

Programming User manual

◆ **DaveyTronic®5**

◆ **Davey Bickford**



 **Enaex**

◆ DaveyTronic 5

System	DaveyTronic® 5	
Language	ENG	
Pack	MVP 1.3.6	
Date	05/2024	
Revision	1	
Equipment	PU	BlastHub
User Interface	1.3.1	1.7.1



Read this manual

⚠ WARNING: This user manual is for information only. The DaveyTronic® 5 system should only be used by personnel who have been trained and authorized to use this system.

Commenté [LD1]: Part 27 4.5.4.1.2 Indicate that only people, who have been educated to use such a system, shall use the electronic initiation system.

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◆ DaveyTronic® 5

I. System overview



DaveyTronic® 5 detonator

PU

BlastHub

Remote Blaster

DaveyTronic® Software Suite

Commenté [DDL2]: Global view of all different components/equipment of the system and global table of all the limits of the system (max capacity etc...)

Version		MVP 1.3.6
Type of product	DaveyTronic® 5	
Release		May 2024
System		
Languages	ENG, PORT, SPA	
DaveyTronic® 5 detonator ms delay	0 - 30 000 ms	
PU		
Programming		
Max number of dets per blast plan	1 000	
Manual programming	●	
Auto programming	●	
GPS assisted auto programming	●	
Easy blast plan import from DSS	●	
Manual BPEX blast plan import from laptop	●	
Live line status during programming	○	
Toolbox		•
Global test	●	
Read det	●	
Count det	●	
Average time to count 300 dets	3'00	
Firing capabilities		•
Wireless blasting	●	
Monoblast	●	
Multiblast	●	
One-touch multiblast	○	
Synchroblast	●	
Max nbr of BlastHub per Synchroblast	3	
Max nb of dets per BlastHub	2 000	
Communication check test	●	
Safety Lockout	●	
Max number of blast plan in Multiblast	5	
Max number of dets in Multiblast	10 000	

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Max number of repeaters per blast plan

A. Programming Unit (PU)



The DaveyTronic® 5 Programming Unit (PU) allows to program up to 1 000 detonators per blast plan in either manual or auto mode.

B. BlastHub (BH)

1. BH overview



The DaveyTronic® 5 BlastHub manages its physically connected detonator network. It is remotely controlled by the Remote Blaster during the **Firing procedure**. This equipment can be put either in **Monitoring** mode or act as a **Repeater**.

When in **Operational** mode during a **Firing procedure**, this unit executes entire internal detonator checks and provides both the necessary energy and firing commands necessary for the blast.

Each BlastHub can fire up to 2 000 detonators.

Note: When no blast plan has been associated with a BlastHub yet, its serial number serves as an identification. The number can be found on the unit label, located at the bottom of the device.

2. Getting started

a) Turn ON/OFF

Press and hold the ON/OFF button for 4 seconds.

Note: The BlastHub forgets all the information previously transferred by the PU every time it is turned OFF. In case of mistake, simply turn it OFF and ON again to re-start fresh.

b) Modes

The BlastHub can be put in 2 modes on the field:

- **Monitoring:** the unit will have a network of programmed detonators connected, will be put in **Ready** mode and will be able to participate to a **Firing procedure (Operational mode)**.
- **Repeater:** the unit will simply expand the wireless coverage between a BlastHub in **Monitoring** mode (so with a network of detonators connected) and a Remote Blaster. Only 1 BlastHub can be placed in repeater mode per Blast plan.

When turned on, the equipment is in **Monitoring** mode per default.

To switch between **Monitoring** and **Repeater** modes, double click on the ON/OFF key. The **Maintenance** mode is enabled by a triple click.

Note: The Repeater mode cannot be used with this version.

3. LED indicators

The BlastHub displays its status via colored LED indicators as presented below.

	ON/OFF indicator
	White slow flashing: the unit is turning ON.
	White: the unit is ON.
	Red: error. The unit didn't pass the self-test, an error occurred while starting up. Restart the BlastHub and try again. If the issue persists, contact your Davey Bickford Enaex representative.

	Battery indicator
	Green: good level of battery.
	Orange: low level of battery.
	Red: very low level of battery.

	Mode indicator
	Blue: Repeater mode.
	White: Monitoring mode.

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White slow flashing: device in pre or post operational mode.



Mine communication indicator



Blue slow flashing: no PU paired.



Blue: unit connected.



Red: connection failure. Check your network.

Notes:

When the device is OFF, all LEDs will be OFF



When charging, the battery LED will flash with its associated level color



When the device is participating to a Firing Procedure, the front LEDs indicators (battery, mode and communication) will all display a red pulsing



C. Remote Blaster (RB)



The DaveyTronic® 5 Remote Blaster allows to wirelessly control BlastHub(s) whether it's for communication tests or Firing procedures.

A set of RFID tags for Testing, Firing and Safety Lockout are provided with the Remote Blaster.

D. DaveyTronic® 5 detonator



The DaveyTronic® 5 electronic detonator is fully programmable from 0 to 30 000 milliseconds (with programming steps of 0.1 ms).

Each unit is composed of a detonator shell (containing the electronic module, fusehead etc...), a wire and a connector.

The detonator connector is designed to be used with the DaveyLine wire. During connection it is important that the wire is placed flat into the connector and clipped in securely to ensure a good connection.

