

ECHOMETER MODEL M CHART RECORDER

Liquid Level Instrument

The Echometer Model M is used in conjunction with an acoustic gas gun to determine the distance to the liquid level in the casing annulus or tubing of a well. A pressure pulse is generated from a gas-gun wellhead attachment that is connected to the surface casing annulus valve. The pressure pulse travels down the casing annulus gas and is reflected by collars, the liquid level and other obstructions. A microphone in the wellhead attachment converts the pressure pulses into electrical signals that are amplified, filtered and recorded on a strip of paper. The record displays the tubing collars from the surface to the liquid level and hence the liquid level depth can be determined by counting the number of tubing collar reflections to the liquid level reflection.

The Model M instrument consists of an analog/digital amplifier-recorder and a dual-channel paper chart recorder. One channel (liquid level) is used to optimize the reflection from the liquid level and other large downhole anomalies. The second channel (collars) is used to optimize the response from the tubing collars and other small downhole anomalies.

A microprocessor controls the instrument. When the gain controls are set to the AUTO position, the microprocessor automatically sets both amplifier gains to the proper recording level based on the current level of well noise. This simplifies operation of the equipment. The recording level of the reflected acoustic signal is optimized by the microprocessor so that the reflected signal can be easily interpreted by the operator. The operator can override the AUTO gain setting by adjusting the gain control manually.



Key Features

- Stand-alone acquisition instrument.
- User-friendly operation.
- Lightweight and portable.
- Acoustic trace prints out on strip chart paper.
- Dual channel recorder.
- Automatic gain setting and control.
- One second timer with date stamp.
- Built-in self-test.
- Operates from self-contained 12V rechargeable lead-cell battery or 12V external outlet.
- CSA or ATEX certified available.

Other Model M Features

General Design & Construction – The quality and design of the Echometer is as important as the features listed. The latest in technology including a microprocessor, clock, timer and printhead are utilized for outstanding performance and reliability.

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Increase production while reducing operating costs...

The Echometer is constructed so that stray noise is reduced by shielding, shock mounting or filtering in order to record the desired information. The reliable Echometer is excellent for use in remote applications where simple, rugged equipment is desired. A built-in self-test permits the operator to test the electronic circuit and the microphone cable.

Interpretation of Records – Interpretation of the charts is simplified. The Echometer features a recording system where reflected pressure waves reflect in a downward direction for anomalies that cause a reduction in the annular area in the casing, i.e. the liquid level, liner tops, casing patches, tubing anchors or other obstructions. The recorder responds in an upward for anomalies that cause an increase in the annular area in the casing i.e. open holes, enlarged sections, split casing, perforations, etc. This feature helps to prevent misinterpretation of the strip chart since upper perforations and “shot” holes can easily be separated from a liquid level kick. The dual-channel recording of the accented liquid level and accented collars allows improved interpretation of the reflected acoustic signal.

Filter Operation – The reflected signals are filtered by the amplifier to remove undesirable noises and accent desired signals. The filter has the capability of removing undesirable noises so that the upper collars can be shown as sharp “kicks” or the deep collars can be recorded for maximum accuracy in a deep well. A distinct liquid level can be recorded even in a deep, low pressure, slim hole well on the channel which is designed to maximize the response from large downhole anomalies.

Self-Contained Rechargeable Battery or External 12

VDC Operation – The amplifier-recorder operates from its own 12V rechargeable lead-cell battery. The amplifier-recorder will also operate from a 12V automobile outlet. When operating from the automobile outlet, the lead-cell battery is charged automatically. This battery system is reliable, convenient and well suited for hot and cold weather operation.

Time Marks

The microprocessor continuously monitors the signal from the microphone and determines the instant of “firing.” A timing mark is placed on the chart at the instant of “firing.” Each second thereafter, another timing mark is placed onto the stripchart. These timing marks are numbered so that the elapsed time after pulse generation can easily be determined. The return trip travel time (RTTT) can be utilized to determine the depth to fluid by incorporating the acoustic velocity of sound through the annular gas.

In addition, an internal clock is used to place a date and time stamp on each record. This aids in record keeping of the precise time that an acoustic test is performed. A header is placed onto the strip chart when the power switch is turned on. The header contains general information, the instrument serial number and an electronic system test. Analysis forms are printed onto the strip chart so that the operator can input the distance to the liquid level, casing pressure, casing pressure build-up rate, SBHP and the well test. AWP 2000 software is supplied and used with an external computer to calculate bottomhole pressures and the maximum production rate of the well which are entered into these analysis forms.

Gas Guns

Several gas guns are available for use with the Model M acoustic instrument. A manual fire Compact Gas Gun, Remote Fire Gas Gun, 5000 psi Gas Gun and a 15000 psi Gas Gun are available. Gas guns are preferred to black powder guns that discharge burning particles which could result in a fire hazard and injury to people.

CSA/KEMA/ATEX CERTIFICATION

The Model M instrument can be certified, by request only, and will incur an additional charge to the following:

- CSA Certificate 1705541
- Class 2258 03; Class 2258 83
- Class I; Division 1; Division 2; Groups A, B, C, and D
- KEMA Certificate: KEMA 05ATEX1246
- II 1 G EEx ia IIC T4 (gas guns)
- II (1) G [EExia] IIC (Model M, Model E)



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When operating the Echometer Model M instrument in a hazardous area, the wellhead attachments must be certified intrinsically safe and approved for use in the classified area. Contact SeniorTech (now Hamdon Wellsite Solutions) to request this certification.

