



Health & Safety
Executive

**OFFSHORE TECHNOLOGY
REPORT - OTO 98 099**

**A Study of the Repeatability of
Explosion Tests
Preliminary Data Report for Test 3**

Date of Issue : April 1998

Health and Safety Executive

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Explosions in Full Scale Offshore Module Geometries

Health & Safety Executive Contract MaTSU 8847/3522

Preliminary Data Report for Test 3

Summary of Experimental Conditions	
Date	25th June 1997
Time	13:52
Test Series	A
Confinement Configuration	C1
Obstacle Configuration	O1
Ignition Position	(X:9.0, Y:11.6, Z:0.4)
Mean Equivalence Ratio	1.07
Water Sprays	None

All data contained in this preliminary report is subject to final confirmation.

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Table 1: Flame Arrival Times

Ionisation Probe	X Co-ord (m)	Y Co-ord (m)	Z Co-ord (m)	Flame Arrival Time (msec)
IP-1	0.5	0.5	2.0	602.9
IP-2	6.0	0.5	2.0	590.4
IP-3	10.0	0.5	2.0	591.6
IP-4	14.0	0.5	2.0	600.1
IP-5	18.0	0.5	2.0	609.3
IP-6	22.0	0.5	2.0	616.7
IP-7	27.5	0.5	2.0	629.1
IP-8	0.5	4.0	2.0	594.9
IP-9	6.0	4.0	2.0	599.2
IP-10	14.0	4.0	2.0	584.2
IP-11	22.0	4.0	2.0	615.1
IP-12	27.5	4.0	2.0	625.8
IP-13	0.5	8.0	2.0	573.2
IP-14	6.0	8.0	2.0	503.5
IP-15	10.0	8.0	2.0	482.6
IP-16	14.0	8.0	2.0	549.3
IP-17	18.0	8.0	2.0	588.1
IP-18	22.0	8.0	2.0	605.4
IP-19	27.5	8.0	2.0	624.8
IP-20	0.5	11.5	2.0	568.8
IP-21	2.0	11.5	2.0	545.0
IP-22	6.0	11.5	2.0	434.0
IP-23	10.0	11.5	2.0	323.5
IP-24	14.0	11.5	2.0	493.0
IP-25	18.0	11.5	2.0	574.6
IP-26	22.0	11.5	2.0	601.8
IP-27	26.0	11.5	2.0	620.0
IP-28	27.5	11.5	2.0	624.5
IP-29	0.5	0.5	4.0	599.9
IP-30	6.0	0.5	4.0	589.3
IP-31	10.0	0.5	4.0	586.9
IP-32	14.0	0.5	4.0	595.3
IP-33	18.0	0.5	4.0	606.9

Ionisation Probe	X Co-ord (m)	Y Co-ord (m)	Z Co-ord (m)	Flame Arrival Time (msec)
IP-34	22.0	0.5	4.0	614.1
IP-35	26.0	0.5	4.0	623.6
IP-36	27.5	0.5	4.0	630.7
IP-37	0.5	4.0	4.0	588.9
IP-38	6.0	4.0	4.0	560.9
IP-39	14.0	4.0	4.0	575.7
IP-40	22.0	4.0	4.0	610.0
IP-41	26.0	4.0	4.0	619.8
IP-42	27.5	4.0	4.0	623.7
IP-43	0.5	8.0	4.0	568.6
IP-44	2.0	8.0	4.0	556.7
IP-45	6.0	8.0	4.0	497.6
IP-46	10.0	8.0	4.0	511.9
IP-47	14.0	8.0	4.0	522.0
IP-48	18.0	8.0	4.0	577.4
IP-49	22.0	8.0	4.0	605.6
IP-50	26.0	8.0	4.0	619.3
IP-51	27.5	8.0	4.0	624.9
IP-52	26.0	10.0	4.0	620.5
IP-53	27.5	10.0	4.0	622.7
IP-54	0.5	11.5	4.0	561.1
IP-55	2.0	11.5	4.0	542.5
IP-56	6.0	11.5	4.0	466.7
IP-57	10.0	11.5	4.0	447.6
IP-58	14.0	11.5	4.0	503.1
IP-59	18.0	11.5	4.0	564.9
IP-60	22.0	11.5	4.0	601.4
IP-61	26.0	11.5	4.0	620.2
IP-62	27.5	11.5	4.0	624.1
IP-63	0.5	0.5	6.0	603.4
IP-64	6.0	0.5	6.0	592.5
IP-65	10.0	0.5	6.0	593.5
IP-66	14.0	0.5	6.0	600.8
IP-67	18.0	0.5	6.0	583.8

Ionisation Probe	X Co-ord (m)	Y Co-ord (m)	Z Co-ord (m)	Flame Arrival Time (msec)
IP-68	22.0	0.5	6.0	600.8
IP-69	27.5	0.5	6.0	633.0
IP-70	0.5	4.0	6.0	590.1
IP-71	6.0	4.0	6.0	564.8
IP-72	14.0	4.0	6.3	586.6
IP-73	22.0	4.0	6.0	612.4
IP-74	27.5	4.0	6.0	630.7
IP-75	0.5	8.0	6.0	584.0
IP-76	6.0	8.0	6.0	543.5
IP-77	10.0	8.0	6.0	553.0
IP-78	14.0	8.0	6.0	562.8
IP-79	18.0	8.0	6.0	584.2
IP-80	22.0	8.0	6.0	608.1
IP-81	27.5	8.0	6.0	628.4
IP-82	0.5	11.5	6.0	572.4
IP-83	2.0	11.5	6.0	567.8
IP-84	6.0	11.5	6.0	503.5
IP-85	10.0	11.5	6.0	495.4
IP-86	14.0	11.5	6.0	532.0
IP-87	18.0	11.5	6.0	585.9
IP-88	22.0	11.5	6.0	607.4
IP-89	26.0	11.5	6.0	621.3
IP-90	27.5	11.5	6.0	627.3

Table 2: Internal Overpressures

Pressure Transducer	X Co-ord (m)	Y Co-ord (m)	Z Co-ord (m)	Maximum Overpressure (mbar)	1.5ms Running Average			
					Maximum Overpressure (mbar)	Time of Arrival (ms)	Idealised Profile Representation	
							Rise Time (ms)	Duration (ms)
PI-1	0.8	0.5	0.0	1085	1066	602.6	14.7	58.3
PI-2	6.0	0.5	0.0	601	561	602.6	36.1	89.4
PI-3	12.5	0.5	0.0	705	666	618.3	51.3	82.0
PI-4	22.0	0.5	0.0	3429	1822	622.0	12.4	37.5
PI-5	27.5	0.5	0.0	-	-	-	-	-
PI-6	0.5	6.0	0.0	382	373	605.6	75.2	131.1
PI-7	9.0	6.0	0.0	456	411	614.3	93.1	129.6
PI-8	14.0	6.0	0.0	616	586	619.0	73.5	101.4
PI-9	21.0	6.0	0.0	1455	1361	624.7	43.1	58.6
PI-10	27.5	6.0	0.0	4725	3388	627.9	14.5	18.4
PI-11	0.5	11.5	0.0	281	276	601.8	87.4	147.7
PI-12	12.3	11.5	0.0	512	442	620.8	77.3	104.1
PI-13	27.5	11.5	0.0	2269	1791	626.9	16.3	34.5
PI-14	0.5	0.5	4.0	670	623	599.1	26.4	88.8
PI-15	4.5	0.6	4.0	587	489	598.7	44.9	104.2
PI-16	11.2	0.0	5.5	555	526	609.1	52.0	91.8
PI-17	12.0	0.5	4.0	651	584	616.9	53.1	83.2
PI-18	22.0	0.5	4.0	2624	1753	617.7	10.8	38.2
PI-19	27.5	0.5	4.0	5167	2179	630.8	10.7	22.5
PI-20	10.2	4.0	4.0	505	451	615.8	77.9	110.9
PI-21	0.5	7.0	4.0	290	274	602.0	74.9	131.5
PI-22	18.0	8.0	4.0	888	748	621.1	56.5	79.0
PI-23	27.5	6.0	4.0	3609	2418	624.7	7.8	26.4
PI-24	0.5	11.5	4.0	226	217	610.7	102.9	152.3
PI-25	10.0	11.5	4.0	351	309	622.6	101.3	129.1
PI-26	18.0	11.5	4.0	526	455	623.9	73.1	89.6
PI-27	27.5	11.5	4.0	3697	2213	625.0	9.3	29.2
PI-28	0.8	0.8	8.0	578	507	602.5	30.6	70.5
PI-29	13.9	1.7	8.0	948	852	613.3	43.3	78.5
PI-30	26.1	1.7	8.0	4896	2000	630.9	17.0	24.7
PI-31	5.9	5.0	8.0	589	533	604.9	67.0	113.1
PI-32	18.9	5.0	8.0	1161	1027	617.0	37.2	64.5
PI-33	1.1	11.1	8.0	305	267	608.3	3.7	55.8
PI-34	12.8	11.2	8.0	787	478	623.9	77.6	98.7
PI-35	26.1	11.3	8.0	3892	2526	623.5	6.4	15.8

Table 3 : External Overpressures

Pressure Transducer	X Co-ord (m)	Y Co-ord (m)	Z Co-ord (m)	Maximum Overpressure (mbar)	Maximum Overpressure 1.5ms Running Average (mbar)
PE-1	34.0	6.0	1.0	-	-
PE-2	40.0	6.0	1.0	2544	1303
PE-3	52.0	6.0	1.0	1346	1063
PE-4	76.0	6.0	1.0	372	249
PE-5	47.2	25.2	1.0	-	-
PE-6	61.3	39.3	1.0	322	258
PE-7	14.0	18.0	1.0	256	234
PE-8	14.0	24.0	1.0	64	45
PE-9	14.0	36.0	1.0	279	261
PE-10	14.0	60.0	1.0	158	143
PE-11	-21.2	25.2	1.0	142	125

Table 4: Gas Concentrations

Measuring Position	X Co-ord (m)	Y Co-ord (m)	Z Co-ord (m)	Natural Gas Concentration (%)
1	25.7	4.0	0.7	9.1
2	12.0	8.0	0.8	9.5
3	1.2	3.1	1.5	9.2
4	7.7	10.9	3.8	9.6
5	13.5	5.5	4.5	9.7
6	25.9	6.0	5.2	9.7
7	4.0	8.5	4.9	9.6
8	19.8	8.0	7.6	9.6

Table 5: Weather Conditions

Air Temperature (°C)	Atmospheric Pressure (mbar)	Wind Speed (ms⁻¹)	Wind Direction (° from Magnetic North)
11.4	966	5.8	310

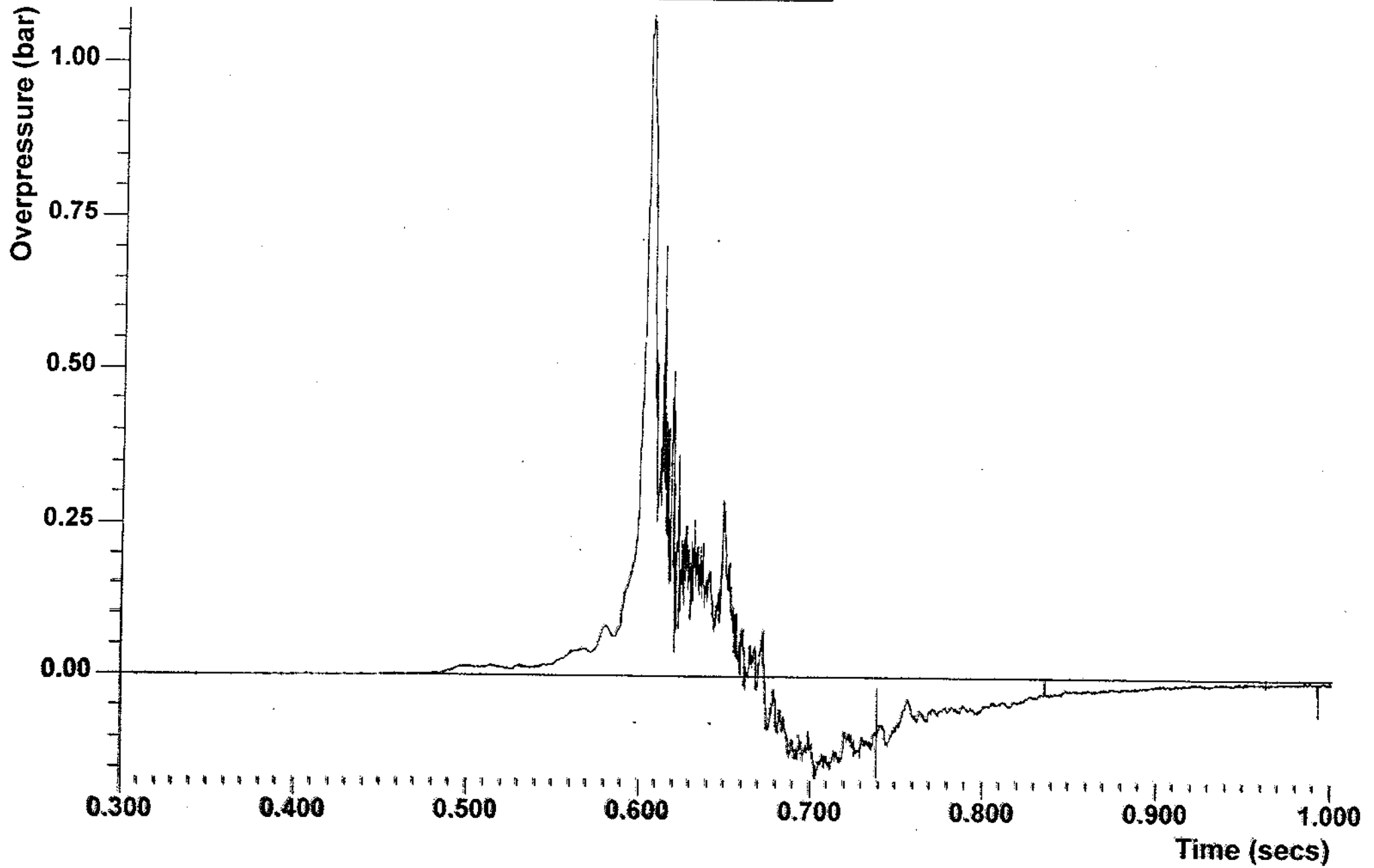
Table 6: Confinement Configuration

Confinement Configuration	Rig Face*	Confinement
C1	North	Open
	East	Open
	South	Open
	West	Open

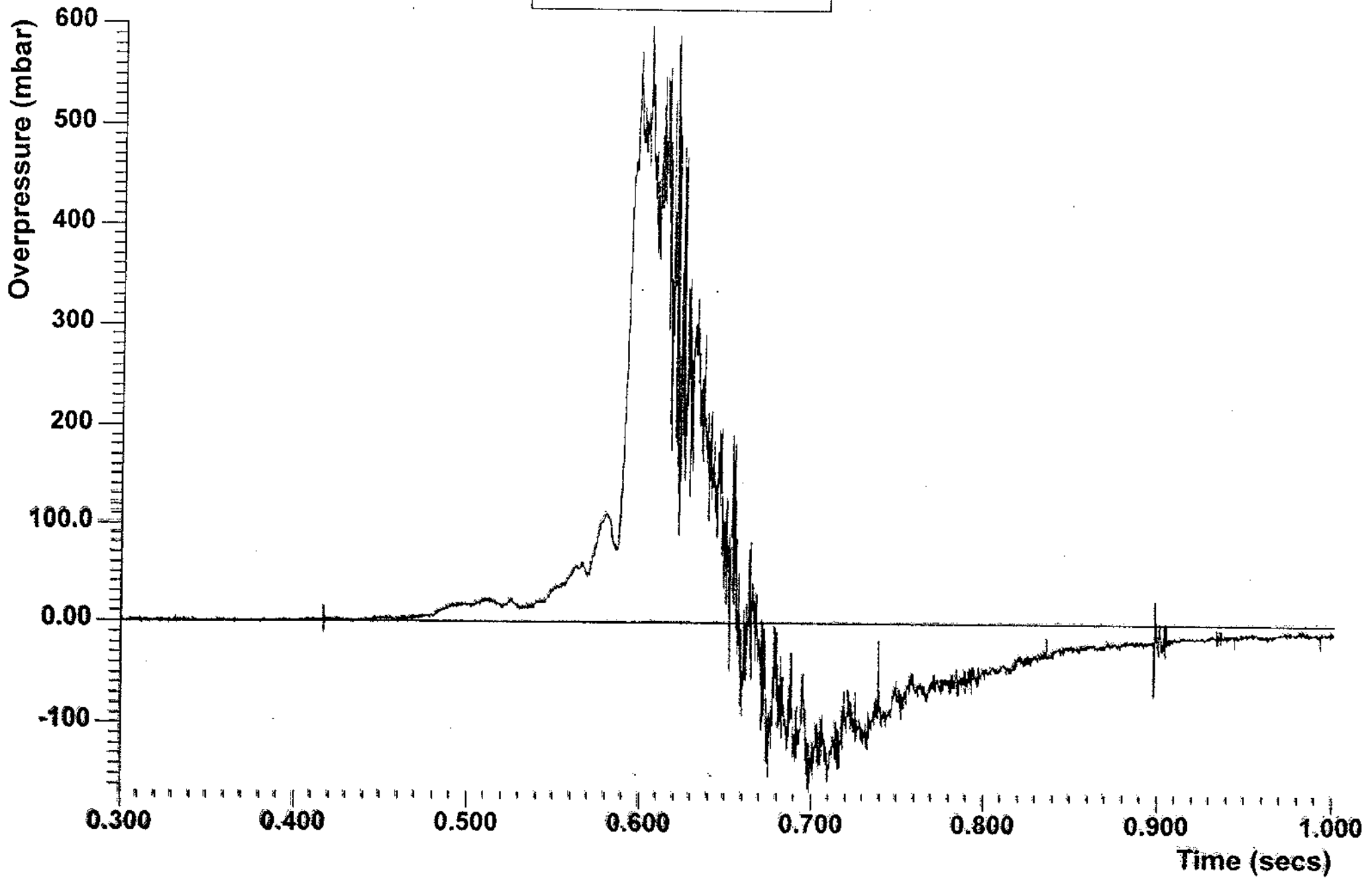
* - Origin is at the junction of the West and South faces at ground level. Roof and floor also confined.

