SHOTTRACK VOD MINI

HIGH RESOLUTION TDR VOD MESUREMENTS

ShotTrack® high speed TDR measurement systems
ShotTrack VoD Mini patent pending.

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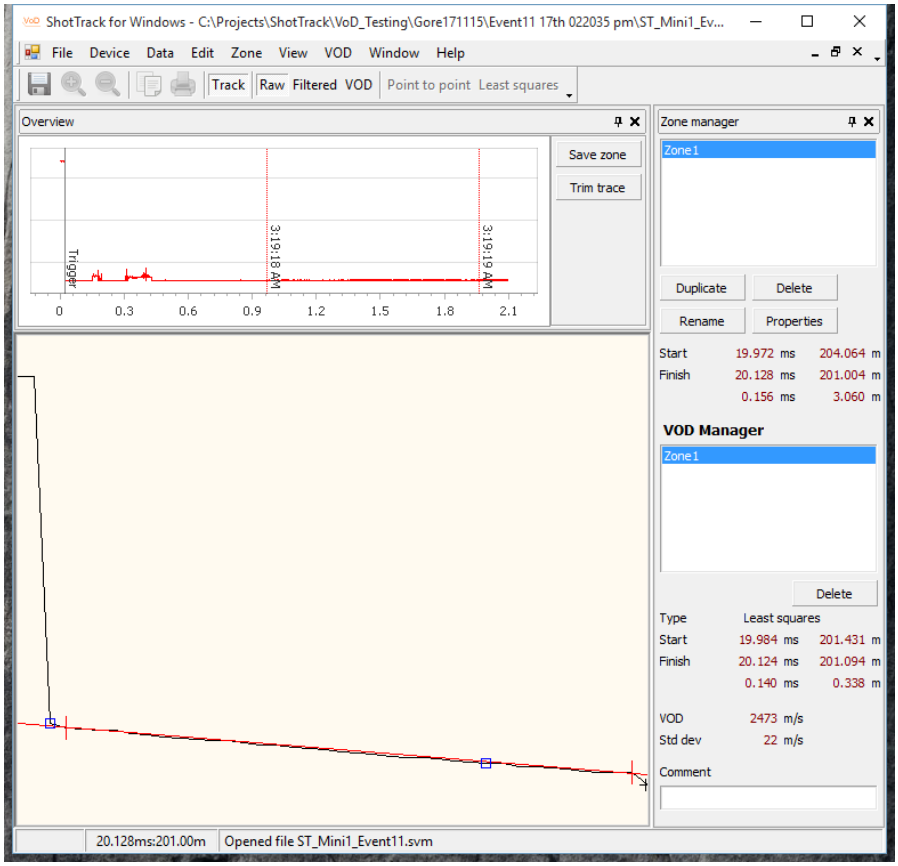
ShotTrack's new TDR (Time-domain reflectometer) type VoD monitor has raised the bar for VoD monitoring using this reliable and cost effective method for measuring the performance of explosives.

Featuring a resolution of 90 picoseconds, a sample rate of 256 KHz and cable lengths of up to 305 meters.

With only one power up button and automatic set function, this is the most user friendly ShotTrack VoD system to date.

ShotTrack VoD for Windows



TDR TYPE MONITOR

ShotTrack VoD injects a pulse into a coaxial cable and measures the propagation of this pulse to the end of the cable and back again. This time is used to calculate the distance. This process is repeated at a precise period and the results are recorded as length over time. As the cable is consumed by the blast the gives an accurate VoD

The unit comes with a comprehensive software suite ShotTrack VoD that makes analyzing the data simple and produces custom reports

SPECIFICATIONS:

Unit specifications:

