Burglar & Fire Alarm Basics

Vanguard Security Corporation

www.DIYalarms

Honeywell

Objectives

Honeywell

- Understanding the basic Security and Fire Alarm system.
- Understanding the Security system components.
- Understanding zones and the different wiring configurations.
- Understanding input and output devices.
- Understanding system communications and devices.
- Knowing what to have with you on site.

A Burglar Alarm…

Honeywell

- Detects an entry, or the attempted entry, of intruders into a protected premises – then signals their presence to others either locally, remotely or both.

A Fire System…

Honeywell

- Detects the activation of manual or automatic signal initiating devices, such as a pull station or smoke detector – then activates the alarm locally and remotely where required.

In Summary…

Honeywell

Installation

Honeywell

- Acts as a visible deterrent against
  - Burglary
  - Vandalism
  - Etc...

- Provides “peace of mind” to users
  - On premises
  - Away from the premises
  - Helps to reduce insurance costs

Login

Honeywell

- Warns of an abnormal condition i.e. fire, smoke, high heat, rising temp.
- Notifies the premise occupants
- Notifies fire department via central station connection when desired
- May operate fire safety functions i.e. shut down A/C fans

Burglar & Fire Alarm Basics

Security System Components

Honeywell

Security System Components

Honeywell

- Control panel
- Keypads
- Zones
- Input devices (contacts, motion detectors, etc.)
- Output devices (horns, strobes, etc.)

The Control Panel

Honeywell

- Central Processing Unit (CPU)
  - Receives signals from initiation devices (contacts, motion detectors, smoke detectors etc.) and activates appropriate notification devices (dialer, horns, strobes etc.)
  - Electrically monitors system wiring and primary power
  - Processes programmed instructions/reactions

The Control Panel

Honeywell

- Programming Methods
  - Keypad programming
    - Enter data using an alpha keypad on site
  - Computer programming
    - Data sent using a computer, compass software and modem via phone line into the control panel's memory
    - Data may also be sent to the control panel on site via "direct connection" on certain panel models via laptop computer

The Control Panel

Honeywell

- Power Supply
  - Use and un-switched outlet less than 50 feet from the panel and run 18 gauge wire from the panel to the transformer.
  - 9-18 Volt Transformer
    - **Step down transformer**
    - **Ademco systems come with the correct transformer**
    - **Transformer may be verified by checking Summary of Connections diagram**
  - Battery Backup
    - **Supplies current for the sounding of bells, horns, etc.**
    - **Provides current during AC power outages**
    - **Fire systems require specific amounts of available backup time (controlled by local A.H.J.)**

Keypads

Honeywell

- An input device that allows user to
  - "**Arm**" or turn on the burglary portion
  - "**Disarm**" or turn off the burglary portion
  - "**Bypass**" or remove a portion of the system
  - In essence, control the system
- Provides system status
  - Visually
  - Audibly

Burglar & Fire Alarm Basics

Zones

Honeywell

What Is A Zone?

Honeywell

- A detection circuit, or zone, is a specific part of the security system which is programmed to respond in a certain way to the presence of an intruder, fire, or other condition.

What Is A Zone?

Honeywell

- Why do we use them?
  - Individually programmable
  - Identifies the area & signal type (burg, fire)
  - Helps authorities respond more effectively
  - Simplifies troubleshooting & testing
  - Bypassing zones allows user to arm only part of the system

Zone Configurations

Honeywell

- Hardwire
  - A zone input which is physically connected to the control panel
- Soft Zone
  - A zone input that does not take a physical location, like a keypad zone or duress (Ambush) code
- Wireless
  - A zone input originating in a self contained device with on board wireless transmitter and battery for power.
  - Panels that support wireless zones require a wireless receiver to pick up the signals and send them to the control panel for processing (some control panels have a receiver built in, others will require you to add one)

Zone Response Types

Honeywell

- Perimeter, entry/exit
  - Normally the exterior
    - Doors, windows, glass break detectors, etc.
- Interior
  - Space protection that may be bypassed as a group when users wish to arm the system but stay in the premise
    - Motion detectors, glass break detectors, etc.
- Fire
  - 24 hour
    - Smoke or Heat detector
- 24 Hour
  - Silent or Audible
    - Panic button, hold up button, medical button, etc.

