

Stronghold Acoustic Burglar Deterrent

Installation Manual

The Stronghold Acoustic Burglar Deterrent is designed to replace the interior alarm sounder on a traditional burglar alarm, enhancing the deterrent effect of the system by generating an unbearable sound upon unauthorized entry. The high decibel output level, combined with the proprietary spread-spectrum waveform, causes an immediate and intense sensation of ear pain, and, in many cases, nausea and vertigo. This deprives the burglar of the opportunity to engage in theft or violence during the period between alarm activation and police response. Unlike competing products, which require periodic replacement of an internal battery, the Stronghold Acoustic Deterrent itself is maintenance-free, as it is powered directly from the existing system's bell output terminals. In most cases, installation of the Stronghold Acoustic Deterrent will have no effect on the day-to-day operation and maintenance of the existing alarm system.

As with any piezo-dynamic sounder (an emerging technology in which a piezo element drives a plastic diaphragm for improved efficiency), the Stronghold Acoustic Deterrent draws less current (180mA) than a sounder based on a traditional moving-coil speaker. This enables multiple units to be installed to protect a larger area, even on systems with low siren current capacity.

In response to the increasing prevalence of combined fire-burglary alarm systems, the Stronghold Acoustic Deterrent has been designed to generate a distinct, non-debilitating fire alarm tone in response to the temporal pulsing fire signal generated by these systems. This is accomplished by sounding the fire tone for 1 second upon input activation, followed by the deterrent tone if the input has not been interrupted during this time (an individual fire signal cycle lasts only 0.5 seconds, therefore, the deterrent tone does not sound during a fire alarm). As such, the device can be operated from a dual-purpose output without the need for an external signal discrimination timer.

Specifications:

Input voltage: 12 VDC nominal

Current draw in alarm: 180 mA (typical)

Standby current draw: 0 mA

Sound level (burglary mode): 124 dB peak (typical) at 1 meter

Sound level (fire mode): 104 dB (typical) at 1 meter

Fire tone: simulated mechanical horn, 520 Hz fundamental frequency

Pre-warning tone: same as fire tone, 1 second duration preceding burglary tone

Burglary tone: proprietary spread-pectrum waveform, 3-4 kHz

Transducer type: triple piezo-dynamic

Dimensions: 13 x 12 x 3.5 cm

Note: specifications are based on design criteria and in-house measurements; this product has **NOT**, at the time of this writing, been evaluated by Underwriter's Laboratories or any other official testing authority. The 520 Hz fundamental frequency of the fire alarm tone does not imply compliance with low-frequency fire alarm notification appliance requirements for public sleeping areas.

Installation Procedure:

1A: Prepare installation site (retrofit):

Disconnect power to the alarm system. Remove the existing siren and save the end-of-line resistor if applicable. Ensure that the remaining wires can supply 12VDC at 180mA when the system is in alarm (refer to the main panel installation manual to determine available siren voltage and current).

1B: Prepare installation site (new installation):

Run a 2-conductor wire from the alarm control cabinet to the installation site. 22AWG is recommended for wiring runs of up to 300 feet divided by the number of units, while larger diameters (such as 18AWG, or paralleled 4-conductor wire) are recommended for longer distances and/or more units. The wire must be connected to the “Alarm Output”, “NAC”, or “Bell” terminals, or to a programmable output for selective operation (please note that programmable outputs usually do not support wiring supervision or fire signal coding). The output must provide a nominal voltage of 12VDC, and must be capable of supplying a current of at least 180mA.

Leave the wire hanging out of the wall, as shown below:



2: Mount backplate:

Remove front cover and circuit board from backplate, taking care not to damage the components. Place backplate onto the wall so as to allow the wire to pass through the rectangular slot in the top right-hand corner. Ensure that the backplate is level. If mounting to drywall, mark the locations of the screw holes, remove the backplate from the wall, and drill out the marked locations.



