Fire Alarm FAQs

Question	Answer
Q: How many zone/circuit fire alarm panel do I need?	**A:** The size of a fire alarm panel is determined by a number of factors, including the size of the building, the number of devices, and the job's requirements. A zone is a defined area in a building in which related functional items work together. This could include things like alarm annunciation (the panel will indicate what area of the building the alarm occurred) and alarm notification (signals will only activate in particular areas of the building, not general alarm). On a conventional fire alarm panel, the terms zone and circuit are often interchanged (one circuit could cover one zone). On an addressable panel, the zones are created in software (you can assign devices to zones). Circuits on a fire alarm panel also have limits as to how many devices you can connect to them. The more devices, the larger the panel. It's also up to the engineer designing the system as to how he wants to divide up the building. A single zone conventional panel, for example, may be able to support enough devices to cover a given building, but you would be limited in terms of annunciation at the panel because you won't be able to tell where in the building the alarm came from.
Q: What candela strobes do I need?	**A:** The brightness requirements (candela) of a strobe is determined by where it is being installed. The larger the room, the brighter the strobe. NFPA 72 National Fire Alarm Code sets the standards for this and provides a chart with different room sizes along with the strobe requirements for each. If an area needs multiple strobes, those strobes must also be synchronized with each other (flash at the same time). See also "How can I synchronize the strobes on the fire alarm system...?".
Q: What do I need for elevator recall?	**A:** ANSI A17.1 is the national elevator code, but local codes may be different. You should always refer to the proper codes for your area for exact requirements. Typically you will need the following: a smoke detector located in each elevator lobby; a smoke and/or heat detector in the elevator machine room (the heat if there are sprinklers); a heat detector located at the top of the elevator shaft (if there is a sprinkler at the top); a smoke detector located at the top of shaft (if there is a sprinkler anywhere in the hoist way); a set of relays located in the elevator machine room to control the elevators (primary, alternate, shunt); a visual warning ("firefighter's hat") indicating if elevators are unsafe to use; and a control panel (the panel can be the building's fire alarm panel or a dedicated panel if there is no FA panel).

Q: How many signals can I connect to the fire alarm panel's NAC (Notification Appliance Circuit)?	**A:** The number of devices you can connect to a signal circuit (NAC) is based on the current rating of the circuit and the current rating of the devices connected to the circuit. You must add up the current draw of all the devices and make sure the total does not exceed the rating of the circuit you want to connect them to (it's also a good idea not to exceed 80% of the circuit's rating to give some margin for error and/or room for expansion). To find the current draw for a particular device, you should refer to the device's installation sheet or the device's U.L. product label. A fire alarm device will have a FWR (Full Wave Rectified) and DC current draw rating. Be sure to use the correct current based on the type of power supply. Also be aware that multi-candela strobe devices will have a different current rating for the different candela settings (the higher the candela, the more current). Use the current rating for the candela you are setting the strobe to (some jurisdictions, however, require you to use the worst case value, regardless of how bright the strobe is set; check with your local AHJ).
Q: How far can I run the signal circuit (NAC) wire on my fire alarm panel?	**A:** You must do a voltage drop calculation for each circuit. The method for doing this should be included with the manual that comes with the fire alarm panel or booster power supply. You will need to know the following information to do the calculation: 1) The minimum operating voltage of the signaling device (for a UL regulated 24 volt device, this would be 16 volts). 2) The maximum operating current of each device (and therefore the total current draw of all devices connected to the circuit). 3) The minimum circuit voltage rating of the NAC (typically 85% of nominal 24v or 20.4 volts, but refer to panel's manual for correct value). 4) The resistance of the wire used for the signal circuit.
Q: How far can I run the IDC (Initiating Device Circuit) wire on my fire alarm panel?	**A:** Panel installation manuals should include this information (it is not the same for all panels). Typically it is based on the circuit's maximum allowable resistance.
Q: How far can I run my addressable loop wire?	**A:** The distance you can run the wire on an addressable loop is determined by the size and type of wire used and the number of devices. You should refer to the fire alarm panel's manual for this information.
Q: How loud do my signals need to be?	**A:** NFPA 72 National Fire Alarm Code sets the standards for what's required. For public mode, signals must produce a sound level of at least 15dB above the average ambient sound level or 5dB above the maximum sound level having a duration of at least 60 seconds, whichever is greater, measured at 5 feet above the floor throughout the covered area.
Q: What size batteries does the fire alarm panel need?	**A:** Fire alarm systems must have a secondary means of power in case of AC power failure. Battery calculations will determine what size batteries are needed, and should be included with the panel or booster power supply manual. You will need to know the following information to do the calculation: 1) The required standby time (typically 24 hours). 2) The required alarm time (typically 5 minutes). 3) The panel's total supervisory current draw. 4) The panel's total alarm current draw (including signal load).