Commenté [LD3]: Part 27 4.5.4.2.1 description of the electronic detonator

Part 27 4.5.4.2.5 description of the wire

Part 27 4.5.4.2.6 description of the connectors

Part 27 4.5.4.1.1 Indicate that these electronic detonators are totally different to conventional electric detonators.

Part 27 4.5.4.1.3 Specify that absolutely no connection with conventional electric detonators and with other electronic detonators is possible. Clarify the consequence of a possible misuse in this respect.

Part 27 4.5.4.1.4 Do not use other devices than those specially designed for this type of Electronic Detonators.

Commenté [DDL4]: What is a detonator + capabilities + also add delay range, delay accuracy and a mention of the bus-line to be used.

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⚠ WARNING: The DaveyTronic® 5 detonators are made of a different technology than conventional electric detonators. They can only be used with dedicated equipment approved by Davey Bickford Enaex and cannot be initiated by or with any other initiation systems (conventional or else).

The DaveyTronic® 5 Programming Unit, BlastHub and Remote Blaster can only be used with DaveyTronic® 5 detonators and must never be connected to any other kind of detonator (conventional, from another manufacturer...).

An improper use of the system as described above can lead to misfires or unplanned initiation.

E. DaveyTronic® software suite (DSS)



The DaveyTronic® Software Suite is a Windows compatible software allowing to create blast plans, manage equipment and RFID tags.

II. Programming Unit

A. PU overview



Note: The serial number serves as an identification of the PU. It can be found on the unit label, located on the rear side of the device.

B. Getting started

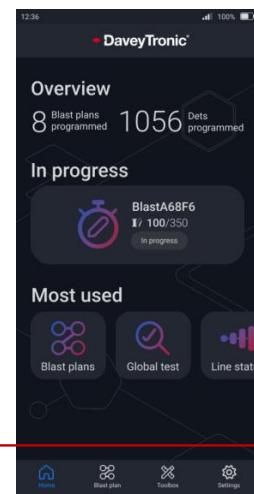
1. Turn ON/OFF

Press and hold the ON/OFF button for 3 seconds.

2. Main environments

- a) **Home**  allows a quick access to the most used features.
- b) **Blast plans**  manage blast plans and access programming.
- c) **Toolbox**  library of tools and tests.
- d) **Settings**

The main environments of the PU are accessible on the bottom navigation bar (as shown on the right).



3. Status indicators

a) Action trackers

Different icons are used as action trackers throughout the entire system. They should be understood as described below:

 Pending: the system awaits a user action
 Waiting: this icon appears when an action or a lag of more than a few seconds occurs.
 Valid: no issue occurred during the last action
 Warning: the system requires the user's attention or validation on a matter
 Error: the system has encountered an event that cannot be bypassed

b) Line status indicators

The quality of the wired communication between the PU and detonator(s) is qualified with the following 5 signal strength indicators. They should be understood as described below:

	Good level of connection with minimal current leakage, ensuring a strong and stable link.
	Ok level of connection, implying some minor current leakage that might lead to occasional disruptions.
	Poor connection due to moderate current leakage, potentially resulting in intermittent interruptions.
	Bad connection with significant current leakage, leading to frequent connection breaks and reduced overall reliability. Communication with the detonator(s) is almost impossible.
	Short circuit: unintended connection between two points in the electrical circuit causing a surge of current. Communication with the detonator(s) is rendered impossible.

c) GPS signal status indicators

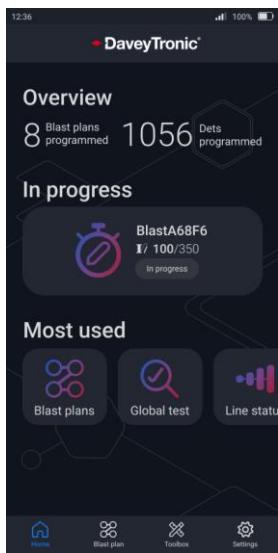
The GPS signal indicators are used for the Auto programming with GPS assistance and Safety Lockout functionalities. They should be understood as described below:

	Good signal reception, the dependent functionalities can be used.
	No signal reception, the dependent functionalities cannot be used.
	GPS position acquisition running
	GPS position acquisition paused

Note: The Safety lockout functionality can only be computed and displayed on the Remote Blaster if Auto programming including GPS coordinates was used with the PU. For more information regarding this feature please refer to the Firing user manual.

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C. Home



Home  allows a quick access to:

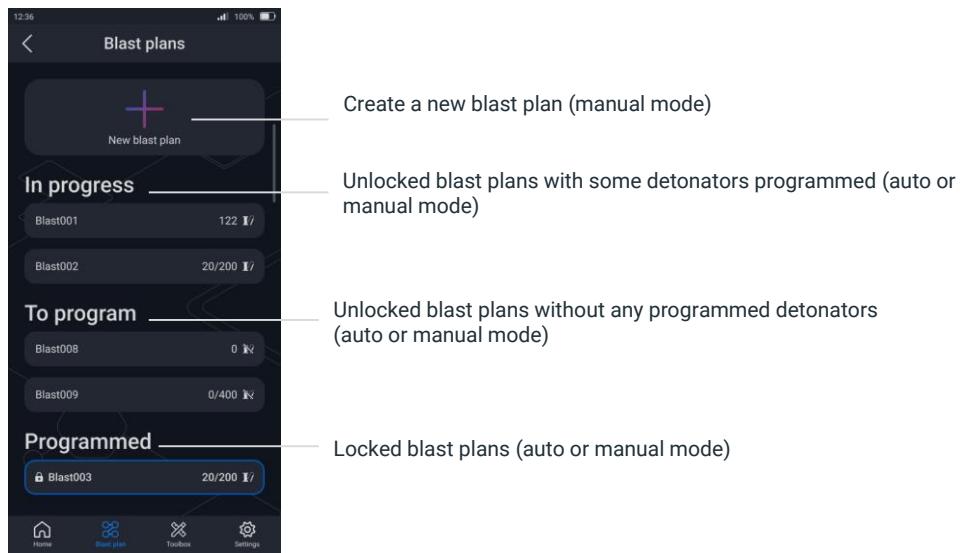
- An overview of a few metrics of use of the PU,
- A shortcut to start or resume the programming of a blast plan,
- The most used features of the PU

