ELECTRONIC INITIATION

SYSTEMS

AECIMINING.COM

AECI®
MINING EXPLOSIVES

CONTENTS

GLOSSARY OF ABREVIATIONS

EMP	Electromagnetic Pulse
RFI	Radio frequency interference
BCU	Blast control unit
CBS	Centralised blasting system
RF	Radio frequency
HD	Heavy duty
PETN	Pentaerythritol tetranitrate
AC	Alternating Current
DC	Direct Current
NEQ	Net Explosives Quantity

INTRODUCTION

AECI Mining Explosives is a world leader in the development and manufacture of electronic initiation systems. Through our select partners, we have pioneered this technology for more than two decades. Electronic initiation has revolutionised blasting. It continues to provide significant advances in safety and operational efficiencies, from mine to mill.

Our experience has enabled us to perfect robust electronic initiation solutions with superior blasting performance, complimenting the Zero Harm philosophy, with safety inherent in the system design.

AECI Mining Explosives' electronic detonators are highly resistant to accidental initiation from static, stray currents, induced current, and over voltage from lightning. Robust electronic and shell design provides high resistance to dynamic shock desensitisation and EMP. These attributes make them suitable for use in the toughest tunneling, shaft-sinking, underground stoping, quarrying and open cast mining environments.

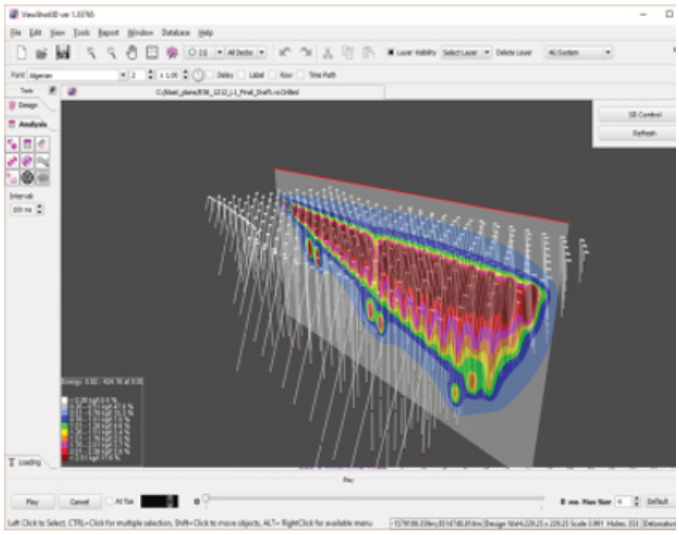
Encrypted blast keys, in conjunction with site-specific procedures, ensure that the blast can only be initiated by authorised persons.

VIEWSHOT® 3D

VIEWSHOT® 3D

ELECTRONIC DETONATOR BLAST TIMING SOFTWARE

The ViewShot 3D blast software facilitates the planning, design and simulation of a blast through a flexible and feature-rich user interface. Efficient blasting practices is now further enhanced with ViewShot 3D's ability to optimise blast outcomes with advanced modelling and simulation features. ViewShot 3D seamlessly integrates with third party mine planning and reporting software. Blast design parameters include hole diameters, explosives material, rock type. Formulates timing designs based on actual hole positions. Create hole-charge templates using a built-in actual explosives database. Calculate costs based on blast parameters and the built-in explosives database.



TECHNICAL SPECIFICATIONS

BENEFITS

- Allows fast and convenient upload of detonator timing to your pre-loaded blast design
- Allows viewing of the blast firing sequence on a PC and facilitates blast timing to optimise outcomes

FEATURES

- Provides the ability to ensure single hole firing and facilitates maximum instantaneous charge firing per blast

TECHNICAL PROPERTIES

HOLE TIMING TOOLS

- Manual timing delays
- By pattern grouping
- By Chevrons - free style polygon, Diamond or V-cut

DELAY HISTOGRAM

- Delay Window
- Decks Firing Sequence
- Optimisation of Delays
- Inter-shot Increments

TIME-MAPPING AND BURDEN RELIEF

- Selecting the time mapping tool gives visual displays of intershots
- Selecting the burden relief tool gives a visual display of the direction of displacement

SIMULATION OF THE BLAST

- Uses colour-coded deck firing
- Animation of firing decks in slow simulation
- Stepping forward / backward through simulation

