

TRUSHOT™



BOART LONGYEAR™

TruShot™ Magnetic Survey Tool



THE TRUSHOT ADVANTAGE

SURVEY IS EASIER WITH TRUSHOT

Assemble the TruShot tool with Boart Longyear's high quality running gear and deploy down the hole for accurate azimuth and dip measurement. Ability to complete single-shot, multi-shot and orientation surveys at all angles up to a 4000-meter depth. Captured data is communicated wirelessly from the tool to the easy-to-read, handheld device.

ACCURATE AND IMMEDIATE

Produce accurate surveys with user-adjustable magnetic anomaly detection to flag and filter erroneous data points. Because data is provided in open format, it is immediately accessible and ready to export directly from survey tool and handheld to USB.

TRUSHOT FEATURES

1. WIRELESS COMMUNICATION

Tool and handheld reliably communicate within seconds, eliminating the need for disassembly to start or end a survey.

2. CHARGEABLE, EASY-TO-READ HANDHELD

Conveniently charge the handheld through USB. A back-lit screen is easy to read with step-by-step instructions and intuitive workflows to minimize operational errors. Large, glove-friendly buttons and vibration feedback make it easy to operate.

3. USB EXPORT DIRECT FROM HANDHELD

Export raw data directly to USB in generic .csv or .dif formats.

4. TRUSHOT VIEW SOFTWARE

Included software allows for quick viewing and assessment of each survey shot. Captured downhole data is easily exported to all industry-standard formats.

5. ROBUST AND DURABLE

The tool remains calibrated and functional even after prolonged field use. Fully sealed and waterproof.

6. MULTI-FUNCTIONAL

Single shot, multi shot and orientation survey functionality.

7. BATTERY OPTIONS

Choose between a long-lasting single-use battery, or a rechargeable battery option.

Quality and Technical Specifications



Controlling the Quality



OVERVIEW

The accuracy and performance of a survey tool depends largely on the level of quality control exercised during usage and the degree of sensor calibration. Sensor calibration is confirmed by the presence of a unique certificate of calibration corresponding to the serial number permanently shown on the brass tool body for every TruShot tool.

The actual results shown are indicative of tool calibration and product specifications at the time of shipment from Boart Longyear facilities.

It is valid for a 1 year period for tools supplied by Boart Longyear or an authorized distributor and is void for any equipment which has been modified or abused.

- 1 Detailed product and gauge information
- 2 Results from factory measurements
- 3 Test results from calibration and confidence check
- 4 Confidence check results verifying tool is operational in an indicative calibration verification fixture
- 5 Certification issued prior to shipping and valid for 1 year

S/N: _____

TRUSHOT™ CERTIFICATE OF CALIBRATION

The tool identified by the serial number permanently shown on the body has been calibrated and tested according to global Boart Longyear™ manufacturing standards and product specifications. All parts used in the manufacture and assembly conform to Boart Longyear specifications and can be traced by quality control records.

The actual results shown are indicative of tool calibration and product specifications at the time of shipment from Boart Longyear facilities. It is valid for tools supplied by Boart Longyear or an authorized distributor and is void for any equipment which has been modified or abused. Refer to the product user guide for more information on operational verification before and after usage.

1 IDENTIFICATION AND TRACEABILITY		2 ERROR LEVELS (RMS)			
Model:		Accelerometers:			
Software Version (OS):		Dip Error ($\leq \dots^\circ$)			
Software Version (CAL):		Roll Error ($\leq \dots^\circ$)			
Tool S/N:		GTot % Error ($\leq \dots\%$)			
Module S/N:		Magnetometers:			
Accelerometer Batch Code:		Dir. Error ($\leq \dots^\circ$)			
Magnetometer Batch Code:		M% Error ($\leq \dots\%$)			
Calibration Temp:		M.Dip Error ($\leq \dots^\circ$)			
Date Calibrated (MM/DD/YYYY):		4 CONFIDENCE CHECK: POSITION 1			
Calibrated by:		Roll:	M-Tot	Azimuth	Dip
3 CALIBRATION EQUIPMENT: ACCELEROMETERS		Ref.			
Equipment ID:		0°			
Date Certified (MM/DD/YYYY):		90°			
CALIBRATION EQUIPMENT: MAGNETOMETERS		180°			
Equipment ID:		270°			
Date Certified (MM/DD/YYYY):		CONFIDENCE CHECK: POSITION 2			
CONFIDENCE CHECK EQUIPMENT		Roll:	M-Tot	Azimuth	Dip
Equipment ID:		Ref.			
Date Certified (MM/DD/YYYY):		0°			
TEST RESULTS		90°			
Tool Status:		180°			
Certified by:		270°			

5 ISSUE DATE: _____

RECOMMENDED RECERTIFICATION DATE: _____

Authorizing Signature: _____
First Name, Last Name

Revision Date: 12 Feb 2015
5700302 B

Introduction to the Equipment





SURVEY TOOL OVERVIEW

- TruShot is a magnetic survey tool with single shot, multi shot and orientation survey capability.
- A Ø35mm OD non-magnetic brass tube houses the internal tool electronics and a user replaceable battery.
- There are 4 optical communication slots which are used to wirelessly communicate with the handheld without disassembling the tool.
- The tool turns on and off automatically based on detected movement. When it is on, a red light will flash from the communication windows. It will enter stand-by mode after five minutes of inactivity.
- The serial number engraved on the tool body must be clearly legible. When it begins to blend with the tool diameter, the brass tool body should be replaced by a Boart Longyear service technician.



HANDHELD OVERVIEW

- The TruShot handheld is used to start, retrieve and export survey data from the downhole instrument.
- It is a robust device with glove friendly buttons and tactical vibration feedback.
- Current and past survey data can be viewed on the handheld.
- It can be safely charged from the included USB charging accessories and standard usb power supplies, including most mobile power packs.
- It can also be charged on a TruCore charging dock.
- Ensure handheld USB port cover is secured in place when not in use to keep it clean and free of debris. Do not use harsh chemicals, solvents or cleaners as they may attack the plastic body and sealing gaskets.





HANDHELD OVERVIEW *continued*



Display

The home screen is the first screen displayed after the handheld is powered up. It will display either a prompt to create a hole, or the data from the deepest survey from the active hole along with other important indicators.

The handheld battery indicator is displayed at the top right corner of the screen.

The hole ID, depth, dip, temperature and azimuth from the last survey of the active hole is displayed.

The time, date and help icon is displayed across the bottom of the screen.

Key Pad

The key pad consists of 15 buttons, individually raised from the surface of the handheld.

Each button is labeled with a symbol corresponding to an intended action. For example, the start button will initiate a survey and the stop button will end it. Once a workflow has been initiated, the required button press to proceed to the next action will be indicated at the bottom of the screen with a corresponding button symbol.

Handheld Overview



BUTTON FUNCTIONALITY



POWER: Hold to turn the handheld on/off



START: Start or resume a single or a multi shot survey.



GET: Transfer survey data from the TruShot tool to the handheld.



VIEW: Display survey data of the selected hole.



HELP: Display the help menu when icon is visible.



HOLE: Create a new hole, delete a hole or change the active hole.



SEND: Transfer survey data from the handheld to a USB memory stick.