Zone Conditions

Honeywell

- Fault
  - Fault occurs when a zone changes state from its normal non-violated position (i.e. a normally closed contact opens – for example a door or window is opened)
  - An indication of the faulted zone will be displayed / annunciated on the control panel keypad
- Alarm
  - Alarm occurs when a fault happens on 24 hour zone or when the control panel is armed and the fault takes place on a burglary zone
  - The control panel will activate alarm annunciation devices as programmed / designed (horns, bells, strobes, lights etc.)
  - The control panel may also communicate the alarm to a remote Central Station monitoring service

Zone Conditions

Honeywell

- Trouble
  - Trouble is activated when an abnormal condition occurs (i.e. loop resistance fluctuates beyond tolerances)
  - Trouble occurs most commonly on supervised loops (24 hour panic, fire etc.)
  - Typically a trouble condition will cause annunciation at the keypad and display of the zone in trouble
  - Trouble may optionally communicate to Central Station monitoring service on most control panels
- Restore
  - Restore is the term used to indicate that the condition causing the Fault, Alarm, Trouble has cleared (i.e. the violated door/window has been closed, or the zone resistance problem has been corrected)
  - Restores may optionally be communicated to Central Station monitoring service on most control panels

Zone Conditions

Honeywell

- Supervised Zone
  - A “supervised” zone is wired with a resistor (values differ) at the last device on that zone (this is known as End Of Line Resistor or EOLR)
    - The zone is then monitored by the control panel – if the resistance on the loop changes then a fault or alarm will occur based on that particular zones programming
    - Resistance may change because a protection device has been activated (i.e. a door is opened), or the wire run of that zone has been damaged or cut
- Non-Supervised
  - A “non-supervised” zone has no resistor at the last device on the zone (no EOLR)
  - The control panel has no way to detect potential damage or tampering on the zone
  - Non-supervised style zones are not recommended

Zone Conditions

Honeywell

- Ready
  - "Ready" refers to the state of a specific zone or the control panel as a whole
  - If a zone is ready there is no current fault, alarm or trouble condition on that zone
  - When the control panel is ready there are no current faults, alarm memories or trouble conditions on ANY of the zones
    - A control panel should be "ready" when arming

Wiring Basics

Honeywell

- Types of zone loops
  - Normally closed
  - Normally closed EOLR (Supervised)
  - Normally open
  - Normally open EOLR (Supervised)

- Ways to wire zone loops
  - Series
  - Parallel

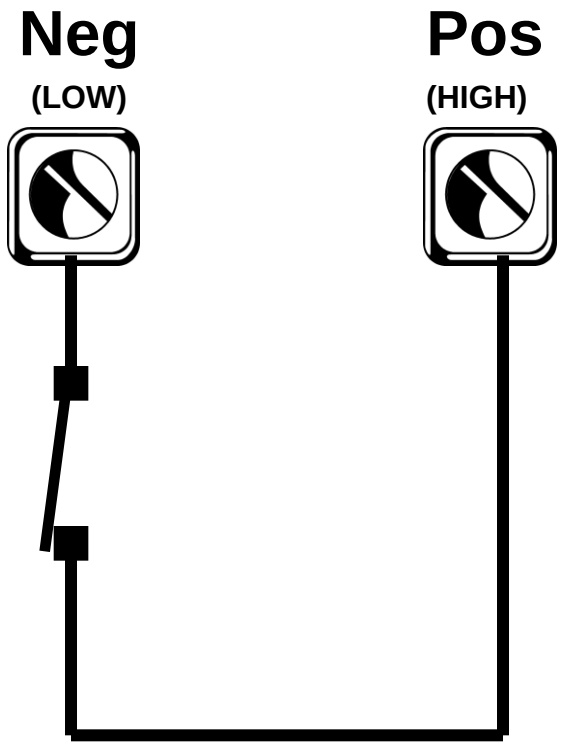
Wiring Basics

Honeywell

- Zone must be closed for current to flow
- If zone opens a fault / alarm occurs
- All devices must be normally closed
- Not recommended

Normally Closed Circuit

<u>No</u> End Of Line Resistor (EOLR)
(un-supervised)



