

Final Calibration Certificate

Instrument Model: MS-2G 1/2 M Instrument SN: 5946 Seismic SN: 5946 Acoustic SN: 5946

Seismic Results (in/s)						
Frequency	Input	Radial	Vertical	Transverse	Tolerance	Pass/Fail
2	1.00	0.900	0.900	0.900	+5% to -3dB	Passed
4	1.00	0.990	0.990	0.990	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
10	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
30	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
60	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
125	1.00	0.990	0.990	0.990	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
200	1.00	0.910	0.910	0.900	+5% to -3dB	Passed
250	1.00	0.800	0.800	0.800	+5% to -3dB	Passed

Acoustic Results				
Frequency	Input	Acoustic	Tolerance	Pass/Fail
2	134.0	131.8	-3 dB, +/-1 dB	Passed
3	134.0	133.3	-1 dB, +/-1 dB	Passed
4	134.0	133.8	+/-1 dB	Passed
10	134.0	134.2	+/-1 dB	Passed
30	134.0	134.2	+/-1 dB	Passed
60	134.0	134.0	+/-1 dB	Passed
100	134.0	134.0	+/-1 dB	Passed
125	134.0	133.8	+/-1 dB	Passed
200	134.0	133.1	+1 dB to -3 dB	Passed
250	134.0	132.0	+1 dB to -3 dB	Passed

Statement

I certify that all seismic and acoustic components of this instrument were calibrated on a shake table or electronically, and in an acoustic chamber, at the listed input level and frequencies. The results are within the International Society of Explosives Engineers (ISEE) Performance Specifications for Blasting Seismographs 2017 Edition.

References

Signal Generator for shake table- Model BK Precision 4040B Serial # 365L17102, Shake table with acoustic chamber- Model ST-1T serial # 9010, Shake table reference- Vibe metrics Accelerometer Model 1020s serial # 3367, Acoustic Reference- Piston Phone is B & K Type 4228. Serial number 1504026. All references are traceable to NIST.

Notes

Frequencies at and above 60 Hz were tested electronically in order to remove shake table distortion error.

Date: 2022-03-29

Technician (Leslie Haynes):

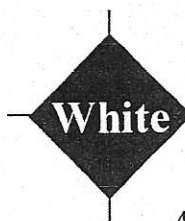


Phase Response Document

Instrument Model: MS-2G 1/2 M Instrument SN: 5946 Seismic SN: 5946

Radial	Frequency Hz	Amplitude in/s	Deviation %	Tolerance	Pass/Fail
Reference F	30.00	1.000		N/A	N/A
F1 (0.707 x A)	1.51	0.707		F1 ≤ 2.0 Hz	Pass
F2 (1.270 x F1)	1.92	0.860	1.18%	F amplitude x 0.85 +/- 10%	Pass
F3 (0.760 x F1)	1.15	0.470	-6.00%	F amplitude x 0.50 +/- 10%	Pass
F4 (0.707 x A)	288.00	0.707		F4 ≥ 250 Hz	Pass
F5 (0.787 x F4)	226.66	0.860	1.18%	F amplitude x 0.85 +/- 10%	Pass
F6 (1.3165 x F4)	379.15	0.480	-4.00%	F amplitude x 0.50 +/- 10%	Pass
Vertical	Frequency Hz	Amplitude in/s	Deviation %	Tolerance	Pass/Fail
Reference F	30.00	1.000		N/A	N/A
F1 (0.707 x A)	1.47	0.707		F1 ≤ 2.0 Hz	Pass
F2 (1.270 x F1)	1.87	0.870	2.35%	F amplitude x 0.85 +/- 10%	Pass
F3 (0.760 x F1)	1.12	0.470	-6.00%	F amplitude x 0.50 +/- 10%	Pass
F4 (0.707 x A)	290.00	0.707		F4 ≥ 250 Hz	Pass
F5 (0.787 x F4)	228.23	0.850	0.00%	F amplitude x 0.85 +/- 10%	Pass
F6 (1.3165 x F4)	381.79	0.480	-4.00%	F amplitude x 0.50 +/- 10%	Pass
Transverse	Frequency Hz	Amplitude in/s	Deviation %	Tolerance	Pass/Fail
Reference F	30.00	1.000		N/A	N/A
F1 (0.707 x A)	1.51	0.707		F1 ≤ 2.0 Hz	Pass
F2 (1.270 x F1)	1.92	0.870	2.35%	F amplitude x 0.85 +/- 10%	Pass
F3 (0.760 x F1)	1.15	0.470	-6.00%	F amplitude x 0.50 +/- 10%	Pass
F4 (0.707 x A)	287.00	0.707		F4 ≥ 250 Hz	Pass
F5 (0.787 x F4)	225.87	0.850	0.00%	F amplitude x 0.85 +/- 10%	Pass
F6 (1.3165 x F4)	377.84	0.490	-2.00%	F amplitude x 0.50 +/- 10%	Pass





