

E★STAR

E L E C T R O N I C B L A S T I N G S Y S T E M

QUICK GUIDE



AUSTIN POWDER

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SYSTEM LIMITS

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- Max. 1,600 detonators per 1 Blasting Machine
- Max. 3,200 detonators per 2 interconnected Blasting Machines
- Max. 1,600 detonators per Logger
- Max. 99 branches
- Max. 100 detonators per branch (80 with Daisy Chaining)

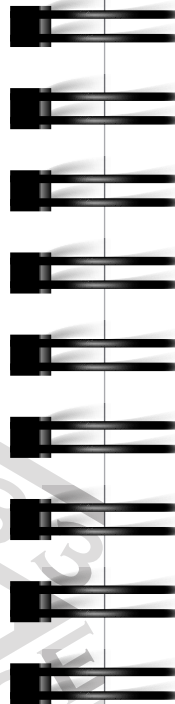
- Max. 26,200 ft branch wire (with Bus-line Cu 0.8 mm)
- Max. 6,600 ft firing line (with Bus-line Cu 0.8 mm)
 - Max. 400 detonators when 6,600 ft firing line is used (with Bus-line Cu 0.8 mm)
 - Max. 1,310 ft firing line when 1,600 detonators are used (with Bus-line Cu 0.8 mm)

WORKING PROCEDURE | E*STAR TESTER**Measuring current by Tester**

- ❶ Press the ON/OFF button to turn on the device.
- ❷ Detonator leakage is indicated by BUS-BUS on display.
The nominal value for detonator leakage is 0.08 or 0.09 mA.
- ❸ Short press of the ON/OFF button switches the measuring mode between BUS-BUS and BUS-SHELL.
- ❹ Ground leakage is indicated by BUS-SHELL on display.
The nominal value for ground leakage is 0.00 mA.
- ❺ Long press of the ON/OFF button turns off the device.



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WORKING PROCEDURE | E*STAR LOGGER 2

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- 1 Press the ON/OFF button to turn on the device.
- 2 Enter security code.
- 3 Press ENTER.
- 4 Erase Detonator & EBR memory.
- 5 Before choosing a programming method, you have to choose the way of programming – CONNECT or RFID.

CONNECT – attach the detonator to the adapter or terminals on top of the Logger.

RFID – touchless communication between the Logger and RFID Label.



E*STAR LOGGER 2 | PROGRAMMING METHODS - MANUAL

All values are manually typed using the Logger keypad

- ❶ In the main menu press #1 to PROGRAM, choose between Connect or RFID and select #1 MANUAL.
- ❷ Set the BRANCH number, confirm by ENTER and set the DETONATOR NUMBER.
- ❸ CONFIRM ALL and CONNECT detonator.
- ❹ Use ↑ ↓ to move up and down and select the option you want to change (DELAY, BRANCH # or DETONATOR #) if needed.
- ❺ CHANGE by typing the new value.
- ❻ When all values are OK press CONFIRM ALL – Detonator will be programmed.



E*STAR LOGGER 2 | PROGRAMMING METHODS - DATA FROM PC

This programming method uses blast timing prepared on PC (e.g. E*STAR PROGRAMMER, Paradigm, etc.).

- 1 In the main menu press #1 PROGRAM, choose between CONNECT or RFID and select #2 – DATA FROM PC.
- 2 The screen will display delay time, det # and branch # for the detonator being programmed.

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The displayed value from PC can be changed by pressing ↓ and confirming selected “CHANGE DATA SETTINGS” by ENTER. It’s possible to skip any detonator. To perform the skip function, press ↓ to get to “SELECT DATA BY DET #” option, then confirm by ENTER. In the next screen, type the desired DET # to program.

E*STAR LOGGER 2 | PROGRAMMING METHODS - AUTO DELAY

This method of programming calculates the delays automatically from the previous delay. It isn't necessary to have any data prepared in advance from a PC. The delays are set at the beginning of programming in the Logger, changes are possible during the programming.