STOP: End or pause a survey.



SETUP: Change operational and hardware settings.



NO: Reject an active question or prompted option on the screen.



YES: Accept an active question or prompted option on the screen.

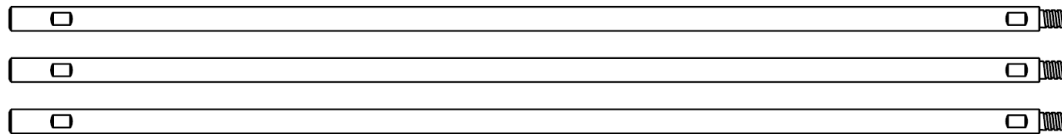


ARROWS: Browse or change selections as indicated on the screen.



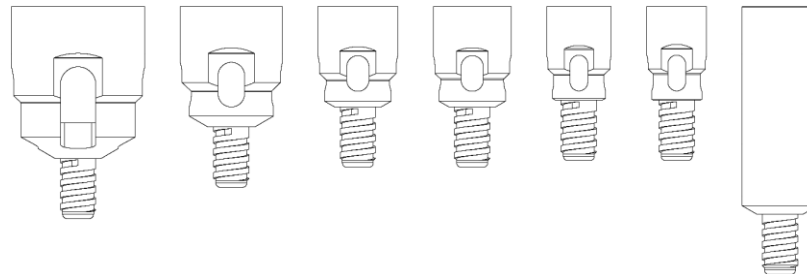
NON-MAGNETIC EXTENSION RODS

- Non-magnetic aluminum extension rods with E thread connections provide the recommended separation distance between the TruShot instrument and a magnetic interference source.
- A minimum of 4.5m or three 1.5m rods are recommended to separate the tool from magnetic objects (e.g. rods, drill rig, bit etc).
- Damaged or worn threads can cause decoupling when in use. Inspect male and female threads on either end of the TruShot tool and running gear for signs of wear or damage. Clean threads prior to assembly to minimize thread wear and damage.



INNER-TUBE ADAPTERS

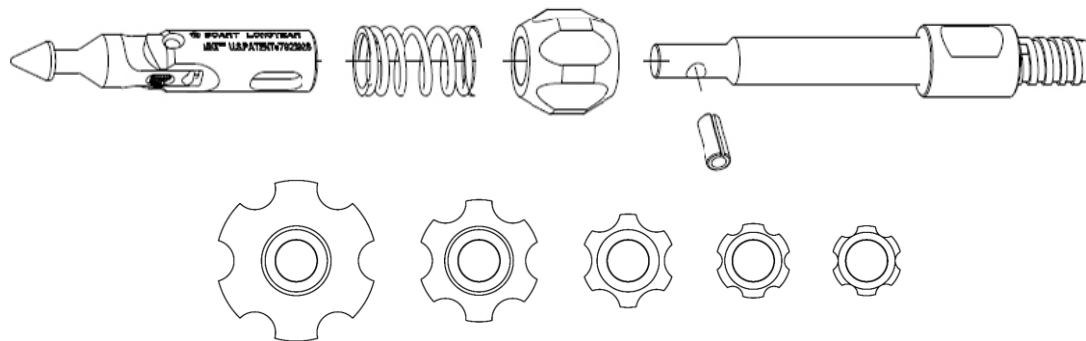
- Inner-tube adapters allow the TruShot survey system to be attached to the drill string or coupled to the inner-tube and pumped into holes. These adapters are available to fit all common size requirements.





LANDING COLLAR AND OVERSHOT ADAPTERS

- The landing collar is used in diamond drilling applications to engage the survey assembly behind the bit allowing the tool and extensions to protrude a safe magnetic distance (4.5m) beyond the rods.
- Interchangeable bit stops are available to fit all standard Q™ sizes. The default configuration features a standard MKII™ spearhead with optional box type couplers for both BQ™ and NQ™ overshot sizes.
- The bit stops should not be smaller than the inside diameter of the drill bit in use and should always be larger than the core sample. Inspect for signs of cracks, deep pitting (greater than 3mm), and wear near the landing collar spring and shoulder. If the bit stop is no longer cylindrical (i.e. wear on one side only – flat faced) they should not be reused.
- Bit stops must always be installed before the spring. Reversing the order may cause serious damage to the equipment.



Warning:

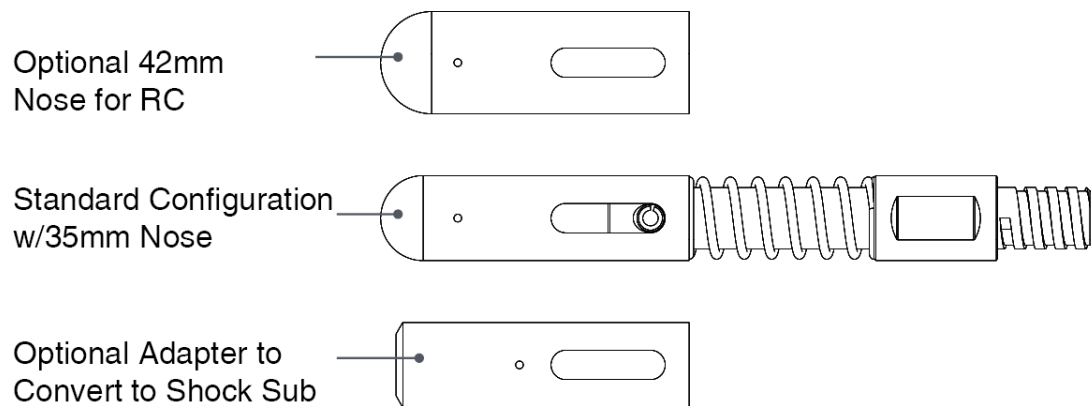
Once a bit stop has been installed, the spearhead or landing collar adapter are spring loaded and may eject at speed. Wear proper PPE and use the pin punch tool to control the spearhead/adapter after the pin has been removed. Always stay out of the line of fire.

Equipment Overview



SHOCK ABSORBER

- The shock absorber is used to help protect the tool against axial impact in the event an obstacle is encountered as the tool enters the hole or to provide additional attenuation when landing in RC or orientation survey applications.
- The shock absorber is not meant to protect against lateral loads or an axial drop in dry holes. With the shock sub adapter installed, the assembly can be installed inline with the TruShot tool and extension rods in RC applications.
- Ensure shock absorbers are free from packed mud or debris that could limit compression and energy absorption.



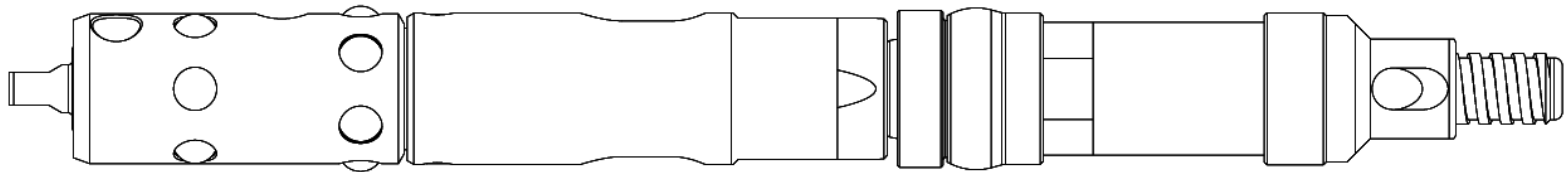
Warning:

The shock absorber nose or shock sub adapter are spring loaded and may eject at speed. Wear proper PPE and use the pin punch tool to control the spearhead/adapter after the pin has been removed. Always stay out of the line of fire.



