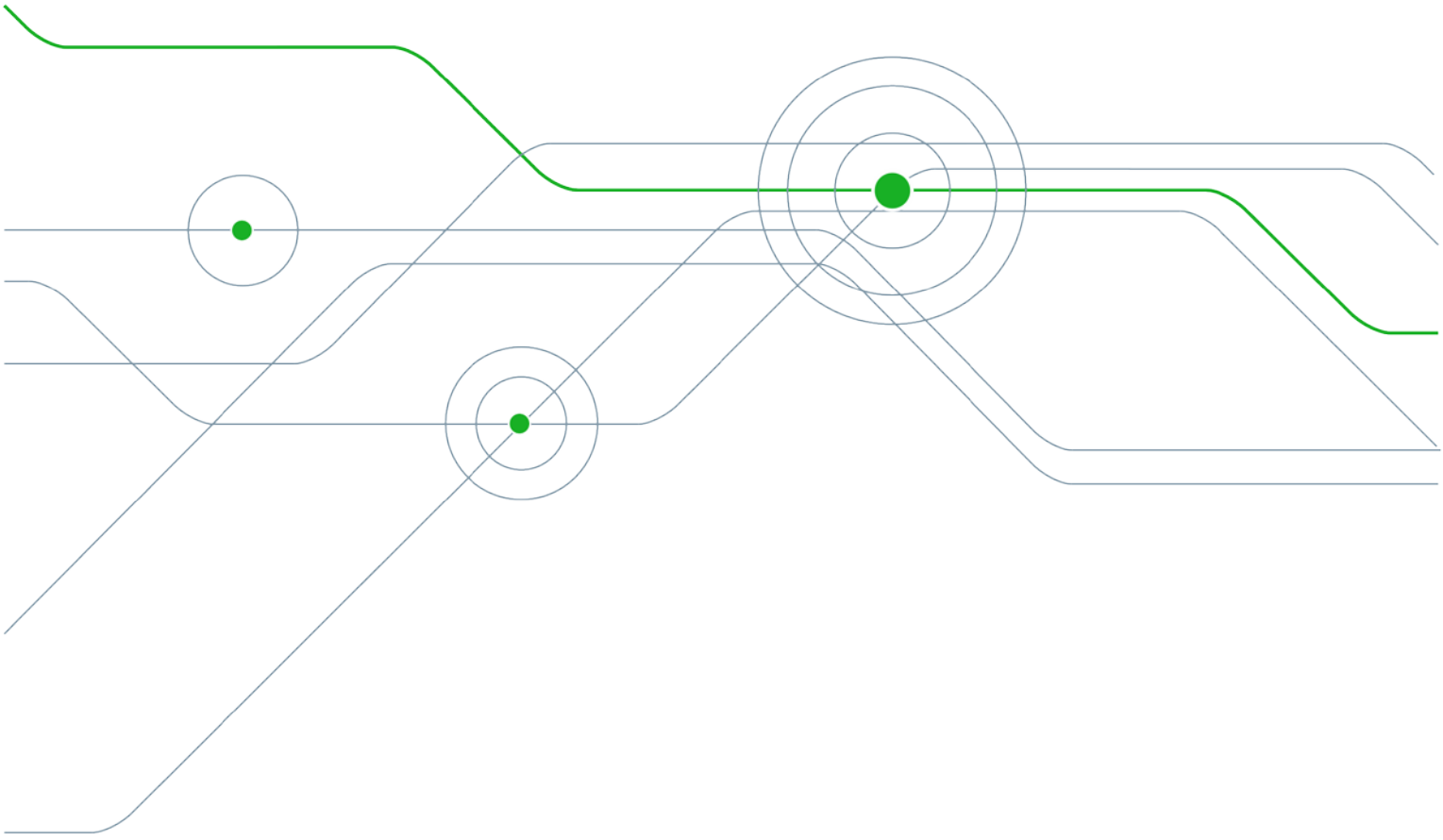
DigiShot® Plus CE4 Tagger | UTM-00330 | Rev 5
SVN 34374B | 2019



APPROVER: 2019/01/17

Vinesh Naidoo yyyy/mm/dd

APPROVED

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1 USERS OF THIS MANUAL

1.1. Purpose of this manual

This manual details the operation of the DigiShot® Plus CE4 Tagger.

This manual is only to be used for the DigiShot® Plus CE4 Tagger and the applicable software version as displayed.

1.2. End User

1.2.1. Requirements

- Only trained personnel, and personnel found competent, are allowed to operate the system.
- Users of the system shall be aware of the recommended procedures for using the DriftShot® BCU System as per manufacturer's recommendations.
- These recommendations do not supersede the method as required by local mine, explosives or statutory regulations/procedures/codes of practise regarding the use of detonators. In such cases, the MOST STRINGENT set of rules between the mine, explosives or local regulations/procedures/codes of practise and the manufacturer must be followed.

1.3. Training

Training and software upgrades shall only be performed by a DetNet SA subject matter expert.
Contact the DetNet head office for additional information.

ALL USERS OPERATING THE DIGISHOT® PLUS CE4 TAGGER SHALL HAVE SUCCESSFULLY COMPLETED THE SPECIFIC TRAINING BEFORE PERFORMING ANY WORK WITH THE DEVICE(S).

1.4. Information

Refer to http://www.detnet.com/ for additional detail and documentation.

1.5. Disclaimer

This document contains restricted information for company and channel partners' application only.
Should any of the restricted information contained in this document be disclosed to any third party either intentionally or unintentionally, DetNet South Africa will not be held responsible, accountable or liable for any resulting event and or issue.

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2 DIGISHOT® PLUS CE4 TAGGER PRODUCT SAFETY

ELECTRONIC DETONATORS ARE TOTALLY DIFFERENT TO CONVENTIONAL ELECTRIC DETONATORS AND ABSOLUTELY NO CONNECTION WITH CONVENTIONAL ELECTRIC DETONATORS OR ANY OTHER ELECTRONIC DETONATORS IS POSSIBLE AS IT CAN LEAD TO UNINTENDED INITIATION. ALL USERS OPERATING THE ELECTRONIC INITIATION SYSTEM SHALL HAVE SUCCESSFULLY COMPLETED THE SPECIFIC TRAINING BEFORE PERFORMING ANY WORK WITH THE DEVICE(S). DO NOT USE ANY DEVICES OTHER THAN THOSE SPECIALLY DESIGNED FOR THIS TYPE OF ELECTRONIC DETONATOR.

2.1. DetNet Safety Philosophy

DetNet safety philosophy is to design, manufacture and provide control equipment, detonators and accessories to the highest safety standards.

- SmartKeys to remain in possession of the accountable person, and should only be used to complete the blast circuit at such a time as stipulated by the Mine after completion of the required Risk Assessment.
- All products must conform to local and international standards before it is sold for use
- DetNet complies to ISO 9001, SANS 551:2009, CEN/TS 13763-27 which is acceptable to countries we operate in; in countries not subscribing to the above marks, we advise users to engage with DetNet to ensure that all equipment comply to local regulations.

2.2. User Safety

Safety is ensured when the user supplements the product's in-built safety systems through adequate training in the safe use of the product:

- Induction training
- Refresher training

DetNet continuously upgrades software to make our products more user friendly and to ensure that users stay abreast on latest developments, it is important that users get trained on the relevant changes before their equipment is updated.

2.3. Product Safety

- CE4 DigiShot® Plus CE4 Tagger is "Inherently Safe" as it cannot produce the necessary minimum required firing voltage to blast the electronic DigiShot® Plus detonator.
- In addition, the DigiShot® Plus CE4 Tagger is not equipped to produce the "fire signal" necessary to initiate the detonator.

THE DIGISHOT® PLUS CE4 TAGGER MUST NEVER BE CONNECTED TO A NORMAL ELECTRIC DETONATOR AND SHOULD NEVER BE CONNECTED TO DETONATORS WHILE BEING CHARGED.

2.4. Transportation, Storage and Handling

DigiShot® Plus CE4 Tagger equipment must be transported, stored, handled and used in conformity with all federal, state, provincial and local laws and regulations. Control equipment and accessories should be handled with due care and not dropped, mishandled, subjected to excessive vibration or exposed to any chemical agents. Connectors should be kept clean and the equipment must be kept in a safe environment to avoid misappropriation or misuse.

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2.5. Maintenance Schedule

All equipment in the field will need to be returned to DetNet, or its repair centres, for service at the following intervals:

- Handheld Equipment (Tagger, etc.) – 18 Months.
- Other equipment (Excluding accessories) – 24 Months.

2.6. Improper Use

- Do not apply undue pressure to the LCD screen as this could damage or cause a malfunction.
- Should the LCD screen break, care should be taken to avoid injury from broken glass and to prevent liquid crystal from the screen touching the skin or entering the eyes or mouth.
- Batteries may leak or explode if incorrectly handled.

CE4 Taggers have sealed batteries, only the external battery pack, which is an optional extra, has removable batteries.

- Only use batteries approved for use in the DigiShot® UG Tagger.
- Do not expose the battery to an open flame or excessive heat.
- Replacing external batteries in the battery pack must be performed in a safe and dry place so as to prevent ingress of moisture or condensation into the battery pack enclosure.

2.7. Information in case of emergency

Refer to http://www.detnet.com/ for additional detail and documentation.

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2.8. Warning, Caution, and Note Statements

WARNING, ***CAUTION***, and ***NOTE*** statements are used throughout this manual to emphasise important and critical information. Observe these statements to ensure safety and to prevent product damage. The statements are *defined as follows:*

	**A WARNING MEANS THAT INJURY OR DEATH IS POSSIBLE IF THE INSTRUCTIONS ARE NOT OBEYED.**

Warnings draw special attention to anything that could injure or kill the reader/user. *Warnings* are generally placed before the step in the procedure they relate to. Warning messages are repeated wherever they apply.

	**A CAUTION MEANS THAT DAMAGE TO EQUIPMENT IS POSSIBLE.**

Cautions draw special attention to anything that could damage equipment or cause the loss of data and will normally describe what could happen if the caution is ignored. *Cautions* are generally placed before the step in the procedure they relate to.

	**Notes are added to provide additional information.**

Notes are used to emphasise important information by visually distinguishing this from the rest of the text. Notes can contain any type of information except safety information, which is always placed in cautions or warnings.
Refer to http://www.detnet.com/ for additional detail and documentation.

2.9. RF compliance - FCC (USA) and ICES (Canada)

2.9.1. Unauthorised Changes

DetNet South Africa has not approved any changes or modifications to this device by the user. Any changes or modifications could void the user's authority to operate the equipment.

DetNet South Africa *n'approuve aucune modification apportée à l'appareil par l'utilisateur, quelle qu'en soit la nature. Tout changement ou modification peuvent annuler le droit d'utilisation de l'appareil par l'utilisateur.*

2.9.2. Radio Interference

This device complies with Part 15 of the FCC Rules and Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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2.9.3. RF Exposure

This equipment complies with FCC and IC radiation exposure limits set forth for an uncontrolled environment. The antenna should be installed and operated with minimum distance of 20 cm between the radiator and your body. Antenna gain must be below 30 dBm
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Cet appareil est conforme aux limites d'exposition aux rayonnements de la IC pour un environnement non contrôlé. L'antenne doit être installé de façon à garder une distance minimale de 20 centimètres entre la source de rayonnements et votre corps. Gain de l'antenne doit être ci-dessous 30dBm
L'émetteur ne doit pas être colocalisé ni fonctionner conjointement avec à autre antenne ou autre émetteur.

2.9.4. FCC Class B digital device notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

2.9.5. Labelling Requirements for the Host device

The host device shall be properly labelled to identify the modules within the host device. The certification label of the module shall be clearly visible at all times when installed in the host device, otherwise the host device must be labelled to display the FCC ID and IC of the module, preceded by the words "Contains transmitter module", or the word "Contains", or similar wording expressing the same meaning, as follows:
Contains FCC ID: 2ARNH-16541610 (V4 hardware)
2ARNH-13631680 (V3 hardware)

L'appareil hôte doit être étiqueté comme il faut pour permettre l'identification des modules qui s'y trouvent. L'étiquette de certification du module donné doit être posée sur l'appareil hôte à un endroit bien en vue en tout temps. En l'absence d'étiquette, l'appareil hôte doit porter une étiquette donnant le FCC ID et le IC du module, précédé des mots « Contient un module d'émission », du mot « Contient » ou d'une formulation similaire exprimant le même sens, comme suit:
Contains IC: 24476- 16541610 (V4 Hardware)
24476-13631680 (V3 hardware)

2.9.6. CAN ICES-3 (B) / NMB-3 (B)

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de classe B est conforme à la norme canadienne ICES-003.

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3 DIGISHOT® PLUS CE4 TAGGER GENERAL INFORMATION

The DigiShot® Plus CE4 Tagger is a lightweight device, which is powered by an internal rechargeable 3.7V Lithium Polymer cell and has a backlit screen and keypad. The keypad has numerical keys, 4 functional Soft Keys and various other command keys.

NOTE

An upgrade to the current CE4 Tagger has been implemented and a containing "Grid" is now fitted over the existing keypad.

The Terminals has also been changed from the original screw type terminals to a more durable Copper Bronze Plichta type terminal.

The functionality of the Tagger remains the same with only cosmetic changes to the appearance.

The DigiShot® CE4 Tagger is used on the bench or at the face to test and configure the DigiShot® detonators by tagging the detonator's location in accordance with a blast plan.

The location tag includes:

- Row number
- Hole number
- Side (left or right of the starting hole)
- Detonator number (if multiple detonators per hole are used)

The DigiShot® Plus CE4 Tagger can accommodate out of pattern detonators referred to as SPECIALS.

The DigiShot® Plus CE4 Tagger has a 2 wire pogo pin connector to which a single DigiShot® Plus detonator can be temporarily connected during the tagging process. The Tagger also has two Harness wire terminals where the surface harness wires can be attached during testing of a detonator string.