Q: What type of device should I install in a kitchen, a smoke detector or heat detector?	**A:** It is generally recommended that fixed temperature heat detectors be installed in kitchens. Every day cooking activities can cause smoke detectors to alarm, and rate of rise type heat detectors can be set off by the sudden temperature increase due to an oven door opening. If the ambient temperature in the kitchen does not exceed 100 degrees F, then you can use a 135F detector. Otherwise you would have to use one with a higher temperature rating (like 194F).

Q: What is the difference between class B and class A wiring?	**A:** In general, class B wiring is a pair of wires from a fire alarm panel circuit that's wired plus and minus, in and out of each device (in parallel), with an end of line resistor wired across the plus and minus of the last device (note: an addressable circuit, SLC, would not have an EOL resistor). Class A circuits wires to the devices in the same way, except that instead of an end of line resistor after the last device, the wires are returned back to another set of terminals at the fire alarm panel. With class B wiring, if there is a break in the circuit, every device after the break will stop working. With class A wiring, power/communications to the devices is fed from 2 directions, so if there is a single break in the wire, all the devices will continue to work.
Q: How do I test my smoke detectors?	**A:** You should always follow the manufacturer's instructions provided with the device. In general, a functional test of a smoke detector can be done by using a can of aerosol smoke recommended by the manufacturer. For Edwards Signaling smokes, the can is sold under part number P-047546-0025. Some detectors have a mechanical means of testing (ie: magnet test), such as the Edwards 500 and 700 series devices, but this does not substitute for a functional test using smoke. In addition to a functional test, a calibration test must be done to check the sensitivity of the detector. Depending on the device, this may require an external meter or other measuring device. For the Edwards Signaling 500 and 700 series smokes, you can use a magnet, which will give you feed back via the detector's LED (number of flashes). For the addressable E- series, sensitivity can be checked from the fire alarm panel. NFPA 72 National Fire Alarm Code sets the standard for how often smoke detectors are tested.
Q: How do I test my heat detectors?	**A:** You should always follow the manufacturer's instructions provided with the device. In general, if it is rate of rise type heat detector, you can use a hair dryer or heat gun to warm the body of the device. If it is a combination rate of rise with a non-self restoring fixed temperature element, you can test the rate of rise portion, but you must protect the fixed temperature element from the heat by covering it with something. If it is a non-self restoring fixed temperature only heat detector, you cannot test it. NFPA 72 National Fire Alarm Code sets the standard for how often devices must be tested. Non restoring fixed temperature heat detectors must be replaced after 15 years, or have 2 detectors per 100 be laboratory tested.
Q: What is the maximum signal load that can be connected to a signal circuit (NAC) on a fire alarm panel?	**A:** Each NAC (Notification Appliance Circuit) in a fire alarm panel or booster power supply has a maximum current rating. This information can be found in the manuals provided with the panels. The total current draw for all the devices connected to the circuit cannot exceed the NAC rating. Be aware that the NAC current rating is different than the panel's power supply rating. For example: A panel may have a power supply rating of 3.5 amps, and include two NACs rated for 2.0 amps each. You cannot put 2 amps of signal load on both NACs, however, because it will exceed the panel's total signal power of 3.5 amps. See also "How many signals can I connect to the fire alarm panel's NAC".
Q: Does the addressable loop wiring have to use twisted/shielded wire?	**A:** You should always follow the manufacturer's recommendation for wire type. The Edwards Signaling E-FSA addressable panels do not require twisted and/or shielded wire.

Q: How can I synchronize the strobes on the fire alarm system so they flash at the same time?	**A:** When using the Edwards FireShield, E-FSC, E-FSA fire alarm panels, or the EBPS()A booster power supplies in conjunction with the Edwards Genesis series of strobe devices, strobe synchronization is built into each circuit (when configured for Genesis mode). By using Edwards panels and signals, you can synchronize all strobes across all circuits. If you are using another manufacturer's signal on an Edwards' panel, you will have to use their synchronization module on each circuit. If you are using Edwards' Genesis strobe devices on another manufacturer's panel, you will have to use Edwards EG1M(-RM) synchronization modules. You *cannot* mix different manufacturer's devices on a circuit if you require strobe synchronization. Also be sure the signaling device you use is UL listed with the panel you connect it to.
Q: How many smoke detectors can I connect to the fire alarm panel?	**A:** This information is provided with the fire alarm panel's device compatibility sheet. It will vary depending on the device and the panel.