White Industrial Seismology, Inc.
1206 Schifferdecker • P.O. Box 1256
Joplin, MO 64802-1256
417-624-0164 ♦ 800-641-4538 ♦ Fax: 417-624-9416
www.whiteseis.com



As Found Certificate

Instrument Model: MS-2G 1/2 M Instrument SN: 5946 Seismic SN: 5946 Acoustic SN: 5946

Seismic Results (in/s)

Frequency	Input	Radial	Vertical	Transverse	Tolerance	Pass/Fail
2	1.00	0.930	0.930	0.940	+5% to -3dB	Passed
4	1.00	0.980	0.970	0.980	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
10	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
30	1.01	1.00	0.990	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
60	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
125	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
200	1.00	0.950	0.960	0.950	+5% to -3dB	Passed
250	1.00	0.870	0.870	0.860	+5% to -3dB	Passed

Acoustic Results

Frequency	Input	Acoustic	Tolerance	Pass/Fail
2	134.0	132.3	-3 dB, +/-1 dB	Passed
3	134.0	133.6	-1 dB, +/-1 dB	Passed
4	134.0	134.2	+/-1 dB	Passed
10	134.0	134.6	+/-1 dB	Passed
30	134.0	134.3	+/-1 dB	Passed
60	134.0	134.0	+/-1 dB	Passed
100	134.0	134.0	+/-1 dB	Passed
125	134.0	134.0	+/-1 dB	Passed
200	134.0	133.6	+1 dB to -3 dB	Passed
250	134.0	132.9	+1 dB to -3 dB	Passed

Statement

I certify that all seismic and acoustic components of this instrument were checked as found on a shake table, and in an acoustic chamber, at the listed input level and frequencies. The results are within the International Society of Explosives Engineers (ISEE) Performance Specifications for Blasting Seismographs 2017 Edition.

References

Signal Generator for shake table- Model BK Precision 4040B Serial # 365L17102, Shake table with acoustic chamber- Model ST-1T serial # 9010, Shake table reference- Vibe metrics Accelerometer Model 1020s serial # 3367, Acoustic Reference- Piston Phone is B & K Type 4228. Serial number 1504026. All references are traceable to NIST.

Notes

Frequencies at and above 60 Hz were tested electronically in order to remove shake table distortion error.

Date: 2022-03-29

Technician (Leslie Haynes):



Industrial Seismology, Inc.

1206 Schifferdecker • P.O. Box 1256

Joplin, MO 64802-1256

417-624-0164 ♦ 800-641-4538 ♦ Fax: 417-624-9416

www.whiteseis.com

Final Calibration Certificate

Instrument Model: MS III 10 IPS Instrument SN: 7360 Seismic SN: 7380 Acoustic SN: 7360

Seismic Results (in/s)

Frequency	Input	Radial	Vertical	Transverse	Tolerance	Pass/Fail
2	1.00	0.900	0.920	0.900	+5% to -3dB	Passed
4	1.00	0.990	0.990	0.980	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
10	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
30	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
60	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
125	1.00	0.980	1.00	0.980	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
200	1.00	0.870	0.890	0.860	+5% to -3dB	Passed
250	1.00	0.740	0.750	0.730	+5% to -3dB	Passed

Acoustic Results

Frequency	Input	Acoustic	Tolerance	Pass/Fail
2	134.0	131.5	-3 dB, +/-1 dB	Passed
3	134.0	133.1	-1 dB, +/-1 dB	Passed
4	134.0	133.6	+/-1 dB	Passed
10	134.0	134.2	+/-1 dB	Passed
30	134.0	134.1	+/-1 dB	Passed
60	134.0	134.0	+/-1 dB	Passed
100	134.0	134.0	+/-1 dB	Passed
125	134.0	133.8	+/-1 dB	Passed
200	134.0	132.8	+1 dB to -3 dB	Passed
250	134.0	131.4	+1 dB to -3 dB	Passed

Statement

I certify that all seismic and acoustic components of this instrument were calibrated on a shake table or electronically, and in an acoustic chamber, at the listed input level and frequencies. The results are within the International Society of Explosives Engineers (ISEE) Performance Specifications for Blasting Seismographs 2017 Edition.

