PHOENIX

ELECTRONIC SAFE LOCK RECOVERY TOOL

Instruction Manual v4.0

The Phoenix Electronic Safe Lock Recovery Tool eliminates the need to drill most keypad equipped safes in the event of a lock out due to lost combination, lock malfunction or keypad failure. Simply remove the existing keypad, plug the lock and/or keypad cable into the Phoenix and select the appropriate opening or diagnostic feature from the on-screen menu. In minutes the Phoenix will have the safe open with no drilling, no repairs to the safe and no replacement of the lock.

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Lost Code Recovery / Lock Reset (via keypad)

- Models
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    - ESL-10/20
  - Sargent & Greenleaf
    - 6120, 6123 & Biometric (through 2014)
    - Titan PivotBolt & D-Drive (through 2017)
    - Spartan PivotBolt & D-Drive (through 2017)
  - Lagard
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    - ComboGard 33E, SafeGard 3650
    - 3801, 3802, 4200, 3040, 3260, 3765, 3740
    - 2441 Mechanical Redundant
  - Sentry Safe
    - SF Series
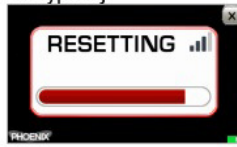
Lost Code Recovery / Lock Reset (via BAT port on lock)

- Lagard
  - ComboGard Pro 39E
  - LPAudit, LGAudit
  - AuditGard 66E
  - 6441 Mechanical Redundant

Keypad Testing

- AMSEC ESL-10/20
- LP Locks
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- Lagard
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- S&G

Emergency Universal Keypad

- Use the Phoenix as an emergency keypad for S&G, Lagard, LP, NL, Amsec, Sentry SF and SecuRam

Automated Lock Programming

- Eliminates time consuming, hard to remember keypad programming procedures

Integrated JumpBox

- Portable electronic lock power boost for overcoming binding or stalled solenoids and motors

Multi-Lock Junction Box

- Directly connect locks from over a half dozen different manufacturers without any special adapters or dongles and with zero splicing
- Safely connect to internally powered locks

Quick and Easy Software Updates over USB

- Quickly update your Phoenix to the latest software release using a Mac or PC and the included USB cable

Lock Malfunction Diagnostics

- Models
  - Sargent & Greenleaf
    - 6120, 6123
    - Titan, Spartan
    - Z/02, Z/03
    - RotaryBolt, Pivotbolt, D-Drive
  - Lagard
    - LGBasic, LGBasic II, LGCombo
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    - Auditgard 66E,
  - Sentry Safe
    - SF Series
  - NL Locks, LP Locks
  - SecuRam
    - SafeLogic series
  - AMSEC
    - ESL/10, ESL/20
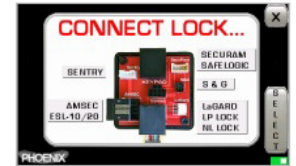
Automatic Lock Identification & Feature ID

- Simply connect the lock and the Phoenix will automatically identify the exact make & model along with drive type, # of users, current settings and more
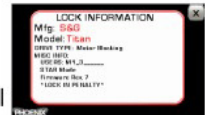
Integrated IONIC Lock Spiking

- AMSEC ESL-5/15, LP/NL, LaGard (Motorized), Tecnosicurezza

Integrated Electronic Safe Lock Quick Reference (2018)

- Identification, drilling, programming

Lock Conditioning & Repair

- Fix S&G 6120/23 drive nut issues

Integrated LaGard 3045 Handheld Programmer

- Fully featured programming capability for 33E / 3650 locks

Integrated Rechargeable Power Cell

- Hundreds of openings on a single charge

Programmable Service Routines

- Quickly save and re-use routines to automate common service tasks such as setting up new locks, user codes, etc
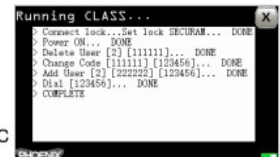
7-Day Technical Support Hotline

- Expert technical support ready to help when you're on the job

Also available:

Phoenix models for Law Enforcement and Military

www.taylortechtools.com
sales@taylortechtools.com
(859) 363-5978

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Includes

- Phoenix v4.0 Electronic Safe Lock Recovery Tool

- Multi-Lock Junction Box

    - Amsec, LaGard, LP, NL, SecuRam, Sentry SF Series, S&G

- Keypad Interface & Testing Cables:

    - S&G Keypads – **RED**

    - LaGard, LpLOCK, NL Keypads – **BLACK**

    - SecuRam SafeLogic Keypads – **YELLOW** Tag

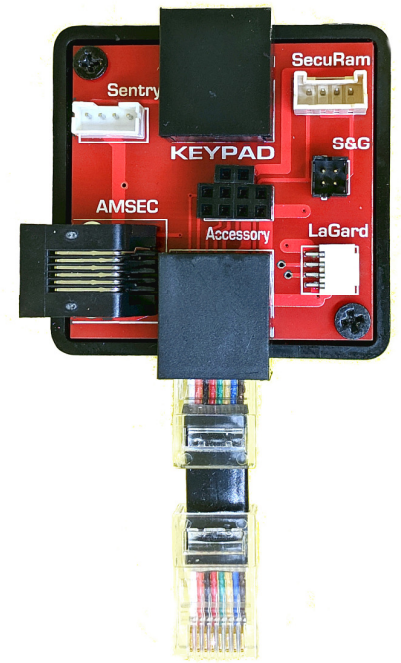   - AMSEC ESL-10/20 Keypads – **GREEN** Tag

- JumpBox Cable – **RED**/**BLACK**

- LaGard Reset Dongle (Basic Plus, 39E, 66E) - **BLUE** Tag

- AMSEC ESL-10/20 Reset Adapter - **WHITE**/**BLACK**

- *IONIC* Spiking Accessories

    - Ionic Solution **'P'**, 3/32" drill bit, syringe needle, depth gauge, tube

- AC Charger (120/240 VAC, 50/60Hz)

- USB Software Update Cable

- Micro SD Card/USB Drive - includes update software and instructions

Connect Locks, Interface Cables and Accessories

Junction Box

- Connect to *PHOENIX OUTPUT JACK* on top of Phoenix

KEYPAD JACK

LOCK SENTRY

LOCK SECURAM

LOCK S & G

ACCESSORY PORT

LOCK LAGARD LP/NL

Locks

- Connect to *LOCK PORTS* on Junction Box

LOCK AMSEC

PHOENIX OUTPUT JACK

Keypad Interface Cables

- **BLACK** Cable – **LAGARD, LP and NL** Keypads
  - White plug to keypad (tab down)
  - Clear plug to *KEYPAD JACK*
- **RED** Cable – **S&G** Keypads
  - Black plug to keypad (keyed plug)
  - Clear plug to *KEYPAD JACK*
- **GREEN** Tag – **AMSEC** Keypads
  - Short end with without tag to keypad
  - Long end with green tag to *KEYPAD JACK*
- **YELLOW** Tag – **SECURAM** Keypads
  - White plug to keypad
  - Clear plug to *PHOENIX OUTPUT JACK*

Other Cables & Accessories

- **RED** / **BLACK** Cable – **JUMPBOX**
  - White plug to keypad battery terminals
  - Clear plug to *PHOENIX OUTPUT JACK*
- **BLUE** Tag - **LAGARD RESET DONGLE**
  - Black plug to *BAT* port on lock case
- **WHITE**/**BLACK** - **AMSEC ESL-10/20 Reset** Adapter
  - Insert in *ACCESSORY PORT* on Junction Box for ESL10/20 Reset
  - Plug lock into ***AMSEC Reset***
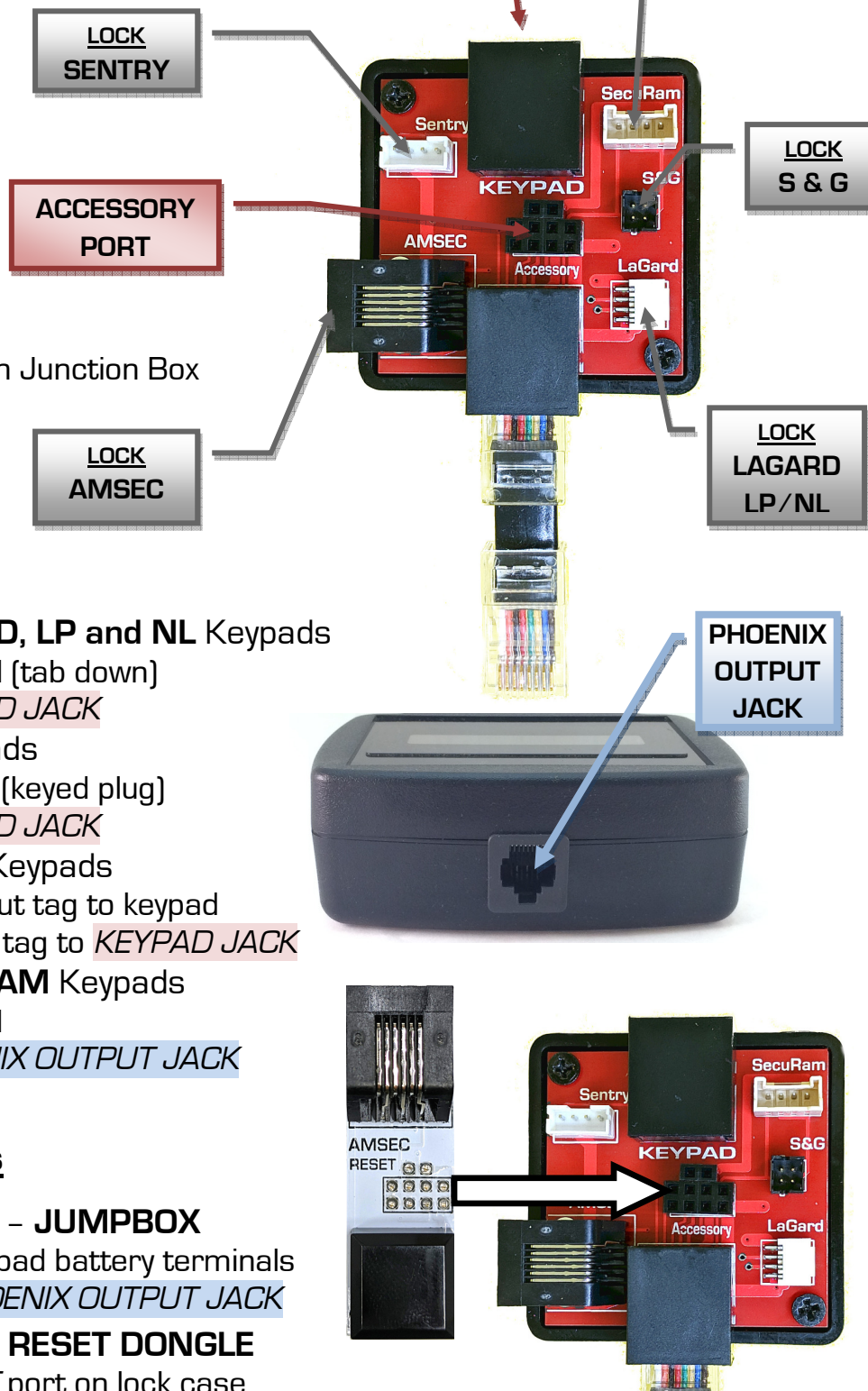
Important Notes and Recommendations

- Disconnect all locks and keypads from Phoenix before powering on/off

- Never connect Phoenix to any lock that has been drilled or damaged (including water damage)

- Use extreme caution if attempting to splice the Phoenix into keypad/lock cables. An incorrect splice can damage both the Phoenix and the lock electronics.