REPORTING AND PRINTING

- Reports may be created for hole properties, as well as entire blast plans. These are displayed in a table format which may be saved and printed (with preview before hand)
- Blast designs may be exported to text files, or DXF files

EXPORTING TO CONTROL EQUIPMENT

- Warnings / errors are created when system defaults are breached
- Exports to Tagger

DIGISHOT® RANGER

DIGISHOT® RANGER

The DigiShot® Ranger has been completely redesigned for the open cut, quarry, civils, and construction industry. It has been vastly improved from its DigiShot® 300 predecessor, providing twice the detonator capacity, updated weatherproof enclosure with a built-in antenna for longer range RF up to 3km which makes it more robust for quick and easy deployment.

Electronic initiation is taking the future of mining to the next level. Electronic systems are more efficient and ensure consistent blasting results every time. A reduced number of blasting delays, uniform rock fragmentation and uncompromised safety are only a few of the key factors that contribute towards sustainable mining.

TECHNICAL SPECIFICATIONS

FEATURES

- Fast and simple tag by plan deployment method
- Minimal training, similar tagging and blasting method
- Automatic check to ensure the correct number of detonators per channel
- Detonator energy monitoring right up to the point of blasting
- Autonomous detection and testing of detonators
- Programming speed is 6 times faster
- Blaster wirelessly controlled through the multi-purpose CE4 Tagger
- Two channels - 300 detonators per channel. Total 600 detonators per Ranger

TAGGING MODES

Plan Mode

Predesigned blast plans containing location and timing created through ViewShot application, via PC/tablet or DigiShot® layout are downloaded to the CE4 Tagger.

The user can define a tagging path that creates a detonator list in the sequence of tagging which is suitable for largescale blasts. The tagger writes the unique ID and timing into the detonator. The tagging path is flexible allowing adjustment of the plan during tagging and the insertion of new blast holes.

DigiShot® Mode

Conventional tagging mode utilizing location-based tagging with sides, rows, hole number, and detonator number. This option allows the user to tag the detonators' location and later send the delays to the detonators via the Tagger when all detonators are connected on the harness wire.

CE4 BLAST RANGER	
Temperature	-30°C to +60°C (Extended to -45 °C for 1 hour with a thermal sleeve) -22°F to +140°F (Extended to -49 °F for 1 hour with a thermal sleeve)
Battery	Internal 3.7 V Lithium Polymer
Battery Life	8 hours at 25 °C
Weight	Approximately 2.0 kg / 4.4 lbs
Software Upgrade	Via a PC and a standard mini USB cable
Water and Dust Resistance	IP57
Display	200 x 96 pixels / 45.80 mm x 21.98 mm / 1.803 in x 0.866 in
External Connectors	4 Sets of terminals to connect 2 wire detonator harnesses

INTELLISHOT®

INTELLISHOT®

THE INTELLISHOT® DETONATOR

The new generation Detonator is a fully programmable electronic detonator that is suitably tailored to fit all types of blasting operations. The design has evolved from the remarkable safety principles of the 3G detonator.

- Redesigned Application Specific Integrated Circuit (ASIC) with 15 times more memory, which allows the storage and tracking of unique identification numbers
- Delay time is fed directly into the detonator during on-bench tagging
- Verification of sufficient firing voltage at the furthest detonator, before the user presses the fire keys
- Down-hole wire length and other critical information is stored in the expanded non-volatile memory during detonator assembly

INTELLISHOT® COMMANDER

This is a multi-purpose device that is used as a Bench Commander, Repeater and Base Commander, and it controls the entire blast.

- Customer Provided with automatic detonator detection, testing and fast programming
- It has four channels that can each connect up to 400 detonators, giving a total capacity of 1600 detonators per Commander
- By verifying the voltage at the detonator, it can blast through high levels of leakage
- Boasts a unique and robust design, with a built-in long-range antenna, that can handle the harshest mining conditions
- The blast is initiated with contactless NFC (Near Field Communication) BlastCards
- Wirelessly controlled by the CE4 Tagger or via the BlastApp on a Tablet device
- Up to 10 Commanders can be deployed for a single blast using long distance RF communication, resulting in 16000 detonators per blast
- Potential to be integrated into Mines clearance systems to authorise blasting

THE CE4 TAGGER

The CE4 Tagger is a leading innovation from and the best of its kind in the industry.