Q: What's the difference between an addressable panel and a conventional panel?	**A:** With a conventional fire alarm panel, each circuit (or zone) will have a pair of wires leaving the panel going in and out of each device (wired in parallel), with an end of line resistor after the last device (if class B wiring). You cannot t-tap a circuit on a conventional panel. A conventional panel will also only be able to tell you which circuit went into alarm, not which device. With an addressable system you will also have a pair of wires leaving the panel going to each device, but there will be no end of line resistor, and you *can* t-tap the circuit. The biggest advantage with an addressable system, however, is the fact that each device will report individually back to the panel so you will know exactly where the event occurred.
Q: What do I need to program the fire alarm panel?	**A:** The Edwards FireShield, E-FSC and E-FSA series of panels can be fully programmed using the panel's front keypad. Out of the box, Edwards FireShield and E-FSC conventional panels default to all alarm input device types and a general alarm system (all signals activate upon any alarm), so in many cases no programming is necessary (if the panel includes a dialer, you will at least have to program the phone numbers and account number). With the addressable E-FSA panels, performing an Autoprogram will also create a general alarm system. Edwards also has a configuration utility program, FSA-CU, that can be used for programming the FireShield and E-FSC panel from a remote location using a modem and F-DACT dialer module (if installed in the panel). With the E-FSA panels you can connect a laptop with the FSA-CU directly to the panel using an SA-232 card and download cable, or remotely using the SA-DACT with modem or SA-ETH via the Internet. Note: Because code requires that any changes made to a fire alarm system be tested, someone must be on site with the fire alarm panel to enable any downloading to the panel.
Q: What's the difference between a 2 wire smoke detector and a 4 wire?	**A:** In a conventional fire alarm system, a 2 wire smoke detector connects to the fire alarm panel's IDC (Initiating Device Circuit) with a single pair of wires which powers the device and initiates an alarm. With a 4 wire detector, the device is powered with 1 pair of wires (typically from a resettable aux source in the panel), while a second pair of wires connects from the panel's IDC to a set of normally open relay contacts in the detector. The relay contacts are what put the circuit into alarm. Some 4 wire detectors also have an additional set of contacts for aux use, such as turning on a light outside a room.

Q: What does the DACT (Digital Alarm Communicator Transmitter) do?	**A:** The DACT is installed in a fire alarm panel and is used to connect to a Central Monitoring Service (CMS) that monitors the status of the system. This is a service you would have to subscribe to and pay a monthly fee. During a system event, such as an alarm, the DACT would send a signal to the CMS who would then notify the proper authorities. The DACT does not (usually) connect directly to the fire department. There must be a DACR (Digital Alarm Communicator Receiver) on the other end that "understands" the digital signals sent by the DACT. You cannot use a DACT to call someone's phone, for example, to say "there's an alarm".
Q: Can I mount the remote annunciator outdoors?	**A:** The remote annunctiators for Edwards fire alarm panels cannot be mounted outdoors. They are U.L. listed for indoor use only.
Q: What type and size wire should I use for remote annunciators?	**A**: You should always follow the manufacturer's recommendation for wire type. For the Edwards Signaling FireShield, E-FSC and E-FSA panels, you will need 1 pair of 18 awg twisted/shielded wire for the data and a second pair (does not need to be twisted/shielded) for the 24Vdc power.
Q: Do the phone lines for the DACT have to be dedicated?	**A:** The DACT must be the first device connected to the building's incoming phone lines. Although in many cases it's recommended the lines (at least one of them) be dedicated, they do not have to be. You can have devices wired down stream as long as you use RJ31X style jacks and follow the manufacturer's instructions. This is to ensure that the dialer can capture the line in the event of an alarm. Because of this, be aware that if someone is on the phone or there's a fax machine running, it will get cut off if the dialer needs to dial out.
Q: How should the DACT be wired?	**A:** The DACT must be the first device on the building's incoming phone lines using an RJ31X style jack. You can refer to the fire alarm panel's manual or dialer's installation sheet for more details. Edwards' F-DACT and SA-DACT dialers are designed to work on POTS (Plain Old Telephone Service) copper lines connected to a PSTN (Public Switched Telephone Network). The use of DSL (Digital Subscriber Lines) or VoIP (Voice over Internet Protocol) may cause problems.
Q: What format does the DACT use?	**A:** With the Edwards FireShield and E-FSC series panels, you can choose between 4/2 SIA or contact ID. The E-FSA addressable panels uses contact ID only.