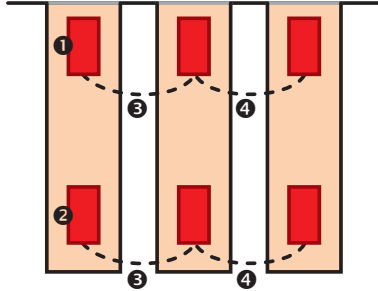
- 1 In main menu press #1 PROGRAM, choose between CONNECT or RFID and select #3 - AUTO DELAY.
- 2 Set the BRANCH number, confirm by ENTER, set the DETONATOR NUMBER and confirm by ENTER.
- 3 Set up the AUTO DELAY values.
- 4 CONFIRM values by ENTER and start programming.

Type in the "FIRST DELAY" value = the delay of the 1st detonator. This delay must be confirmed by pressing ENTER. Cursor will jump automatically to the "SECOND DELAY" = the 2nd delay is the delay of the 2nd detonator (either 2nd detonator in the hole or detonator in the next hole depending on double or single priming). Confirm by ENTER. Cursor will move to "INTERVAL" value = delay between 1st and 3rd detonator. Type in the value and change by pressing ↓ to set it as "decrement" (minus sign before the value) or ↑ to be "increment" (plus sign before the value). Default setup is "increment". Confirm by ENTER. Press → to confirm the settings. You can change the settings by pressing ← TO CANCEL THE SETTINGS and START FROM THE BEGINNING.



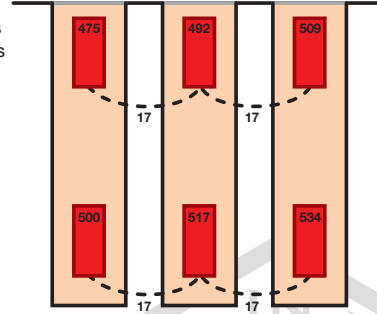
Double Priming

- 1 = 1st delay
2 = 2nd delay
3 = interval



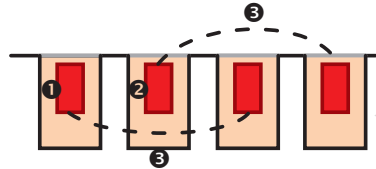
Double Priming - example

- 1st delay = 475 ms
2nd delay = 500 ms
interval = 17 ms



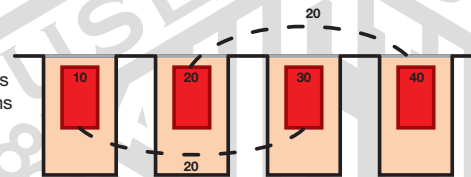
Single Priming

- 1 = 1st delay
2 = 2nd delay
3 = interval



Single Priming - example

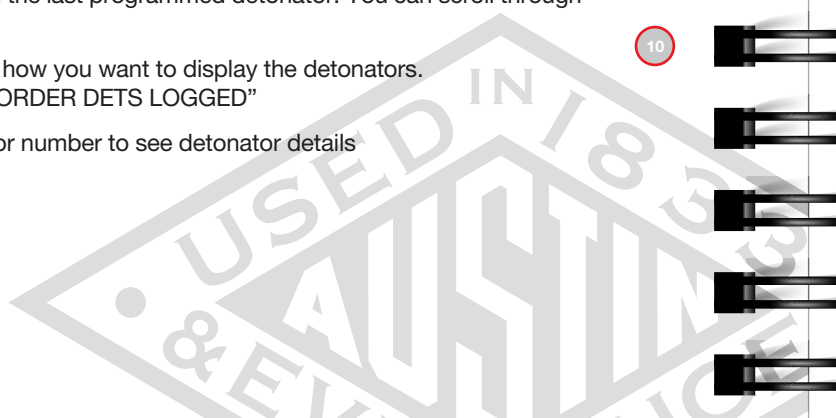
- 1st delay = 10 ms
2nd delay = 20 ms
interval = 20 ms



E*STAR LOGGER 2 | DETONATOR LIST

This function is used to check what values have been programmed.