D. Blast plan

1. List

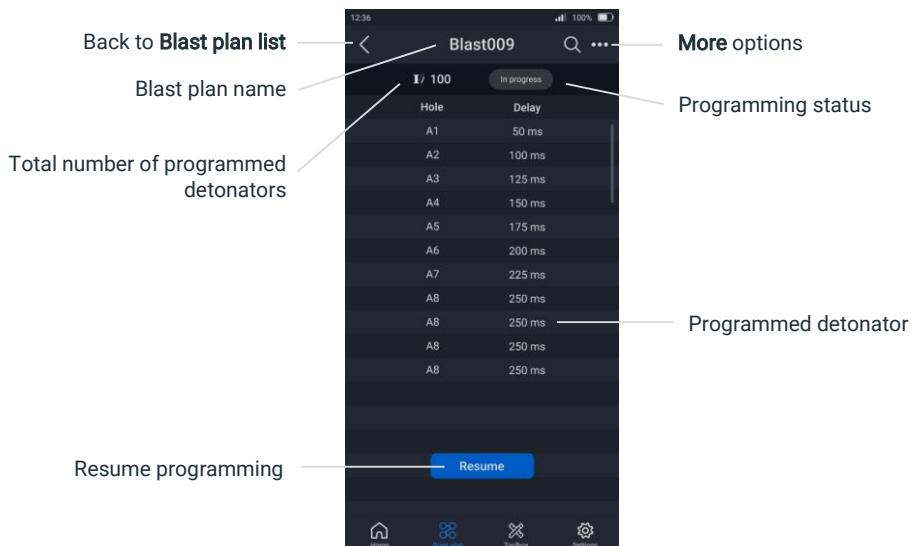
The **Blast plan**  section of the PU allows to navigate through the different blast plans and access their associated data. They are organized according to their programming status.

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2. Details

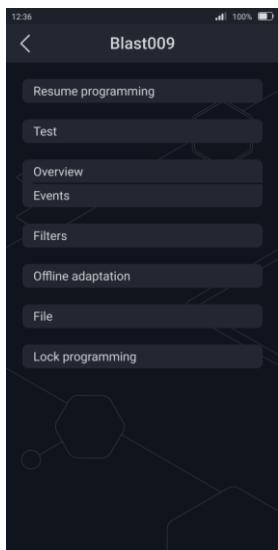
a) Main view



Note: To start programming from specific detonator (already programmed or planned in Auto mode), tap the associated line in the Blast plan details to Jump.

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b) Additional features



Resume: get back to the programming screen of the next detonator.

Test: shortcut to the **Toolbox' Test** allowing to easily test the current blast plan.

Overview: additional data regarding the blast plan as the number of programmed detonators, hole adaptations, minimum/maximum blast plan ms delays, minimum/maximum ms gap.

Events: log of the different actions effectuated during programming.

Filters:

- show/hide det IDs wire length in the blast plan details
- sort the list by hole or delay

Offline adaptation: edit the blast plan without having the line connected (skip, add, delete, edit delay)

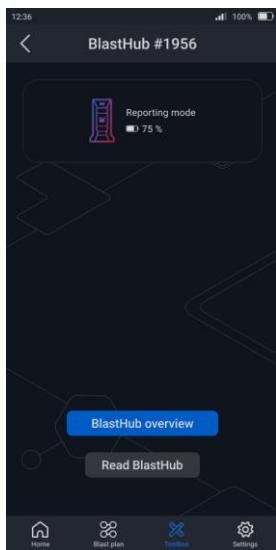
File:

- Export: the PU will generate a BPEX file of the current blast plan in its memory.
- Rename: the blast plan (manual programming mode only).
- Delete: the blast plan. Note: If selected, all the programming data of the blast plan will be deleted from the PU.

Lock programming: to lock the programming of the blast plan and transfer its associated data to the BlastHub. Note: See the related section [here](#).

E. Toolbox

1. BlastHub

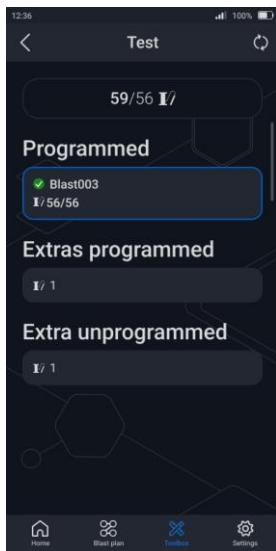


This functionality allows to connect to a BlastHub and view:

- its mode,
- battery status
- programming data via **BlastHub overview**.

Tap the **Read BlastHub** to connect to another BlastHub.

2. Global Test



The **Global Test** functionality compares the programming data of a selected blast plan in regards to what is connected on the line.

The test result will display: the total number of detected detonators vs. expected.