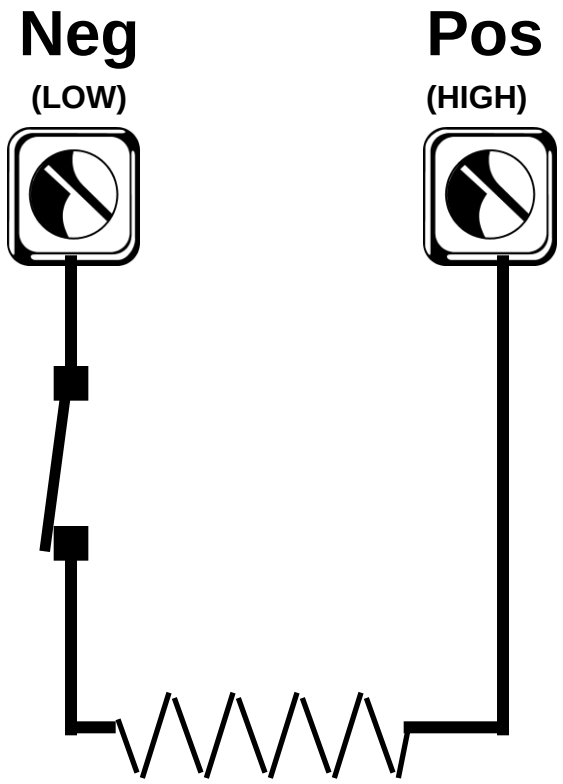
Wiring Basics

Honeywell

- Most common type of zone for burglar alarms
- Proper resistance monitored by the control panel
- Allows installer to combine normally open AND normally closed devices if necessary
- Open OR short causes fault / alarm
- Recommended

Normally Closed Circuit

<u>With</u> End Of Line Resistor (EOLR) (supervised)



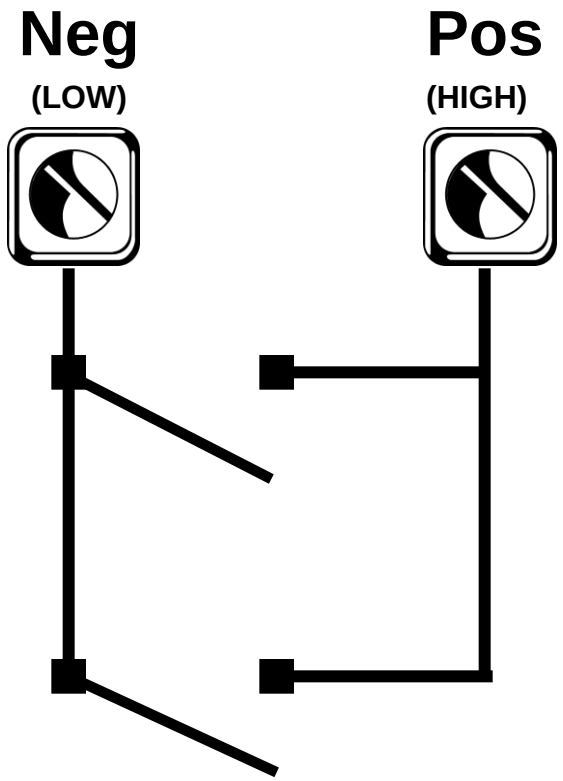
Wiring Basics

Honeywell

- Generally used for 24 hour zones
- Short results in alarm
- Not recommended

Normally Open Circuit

<u>No</u> End Of Line Resistor (EOLR)
(un-supervised)