- Tests leakage and troubleshoots the bench before leaving
- Single device on-bench used for tagging, testing and final troubleshooting before leaving the bench
- Scratch proof glass screen provides excellent visibility
- User alerts engage multiple sensory formats: tactile (vibration), audible (speaker) feedback and visual alerts through high-bright LEDs
- GPS enabled to aid in detonator trouble-shooting
- Excellent battery management technology and standard USB charging
- Wireless control of Commander to execute arm & fire
- Up to 10 ViewShot 3D blast plans can now be stored on a tagger

BLAST APP *(OPTIONAL)*

The optional BlastApp can be installed on a commercial off the shelf Tablet to run on either Android or Windows based operating system. This enable users to communicate wirelessly with the Commander via a Tablet instead of a Tagger.

- The Tablet becomes the user interface during blast execution with bigger & more readable information
- The Tablet enables a full colour graphic interface
- Download and view the full detonator list
- User can design a simple blast design that features helicopter view and blast simulation
- Consolidate planned versus actual tagged list during fault-finding
- Execute the firing command

BLASTCARDS

- Uses Near Field Communication (NFC) to wirelessly interact with the Commander
- Encrypted blast commands and RF settings are stored in the card
- BlastCards are password protected to ensure safe blasting

INTELLISHOT® PRODUCT SPECIFICATIONS

DETONATOR	
Temperature	-40 °C to +80 °C -40 °F to +176 °F *Suitable for hot hole applications
Dynamic Shock Resistance	110 MPa Copper Detonator Shell
Connector	Rugged, water-resistant
Base Charge	PETN
Timing	Fully programmable / 1 ms increments / Max delay 20 000 ms
Accuracy	< 1 ms for blast durations of less than 5 seconds

INTELLISHOT®	
Temperature	-30°C to +60°C -22°F to +140°F
Battery	Internal 3.7 V Lithium Polymer
Battery Life	8 hours at 25 °C (77 °F)
Weight	Approximately 2.0 kg / 4.4 lbs
Software Upgrade	Via a PC and a standard mini USB cable
Water and Dust Resistance	IP57
Display	200 x 96 pixels / 45.80 mm x 21.98 mm / 1.803 in x 0.866 in
External Connectors	4 Sets of terminals to connect 2 wire detonator harnesses

CE4 TAGGER	
Temperature	-30 °C to +60 °C -22 °F to +140 °F
Battery	Internal 3.7 V Lithium Polymer / External pack 6 x 1.5 V
Battery Life	Approximately 10 hours at 25 °C (77 °F)
Weight and Dimensions	570 g / 1.25 lbs; 213 mm (L), 88 mm (W), 38 mm (H)
Software Upgrade	Via the USB connector in the CE4 Tagger, and a flash drive
Water and Dust Resistance	IP57
Display	128 pixels x 128 pixels / 44.78 mm x 44.78 mm / 1.76 in x 1.76 in

INTELLISHOT® DEPLOYMENT

VIEWSHOT® 3D
BLAST DESIGN

viewshot 3D

1

VIA
USB

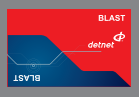
DOWNLOAD PLAN
TO TAGGER

2

ON-BENCH
TAGGING
ASSIGNING TIME
DELAY TO
DETONATOR

BASE
COMMANDER

4



TAP TO
BLAST

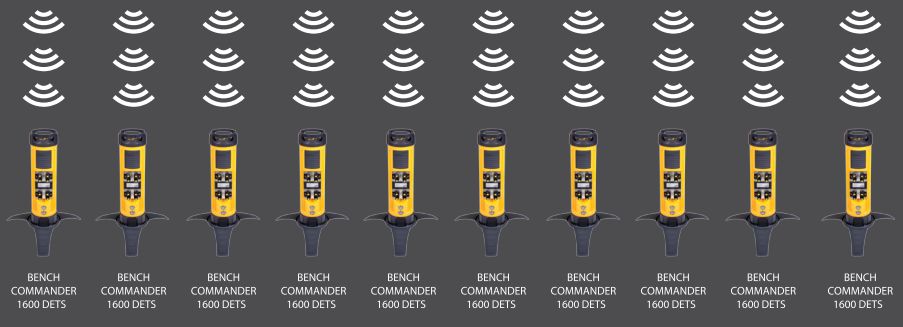
3000 m LINE OF SIGHT

REPEATER

OPTIONAL ONLY
IF LINE OF SIGHT
IS NOT POSSIBLE

VIA RF

SCALABLE, BLAST UP TO
10 BENCH COMMANDERS



BENCH COMMANDER 1600 DETS

UP TO 16 000 DETS

3

TAP TO
ARM

DIFFERENTIAL GLOBAL POSITIONING SYSTEM (*d*GPS)

DIFFERENTIAL GLOBAL POSITIONING SYSTEM (*d*GPS)

The *d*GPS is a high accuracy (sub-1 meter), new addition to the CE4 Commander blasting system. The market leading CE4 Commander system has been further enhanced with the *d*GPS technology to accurately detect blast hole positions.