If extra detonators (programmed or not) are spotted, they will be flagged as such. For each type of result different levels of details will be accessible.

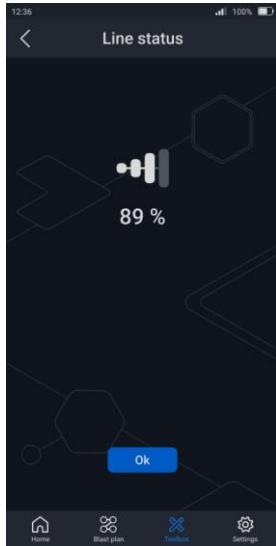
Tap the **Refresh** (↻) on the top left corner of the title bar to re-launch the test.

Notes:

During the blast plan selection, the **Locked** blast plans conglomerating all the programming data received by the BlastHub can be identified as its name will start by "BH_".

If delays were edited offline on the PU, launching a **Global Test** will transmit their new timing to the detonators.

3. Line status



The **Line status** functionality detects and showcases dynamically the quality of communication with one or several detonators.

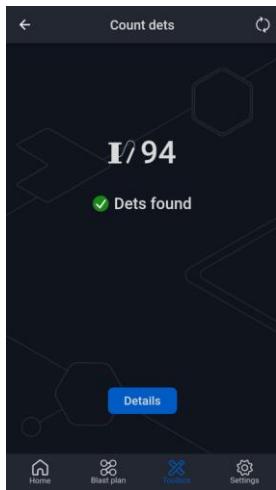
The displayed value is accompanied by the line status indicator icon.

Note: see the related section [here](#) for more information regarding the icon.

Commenté [LD5]: The **Line status** functionality detects and showcases dynamically the level of **current leakage** in the electrical connection with one or several detonators. The displayed value is accompanied by the line status indicator icon.

Note: see the related section [here](#) for more information regarding the icon.

4. Count dets

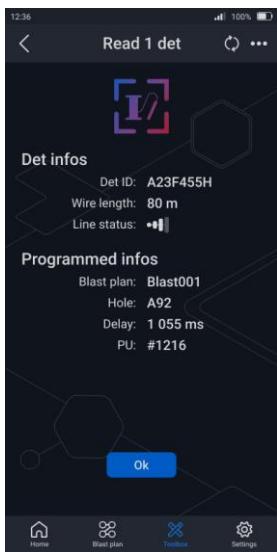


This test counts how many detonators are connected to a given bus line. A **Count dets** can be done on any line of detonators programmed or not or both. It can also be launched from any PU whether it has participated in programming the detonators or not.

Tap the **Refresh**  on the top left corner of the title bar to re-launch the test.

To access the details of the connected detonators, tap **Details**. If incompatible or extra detonators (programmed or not) are spotted, they will be flagged as such. For each type of result different levels of details will be accessible.

5. Read det



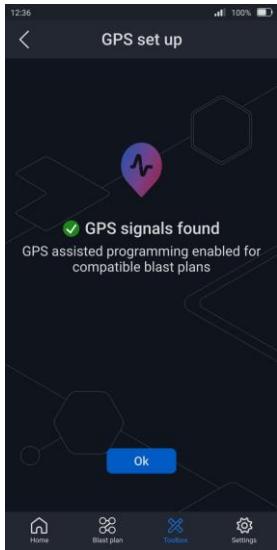
This test allows to read the information stored in a connected detonator. Depending on its status (programmed or not) different levels of information will be available.

Note: the PU used to program the connected detonator will be able to display more information as shown in the example on the left.

Tap **Refresh**  on the title bar to read another detonator.

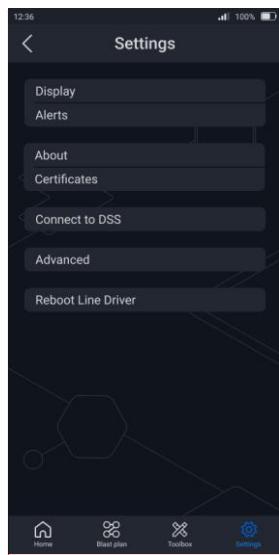
Tap **More ...** on the title bar to access the option **Save det to PU** to export all the encrypted internal data of a faulty detonator to the logs.

6. GPS set up



This setup functionality enables the PU to collect GPS signals, preparing it for GPS-assisted programming.

F. Settings



The **Settings** section is available through the bottom navigation bar. It offers an access to:

Display: adjust the screen's brightness and choose between Light or Dark mode.

Alerts: adjust the volume, enable/disable vibrations and enable/disable visual alerts.

About: view the software versions of the PU and its serial number.

Certificates: view the certificates associated to the PU.

Connect to DSS: allows to set the connection between the PU and the DaveyTronic® Software Suite.

Advanced: administrator tools.

Reboot line driver.

Commenté [LD6]: Attention tableau transparent pour que le texte reste bien en place !

