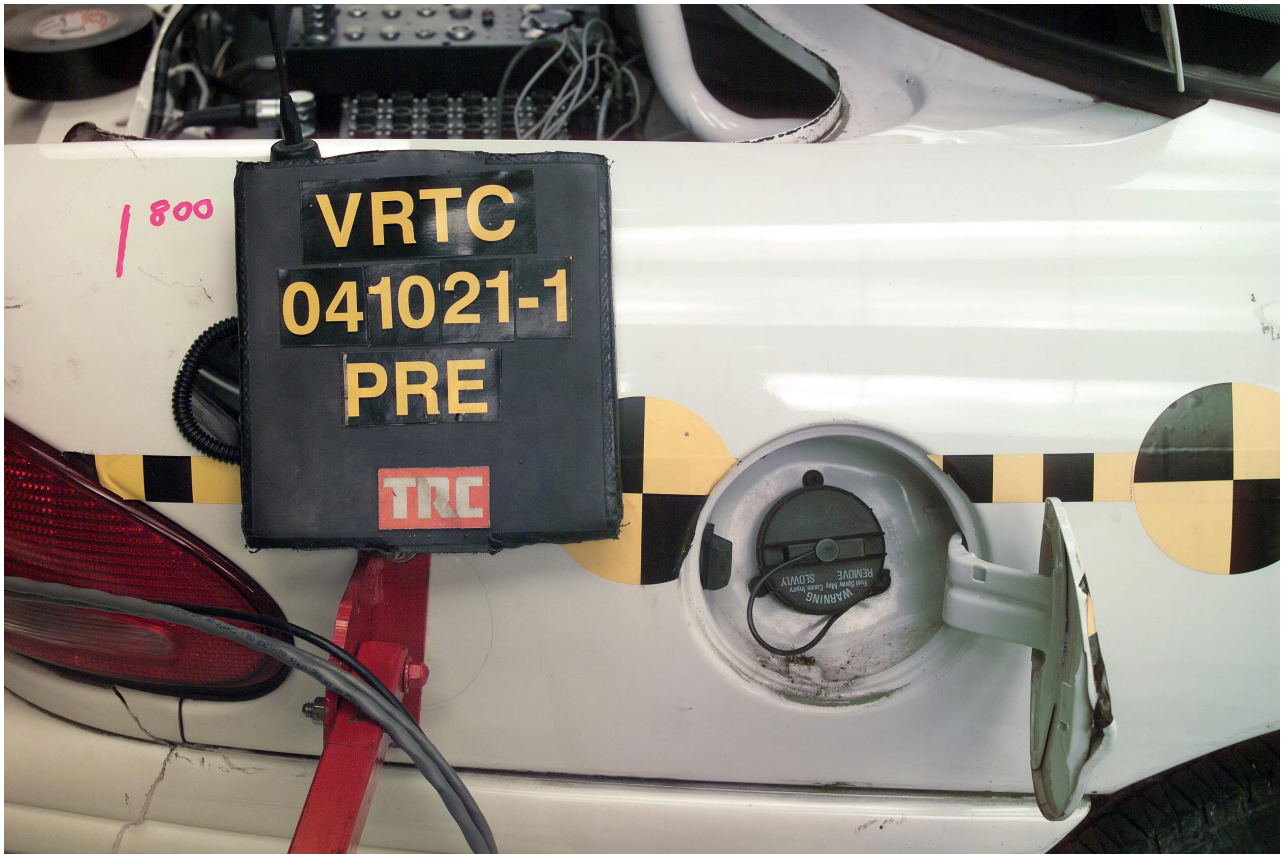


Figure A-27 Pre-Test Fuel Filler Cap View



Figure A-28 Post-Test Fuel Filler Cap View



Figure A-29 Pre-Test Engine Compartment View

Intentionally Left Blank



Figure A-30 Pre-Test Windshield View



Figure A-31 Post-Test Windshield View



Figure A-32 Post-Test Driver Airbag View

Intentionally Left Blank



Figure A-33 Post-Test Driver Floorpan Deformation View



Figure A-34 Post-Test Driver Toe-board Deformation View



Figure A-35 Post-Test Passenger Airbag View

Intentionally Left Blank



Figure A-36 Post-Test Passenger Floorpan Deformation View



Figure A-37 Post-Test Passenger Toe-board Deformation View

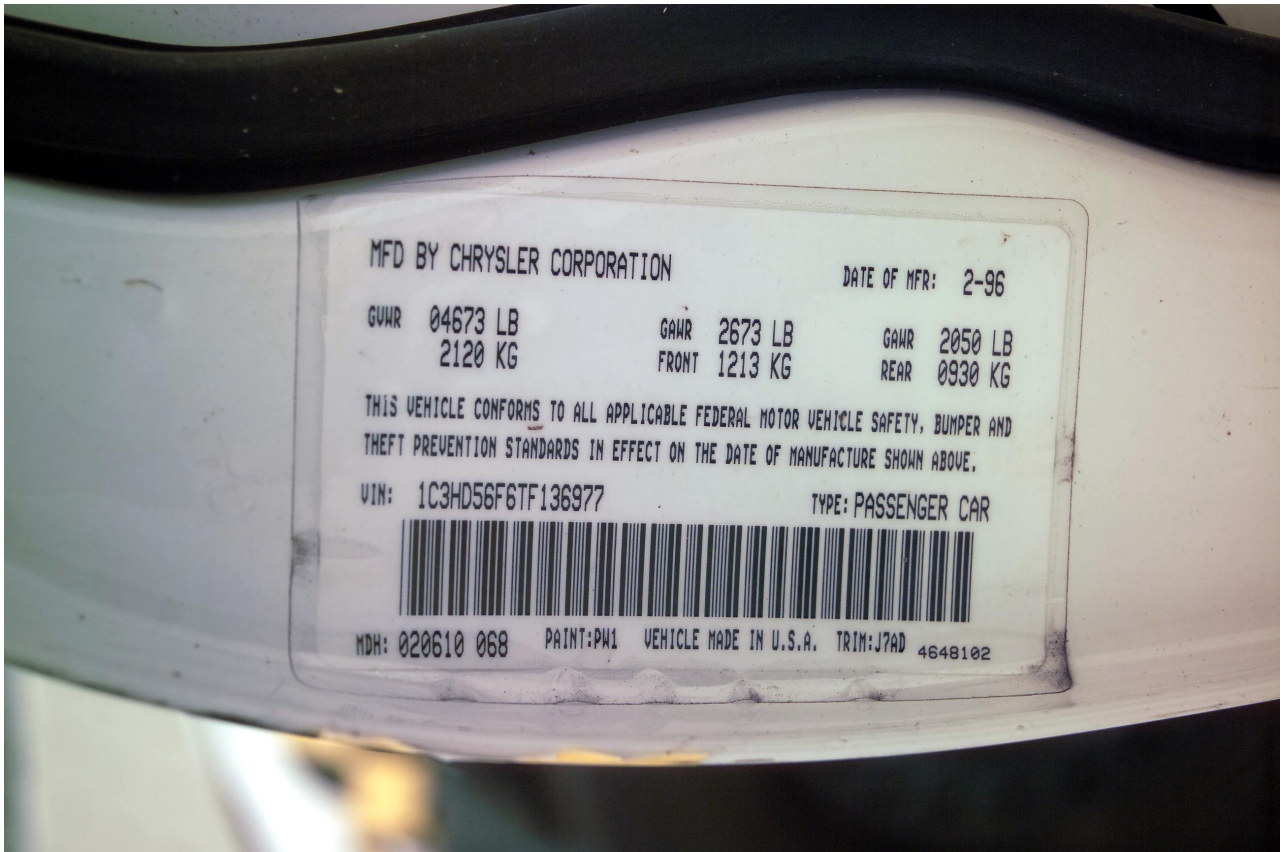


Figure A-38 Vehicle Certification Label View

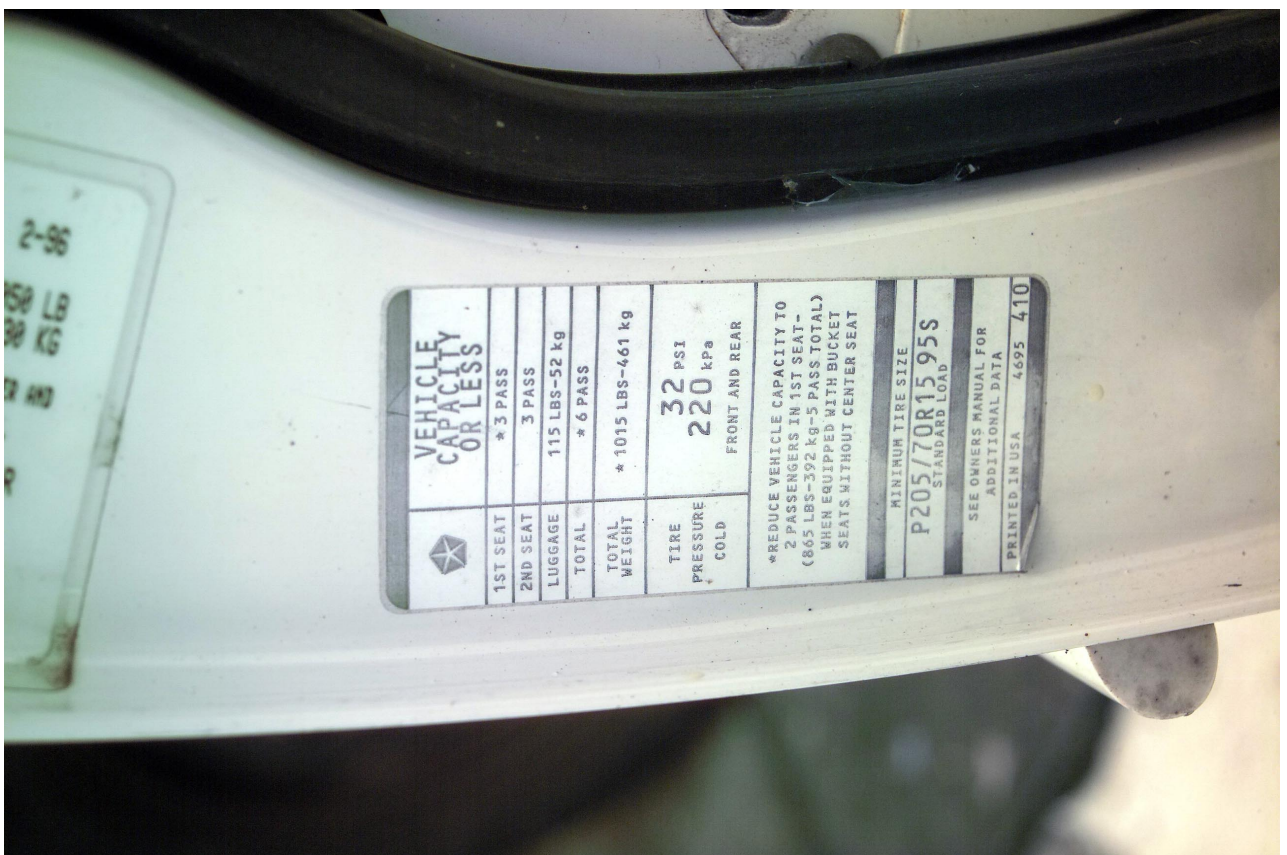


Figure A-39 Vehicle Tire Pressure Label View

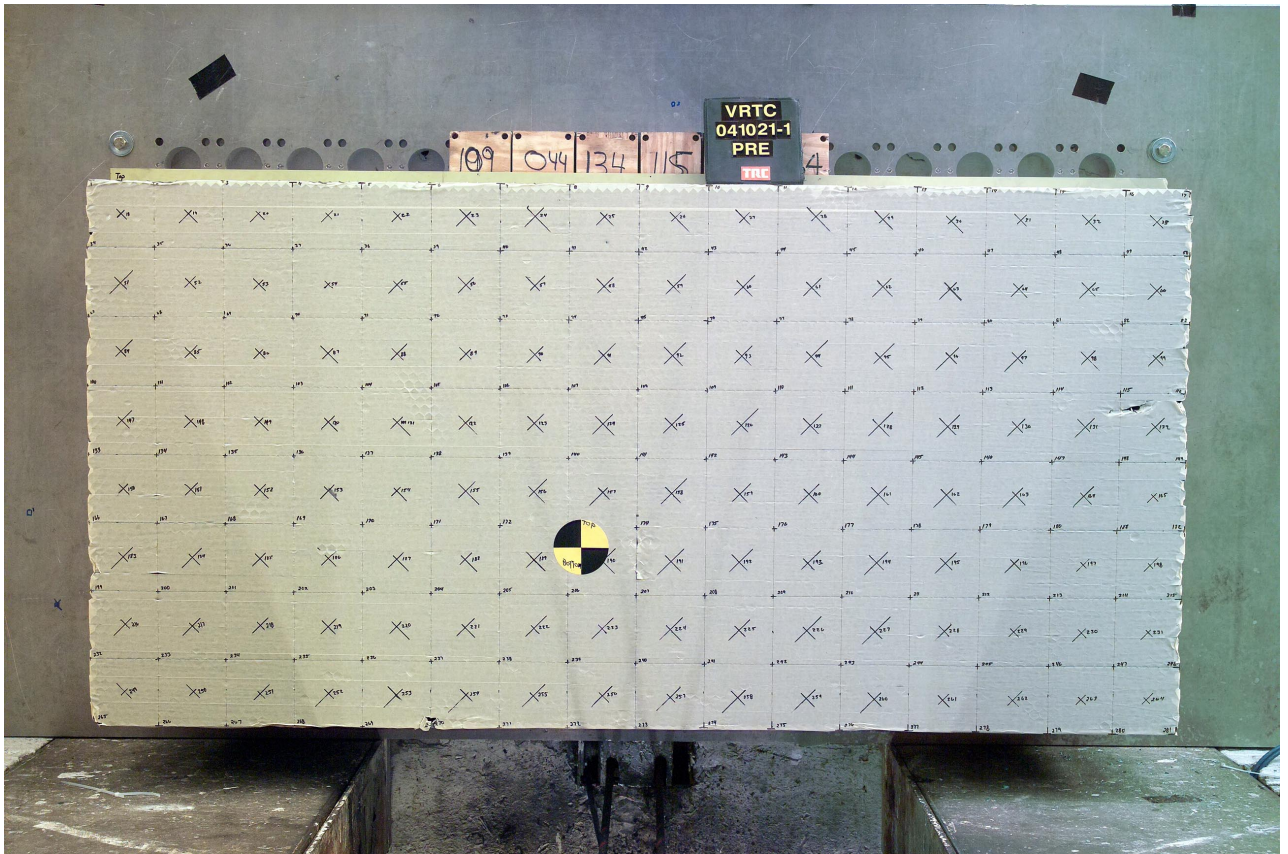


Figure A-40 Pre-Test Deformable Barrier Front View

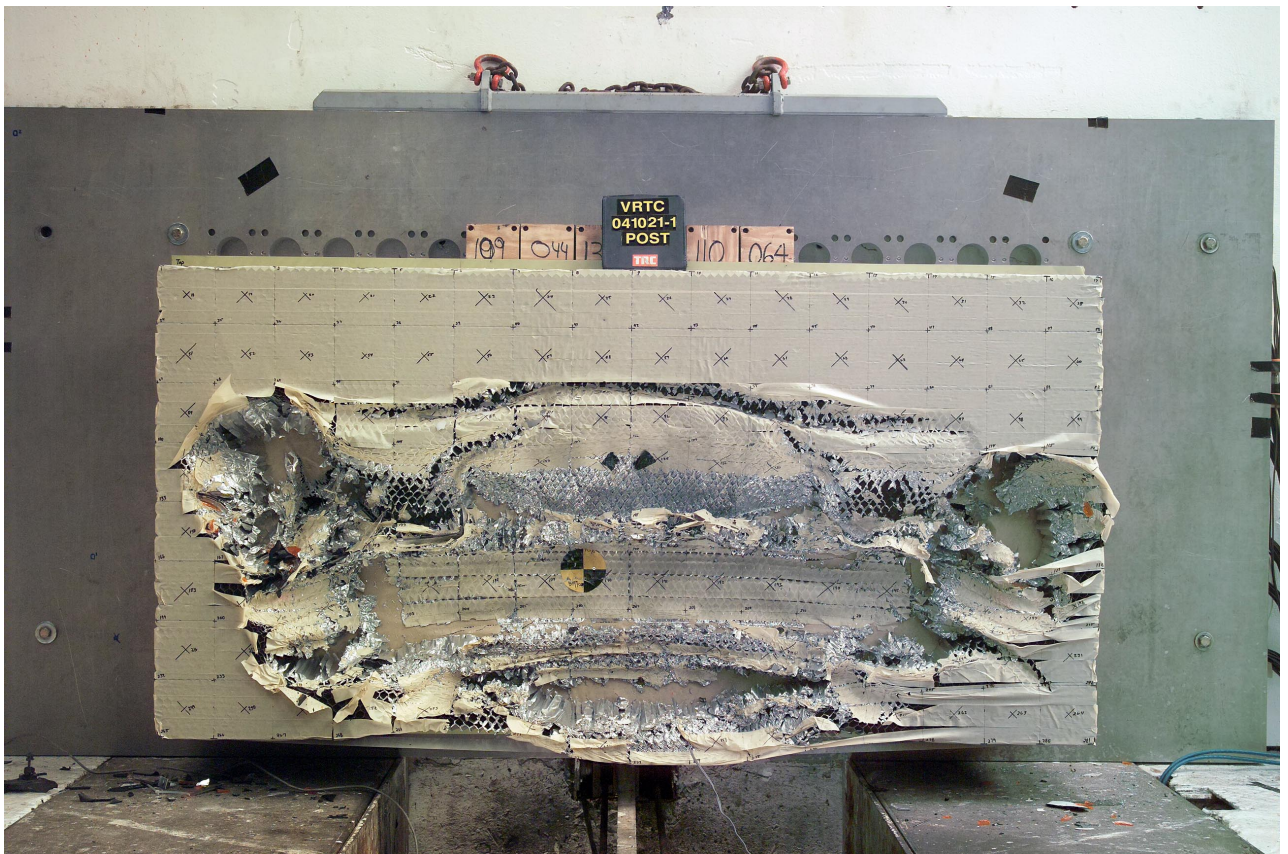


Figure A-41 Post-Test Deformable Barrier Front View



Figure A-42 Pre-Test Deformable Barrier Left Side View



Figure A-43 Pre-Test Deformable Barrier Left Side Close-up View

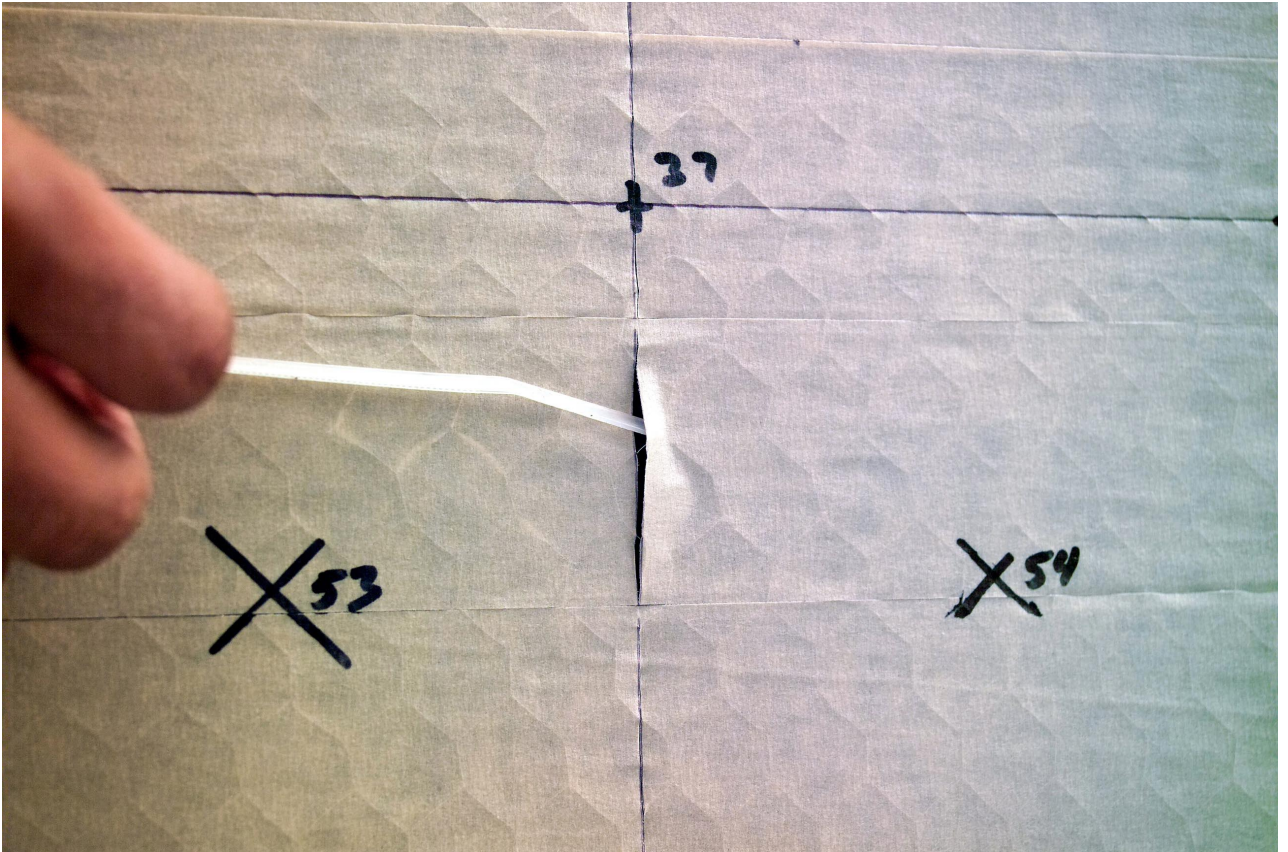


Figure A-44 Pre-Test Deformable Barrier Cover Detail View

Intentionally Left Blank



Figure A-45 Pre-Test Vehicle Impact Point Target View



Figure A-46 Pre-Test Vehicle Impact Point Marker View



Figure A-47 Pre-Test Impact Point Alignment View



Figure A-48 Post-Test Vehicle Impact Point Deviation View



Figure A-49 Pre-Test Vehicle Ballast - View 1



Figure A-50 Pre-Test Vehicle Ballast - View 2

Appendix B

Data Plots



Transportation Research Center, Inc.

Vehicle CG X-Axis Acceleration

Date: 10/21/2004

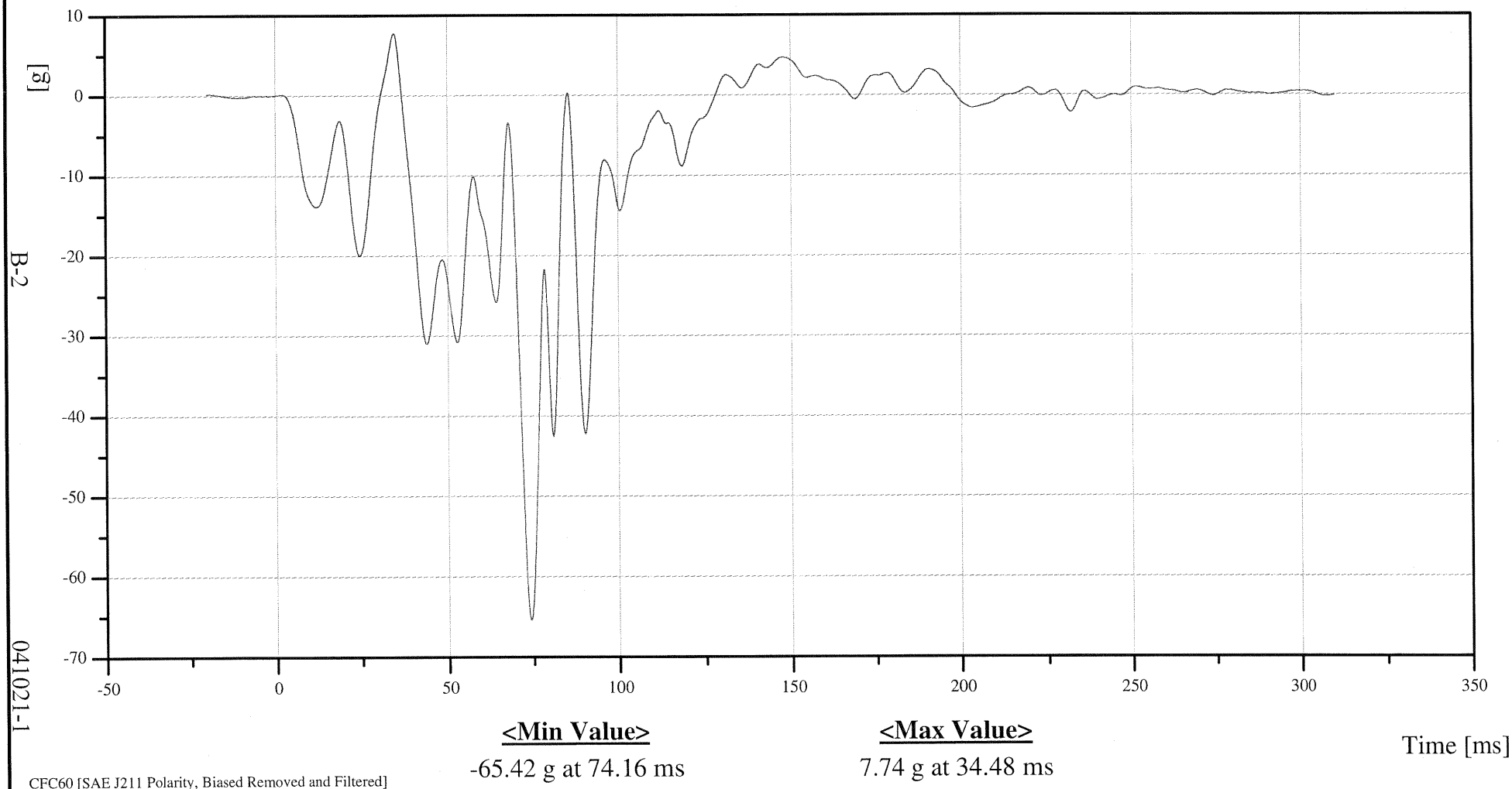
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

VCGXG1





Transportation Research Center, Inc.

Vehicle CG Y-Axis Acceleration

Date: 10/21/2004

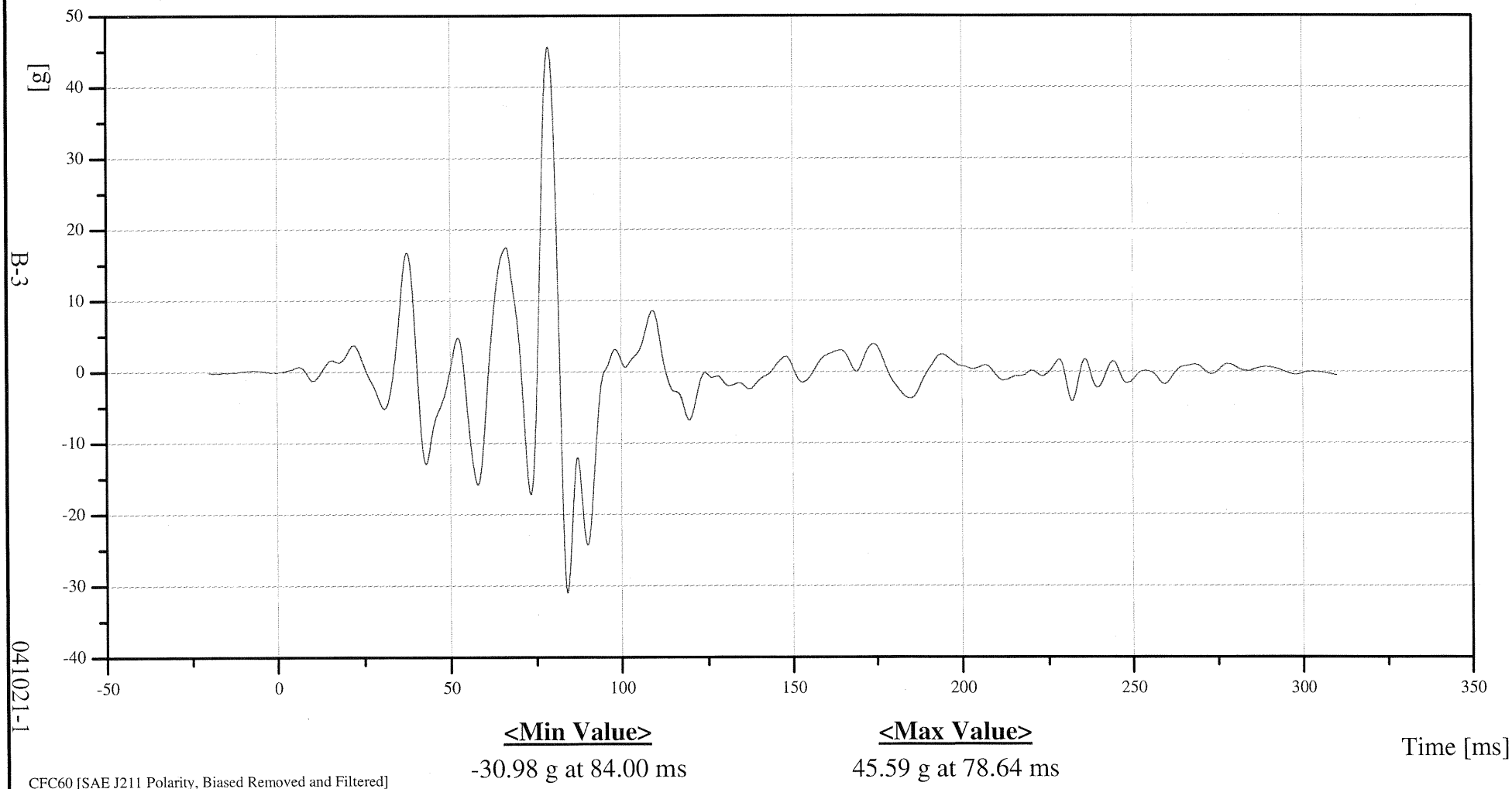
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

VCGYG1





Transportation Research Center, Inc.

Vehicle CG Z-Axis Acceleration

Date: 10/21/2004

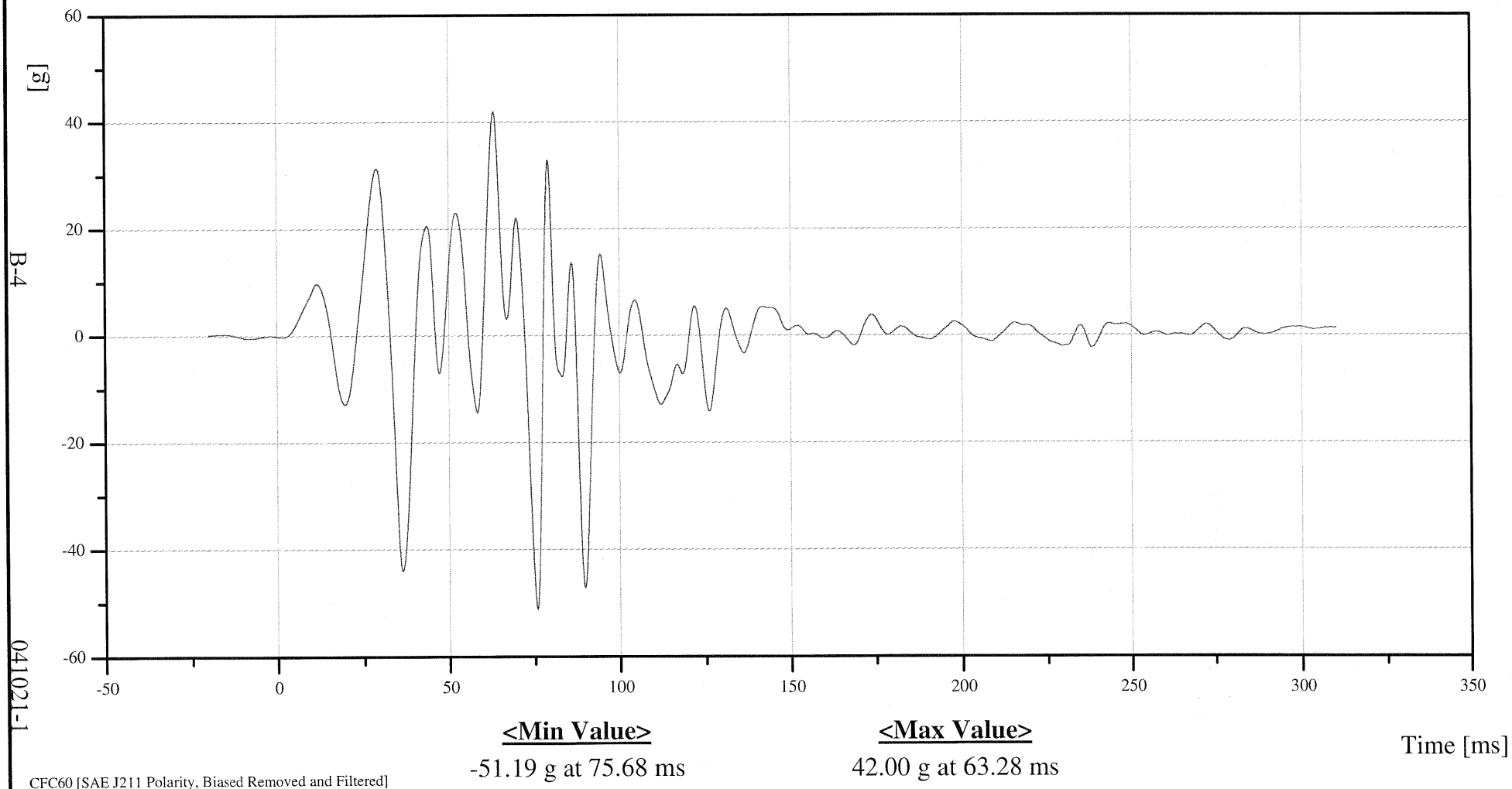
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

VCGZG1





Vehicle CG Resultant Acceleration

Date: 10/21/2004
Time: 11:48:25

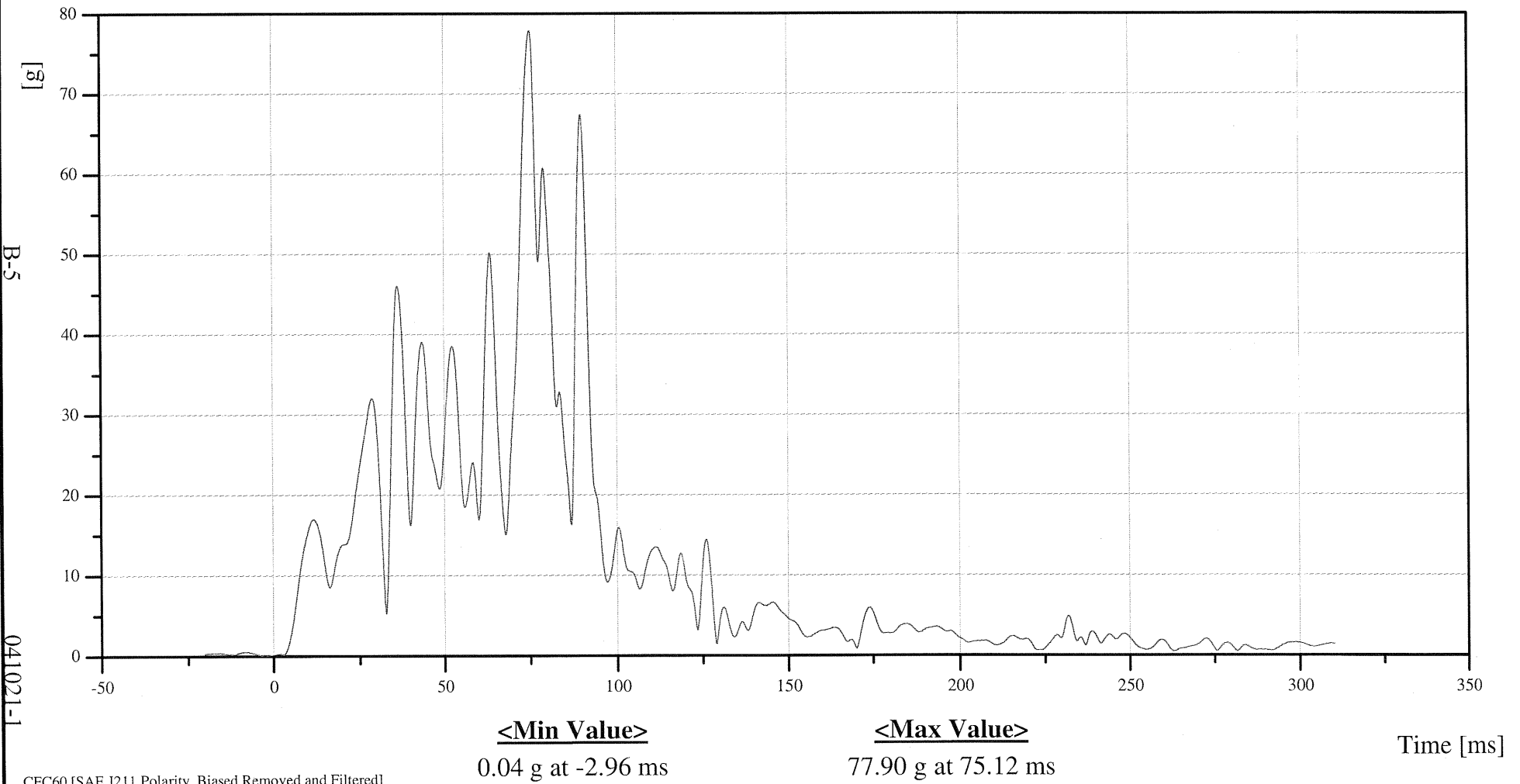
Transportation Research Center, Inc.

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

VCGRG1





Transportation Research Center, Inc.

Vehicle Rear Deck X-Axis Acceleration

Date: 10/21/2004

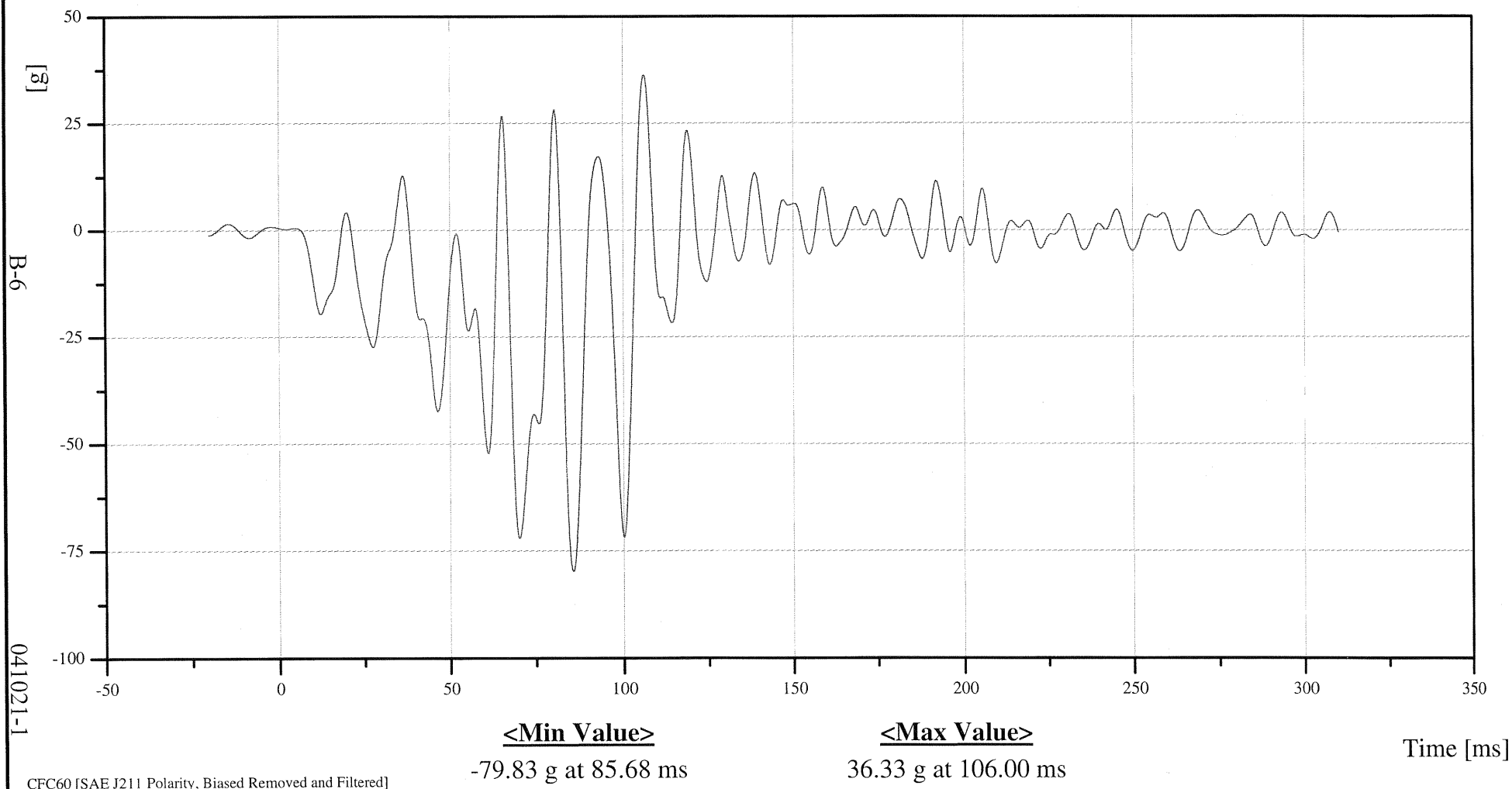
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

RDKXG1





Vehicle Rear Deck Y-Axis Acceleration

Date: 10/21/2004
Time: 11:48:25

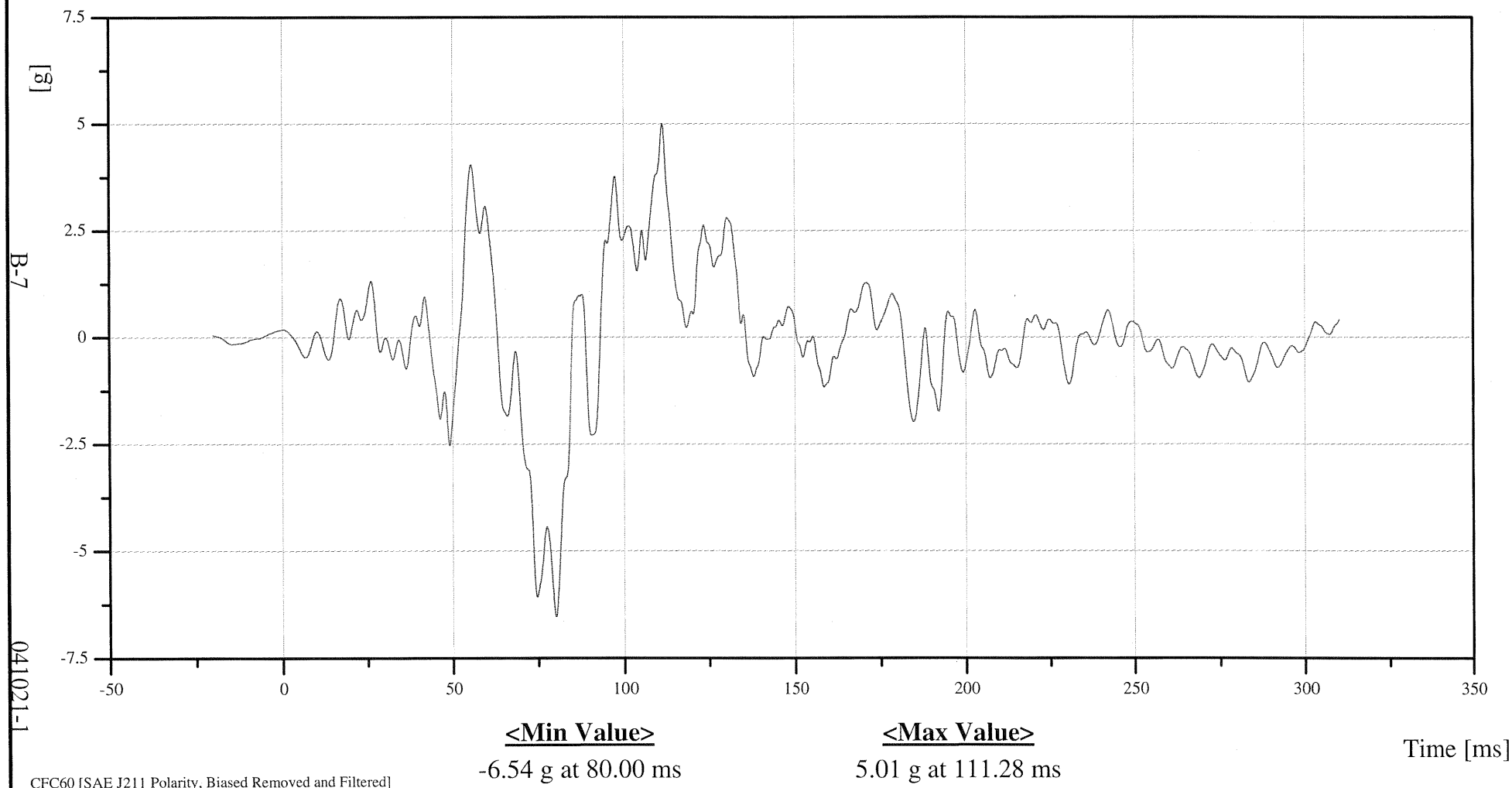
Transportation Research Center, Inc.

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

RDKYG1





Transportation Research Center, Inc.

Vehicle Rear Deck Z-Axis Acceleration

Date: 10/21/2004

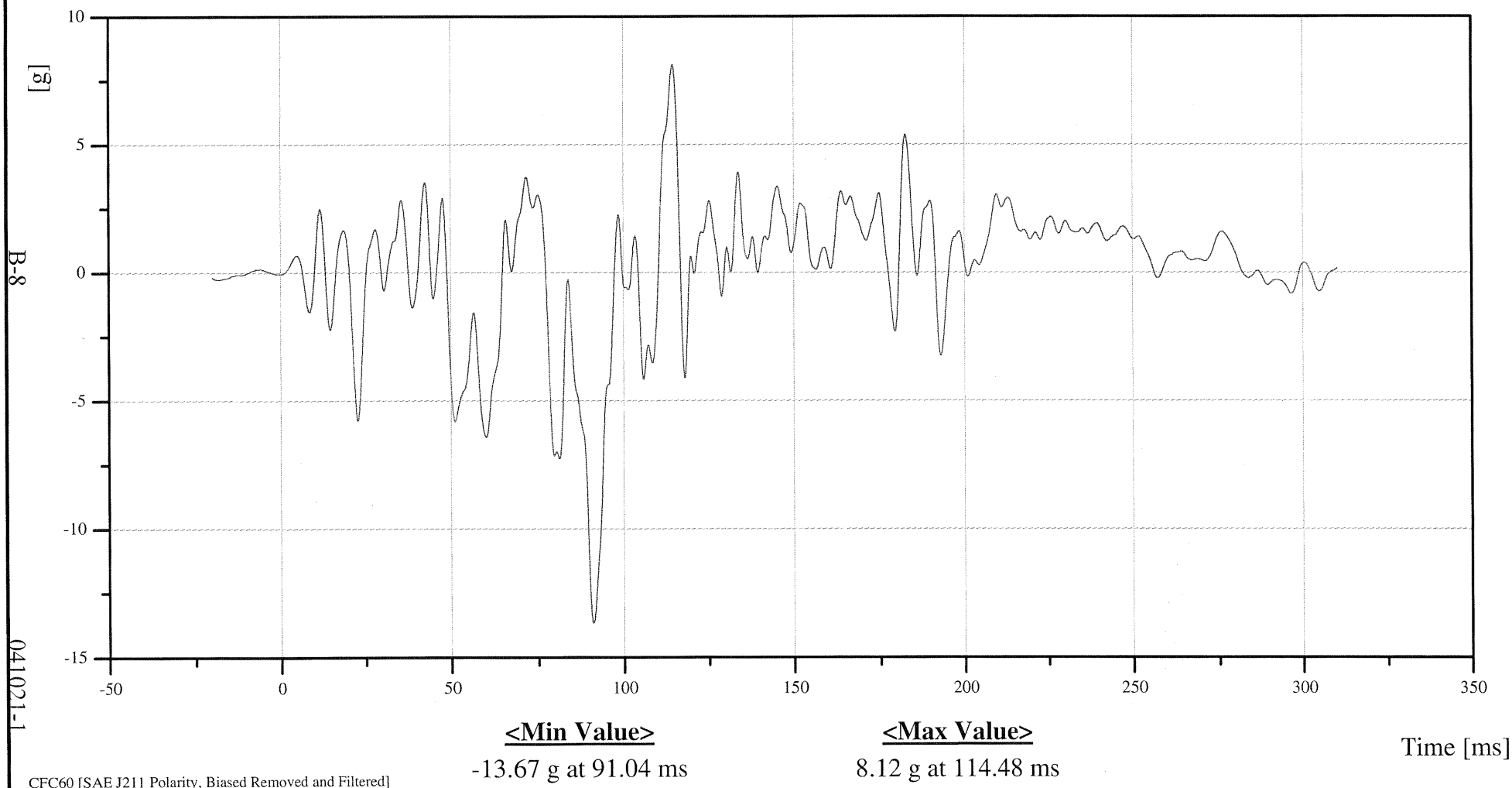
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

RDKZG1





Transportation Research Center, Inc.

Vehicle Rear Deck Resultant Acceleration

Date: 10/21/2004

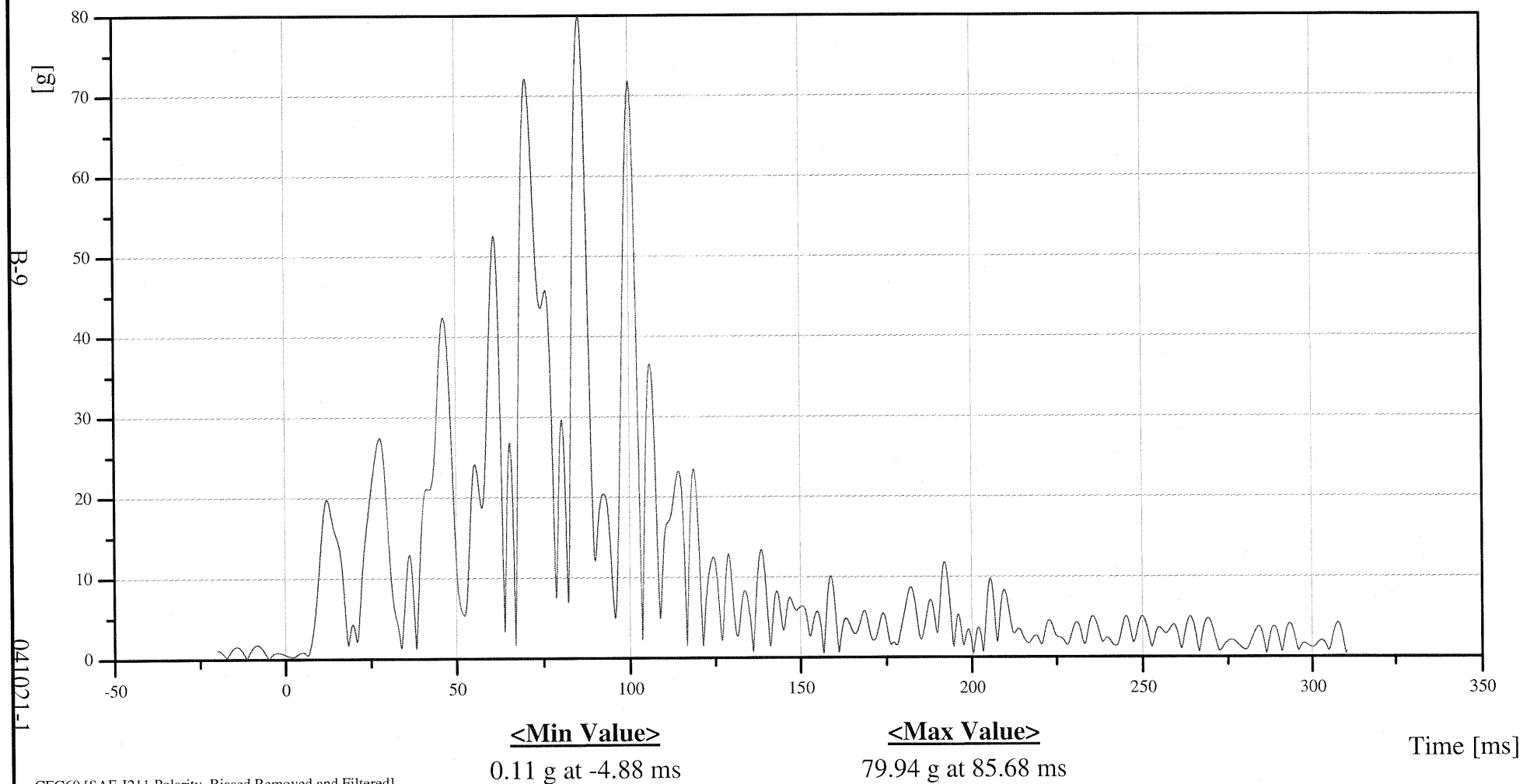
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

RDKRG1





Transportation Research Center, Inc.

Driver Airbag - Primary

Date: 10/21/2004

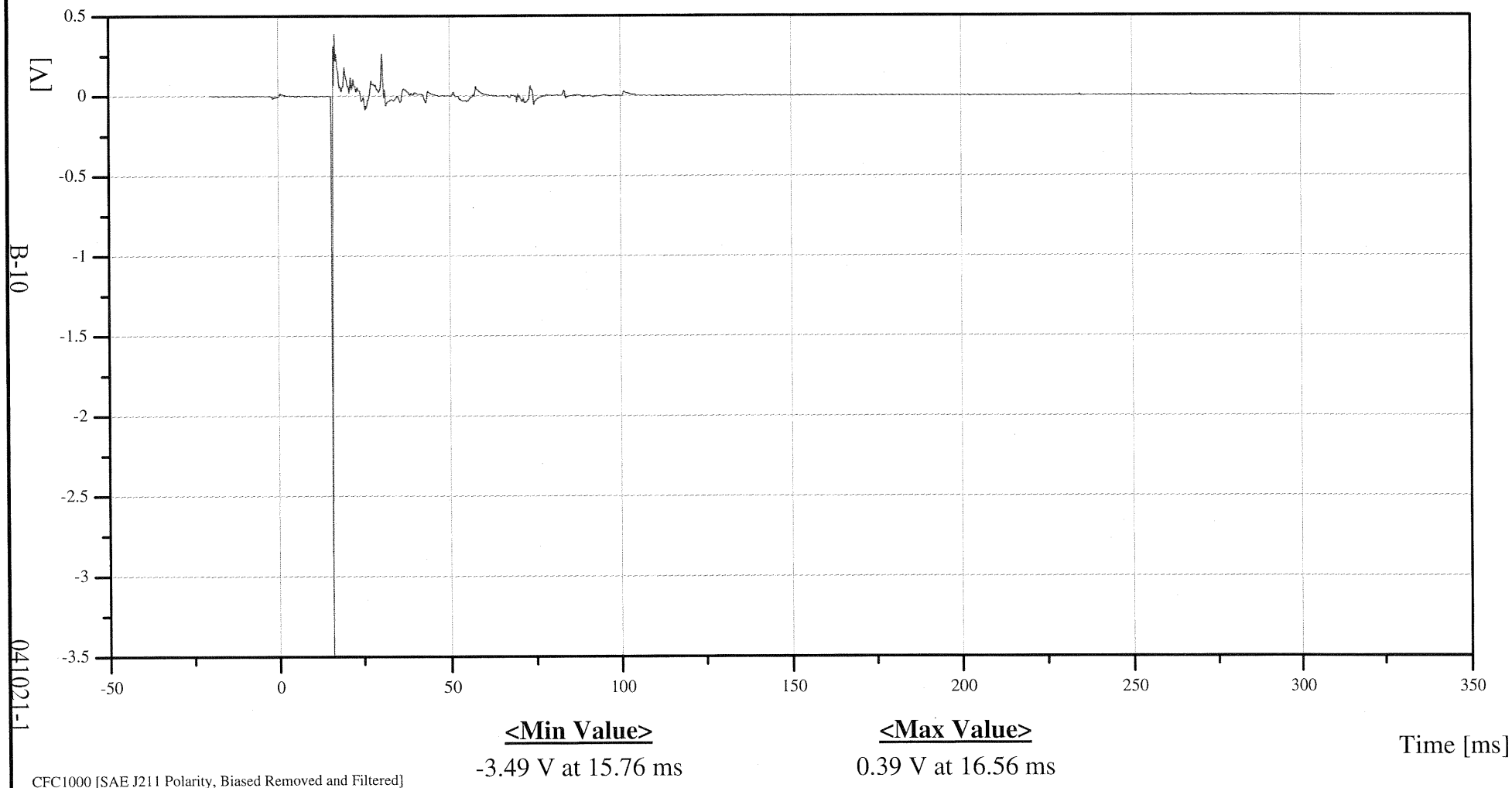
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

DABETA





Transportation Research Center, Inc.

Driver Airbag - Secondary

Date: 10/21/2004

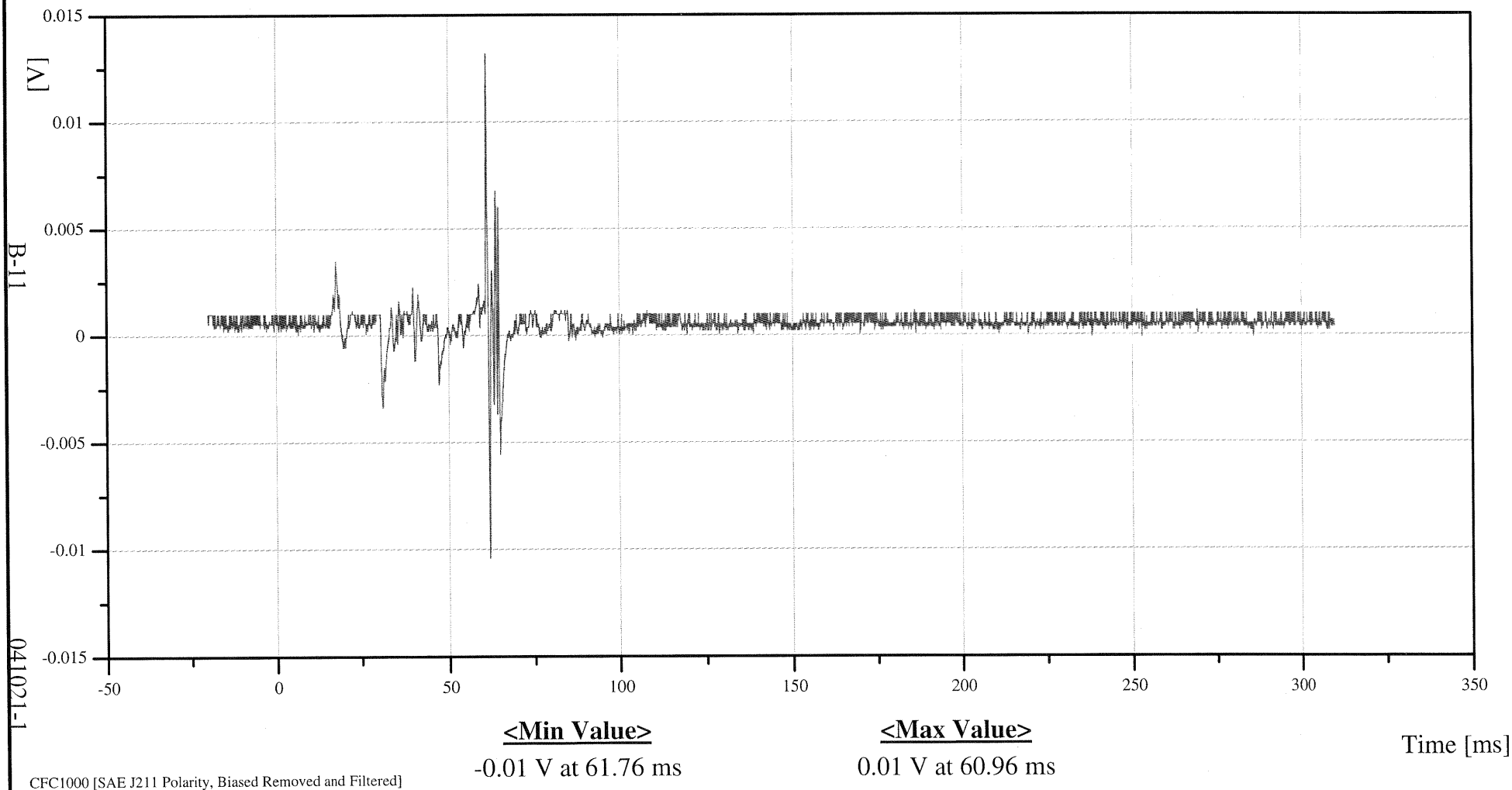
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

DABETB





Transportation Research Center, Inc.

Passenger Airbag - Primary

Date: 10/21/2004

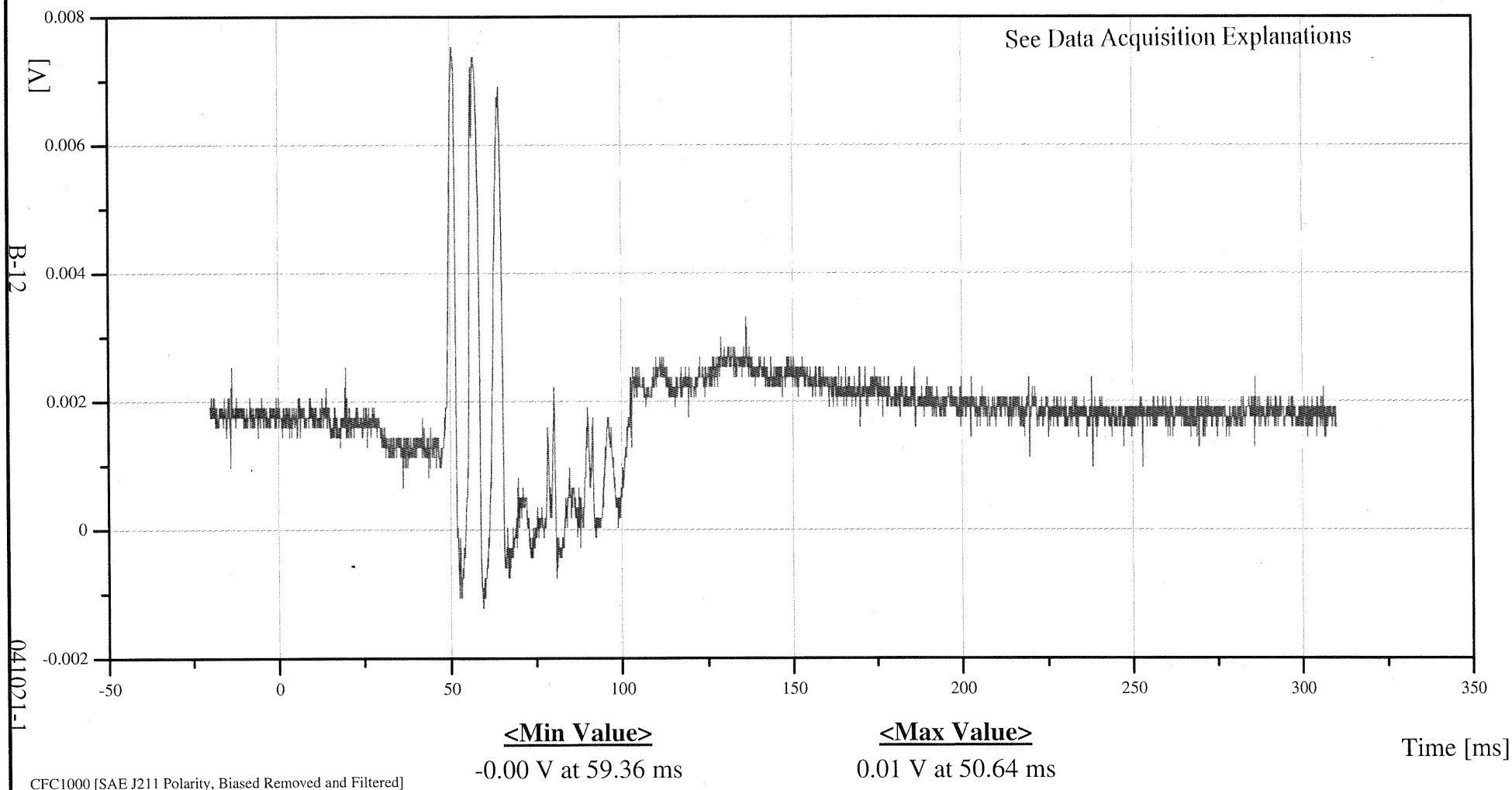
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

PABETA





Transportation Research Center, Inc.

Passenger Airbag - Secondary

Date: 10/21/2004

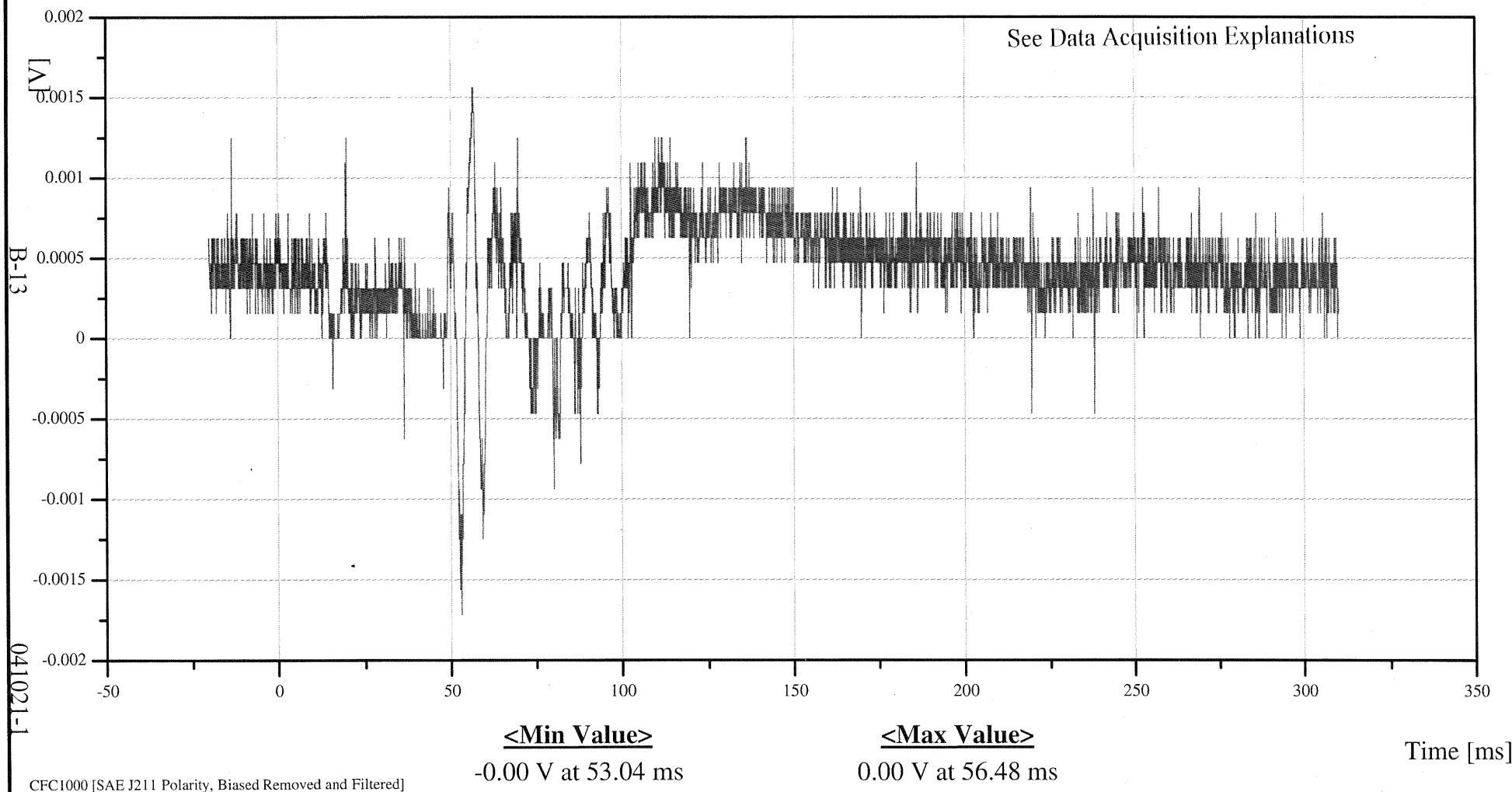
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

PABETB





Transportation Research Center, Inc.

ROW 1 COLUMN 1

Date: 10/21/2004

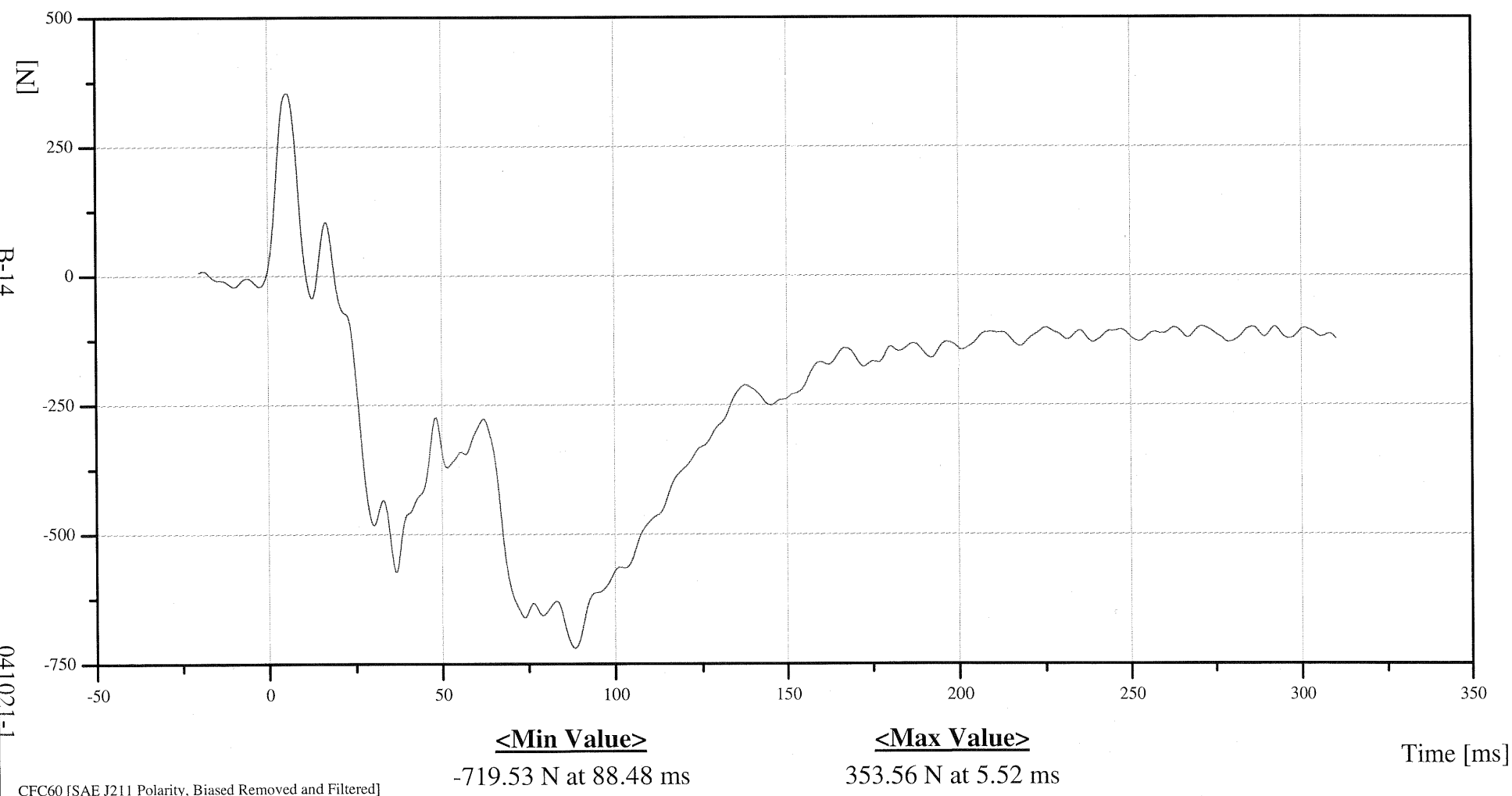
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0101





Transportation Research Center, Inc.

ROW 1 COLUMN 2

Date: 10/21/2004

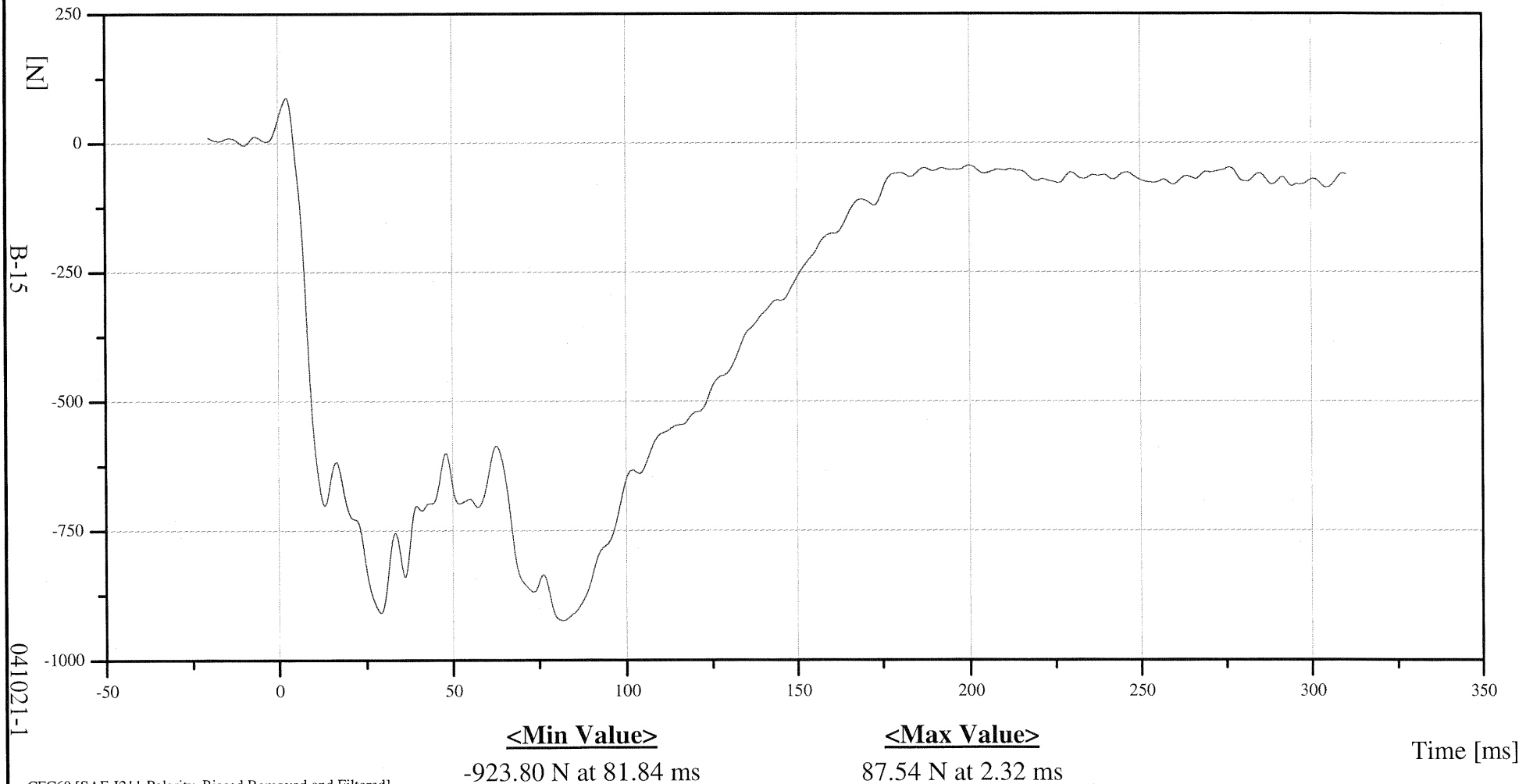
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0102





Transportation Research Center, Inc.