High accuracy differential GPS will revolutionize the deployment and tagging of the 4G detonators for surface mining. Potential human error with regards to incorrect blast hole identification or incorrect delay assignment is practically eliminated. Apart from eliminating potential human error during deployment this new feature enables autonomous detonator tagging and /or blast hole logging.

TECHNICAL SPECIFICATIONS

BENEFITS

The CE4 Commander *d*GPS system is a ground-breaking technology advancement which:

- Eliminates potential human error by semi-automnomous tagging of blast holes essential to improve blast outcomes
- Ensure accurate tagging of blast holes to improve blast outcomes
- Easy, reliable and fast deployment to speed up the blasting process
- Allows for future fully autonomous (robotic) deployment & tagging

FEATURES

- Using the “Plan Mode” the CE4-Tagger automatically detects the blast hole location using the GPS co-ordinate from ViewShot® 3D and automatically assigns the correct delay to the detonator as per the blast design
- The tagging process does not need to follow a specific tagging path
- When drill rigs are not equipped with GPS logging, the *d*GPS Tagger can be used to accurately log the blast hole positions

*d*GPS PRODUCT SPECIFICATIONS

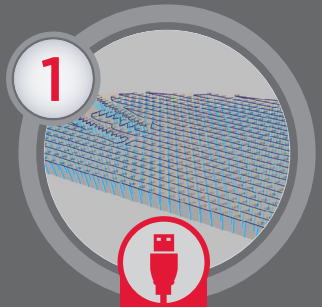
*d*GPS	
Temperature	-30 °C to +60 °C -22 °F to +140 °F
Battery	Internal 3.7 V Lithium Polymer
Battery Life	Approximately 8 hours at 25 °C (77 °F)
Weight	800 g / 1.76 lbs; 245 mm (L), 89 mm (W), 59 mm (H)
Software Upgrade	Via the USB connector in the CE4 Tagger, and a flash drive
Water and Dust Resistance	Conforms to IP57 design
Display	128 pixels x 128 pixels / 44.78 mm x 44.78 mm / 1.76 in x 1.76 in

*d*GPS COMMANDER REFERENCE BEACON	
Temperature	-30 °C to +60 °C -22 °F to +140 °F
Battery	Internal 3.7 V Lithium Polymer
Battery Life	Approximately 8 hours at 25 °C (77 °F)
Weight and Dimensions	2.1 kg / 4.6 lbs
Software Upgrade	Via a PC and a standard USB cable
Water and Dust Resistance	IP57
Display	200 x 96 pixels / 45.80 mm x 21.98 mm / 1.803 in x 0.866 in