- For faster LaGard Resets, avoid charging via A/C during the reset process

- During lock reset procedure, avoid touching or moving lock cable or tool. Leave stationary until reset is complete to insure signal integrity

- Remove batteries from all keypads before connecting to Phoenix except when prompted otherwise

- Observe orientation of tabs on keyed plugs before connecting

- Hold "backup" pressure on Junction Box connectors when plugging in cables

- Never allow powered JumpBox cable to come into contact with metal surfaces such as the safe door or keypad housing

- For proper functionality, wait until locks in penalty mode are no longer in lockout before connecting them to the Phoenix

- Never open Phoenix tool or remove cover while the unit is powered up

- Never connect USB programing cable to the Phoenix will the tool is powered on. Doing so can potentially damage your computer.

Powering Up

Power on the Phoenix by pressing the Power Button located on the front cover. The Power Button will illuminate while the Phoenix is powered up.

Powering Down

Unplug all locks, keypads and accessories from the Phoenix then press the Power Button to turn off the machine.

Sleep Mode - Automatic Power Off

The Phoenix will automatically turn itself off after 5 minutes of inactivity *at the startup screen*. This feature protects the internal battery pack from becoming discharged if the Power Button is activated while the tool is in storage. If this occurs, the Phoenix will display a notification on the next power up in order to alert you of any possible issues while in storage. Simply tap the notification message to clear it from the screen. After entering a valid PIN code to log into the machine the notification will be erased and no longer display at startup.

Charging / Battery Life

The Phoenix is equipped with a replaceable 3-cell lithium ion battery module that delivers exceptional runtime (6-10 hrs), extended battery life (18-24mo) and high current capacity comparable to that of the previous models high wattage A/C power adapter. A battery level indicator is displayed in the lower right corner of the screen during normal operation allowing you to quickly gauge the state of charge and USB connection status.
FULL ▮, OK ▮, LOW ▯, CRITICAL ⊠, USB USB
The Phoenix is charged by plugging the included A/C charger into the charger/power port located at the bottom of the tool. You can choose between two different charging methods - **Quick Charge** and **Smart Charge**. **Quick Charge** is designed to maximize the total battery run time by allowing the battery module to charge to 120% of normal capacity at the expense of overall battery life. **Smart Charge** is designed to maximize the overall battery life while still offering an acceptable 6-10 hours of run time per charge.

Quick Charge

To Quick Charge the Phoenix simply plug the included charger into the tool's charging/power port while the tool is powered off. The charge level will reach 100% as quickly as possible but the extra 20% of charge will require an overnight charge cycle at a reduced charging rate for avoid overly stressing the battery cells.

Smart Charge

Smart Charge is designed to maximize the overall battery life while still offering an acceptable 6-10 hours of run time per charge.

To enable Smart Charge, plug the charger into the Phoenix then power on the tool and press the Smart Charge icon located on the lower left corner of the startup screen.

When Smart Charge is enabled, the Phoenix will display the current charge level (%) along with the estimated time until fully charged (100%). To conserve power and maximize the charging rate the Phoenix will enter sleep mode and power down the screen after 10 seconds. You can check the current charge progress at any time by quickly tapping the screen. Once Smart Charge detects that the battery module has reached 100% charge level the Phoenix will begin beeping and signal you of charge completion. Once this occurs, simply unplug the charger and the Phoenix will power itself down automatically. In order to see the benefits of the Smart Charge feature it is important that you remove the charger from the Phoenix in a timely manner once a 100% charge level is reached. The included charger will continue charging the internal battery module tool as long as it remains connected to the Phoenix. *The only way to cease the charge is by disconnecting the charger from the tool.*
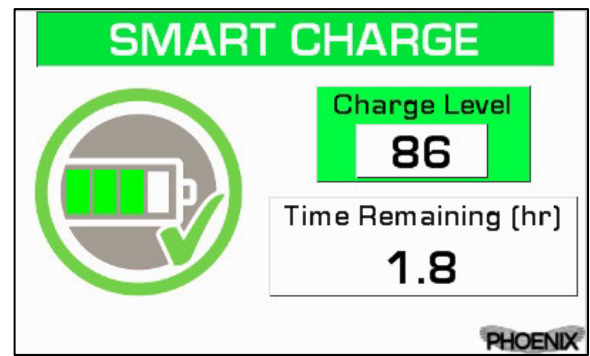
Battery/Charging Notes

- Storing lithium ions batteries at or near full charge for extended periods is always detrimental to battery life to some degree but when this is done at high temperatures the impacts are dramatic. Keeping the Phoenix at a 120% charge level in the back of a hot work van will eventually shorten the battery life. Using Smart Charge whenever possible will help you avoid this and ensure that the battery is always at the optimal charge levels for storage in hot or cold conditions.
- The lithium battery cells inside the Phoenix were specifically chosen for their low rate of self-discharge. Nothing is worse than a rechargeable power tool that goes dead from simply sitting on the shelf unused for two months. A good tool should be ready to go anytime you reach for it and it shouldn't require your constant attention to maintain a proper charge level. The Phoenix is designed to draw

essentially zero power when not in use and the lithium cells inside will maintain a decent charge level during extended periods of storage.

- Don't get "range anxiety" over fears of a potentially dead battery. In addition to a low self-discharge rate the Phoenix is also designed to maintain a usable about of "reserve" power that can be accessed in an emergency to finish a job even when the battery indicator reads zero ⊠. This reserve capacity will be triggered automatically anytime the charge level reaches 0%. Reserve power should be able to reliably provide 25 to 30 minutes of additional runtime with no drop off in performance. As reserve power starts to become depleted the Phoenix will begin to selectively throttle down non-essential system resources in an effort to reduce power consumption and extend runtime. A sudden drop in screen brightness signals that reserve power has fallen to under 50%. A second and more severe drop on brightness indicates that reserve power has fallen below 10% and the Phoenix may soon be forced to power down without warning. If you routinely use the SmartCharge feature for charging and don't frequently tap into the battery's reserve power then you can typically rely on the Phoenix's reserve power to get you 30 minutes to an hour of additional runtime when you really need it.
- We don't recommend plugging the charger into the Phoenix while the tool is in use. Some of the capabilities offered by the Phoenix require the machine to take extremely precise readings with very sensitive electronics. This requires a smooth and stable power supply for proper performance. The Phoenix is designed with filters to effectively cancel out interference from standard 50/60Hz A/C power lines and other common sources but excessively "dirty" power can cause measurement accuracy to drop considerably which extends the time necessary to complete certain processes. Having the charger plugged into the Phoenix during normal use can feed any fluctuations or "dirty" power on the A/C line directly into the tool which can makes its job much harder and time consuming.

System Startup Screen

When powered on the Phoenix will do a quick System Check then immediately display the Startup Screen. Some of the notable elements shown on the Startup Screen include the product key, serial number, software version, battery level indicator, SmartCharge shortcut and a listing of any option features enabled on the machine. When prompted, simply "TAP TO BEGIN" (touch the screen) to proceed to the login screen.

Activation / Login PIN

Each Phoenix device is individually serialized to a specific owner and requires an **Activation Code** before the tool can be used. If prompted for an activation code, follow the onscreen instructions and visit http://www.taylortechtools.com/activate with your Product Key and Serial Number to retrieve your Activation Code. Once your activation code has been entered the Phoenix will prompt to choose a 4-digit Login PIN. Your Login PIN code can also be changed at any point from the **Settings Menu**. If your login PIN is lost, contact Taylor Technologies to have your PIN reset by phone. A valid Login PIN code is required each time the Phoenix is used in order to prevent the tool from being used if lost or stolen. An incorrect login PIN will result in a 1 minute lockout period. An on-screen timer will show the remaining lockout time and restart the tool once the lockout has expired.