ROW 1 COLUMN 3

Date: 10/21/2004

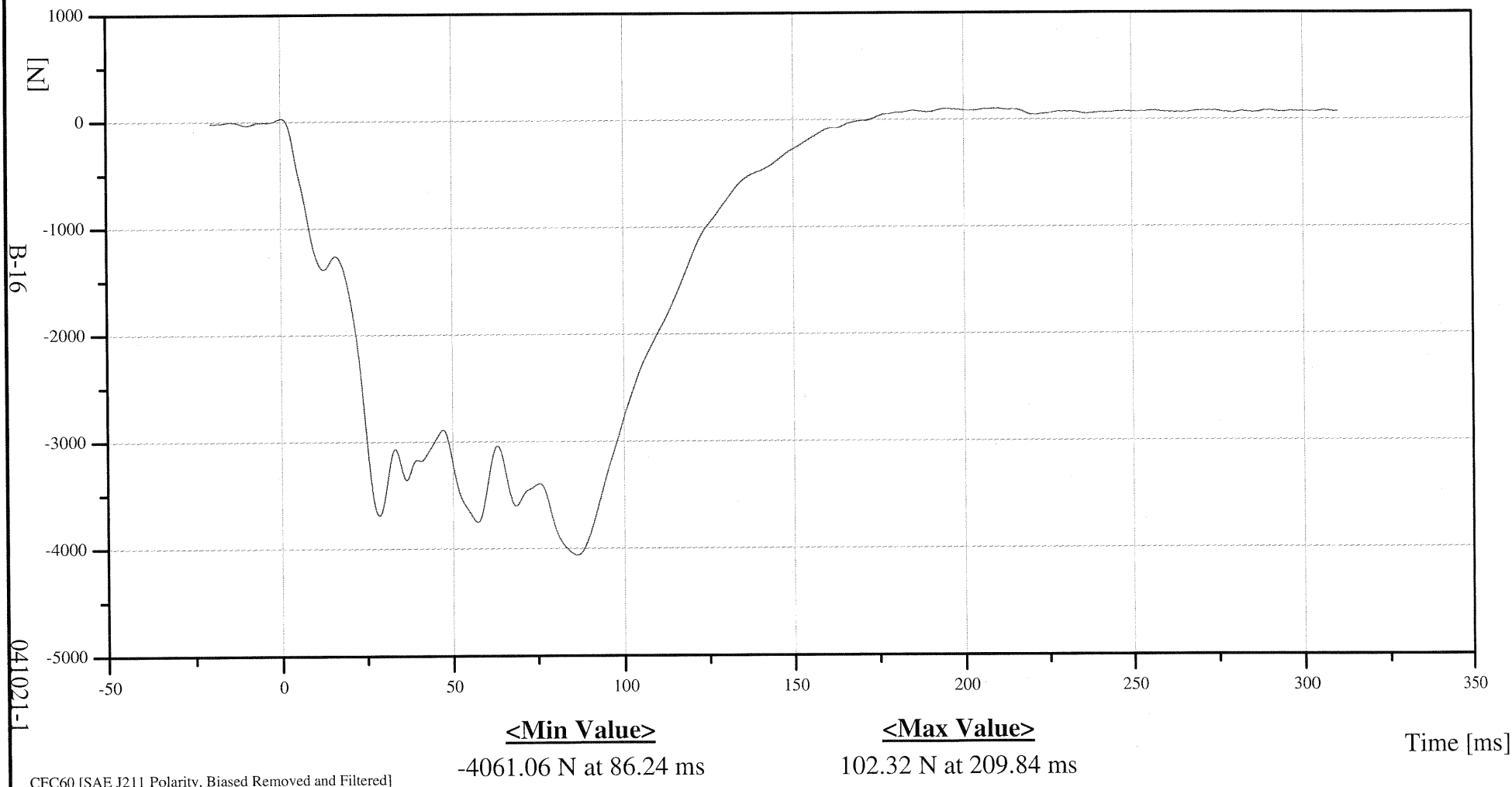
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0103





Transportation Research Center, Inc.

ROW 1 COLUMN 4

Date: 10/21/2004

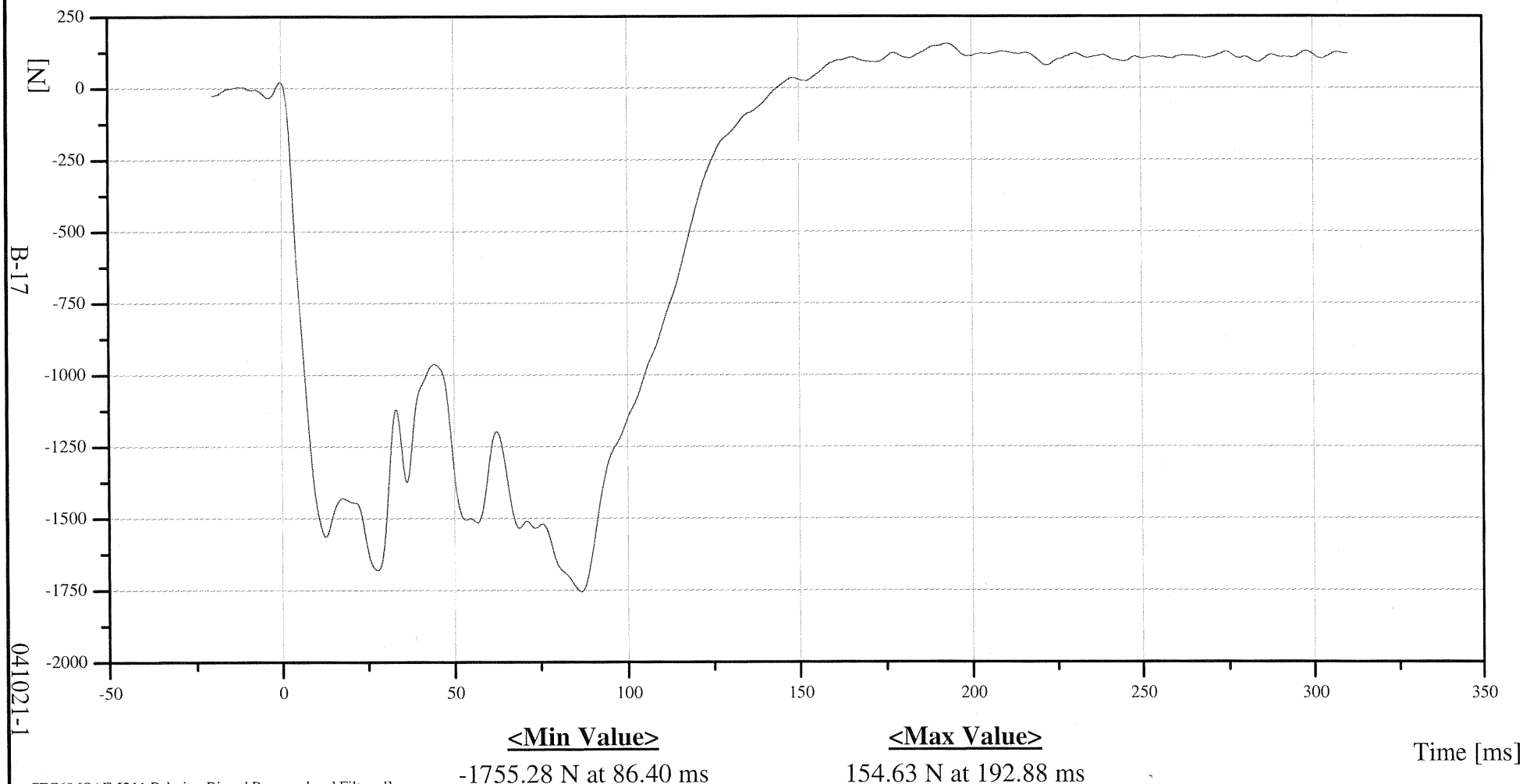
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0104





Transportation Research Center, Inc.

ROW 1 COLUMN 5

Date: 10/21/2004

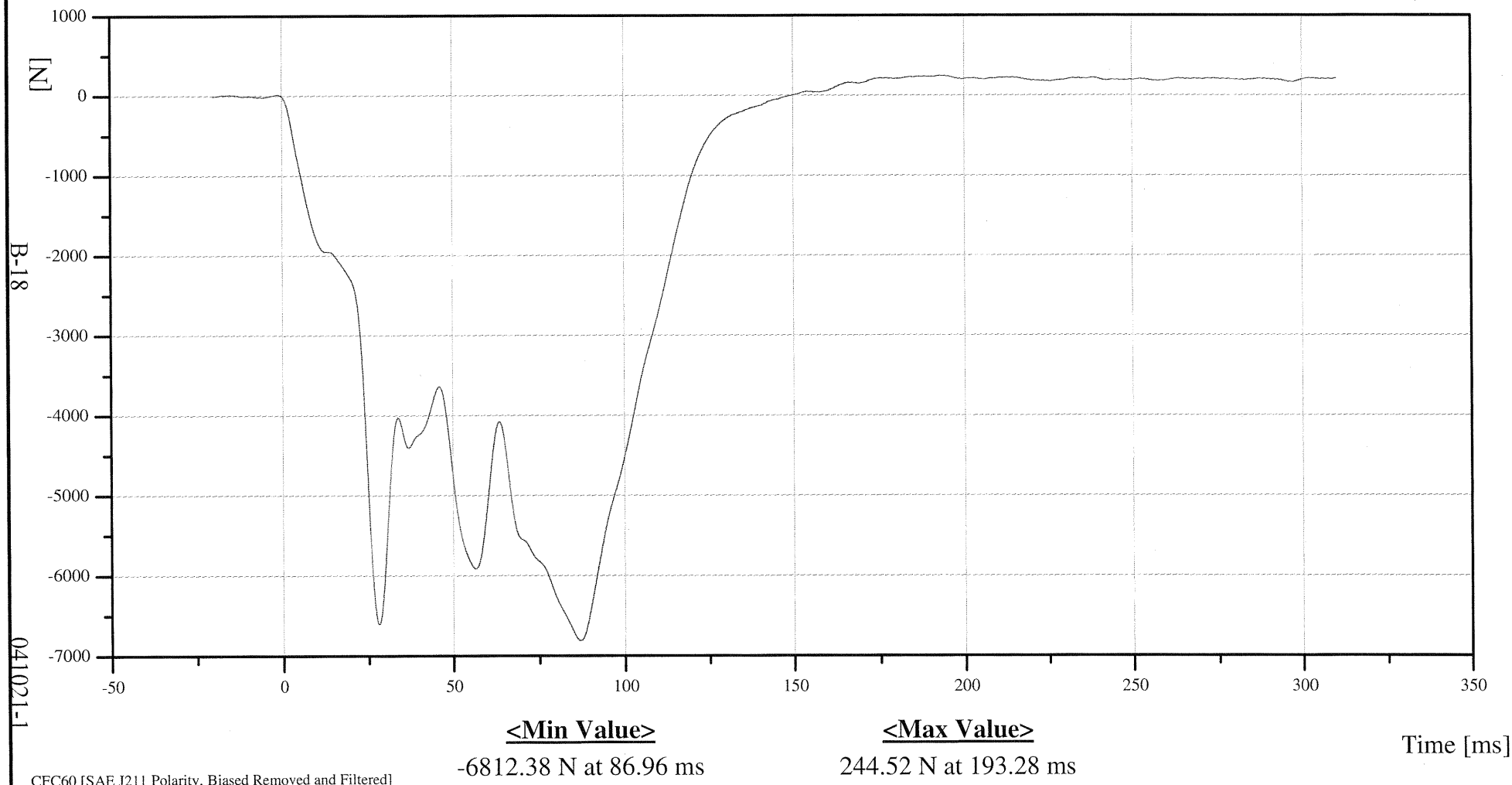
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0105





Transportation Research Center, Inc.

ROW 1 COLUMN 6

Date: 10/21/2004

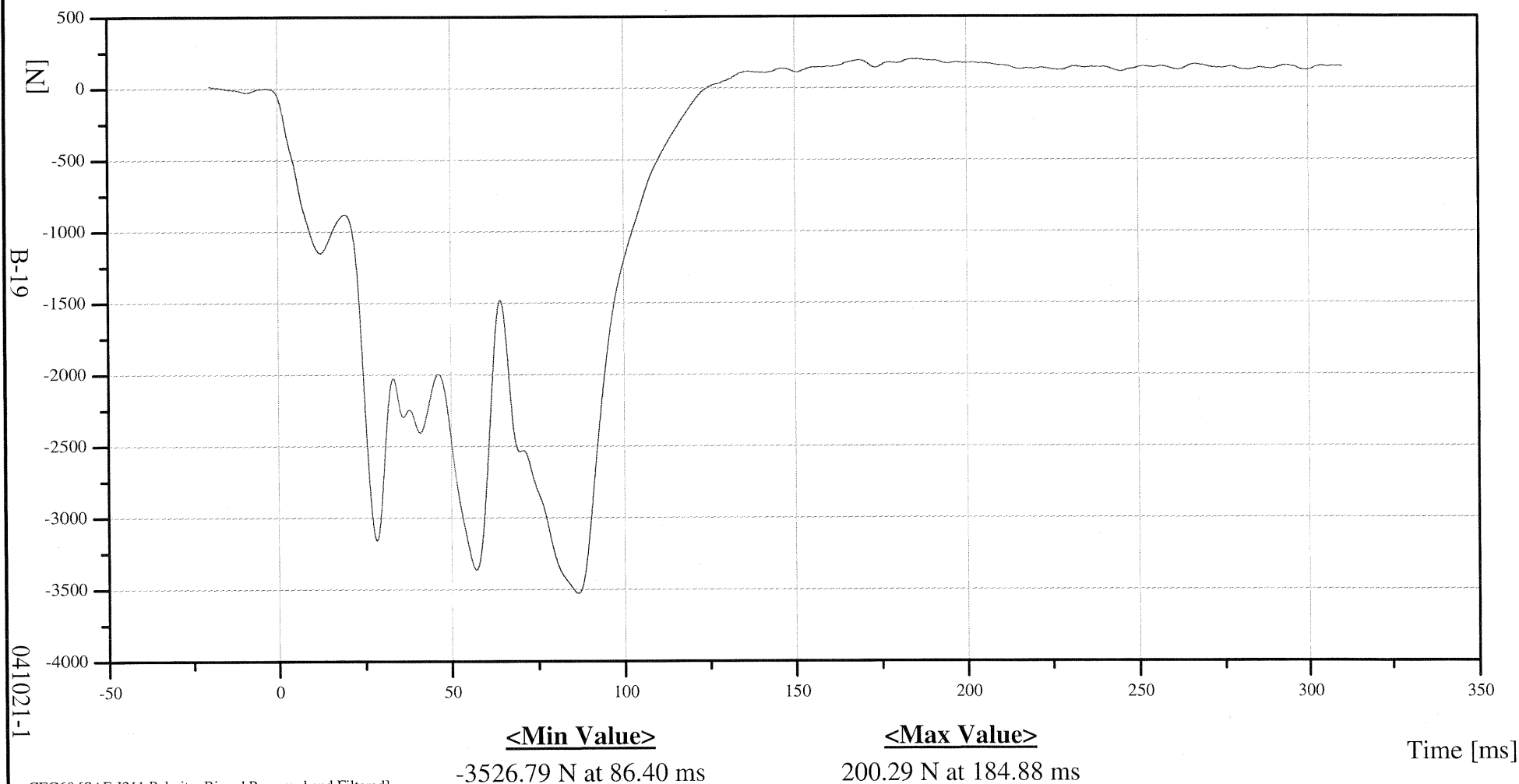
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0106





Transportation Research Center, Inc.

ROW 1 COLUMN 7

Date: 10/21/2004

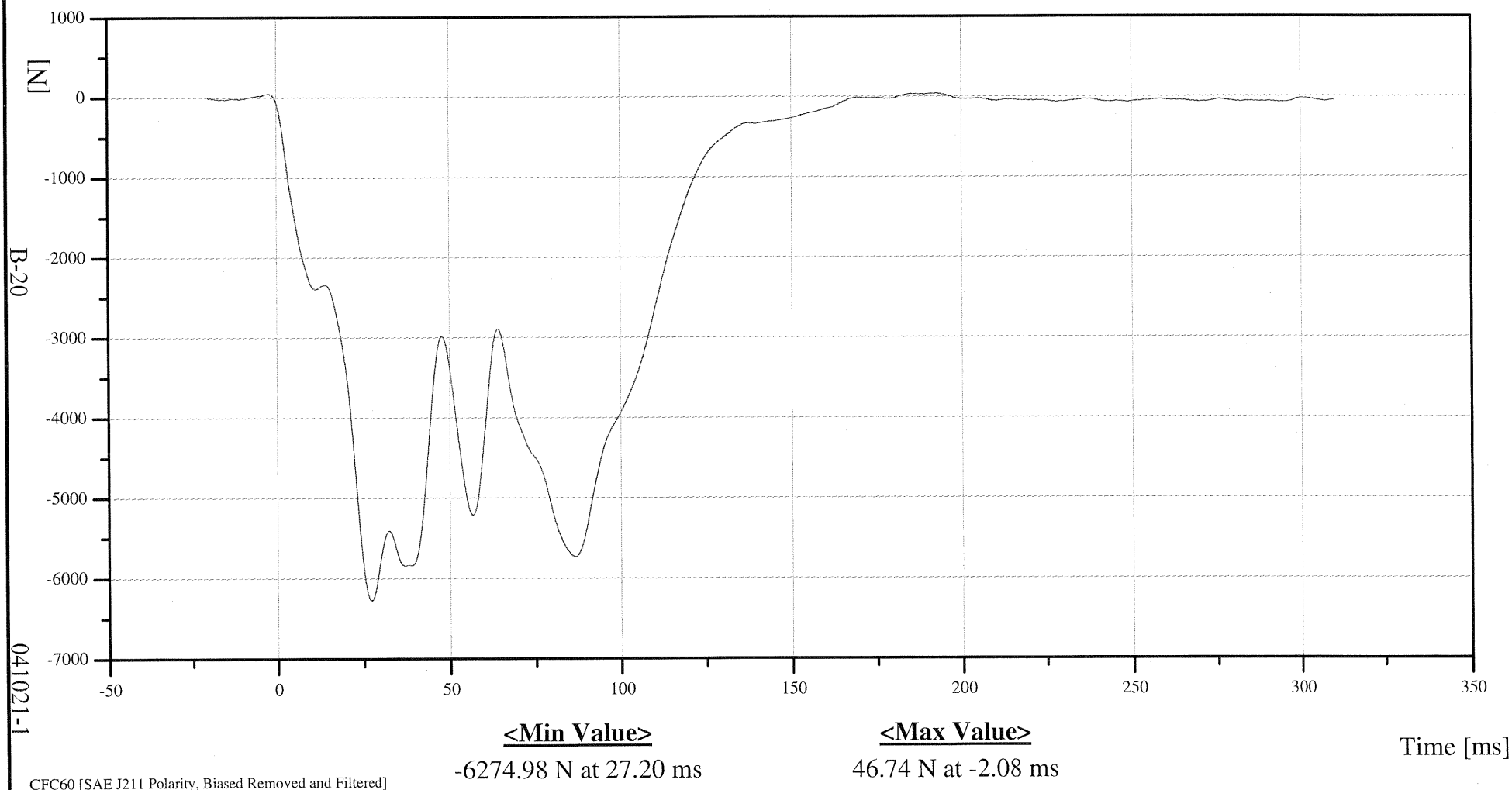
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0107





Transportation Research Center, Inc.

ROW 1 COLUMN 8

Date: 10/21/2004

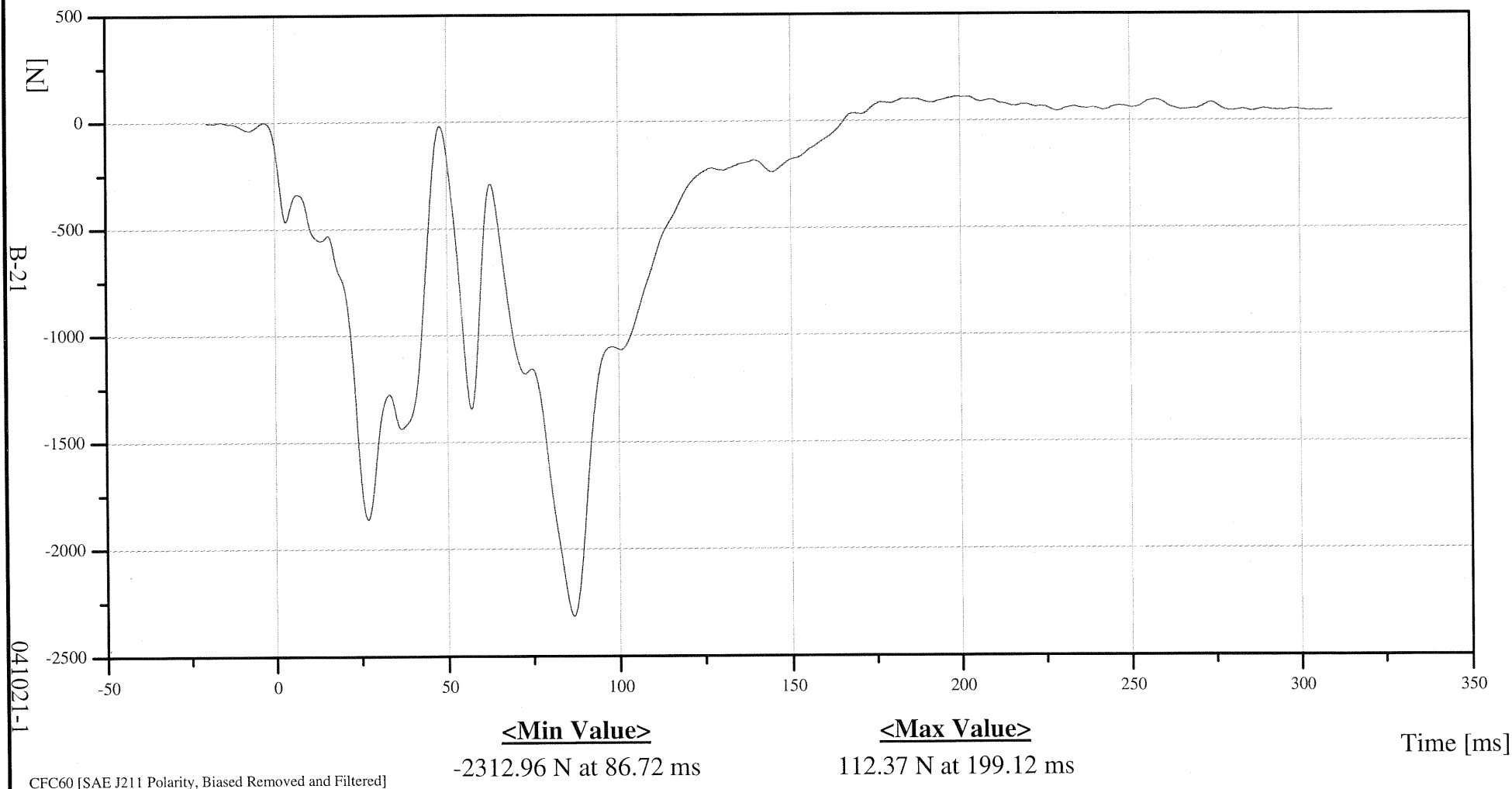
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0108





Transportation Research Center, Inc.

ROW 1 COLUMN 9

Date: 10/21/2004

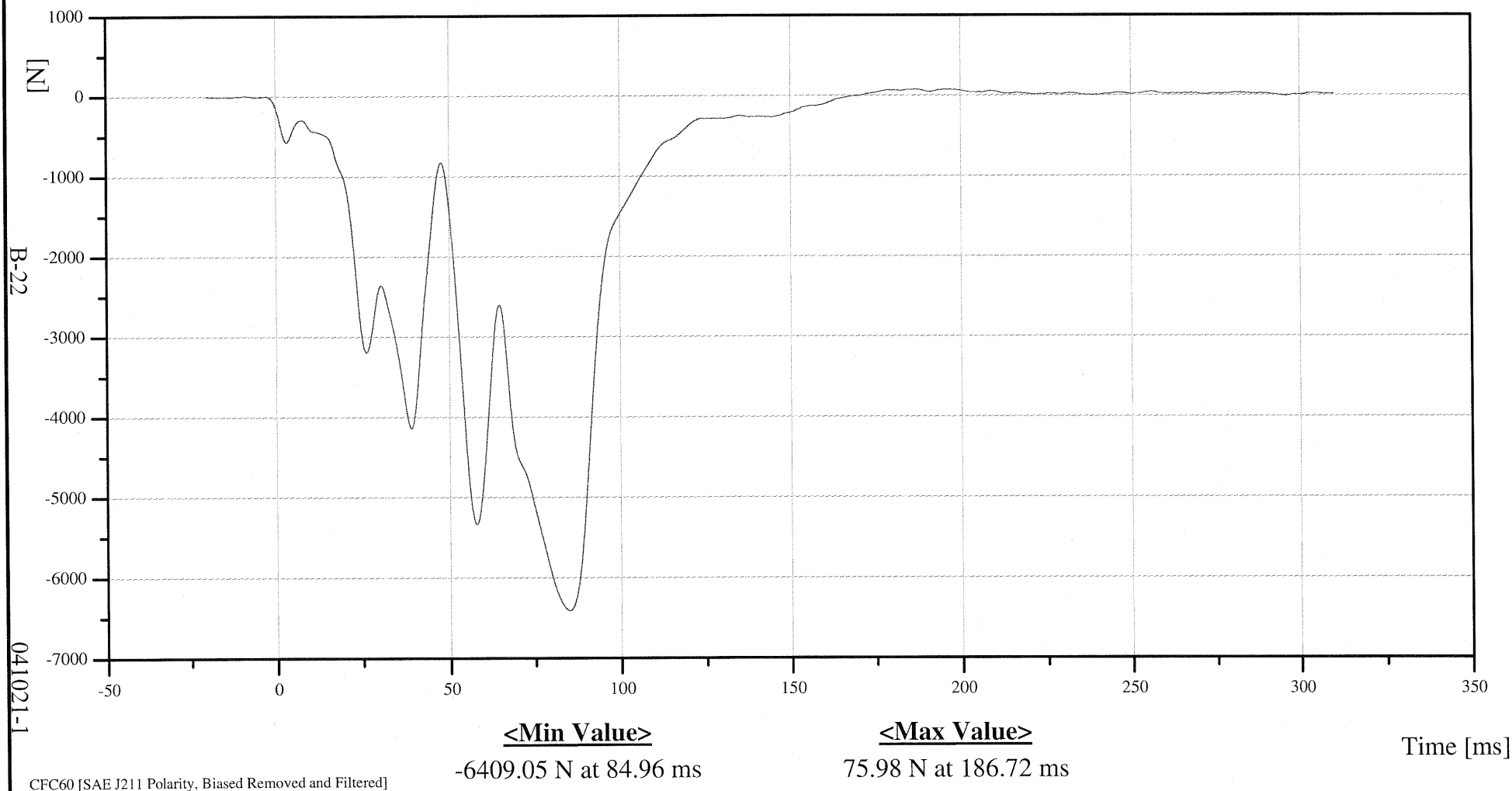
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0109





Transportation Research Center, Inc.

ROW 1 COLUMN 10

Date: 10/21/2004

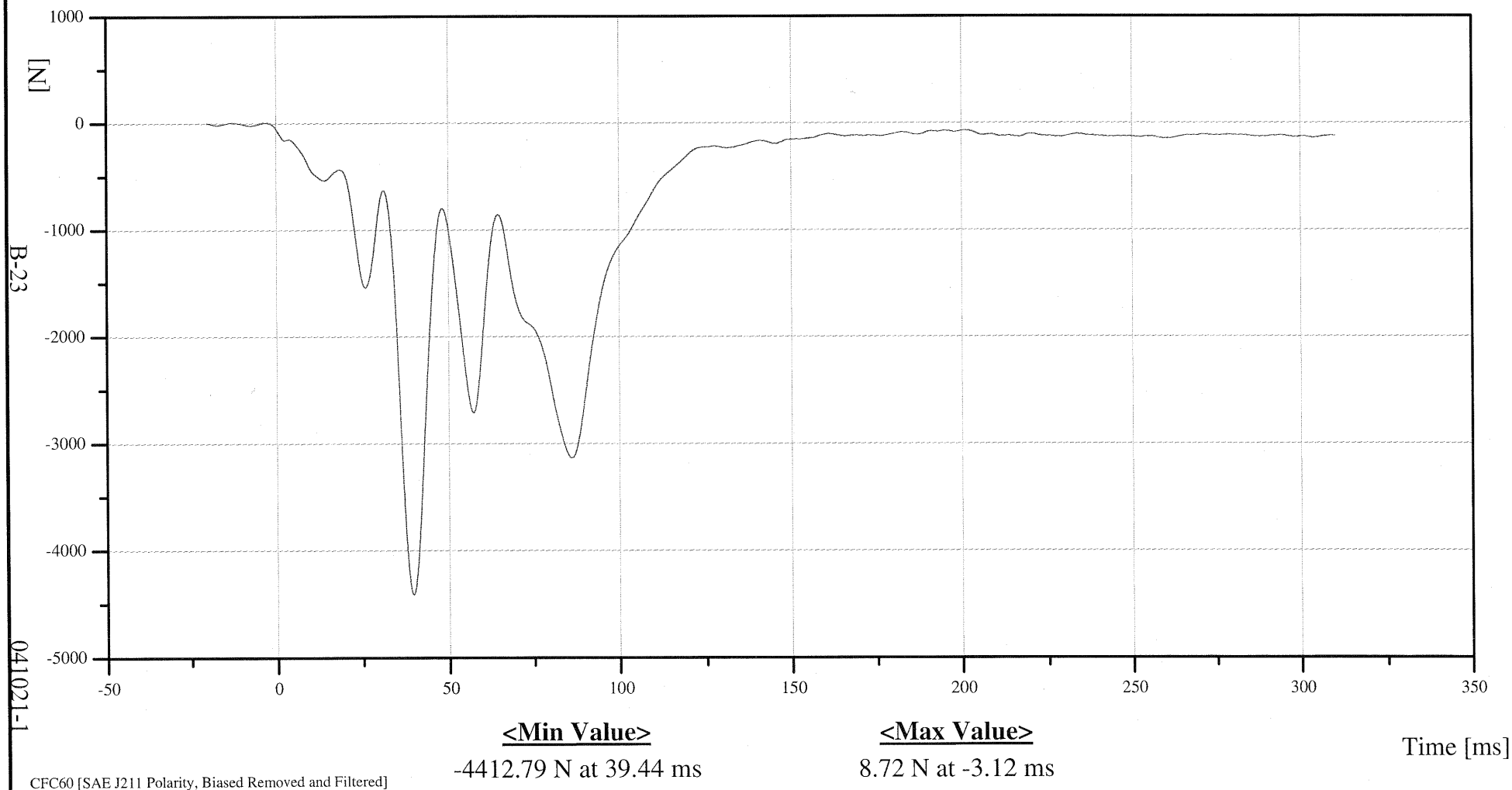
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0110





Transportation Research Center, Inc.

ROW 1 COLUMN 11

Date: 10/21/2004

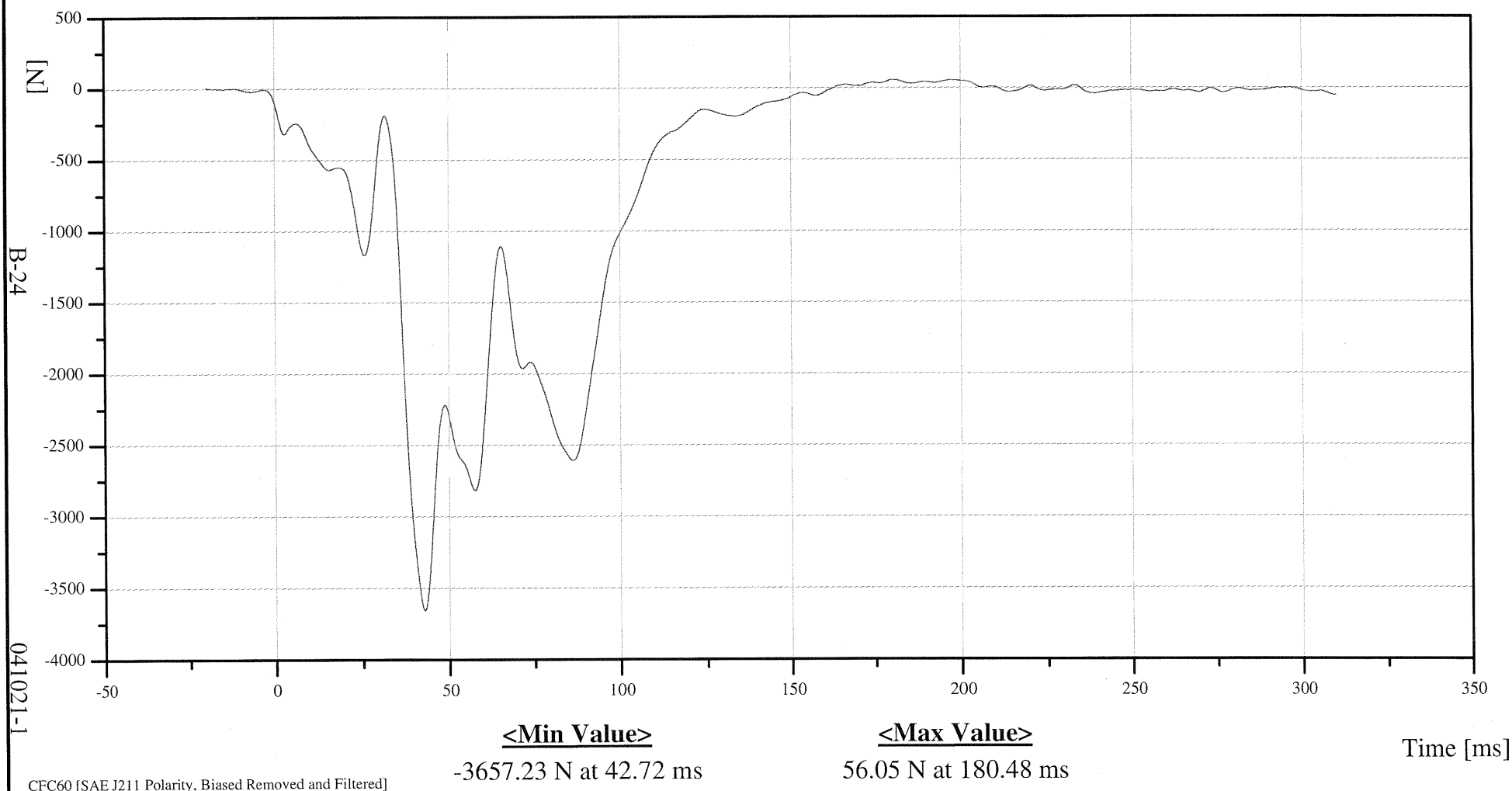
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0111





Transportation Research Center, Inc.

ROW 1 COLUMN 12

Date: 10/21/2004

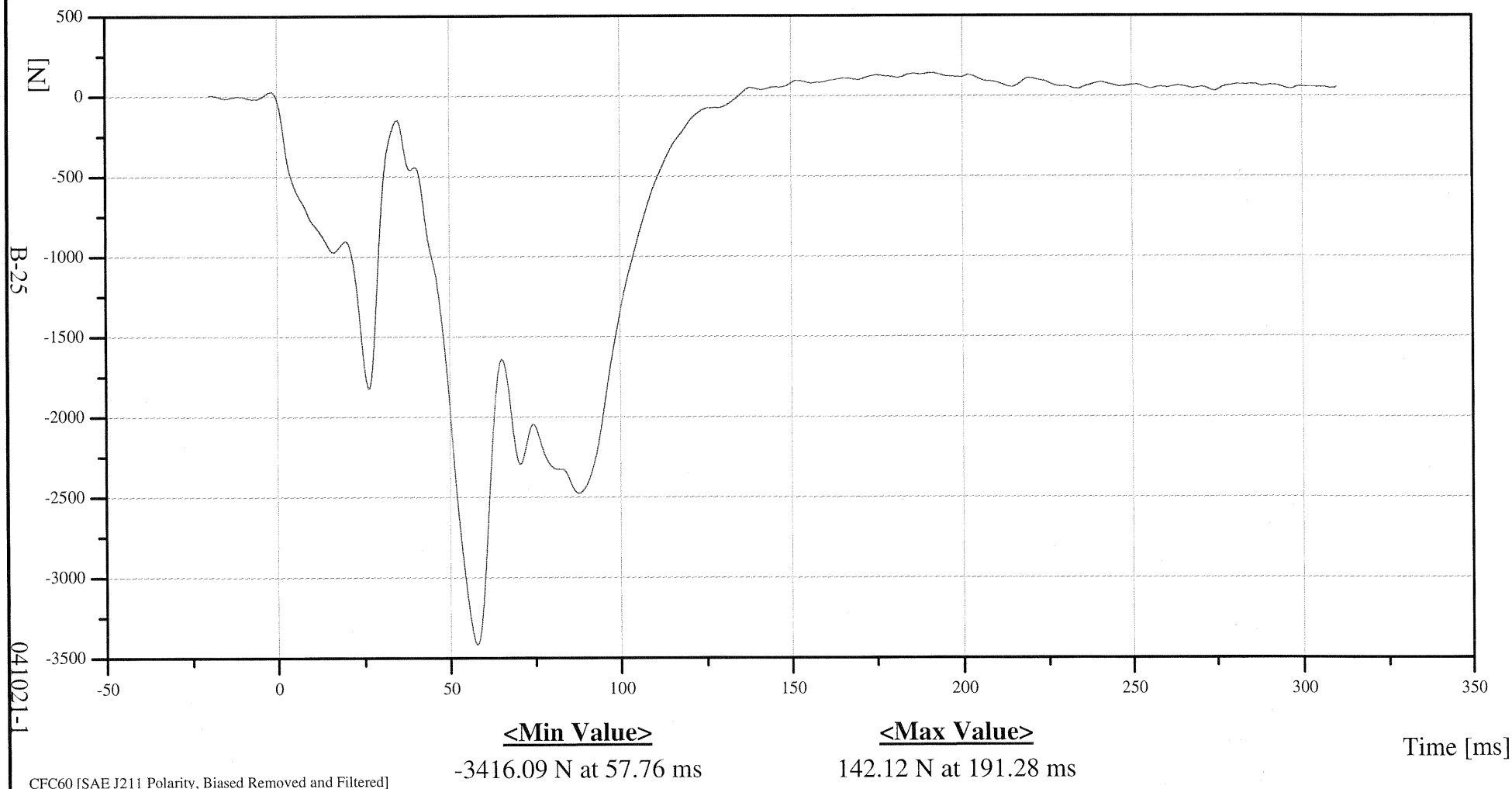
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0112





Transportation Research Center, Inc.

ROW 1 COLUMN 13

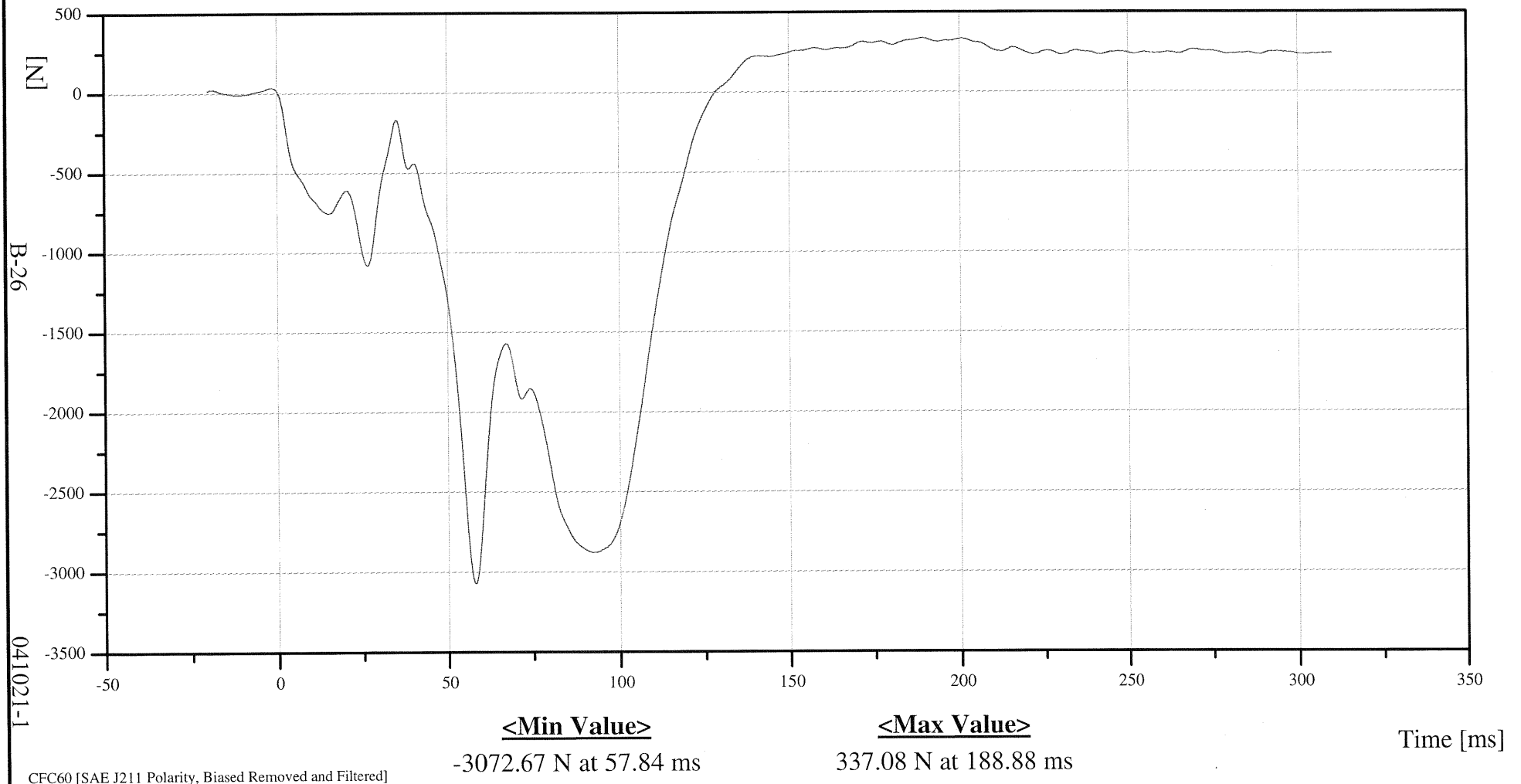
Date: 10/21/2004
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0113





Transportation Research Center, Inc.

ROW 1 COLUMN 14

Date: 10/21/2004

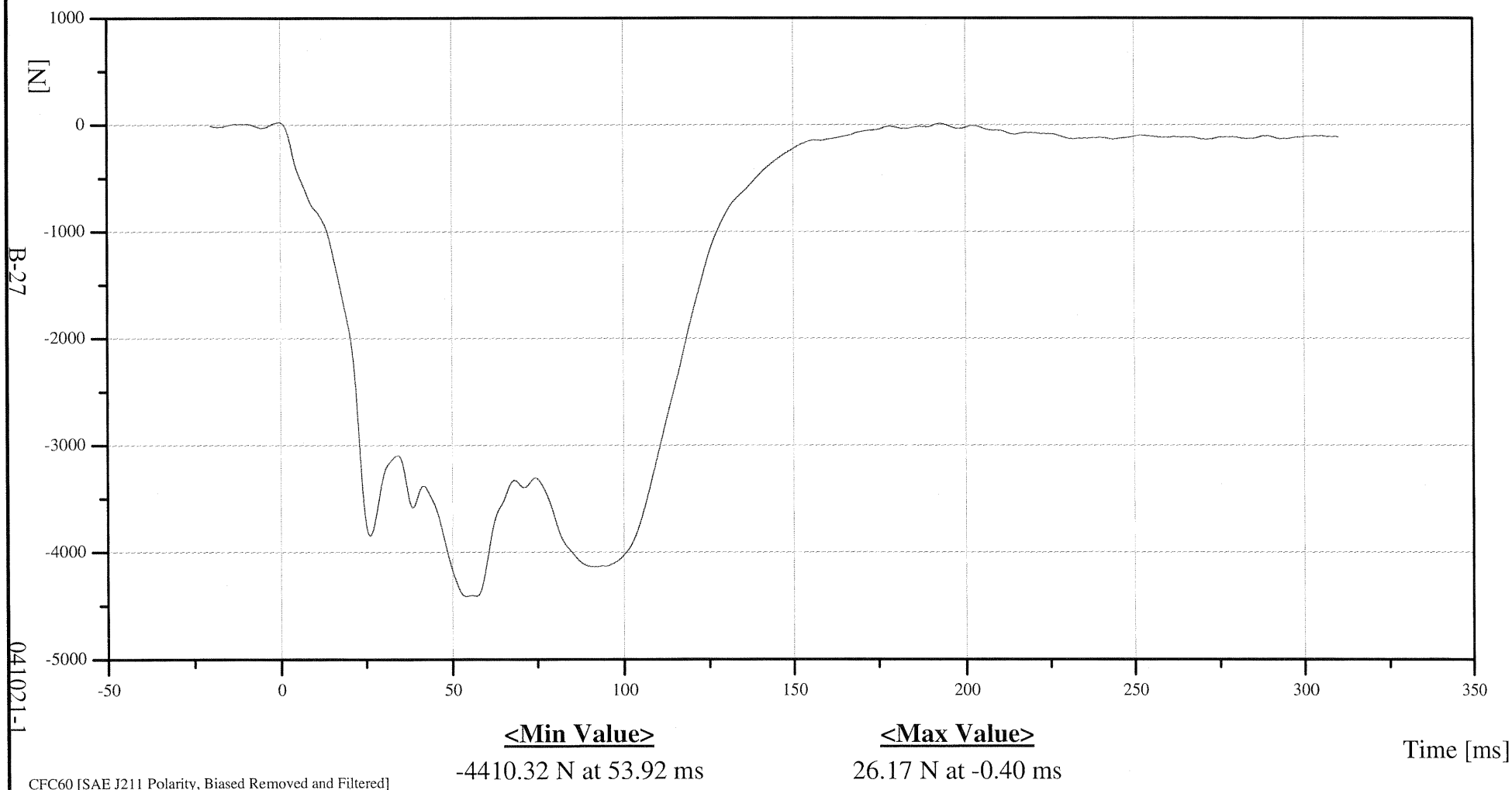
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0114





Transportation Research Center, Inc.

ROW 1 COLUMN 15

Date: 10/21/2004

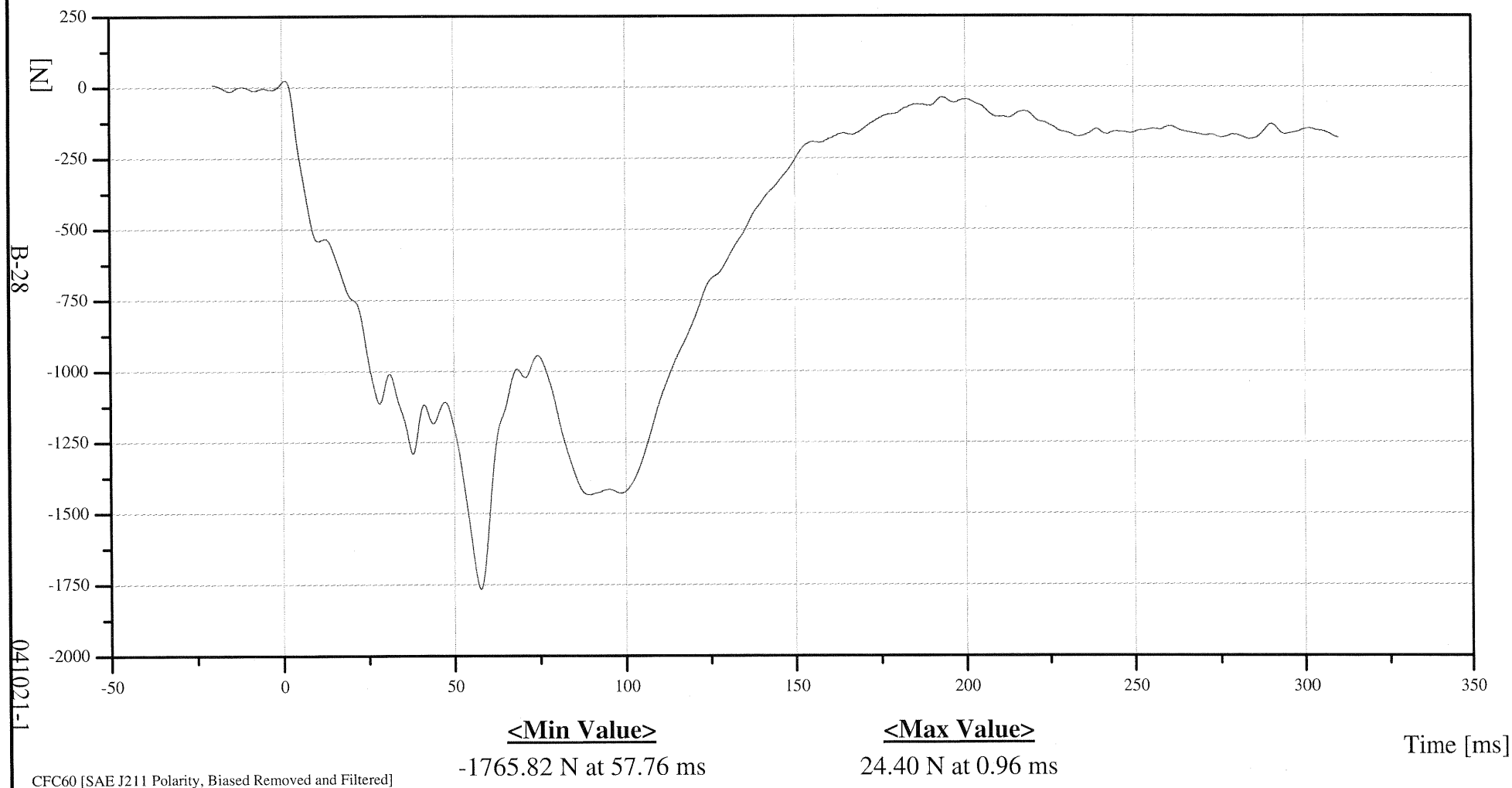
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0115





Transportation Research Center, Inc.

ROW 1 COLUMN 16

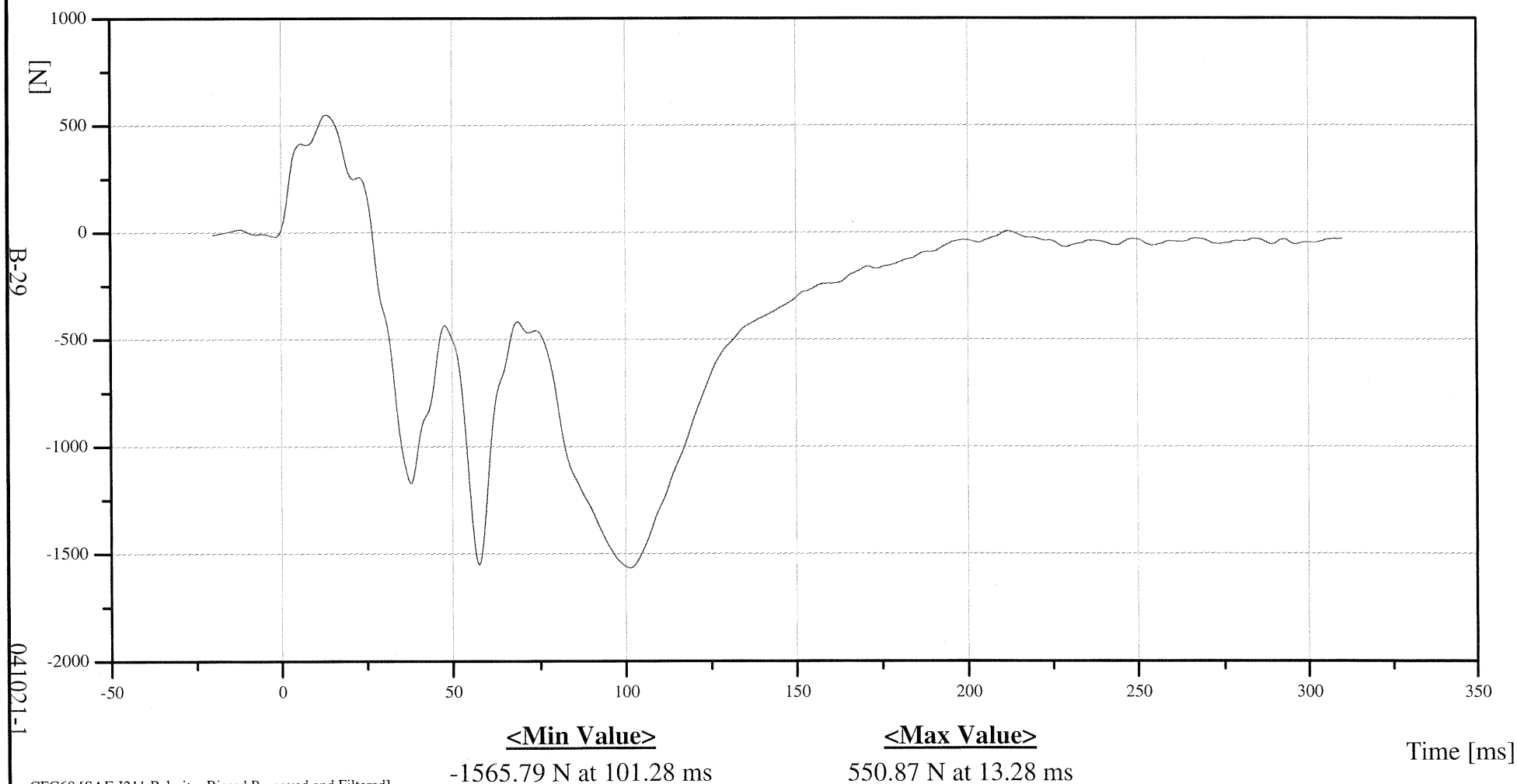
Date: 10/21/2004
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0116





Transportation Research Center, Inc.

ROW 2 COLUMN 1

Date: 10/21/2004

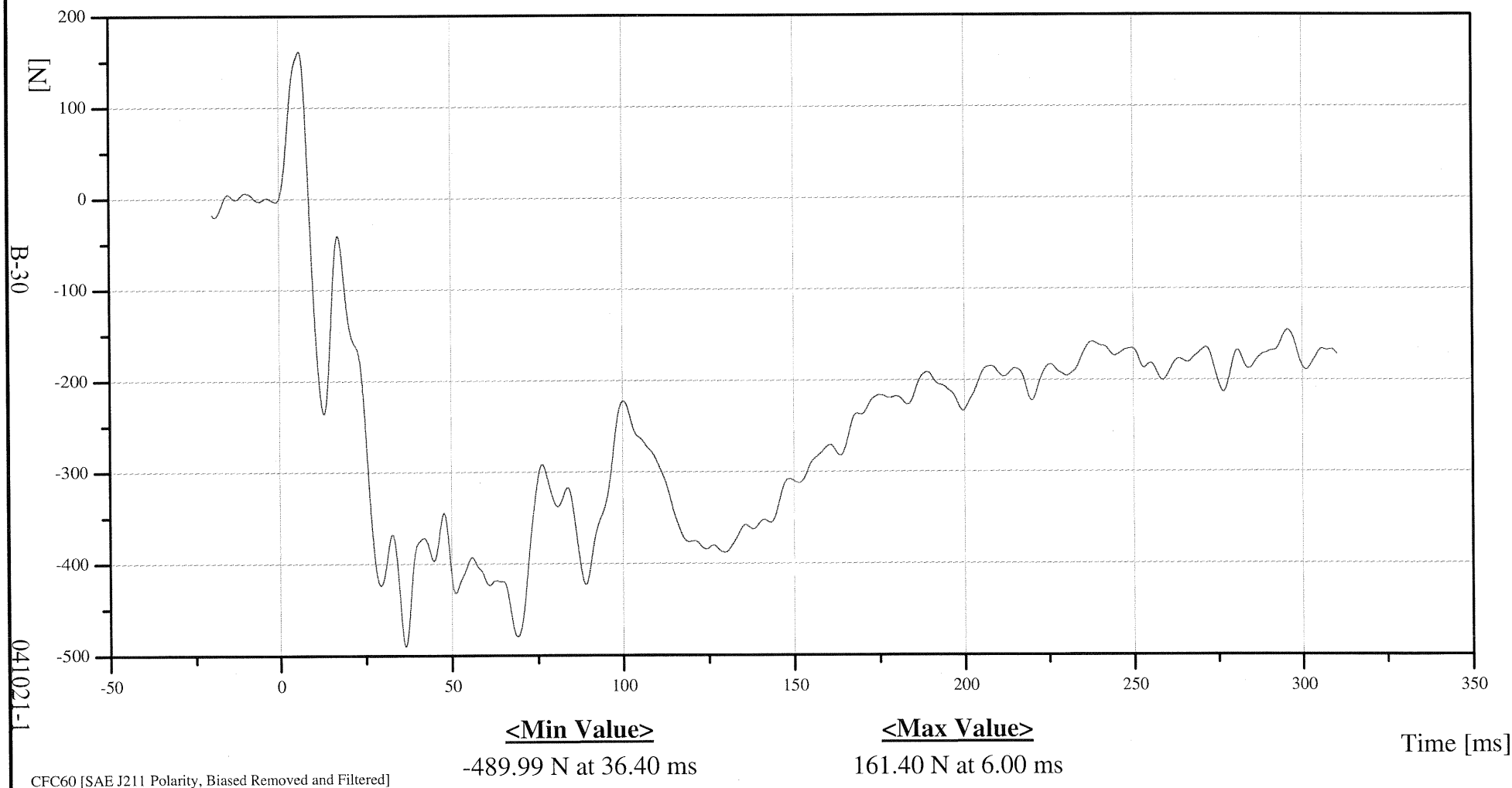
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0201





Transportation Research Center, Inc.

ROW 2 COLUMN 2

Date: 10/21/2004

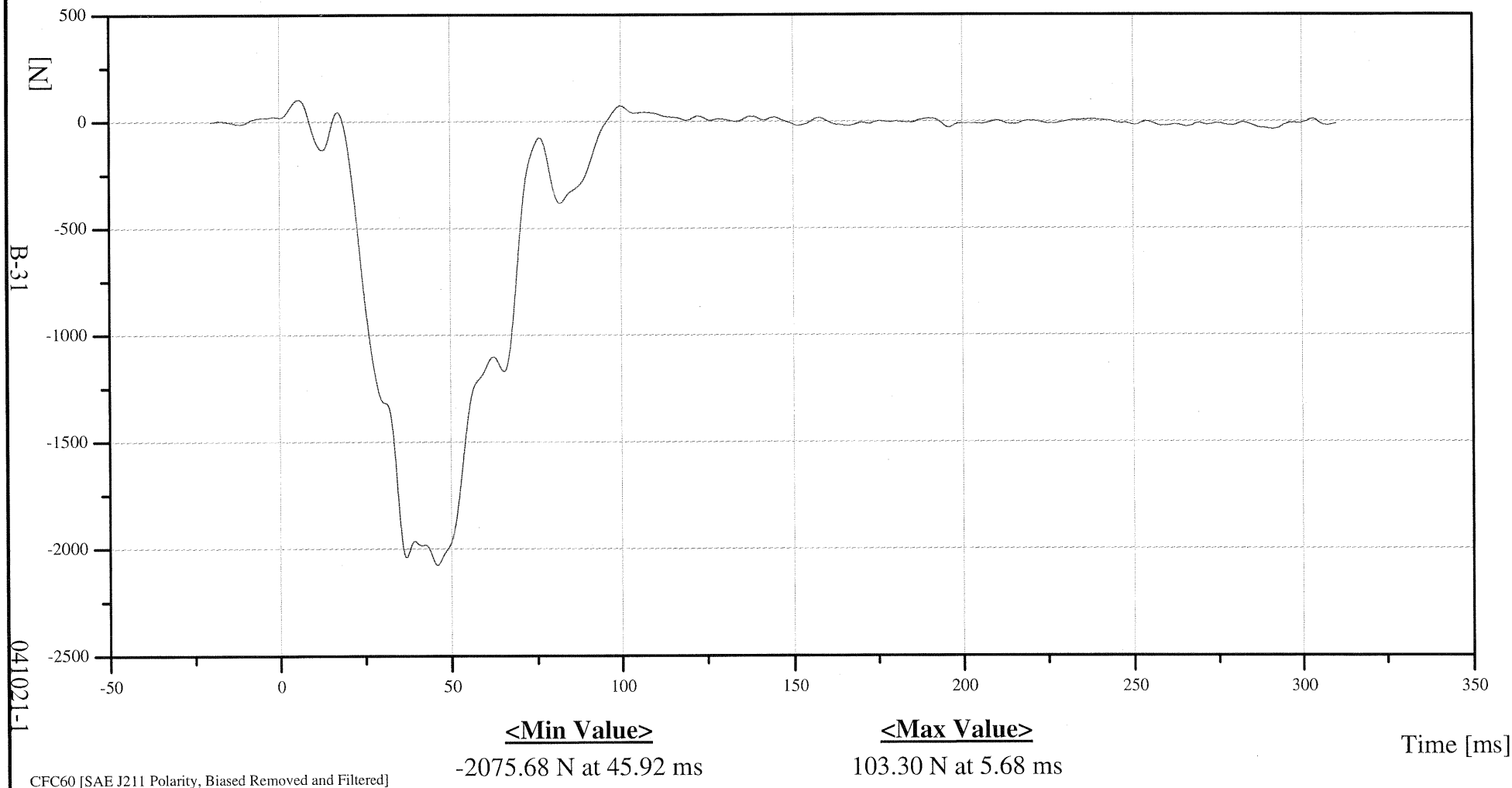
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0202





Transportation Research Center, Inc.

ROW 2 COLUMN 3

Date: 10/21/2004

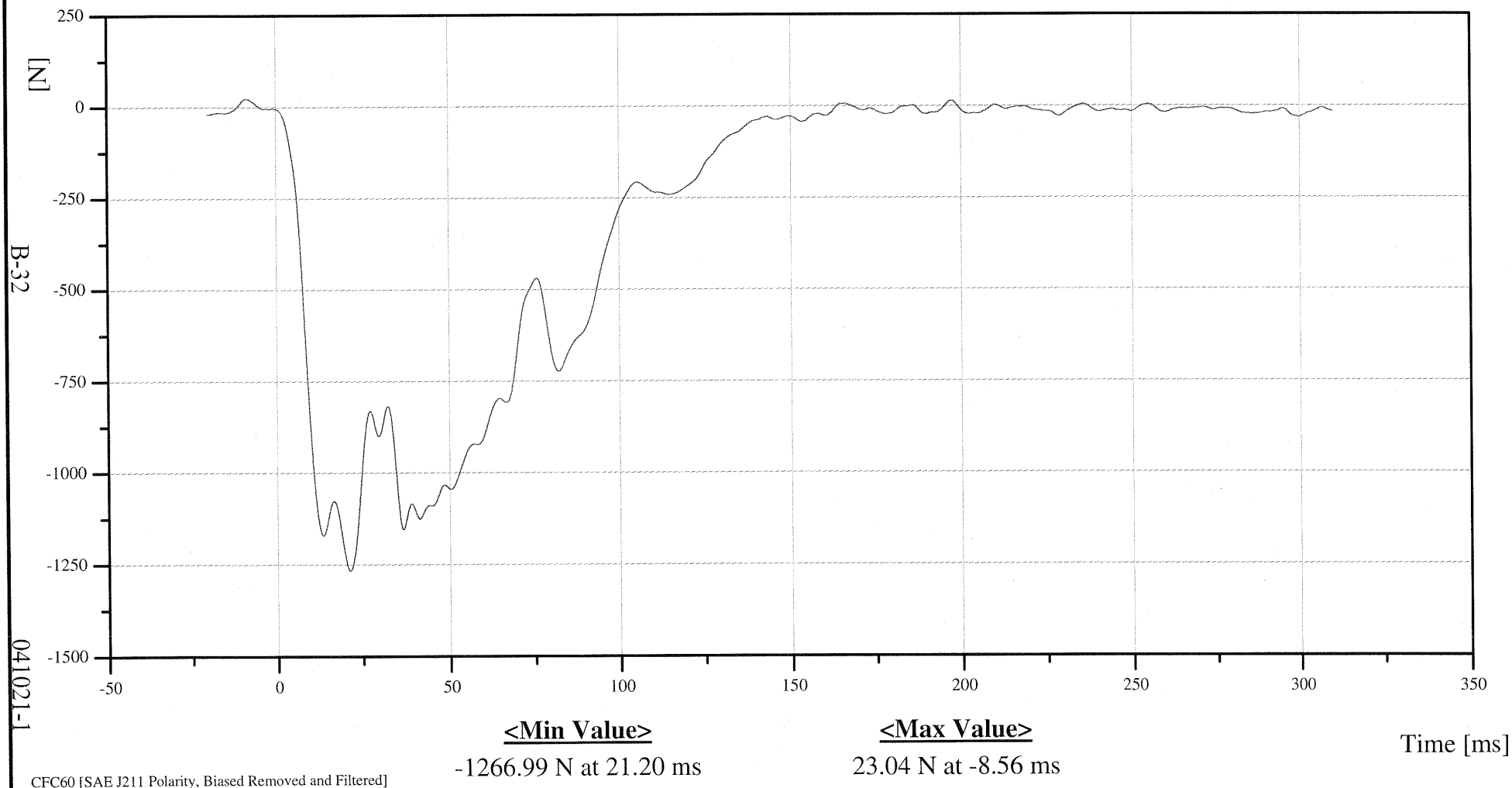
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0203





Transportation Research Center, Inc.

ROW 2 COLUMN 4

Date: 10/21/2004

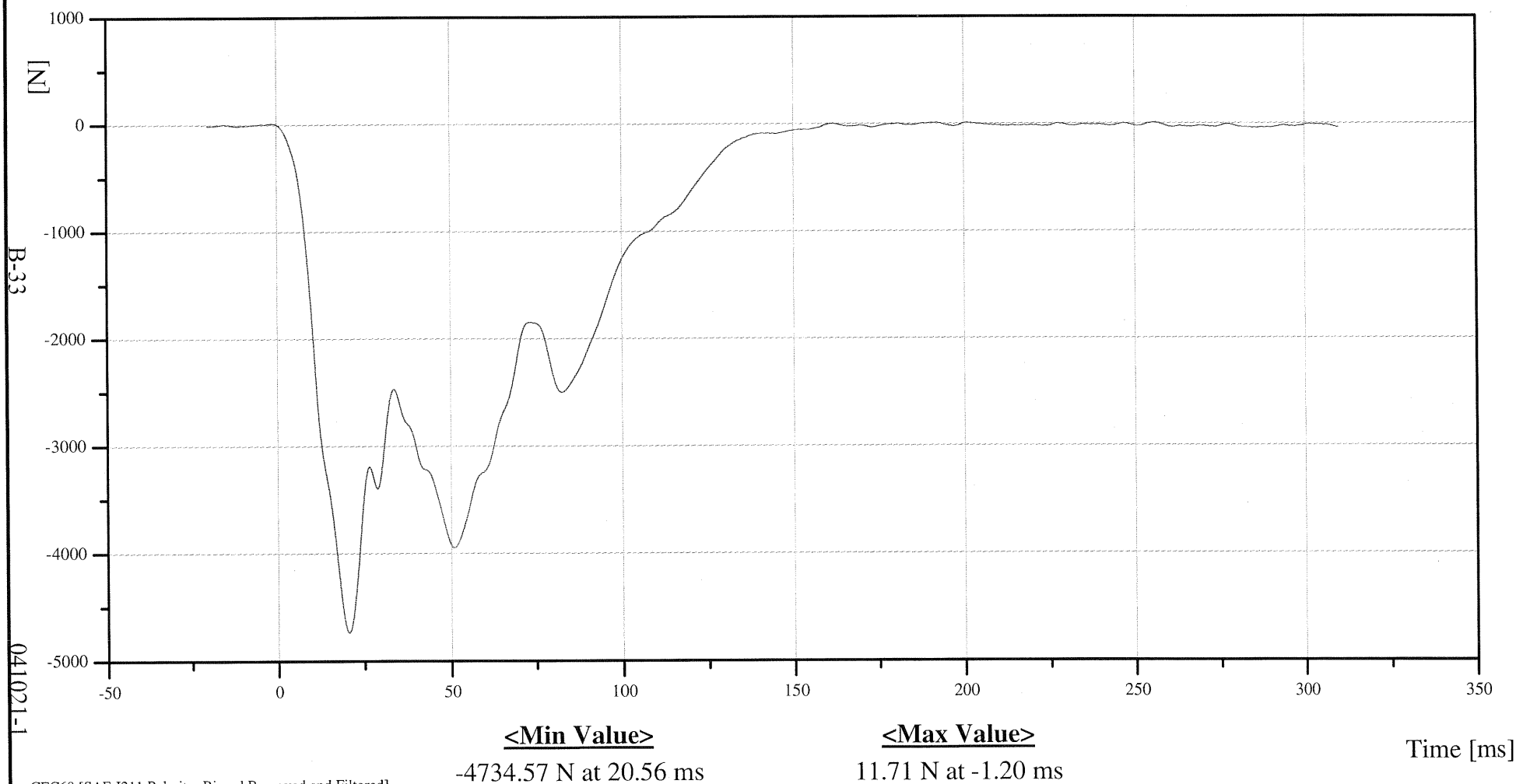
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0204



CFC60 [SAE J211 Polarity, Biased Removed and Filtered]



Transportation Research Center, Inc.

ROW 2 COLUMN 5

Date: 10/21/2004

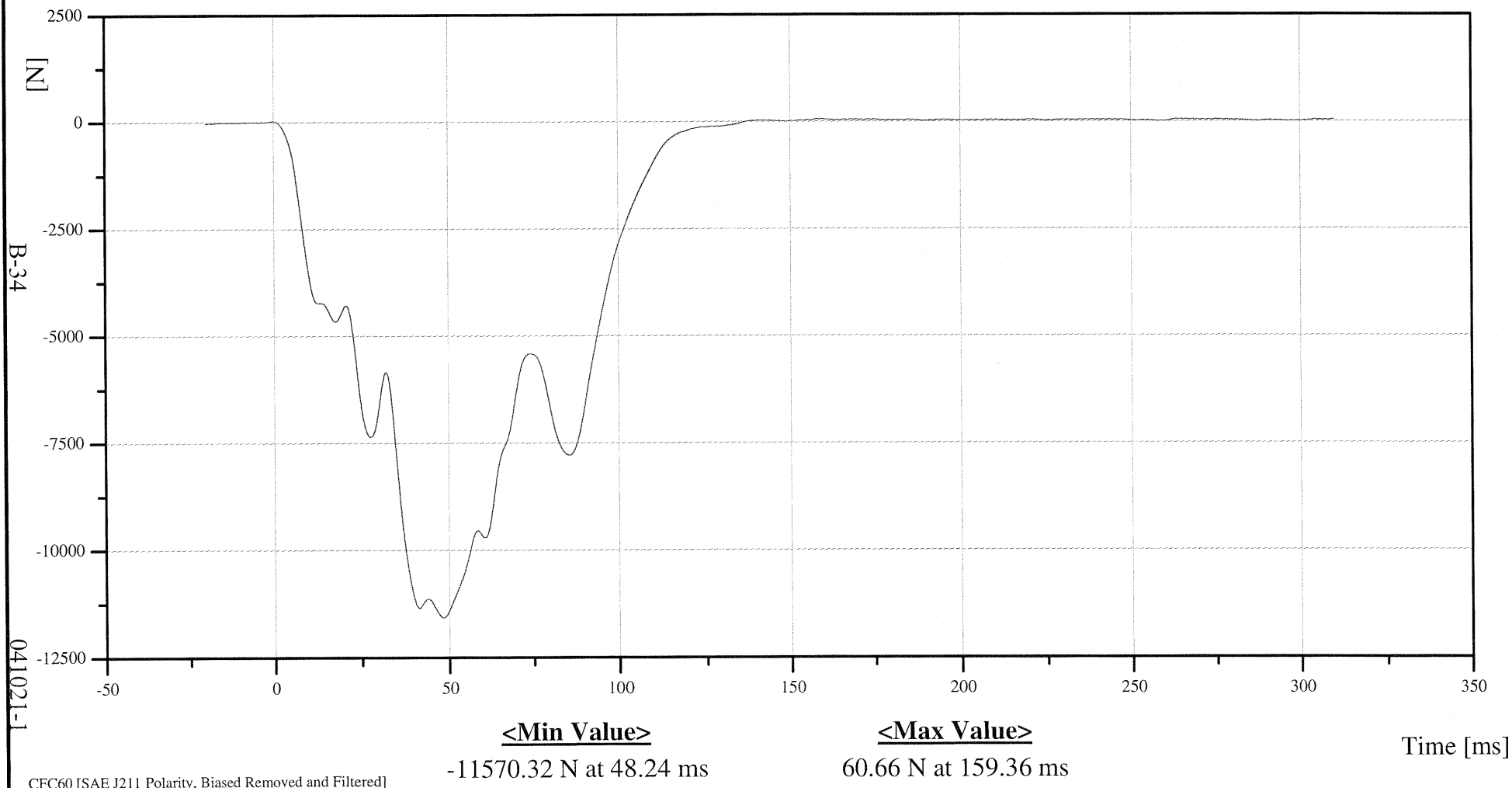
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0205





Transportation Research Center, Inc.

ROW 2 COLUMN 6

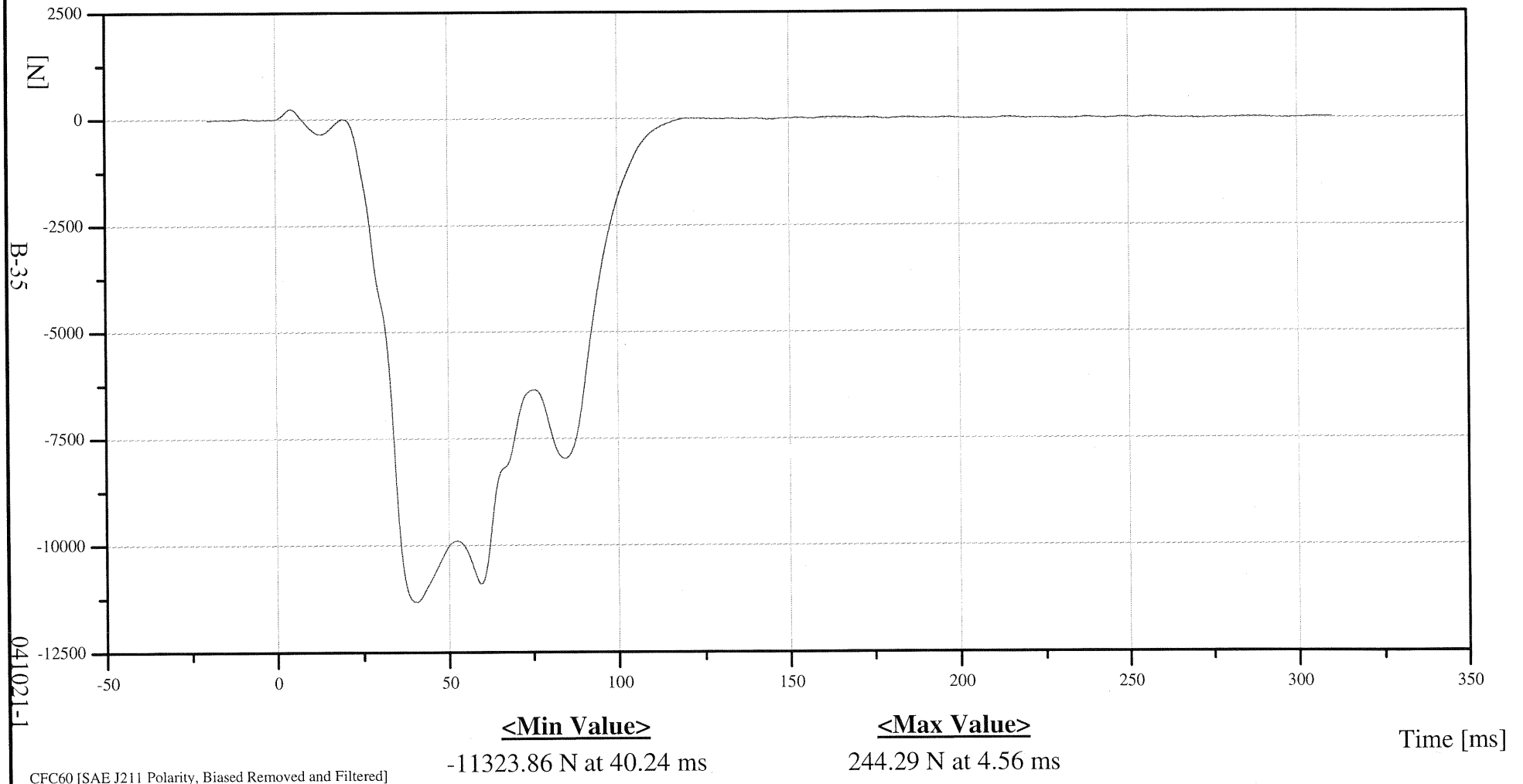
Date: 10/21/2004
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0206





Transportation Research Center, Inc.

ROW 2 COLUMN 7

Date: 10/21/2004

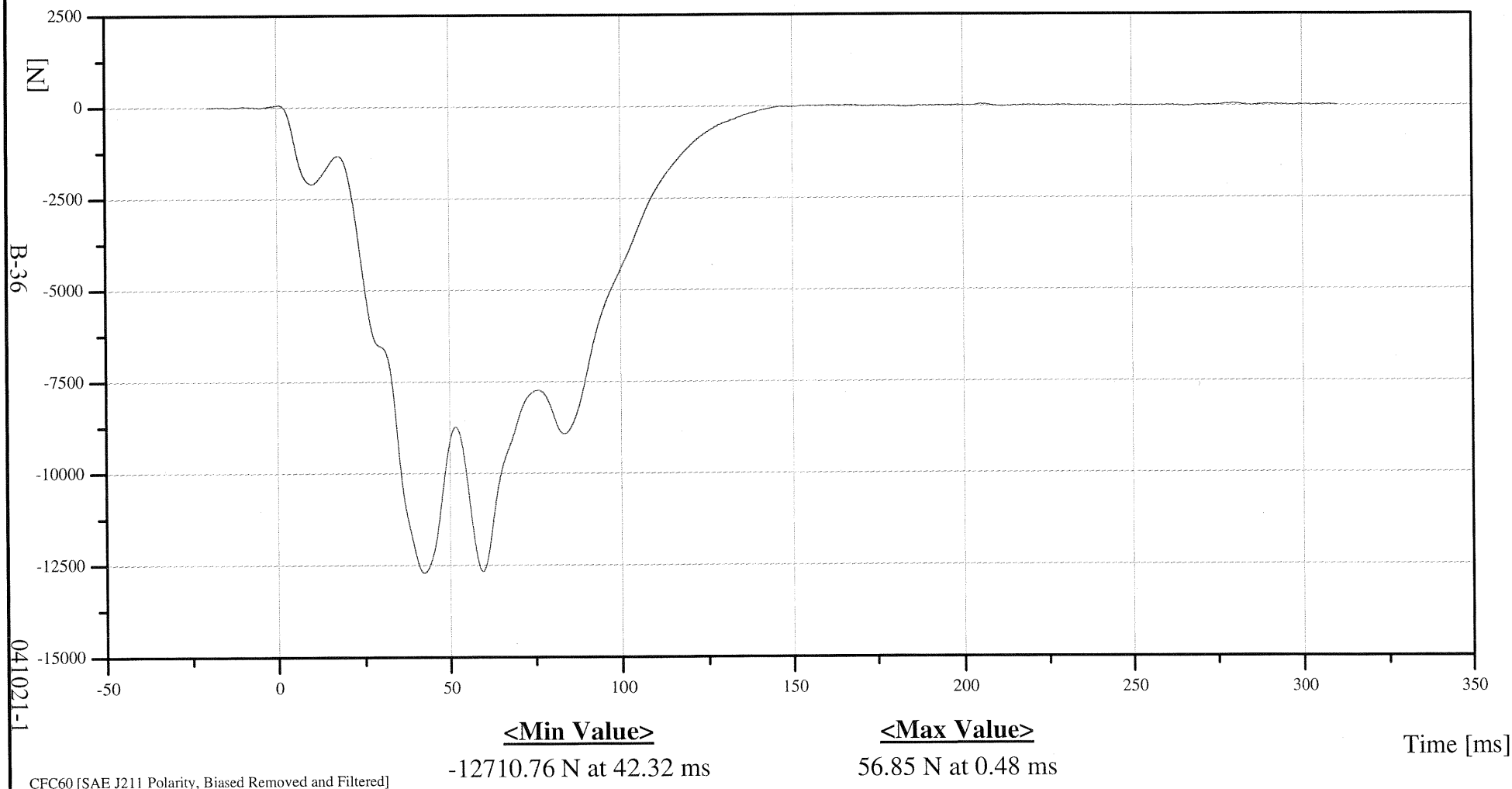
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0207





Transportation Research Center, Inc.