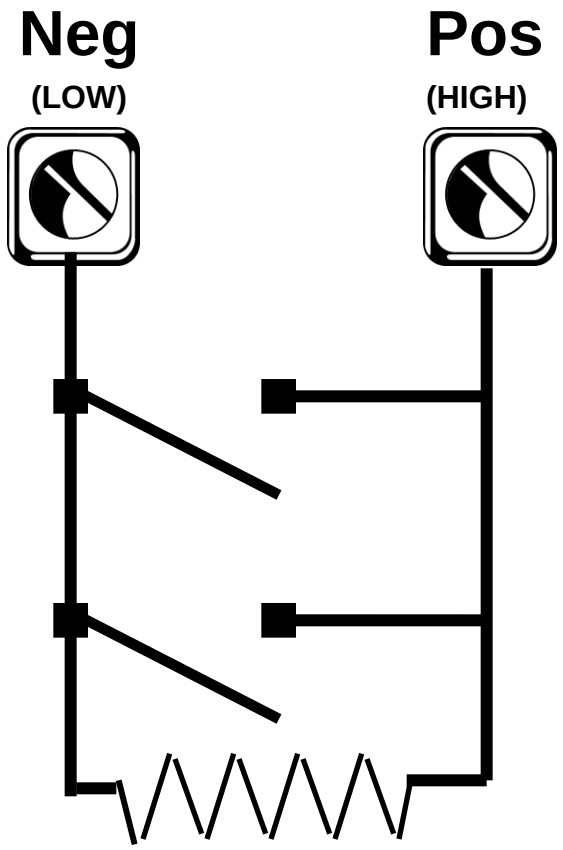
Wiring Basics

Honeywell

- Most common type of zone for fire and other 24 hour devices
- Proper resistance monitored by the control panel
- Short causes fault / alarm
- Open causes fault, alarm or trouble condition depending on the zone's response type
- Recommended

Normally Open Circuit

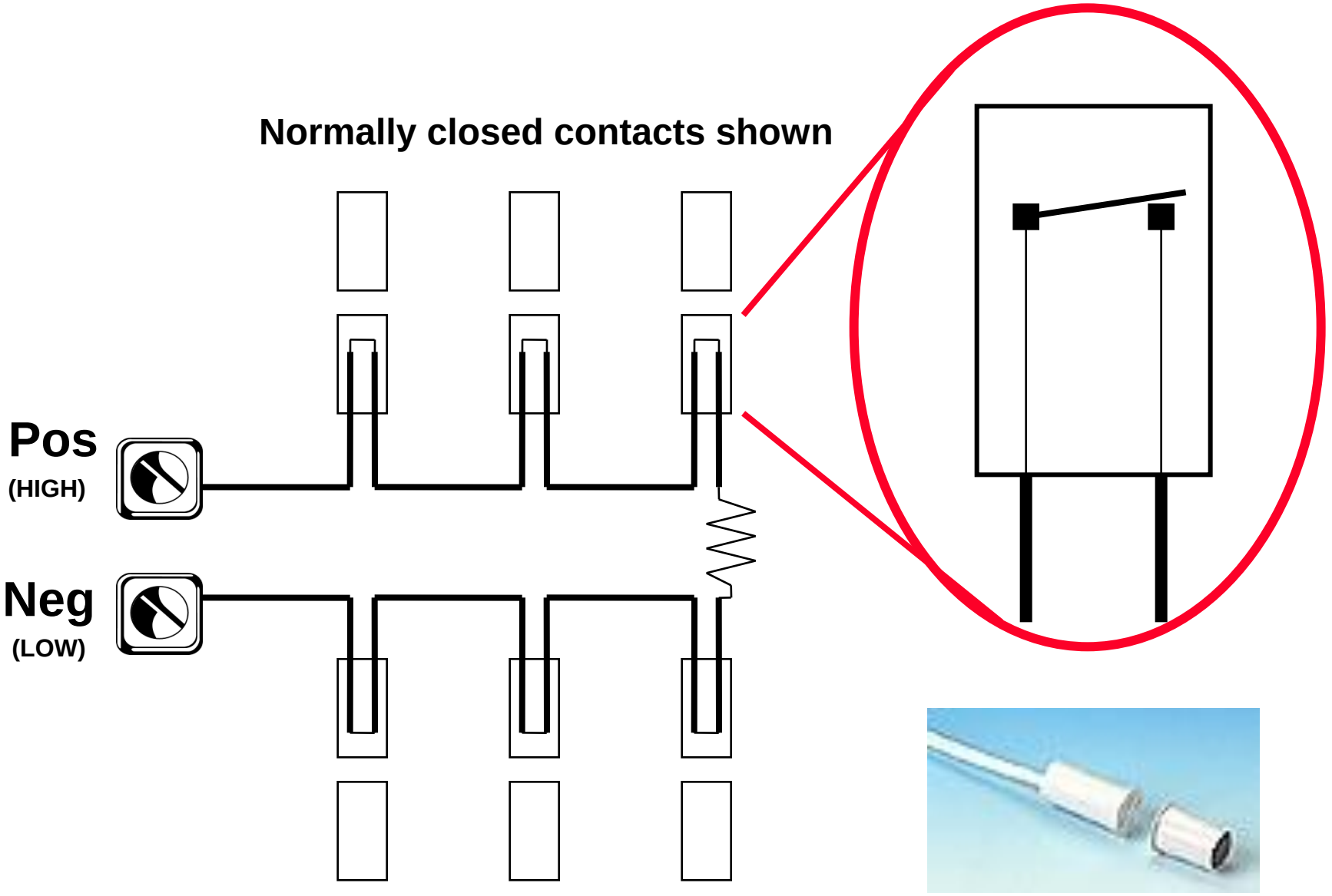
With End Of Line Resistor (EOLR) (supervised)