- “SHOW ALL” = detonator list with the cursor on the last programmed detonator. You can scroll through the list to see the programming history
- “SHOW EACH DETONATOR” - Logger will ask how you want to display the detonators. You can choose “SEQUENTIAL BY DET#” or “ORDER DETS LOGGED”
- “SELECT DETONATOR” = choose the detonator number to see detonator details

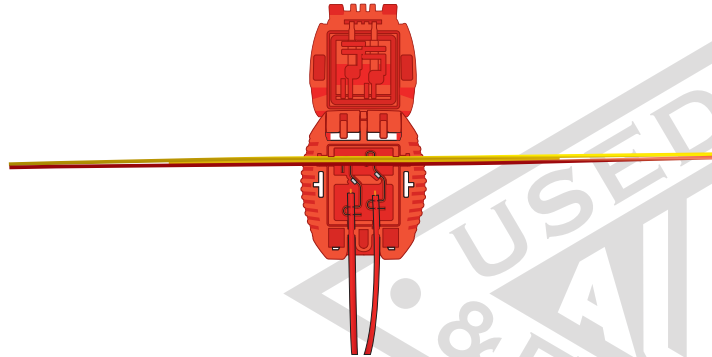


WORKING PROCEDURE | BRANCHING

Once programming is completed, the detonators must be connected to the branch wires (Bus-line) according to the programmed branch numbers. You can connect detonators to the Bus-line or use Daisy Chaining Connection (described below).

EXAMPLE: DETONATORS THAT HAVE BEEN PROGRAMMED WITH BRANCH NUMBER 1 MUST BE CONNECTED TO BRANCH WIRE NUMBER 1.

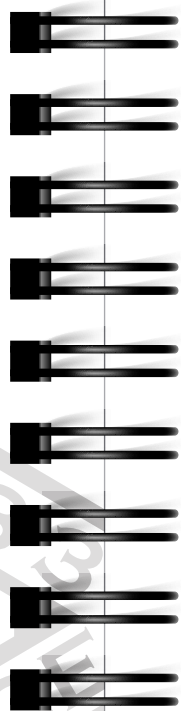
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BRANCHING | E*STAR PRONTO CONNECTOR

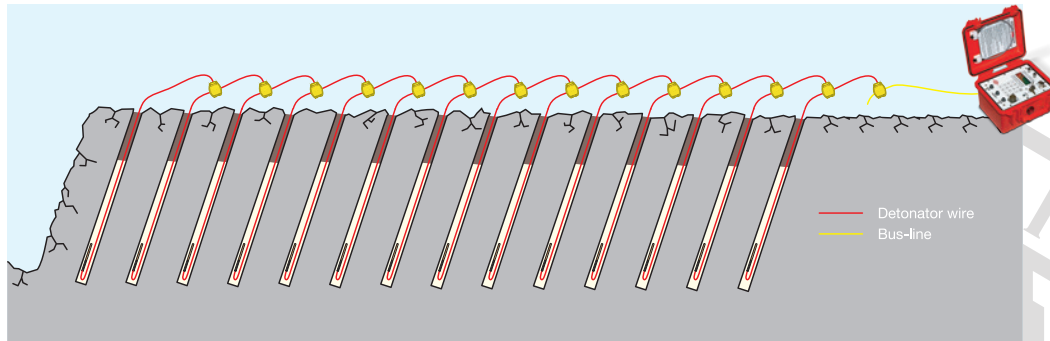
Can be used for:

- Connection between branch wire and firing line
- Fast extension of the firing line (Bus-line)
- Fast extension of the branch wire (Bus-line)
- Fast verification / leakage test from any point on firing line or branch wire
- Adding a spare connector in case of a damaged original connector



BRANCHING | DAISY CHAINING CONNECTION

Daisy Chaining connection is connection of one detonator to another detonator instead of Bus-line. For illustration please see the schematic drawings below.