ROW 2 COLUMN 8

Date: 10/21/2004

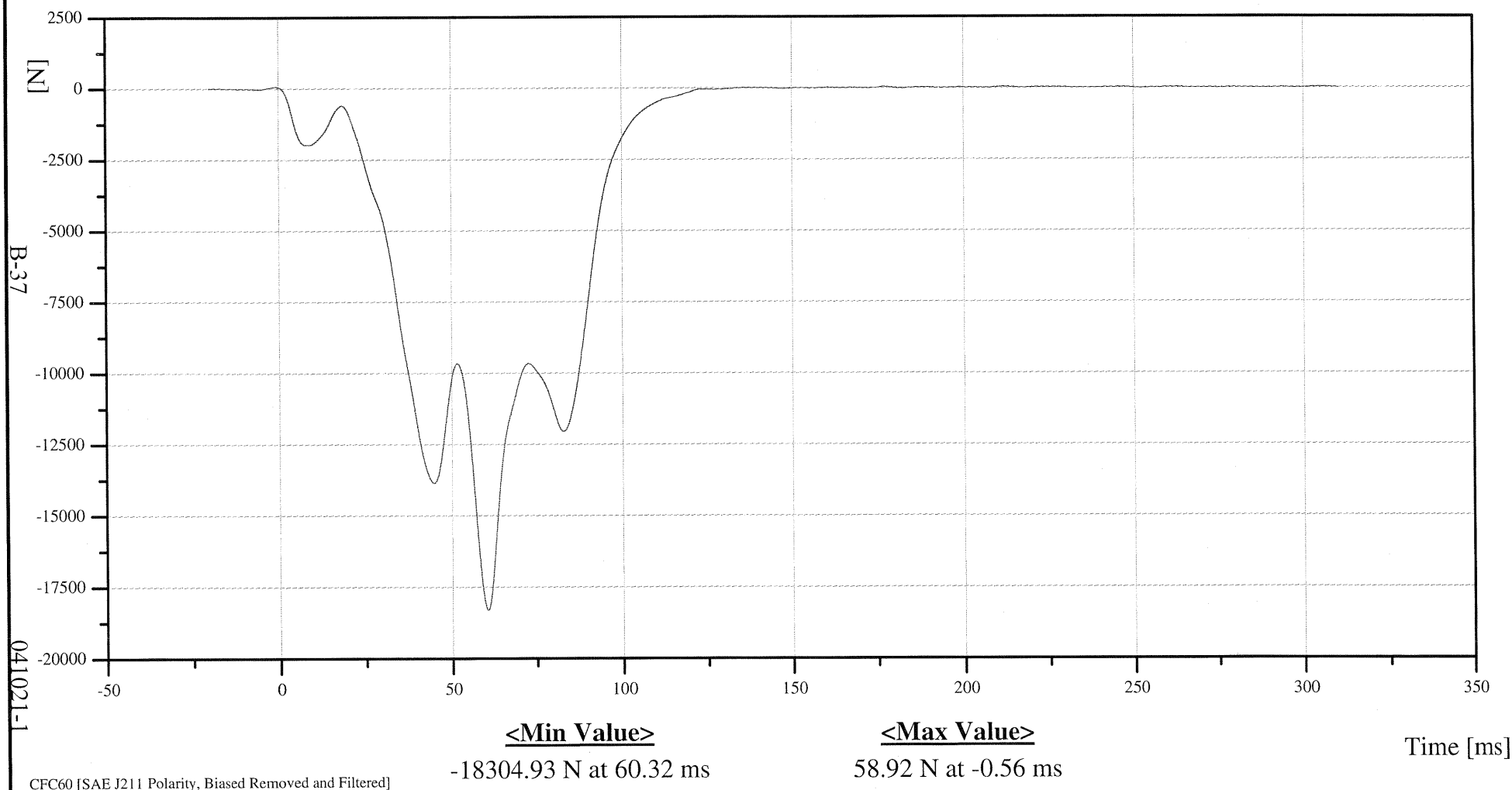
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0208





Transportation Research Center, Inc.

ROW 2 COLUMN 9

Date: 10/21/2004

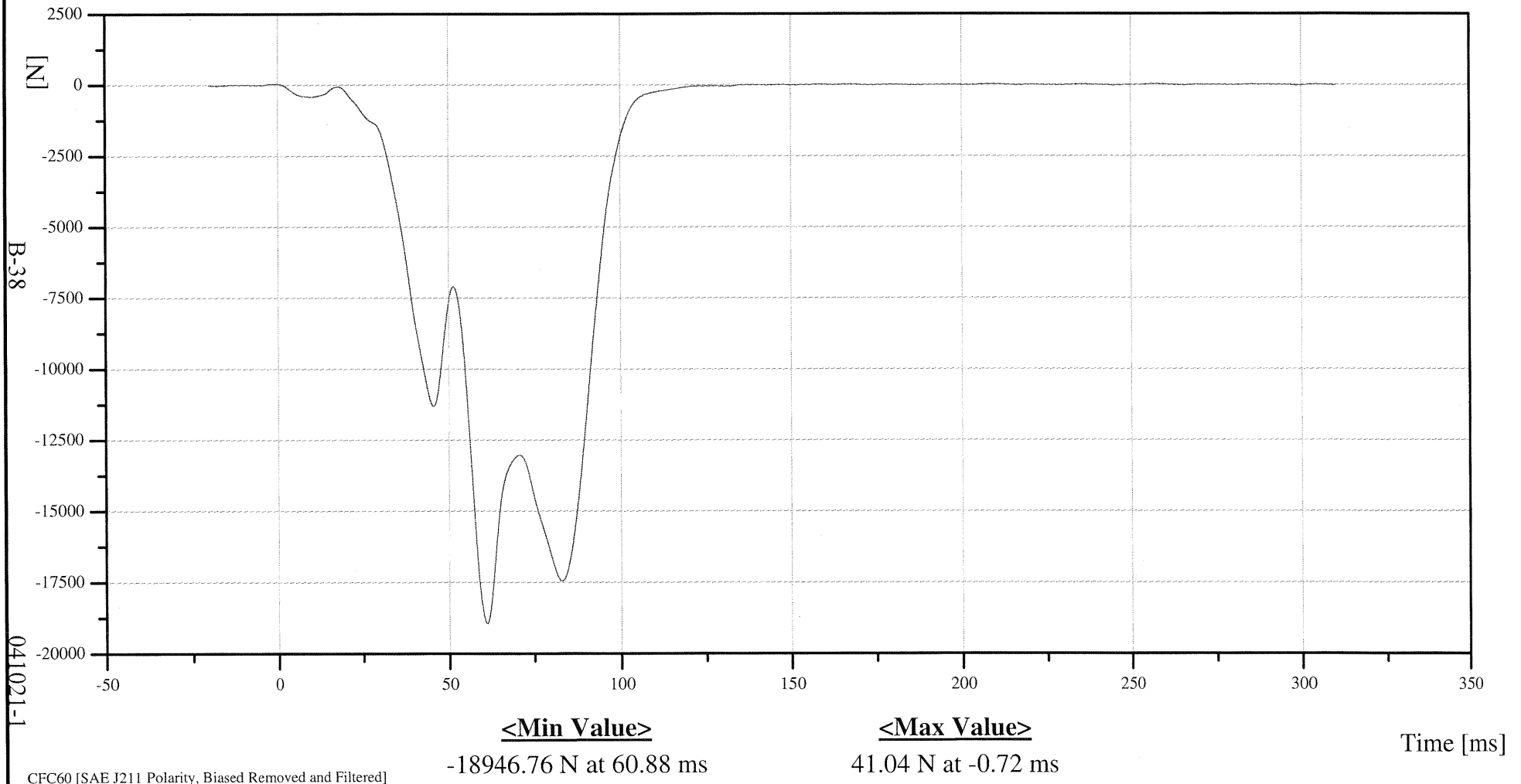
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0209





Transportation Research Center, Inc.

ROW 2 COLUMN 10

Date: 10/21/2004

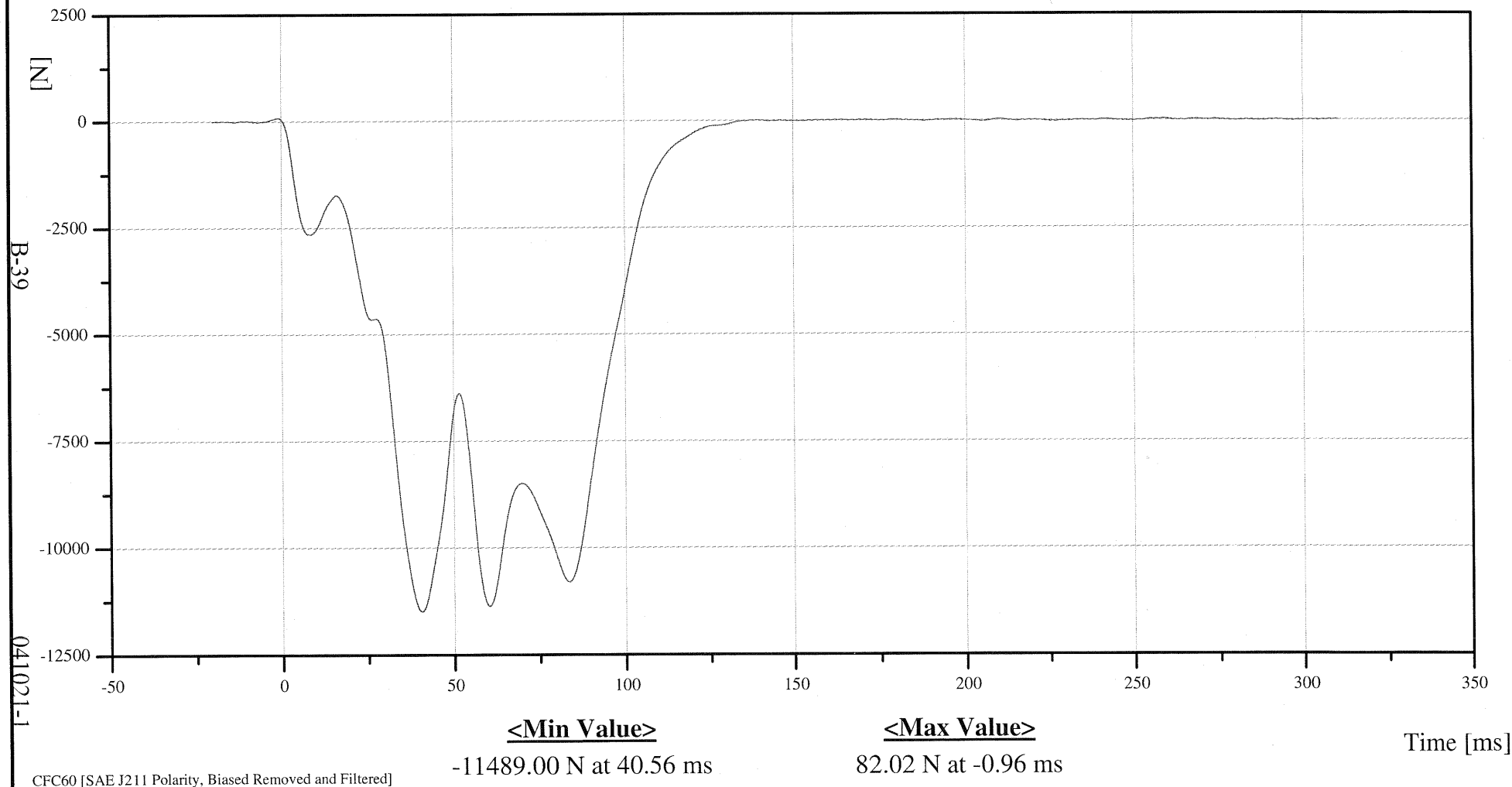
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0210





Transportation Research Center, Inc.

ROW 2 COLUMN 11

Date: 10/21/2004

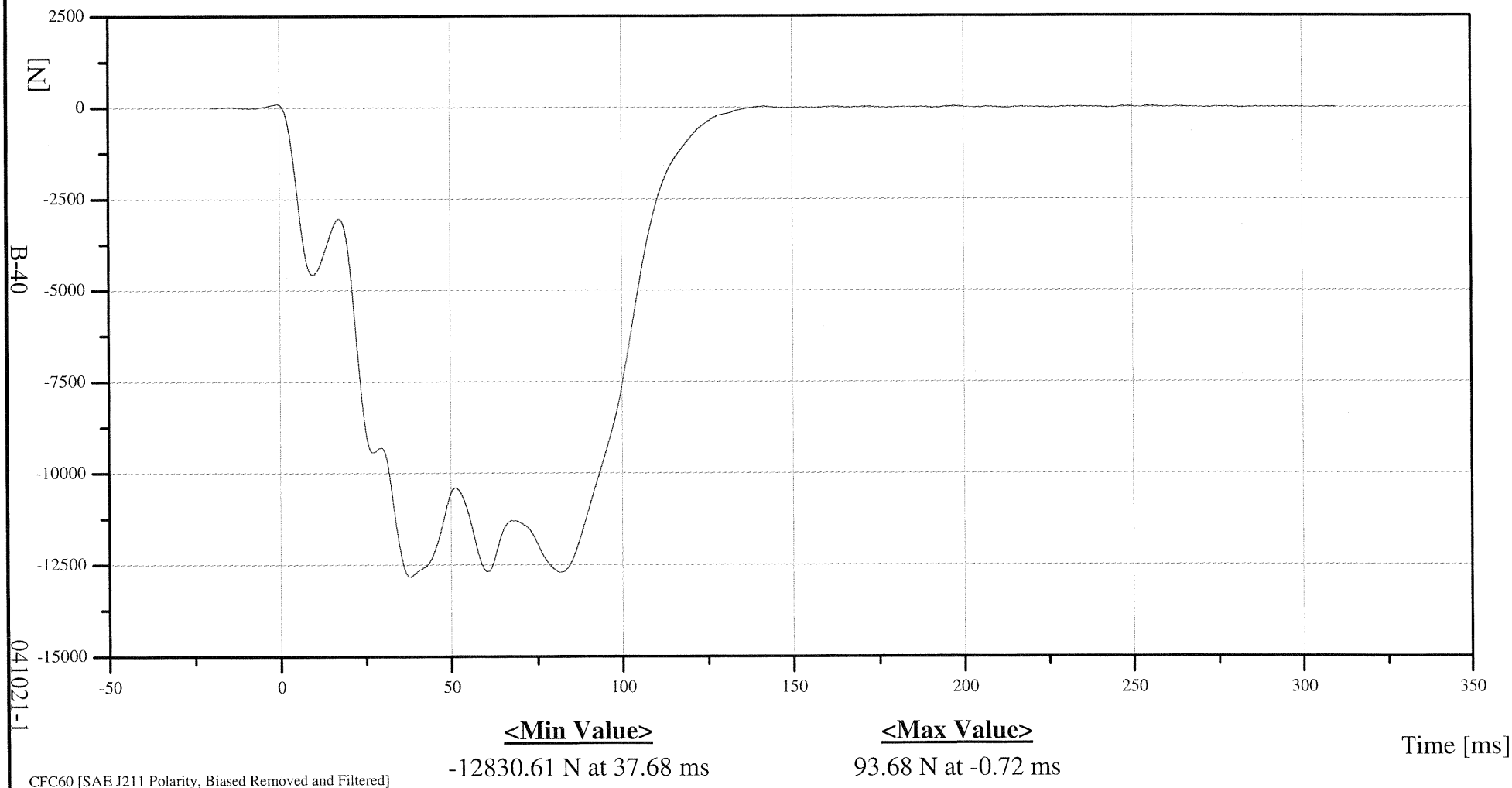
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0211





Transportation Research Center, Inc.

ROW 2 COLUMN 12

Date: 10/21/2004

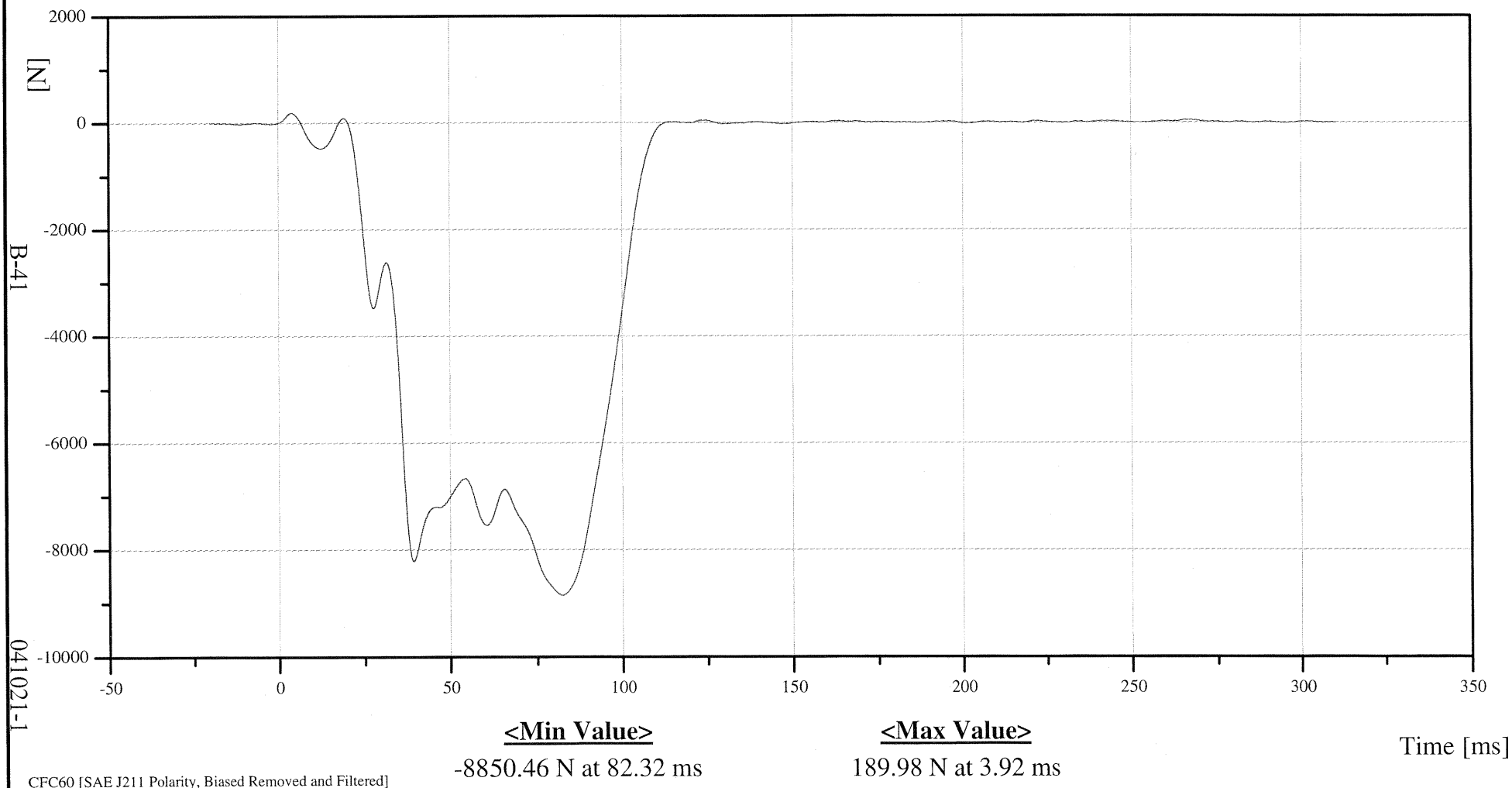
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0212





Transportation Research Center, Inc.

ROW 2 COLUMN 13

Date: 10/21/2004

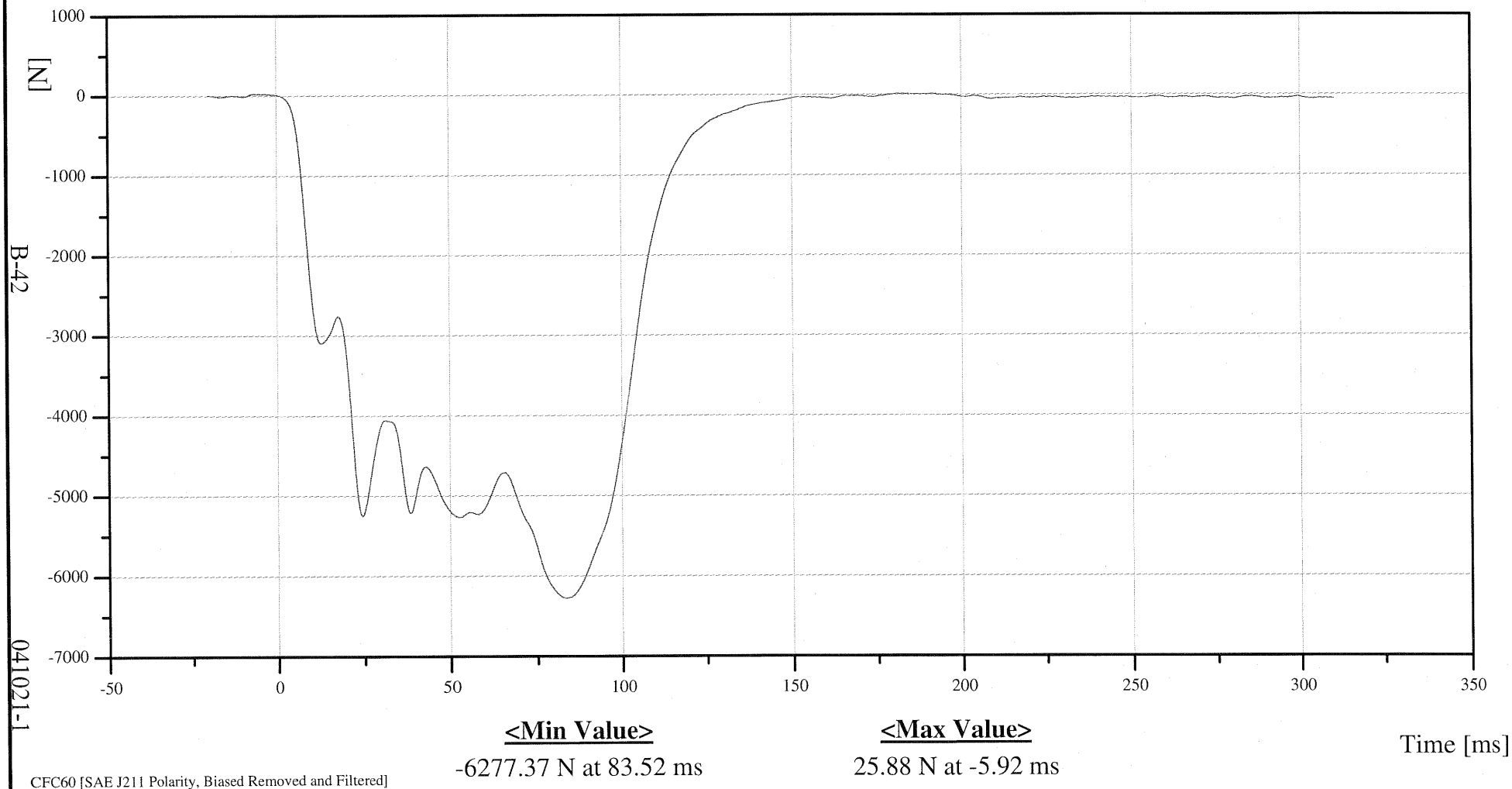
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0213





Transportation Research Center, Inc.

ROW 2 COLUMN 14

Date: 10/21/2004

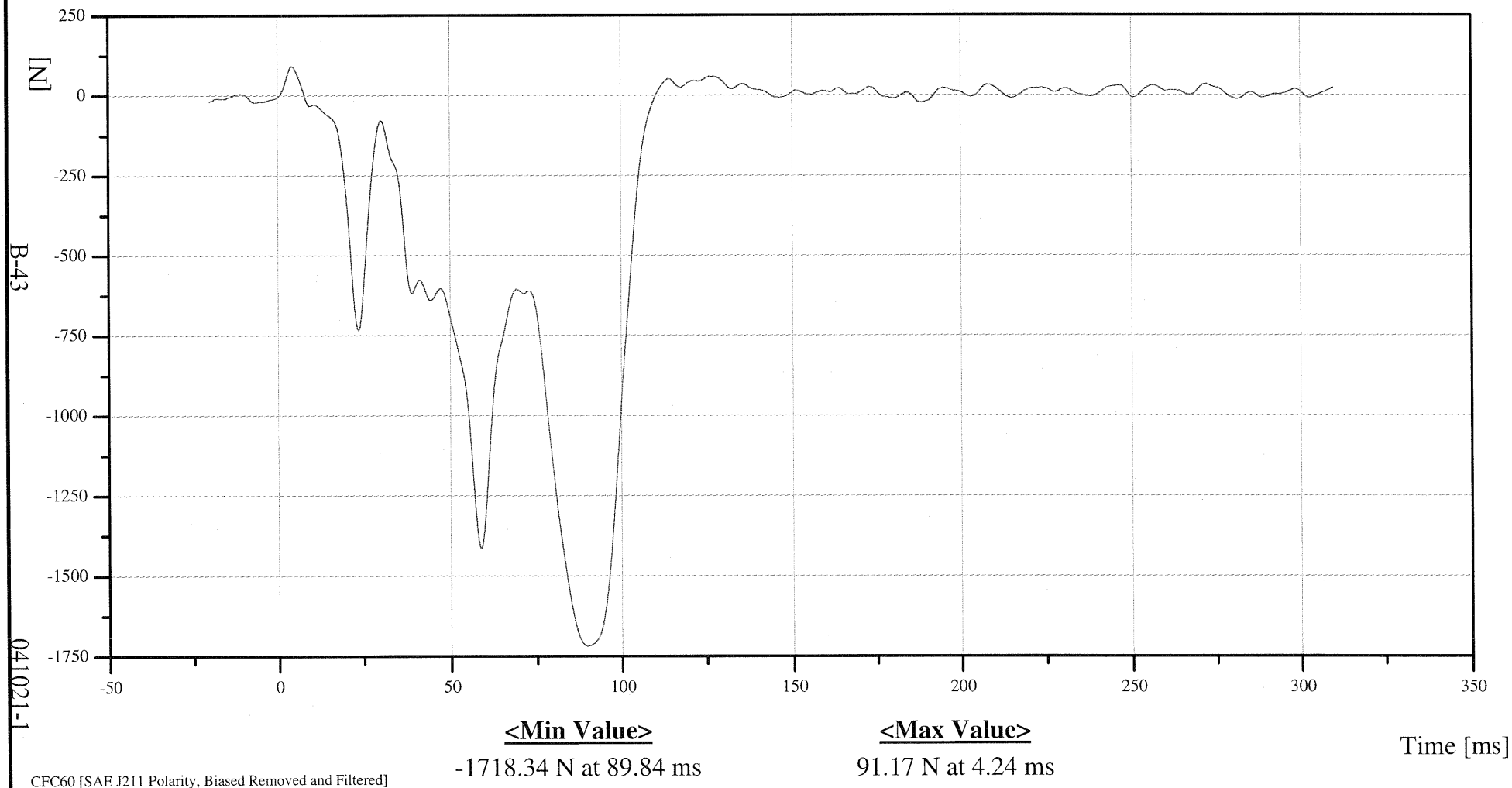
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0214





Transportation Research Center, Inc.

ROW 2 COLUMN 15

Date: 10/21/2004

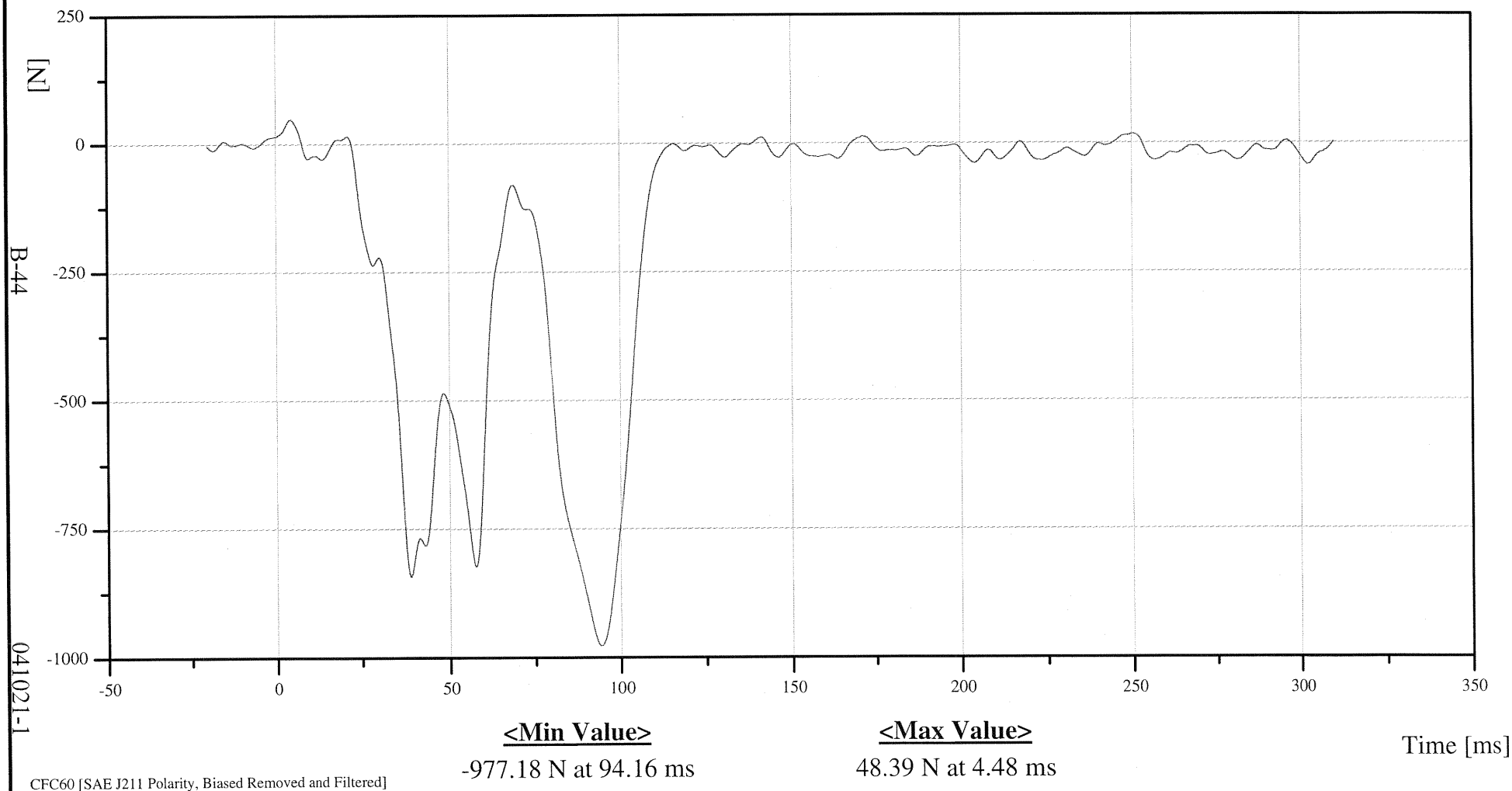
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0215





Transportation Research Center, Inc.

ROW 2 COLUMN 16

Date: 10/21/2004

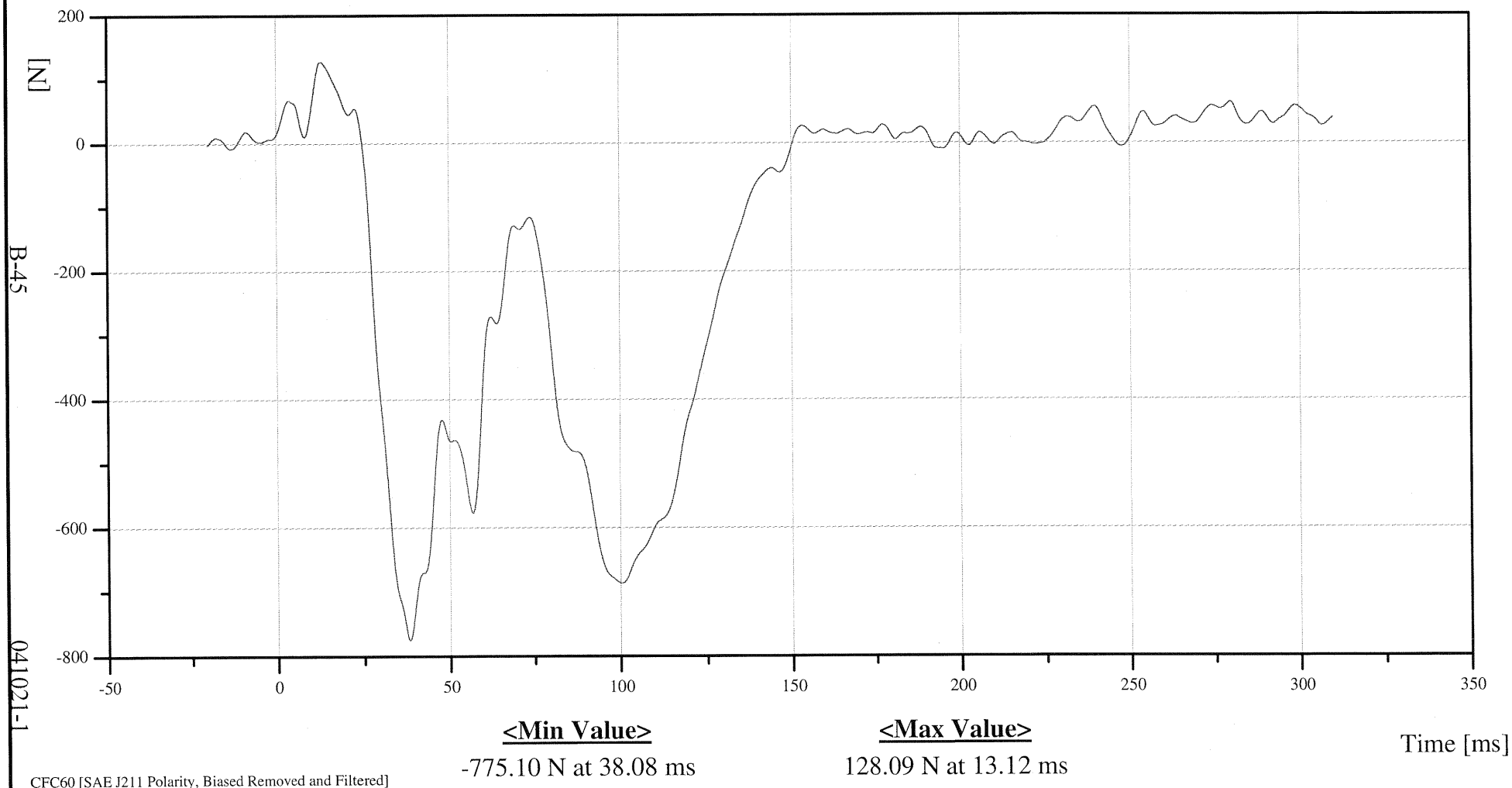
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0216





Transportation Research Center, Inc.

ROW 3 COLUMN 1

Date: 10/21/2004

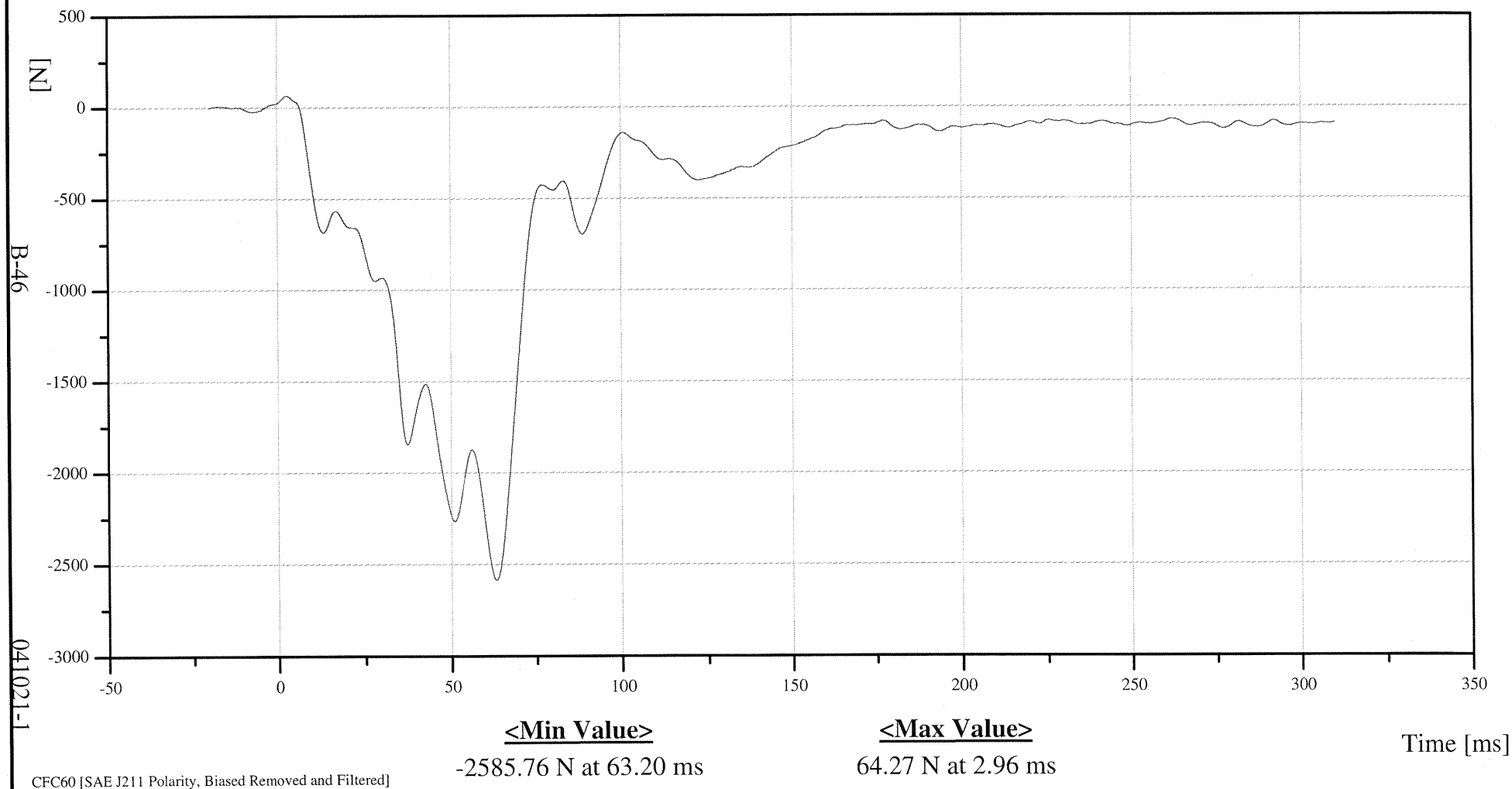
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0301





Transportation Research Center, Inc.

ROW 3 COLUMN 2

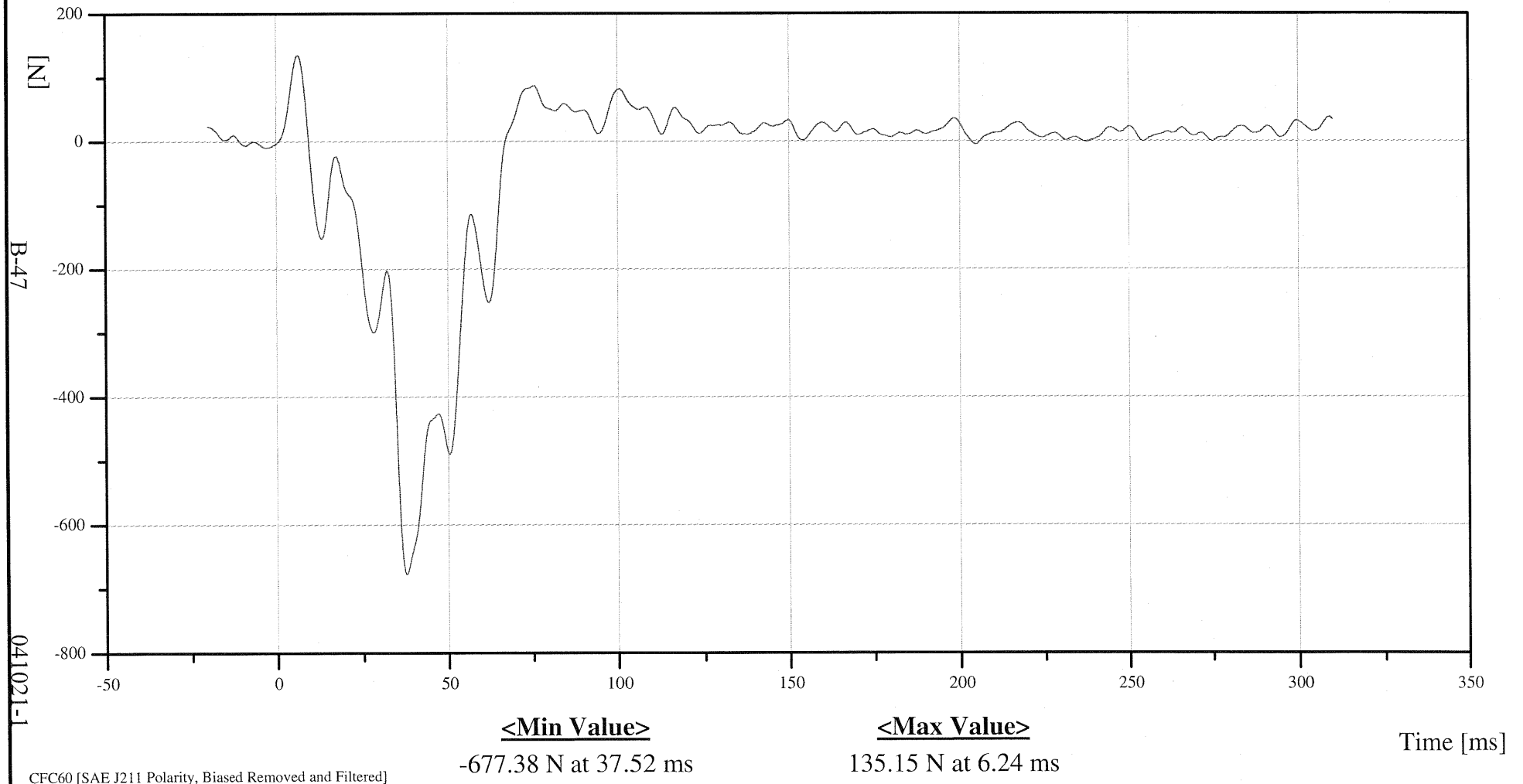
Date: 10/21/2004
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0302





Transportation Research Center, Inc.

ROW 3 COLUMN 3

Date: 10/21/2004

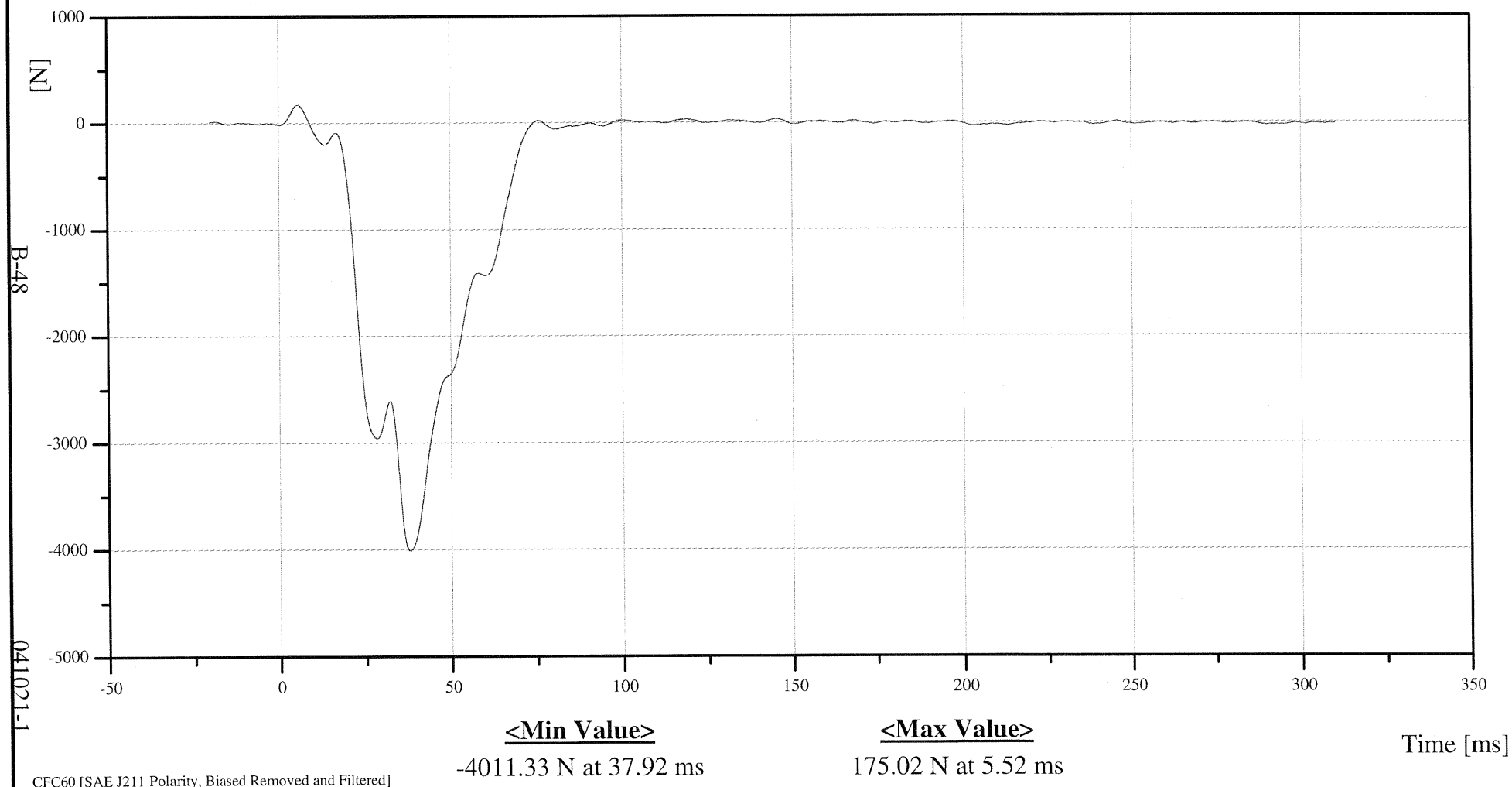
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0303





Transportation Research Center, Inc.

ROW 3 COLUMN 4

Date: 10/21/2004

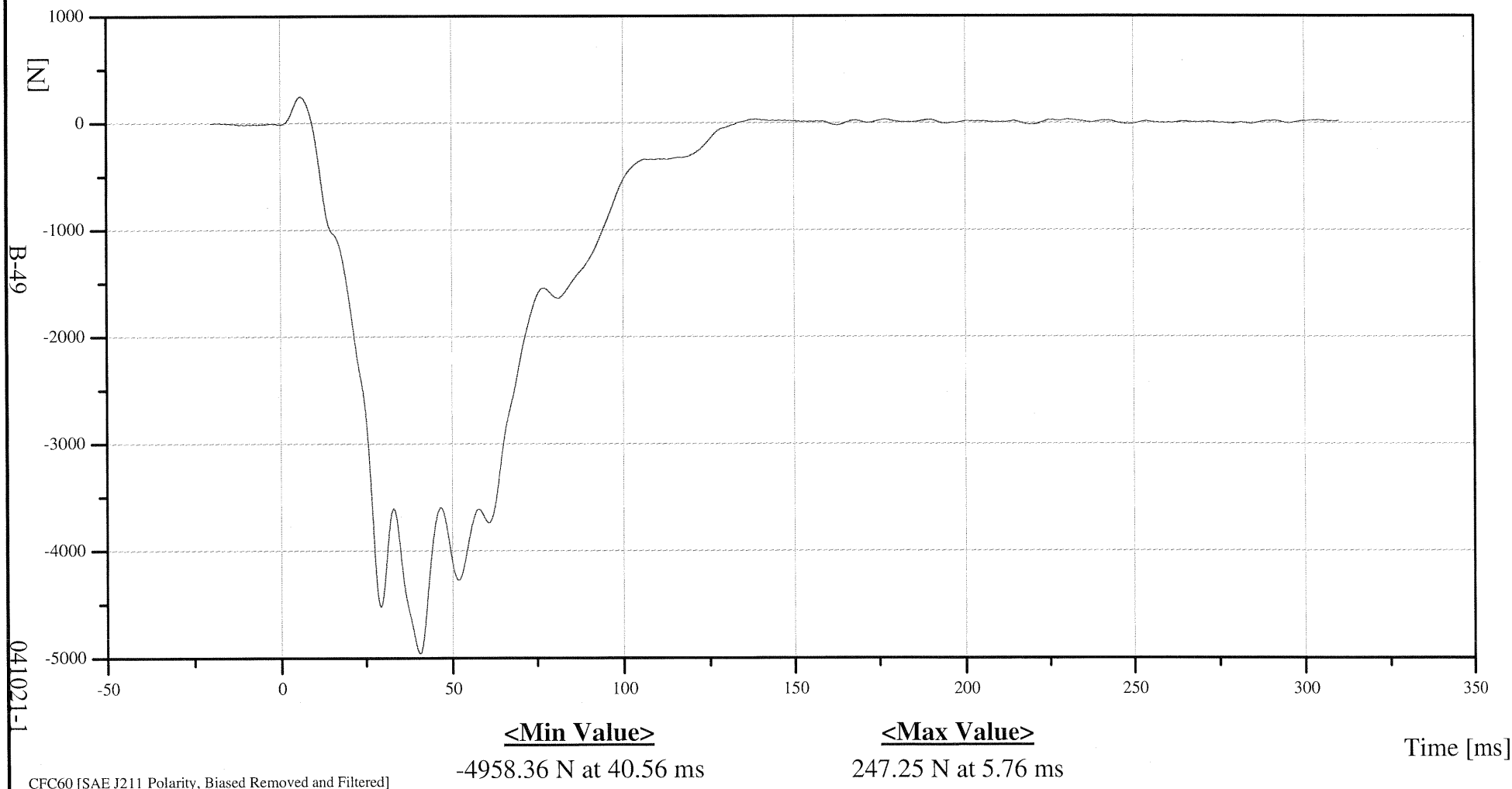
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0304





Transportation Research Center, Inc.

ROW 3 COLUMN 5

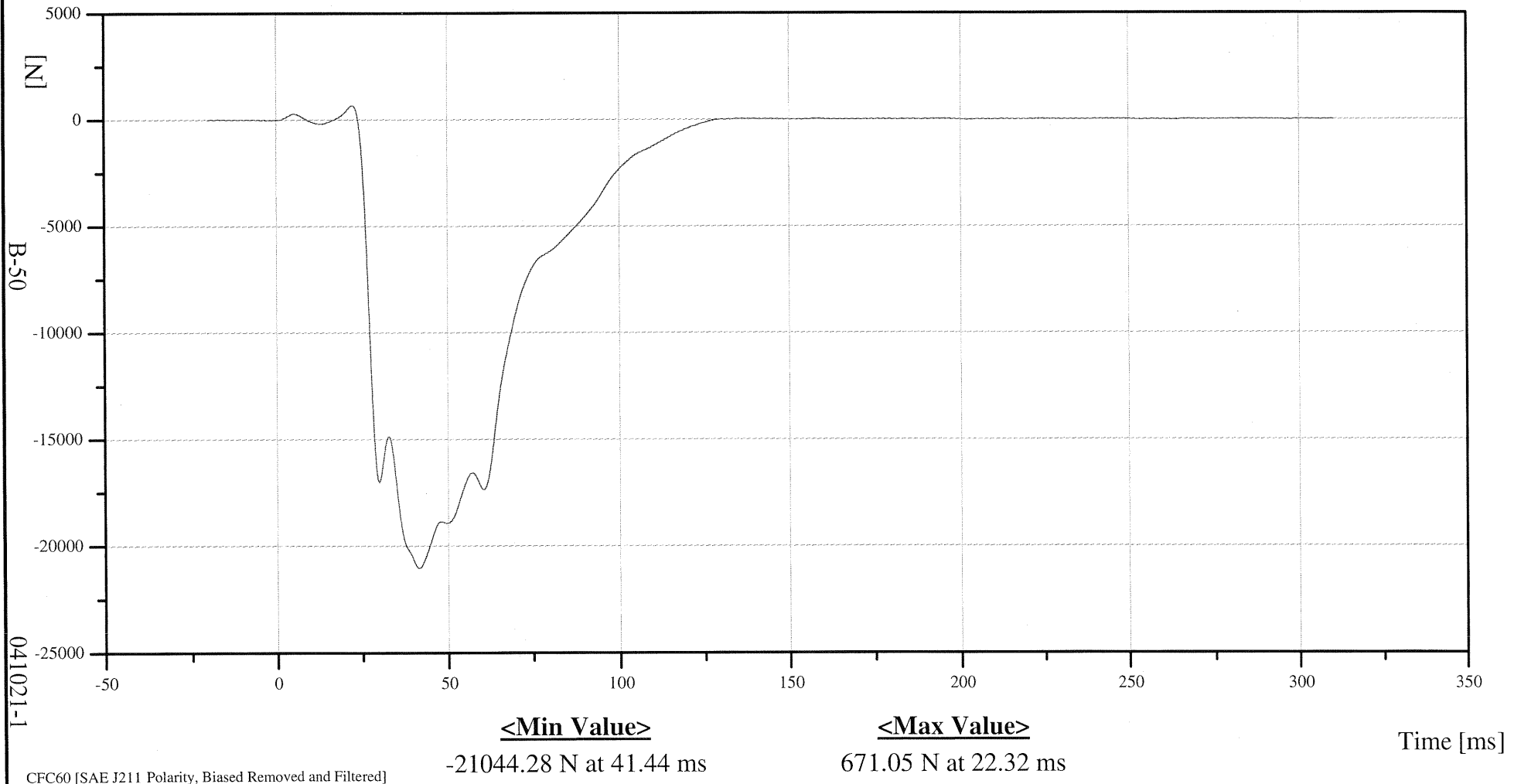
Date: 10/21/2004
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0305





Transportation Research Center, Inc.

ROW 3 COLUMN 6

Date: 10/21/2004

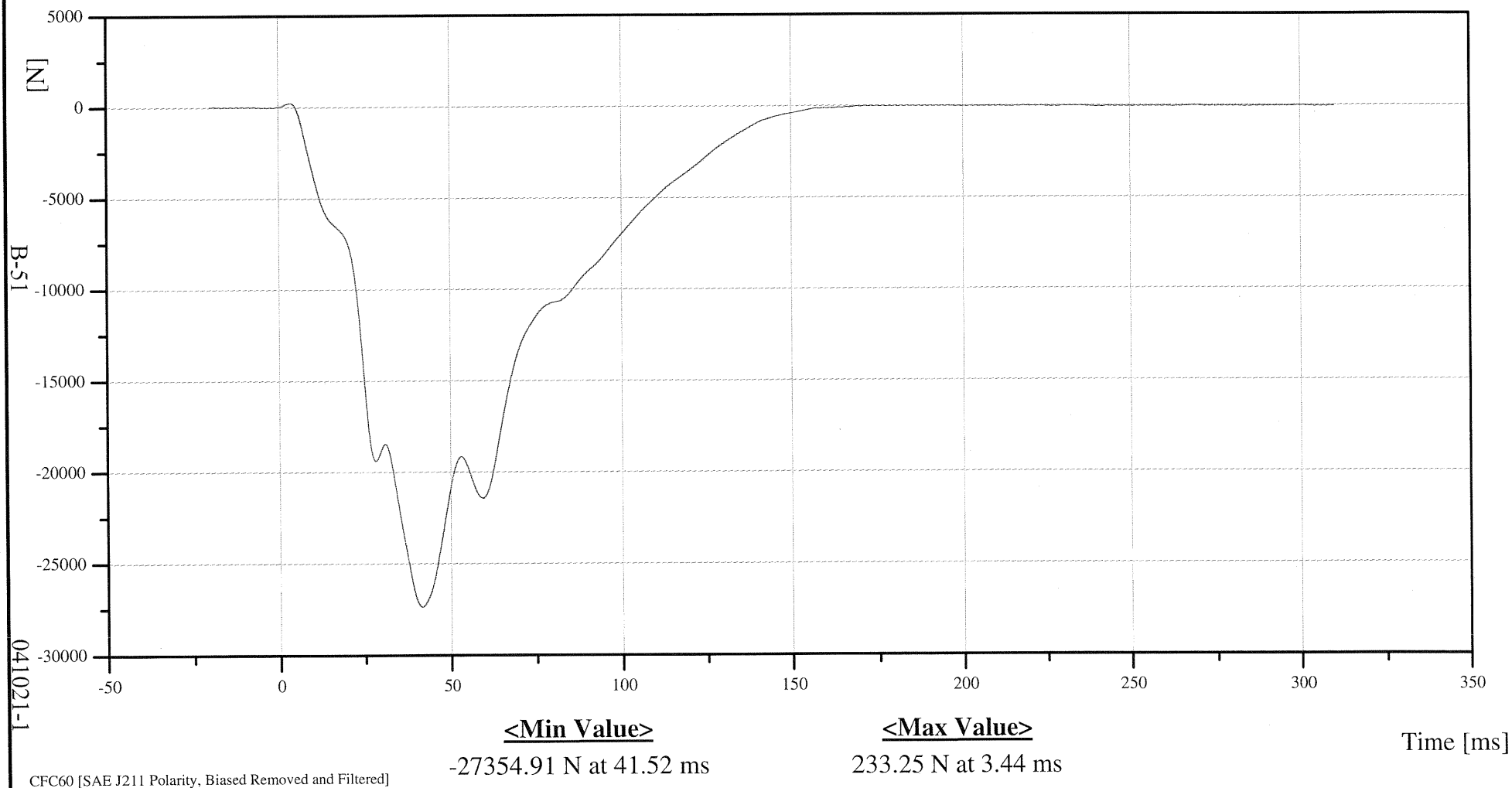
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0306





Transportation Research Center, Inc.

ROW 3 COLUMN 7

Date: 10/21/2004

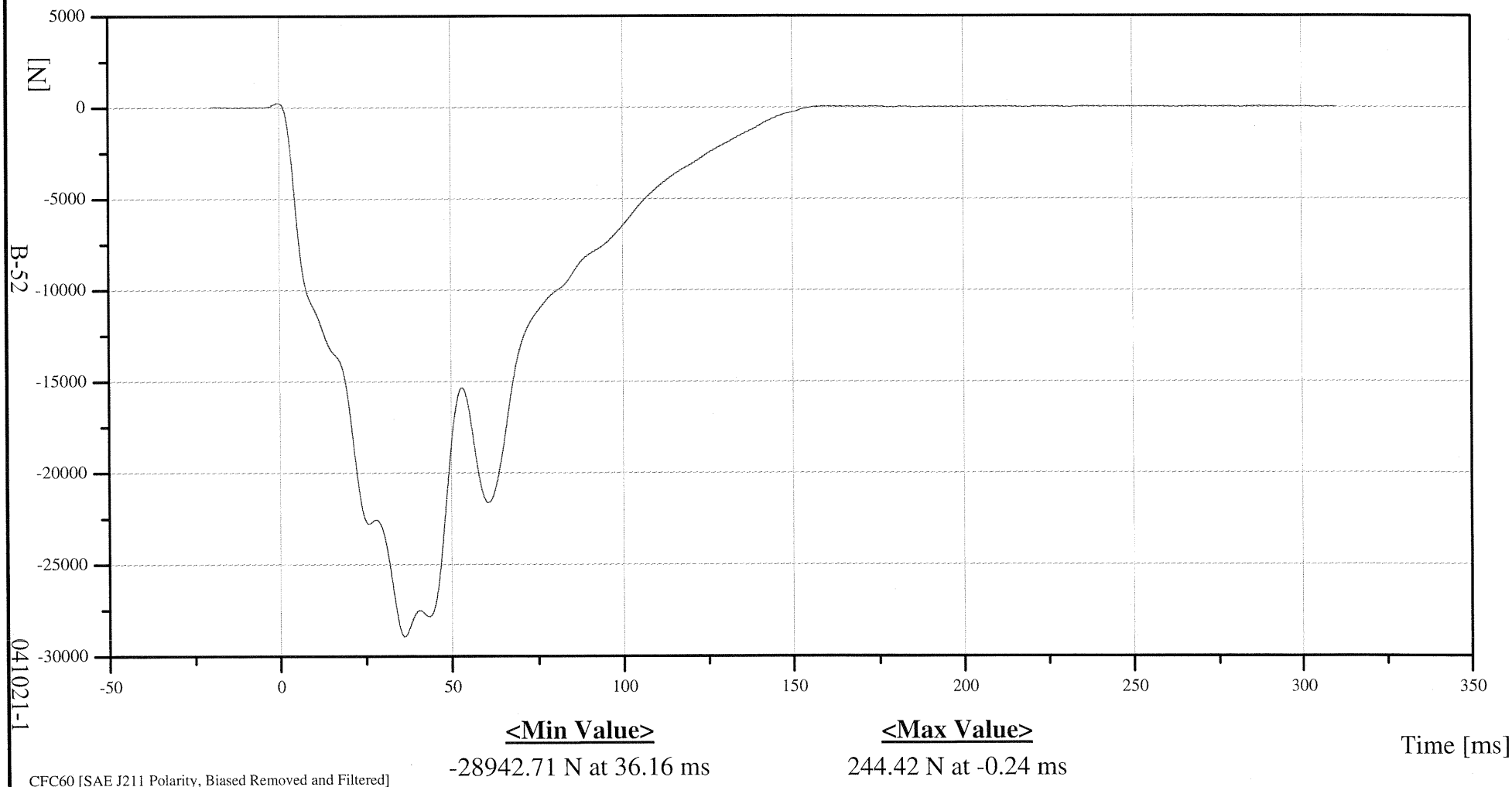
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0307





Transportation Research Center, Inc.

ROW 3 COLUMN 8

Date: 10/21/2004

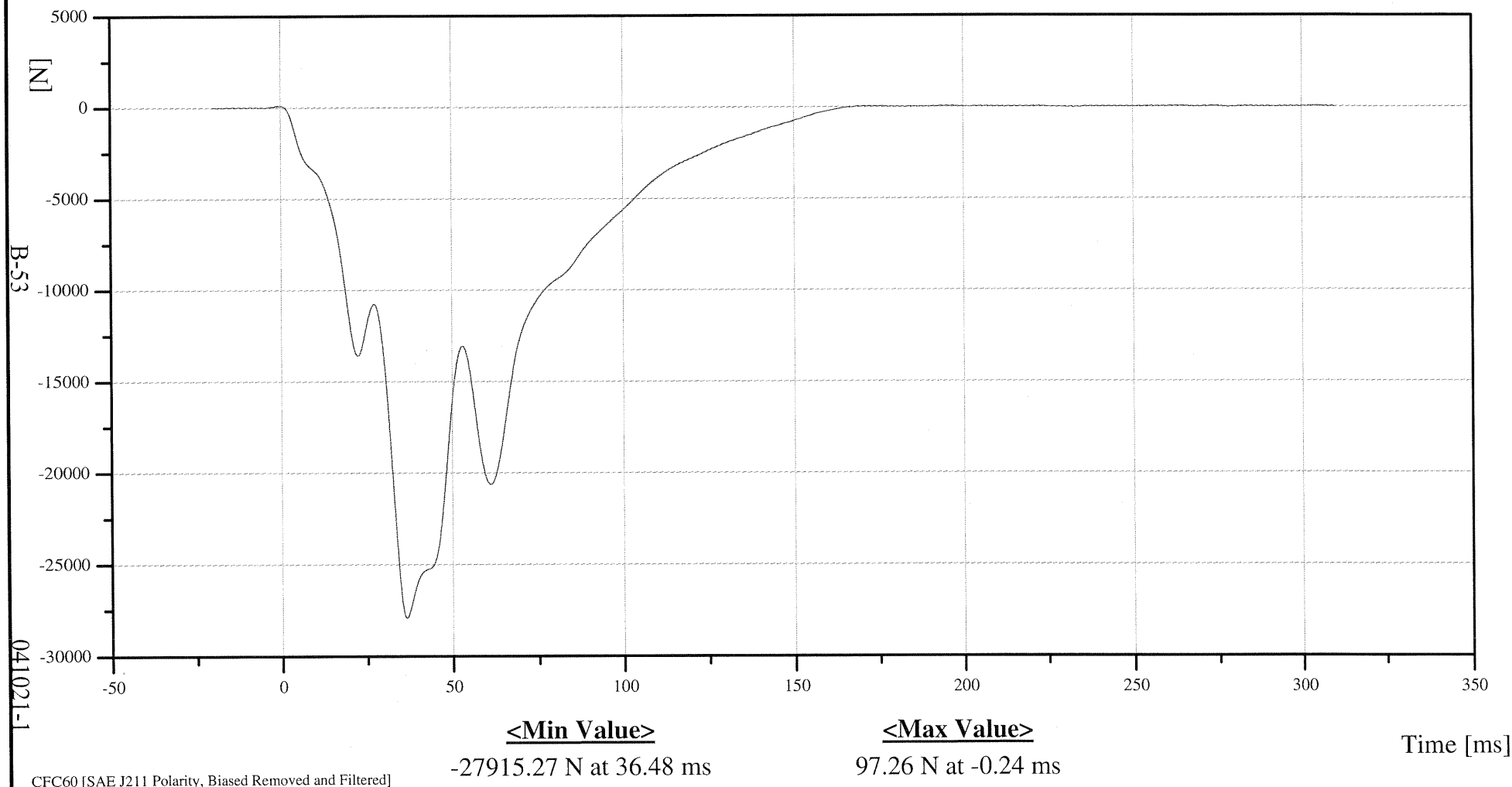
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0308





Transportation Research Center, Inc.

ROW 3 COLUMN 9

Date: 10/21/2004

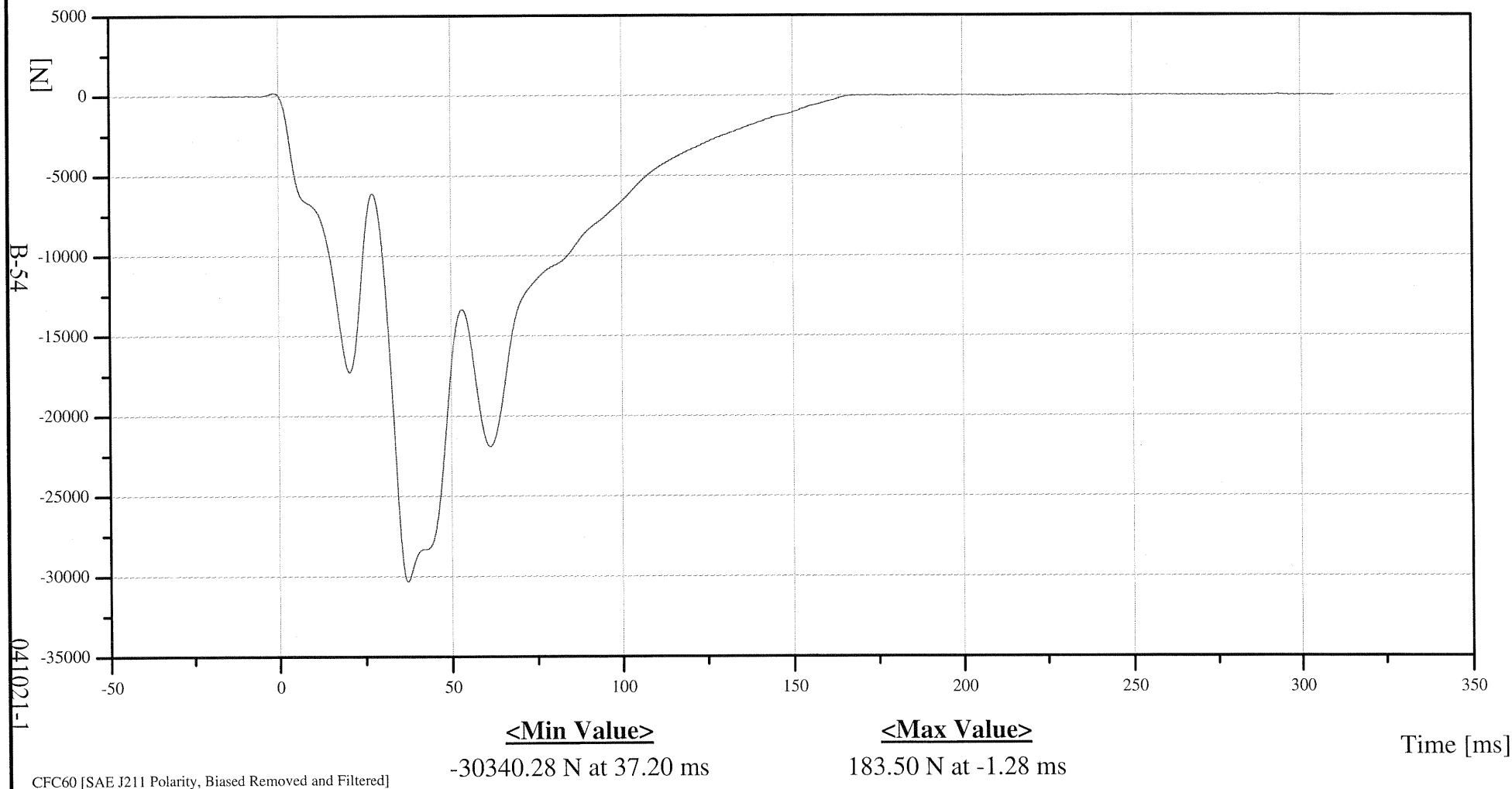
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0309





Transportation Research Center, Inc.

ROW 3 COLUMN 10

Date: 10/21/2004

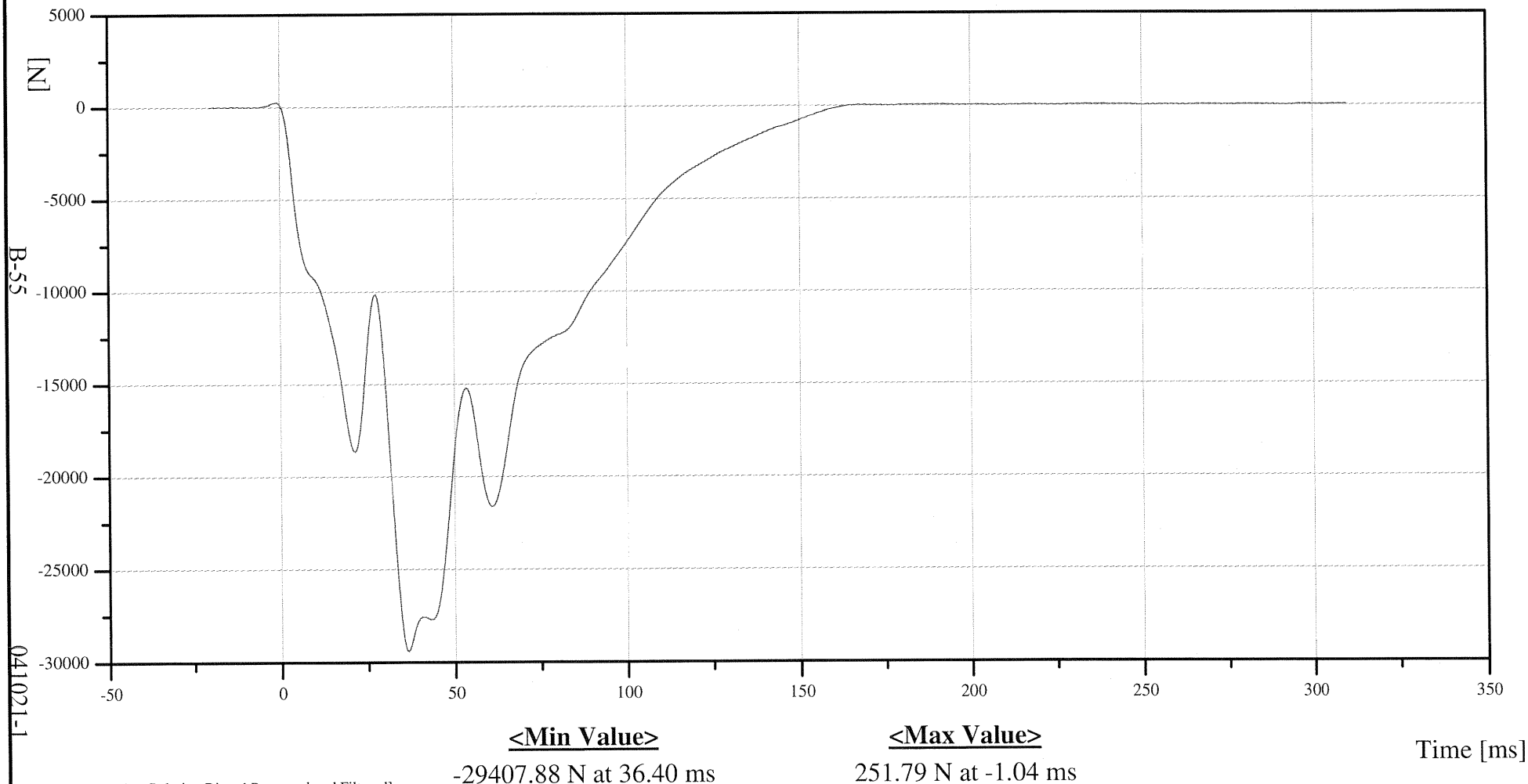
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0310



CFC60 [SAE J211 Polarity, Biased Removed and Filtered]



Transportation Research Center, Inc.

ROW 3 COLUMN 11

Date: 10/21/2004

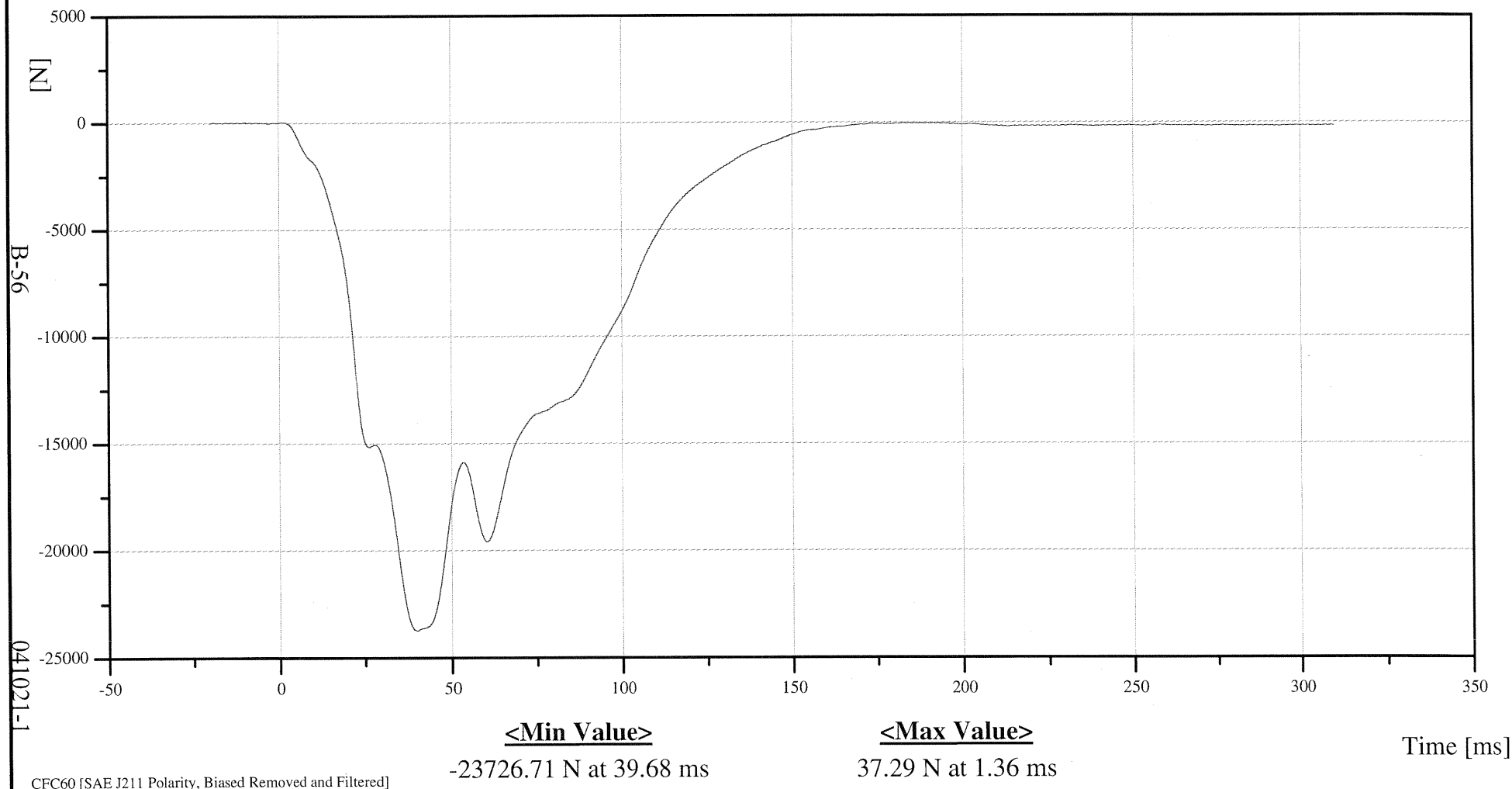
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0311





Transportation Research Center, Inc.