References

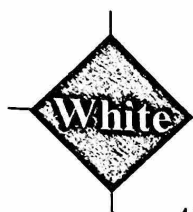
Signal Generator for shake table- Model BK Precision 4040B Serial #365H17101, Shake table with acoustic chamber- Model ST-1S serial # 9019, Shake table reference- Vibe metrics Accelerometer Model 1020s serial # 3367, Acoustic Reference- Piston Phone is B & K Type 4228, Serial number 1504026. All references are traceable to NIST.

Notes

Frequencies at and above 60 Hz were tested electronically in order to remove shake table distortion error.

Date: 2021-11-06

Technician (Russel Milar):



Industrial Seismology, Inc.

1206 Schifferdecker • P.O. Box 1256

Joplin, MO 64802-1256

417-624-0164 ♦ 800-641-4538 ♦ Fax: 417-624-9416

www.whiteseis.com



Phase Response Document

Instrument Model: MS III 10 IPS Instrument SN: 7360 Seismic SN: 7380

Radial	Frequency Hz	Amplitude in/s	Deviation %	Tolerance	Pass/Fail
Reference F	30.00	1.000		N/A	N/A
F1 (0.707 x A)	1.51	0.707		F1 <= 2.0 Hz	Pass
F2 (1.270 x F1)	1.92	0.870	2.35%	F amplitude x 0.85 +/- 10%	Pass
F3 (0.760 x F1)	1.15	0.460	-8.00%	F amplitude x 0.50 +/- 10%	Pass
F4 (0.707 x A)	265.00	0.707		F4 >= 250 Hz	Pass
F5 (0.787 x F4)	208.56	0.850	0.00%	F amplitude x 0.85 +/- 10%	Pass
F6 (1.3165 x F4)	348.87	0.490	-2.00%	F amplitude x 0.50 +/- 10%	Pass
Vertical	Frequency Hz	Amplitude in/s	Deviation %	Tolerance	Pass/Fail
Reference F	30.00	1.000		N/A	N/A
F1 (0.707 x A)	1.48	0.707		F1 <= 2.0 Hz	Pass
F2 (1.270 x F1)	1.88	0.880	3.53%	F amplitude x 0.85 +/- 10%	Pass
F3 (0.760 x F1)	1.12	0.450	-10.00%	F amplitude x 0.50 +/- 10%	Pass
F4 (0.707 x A)	265.00	0.707		F4 >= 250 Hz	Pass
F5 (0.787 x F4)	208.56	0.870	2.35%	F amplitude x 0.85 +/- 10%	Pass
F6 (1.3165 x F4)	348.87	0.490	-2.00%	F amplitude x 0.50 +/- 10%	Pass
Transverse	Frequency Hz	Amplitude in/s	Deviation %	Tolerance	Pass/Fail
Reference F	30.00	1.000		N/A	N/A
F1 (0.707 x A)	1.51	0.707		F1 <= 2.0 Hz	Pass
F2 (1.270 x F1)	1.92	0.860	1.18%	F amplitude x 0.85 +/- 10%	Pass
F3 (0.760 x F1)	1.15	0.460	-8.00%	F amplitude x 0.50 +/- 10%	Pass
F4 (0.707 x A)	260.00	0.707		F4 >= 250 Hz	Pass
F5 (0.787 x F4)	204.62	0.850	0.00%	F amplitude x 0.85 +/- 10%	Pass
F6 (1.3165 x F4)	342.29	0.490	-2.00%	F amplitude x 0.50 +/- 10%	Pass

Date: 2021-11-06

Technician (Russel Milar):



Industrial Seismology, Inc.
1206 Schifferdecker • P.O. Box 1256
Joplin, MO 64802-1256
417-624-0164 ♦ 800-641-4538 ♦ Fax: 417-624-9416
www.whiteseis.com



As Found Certificate

Instrument Model: MS III 10 IPS Instrument SN: 7360 Seismic SN: 7380 Acoustic SN: 7360

Seismic Results (in/s)

Frequency	Input	Radial	Vertical	Transverse	Tolerance	Pass/Fail
2	1.00	0.900	0.920	0.900	+5% to -3dB	Passed
4	1.00	0.990	0.990	0.980	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
10	1.00	1.00	1.00	0.990	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
30	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
60	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
125	1.00	0.980	1.00	0.980	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
200	1.00	0.870	0.890	0.860	+5% to -3dB	Passed
250	1.00	0.740	0.750	0.730	+5% to -3dB	Passed

Acoustic Results

Frequency	Input	Acoustic	Tolerance	Pass/Fail
2	134.0	131.5	-3 dB, +/- 1 dB	Passed
3	134.0	133.1	-1 dB, +/- 1 dB	Passed
4	134.0	133.6	+/- 1 dB	Passed
10	134.0	134.2	+/- 1 dB	Passed
30	134.0	134.1	+/- 1 dB	Passed
60	134.0	134.0	+/- 1 dB	Passed
100	134.0	134.0	+/- 1 dB	Passed
125	134.0	133.8	+/- 1 dB	Passed
200	134.0	132.8	+1 dB to -3 dB	Passed
250	134.0	131.4	+1 dB to -3 dB	Passed

Statement

I certify that all seismic and acoustic components of this instrument were checked as found on a shake table, and in an acoustic chamber, at the listed input level and frequencies. The results are within the International Society of Explosives Engineers (ISEE) Performance Specifications for Blasting Seismographs 2017 Edition.