Appendix A: Internal Overpressure Profiles

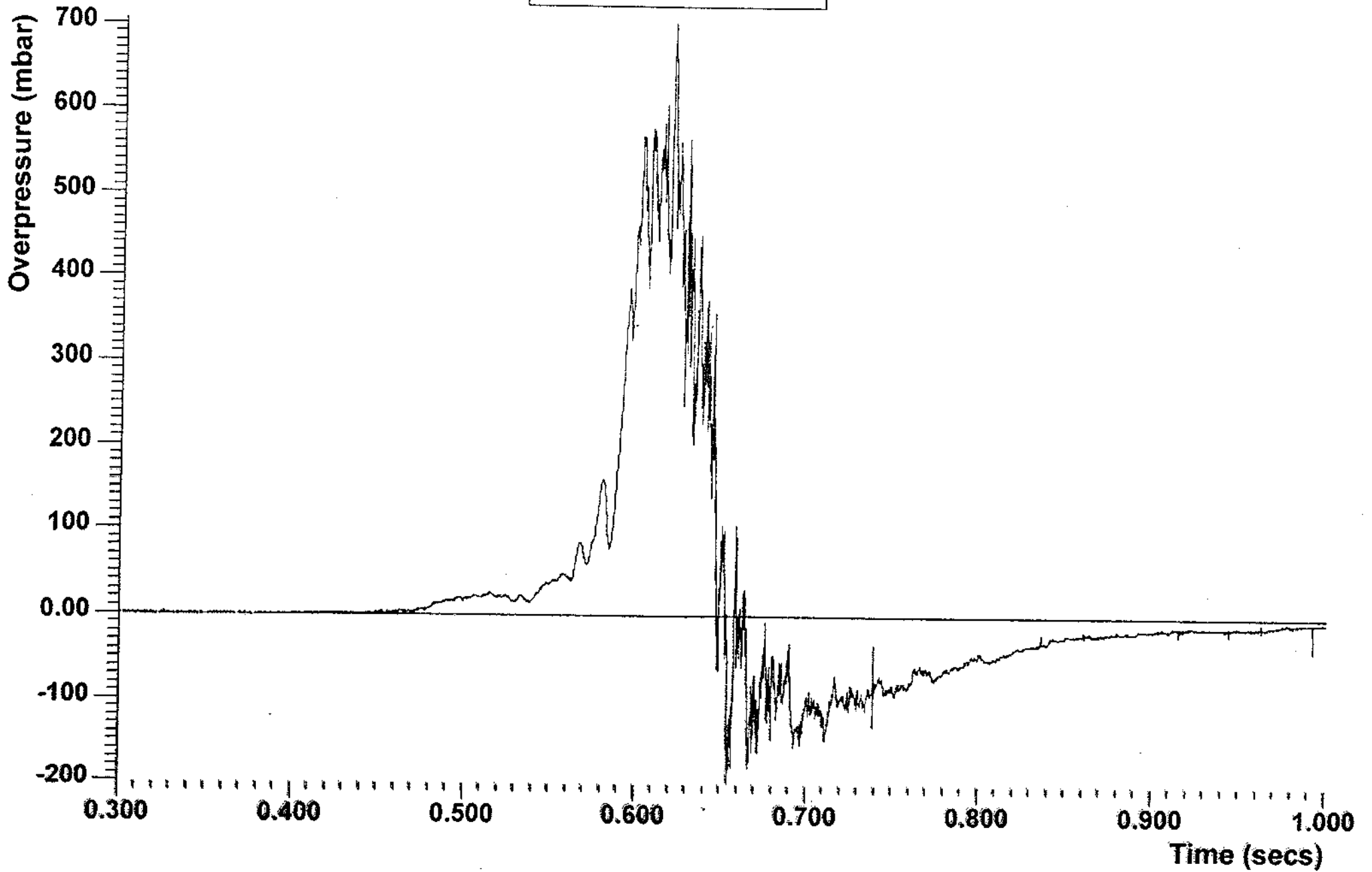
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Transducer no: PI-1



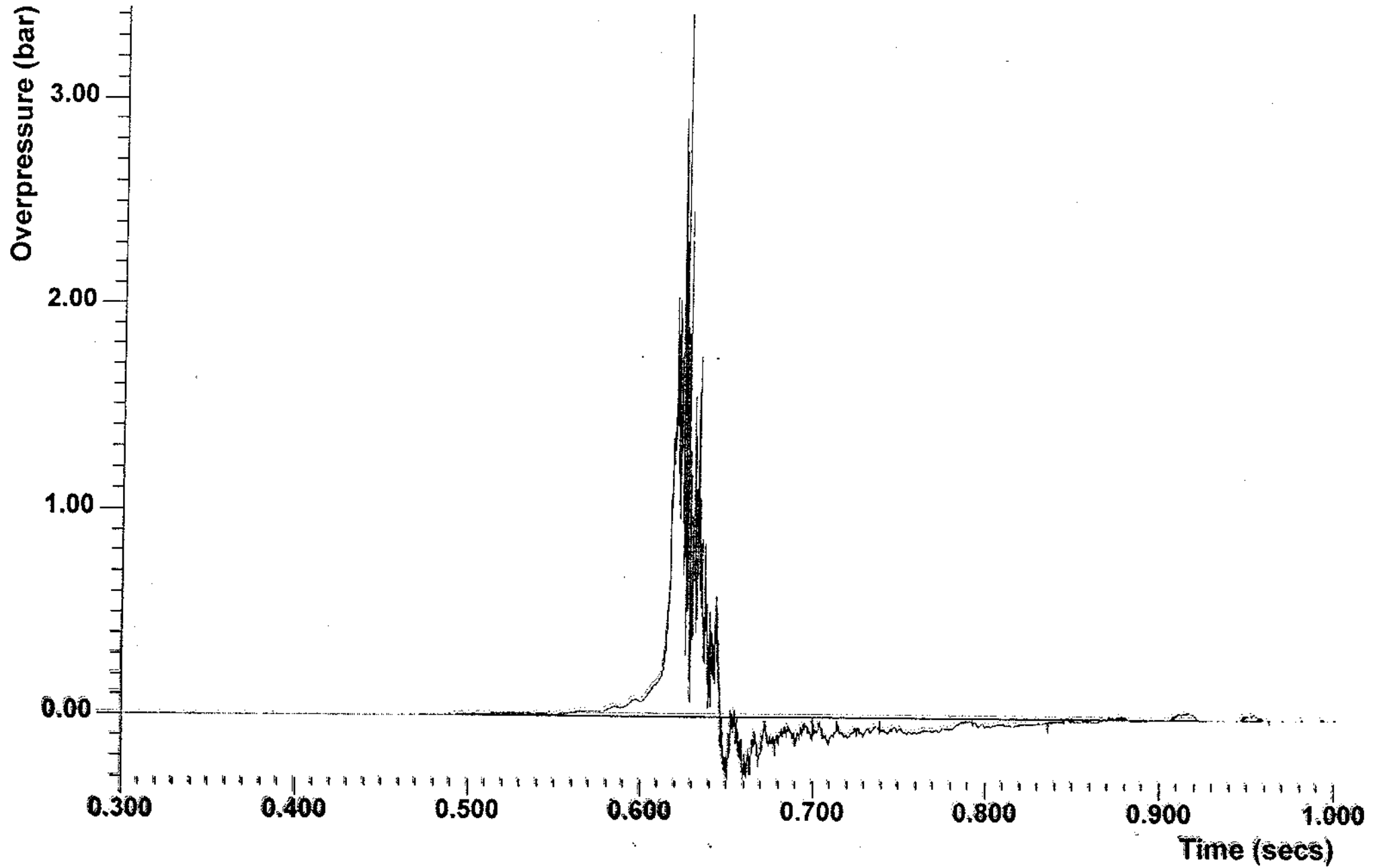
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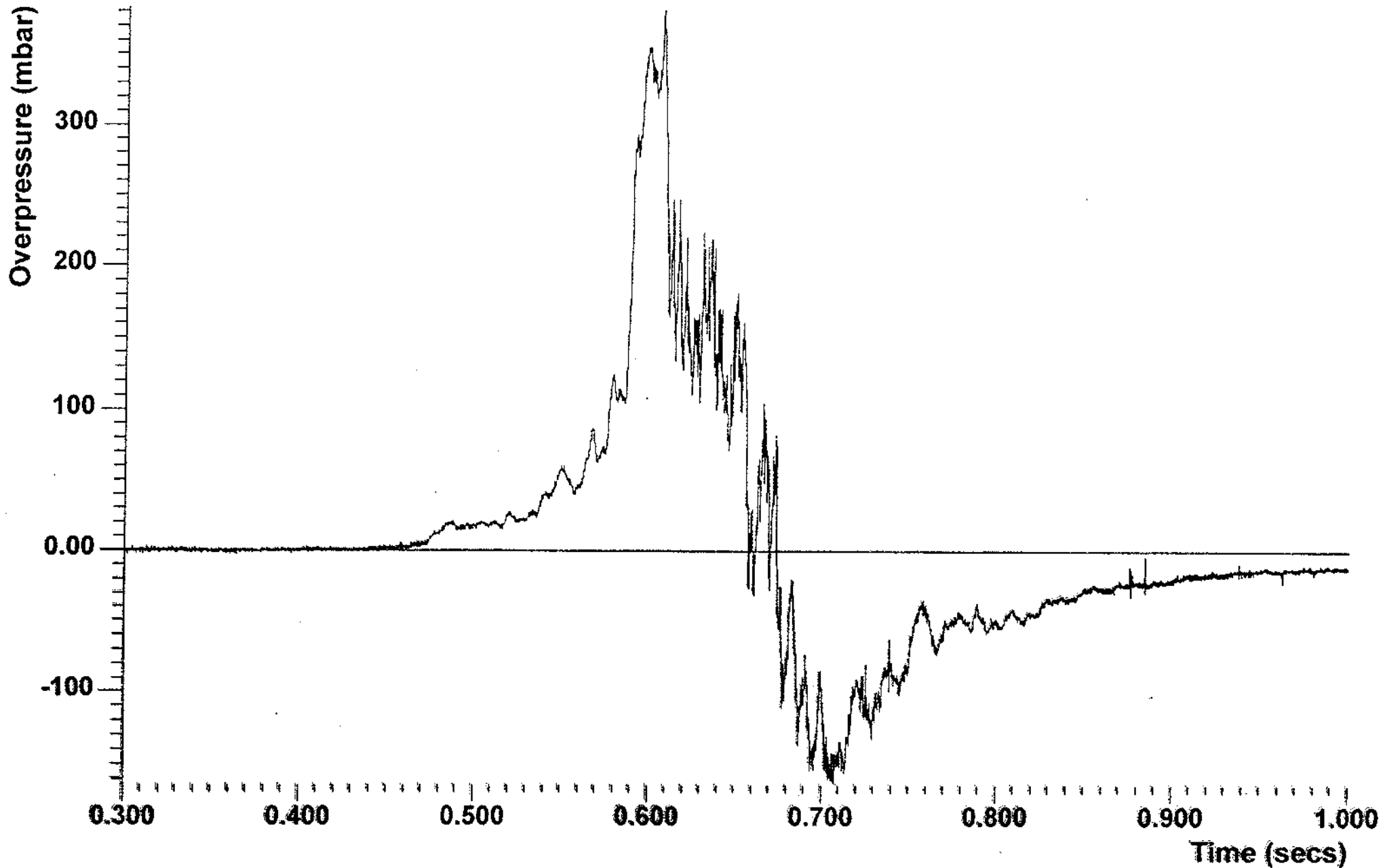
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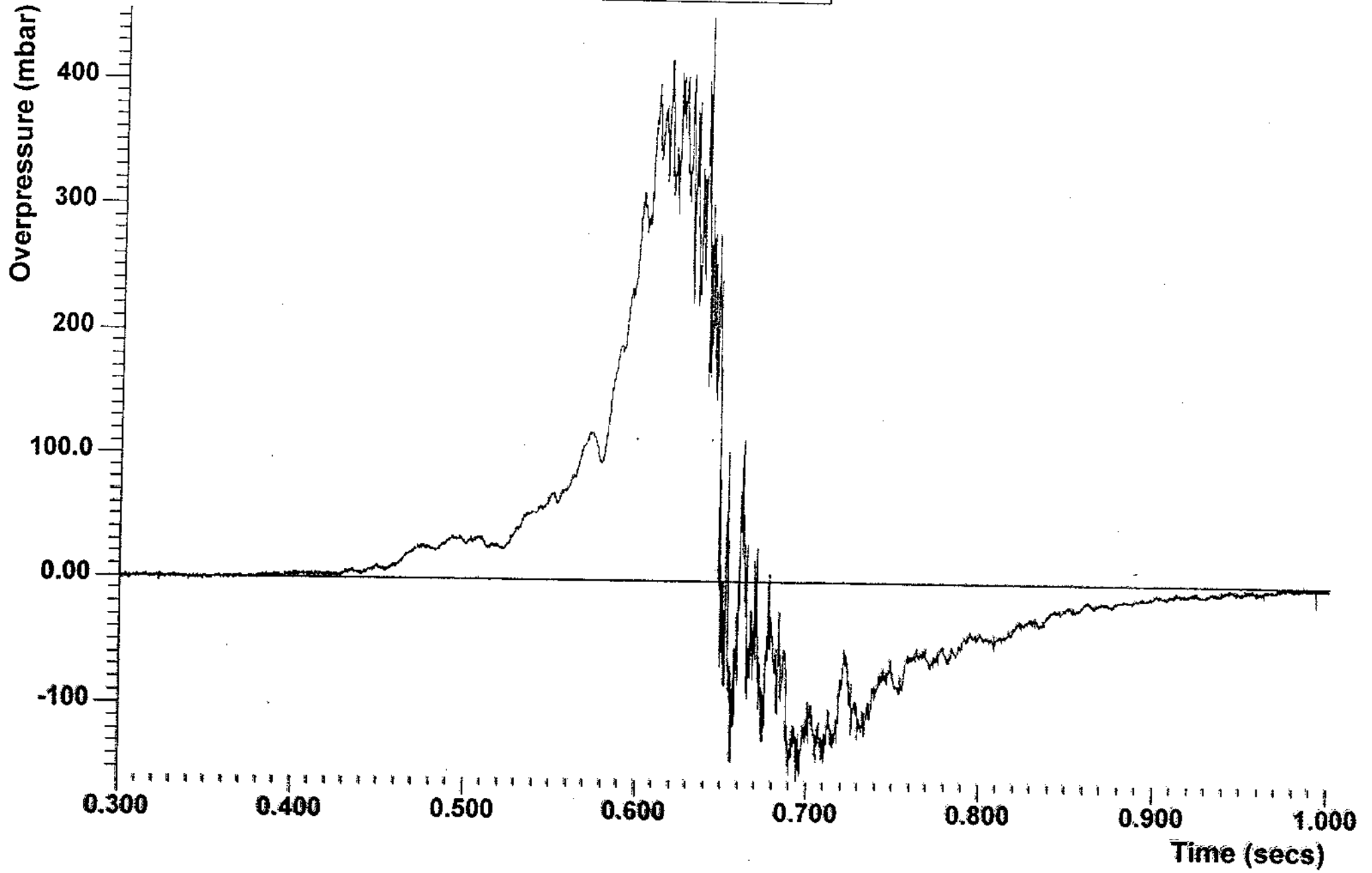
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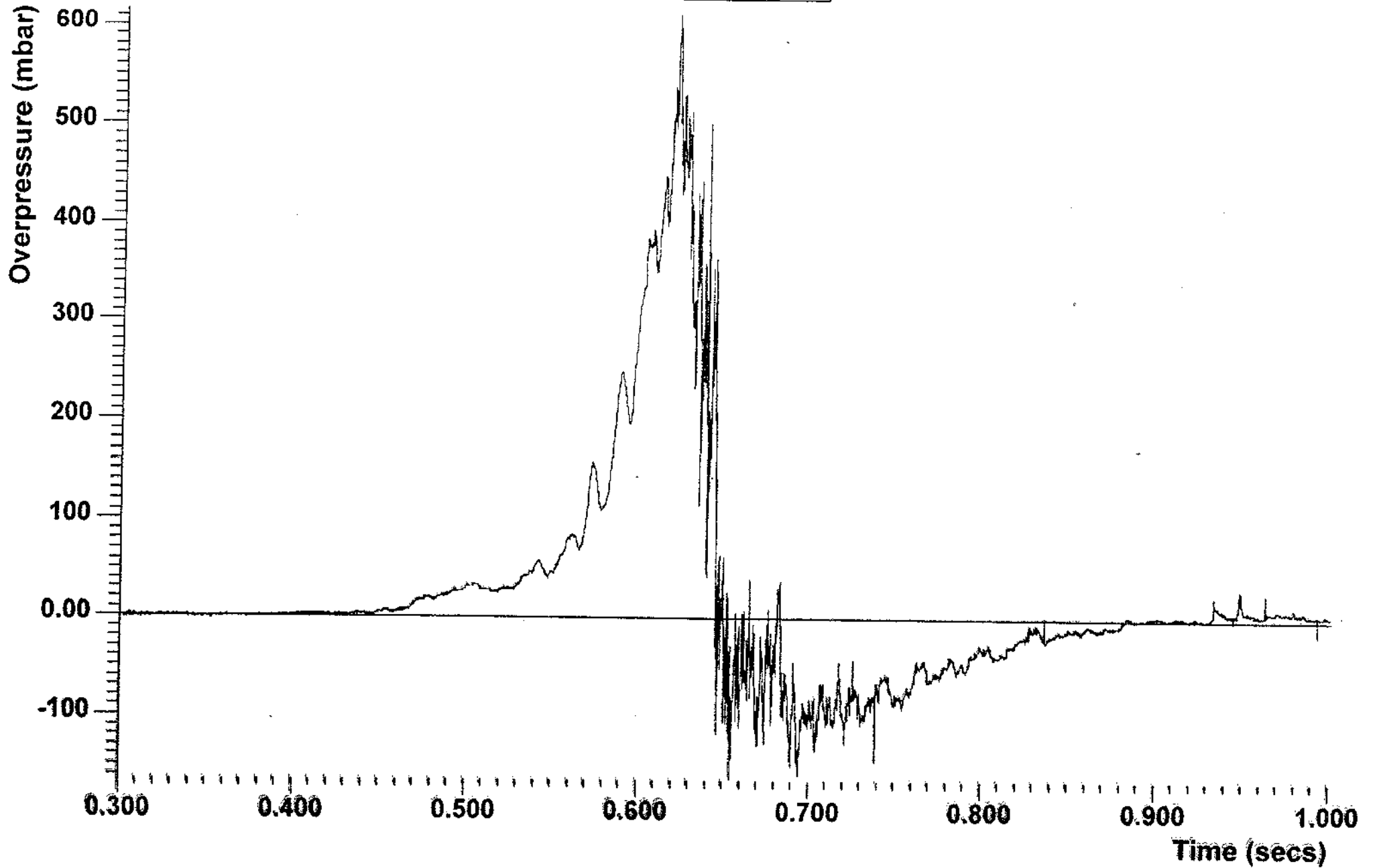
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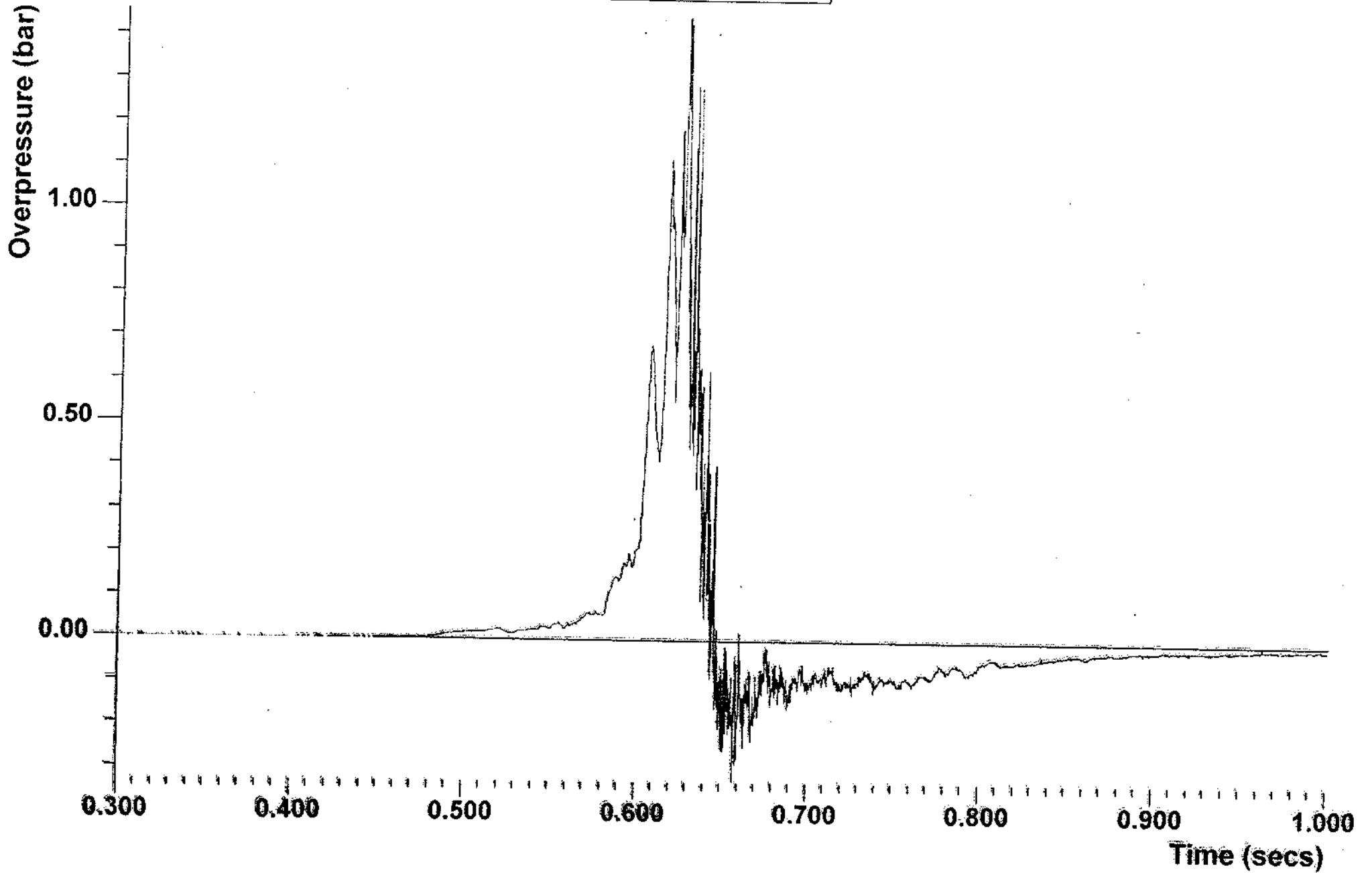
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Transducer no: PI-7