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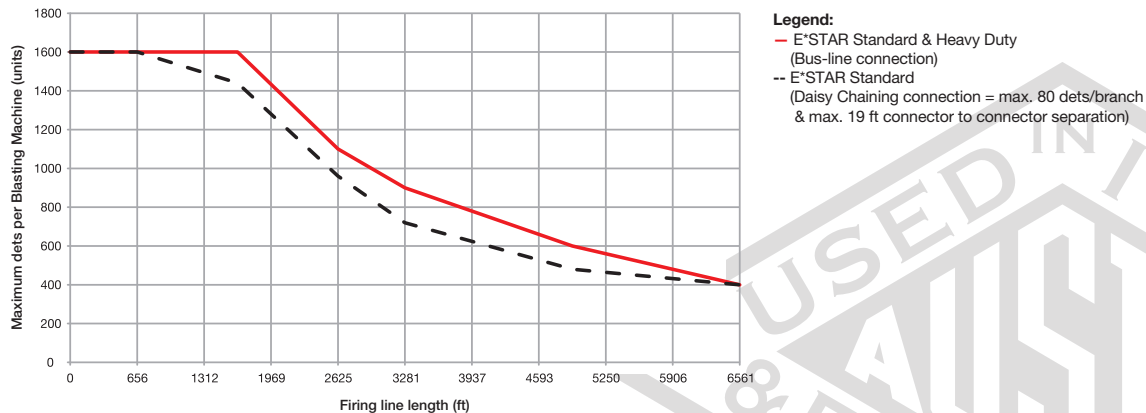
LESS IS MORE!

Connection between the branch and firing line can be done in several ways. It mostly depends on the connection method in the specific branch.

The maximum number of detonators connected to one branch is 100, with Bus-line connection. A lower number of detonators in a branch is always better for energy distribution.

If detonators are connected in the Daisy Chaining connection, the interconnection between branch and firing line should be considered. The maximum number of detonators in one branch with Daisy Chaining connection is 80. A lower number of detonators in the branch makes it easier to troubleshoot any issues.

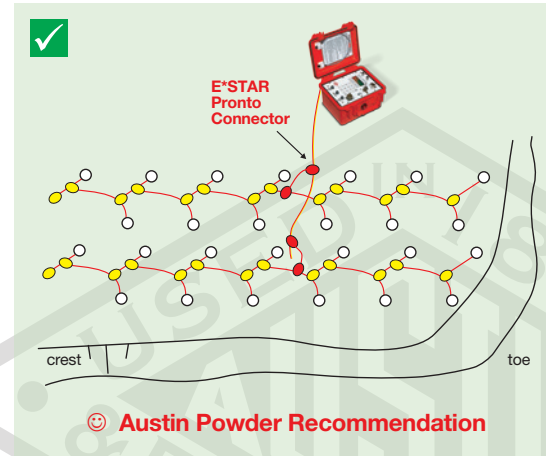
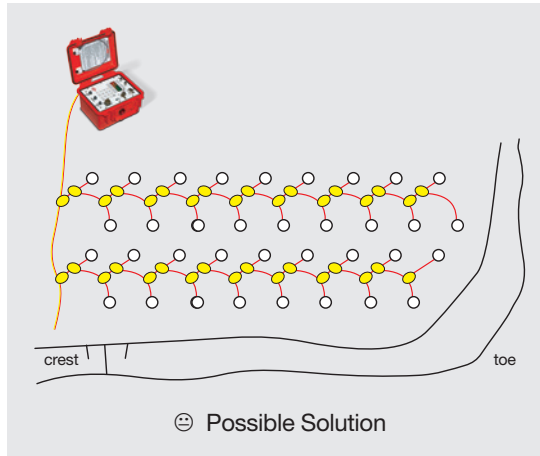
Maximum detonators per Blasting Machine for E*STAR systems based on connection method