III. Programming

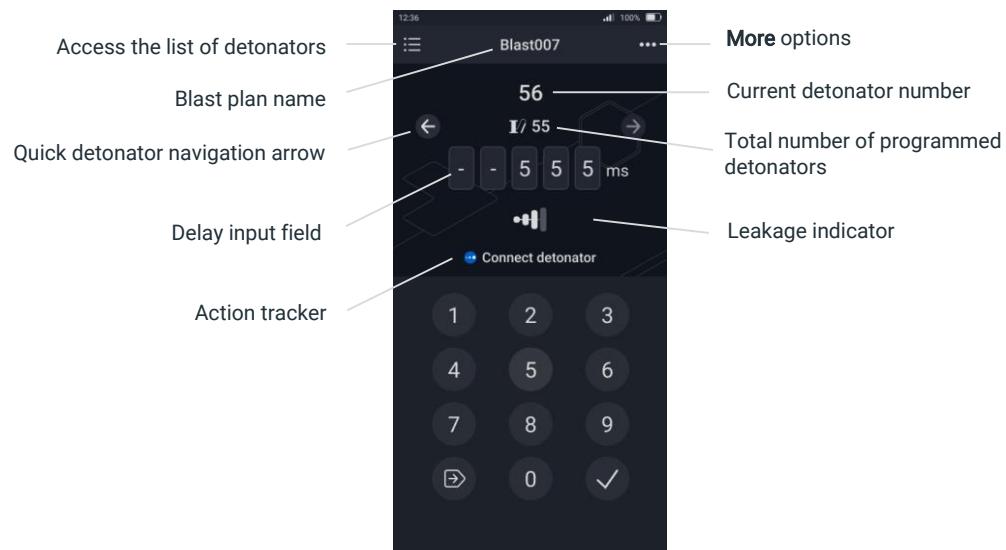
A. Programming in manual mode

1. Create a manual blast plan

1. Go to **Blast plan** ☰ and select **New blast plan**.
2. Enter a blast plan name of maximum 8 characters (A-Z; 0-9; “-”; “_” ...).

2. Manual programming screen

The standard programming screen is built as shown below:



3. Programming

a) Programming a detonator

To program a detonator, follow the steps below:

1. From the **Blast plan list** tap **Program** or **Resume**.
2. Edit and validate the proposed delay if needed. To edit the proposed delay, either tap the delay input field, a dedicated numeric keyboard will appear.
3. Connect the corresponding detonator.
4. The programming information are written in the detonator.

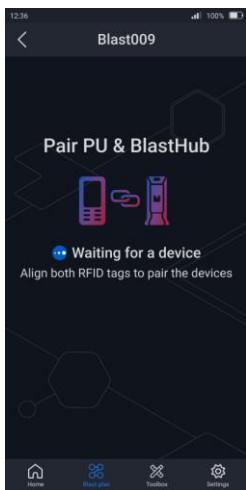
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5. The PU will confirm that the detonator was programmed correctly.
6. The detonator is added to the blast plan, its information are available in the blast plan details.
7. The PU will automatically display the next detonator.

Note: detonators can be connected to the PU during programming in two ways:

- **One-by-one** connection: the detonators are individually and physically connected one by one to the PU. This method enables programming without the need to lay down bus lines, thereby facilitating vehicle access.
- **On line** connection: a bus-line is connected to the terminals of the PU, detonators are connected to this line consecutively during programming. This method allows to ensure a good connection between the connector and the line, reducing the risk of missing detonators later on.

b) Lock programming



Once all the planned detonators have been programmed and tested, the blast plan must be locked and transferred to the BlastHub to launch the blast later on.

To **Lock programming**, follow the steps below:

1. Turn the BlastHub **ON**.
2. Tap **More ...** in the top navigation bar of the blast plan details (or programming screen) and select **Lock programming**.
3. Acknowledge that all detonators added on the line after this point will be considered as extras.
4. Align the PU and BlastHub's RFID tags to pair the devices.
5. Validate the pairing modal to establish the connection between the devices.
6. Upon validation of a successful pairing, the PU sends all the programming data to the BlastHub.

Notes:

All PUs used to program a blast plan must go through **Lock programming**. If not, their detonators will be flagged as extras during the **Firing** procedure.

Once a blast plan has been **Locked**, the BlastHub sends back to the PU a conglomerate of all the programming information it received. The last PU locking the blast plan will then have the entire programming data and can launch a **Global test** on the entire blast plan. The conglomerated plan's name will start by "BH_".

WARNING: It is the responsibility of each user to **Lock and upload their programming data systematically to the BlastHub**.

c) Connecting the line to the BlastHub

Connect the DaveyLine to the line connection terminals of the BlastHub.

d) Switch to Ready mode

Once all the PUs used for programming have been through **Lock programming**, the BlastHub must be switched to **Ready** (to be fired) **mode** so it can participate in a **Firing procedure** later on.

1. On the PU, go to **Blast plan** ☰ and select a Locked Blast plan from the **List**.
2. In the **Blast plan details** tap **More ...** and select **Switch to ready mode**.
3. Align the PU and BlastHub's RFID tags to pair the devices (if the devices were disconnected).
4. The BlastHub info is displayed. Tap **Switch to ready mode**.
5. The BlastHub is switched to **Ready mode**, an overview of the overall locked blast plan is displayed. In this state, the device can participate to a **Firing procedure**. Note: see the related Firing user manual.

WARNING: It is the responsibility of the operator performing the **Switch to ready mode** to ensure that all personnel have left the area.

Commenté [LD7]: Once all PUs used for programming have been through **Lock programming**, the BlastHub must be switched to **Ready mode** so it can participate in a **Firing procedure** later on.