Then, install the supplied drywall anchors:



Finally, screw the backplate into the anchors:



If mounting to a junction box, simply align the four mounting holes and insert the appropriate screws. The backplate can also be mounted directly to a wooden surface (drill pilot holes if necessary).

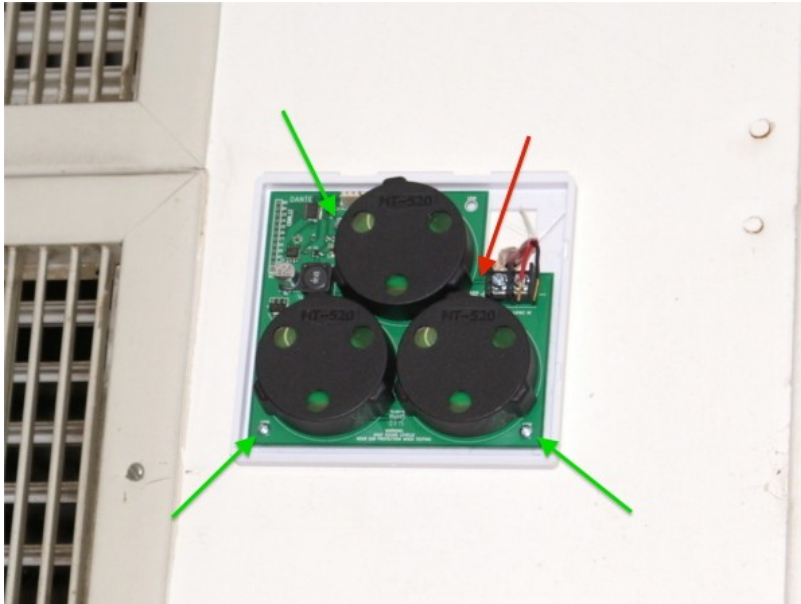
3: Mount circuit board:

Place the circuit board into the backplate, ensuring that the molded plastic standoffs enter the mounting holes in the board:



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Fasten the board to the backplate by inserting the small non-pointed screws into 3 of the molded standoffs indicated on the circuit board by the text “1PIN”. Two of these standoffs are located at the bottom corners of the board, while the remaining standoff is located in the circuitry area to the left of the uppermost transducer (indicated by green arrows). A fourth standoff (indicated by a red arrow) exists near the terminal block, and exists only to support the terminal block; placing a screw in this standoff is not necessary.



Note: In the photo above the wiring is NOT connected. Later the red wire will be connected to the left terminal, as shown.

If the board does not fit properly, please ensure that the backplate mounting screws have been driven in fully, and that the space between the backplate and circuit board is free of foreign objects.

4: Connect wires:

Strip the input wires as necessary, then connect them to the terminal block located on the right side of the board, as indicated by the blue rectangle in the picture below:



The left-hand terminal is positive, and the right-hand terminal is negative. If multiple sounders are present in the system, two cables may exist (one from the panel or upstream sounders, and one to downstream sounders). Connect both positive wires to the left-hand terminal, and both negative wires to the right-hand terminal. Observe proper practices for wiring supervised sounder circuits if applicable. If the original siren (in a retrofit installation) had a resistor connected across its terminals, connect this resistor across the Stronghold Acoustic Deterrent's terminals.

5: Install front cover:

The front cover latches onto the backplate with tabs on the top, and is fastened by a screw on the bottom. Place the front cover on the unit, ensuring that it fits properly onto the backplate (if it doesn't fit, check the fit of the circuit board, and for foreign objects inside the unit). Then, insert the small pointed screw into the hole on the bottom of the cover (it may help to start the screw into the cover before placing it on the backplate).



Ensure that the cover cannot be removed from the backplate after installing this screw. Restore power to the system.

6: Test fire signal (if applicable):

Note: This section involves sounding alarms. Notify occupants and the central station if applicable before testing.