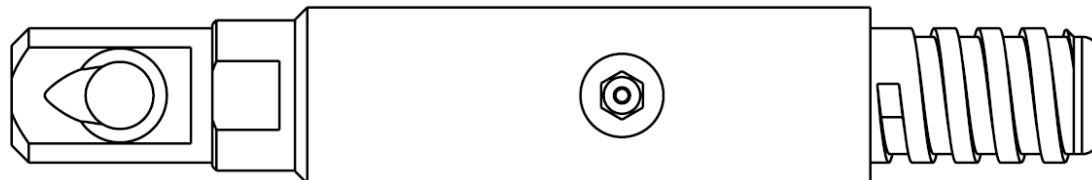
PUMP-IN HOLD-BACK PLUG

- The hold-back plug is pumped to the end of the rod string where it lands and holds on the outer tube during a single or multi shot survey.
- Once pumped in, the hold-back mechanism cannot be disengaged until the rods are retrieved which prevents accidental run-away or expulsion due to gravity, ground-source fluid or gas pressure during the survey.
- The hold-back plug can be used with all wireline drill rigs at any hole angle.



WIRELINE SWIVEL

- The wireline swivel can be used in place of the landing collar when surveying in open holes. It has a non-magnetic brass body and can be coupled directly to the aluminum extension rods.





TRUSHOT™ DIGITAL SURVEY

QUICK START GUIDE

Important Information to a quality Survey



OVERVIEW

The following list contains general product information and best practices to be kept in mind when using TruShot.

- 1 Ensure equipment is set up correctly for the chosen survey method.
- 2 Before starting a survey, verify the time/date, depth units, temperature, and magnetic reference are set up correctly for the hole selected.
- 3 If a survey is attempted before any holes are created, the handheld will display a prompt to create a new hole.
- 4 The handheld can store up to 32 different holes at the same time.
- 5 Each hole can store up to 2,048 survey points with supporting data.
- 6 When a hole is created it will become the current (or active) hole.
- 7 There can only be one current hole in use and all surveys go into this hole. The current hole name is displayed on the home screen.
- 8 To change the current hole or create a new hole, press the hole button and follow the prompts.
- 9 A hole and its survey data can be viewed but not edited via the handheld.
- 10 After the completion of a survey, always retrieve the data from the tool as soon as possible to maximize battery life.
- 11 Survey data should be viewed on a PC for confirmation before deleting a hole on the handheld.
- 12 When TruShot is in standby mode, it will turn off after 5 minutes if no movement is detected.
- 13 The TruShot tool and handheld retains all data if the battery becomes depleted in operation.

Trushot™ Survey Process Overview



1 Setting Up The Handheld

Setting Up The Handheld

- TURN ON HANDHELD**
Press and hold to turn on
- CREATE HOLE**
Press and follow prompts
- CONFIGURE SETTINGS**
Press to review or modify settings



2 Turning On The Tool

Turning On The Tool

- SHAKE TOOL TO EXIT SLEEP MODE**
Trushot will enter sleep mode when undisturbed for prolonged periods. Trushot is ready to use when the LED flashes red.

3 Starting A Survey

Starting A Survey

- CHOOSE SURVEY**
Press to choose survey type and follow a screen to complete

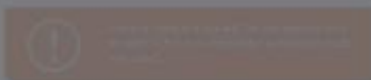
- POINT HANDHELD TO TOOL**
When prompted by the handheld, point at the communication receiver to initialize the tool.



4 Taking A Survey

Taking A Survey

- DEPLOY TOOL IN THE HOLE**
Verify the installation of marking gear for the application and center in the hole.



- TAKE THE SURVEY**
Once the tool is at the desired survey location, take the survey by following the handheld prompts.



5 Completing A Survey

Completing A Survey

- END SURVEY**
Press and follow prompts

- GET DATA**
Upon completing the survey, retrieve the tool from the hole. Follow the handheld prompts and get the data.



6 Viewing and Recording Survey Results

Viewing and Recording Survey Results

- VIEW SURVEY DATA**
Press to view survey results. Press to return to survey and to record.



7 Exporting Survey Results

Exporting Survey Results

- SEND DATA**
Press (H) memory stick press the send button and follow prompts to export.



- VIEW AND ANALYZE IN TRUSHOT VIEW**
Data can be imported into Trushot View or opened directly in Microsoft Excel.



STEP 1: Setting up the Handheld



OVERVIEW

Before beginning a survey for the first time, a hole must be created within the handheld to store the survey data and the time/date, depth and temperature units are set up correctly for the hole selected.



TURN ON HANDHELD

Press and hold to turn on



CREATE HOLE

Press and follow prompts



CONFIRM SETTINGS

Press to review or modify settings

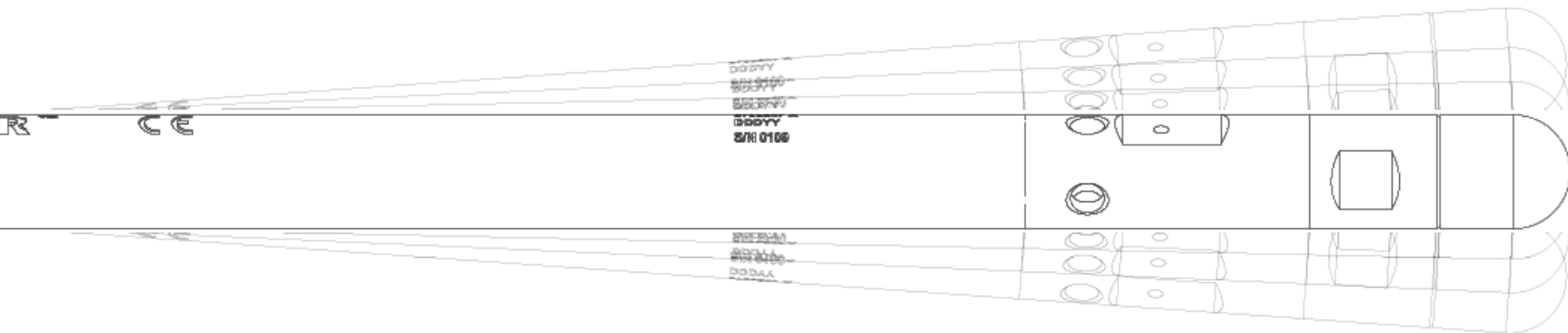


STEP 2: Turning on the Tool



SHAKE TOOL TO EXIT SLEEP MODE

TruShot will enter sleep mode when undisturbed for prolonged periods. TruShot is ready to use when the LED flashes red.



STEP 3: Starting a Survey



OVERVIEW

Pressing the start button on the handheld will prompt for the selection of a **single shot** or **multi shot** survey. After confirming the selection, the infrared communication window on the top of the handheld must be pointed towards one of the four communication windows on the tool to initialize the survey.