References

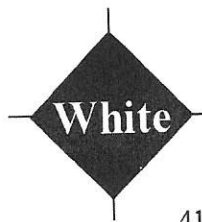
Signal Generator for shake table- Model BK Precision 4040B Serial #365H17101, Shake table with acoustic chamber- Model ST-1S serial # 9019, Shake table reference- Vibe metrics Accelerometer Model 1020s serial # 3367, Acoustic Reference- Piston Phone is B & K Type 4228, Serial number 1504026. All references are traceable to NIST.

Notes

Frequencies at and above 60 Hz were tested electronically in order to remove shake table distortion error.

Date: 2021-11-06

Technician (Russel Milar):



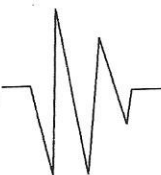
Industrial Seismology, Inc.

1206 Schifferdecker • P.O. Box 1256

Joplin, MO 64802-1256

417-624-0164 ♦ 800-641-4538 ♦ Fax: 417-624-9416

www.whiteseis.com



Final Calibration Certificate

Instrument Model: MS III 10 IPS Instrument SN: 7762 Seismic SN: 7762 Acoustic SN: 7762

Seismic Results (in/s)						Pass/Fail
Frequency	Input	Radial	Vertical	Transverse	Tolerance	
2	1.00	0.900	0.890	0.910	+5% to -3dB	Passed
4	1.00	0.990	1.00	0.990	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
10	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
30	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
60	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
125	1.00	1.01	1.01	1.01	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
200	1.00	0.900	0.896	0.890	+5% to -3dB	Passed
250	1.00	0.730	0.730	0.720	+5% to -3dB	Passed

Acoustic Results				Pass/Fail
Frequency	Input	Acoustic	Tolerance	
2	134.0	130.5	-3 dB, +/-1 dB	Passed
3	134.0	133.2	-1 dB, +/-1 dB	Passed
4	134.0	133.9	+/-1 dB	Passed
10	134.0	134.4	+/-1 dB	Passed
30	134.0	134.4	+/-1 dB	Passed
60	134.0	134.0	+/-1 dB	Passed
100	134.0	134.2	+/-1 dB	Passed
125	134.0	134.2	+/-1 dB	Passed
200	134.0	133.1	+1 dB to -3 dB	Passed
250	134.0	131.3	+1 dB to -3 dB	Passed

Statement

I certify that all seismic and acoustic components of this instrument were calibrated on a shake table or electronically, and in an acoustic chamber, at the listed input level and frequencies. The results are within the International Society of Explosives Engineers (ISEE) Performance Specifications for Blasting Seismographs 2017 Edition.

References

Signal Generator for shake table- Model BK Precision 4040B Serial # 365L17102, Shake table with acoustic chamber- Model ST-1S serial # 9031, Shake table reference- Vibe metrics Accelerometer Model 1020s serial # 3367, Acoustic Reference- Piston Phone is B & K Type 4228. Serial number 1504026. All references are traceable to NIST.

Notes

Frequencies at and above 60 Hz were tested electronically in order to remove shake table distortion error.

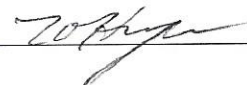
Date: 2021-11-15

Technician (Leslie Haynes):