Place the main control panel into a fire alarm condition (activate a pull station or smoke detector). The Stronghold Acoustic Deterrent should emit the NFPA Temporal 3 fire signal (a repeating pattern of 3 tones followed by a pause), with each cycle consisting of a buzzing sound (similar to a mechanical horn). The unit should not, at any time during the fire signal, emit a high-pitch warbling sound (if this occurs, the panel may be emitting a signal other than the required Temporal 3, and may not be compatible with the Stronghold Acoustic Deterrent's fire mode). Reset panel and confirm that the sounder has silenced. If a sounder did not operate, check the wiring. If a persistent buzzing or clicking sound is heard, see section: “*Buzzing or clicking noises on supervised sounder circuits*”.

7: Test burglary signal:

Note: This section involves sounding alarms. Notify occupants and the central station if applicable before testing. The burglar deterrent tone is EXTREMELY LOUD, so wear hearing protection while conducting this portion of the test, and evacuate occupants and pets.

Place the main control panel into a burglary alarm condition (arm system and violate a burglary zone or press an audible panic button). The Stronghold Acoustic Deterrent(s) should emit a brief buzzing tone, followed by a continuous, high-intensity warbling sound. If a decibel meter is available, verify that a sound level of at least 110 dBA is present at any location from which an intruder is to be deterred (if the sound level is lower, reposition the unit or install additional units). Reset panel and confirm that the sounder has silenced. If a sounder did not operate, check the wiring. If a persistent buzzing or clicking sound is heard, see section: “*Buzzing or clicking noises on supervised sounder circuits*”.

Troubleshooting/Tips:

Buzzing or clicking noises on supervised sounder circuits:

Many commercial alarm panels monitor wiring integrity via a reverse-polarity supervisory voltage, which poses no problem for most sounders including the Stronghold Acoustic Deterrent. However, some alarm panels, most notably those intended for residential use, provide a straight-polarity supervisory voltage. In such systems, a small DC current (a few milliamps), of the same polarity as the alarm signal, is constantly passed through the siren circuit during non-alarm conditions. The magnitude of this supervisory current is typically insufficient to cause traditional moving-coil sounders to emit any sound. However, modern high-efficiency sounders, including the Stronghold Acoustic Deterrent as well as most other piezo sirens, may emit a buzzing or clicking noise due to partial activation by this current. If this occurs, install the included 1000 ohm resistor across the device's terminals (note that this will increase current draw by approximately 13mA). If the problem persists, connect additional resistors or sounders, or move the Stronghold Acoustic Deterrent to a non-supervised output (if permissible).

Stronghold Acoustic Deterrent units connected to a Stronghold Zone Protection System will not exhibit this problem, as the Stronghold Zone Protection System Control and Power Panel does not emit supervisory voltage.

Voltage drop and insufficient intensity:

If a Stronghold Acoustic Deterrent is not achieving its rated acoustic performance, the most likely culprit is insufficient voltage. Measure the voltage across the last device on the circuit while the system is in alarm; if the input voltage is significantly lower than 12VDC, the output sound level will drop, potentially compromising the range and effectiveness of the device. Re-wire the circuit with thicker gauge wire, or, if wiring supervision is not required, place each unit on a dedicated home-run cable. In addition, some security systems power the bell output directly from the system battery; a dead or incorrect battery may cause a significant drop in sounder circuit voltage.

6-volt and 24-volt systems:

Some older burglar alarms, as well as some “all-in-one” wireless alarms, may provide a 6-volt

bell output. It is possible, but not recommended, to operate Stronghold Acoustic Deterrents from this voltage; the decibel output will drop by 6dB, and the effective deterrent range will be reduced by half. Commercial fire/burglary alarm and access control systems, as well as most auxiliary power supplies/NAC extenders, may operate at 24 volts. *DO NOT operate a Stronghold Acoustic Deterrent directly from 24 volts, this will damage the device!* If necessary, use a 24VDC to 12VDC regulator module (note that wiring supervision will not be possible). We do not recommend the use of a dropping resistor or another unit in series, as the current draw fluctuates during operation.