Ensure optical communication window is free from dirt and debris. Rinse with freshwater to remove any blockages.



CHOOSE SURVEY

Press to choose survey type and follow prompts to complete

POINT HANDHELD TO TOOL

When prompted by the handheld, point at the communication window to initialize the tool.



STEP 4: Taking a Survey

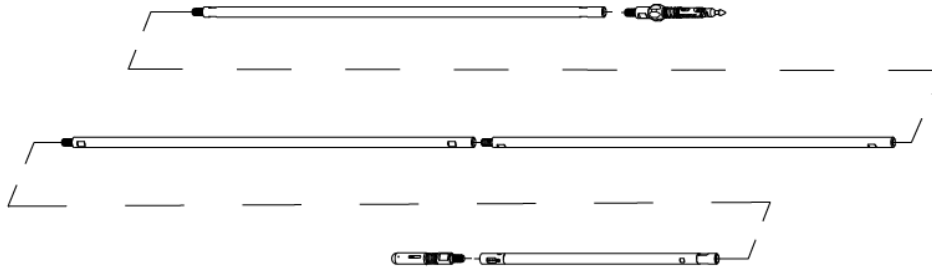


OVERVIEW

Assemble the tool and running gear for the required application and deploy the tool in the hole. Once the tool is at the desired survey location, take the survey by following the handheld prompts.

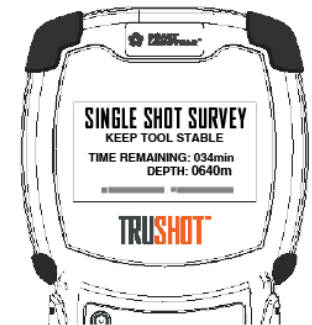
DEPLOY TOOL IN THE HOLE

Verify the installation of running gear for the application and deploy in the hole.



TAKE THE SURVEY

Once the tool is at the desired survey location, take the survey by following the handheld prompts.



Ensure rods are pulled 7m off bottom and at least 4.5m non-magnetic extension rods are used.

STEP 5: Completing a Survey



OVERVIEW

If taking a **single shot** survey, retrieve the tool directly after the handheld has indicated the survey is complete and press the get data button on the handheld and point to the tool to download it.

If taking a **multi shot** survey, press the STOP button upon completing the last survey station, retrieve the tool and press the GET button on the handheld and point to the tool to download it.



END SURVEY

Press and follow prompts



GET DATA

Upon completing the survey, retrieve the tool from the hole.

Follow the handheld prompts and get the data.



STEP 6: Viewing and Recording Results



OVERVIEW


Once the survey data has been retrieved from the tool, it can be viewed on handheld display. Pressing the VIEW button once will show the survey report of the current hole. The up and down arrows can be used to scroll between previous surveys. Pressing VIEW a second time will toggle between the default survey screen and the secondary screen showing tool face data & temperature.

The survey data can be then be recorded on a drill hole survey record pad or downloaded to a USB key.




VIEW DATA

Press and review results.
Record on survey pad as required

 SURVEY RESULTS	
HOLE ID: HOLE 002	
DEPTH: 0050m	M-TOT: 55297
AZI: 49.1°	M-DIP: 55298
DIP: -45°	G-TOT: 9999
◀▶ : SELECT ✓ : CONFIRM ✕ : CANCEL	

Default survey screen

 SURVEY RESULTS	
HOLE ID: HOLE 002	
DEPTH: 0050m	Mtf: 359.1°
AZI: 49.1°	Gtf: 5.8°
DIP: -45°	T: +49.1°
◀▶ : SELECT ✓ : CONFIRM ✕ : CANCEL	

Secondary survey screen



TRUSHOT™ DRILLHOLE SURVEY RECORD

Project/Property: _____
Hole ID/Reference: _____
Surveyed by: _____

TOOL S/N		HOLE DEPTH		PULL BACK	
DATE	TIME	STATION	DEPTH	AZIMUTH	
DIP/INCLINATION	ROLL (TOOLFACE) REL TO DIP		ROLL (TOOLFACE) REL TO MAG NORTH		
MAGNETIC FIELD		TEMPERATURE		OTHER	
WEDGE INFORMATION					
NOTES					

STEP 7: Exporting Survey Results



OVERVIEW

Survey data can be exported directly from the handheld to a USB memory stick by pressing the SEND button and choosing the desired hole to export the data from. Once the data is transferred to the memory stick, it can be opened directly in Excel or TruShot View survey software.



SEND DATA

Insert USB memory stick, press the send button and follow prompts to export.



The default export file format can be changed in the settings menu.



VIEW AND ANALYZE IN TRUSHOT VIEW

Data can be imported into TruShot View or opened directly in Microsoft Excel.



Applications & Deployment Methods



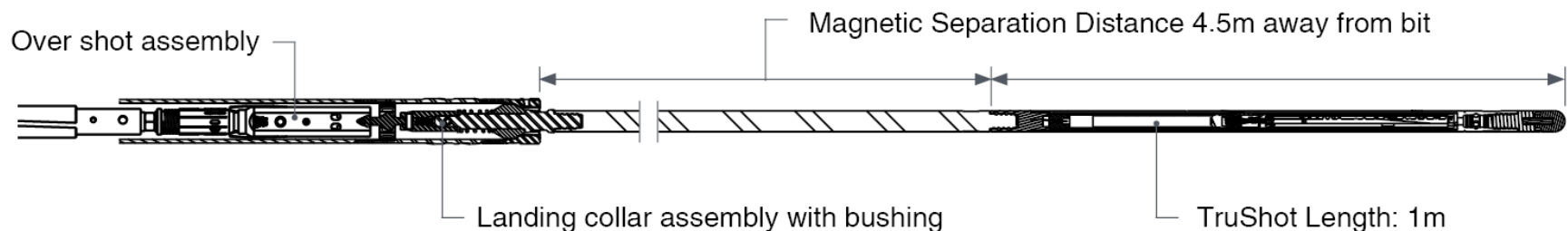


OVERVIEW

TruShot should be deployed according to established best practices and standard work procedures for the job site. Prior to using the TruShot survey system, a site-specific risk assessment should be completed. The procedures and methodology outlined in the following sections are recommendations only.

Wireline Diamond Drilling

In standard wireline diamond drilling applications rods should be pulled 7m off bottom prior to the survey. TruShot can then be deployed through the bit ahead of 3 non-magnetic extension rods. The required running gear and deployment method will depend on the orientation of the hole.