Wiring Basics - Series

Honeywell

Normally closed contacts shown



Wiring Basics - Parallel

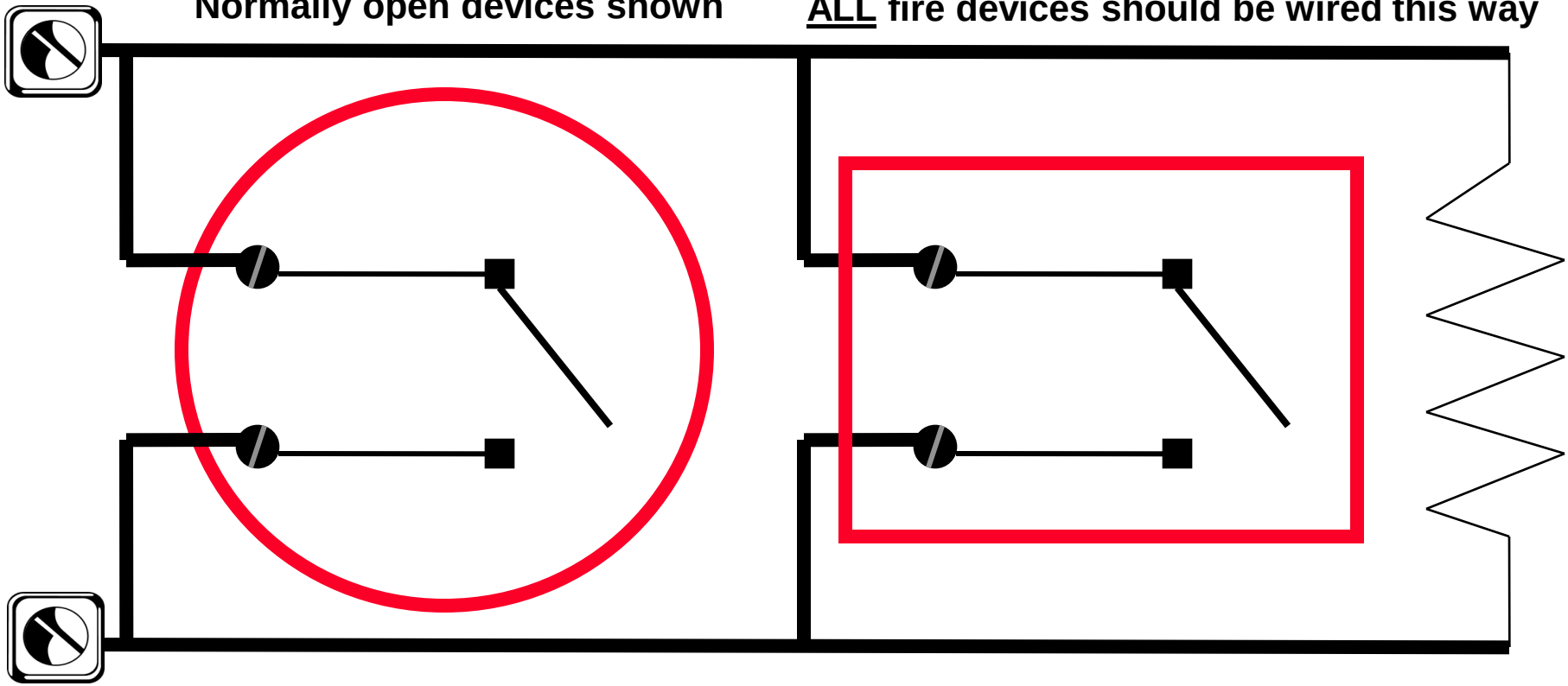
Honeywell

Pos

(HIGH)