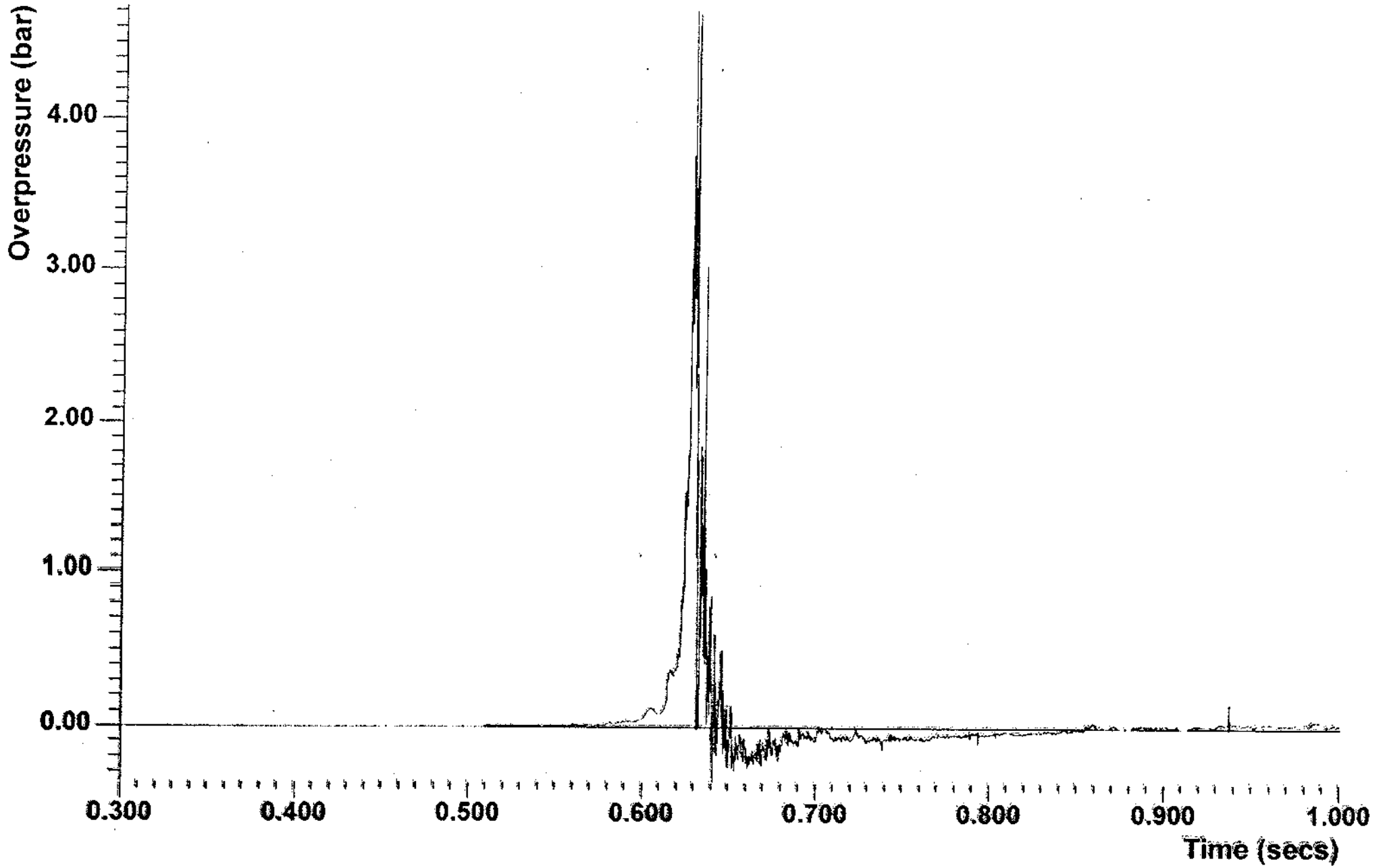
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Transducer no: PI-8



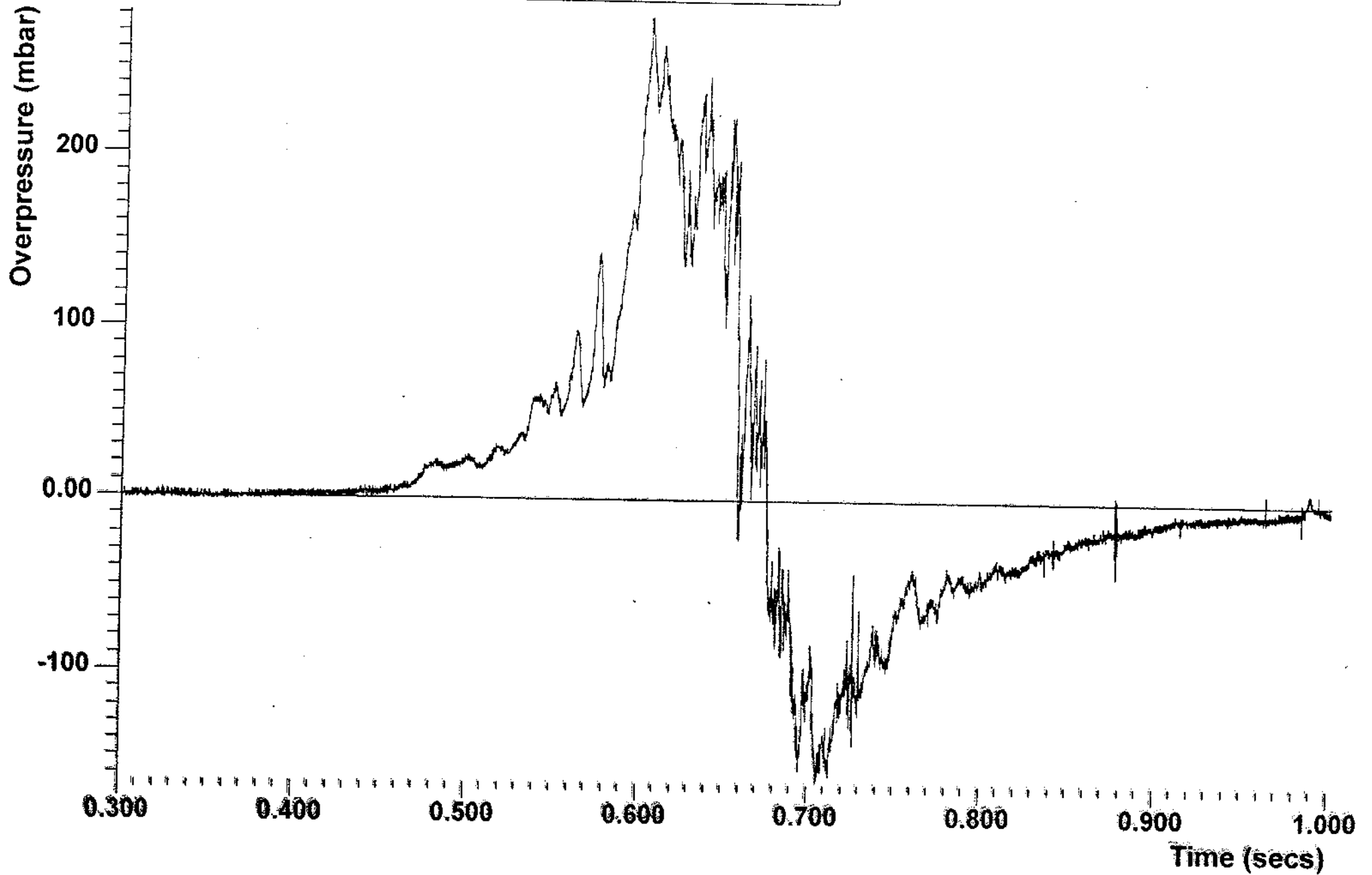
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Transducer no: PI-9