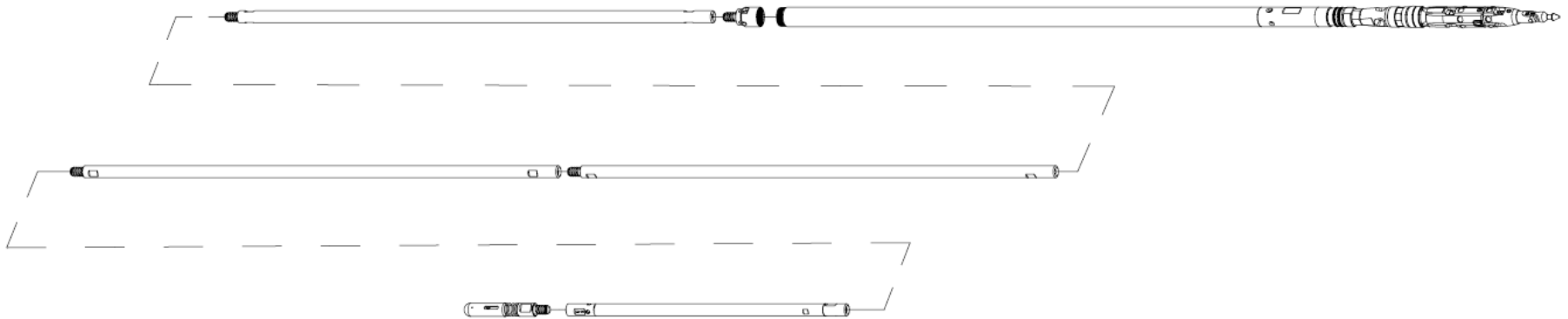


Applications & Deployment Methods



Pump-In Method

The pump-in deployment method is typically used in underground drilling applications where a complete range of hole configurations is possible. Required equipment includes the TruShot survey tool with shock absorber installed, three 1.5m extensions and an inner-tube adapter as shown below:



Warning:

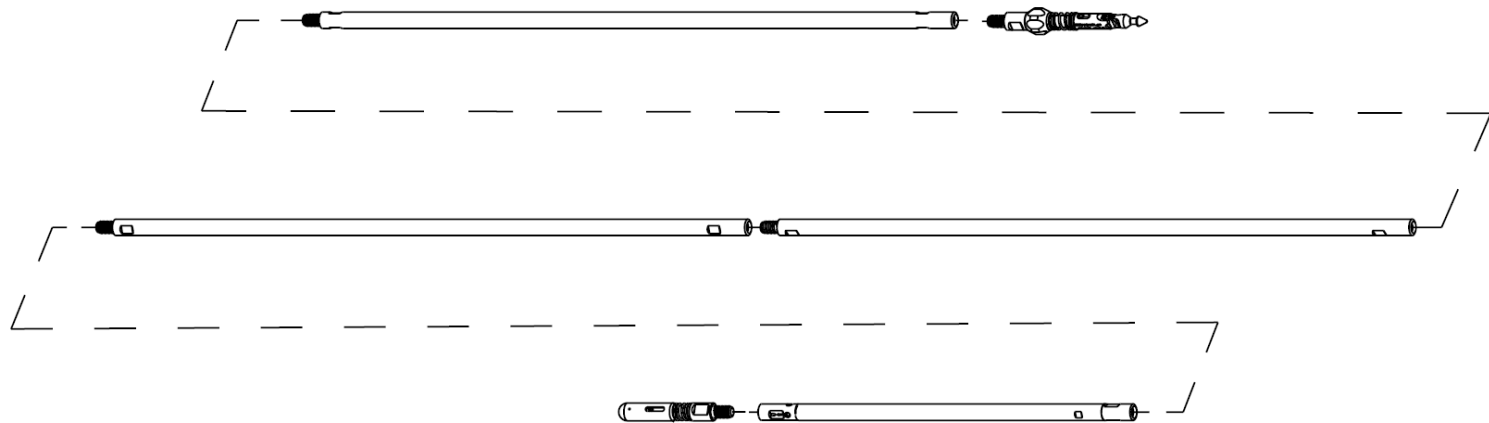
Battery cover and all running gear should be tightened with supplied wrenches. The tool must be oriented such that orientation arrow symbol is inserted into the hole first.

Applications & Deployment Methods



Gravity Method

The gravity drop deployment method is typically used in surface drilling applications where inclinations range from vertical to approximately 45°. Required equipment includes the TruShot survey tool with shock absorber installed, three 1.5m extensions and the landing collar with the appropriately sized bit stop installed.



Note:

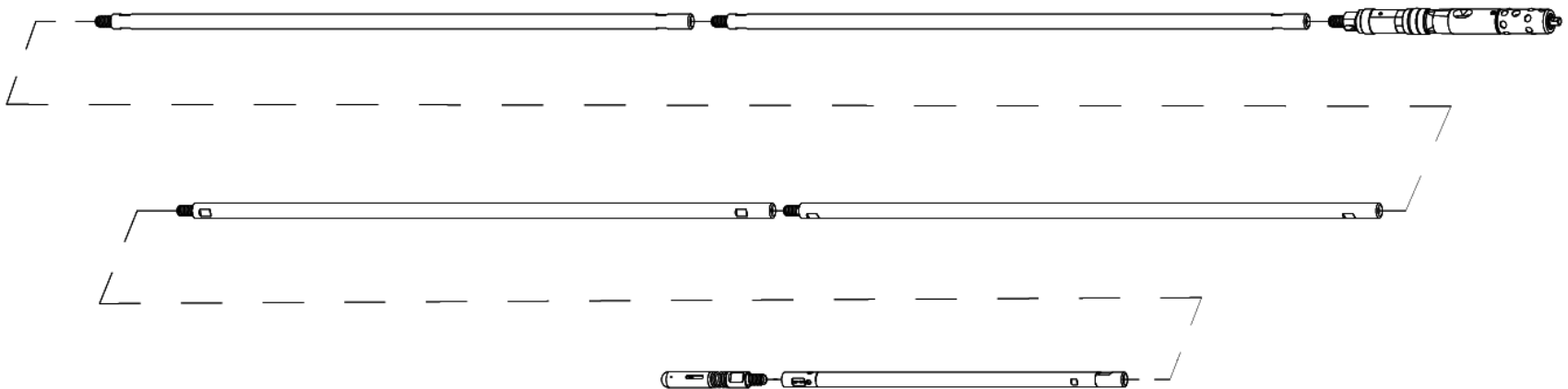
The overshoot assembly can be used to lower the TruShot in conjunction with the landing collar equipped with an MKII™ spearhead installed. It must be released and recovered before rods are pulled.



Pump-In Hold-Back Plug

The hold-back plug can be used with all wireline drill rigs at any hole angle to address risk of tooling expulsion due to gravity or ground source fluid or gas pressure. Once pumped in, the hold-back mechanism cannot be disengaged until the rods are retrieved which prevents accidental run-away.

Required equipment includes the TruShot survey tool with shock absorber installed and the required number of 1.5m non-magnetic extension rods to compensate the length of the outer tube. For example, use four (1.5m/5ft tube) or five (3.0m/10ft tube) 1.5m extensions as shown below.