ROW 3 COLUMN 12

Date: 10/21/2004

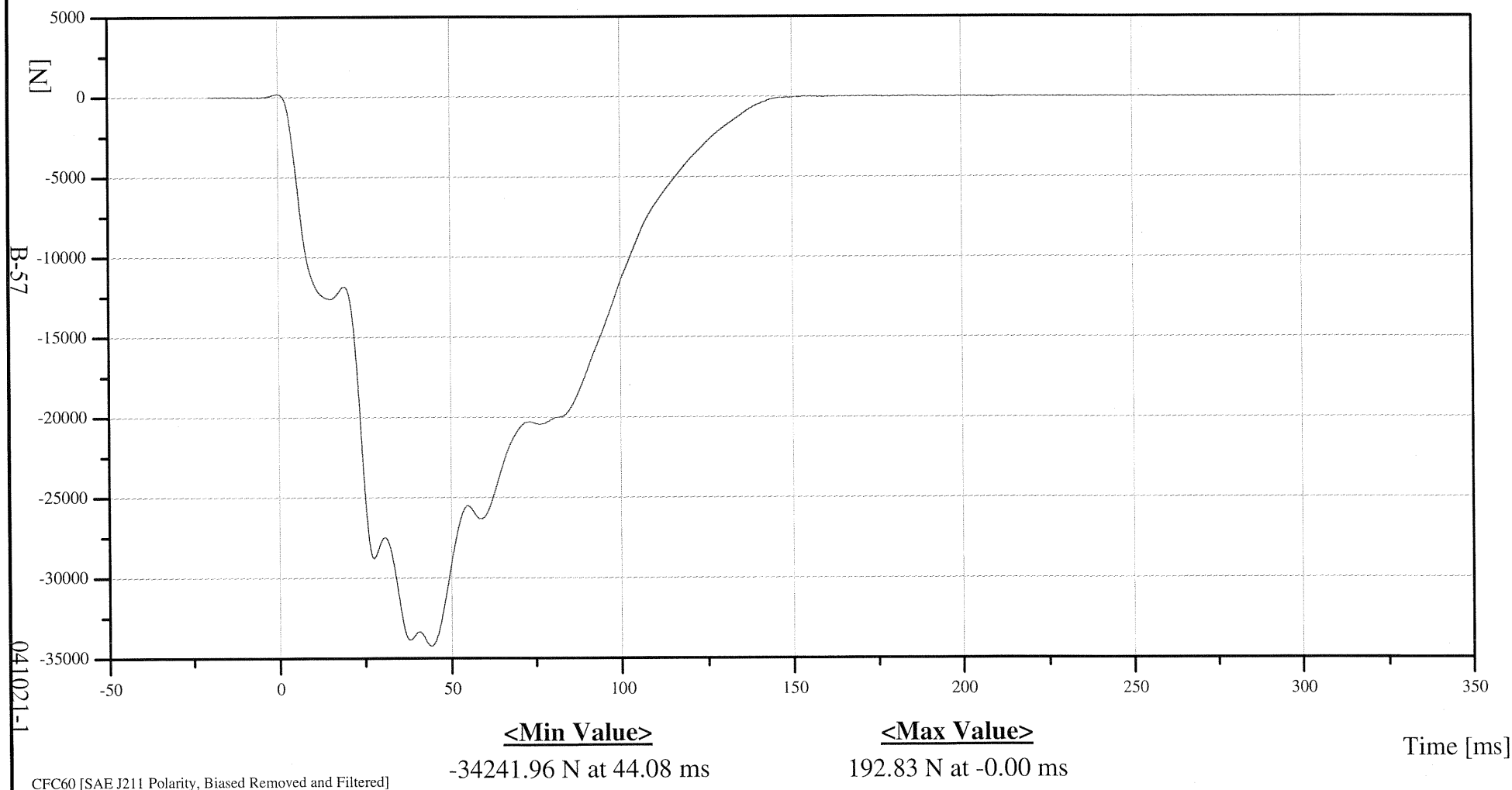
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0312





Transportation Research Center, Inc.

ROW 3 COLUMN 13

Date: 10/21/2004

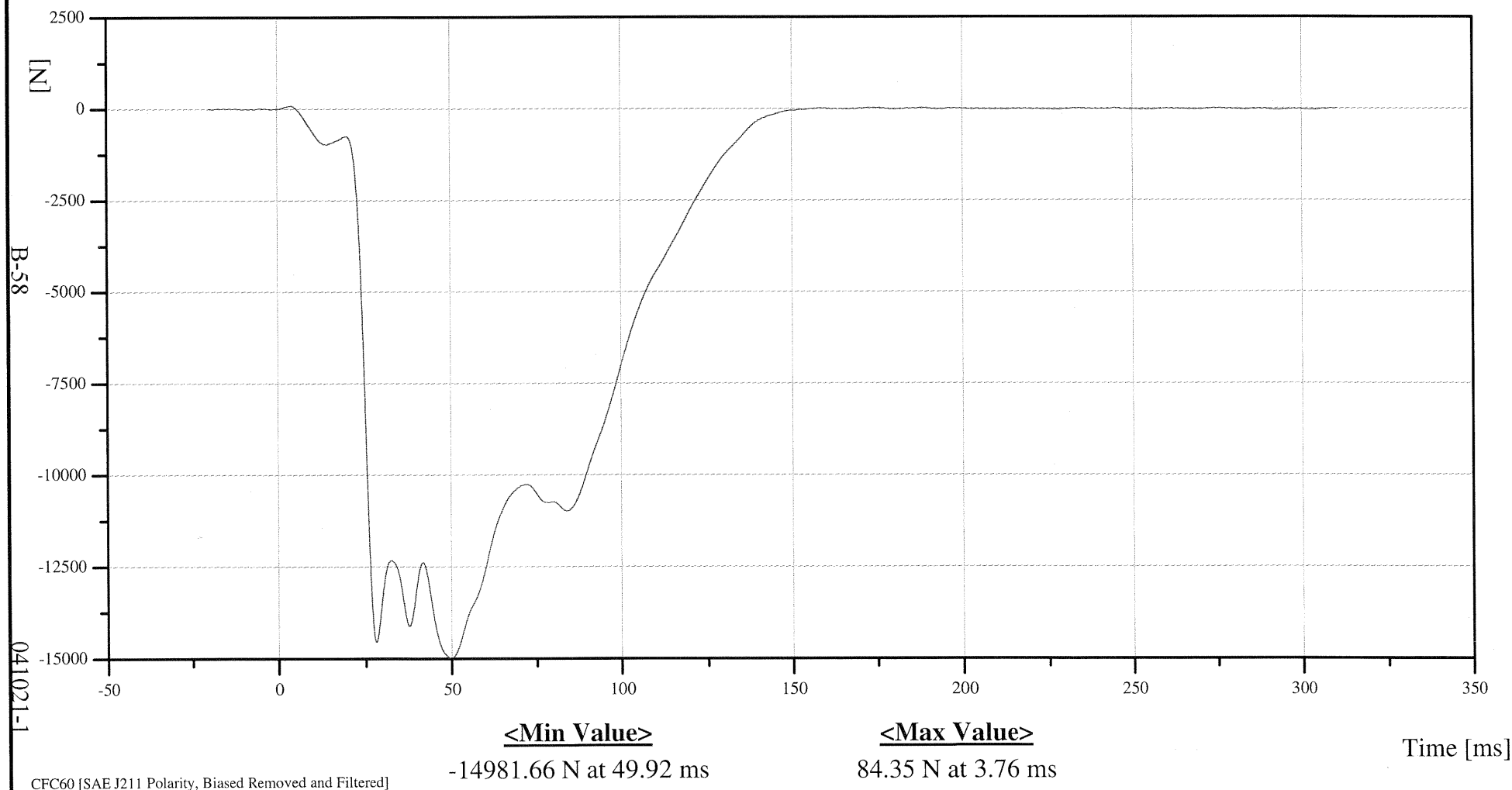
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0313





Transportation Research Center, Inc.

ROW 3 COLUMN 14

Date: 10/21/2004

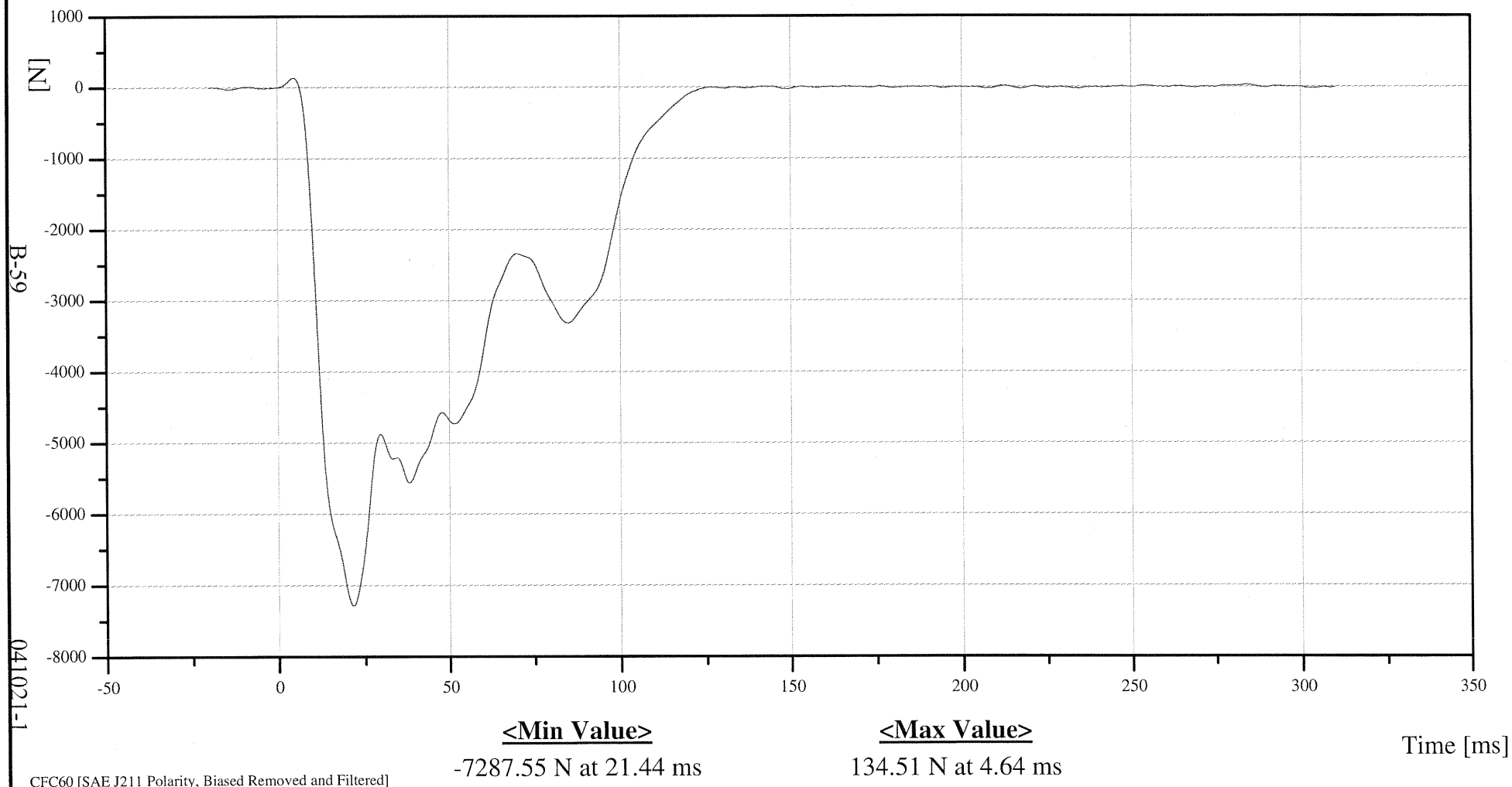
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0314





Transportation Research Center, Inc.

ROW 3 COLUMN 15

Date: 10/21/2004

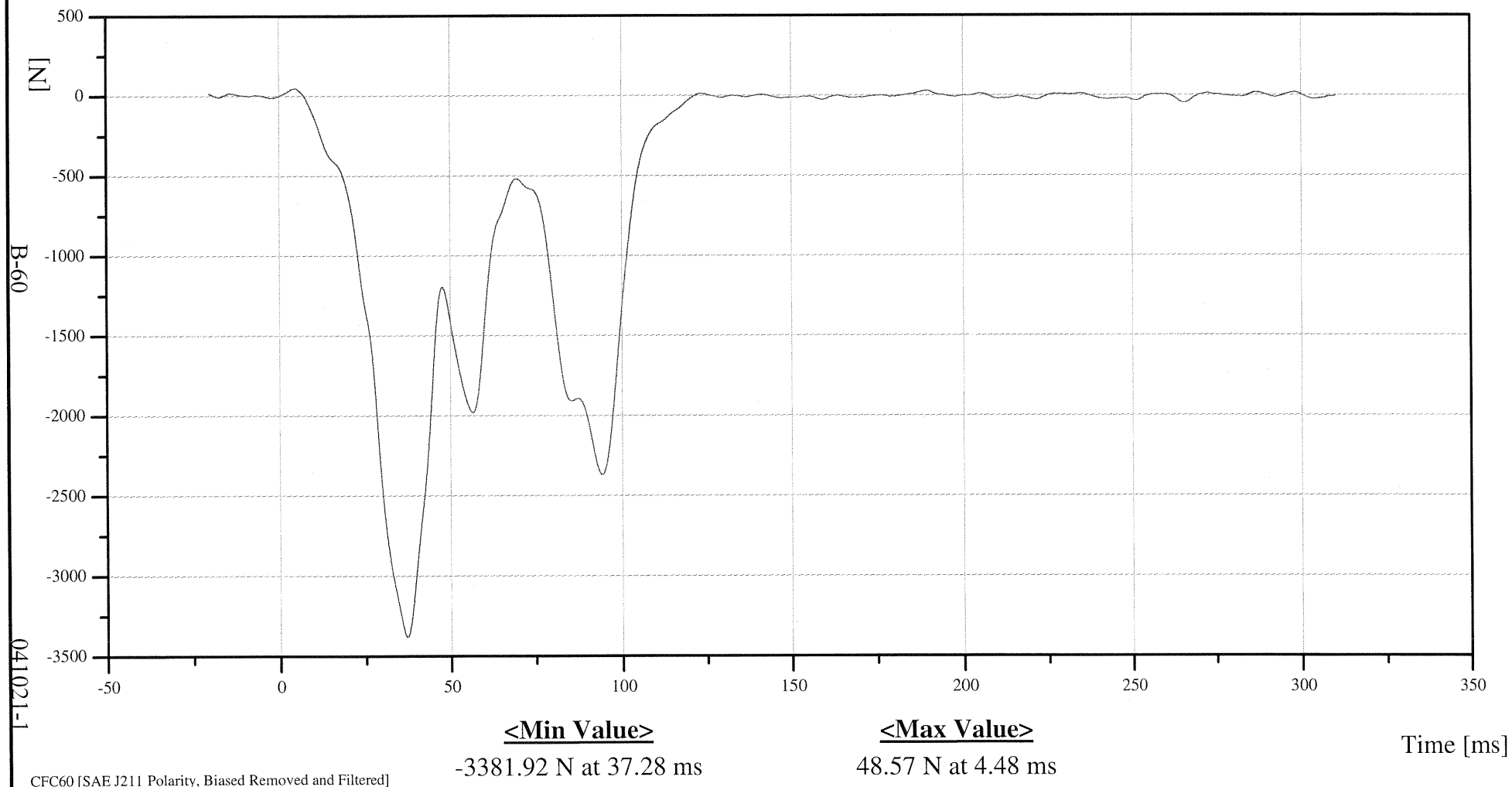
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0315





Transportation Research Center, Inc.

ROW 3 COLUMN 16

Date: 10/21/2004

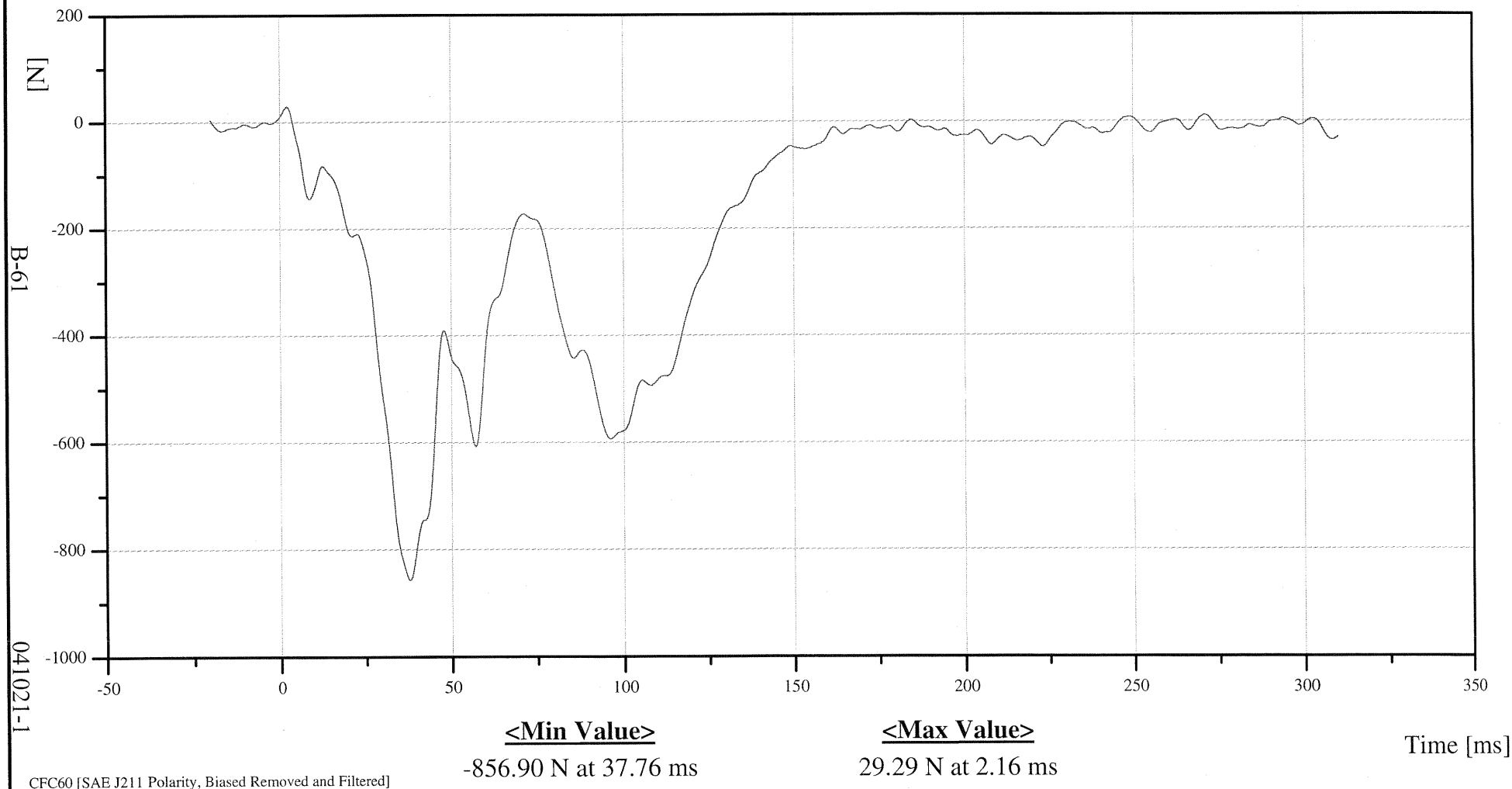
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0316





Transportation Research Center, Inc.

ROW 4 COLUMN 1

Date: 10/21/2004

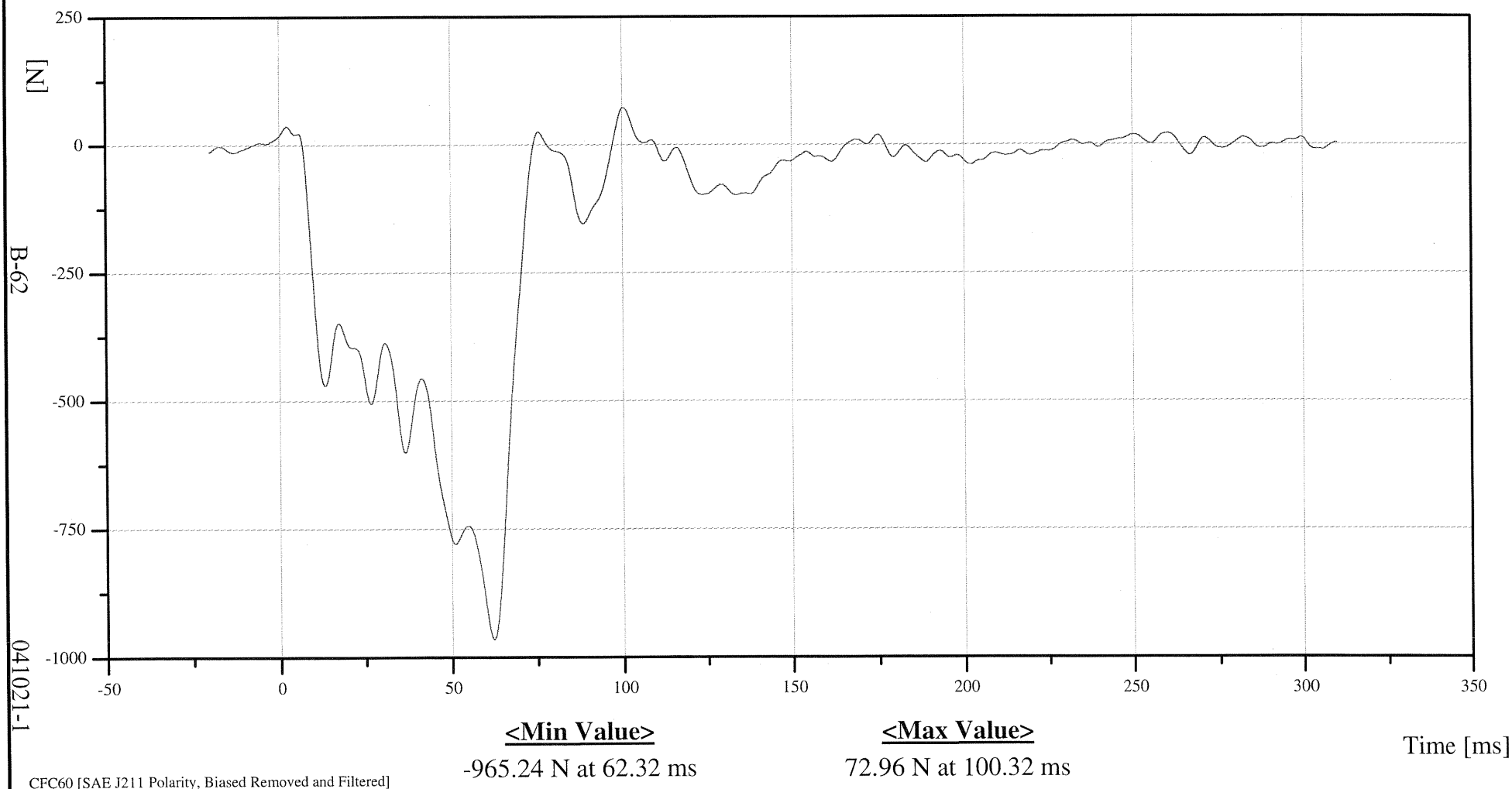
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0401





Transportation Research Center, Inc.

ROW 4 COLUMN 2

Date: 10/21/2004

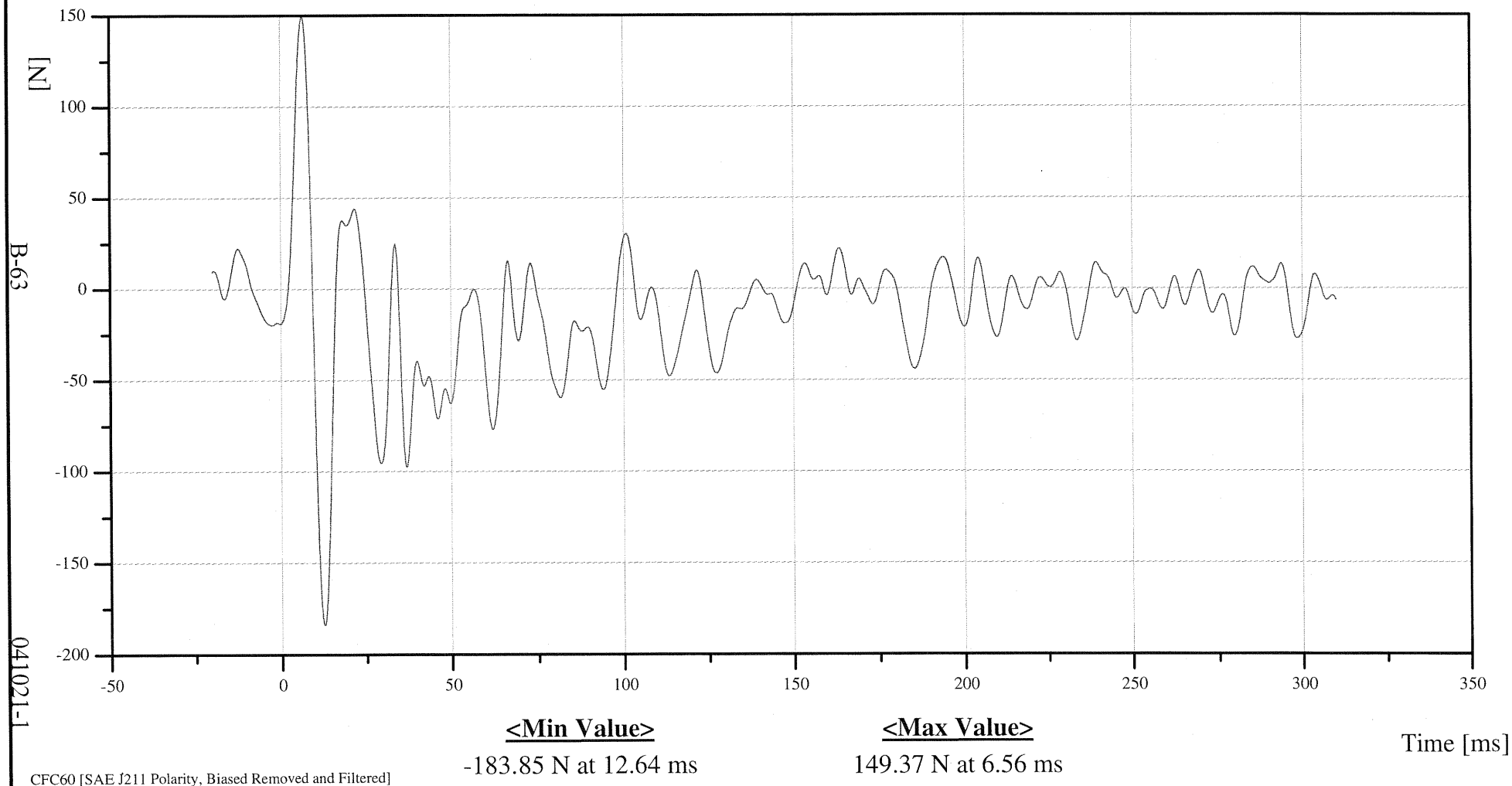
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0402





Transportation Research Center, Inc.

ROW 4 COLUMN 3

Date: 10/21/2004

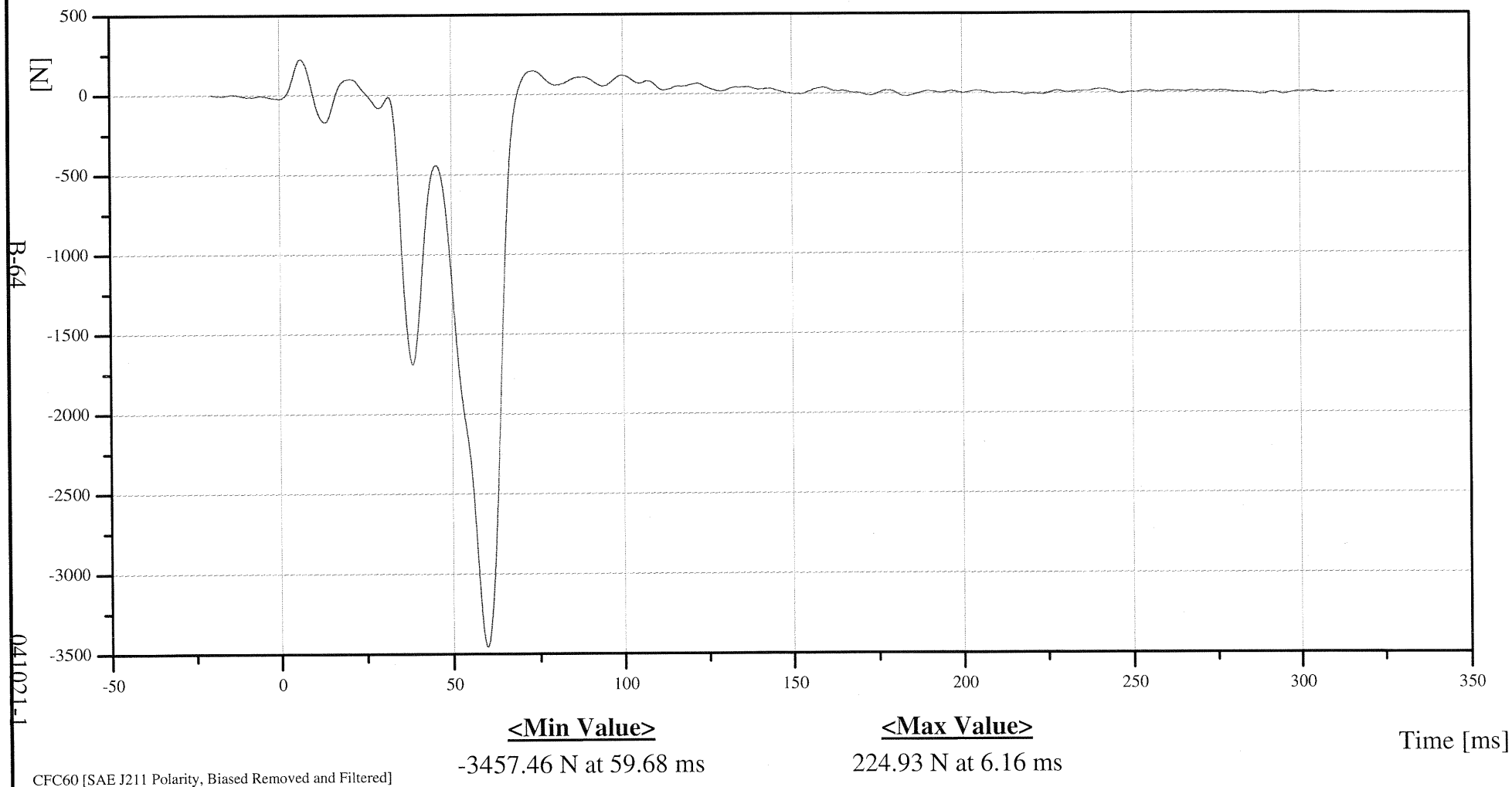
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0403





Transportation Research Center, Inc.

ROW 4 COLUMN 4

Date: 10/21/2004

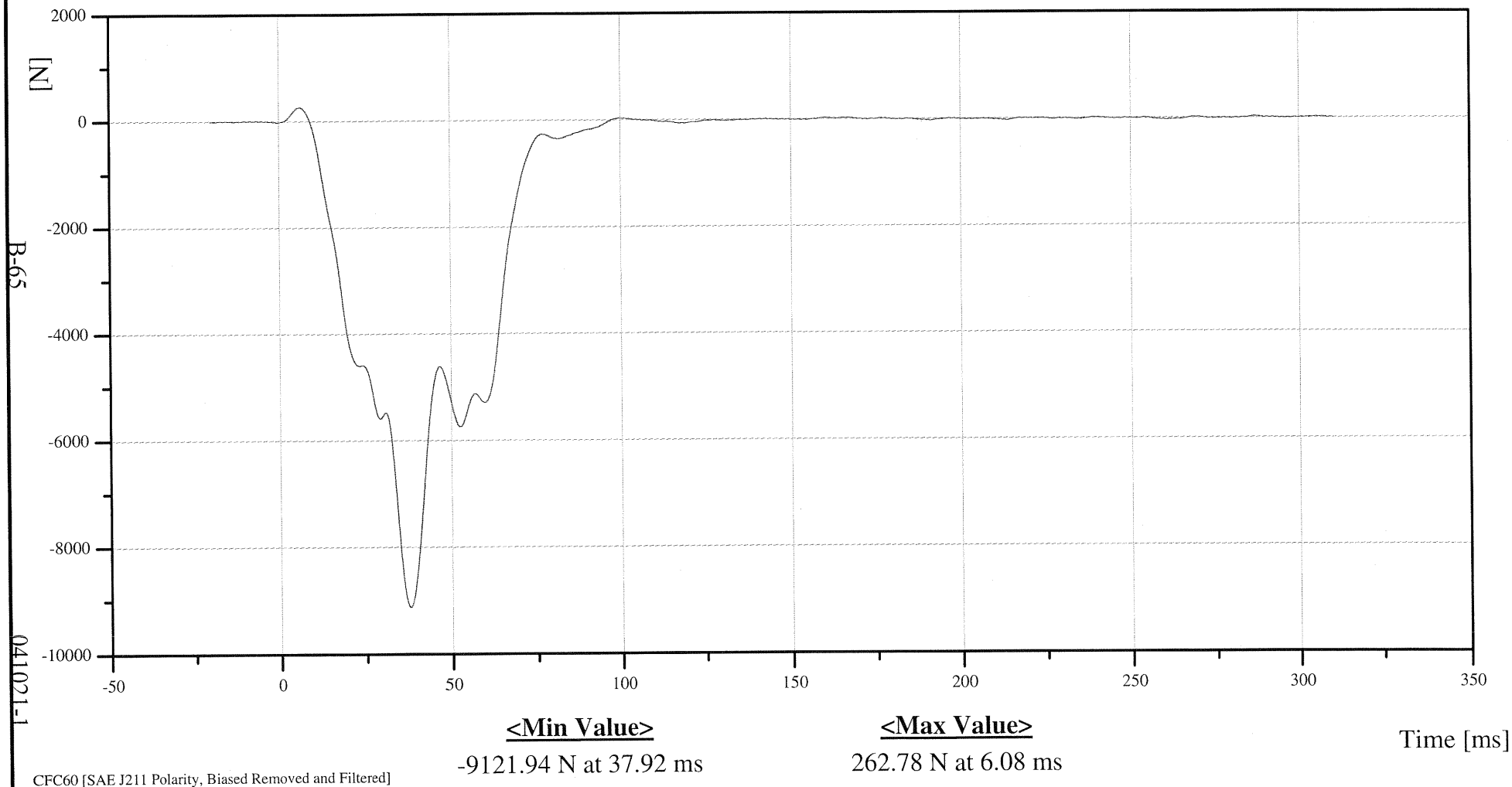
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0404





Transportation Research Center, Inc.

ROW 4 COLUMN 5

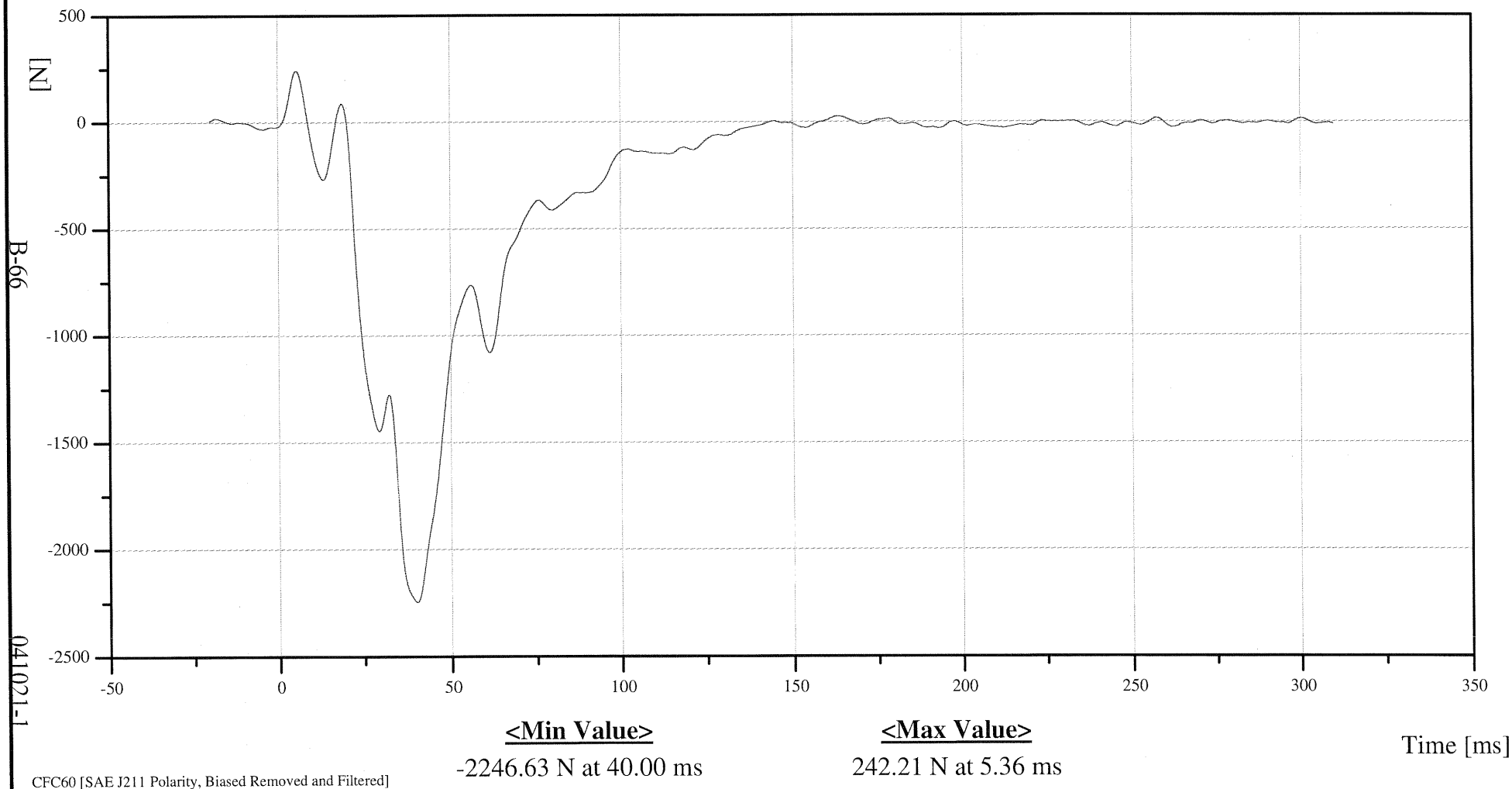
Date: 10/21/2004
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0405





Transportation Research Center, Inc.

ROW 4 COLUMN 6

Date: 10/21/2004

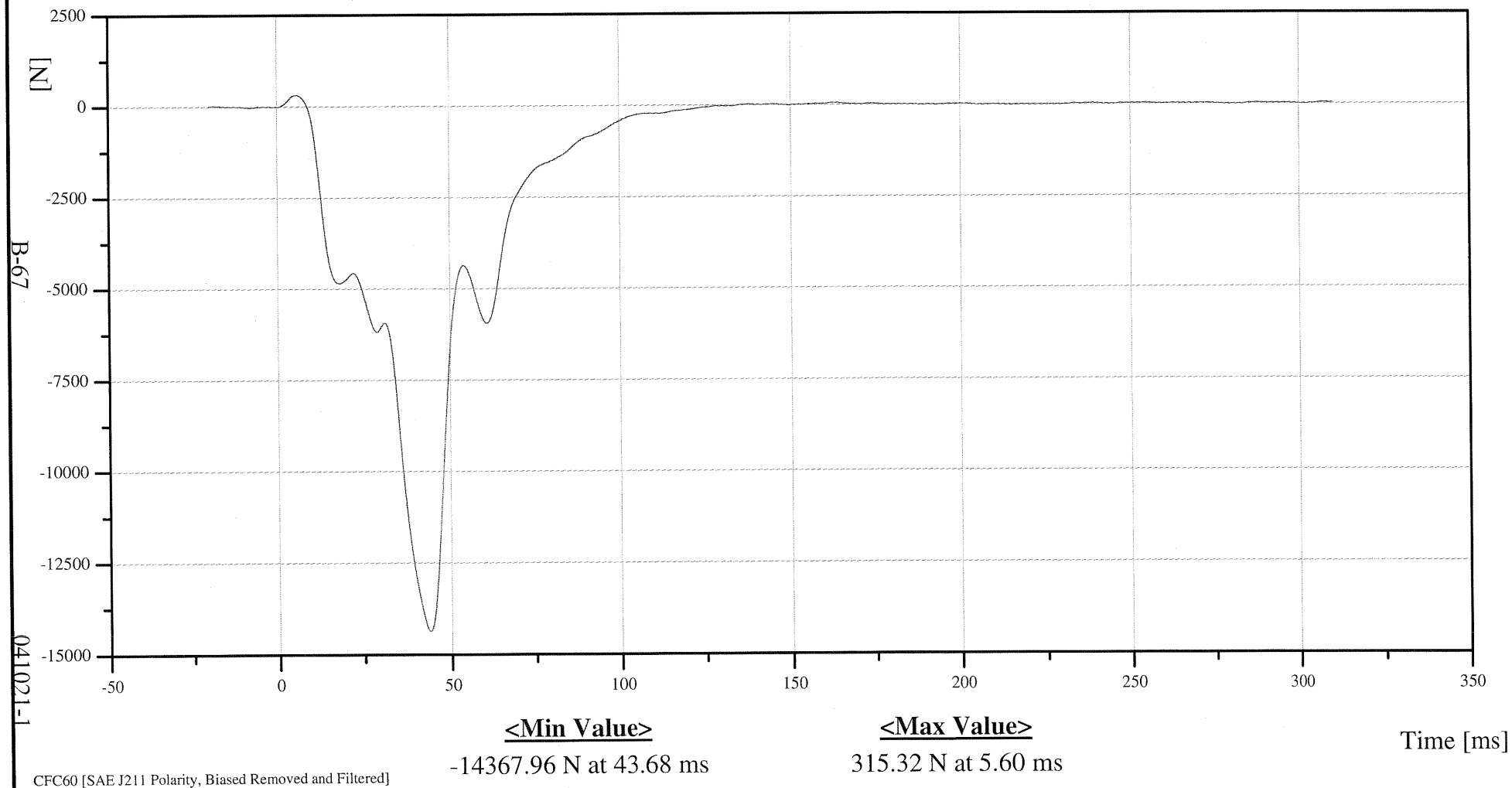
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0406





Transportation Research Center, Inc.

ROW 4 COLUMN 7

Date: 10/21/2004

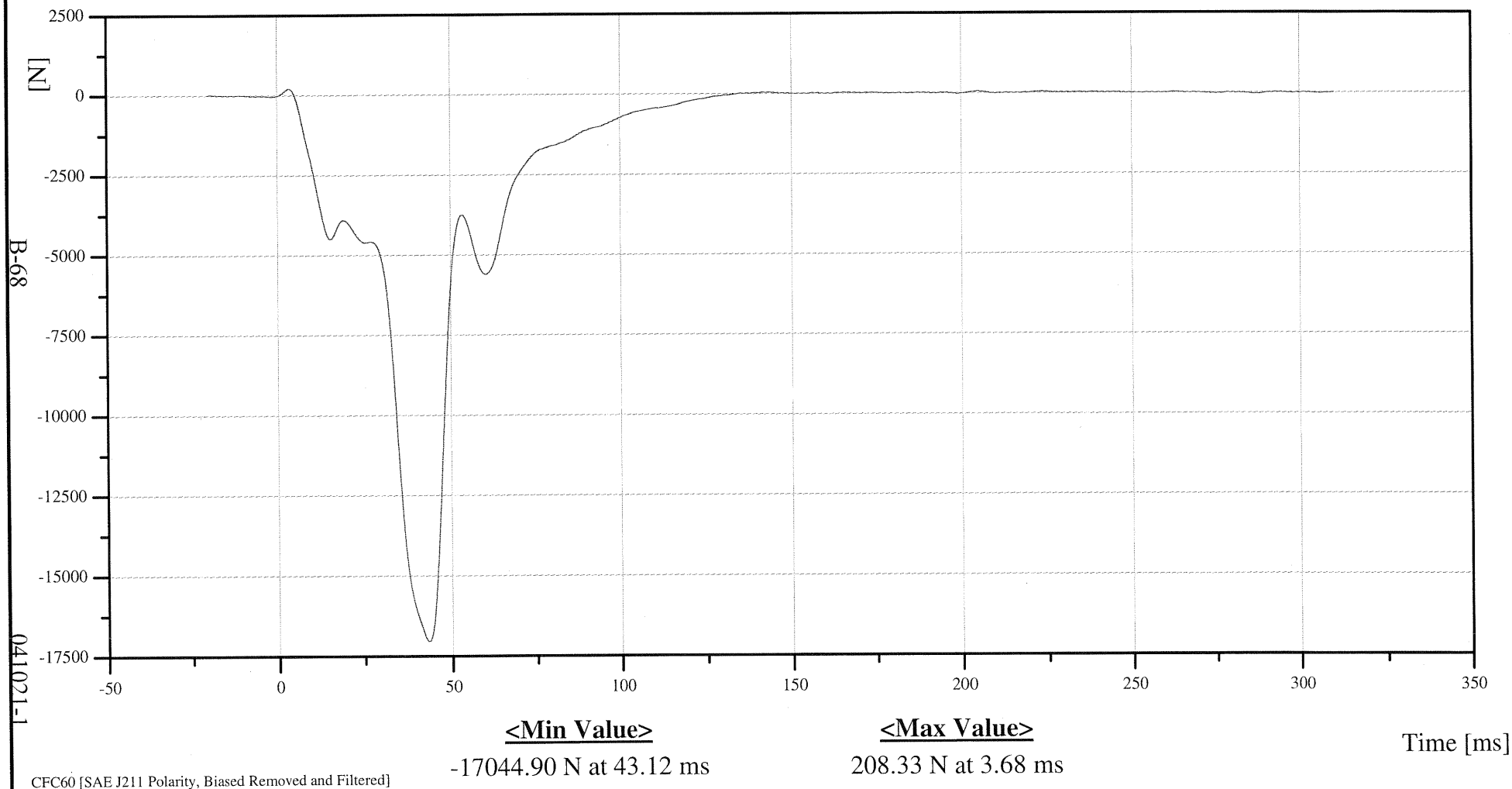
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0407





Transportation Research Center, Inc.

ROW 4 COLUMN 8

Date: 10/21/2004

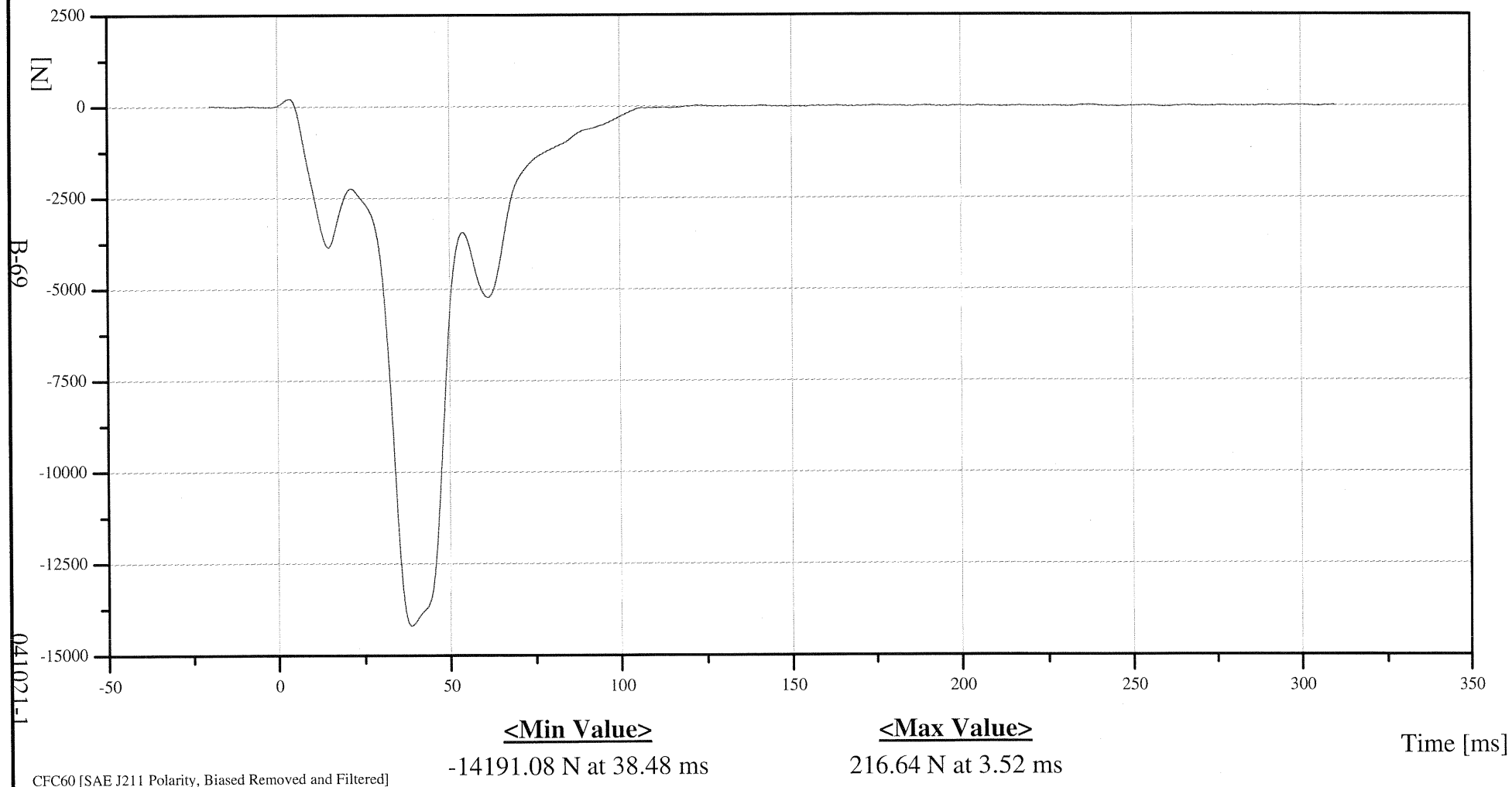
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0408





Transportation Research Center, Inc.

ROW 4 COLUMN 9

Date: 10/21/2004

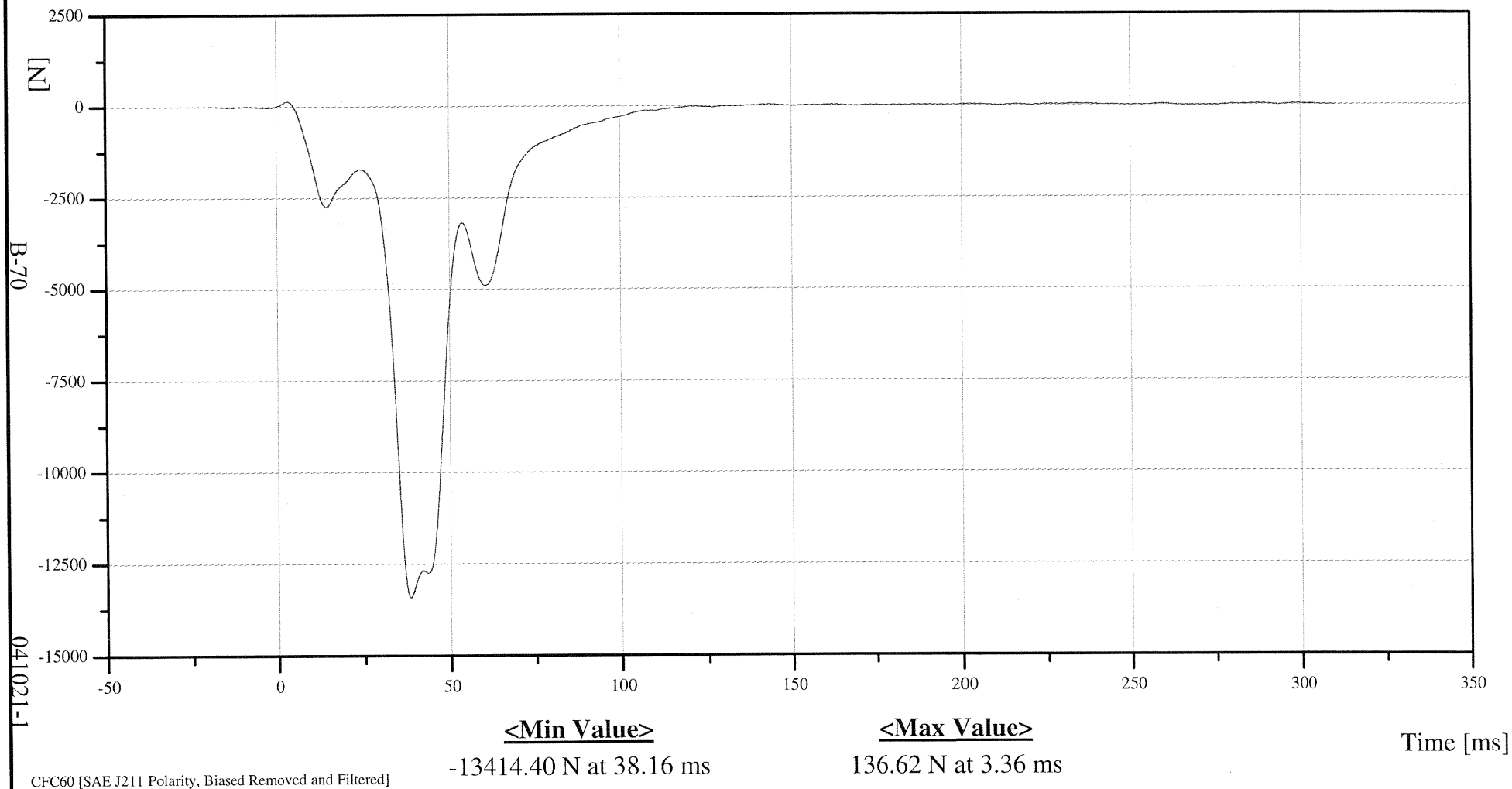
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0409





Transportation Research Center, Inc.

ROW 4 COLUMN 10

Date: 10/21/2004

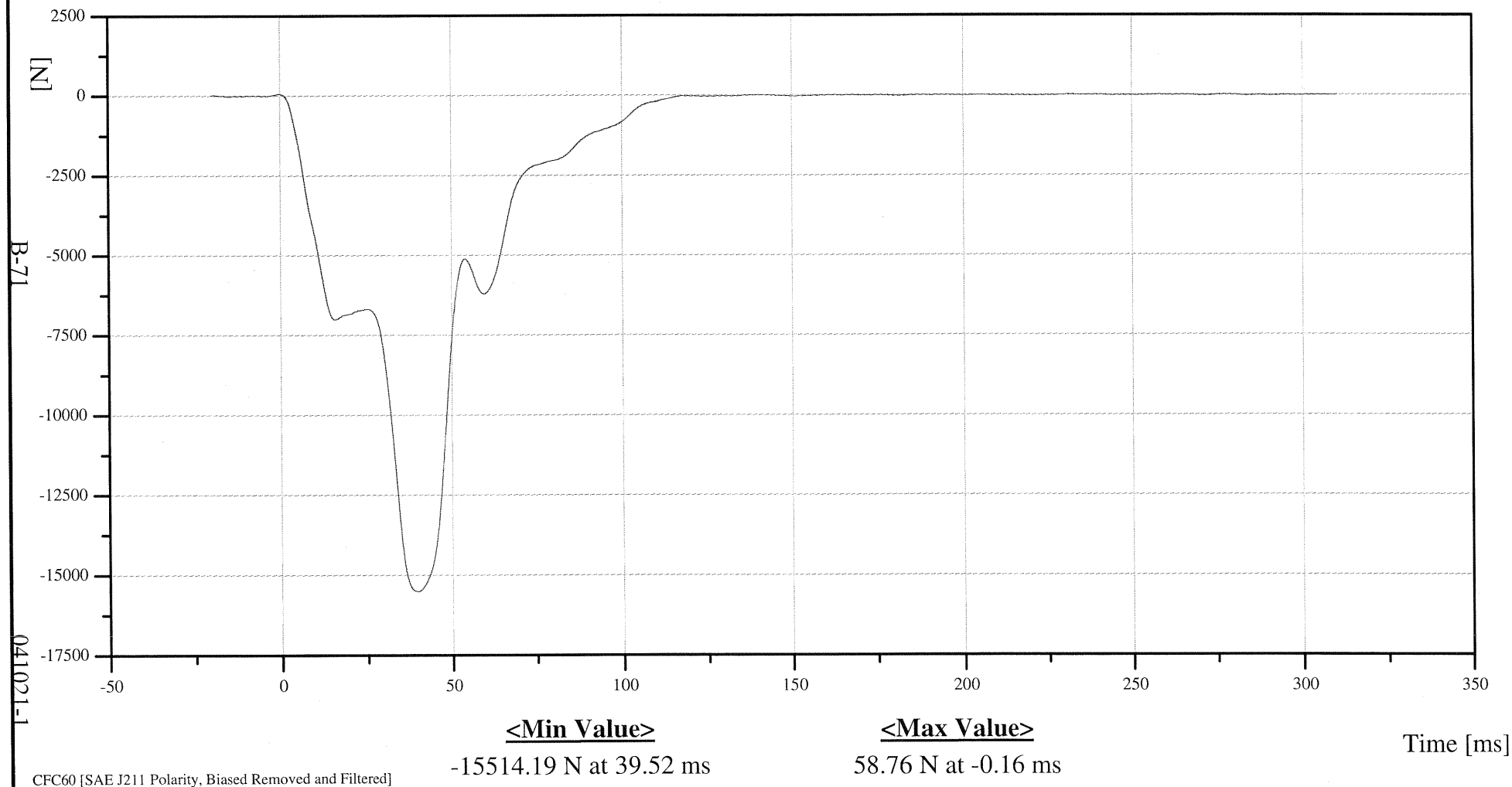
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0410





Transportation Research Center, Inc.

ROW 4 COLUMN 11

Date: 10/21/2004

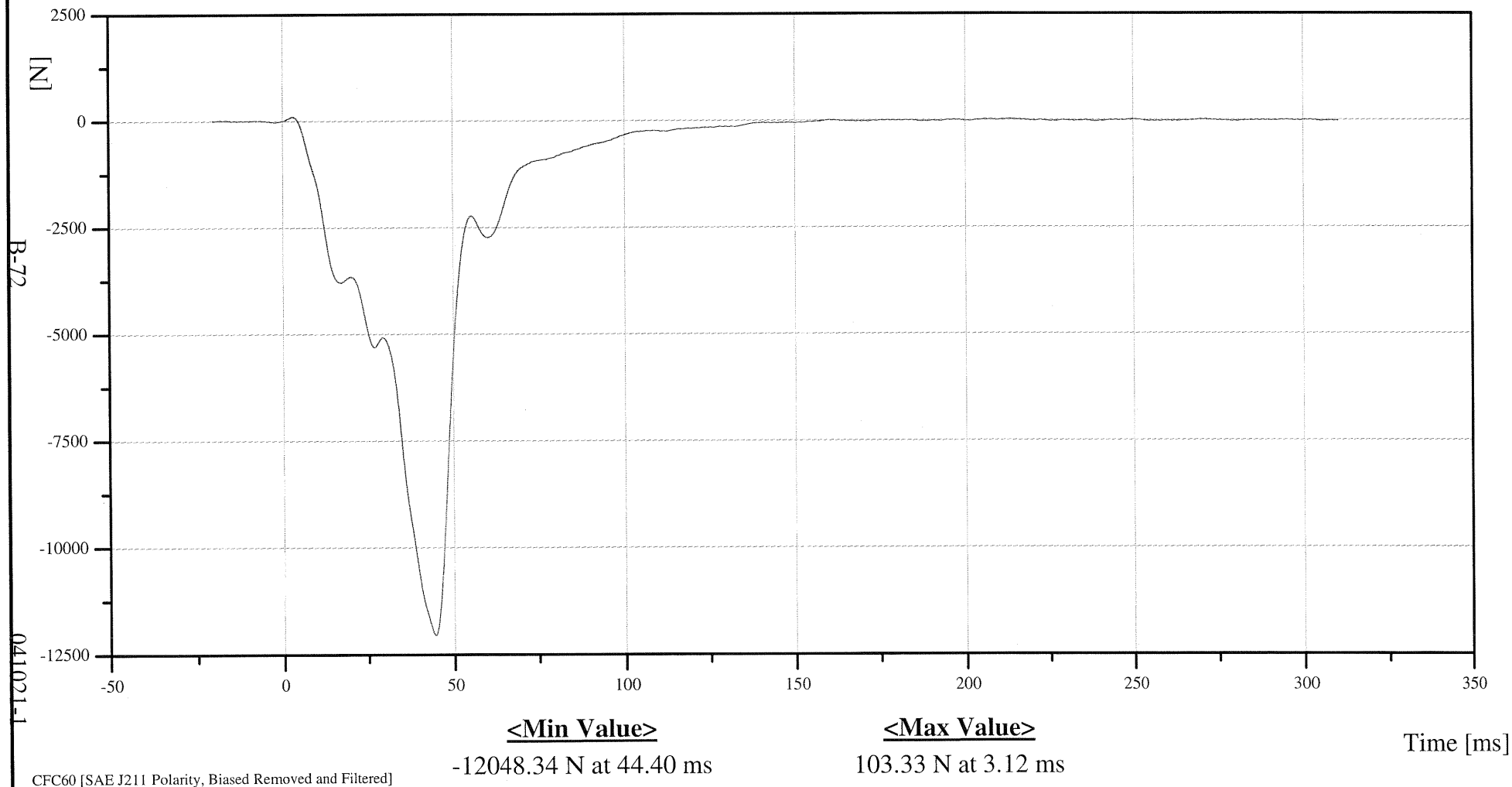
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0411





Transportation Research Center, Inc.

ROW 4 COLUMN 12

Date: 10/21/2004

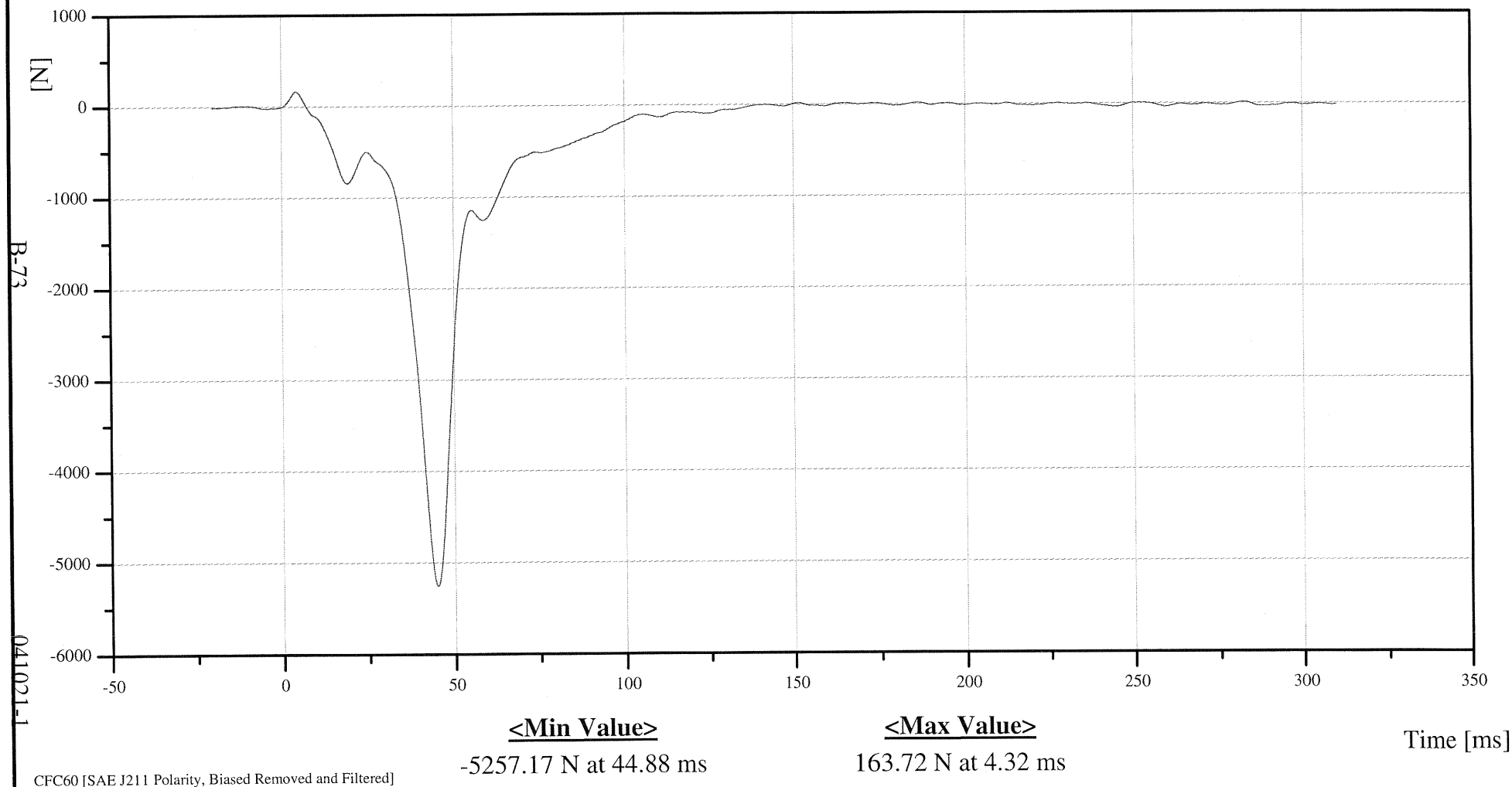
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0412





Transportation Research Center, Inc.

ROW 4 COLUMN 13

Date: 10/21/2004

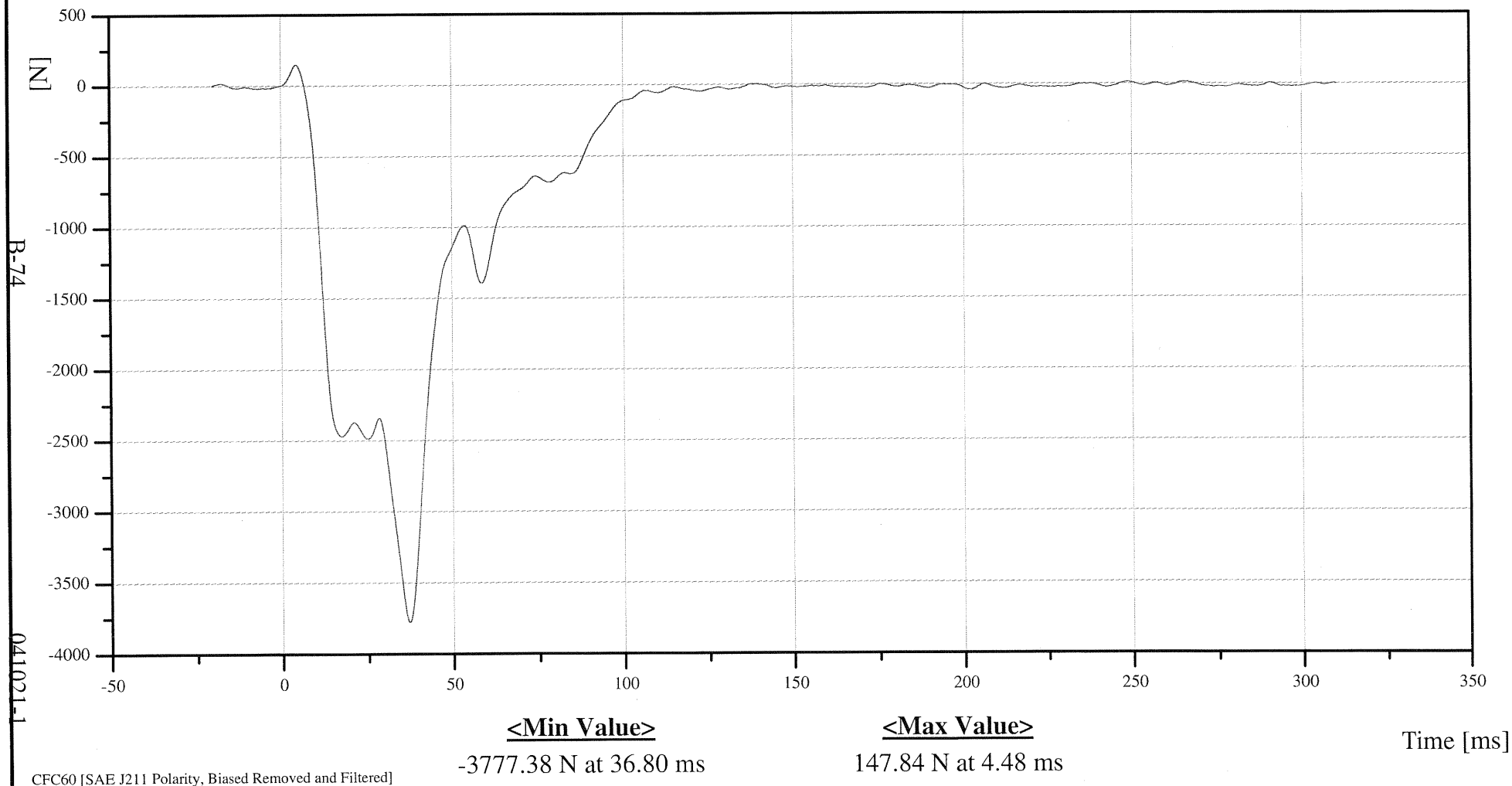
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0413





Transportation Research Center, Inc.

ROW 4 COLUMN 14

Date: 10/21/2004

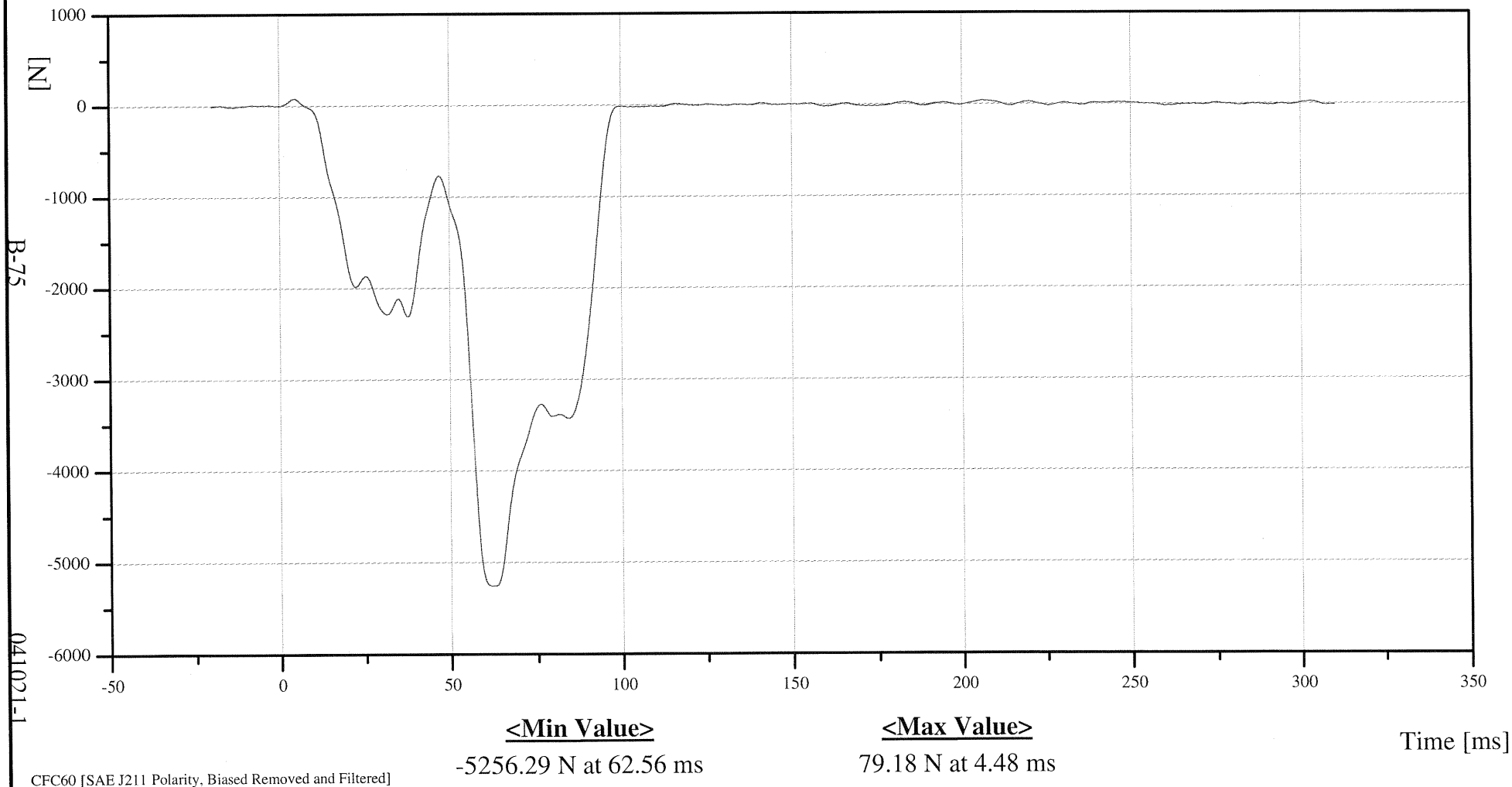
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0414





Transportation Research Center, Inc.

ROW 4 COLUMN 15

Date: 10/21/2004

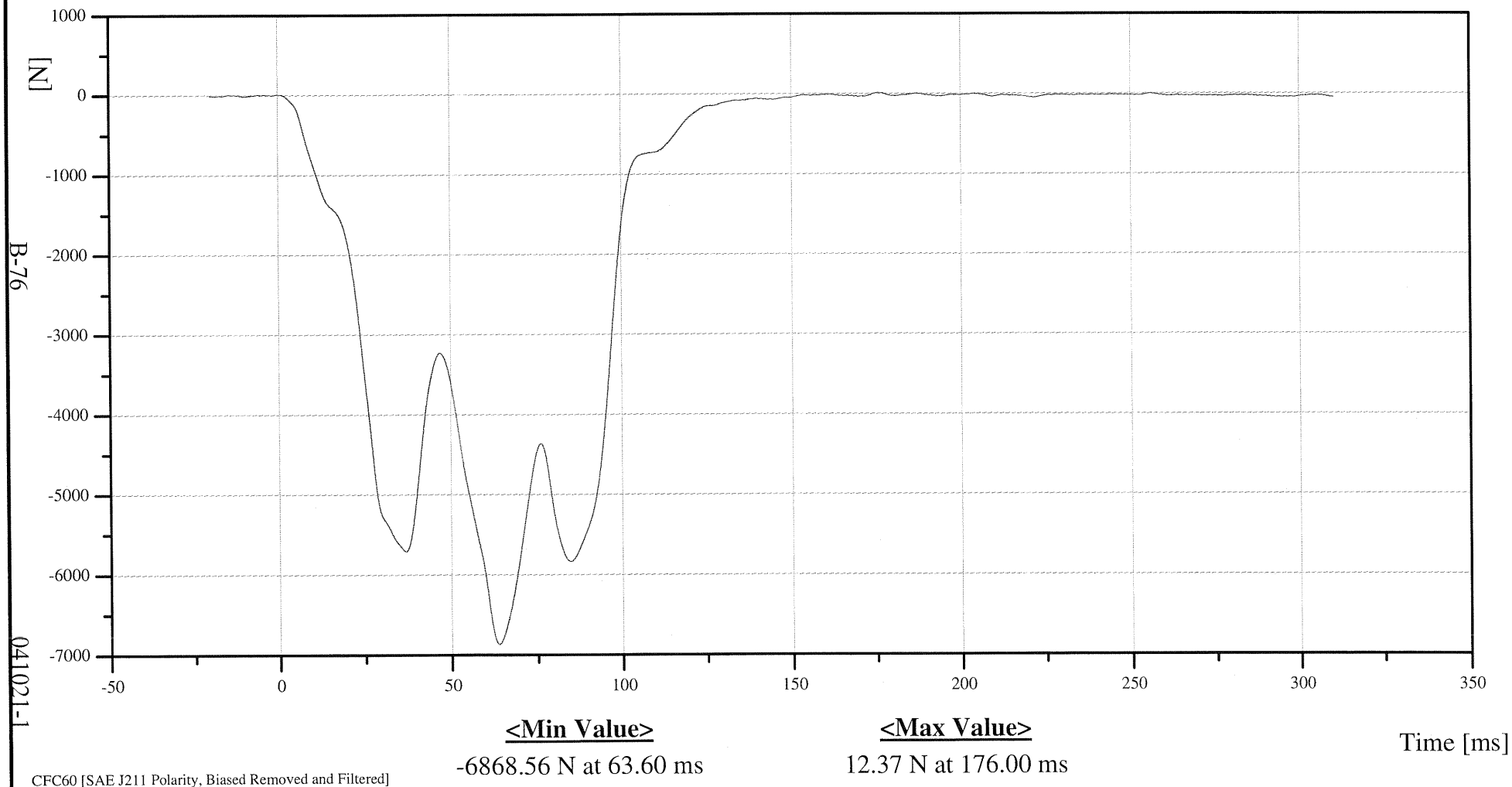
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0415





Transportation Research Center, Inc.