Code Entry / PIN Entry

The Phoenix provides an on-screen keypad interface to allow you to enter information such as login PIN's, activation codes, user codes, time delay values, etc. The default layout is in the style of an electronic safe lock keypad similar to what you might find on many safes (see above). The Phoenix also offers a second, more traditional digital keypad layout with larger buttons (see below). You can switch between the two available keypad layouts at any time by pressing the **[STYLE]** button in the lower left corner of the screen. Pressing the **[*]** button allows you to conceal any digits you enter from outside viewers (see below). The number of digits required is indicated by the number of light grey boxes shown for each digit location. If you make a mistake, press the **[X]** button in the upper right corner of the screen to erase the current entry. Pressing **[X]** a second time aborts the entry procedure and returns to the previous menu. During **Lock Servicing**, the Phoenix keeps a record of any manager or user codes programmed in the lock and places a handy quick entry button on the left of the keypad showing the user type and current code. Tap the quick entry button to automatically enter the code in the keypad.
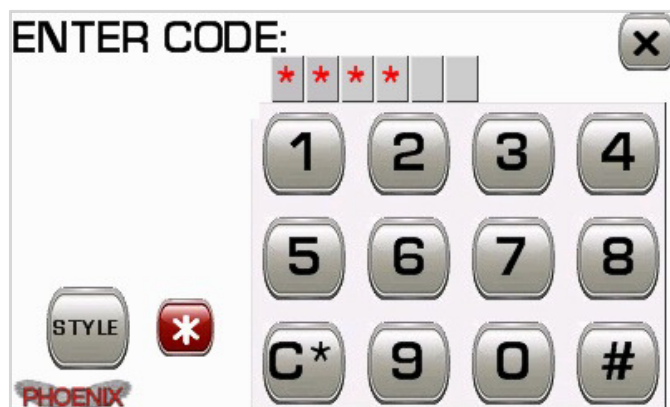
Menu Navigation

All menus in the Phoenix 4.0 share a similar layout and interface method which should help to quickly familiarize you with navigating between the tools different functions. The **[X]** button in the upper right corner of most screens can be used to return to the previous menu page or abort ongoing processes such as a lock resets. Tapping the **[PHOENIX]** logo in the bottom left corner of the screen will often allow you to directly access the advanced **Command Mode** interface. The screen is designed for accurate finger touch interaction but an appropriately designed stylus can also be used if you prefe (not included). DO NOT use a pen or other sharp instrument on the Phoenix touchscreen.

Main Menu

The Main Menu is the first screen you'll encounter on the Phoenix after entering your Login PIN. This menu will allow you access to every feature on the Phoenix and is your launching pad to all other important menus on the machine.
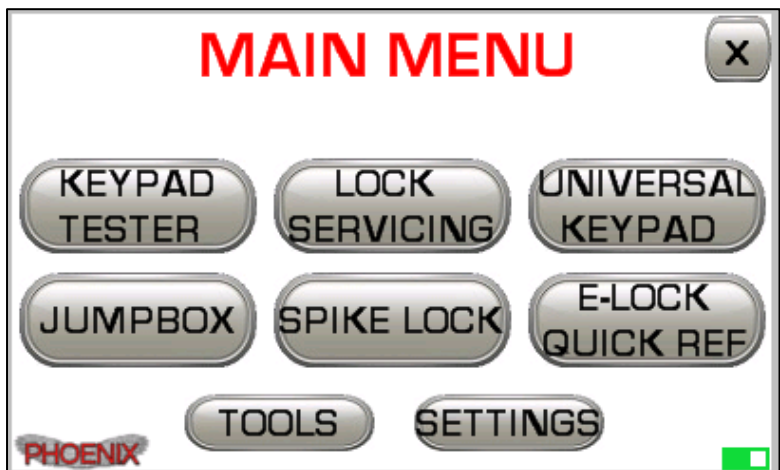
Main Menu Selections

- **KEYPAD TESTER** *(see page 14)*
    - o Diagnose faulty or potentially failing keypads
- **LOCK SERVICING** *(see page 19-25)*
    - o Identify, open, service, program and reset locks
- **UNIVERSAL KEYPAD** *(see page 15)*
    - o Use the Phoenix as an emergency keypad for electronic safe locks
- **JUMPBOX** *(see page 13)*
    - o Electronic safe lock power booster for troublesome locks & keypads
- **SPIKE LOCK** *(see page 16-18)*
    - o Spike locks from Amsec, LaGard, NL, LP and more
- **E-LOCK QUICK REF** *(see page 12)*
    - o Access our Electronic Safe Lock Quick Reference mobile app
- **TOOLS** *(see page 26-29)*
    - o Useful tools and diagnostic utilities
- **SETTINGS** *(see page 30)*
    - o Change sound volume, login PINs, recalibrate and more

Electronic Safe Lock Quick Reference

The Phoenix 4.0 allows you to access our popular Electronic Safe Lock Quick Reference right on machine. The quick reference includes high resolution images and detailed information for identifying, programming and drilling many of the most common electronic safe locks. Pages are ordered alphabetically by manufacturer. Touch and drag on the screen to move to different areas on each the page. To change between pages, touch the screen and SWIPE LEFT or RIGHT in the direction of the page you'd like to navigate to. To exit the quick reference, touch the screen and SWIPE DOWN or tap the **[X]** in the top right corner.
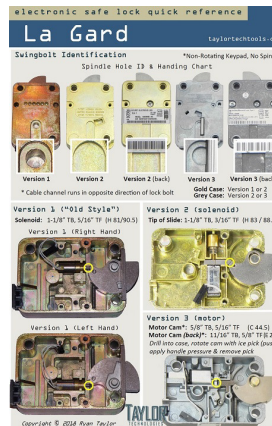
Drill Points Abbreviations

TB = *Towards Bolt*   **TF** = *Toward Flat of Bolt*   **AF** = *Away from Flat of Bolt*
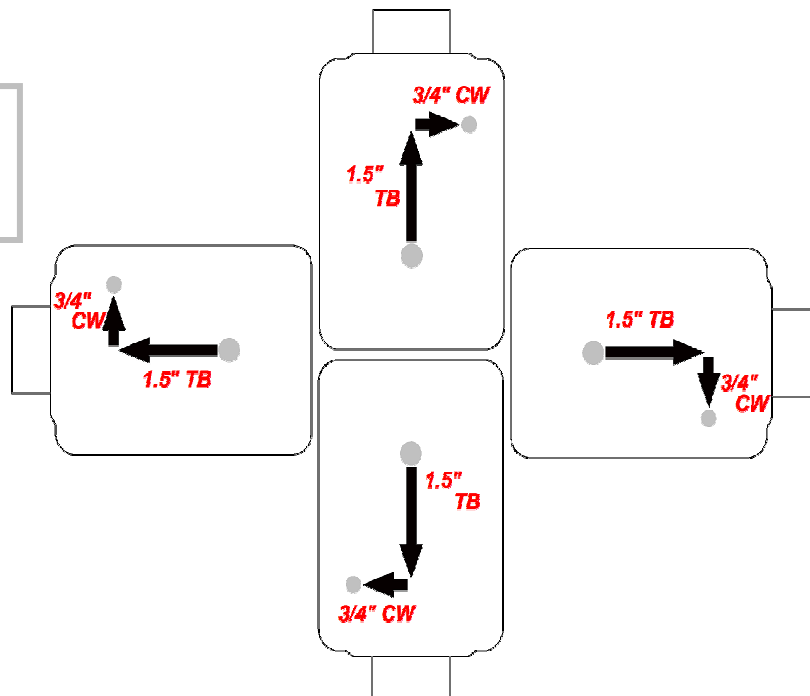
CW = *Clockwise*   **CCW** = *Counter-Clockwise*

All Drill Points are measured from the CENTER OF THE SPINDLE HOLE

Example Drill Point Measurement:

 1.5" TB, ¾" CW

JumpBox E-Lock Power Boost

Since its release over a decade ago the JumpBox from Lockmasters, Inc has built a reputation as one of the most effective electronic safe lock servicing aids in the industry. A genuine JumpBox E-Lock Power Boost module is built into every Phoenix tool. This allows the Phoenix to overcome many common electronic safe lock issues such as stalled bolts, cross-threaded drive nuts, stuck solenoids and damaged cables. Selecting the JumpBox option on the Main Menu allows you to manually access and control the Phoenix tool's embedded JumpBox power supply. To use this feature, remove the Junction Box from the output jack on the Phoenix and plug the RED / BLACK JumpBox cable directly into the top of the Phoenix tool (see image to left).Next, remove any batteries from the lock keypad then plug the white end of the JumpBox cable into any one of the 9-volt battery snap connectors inside the keypad in place of the battery (see images to left).
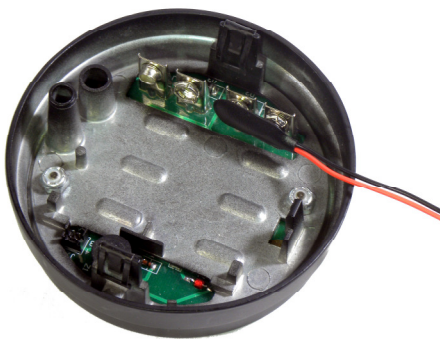
Once the JumpBox cable is connected to the 9-volt battery terminals in the keypad, tap the screen to proceed to the JumpBox control interface. (see below)

The slide switch in the middle of the screen allows you complete control of the output of the JumpBox circuit, by turning it **ON** or **OFF** instantly by simply tapping on the screen. The JumpBox feature in the Phoenix also includes an "***Active Power Display***" that continuously measures the current draw of the lock and provides a scrolling graph of real-time current consumption along the bottom of the screen. The "Active Power Display" can be used to help in diagnosing a fault lock or keypad. A non-responsive lock that's simply in penalty lockout will show a periodic "blip" scroll across the screen as the timer inside the lock counts during the lockout period. Active Power Display can also reveal a defective motor or solenoid.

Keypad Tester

The Keypad Testing feature on the Phoenix allows you to run a quick and simple diagnostic test on keypads from LaGard, LP, NL, Amsec, S&G , SecuRam and more. This test will reveal any buttons on keypads that might be so far out of factory spec that they will no longer read currently on connected locks. The test also provides an early warning for any buttons that may fail in the near future allowing for the keypad to be replaced *before* there is an issue.

To begin testing a keypad, select **Keypad Tester** from the **Main Menu** then select the manufacturer of the keypad you'd like to test. The Phoenix will then show an image of a similarly style keypad along with an indication of the correct keypad testing table to use in order to connect the keypad to the Phoenix tool. The side of the cable with a phone style plug is inserted into either the keypad jack on the Junction Box or directly into the top of the Phoenix tool. The other end plugs in the keypad. Make sure to note any keyed plugs or jacks and observe proper alignment when trying to plug testing cable into keypads.

Keypads should normally be tested *without* a battery installed but you will be prompted to insert a 9-volt battery when testing SecuRam entrypads. Also on SecuRam Safelogic keypads the Phoenix will identify the dipswitch positions set of the back of the keypad (1&3 UP, or 2&4 UP) to help with accurate identification.