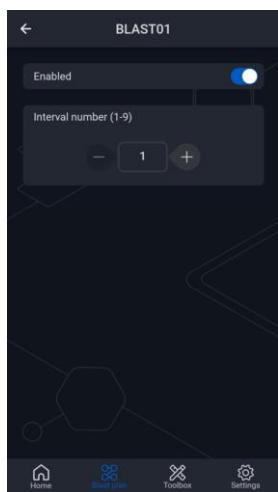
1. On the PU, go to **Toolbox**

2. Align the PU and BlastHub's RFID tags to pair the devices.
3. Tap **Switch to ready mode**.

4. Additional features in manual mode

Additional features are accessible from the programming screen by taping **More ...**

a) Delay pattern



The **Delay pattern** function gives an assistance for manual programming. After programming a couple of detonators, the PU will suggest the next delays according to the chosen **Interval number**.

If 1 is selected as an **Interval number**, the PU will suggest a delay matching the increment entered between the 1st and 2nd detonator for the 3rd detonator and the next ones.

Example: The delay for the 1st and 2nd detonators are entered manually. The PU will suggest a delay for the 3rd detonator etc.



If 2 is selected as an **Interval number**, the PU will suggest a delay matching the increment entered between the 1st and 2nd detonator for the 3rd detonator. The delay for the 4th detonator will then match the increment entered between the 2nd and the 3rd detonator.

Example: The delay for the 3 first detonators is entered manually. The PU will suggest a delay for the 3rd detonator based on the first detected increment (3 ms) and one for the 4th based on the 2nd increment (7 ms) etc.



b) Adapt hole

During programming some adaptations of the blast plan according to reality might be necessary:

- **Skip** allows to skip a hole (or a detonator) planned for on the blast at the design stage but not physically present on the bench.
- **Add** will allow to add an extra hole (or detonator) to the blast plan, catering for a variation between the bench's reality and the blast in the design.

To **Skip** or **Add** a detonator, follow the steps described below:

1. From the programming screen, tap **More ...**.
2. Select an adaptation.
3. Select a comment to justify the hole adaptation. If "None" is selected, no comment will be added.

c) Edit a detonator delay on line

To edit a detonator delay on line:

1. From the **Blast plan details** displaying the list of detonators, **Jump** to its associated programming screen,
2. Edit the necessary data,
3. Connect the detonator,
4. A warning message regarding the reprogramming is displayed.
5. Upon its validation, the data in the detonator will be re-written, the detonator is re-programmed. The programming information are accessible through the **Blast plan details**.

d) Offline adaptation

Programming can be edited offline from the **Blast plan details** thus allowing to:

- Edit delays,

- Skip planned detonators,
- Add unplanned detonators,
- Delete detonators.

Edit delays

Any planned or already programmed delay can be edited offline via this functionality. Assigning their new delays to already programmed detonators can be done either:

- By launching a **Global test** on the blast plan,
- Automatically during the **Firing procedure**.

Note: Transmitting offline edited delays during the **Firing procedure** might increase its duration according to the number of concerned detonators.

Skip

Any planned detonator can be skipped. Already programmed units cannot be selected.

Add

Allows the addition of reserved slots in the blast plan, which are intended for extra holes (or detonators) that were not planned and timed during the design phase. Detonators will need to be programmed into these slots at a later stage.

Delete

Any detonator planned or programmed can be deleted from the blast plan.

For a planned detonator, the reserved slot will simply be deleted.

For an already programmed unit, the detonator's unique ID will be detached from its slot in the blast plan. The deleted units need to be physically disconnected from the bench and re-programmed or they will be considered as extras by the equipment.

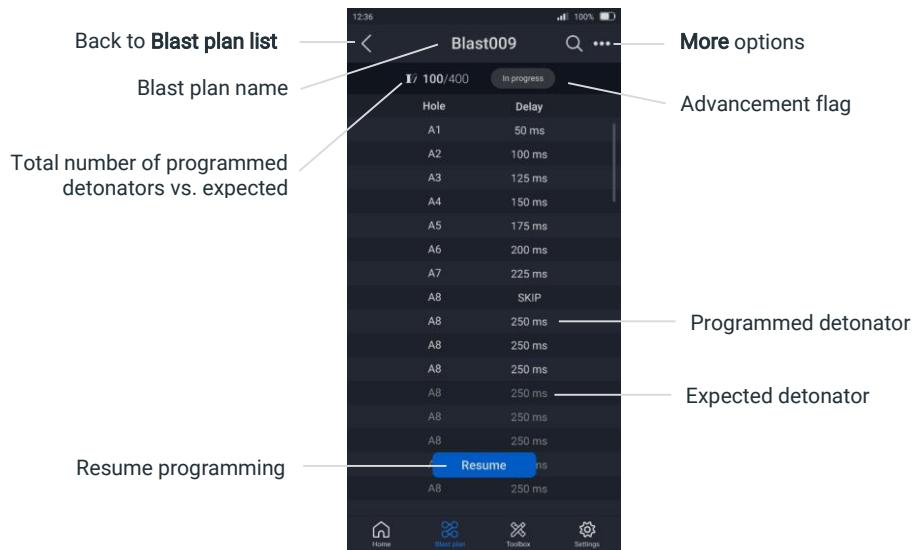
e) Re-program detonators

To re-program one or several detonators:

1. Go to the **Offline adaption** function in the **Blast plan details**
2. Tap delete on the necessary detonators to detach their ID to their slot in the blast plan
3. Physically disconnect the deleted detonators from the line
4. Re-program the previously deleted detonators with the correct Hole/delay