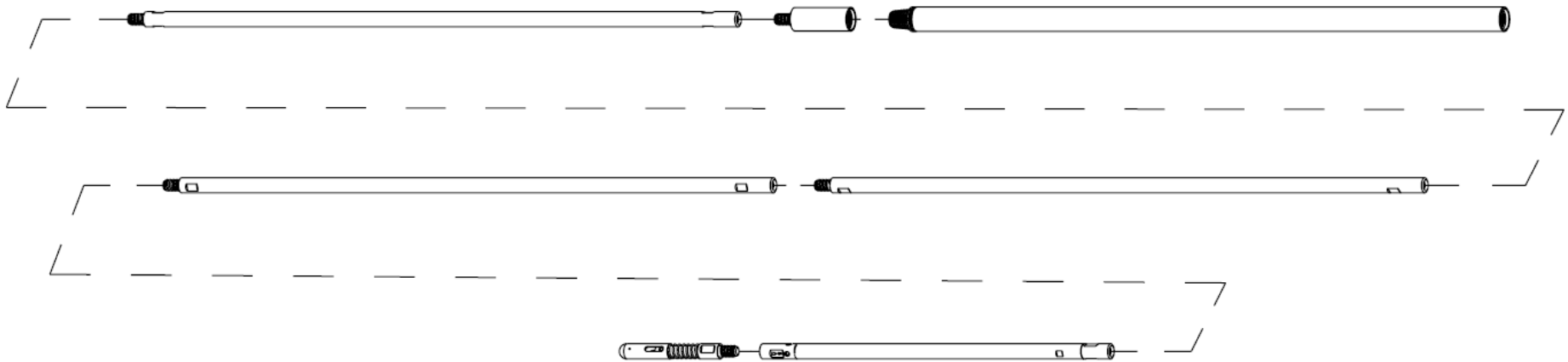


Applications & Deployment Methods



Conventional Diamond Drilling

In conventional diamond drilling applications, holes are surveyed in front of the drill string using the appropriate adapter and a minimum non-magnetic spacing of 4.5m. The same method can also be used in wireline diamond drilling applications for conducting multi shot surveys both in and out of the hole.



Warning:

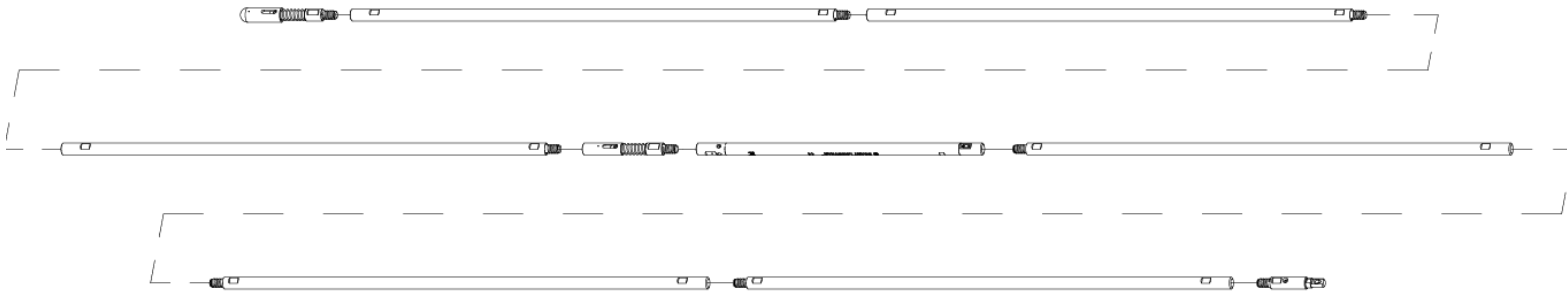
Do not rotate the rods counter-clockwise. The survey tool and/or non-magnetic extension rods may become un-threaded.



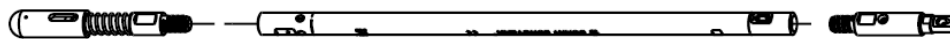
RC Drilling

In RC drilling, it is not possible to pass the survey instrument through the bit due to the presence of the hammer. Therefore the survey must be taken from within the rods. If azimuth results are needed, a total of 9m of non-magnetic rods are required after the hammer with the TruShot survey tool centered between 4.5m of non-magnetic extension rods with an additional shock absorber assembly. When dip is the only survey requirement, non-magnetic rods are not required. Simply assemble the TruShot tool with the 42mm shock absorber together with the wireline swivel and follow the general procedure.

Azimuth and Dip Measurement Setup



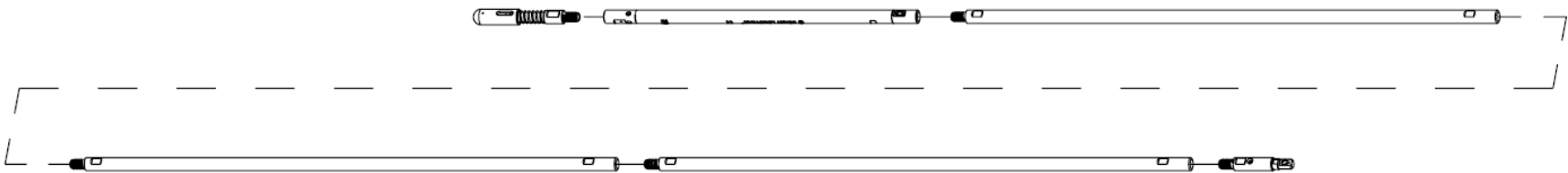
Dip Measurement Only Setup





Open Hole Surveying

A survey can be completed after the rods are removed from the hole using the TruShot survey tool, a shock absorber, 4.5m of non-magnetic extension rods and a wireline swivel.



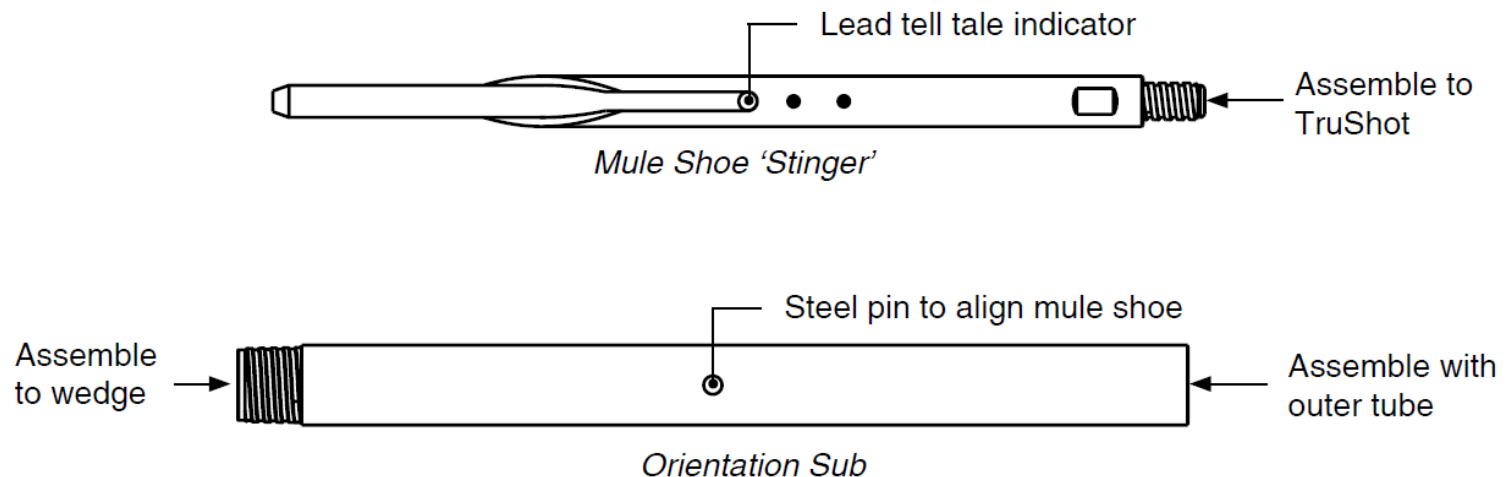


ORIENTATION SURVEYS

An orientation survey measures the orientation or rotation of a downhole wedge which is used to correct hole deviation or target a specific location in directional drilling applications. It is a two step process which consists of registering a zeroing reference on surface and then measuring the subsequent rotation from the zero reference with a downhole survey.