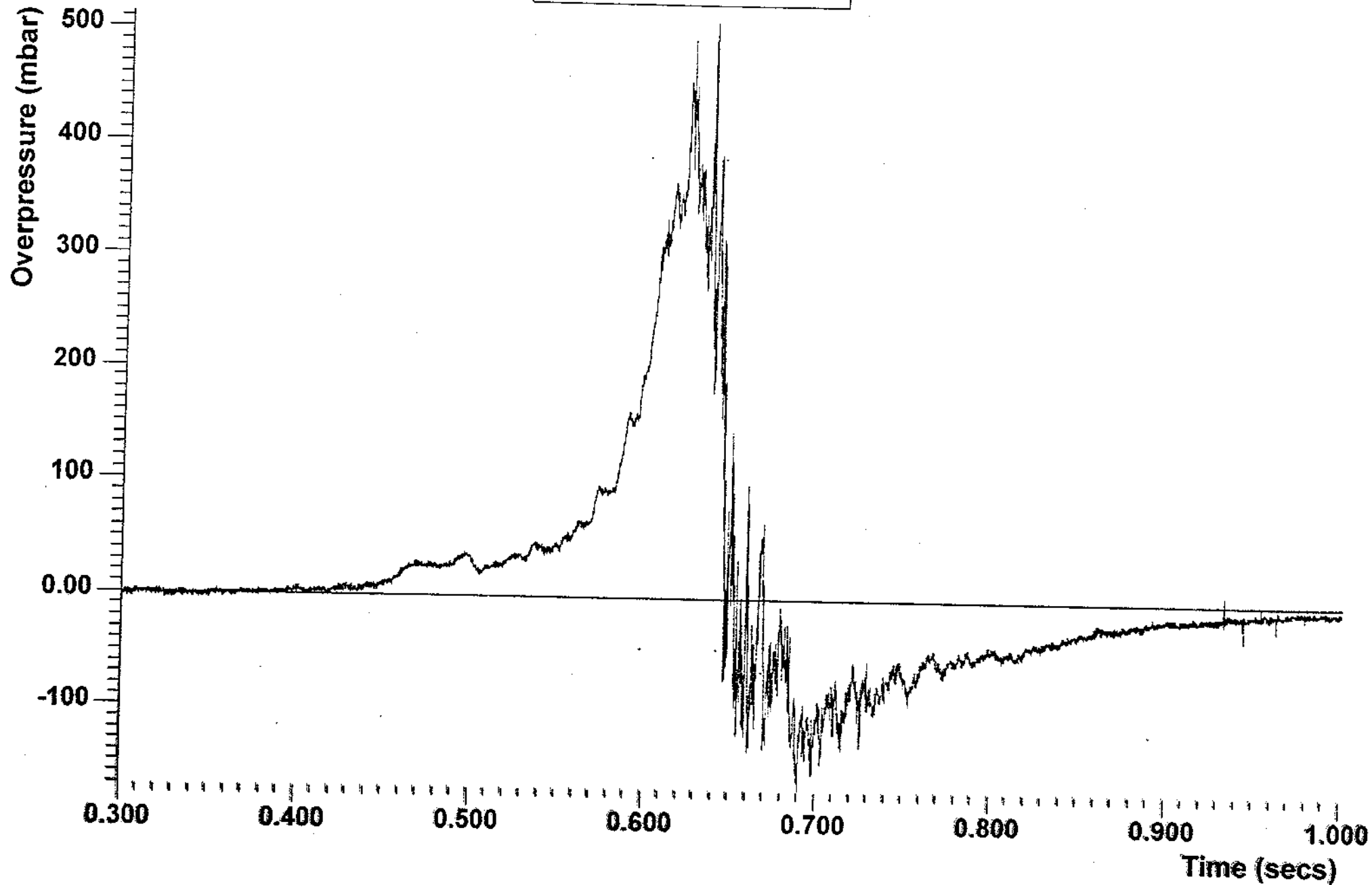
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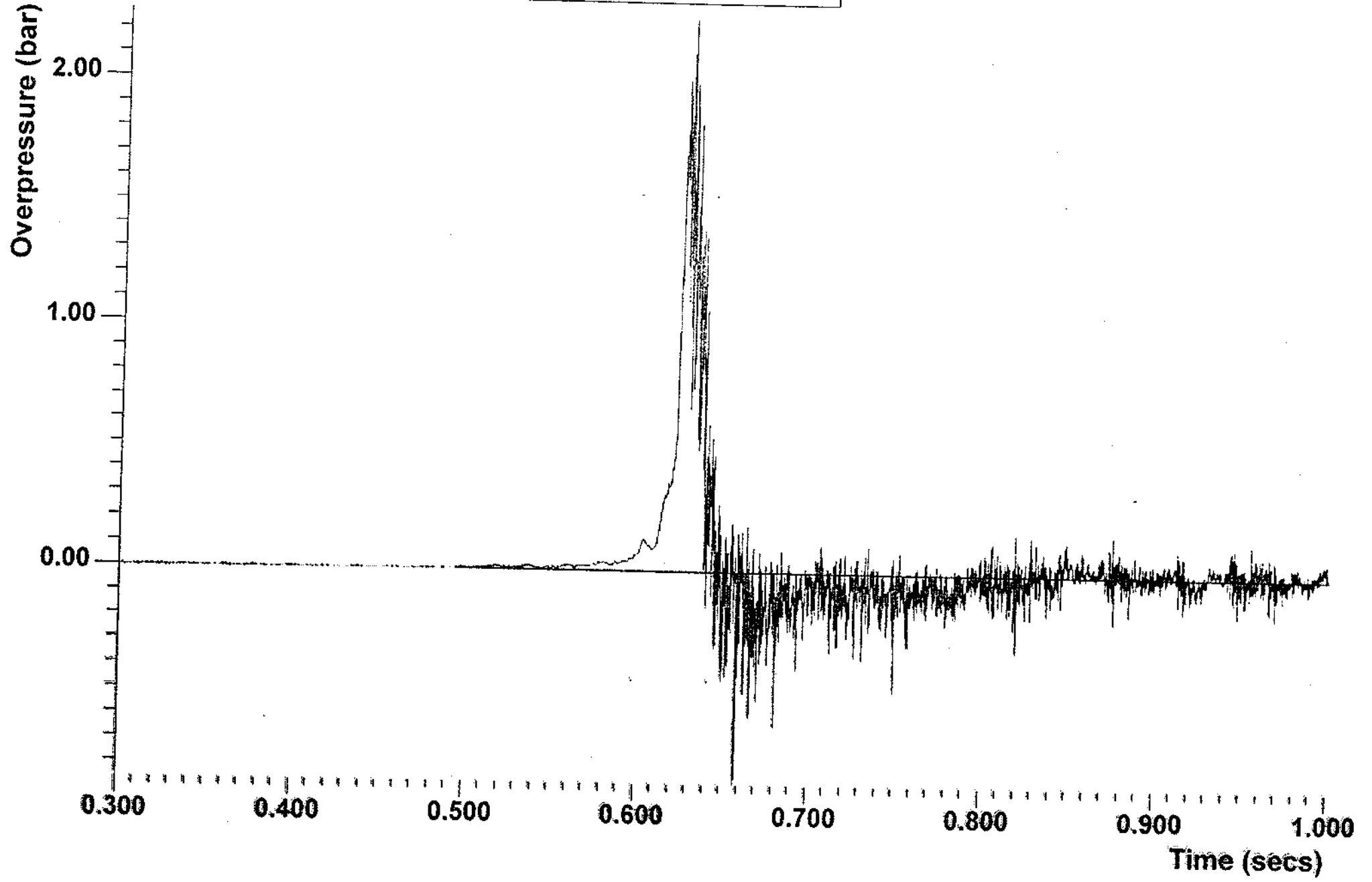
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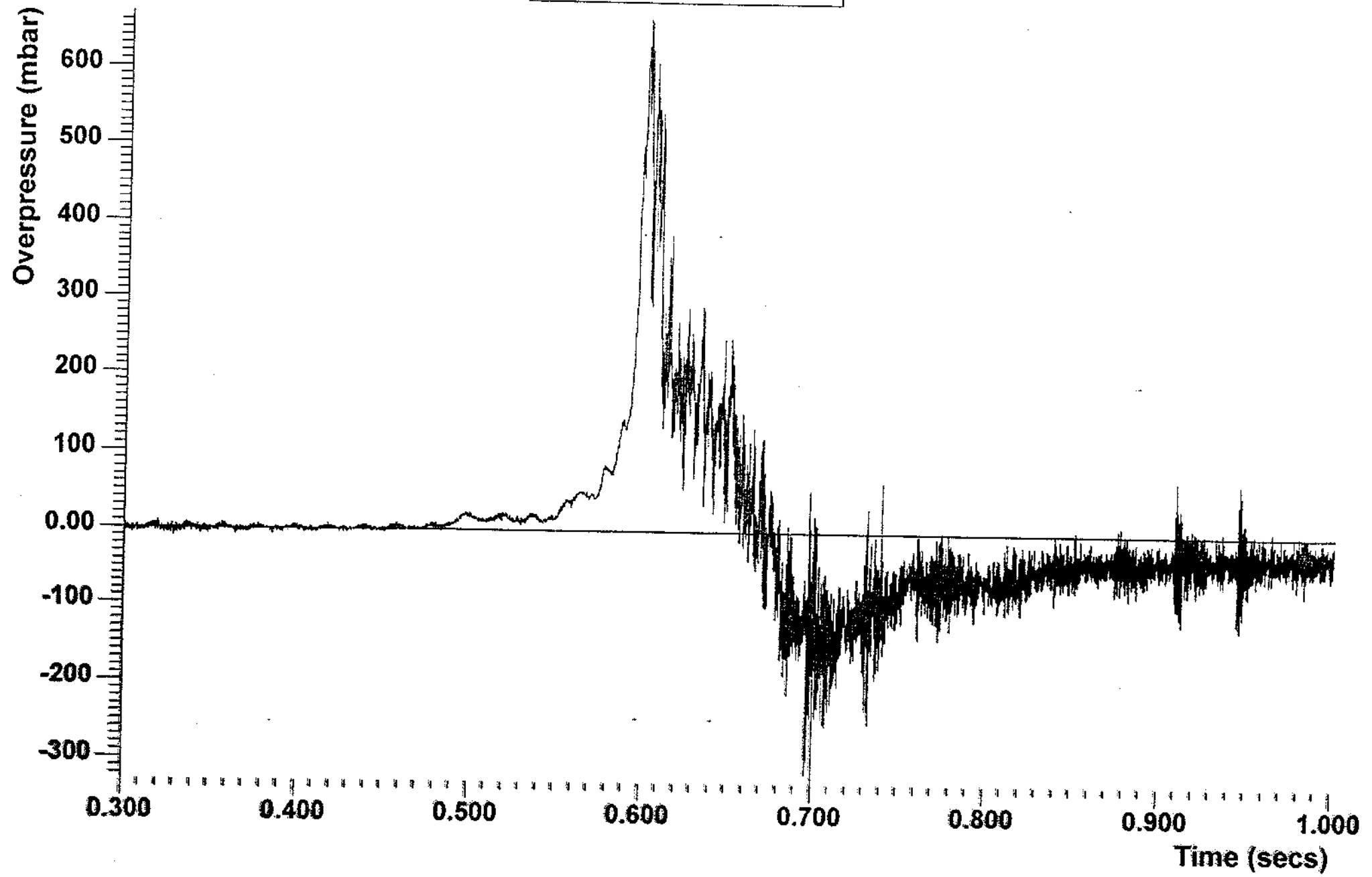
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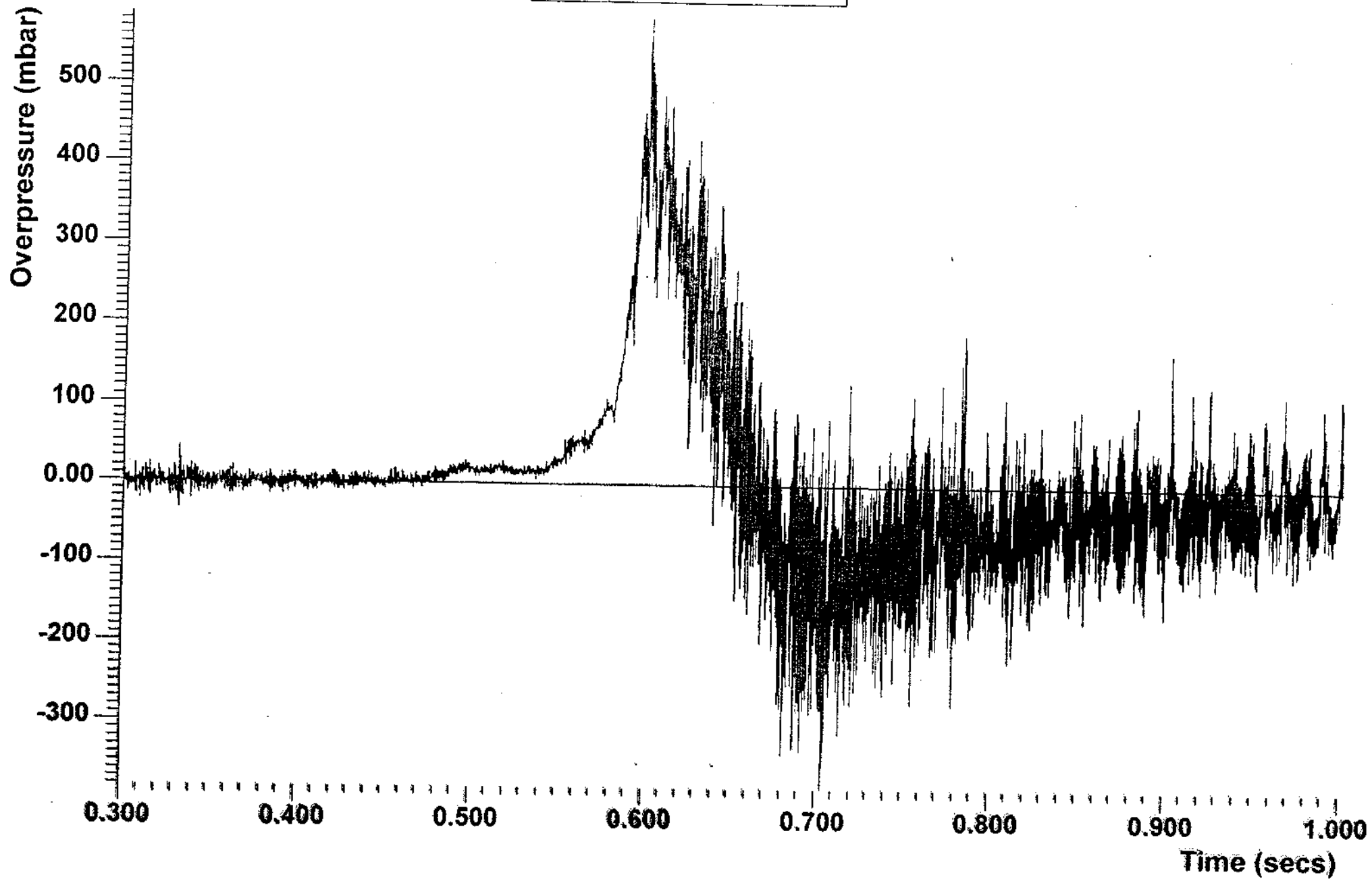
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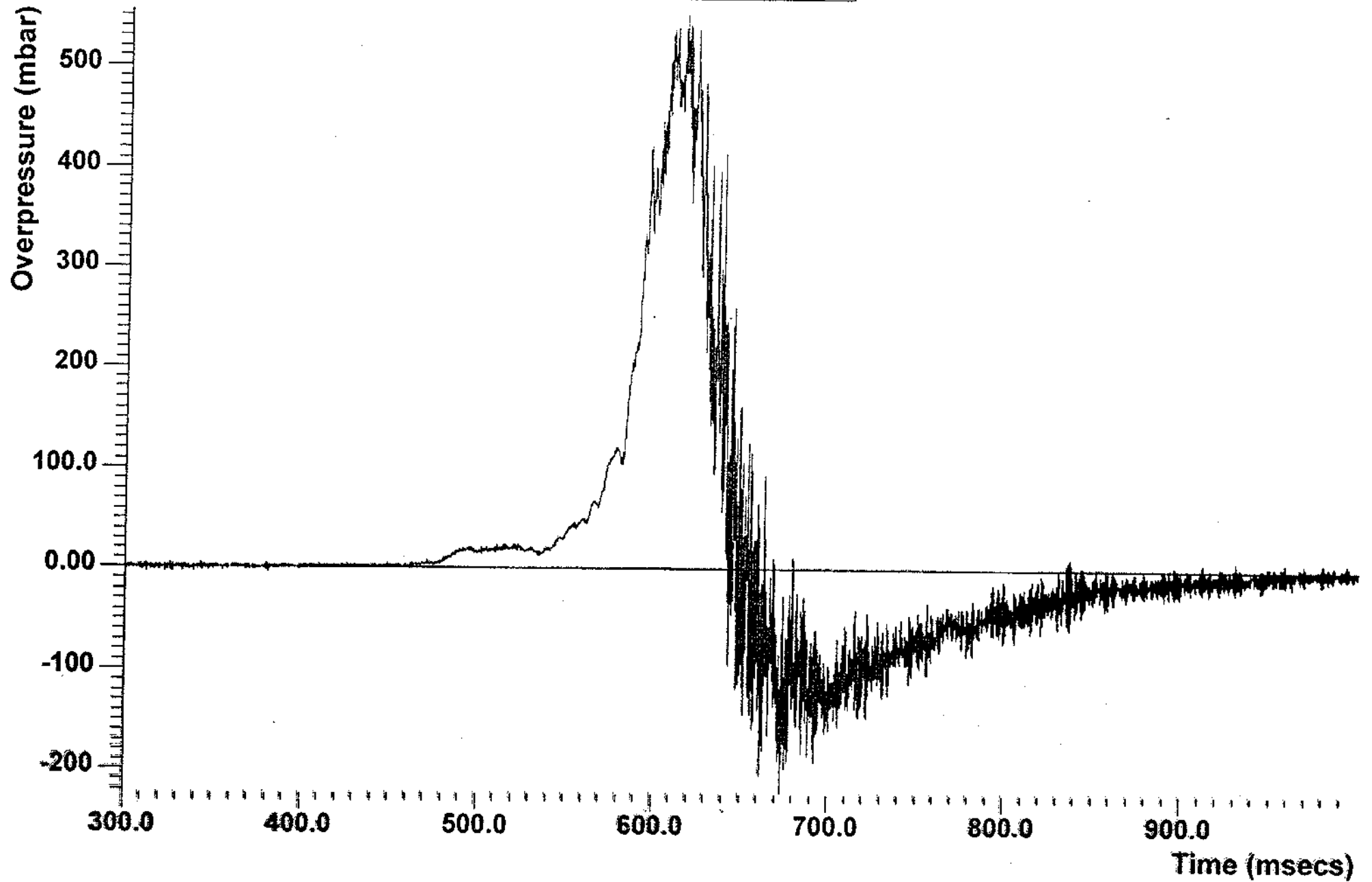
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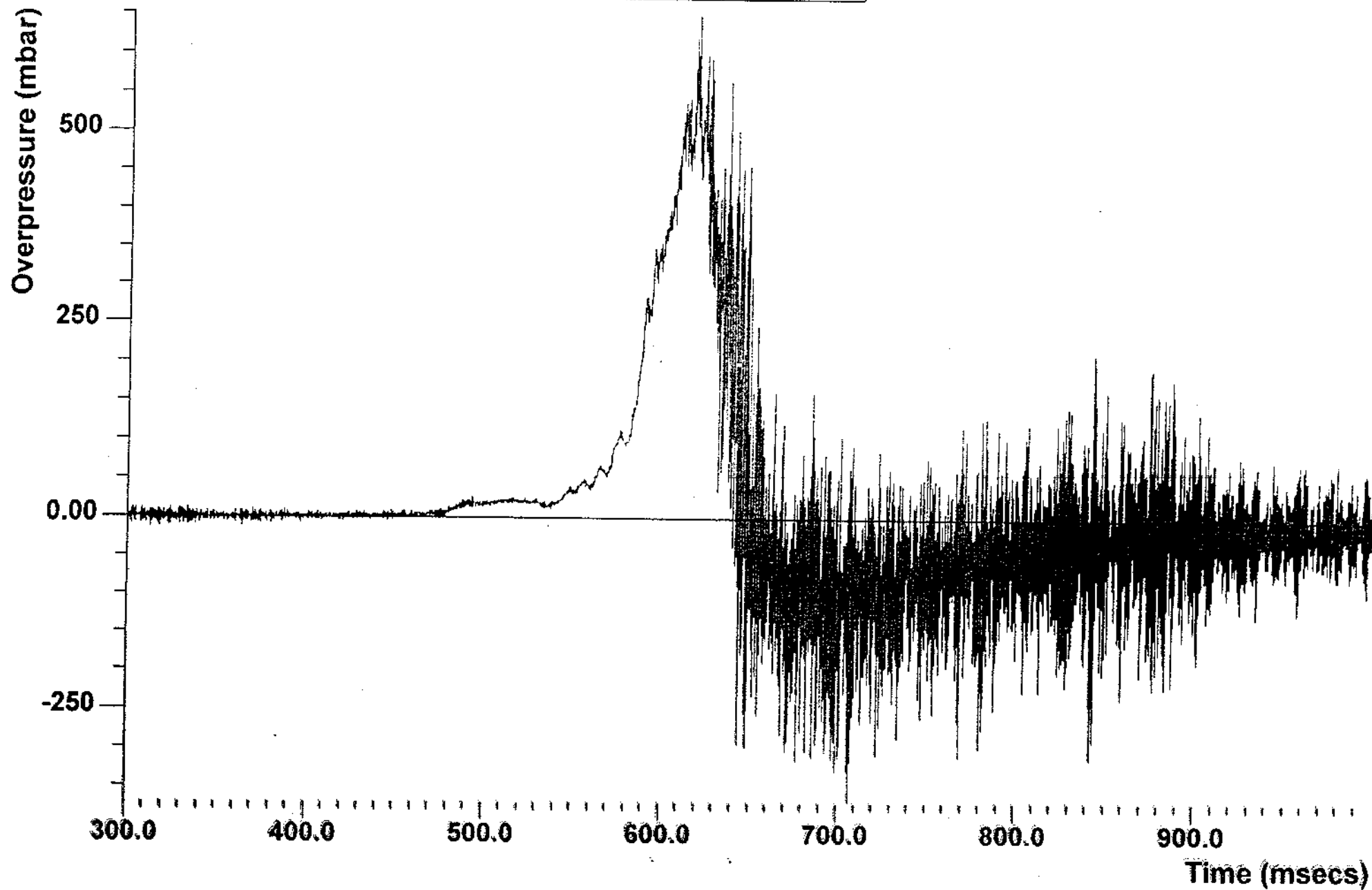
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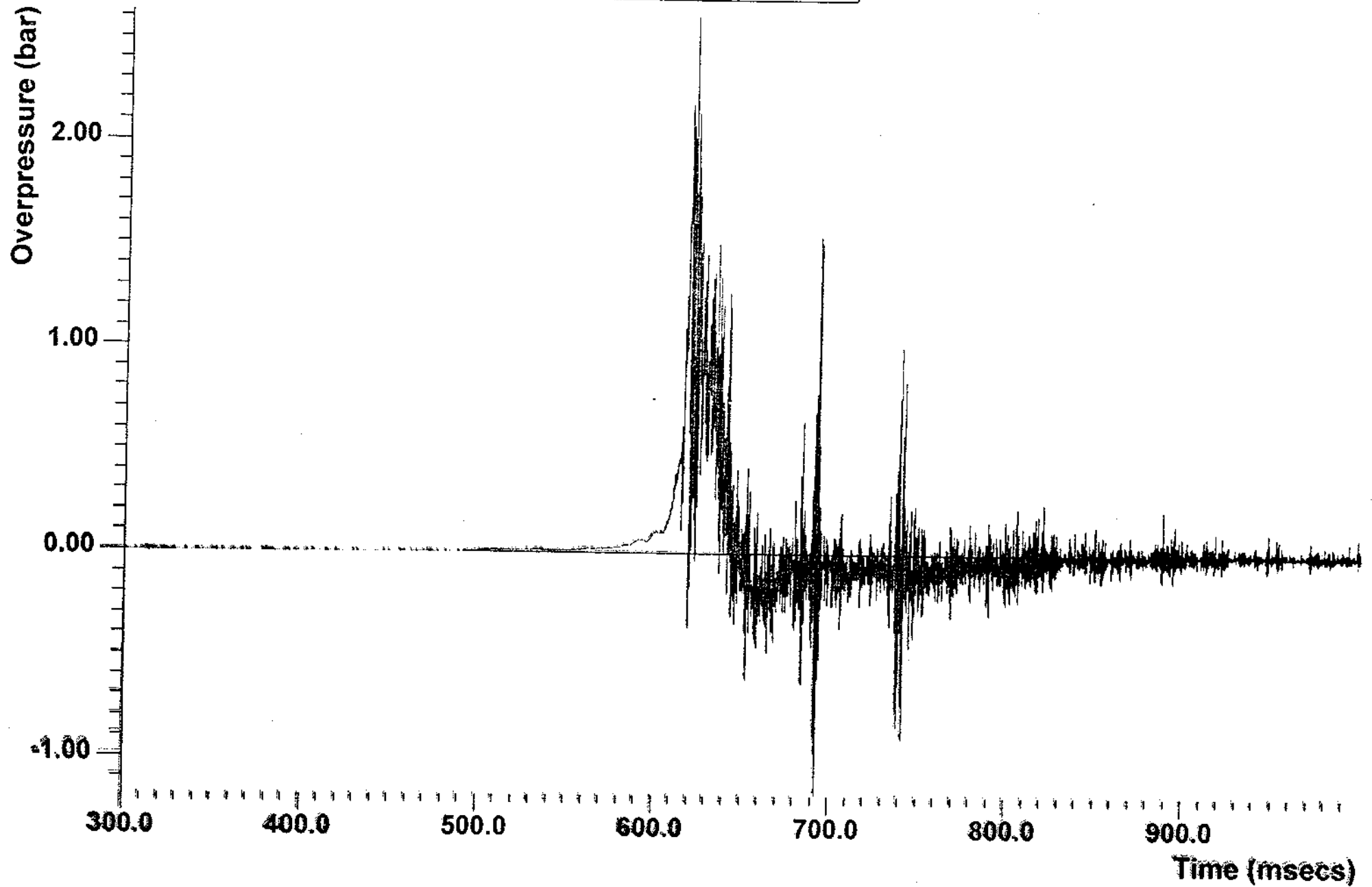
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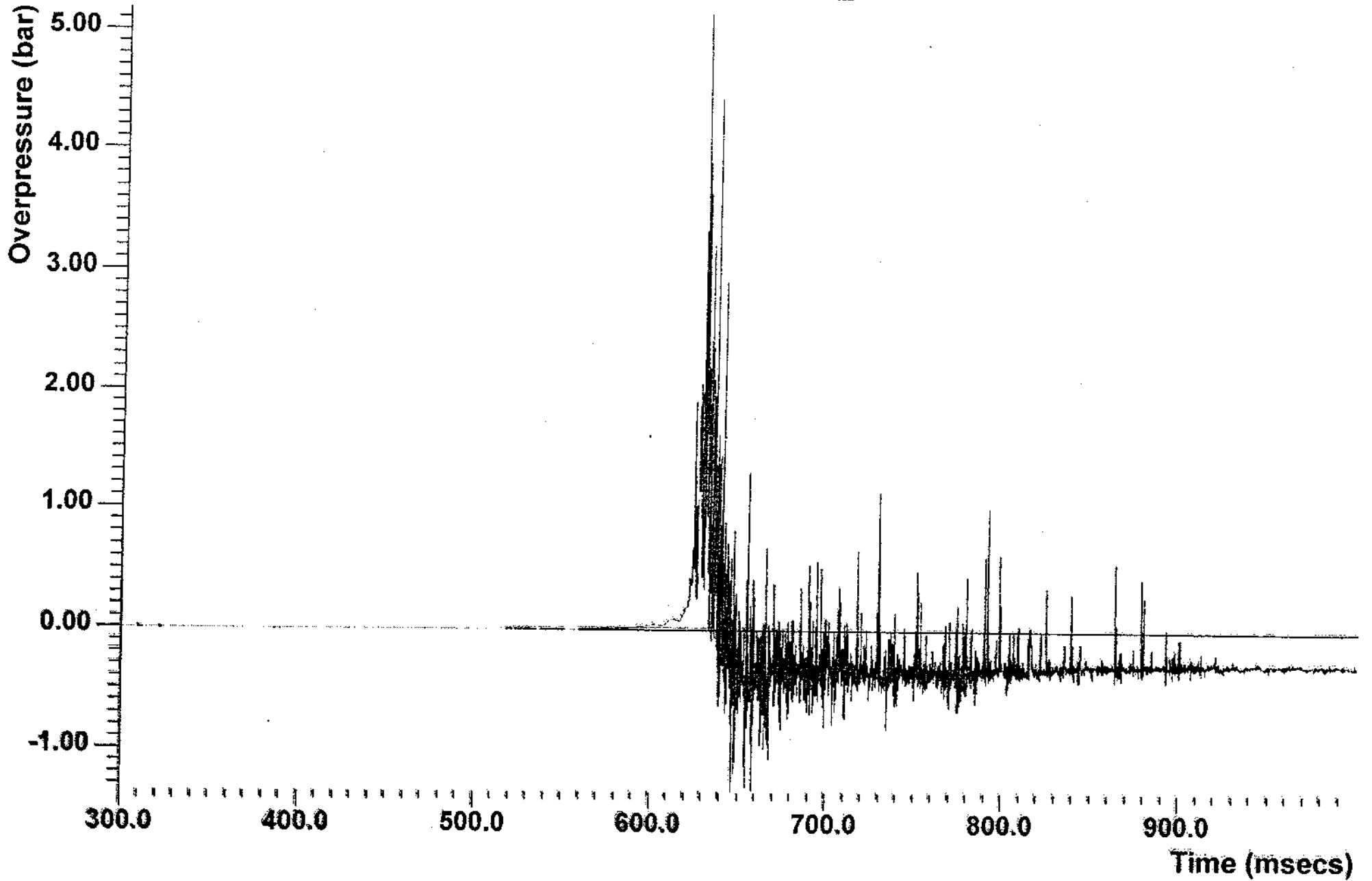