Q: What is the difference between an alarm, supervisory, and trouble condition?	**A:** An alarm condition has the highest priority on a fire alarm system. This occurs when a smoke detector, heat detector, pull station, waterflow, or some other alarm initiating device activates, and usually sounds the signaling devices to evacuate the building. A supervisory condition occurs when a device like a sprinkler tamper switch activates. This would give an indication at the fire alarm panel that something is off normal, but would not sound any alarm signals to evacuate the building. A trouble condition means something is wrong, but not in alarm or supervisory, and would also not sound the alarm signals. Some examples would include a circuit with a broken wire, a bad battery, or a ground fault.
Q: What is Alarm Verification?	**A**: Alarm verification is used with smoke detectors to help prevent false alarms. When a smoke detector senses smoke, it will delay activation by a predetermined amount of time (typically less than 1 minute). If there is still smoke present after that time period has expired, then the detector will alarm the system. If the smoke has cleared before the time expires, the detector will reset and the system will not alarm.

Q: Can I use another manufacturer's smoke detector on an Edwards fire alarm panel (or an Edwards smoke on another manufacturer's panel)?	**A:** To ensure proper operation, a 2 wire smoke detector must be U.L. cross listed with the panel you wish to connect it to. Each fire alarm panel should include a U.L. compatibility list that will show all detectors that can be used with a particular panel. You cannot assume that just because a smoke detector is 24 volts, and the panel is 24 volts, that they will both work together (this is especially true with addressable detectors, because the communication protocols are usually different). You must refer to the U.L. compatibility sheet.
Q: Can I use another manufacturer's signaling device on an Edwards fire alarm panel (or an Edwards device on another manufacturer's panel)?	**A:** To ensure proper operation, signaling devices must be U.L. compatible with the panel or booster power supply they are being connected to. Each panel should include a U.L. compatibility sheet that will show which signals will work with a particular panel. If a panel or device is U.L. listed as Special Applications, the device must be on the panel's compatibility sheet. If *both* the panel *and* device are U.L. listed as Regulated, then they are considered compatible, and may not be on the compatibility sheet. Note: Compatibility does not necessarily mean you will have strobe synchronization (see question "How can I synchronize the strobes on the fire alarm system...? ").
Q: Can I use another manufacturer's heat detector or pull station on an Edwards fire alarm panel (or an Edwards device on another manufacturer's panel)?	**A:** Heat detectors and pull stations are usually just normally open, dry contact devices that close when they activate. If this is the case, there is no U.L. compatibility requirement, and you can use anyone's device on any panel's IDC (Initiating Device Circuit) that accepts normally open contact inputs. If it's an addressable system, however, you must use a device that is designed to work (communicate) with the panel.
Q: Can I connect speakers to the fire alarm panel?	**A:** Unlike horns which just produce a sound when voltage is applied, speakers are used to provide tones, pre-recorded voice messages and/or live paging in the event of an alarm. The fire alarm system must have the supporting audio amplifiers and audio source to connect to the speakers. You cannot connect speakers to a 24Vdc signal circuit like you would with a horn or strobe.
Q: What is a Walk Test?	**A:** Walk Test is used to test a fire alarm system to ensure everything works properly. By putting a panel into Walk Test mode, a technician can activate a device, which then gives an indication at the fire alarm panel and may or may not (depending on the set up) momentarily sound the signals. After the device activates, it will automatically restore, then the technician can go on to the next device to test. This allows for one person to test a system without someone else being at the control panel to reset it each time.
Q: Why does my panel show a ground fault?	**A:** A ground fault occurs when a circuit wire touches ground. This could be an input circuit, signal circuit, data wires, or most any other wiring that connects to the panel. To find the fault, remove each circuit one at a time until the ground fault restores. When you find the circuit with the ground fault, reconnect it, then begin breaking the circuit into sections (typically starting somewhere near the middle). If you break the circuit in the middle and the ground fault does not clear, then you know it's between your break and the panel. If it does clear, then you know it's after your break. If you end up removing all external wiring from the panel and the ground fault still does not restore, then there may be something wrong with the panel itself.
Q: What size sampling tube do I need for my duct detector?	**A:** The sampling tube must protrude into the duct at least two thirds of the way across. You *cannot* use a sampling tube that is longer than the duct is wide and just cut it to length. You must select the correct size tube for the duct it's being installed in. Refer to the manufacturer's instructions provided with the duct detector for proper installation.

Q: Which is better, an ionization type smoke, or photoelectric?	**A:** Ionization type smoke detectors are good for faster burning fires that do not produce a lot of large smoke particles. Photoelectric smokes are good for slower, smoldering type fires that produce larger smoke particles. Photoelectric smokes also tend to be more stable and less susceptible to air movement and higher altitudes. In most installations a photoelectric smoke should work fine, because most places will contain items such as furniture, drapes, carpeting, and other products that generate a lot of smoke.