Model M Specifications

The Echometer Model M is a portable, self-contained instrument operating from a rechargeable self-contained battery or external 12 VDC power supply. The amplifier-recorder is housed in a compact, plastic case. Standard equipment consists of the Model M amplifier-recorder, compact gas gun, carrying case, a 5' (1.5 m) microphone to amplifier cable, 110 VAC (or 220, specify when ordering) automatic battery charger, 12 VDC automobile cigar lighter power cord, 11 point dividers, 10 rolls of paper, a 200 psi gauge with quick connector for measuring casing pressure, set of o-rings and miscellaneous parts, and a comprehensive operating manual. A 5 lbs (2.3 kg) cylinder is supplied unless the customer requests other CO₂ / N₂ options. A hose and filler connector are supplied for the CO₂ / N₂ cylinders. If a different wellhead, special equipment, longer cables, or changes are desired (specify when ordering).

Weight

- Amplifier-recorder Case 12 lbs (5 kg)
- Wellhead Attachment 8 lbs (4 kg)
- Well Accessory Box with Wellhead Attachment and Supplies 25 lbs 11 (kg)

Size

- Amplifier-recorder Case 5" x 9" x 12" (12 cm x 20 cm x 30 cm)
- Well Accessory Box, Complete 8" x 10" x 12" (20 cm x 25 cm x 30 cm)
- Shipping dimensions - 15" x 15" x 18" (38 cm x 38 cm x 46 cm)
- Approximate shipping weight - 50 lbs (23 kg), shipped in one crate

Senior Tech (now Hamdon Energy Solutions) maintains an inventory of Echometer units and accessories. Units typically ship within 24 hours of order confirmation.

Wellsite Optimization Services

Senior Tech (now Hamdon Energy Solutions) provides oil and gas well optimization services that both enhance and sustain well efficiency and production. With effective optimization solutions and a mobile service fleet, Senior Tech (now Hamdon Energy Solutions) offers professional expertise and a diverse selection of optimization equipment across Canada and internationally.

Production Optimization

Senior Tech's (now Hamdon Energy Solutions) wellsite production optimization services are designed to optimize a company's producing assets through data analysis and hardware/system reviews throughout the primary and secondary lifecycles of oil and gas wellsites. Our production optimization services, delivered by experienced engineers and technicians, ease the workload of production engineers, enabling them to quickly understand the current state of each wellsite. Services include:

- Acoustic Fluid Level Monitoring
- Dynamometer Surveys
- Foam Depression Tests/Fluid Depression Testing
- Plunger Lift Optimization
- Static Bottom Hole Pressure Calculations

Regulatory Compliance





As the demands placed on oil and gas companies by the government, private sector and environmental groups increase, it is important to ensure operations are current and meeting the ever-changing regulatory guidelines. In addition to production optimization, Senior Tech (now Hamdon Energy Solutions) provides a range of wellsite services that are conducted to maintain compliance within the parameters set out by the AER and other regulatory agencies. Typically these services are conducted on a yearly basis, reported and submitted to the local regulatory agencies. They include:

- AWS Pressure Transient Surveys
- Packer Isolation Testing
- Surface Casing Vent Flow Testing
- Gas Migration Testing



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Echometer Model Comparison

FUNCTION	MODEL E (WELL ANALYZER)	WIRELESS WELL ANALYZER	MODEL H	MODEL M
Unit Image				
Readout	Digital	Digital	Digital	Dual Channel Paper Recorder
Data Storage and File Sharing	✓	✓	✓	✓
Intrinsic Safety Certification	ATEX Optional	Awaiting Certification	ATEX an IECEx	ATEX Optional
Fluid Level Determination	Automatic Collar Count Acoustic Velocity Downhole Marker	Automatic Collar Count Acoustic Velocity Downhole Marker	Automatic Collar Count Acoustic Velocity Downhole Marker	Manual Collar Count Acoustic Velocity Downhole Marker
Surface Pressure Acquisition	✓	✓	—	—
Dynamometer Testing	✓	✓	—	—
Motor/Power Current Data Acquisition	✓	✓	—	—
Pressure Transient Testing	✓	✓	—	—
Plunger Lift Analysis	✓	✓	—	—
BHP & IPR Calculations	✓	✓	AWP2000	AWP2000
Printing Reports	✓	✓	✓	AWP2000
Protective Case	✓	✓	✓	✓
Notebook Computer (Windows)	✓	Required/Not Included	—	—
Rechargeable Battery	✓	✓	✓	✓

Warranty Policy: The Echometer is guaranteed for a period of one year. The guarantee covers defects in material and workmanship and is limited to replacement of parts.

Senior Tech (now Hamdon Energy Solutions) is an authorized Echometer distributor in Canada and internationally, providing equipment sales, rentals, training and service. Echometer's Well Analyzer equipment is used to determine well productivity, reservoir pressure, overall efficiency, equipment loading and well performance, which are calculated based on a combination of measurements of surface pressure, acoustic liquid level, dynamometer, power and pressure transient response.



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