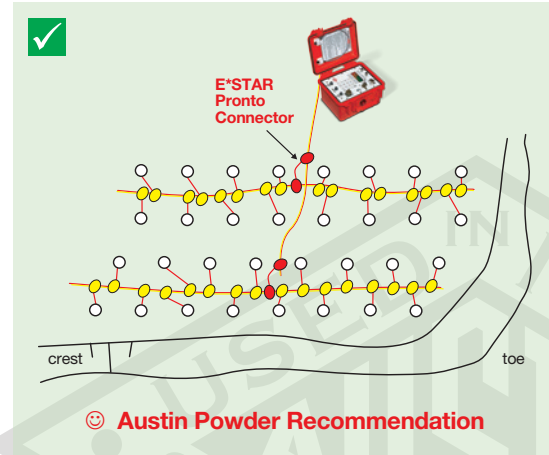
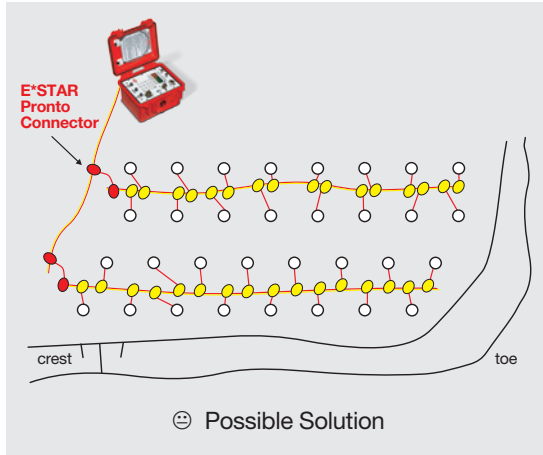
BRANCHING | DAISY CHAINING CONNECTION

TO ACHIEVE THE BEST ENERGY DISTRIBUTION, IT IS HIGHLY RECOMMENDED TO CONNECT THE FIRING LINE IN THE MIDDLE OF THE BRANCHES BY USING THE E*STAR PRONTO CONNECTOR!

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BRANCHING | BUS-LINE CONNECTION



BRANCHING | VERIFICATION

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Verification is the process where the Logger is connected to the branch wire. The Logger communicates with all programmed detonators to identify any unconnected, programmed detonators (MISSING), and detonators that may not have been programmed but are connected to the branch wire (UNEXPECTED).

All issues must be resolved before proceeding to firing. During verification, the Logger compares what is in the memory (what was programmed) and what is connected to the branch wires.

After successful verification, the Logger performs current measurements, informing the user about potential Leakage problems. Explanation of the function is in the next chapter.

This same process must be completed for every branch in the blast.

Remember, 100 detonators are the maximum number of detonators permitted per branch!

BRANCHING | BRANCH LEAKAGE MEASURING

Branch leakage is measured automatically during verification as its last step.

For separate branch leakage measuring, select “LEAKAGE” in “MAIN menu” and then “BRANCH”.

Type in the branch number for which you want to measure the leakage.

The measured values will appear on the screen, along with the branch number.

- The third line is the expected value (calculated based on number of detonators times current consumption 0.1 mA).
- The fourth line displays the measured values in different directions / polarities.

When the values of expected and measured match, there is no excessive leakage.

When measured values are higher than expected, there is excessive leakage in the network, which must be identified and remedied before proceeding.

When measured values are lower than expected ones, it means there are some missing detonators. Running a new verification of the branch is advisable to identify the issue.



LEAKAGE TROUBLESHOOTING

What is Leakage?

A leakage occurs when current is lost through a leak. The leak is caused by the damage of insulation of the wires. It is an Achilles heel of all electronic blasting systems since they use of low energy to carry signals to the detonators.

Types of leakage

Ground leakage (Bus-Shell)

- Only one wire core is exposed - damage of insulation on that particular conductor core
- It is detectable only when using ground rod connected to the E*STAR Tester, E*STAR Logger or E*STAR Logger 2
- Proper value, which must be read on the equipment, is 0.00 mA. Higher value means ground leakage is present. Since there is damage on only one wire, it's important to know which polarity the leakage exists.

Detonator leakage (Bus-Bus)

- Two wire cores are exposed - damage of insulation
- It is detectable by E*STAR Tester, E*STAR Logger or E*STAR Logger 2

Leakage Tolerance

Logger, Logger 2 = max. 18 mA to read and program detonator or to do branch verification.

If you have 2 dets, each 12 mA, in the same branch, you will be able to program them but not verify the branch because total branch leakage will be higher than 18 mA.

