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Lightning: Seismic Vibrator Data Sheet

The Lightning is an electromechanical seismic vibrating source ideal for shallow (200m) geological exploration and engineering projects. The electric actuator is positioned within the source plate and can be rotated through 90º in order to generate shear (S) and primary compression (P) waves. Powered from a 48VDC battery bank or 230V power supply the Lightning can be deployed to suit the constraints of the survey area.









Lightning Seismic Vibrating source mounted to an ATV for deployment on difficult terrain.

The Lightning is most commonly deployed on an electric wheeled or tracked vehicle to allow access over uneven slippery terrain. The electric tracked vehicle supplied with the Lightning rental system from Geomatrix Earth Science ltd, can be loaded into the back of a high top van fully assembled for easy fast deployment on site. With sufficient battery power for one and half days of field operation the tracked electric vehicle can cope with inclines of up to 15º and access areas which are restricted to vehicles.

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For larger area coverage the lightning can be fitted to an electric lift mounted to the front or rear of a vehicle, via a standard tow hitch. When mounted on an ATV the lightning can access even the most remote locations. The lift will also apply addition load to the source plate enhancing ground coupling.

With an electric drive motor and mount for the electronics and battery module the trolley can be manoeuvred by a single operator. The concept has been further developed into a full remote control vehicle deployment for use in mines and tunnels.

For sites constrained by surface furniture (railings, dust bins, lamp posts etc.…) the source plate can be positioned use a hand trolley and loaded with blast.



Lightning source in P (top) & S (bottom) wave configuration.

Features

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- High quality vertical resolution
- Wide frequency range
- Low THD
- P-waves & S-Waves
- Easy handling and easy transportation
- Highly repeatable signals
- Very low maintenance
- Very low noise emmision
- Watertight up till 20 bar
- User specified sweep taper
- Reaction Mass and Base plate accelerators
- Compatible with all leading seismographs

If 1700N of force wont cut the mustered, multiple lightning systems can be synchronised to double the output force, and the system will still run off a 48VDC supply. The phase and time zero are synchronous to within 8us enabling bespoke portable source arrays for both near surface site investigation and structural dynamics testing.