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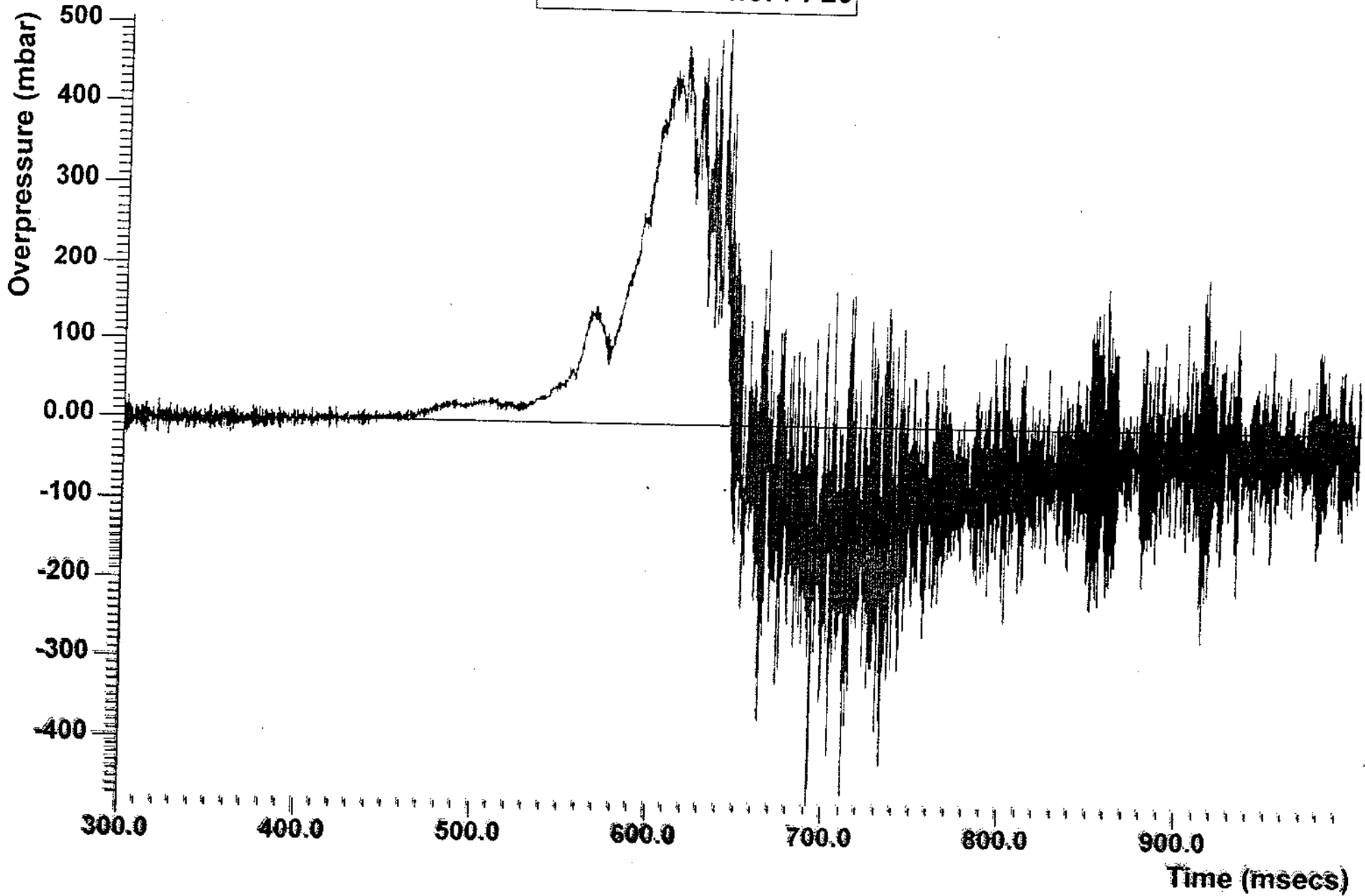
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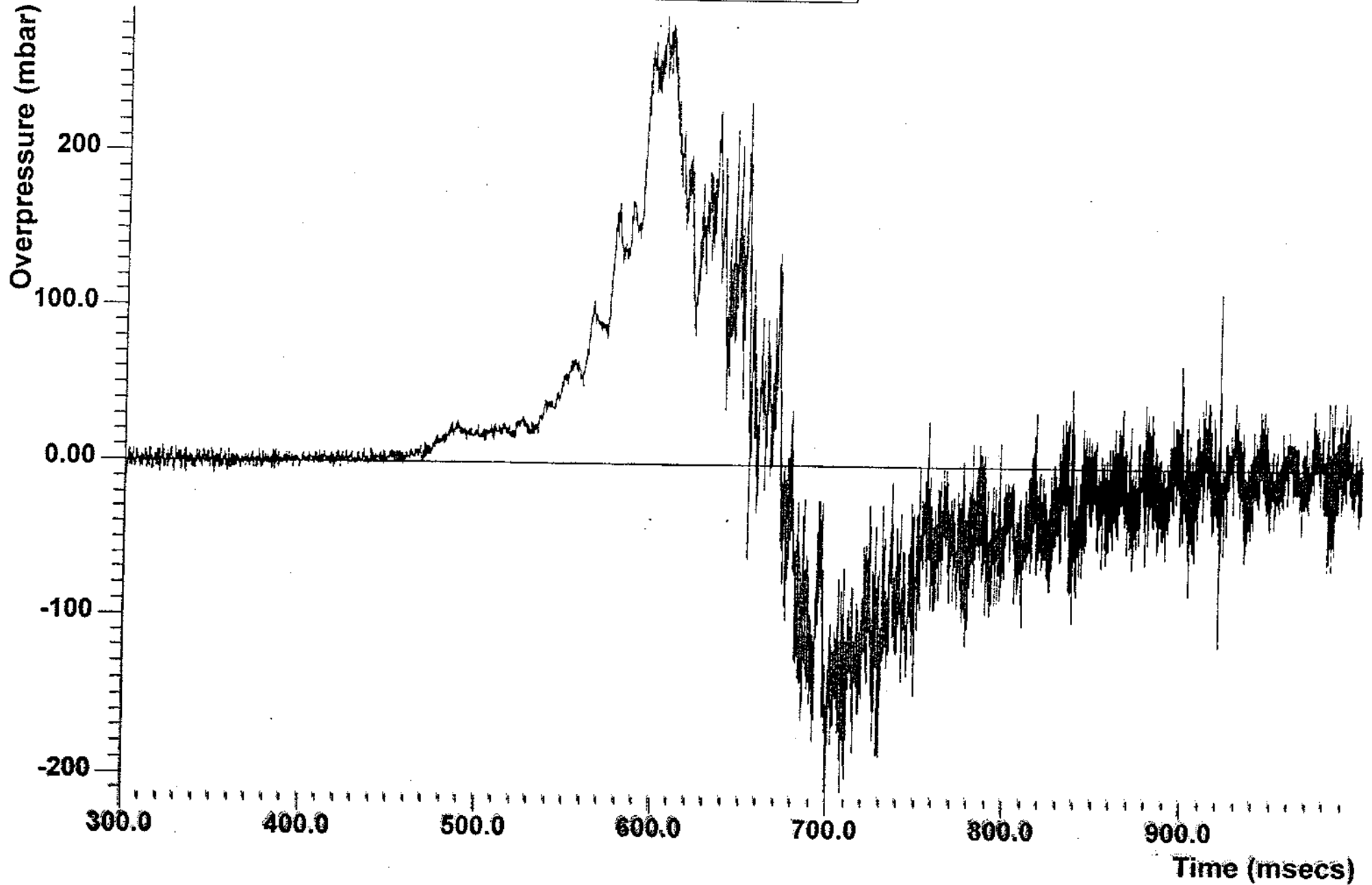
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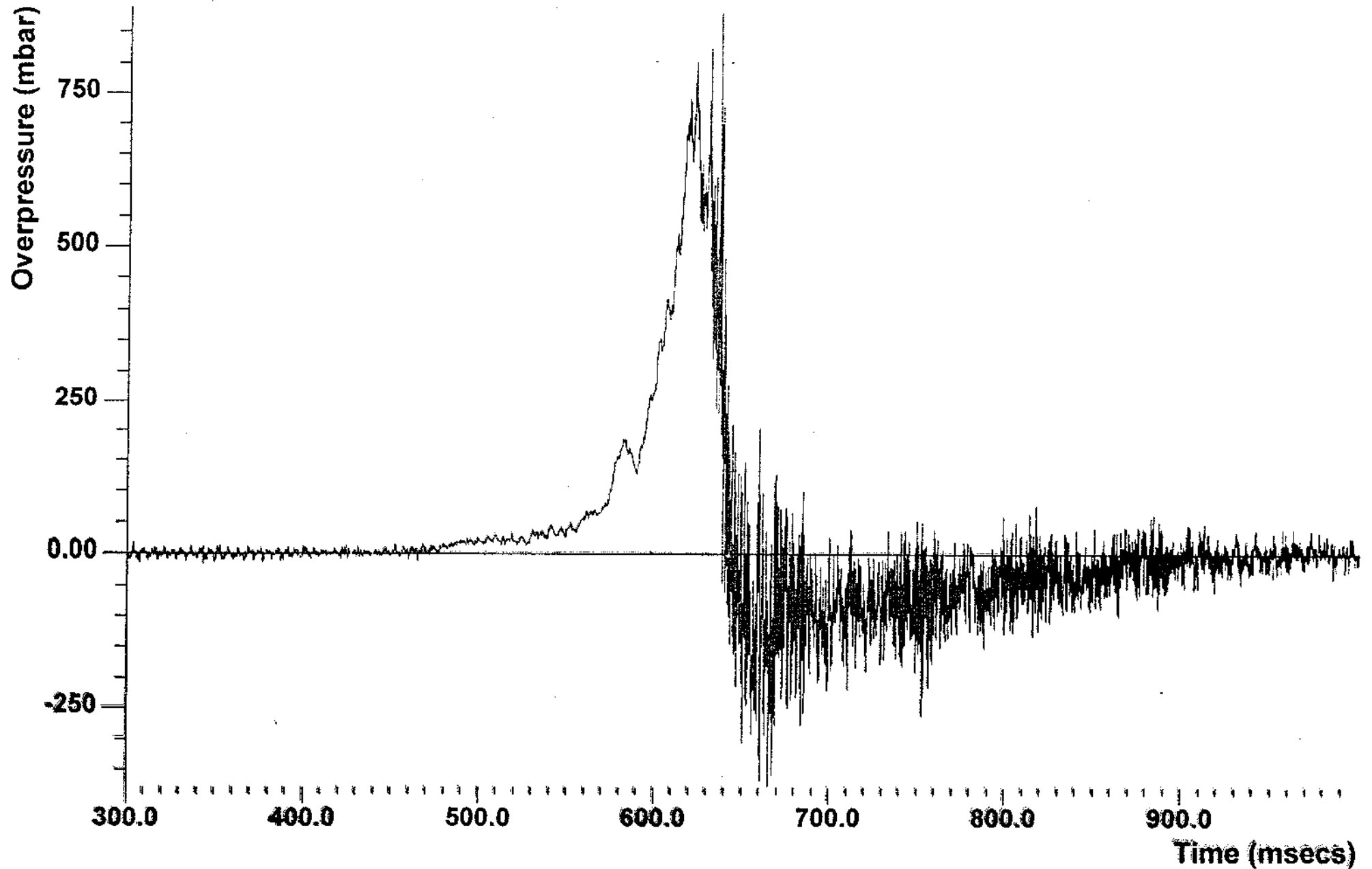
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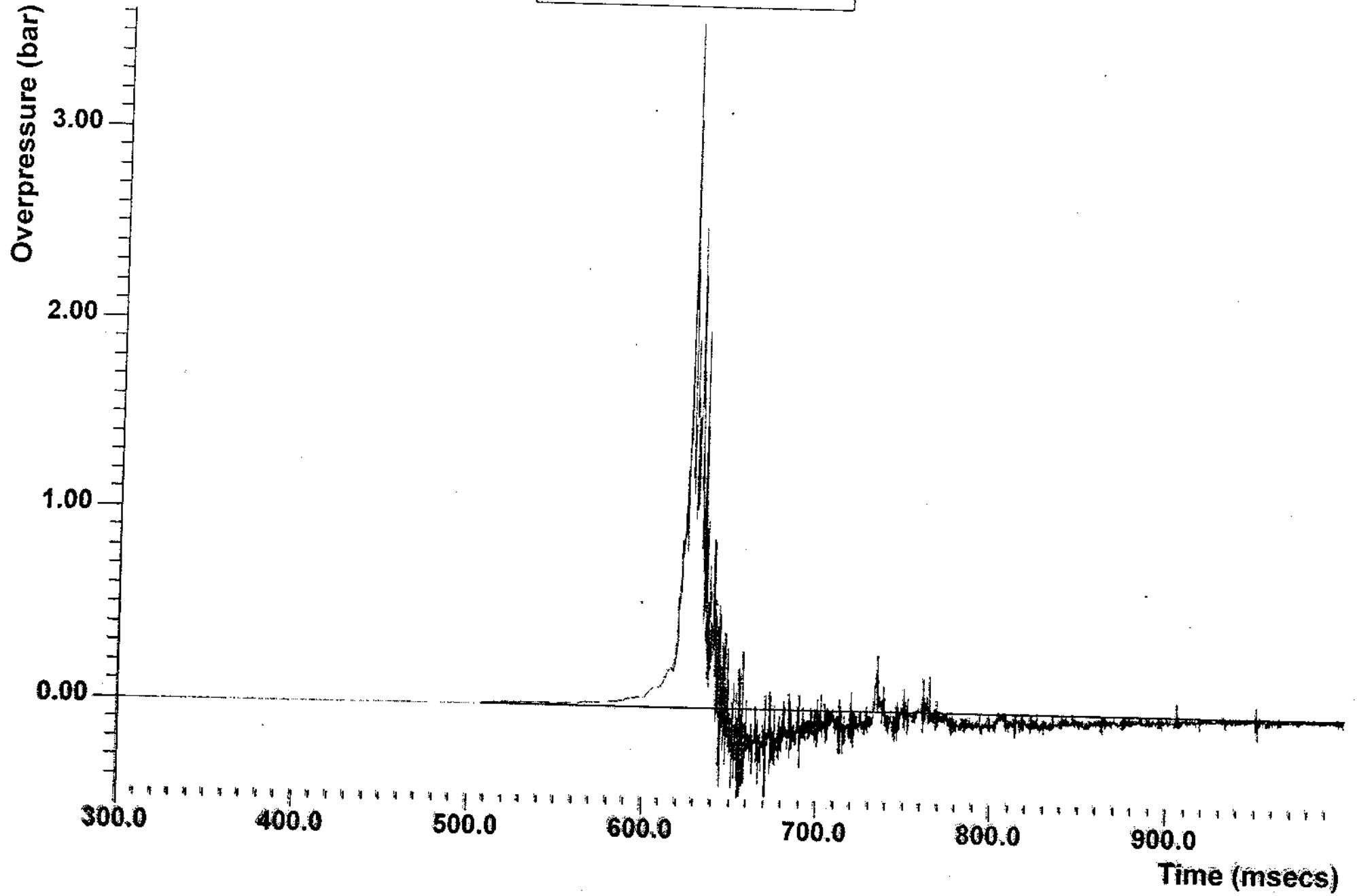
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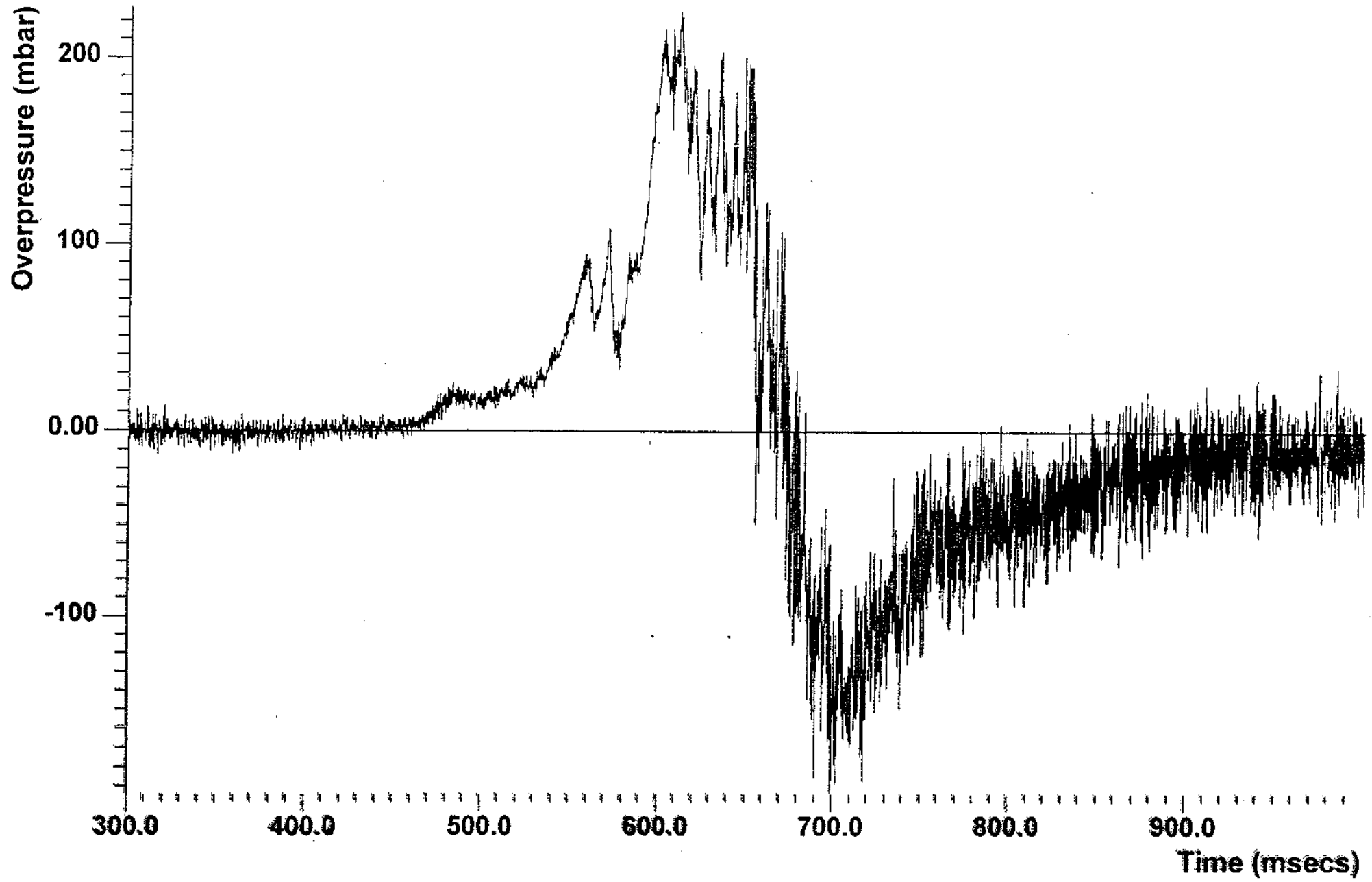
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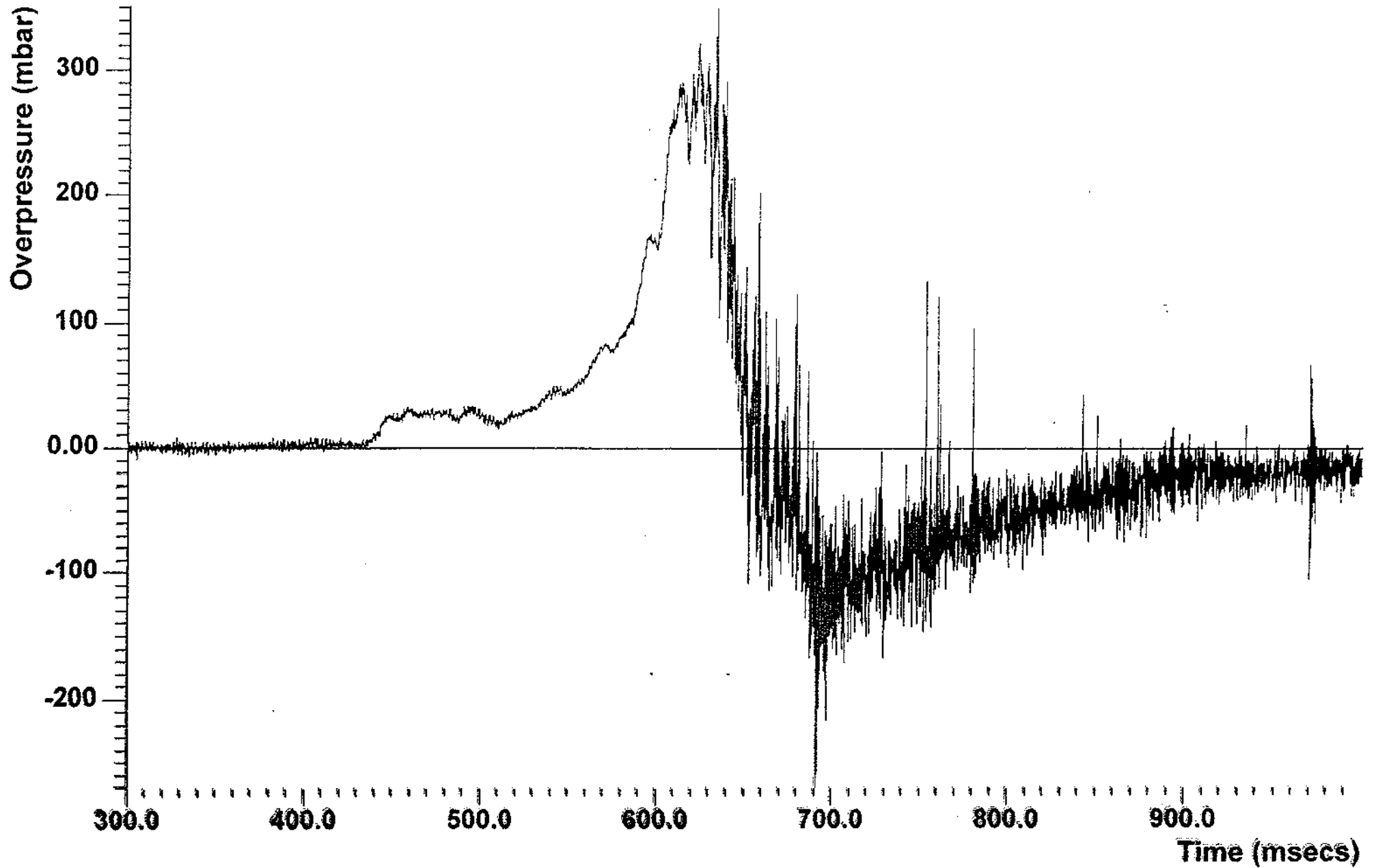
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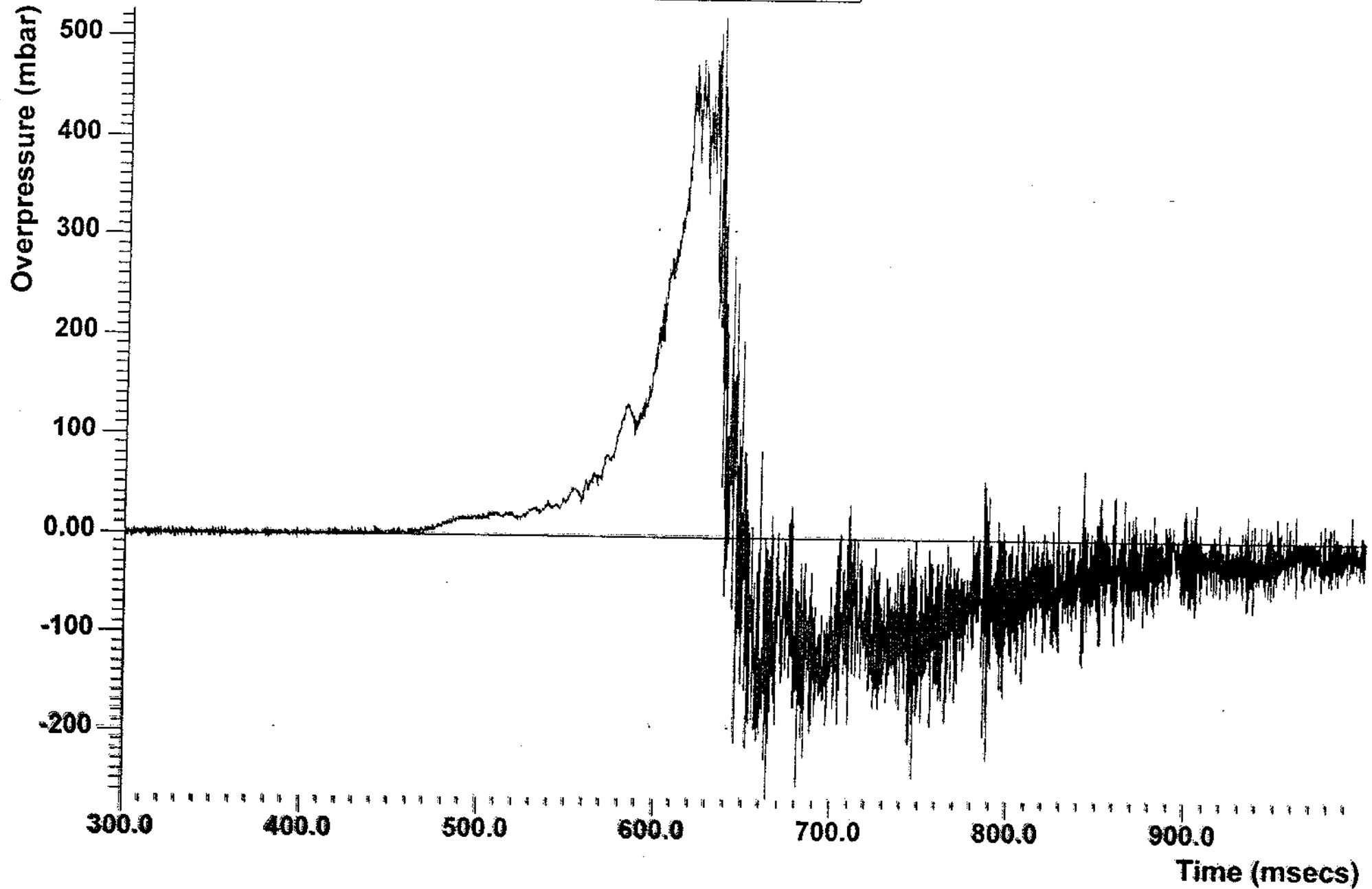
