

Acronym List

The Seismic Industry and I/O

A/C – Analog Cable. The geophone-equipped version of System Four, Scorpion, etc.

ASIC – Application Specific Integrated Circuit. The integrated circuit in VectorSeis that converts the sensor's movement into a digital signal.

A-unit – Analog Unit. Component of System Four that collects information from 3 geophone strings, digitizes the information and sends it to the central recording truck.

AU2 - Analog Unit. Component of Scorpion that collects information from 3 geophone strings, digitizes the information and sends it to the central recording truck.

AVA – Amplitude Variation with Angle (or Azimuth). Variation in seismic reflection amplitude with change in azimuth between a common shot point and the receivers.

AVO – Amplitude Variation with Offset. Variation in seismic reflection amplitude with change in distance between a common shot point and the receivers. AVO analysis is a technique by which geophysicists attempt to determine thickness, porosity, density, velocity, lithology and fluid content of rocks. AVO analysis is more successful in young, poorly consolidated rocks, such as those in the Gulf of Mexico, than in older, well-cemented sediments.

BBL – Barrels, in the context of a reserve measurement. Often used with M (Million) or B (Billion).

BBU – Battery Booster Unit. A component of System Four and Scorpion that ensures consistent levels of power across a cable-based land spread.

BLM – Bureau of Land Management. The steward of government lands in the U.S., controlling access to approximately 40% of all acreage in the West.

BOM – Bill of Materials, describing a product in terms of its sub-assemblies and basic parts.

BOPD or **BOD** – Barrels of Oil Per Day. Often used with k (thousand) or M (Million).

CIS – Commonwealth of the Independent States (of the FSU).

CPU - Central Processing Unit. A programmable logic device that performs all the instruction, logic, and mathematical processing in a computer.

CSL – Concept Systems Limited.

C-wave – a “converted” wave. Refers to the shear wave that is naturally created when an acoustic pressure wave hits off a reflector in the subsurface. Differentiated in geophysics from a shear wave, which is generally associated with a Vibroseis source that creates both P- and S-waves on the surface.

DHI – Direct Hydrocarbon Indicator. The Holy Grail of exploration, associated with detecting hydrocarbons in advance of any drilling activity.

DP – Data Processing.

D-unit – Digital Unit. Component of System Four and Scorpion that collects information from 3 VectorSeis (SVSM) sensors and sends it to the central recording truck.

EAGE – European Association of Geoscientists and Engineers.

EAME – Europe, Africa, and the Middle East.

EM – Electro-magnetic, generally referring to controlled-source, electro-magnetic surveys in the marine environment (conducted by firms like EMGS and OHM) to identify hydrocarbons in the sub-surface before any wells are drilled. Works on the same principles as an induction log in well-logging, just at a larger scale.

EMI – Electro-magnetic interference. The interference in signal transmission or reception caused by the radiation of electrical and magnetic fields.

E&P – Exploration and Production.

FSE – Field Service Engineer.

FSU – 1) Former Soviet Union; 2) Field Service Unit (the FireFly “yellow box”).

GIS – Geographical Information System. In its simplest form, a map; but generally refers today to an electronic spatial database that might be used in GM’s OnStar or for FireFly navigation.

GoM – Gulf of Mexico.

GMG – GMG/Axis, a software subsidiary of I/O based in Denver and part of the GXT organization. Previously called “Green Mountain Geophysics”. Provides MESA and Millennium software for seismic survey design, illumination modeling, acquisition project tracking, and near-surface refraction statics.

GPS – Global Positioning System. A method of triangulating the latitude, longitude, and vertical position of an object using a series of geo-synchronous orbiting satellites.

GXT – GX Technology Corporation.

HSE – Health, Safety, and Environmental. Sometimes pre-fixed with a “Q” (for Quality).

IAGC – International Association of Geophysical Contractors. The HSE standards of this industry organization are used as a model for I/O Solutions’ QHSE management system.

ISO – International Standardization Organization, as in ISO-9001 quality standards.

LIDAR – Light Detection and Ranging.

LMO – Linear Moveout. A seismic processing step whereby a single refraction or reflection event is flattened in a common midpoint gather in preparation for stacking.

LTI – Lost Time Incident. An industry standard industry HSE metric/term used to track any work related injuries or illnesses which prevent a person from doing any work.

MEMS – Micro-electro-mechanical systems. The ‘technology of the very small,’ associated with the three accelerometers that are mounted orthogonally within the VectorSeis sensor.

MENA – Middle East and North Africa.

METF – Middle East Technology Forum.

M/V – Merchant Vessel. For example, M/V Ocean Pearl is a vessel that RXT uses in its seabed operations.

NMO – Normal Moveout. A seismic processing step whereby reflection events are flattened in a common midpoint gather in preparation for stacking.

OBC – Ocean-Bottom Cable. A method of seismic application involving the placement of receivers and cabling on the seabed.

OPEC – Organization of Petroleum Exporting Countries.

OVT – Offset Vector-Tile. An advanced processing technique that can be used with FireFly. OVTs are single-fold subsets of an orthogonal survey and can be extracted for near, mid- and far offsets. OVT-sorted data groups like offsets and azimuths, thereby optimally preserving offset and azimuth integrity. Sorting and processing the data in this manner allows for robust methods of interpolating for missed shots, statics processing, noise attenuation, data migration and AVO analysis.