Begin testing your keypad by pressing different buttons and observing the results. You can press keys in any order and once all keys have been passed you will receive a confirmation of success. When a button is pressed the Phoenix measures the resistance across that button and places it on a table on the left side of the screen. The "FACTORY" value indicates the factory resistance value for that particular button. "MEASURED" shows the actual measure resistance from the button. And the % below these numbers tells you how far the button is off of factory spec. As each button is pressed the Phoenix will place a pass or fail mark on the corresponding button in the sample keypad shown on-screen. A GREEN Check ✅ indicates that the button is well within range of factory specs and tolerances. A YELLOW Question Mark ❓ signals that the button value is with acceptable range for operation but may be failing in the future. The RED X ❌ indicates that the button has FAILED and its values are beyond the acceptable range for that lock manufacturer.

Universal Keypad / Emergency Keypad

The Emergency Keypad feature in the Phoenix allows the machine to be used as a temporary "emergency" keypad to replace damaged or missing keypads from manufacturers such as LaGard, LP/NL, Amsec, SecuRam, Sentry and S&G. After selecting **UNIVERSAL KEYPAD** from the **Main Menu**, the Phoenix will prompt you to connect the lock to the appropriate port on the Junction Box. The Junction Box should be plugged into the top output jack on the Phoenix to allow the tool to automatically detect and identify the attached lock. If the tool is unable to accurately detect or identify the connected lock (possibly due to a damaged cable or lock electronics) then you can tap the vertical **SELECT** button on the right side of the screen to manually select the type of lock you're wanting to connect to.
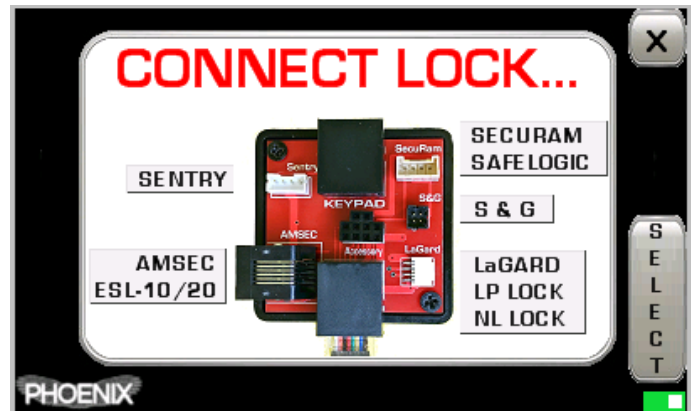
After automatically identifying or manually selecting the lock manufacturer, the Phoenix will automatically reconfigure its outputs to perfectly replicate an actual factory keypad. The emergency keypad feature will take measurements from each individual wire in the lock cable and adjust its voltage, polarity and resistance to match. The system can even detect issues such as faulty electronics and damaged wiring then automatically adjust itself to compensate. It is not uncommon for the Phoenix's Emergency Keypad feature to work on locks that refuse to accept codes from a brand new keypad. When troubleshooting mechanical safe locks that won't open on the correct combination, a seasoned safe technician will use "dialing diagnostics"and run the combination half a number high or low in order to open the safe without drilling. With electronic locks it's physically impossible for a human to dial fractional codes By taking the place of the actual keypad, the Phoenix *is* able to dial "half a number high and low" by sending non-standard keypad values to compensate for faulty components.

Using the Emergency Keypad

Press any button on the on-screen keypad to send that button press to the attached lock. Don't forget to start with the **C** button on AMSEC locks or to end with the **#** key on AMSEC and S&G locks. On the left side of the screen a vertical **Active Power Display** shows the real-time power consumption of the lock. For example, a firing solenoid or rotating motor will show a huge a large red spike immediately. The **JumpBox** circuit is accessible from inside the **Emergency Keypad** by tapping the JUMPBOX button. The GREEN ▬ will show when the JumpBox circuit is active. On S&G locks, two additional buttons are shown that allow sending the special [0/1] and [0/3] button combinations used with MRC codes.

IONIC Spiking

IONIC spiking is a revolutionary approach to spiking electronic safe locks through the spindle hole of the safe. Instead of having the drill a ½" hole into the lock case, splice into wires and working to hit a tiny spiking point buried inside the lock case with a custom formed probes, the _IONIC_ spiking method system allows you to simply poke a small 3/32" hole in the case, plug in the keypad battery connector and insert a syringe needle. The specifically calibrated _IONIC_ spiking solution included with the Phoenix will work its way across the surface of the circuit board inside the lock case, penetrating down through most factory applied coatings and quickly establish a conductive path the lock's motor drive circuitry. The Phoenix tool will automatically detect when this connection has been made and then deliver a non-damaging, low power signal that will effectively "trip" the motor driver over into a fully conductive state which causes power to flow to the motor and opens the lock. Spiking is accessible in Main Menu and is also shown as an option in the Lock Menu any time a compatible lock is connected to the tool.

Step 1]   Select Lock Type and Handing

When I_ONIC SpikeTool_ launches it begins by asking you to select the type of lock as well as the handing of the lock. Many swingbolt-style locks are "dual-handed" and can be flipped and installed with either side of the case facing the safe door. Flipping the lock case also flips the circuit card inside the lock and this must be accurately taken into account when spiking because we are targeting components located on one particular side on the lock circuit board. The Phoenix simplifies this process by providing a high resolution image of the spindle hole view for each lock shown. Use the LEFT and RIGHT arrows on the side of the screen to navigate between the different locks and mounting arrangements. Tap the screen to select the appropriate lock and progress to micro-drilling.

Step 2]   Micro-Drill Lock Case Thru Spindle Hole

After selecting a lock, the Phoenix will display the appropriate drilling depth along with a spindle hole view indicating the recommended drill position with a red circle. The Phoenix 4.0 includes a 3/32"x6" drill bit along a brass sleeve and a Drill Depth Gauge. Place the drill bit on the depth gauge and position the tip of the bit at the depth indicated on the Phoenix. Next, while holding the bit in position on the depth gauge, slide the included brass sleeve over the shank of the drill bit until it contacts the gauge. Chuck the drill bit into a keyless chuck equipped cordless drill, sliding the bit into the chuck until the brass sleeve contacts the jaws of the chuck then tighten. The sleeve now functions as a drill depth stop which ensures a precise drilling depth into the lock case and also protects the keypad cable from cable damage while drilling. Double check the depth of the bit and sleeve once chucked up then micro-drill into the lock case down the spindle hole at the position indicated. Use light pressure and allow the bit to cut cleanly into the lock case. Once complete, tap the screen to continue.

Step 3]   Connect JumpBox cable to Keypad

Disconnect the Junction Box and all cables from the output jack on the Phoenix. Plug the red and black **JumpBox** cable directly into the output jack on top of the Phoenix.

Connect the **WHITE/BLUE** 9-volt snap terminal from the **JumpBox cable** into the keypad battery connector.

Tap the screen to continue.
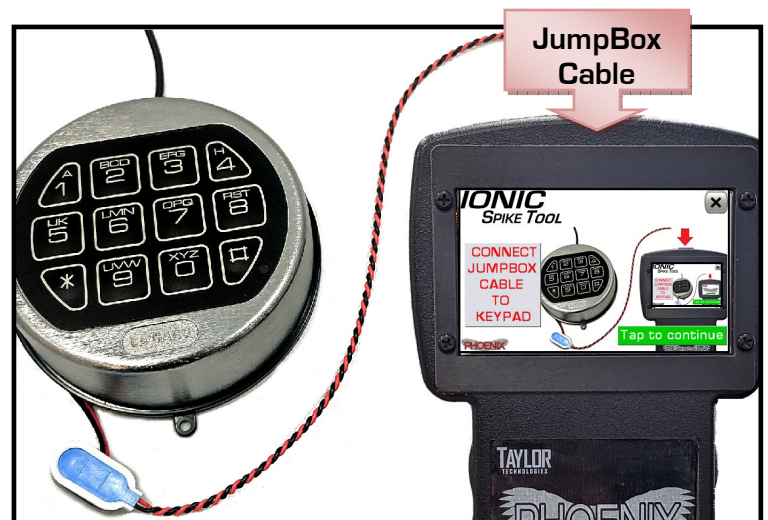
Step 4] Inject *IONIC* Solution

Remove the protective cap from the *IONIC Solution 'P'* and place the included needle onto the syringe. Guide the needle down the spindle hole and carefully insert it into the 3/32" access hole. Once *fully inserted* depress the plunger on the spiking solution and inject approximately *3mL* of solution into the lock case then carefully remove the syringe and allow the *IONIC* solution 3 or 4 minutes to coat the circuit board and start working its magic. During this time the Phoenix will be sending a low level signal into the lock and taking continuous readings to determine when the *IONIC* solution has successfully reached the motor driver. After a few minutes the Phoenix may prompt you to inject additional spike solution. This is entirely optional and you may decide for yourself when to add more *IONIC* solution. To conserve spiking solution you may want to wait up to 10 minutes before adding more solution 'P'. If you are feeling impatient you can also "force" the issue by injecting *5mL* initially and following up every 30 seconds with another *1mL* of solution. This will often allow a viable spiking connection to be made in seconds rather than minutes.