- Instrument type: One channel - Time-domain reflectometer
- Sample rate: 256 KHz
- Resolution: nominally 90 picoseconds
- Size: 18 x 7 x 4 cm
- Weight: 1.2 Kg
- IP Rating: IP 67
- Consumable: Low cost standard co-axial cable
- Pulse type: Negative 6 volts (note2)
- Power supply: 7.4 Volt LION battery (note2)
- Display: 4 character 7 segment bright LED display
- Indicators: Multi LED status indicator in ON/OFF button
- Charging: Intelligent internal LION battery charger On and Charged indication
- Dead zone: First 30 meters of cable.
- Sample storage size: 1000000 samples @ 16 bit
- Timing: GPS synchronized timing. (note3)
- Use: VoD measurement on site, above or under ground
- Communications: USB or Bluetooth long range wireless
- Max cable length: 305m

GPS Specifications:

- 72-channel u-blox M8 engine,
- GPS L1C/A, SBAS L1C/A, QZSS L1C/A, GLONASS L1OF, BeiDou B1

Horizontal position accuracy:

- Autonomous 2.5 meters SBAS 2.0 meters

Accuracy of time pulse signal

- RMS 30 ns 99% 60 ns

Wireless Specifications:

- Bluetooth 2.1 + EDR
- Transmit power +20dBm Receive sensitivity -90dBm
- Range 1000 meters (with Long Range Bluetooth modules each end)

USB

- USB 2.0 High Speed

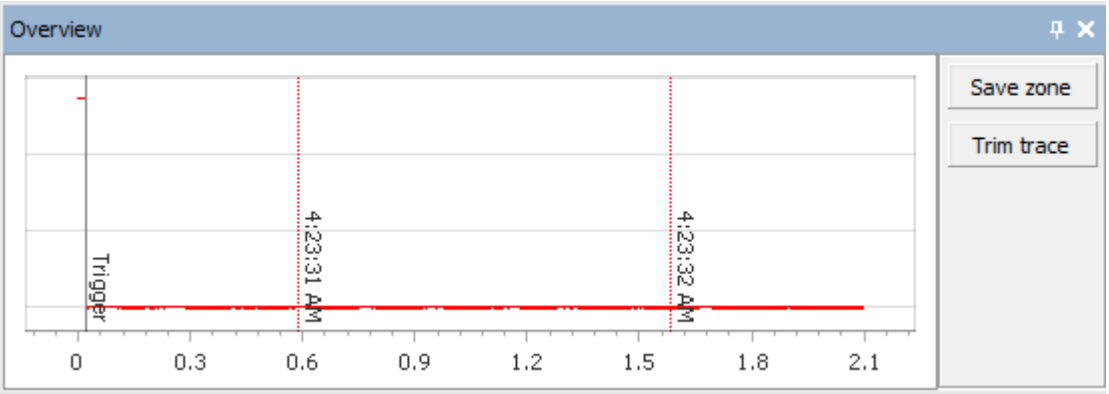
SYNCHRONIZED TIMING

The ShotTrack Mini uses a dedicated GPS module to produce a Pulse per Second (PPS) signal that is embedded into the data. Every sample period at the sample rate of 256 KHz (3.90625 microseconds) the PPS is checked and the state embedded into the sample data. The leading edge of the PPS pulse represents the UTC second time stamp. This then “time stamps” the data to an accuracy of 3.90625 microseconds. The PPS timing is displayed on the Overview bar of the software suite.

This “time stamp” is compatible with the ShotTrack ViB monitor and allows synchronized timing between the data captured by the VoD and ViB units.

The relationship between the data saved for the Vibration Monitor and the VoD Monitor is scalable. At the Maximum sample rate of the vibration monitor of 64 KHz there will be exactly 4 VoD samples for each vibration monitor sample. For 32 KHz there will be 8 VoD samples etc. This allows for data to be time aligned and the PPS will aid in matching the data sets to give an accuracy of the slowest sample. This would be 15.625 us when using the highest vibration monitoring frequency.

If the VoD monitor cable is inserted into the first (initiating hole) of a blast, then propagation times can be measured from the blast initiation to the vibration monitor sites with an accuracy of 15.625 us.



DATE AND TIME

Date and time information comes from the GPS module. If the GPS has acquired enough satellites to get a fix, then this information comes directly from the latest GPS data otherwise it comes from the RTC on the GPS unit.