P-wave – Pressure wave. The type of seismic wave assumed in conventional seismic exploration. Also called compressional wave, longitudinal wave, primary wave, or dilatational wave.

PreSDM (or **PSDM**) – Pre-Stack Depth Migration. A step in seismic processing in which reflections in seismic data are moved to their correct locations in space. Used in areas of complex geology.

PreSTM (or **PSTM**) – Pre-Stack Time Migration. A step in seismic processing in which reflections in seismic data are moved from apparent locations to their true locations in time. The resulting image is shown in terms of travel time rather than depth and, if desired, would need to be converted to depth with an accurate velocity model. Used in areas where geology is less complex.

PZ summation – A technique for processing 2C and 4C seabed data. The data recorded by the pressure-detecting hydrophone (the P in PZ) is summed with the z-component (vertical component - the Z in PZ) of the geophone to attenuate unwanted, water-borne multiple energy.

QA – Quality Assurance.

QC – Quality Control.

RF – Radio Frequency. That portion of the electromagnetic spectrum in which electromagnetic waves can be generated by alternating current which is fed to an antenna.

RMAG – Rocky Mountain Association of Geologists.

RSR – Remote Seismic Recorder. A “wireless” precursor to FireFly and the first system to be VectorSeis capable in the I/O acquisition system portfolio.

RTM – Reverse Time Migration. An advanced, compute-intensive migration technique that runs the wave equation forward in time for the source and backwards in time for the receiver. Used in the most complex velocity regimes, including sub-salt, for structures having dips in excess of 70 degrees, and in the presence of reflection boundaries that may generate internal multiples.

RXT – Reservoir Exploration Technology AS. A publicly-traded Norwegian company that is our exclusive acquisition contractor for VSO applications.

SEG – Society of Exploration Geophysicists.

SEG-Y – one of several tape standards developed by the Society of Exploration Geophysicists and the most common format used for seismic data in the exploration and production industry.

SM-24 – SeisMometer, the industry standard-setting geophone element from Sensor b.v.

SMT-300 – the industry standard-setting geophone tester from Sensor b.v.

SPE – Society of Petroleum Engineers.

SRME – Surface-Related Multiple Elimination. A processing technique that is designed to minimize secondary reflections, most commonly in marine acquisition, between a) the interface of the base of water and the seabed; or b) the air-water interface at the ocean's surface.

SVSM – Standard VectorSeis Sensing Module. The three-component digital seismic receiver designed to operate with the System Four, Scorpion, and FireFly seismic recording systems.

TFlop - A trillion floating-point computing instructions per second. A measure of the number of operations carried out by advanced supercomputers.

TIM – Truck Interface Module. Timing device for FireFly, Scorpion and System Four.

TZ – Transition Zone. The somewhat nebulously defined area between the onshore and marine environments in which neither land, OBC, nor streamer acquisition systems are ideally suited. Often delineated in the region between the shoreline and 50 meters of water depth.

UHF – Ultra High Frequency. Television broadcasts, microwave ovens, mobile phones, wireless LAN, Bluetooth, and Two-Way Radios at 300-3000 MHz.

V/C – VectorSeis Cable. The VectorSeis-equipped version of System Four, Scorpion, etc.

VHF – Very High Frequency. FM, television broadcasts and line-of-sight ground-to-aircraft and aircraft-to-aircraft communications at 30-300 MHz.

Vib – Vibroseis. A method used to propagate energy signals into the earth over an extended period of time (using a mobile hydraulic vibrator or shaker) as opposed to the near instantaneous energy provided by an impulsive source such as explosives.

VOR – Vertical Orientation Rotation. The initial processing step used with VectorSeis, to align the three orthogonal sensors to a perfect vertical orientation, regardless of the sensor plant.

VRSR – VectorSeis Remote Seismic Recorder. A “wireless” precursor to FireFly and the first system to be VectorSeis capable in the I/O acquisition system portfolio.

VSO – VectorSeis Ocean. I/O's redeployable system for full-wave acquisition from the seabed.

VSSN – VectorSeis Sub-Sea Network. The ‘brand name’ given to our concept for permanent seismic data recording from the seabed.

WATS – Wide Azimuth Towed Streamer. An advanced acquisition technique for imaging complex structures (e.g., subsalt) in the marine environment, generally implemented with multiple source vessels that shoot at some distance from the streamer recording vessel.

XLU – Cross-Line Unit. A component of Scorpion and System four that allows individual cable lines in the spread to exchange data and power with other cable lines, providing an element of redundancy.

2C – Two-Component. Shorthand for seabed seismic imaging using a hydrophone and single component geophone.

2D – Two-Dimensional seismic data in which seismic lines are acquired individually such that significant gaps (commonly 1 km or more) typically exist between adjacent lines.

3C – Three-Component. Shorthand for multicomponent (full-wave) seismic imaging, as well as the notation for the orthogonal geometry associated with the VectorSeis sensor.

3D – Three-Dimensional seismic data in which a set of numerous, closely-spaced seismic lines provide a high, spatially sampled measure of subsurface reflectivity.

4C – Four-Component. When full-wave data is acquired in the marine environment, a fourth receiver (a hydrophone) is added to the three-component sensor package.

4D – Four-Dimensional Seismic in which the fourth dimension is time for the purposes of tracking fluid movements (and by-passed oil) in the reservoir.