The device is equipped with various user-interface elements including separate LEDs located above the LCD screen, a buzzer and a vibration motor to draw the user's attention to the system's current state.

The DigiShot® Plus Tagger is designed for use on the blast front and it is incapable of producing sufficient voltage and is unable to reproduce the coded signal required to fire any detonators thus rendering the Tagger inherently safe.

3.1. Multiple Channel Mode

Users can tag up to a maximum of 1800 dets in the multiple channel mode. An option to tag on 6 different 'channels' is provided. Each channel operates individually and allows a maximum of 450 detonators. All functions (Autosearch, Test all, etc.) will prompt the user to select the required channel. Tagger operations will affect only the currently selected channel and all other channels will remain unaffected.

NOTE

During tagging, at the end of Test All / Row, Autosearch and Check Pattern, a duplicate detonator check is performed and the software will check the entire list across all channels for 'location exists' errors, to avoid duplicate detonators

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3.2. DigiShot® Plus CE4 Tagger Components

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3.2.1. Harness wire terminals

The Harness wire terminals are used to connect to the lead-in harness wires.

3.2.2. Pogo pin connector

The 2-Wire connector is used to connect a single DigiShot® Plus detonator while testing and tagging holes.

3.2.3. LED's

- STATUS LED – A Blue circular LED which indicates successful tests or operations result status.
- CHARGE LED – A White DetNet Swirl shaped LED which indicates that the Tagger is charging.
- ERROR LED – A Red triangular LED which indicates when an error is present.

3.2.4. LCD Screen

The LCD screen displays 128x128 pixels. Heating of the LCD will be necessary if the device is used in environments where the temperature drops below -15°C, the internal heater pad will automatically switch on to warm the display.

3.2.5. Soft Keys

The Soft Keys will activate functions that appear at the bottom of the LCD screen, above the corresponding Soft Key, as an option in a menu.

3.2.6. Navigation and Numerical keys ↑↓←→

The Yellow arrows are the Navigation keys. They are used to navigate during actions where you may need to move left, right, up or down in an active screen.
The Up and Down Navigation Keys can increase and decrease values in some screens.
The Numerical keys are used to enter numerical values and to make selection from the list of commands or menus.

3.2.7. Enter key

The Enter key is used to accept an on-screen activity/option.

3.2.8. Backspace Key

The Backspace key is used to delete the character to the left of the cursor.

3.2.9. ESC key

ESC The **ESC** key is used to cancel and escape out of selected options.

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3.2.10. ON/OFF key

Pres the **ON** key to switch the Tagger on.
Press and hold the **FN** key, and then press the ON key to switch the tagger OFF.

To save battery power, the DigiShot® Plus CE4 Tagger turns off automatically after a set period of idle operation. The auto power-off time can be adjusted.

3.2.11. FN key

The **FN** key is a Function key that is used in conjunction with other keys to perform specific functions.

3.2.12. USB connector port

The USB connector port allows for software upgrades and charging of the rechargeable battery via the connector.

WARNING	**No detonator shall be connected to the Tagger whilst the DigiShot® Plus CE4 Tagger is connected to a charger.**

3.2.13. Battery

The DigiShot® Plus CE4 Tagger uses a rechargeable 3.7V Lithium Polymer battery.
Although the battery has sufficient power to operate the DigiShot® Plus CE4 Tagger, the operating voltage is significantly lower than the minimum firing voltage required by DigiShot® Plus detonators. The Tagger may therefore be used on the bench/location safely as it is unable to produce sufficient voltage to fire any 3G Detonators.

NOTE	**The battery should only be replaced by a DetNet qualified technician and is not field replaceable.**

3.2.14. Audio Tones

Audible feedback operates as follows:

- A specific audio sample is played during the boot-up process
- A positive acknowledgement sound accompanies successful tasks
- An error acknowledgement sound accompanies errors or automatic power-off after a software timeout
- An informational sound accompanies other noteworthy events to draw the user's attention to the screen.

3.2.15. Vibration Signals

Errors events are accompanied by a tagger vibration.

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3.2.16. Visual Signals

LEDs will illuminate to visually signal a change to the user.
A round blue LED (●) and a triangular red LED (▲) will illuminate under the following conditions:

- Successful tests or operations result in the blue LED illuminating until a new operation is performed or until the screen is exited.
- Unsuccessful tests or operations result in the red LED illuminating until a new operation is performed or until the screen is exited.
- When an error is accepted by the User, the red LED will switch off, and only if a test fails will the red LED flash.
- The red and blue LEDs will not illuminate simultaneously.
- The DetNet Swirl shaped white LED will illuminate to indicate that the Tagger is charging.

3.2.17. Real Time Clock (RTC) Function

The DigiShot® Plus CE4 Tagger contains an internal Real Time Clock (RTC), which is required for log keeping.
The user should manually confirm/set the time-zone on the DigiShot® Plus CE4 Tagger.
The time is automatically updated via the internal GPS.

3.2.17.1. NFC

The CE4 Tagger (version 4 and later) is equipped with a Near Field Communication (NFC) reader located on the rear of the Tagger. NFC functionality will be activated in a future software release.

3.2.17.2. Wireless Charging

Wireless charging has been incorporated into the CE4 Tagger (version 4 and later) to allow the unit to be charged using a commercially available authorised Qi wireless charging pad. (An authorised Qi charger will display the Qi logo). This will allow the user to charge the Tagger without the need for USB cables, and also ensures that the protective cover on the USB connector remains closed and sealed in harsh environments.

The wireless charging receiver is situated on the rear of the Tagger. The receiver supports a power transfer of 5 W and can charge the Tagger with a current of 1A when ideal alignment, field coupling and matching is achieved. Note that the maximum supported power transfer rate is not guaranteed given the matching and alignment requirements that may not always be met. Therefore, the Tagger may take longer to charge wirelessly than when connected to a USB cable / charger, where a charging current of up to 1A is readily obtained.

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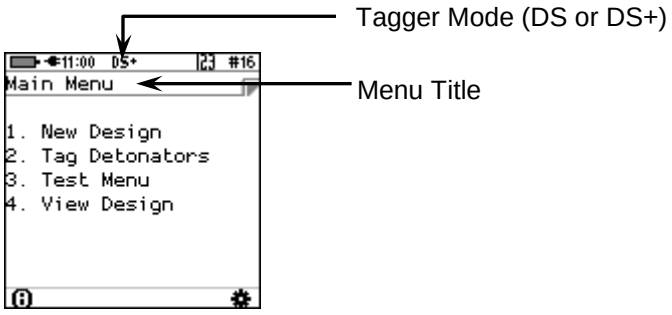
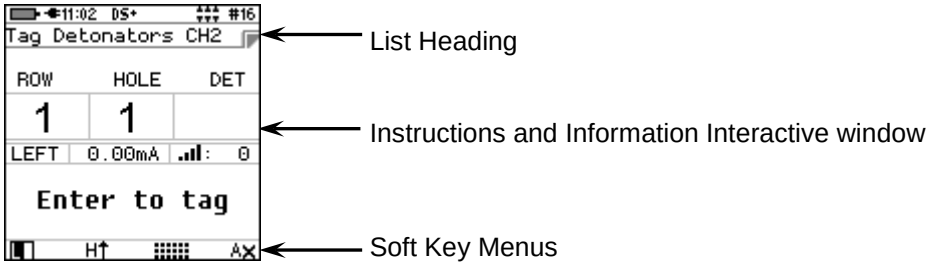
3.3. DigiShot® Plus CE4 Tagger Menu Navigation

Menu navigation is performed by directly pressing the associated menu item number key. This is indicated to the user by the '**123'** keyboard mode shown in the top bar. Pressing escape will normally navigate to the previous menu. In some screens, such as Tagging, other keyboard modes may be appropriate e.g. an arrow notation may be displayed to indicate options on the screen may be incremented or decremented using up and down arrow keys.



The Top Bar Shows the estimated battery capacity in quarters, the local time, DigiShot mode and the keyboard mode. It will also indicates when the device is charging, if the heater is on or if GPS is available.

- Use the Numerical keys to enter numerical values to select a function from the list of commands or menus.
- The Yellow arrows are the Navigation keys and are used to navigate during actions where it is required to move left, right, up or down in an active screen.
- The Up and Down Navigation Keys are also used to increase and decrease values in certain screens.



- Use the Soft Keys  to select soft menu options.
- Use  key to confirm an instruction
- Use  key to cancel an instruction
- Use or soft menu keys to navigate to next or previous where applicable

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3.3.1. CE4 Tagger Common User Interface Conventions

The CE4 Tagger screens support standard conventions of interaction as detailed below:

3.3.1.1. 'Box' Numeric input

- When a default number is displayed on the screen, any numeric keyboard input will replace the existing number entirely.
- Pressing Enter will move to the next field, if any
- Pressing Escape will exit the numeric field and consequently also the active screen if it cannot continue without the required input.
- The Backspace key will delete the rightmost character, including that of a default number if present.
- Escape will not return a changed numeric input field to the original value. Pressing escape will exit the menu.

3.3.1.2. 'Scrolled' Numeric input

Fixed range numeric input may be scrolled if indicated by up/down arrows associated with the field:

- Pressing the Up key (2) increments the number, if possible.
- Pressing the Down key (8) decrements the number, if possible.

3.3.1.3. Navigation

Navigation follows the conventions of DigiShot® to ease migration as detailed below:

- Menus are selected by pressing the appropriate numeric key directly.
- Soft-keys perform the indicated function.
- Escape exits the current field or screen, as appropriate.
- Arrow keys may be used to move in selected lists or scroll selected lists e.g. the detonator list.
- Arrow keys may also jump between selected fields in specific screens, typically those involving configuration settings.

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3.4. Systems Notification/Quick info screen

Only channels currently in use will be displayed and this function will not alter the operation of any other menus.

A quick-access information screen is available in all menus.

- Press the "#" key to view system notifications (If any) and quick info.

- The following system notifications will be displayed:
- Low Battery.
- High Humidity,
- Charger Error,
- Charging Fault.

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4 DIGISHOT® PLUS CE4 TAGGER ACCESSORIES

4.1. External Battery Pack

The External Battery Pack is an optional extra to increase the capacity of the internal battery when operating in sub-zero temperatures or other environments that demand extended operating times.
The Internal Heater Pad can operate with the internal polymer battery, independently of the external battery pack, and will switch ON when the temperature drops below -15°C.

External Battery Pack enclosure is attached to the back of the Tagger by four retaining screws

Six batteries are fitted in the bottom of the External Battery Pack. A cover closes the batteries.

NOTE	**Replace using 6 x 1.5V AA Alkaline or 6 x 1.2V Ni-MH / Ni-Cd batteries only.**

Closed External Battery pack fitted to the Tagger

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4.2. Replaceable Top Connector

The Top Connector contains the pogo pins used for connecting and tagging the detonators.
It also consists of the Harness wire terminals, used to connect detonator harness wires.
The Replaceable Top Connector may be ordered separately.

The Tagger's top connector may be ordered separately and is easily replaceable should the contacts become worn and / or damaged through prolonged use.

NOTE	**Always keep the contacts clean and free of contamination.**

4.3. Surface Harness Wire

DigiShot® detonators are connected to the surface harness wire to enable communication between detonators and control equipment.
The Surface harness wire is yellow and green individually sheathed copper wire, 0.63mm in diameter.
DigiShot® can be connected in any order to the surface harness as the detonator connectors are not polarity sensitive.

The maximum length of surface harness, including the lead-in wire used to connect DigiShot® detonators to the Blaster, shall not exceed 2500m.

CAUTION	**Exceeding these distances shall jeopardise the integrity by increasing the inherent resistance on the harness wire resulting in potential misfires.** **All joints shall be securely twisted and insulated to prevent intermittent connections, short circuits and excessive leakage. These can be a major source of trouble causing potential misfires**

NOTE	**Refer to Blast Layout section and tables in UTM-00329 - Additional System Information for further information.**

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5 DIGISHOT® PLUS CE4 TAGGER BATTERY

The DigiShot® Plus CE4 Tagger uses a rechargeable 3.7V Lithium Polymer cell.
The Tagger battery compartment is sealed to prevent moisture ingression and condensation, which could cause corrosion and or short circuits within the tagger resulting in a possible malfunction or an unreliable Tagger. The Tagger is IP 57 rating tested.

CAUTION	**No detonator shall be connected to the Tagger whilst the DigiShot® Plus CE4 Tagger is connected to a charger.**

NOTE	**The battery is not replaceable in the field and should only be replaced by a DetNet qualified technician.**

5.1. Charging the DigiShot® Plus CE4 Tagger

- Connect the USB cable between the mini USB port on the DigiShot® Plus CE4 Tagger and a Personal Computer or use a DetNet Universal charger to charge the Tagger.
- The DigiShot® Plus CE4 Tagger will automatically start charging as soon as the USB connector port is plugged into a USB socket.
- A battery level indication will be displayed during charging.

The tagger may not charge sufficiently if the tagger is connected to a weak charger or damaged USB port.
The charging circuit of the tagger may require as much as 1A for charging.

NOTE	**It is recommended that the DigiShot® Plus CE4 Tagger be charged to 100% before use, to allow for maximum operating time.**

CAUTION	**It is recommend that the Tagger be charged to 50% when placed into storage, and thereafter the unit should be charged at least every three months to 50%, to maintain the expected lifetime of the battery. Refer to Tagger Storage Mode under Advanced Setup for more detail.**

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5.1.1. Low Battery

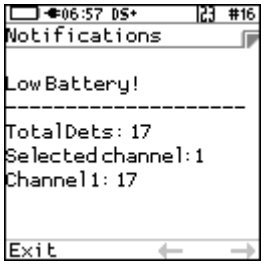
Once the battery has discharged to 9%, the tagger will display the following icon [:] next to the clock indicating a low battery condition.