Q: Where do I get power for my door holders?	**A:** The Edwards Signaling 15**-AQN5 series door holders can be powered from 24Vac, 24Vdc, or 120Vac, so you can use a transformer with a 24Vac output, a DC power supply, or local 120Vac. In a fire alarm application you could use the aux 24Vdc supply built into most fire alarm panels, but this would put a drain on the batteries during an AC power failure (unless otherwise specified, door holders do not have to be battery backed up because loss of power would release the doors in a fail safe manor). With the Edwards Signaling EPBS series booster power supplies, you can configure the aux power to drop out during an AC failure.
Q: Does Edwards Signaling sell explosion proof horn strobe combination signals?	**A:** Edwards Signaling does not sell a combination explosion proof horn with strobe. The cost and size of such a device would be prohibitive. Edwards does offer, however, separate horn and strobe devices, such as the 889D-AW and 116DEGEX-FJ.
Q: Can I connect a "general purpose" horn or bell to my fire alarm panel?	**A:** You cannot connect a signaling device that is not listed for fire alarm use to a panel's NAC (Notification Appliance Circuit). Fire alarm signals are designed to connect to supervised fire alarm circuits. Using a non-fire alarm signal on a supervised circuit will cause a trouble on that circuit.
Q: How large a building will your fire alarm panels cover?	**A:** The Edwards Signaling E-FSC and E-FSA panels are good for small office buildings, stores, churches, theaters, strip malls, and the like. Generally, buildings up to about 100,000 sq ft (but may accommodate larger depending on the actual number of devices needed). These panels are not designed for high rises or campus type installations.
Q: How many heat detectors and pull stations can I connect to a conventional fire alarm panel?	**A:** Most conventional heat detectors and pull stations are normally open, dry contact devices that do not draw power from the circuit they are connected to under normal (supervisory) conditions. Because of this, there is no limit to the number you can put on an Edwards conventional fire alarm panel.
Q: What do I do if the fire alarm panel does not have enough power for the signals?	**A:** If the signal load for your system exceeds the power supply rating of the fire alarm panel, you can add booster power supplies. Edwards offers a 6 amp (EBPS6A) and 10 amp (EBPS10A) version. You can add as many booster supplies as the job needs.
Q: How often do I have to replace the smoke and heat detectors (how long do they last)?	**A:** Per NFPA 72 (2007 edition), residential type smoke alarms (single/multi-station) must be replaced every 10 years. Commercial type smoke detectors (connected to fire alarm panel) do not have a defined replacement period (unless specified by the manufacturer), but must be tested periodically and replaced if they fail. Self restoring heat detectors also do not have a defined replacement period, but must be tested periodically as well. Fixed temperature, non restoring heats must be replaced every 15 years, or have 2 per every 100 installed laboratory tested. Refer to NFPA 72 and the manufacturer's installation instructions for more detailed descriptions of testing methods and frequency.
Q: How often do I have to replace the batteries in the fire alarm panel?	**A:** A general rule of thumb is that batteries should be replaced every 4 years, or so. If a fire alarm panel indicates a battery trouble, then you may need to replace sooner. Even if a battery voltage seems normal, a bad cell may cause a fault during a load test.

Q: Where else can I go to learn about fire alarm systems in general, and the requirements needed to work on them?	**A:** There are several publications relating to fire alarm codes and standards, some of which include the following: *NFPA 72 National Fire Alarm Code*, *NFPA 101 Life Safety Code*, *NFPA 70 National Electrical Code*, *Fire Protection Handbook*, and *Fire Alarm Signaling Systems*, to name just a few. NICET (National Institute for Certification of Engineering Technologies) provides national certification on fire alarm systems. There are also several web sites, including: nfpa.org, nicet.org, firemarshals.org, and reedconstructiondata.com/building-codes, where you can find information on a national and local level. If you are just getting into the fire alarm business, a good place to start is the local fire marshal or AHJ (Authority Having Jurisdiction). They should be able to tell you what is required to work on fire alarm systems in your area.
Q: How do I know if I should be using horns or speakers on my fire alarm system?	**A:** You should always refer to your local codes, but in general, areas with an occupancy of 300 or more people, theaters with more than one viewing room, or buildings where an occupied floor is higher than 75 feet above the exit level will require notification by means of either pre-recorded voice messages and/or live announcements, which means you need speakers and a fire alarm panel with the amplifiers and audio source to support them. This can include places like churches, auditoriums, theaters, and high rises.