Wireless alarm systems:

As a wired device, the Stronghold Acoustic Deterrent cannot directly replace a wireless siren. However, some wireless alarm systems include a wired siren output. If this output provides 12VDC with at least 180mA, the Stronghold Acoustic Deterrent can be connected directly to the output. If the output is 6VDC, see the above section. Alternatively, if the system includes lighting/appliance control modules which can be programmed to switch on during an alarm (such as X10 or Insteon), the Stronghold Acoustic Deterrent can be wired to an ordinary 12VDC wall adapter which is in turn plugged into the control module. Note that this type of installation does *not* typically provide battery backup, supervision, or fire alarm capability!

Vehicle applications:

Like any 12VDC siren, the Stronghold Acoustic Deterrent may be connected to the siren output of a vehicle alarm, provided that sufficient current is available. This mode of installation may be used as a high-performance alternative to the miniature piezo interior sirens provided with many vehicle alarms. Do not attempt to install the Stronghold Acoustic Deterrent in the engine compartment, pickup bed, or undercarriage; it is not weatherproof or heat-resistant. Since the enclosure is not designed to be mounted in a vehicle, some creativity may be necessary. In any case, take extreme care to not activate the device while driving!

Additional tips:

For wall-mounted Stronghold Acoustic Deterrent units, the deterrent tone is extremely painful out to a distance of 15-20 feet in front of the unit, and 7-10 feet to either side (actual range varies with room acoustics). Units aimed down a long hallway may have significantly greater range, as the hallway focuses the sound waves (this is especially true if the hallway is made of hard, reverberant materials). Ceiling-mounted units are unlikely to cover a large area, but may be useful for point protection of a valuable object.

In a retrofit application, the easiest installation method is to simply replace the existing siren. This is advisable if the siren is located above a valuable object to be protected, near a point of entry, or in a hallway, and *away* from bedrooms or any other area where legitimate occupants (especially children, elderly, or disabled persons) may reside during a burglary.

When activated by the alarm panel during a burglary condition, the Stronghold Acoustic Deterrent emits a 1-second pre-warning tone (a buzzing noise similar to the fire tone), followed by an extremely loud deterrent tone. The pre-warning tone allows legitimate occupants to preemptively cover their ears to avoid exposure to the deterrent tone.

The deterrent tone emitted by the Stronghold Acoustic Deterrent forces intruders to cover their ears (impairing use of the hands), but doesn't necessarily prevent them from walking through the

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coverage area. For this reason, units should be located not only at the point of entry, but also near valuables (including the main control box), and outside of interior doors (which are difficult to open while covering one's ears).

The intermediate space of “airlock-style” double doors (often found in jewelry stores and other high-security facilities) is an ideal location for a Stronghold Acoustic Deterrent. It is recommended that the device be activated concurrently with the automatic locking of the interior door, so as to stop the intruder from attempting to flee from the device by running further into the facility.

Acoustic deterrents are unlikely to be effective against intruders located outdoors or inside vehicles (e.g. during “ram-raiding”), or against intruders wearing ear protection, so do not depend on an acoustic deterrent as the only line of defense.

The psychological intimidation effect of an acoustic deterrent may be multiplied by a real or perceived threat of lethal force; a Stronghold Acoustic Deterrent installed in an area wherein an intruder may be fired upon from a nearby room will deprive the intruder of situational awareness (especially if the intruder attempts to defeat the device by wearing ear protection), making him an easier target.

High-frequency sound waves are directional, so a device installed above a doorway or around a corner may create coverage gaps on the other side of the doorway or corner. This can actually be useful in some circumstances (e.g. to give the property owner, security professionals, or police, located in a coverage gap, an immediate tactical advantage over the intruder).

Tasks which require concentration, such as lock picking or tampering with alarm system hardware, as well as verbal communication, become far more difficult in the presence of an acoustic deterrent.

Do not locate Stronghold Acoustic Deterrent units in children's rooms or play areas, as children's ears may be more sensitive than those of adults.