Step 5] Spike Lock to Open

Once conductive contact with motor driver is clearly sufficient for spiking, the Phoenix will indicate "*Connection Found - Tap to Spike*". Tap the screen and the Phoenix will show "Working..." then "LOCK OPEN" once the lock is successfully spiked. The tool will show a countdown to indicate how much longer it will be holding the lock open. After this expires the Phoenix will release the motor driver for a period to prevent any potential damage to the circuit board. You can tap the following screen showing "LOCK CLOSE - Tap to retry" to have the Phoenix again spike the motor driver and open the lock. If the lock does not open on the first attempt then wait several minutes and try spiking open again. Repeatedly trying to spike the lock open without allowing a sufficient amount of "cooldown" time between attempts can reduce the effectiveness of the IONIC solution already inside the lock case. As electricity travels through the IONIC carrier solution hydrogen atoms are slowly released at the point of contact with the motor driver and this can create small gas bubbles that push the solution away from the driver contacts. If this occurs, injecting additional spike solution will "flush out" the depleted solution and re-establish contact with the surface of the motor driver.
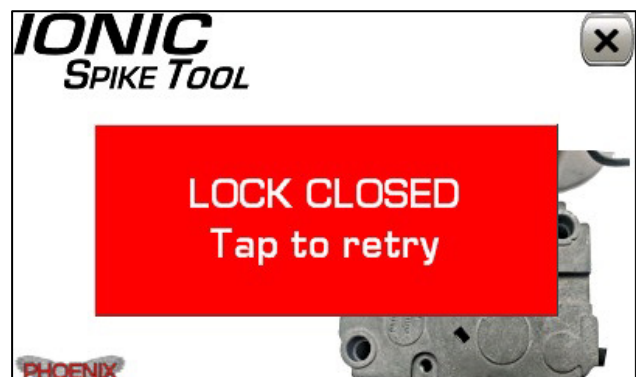
LOCK SERVICING

Selecting the **LOCK SERVICING** option from the **Main Menu** will launch the automated e-lock servicing functionality that the Phoenix has become so widely known for. This quickly becomes the "go to" selection for both novice and skilled safe technicians. For the majority of safe jobs, **LOCK SERVICING** is frankly the place you want to be.
The first thing you'll see each and every time you make the **LOCK SERVICING** selection is the "**CONNECT LOCK**" screen. One of the more commonly overlooked features of the tool that a lot of safe technicians say they've come to really appreciate is the automated lock identification process that allows even unfamiliar locks to be successfully serviced with little or no information on that make & model or its history. It's also not necessary to install the correct adapter or dongle in order to make the tool compatible. When prompted to "CONNNECT LOCK..." you simply need to remove the safe's keypad and plug the lock cable into whichever jack it fits.
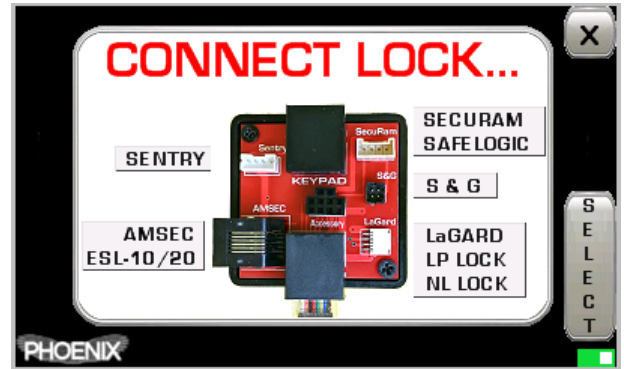
Once the lock is connected the Phoenix will begin an automated identification process to determine the make, model and vintage of the lock. Once this is complete the tool then begins an analysis to determine as much useful information as possible about the lock.

Once the *Identifying* and *Analyzing* processes are completed, the *Lock Information* screen provides a breakdown of everything the tool was about to determine about the newly connected lock. *Please* take a few moments to review the lock information as some of it may be useful to you. Surprisingly, more than half of the callers to our technical support line are unable to recall the type of lock they're connected to.
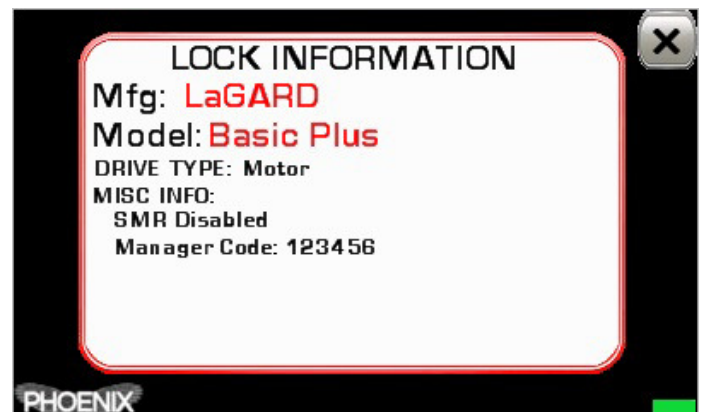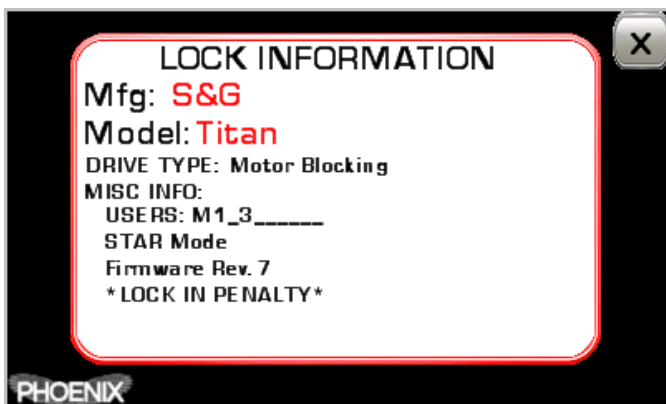
LOCK MENU

The lock information uncovered during the identification process determines the options shown on the *Lock Menu*. The Phoenix includes literally hundreds of unique diagnostic routines, programming procedures, opening and reset methods. Once the make, model and vintage of the lock has been properly determined the Phoenix will be able to properly populate the *Lock Menu* screen to allow quick access to any compatible routines.

LOCK MENU
MFG: LaGARD
MODEL: Basic Plus

INFO   OPEN   PROGRAM

DRILL POINTS   SPIKE   RESET

PHOENIX

Lock Menu Options

- o INFO - Recheck and display *Lock Information*

- o OPEN - To open a lock *WITH A KNOWN CODE*

- o PROGRAM - Change code, add/delete users change settings, etc

- o DRILL POINTS - Display drilling info from E-Lock Quick Reference

- o SPIKE - Use *IONIC* spiking method to open lock (*see IONIC Spiking*)

- o RESET - Open lock *WITHOUT A KNOWN CODE* and reset to 123456

- o AUDIT - Retrieve audit report from lock

- o JOB NOTES 📄 - Automatically add lock information to stored *JOB NOTES* and add custom job note with date/time

- o HELP ❓ - Quick popup reminder of selection options

LOCK MENU - OPEN

Select this option to open or test a lock with a known or suspected code. You will first be prompted to enter your code. Any previously uncovered codes will be available to you on the quick entry buttons located to the left of the keypad.
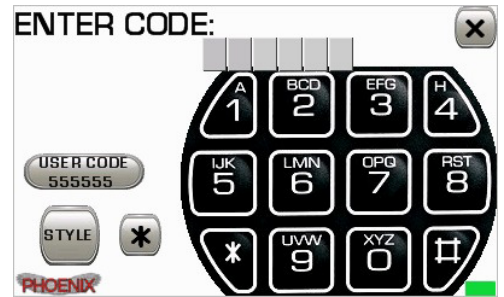
After code entry, you will be given an option of two different opening methods:

QUICK DIAL

Quick Dial will simply send to the lock the code you provided. If the lock opens then you will see "LOCK OPEN" on the screen along with a progress bar indicating the length of the time the lock will remain open. On some locks it is possible for the Phoenix to quickly remove power from lock before the closing cycle which will keep the lock in the "open" or unlocked position. If this option is available then you will see "TAP TO KEEP OPEN" and a quick tap of the screen during the "LOCK OPEN" message pull power from the lock, preventing it from re-locking.

LOCK MENU - OPEN

TROUBLESHOOT

This is the best option when you have a suspected code but the lock is not opening as expected. This could be the result of a defective electronic component (ie. keypad cable), faulty mechanical component (ie. drive nut, solenoid), the current lock state (ie. penalty lockout, time delay) or a simple invalid code.

The first step in the troubleshooting process will look for issues such as communication problems and penalty lockout conditions. If these can be remedied then the Phoenix will begin to confirm the supplied code. If the code is determined valid then the Phoenix assumes that the problem must be mechanical in nature and will use its built-in JumpBox circuit along with its pre-programmed diagnostic routines to repair and open the lock. Examples of these issues include stuck solenoids, stalled bolts and cross-threaded drive nuts. In many of these cases the lock can be re-used after repair.
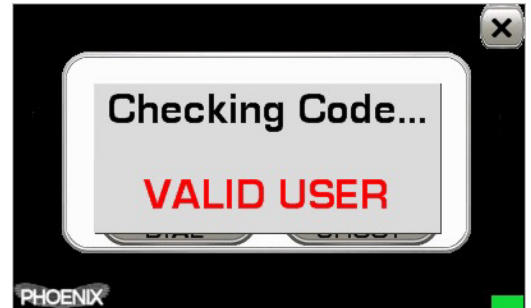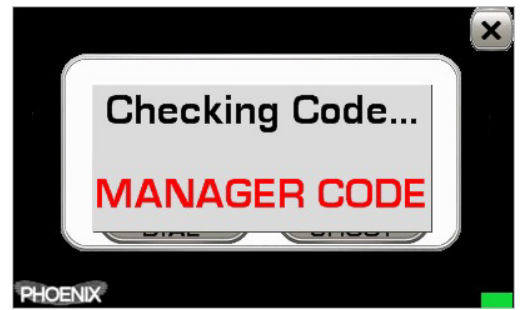
In-Depth - Lock Repair Process

*"I understand the Phoenix might get it open but the tool can't actually **repair** a lock, right?"*

In some cases the Phoenix can indeed repair a mechanically defective lock. The best illustration of this physical repair process is a S&G 6120 series lock with a cross-threaded drive nut. These locks exhibit a tell-tale faint click followed by a 2nd faint click when running the code. This is caused by the design of the drive mechanism which uses a plastic drive nut traveling on a threaded brass shaft to retract the lock bolt. For proper bolt extension this design requires the threads on the end of the brass drive shaft to be tapered similar to a hand tap. Normally this system works fine but with increased use a potential problem arises. When closely examining the defective 6120 locks used in our e-lock drilling classes, we noticed that the locks removed for cross-threaded drive nuts had a fine gray powder built-up between the brass threads on the drive shaft. This powder was deposited over time as the black plastic drive nut slowly wore. On the tapered threads this powder was enough to fill the small valleys between threads and resulted in the drive nut jumping a thread on one side of the driveshaft resulting in a cross-thread. By threading the nut off by hand and wiping or spraying away the fine powder the locks functioned perfectly. Countless "defective" 6120's have now been put back into service using this repair method either by hand or with the Phoenix tool. The Phoenix tackles a cross-thread by first using it's JumpBox circuit to spin the motor OUT rather than in (just as you'd do by hand). If needed, it also pulses the motor to create an impact-like effect which dislodges the seized nut. Once the nut is free, the tool uses it's JumpBox to rotate the motor in high speed pulses to dislodge any built-up powder between the threads. It then does a sequence of "soft openings", lightly retracting the bolt and gauging the resistance. This process is repeated until the Phoenix feels that the drive nut is operating smoothly and without resistance.