ROW 4 COLUMN 16

Date: 10/21/2004

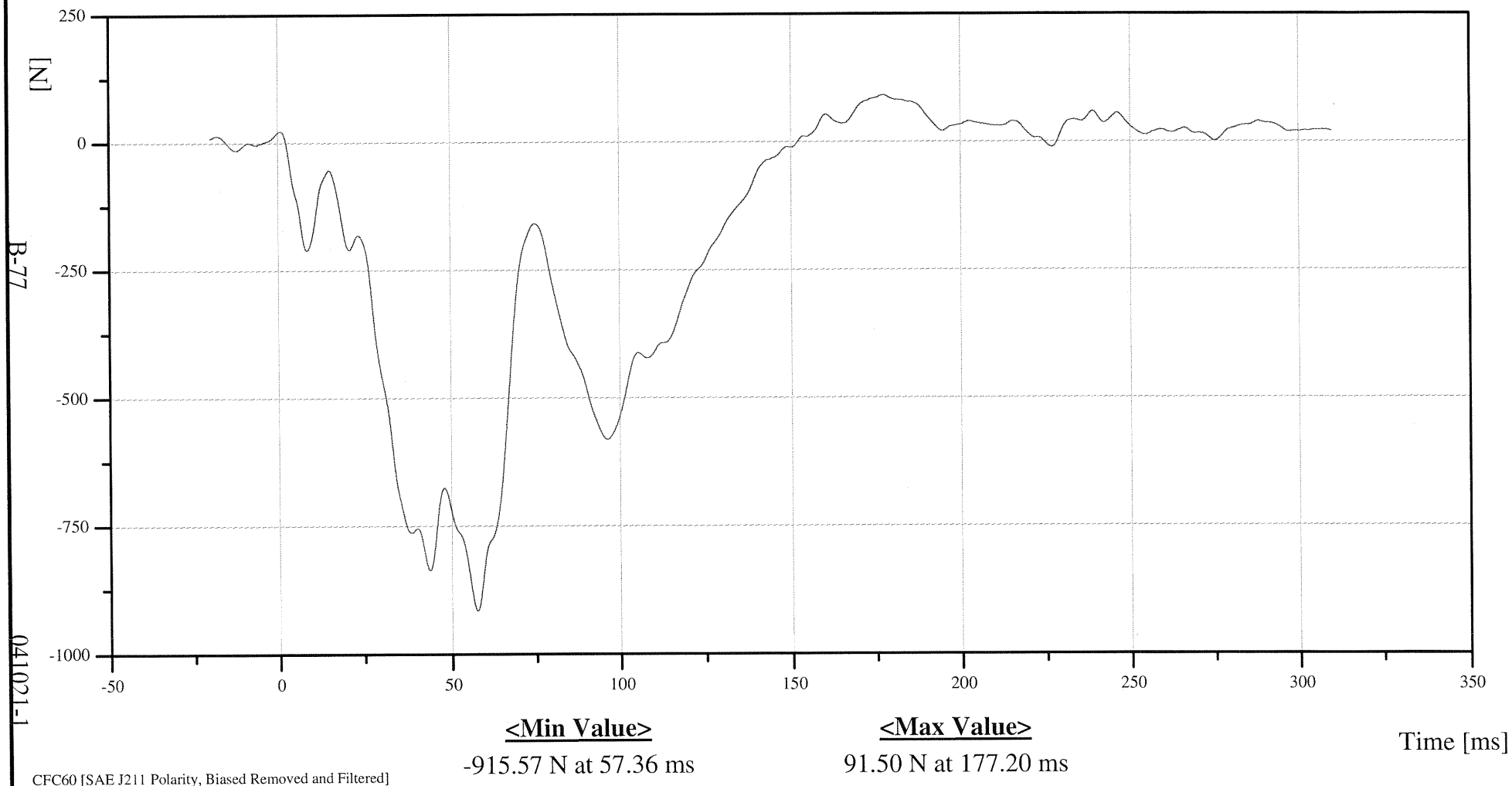
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0416





Transportation Research Center, Inc.

ROW 5 COLUMN 1

Date: 10/21/2004

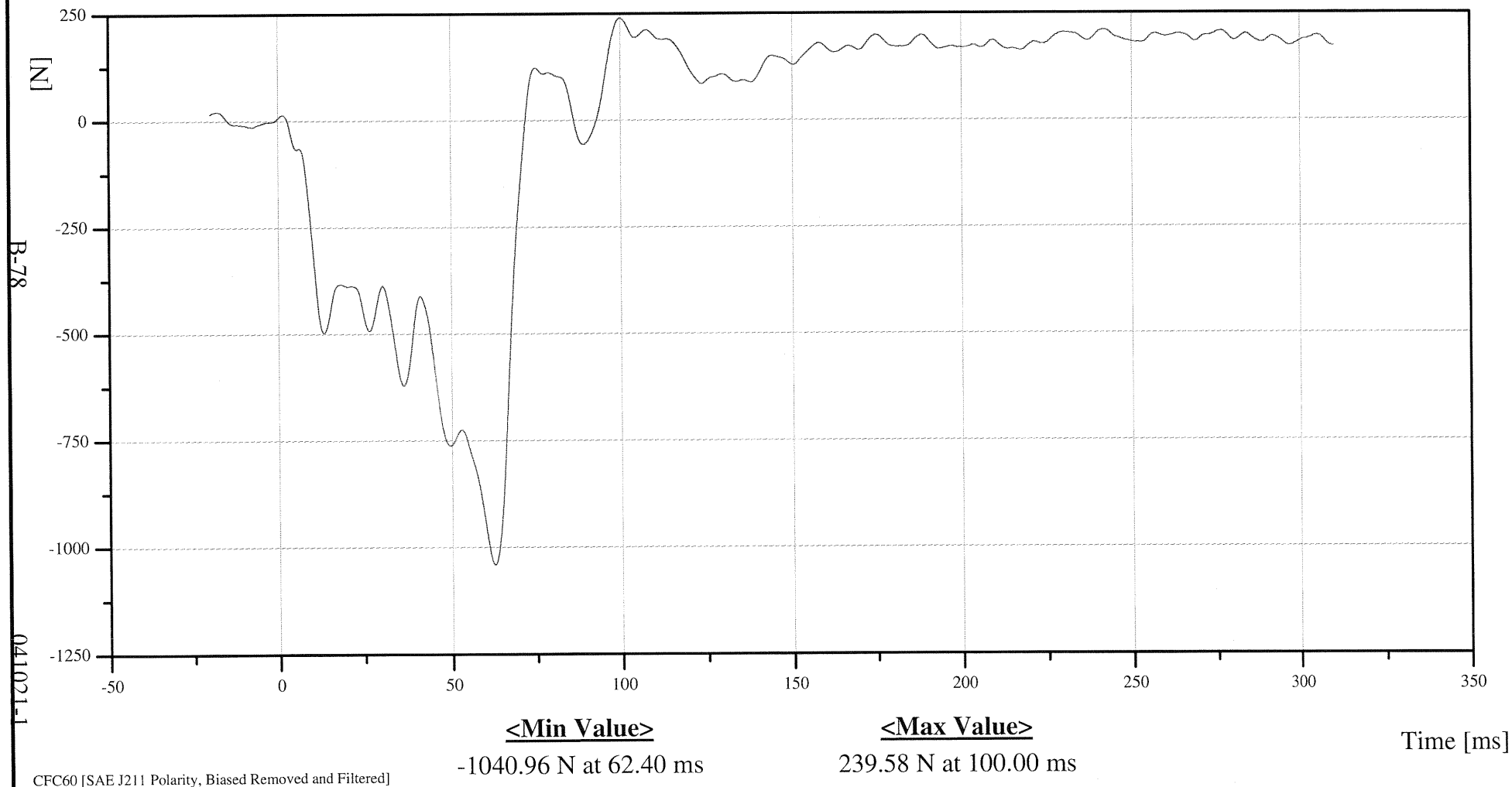
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0501





Transportation Research Center, Inc.

ROW 5 COLUMN 2

Date: 10/21/2004

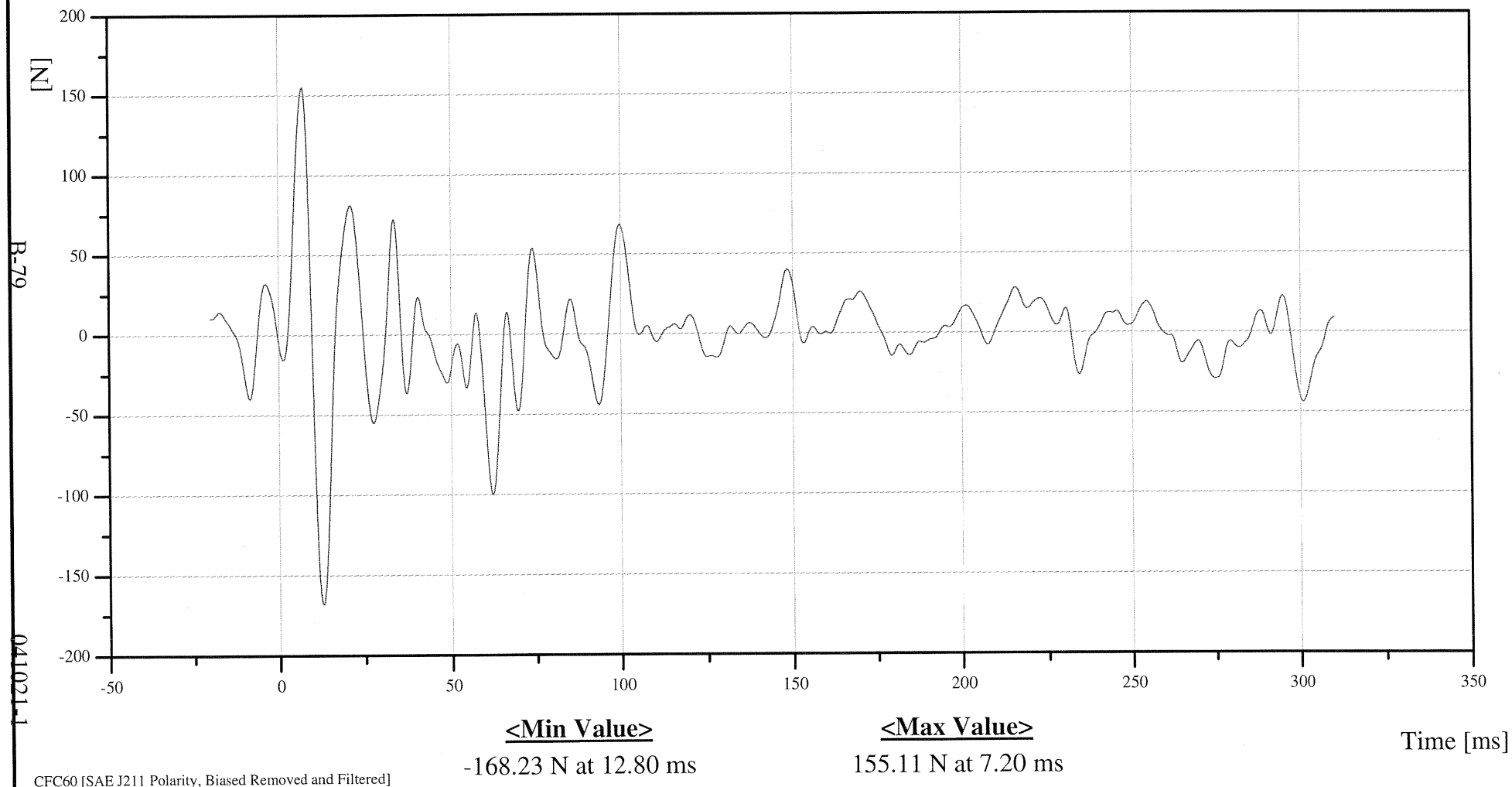
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0502





Transportation Research Center, Inc.

ROW 5 COLUMN 3

Date: 10/21/2004

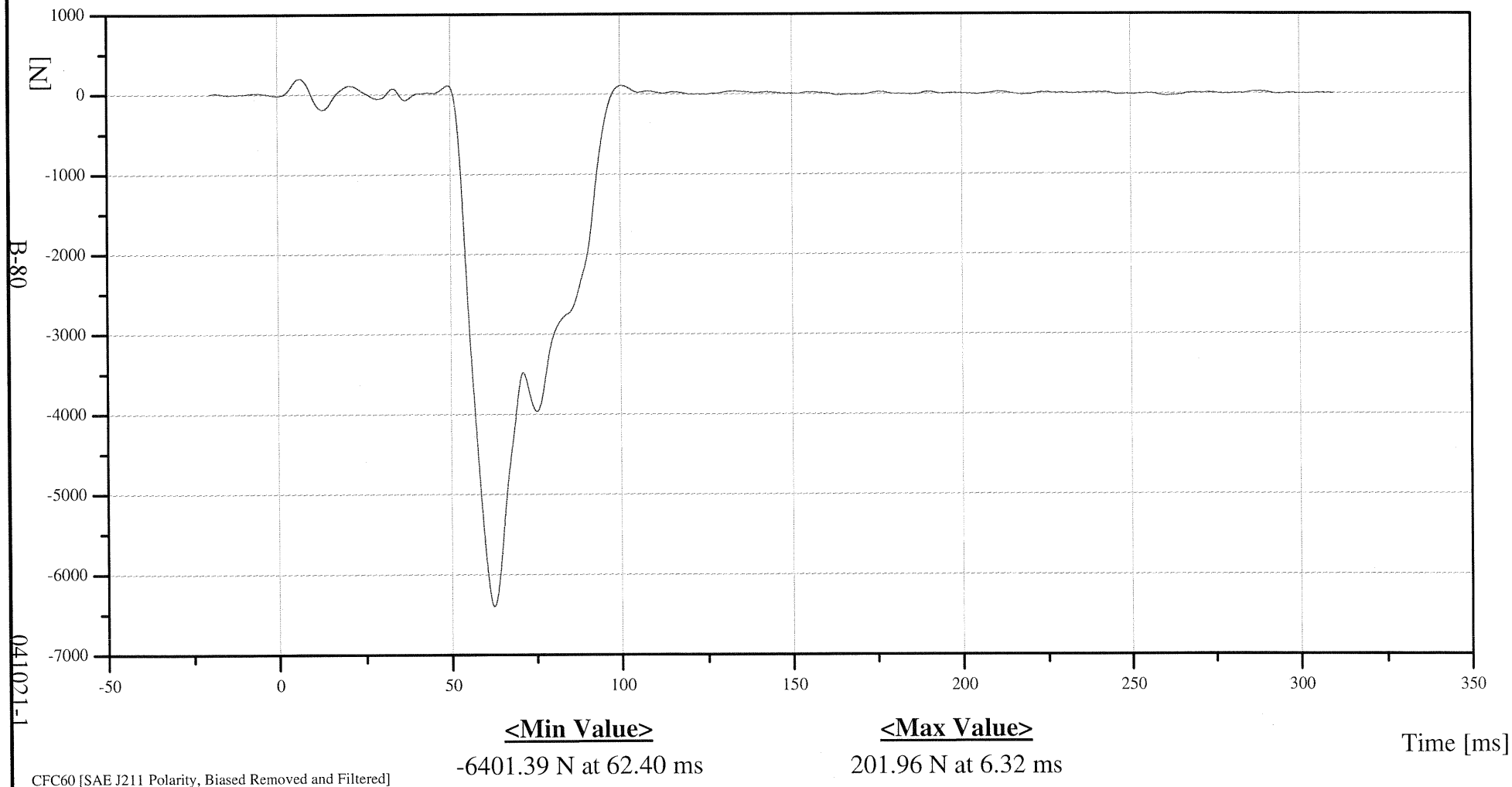
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0503





Transportation Research Center, Inc.

ROW 5 COLUMN 4

Date: 10/21/2004

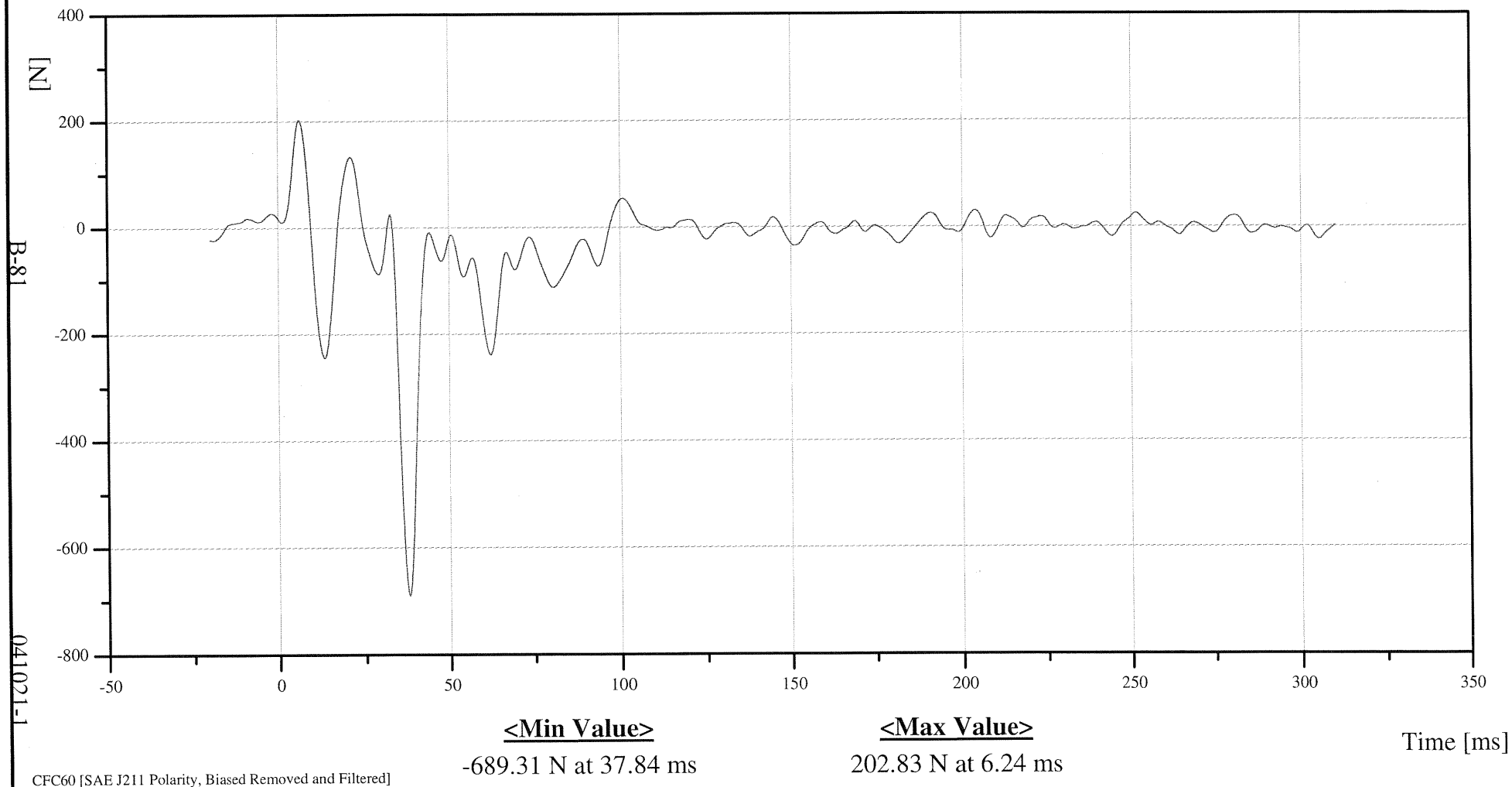
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0504





Transportation Research Center, Inc.

ROW 5 COLUMN 5

Date: 10/21/2004

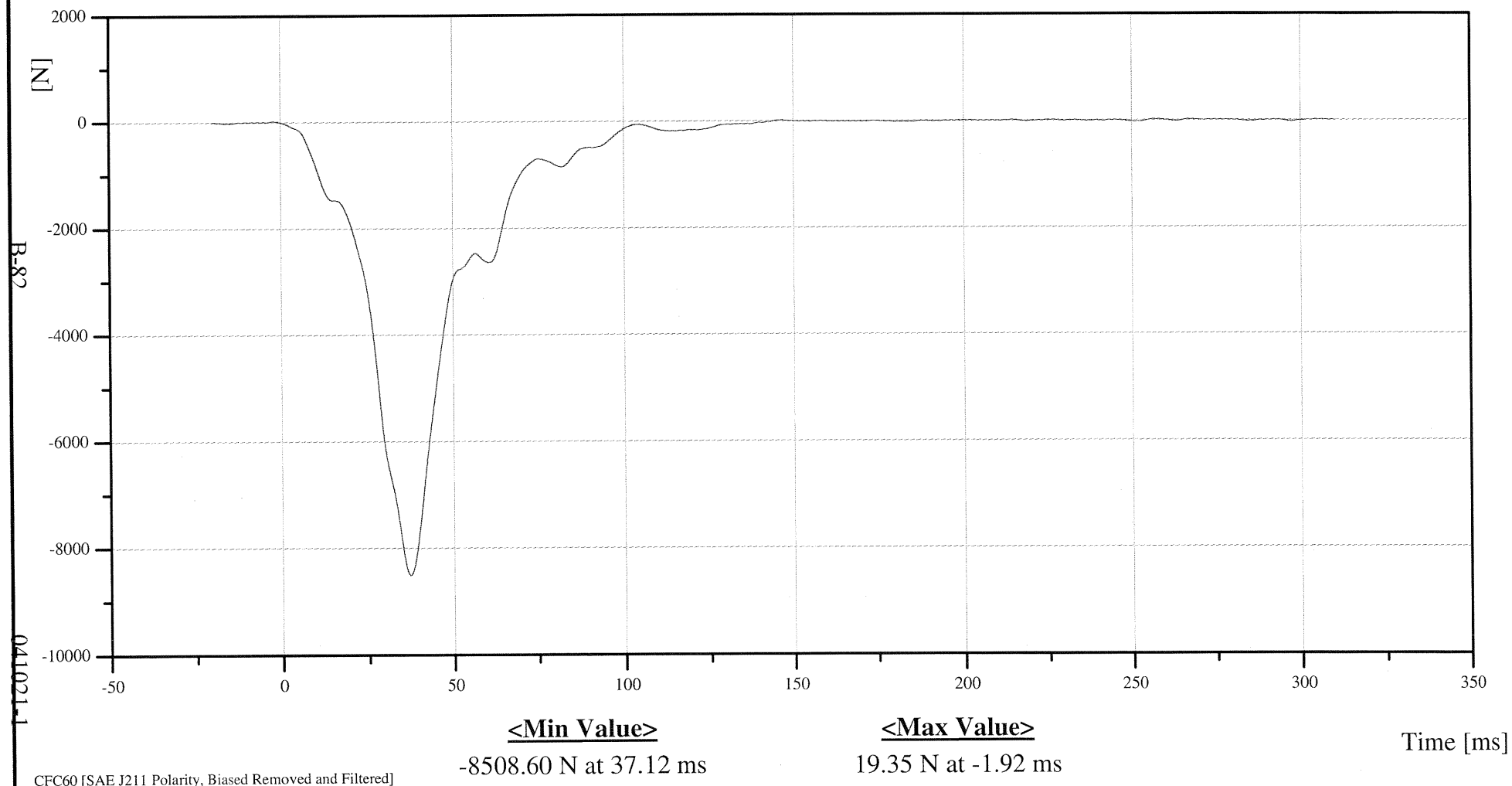
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0505





Transportation Research Center, Inc.

ROW 5 COLUMN 6

Date: 10/21/2004

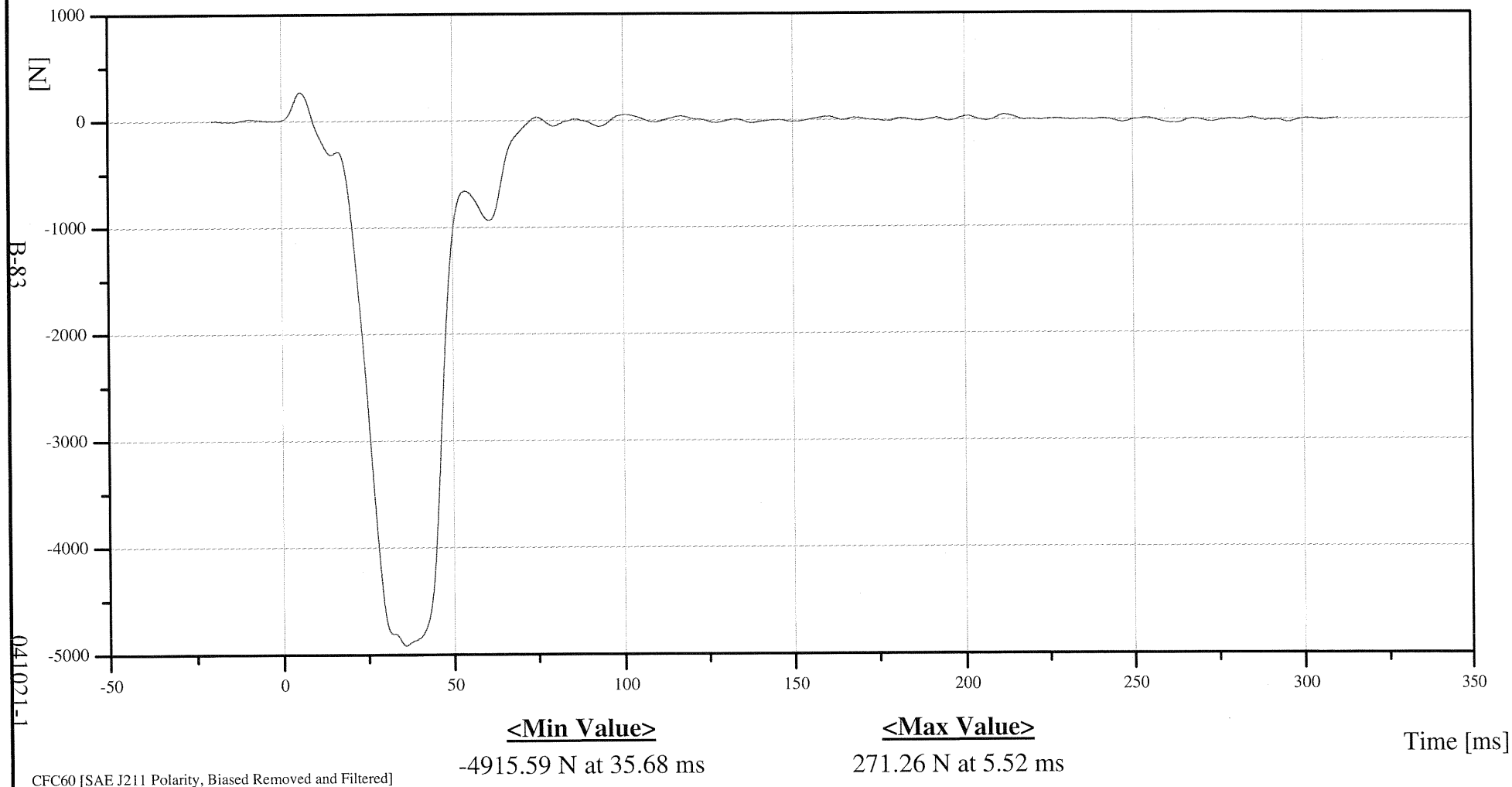
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0506





Transportation Research Center, Inc.

ROW 5 COLUMN 7

Date: 10/21/2004

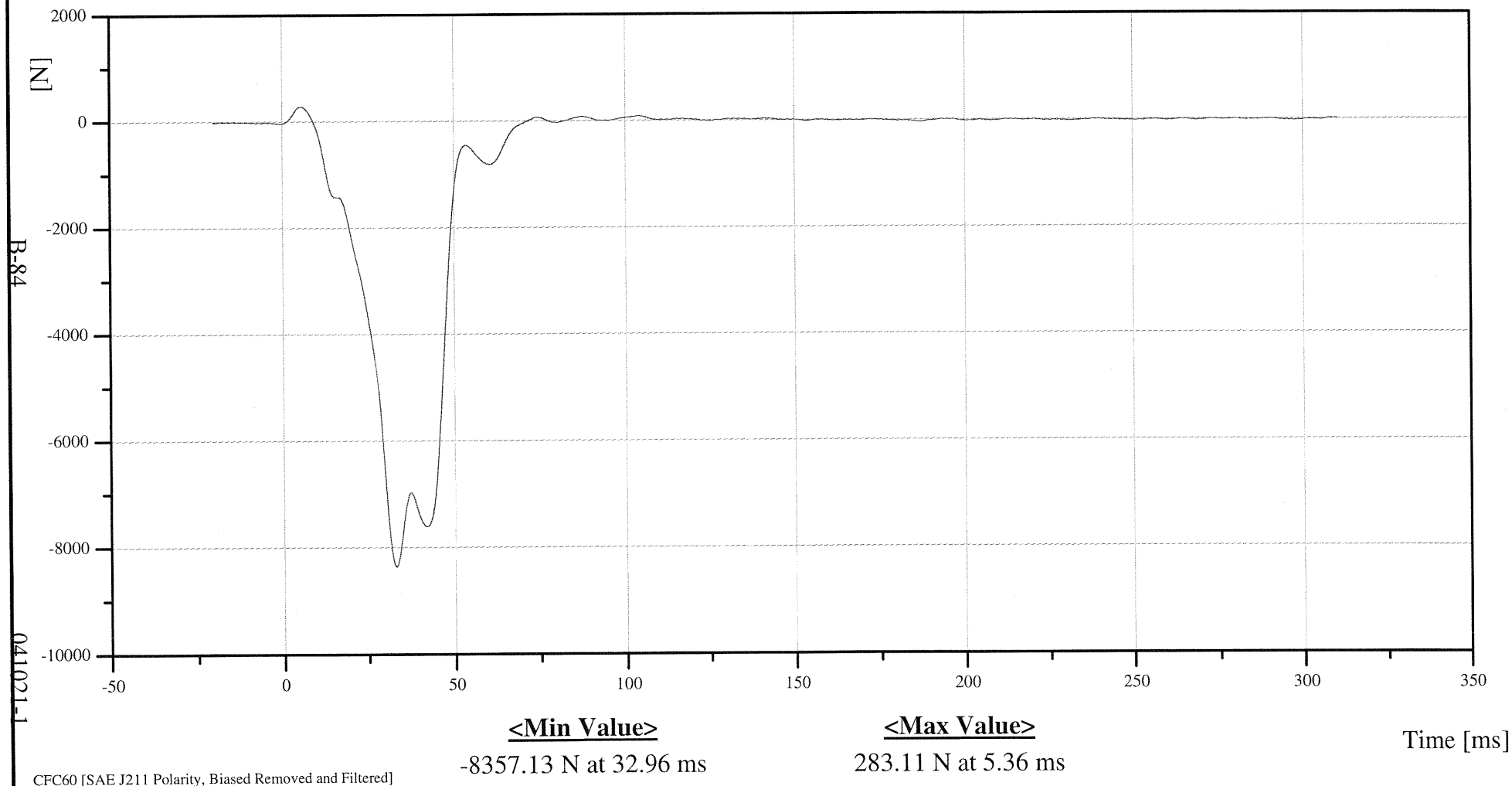
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0507





Transportation Research Center, Inc.

ROW 5 COLUMN 8

Date: 10/21/2004

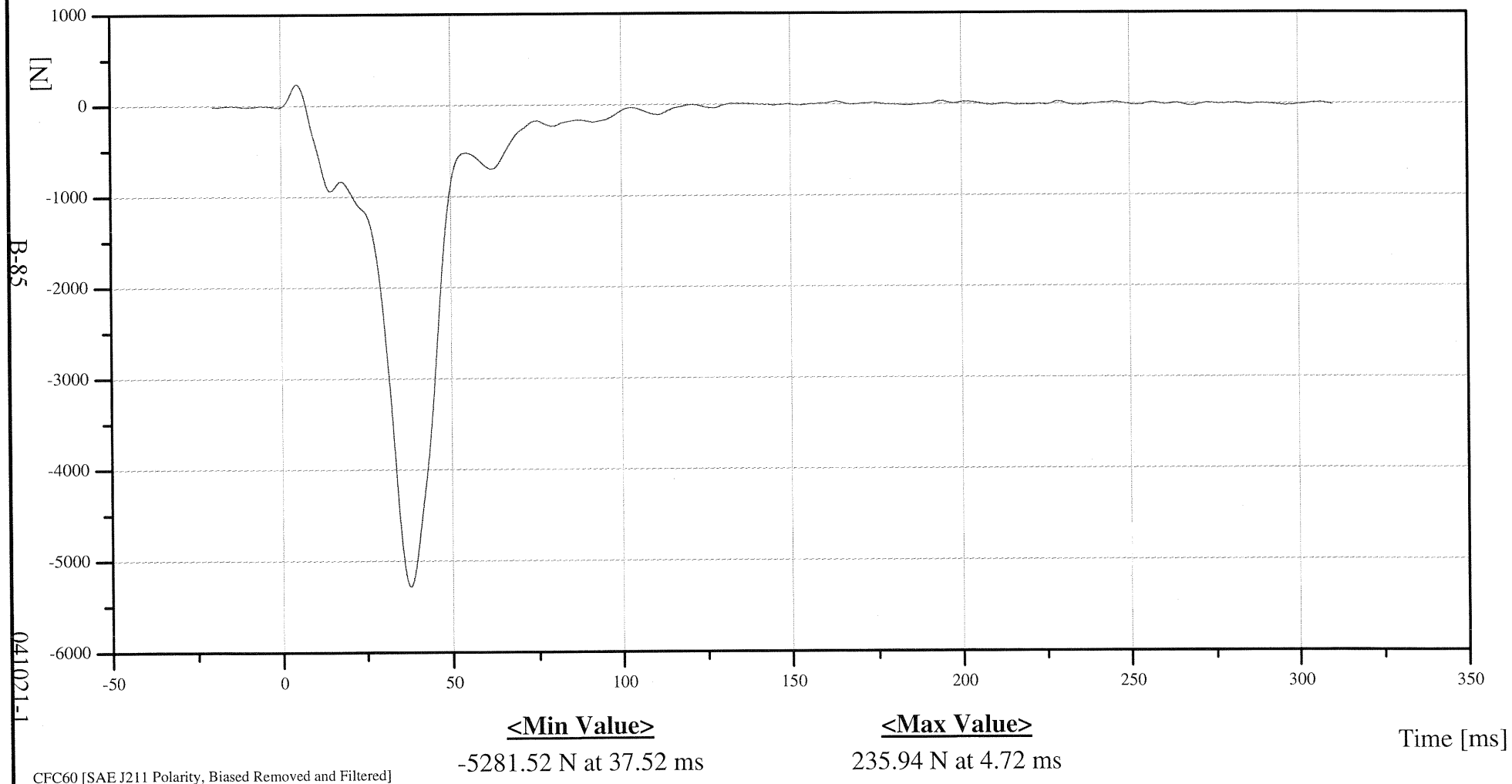
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0508





Transportation Research Center, Inc.

ROW 5 COLUMN 9

Date: 10/21/2004

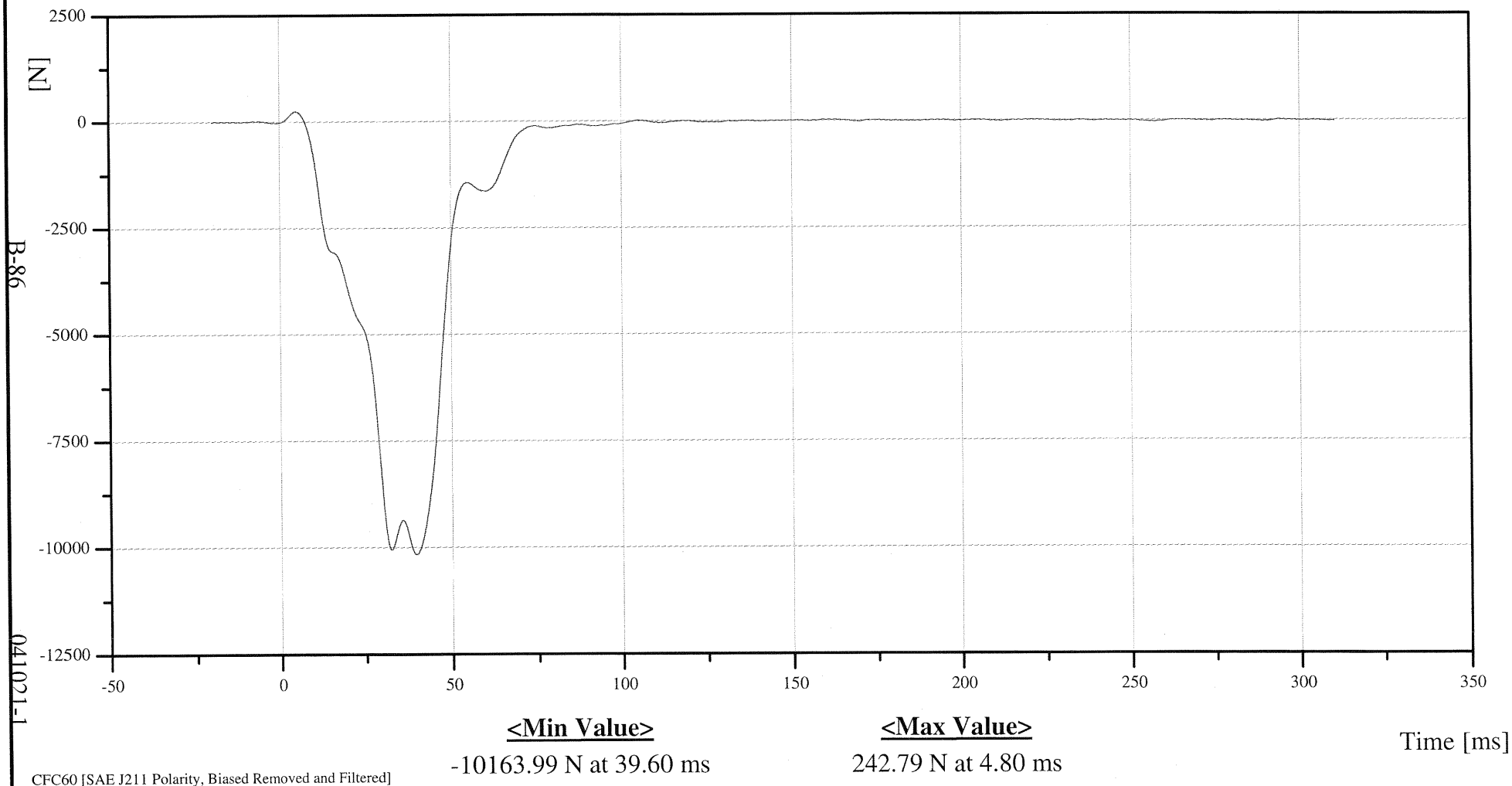
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0509





Transportation Research Center, Inc.

ROW 5 COLUMN 10

Date: 10/21/2004

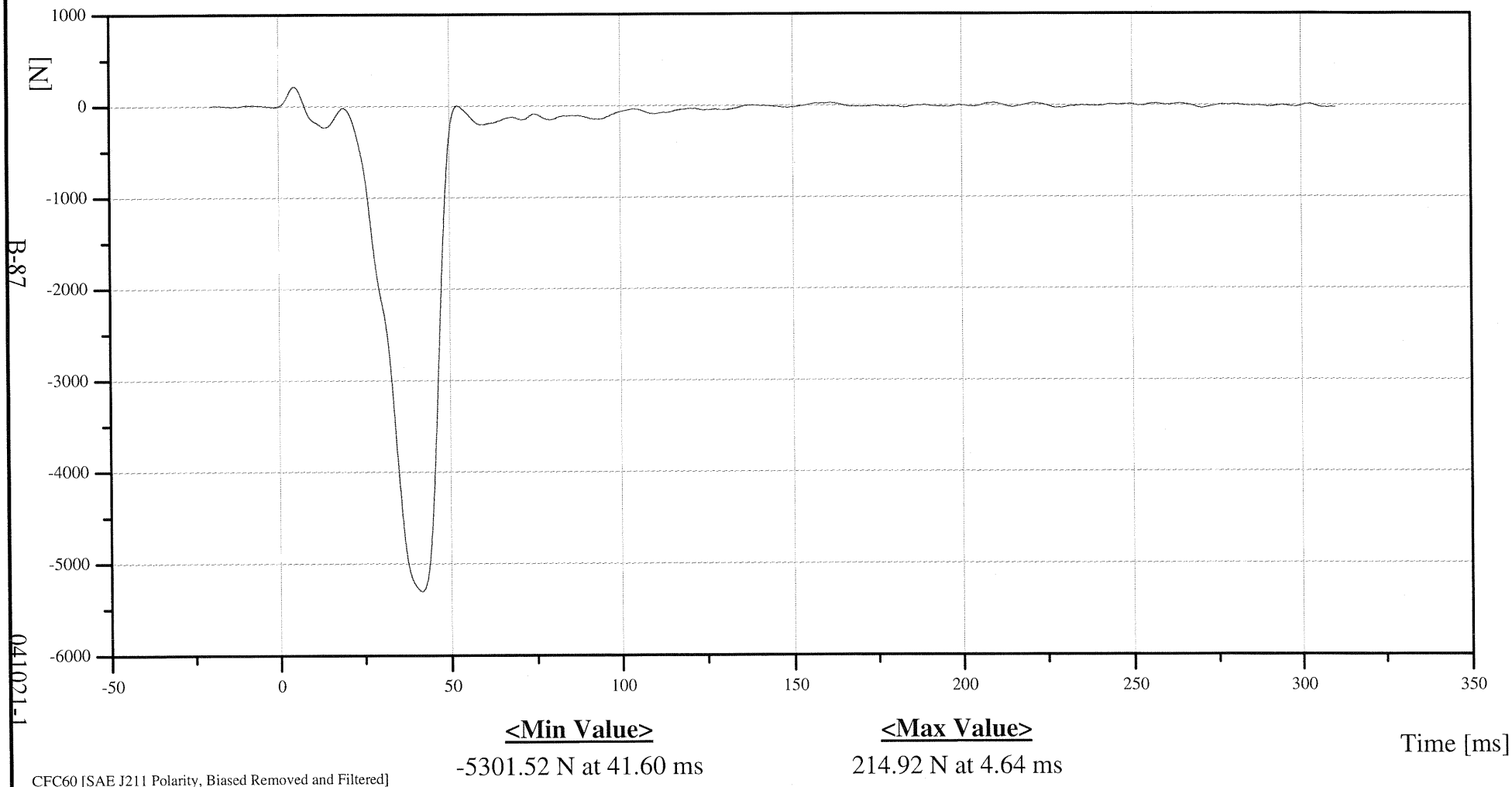
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0510





Transportation Research Center, Inc.

ROW 5 COLUMN 11

Date: 10/21/2004

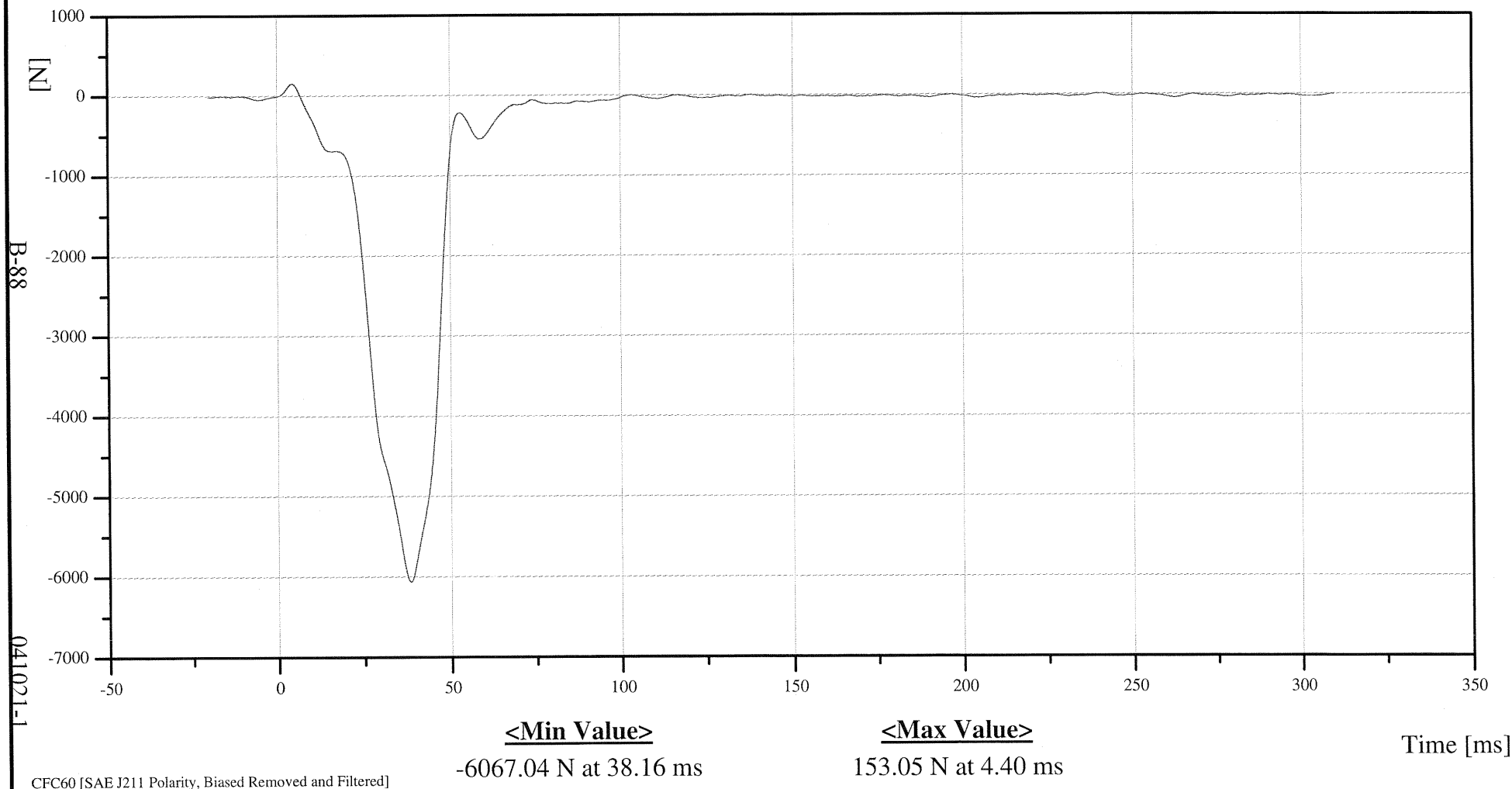
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0511





Transportation Research Center, Inc.

ROW 5 COLUMN 12

Date: 10/21/2004

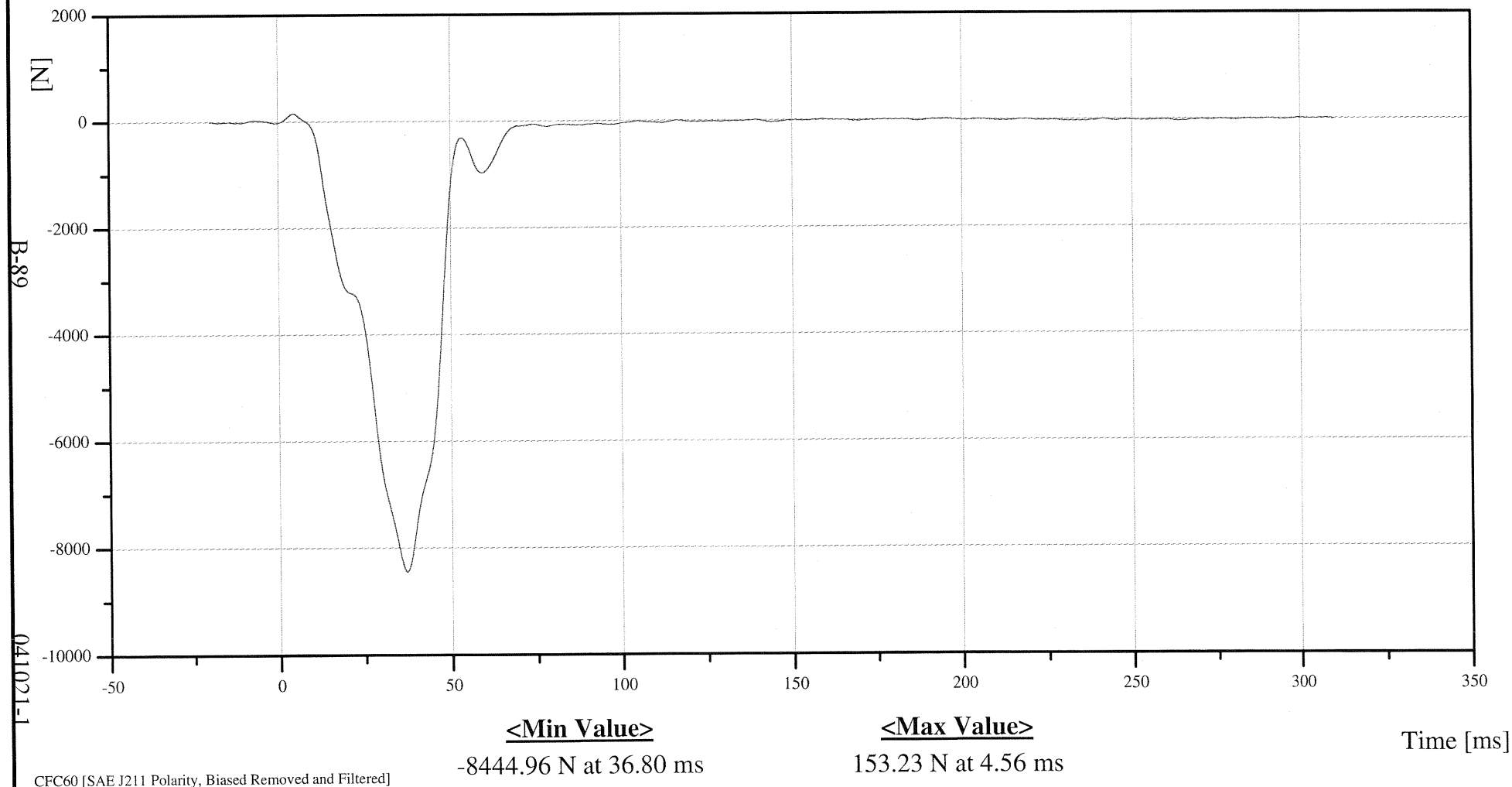
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0512





Transportation Research Center, Inc.

ROW 5 COLUMN 13

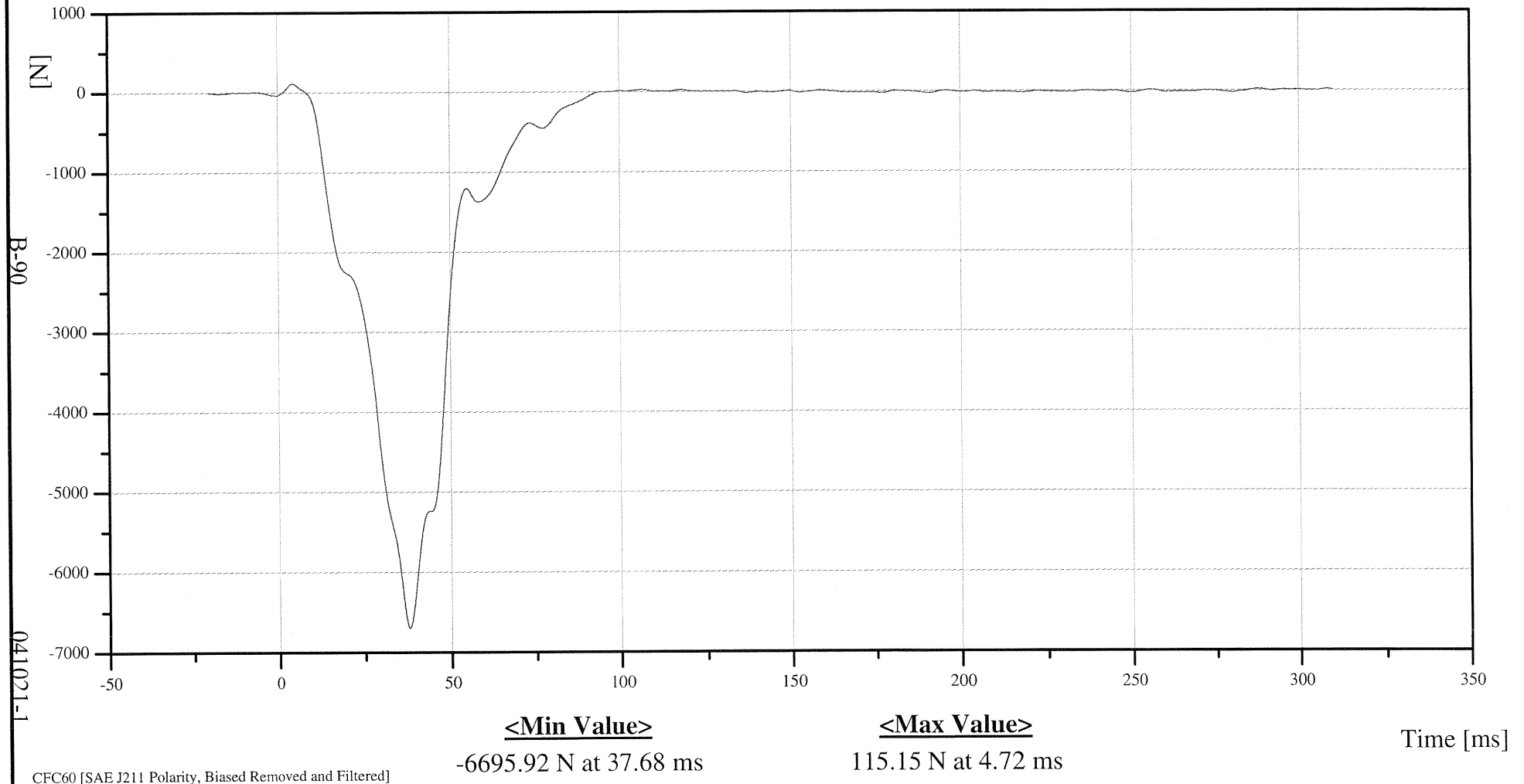
Date: 10/21/2004
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0513





Transportation Research Center, Inc.

ROW 5 COLUMN 14

Date: 10/21/2004

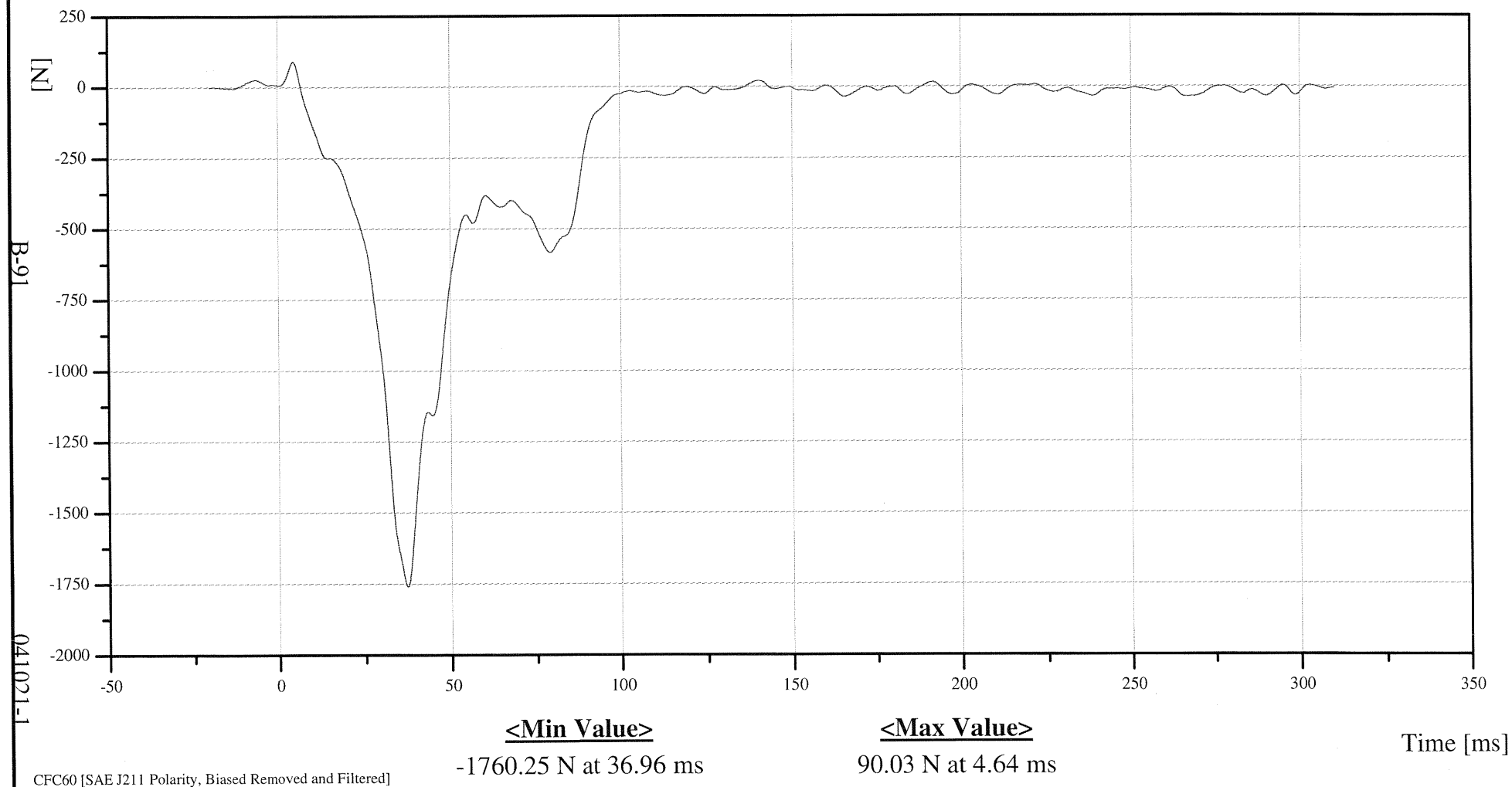
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0514





Transportation Research Center, Inc.

ROW 5 COLUMN 15

Date: 10/21/2004

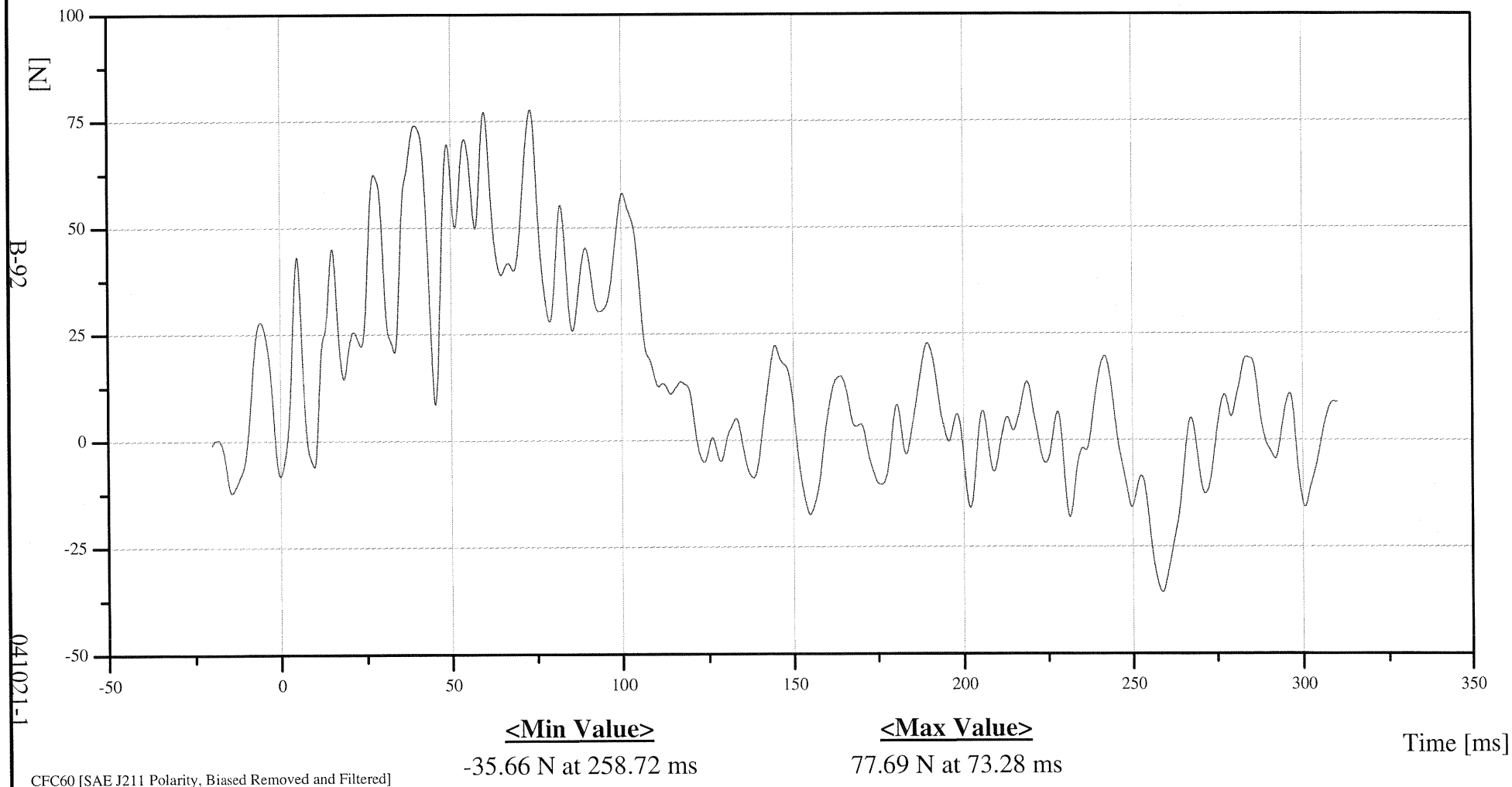
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0515





Transportation Research Center, Inc.

ROW 5 COLUMN 16

Date: 10/21/2004

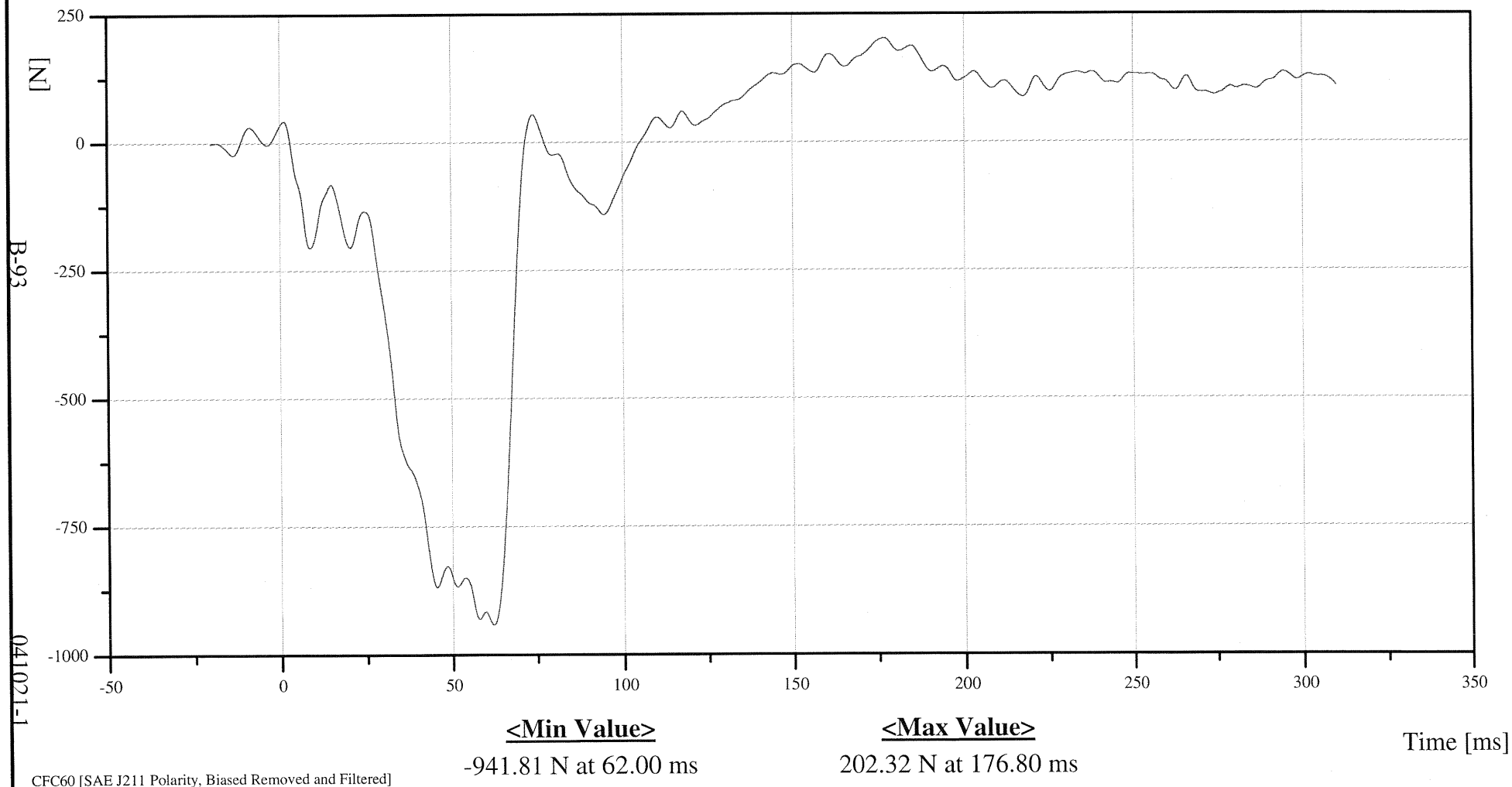
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0516





Transportation Research Center, Inc.

ROW 6 COLUMN 1

Date: 10/21/2004

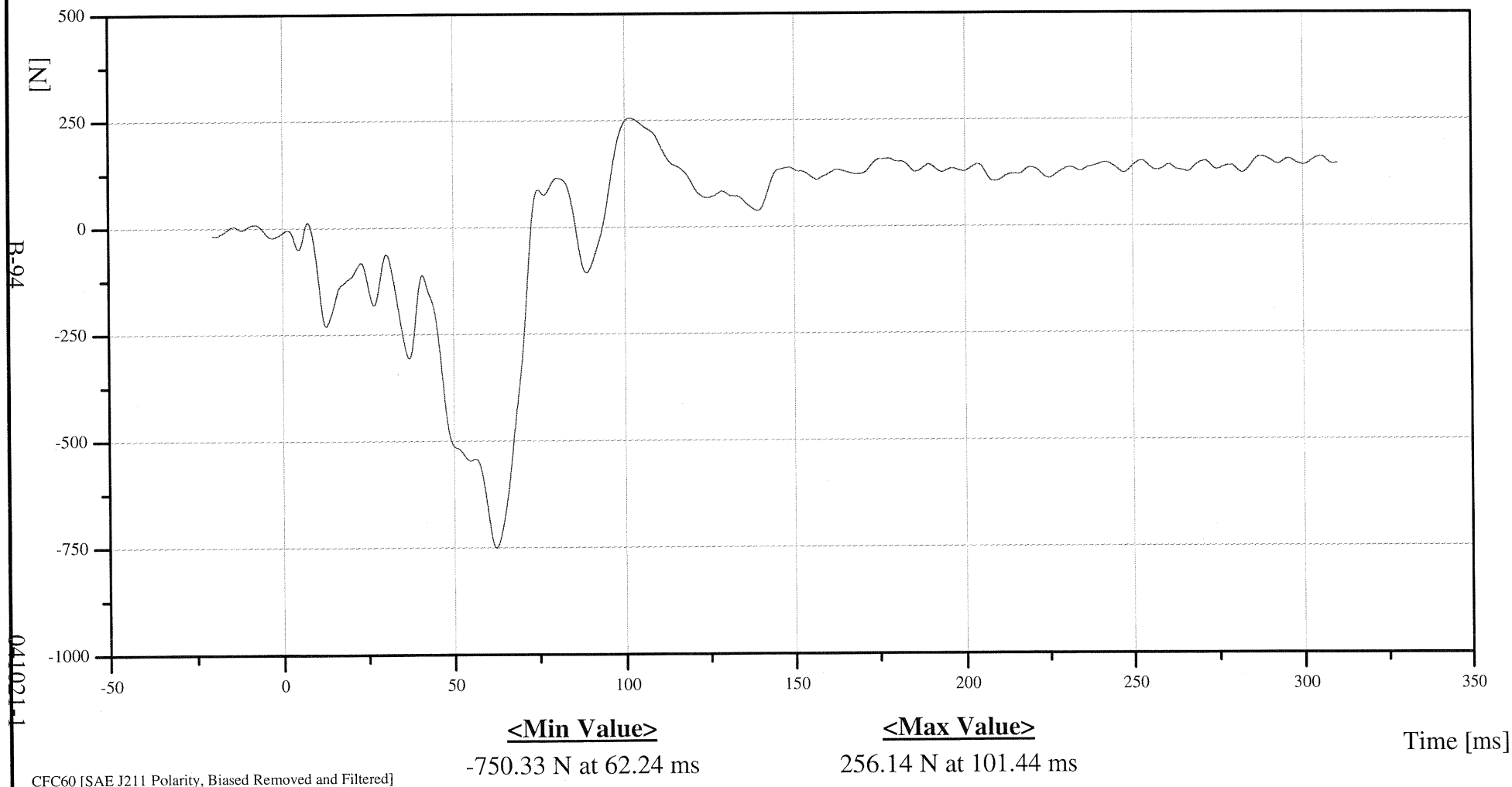
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0601





Transportation Research Center, Inc.

ROW 6 COLUMN 2

Date: 10/21/2004

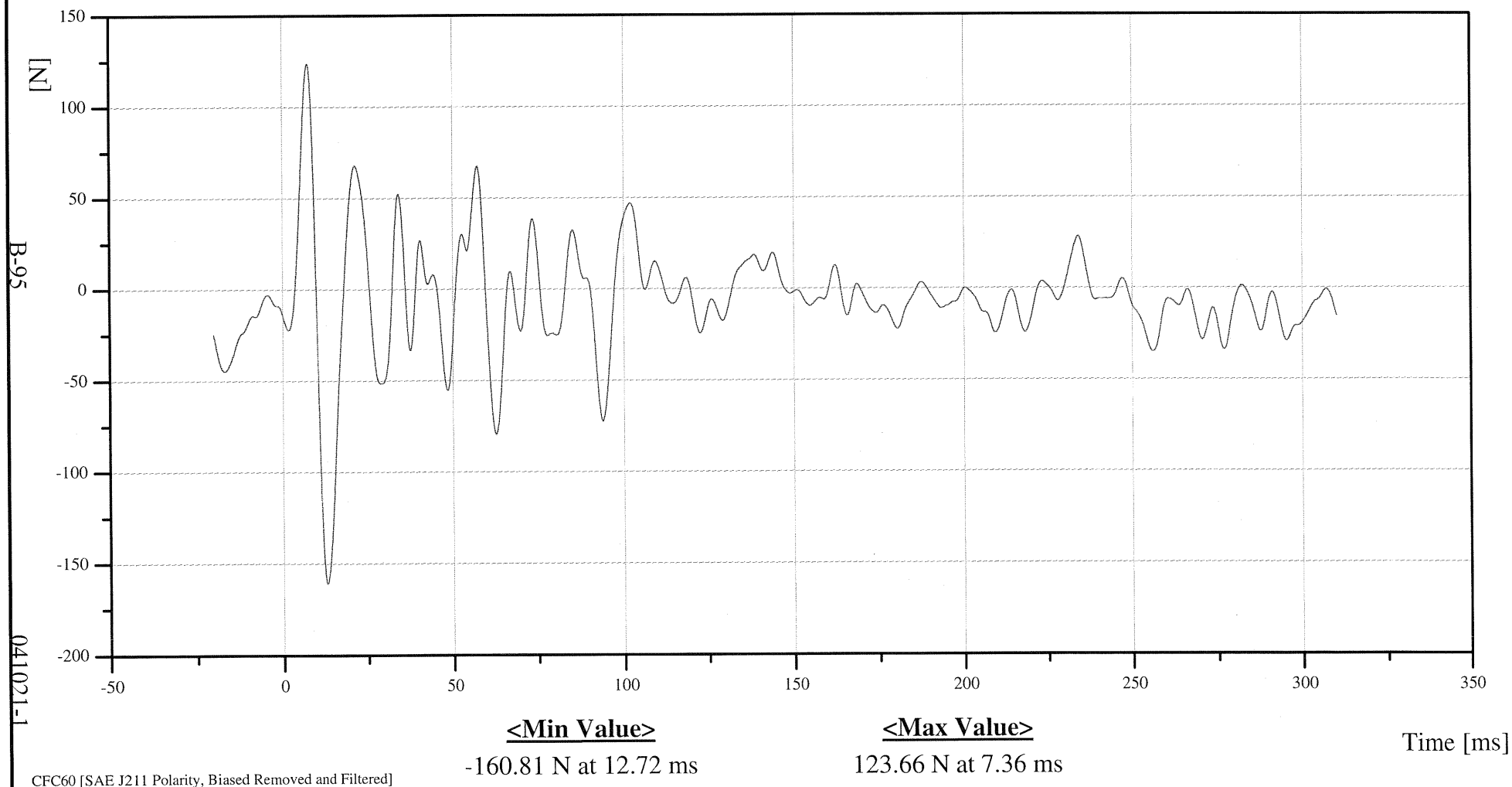
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0602





Transportation Research Center, Inc.

ROW 6 COLUMN 3

Date: 10/21/2004

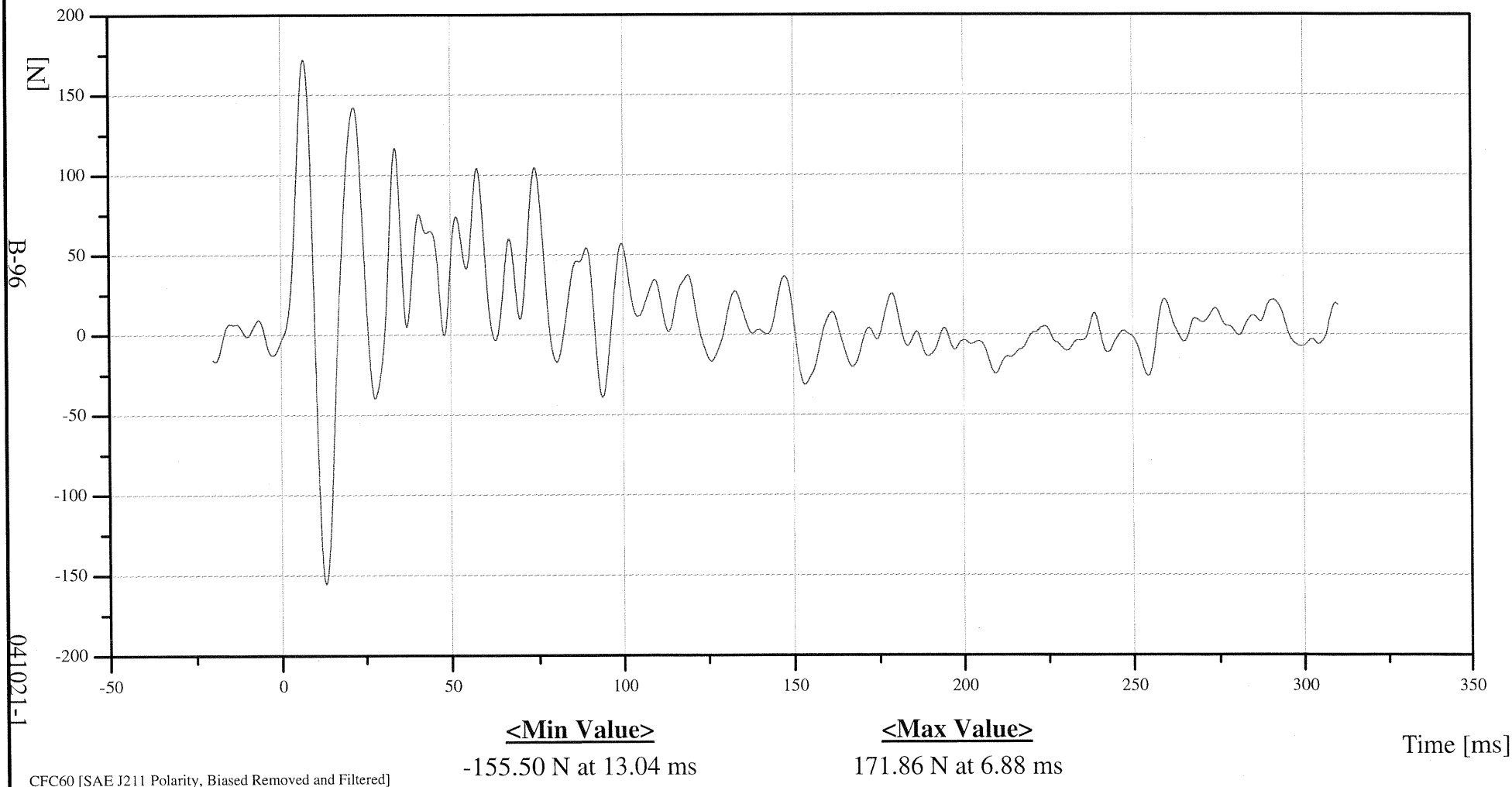
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0603





Transportation Research Center, Inc.