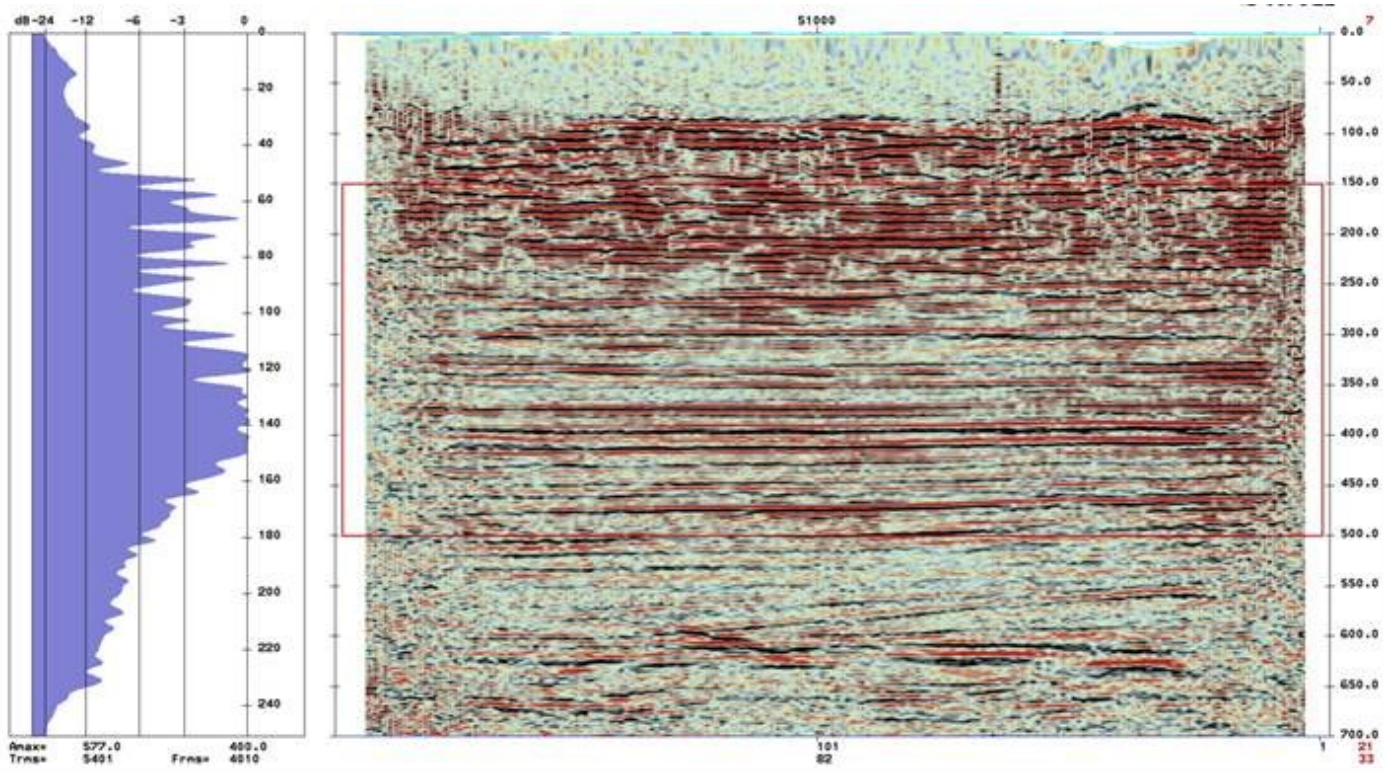


Lightning Dual Source configuration (image courtesy of Seismic-Mechatronics

Similar to the image/configuration above, the “Synchro lightning Dual Source” has been used for several projects across Europe. The Profile below shows the results for the Synchro Lightning 2.5-3kN seismic vibrator.

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This profile displays the data obtained from using the Synchro Lightning 2.5 - 3kN vibrator. The scale is in milliseconds (ms), for example 500ms is 600-700 meters.

Product Dimensions

Physical	Dimensions (L x W x H)	Weight
(instrument only)	0.4m x 0.4m x 0.15m	90kg

Technical Specifications

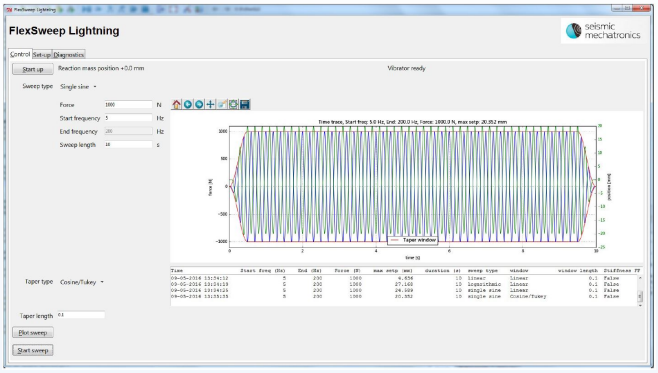
Frequency Range:	1 — 1000Hz (start taper at 1 Hz)
Full Drive Frequency:	8 — 400Hz
Force:	S-wave: 1700N (400lbs) P-wave: 1200N (270lbs)
Sweep Length:	Unlimited
Signal Penetration:	Approx. 200 m
Power supply:	48VDC battery / 230VAC power

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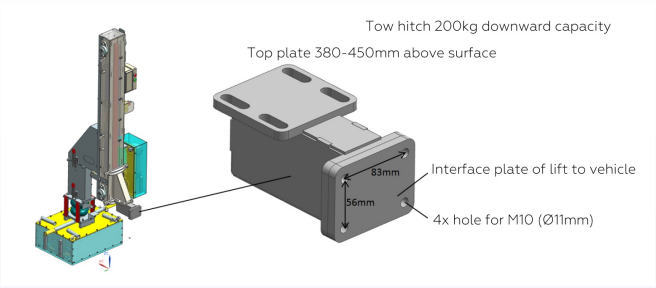
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Battery Type:	LiIon, 2160Wh (two required)
Output:	Pilot, Weighted Sum Ground Force
Internal Trigger:	Send/receive 0-5V state change edge
External Trigger Requirements:	0-5V or 5-0V state change
Communication:	Network (TCPIP)
Safety Interlocks:	- Mass Motion Range - Winch Motor Voltage and Current draw - Electronics Temperature
Deployment:	- Manual trolley - Vehicle lift (mounts on tow point) - ATV with vehicle lift - Electric tracked vehicle

Gallery



The Lightning is controlled via a simple windows interface which allows users to generate bespoke sweeps tailored to the project objective.



Schematic diagram illustrating the lightning vehicle lift assembly

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Lightning Electric ATV front mount



Lightning setup for a P-wave sweep.



The Lightning can be transported in the back of a high top long wheel based van under a standard drivers licence

Videos

Seismic Mechatronics - near surface seismic source
https://www.youtube.com/watch?v=LNczvkm1o7o

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Lightning Trolley deployment
https://www.youtube.com/watch?v=8SLZEteDu2k

Seismic Mechatronics - Project Einstein Telescope
https://www.youtube.com/watch?v=_OjpBPW6yzg

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