Phase Response Document

Instrument Model: MS III 10 IPS Instrument SN: 7762 Seismic SN: 7762

Radial	Frequency Hz	Amplitude in/s	Deviation %	Tolerance	Pass/Fail
Reference F	30.00	1.000		N/A	N/A
F1 (0.707 x A)	1.29	0.707		F1 ≤ 2.0 Hz	Pass
F2 (1.270 x F1)	1.63	0.900	5.88%	F amplitude x 0.85 +/- 10%	Pass
F3 (0.760 x F1)	0.98	0.460	-8.00%	F amplitude x 0.50 +/- 10%	Pass
F4 (0.707 x A)	258.50	0.707		F4 ≥ 250 Hz	Pass
F5 (0.787 x F4)	203.44	0.890	4.71%	F amplitude x 0.85 +/- 10%	Pass
F6 (1.3165 x F4)	340.32	0.460	-8.00%	F amplitude x 0.50 +/- 10%	Pass
Vertical	Frequency Hz	Amplitude in/s	Deviation %	Tolerance	Pass/Fail
Reference F	30.00	1.000		N/A	N/A
F1 (0.707 x A)	1.30	0.707		F1 ≤ 2.0 Hz	Pass
F2 (1.270 x F1)	1.65	0.910	7.06%	F amplitude x 0.85 +/- 10%	Pass
F3 (0.760 x F1)	0.99	0.460	-8.00%	F amplitude x 0.50 +/- 10%	Pass
F4 (0.707 x A)	257.00	0.707		F4 ≥ 250 Hz	Pass
F5 (0.787 x F4)	202.26	0.880	3.53%	F amplitude x 0.85 +/- 10%	Pass
F6 (1.3165 x F4)	338.34	0.460	-8.00%	F amplitude x 0.50 +/- 10%	Pass
Transverse	Frequency Hz	Amplitude in/s	Deviation %	Tolerance	Pass/Fail
Reference F	30.00	1.000		N/A	N/A
F1 (0.707 x A)	1.28	0.707		F1 ≤ 2.0 Hz	Pass
F2 (1.270 x F1)	1.62	0.910	7.06%	F amplitude x 0.85 +/- 10%	Pass
F3 (0.760 x F1)	0.97	0.450	-10.00%	F amplitude x 0.50 +/- 10%	Pass
F4 (0.707 x A)	255.50	0.707		F4 ≥ 250 Hz	Pass
F5 (0.787 x F4)	201.08	0.880	3.53%	F amplitude x 0.85 +/- 10%	Pass
F6 (1.3165 x F4)	336.37	0.460	-8.00%	F amplitude x 0.50 +/- 10%	Pass



As Found Certificate

Instrument Model: MS III 10 IPS Instrument SN: 7762 Seismic SN: 7762 Acoustic SN: 7762

Seismic Results (in/s)

Frequency	Input	Radial	Vertical	Transverse	Tolerance	Pass/Fail
2	1.00	0.890	0.900	0.920	+5% to -3dB	Passed
4	1.00	0.990	1.00	1.01	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
10	1.00	0.990	0.990	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
30	1.00	1.00	0.990	0.990	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
60	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
125	1.00	1.01	1.01	1.01	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
200	1.00	0.900	0.890	0.890	+5% to -3dB	Passed
250	1.00	0.730	0.730	0.720	+5% to -3dB	Passed

Acoustic Results

Frequency	Input	Acoustic	Tolerance	Pass/Fail
2	134.0	130.5	-3 dB, +/-1 dB	Passed
3	134.0	133.2	-1 dB, +/-1 dB	Passed
4	134.0	133.9	+/-1 dB	Passed
10	134.0	134.4	+/-1 dB	Passed
30	134.0	134.4	+/-1 dB	Passed
60	134.0	134.0	+/-1 dB	Passed
100	134.0	134.2	+/-1 dB	Passed
125	134.0	134.2	+/-1 dB	Passed
200	134.0	133.1	+1 dB to -3 dB	Passed
250	134.0	131.3	+1 dB to -3 dB	Passed

Statement

I certify that all seismic and acoustic components of this instrument were checked as found on a shake table, and in an acoustic chamber, at the listed input level and frequencies. The results are within the International Society of Explosives Engineers (ISEE) Performance Specifications for Blasting Seismographs 2017 Edition.

References

Signal Generator for shake table- Model BK Precision 4040B Serial # 365L17102, Shake table with acoustic chamber- Model ST-1S serial # 9031, Shake table reference- Vibe metrics Accelerometer Model 1020s serial # 3367, Acoustic Reference- Piston Phone is B & K Type 4228. Serial number 1504026. All references are traceable to NIST.

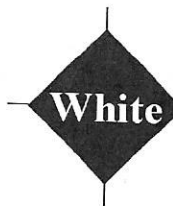
Notes

Frequencies at and above 60 Hz were tested electronically in order to remove shake table distortion error.

Date: 2021-11-15

Technician (Leslie Haynes):





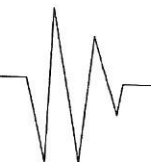
Industrial Seismology, Inc.