Normally open devices shown

ALL fire devices should be wired this way



Neg

(LOW)

Burglar & Fire Alarm Basics

Input Devices

Honeywell

Input Devices - Burg

Honeywell

- Monitor specific conditions within the system
  - Report status changes to the control panel
  - May be powered by the control panel or optional power supply
  - The “Eyes & Ears” of the system
- Connected to the control panel using zones

Input Devices - Burg

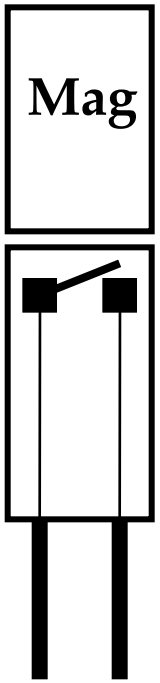
Honeywell

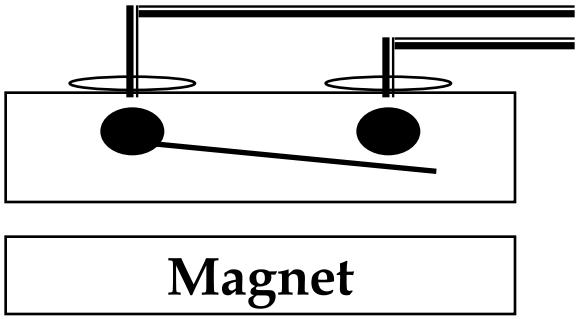
- Magnetic contacts
- Passive Infra-red motion detectors
  - Also Called A P. I. R.
- Dual technology motion detectors
  - Use infra-red AND microwave
- Glass break detectors
- Photoelectric beams
- Wireless

Input Devices - Burg

Honeywell

- Magnetic Contacts
  - A common cost effective means of protection
  - Used on any accessible opening
  - Proper alignment on installation is important
  - Classified by
    - Recessed or Surface Mounting
    - Size
    - Gap
    - Color
    - Normally Open
    - Normally Closed