NOTE

The DigiShot® Plus Tagger will automatically switch off when the battery capacity drops below 3%. (The CE4 Tagger will display a warning at 9% and switch OFF at 3%).

- Press # on Tagger keypad to view error message
- **Low Battery!** will be displayed
- Press **Exit** to return to previous screen.

The user may navigate to the System information screen (Detailed in Chapter 9 of this manual) to check that the Tagger is being charged.



NOTE

Press [i] Soft Key from Main Menu to view System Info.

Detailed information such as current consumption, state of health of the battery and temperature can be found under System Info.
Charging will be indicated by **(USB)** when a USB charger is used or **(AUX)** when a wireless charger is used.

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5.2. Power DigiShot® Plus CE4 Tagger ON and OFF

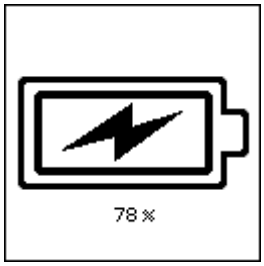
5.2.1. DigiShot® Plus CE4 Tagger Power-ON

1. Press the ON key.
2. The splash screen will display for approximately 1.5 seconds during the tagger boot sequence.
3. The system name is displayed.
4. The software release and hardware version number is displayed.

5. The user must acknowledge the disclaimer before proceeding.
6. Acknowledge by pressing the Ok Soft Key.

NOTE

The charging screen is only displayed when the tagger is plugged into a USB, Wireless charger, external battery pack, or charging source . Pressing ESCAPE returns the user to the original screen and prevents this screen being shown again until the next power-on sequence.



7. Use the numerical keypad to enter the password.
8. Press to continue.

NOTE

To prevent unauthorised use, the DigiShot® CE4 Tagger is assigned a default password by the manufacturer. The default password may be changed by the user and can be configured from the "Settings" menu. The user may reset the password with a ticket retrieved from DetNet Portal. Entering value 0 as a password will remove the password-required step when starting the device.

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9. Main Menu screen will be displayed.

5.2.2. DigiShot® Plus CE4 Tagger Power-OFF

10. Press and hold FN key and then press the key to power OFF the Tagger.

CAUTION	IN THE EVENT OF THE SOFTWARE NOT RESPONDING TO THE FN KEY IN COMBINATION WITH THE KEY, IT IS POSSIBLE TO FORCE THE TAGGER TO POWER OFF BY PRESSING AND HOLDING THE KEY FOR AT LEAST 10 SECONDS TO POWER OFF THE TAGGER. NOTE THAT THIS ACTION MAY RESULT IN SETTINGS OR BLAST INFORMATION BEING LOST AND SHOULD NOT BE USED IN NORMAL PRACTICE AND SHOULD BE AVOIDED AS HARD POWER DOWNS CAN LEAD TO DATA CORRUPTION OR LOSS..

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6 TAGGING DIGISHOT® PLUS DETONATORS

6.1. New Design Screen

This function enables the user to erase the existing detonator list in order to start a new blast. Before tagging a new installation, the memory must be cleared of the previous detonator list to avoid conflicts with the new detonator list.

1. Main Menu
   - Press 1 to select **New Design**.

2. Clear Memory
   - Press Yes Soft Key to clear detonator list.
   - Press No Soft Key to exit option and return to Main Menu.

3. Warning.
   - If YES was selected, Det List Cleared will be displayed briefly.
   - After clearing the list, the Tag detonator option is selected automatically.
   - The **Only connect one det at a time** warning screen message is displayed once per tagger power-up and must be acknowledged by the user.
   - Press Ok Soft Key to acknowledge and continue tagging.

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6.2. Tag Detonators

This function enables the user to assign a position to one detonator at a time.
The position is either a combination of a side (left/right), a row number (1-63), a hole number (1-127) and detonator number in a decked hole (1-15) OR a Special – an out-of pattern detonator (1-255).

1. Main Menu
   - Press 2 to select **Tag Detonators.**

2. Tag Detonators Warning
   - Press Ok Soft Key to acknowledge warning.

3. Tag Side
   - Press Yes Soft Key to tag only on one side.
   - Press No Soft Key to tag both sides.

4. Tag Side (Cont.)

This screen will not be displayed again unless the memory is cleared via new design or the tagger is restarted.

   - Press Left Soft Key to tag only on the left-hand side.
   - Press Right Soft Key to tag only on the right-hand side.

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NOTE	**This screen will only be displayed if the option to tag on one side only was selected.**

5. Tag Detonators

- Use the numerical keypad to enter number of detonators used in each hole.
- Press ↵ to confirm.

CAUTION	**Maximum of 15 detonators per hole.**

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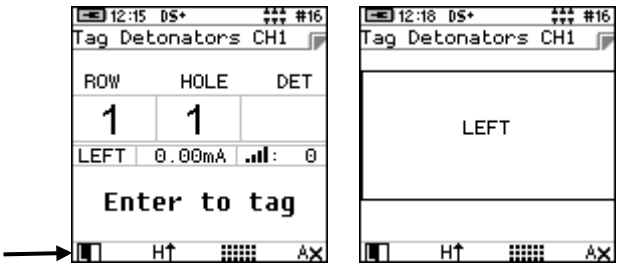
6.3. Tagging Screen Soft Key Options

Left / Right Mode - This function enables the user to select the side being tagged based on the blast plan. Select L / R Soft Key to toggle between Left and Right side. The Tagger will display the selected side.

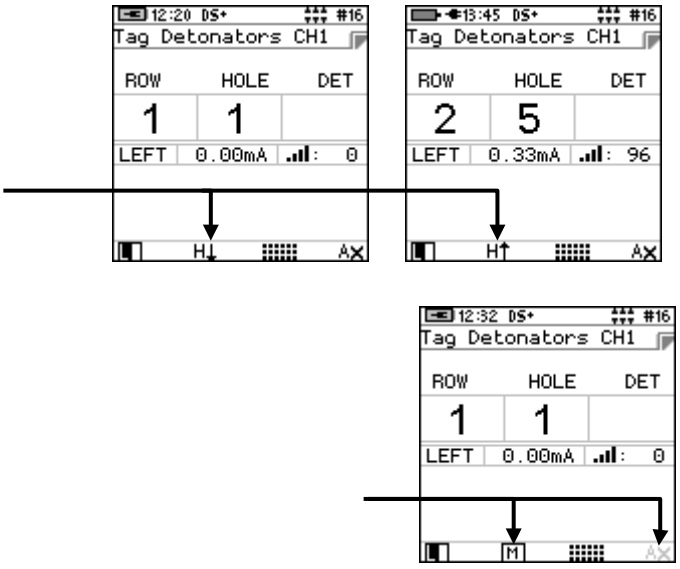


> **NOTE** **This screen will only be displayed if the option to tag on both sides was selected.**

The **Function** key may be used to select the required side while in the Tagging mode as follows:

Press and hold FN key while pressing the L / R Soft Key to toggle between sides.

Hole Increment and Decrement - This function enables the user to auto increment and decrement hole numbering while tagging. Press H↓ / H↑ / M Soft Key to toggle between Decrement, Increment and Manual mode.



> **NOTE** **Manual mode M can only be selected when manual tagging mode Ax is selected.**

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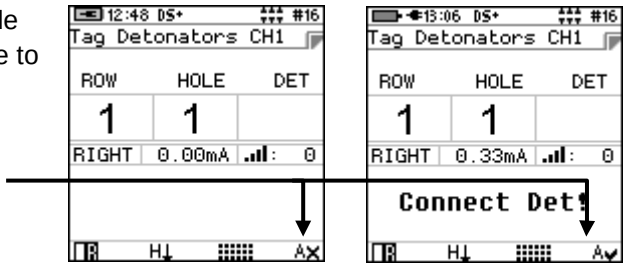
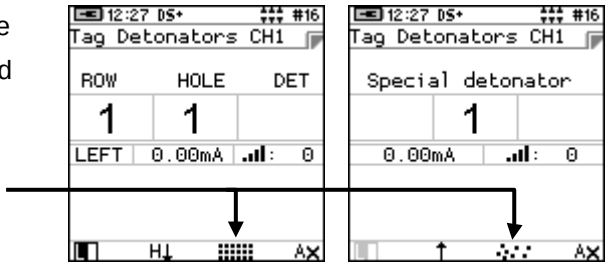
Tagging Mode - When **A✓** is displayed Auto tagging mode is active. Pressing the Soft Key again will toggle the mode to manual mode indicated by **Ax.**



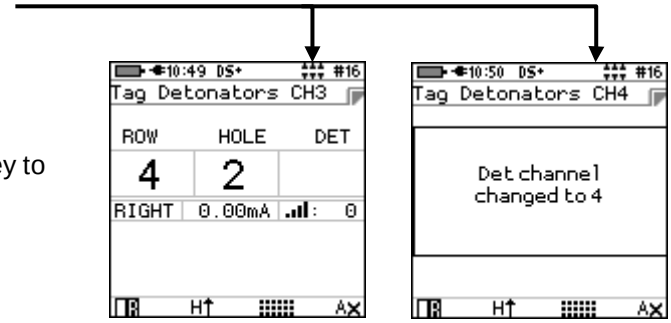
Special detonators - Press the **Pattern** Soft Key to toggle between **IN-** and **OUT**-of-pattern holes to add Special detonators



Select Channel Function

The Function key may be used to select Channels while in the Tagging mode as follows:

Press and hold FN key while pressing 1 or 7 key to toggle up or down between Channels



Test Single Det

While in the Tagging menu, the user has the option to test a single detonator (Connected to the pogo pin connector) by pressing the minus/power key. During this test, any detonators connected via the harness wire terminal posts will be temporarily disconnected, and there will thus be no need to disconnect the bus-line when the Test Single Det option is activated. This feature is permanently enabled.

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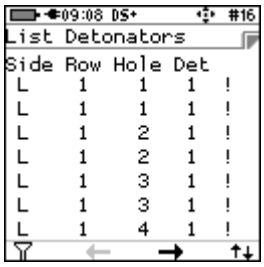
Maximum Dets per Hole

The maximum dets per hole setting is requested when the user enters the tagging menu but can also be changed while in the tagging menu.

Press and hold the FN key while pressing the 3 DEF or 9 WXYZ key to adjust this setting.

A message will display the new **Maximum Dets per hole** setting.

View Det List



While in the Tagging menu, the user has the option to view the detonator list.

- Press the '0' key to display the list

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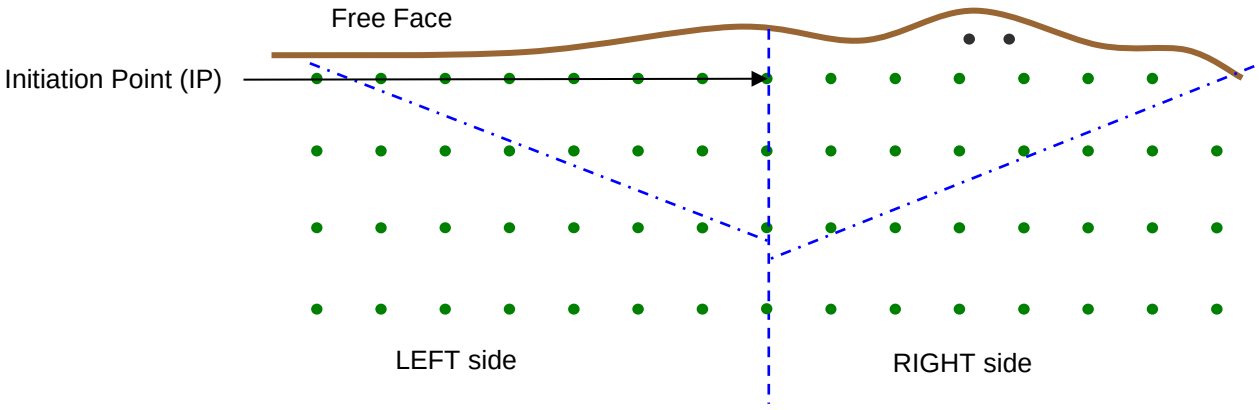
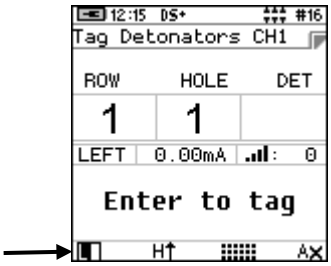
6.4. Right or Left Side Definition

This function enables the user to select the side being tagged based on the blast plan. The location of the Initiation Point is determined and the blast divided according to a left-right convention or single side convention.



To change sides of Initiation Point

- Press L / R Soft Key to toggle between Left and Right side
- L Tagging left-hand side
- R Tagging right-hand side



- The Tagger will display the selected side.

NOTE	**When tagging, ensure the correct side of the Initiation Point is selected according to the blast plan. Tagging the incorrect location w*ill result in retagging and valuable time being lost or even an out of sequence* hole or mismatch with the blaster design pattern.**

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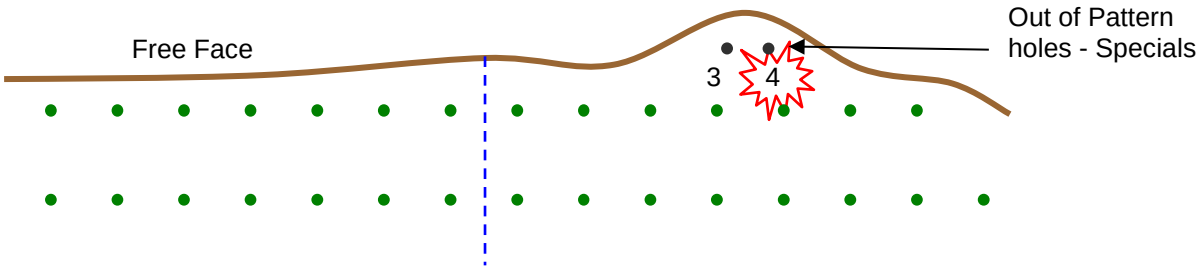
6.4.1. Special detonators

This function enables the user to tag detonators in out of pattern holes or out of sequence holes.
The DigiShot® Plus detonators in those holes are referred to as **SPECIALS**. They are treated as a separate group and are numbered sequentially.
Absolute delays must be manually assigned to Special detonators according to the blast plan.
It is important when tagging Specials to clearly mark their location and delays on the blast plan. This will ensure that correct delays are assigned later.