1206 Schifferdecker · P.O. Box 1256

Joplin, MO 64802-1256

417-624-0164

Fed. I.D. #43-0956526



Packing List

Date	Packing List #
11/16/2021	71465

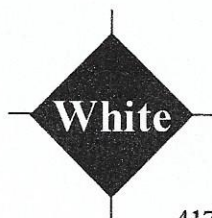
Bill To
Ed's Drilling & Blasting Company Attn: Accounts Payable 2809 Hwy A, Suite B Washington, MO 63090

Ship To
Ed's Drilling & Blasting Attn: Aaron Wundrack 2060 Napper Road Billings, MO 65610

P.O. No.	Ship	Via
	11/16/2021	UPS Ground

Quantity	Description
	Mini-Seis III 10 IPS Digital Seismograph S/N 7762 Please note that the peripheral items included with the unit are the same as those received on October 6, 2021.
It's been a pleasure working with you!	

For More Information Contact: White Industrial Seismology, Inc.
Toll Free: 800-641-4538 ♦ Local: 417-624-0164 ♦ Fax: 417-624-9416 ♦ www.whiteseis.com



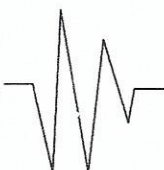
Industrial Seismology, Inc.

1206 Schifferdecker • P.O. Box 1256

Joplin, MO 64802-1256

417-624-0164 ♦ 800-641-4538 ♦ Fax: 417-624-9416

www.whiteseis.com



Final Calibration Certificate

Instrument Model: MS III 10 IPS Instrument SN: 7763 Seismic SN: 7763 Acoustic SN: 7763

Seismic Results (in/s)

Frequency	Input	Radial	Vertical	Transverse	Tolerance	Pass/Fail
2	1.00	0.910	0.900	0.910	+5% to -3dB	Passed
4	1.00	0.990	0.990	0.990	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
10	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
30	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
60	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
125	1.00	1.02	1.00	1.02	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
200	1.00	0.900	0.900	0.900	+5% to -3dB	Passed
250	1.00	0.740	0.730	0.730	+5% to -3dB	Passed

Acoustic Results

Frequency	Input	Acoustic	Tolerance	Pass/Fail
2	134.0	131.2	-3 dB, +/- 1 dB	Passed
3	134.0	133.0	-1 dB, +/- 1 dB	Passed
4	134.0	133.4	+/- 1 dB	Passed
10	134.0	133.9	+/- 1 dB	Passed
30	134.0	133.8	+/- 1 dB	Passed
60	134.0	31.0	+/- 1 dB	Failed
100	134.0	134.1	+/- 1 dB	Passed
125	134.0	134.1	+/- 1 dB	Passed
200	134.0	133.0	+1 dB to -3 dB	Passed
250	134.0	131.3	+1 dB to -3 dB	Passed

Statement

I certify that all seismic and acoustic components of this instrument were calibrated on a shake table or electronically, and in an acoustic chamber, at the listed input level and frequencies. The results are within the International Society of Explosives Engineers (ISEE) Performance Specifications for Blasting Seismographs 2017 Edition.

References

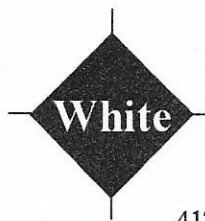
Signal Generator for shake table- Model BK Precision 4040B Serial # 365L17102, Shake table with acoustic chamber- Model ST-1T serial # 9010, Shake table reference- Vibe metrics Accelerometer Model 1020s serial # 3367, Acoustic Reference- Piston Phone is B & K Type 4228. Serial number 1504026. All references are traceable to NIST.

Notes

Frequencies at and above 60 Hz were tested electronically in order to remove shake table distortion error.

Date: 2022-03-29

Technician (Leslie Haynes):



Industrial Seismology, Inc.