Reside Covering Tapered Threads
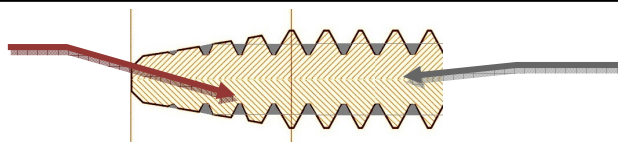
S&G 6120 Driveshaft with Threads (BRASS)

LOCK MENU - PROGRAM

The Program menu on the Phoenix spares safe technicians from needing to carry a copy of programming procedures for every make and model of electronic lock. Based on the information found during the *Identification* process, the Phoenix will populate the *Lock Programming* menu with all available programming options stored in its memory. You may add to the list of programming options yourself using the advanced *Command Mode* interface to program in new abilities and along with the lock make and model (*software 4.0.5 and above required*). Most options will require entering the lock Manager Code. However, the Phoenix will automatically skip this step if the manager code is already known. After each programming process with Phoenix will confirm that the procedure was successful.

Some common programming examples:
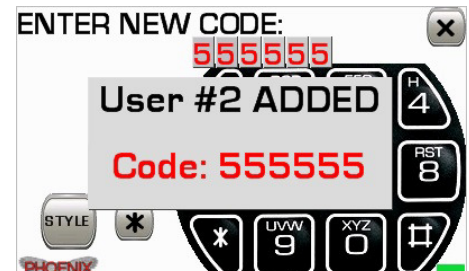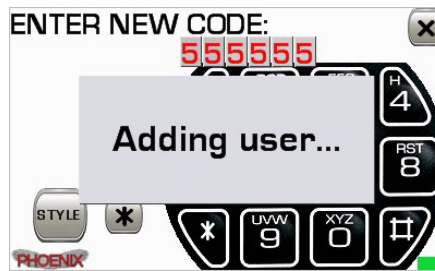
LaGARD 3045 HANDHELD PROGRAMMER

This feature allows the Phoenix to successfully simulate the LaGard 3045 Handheld Programmer for programming features on the 33E ComboGard and 3650 SafeGard. When the 3045 feature first loads it will download the current settings from the lock and display them as the current settings in the 3045 Programmer Menu. If the displayed Manager Code is incorrect, tap the code to update it. Use the RIGHT ARROW to transition to the 2nd menu then tap SEND to transfer the indicated settings to the lock.
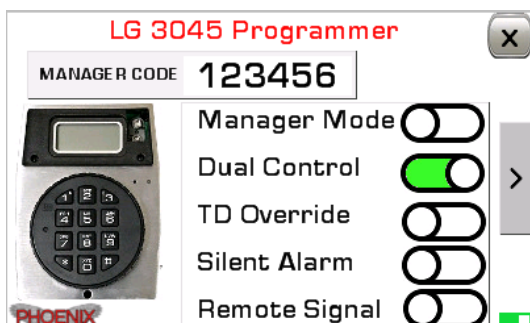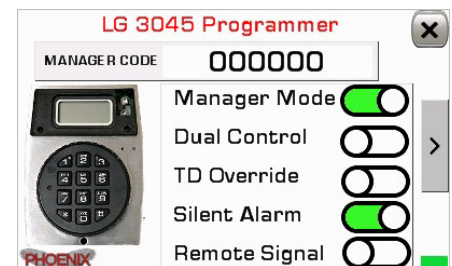
LOCK MENU - RESET

This option will launch the reset process that corresponds to the vintage, make and model of lock identified. (Note: If the lock is damaged or connected improperly and the Phoenix misidentifies it then selecting this option will not be successful because the machine is running the wrong process. The reset method for a LaGard Basic is *never* going to reset an Amsec ESL-10. Just back out, figure out the identification issue and try again.)

The reset process typically takes between 15 and 20 minutes depending upon the exact lock and unique circumstances.

Notes specific to manufacturer/model:

- **S&G 6120/6123**
    - The Phoenix will *completely* wipe the memory of the lock and write a new MRC code into memory.
    - If the RESET option is not shown then look for an * or ** after the model type. These indicate that the lock has specific countermeasures added to prevent the reset method from working.
    - A well charged battery will speed up the reset process considerably
    - Very old locks (grey cable, blue stripe, no band) can be sometimes be troublesome to reset because the electronics have aged considerably. If may be best to select the OPEN option for SET PRIORITY in the SETTINGS MENU. It is still possible to reset the lock but 30 minute reset times are not uncommon.
- **S&G Titan/Spartan**
    - The Phoenix will reset all existing codes but the leave any pre-programmed MRC intact.
    - The Phoenix includes reset routines for firmware revisions 1 thru 7 running in STAR mode (the default setup).
- **LaGard 33E, Basic, 3650**
    - The Phoenix will reset all existing codes but place the lock in manager mode allowing a 2nd user to be added
    - A clean power supply is necessary for successful reset. Do not charge the battery or attach A/C power while attempting lock reset
- **AMSEC**
    - The Phoenix will prompt you to insert the **AMSEC Reset Adapter** into the *Accessory Port* on the *Junction Box* and connect the lock to the AMSEC jack on the **AMSEC Reset Adapter**. *The standard AMSEC jack should be used at all other times.*
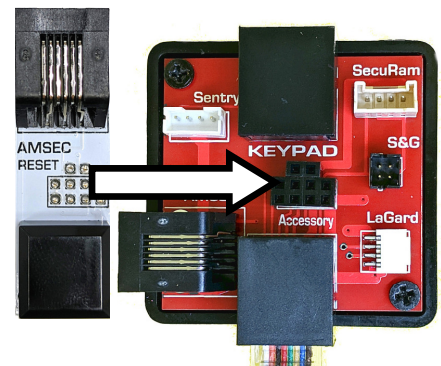
- **ALL**
  - A signal strength indicator is shown during most reset routines. More bars indicate a better connection to the lock and ensure a quick and successful reset operation. If an X or no bars are shown after 15 minutes then contact Taylor Technologies and we can walk you through some troubleshooting steps.
- **LaGard BASIC Plus, 39E**
  - You may be asked to select the reset type - CODE or FULL. CODE resets are accomplished through the keypad cable and reset only the code. FULL resets completely reset the lock and require access to the back of the lock.
- **SECURAM PROLOGIC/SCANLOGIC**
  - See the ***SecuRam Recovery Process*** section below

SECURAM CODE RECOVERY

Taylor Technologies has partnered with SecuRam Systems to help certified safe technicians better utilize the company's innovative and secure Recovery System. In the future, SecuRam plans to expand the Recovery System capabilities to also include its popular SafeLogic line of electronic safe locks using the Phoenix as a digital interface.

SETUP

BASIC RECOVERY

- Place 9V battery in entrypad and connect entrypad to lock cable

ADVANCED RECOVERY (software versions 4.0.5+)

- Place 9V battery in entrypad, connect entrypad to keypad port on *Junction Box* using **SecuRam Keypad Testing Cable** and connect lock to SecuRam port on *Junction Box*

RECOVERY PROCESS

On ProLogic and Scanlogic series locks, the entrypad and lock assembly are "married" to one another with a shared encryption key. To prevent the lock and entrypad from going out of sync, the Recovery process requires that the lock and entrypad are connected during the entire process (see SETUP above).

Follow the on-screen instructions to retrieve a recovery key from the entrypad. Call the Taylor Technologies TECH HOTLINE with this key to retrieve a Recovery Code or OTC (One Time Code). This OTC will expire in 20 minutes after which time a new code must be generated.

Tools Menu

Audit Viewer

- View the full history of activity on your Phoenix. Tap to scroll to the next screen. Press **[X]** to exit the audit viewer.

Job Notes

- View any save job notes using the Text Viewer app. (see *Job Notes*)

LaGard 3045 Programmer

- Access the Phoenix tools integrated LaGard 3045 Handheld Programmer interface to program LaGard 33E ComboGard and LaGard 3650 SafeGard electronic locks. Set modes, time delay values, code length and more. (see *LaGard 3045 Programmer* section)
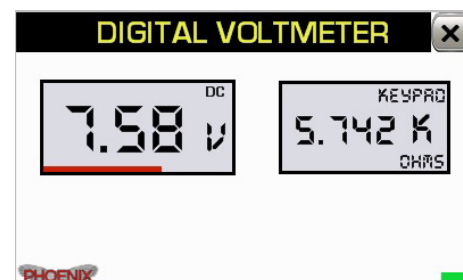
Power Supply

- Use the Phoenix as a precision adjustable, high current power supply. Output from 0.00 to 12.50 volts with real-time amperage readings (see *Power Supply* section).

Voltmeter

- Use the Phoenix as a precision digital multi-meter to measure voltage and resistance (see *Voltmeter* section)
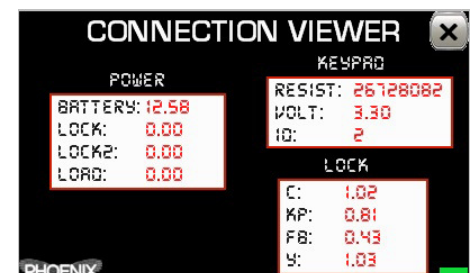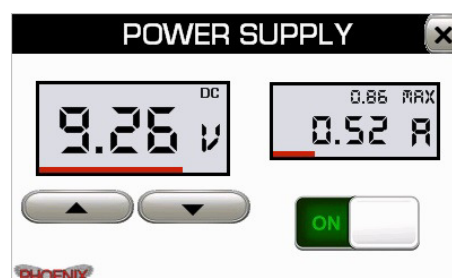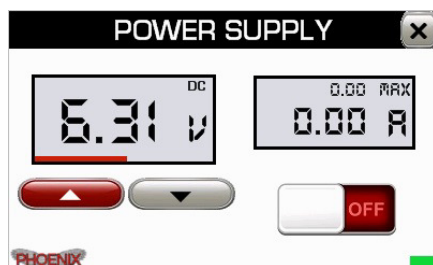
System Check

- View the status of system components and check system values such as battery voltage, LCD software version, Phoenix software version, serial number, product key, login counter and reset counter.
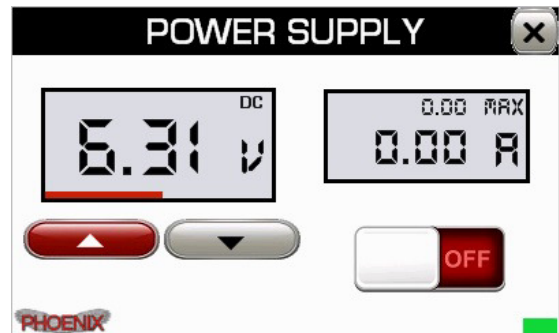
Connection Diagnostic

- View live readings from the Phoenix output jack. (Advanced Users)

TOOLS MENU - POWER SUPPLY

The Phoenix includes a digital power supply app that allows you to use the tool to supply a precise voltage level for specific applications. Perhaps you're working on an alarm panel, mag lock or electronic keypad that uses a voltage other than 9 volts.