Providing there has been at least one GPS fix since the batteries are installed or recharged from completely flat then the Time and Date will be accurate to the internal RTC accuracy updated from the last GPS fix.

Start and Trigger times will therefore be accurate to 3.90625 microseconds when GPS data is available and to a degraded accuracy if there has been no GPS fix over an extended time.

If using underground then switching the unit on for a few minutes above ground will synchronize the RTC and produce as accurate timing as possible.

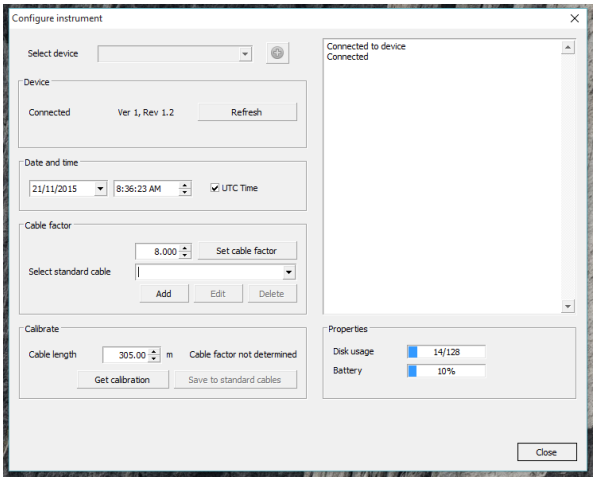
COMMUNICATIONS

Whichever communications mode is used USB or Wireless the unit connects to ShotTrack VoD software suite.
These configuration commands are possible.

- **Calibrate unit to types of cable:** Interrogate unit for cable return time for calculation of cable factor.
- **Upload the configuration factor to unit:** Set unit to cable factor.

The unit sends various operation conditions to the software.

- **Time set in unit:** This can be viewed as UTC or Local time
- **Current Cable factor:** This is the cable factor set in the unit
- **Firmware version:** Current firmware version.
- **Disk usage:** This shows the number of files saved and the maximum possible
- **Battery:** Percentage of battery life remaining.



CHARGING:

The ShotTrack VoD mini has an internal 7.4 volt 4 aH LION battery.

Charging is accomplished by a standard 12 Volt plug pack.

When the plug pack is connected and switched on the right hand LED on the display panel is illuminated. The left hand LED is on while the battery is charging and is extinguished when the battery is fully charged.

The USB is plugged into the left hand socket.

OPERATION

- The unit should be placed where it is intended to be left for the shot and the cable connected.
- The unit is then turned on with a 1 second or longer press of the ON/OFF button.
- The unit will display the battery condition “capacity left” 10 to 100% for 6 seconds.
- The unit starts measuring the cable length and shows this length on the display.
- After 3 minutes if a valid cable length is detected the unit will SET itself.
- The SET date and time is retrieved from the GPS module either as current data or from the RTC.
- The ON/OFF button will illuminate BLUE to indicate that the unit is SET.
- The display will show the last cable reading before the unit was set.
- When the unit is triggered the unit will switch itself off and the ON/OFF button illumination is extinguished to indicate a successful trigger.
- If after reading the triggered data, the unit detects that the cable has returned to its original length then the unit will RE-SET itself assuming a transient trigger condition has falsely triggered the unit (for example a truck running over the cable)
- The unit will then switch itself off.

SWITCHING UNIT OFF

- Press the ON/OFF button holding the button on for an extended time (3 seconds). The unit will switch off from idle or SET state.

The data can be retrieved when the unit is plugged into a computer/lap top using the USB port or connected via the Bluetooth interface.

Note1: Based on a VoD of 5000 meters per second.

Note2: compliant for use with electronic and electric detonator systems

Note3: Enhanced accuracy when GPS “Fix” valid otherwise accurate to GPS internal RTC

TRADEMARKS

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PATENT PENDING

ShotTrack VoD Mini

DISCLAIMER