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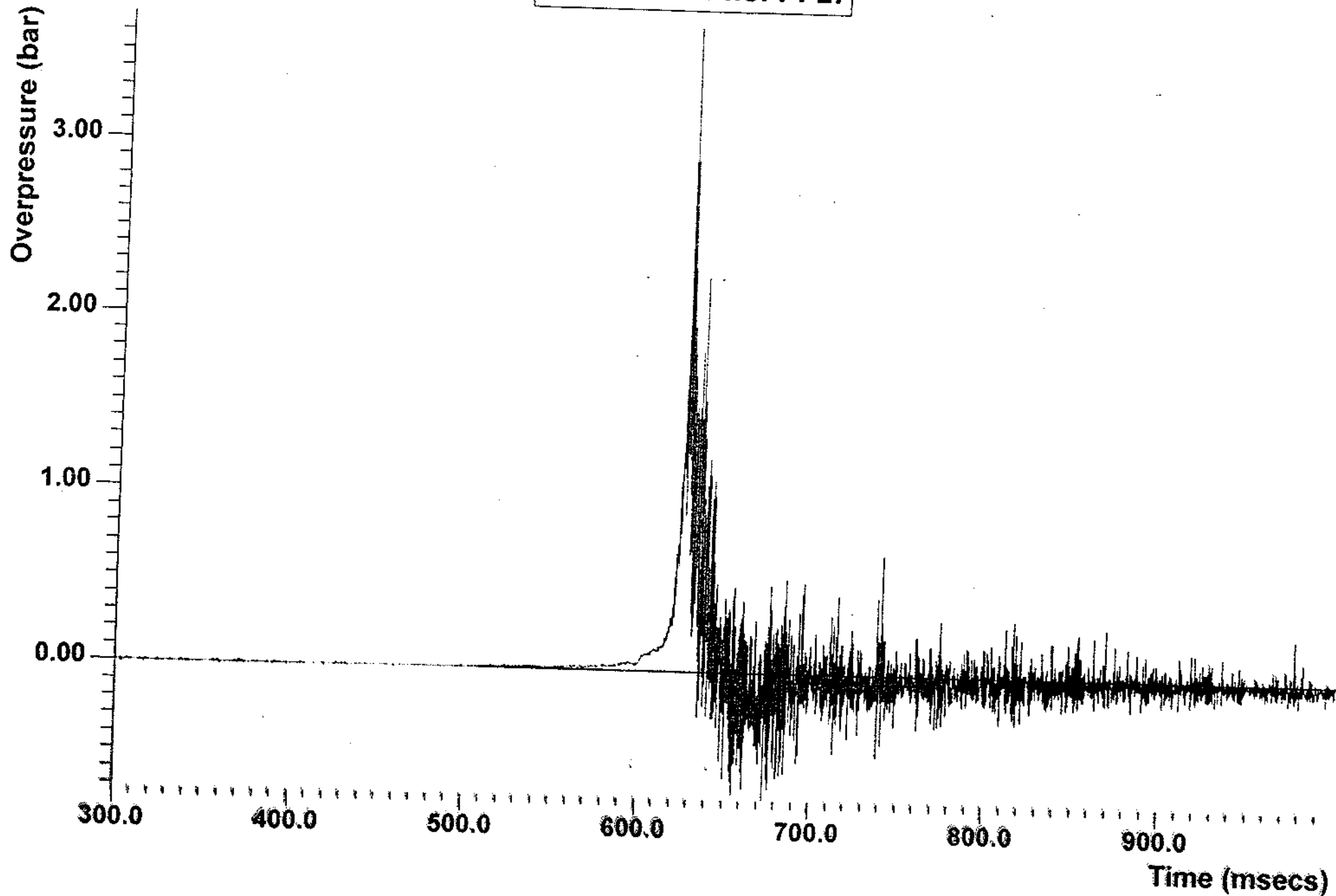
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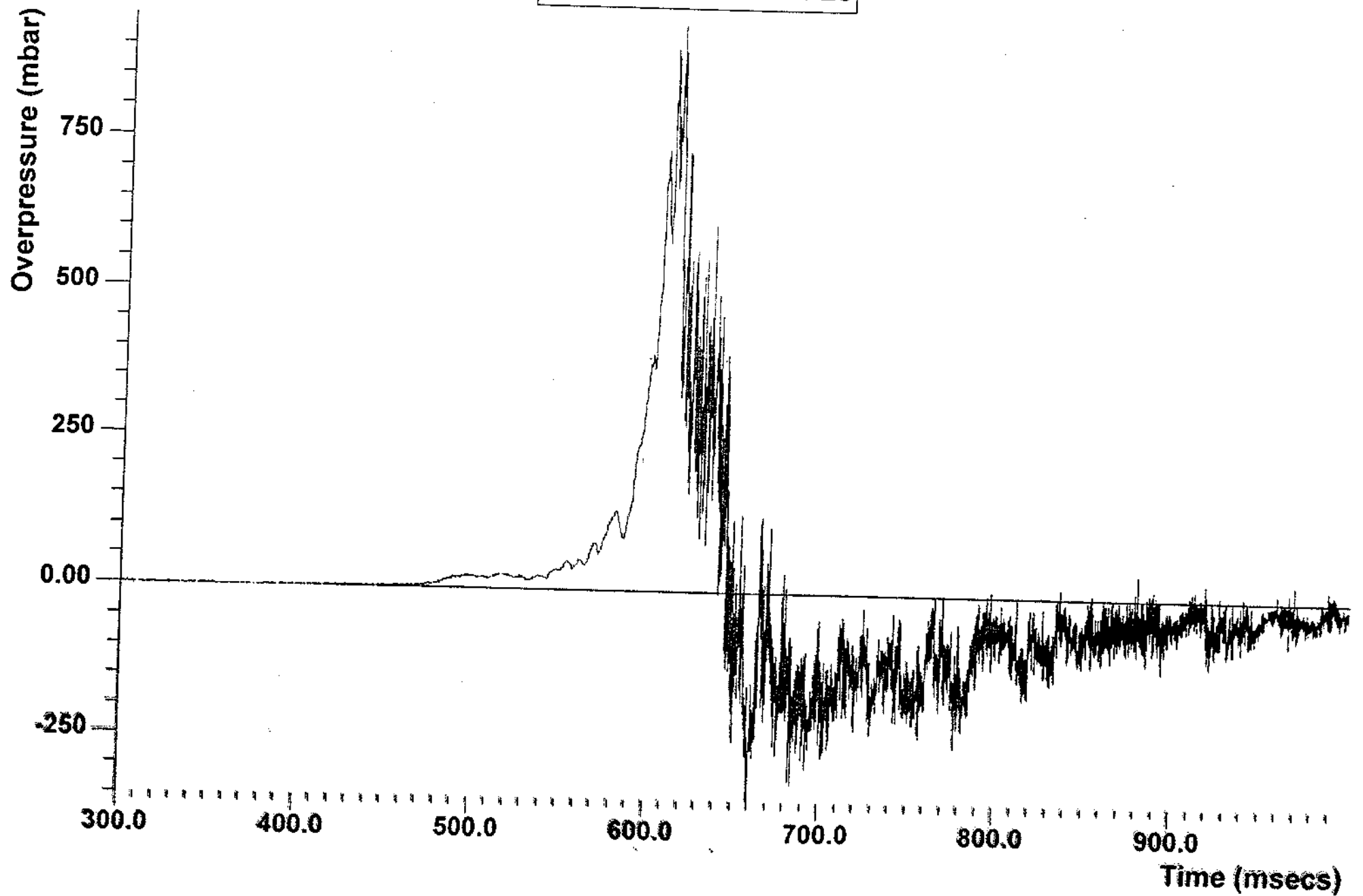
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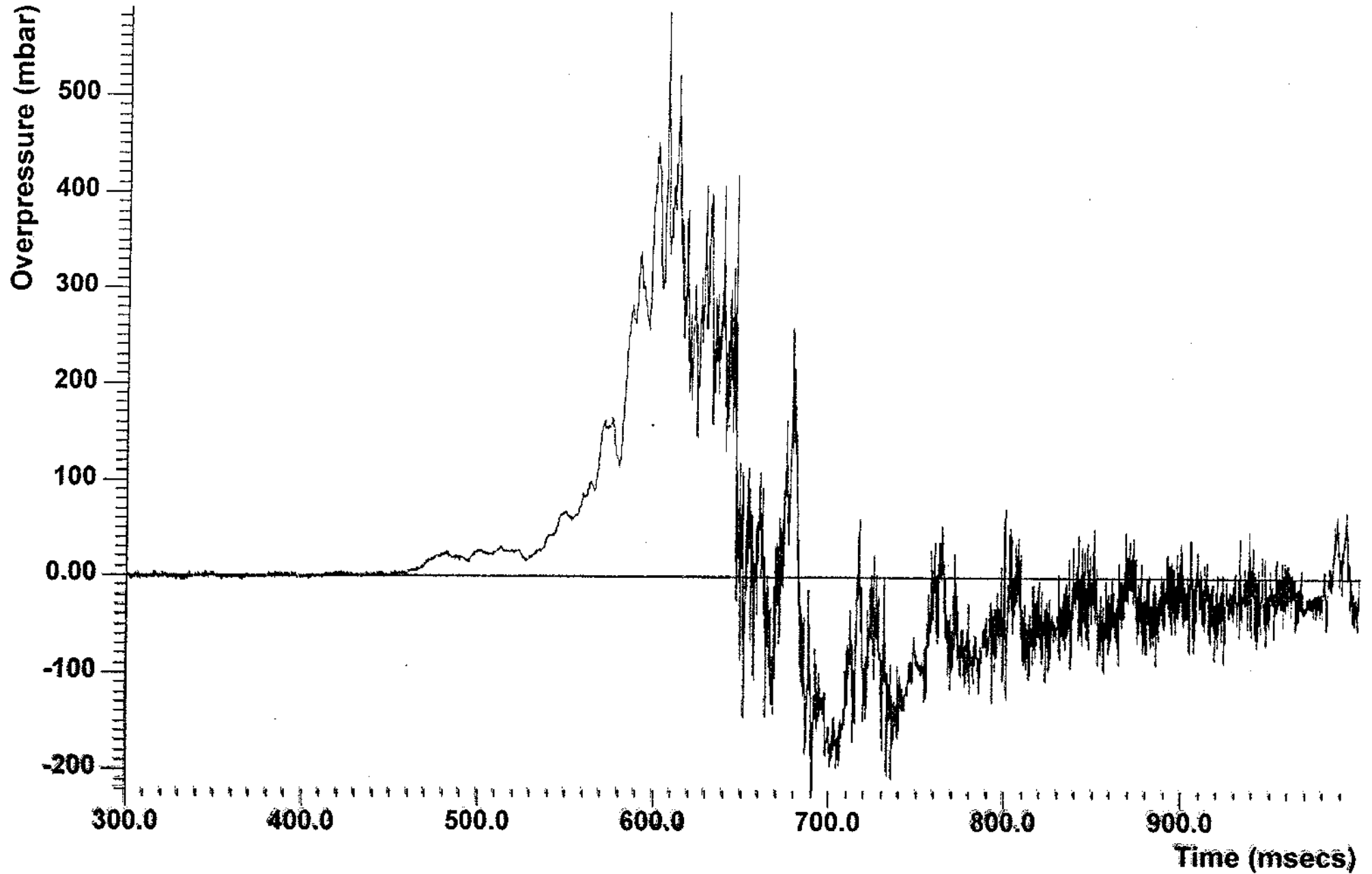
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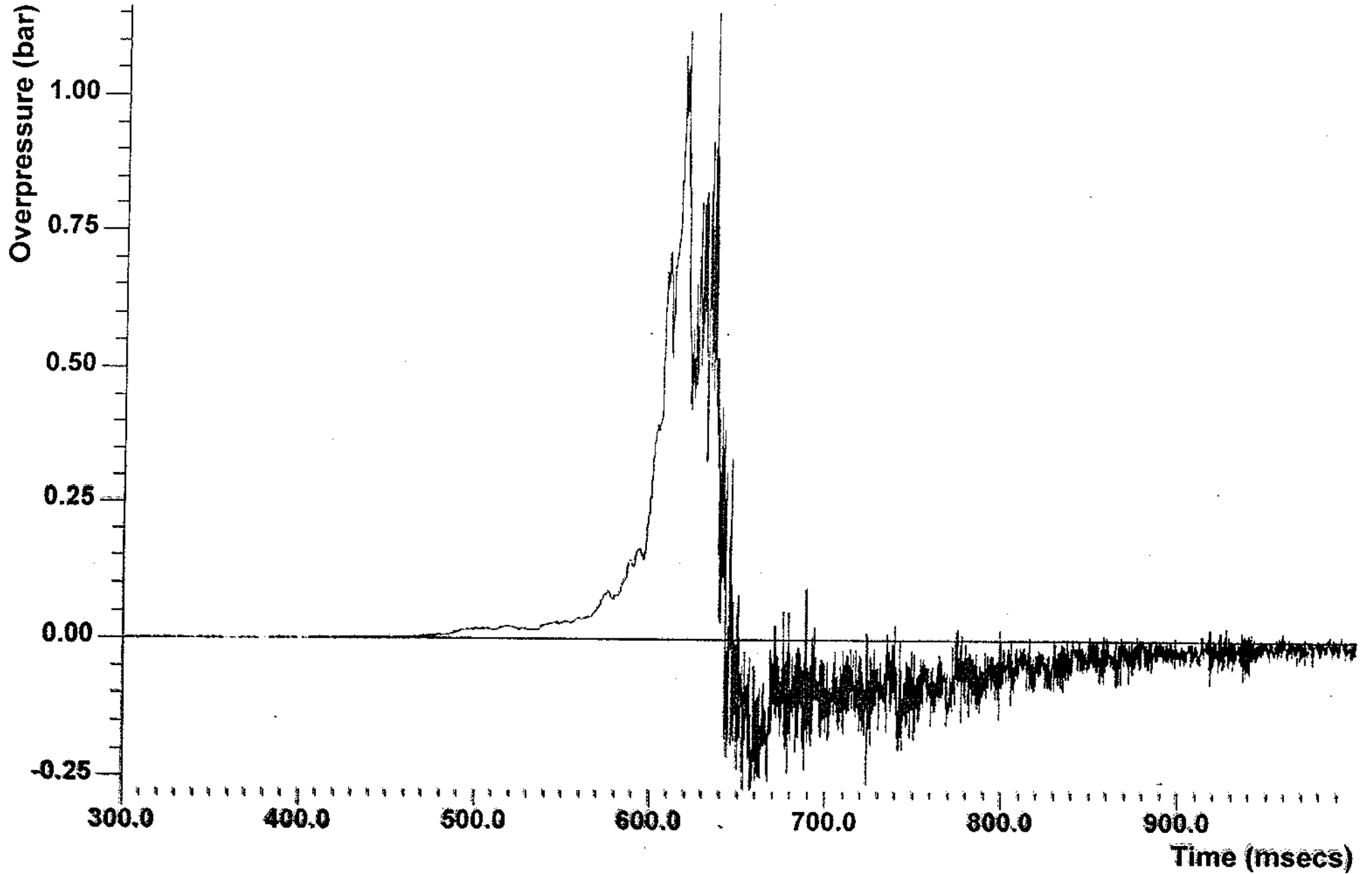
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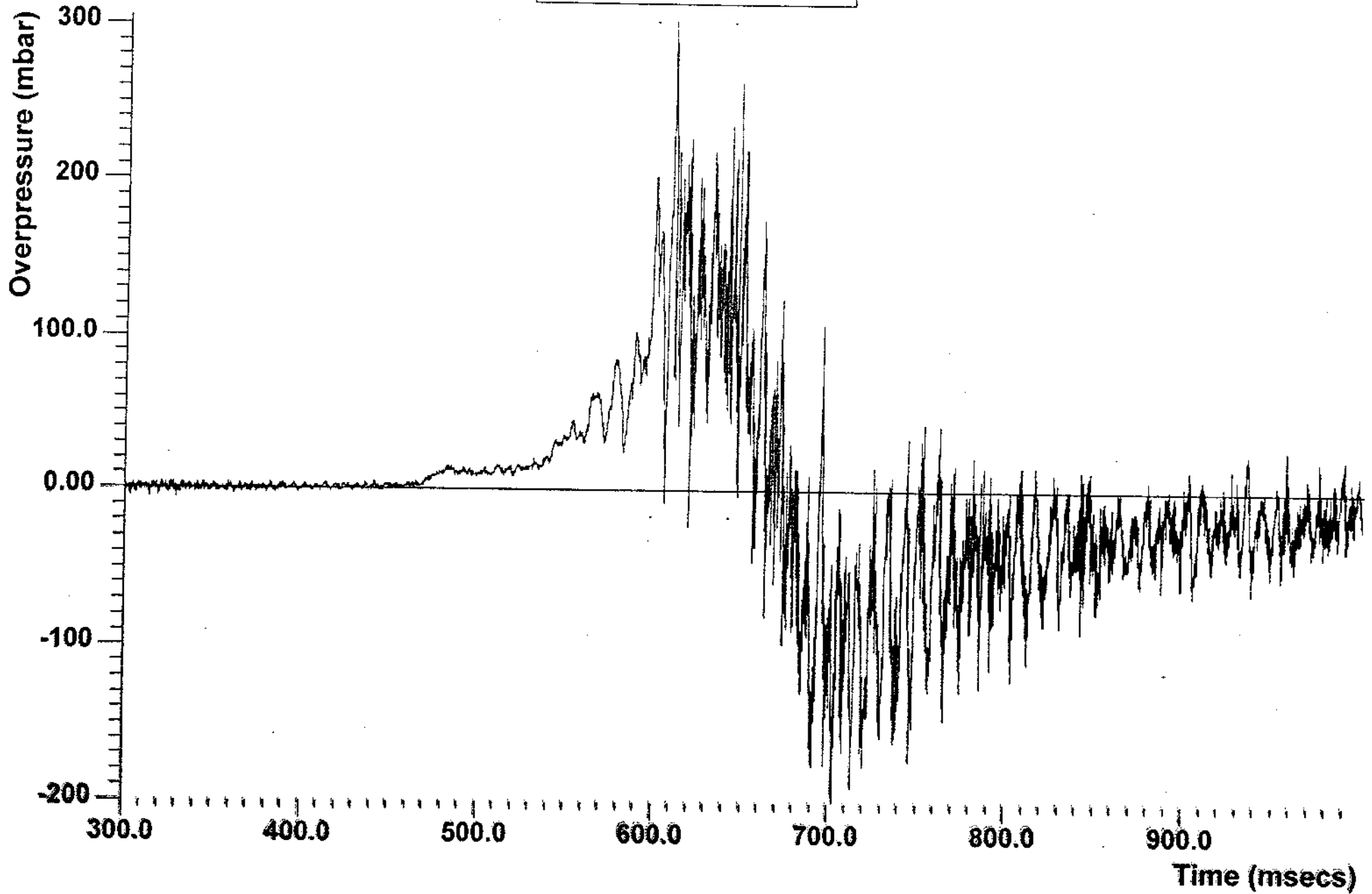
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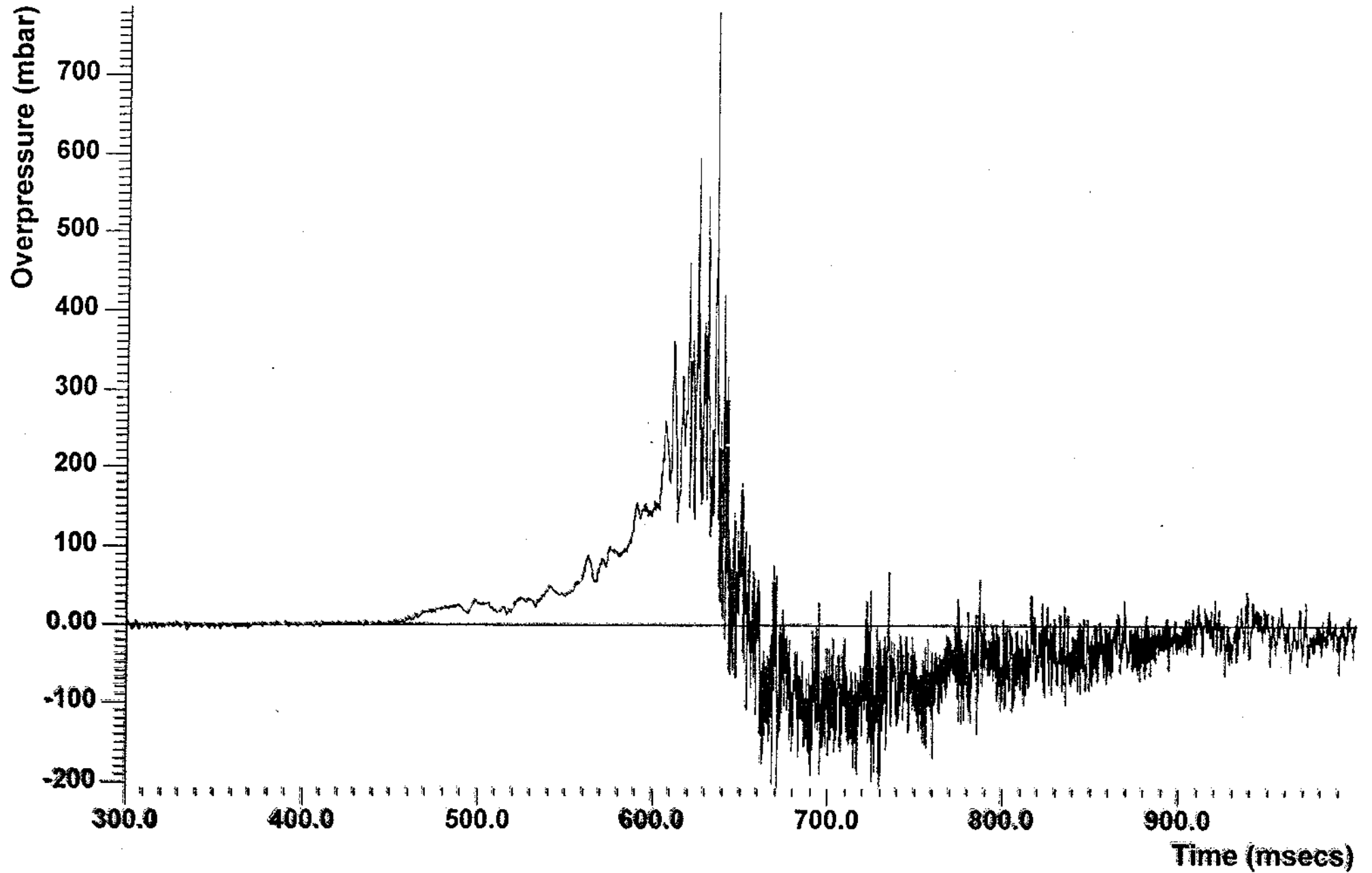
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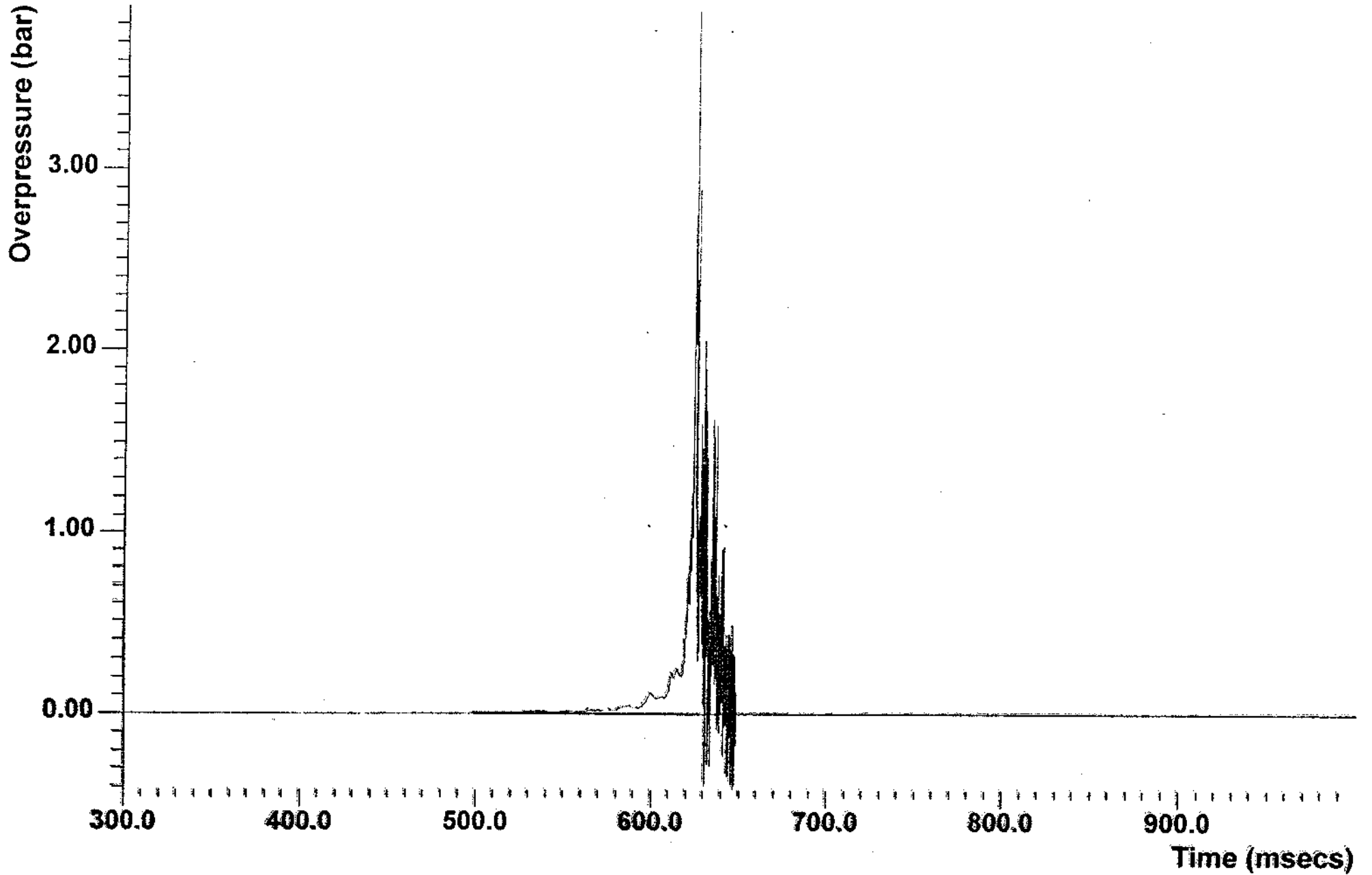
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Transducer no: PI-33