ROW 6 COLUMN 4

Date: 10/21/2004

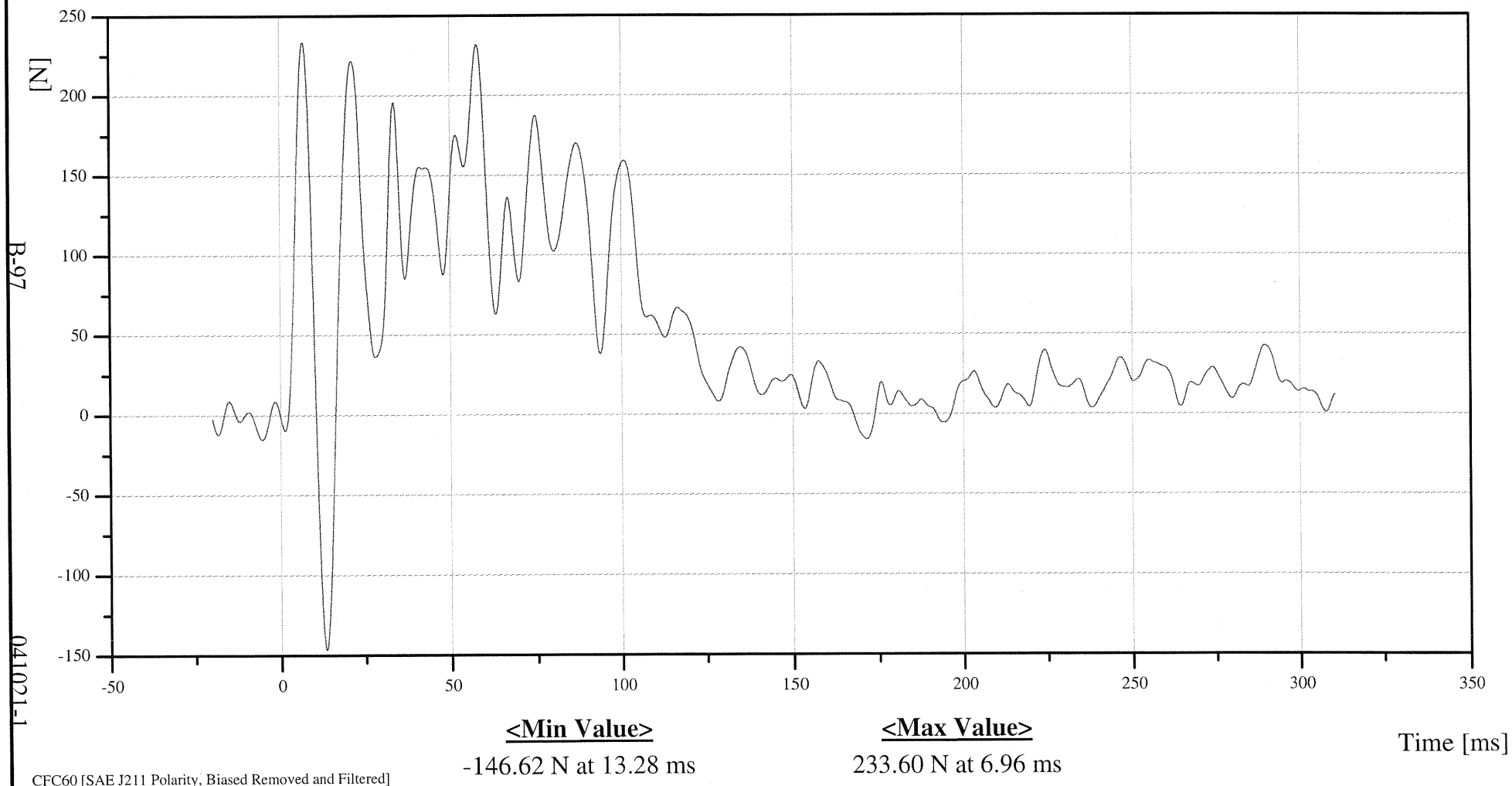
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0604





Transportation Research Center, Inc.

ROW 6 COLUMN 5

Date: 10/21/2004

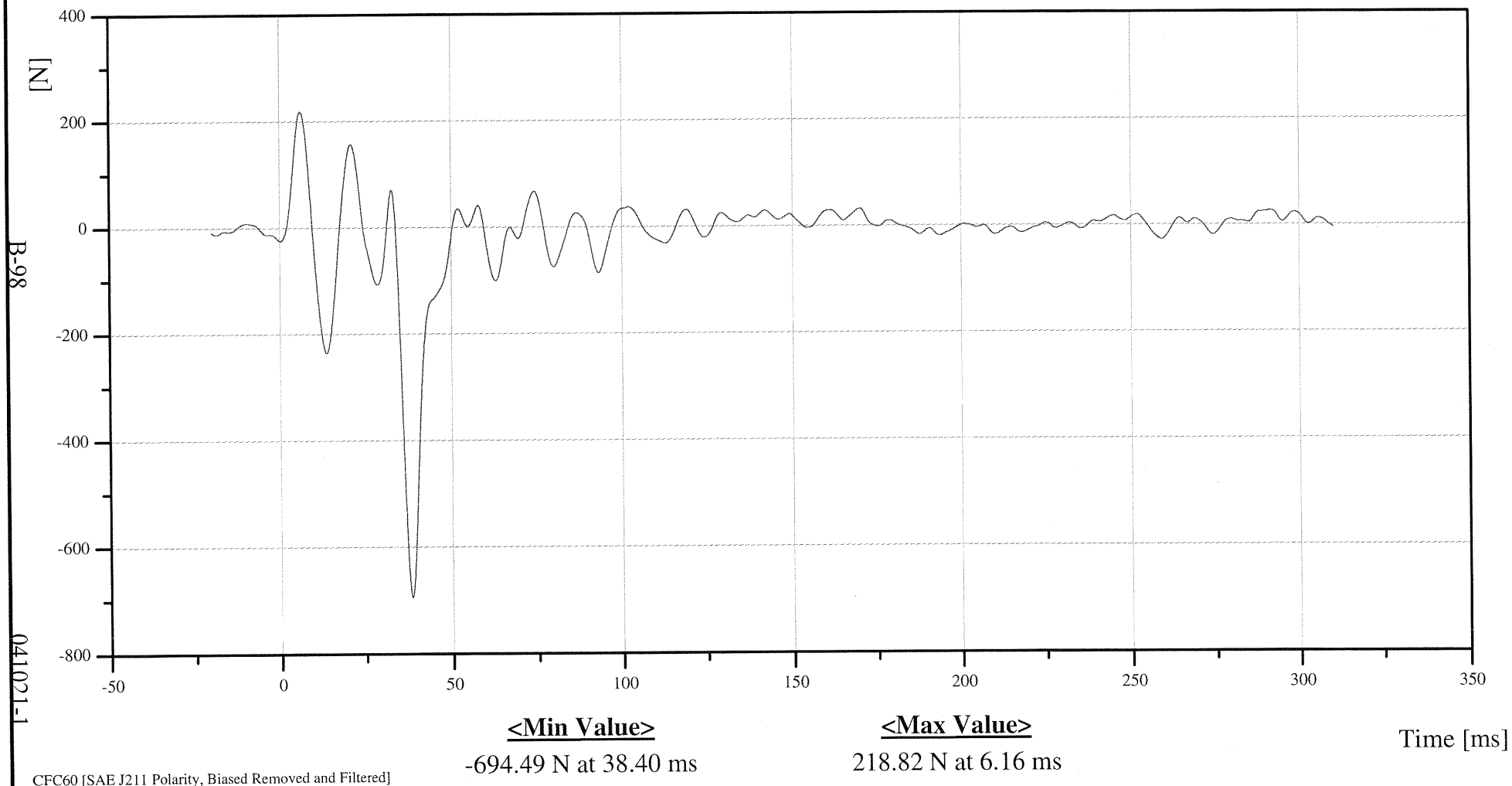
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0605





Transportation Research Center, Inc.

ROW 6 COLUMN 6

Date: 10/21/2004

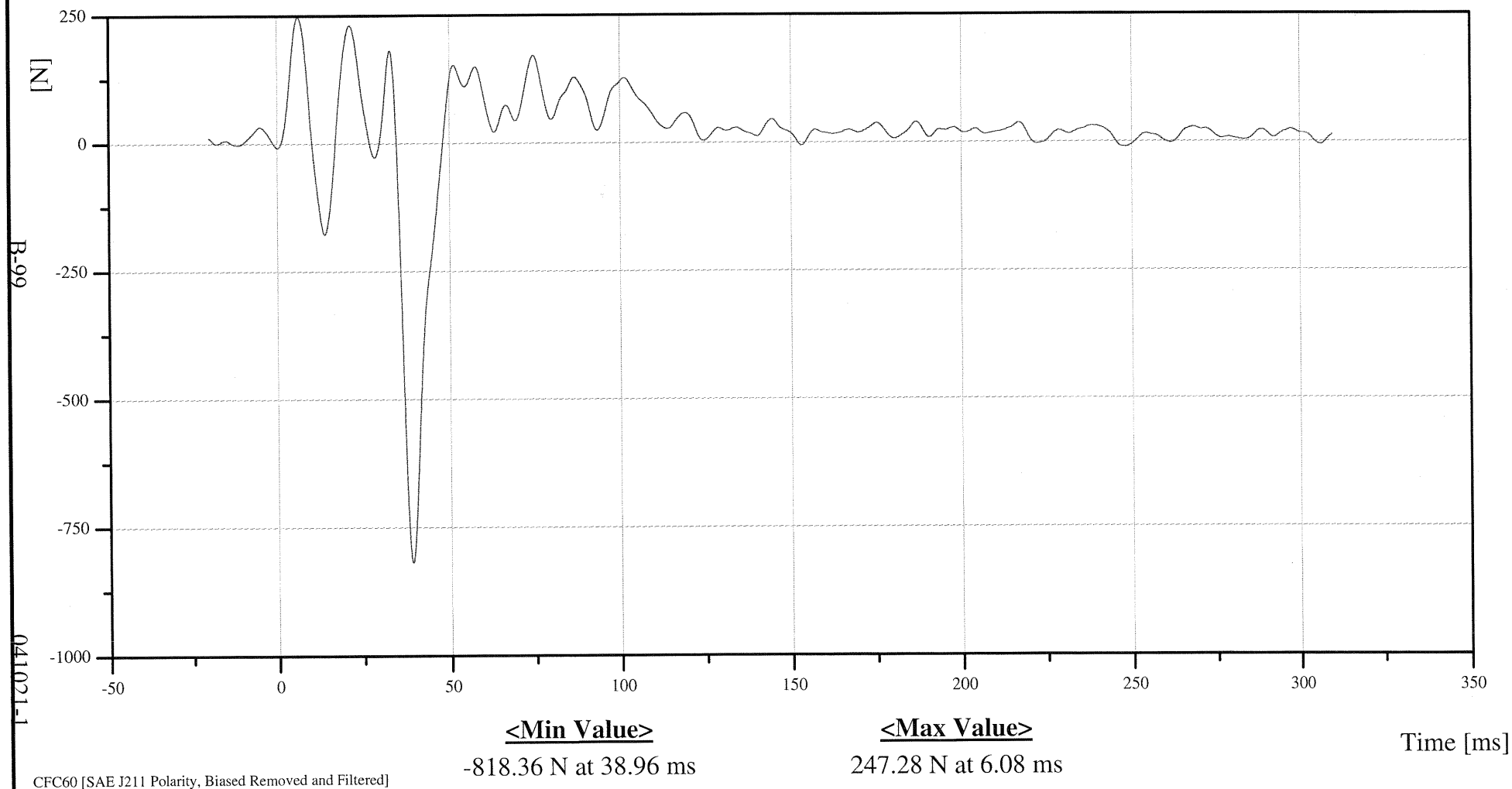
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0606





Transportation Research Center, Inc.

ROW 6 COLUMN 7

Date: 10/21/2004

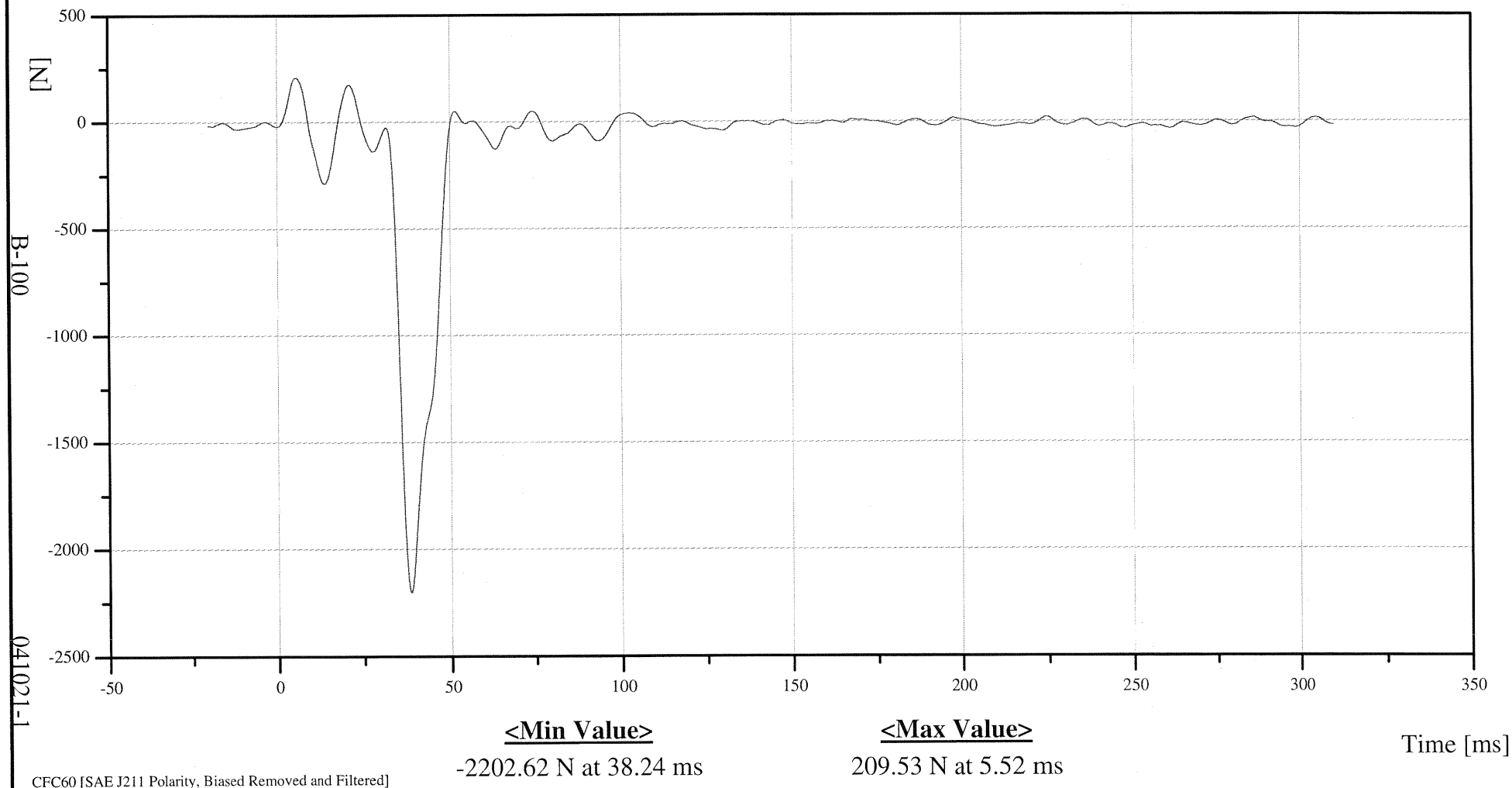
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0607





Transportation Research Center, Inc.

ROW 6 COLUMN 8

Date: 10/21/2004

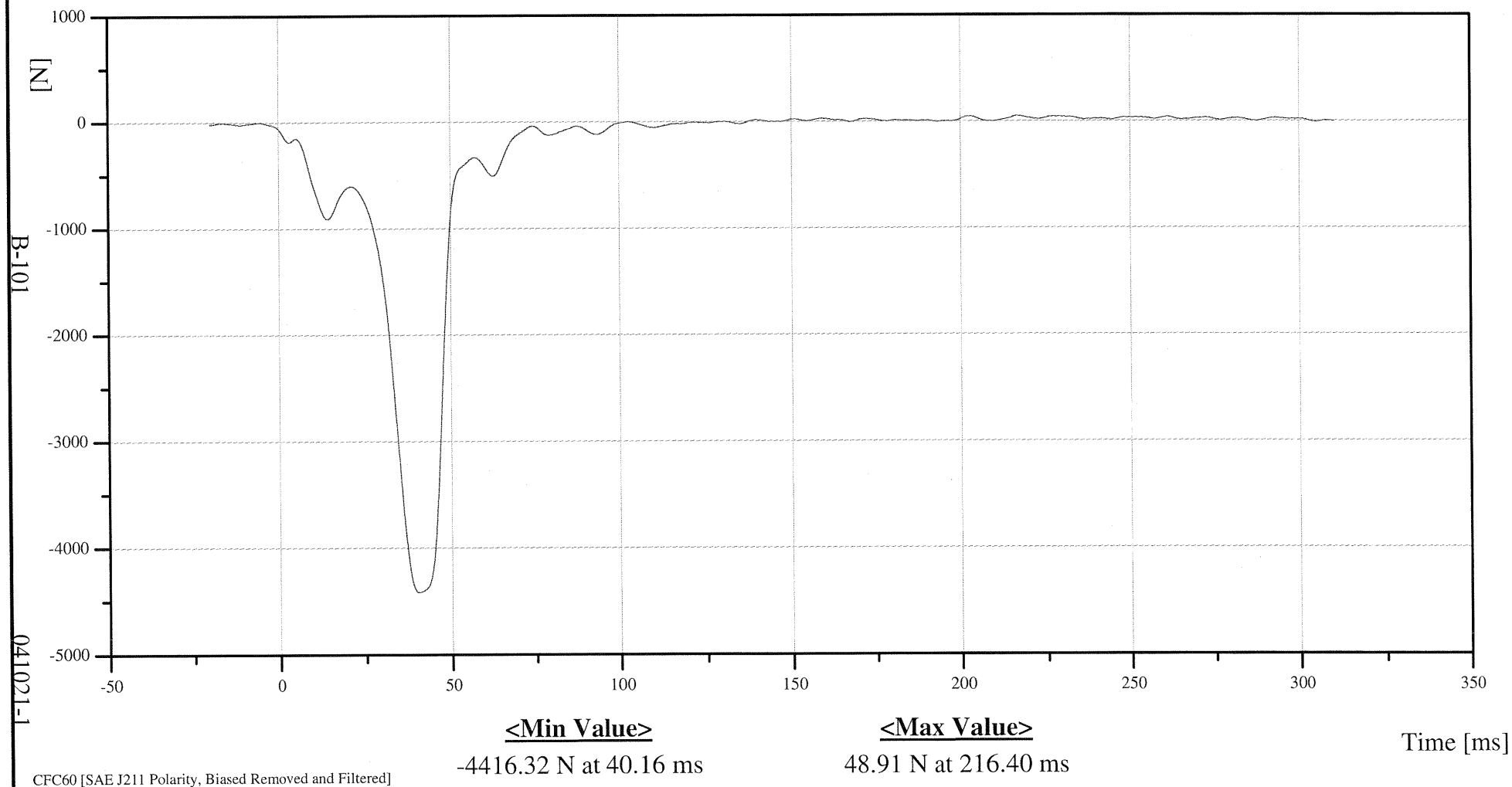
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0608





Transportation Research Center, Inc.

ROW 6 COLUMN 9

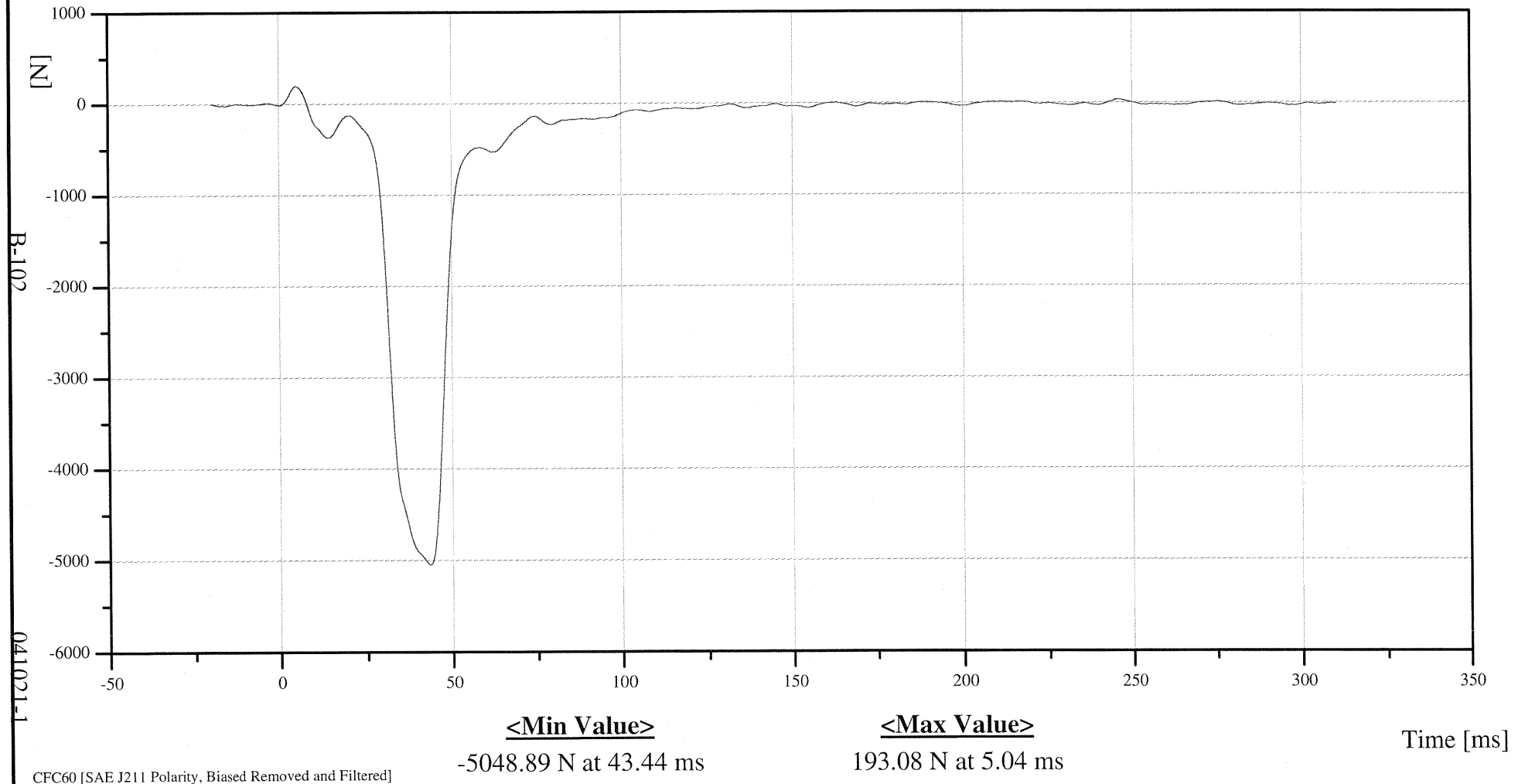
Date: 10/21/2004
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0609





Transportation Research Center, Inc.

ROW 6 COLUMN 10

Date: 10/21/2004

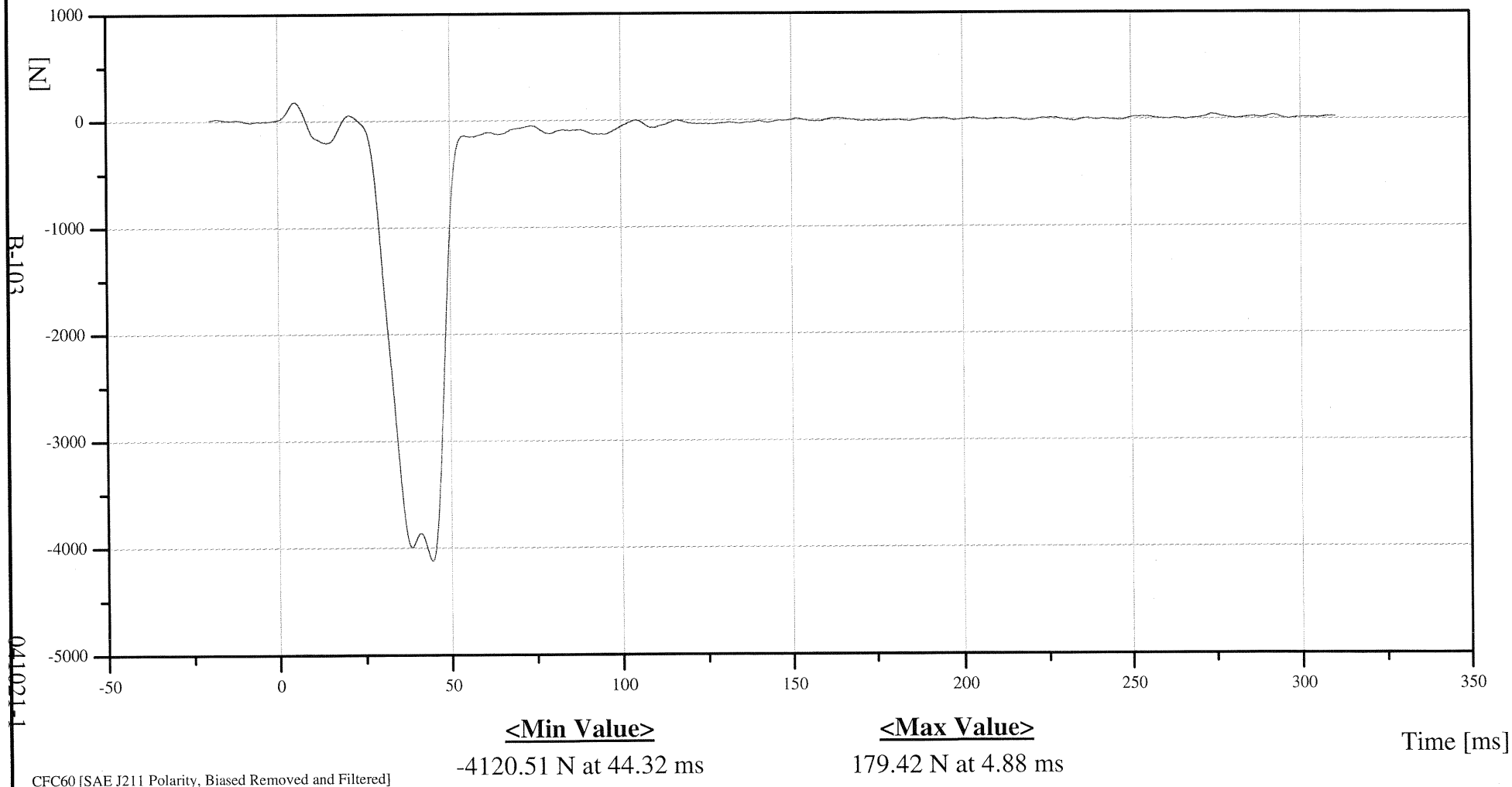
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0610





Transportation Research Center, Inc.

ROW 6 COLUMN 11

Date: 10/21/2004

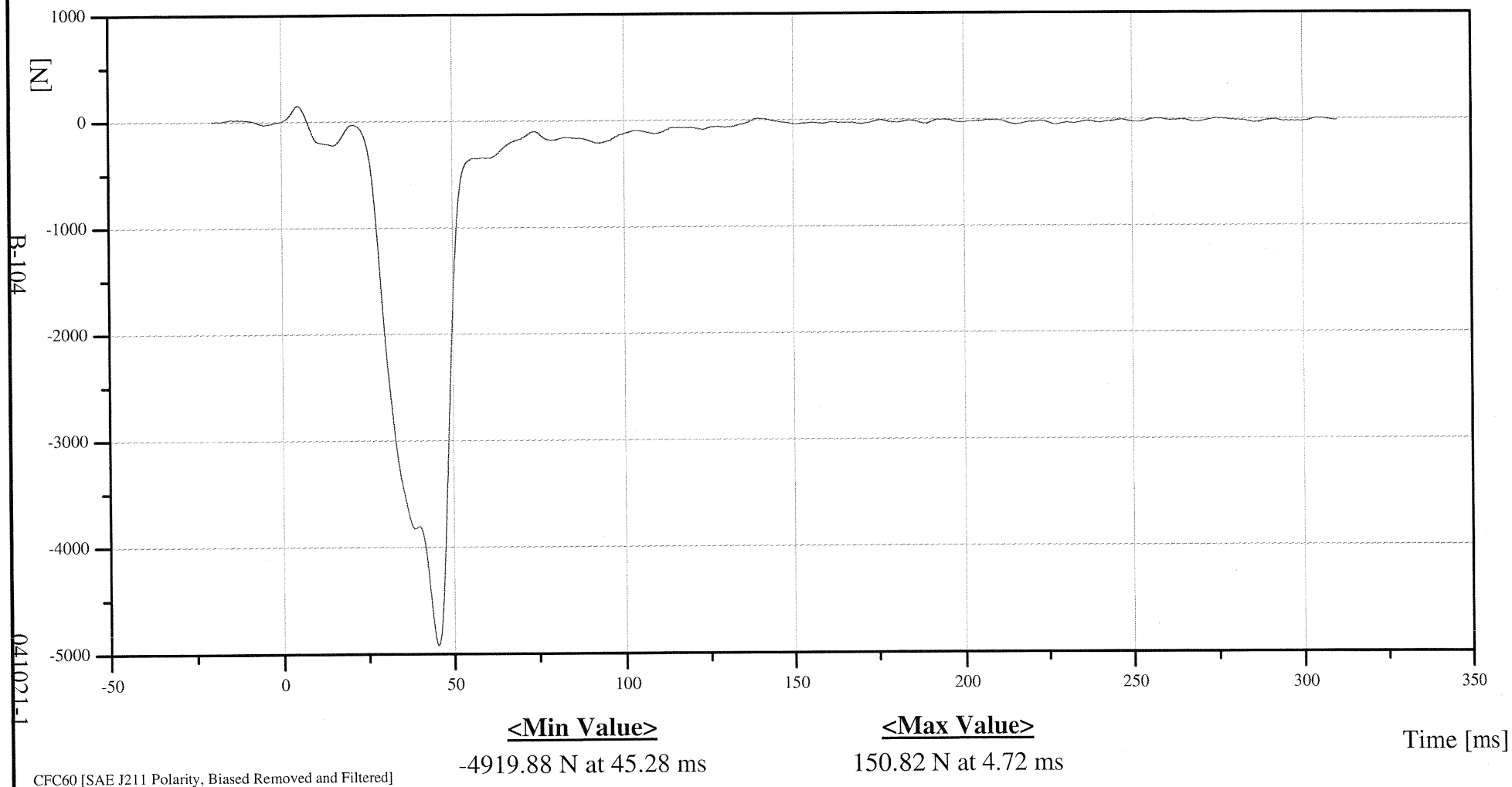
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0611





Transportation Research Center, Inc.

ROW 6 COLUMN 12

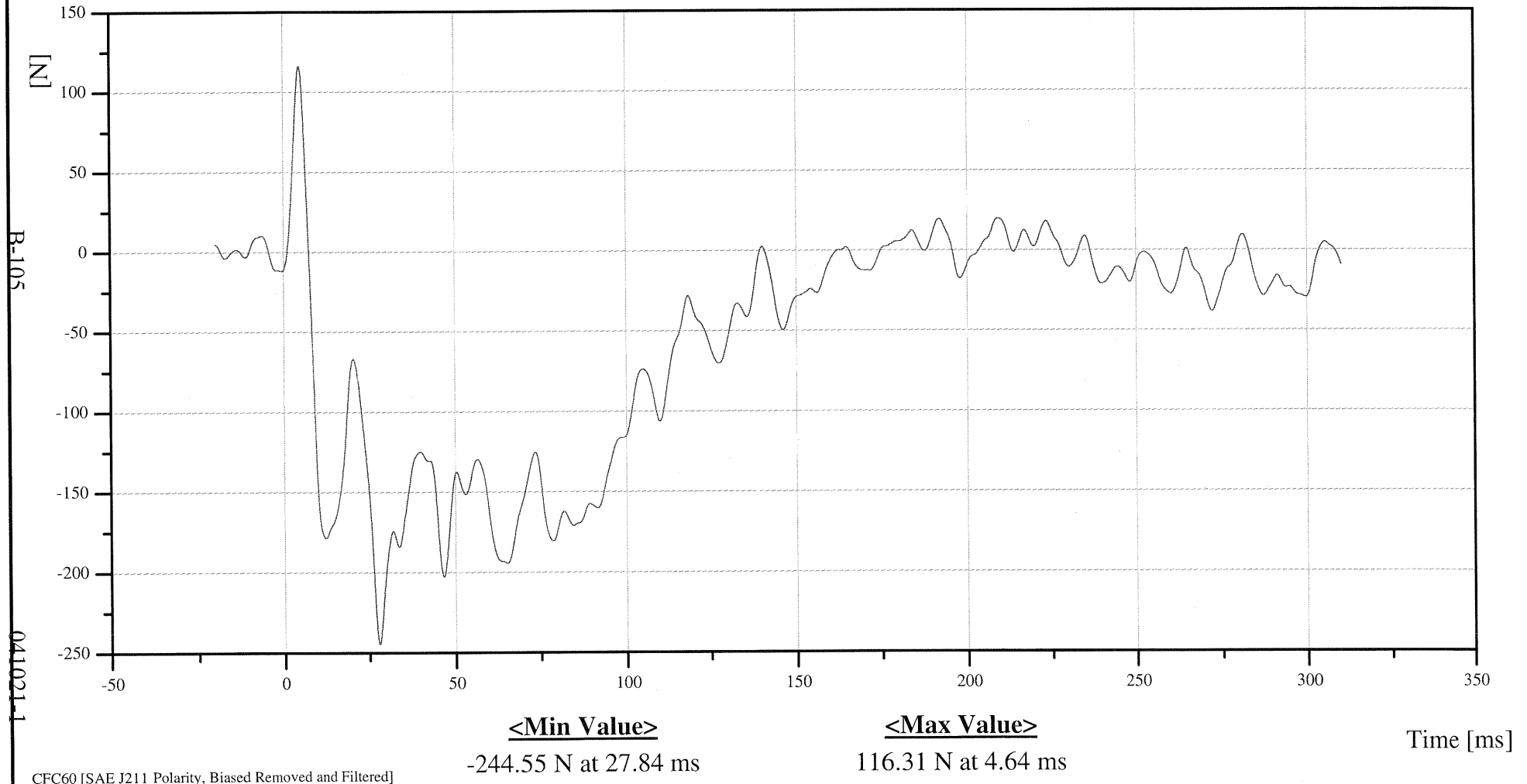
Date: 10/21/2004
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0612





Transportation Research Center, Inc.

ROW 6 COLUMN 13

Date: 10/21/2004

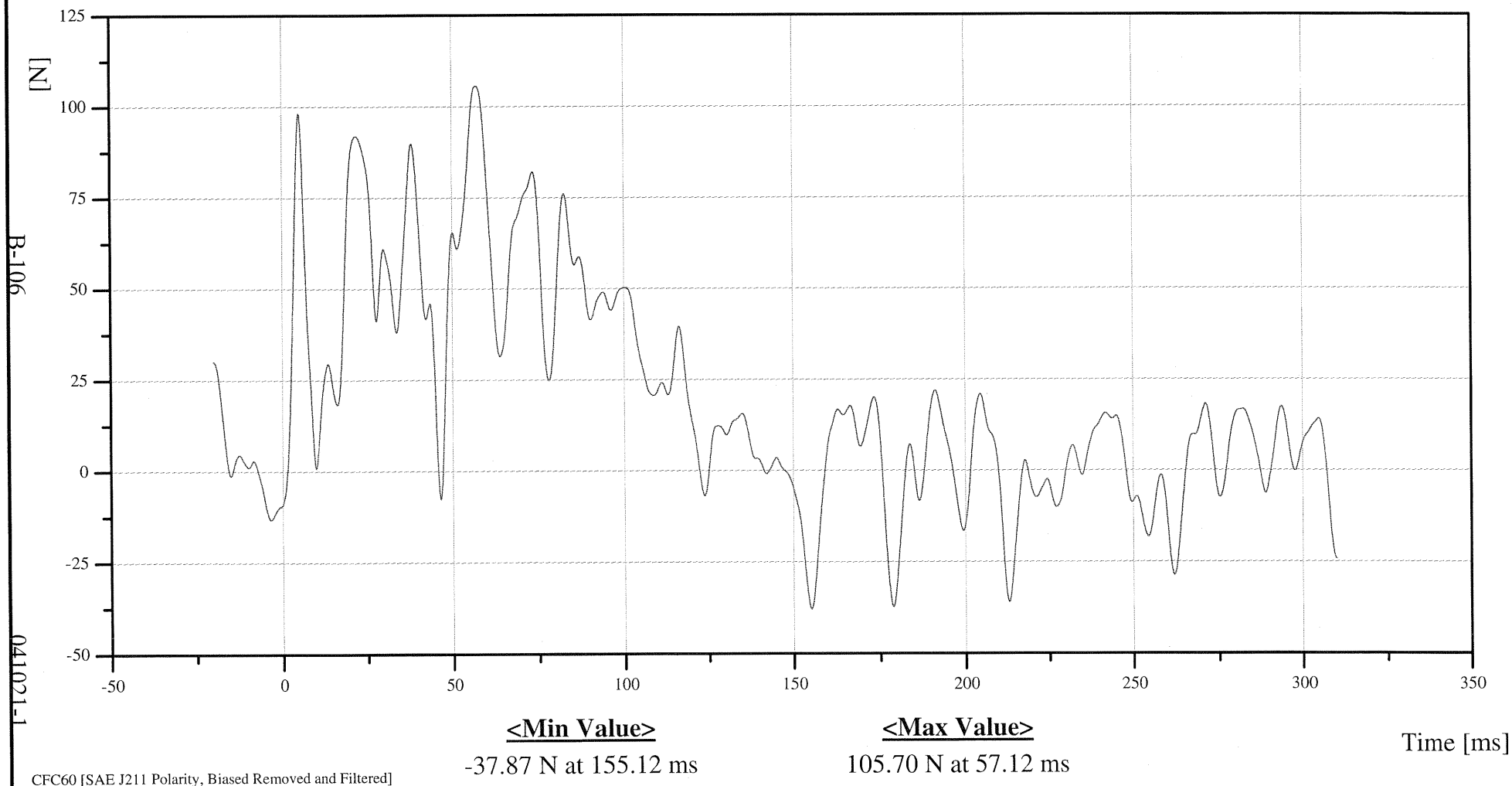
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0613





Transportation Research Center, Inc.

ROW 6 COLUMN 14

Date: 10/21/2004

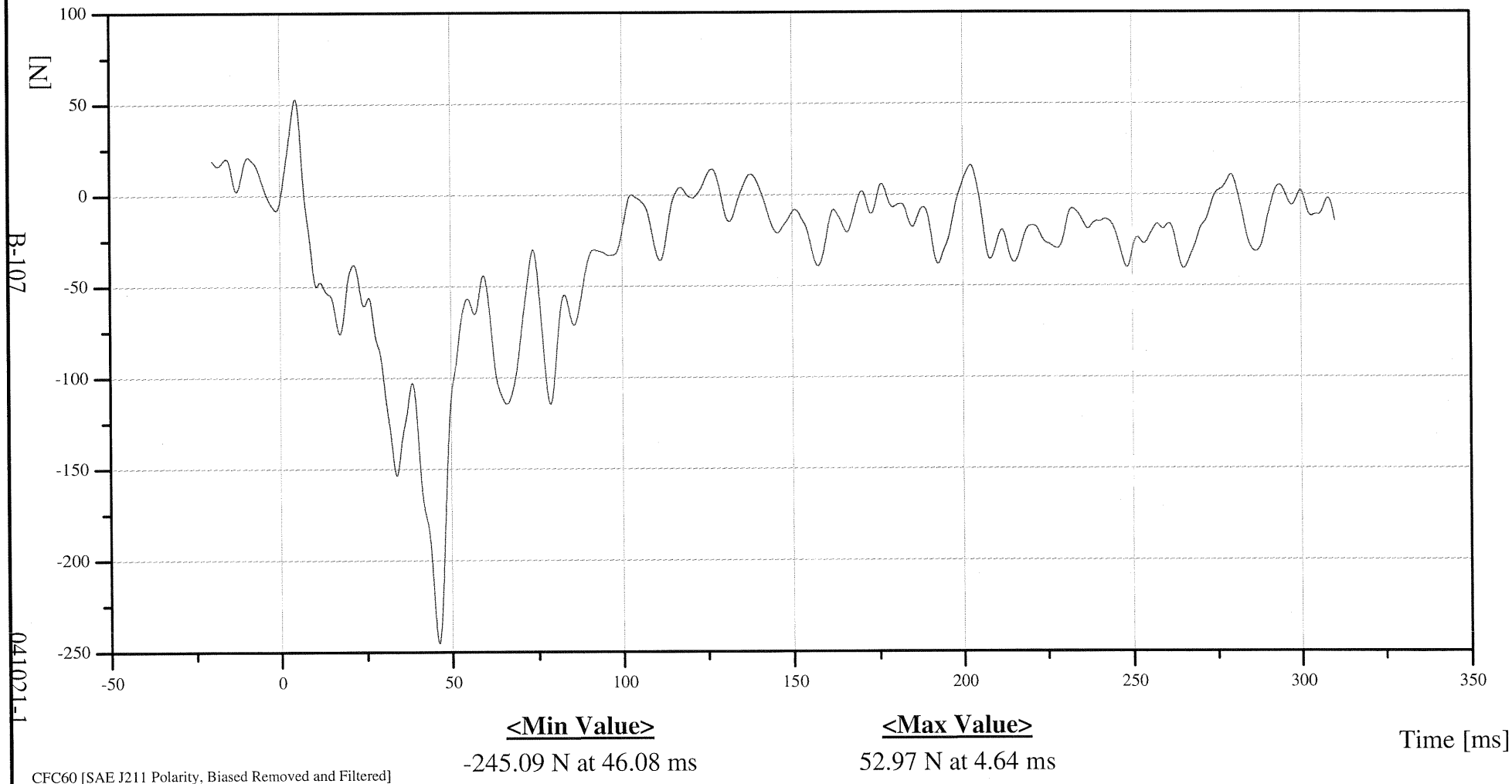
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0614





Transportation Research Center, Inc.

ROW 6 COLUMN 15

Date: 10/21/2004

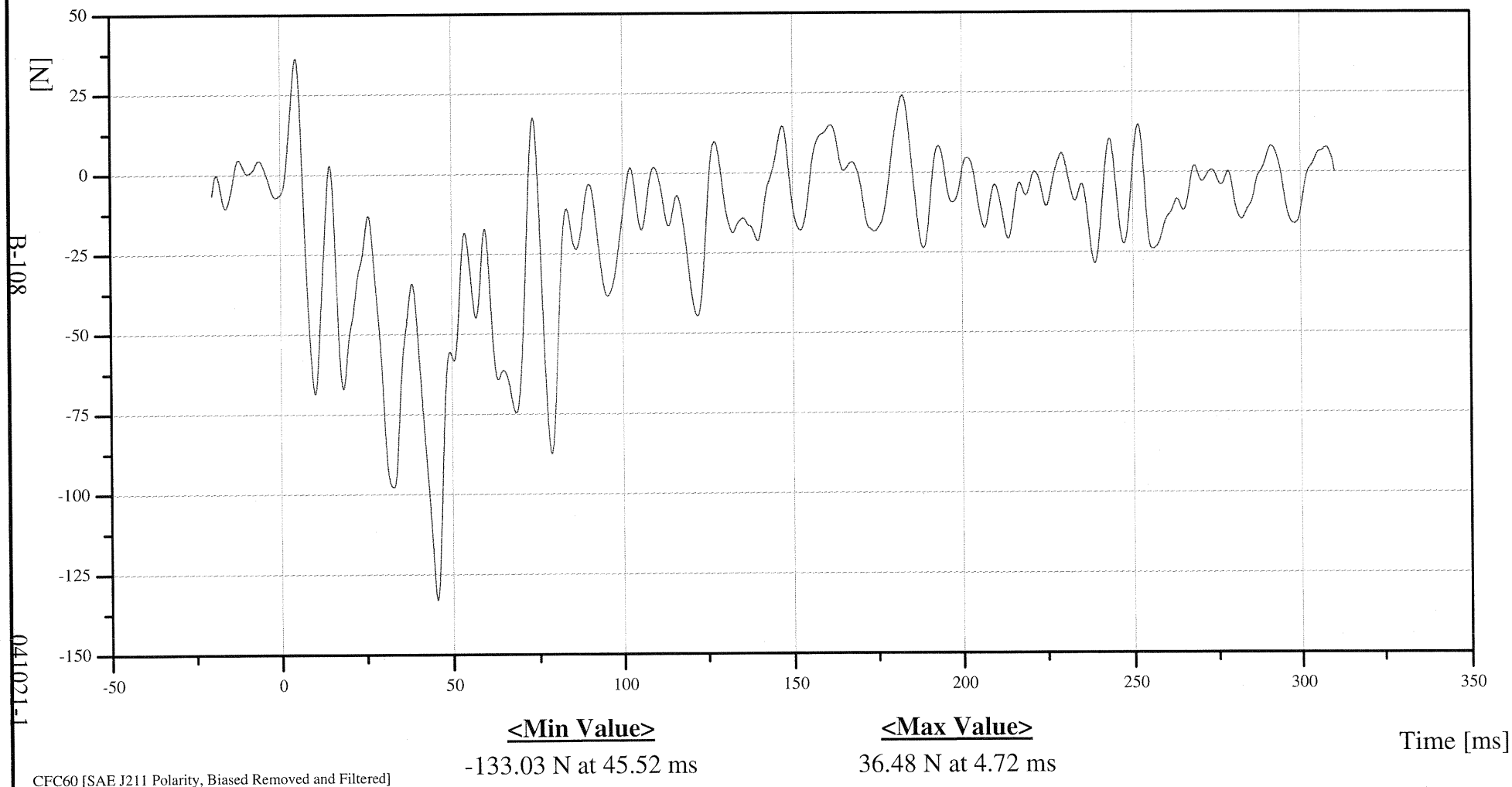
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0615





Transportation Research Center, Inc.

ROW 6 COLUMN 16

Date: 10/21/2004

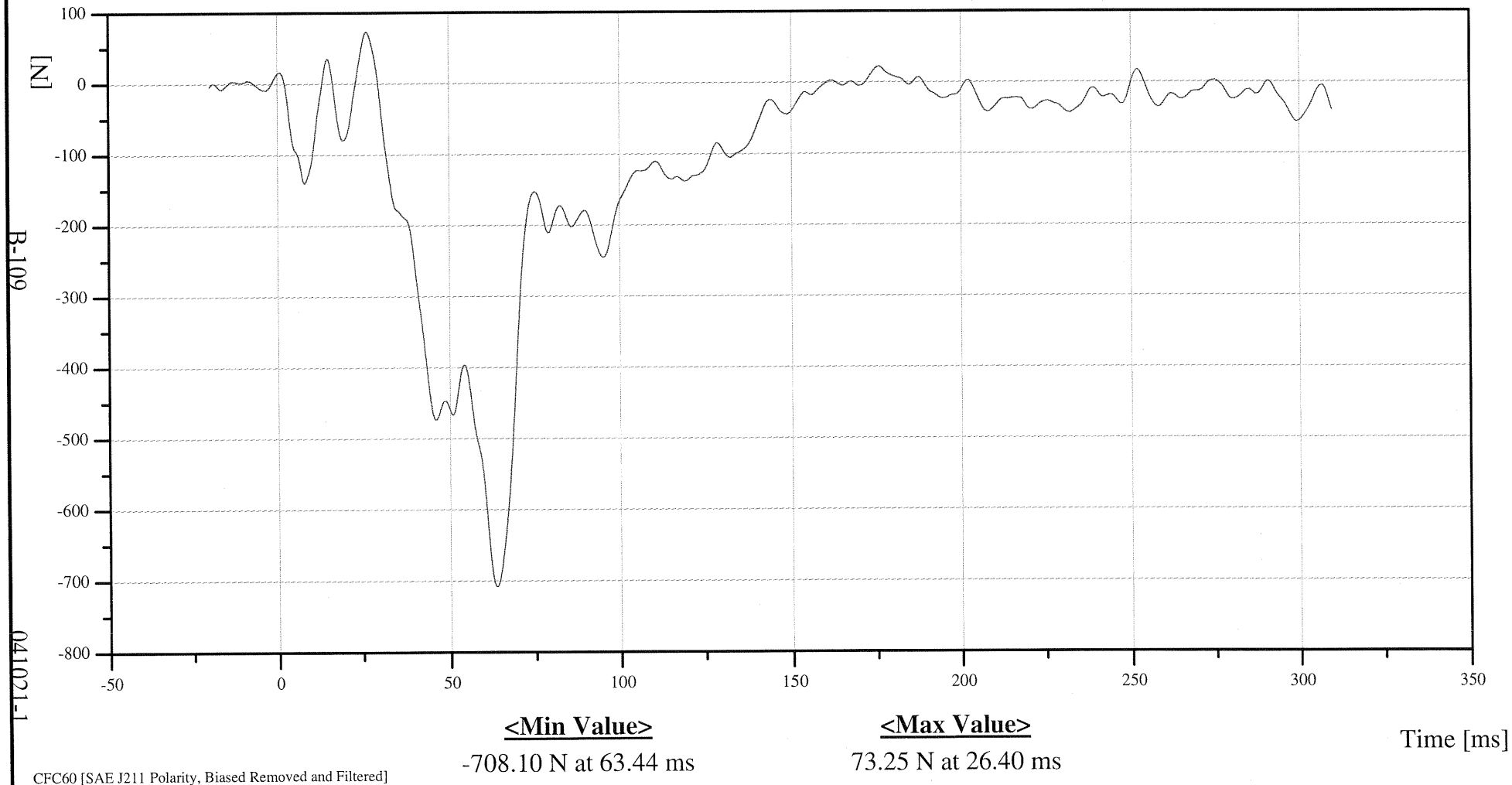
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0616





Transportation Research Center, Inc.

ROW 7 COLUMN 1

Date: 10/21/2004

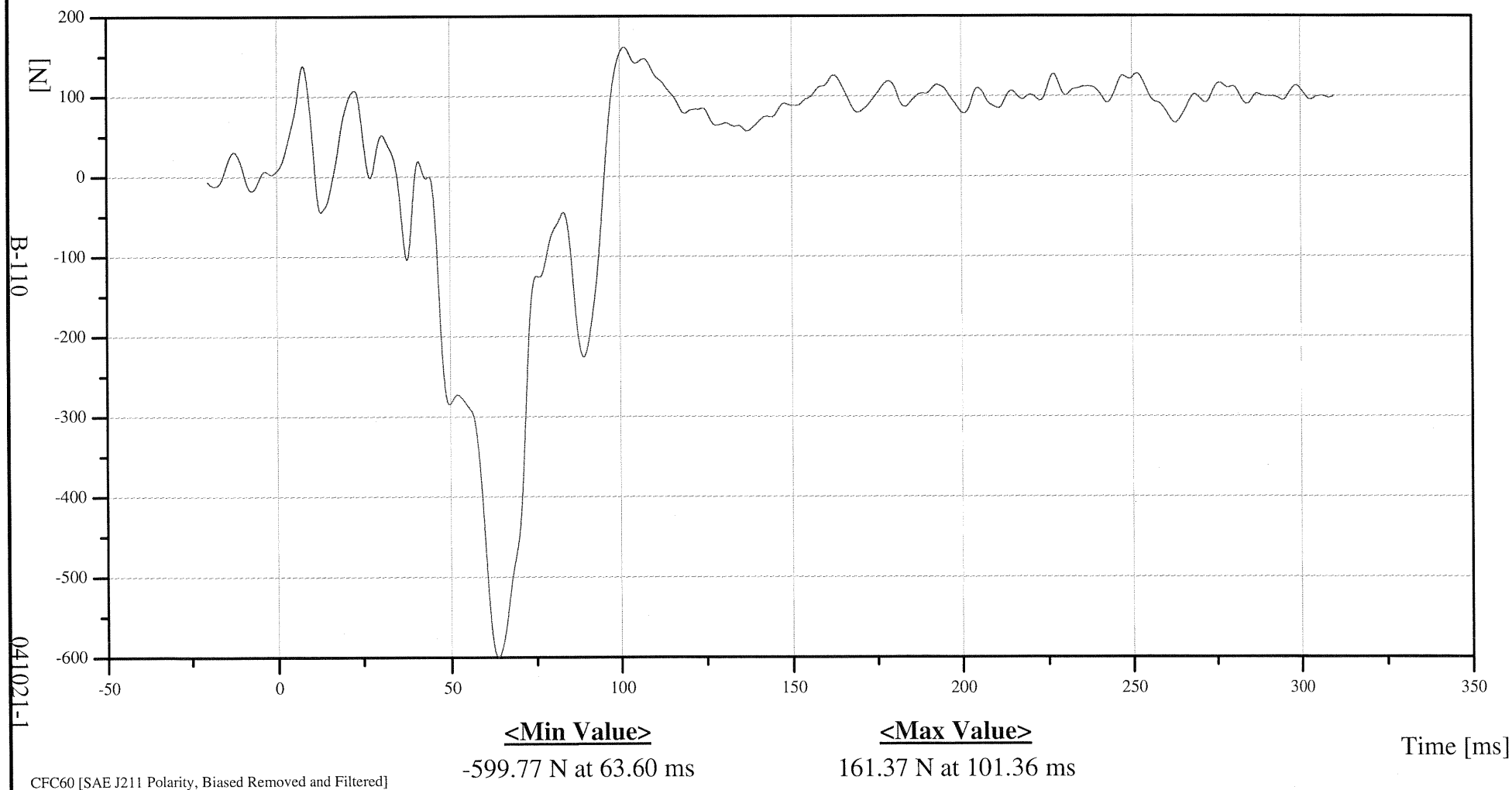
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0701





Transportation Research Center, Inc.

ROW 7 COLUMN 2

Date: 10/21/2004

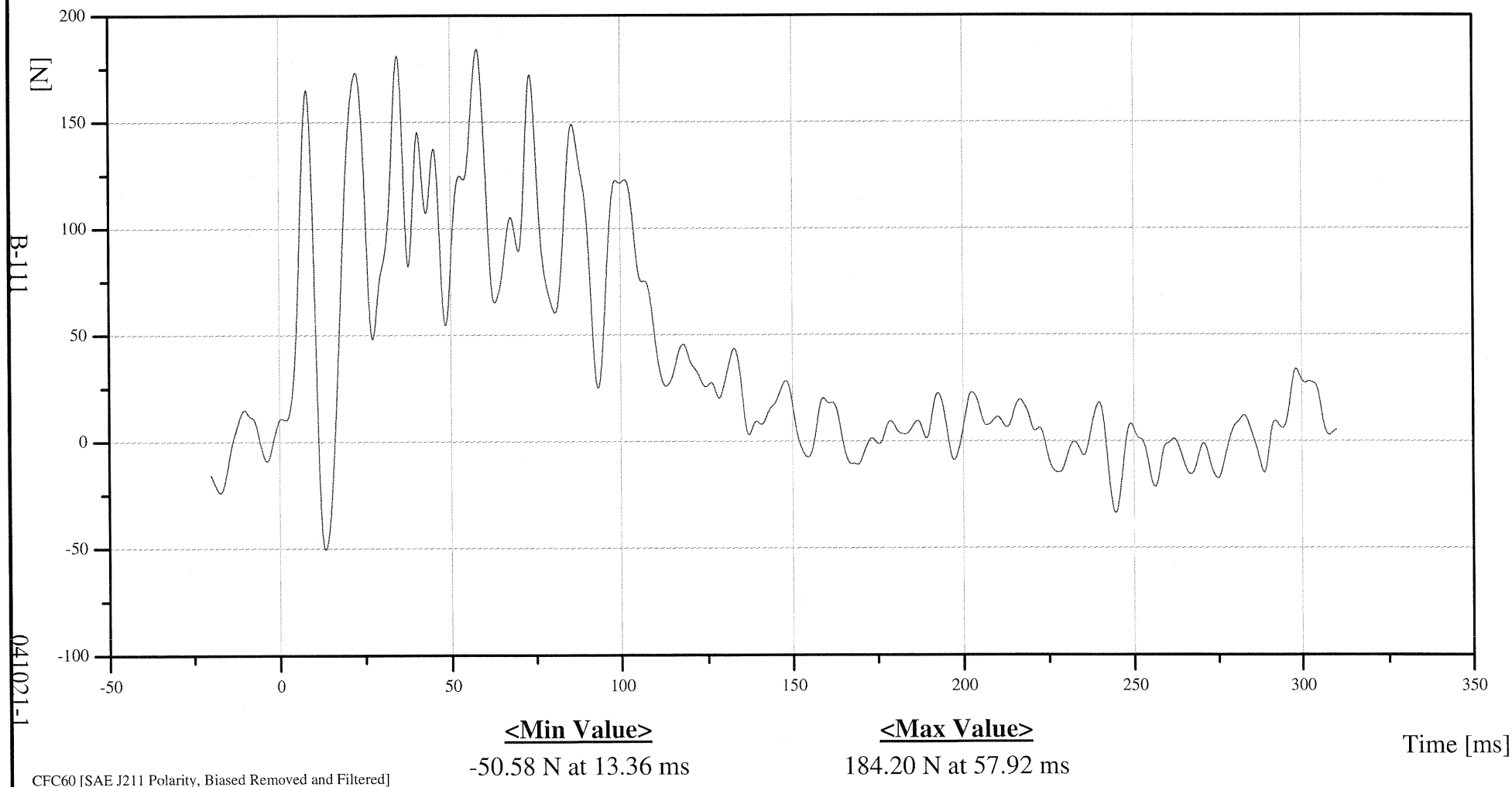
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0702





Transportation Research Center, Inc.

ROW 7 COLUMN 3

Date: 10/21/2004

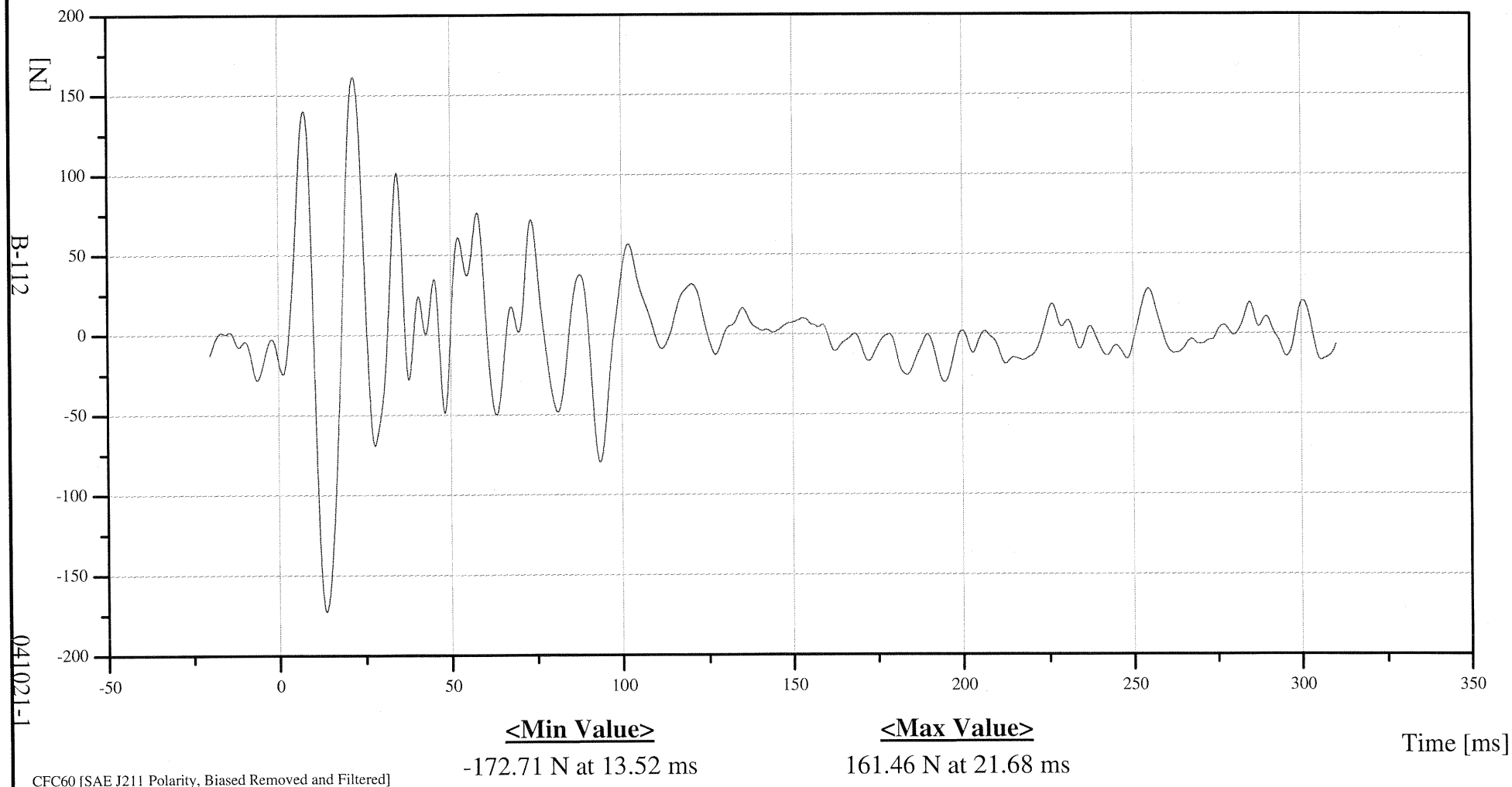
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0703





Transportation Research Center, Inc.

ROW 7 COLUMN 4

Date: 10/21/2004

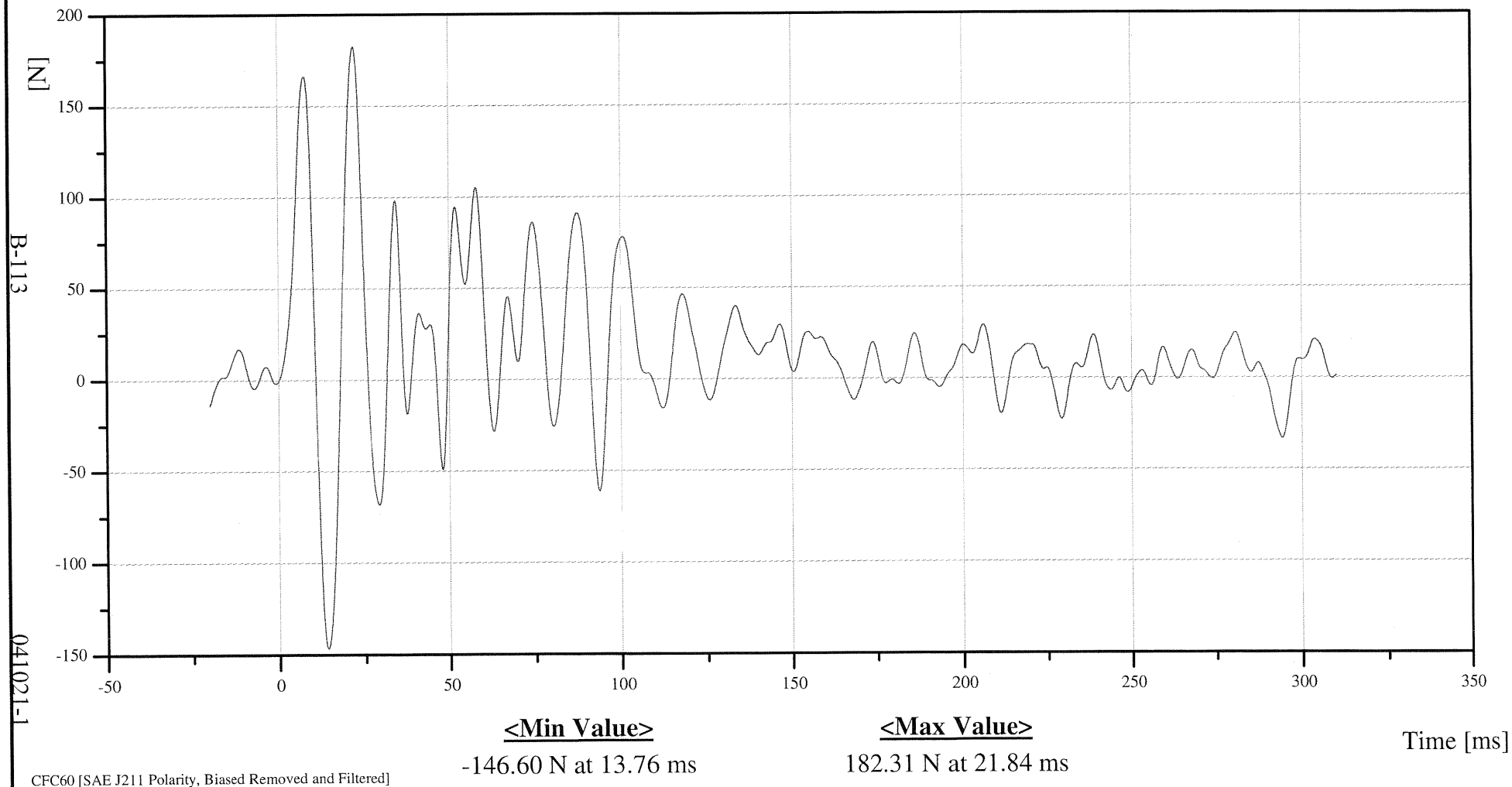
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0704





Transportation Research Center, Inc.

ROW 7 COLUMN 5

Date: 10/21/2004

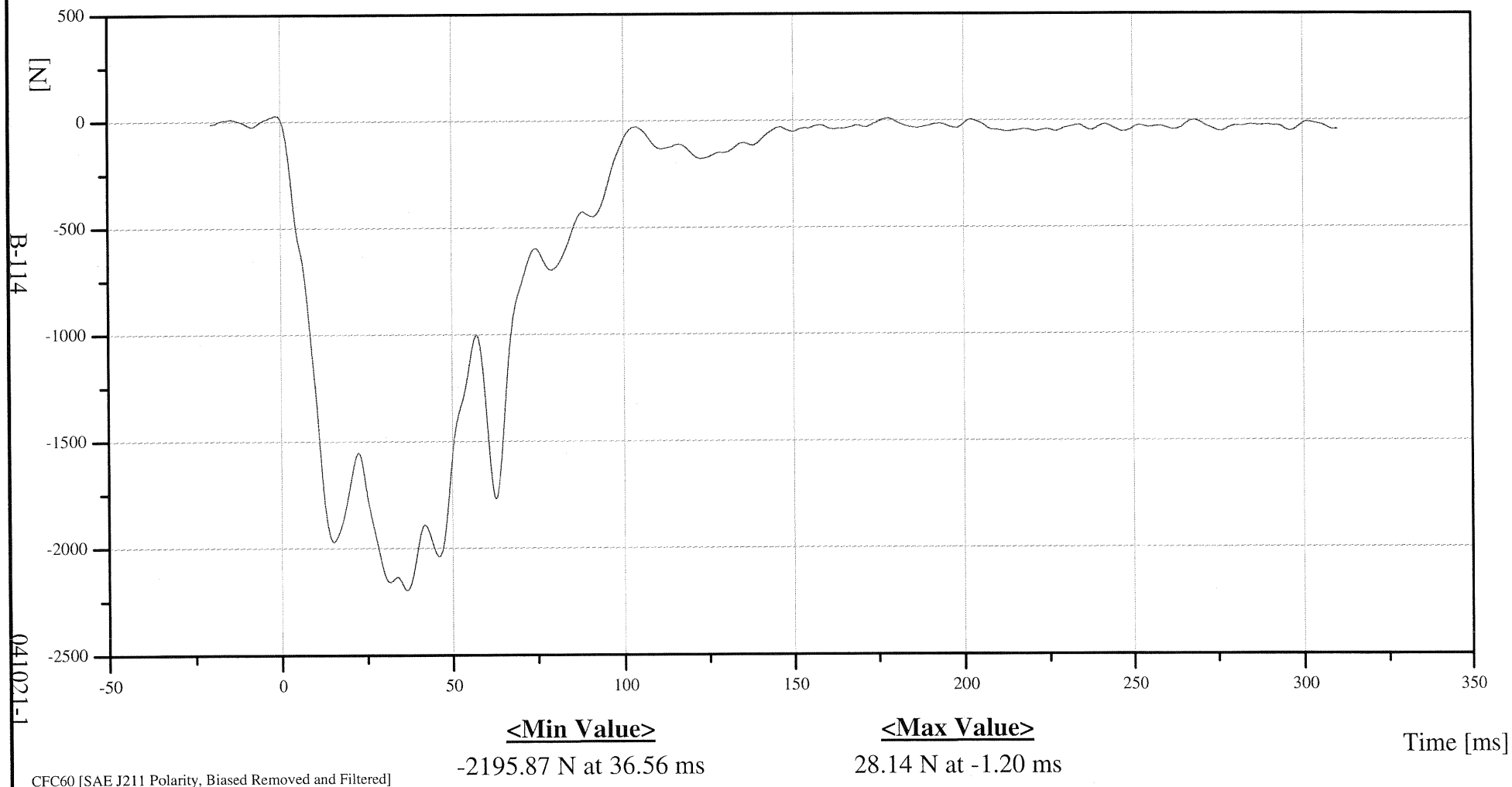
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0705





Transportation Research Center, Inc.

ROW 7 COLUMN 6

Date: 10/21/2004

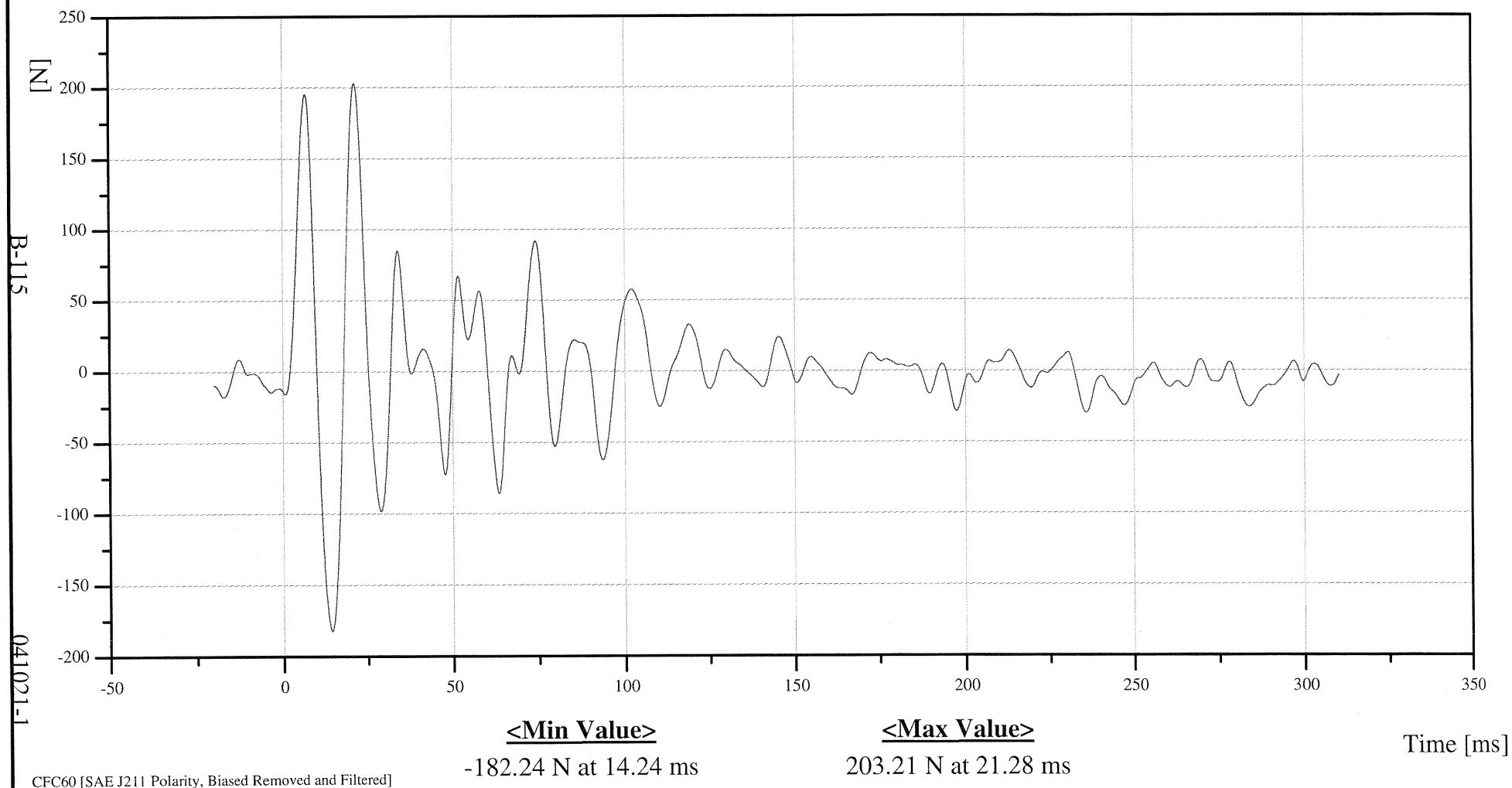
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0706





Transportation Research Center, Inc.

ROW 7 COLUMN 7

Date: 10/21/2004

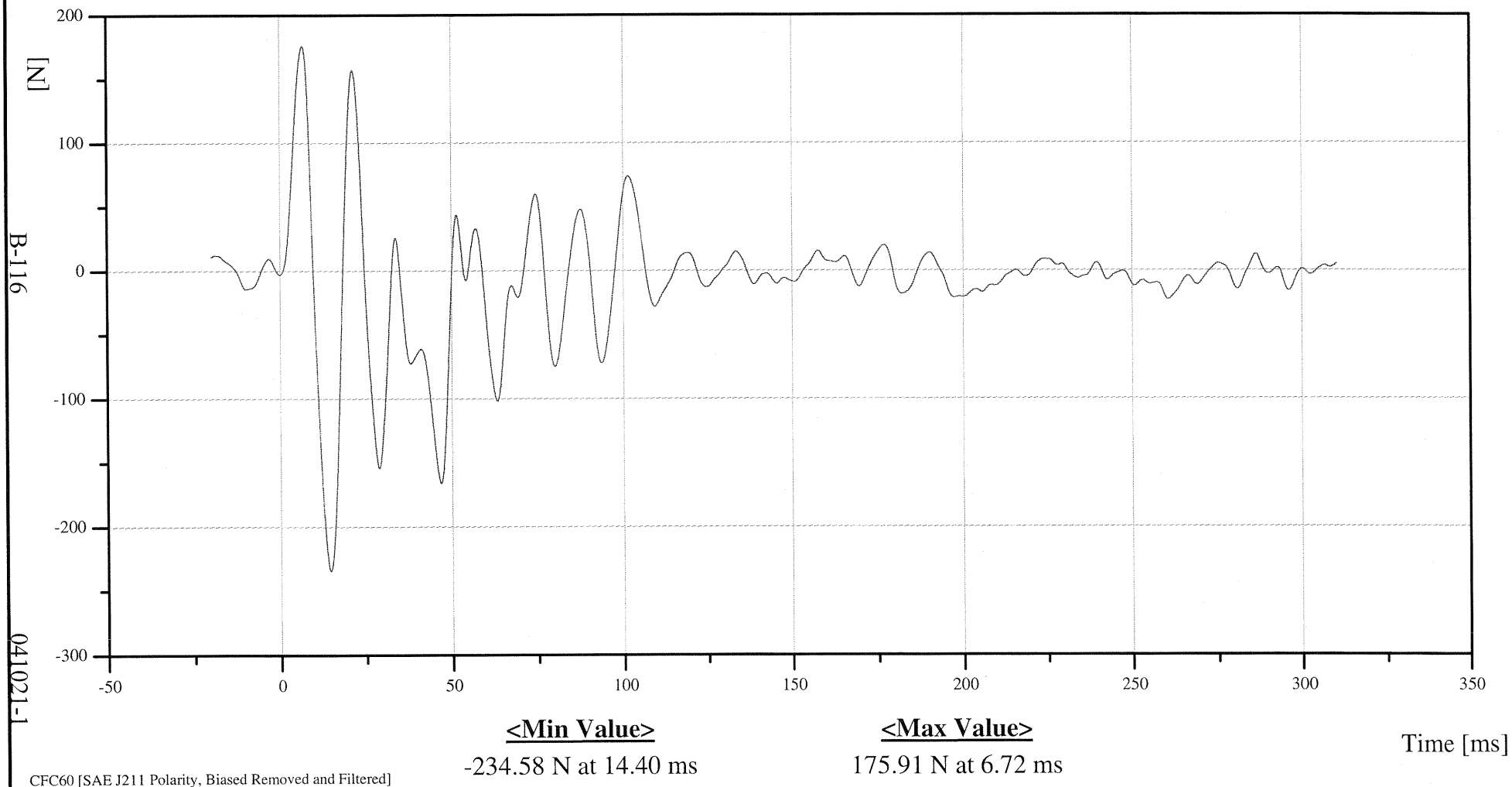
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0707





Transportation Research Center, Inc.

ROW 7 COLUMN 8

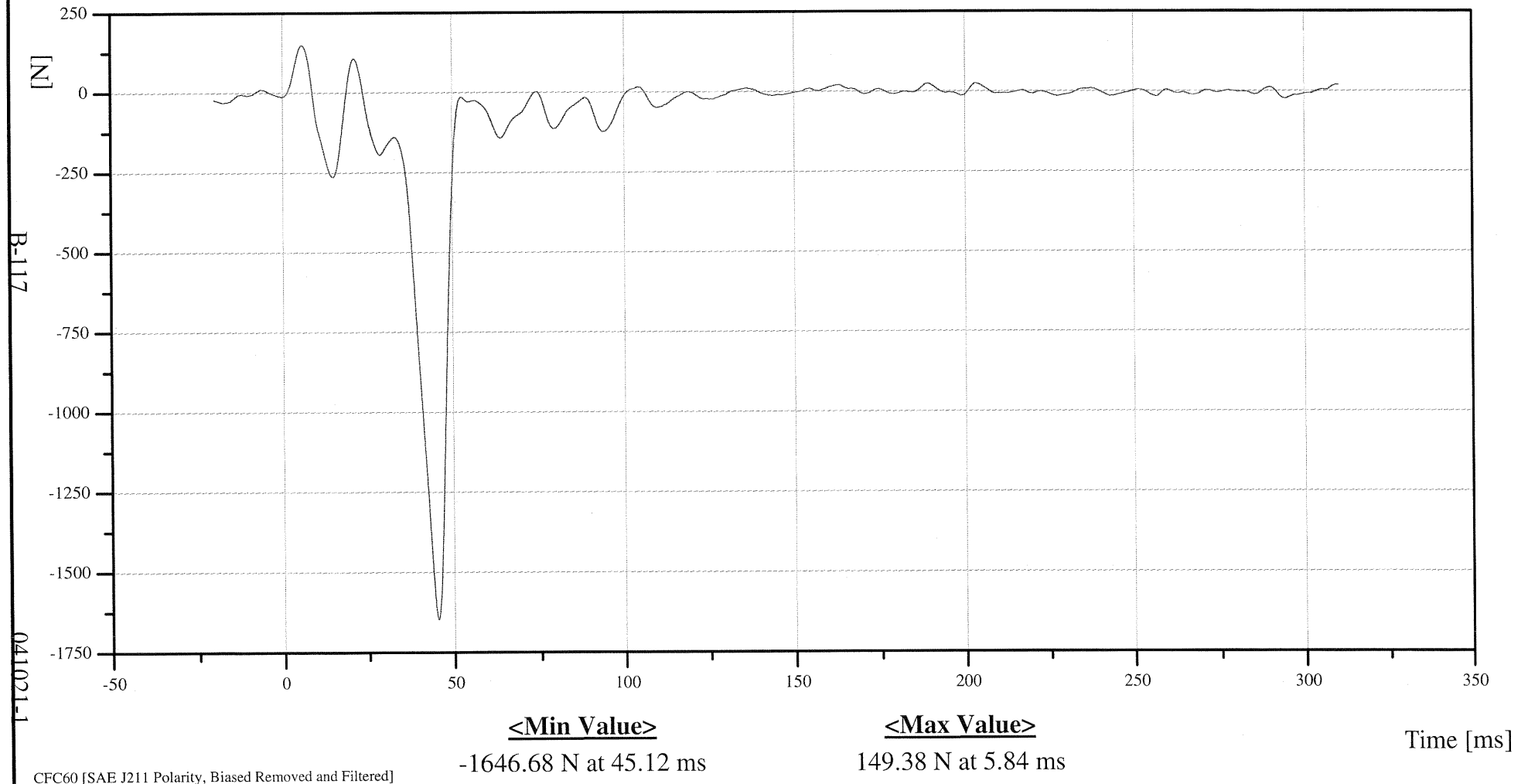
Date: 10/21/2004
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0708





Transportation Research Center, Inc.