To facilitate an orientation survey, a mule shoe sleeve is assembled with a downhole wedge and the outer tube. A mule shoe stinger is assembled to the TruShot tool in place of the shock absorber. The grooved shape of the mule shoe stinger aligns with the steel pin in the mule shoe sleeve to establish the survey position behind the wedge. A lead tell tale is placed on the mule shoe stinger assembly to provide confirmation that the TruShot tool was seated in position behind the wedge in the required orientation during the survey.

For detailed information on orientation surveys, refer to the TruShot user guide and established standard work procedures.



TruShot Consumables



TruShot Consumables											
			Diamond Drilling Survey								
No:	Equipment	Qty	BQ	BQTK	NQTK	NQ	NQ3	HQ	HQ3	PQ	PQ3
1	Bit Stop	1	5700189	5700190	5700192	5700192	5700192	5700193	5700193	5700194	5700194
2	Adapter to E-Thread	1	5700178	5700179	5700181	5700180	5700180	5700182	5700182	5700183	5700183
3	Rod Alimunium Spacers	3	5700177	5700177	5700177	5700177	5700177	5700177	5700177	5700177	5700177
4	Lading Collar	1	5700187	5700187	5700187	5700187	5700187	5700187	5700187	5700187	5700187
5	Shock Absorber 35mm	1	5700195	5700195	5700195	5700195	5700195	5700195	5700195	5700195	5700195
			Orientation Survey								
No:	Equipment	Qty	BQ	BQTK	NQTK	NQ	NQ3	HQ	HQ3	PQ	PQ3
1	Orientation, Mule Shoe	1	5700562			5700563		5700318			
2	Rod Alimunium Spacers	3	5700177			5700177		5700177			
			RC Drilling Survey								
No:	Equipment	Qty	RC								
1	Shock Absorber 42mm	1	5700391								
2	Swivel, Wireline	1	5700201								
3	Shock Sub	1	5700701								
4	Rod Alimunium Spacers	6	5700177								



TRUSHOT™ VIEW

Open a TruShot™ file to get started

Open

Why use TruShot View



- **Fix Bad Shots:** TruShot View has the capability to identify bad survey points caused by magnetic interference or tool movement and fix or filter the data as required. The fixing and filtering of survey points is accomplished by algorithms which analyze the expected magnetic totals, dip and gravity sensors and the neighboring survey points. The specific algorithm applied is based on the software settings selected in TruShot View which can be set to either auto or manual.
- **Detect Duplicate Survey Points:** It is not uncommon for a duplicate survey to be taken at the same depth in scenarios where the driller has become distracted or is unsure about the quality of the initial survey. TruShot View will detect these duplicate surveys and combine them to eliminate the erroneous data point.
- **Detect Duplicate Surveys:** Another common occurrence is a driller may take a second survey within the same hole file. TruShot View will be able to highlight the suspect data and separate or combine it according to the user needs.
- **Hole Path Visualization:** All holes will deviate from the original azimuth and dip due to varying hardness and composition of the underlying geology. The visualization capability in TruShot View provides immediate hole path visualization that can be rotated or scaled as needed. The hole path is color-coded with brown lines representing original good data, red lines representing original bad data and green lines representing the original bad data that has been fixed.
- **Local Magnetic Declination compensation:** Magnetic survey tools measure the azimuth with respect to the magnetic north. TruShot View allows the user to easily input the local magnetic declination which immediately converts the azimuth to the “true north” values.
- **Modify Export Formats and Types:** Data from the TruShot handheld can be directly exported in standard “comma separated variable” format (.csv) or the “default data interchange” format (.dif). When a .dif file is opened in TruShot View, the user can choose exactly what data columns will be exported, the order of export and modify the column names as required. The order in which the data is displayed in the exported file can be changed by selecting the desired row and dragging to the new location. The name of the data can be modified by double clicking the export title and entering an alternative name. Only data selected by the check box will be included in the file export. All preferences can be saved as a template for future reference.



Why use TruShot View Software?

The TruShot View user interface allows for basic analysis of the tool data which can quickly highlight a range of minor issues that are easily fixed within the software. Both the data table and 3D hole path plot use color-coded indicators, making it easy to distinguish between the original raw data and the good, bad, filtered and processed hole information.

- 1 Hole Information
- 2 Data Processing & View Options
- 3 Handheld and Tool Info
- 4 Raw Data Table
- 5 Graphic Hole Path View

The screenshot shows the TruShot View software interface. The window title is "TruShot™ - v27.00 - KAL_ver1 data example for user guide.DDF". The interface is divided into several sections:

- 1 Hole Information:** Displays hole ID (KAL), operator (BA), latitude (3044.15155), longitude (12128.4738E), mag total (58.8133), and dip (-64.4).
- 2 Data Processing:** Includes checkboxes for "PROCESS ALL for Best Hole Path", "Fix All Bad Shots", "Filter Out All Bad Data", and "Combine Duplicate Shots". It also has "Export data..." and "Export to Pdf" buttons.
- 3 Handheld and Tool Info:** Shows UTC (08/05/2017 04:25:21), Local Time (08/05/2017 12:51:00), MCU S/N (N/A), MCU F/W (N/A), and probe S/N (00001017).
- 4 Raw Data Table:** A table with columns: Depth, Magnetic Azimuth, Dip, Quality, and UserEntry. The data shows a hole path from 0 to 100 depth, with quality ranging from "Fixed" to "Good".
- 5 Graphic Hole Path View:** A 3D plot showing the hole path in a 3D coordinate system with axes for North, East, and Elevation. The path is color-coded by quality.