Test: HSE 3
Transducer no: PI-34

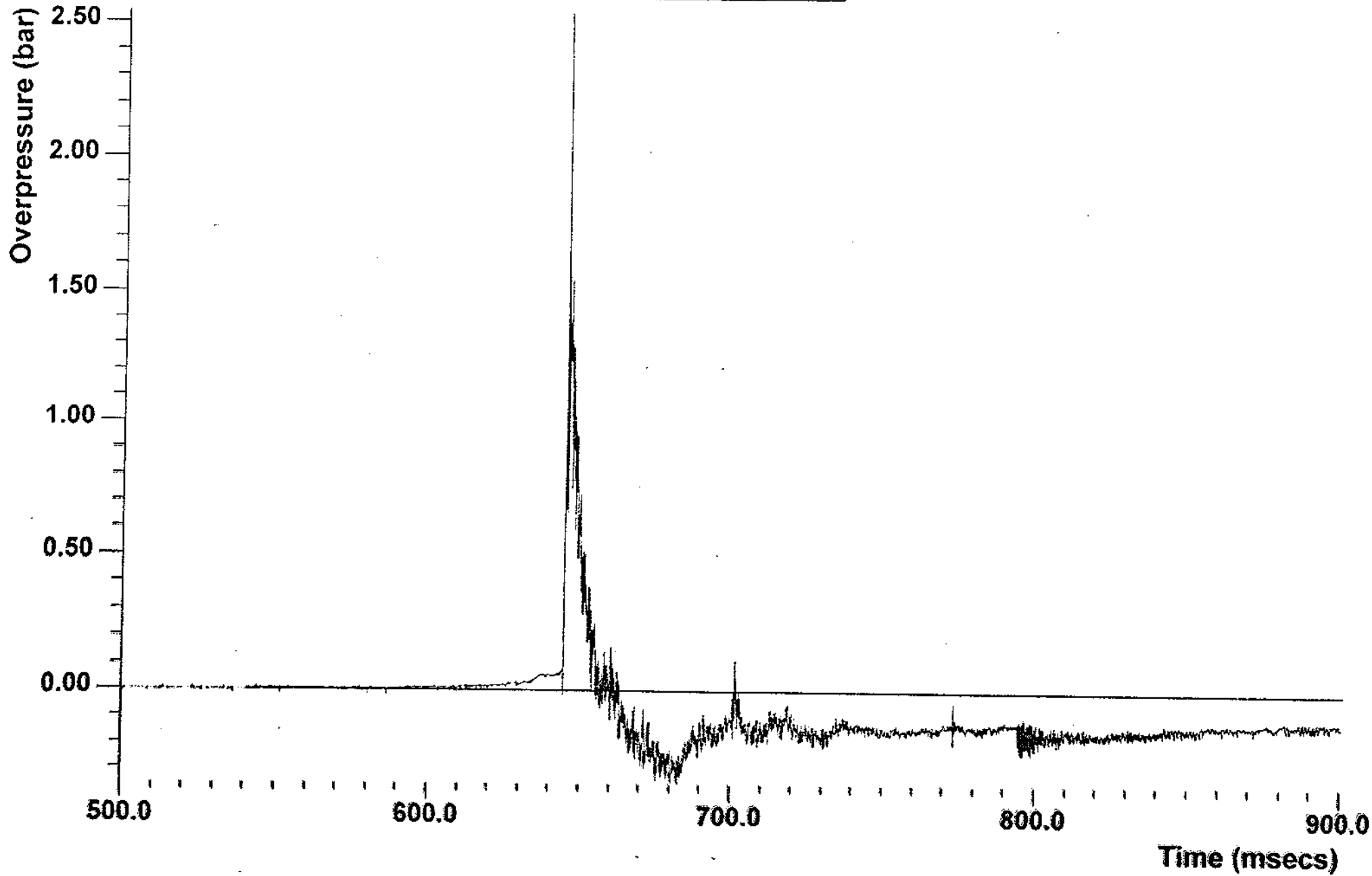


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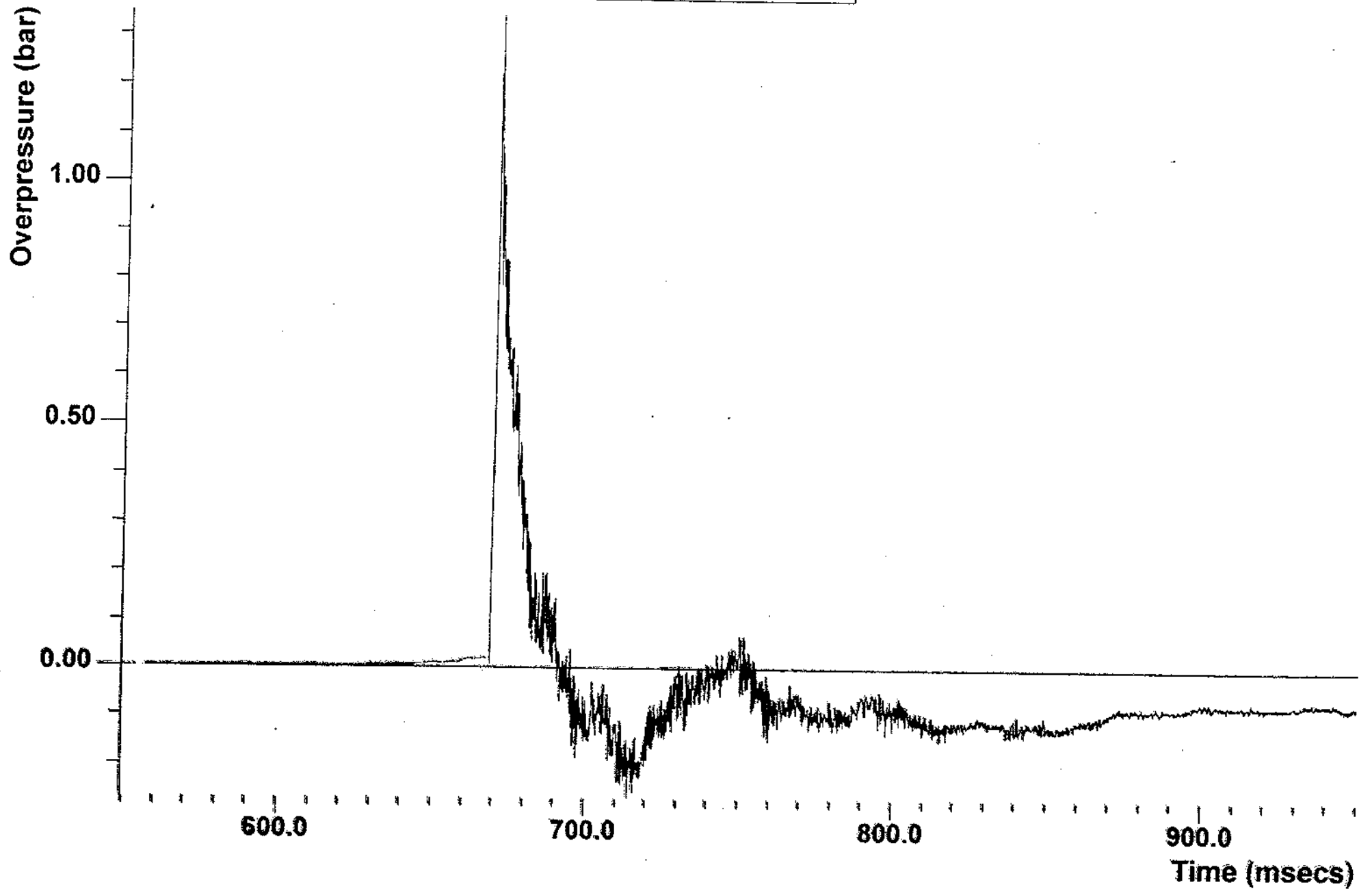