B. Programming in auto mode

1. Auto blast plan

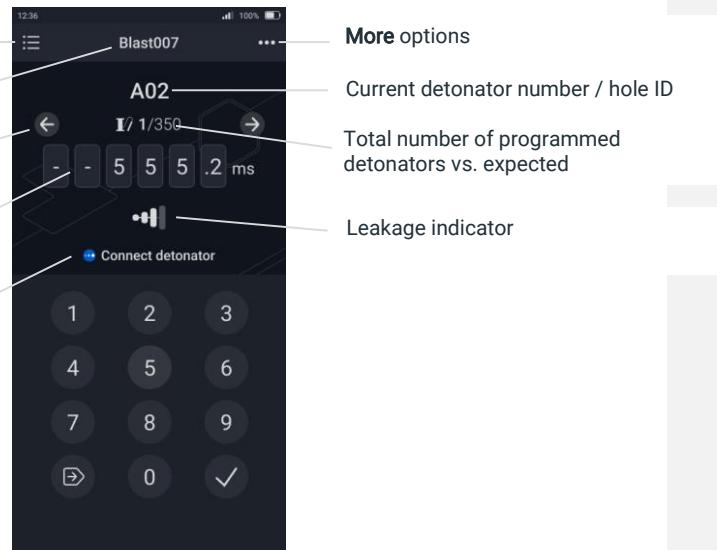


Notes: If the blast plan contains decks (with or without several detonators per deck), they will be automatically displayed in the **Blast plan details**.

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2. Auto programming screen

The standard auto programming screen is built as shown below:



Notes:

In Auto mode, delays can be programmed by 0.1 ms paths.

If the blast plan contains decks (with or without several detonators per deck), they will be automatically displayed with the detonator number/hole ID on the programming screen.

3. Additional features in auto mode

a) Incremental and decremental order

During programming, if **Incremental** is enabled then the detonators will be suggested by hole order. If **Decremental** is enabled, then the detonators will be displayed in the reversed order.

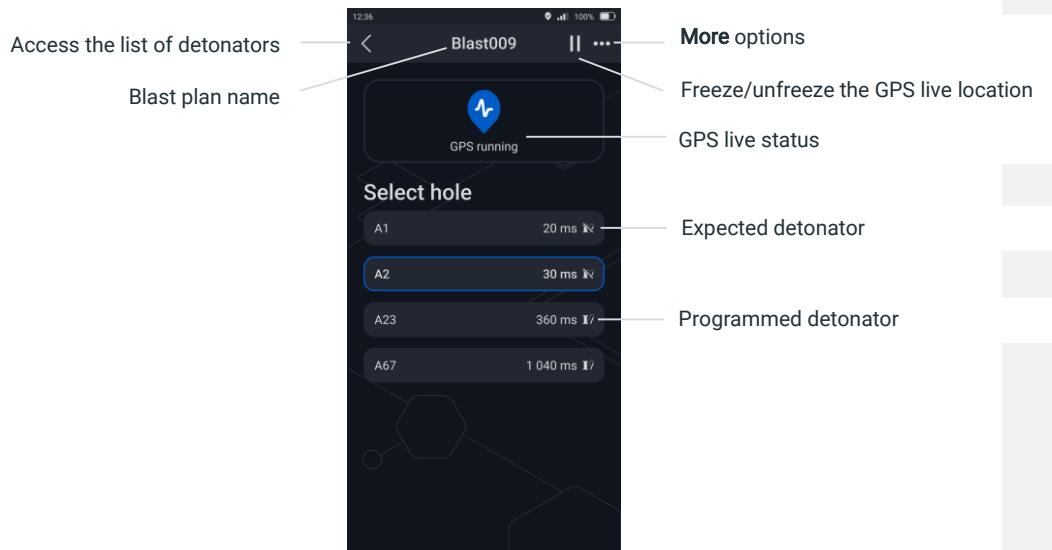
b) GPS assisted programming

If coordinates are detected in a blast plan (in auto mode only), the PU will prompt for GPS assistance activation. If enabled, the PU will suggest the closest holes according to its physical position on the bench.

With a compatible blast plan, the GPS assistance can be turned on or off at any time via **More ***** during programming.

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The GPS assisted programming screen is built as shown below:



Notes:

Using the **GPS setup** functionality in the **Toolbox** before launching this feature will significantly decrease its launch time. See the related section [here](#)

Already programmed detonators can be hidden from hole suggestions via **More ...**

c) Prepare a Synchroblast

To program a **Synchroblast**, all concerned PUs must have the same blast plan file imported from the DSS.

Once all the PUs used for programming have been through **Lock programming**, all the concerned BlastHubs must be switched to **Synchroblast mode** so they can participate in a **Firing procedure** later on.

1. On the PU, go to **Blast plan**  and select a Locked Blast plan from the **List**.
2. In the **Blast plan details** tap **More ...** and select **Switch to ready mode**.
3. Align the PU and BlastHub's RFID tags to pair the devices (if the devices aren't already paired).
4. The BlastHub info is displayed. Tap **Synchroblast** to switch the device to this mode.
5. The BlastHub is switched to **Synchroblast mode**, an overview of the overall locked blast plan is displayed. In this state, the device can participate to a **Firing procedure**. Note: see the related Firing user manual.

WARNING: It is the responsibility of the operator performing the switch to **Synchroblast mode** to ensure that all personnel have left the area.

Note: If one BlastHub is switched to **Ready mode** and not **Synchroblast mode**, it will appear as a separate blast plan on the Remote Blaster and won't be fired with the others.