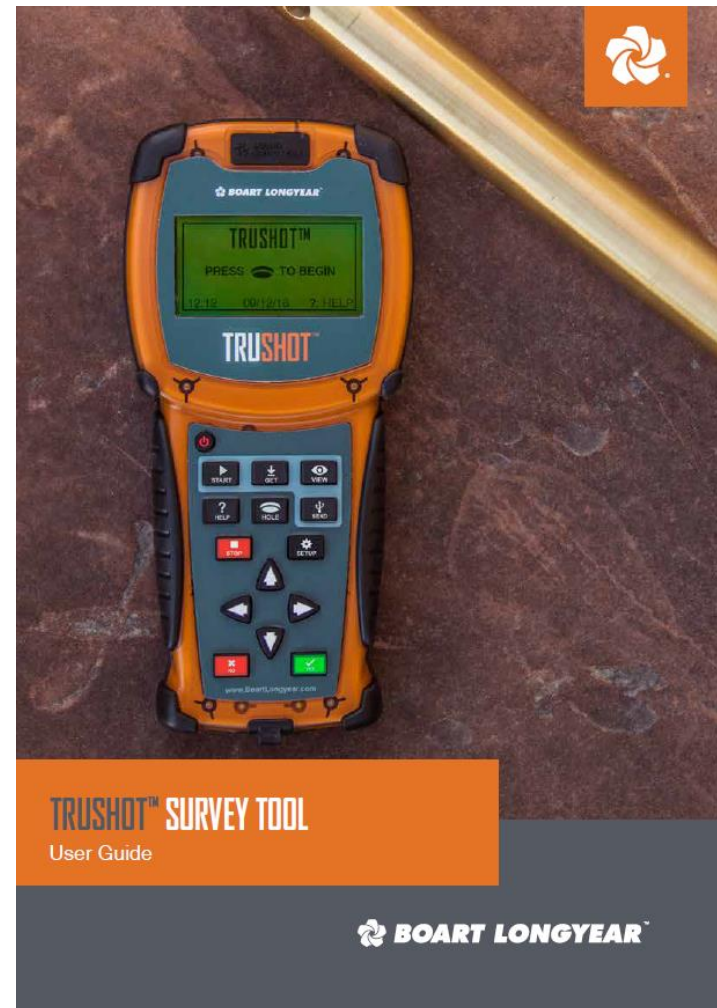
Depth	Magnetic Azimuth	Dip	Quality	UserEntry
0	130.0	-64.9		ALL
5	130.0	-64.9	Fixed	1
10	130.0	-64.9	Fixed	1
15	130.0	-64.9	Fixed	1
20	130.0	-64.9	Fixed	1
25	130.0	-64.9	Fixed	1
30	130.0	-64.9	Fixed	1
35	130.0	-64.9	Fixed	1
40	130.0	-64.9	Fixed	1
45	130.0	-64.9	Fixed	1
50	130.0	-64.9	Fixed	1
55	130.1	-64.8	Fixed	1
60	130.1	-64.8	Fixed	1
65	130.1	-64.8	Fixed	1
70	130.1	-64.8	Good	1
75	129.8	-64.9	Good	1
80	129.8	-64.9	Good	1
85	129.8	-64.9	Good	1
90	129.7	-64.9	Good	1
95	130.0	-64.9	Good	1
100	129.8	-64.9	Good	1

What happens after using TruShot View?



Once the raw survey file has been analyzed and exported in TruShot View, the resulting file will contain a series of accurate 3D coordinates (X, Y, Z) with respect to the hole collar. This file can then be imported with confidence for de-surveying in any third party geological modeling software.

For more information, consult the TruShot User Guide, or contact your local Boart Longyear GDS representative.



Magnetic Reference, Tool
Functionality Check and Cold
weather conditions



REGISTERING A MAGNETIC REFERENCE

The TruShot handheld can be configured to register a magnetic reference from which natural or man-made magnetic disturbances can be identified. The default reference tolerance for magnetic disturbance identification is $\pm 1000\text{nT}$ for the magnetic total strength reference and $\pm 0.5^\circ$ for the magnetic dip reference. Following the completion of a run, survey points which lie beyond the reference tolerance can be identified by a flashing azimuth value on the handheld.

STEP 1: FIND A CLEAN LOCATION

A magnetically clean location must first be identified visually and verified by conducting a survey on surface and comparing the magnetic data results to the known acceptance criteria. For further information on acceptance criteria, refer to the TruShot user guide.

STEP 2: ACQUIRE THE MAGNETIC REFERENCE

Once the location is confirmed to be clean, simply set the magnetic reference by following the prompts on the handheld.



Down-hole magnetic anomaly (pyrrhotite) detected by TruShot and confirmed on surface using a magnetic susceptibility tool

Tool Functionality Check



OVERVIEW

Calibration verification can be accomplished in the field by performing what is known as a roll test. A roll test is an indicative test method used to quickly identify damaged or out-of-calibration tools that does not rely on a precise comparison to a verified azimuth or dip value. Boart Longyear recommends weekly roll tests are completed on each instrument before and after usage. This will help ensure tools are operating correctly.

A bent tool can also cause measurement errors. Place tool on a flat surface and roll the tool 360° to inspect for signs of bending. If a bent tool is encountered, contact Boart Longyear TruShot technician for immediate service.

For detailed instructions on completing a roll test and general tool maintenance, refer to the TruShot user guide.



Cold Weather Considerations



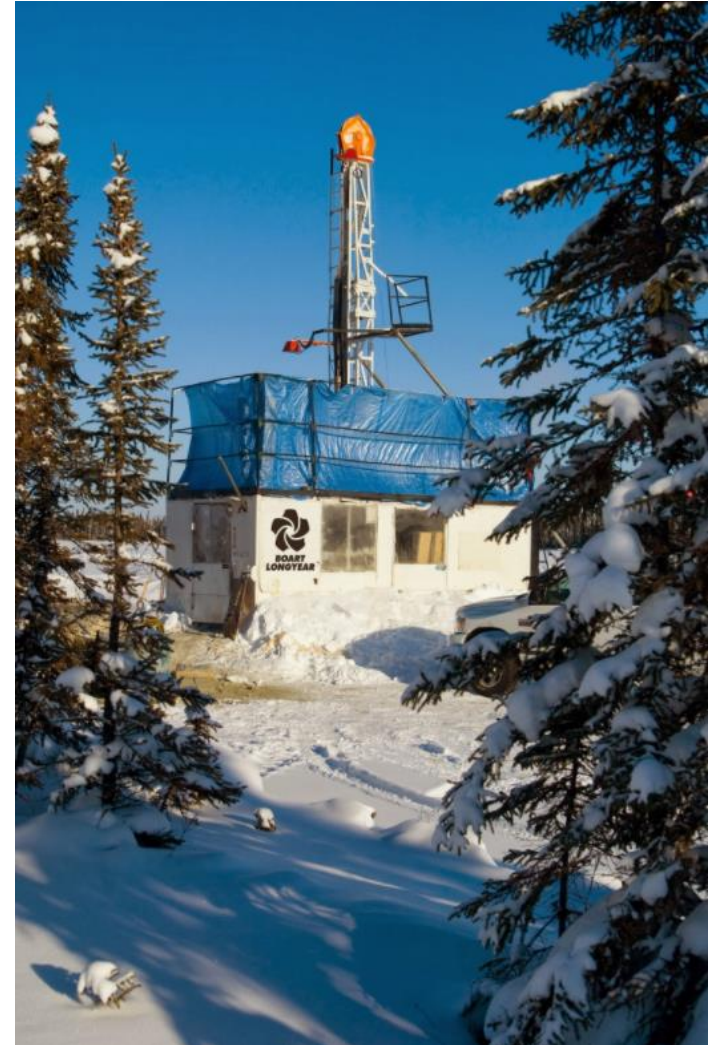
ALL batteries will perform poorly in cold weather, regardless of size and type. Please keep consider the following recommendations to ensure continuous operation:

HANDHELD

Keep the handheld close to your body in an insulated pocket to prevent or minimize the impact of the cold weather on battery life and LCD screen responsiveness.

TOOL

Keep an adequate supply of spare batteries on hand when working in cold conditions. Minimize exposure to freezing temperatures by storing tools and batteries in a warm environment when not in use.





TRUSHOT™ TRAINING CERTIFICATE

Boart Longyear™ presents this certificate to:

First Name, Last Name

For successfully completing the TruCore™ training session
on the 1st day of January, 2021.
day month year

Name

Title