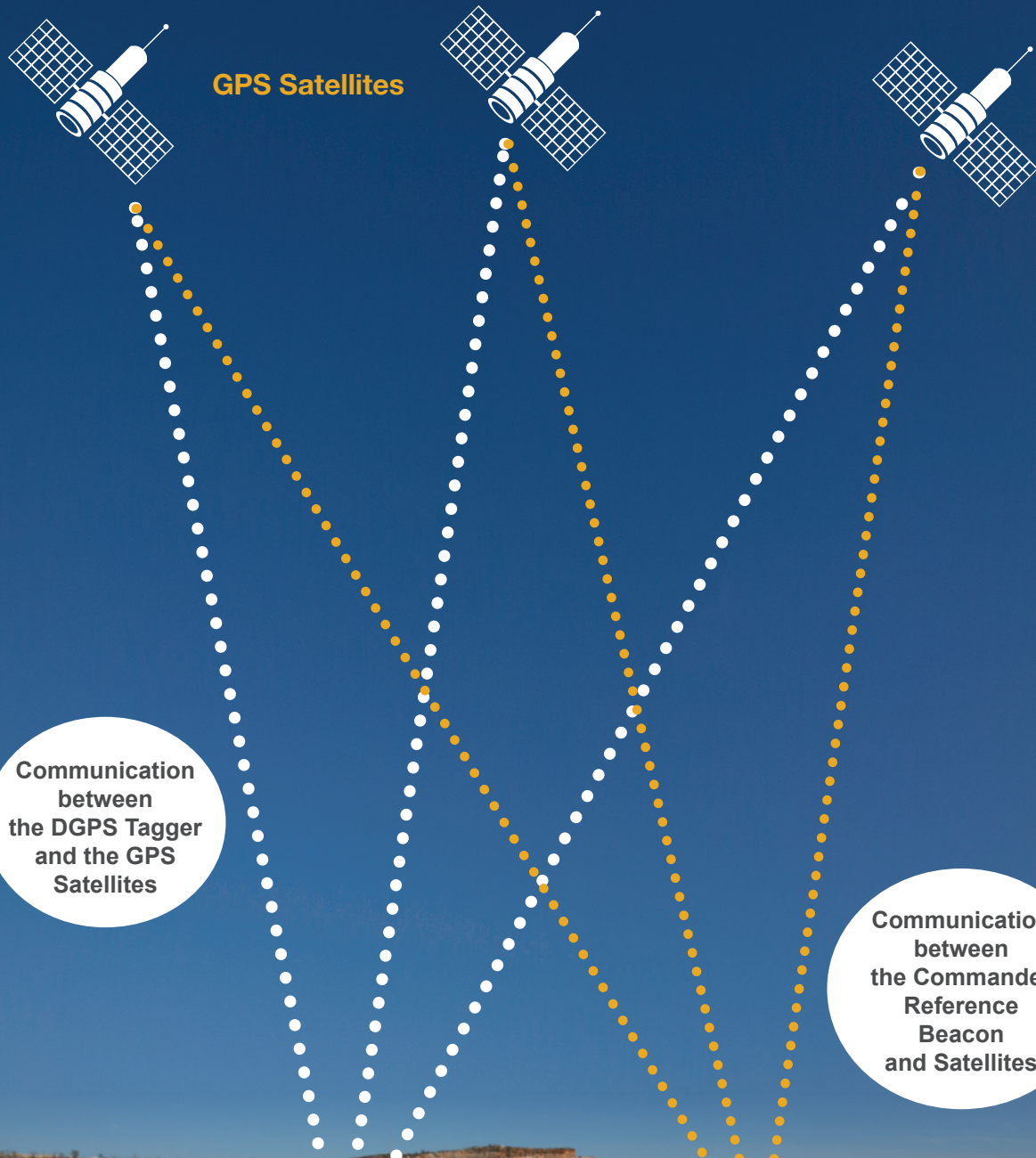# *Differential GPS* & *Technology*
combined with *digishot*® *plus*.4G

*DYNO NOBEL'S WORLD
RECORD BREAKING
ELECTRONIC INITIATION
SYSTEM JUST GOT BETTER*

DYNO®
Dyno Nobel

How does the DGPS system work?

GPS Satellites

Communication between the DGPS Tagger and the GPS Satellites

Communication between the Commander Reference Beacon and Satellites

DGPS Tagger

Communication between the DGPS Tagger and the Commander Reference Beacon

Commander Reference Beacon connected to a DGPS Antenna which is accurately positioned at a known surveyed GPS location

High Accuracy DGPS (Differential Global Positioning System)

The DGPS is a high accuracy (sub one meter), new addition to DigiShot Plus.4G's CE4 Commander blasting system. This market leading electronic initiation system has been further enhanced with the DGPS technology to accurately detect blasthole positions.

High accuracy Differential GPS revolutionises the deployment and tagging of 4G detonators for surface mining. Potential human error from incorrect blasthole identification or incorrect delay assignment is practically eliminated.

