

DrillNAV Plus

DrillNAV Plus is a robust, easy to use, blasthole drill monitoring and navigation system utilizing GPS technology. Mines can design drill patterns in the office and radio them to the drill, or the operator can layout the pattern while on board the drill. However designed, the pattern will appear on the operator's touch, sunlight readable, VGA color display. It is a moving map display. As the drill navigates around the pattern, the map moves on the operator's display. The operator's screen shows where every hole should be drilled and the location of previously drilled holes. In addition, the operator sees the bit elevation above sea level as he is drilling allowing him to drill to a specified elevation rather than a depth.

Simplicity

DrillNAV is designed with the operator in mind. Effectively displaying the position of the drill, as well as the hole design location, enables the operator to quickly incorporate DrillNAV as another "tool" on the drill. After drilling two or three holes using DrillNAV, an operator can navigate effortlessly to within 20 cm of the designed hole location. System parameters are provided to the operator, with easy to understand information, including when the GPS accuracy is acceptable and when the drill is located within the mine's hole position tolerance distance.

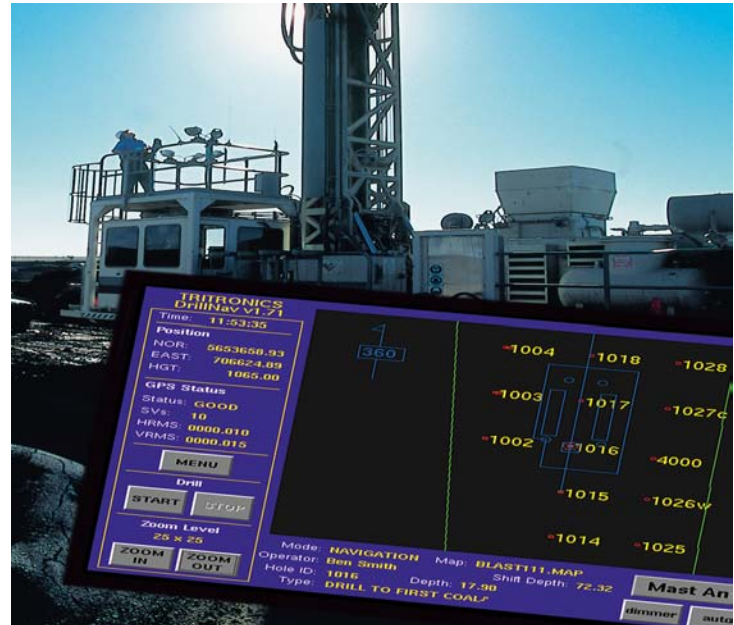
Improved Productivity

Eliminates the need for surveyors or drillers to stake a drill pattern. DrillNAV provides the drill operator with a moving map to allow quick navigation to the designed hole locations, without the need for traditional staking. No more guessing at hole locations due to lost or buried stakes, jockeying around a stake in darkness, or down time due to lack of staked patterns. DrillNAV operates on the same map file used by the surveyors to stake a pattern. All coordinates are in local mine grid coordinates.

Improved Bench Construction and Elimination of Hard Toes

Allows holes to be drilled to a defined elevation above sea level, reducing over or under drilling.

There are no hard toes to dig out causing non-level excavating. The result is



level benches, with less water pooling, and smoother haul roads.

Better Blasting

Allows easy visualization of the blast pattern versus the blast results allowing pattern modifications to be made to improve the next pattern. Accurately drilled holes (parallel and to correct elevation) leads to better rock fragmentation and a decrease in overall blasting costs. Engineering's confidence in the drilling will lead to less overloading of holes and better overall pattern design.

Accurate Production Reporting

All critical drilling parameters are measured, displayed, and recorded: Feet/meters drilled, Penetration Rate, Drilling and Non-Drilling Time, Tramming Time, Hole, Pattern and Drill Bit numbers, and all Delay Codes.

System Advantages

DrillNAV GPS uses a real time kinetic positioning technology. RTK is up to 100 times more accurate than Differential GPS. Also, RTK only requires a short initialization period on power up until it has centimeter level accuracy. The RTK receiver can fix integer ambiguities where no other L1 GPS-only RTK system can.