Adding Special detonators

- Use the **Pattern** Soft Key to toggle between **IN** and **OUT** of pattern holes to add Special detonators.

- Press 2 8 to adjust the detonator number manually if required.
- Connect detonator.
- Press ↵ to assign a location to a detonator.
- One beep will sound and the blue LED will illuminate to confirm detonator successfully labelled.
- Continue to next detonator.

NOTE	**Ensure the correct hole number is being allocated when tagging, as it will change the location of the DigiShot® Plus detonator in relation to the Blast Plan.** **Do not remove the DigiShot® Plus detonator from the Tagger until the LABELLED OK message appears, to ensure that the detonator is correctly tagged.**

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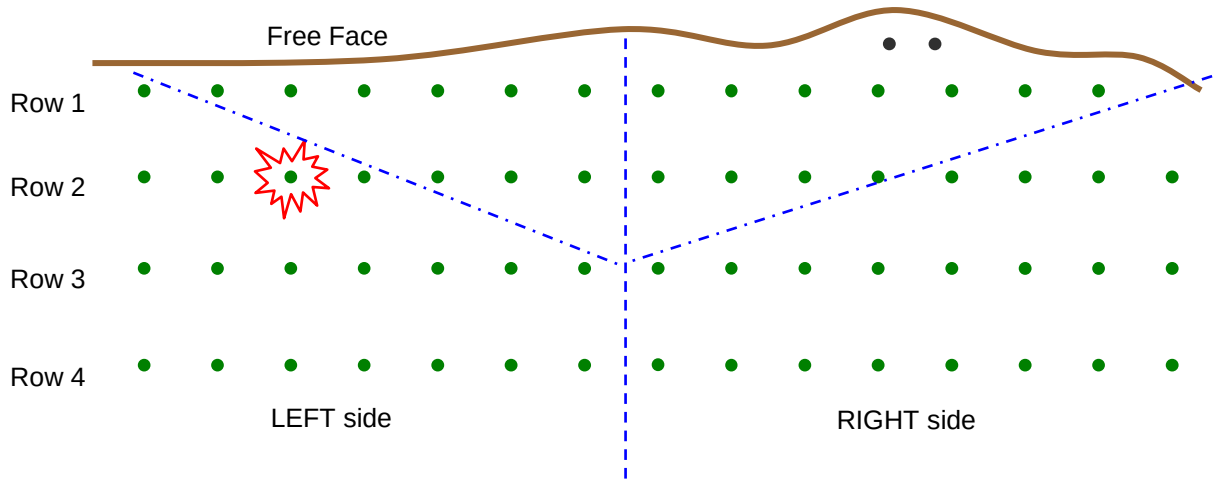
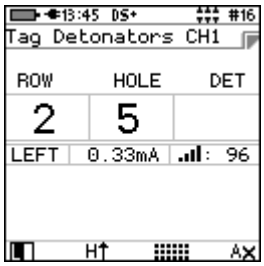
6.4.2. Row Allocation

In a blast plan that allows for multiple rows, row allocation refers to the particular row that a DigiShot® Plus detonator is located in.



Rows can be tagged in any order. Row numbers have to be manually changed.
ROW denotes row number being tagged.

- Press 1 to increase row number.
- Press 7 PQRS to decrease row number.



NOTE	**When tagging, ensure the row number is selected according to the blast plan.** ***Tagging the incorrect location, due to the wrong row being selected, will result in retagging, lost time and possibly out of sequence firing.***

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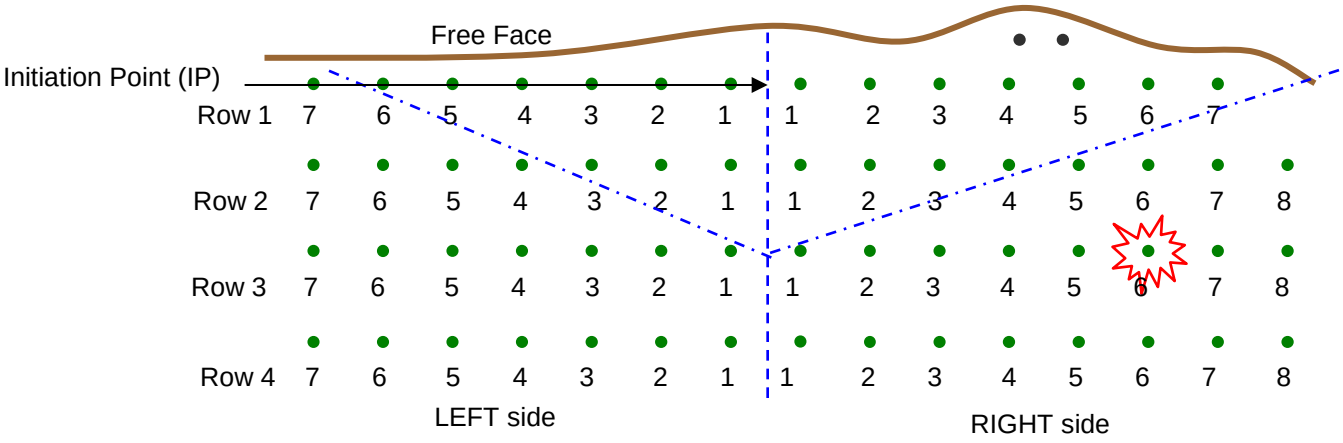
6.4.3. Hole Allocation

In a blast plan each hole is allocated a position number in each row. Hole allocation refers to the particular hole a DigiShot® Plus detonator is located in.

NOTE	**All holes should be tagged in order to ensure detonators are not excluded during the tagging process.**

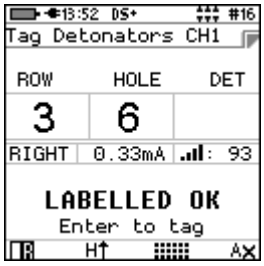


Hole numbers on the Tagger may change automatically once a detonator is successfully tagged depending on the selected tagging mode (Increment/Decrement/Manual).

NOTE	**Lower hole numbers are closer to the initiation point and higher numbers are further away from the initiation point, as with chevron blasting practices.**

HOLE denotes the hole number being tagged.

- Press 2 ABC to increase hole number manually.
- Press 8 TUV to decrease hole number manually.
- **LABELED OK** indicates a successfully tagged detonator.



NOTE	**When tagging, ensure the row number is selected according to the blast plan.** ***Tagging the incorrect location, due to the wrong row being selected, will result in retagging, lost time and possibly out of sequence firing.***

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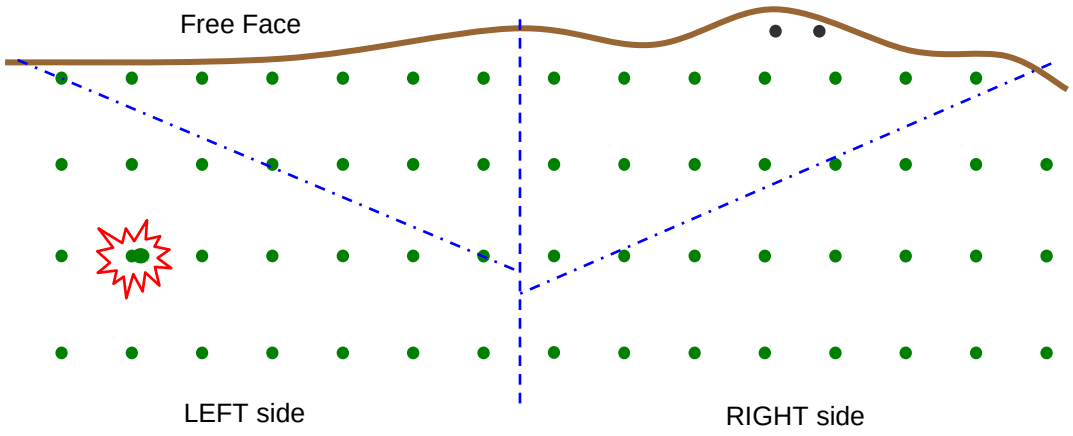
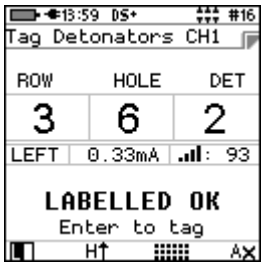
6.4.4. Decking Allocation

This option enables the user to perform multiple deck blasting where more than one detonator is allocated per hole.
In a blast plan a hole can be set up for decking up to a maximum of 15 DigiShot® Plus detonators per hole.
Decking allocation refers to the position of a DigiShot® Plus detonator inside a hole.



When more than one detonator is placed into a hole, two tagging modes are available:

- Load per hole, and
- Load per deck.



NOTE	**Ensure the DigiShot® Plus detonator deck positions are clearly marked on the detonator label to avoid wrong position tagging.** ***Decked DigiShot® Plus detonators also need to be clearly marked on the blast plan to ensure their locations are correctly assigned.*** ***Refer to the Advanced Setup section in this manual where the Hole Load Mode is detailed.***

The DigiShot® Plus Tagger allocates a unique tag to each detonator. When more than one detonator is allocated per hole (Decking), the user has the following options (hole load mode as selected in advanced setup):

1. Load per hole - Tag all the detonators decked in a hole before moving over to the next hole
2. Load per deck - Tag only one detonator per hole (one deck at a time) until all holes have been completed (the first deck) thereafter, return to the first hole to tag the second detonator (deck) etc.

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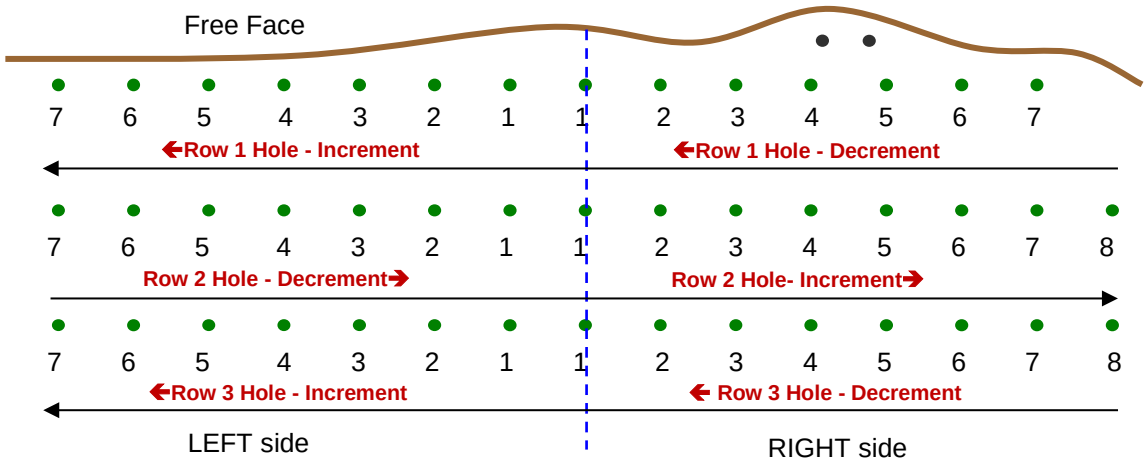
6.4.5. Automatic Hole Increment and Decrement

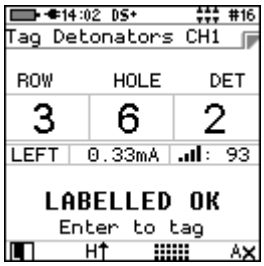
This function enables the user to auto increment and decrement hole numbering while tagging i.e. after a hole is completed, the location hole number will increment or decrement automatically as selected in anticipation of the next hole to be tagged.
Manual mode enables the user to manually increment and decrement the hole numbering for each hole.

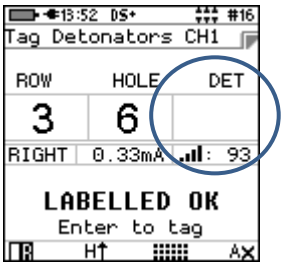
NOTE	**At the end of a row, the row number and increment/decrement may need to be manually adjusted before tagging the next row.**



To change hole increment and decrement:

- Press H↓ / H↑ / M Soft Key to toggle between Increment, Decrement and Manual mode





NOTE	**When only 1 detonator is used per hole, the DET number is not displayed.**

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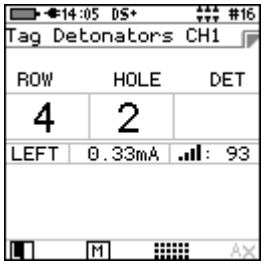
6.4.6. MANUAL TAGGING



This function enables the user to Tag one detonator at a time by connecting the detonator to the top connector on the DigiShot® Plus CE4 Tagger as follows:

- Connect detonator.
- Press ↵ to tag detonator.
- **LABELLED OK** indicates detonator successfully tagged; followed by a single beep and the blue LED will illuminate.
- Continue to next detonator by adjusting the position using the navigation keys as desired.