Blasting Machine = max. 550 mA to charge detonators and fire them.

If you will have 35 branches, each 18 mA, you will be able to verify them but not to fire them because total blast leakage will be higher than 550 mA. The real mA value on Blasting Machine will not be $35 \times 18 = 630$ mA, but higher, because Blasting Machine's voltage is much higher than Logger's voltage.



BLASTING MACHINE

The standard procedure with the Blasting Machine should be:

- ❶ Delete all data from previous blasts (ADMINISTER – MEMORY – ENTER).
- ❷ Transfer data from Logger to Blasting Machine (DATA TRANSFER – LOGGER RECEIVE).
 - Connect Logger and Blasting Machine by cable
 - Turn ON Blasting Machine
 - Turn ON Logger
 - Start receiving data on Blasting Machine
 - Send data from Logger to Blasting Machine
 - Disconnect cable
- ❸ Verify detonators (DETONATORS – CHECK DETS).

- ④ Proceed to the blast (DETONATORS – BLAST).
 - Prior to blast, capacitors must be charged by pressing ARM button
 - After charging, the green colored LED will be illuminated – press & hold ARM + FIRE.
 - Simultaneously pressing and holding both the ARM and FIRE buttons will start the firing procedure which is indicated on the display, “Sending Fire Command”. The estimated time for fire commands to be sent to all detonators is 4-5 seconds.
 - After that Blasting Machine screen display will show – “Fire Command Done”.

Remember it is **VERY IMPORTANT TO ERASE MEMORY OF BLASTING MACHINE** from **YOUR PREVIOUS BLAST** before transferring data from the Logger for the current blast.

Start Blasting Machine verification only once you're ready to fire.
After the verification, proceed to arming and firing ASAP.

Firing line must not be disconnected after charging or verification.

If you would like to cancel blasting procedure, it's strictly recommended to do blast cancellation by pressing ABORT button.

It is recommended to hold ARM and FIRE buttons until you hear initiation of the blast.



LOGGER 2 TROUBLESHOOTING | PROGRAMMING

MESSAGE	INTERPRETATION	SOLUTION
BATTERY LOW	Recharge batteries soon.	This message should start appearing when the battery is below approximately 20% of capacity. Two hours of charging will charge Logger to 80% of battery capacity.
LOGGER FAILED SELF TEST	Return Logger to manufacturer for analysis and repair.	Restart Logger, if problem continues, don't use Logger. Report problem.
DELAY AND DET# MUST NOT BE 0		A zero value has been entered for either the delay time or the detonator number. Zero is not permitted. Type in value from range 1 to 20,000.
DET # MUST BE 1 TO 1600	Detonator numbers must be between 1 and 1,600.	Type in value from range 1 to 1,600.
DELAY MUST BE 1 TO 20000	Delays less than 1 and greater than 20,000 ms (in 1 millisecond increments) cannot be entered.	Type in value from range 1 to 20,000 ms.
WRONG DEFAULT DELAY	Factory preset delay is 712 ms or 901 ms, any different delay will show warning.	There is no defect with the detonator. Mark detonator s/n and continue in programming.

MESSAGE	INTERPRETATION	SOLUTION
DETONATOR ALREADY LOGGED	Detonator already exists in the Logger memory.	Disconnect detonator, continue with programming, or confirm intended change and type in new values.
DETONATOR FAILED SELF TEST. REMOVE DETONATOR	Bridge wire of the fuse head is broken. There is discontinuity in the electronic board circuit. Detonator is not functional.	Restart Logger, then repeat procedure. If problem persists, disconnect detonator from circuit and don't use. Report problem.
ERROR NO COMMUNICATION	Communication error.	Repeat procedures, restart Logger, check connection Logger/adapter, adapter/connector and connector/detonator line. Measure leakage using Tester, report problem.
NO RESPONSE	There is no response from the detonator.	Repeat procedures, restart Logger, check connection Logger/adapter, adapter/connector and connector/detonator line. Measure leakage using Tester, report problem.
NO RFID TAG FOUND	Timeout message when tagging RFID tags. The tag was not in the close proximity to the antenna in the dedicated reading time. Or the RFID tag might be damaged = not readable.	Repeat procedure. If this continues, take picture of the detonator ID Tag (traceability & SN), switch to connect programming method and program the detonator connected to the adapter using the connector. Report problem.