A few important rules:

DO NOT connect to any system that is already powered.

DO NOT connect to any system with the polarity reversed (positive/negative flipped)

DO NOT exceed 2 Amps of output for more than a couple seconds or 1 Amp sustained for more than 20 seconds.

Connecting

You may use the included JumpBox cable to access the output of the adjustable Power Supply. Depending upon interest level, Taylor Technologies also plans to offer an alligator clip adapter that snaps onto the JumpBox cable's 9V terminals.
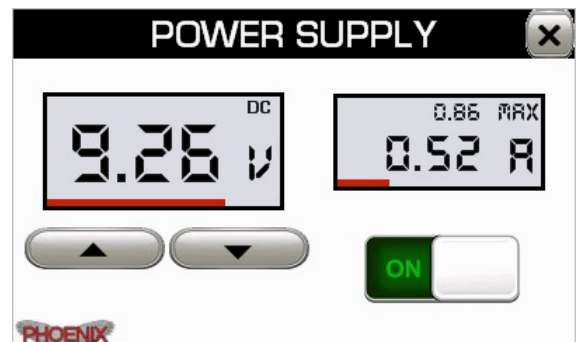
Adjusting Output Level

Use the UP and DOWN arrows to adjust the target voltage as needed. Once the voltage level is correctly set, tap the **ON** or **OFF** to enable or disable power output on the JumpBox cable. The current amperage reading will be shown on the right side of the screen along with the maximum amperage level measured. The voltage level may be adjusted at any time even while power output is enabled. The maximum available output voltage will be dependent upon the current internal battery charge state.

TOOLS MENU - VOLTMETER

As part of its lock diagnostic and keypad testing capabilities, the Phoenix has the ability to make precision power (voltage/amperage) and resistance measurements. The *VOLTMETER* app in the *TOOLS* menu allows you to access these capabilities directly for other day to day uses.
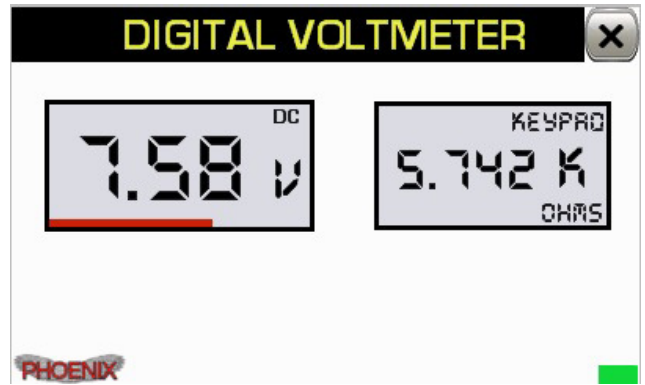
A few import notes:

DO NOT connect to AC lines (DC voltage only).

DO NOT connect the voltage measurement input to over 13.2 Vdc.

DO NOT connect the voltage measurement inputs with the positive and negative lines flipped (Phoenix = *FRIED*)

DO NOT connect a line with live voltage on the resistance measurement input.

Connecting

The voltage input lines can be directly accessed through the JumpBox cable (attached directly to the top of the Phoenix).

The resistance input lines can currently only be accessed through the keypad testing cables. Attach a keypad with testing cable to view the total resistance measurement on that line.

NOTE: This is a new feature that must be used with caution and is included in the Phoenix 4.0 per request to gauge overall interest level. Depending upon feedback Taylor Technologies will begin offering a voltmeter adapter for the ACCESSORY PORT with simple alligator clip connections and integrated reverse polarity protections.
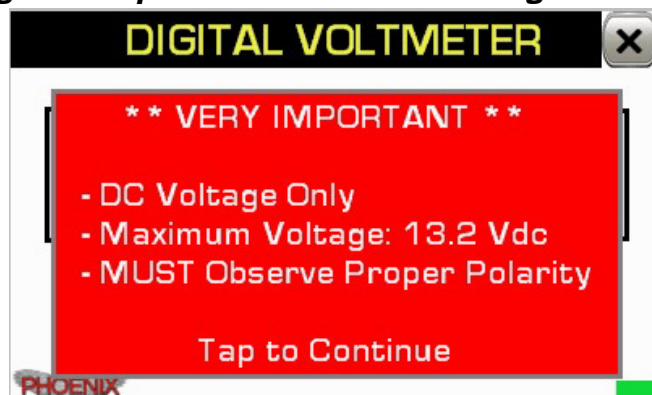
JOB NOTES

Many technicians will often keep a log of important notes from different safe jobs - the type of lock, services performed, any recommendations, any warranty information, etc.

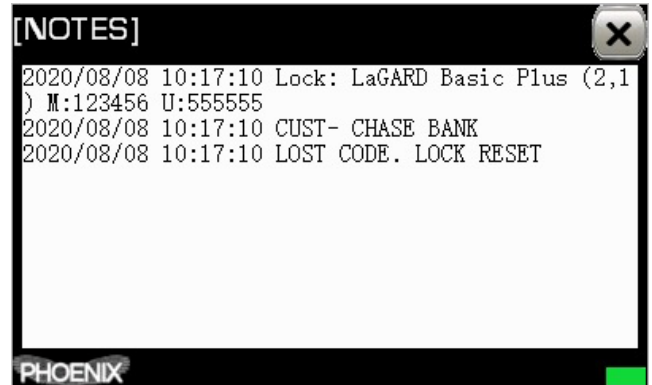The Phoenix JOB NOTES app streamlines this process and offers a quick and simple way to record and retrieve notes for different safe jobs. You can view these Job Notes at any time using the Text Viewer app by selecting JOB NOTES in the TOOLS menu. You may also export your stored job notes to a connected computer using a micro USB cable and the Phoenix Commander PC software (optional).

```
[NOTES]                              ✕
2020/08/08 10:17:10 Lock: LaGARD Basic Plus (2,1
) M:123456 U:555555
2020/08/08 10:17:10 CUST- CHASE BANK
2020/08/08 10:17:10 LOST CODE. LOCK RESET



PHOENIX
```

All job notes include the time and date entered.

To add a new JOB NOTE from inside the LOCK MENU, click the JOB NOTES icon on the top of the screen.

The Phoenix will automatically enter any known information into the JOB NOTES section included lock manufacturer, lock model and any currently known codes.

```
LOCK MENU            ▤  ✕
MFG: LaGARD
MODEL: Basic Plus          ?
 INFO    OPEN    PROGRAM
 DRILL
 POINTS  SPIKE    RESET
PHOENIX
```
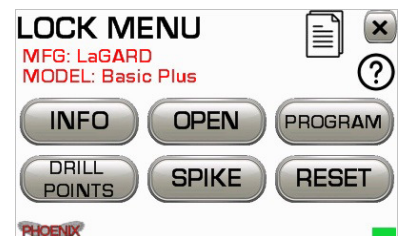
You will then be presented a standard QWERTY style keyboard to allow for entering additional notes. Press OK after each new note and when finished tap **[X]** to save your notes and exit.

```
JOB NOTES:        08/08/20   ✕
                  10:43
PHOENIX                    DEL
 q  w  e  r  t  y  u  i  o  p
TB  a  s  d  f  g  h  j  k  l   OK
CAPS  z  x  c  v  b  n  m  [  ]
123  >      SPACE       ,  .  |
```

Settings Menu

Secure Reset

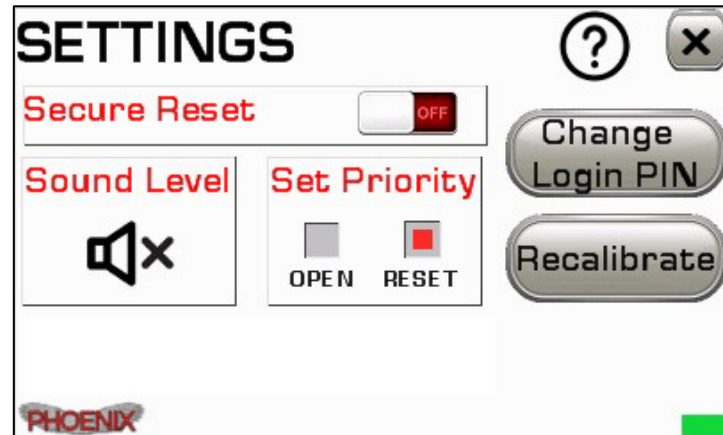- Turning on Secure Reset will require your login PIN to be entered to complete the final step in a lock reset operation. This prevents others from accessing the safe if the tool is left unattended during a lock reset.

Volume Setting

- Tap the speaker icon to cycle between the three sound volume options - OFF, LOW, and HIGH.

Change Login PIN

- Set a new login PIN. You must first enter the current login PIN.

Set Priority

- If the Phoenix is unable to fully reset a particular lock in the standard 15 minute time period then it will check your *Set Priority* setting. The default setting, **RESET**, tells the Phoenix to continue attempting to reset the lock using more aggressive methods (for example, when your goal is to re-use the lock). Using the **OPEN** setting tells the Phoenix to abandon the reset attempt and instead try to simply open the lock even though you will have no working codes to all for re-using the lock.

Recalibrate

- Recalibrate the power output of the Phoenix for accuracy and optimal performance. You can also use this feature to switch between RED and BLACK junction boxes if needed.