6.4.7. AUTO TAGGING

This function enables the user to Autotag detonators by connecting the DigiShot® Plus CE4 Tagger to one end of the Harness wire and **untagged** detonators are connected one at a time. The tagger will automatically tag the location as each detonator is connected. The existing tagged detonators will remain connected to the Harness wire. It is advisable to use a blast plan when tagging the DigiShot® Plus detonators to ensure that all detonators are tagged in a systematic and organised manner.

CAUTION	**Do not remove detonator from the Tagger before tagger confirms a successful tag by displaying LABELLED OK message.**

NOTE	**The Autotag function cannot be used in Manual Mode. In the event of an error occurring while tagging, the Tagger will halt and display a Fail message and the Error LED will flash. Refer to Fault Finding section for error details.**

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7 TESTING DIGISHOT® PLUS DETONATORS

7.1. Test All in List

This function enables the user to test the integrity of a string of DigiShot® Plus detonators that have been tagged. The Tagger will test DigiShot® Plus detonators connected on the Harness wire that correspond with tagged detonators in the Detonator list.

NOTE	**DigiShot® Plus detonators connected to the Harness Wire, which are not in the detonator list, will be ignored. Use Autosearch or Check Pattern to locate newly connected detonators.** **The user can select the channel to test in the test all / row menu only if multiple channels are used.** **An option to halt on errors while testing is available and may be configured as "Halt on test" under the DigiShot Setup menu.** **During tagging, at the end of Test All / Row, Autosearch and Check Pattern, a duplicate check is performed and the software will check the entire list across all channels for 'location exists' errors, to avoid duplicate detonators.**

1. Main Menu
   - Press 3 DEF to select **Test Menu**.

2. Test Menu
   - Connect all detonators to be tested to the harness wire.
   - Press 1 to select Test All in List.

3. Test All
   - Use numerical keys to enter Channel number.
   - Press ↵ to continue.

NOTE	**Channel number will only be requested when in multiple channel mode.**

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4. Test all detonators against the list
   - Failed detonators will be displayed
   - Total amount of detonators will be displayed
   - Press Soft Key to continuously repeat test.
   - Press Soft Key to stop continuously repeating test

The information bar at the bottom of the Tagger screen displays the CURRENT state i.e. the Soft Key tick indicates that it is repeating and the cross indicates that it is not repeating.

Refer to View Design section for further information.

- Press Soft Key to view View Design

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7.2. Test Row

This function enables the user to test the integrity of one or more rows, of DigiShot® Plus detonators that have been tagged. The Tagger will only test detonators connected on the Harness wire that correspond with tagged detonators in the Detonator list.

CAUTION	**DigiShot® Plus detonators connected to the harness wire that are not in the detonator list will be ignored. Use Autosearch or Check Pattern to locate newly connected detonators.**

1. Main Menu
   - Press 3 DEF to select **Test Menu**.

2. Test Menu
   - Connect all detonators to be tested to the harness wire.
   - Press 2 ABC to select Test Row.

3. Channel selection
   - Use the numerical keypad to enter Channel number
   - Press ↵ to continue.

4. Row selection
   - Use the numerical keypad to enter Start Row number.
   - Use the numerical keypad to enter Last Row number
   - Press ↵ Soft Key to start test.

NOTE	**Testing will take place between, and including, the specified rows.**

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5. Side selection

NOTE	**Side selection option is available only if multiple sides are present on the particular row.**

Use 2 / 8 to toggle between Test left only, Test right only or Test both sides

- Press Soft Key to save
- Press to continue.

6. Test Row

- Test all detonators in the row.
- Failed detonators will be displayed.
- Total amount of detonators will be displayed.
- Press Soft Key to continuously repeat test.
- Press Soft Key to stop continuously repeating test

NOTE	**The information bar at the bottom of the Tagger screen displays the CURRENT state i.e. the Soft Key tick indicates that it is repeating and the cross indicates that it is not repeating.** **Refer to View Design section for further information.**

- Press Soft Key to navigate to View Design if required.

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7.3. Test Single Detonator

This function enables the user to test an individual DigiShot® Plus detonator.

1. Main Menu

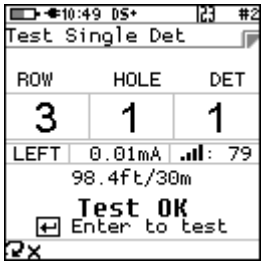
- Press 3 DEF to select **Test Menu**.

2. Test Menu

- Ensure that the detonator is connected to the Tagger Pogo Pin connector.
- Press 3 DEF to select **Test Single Det.**

3. Test Single Det

- Tagged location is displayed.
- If the Detonator contains a wire length, this value is displayed. This value is displayed in meters and feet.
- Press Soft Key to continuously repeat test.
- Press Soft Key to stop continuously repeating test



NOTE	**The information bar at the bottom of the Tagger screen displays the CURRENT state i.e. the Soft Key tick indicates that it is repeating and the cross indicates that it is not repeating.**

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7.4. Autosearch

This function enables the user to build a detonator list based on detonators that respond when tested within a given search area.
This function is normally used when more than one DigiShot® Plus CE4 Tagger is used to tag detonators. Autosearch combines all detonators found into one detonator list.

CAUTION	**A new detonator list will be created and the previous detonator list will be erased. In multi-channel mode, only the detonators in the selected channel will be erased.**

1. Main Menu
   - Press 3 DEF to select **Test Menu**.

2. Test Menu
   - Ensure that the detonator is connected to the Tagger.
   - Press 4 GHI to select **Autosearch.**

CAUTION	**Autosearch does not erase the locations tagged to each DigiShot® Plus detonator, only the Detonator List stored on the DigiShot® Plus CE4 Tagger. When using Autosearch a Tagger will only detect and store a maximum of 450 DigiShot® Plus detonators per channel.**

3. Warning
   - Press Ok to accept the warning and start the Autosearch function

4. Autosearch
   - Use numerical keys to enter Channel number on which the search should start.
   - Press ↵ to continue.

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- Use numerical keys to enter the **Start row** number on which to start the search.
- Press ↵ to continue.

- Use numerical keys to enter the **Last row** number on which the search will end.
- Press ↵ to continue.

- Use numerical keys to enter **maximum detonators per hole** to search for.
- Press ↵ to continue.

- Use numerical keys to enter **maximum special detonators** to search for.
- Press ↵ to continue.

5. Autosearch – Leakage Test

- The Tagger will perform a leakage test and will automatically stop when high leakage is detected.
- Press ↵ to continue.

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6. Autosearch -Untagged detonator

- The Tagger will check for Untagged dets and will automatically stop when an untagged detonator is located.
- Press ↵ to continue.

7. Autosearch

Autosearch will only search from the first to the last row, and will search up to the special detonators as specified.
The Tagger will create a new detonator list from the search results.
Each detonator is individually checked, starting from the start row e.g. Row 1, Hole 1, Det 1. Depending on the search parameters and whether a detonator is found or not, searching may continue in the same hole, or move to a new hole, a new side or a new row.
To ensure that the search is performed as rapidly as possible, it will proceed to a new hole, side or row after a selected number of bad detonators or holes are exceeded. These parameters are adjustable in the autosearch limits section.

NOTE	**Refer to Autosearch Limits section found under the DigiShot Setup menu for detailed information.**

WARNING	***Autosearch will not search outside the specified parameters. Detonators connected outside the specified parameters will not be found or added to the detonator list. Ensure all possible parameters are included or the total number of connected detonators will differ from the tagged number of detonators. Autosearch can search beyond bad or missing holes and rows depending on how the Tagger is setup for Autosearch***

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7.5. Leakage Test

This function enables the user to perform a current measurement and a leakage measurement test.

WARNING	***High leakage levels can result in potential misfires of the DigiShot® Plus detonators. Refer to the scalability chart contained in UTM-00329 - Additional System Information for detailed information.***

Leakage is measured in milli-amps (mA)
Low leakage - below 0.5mA.
Leakage higher than 0.5mA is considered problematic and may result in blasting problems. This should be addressed and the leakage problem resolved.
Leakage higher than 1mA is considered high leakage and will likely result in blasting problems (potential misfires) and should therefore be addressed and resolved prior to arming.

1. Main Menu
   - Press 3 DEF to select **Test Menu**

2. Test Menu
   - Ensure that the detonator is connected to the Tagger
   - Press 5 JKL to select **Leakage Test**

3. Leakage Test
   - Press Soft Key to continuously repeat test.
   - Press Soft Key to stop continuously repeating test

NOTE	**The information bar at the bottom of the Tagger screen displays the CURRENT state i.e. the tick indicates that the test is repeating and the cross indicates that it is not repeating.**

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7.6. Untagged Test

This function enables the user to test for Untagged Detonators connected to the harness wire.
These are DigiShot® Plus detonators that have not been assigned a location and are connected to the harness wire.

NOTE	**While performing an untagged test, a leakage test is also included. This function may be used to repeatedly perform the test, thus assisting to diagnose problems while connecting detonators to the harness wire.**

1. Main Menu
   - Press 3 DEF to select **Test Menu**.

2. Test Menu
   - Press 6 MNO to select **Untagged Test.**

3. Untagged Test
   - OK message displayed when no untagged detonators are found.

   - Error message displayed when untagged detonators are found.

NOTE	**Use a binary search to locate untagged detonator(s) – Refer to Binary Search section for further information.**

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7.7. Check Pattern

This function enables the user to search for connected DigiShot® Plus detonators and to compare the results of the search against the stored Detonator List. It performs the same steps as an Autosearch except for the following:

- Check Pattern does not overwrite the Detonator List.
- Check Pattern generates a list of detonators that should correlate with the existing detonator list.
- Check Pattern generates a list of Missing detonators that were not found when compared to the detonator list.
- Check Pattern generates a list of new detonators found during test, which were not part of the original detonator list before the test.
- Parameters for check pattern will be determined automatically from the list. However, the Autosearch settings parameters still applies here.

NOTE	**A warning will be displayed if any discrepancies are found once the Check Pattern function has completed.**

1. Main Menu
   - Press 3 DEF to select Test Menu

2. Test Menu
   - Press 7 PQRS to select **Check Pattern**

3. Channel selection
   - Use the numerical keypad to enter Channel number
   - Press ↵ to continue.

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4. Untagged detonator found

- The Tagger automatically stops when an untagged detonator is located.
- Press ↵ to continue.

5. Check Pattern

Check pattern will search from the first row specified to the last row specified and the maximum number of special detonators in the list or as found taking bad holes/detonators into account.

6. Check Pattern

- After Check Pattern function completed, the Tagger displays total detonators.
- Tagger also displays Test Complete or Issues Found
- Press ↵ to continue.

7. View Design

- Press ↵ to open View Design screen.

NOTE	**Refer to View Design section for further information.**

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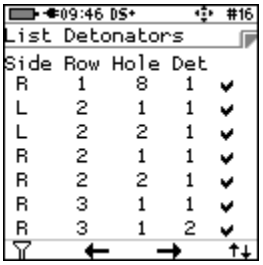
8 VIEW DESIGN

8.1. View Design Soft Key Options

Filter Mode

Press Soft Key to toggle between:

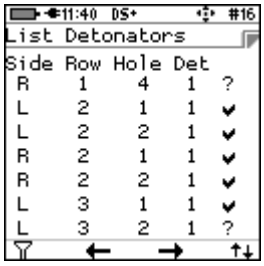
- List Detonators
- List New Detonators



- List Missing Detonators
- List Bad Status Detonators

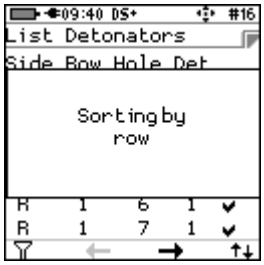
Next / Previous Page Mode → ←.

This function enables the user to scroll to the next or previous page. Press the → Soft Key to scroll to the next and the ← Soft Key to scroll to the previous page.



Sort Mode

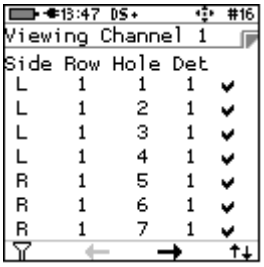
Press the ↑↓ Soft Key to sort by Row or to Sort by tag order.



View Channel Detlist

This function enables the user to scroll to the next or previous channel.

- Press the **6** Key to scroll to the next channel
- Press the **4** Key to scroll to the previous channel.



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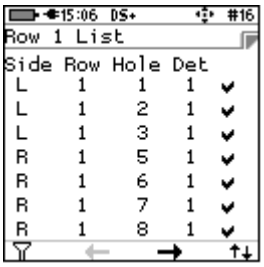
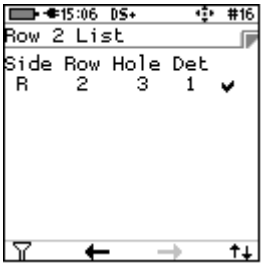
View Row List

When in the View Row List, this function enables the user to scroll to the next or previous row.

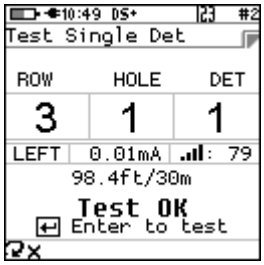


- Press the **6** Key to scroll to the next Row.
- Press the **4** Key to scroll to the previous Row.
- Use Soft Keys to navigate pages and sort/filter the view as required.



Test Single Det

In the Detlist View menu, the user has the option to test a single detonator (Connected to the pogo pin connector) by pressing the minus/power key. During this test, any detonators connected via the terminal posts will be temporarily disconnected, so the user need not disconnect the bus-line when the 'test single' option is run. This feature is permanently enabled.



Notifications Screen

- Press the # key on the Tagger keypad to navigate to the Notifications Screen

The Notifications Screen option is available from every screen.

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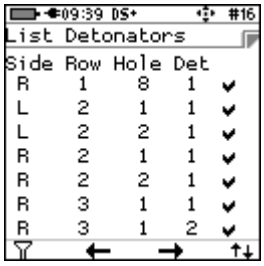
8.2. List Detonators

The list will indicate both detonators that existed in the original list and any new detonators that may have been found. The list also includes any missing detonators.