A potentially hazardous situation may arise if a person becomes trapped in the vicinity of an active Stronghold Acoustic Deterrent for an extended period of time.

Exercise extreme care when using Stronghold Acoustic Deterrents to secure areas where a severe startle response may result in significant harm to life or property (such as vehicle interiors, operating rooms, cardiac care facilities, chemistry labs, and nuclear power plant control rooms).

Stronghold Acoustic Deterrents may double as fire alarm audible notification appliances if permitted by the local authority having jurisdiction. If this is the case, the placement of the sounders must comply with fire alarm audibility requirements, possibly requiring a unit outside of each bedroom (when planning such a system, remember that the decibel level of the fire tone is only 104dB at 1 meter, not 124dB). Note that Stronghold Acoustic Deterrents *are not* smoke detectors; separate detection devices are required.

Units located in bedrooms or other living areas should be provided with a relay or other means to selectively enable them when the system is armed in “Away” mode. This protects valuables while the building is unoccupied, without incapacitating legitimate occupants otherwise. It is generally not recommended to use selectively-controlled Stronghold Acoustic Deterrents for fire alarm purposes, as they may not operate as fire alarms if the relay is off.

The deterrent tone, despite its extreme shrillness, will not break undamaged glass, so do not hesitate to locate the unit near windows. However, there exists a possibility that the tone will interfere with some types of acoustic sensors, such as glass break detectors or bank vault seismic sensors.

Leave at least one keypad (but preferably NOT the main control box) outside of the coverage area of the Stronghold Acoustic Deterrent(s) to allow for disarming.

Do not program the alarm system to generate a continuous siren output for any condition other than burglary (e.g. fire, CO, flood, freeze, dialer trouble, etc.), as this will cause the Stronghold Acoustic Deterrent to unnecessarily emit a deterrent tone.

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If any newly installed sounder operates continuously (even when the system is not in alarm), please ensure that it has not been wired directly to an auxiliary power circuit.

If a very large number of units are required for protecting a large area, consider adding a separate battery-backed power supply and relay. Note that this approach will not provide wiring supervision, unless a supervised NAC power extender is used (12VDC only).

Remember that the unit, if connected to the bell output, will not sound until the system goes into full alarm; entry delays should be set as short as practical, and particularly valuable or vulnerable items should be protected by sensors connected to instant zones. Alarm timeouts should be as long as practical to prevent the intruder from simply waiting until the unit shuts off before re-entering (if necessary, disable the main panel's bell timeout, and install a hardwire siren timer exclusively on the outdoor siren).

Consider providing a means of operating the security system from outside the premises (e.g. proximity cards, outdoor keypad, telephone/internet remote control, or a handheld transmitter). This allows the property owner to reset the system without exposure to the deterrent tone, and permits entry/exit doors to be configured for instant alarm.

Consider the effect of acoustic deterrents in conjunction with panic buttons. Such buttons are generally programmed to generate a silent alarm in the event of an armed robbery, as a traditional siren may provoke rather than stop such an intruder. After installing a Stronghold Acoustic Deterrent, one may wish to reprogram the panic buttons as audible so as to employ the disorienting effect of the device against robbers (it is strongly recommended to inform staff of the presence of the device, and to educate them on tactics involving its use). Keep in mind any delays associated with activating the Stronghold Acoustic Deterrent, including the built-in 1-second pre-warning tone.

For very high-security installations, deploy Stronghold Acoustic Deterrents in conjunction with other active security measures, such as blinding strobes, smoke generators, deployable physical barriers, and automatic pepper spray dispensers.

Disclaimer:

Stronghold Security, SoftBaugh, Inc., their distributors, and affiliates disclaim any liability resulting from the use of this product, including, but not limited to, code violations, noise ordinance violations, failure to stop an intruder, pain and suffering, vehicular accidents resulting from installation therein, and noise-induced hearing loss. Device specifications may be subject to change without notice. Use at your own risk.

FCC Compliance Statement:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.