This new feature also enables integration for autonomous detonator tagging and/or blasthole logging.

Features

- Using the "Plan Mode" the CE4-Tagger automatically detects the blasthole 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 DGPS Tagger can be used to accurately log the blasthole positions.

Benefits

The CE4 Commander DGPS system is a ground-breaking technology advancement which:

- Eliminates potential human error by semi-automnomous tagging of blastholes, essential to improve blast outcomes.

- Ensure accurate tagging of blastholes to improve blast outcomes.

- Easy, reliable and fast deployment to speed up the blasting process.

- Allows for future fully autonomous (robotic) deployment & tagging.

Dyno Nobel continues to strive towards excellence in electronic initiation. As a world leader in our field, we aim to deliver world-class safety, the latest technology and consistent quality; resulting in improved loading and fragmentation, to ensure mining becomes more sustainable today and into the future.

# What is the Difference Between Regular GPS and Differential GPS (DGPS)?

Normal GPS provides a position of an object on earth. It uses signals generated by satellites revolving around the earth.

It uses standalone receivers where the location is directly calculated but is also prone to satellite orbit, multi-path and clock errors. As a result, GPS can only offer accuracy of 10 - 15 meters. Therefore, normal GPS accuracy is not suitable for blasthole positioning.

This is why Dyno Nobel has developed a user-friendly Differential-GPS (DGPS) system which is fully integrated with the CE4 Tagger and Commander system. The system provides sub one-meter accuracy for accurate blast hole tagging/logging.

DGPS - Is a vast improvement to GPS. It reduces or eliminates signal degradation, resulting in improved accuracy.

The accuracy in DGPS is achieved by using a reference receiver (Commander) at a known (surveyed location) position that broadcast correction data to one or more rovers (Taggers). The rovers then adjust their 'perception' of where they are using the correction data from the reference station.
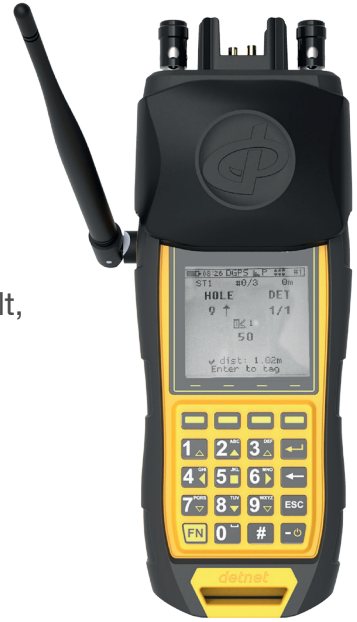
ViewShot 3D®

The ViewShot 3D blast software facilitates the planning, design and simulation of a blast through a flexible and feature-rich user interface.

With using DGPS in "plan mode", drill rig blast hole GPS coordinates is transferred to ViewShot 3D to do the final blast design timing sequence. The blast plan & timing sequence is then downloaded onto the DGPS tagger ready for tagging on the bench in "Plan Mode".

Alternatively, if drill rigs are not equipped with GPS accurate blasthole coordinates can now be logged by the DGPS tagger on the bench and then be transferred to the ViewShot 3D to provide for an accurate layout of the blast hole positions used in the blast design.

Future application of this technology*

- Stand alone module enabling DGPS capability on other equipment, MPU's etc.
- Common detonator list updated in real-time as multiple users or machines tag detonators.
- Centralised user interface - real time graphical update on deployment process.

Differential GPS Technology
combined with
digishot plus.4G

viewshot.3D
BLAST DESIGN

1

VIA
USB
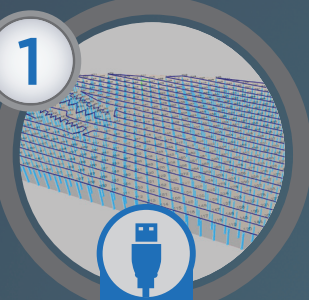
DOWNLOAD PLAN
TO TAGGER

2

ON-BENCH
TAGGING
ASSIGNING TIME
DELAY TO
DETONATOR

3

ACTIVATE
detnet
ACTIVATE

TAP TO
ARM

BASE
COMMANDER

4

BLAST
detnet
BLAST

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

BENCH
COMMANDER
1600 DETS

BENCH
COMMANDER
1600 DETS

BENCH
COMMANDER
1600 DETS

BENCH
COMMANDER
1600 DETS

BENCH
COMMANDER
1600 DETS

BENCH
COMMANDER
1600 DETS

BENCH
COMMANDER
1600 DETS

BENCH
COMMANDER
1600 DETS

BENCH
COMMANDER
1600 DETS

MAX 16 000 DETS

DGPS REFERENCE
BEACON

DGPS Tagger

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	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

DGPS 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

DISCLAIMER:
*   This technology is in the design/development phase and currently not available to end users.