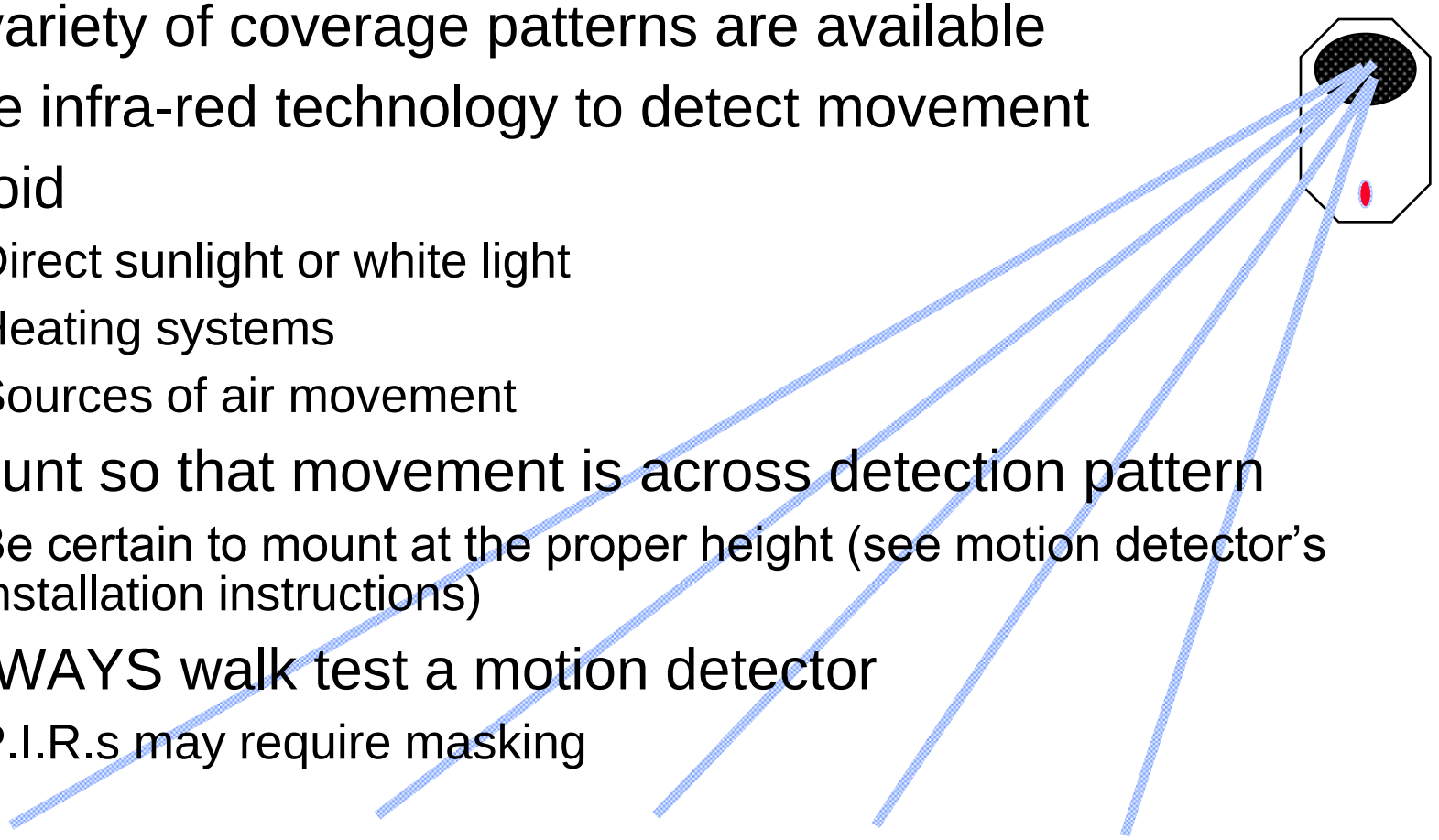




Input Devices - Burg

Honeywell

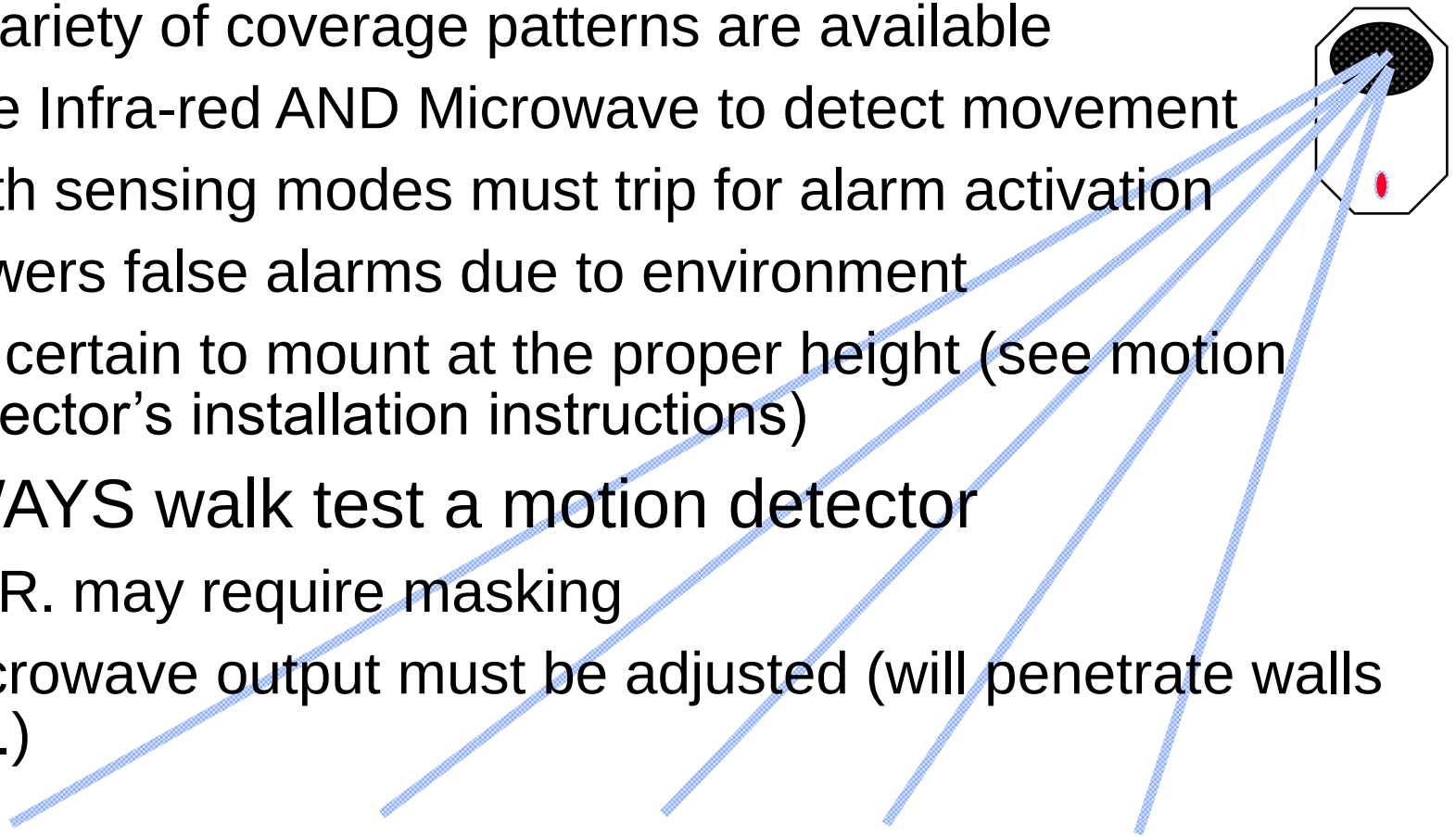
- Passive Infrared motion detectors
  - Require power from control panel / alternate source
  - A variety of coverage patterns are available
  - Use infra-red technology to detect movement
  - Avoid
    - Direct sunlight or white light
    - Heating systems
    - Sources of air movement
  - Mount so that movement is across detection pattern
    - Be certain to mount at the proper height (see motion detector's installation instructions)
  - ALWAYS walk test a motion detector
    - P.I.R.s may require masking



Input Devices - Burg