IV. Dealing with errors

A. System errors

Error name	Cause	Resolution
Timeout	At any time during the use of the equipment, the PU couldn't communicate with its Line Driver.	Restart the PU and try again. If the issue persists, contact your Enaex representative.
Line Driver issue	During the start-up and associated selftests, the PU couldn't communicate with its Line Driver.	Restart the PU and try again. If the issue persists, contact your Enaex representative.
Wi-Fi issue	During the start-up and associated selftests, the PU couldn't enable the Wi-Fi.	Restart the PU and try again. If the issue persists, contact your Enaex representative.
GNSS issue	During the start-up and associated selftests, the PU's GNSS couldn't be enabled.	Restart the PU and try again. If the issue persists, contact your Enaex representative.
RFID issue	During the start-up and associated selftests, the PU's RFID couldn't be enabled.	Restart the PU and try again. If the issue persists, contact your Enaex representative.
Update error	The PU couldn't update its software	Restart the PU and try again. If the issue persists, contact your Enaex representative.
Error opening .BIN file	The PU couldn't update its Line Driver software	Restart the PU and try again. If the issue persists, contact your Enaex representative.

B.Blast plan errors

1. Blast plan creation

Error name	Cause	Resolution
Blast plan name cannot be empty	A blast plan must have a name.	Enter a blast plan name of maximum 8 characters (A-Z; 0-9; “_”;- “_”...)-

2. Export blast plan to PU memory

Error name	Cause	Resolution
Export failed	The export of the blast plan in BPEX to the internal memory of the PU failed.	Restart the PU and try again. If the issue persists, contact your Enaex representative.
The blast plan contains no detonator, export failed.	A blast plan without any detonator programmed cannot be exported to the internal memory of the PU.	Program at least one detonator before exporting.
The blast plan is in to do mode and can not be exported.	Only a blast plan can be exported to the PU memory.	Lock the blast plan and retry to export it.

3. BlastHub errors

Error name	Cause	Resolution
Compatibility error	BlastHub pairing version is not supported.	Update the BlastHub's software to the version indicated by the PU.
The synchronization GNSS has failed. Move the BlastHub and try again	The BlastHub couldn't retrieve its GPS position while switching to Synchroblast ready mode	Move the BlastHub and try again. Restart the BlastHub and try again. If the issue persists, contact your Enaex representative.

C. Programming errors

Note: see the related section [here](#) for more information regarding the line status communication icons that can be found during programming.

Error name	Cause	Resolution
Incoherent answer	<p>Faulty detonator communication.</p> <p>The PU is receiving a response from the detonator but cannot understand it.</p> <p>A bad communication due to current leakage can be affecting the communication with the line or the detonator.</p> <p>The detonator could also be defective.</p> <p>Several detonators were connected on the line while the PU was expecting to program one.</p>	<p>Make sure that only 1 detonator was added on the line.</p> <p>Use the Line status and Read det functionalities to identify if the cause of the error is current leakage or a defective detonator.</p> <p>If current leakage is the issue, locate the origin of the problem and reduce it.</p> <p>If the detonator is defective, disconnect the detonator from the line and replace it. Treat this unit as defective in accordance with applicable rules</p>
Already timed	This detonator has already been programmed by this or another PU.	Either disconnect the detonator if you do not wish to reprogram it or accept the warning to rewrite its information.
Disconnect detonator	This detonator has been programmed in another blast plan of this PU.	<p>Program another detonator in the initial blast plan.</p> <p>Delete the troublesome initial blast plan.</p>
Disconnect last detonator	One or several unprogrammed detonator have been added to the line during the programming session.	Identify the extra unprogrammed detonator(s) and disconnect it/them.
Incompatible detonator	The connected detonator isn't compatible with this system.	Disconnect the detonator.
Delay cannot be empty	A delay between 0 and 30 000 ms has to be entered.	Enter a delay.

D. Toolbox errors

Note: see the related section [here](#) for more information regarding the line status communication icons that can be found in all the Toolbox's  tests.

1. Global test and Count dets

Error name	Cause	Resolution
No dets detected	No detonators are connected to the PU.	Make sure that there's a good connection between: -the detonator connector and the PU -or the PU and the line and between the line and the detonators connectors.
Missing detonator (Global test only)	A detonator programmed with this blast plan is not responding.	Ensure that all detonators are properly connected to the bus-line. Identify the forgotten or misconnected detonator(s) and secure its connection to the line.
Extra programmed detonator (Global test only)	A detonator programmed for another blast plan is connected on the line.	Identify the detonator and either disconnect or reprogram it.
(Extra) unprogrammed detonator	A detonator that wasn't programmed is connected on the line.	Identify the detonator and either disconnect or program it.

2. Read det

Error name	Cause	Resolution
No dets detected	No detonator is connected to the PU.	Make sure that there's a good connection between the detonator connector and the PU.
Incoherent answer	The PU is receiving a response from the detonator but cannot understand it. A bad communication due to current leakage can be affecting the communication with the detonator.	Always make sure to connect only 1 detonator at a time for this test. If current leakage is the issue, locate the origin of the problem and reduce the current leakage. If the detonator is defective, disconnect the detonator from the line and replace it. Treat

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	<p>Several detonators could be connected on the line.</p> <p>The detonator could also be defective.</p>	<p>this unit as defective in accordance with applicable rules.</p>
Error while saving det	<p>The PU couldn't save the detonator information in its internal memory.</p> <p>The equipment's memory could be defective.</p>	<p>Try again.</p> <p>Restart the PU and try again.</p> <p>If the issue persists, contact your Enaex representative.</p>

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