1206 Schifferdecker • P.O. Box 1256

Joplin, MO 64802-1256

417-624-0164 ♦ 800-641-4538 ♦ Fax: 417-624-9416

www.whiteseis.com



Phase Response Document

Instrument Model: MS III 10 IPS Instrument SN: 7763 Seismic SN: 7763

Radial	Frequency Hz	Amplitude in/s	Deviation %	Tolerance	Pass/Fail
Reference F	30.00	1.000		N/A	N/A
F1 (0.707 x A)	1.50	0.707		F1 <= 2.0 Hz	Pass
F2 (1.270 x F1)	1.91	0.860	1.18%	F amplitude x 0.85 +/- 10%	Pass
F3 (0.760 x F1)	1.14	0.470	-6.00%	F amplitude x 0.50 +/- 10%	Pass
F4 (0.707 x A)	260.00	0.707		F4 >= 250 Hz	Pass
F5 (0.787 x F4)	204.62	0.890	4.71%	F amplitude x 0.85 +/- 10%	Pass
F6 (1.3165 x F4)	342.29	0.450	-10.00%	F amplitude x 0.50 +/- 10%	Pass
Vertical	Frequency Hz	Amplitude in/s	Deviation %	Tolerance	Pass/Fail
Reference F	30.00	1.000		N/A	N/A
F1 (0.707 x A)	1.57	0.707		F1 <= 2.0 Hz	Pass
F2 (1.270 x F1)	1.99	0.840	-1.18%	F amplitude x 0.85 +/- 10%	Pass
F3 (0.760 x F1)	1.19	0.480	-4.00%	F amplitude x 0.50 +/- 10%	Pass
F4 (0.707 x A)	259.00	0.707		F4 >= 250 Hz	Pass
F5 (0.787 x F4)	203.83	0.890	4.71%	F amplitude x 0.85 +/- 10%	Pass
F6 (1.3165 x F4)	340.97	0.460	-8.00%	F amplitude x 0.50 +/- 10%	Pass
Transverse	Frequency Hz	Amplitude in/s	Deviation %	Tolerance	Pass/Fail
Reference F	30.00	1.000		N/A	N/A
F1 (0.707 x A)	1.49	0.707		F1 <= 2.0 Hz	Pass
F2 (1.270 x F1)	1.89	0.870	2.35%	F amplitude x 0.85 +/- 10%	Pass
F3 (0.760 x F1)	1.13	0.470	-6.00%	F amplitude x 0.50 +/- 10%	Pass
F4 (0.707 x A)	259.00	0.707		F4 >= 250 Hz	Pass
F5 (0.787 x F4)	203.83	0.890	4.71%	F amplitude x 0.85 +/- 10%	Pass
F6 (1.3165 x F4)	340.97	0.460	-8.00%	F amplitude x 0.50 +/- 10%	Pass

Date: 2022-03-29

Technician (Leslie Haynes):

As Found Certificate

Instrument Model: MS III 10 IPS Instrument SN: 7763 Seismic SN: 7763 Acoustic SN: 7763

Seismic Results (in/s)

Frequency	Input	Radial	Vertical	Transverse	Tolerance	Pass/Fail
2	1.00	0.880	0.900	0.880	+5% to -3dB	Passed
4	1.00	0.990	1.00	0.990	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
10	1.00	0.990	0.990	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
30	1.00	1.00	0.990	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
60	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
100	1.00	1.02	1.01	1.02	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
200	1.00	0.900	0.900	0.900	+5% to -3dB	Passed
250	1.00	0.740	0.730	0.730	+5% to -3dB	Passed

Acoustic Results

Frequency	Input	Acoustic	Tolerance	Pass/Fail
2	134.0	131.2	-3 dB, +/-1 dB	Passed
3	134.0	133.0	-1 dB, +/-1 dB	Passed
4	134.0	133.4	+/-1 dB	Passed
10	134.0	133.9	+/-1 dB	Passed
30	134.0	133.8	+/-1 dB	Passed
60	134.0	134.0	+/-1 dB	Passed
100	134.0	134.1	+/-1 dB	Passed
125	134.0	134.1	+/-1 dB	Passed
200	134.0	133.0	+1 dB to -3 dB	Passed
250	134.0	131.3	+1 dB to -3 dB	Passed

Statement

I certify that all seismic and acoustic components of this instrument were checked as found on a shake table, and in an acoustic chamber, at the listed input level and frequencies. The results are within the International Society of Explosives Engineers (ISEE) Performance Specifications for Blasting Seismographs 2017 Edition.

References

Signal Generator for shake table- Model BK Precision 4040B Serial # 365L17102, Shake table with acoustic chamber- Model ST-1T serial # 9010, Shake table reference- Vibe metrics Accelerometer Model 1020s serial # 3367, Acoustic Reference- Piston Phone is B & K Type 4228. Serial number 1504026. All references are traceable to NIST.

Notes

Frequencies at and above 60 Hz were tested electronically in order to remove shake table distortion error.

Date: 2022-03-29

Technician (Leslie Haynes):





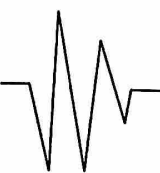
Industrial Seismology, Inc.

1206 Schifferdecker • P.O. Box 1256

Joplin, MO 64802-1256

417-624-0164 ♦ 800-641-4538 ♦ Fax: 417-624-9416

www.whiteseis.com



Final Calibration Certificate

Instrument Model: MS III 10 IPS Instrument SN: 8231 Seismic SN: 8231 Acoustic SN: 8231

Seismic Results (in/s)						
Frequency	Input	Radial	Vertical	Transverse	Tolerance	Pass/Fail
2	1.00	0.890	0.910	0.890	+5% to -3dB	Passed
4	1.00	0.980	0.990	0.980	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
10	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
30	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
60	1.00	1.00	1.00	1.00	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
125	1.00	0.980	0.980	0.980	+/- 5% or +/- 0.02 in/s whichever is greater	Passed
200	1.00	0.860	0.870	0.870	+5% to -3dB	Passed
250	1.00	0.730	0.740	0.740	+5% to -3dB	Passed