1. Main Menu
   - Press 4 GHI to select **View Design**

2. View Design Menu
   - Press 1 to select **List Detonators**

3. List Detonators
   - The **List Detonators** screen will be displayed
   - Use Soft Keys to navigate pages and sort/filter the view as required.



NOTE	**The list contains symbols indicating the current detonator state as follows:** **√ - Detonator tested good** **? – Detonator is missing** **X – Detonator tested with bad status** **! – New Detonator found** **Blank status - Detonator needs to be tested.**

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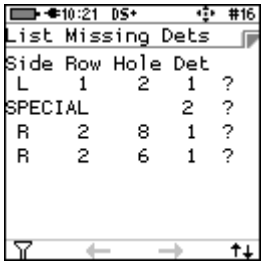
8.3. List Missing detonators

This screen lists the DigiShot® Plus detonators that were not found during the Check pattern test (or test all).

1. Main Menu
   - Press 4 GHI to select **View Design**

2. View Design Menu
   - Press 2 ABC to select **List Missing Dets**

3. List Missing Dets
   - The **List Missing Detonators** screen will be displayed



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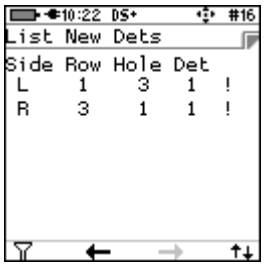
8.4. List New Detonators

This screen lists the DigiShot® Plus detonators that were found during the test and did not exist in the stored detonator list before the test.
Check Pattern does not overwrite the detonator list.

1. Main Menu
   - Press 4 GHI to select **View Design**

2. View Design Menu
   - Press 3 DEF to select **List New Dets**

3. List New Dets
   - The List New Detonators screen will be displayed
   - Use Soft Keys to navigate pages and sort/filter the view as required.



NOTE	**The user is prompted with the option to add new detonators to the existing list at the time of exiting this menu.**

   - If YES was selected, the TEST menu will be displayed.

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8.5. List bad status

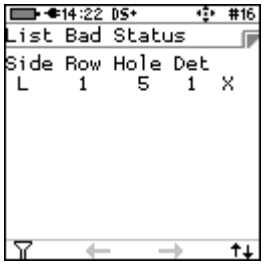
This screen lists the DigiShot® Plus detonators that were found to be bad during the check pattern test. (A bad status indicates the detonator may have a bad fuse or other internal problem).

This List does NOT include untagged detonators.

1. Main Menu
   - Press 4 GHI to select **View Design**

2. View Design Menu
   - Press 4 GHI to select **List Bad Status**

3. List Bad Status
   - The List Bad Status screen will be displayed
   - Use Soft Keys to navigate pages and sort/filter the view as required.



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8.6. Blast Summary

The Blast Summary function enables the user to view a summary of the number of holes and detonators on each side on a per row basis.

1. Main Menu

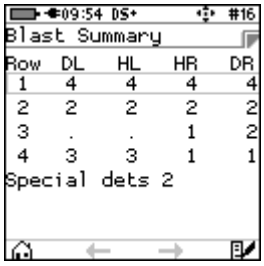
- Press 4 to select **View Design**

2. View Design Menu

- Press 5 to select **Blast Summary**

3. Blast Summary

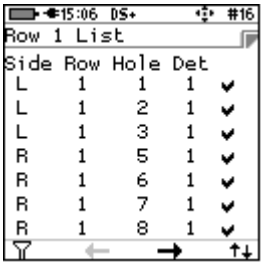
- The Blast Summary screen displays the Rows in the first column. The number of detonators / holes on the Left and Right side per corresponding row is displayed.
- The total number of Special detonators found is also displayed.
- Press the Soft Key to list all the detonators.



4. Row List View

The user can view the row list from here by pressing enter on the selected row.

- Use the **6** and **4** keys to navigate between rows
- Use Soft Keys to navigate pages and sort/filter the view as required.



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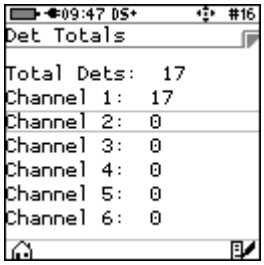
8.7. Det Totals

The list will indicate both detonators that existed in the original list and any new detonators that may have been found. The list also includes any missing detonators.

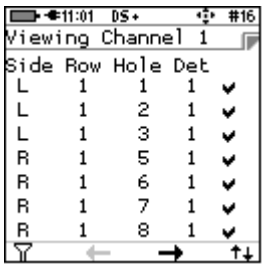
1. Main Menu
   - Press 4 GHI to select **View Design**

2. View Design Menu
   - Press 6 MNO to select **Det Totals**

3. Det Totals
   - The Det Totals screen will display a summary of total dets per channel
   - Press 2 ABC / 8 TUV to select required channel
   - Press **Enter** on selected channel to view Channel List



   - Use the **6** and **4** keys to navigate between Channels



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9 SYSTEM INFORMATION

This function enables the user to view battery charge information, current consumption, State-of-health of the battery, temperature information, hardware and software serial numbers, GPS detail and User ID.

1. Main Menu
   - Press Soft Key to view **System Info**

2. System Info - Battery
   - 100%: Battery charge information (The charging source will be displayed as either USB when a USB source is used or AUX when a wireless charger is used. Should the charger not be able to supply enough power to charge the Tagger, 'Weak Charger' will be indicated as the charging status, instead of 'Charging (USB/AUX)'.
   - Current Consumption: By convention a negative value indicates that current is being drawn from the battery.
   - Cell Status: (Good) indicates the state of health of the battery. Should the status indicate 'Low' the unit should be serviced to have the battery replaced.

NOTE	**The Tagger will switch OFF automatically when the battery capacity drops below 3% (The Tagger will display a warning at 9% and switch OFF at 3%).**

3. Temperature and the Relative Humidity as measured inside the Tagger are displayed as follows:
   - Temp: The Temperature is displayed in degrees Celsius and Fahrenheit.
   - Humidity: The Relative Humidity is displayed as a percentage.

4. System Info – Hardware Serial Number and SW Release Number
   - Press to select page right.
   - Hardware Serial Number will be displayed.
   - Software Release Number will be displayed

NOTE	**Hardware Serial number is required when Challenge Response tickets are required from the DetNet Portal.**

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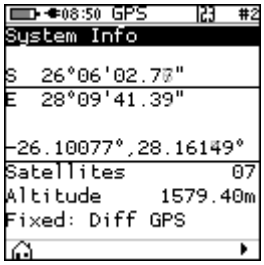
5. System Info –GPS Detail
   - Press ▶ to select page right.
   - The GPS location will be displayed.
   - Altitude and the number of satellites found will also be displayed.



6. System Info –User ID
   - Press ▶ to select page right.
   - Press to enter or edit User ID
   - Use alphanumeric characters to enter a User ID.

The User ID may be used to identify ownership of the Tagger such as the User name or site name where used.

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10 CONFIGURATION SETTINGS

10.1. DigiShot® Plus Setup

10.1.1. Autosearch Limits

This function enables the user to set the Autosearch limits, thereby ensuring the Autosearch function will search beyond (or up to) the stipulated bad or missing holes or detonators.

1. Main Menu

- Press ⚙ to select **Configuration**

2. Configuration Menu

- Press 1 to select **DigiShot® Setup**

3. DigiShot® Setup

- Press 1 to select **Autosearch Limits**

4. Default Autosearch limits are 2 missed dets and 5 missed holes.

- Use numerical keys to enter Maximum consecutive missing detonators allowed in a hole, before the search progresses to the following hole.
  Press ↵ to continue
- Use numerical keys to enter Maximum consecutive missing holes on a row before the search progresses to the alternate side or the next row.
  Press ↵ to continue
- Press 💾 Soft Key to save and 🏠 Soft Key to return to Main Menu.

NOTE	**If the Autosearch limits are set too low, numerous missing detonators or holes may result in 'Autosearch' or 'check pattern' not finding parts of the blast design when searching. Increasing the limits and repeating the search is recommended under these circumstances. However, setting the limits to high values will result in increased search times, and it may thus be desirable to lower the limits again when using the tagger on blasts with fewer or no errors.**

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10.1.2. Autotag Configuration

This function allows the user to activate or de-activate the Autotag function.

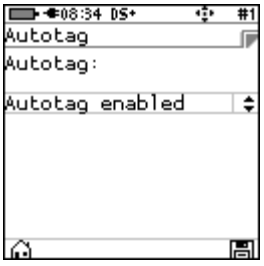
NOTE	**When the Autotag function is disabled, the Autotag Soft-key display will be greyed out in the Tagging screen.**

1. Main Menu
   - Press ⚙ to select **Configuration**

2. Configuration Menu
   - Press 1 to select **DigiShot® Setup**

3. DigiShot® Setup
   - Press 2 to select **Autotag**

4. Autotag
   - Press 2 8 to enable / disable Autotag.
   - Press 💾 Soft Key to save
   - Press 🏠 Soft Key to return to Main Menu



The Autotag function will be greyed-out on the Tagger display when disabled

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10.1.3. Extra Information Bar Configuration

This function enables the user to enable or disable the Extra Info Bar, which is displayed on the tagging screens. The information bar displays side, leakage and the signal strength of the detonator reply.

NOTE	**The information bar is turned OFF by default.**

1. Main Menu

- Press ⚙ to select **Configuration**

2. Configuration Menu

- Press 1 to select **DigiShot® Setup**

3. DigiShot® Setup

- Press 3 to select **Extra Info Bar**

4. Extra Info Bar

- Press 2 to manually Show or Hide the Extra Info Bar
- Press 8 to manually Show or Hide the Extra Info Bar
- Press 💾 Soft Key to save
- Press 🏠 Soft Key to return to Main Menu

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10.1.4. Halt on test Configuration

This function enables the user to adjust the 'halt at every error during testing' setting. When activated, this function will trigger the software to stop at each error during testing.

NOTE	**When Halt on test setting is activated, the user will have to acknowledge each error individually. The Halt on test function is turned OFF by default.**

1. Main Menu
   - Press ⚙ to select **Configuration**

2. Configuration Menu
   - Press 1 to select **DigiShot® Setup**

3. DigiShot® Setup
   - Press 4 to select **Halt on test**

4. Halt on test
   - Press 2 8 to select Halt on test or Continue on test
   - Press 💾 Soft Key to save
   - Press 🏠 Soft Key to return to Main Menu

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10.1.5. Multiple Channel Configuration

This function enables the Tagger to operate in multiple channel mode allowing the user to tag up to 1800 detonators spread across 6 channels.

NOTE	**User will not be prompted to enter channels when this option is disabled.**

1. Main Menu
   - Press ⚙ to select **Configuration**

2. Configuration Menu
   - Press 1 to select **DigiShot® Setup**

3. DigiShot® Setup
   - Press 5 JKL to select **Multiple Channel**

5. Multiple Channel
   - Press 2 ABC / 8 TUV to enable / disable Multiple Channel
   - Press 💾 Soft Key to save
   - Press 🏠 Soft Key to return to Main Menu

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10.1.6. Select Channel Configuration

This function enables the user to set the current working channel
All functions (Autosearch, test all, etc.) will prompt the user to select a channel to work with. Operations will only affect the currently selected channel and all other channels will be unaffected. During tagging however, the software will check the entire list across all channels for 'location exists' errors, to avoid duplicate detonators.

NOTE

The Select Channel function will only be available when the Multiple Channel function is enabled.

1. Main Menu
   - Press ⚙ to select **Configuration**

2. Configuration Menu
   - Press 1 to select **DigiShot Setup**

3. DigiShot® Setup
   - Press 6 MNO to select the **Select Channel** setup

6. Select Channel
   - Use the numerical keypad to enter Channel number
   - Press 💾 Soft Key to save
   - Press 🏠 Soft Key to return to Main Menu.

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10.1.7. Use Starter Dets

This function supports the use of NetShock / DriftShot Starter detonators, which will allow the user to interface to Shocktube / Nonel. To enable this function the user must select 'Use Starter dets' in the DigiShot Setup menu shown below.

1. Main Menu

- Press ⚙ to select **Configuration**

2. Configuration Menu

- Press 1 to select **DigiShot Setup**

3. DigiShot® Setup

- Press 7 to select **Use Starter dets**

4. Use Starter Dets.

- Use the arrow key 2 8 to display the **YES /NO** option as required.
  Press ↵ to continue
- Press 💾 Soft Key to save and 🏠 Soft Key to return to Main Menu

When the 'Use Starter dets' feature is activated, the Tagger will scan for Starter detonators in the Test Single Detonator, Test All, Autosearch and Check Pattern functions. If found, Starter detonators will also be displayed in the detonator list.

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10.2. Device Setup

10.2.1. Contrast

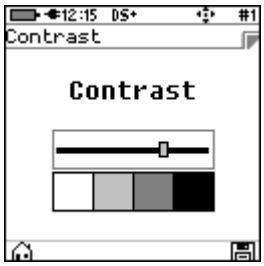
This function enables the user to adjust the LCD screen contrast

1. Main Menu
   - Press ⚙ to select **Configuration**

2. Configuration Menu
   - Press 2 ABC to select **Device Setup**

3. Device Setup
   - Press 1 to select **Contrast**

4. Contrast
   - Use the arrow key 4 GHI 6 MNO to adjust contrast.
   - Adjust to ensure the displayed contrast 'blocks' are distinguishable to allow viewing 'greyed out' versus 'bold' items. If the contrast is either too high or too low, these font differences will not be notable.
   - Press 💾 Soft Key to save.
   - Press 🏠 to return to Main Menu.