Command Mode Interface (ADVANCED - use caution)

COMMAND MODE is an entirely new interface that allows tool owners to interact with the Phoenix in a much more direct fashion and to use its built-in features in new and innovative ways. You can use COMMAND MODE to carry out simple tasks such as changing a code or to automate complex tasks like setting up entire locks or building custom troubleshooting routines.

COMMAND MODE is 100% safe *if used correctly*. It will also give you complete control of the Phoenix and will faithfully execute any orders given to it. If you tell the Phoenix to send 12 volts to a 6 volt Sentry Safe then it do exactly as told and probably fry the lock. You are in complete control here. We encourage experienced owners to explore this interesting new interface option but we also cannot warranty stupidity. Please be cautious and thoughtful with every command. If you do happen to make a serious mistake that potentially damages the machine, just be upfront and honest about what occurred so we can get the machine back in working order for you quickly. This can often be accomplished over the phone. When an owners description of events don't match the damage we have to manually go through the machine logs to reconstruct what occurred in order to determine the necessary fix and going through those logs line-by-line really stinks.
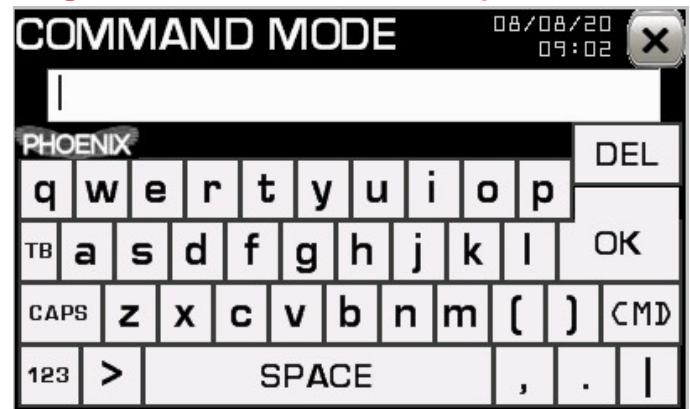
You can access COMMAND MODE from most screens by tapping the small PHOENIX logo on the bottom left corner of the screen. Some commands will not be accessible without being logged into the tool or when your machine is in lockout condition. Simply type the command you'd like to perform and press OK to execute that command immediately. A list of many commands is shown in the COMMANDS section. Clicking the CMD button will pull up a quick menu that allow easy access to many common commands. In most situations your first command will always be the 'lock' command which converts the output terminals of the Phoenix for interfacing with a particular lock and sets the appropriate output voltage. Commands are not case sensitive. You can string together multiple commands by separating them with the | character located on the bottom right of the keyboard.
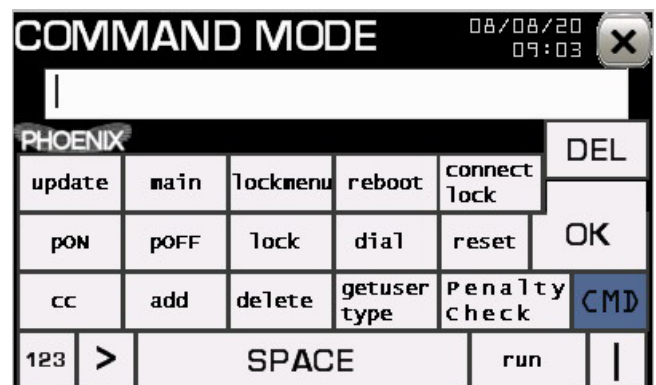
Command Mode Examples

Changing a code from 123456 to 111111 on a LaGard

`'lock LG'`   [OK]   (set the Phoenix to dial LaGard locks)

`'cc 123456 111111'`   [OK]   (change code command)

Or with a single line `'lock lg|cc 123456 111111'`   [OK]

Remove the time delay from an S&G 6120 without waiting

INFO: Removing the time delay on S&G 6120 series locks requires you to first enter a code, then wait through the time delay period before entering the command to remove time delay. This script will handle the process for you without having to sit and wait through the time delay yourself.

`'lock SG 20'`   [OK]   (set the lock to an S&G 6120)

`'dial 123456'`   [OK]   (enter 123456)

`'pr #'`   [OK]   (press & release the # key)

`'wait 900|pr 7|pr 4|pr *|dial 123456|pr #|wait 1|pr 0|pr *|pr 0|wait 1|pr 0|wait 1|beep 5'` [OK]

                (wait 900 seconds or 15 minutes for time delay to complete)

                (enter command to remove time delay 74*123456#0*0#0#)

                (signal with 5 beeps when completed)

Check if a lock is in penalty and if a code is valid

`'lock LG'`   [OK] (set the Phoenix to dial LaGard locks)

`'pencheck'`   [OK] (check is lock is in penalty mode: 0=NO, 1=YES)

`'getusertype 123456'` [OK] (check if 123456 is a valid code

                                    0=Invalid, 1=Manager Code, 2=User Code,

                                    9=Lock in Penalty, 99=N/A)

Note: Results from any commands are shown in the blank area below the command line in COMMAND MODE or beside the command in SCRIPT mode

Show a positive, uplifting message and beep a bunch

`'message You are the BEST!'`   [OK]

`'beep 10'`   [OK]

Command Mode - Saving and Replaying Command Scripts

You may have a sequence of commands that you commonly use or would be helpful to have quick access to again in the future. In these cases you can SAVE and RUN list of commands from the COMMAND MODE prompt. **You can even assign these commands to a new button in the PROGRAM menu for specific locks!** With this ability you can actually custom program your Phoenix tool. Command scripts can also be exported and imported to the Phoenix using the Phoenix Commander software (optional) allowing you to share your scripts with other safe technicians.

Creating a new command script is a simple as entering COMMAND MODE and entering 'save' following by the name you'd like to assign to the script and pressing [OK]. You'll then enter each command individually and instead of executing the commands the Phoenix will save them to the indicated script. Once completed, use the **[X]** button to exit COMMAND MODE and save your script. To run your command at any point in the future, go to COMMAND MODE and enter 'run' followed by the script name.

Example Script - Adding User #2 with code 222222
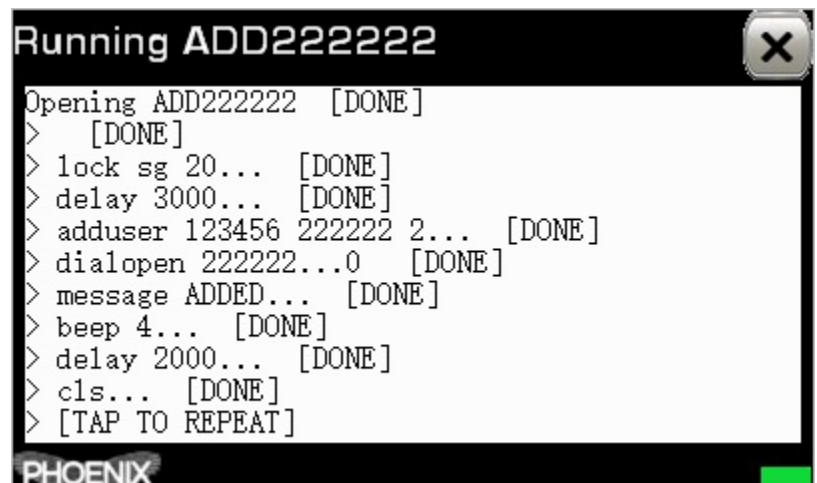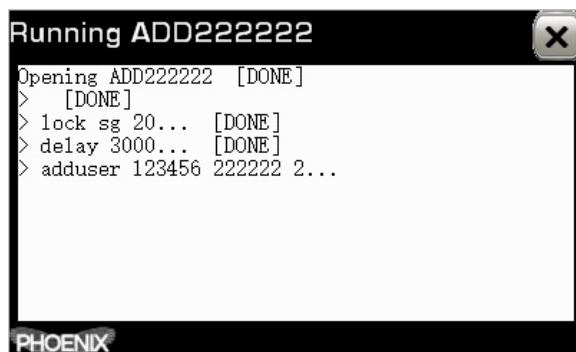
Command Mode - Adding New PROGRAM Menu Buttons

The following applies to Phoenix software version 4.0.5 and above.

To create a new command script that also appears as an option in the PROGRAM menu for a particular lock, create a command script as before BUT for the first command use the '@' symbol followed by the 'lock' command with the lock manufacturer and model. For example, '@lock LG 33' would add the script to the PROGRAM menu for LaGard 33E ComboGards.

Useful Examples

Use Walkback Procedure on S&G 6120

INFO: On S&G 6120/6123 locks with a stalled bolt, the Walkback Procedure can be implemented to slowly "walk" the lock bolt back into the lock case. This is done by repeatedly entering the code to open the lock, waiting 2 seconds then removing power before the bolt extends. Each time the lock bolt will start further inside the lock case allowing it to slowly 'walk' fully into the case even when heavily stalled.

`'save walkback'`	[OK]	(save new script as 'walkback')
`'@lock SG 20'`	[OK]	(set lock to S&G 6120 and save as new button)
`'p111'`	[OK]	(enabled JumpBox and adjustable power)
`'setv 10.5'`	[OK]	(set adjustable power circuit to 10.5V output)
`'getcode code'`	[OK]	(prompt for code and save to 'code')
`'dialopen code'`	[OK]	(dial the lock open with supplied code)
`'wait 1'`	[OK]	(wait 1 second)
`'p000'`	[OK]	(remove power from lock)
`'wait 1'`	[OK]	(wait 1 second)
`'p111'`	[OK]	(restore power to lock)
`'dialopen code'`	[OK]	(dial the lock open with supplied code)
`'wait 1'`	[OK]	(wait 1 second)
`'p000'`	[OK]	(remove power from lock)
`'wait 1'`	[OK]	(wait 1 second)
`'p111'`	[OK]	(restore power to lock)
`'dialopen code'`	[OK]	(dial the lock open with supplied code)
`'wait 1'`	[OK]	(wait 1 second)
`'p000'`	[OK]	(remove power from lock)
`'wait 1'`	[OK]	(wait 1 second)
`'p111'`	[OK]	(restore power to lock)
`'dialopen code'`	[OK]	(dial the lock open with supplied code)

Software Updates

Visit our website to activate your tool and register for email updates to receive email notification of new software updates. The included micro-USB cable is used to download new software to your Phoenix tool.

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