*d*GPS DEPLOYMENT

viewshot 3D
BLAST DESIGN

1



VIA USB

DOWNLOAD PLAN TO TAGGER

2

ON-BENCH TAGGING ASSIGNING TIME DELAY TO DETONATOR

3

TAP TO ARM

BASE COMMANDER

4

TAP TO BLAST

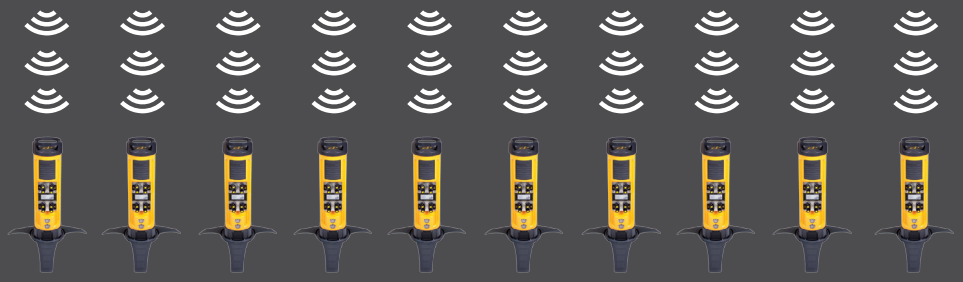
3000 m LINE OF SIGHT

REPEATER

OPTIONAL ONLY IF LINE OF SIGHT IS NOT POSSIBLE

VIA RF

SCALABLE, BLAST UP TO 10 BENCH COMMANDERS



BENCH COMMANDER 1600 DETS

MAX 16 000 DETS

DGPS REFERENCE BEACON

CYBERDET I™

CYBERDET I™

The CyberDet I™ forms part of the wireless detonator system offering, which communicates through the rock strata without the use of any downline (in the hole) or external connecting wires.

The communication is carried out using Through-the-Earth signaling (TTE) where magnetic transmissions propagate through the rock, which is used as the medium to carry the ultra-low frequencies.

TECHNICAL SPECIFICATIONS

BENEFITS

- The removal of personnel from hazardous conditions
- Making blasting easy:
  - Efficiency and productivity improvements
  - Changing conventional Mining methods
  - Reduce man hours underground
  - Improvement in cycle times
  - Blast holes are pre-loaded and charged up to days
- Use of the exisiting BlastWeb®II system for centralised blasting from surface. The digitilisation of each process enables additional safety and tracking of the CyberDet I™ and the information can be used for further data analytics
- Autonomous deployment of equipment

BLASTWEB® II

ELECTRONIC DETONATOR CENTRALISED BLASTING SYSTEM

The BlastWeb® II electronic initiation system is designed for underground environments where there is a requirement for ease-of-use, limited user interaction and centralised blasting. The BlastWeb® II system is capable of initiating specific AECI Mining Explosives' electronic detonators or to initiate underground shock tube rounds. The system is deployed internationally with a solid performance track record.

TECHNICAL SPECIFICATIONS

BENEFITS

- Pre-blast diagnosis and communication of potential safety hazards and production problems
- The scale, location and extent of the planned blasts are known before panels are centrally initiated from the surface
- The lost blast rate is significantly reduced using this system thereby minimising production losses

FEATURES

- Provides pre- and post-blast diagnostics
- Includes an on-board diagnostic system for safe testing
- Timing offset between sections can be introduced for mining areas that require reduced seismicity
- The use of high security blast keys and passwords ensure that total blast safety is always under the control of the responsible person

CERTIFICATION / APPROVALS

- Certificate of approval M-XPL/08326
- ISO 9001
- Explosives Authorisation / Permit - ZA-X 213A

TECHNICAL PROPERTIES

Programmability	Semi-programmable
Firing Method	Network infrastructure
Timing; Delay Assignment	From central position
Water Resistance	Excellent
Shaft Network	Copper, Fibre, Leaky Feeder, Wi-Fi, PED
Surface Network	Ethernet or LAN
Face Network	Copper (Biphase Space), 1.8mm^2, 6 independent phases

BLASTER TECHNICAL INFORMATION

Maximum firing cable – from 1st detonator to blasting point	1000m 3000ft
Access to blast history or blast logs	✓
Blast locally or centrally from surface	✓
Battery backup to blast in power failure situations	✓
Incorporated relays to enable control of external systems (Air, water, electricity)	✓

BLASTWEB®II DEPLOYMENT

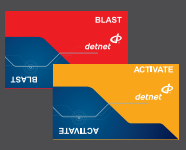
SURFACE BLAST CONTROLLER LOADED WITH BLASTWEB SOFTWARE

CLIENT PC'S CONNECTED TO THE MINE NETWORK TO DISPLAY BLAST INFORMATION, BUT CANNOT FIRE THE BLAST

COMMUNICATION VIA EXISTING MINE NETWORK: COPPER, FIBRE, ETHERNET, WiFi

NETSHOCK ELECTRONIC INITIATOR

THE BLAST CONTROL UNIT (BCU) COMMUNICATES WITH EVERY DETONATOR IN REAL TIME AND ISSUES THE FINAL BLAST COMMAND



A NFC SMARTCARD IS REQUIRED TO ARM AND FIRE THE BLAST

THE FIREFLY IS AN INTERFACE BETWEEN THE DETONATOR AND THE BCU. IT ALSO SERVES AS A DIAGNOSTIC DEVICE THAT TESTS THE INTEGRITY OF THE INSTALLATION

4G DETONATOR

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