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10.2.2. Brightness

This function enables the user to adjust the LCD screen brightness

1. Main Menu
   - Press ⚙ to select **Configuration**

2. Configuration Menu
   - Press 2 ABC to select **Device Setup**

3. Device Setup
   - Press 2 ABC to select **Brightness**

4. Adjusting the Brightness
   - Use the arrow key 4 GHI 6 MNO to adjust brightness.
   - Press 💾 Soft Key to save.
   - Press 🏠 to return to Main Menu.

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10.2.3. Time Zone

This function enables the user to define the time zone. Date/time settings are controlled by GPS GMT time data but since the time zone cannot be configured automatically, it should always be set by the user in order to ensure the correct local time display.

1. Main Menu

- Press ⚙ to select **Configuration**

2. Configuration Menu

- Press 2 ABC to select **Device Setup**

3. Device Setup

- Press 3 DEF to select **Time Zone**

4. Set Time Zone

- Use the arrow key 2 ABC / 8 TUV to navigate the **TIME ZONE** options.
- Press 💾 Soft Key to save.
- Press 🏠 Soft Key to return to Main Menu.

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10.2.4. Timeouts

This function enables the user to set a time-period of inactivity before the Tagger will automatically power off to conserve battery power. The user can set the idle time between 2 and 120 minutes.

1. Main Menu
   - Press ⚙ to select **Configuration**

2. Configuration Menu
   - Press 2 ABC to select **Device Setup**

3. Device Setup
   - Press 4 GHI to select **Timeouts**

4. Auto Shutdown
   - Use 2 ABC / 8 TUV navigational keys to navigate selection.
   - Minimum of 2 minutes.
   - Maximum of 120 minutes.
   - Press 💾 Soft Key to save.
   - Press 🏠 Soft Key to return to Main Menu

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10.2.5. Language

This function enables the user to select a language preference for the DigiShot® Plus Tagger menus.

1. Main Menu
   - Press ⚙ to select **Configuration**

2. Configuration Menu
   - Press 2 ABC to select **Device Setup**

3. Device Setup
   - Press 5 JKL to select **Language**

4. Language
   - Press 1 on the keypad to select English.
   - Press 2 ABC on the keypad to select Español (Spanish).
   - Press 3 DEF on the keypad to select Français (French).
   - Press Soft Key to return to Main Menu

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10.3. Advanced Setup

The Advanced Setup menu is password protected.

10.3.1. Tagger ID

This function enables the user to set a unique Tagger ID. The Tagger ID should be unique amongst all Taggers at a site.

NOTE

The current tagger ID is displayed on the right side of the top bar on the screen (#1 in the screen depicted below).

1. Main Menu

- Press ⚙ to select **Configuration Settings.**

2. Configuration Settings Menu

- Press 3 DEF to select **Advanced Setup**.
- Use numerical keypad to enter Unique Tagger Password.
- Press **ENTER** to continue.

NOTE

Should the "Reset" Soft Key be pressed on Device Password screen, a Web Ticket will be required to obtain a new advanced password.

3. Advanced Setup

- Press 1 △ to select **Tagger ID**

4. Tagger ID

- Using numerical keypad to enter Unique Tagger ID between 1 and 32.
- Press 💾 Soft Key to save.
- Press 🏠 Soft Key to return to Main Menu.

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10.3.2. Clear Tags

This function enables the user to clear the detonator memory and remove the tag that was assigned. Connect the harness wire to the Harness wire terminals of the Tagger. The detonators should remain connected to the Harness wire.

1. Main Menu
   - Press ⚙ to select **Configuration Settings.**

2. Configuration Settings Menu
   - Press 3 DEF to select **Advanced Setup**.
   - Use numerical keypad to enter Unique Tagger Password.
   - Press **ENTER** to continue.

3. Advanced Setup
   - Press 2 ABC to select **Clear Tags**

4. Clear Tags
   - An information screen will be displayed.
   - Press Yes Soft Key to erase all detonators tags for **connected** detonators.
   - Press No Soft Key to exit without clearing detonators.

5. **Det tags cleared** message will be displayed to indicate that Tags have been cleared.
6. Press **OK** Soft Key to return to Advanced Setup Menu.

NOTE	**Use this feature with caution. Once all det tags were cleared, the detonators may need to be re-tagged from the start, which will be time consuming.**

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10.3.3. Passwords

This function enables the user to change the default password by assigning a new unique password that is known only to the user.
The DigiShot® Plus CE4 Tagger is protected from unauthorised use by assigning a password.

1. Main Menu

Press ⚙ to select **Configuration Settings.**

2. Configuration Settings Menu

Press 3 DEF to select **Advanced Setup**.
Use numerical keypad to enter Unique Tagger Password.
Press **ENTER** to continue.

3. Advanced Setup

Press 3 DEF to select **Passwords**

4. Passwords

- Press 1 to edit Device Password.
- Press 2 ABC to edit Advanced Password.

5. Passwords

Use the numerical keypad to enter **Current Password.**
Press ↵ to confirm.

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6. Passwords

- Use the numerical keypad to enter **New Password.**
- Press ↵ to confirm.

7. Passwords

- Information message confirming password changed will be displayed briefly.
- Tagger will display Password Screen.
- Press ESC to return to Advanced Menu.
- Press Soft Key to return to Main Menu.

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10.3.4. Hole Load Mode

1. Main Menu

- Press ⚙ to select **Configuration Settings.**

2. Configuration Settings Menu

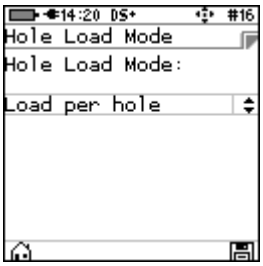
- Press 3 DEF to select **Advanced Setup**.
- Use numerical keypad to enter Unique Tagger Password.
- Press **ENTER** to continue.

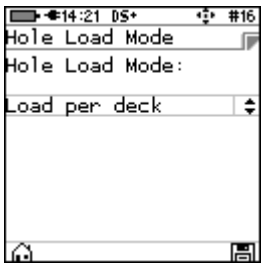
3. Advanced Setup

- Press 4 GHI to select **Hole Load Mode**

4. Hole Load Mode

- Press 2 ABC / 8 TUV to toggle between Load per hole and Load per deck
- Press 💾 Soft Key to save.
- Press 🏠 Soft Key to return to Main Menu.





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10.3.5. DigiShot Mode

1. Main Menu

- Press ⚙ to select **Configuration Settings.**

2. Configuration Settings Menu

- Press 3 DEF to select **Advanced Setup**.
- Use numerical keypad to enter Unique Tagger Password.
- Press **ENTER** to continue.

3. Advanced Setup

- Press 5 JKL to select **DigiShot Mode**

4. DigiShot Mode

- Press 2 ABC / 8 TUV to toggle between DigiShot Mode and DigiShot Plus Mode.
- Press 💾 Soft Key to save.
- Press 🏠 Soft Key to return to Main Menu.

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10.3.6. Storage Mode

The Tagger storage process is to be followed when the Tagger will be stored for an extended period.

CAUTION	**It is recommend that the Tagger be charged to 50% when placed into storage, and thereafter the unit should be charged at least every three months to 50%, to maintain the expected lifetime of the battery.**

1. Main Menu

- Press ⚙ to select **Configuration Settings.**

2. Configuration Settings Menu

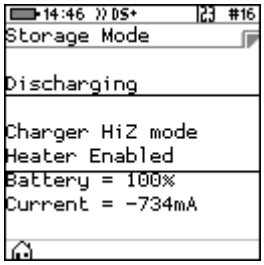
- Press 3 DEF to select **Advanced Setup**.
- Use numerical keypad to enter Unique Tagger Password.
- Press **ENTER** to continue.

3. Advanced Setup

- Press 6 MNO to select **Storage Mode**

4. Storage Mode

- When the battery capacity is more than 50%, the tagger will discharge the battery by activating additional battery draining functions such as the heating pad, to accelerate the discharge level to the required 50% charge level.
- When the battery capacity is less than 50%, the tagger will prompt the user to connect a charger to attain the required 50% charge level.
- When the tagger reaches the required 50% battery storage capacity, the tagger will automatically switch off allowing for safe storage.



NOTE	**Store the CE4 Tagger in a cool, dry place when not in use.**

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10.3.7. Read All Det Data

The Read All Det Data function enables the user to dump 4G det data to logs.

1. Main Menu

- Press ⚙ to select **Configuration Settings.**

2. Configuration Settings Menu

- Press 3 DEF to select **Advanced Setup**.
- Use numerical keypad to enter Unique Tagger Password.
- Press **ENTER** to continue.

3. Advanced Setup

- Press 7 PQRS to select **Read All Det Data**
- Dump data progress will be displayed as a percentage
- At 100% all Det data is dumped

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10.3.8. Connecting to PC

Additional software may be required from the manufacturer to support this feature. USB cable or Wi-Fi must be connected, and the PC software must be configured and activated before this function can be used.

USB and WiFi Link with PC

This function enables the Tagger to communicate via USB or WiFi to a PC.

1. Main Menu

- Press ⚙ to select **Configuration Settings.**

2. Configuration Settings Menu

- Press 3 DEF to select **Advanced Setup**.
- Use numerical keypad to enter Unique Tagger Password.
- Press **ENTER** to continue.

3. Advanced Setup

- Leave Tagger in Advanced menu and open the PC software to connect

Remote View

This function enables the user to demonstrate the Tagger in action by replicating the screen on a PC. It may be used by trainers, product presenters and document writers.

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11 TROUBLESHOOTING

11.1. Troubleshooting during Tagging

Ensure DigiShot® Plus detonator connector is pushed down properly on the Pogo pin connector before tagging detonators.

11.1.1. Leakage Warning Message

The first step in the tagging process, regardless of the mode (AUTO-TAG or SINGLE) is measuring of leakage. Should the leakage be greater than 0.50mA, a leakage warning will be displayed.

- Tagger vibrates to inform the user of an error condition.
- Press ↵ to continue or ESC to abort tagging.
- While the tagger waits for user-input, other key presses are ignored, as the user must respond to the indicated problem with ENTER or ESCAPE.

11.1.2. Fail Warning Messages

On completion of the tagging process a message is displayed indicating the success or failure of the operation. The possible failed messages could be any of the following:

a. "**Leakage too high**" - Tagger could not obtain a good det reply possibly due to the excessively high leakage detected.

b. "**Possibly many dets**" - Possibly more than one det connected. Only one det must be connected at a time.

c. "**No det reply**" – No detonator reply was detected, detonator could possibly be faulty or not connected.

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d. **“Det connection issues”** – Only a partial det reply was detected, det connection could be bad.

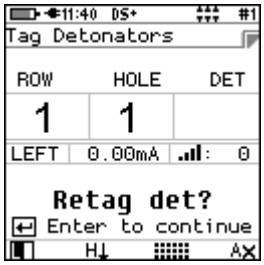
e. **“User aborted”**. User aborted when a warning message was displayed.

11.1.3. Warning Messages

Retag det?

The detonator is already tagged.

- Tagger vibrates to inform the user of an error condition.
- Press ↵ to retag with the new location or ESC to abort tagging.



Location exists.

The chosen location already exists in the detonator list. Manually adjust location according to blast plan if required.

- Tagger vibrates to inform the user of an error condition.
- Press ↵ to retag with the new location or ESC to abort tagging.

Wrong Product

Detonator connected to the Tagger is the wrong product or the detonator could be faulty.

Disconnect the detonator and allow at least 1 minute to power down completely. This will reset the detonator – Tag detonator again.

Replace the detonator with a detonator that is the correct product.

- Press ↵ to acknowledge and abort.

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Bad Status

The detonator about to be tagged tested with a bad status. Bad status indicates the detonator may have a bad fuse or other internal problems.

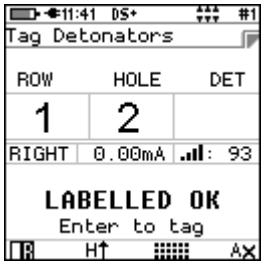
- Tagger vibrates to inform the user of an error condition.

NOTE	**It is recommended that the "Bad status" detonator be replaced.**

- Press ↵ to retag with the new location or ESC to abort tagging.

Labelled OK

A successful tagging operation will display the **LABELLED OK** message.



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11.2. Troubleshooting during Testing

11.2.1. Untagged Test

The Untagged Test connects to the factory 'untagged ID' and measures the response level. Theoretical and practical considerations should be applied to choosing an appropriate level when considering factors such as lead-in resistance, the effect of multiple detonator talkback and capacitive damping effects that weaken the modulated reply signal from the detonator. The untagged test will also measure leakage and display the result. If no untagged detonator is detected and the leakage is low the screen will display **OK – No untagged dets.**

An **Error** message will be displayed indicating:

- High leakage, and / or
- Untagged Dets Found

The untagged test is also integrated into Test All, Test Row, Check Pattern and Autosearch but there it elicits a custom error indication with the associated screen design rather than the screens displayed here.

11.2.2. Test Single detonator

Bad Status

Tested detonator has a bad status. Bad status indicates the detonator may have a bad fuse or other internal problems. Replace the detonator to avoid a possible misfire.

- Press ↵ to continue.

Fail

Tested detonator has failed to communicate with Tagger. Replace the detonator to avoid a possible misfire (see above).

- Press ↵ to continue.

11.2.3. Test All/Test Row

Det Misssing

Detonator that was previously in the design has failed to reply possibly due to detonator not connected or faulty. Check the det connection and test the detonator individually.

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Bad Status Dets

Detonators in the design has tested with a bad status. Bad status indicates the detonator may have a bad fuse or other internal problems. Replace the detonator to avoid a possible misfire.