Appendix B: External Overpressure Profiles

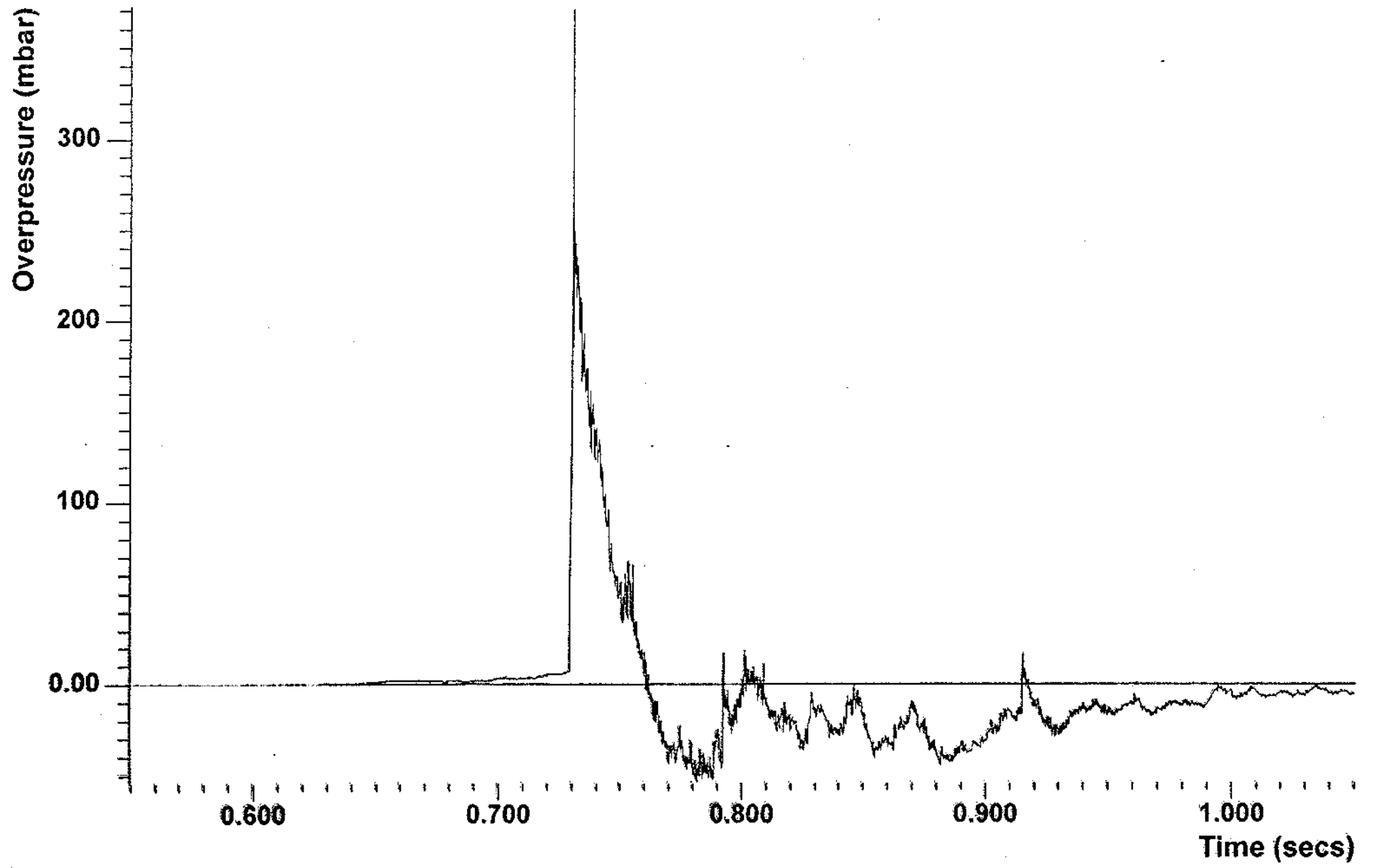
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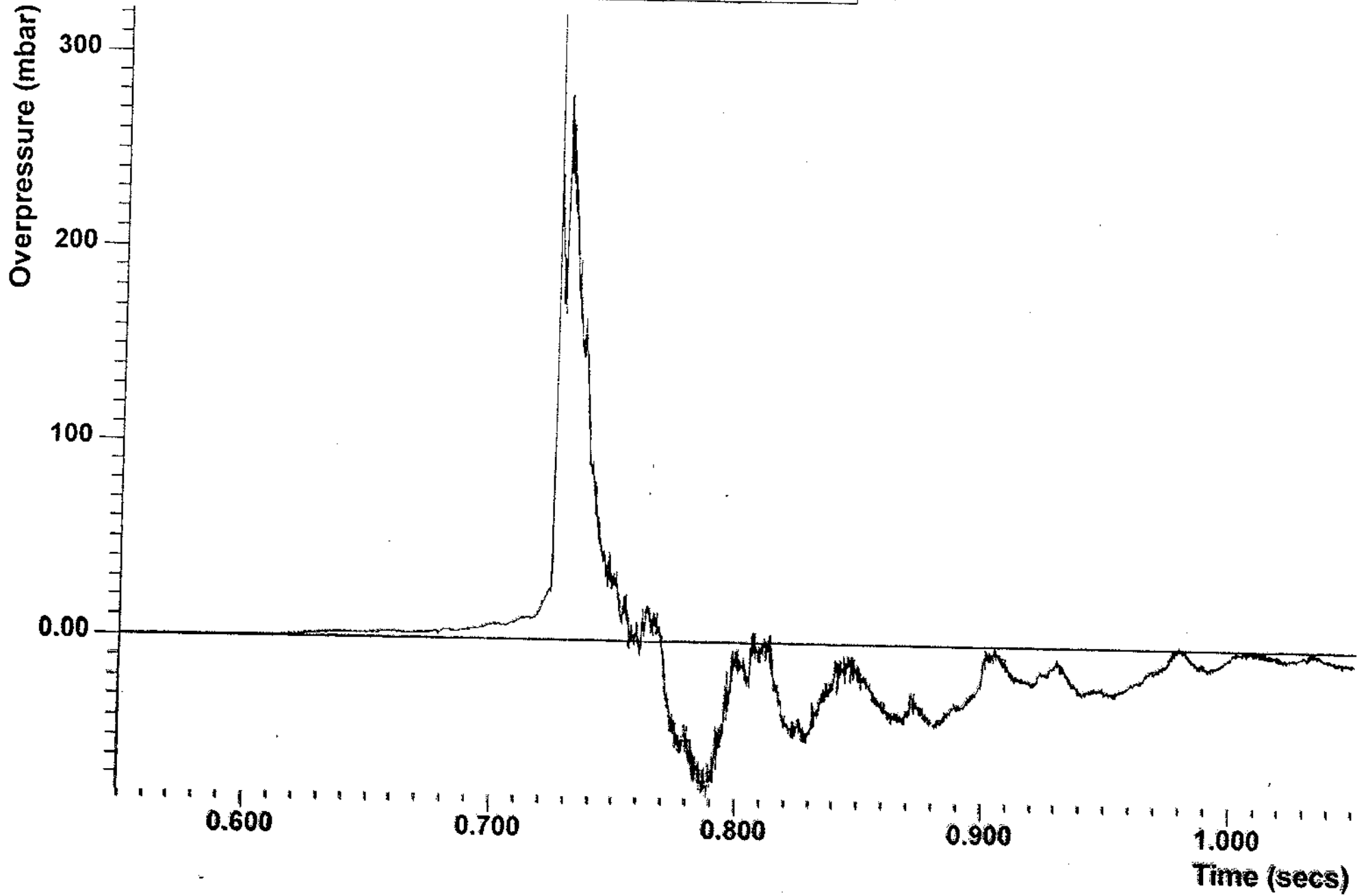
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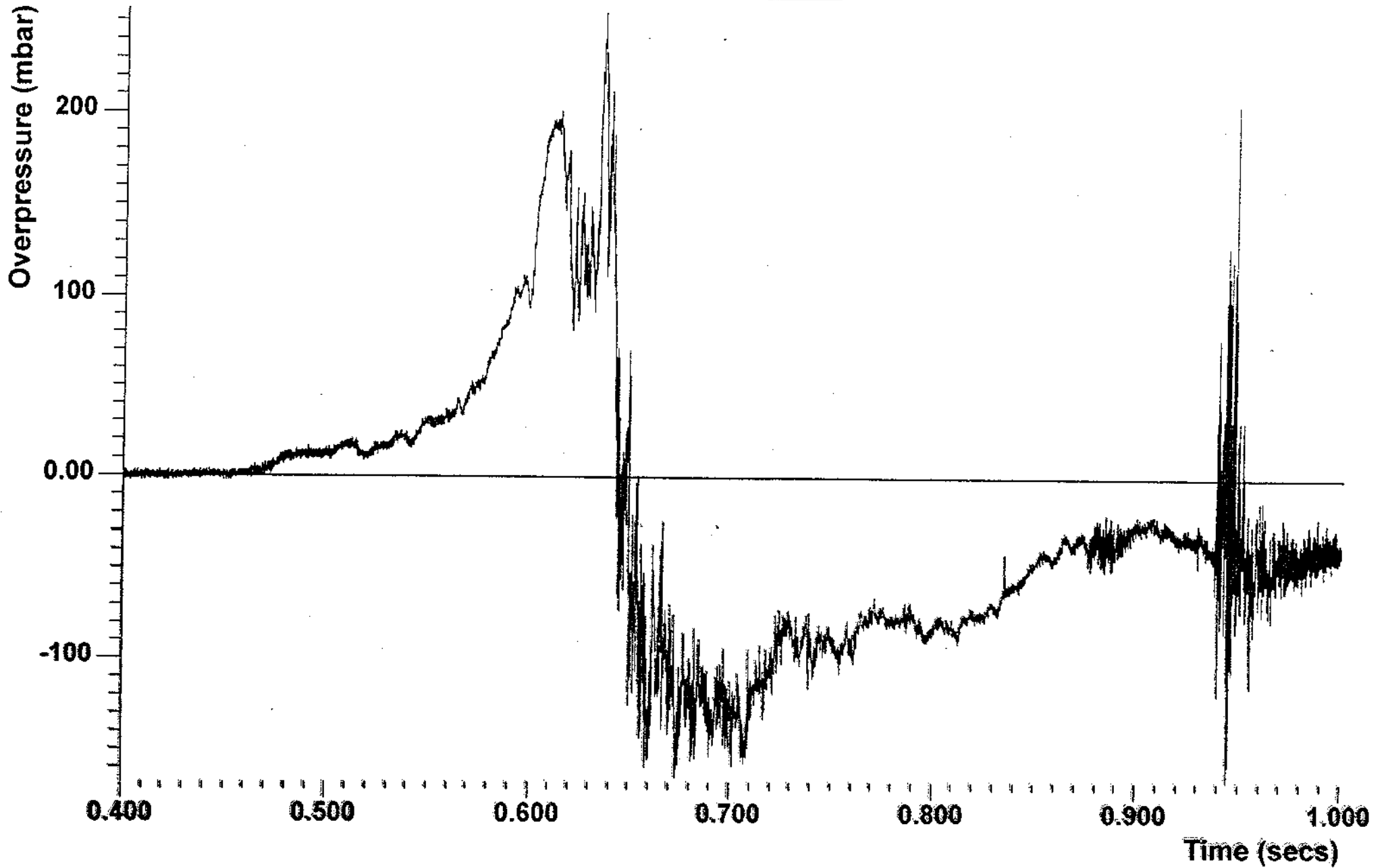
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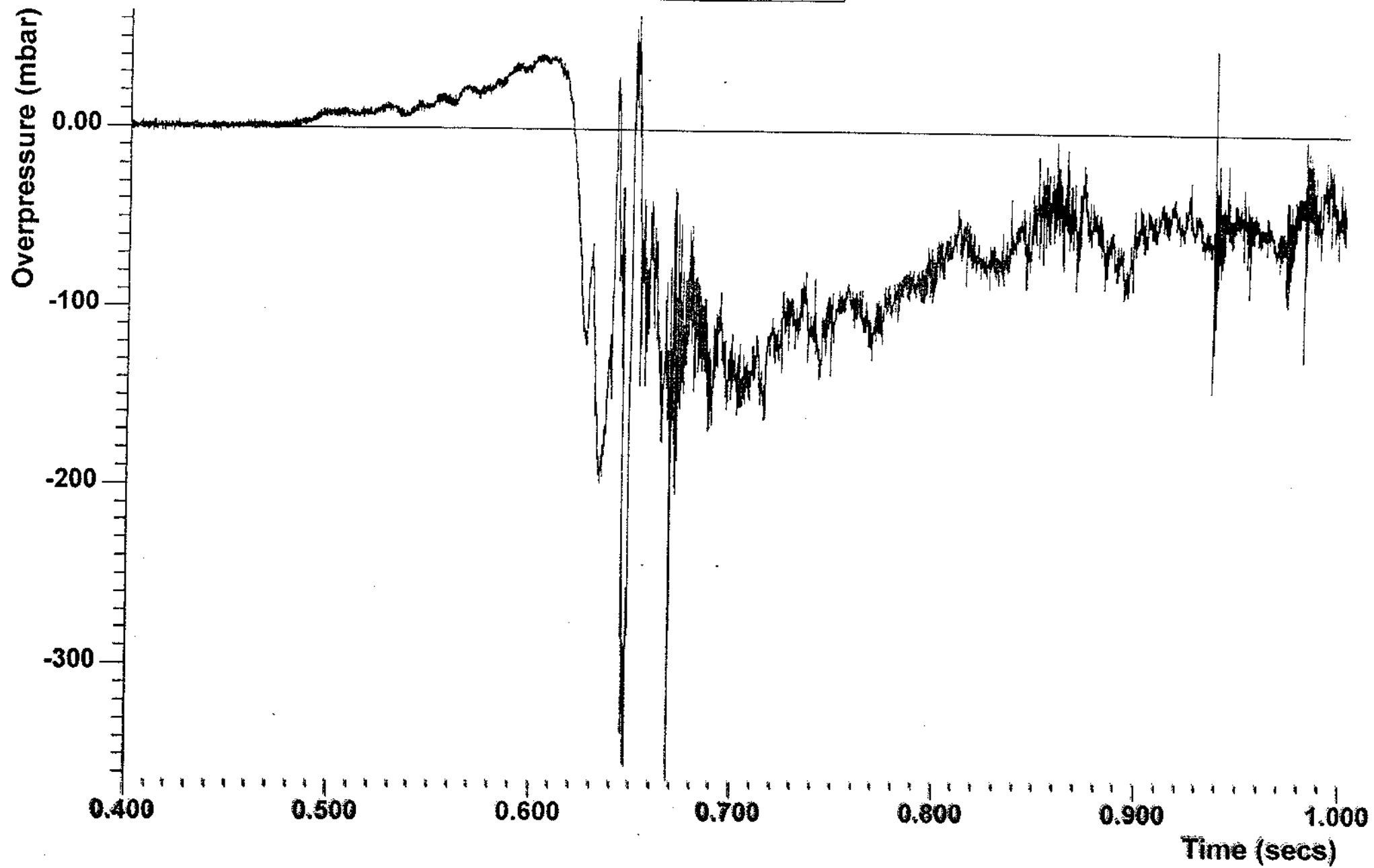
Test: HSE 3
Transducer no: PE-6



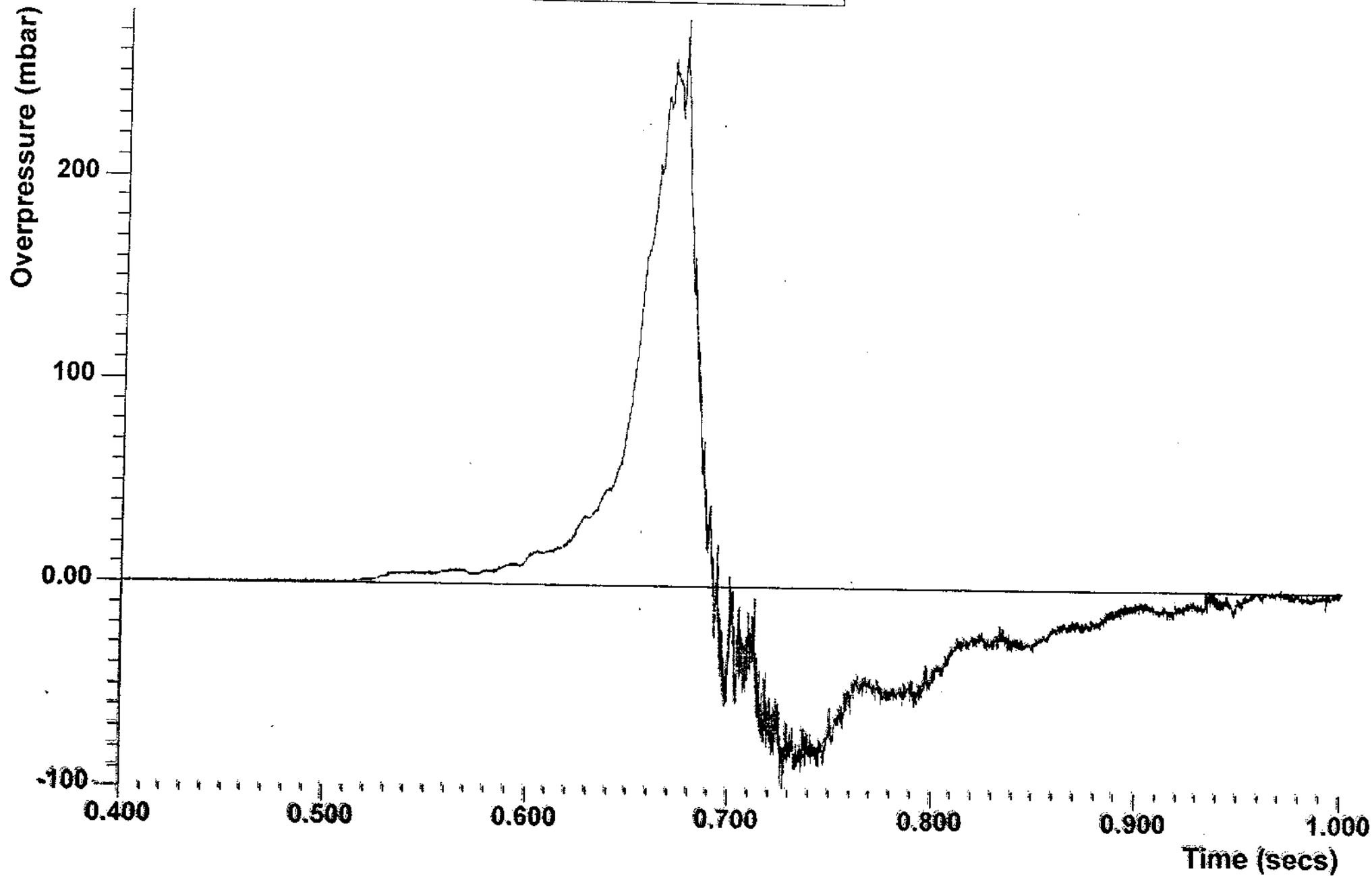
Test: HSE 3
Transducer no: PE-7



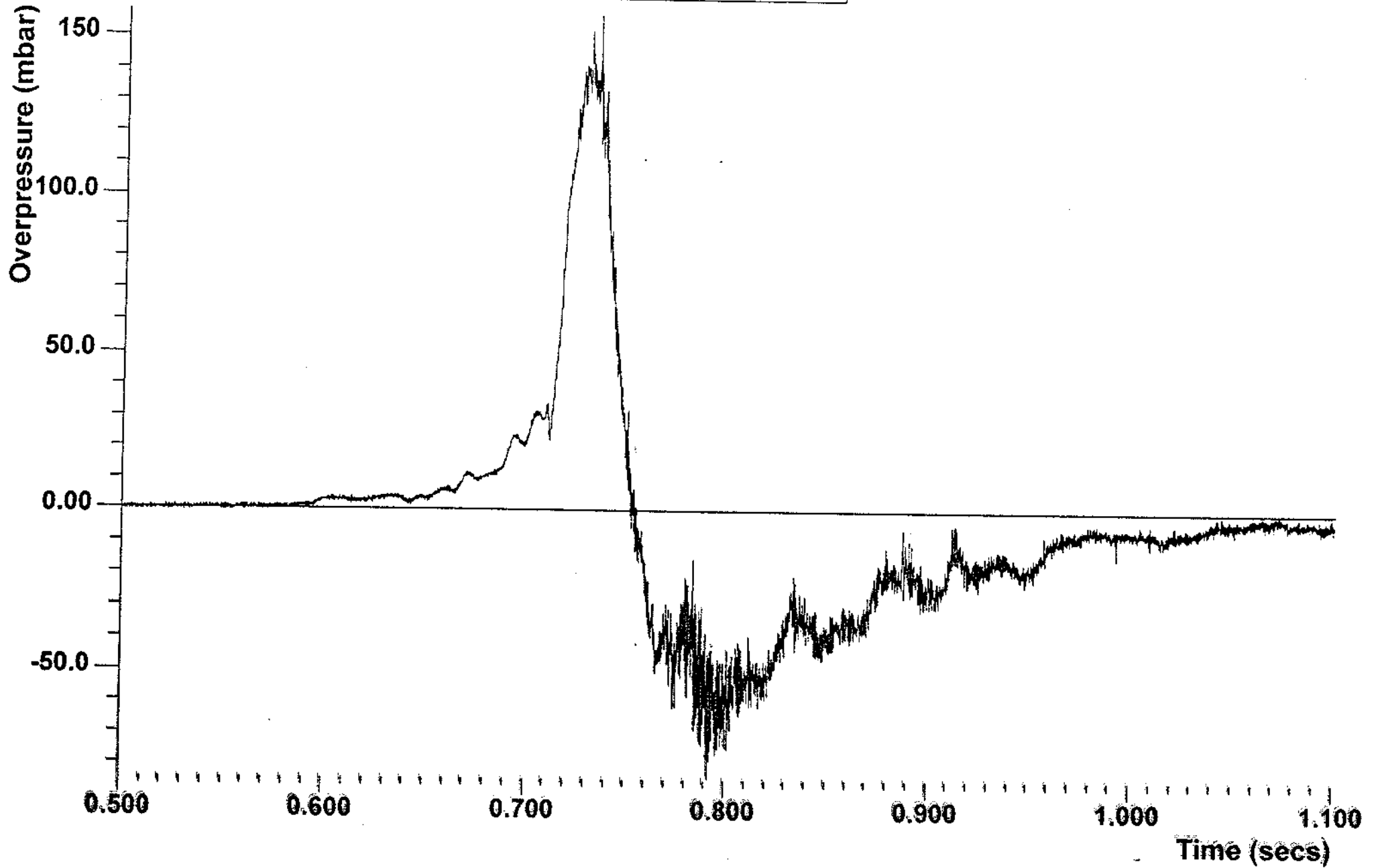
Test: HSE 3
Transducer no: PE-8



Test: HSE 3
Transducer no: PE-9



Test: HSE 3
Transducer no: PE-10



Test: HSE 3
Transducer no: PE-11