LOGGER 2 TROUBLESHOOTING | VERIFICATION

MESSAGE	INTERPRETATION	SOLUTION
FAILED LINE TEST CHECK DETONATOR TYPE RESOLVE ERROR	A low resistance was detected. The detonator may be the wrong type. Resolve error before proceeding.	Check wire ends (not in water). Check for shorted wires, measure leakage, locate high leakage source, replace Bus-line, report problem.
FOUND UNEXPECTED DETONATOR	Detonator either has not been logged, or the detonator is not logged in the branch being verified.	Try to locate on blast plan, program detonator, continue, report procedure.
LINE OVERLOAD TURN POWER OFF	High current due to excessive leakage or shorted line or detonator.	Check wire ends (not in water). Check for shorted wires, measure leakage, locate high leakage source, replace Bus-line, report problem.
MISSING	A detonator in memory is missing.	Locate detonator in time plan, check detonator connection to Bus-line, repeat verification.

BLASTING MACHINE TROUBLESHOOTING | VERIFICATION

MESSAGE	INTERPRETATION	SOLUTION
BATTERY LOW	Recharge batteries soon.	Charge Blasting Machine using main / car charger, 2 hours will charge to 80% capacity. Charging should be done prior blasting.
AUTO BUS DETECT ERROR	Message during Auto Bus Detect (ABD) command when looking for unlogged detonators. Ensure all detonators have been logged.	Restart Blasting Machine, repeat procedure, report issue.
COMMUNICATION ERRORS, REMOVE POWER, CHECK ALL CONNECTIONS		Restart Blasting Machine, repeat procedure, report issue.
MISSING	Detonator is missing.	Using identifiers (det number, delay) locate on blast, check connection, repeat procedure, and report issue.
FOUND UNEXPECTED DETONATOR	Detonator either has not been logged.	Detonator has to be logged, by confirming with arrow BM will log the detonator.
DETONATOR FAILED SELF TEST REMOVE DETONATOR	Detonator is defective.	Repeat procedure, restart Blasting Machine, report issue, and check connection.
ERROR	Communication errors.	Check connections, measure leakage.

BLASTING MACHINE TROUBLESHOOTING | CHARGING OF CAPACITORS

MESSAGE	INTERPRETATION	SOLUTION
DISCHARGE ERROR DETECTED	Some detonators did not respond to discharge command.	Wait 30 minutes, restart blasting machine.
CHARGE ERROR, SOME DETS MAY NOT FIRE	Not all detonators are charged.	Blast box will try to recharge 5 times. A choice to abort or charge is given. Choose "CHARGE". Don't abort blast, restart Blasting Machine, repeat procedure, proceed to fire, report problem.
LINE OVERLOAD TURN POWER OFF	A low resistance was detected. The detonator may be the wrong type. Resolve error before proceeding.	Restart Blasting Machine, repeat procedure, check ends of Bus-line for shorting, measure leakage on each branch using Logger, locate leakage source by half cutting, disconnect source of leakage, proceed to blasting, report issue.

ADDITIONAL DOCUMENT SOURCES



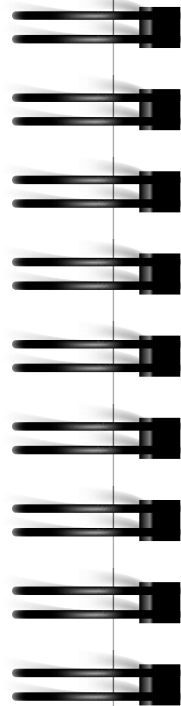
Customer Survey



E*STAR manual



Troubleshooting





Need more information? / Have a problem?

Visit www.austinpowder.com/estar
or contact your local Austin Powder representative.



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