ROW 7 COLUMN 9

Date: 10/21/2004

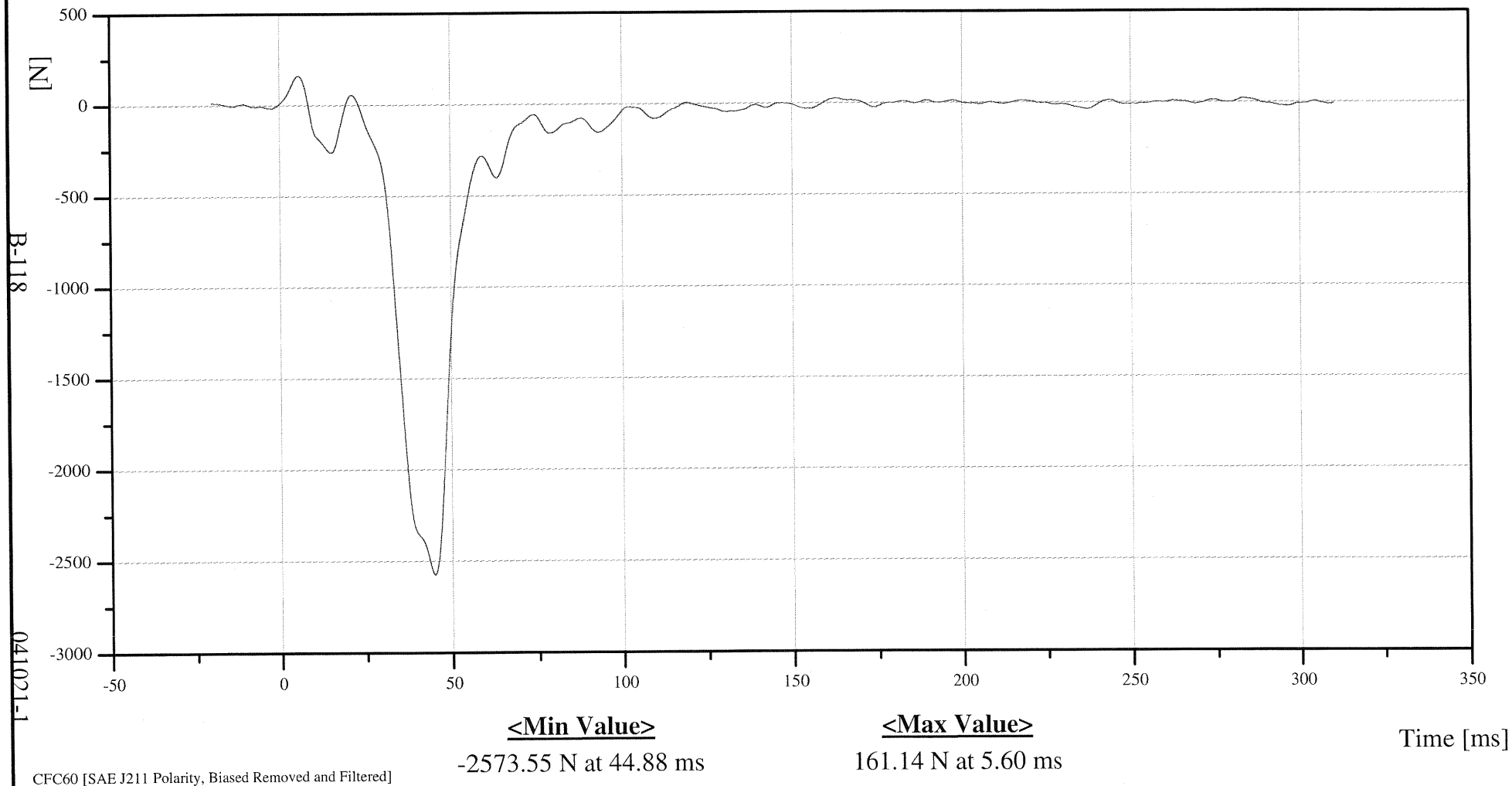
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0709





Transportation Research Center, Inc.

ROW 7 COLUMN 10

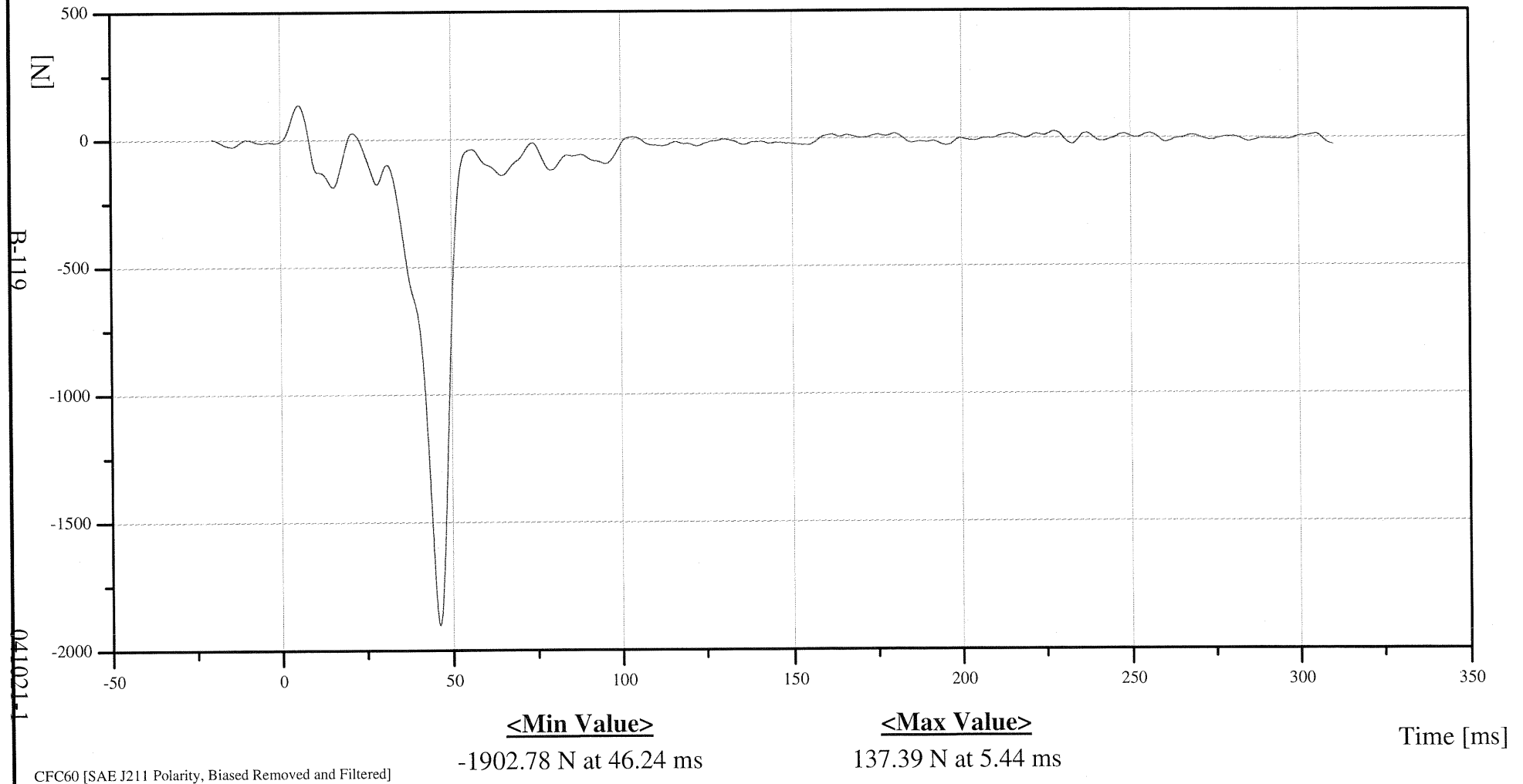
Date: 10/21/2004
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0710





Transportation Research Center, Inc.

ROW 7 COLUMN 11

Date: 10/21/2004

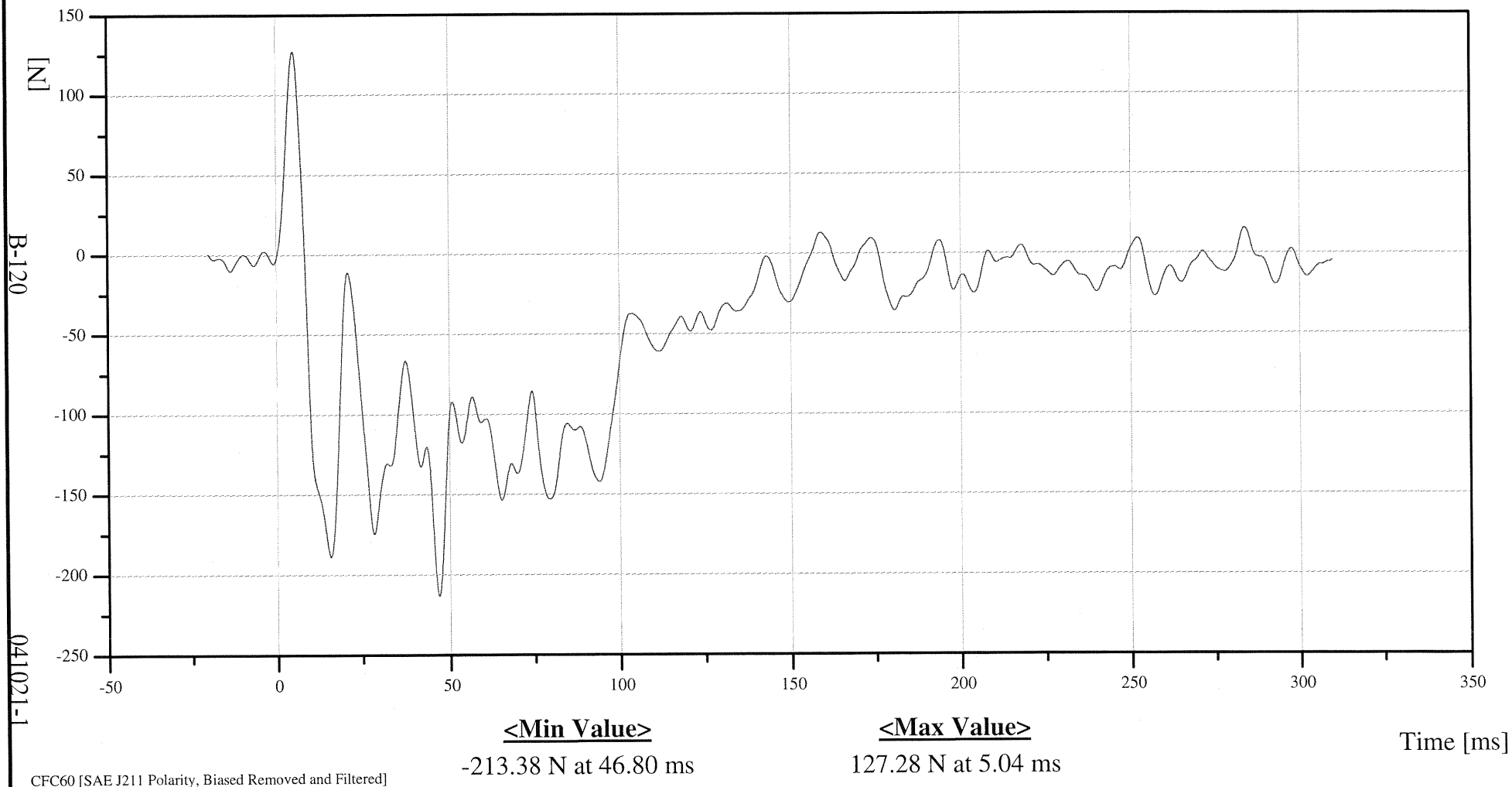
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0711





Transportation Research Center, Inc.

ROW 7 COLUMN 12

Date: 10/21/2004

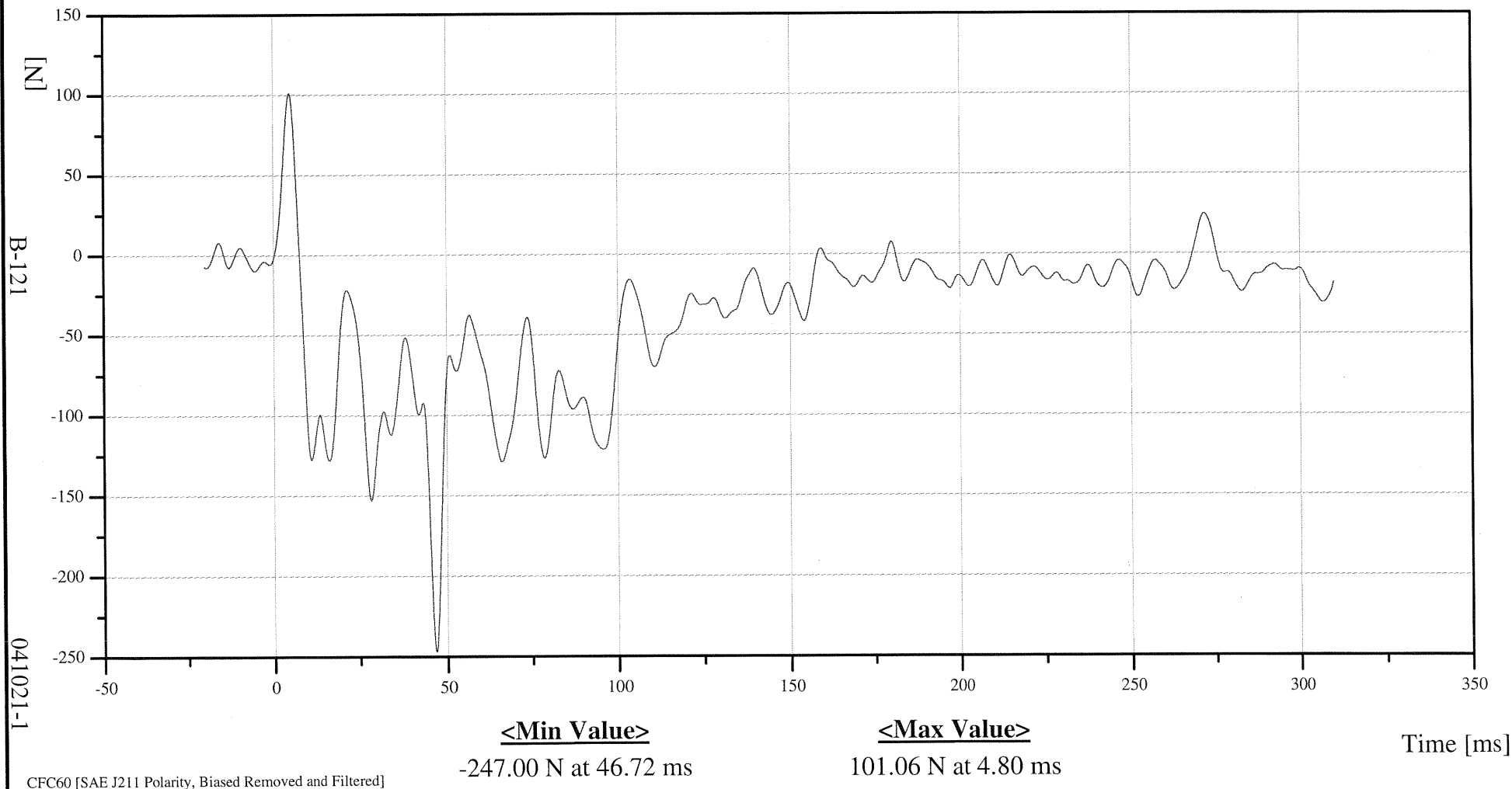
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0712





Transportation Research Center, Inc.

ROW 7 COLUMN 13

Date: 10/21/2004

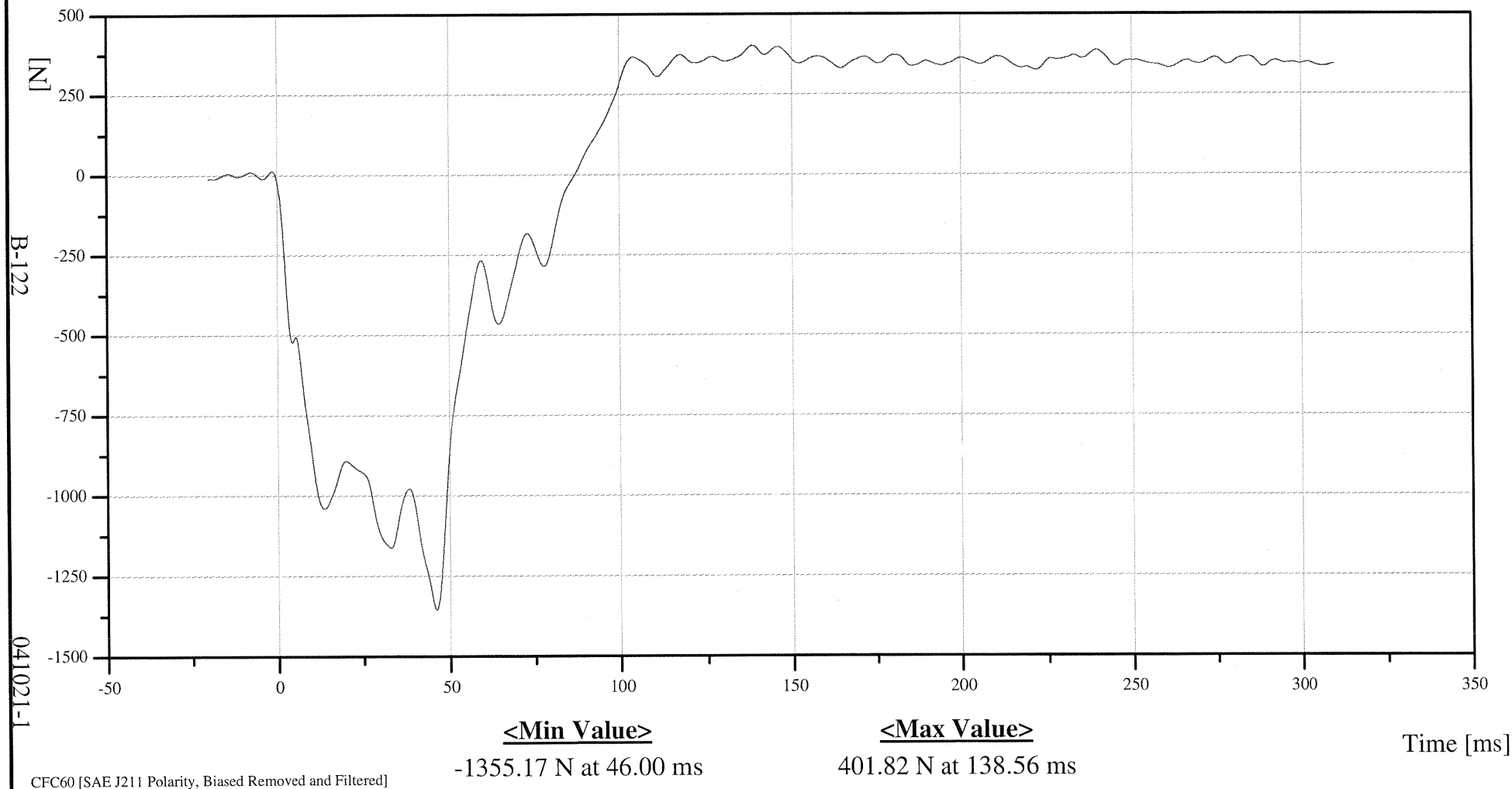
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0713





Transportation Research Center, Inc.

ROW 7 COLUMN 14

Date: 10/21/2004

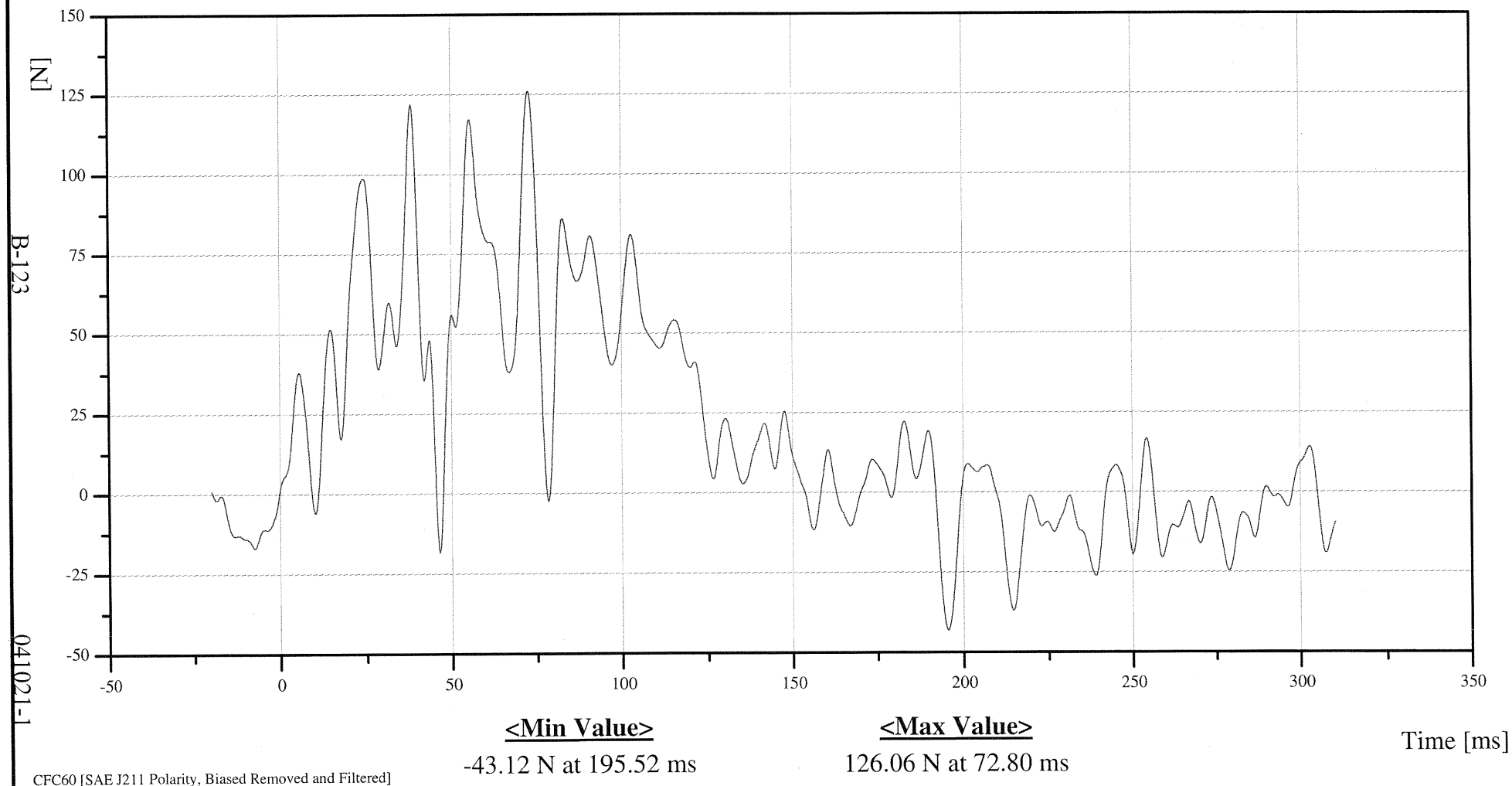
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0714





Transportation Research Center, Inc.

ROW 7 COLUMN 15

Date: 10/21/2004

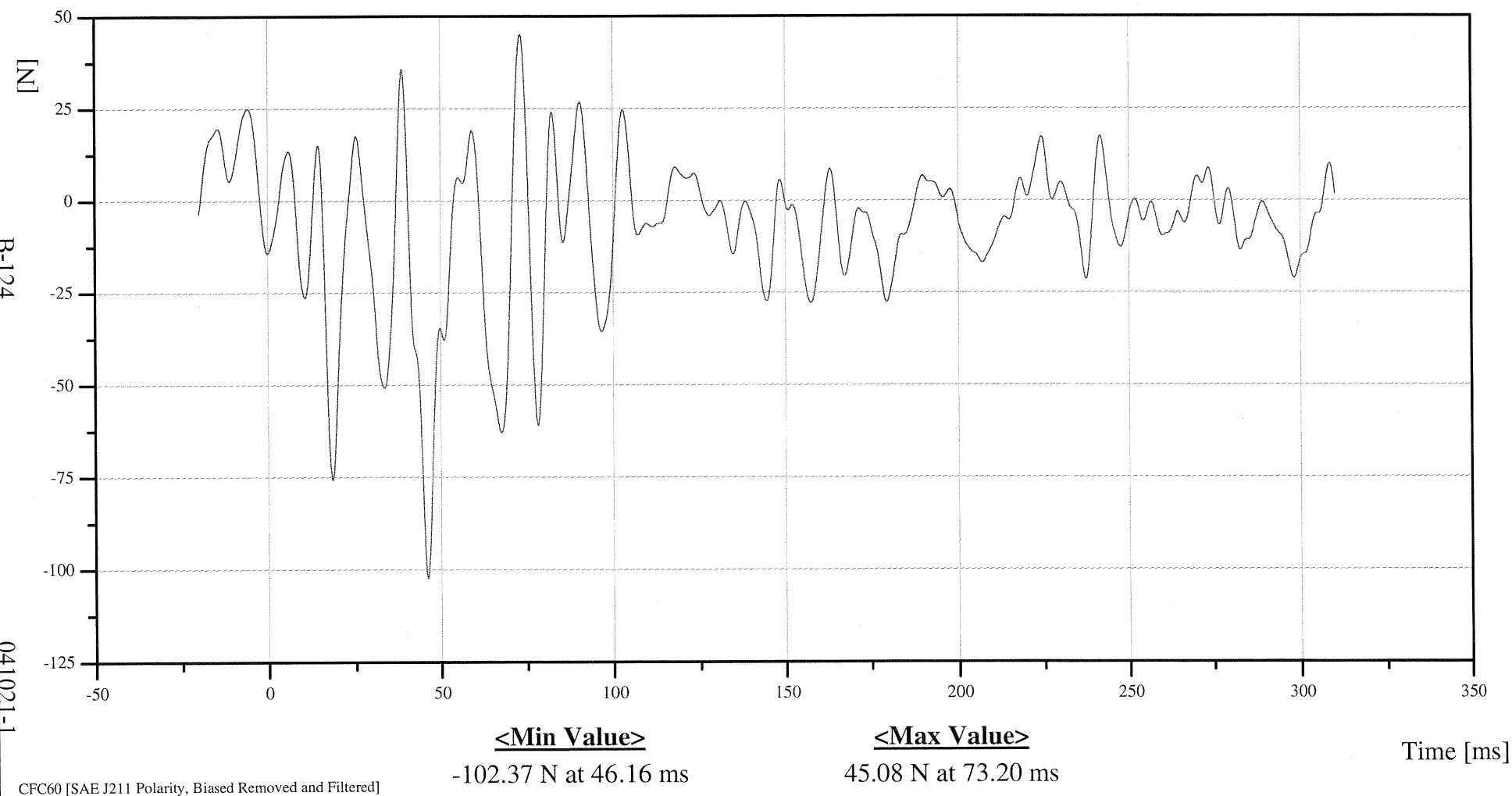
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0715





Transportation Research Center, Inc.

ROW 7 COLUMN 16

Date: 10/21/2004

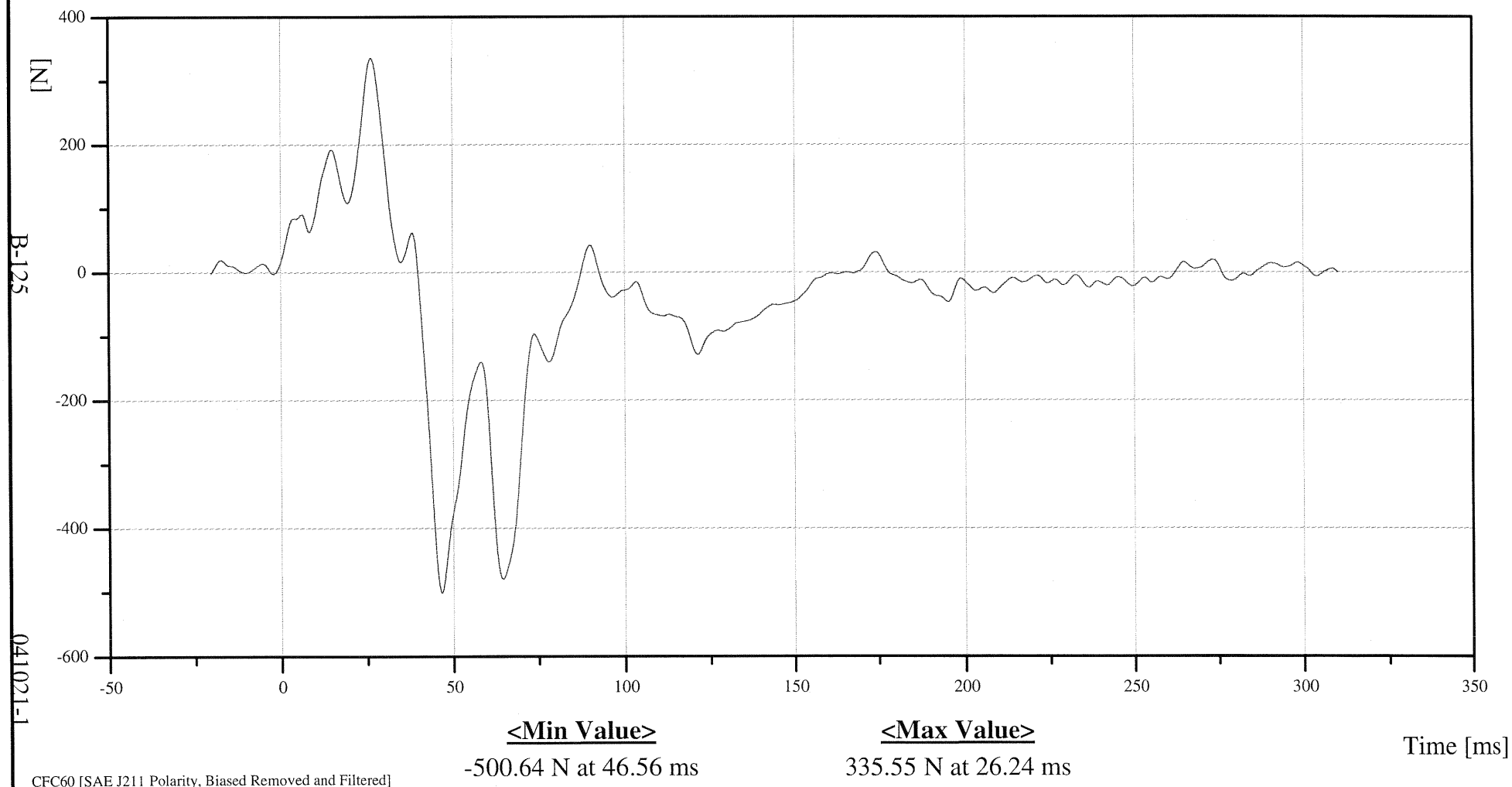
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0716





Transportation Research Center, Inc.

ROW 8 COLUMN 1

Date: 10/21/2004

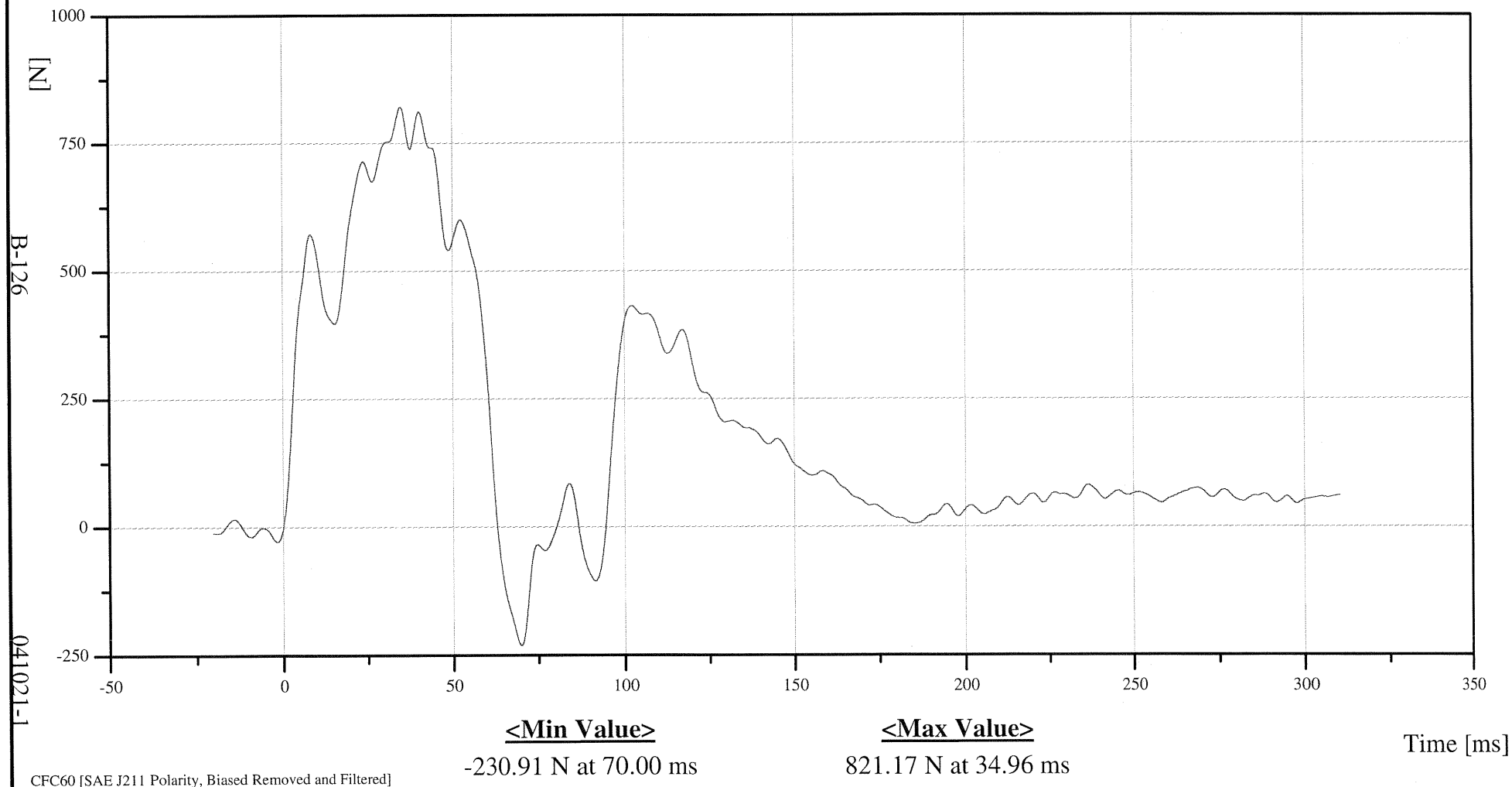
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0801





Transportation Research Center, Inc.

ROW 8 COLUMN 2

Date: 10/21/2004

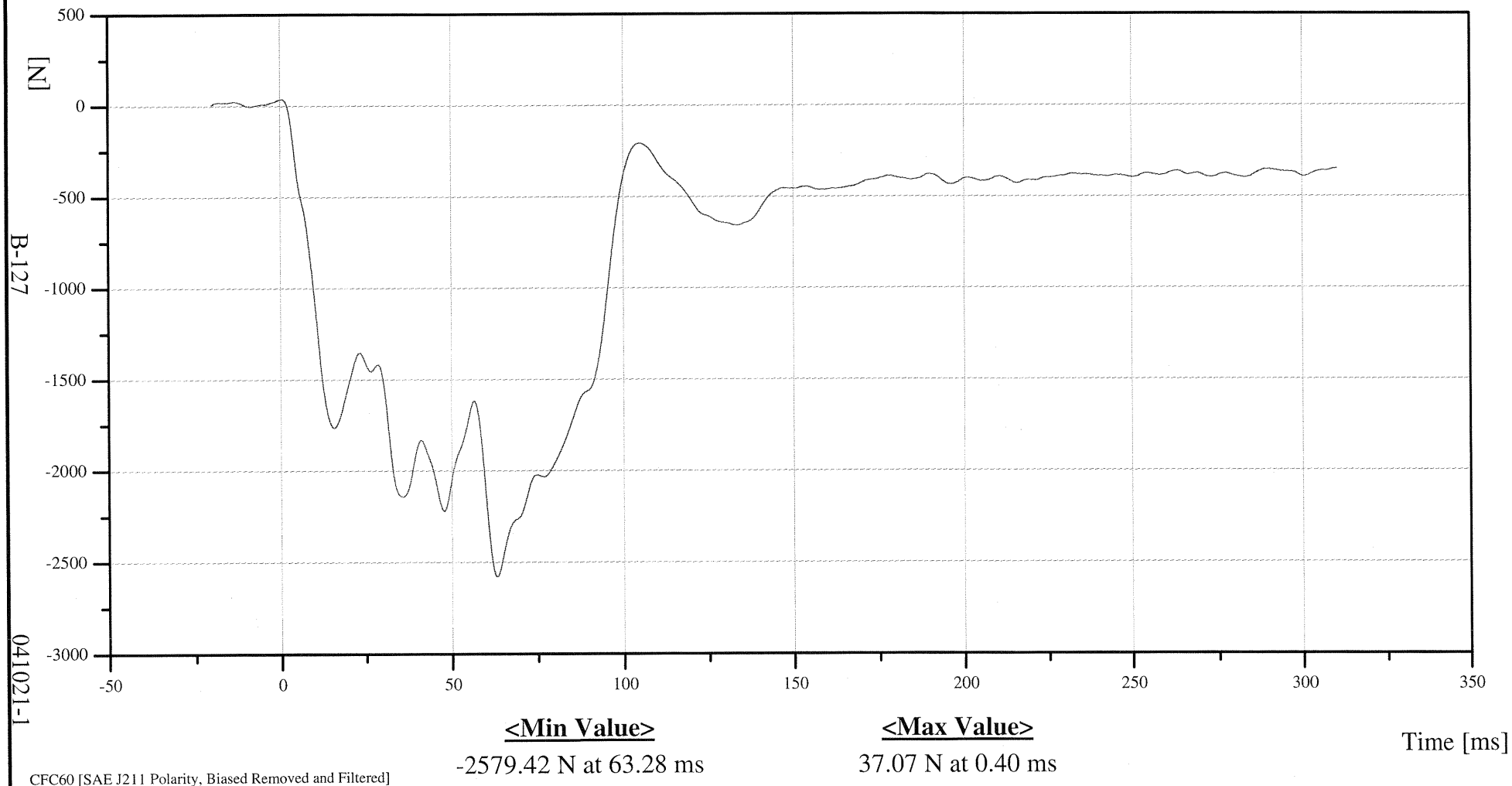
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0802





Transportation Research Center, Inc.

ROW 8 COLUMN 3

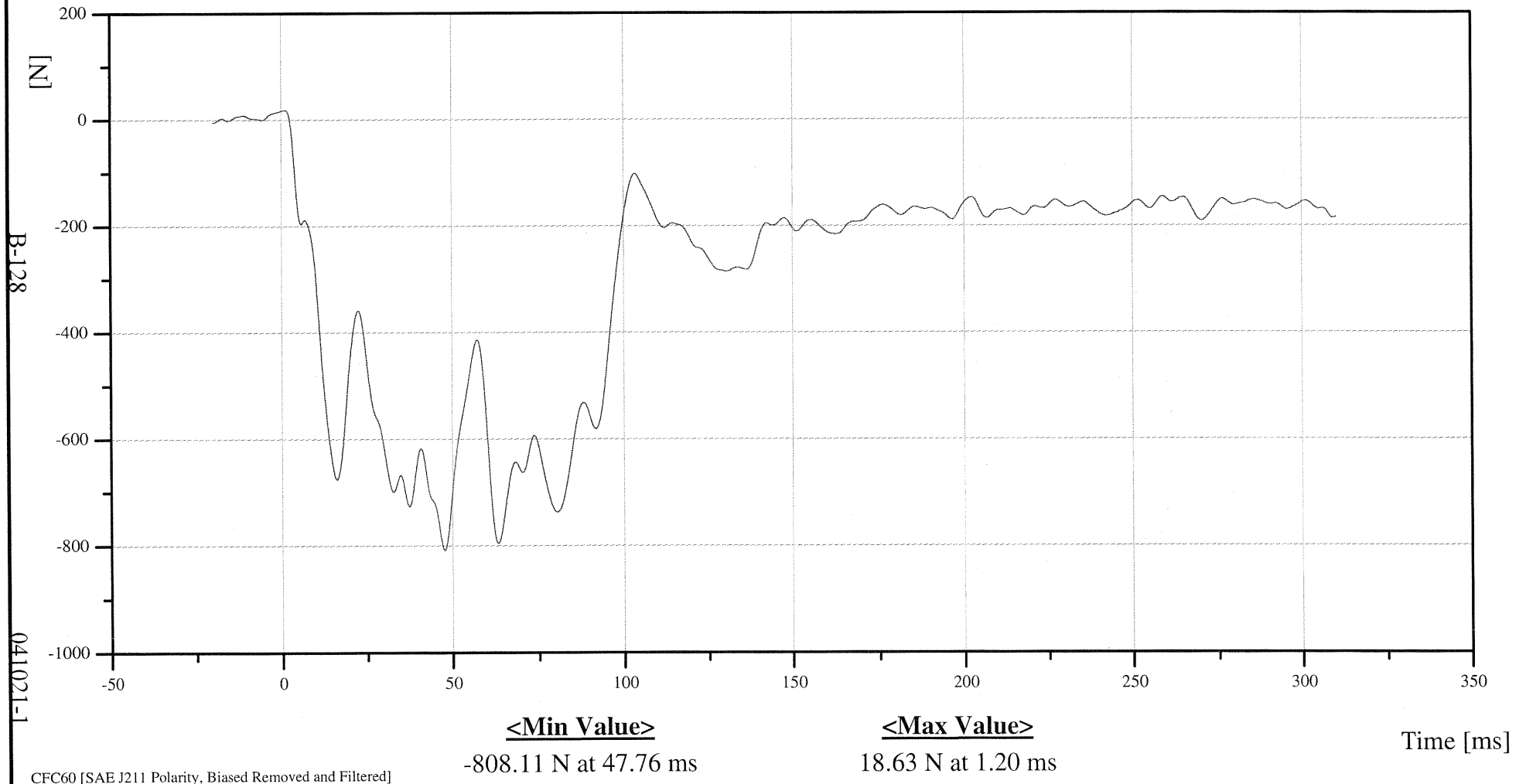
Date: 10/21/2004
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0803





Transportation Research Center, Inc.

ROW 8 COLUMN 4

Date: 10/21/2004

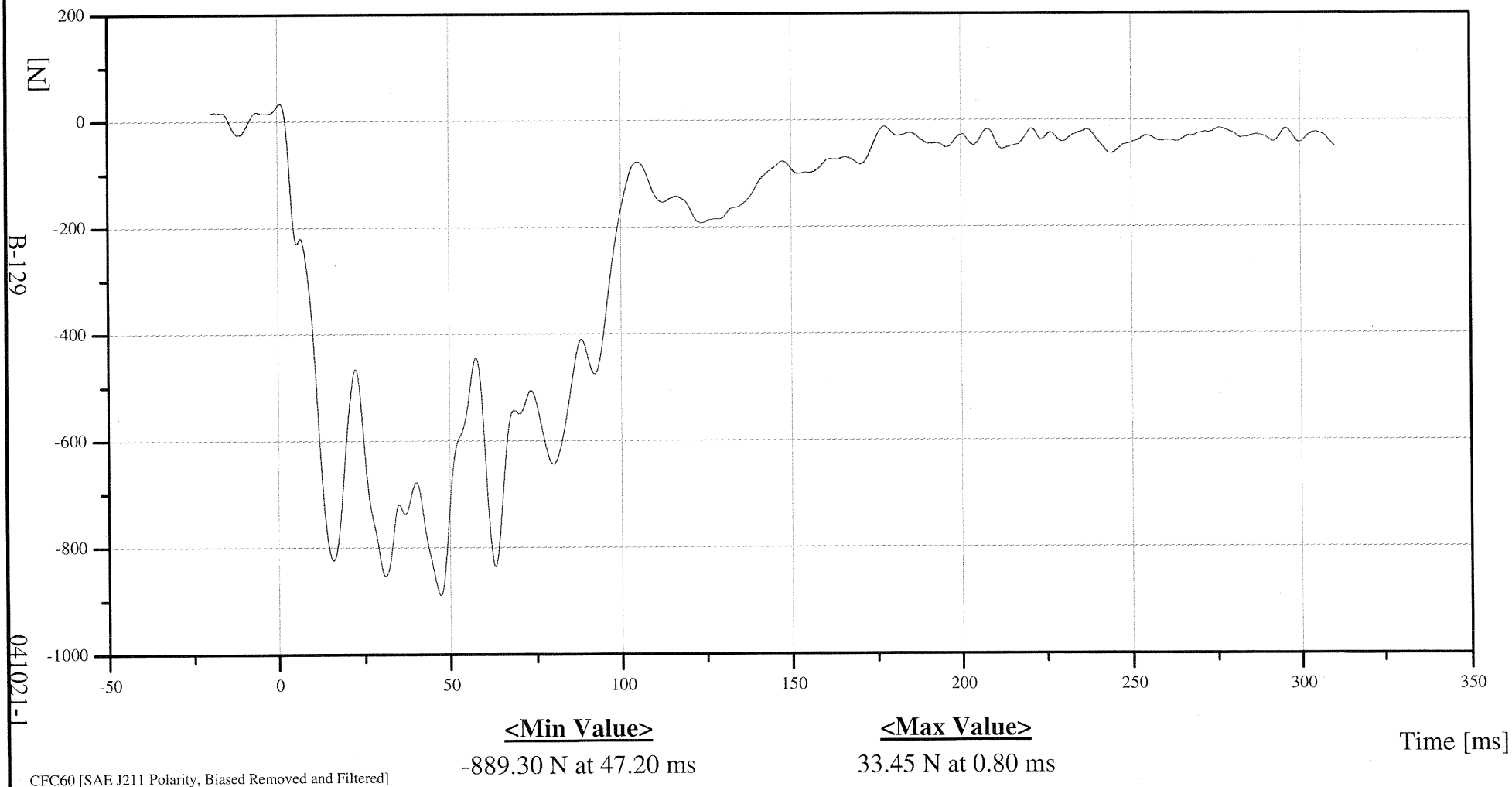
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0804





Transportation Research Center, Inc.

ROW 8 COLUMN 5

Date: 10/21/2004

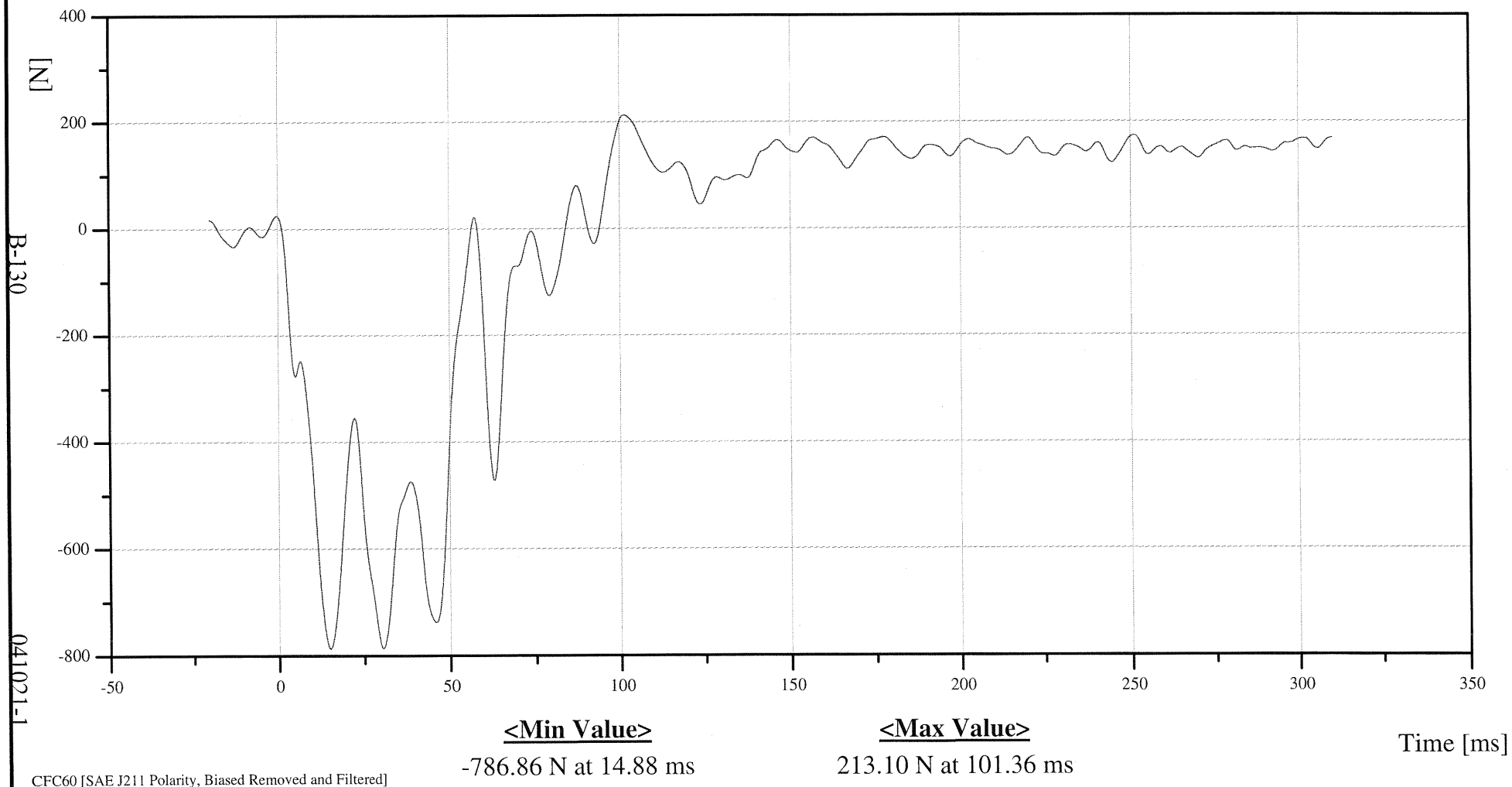
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0805





Transportation Research Center, Inc.

ROW 8 COLUMN 6

Date: 10/21/2004

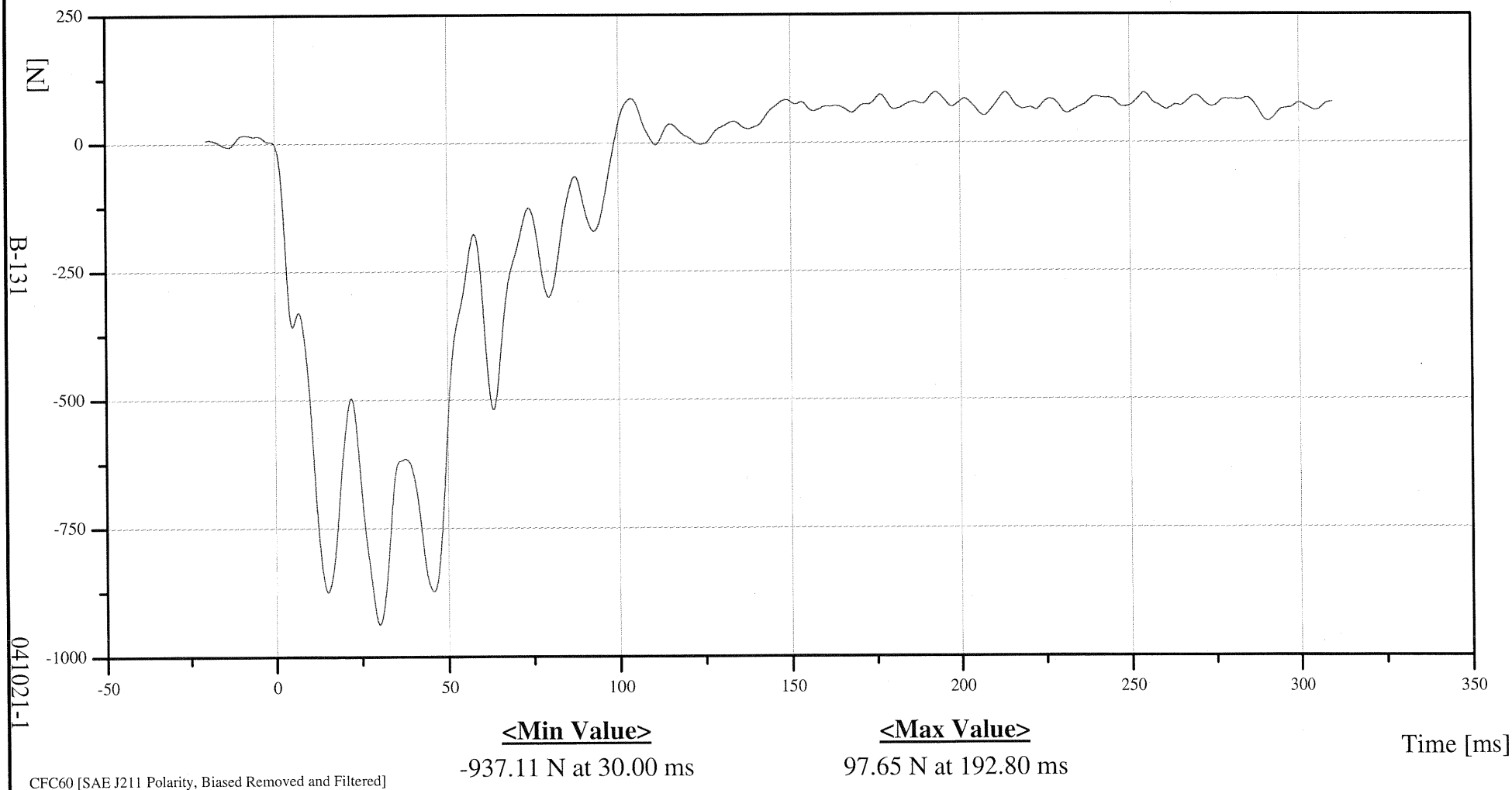
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0806





Transportation Research Center, Inc.

ROW 8 COLUMN 7

Date: 10/21/2004

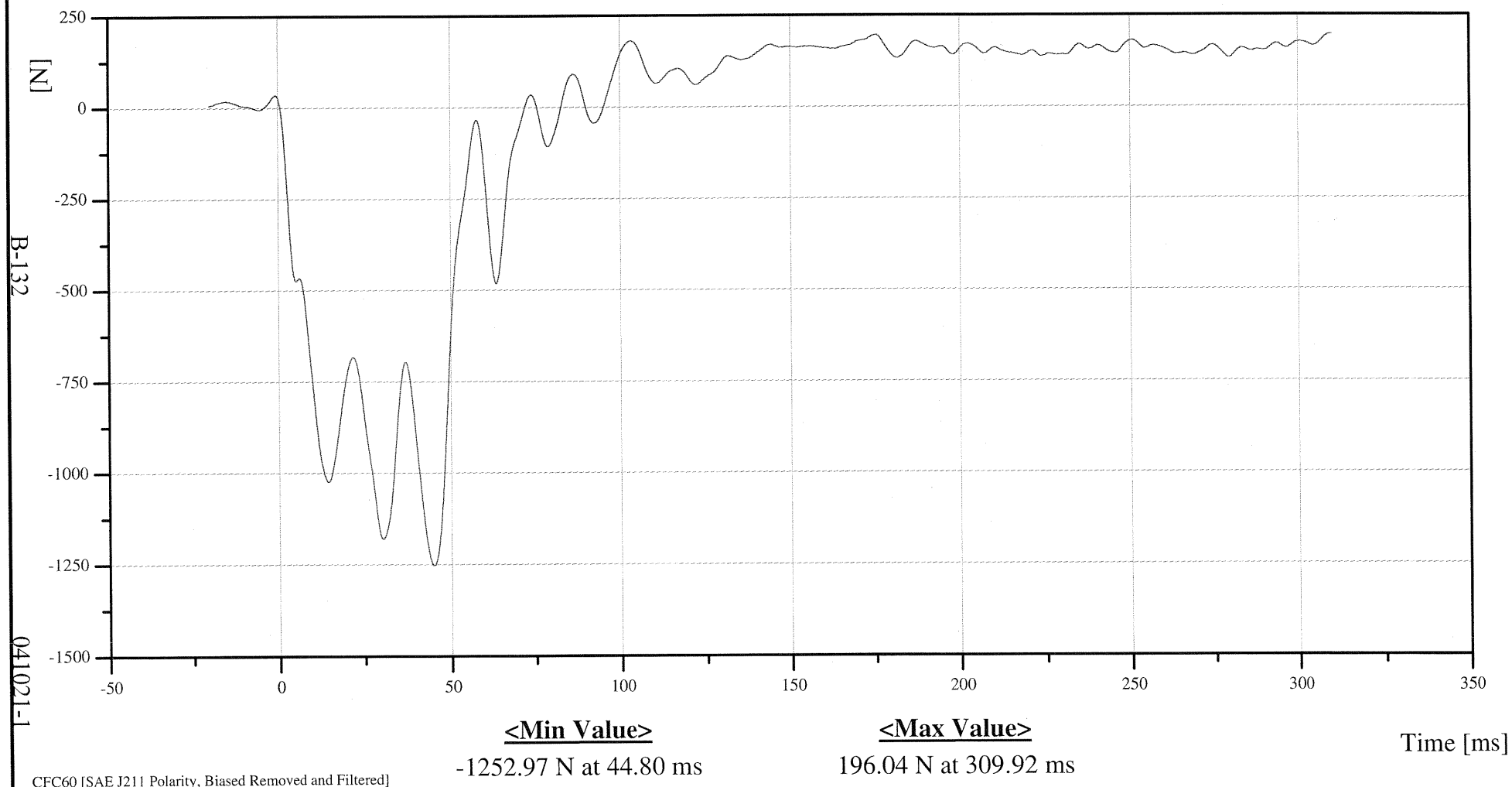
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0807





Transportation Research Center, Inc.

ROW 8 COLUMN 8

Date: 10/21/2004

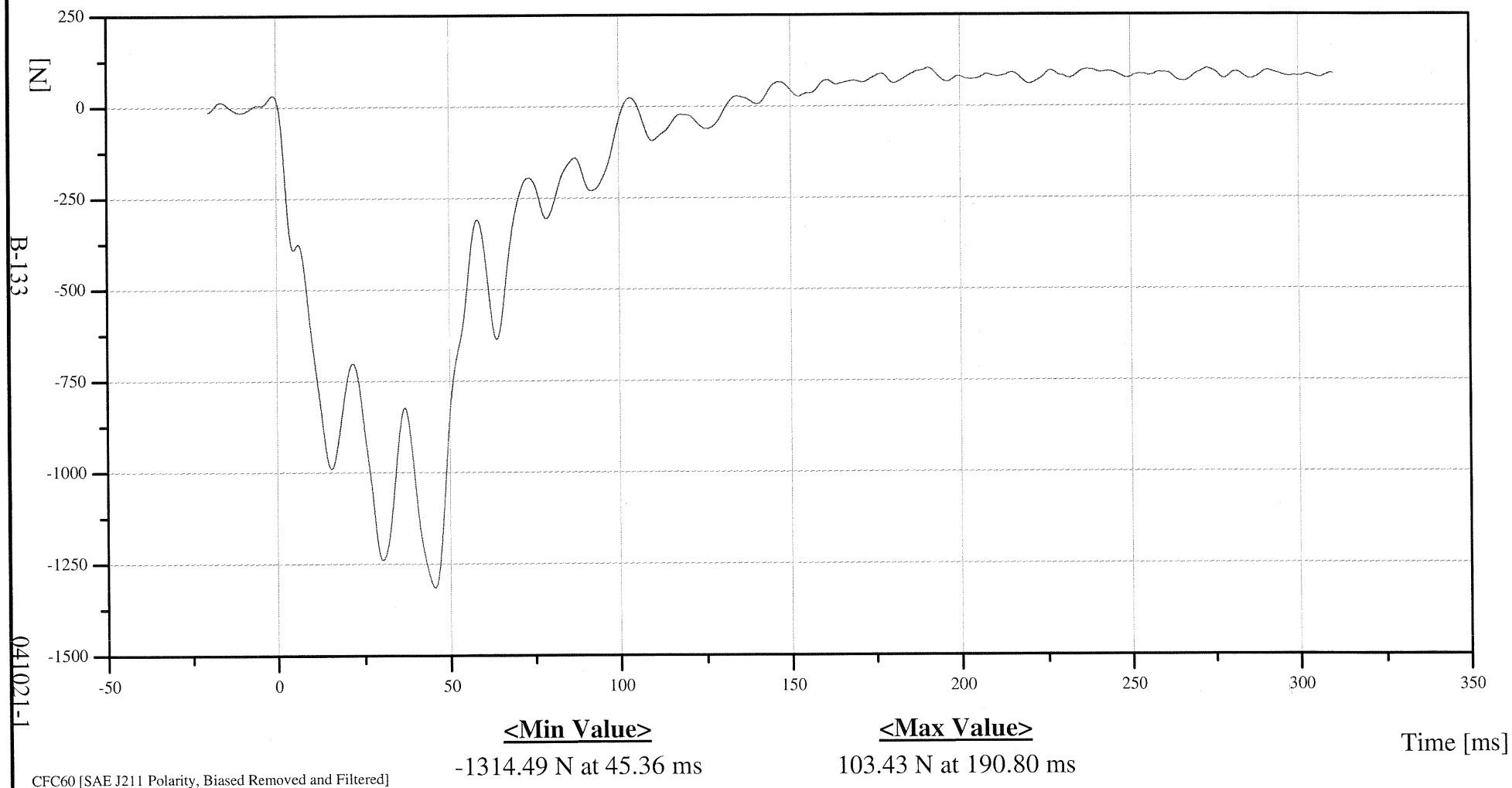
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0808





Transportation Research Center, Inc.

ROW 8 COLUMN 9

Date: 10/21/2004

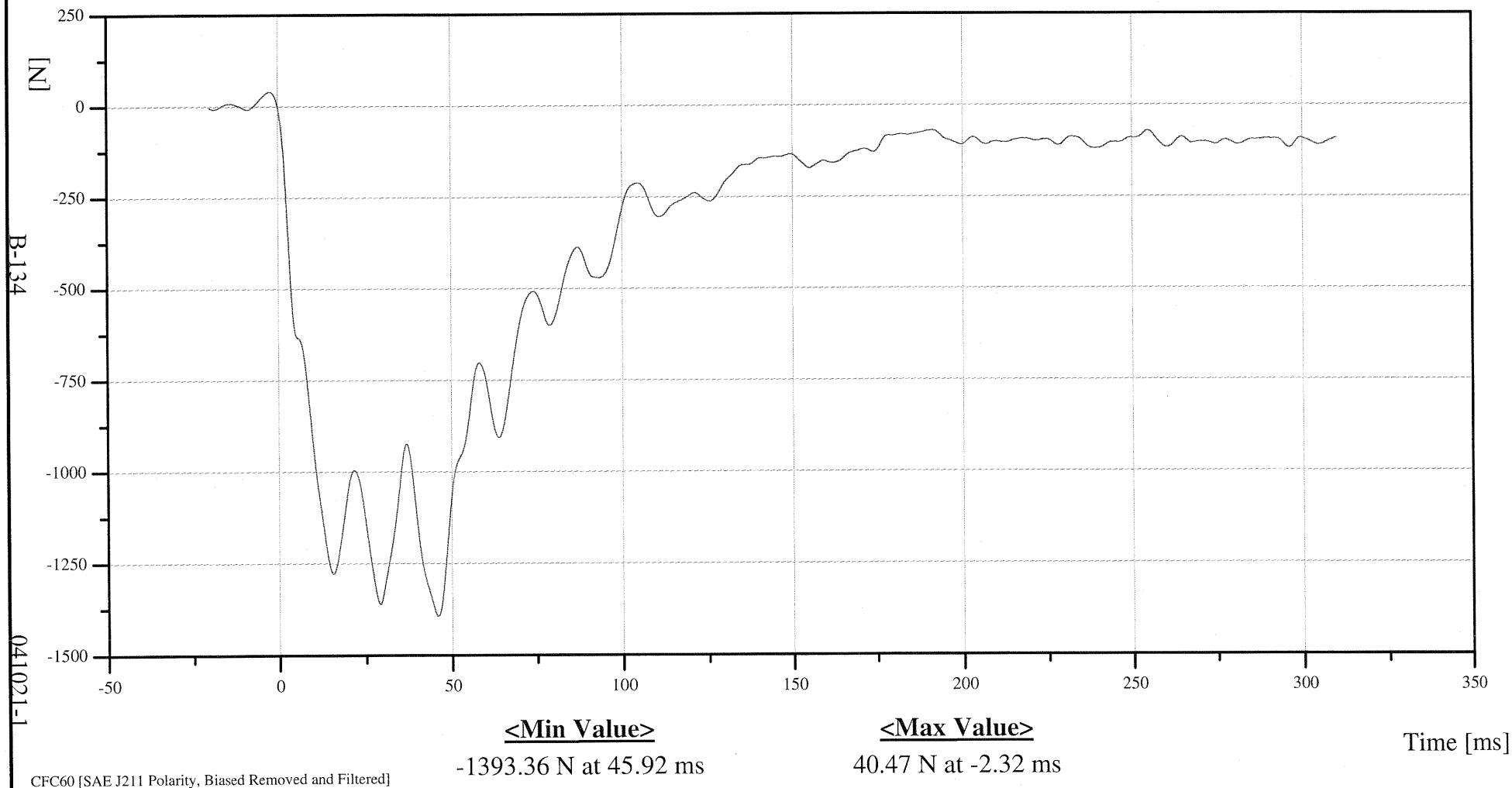
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0809





Transportation Research Center, Inc.

ROW 8 COLUMN 10

Date: 10/21/2004

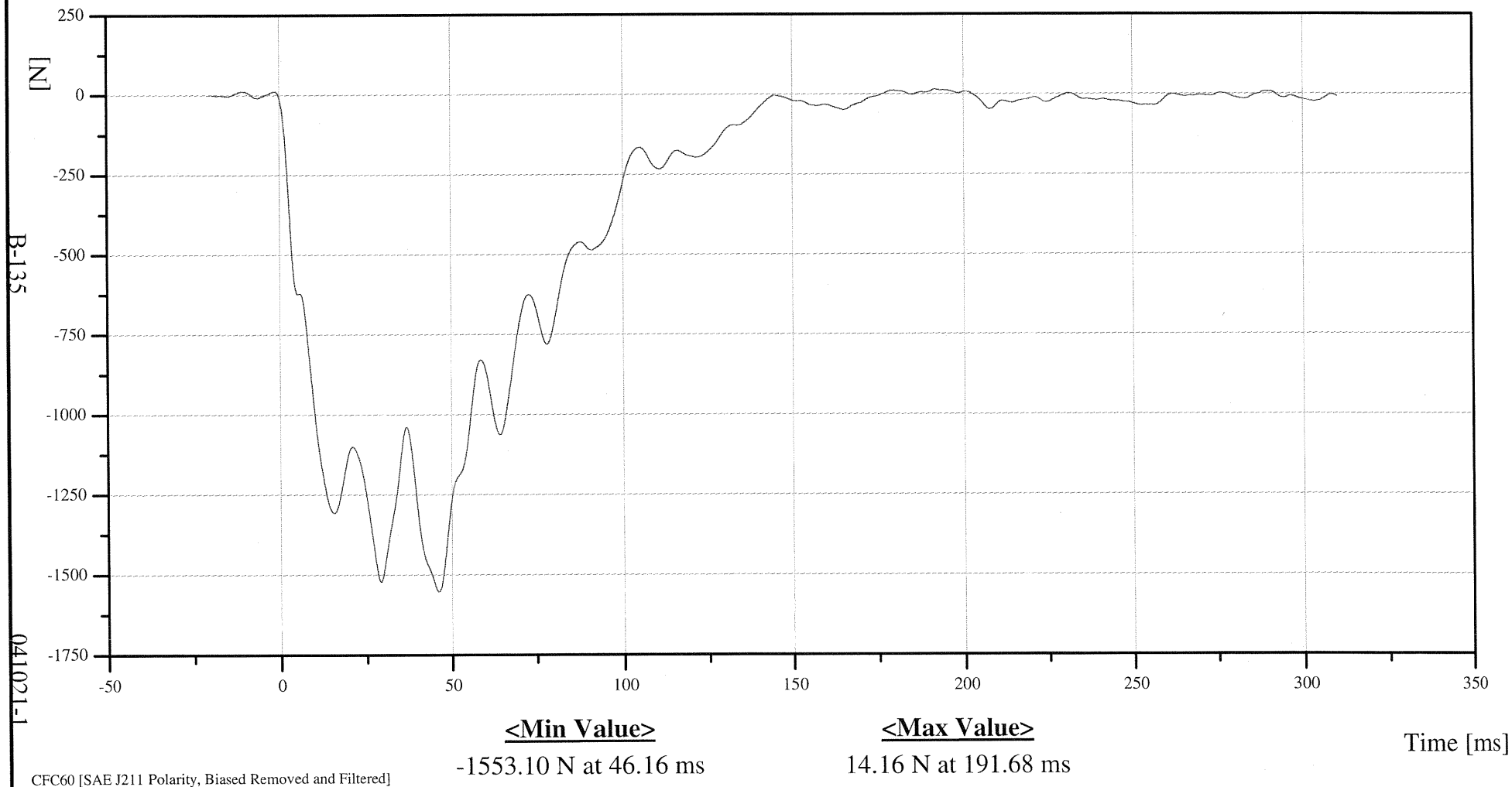
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0810





Transportation Research Center, Inc.

ROW 8 COLUMN 11

Date: 10/21/2004

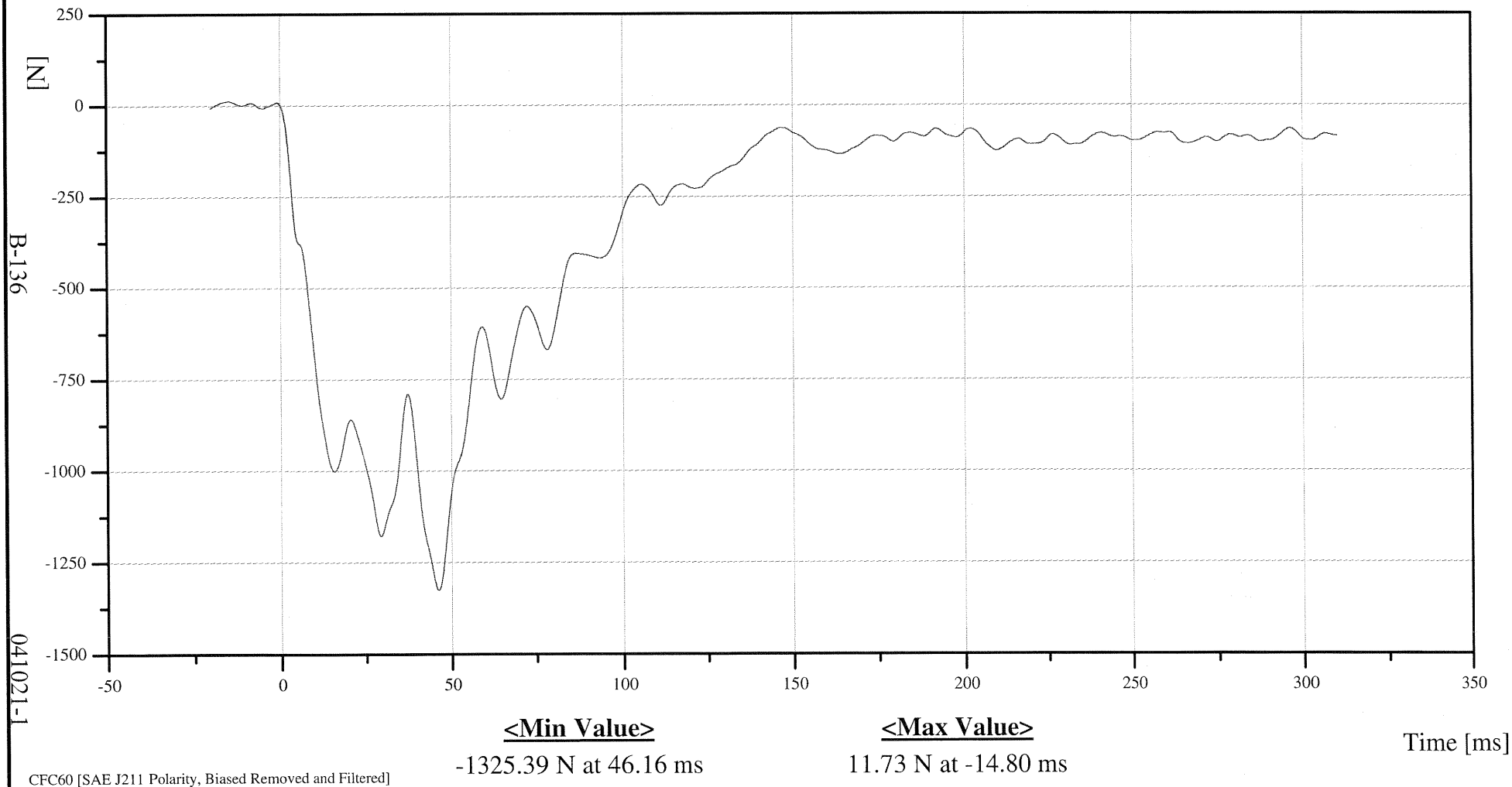
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0811





Transportation Research Center, Inc.

ROW 8 COLUMN 12

Date: 10/21/2004

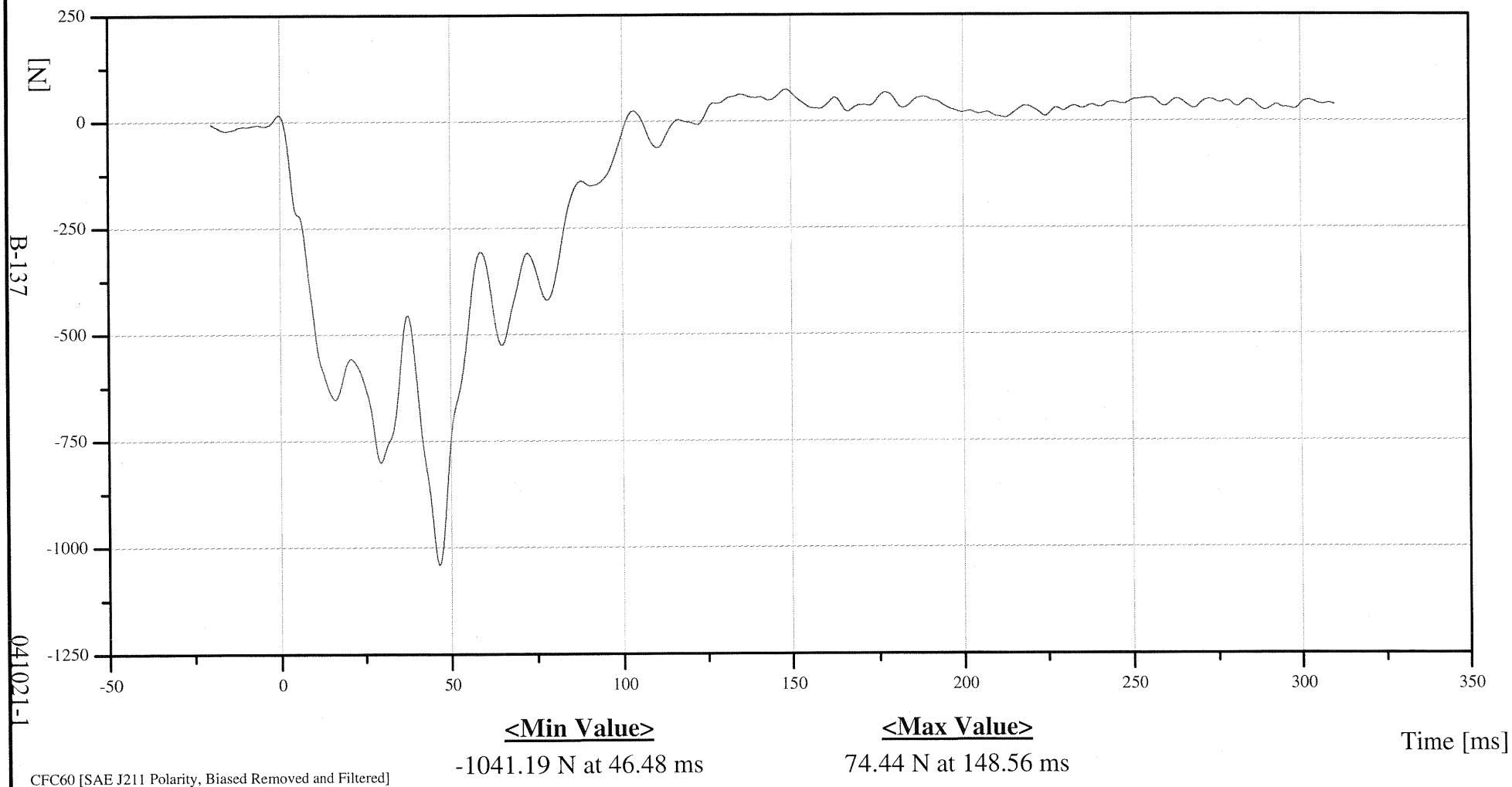
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0812





Transportation Research Center, Inc.