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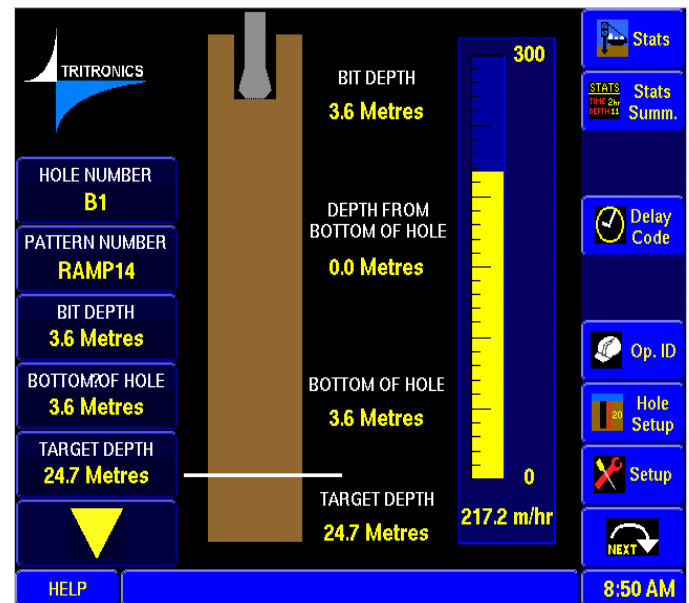
Map data transfer to and from the drill is by Spread Spectrum radio. This radio operates in the 900 MHz range at 115 KBAUD. This frequency range at this power is unlicensed in the United States and many other countries. Data can travel 30-km line of site with these radios

The on board operating system is QNX[®], the market leader for mobile equipment applications requiring embedded PC compatibility. The processor is quick, allowing the operator's screen to display real time information. DrillNAV uses solid-state inclinometers to provide mast angle, drill pitch, and roll data so the operator can set up level and angle the mast correctly. The on board compass also allows the operator to set up on azimuth easily.

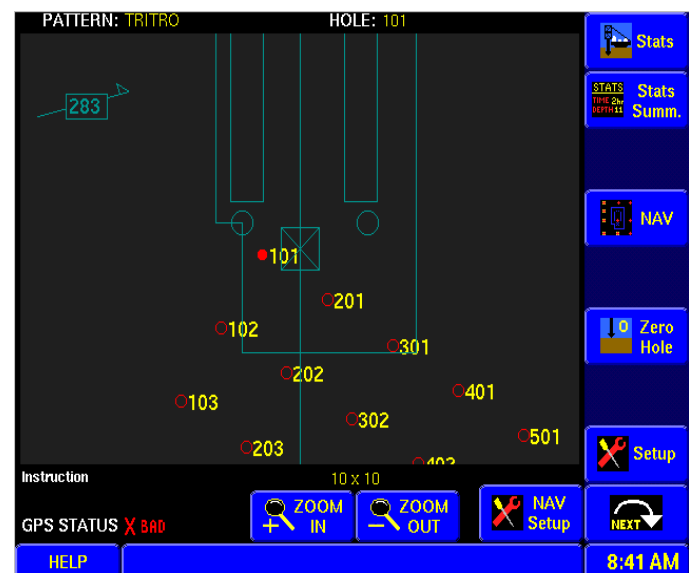
Technical Features

- Allows positioning of the bit to within 20 cm of design location.
- Logs hole bottom elevation above sea level, depth, location, and drilling time on a hole-by-hole basis.
- Visual lock ring function allows operators to easily see when the drill is within tolerance of the design location of the hole.
- Operation is in mine local grid coordinates.
- Multiple map files can be made available for the operator.
- Drill hole pattern maps can be uploaded and downloaded to and from the office at any time while the system is operating.
- Representation of holes and the drill icon is to scale displaying the pattern realistically on the screen. This representation aids the prevention of hole caving due to tracks and pads.
- Provides for angle drilling
- Zoom levels are automatic to minimize operator keystrokes.
- Leveling screen assists operator in leveling the drill.
- Direct sunlight readable display provides bright, crisp, and wide-angle viewing
- IMS database common with other Tritronics products including Fleet Management System, 9000 Dragline Monitor, and ShovelPRO.

DRILLING SCREEN



NAVIGATION SCREEN



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