Acoustic Results				
Frequency	Input	Acoustic	Tolerance	Pass/Fail
2	134.0	131.2	-3 dB, +/- 1 dB	Passed
3	134.0	133.3	-1 dB, +/- 1 dB	Passed
4	134.0	134.0	+/- 1 dB	Passed
10	134.0	134.4	+/- 1 dB	Passed
30	134.0	134.2	+/- 1 dB	Passed
60	134.0	134.0	+/- 1 dB	Passed
100	134.0	134.0	+/- 1 dB	Passed
125	134.0	133.9	+/- 1 dB	Passed
200	134.0	132.9	+1 dB to -3 dB	Passed
250	134.0	131.5	+1 dB to -3 dB	Passed

Statement

I certify that all seismic and acoustic components of this instrument were calibrated on a shake table or electronically, and in an acoustic chamber, at the listed input level and frequencies. The results are within the International Society of Explosives Engineers (ISEE) Performance Specifications for Blasting Seismographs 2017 Edition.

References

Signal Generator for shake table- Model BK Precision 4040B Serial #365H17101, Shake table with acoustic chamber- Model ST-1S serial # 9019, Shake table reference- Vibe metrics Accelerometer Model 1020s serial # 3367, Acoustic Reference- Piston Phone is B & K Type 4228, Serial number 1504026. All references are traceable to NIST.

Notes

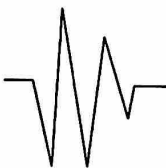
Frequencies at and above 60 Hz were tested electronically in order to remove shake table distortion error.

Date: 2021-10-20

Technician (Russel Milar):



Industrial Seismology, Inc.
1206 Schifferdecker • P.O. Box 1256
Joplin, MO 64802-1256
417-624-0164 ♦ 800-641-4538 ♦ Fax: 417-624-9416
www.whiteseis.com



Phase Response Document

Instrument Model: MS III 10 IPS Instrument SN: 8231 Seismic SN: 8231

Radial	Frequency Hz	Amplitude in/s	Deviation %	Tolerance	Pass/Fail
Reference F	30.00	1.000		N/A	N/A
F1 (0.707 x A)	1.52	0.707		F1 <= 2.0 Hz	Pass
F2 (1.270 x F1)	1.93	0.860	1.18%	F amplitude x 0.85 +/- 10%	Pass
F3 (0.760 x F1)	1.16	0.470	-6.00%	F amplitude x 0.50 +/- 10%	Pass
F4 (0.707 x A)	260.00	0.707		F4 >= 250 Hz	Pass
F5 (0.787 x F4)	204.62	0.850	0.00%	F amplitude x 0.85 +/- 10%	Pass
F6 (1.3165 x F4)	342.29	0.490	-2.00%	F amplitude x 0.50 +/- 10%	Pass
Vertical	Frequency Hz	Amplitude in/s	Deviation %	Tolerance	Pass/Fail
Reference F	30.00	1.000		N/A	N/A
F1 (0.707 x A)	1.49	0.707		F1 <= 2.0 Hz	Pass
F2 (1.270 x F1)	1.89	0.870	2.35%	F amplitude x 0.85 +/- 10%	Pass
F3 (0.760 x F1)	1.13	0.470	-6.00%	F amplitude x 0.50 +/- 10%	Pass
F4 (0.707 x A)	263.00	0.707		F4 >= 250 Hz	Pass
F5 (0.787 x F4)	206.98	0.860	1.18%	F amplitude x 0.85 +/- 10%	Pass
F6 (1.3165 x F4)	346.24	0.490	-2.00%	F amplitude x 0.50 +/- 10%	Pass
Transverse	Frequency Hz	Amplitude in/s	Deviation %	Tolerance	Pass/Fail
Reference F	30.00	1.000		N/A	N/A
F1 (0.707 x A)	1.53	0.707		F1 <= 2.0 Hz	Pass
F2 (1.270 x F1)	1.94	0.860	1.18%	F amplitude x 0.85 +/- 10%	Pass
F3 (0.760 x F1)	1.16	0.470	-6.00%	F amplitude x 0.50 +/- 10%	Pass
F4 (0.707 x A)	263.00	0.707		F4 >= 250 Hz	Pass
F5 (0.787 x F4)	206.98	0.860	1.18%	F amplitude x 0.85 +/- 10%	Pass
F6 (1.3165 x F4)	346.24	0.490	-2.00%	F amplitude x 0.50 +/- 10%	Pass

Date: 2021-10-20

Technician (Russel Milar):