NOTE	***Failures may be the result of cable damage, connector or other problems.***

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11.3. Basic causes of leakage

- Poorly made joints when joining Harness Wire.
- Re-using Harness Wire.
- Leakage occurs when a damaged Harness Wire lies in water or emulsion. The water and emulsion are both conductive substances that can result in leakage. The same can occur if a connector is left submerged in water or emulsion indefinitely. It is advisable to raise the connectors off the ground, or at least away from standing water, if the ground conditions are very wet.
- DigiShot® Plus detonator down hole wire – holes not correctly de-sludged, rubbing of down hole line against hole wall, bent cable when lowering booster into a hole
- Detonator cable damaged around the insulation exposing the steel wire
- Ingress of water or moisture into connector
- Harness wire not properly secured inside connectors
- Short circuits occur when the harness wires are exposed and touch each other.
- SHORTS are typically identified by very high leakage errors - >19mA

It is advised that once the system is tagged, tested and found to be ready for blasting that the connected control equipment is switched off until blasting time to reduce the likelihood of leakage caused by corrosion.

These errors can be located and rectified using the Leakage Test in conjunction with a Binary Search.

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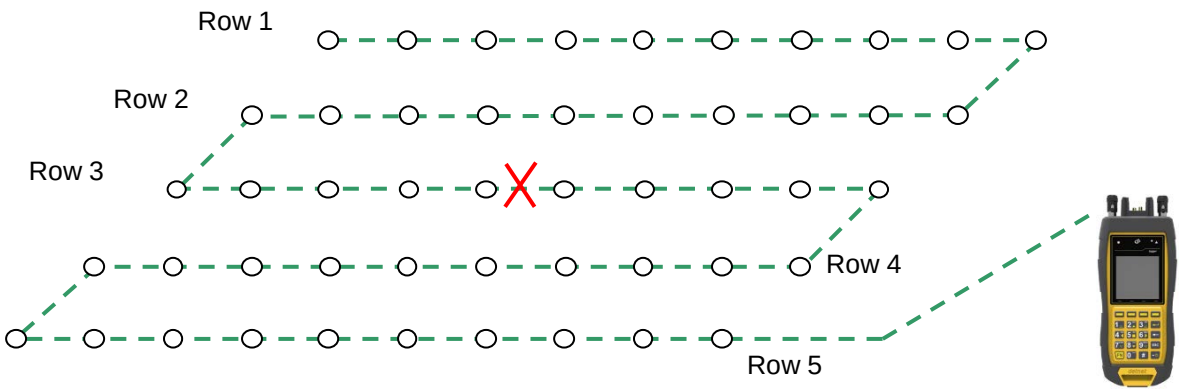
11.4. Troubleshooting during Installation

11.4.1. Binary Search

Untagged Detonators
Conduct a binary search by breaking down the blast into manageable sections, to locate untagged detonators.



The Binary Search is conducted as follows:

1. Assume Row 1 above has an untagged detonator connected but its location is unknown and it needs to be found.
2. Divide the blast in half and cut the surface harness at mid-point.
3. Connect the DigiShot® Plus Tagger and check the back half for untagged detonators. Should the DigiShot® Plus Tagger display NO UNTAGGGED DETONATORS, proceed with following step.
4. Connect the DigiShot® Plus Tagger and check front half for untagged detonators. Should the Tagger now display UNTAGGGED DETONATORS it can be deduced that the problem is located in the front half of the blast. Repeat the partitioning process there.
5. Divide the front half and test backward and forward from the centre to narrow down the search area.
6. By repeating this process, the fault is narrowed down to a small and manageable area. At this point DigiShot® Plus detonators may be disconnected from the surface harness and tested one at a time using the **TEST SINGLE DETONATOR** facility to locate the untagged detonator.
7. Once the untagged detonator is found, tag the DigiShot® Plus detonator according to blast plan and ensure all broken wires are correctly reconnected and insulated with tape to prevent leakage problems.
8. Test Harness Wire to ensure all DigiShot® Plus detonators have been identified and detected.

Alternative method:
If an existing blast plan is available, use the Autosearch function and check the blast summary against the blast plan to determine which row has a problem. The detonator count on that row will be incorrect.
Examine the detonator list for that row to determine which detonator in that row is missing.
There is a strong possibility that this is the untagged detonator thus checking for the untagged detonator as detailed in this alternative method may be easier than performing the binary search.

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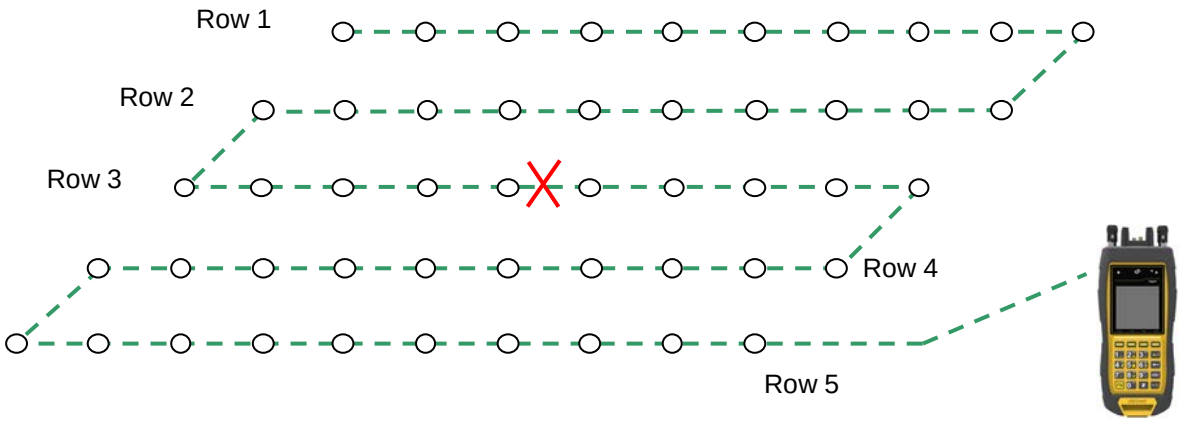
11.4.2. High Leakage

Conduct a binary search by breaking down the blast into manageable sections to locate high leakage.



The Binary Search is conducted as follows:
Assume Row 5 has an exposed wire in surface harness in water causing a high leakage reading on the DigiShot® Plus Tagger.

1. Divide the blast in half and cut the surface harness at mid-point.
2. Connect the DigiShot® Plus Tagger and check back half for leakage. Should the DigiShot® Plus Tagger display high leakage it indicates a fault present.
3. Connect DigiShot® Plus Tagger and check front half for leakage. Should the DigiShot® Plus Tagger display satisfactory leakage it indicates no fault present.
4. Divide the front half and test backward and forward from the centre to narrow down the search area.
5. By repeating this process, the fault is narrowed down to a small and manageable area.
6. Conduct a visual inspection of the surface harness to locate the fault.
7. Fix the problem ensuring all wires are correctly sealed with insulation tape to prevent further leakage problems.
8. Test the surface harness to ensure all faults have been fixed

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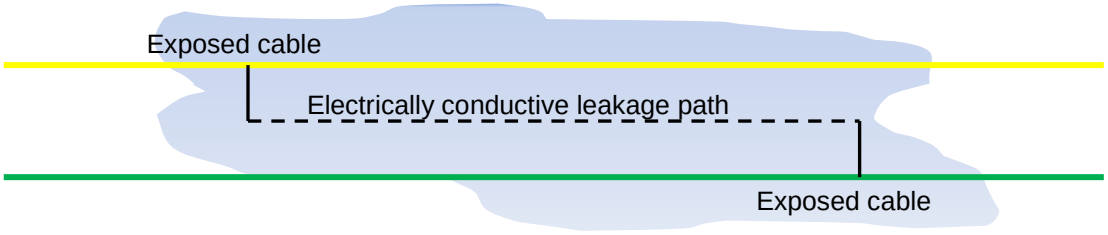
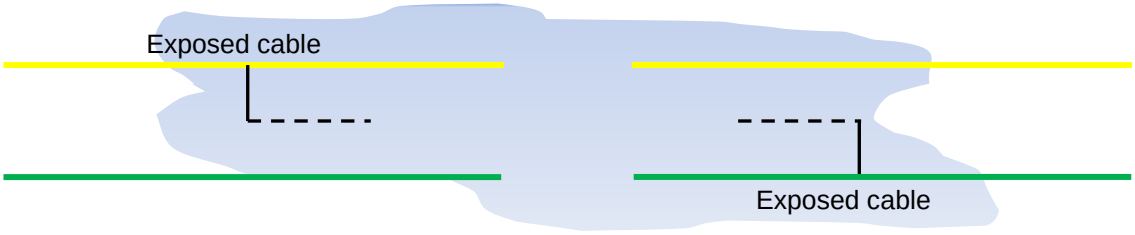
11.4.3. Leakage through conductive materials

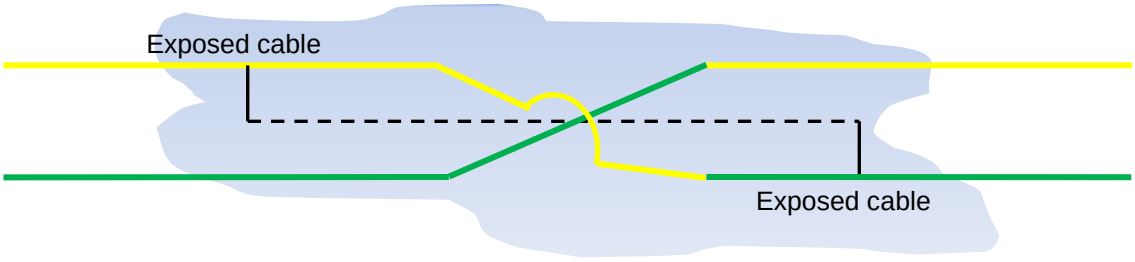
When an individual string of detonators is tested with a Tagger, the leakage reading is within specification, however, when all strings are connect together, the leakage value is outside the acceptable limit indicating that the accumulative leakage value is now outside acceptable parameters. The sum of the leakage on all the strings is greater than the acceptable level.
Damaged surface harness wire insulation and/or detonators cables cause resistance between the surface harness wires when lying in an electrically conductive material which results in high leakage.



The best way of resolving this problem is by conducting a binary search as follows.
Divide the blast in half, cut the surface harness at mid-point.



Connect DigiShot® Plus Tagger and check the rear half of the installation for leakage, Tagger displays satisfactory leakage.
Connect DigiShot® Plus Tagger and check front half of the installation for leakage, Tagger displays satisfactory leakage.
Reconnect the break in the surface wire / bus and retest surface harness, DigiShot® Plus Tagger displays high leakage indicating fault present.
Return to mid-point break, remove joint in surface harness.



Re-join the surface harness wire by crossing over the wires, **yellow wire** to **green** and **green wire** to **yellow**.
High leakage is reduced because the exposed wires A and B are now on the same line.
Ensure all wires are correctly insulated with tape to prevent further leakage problems.
Test surface harness wire to ensure leakage is within acceptable limits.
If high leakage is still present, split the blast onto separate channels in the middle of the blast.

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12 SPECIFICATIONS

12.1. Temperature Limitations

The following temperature limitations apply to the DigiShot® Plus Tagger:
Storage temperature: -20˚C / -4˚F to +60˚C / +140˚F
Operational temperature: -30°C/ -22°F to +60°C / +140°F
The DigiShot® Plus Tagger should never be exposed to direct sunlight for long periods.

12.2. Battery Life

Battery life is influenced by the conditions in which the DigiShot® Plus Tagger operates.
Lower temperatures can dramatically reduce the capacity of the battery.

12.3. Storing the DigiShot® Plus Tagger

Should the Tagger be stored for an extended period, it is recommend that the Tagger be charged to approximately 50%. Thereafter the unit should be charged at least every three months, to 50%, to maintain the expected lifetime of the battery.

Refer to Tagger Storage Mode description under General Information in this manual for detailed information.
Store the DigiShot® Plus Tagger in a cool, dry place when not in use.

12.4. Cleaning the DigiShot® Plus Tagger

When cleaning the DigiShot® Plus Tagger body, wipe gently using a soft, dry cloth.
Dust on the screen should be blown off before gently wiping with a soft, dry cloth so as to avoid scratches.
Ensure the Pogo pin connector and Harness Wire terminals are clean and dust free
If the terminals are exposed to explosives and contaminated or worn, the top connector adapter should be replaced to avoid communication errors.

12.5. Electrostatic Discharge, Over Voltage, Over Current and EMP Immunity

The system is also designed to be immune (within limits) to Radio Frequency Interference (RF) but it is advised that two-way radios be kept at least 5m away from control equipment (Blasters) during Programming, Arming and Firing as communication between the blaster and DigiShot® Plus detonators may be corrupted.

12.6. Inherent Safety

DigiShot® Plus Taggers are said to be INHERENTLY SAFE because they cannot produce the necessary minimum required firing voltage to blast the electronic DigiShot® detonator. It is also unable to produce the encoded FIRING SIGNAL necessary to initiate a blast.

The DigiShot® Tagger must NEVER be connected to a normal electric detonator and should never be connected to detonators while being charged.

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12.7. Safety Warnings

Batteries may leak or explode if incorrectly handled.
Only use batteries approved for use in the DigiShot® Plus Tagger.
Do not expose the battery to an open flame or excessive heat.
Replacing external batteries in the battery pack must be done in a safe and dry place to prevent ingress of moisture or condensation into the battery pack enclosure.
Do not apply undue pressure to the LCD screen as this could damage the Tagger or cause a malfunction.
Should the LCD screen break, care should be taken to avoid injury from broken glass and to prevent liquid crystal from the screen touching the skin or entering the eyes and mouth.

12.8. Maximum Dets vs Leakage for successful Blasting

High leakage levels can result in misfires of the DigiShot® Plus detonators. Refer to the scalability chart contained in UTM-00329 - Additional System Information for detailed information.

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