ROW 8 COLUMN 13

Date: 10/21/2004

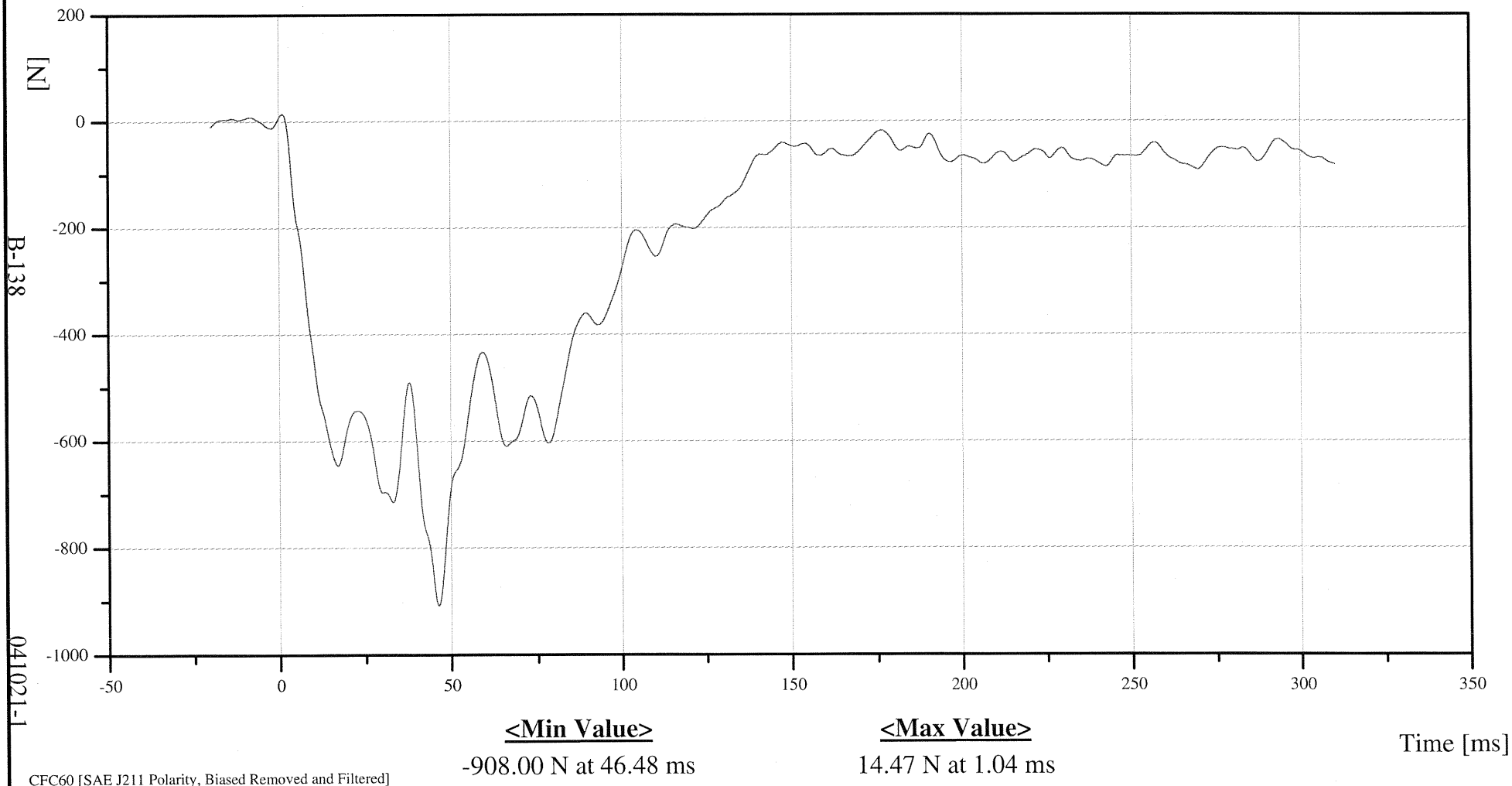
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0813





Transportation Research Center, Inc.

ROW 8 COLUMN 14

Date: 10/21/2004

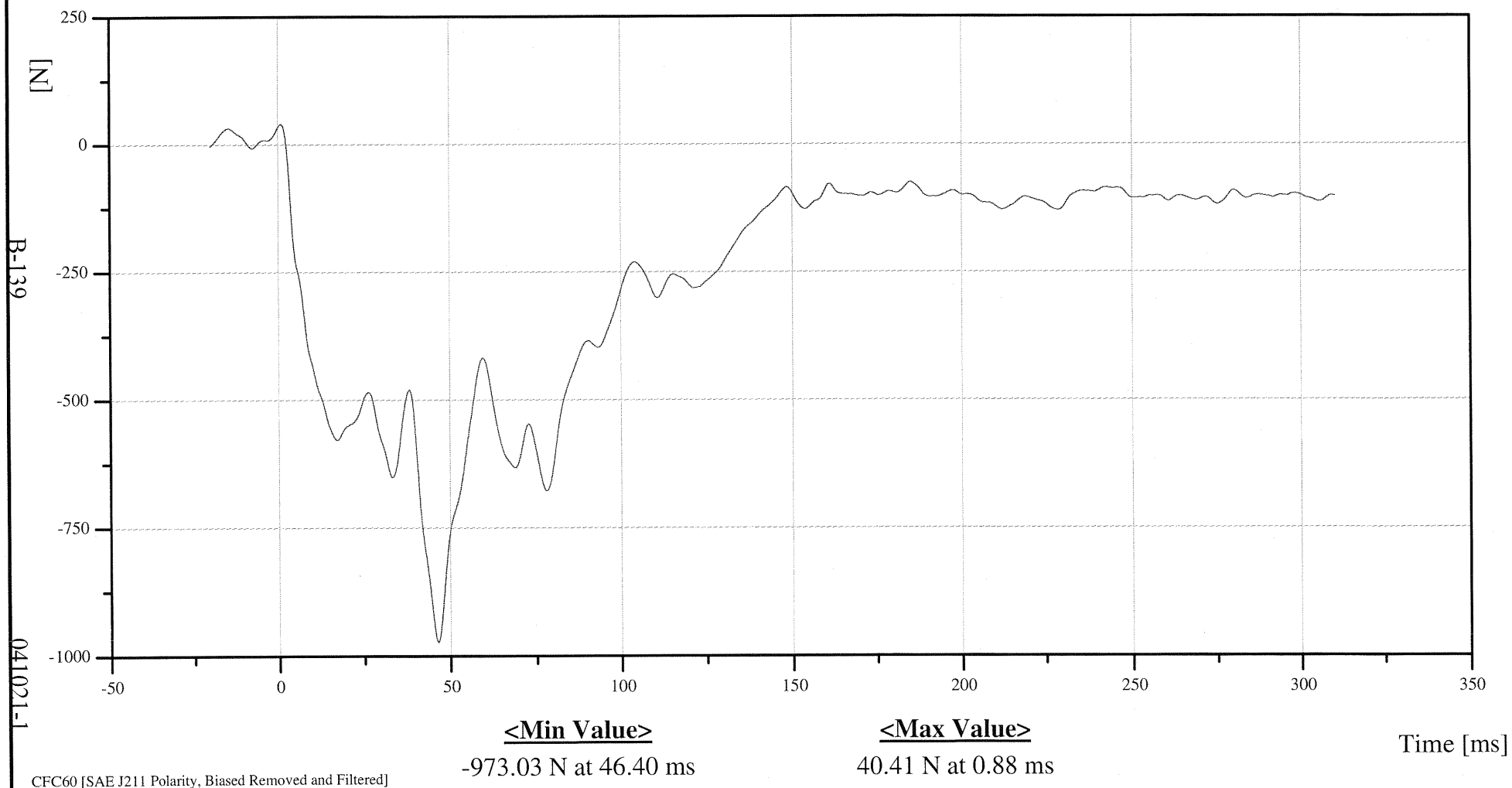
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0814





Transportation Research Center, Inc.

ROW 8 COLUMN 15

Date: 10/21/2004

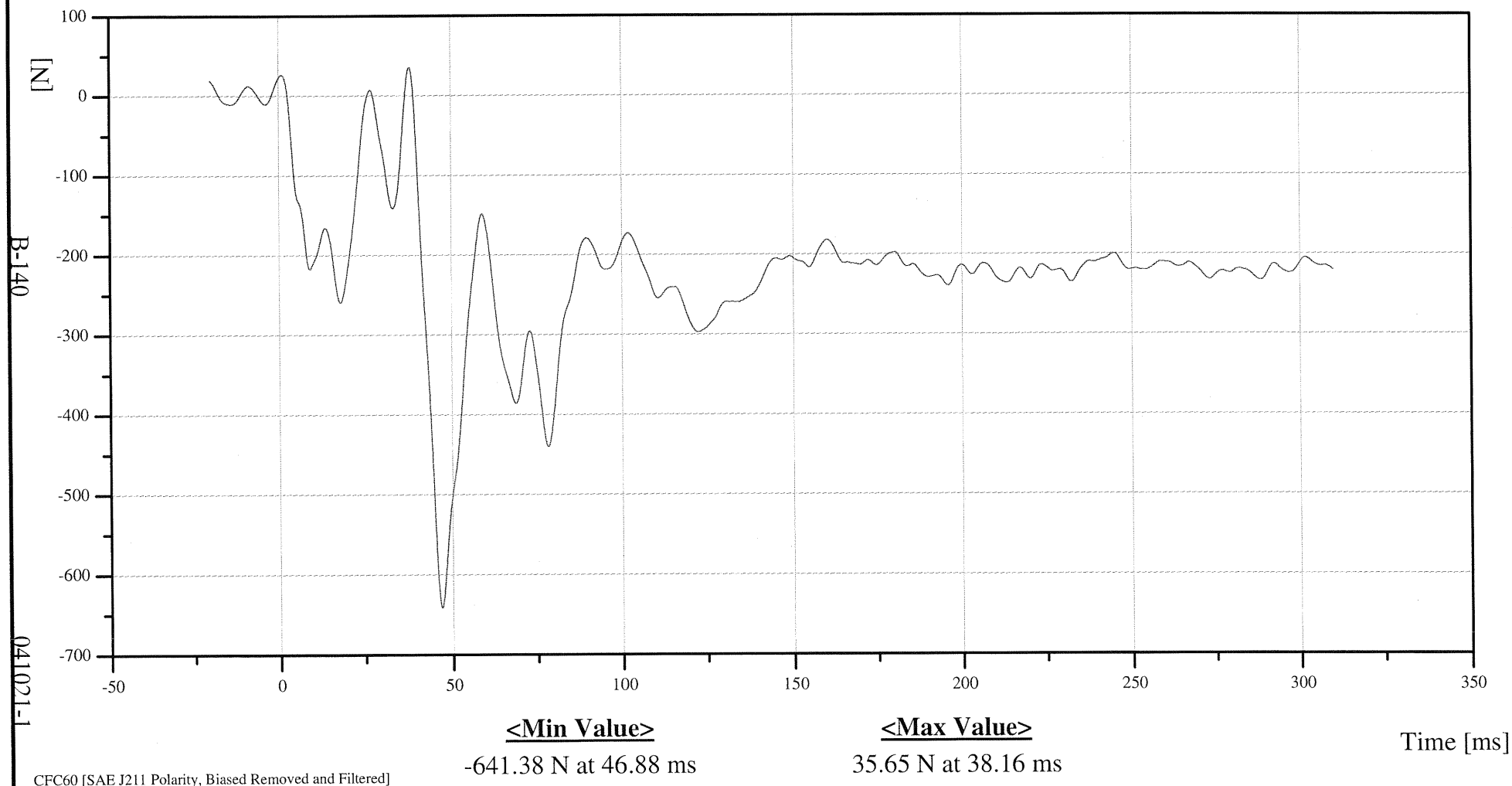
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0815





Transportation Research Center, Inc.

ROW 8 COLUMN 16

Date: 10/21/2004

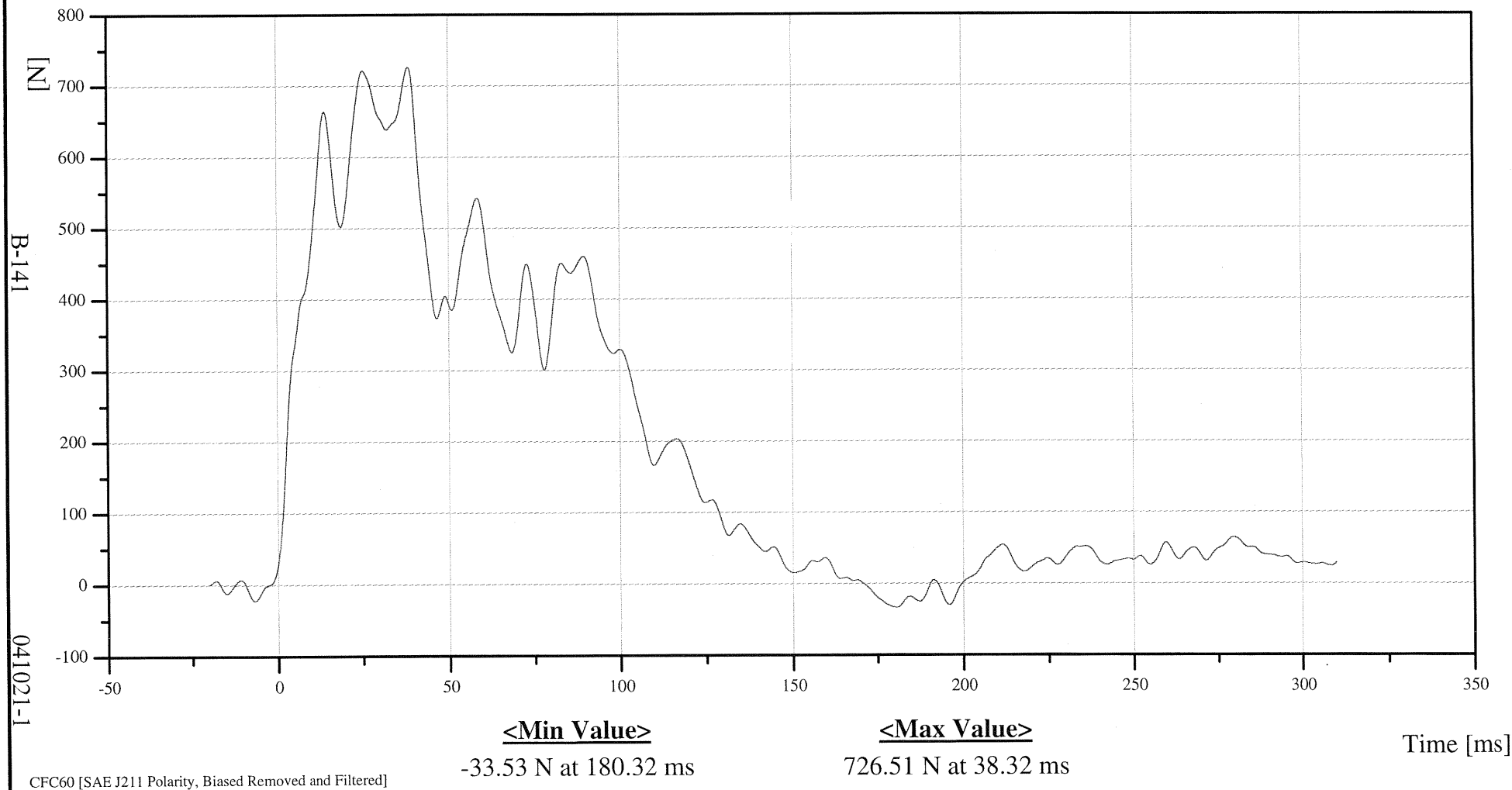
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0816





Transportation Research Center, Inc.

ROW 9 COLUMN 6

Date: 10/21/2004

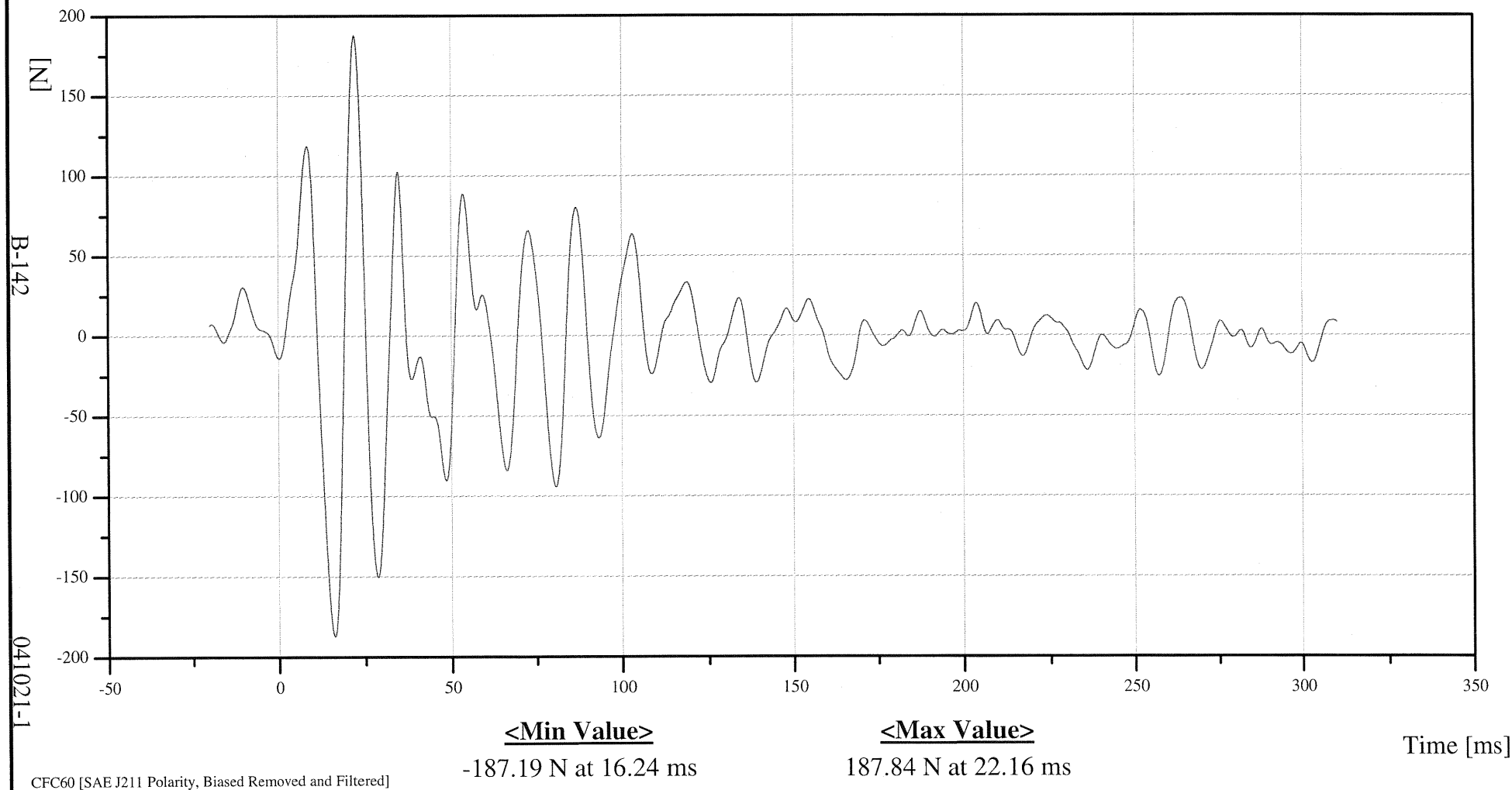
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0906





Transportation Research Center, Inc.

ROW 9 COLUMN 7

Date: 10/21/2004

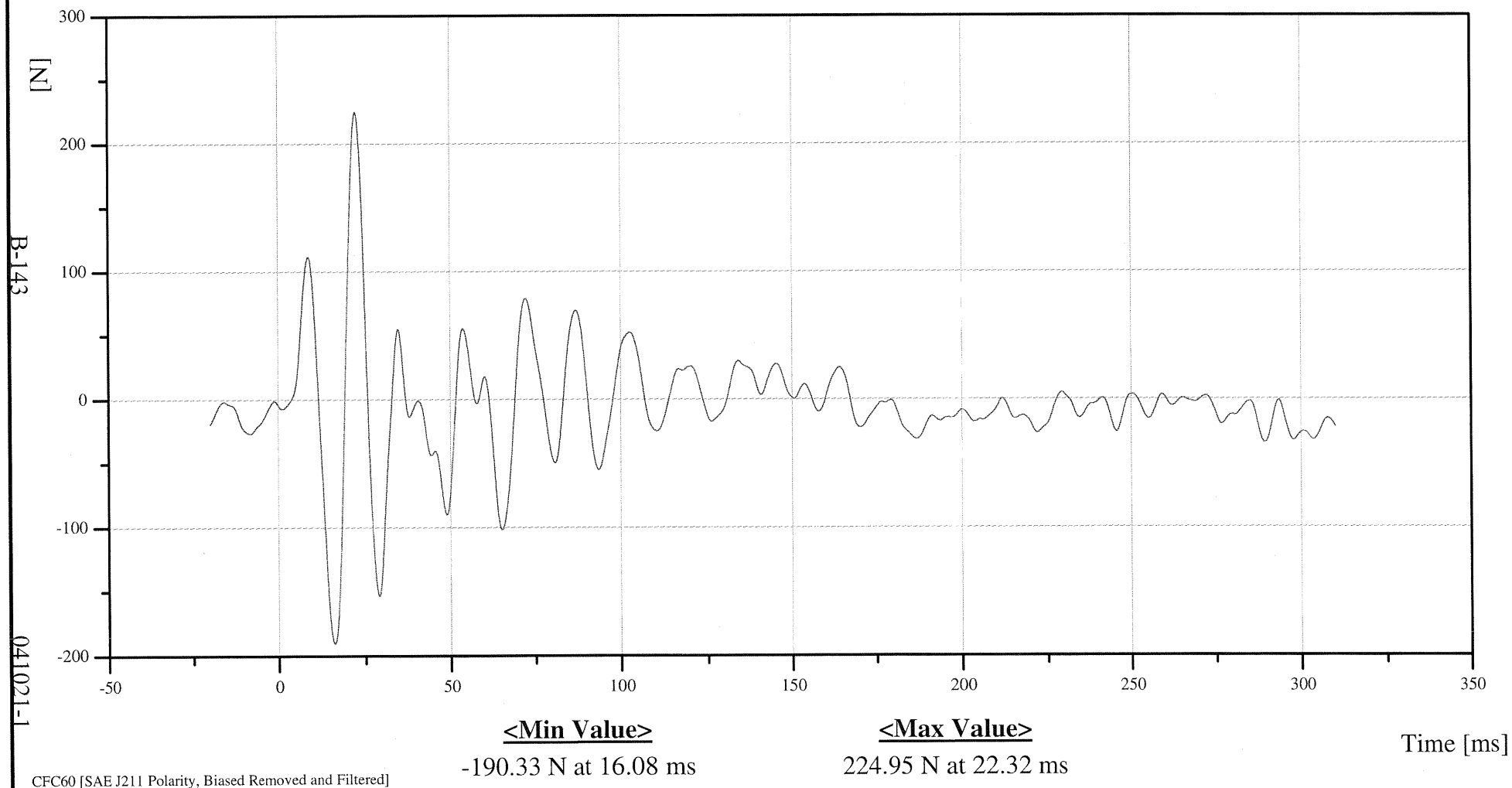
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0907





Transportation Research Center, Inc.

ROW 9 COLUMN 8

Date: 10/21/2004

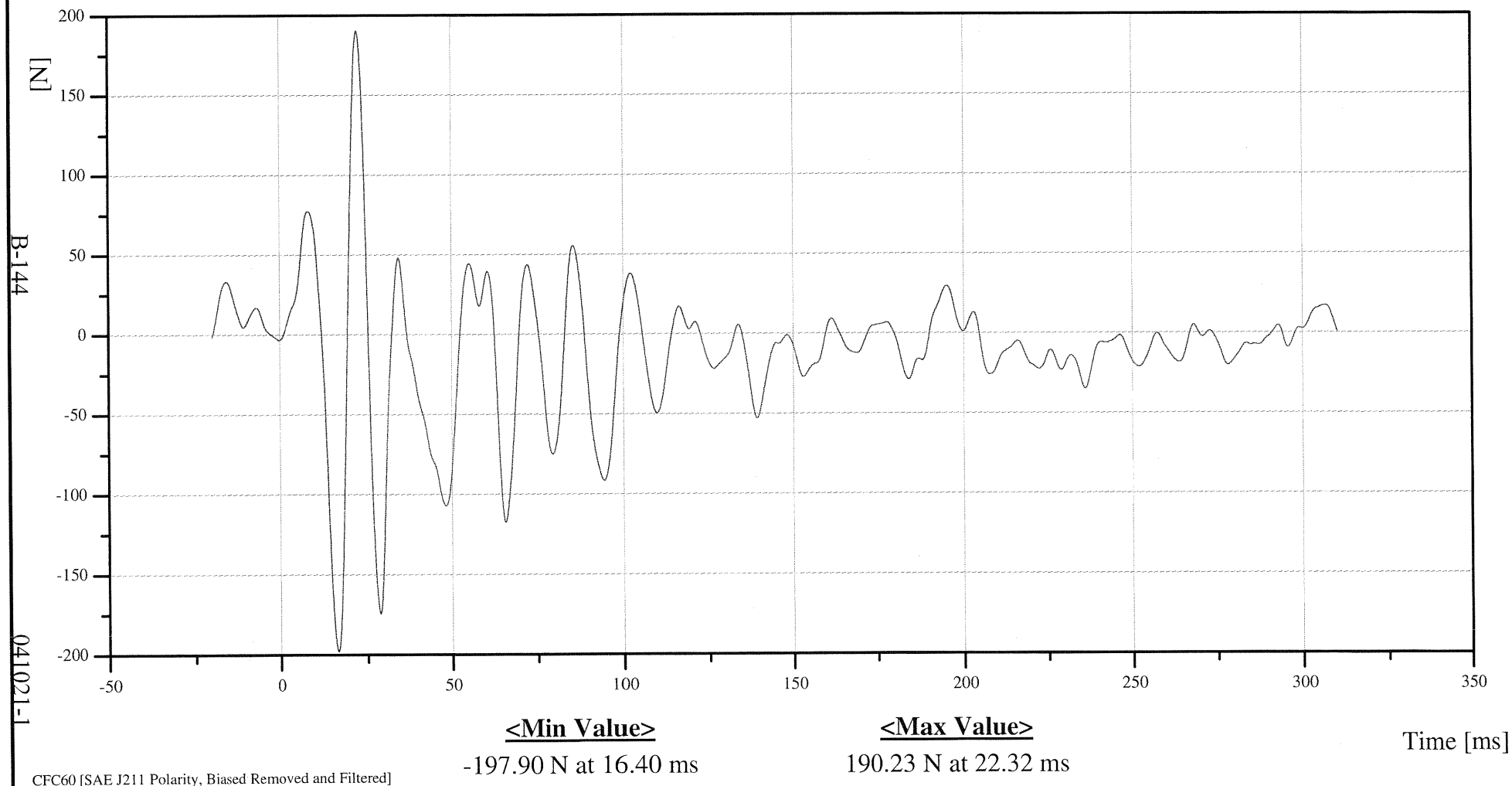
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0908





Transportation Research Center, Inc.

ROW 9 COLUMN 9

Date: 10/21/2004

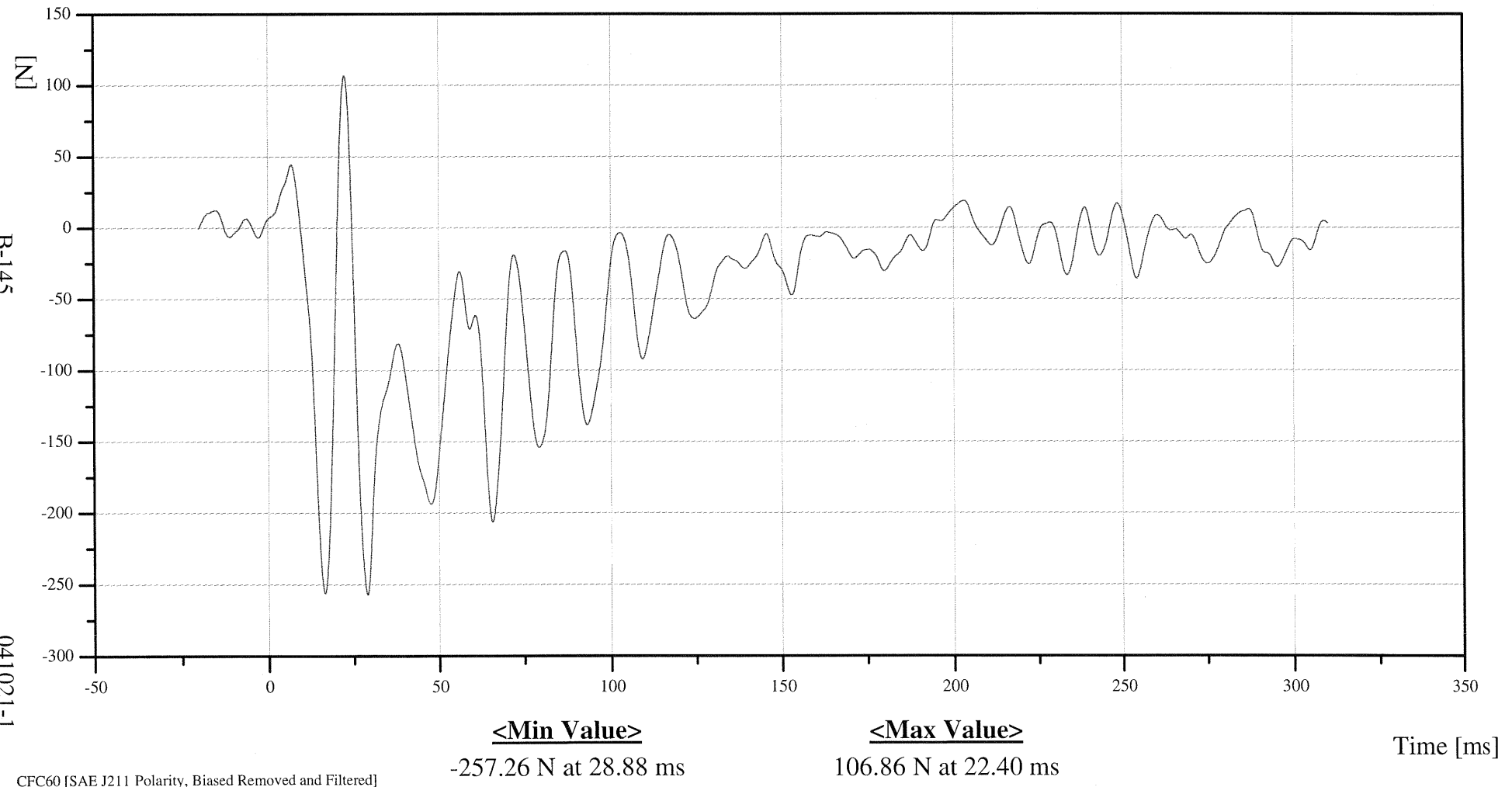
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0909





Transportation Research Center, Inc.

ROW 9 COLUMN 10

Date: 10/21/2004

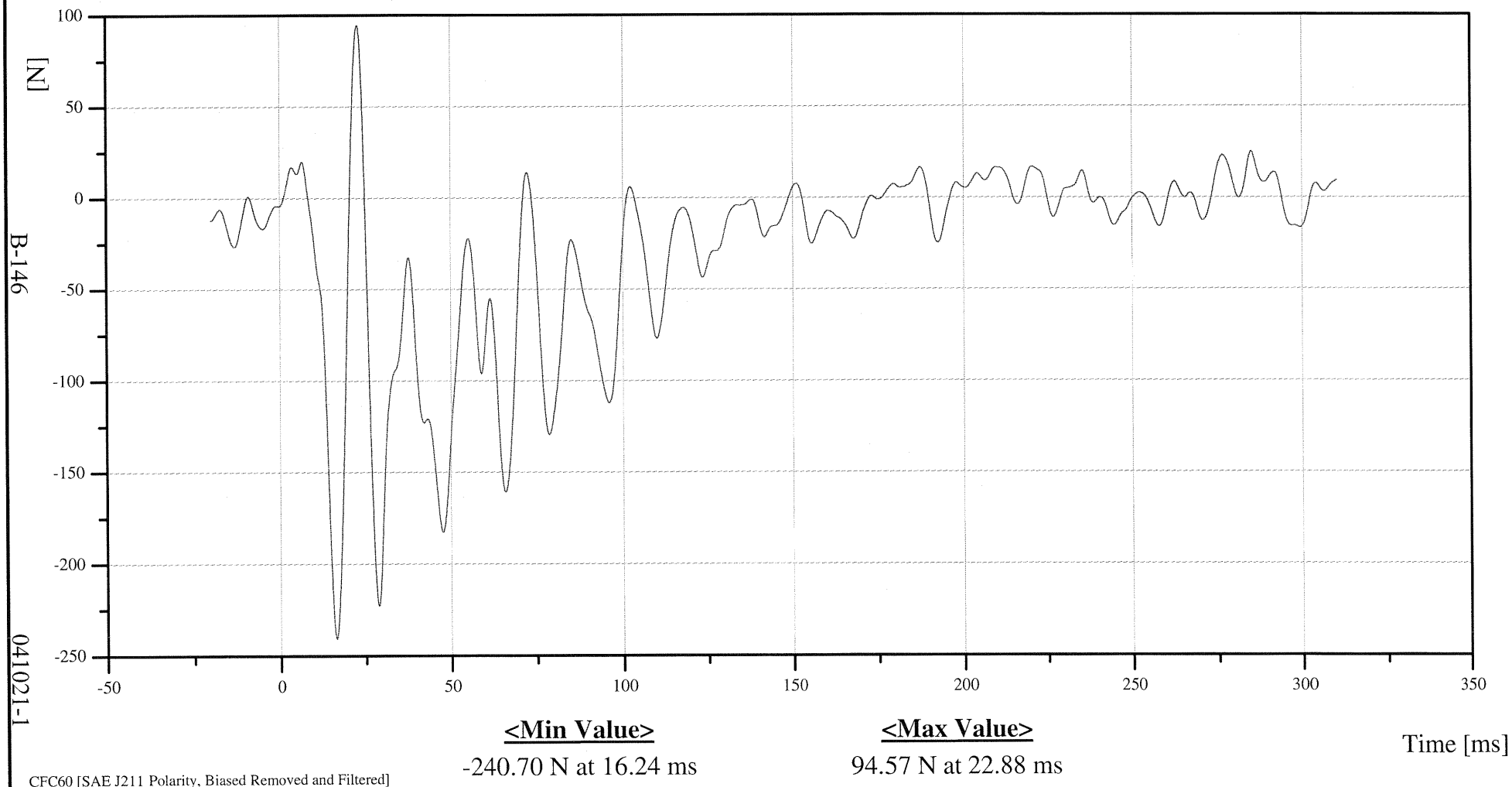
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0910





Transportation Research Center, Inc.

ROW 9 COLUMN 11

Date: 10/21/2004

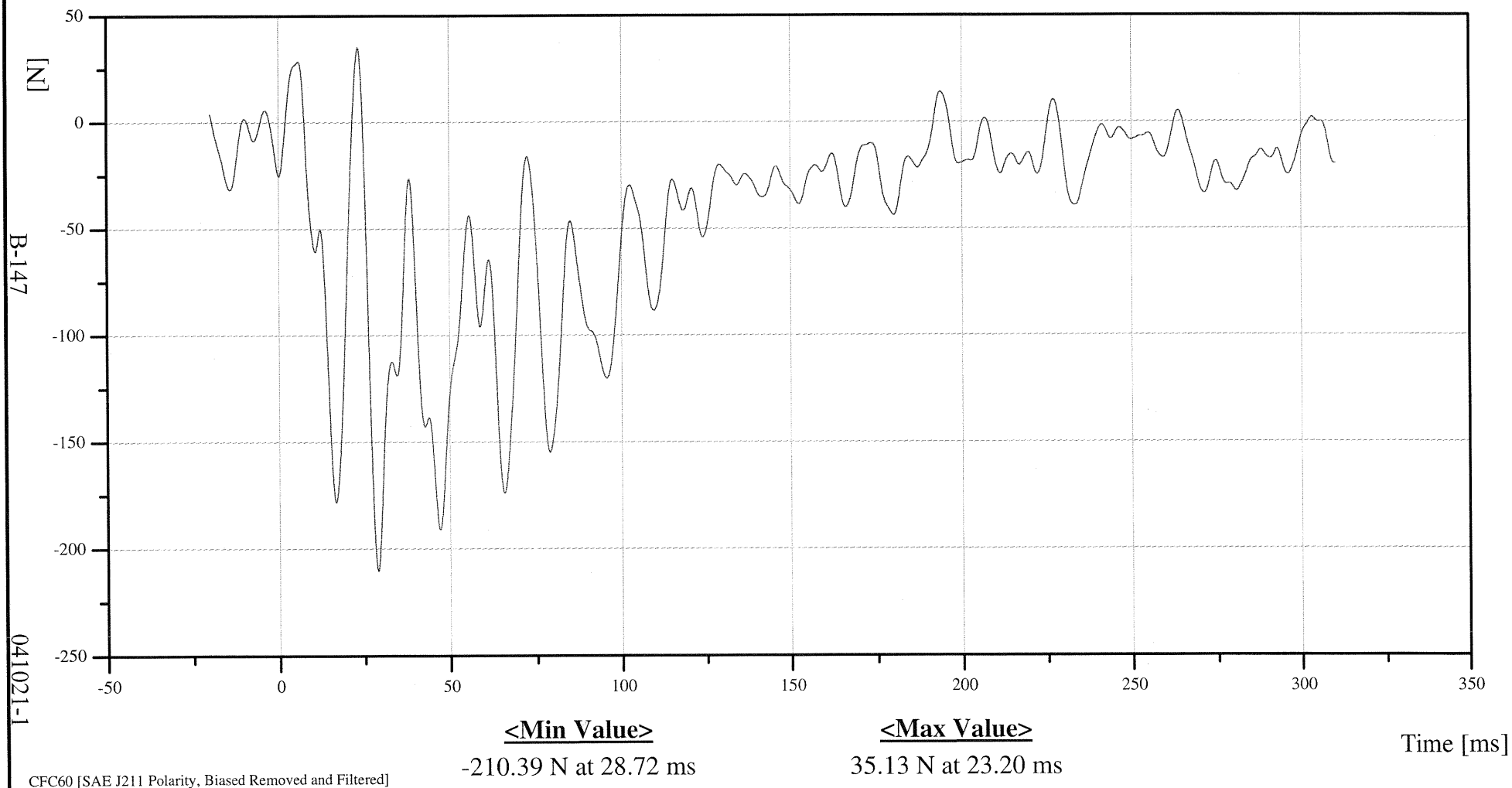
Time: 11:48:25

Test Lab: CTF

Customer: VRTC

Test Number: 041021-1

LC0911



Appendix C

Miscellaneous Test Information

Channel Report

10/21/2004 7:47:14 AM

Name of Test 041021-1

System MINIDAU

Name of DAU DAUC

Chan.#	Sensor #	Mnemonic	Description	Dir.	Range	Pol.	Cal.	Group	Mfg.	Model
C-2 <										

C-2

041021-1

Channel Report

10/21/2004 7:47:15 AM

Name of Test 041021-1

System MINIDAU

Name of DAU DAUD

Chan.#	Sensor #	Mnemonic	Description	Dir.	Range	Pol.	Cal.	Group	Mfg.	Model
0001	398390125	LC0301	ROW 3 COLUMN 1		500176.82 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0002	398390004	LC0302	ROW 3 COLUMN 2		500298.02 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0003	398390051	LC0303	ROW 3 COLUMN 3		500298.02 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0004	398390042	LC0304	ROW 3 COLUMN 4		499816.96 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0005	398390011	LC0305	ROW 3 COLUMN 5		500057.13 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0006	398390117	LC0306	ROW 3 COLUMN 6		500298.02 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0007	398390066	LC0307	ROW 3 COLUMN 7		499692.08 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0008	398390045	LC0308	ROW 3 COLUMN 8		499943.36 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0009	398390077	LC0309	ROW 3 COLUMN 9		500056.15 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0010	398390029	LC0310	ROW 3 COLUMN 10		499750.85 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0011	398390100	LC0311	ROW 3 COLUMN 11		499874.29 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0012	398390102	LC0312	ROW 3 COLUMN 12		500056.15 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0013	398390091	LC0313	ROW 3 COLUMN 13		500176.82 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0014	398390012	LC0314	ROW 3 COLUMN 14		499943.36 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0015	398390017	LC0315	ROW 3 COLUMN 15		500252.81 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0016	398390081	LC0316	ROW 3 COLUMN 16		500180.72 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0017	398390040	LC0401	ROW 4 COLUMN 1		499692.08 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0018	398390007	LC0402	ROW 4 COLUMN 2		499933.11 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0019	398390071	LC0403	ROW 4 COLUMN 3		500056.15 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0020	398390094	LC0404	ROW 4 COLUMN 4		499994.14 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0021	398390067	LC0405	ROW 4 COLUMN 5		499943.36 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0022	398390086	LC0406	ROW 4 COLUMN 6		500176.82 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0023	398390118	LC0407	ROW 4 COLUMN 7		500056.15 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0024	398390101	LC0408	ROW 4 COLUMN 8		500056.15 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0025	398390073	LC0409	ROW 4 COLUMN 9		500056.15 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0026	398390047	LC0410	ROW 4 COLUMN 10		500298.02 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0027	398390099	LC0411	ROW 4 COLUMN 11		499692.08 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0028	398390080	LC0412	ROW 4 COLUMN 12		499708.66 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0029	398390097	LC0413	ROW 4 COLUMN 13		500180.72 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0030	398390048	LC0414	ROW 4 COLUMN 14		500056.15 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0031	398390061	LC0415	ROW 4 COLUMN 15		499933.11 N	-	12/10/2003	---	VRTC	KYOWA F99-1875
0032	398390005	LC0416	ROW 4 COLUMN 16		500240.10 N	-	12/10/2003	---	VRTC	KYOWA F99-1875

C-3

041021-1

Channel Report

10/21/2004 7:47:15 AM

Name of Test 041021-1

System MINIDAU

Name of DAU DAUE

Chan.#	Sensor #	Mnemonic	Description	Dir.	Range	Pol.	Cal.	Group	Mfg.	Model
0001	398390027	LC0701	ROW 7 COLUMN 1		500180.72	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0002	398390111	LC0702	ROW 7 COLUMN 2		499994.14	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0003	398390072	LC0703	ROW 7 COLUMN 3		500125.03	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0004	398390106	LC0704	ROW 7 COLUMN 4		499933.11	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0005	398390056	LC0705	ROW 7 COLUMN 5		500180.72	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0006	398390114	LC0706	ROW 7 COLUMN 6		499755.97	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0007	398390068	LC0707	ROW 7 COLUMN 7		500331.76	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0008	398390057	LC0708	ROW 7 COLUMN 8		500180.72	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0009	398390049	LC0709	ROW 7 COLUMN 9		499692.08	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0010	398390131	LC0710	ROW 7 COLUMN 10		500125.03	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0011	398390018	LC0711	ROW 7 COLUMN 11		499750.85	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0012	398390084	LC0712	ROW 7 COLUMN 12		500122.10	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0013	398390062	LC0713	ROW 7 COLUMN 13		499874.29	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0014	398390078	LC0714	ROW 7 COLUMN 14		499933.11	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0015	398390127	LC0715	ROW 7 COLUMN 15		499692.08	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0016	398390021	LC0716	ROW 7 COLUMN 16		499874.29	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0017	398390133	LC0801	ROW 8 COLUMN 1		499874.29	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0018	398390039	LC0802	ROW 8 COLUMN 2		499750.85	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0019	398390085	LC0803	ROW 8 COLUMN 3		500298.02	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0020	398390059	LC0804	ROW 8 COLUMN 4		500125.03	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0021	398390116	LC0805	ROW 8 COLUMN 5		500176.82	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0022	398390013	LC0806	ROW 8 COLUMN 6		499933.11	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0023	398390119	LC0807	ROW 8 COLUMN 7		500122.10	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0024	398390107	LC0808	ROW 8 COLUMN 8		500122.10	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0025	398390095	LC0809	ROW 8 COLUMN 9		499755.97	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0026	398390103	LC0810	ROW 8 COLUMN 10		499750.85	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0027	398390129	LC0811	ROW 8 COLUMN 11		499692.08	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0028	398390058	LC0812	ROW 8 COLUMN 12		499874.29	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0029	398390126	LC0813	ROW 8 COLUMN 13		499692.08	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0030	398390108	LC0814	ROW 8 COLUMN 14		499755.97	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0031	398390025	LC0815	ROW 8 COLUMN 15		500176.82	N	- 12/10/2003	---	VRTC	KYOWA F99-1875
0032	398390070	LC0816	ROW 8 COLUMN 16		500252.81	N	- 12/10/2003	---	VRTC	KYOWA F99-1875

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Channel Report

10/21/2004 7:47:15 AM

0033	398390109	LC0906	ROW 9 COLUMN 6	500122.10	N	-	12/10/2003	---	VRTC	KYOWA	F99-1875
0034	398390044	LC0907	ROW 9 COLUMN 7	500122.10	N	-	12/10/2003	---	VRTC	KYOWA	F99-1875
0035	398390134	LC0908	ROW 9 COLUMN 8	499960.94	N	-	12/10/2003	---	VRTC	KYOWA	F99-1875
0036	398390115	LC0909	ROW 9 COLUMN 9	499755.97	N	-	12/10/2003	---	VRTC	KYOWA	F99-1875
0038	398390064	LC0911	ROW 9 COLUMN 11	499943.36	N	-	12/10/2003	---	VRTC	KYOWA	F99-1875
0039	EVENT	EVENT	EVENT	5.12	V	+	4/19/2004	OK	-1	TRC	Event
0040	398390110	LC0910	ROW 9 COLUMN 10	499692.08	N	-	12/10/2003	---	VRTC	KYOWA	F99-1875

Channel Report

10/21/2004 7:47:15 AM

Name of Test 041021-1

System MINIDAU

Name of DAU DAUG

Chan.#	Sensor #	Mnemonic	Description	Dir.	Range	Pol.	Cal.	Group	Mfg.	Model
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Channel Report

10/21/2004 7:47:16 AM

Name of Test 041021-1

System MINIDAU

Name of DAU DAUH

Chan.#	Sensor #	Mnemonic	Description	Dir.	Range	Pol.	Cal.	Group	Mfg.	Model
0001	P39854	VCGXG1	Vehicle CG X-axis accel	FWD	1011.9517	g	+ 10/15/2004	OK -1	Endevco	7264C-2K-2-180
0002	P32450	VCGYG1	Vehicle CG Y-axis accel	RT	990.46215	g	+ 10/12/2004	OK -1	Endevco	7264C-2K-2-180
0003	P33085	VCGZG1	Vehicle CG Z-axis accel	UP	995.01830	g	- 10/4/2004	OK -1	Endevco	7264C-2K-2-180
0004	P33825	RDKXG1	Vehicle rear deck X-axis accel	FWD	991.71107	g	+ 10/15/2004	OK -1	Endevco	7264C-2K-2-180
0005	P39372	RDKYG1	Vehicle rear deck Y-axis accel	LT	997.13246	g	- 10/15/2004	OK -1	Endevco	7264C-2K-2-180
0006	P40045	RDKZG1	Vehicle rear deck Z-axis accel	DN	1010.5555	g	+ 10/15/2004	OK -1	Endevco	7264C-2K-2-180
0007	ABFire1	DABETA	Driver airbag - primary	IP-07	5.12	V	+ 4/19/2004	OK -1	FLUKE	Y8101A
0008	ABFire2	DABETB	Driver airbag - secondary		5.12	V	+ 4/19/2004	OK -1	FLUKE	Y8101A
0009	ABFire3	PABETA	Passenger airbag - primary	IP-28	5.12	V	+ 4/19/2004	OK -1	FLUKE	Y8101A
0010	ABFire4	PABETB	Passenger airbag - secondary		5.12	V	+ 4/19/2004	OK -1	FLUKE	Y8101A

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Appendix D

INSIA Report on Structural Measurements

STRUCTURAL SURVEY OF CARS. MEASUREMENT METHODOLOGY OF THE MAIN RESISTANT ELEMENTS IN THE CAR BODY

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March, 1999

REPORT DOCUMENTATION PAGE

Title: <i>STRUCTURAL SURVEY OF CARS. MEASUREMENT METHODOLOGY OF THE MAIN RESISTANT ELEMENTS IN THE CAR BODY</i>
Author(s): Aparicio Izquierdo, Francisco Páez Ayuso, Francisco Javier
Performing Organisation name and address: INSIA – University Institute for Automobile Research Carretera de Valencia, Km. 7 – Campus Sur de la Universidad Politécnica de Madrid 28031 – Madrid – Spain
Supplementary notes: Under contract to: THE EUROPEAN COMMUNITY Project: "Improvement of Crash Compatibility between Cars" Contract N°: RO – 97 – SC.1064
Abstract: The main aim of this working package - <i>Structural Survey of Cars</i> - is the reduction of incompatibilities, both structural and geometric, between passenger vehicles and their potential collision partners. The understanding of these incompatibilities needs a previous step for the knowledge of the existing car fleet. Firstly, it is necessary to select the main resistant elements in the car body. These elements have to be chosen from the point of view of the sort of collision that we want to study, that is to say, frontal and side impacts. Detailed measurements have been taken from exterior and interior elements, spread to a total number of 74 models selected from the main vehicle manufacturers at Spain. All of them are being sold this year. Using the information available from the previous measurements in vehicles, the geometric characteristics of the main resistant elements involved in the geometric compatibility between cars will be defined. This report shows the methodology followed to get these measurements.
Subject terms: Crash compatibility, geometric compatibility, resistant elements, measure methodology
Date: March, 1999

1.- METHODOLOGY.

Detailed measurements have been taken from exterior and interior elements. Using the information available from the previous measurements in vehicles, the geometric characteristics of the main resistant elements involved in the geometric compatibility between cars have been defined. These elements are presented in the following figures, and have been divided in two main groups according to the vehicle zones studied in this project.

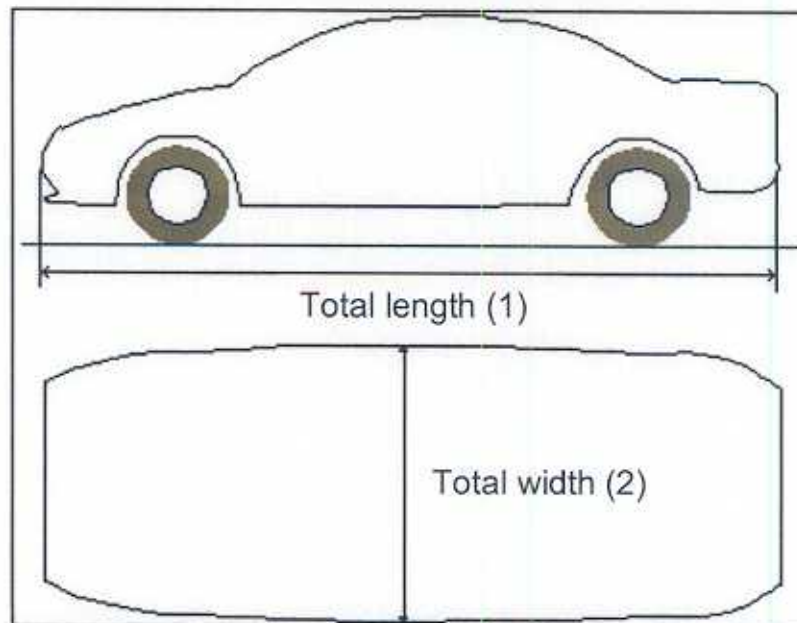


Figure 1.- Definition of the main resistant elements. General dimensions.

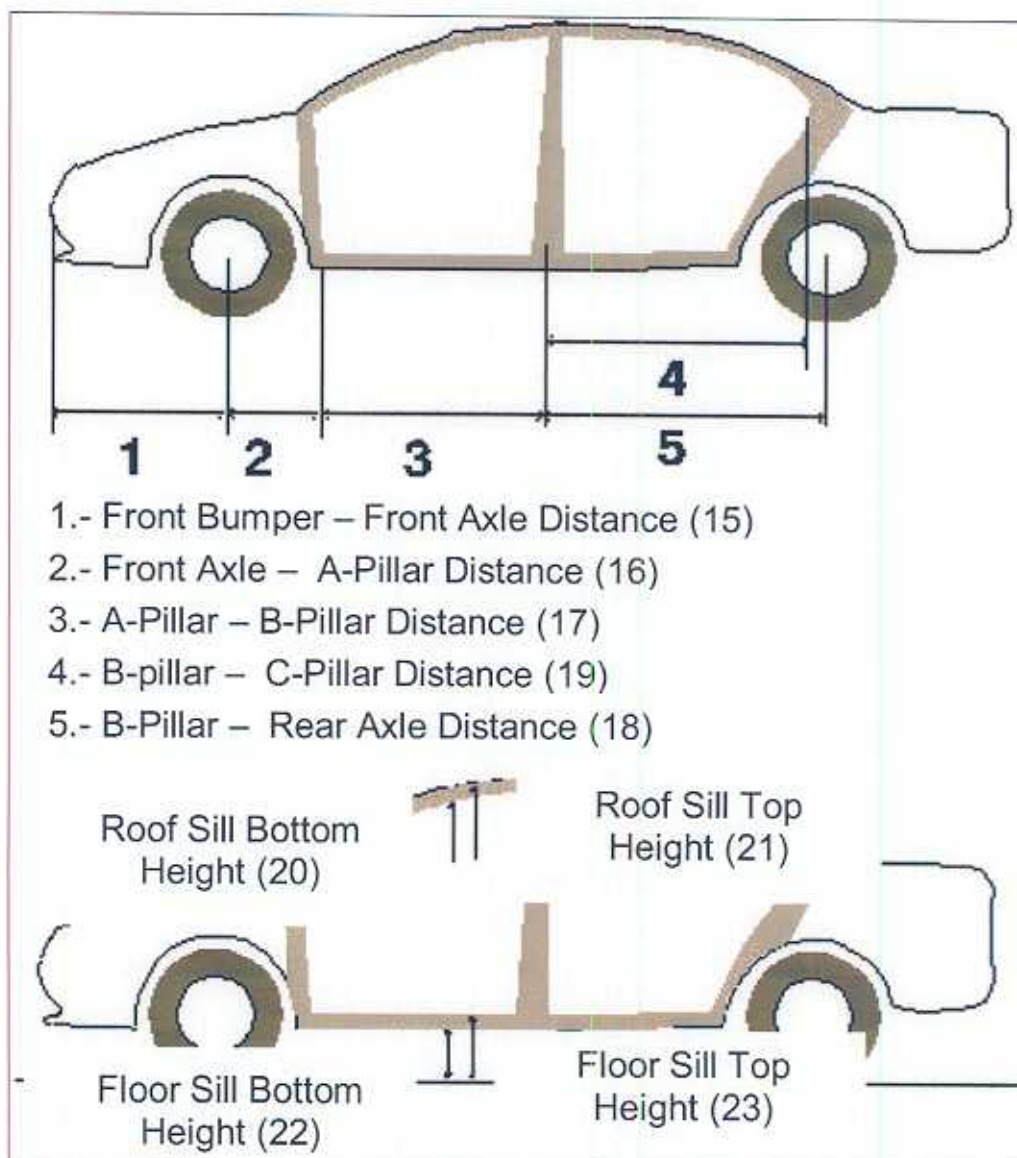


Figure 2.- Definition of the main resistant elements. Side elements.

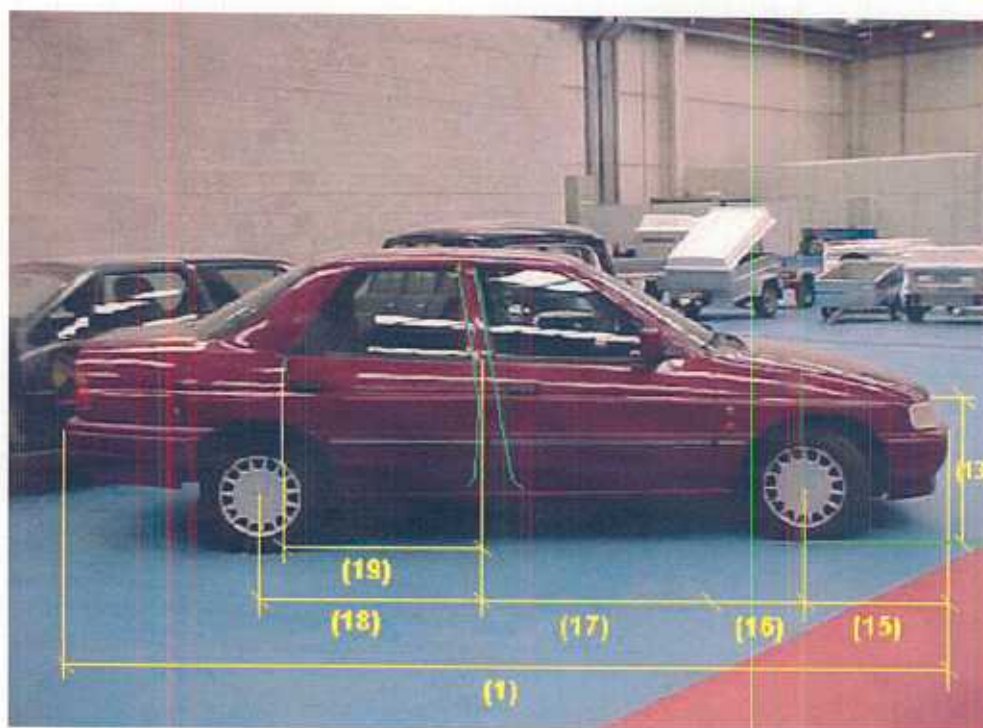


Figure 3.-
Measurements of
the side resistant
elements (outer).

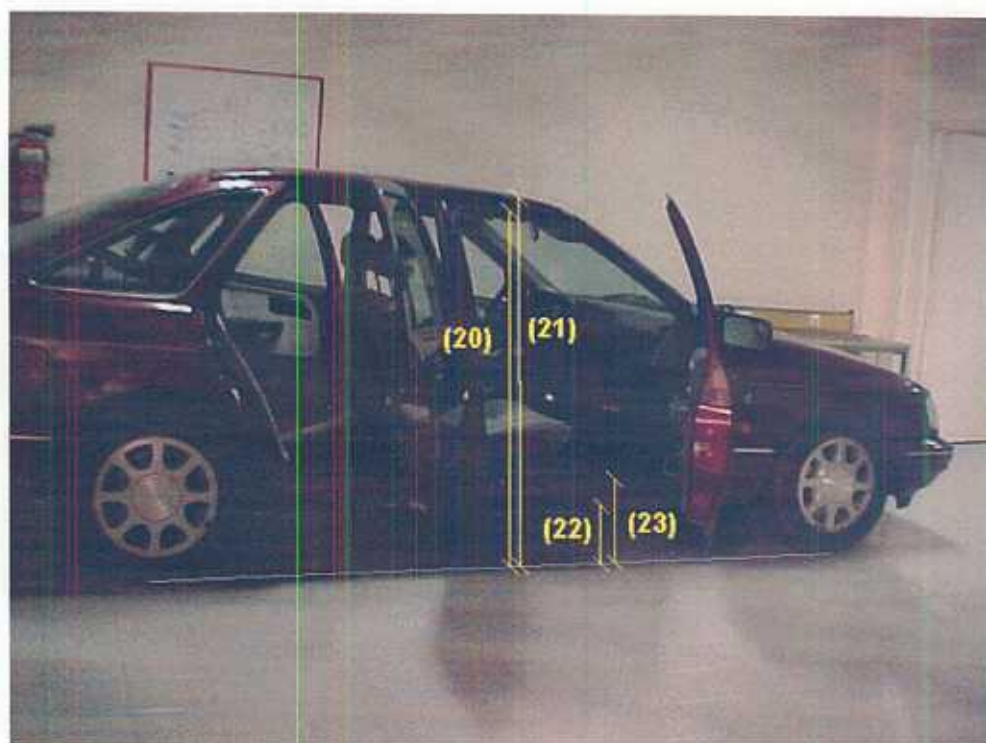


Figure 4.- Measurements
of the side resistant
elements (inner).

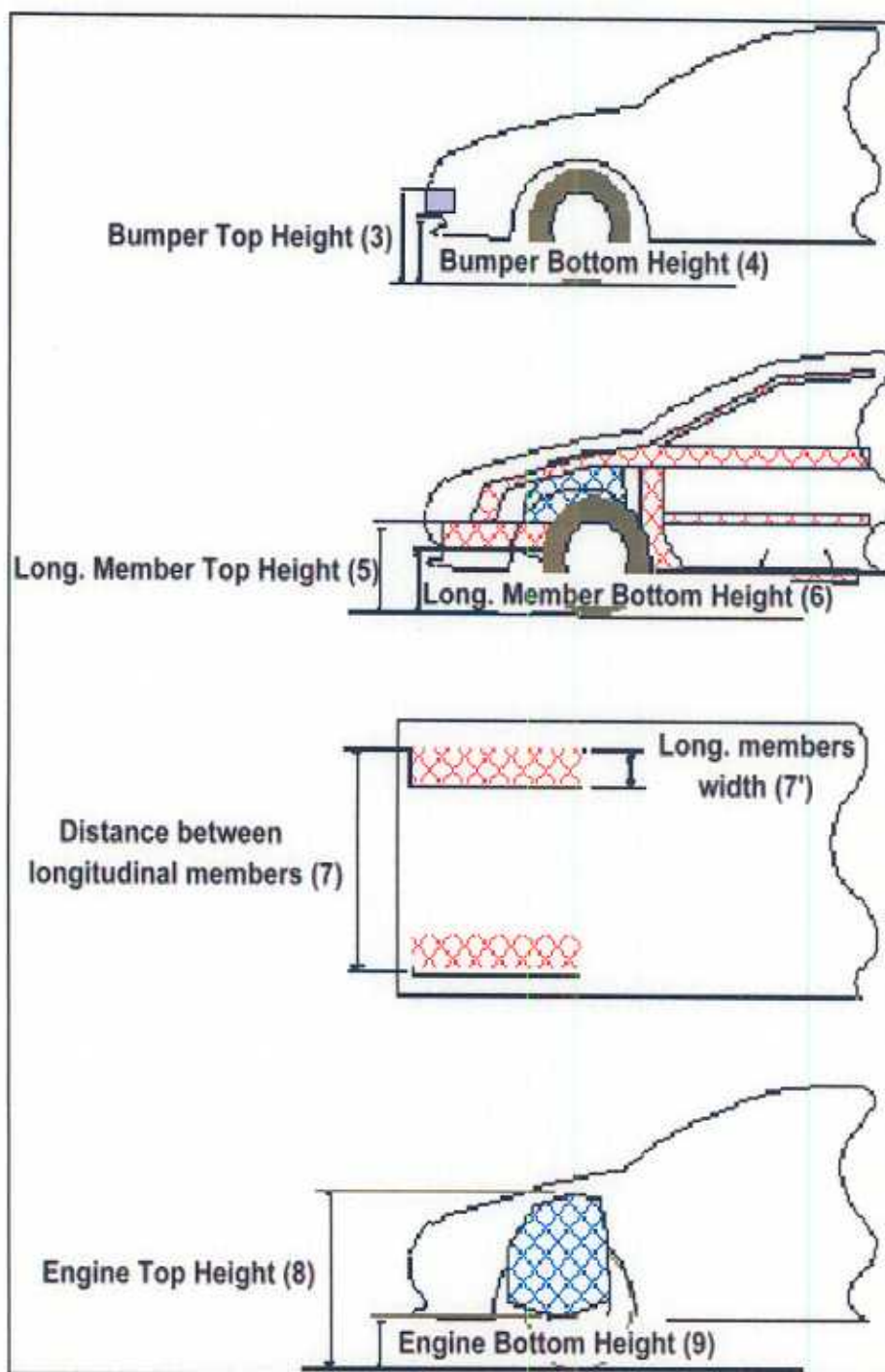


Figure 5.- Definition of the main resistant elements. Front elements.

Figure 6.-
Measurements of the
main resistant elements.
Front elements 1.

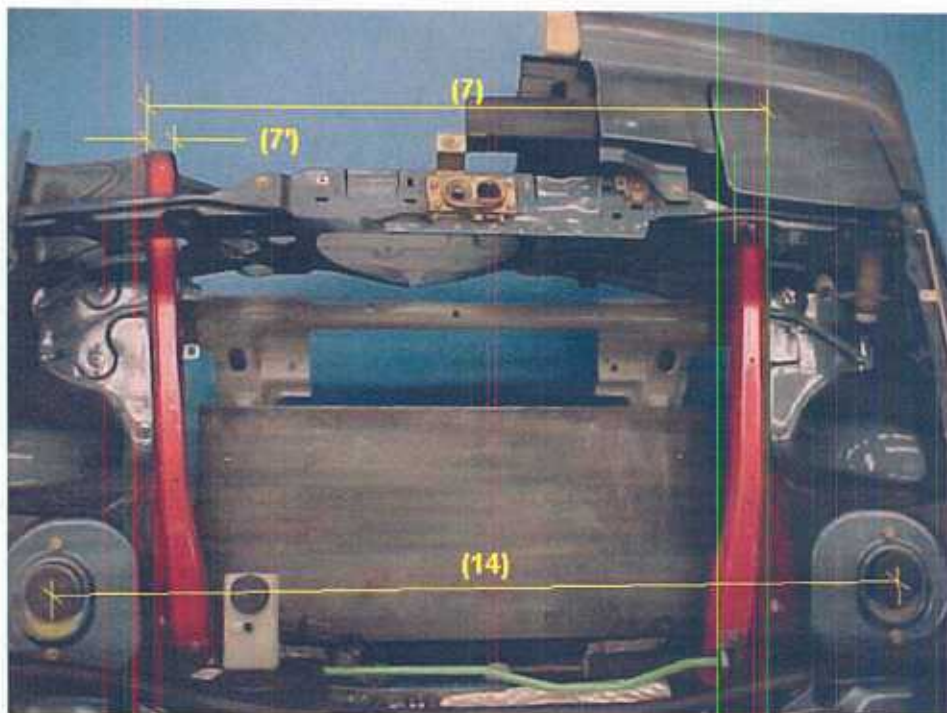
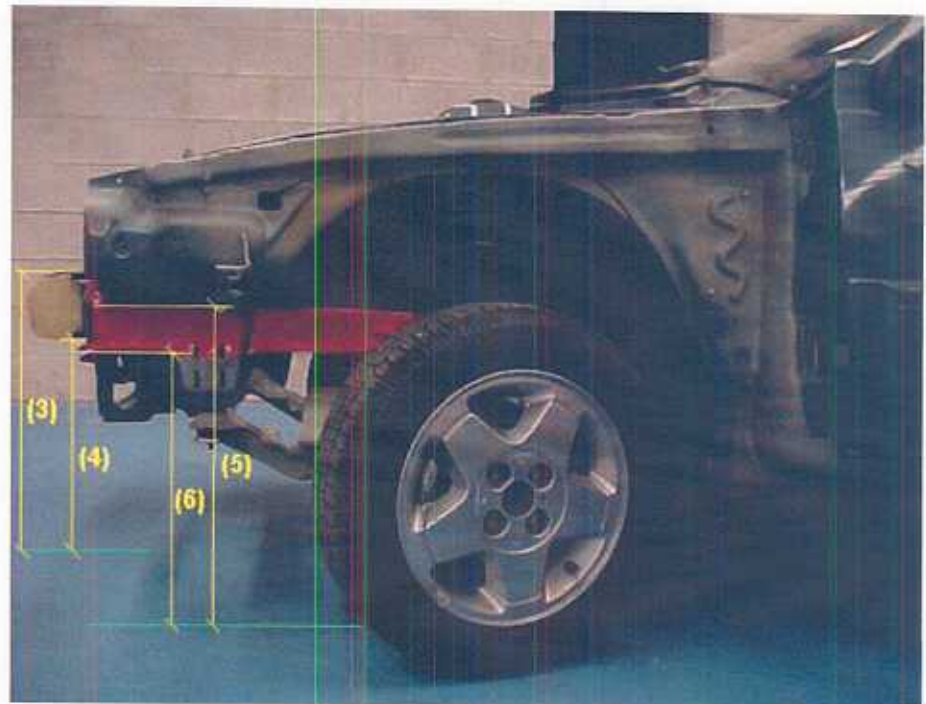


Figure 7.-
Measurements
of the main
resistant
elements. Front
elements 2.

Figure 8.-
Measurements of
the main resistant
elements. Front
elements 3.

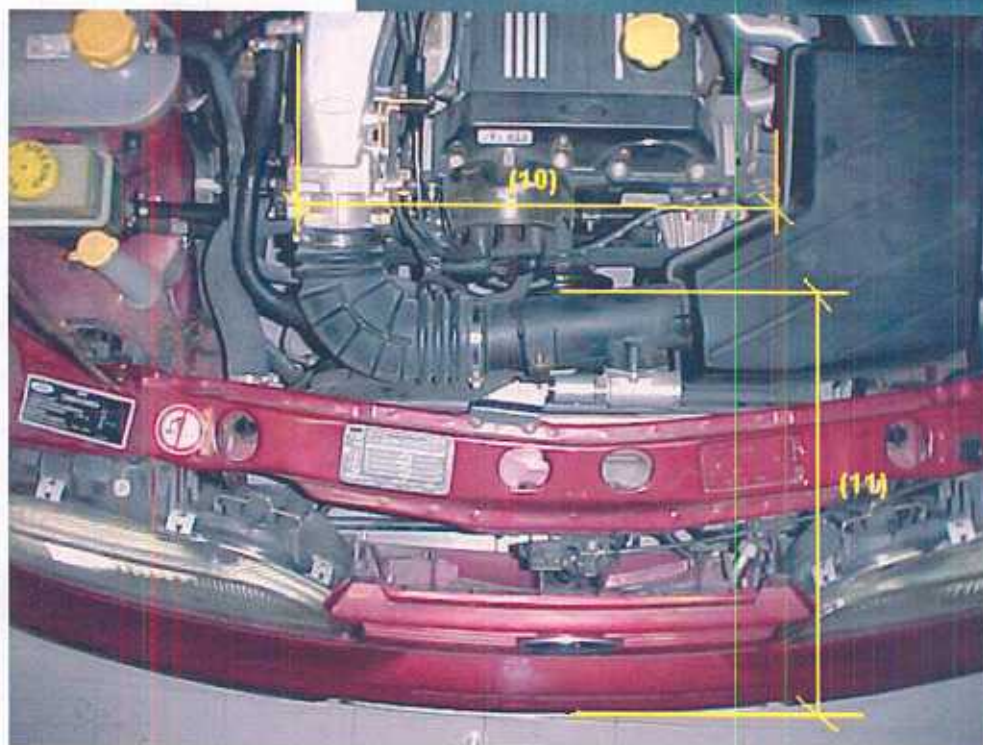
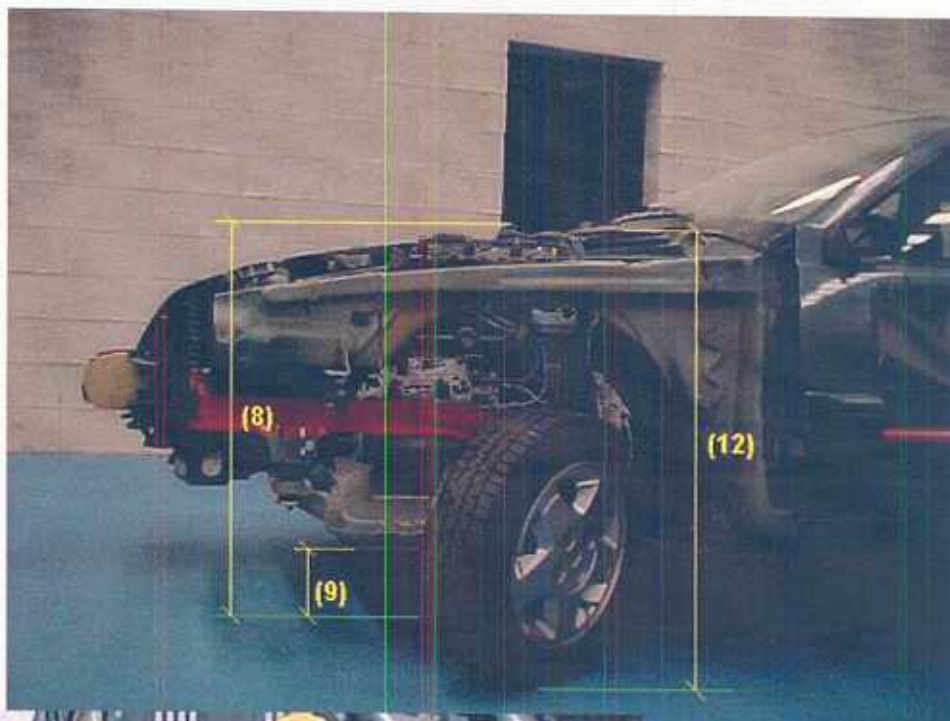


Figure 9.-
Definition of
the main
resistant
elements. Front
elements
(Longitudinal
engine).

The procedure considered to measure these elements is described as follows, where it is indicated the location of these ones in the Excel Sheet (SURVEY.XLS) into brackets:

FRONT ELEMENTS

- **Total Length –(1)- (Side & Front Sheets - C column):** distance between the point in the front bumper further on and the point in the rear bumper further back.
- **Weight (Side & Front Sheets - D column):** mass, including an average driver weight (70 kg), and the fuel tank mass (at half-capacity).
- **Total Width –(2)- (Side & Front Sheets - E column):** distance between the outer side points in a transverse plane of the vehicle (middle plane between the front and rear axles).
- **Bumper bottom height –(4)- (Front Sheet G column):** distance between the ground and the lowest point on the front bumper, being a resistant member (aerodynamic elements under the front bumper are not considered).
- **Bumper top height –(3)- (Front Sheet H column):** distance between the ground and the highest point on the front bumper, being a resistant member (aerodynamic elements are not considered).
- **Longitudinal member top height –(5)- (Front Sheet I column):** distance between the ground and the highest point on the longitudinal members, measured approximately in the front bumper-longitudinal member joint (when accessible).
- **Longitudinal member bottom height –(6)- (Front Sheet J column):** distance between the ground and the lowest point on the longitudinal members, measured approximately in the front bumper-longitudinal member joint.
- **Distance between longitudinal members (Front Sheet K column):** transverse distance between extreme points in longitudinal members, measured approximately in the front bumper-longitudinal member joint.

Depending on the accessibility of these members, the extreme points are the inner points (I) or the outer points (O).

- **Longitudinal member width -7'- (Front Sheet L column):** width of one of the longitudinal members, measured approximately in the front bumper-longitudinal member joint.



- **Engine top height (8) (Front Sheet N column):** distance between the ground and the highest point on the engine that can be a resistant member in case of accident (usually, the highest point on the head, or the highest point of the inlet or exhaust manifolds).
- **Engine bottom height (9) (Front Sheet M column):** distance between the ground and the lowest point on the engine (usually, the lowest point on the crankcase).
- **Engine and Gearbox width (10) (Front Sheet O & P columns):**
 - *Transverse configuration engine:* distance between extreme points in the gearbox-cylinder block unit or others resistant members attached to the cylinder block unit, i.e. fan belts (from a front point of view).
 - *Longitudinal configuration engine:* distance between extreme points in the cylinder block unit (from a front point of view).
- **Front bumper - Engine distance (11) (Front Sheet Q column):** distance between the point in the front bumper further on and the point in the engine further on that is a resistant element, i.e. the further on point of the exhaust manifold placed in the front of the engine.
- **Front shock absorber fixing width (14) (Front Sheet R column):** transverse distance between the front shock absorber - body car joints.
- **Front shock absorber fixing height (12) (Front Sheet S column):** distance between the ground and the front shock absorber-body car joint.
- **Bonnet leading edge height (Front Sheet T column):** distance between the ground and the bonnet edge further on.

SIDE ELEMENTS

- **Front bumper - Front axle distance (15) (Side Sheet G column):** distance between the point in the front bumper further on and the middle point in the front tyre-road contact patch.
- **Front axle - A Pillar distance (16) (Side Sheet H column):** distance between the middle point in the front tyre-road contact patch and the point in the A-pillar further back.
- **A Pillar - B Pillar distance (17) (Side Sheet I column):** distance between the point in the A-pillar further back and the middle point in the B-pillar.
- **B Pillar - C Pillar distance (19) (Side Sheet J column):** distance between the middle point in the B-pillar and the point in the C-pillar further back (only 4/5-door vehicles).
- **B Pillar - Rear axle distance (18) (Side Sheet K column):** distance between the middle point in the B-pillar and the middle point in the rear tyre-road contact patch.
- **Roof sill bottom height (20) (Side Sheet L column):** distance between the ground and the lowest point on the roof sill, measured in the front door middle point.
- **Roof sill top height (21) (Side Sheet M column):** distance between the ground and the highest point on the roof sill (usually located in the sill-roof joint), measured in the front door middle point.
- **Floor sill bottom height (22) (Side Sheet N column):** distance between the ground and the lowest point on the floor sill, measured in the front door middle point.
- **Floor sill top height (23) (Side Sheet O column):** distance between the ground and the highest point on the floor sill, measured in the front door middle point.

NOTE

- N/A: dimension not available.