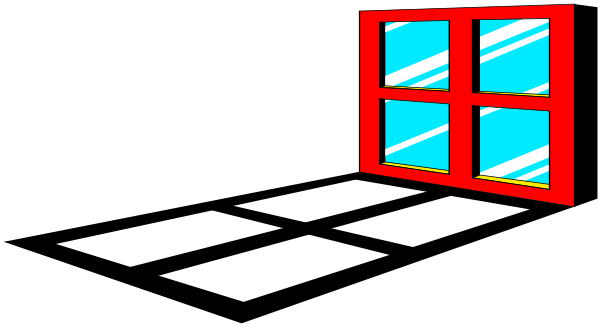
Honeywell

- Dual Technology Motions
  - Require power from control panel / alternate source
  - A variety of coverage patterns are available
  - Use Infra-red AND Microwave to detect movement
  - Both sensing modes must trip for alarm activation
  - Lowers false alarms due to environment
  - Be certain to mount at the proper height (see motion detector's installation instructions)
- ALWAYS walk test a motion detector
  - P.I.R. may require masking
  - Microwave output must be adjusted (will penetrate walls etc.)



Input Devices - Burg

Honeywell

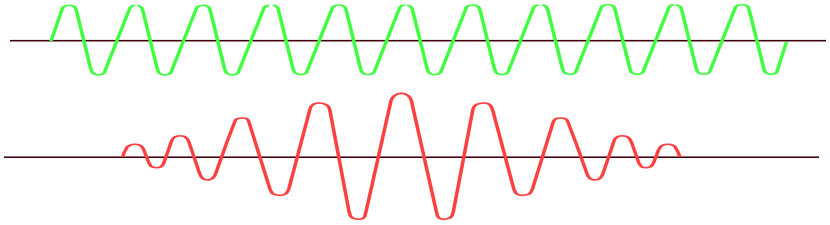


- Glass Break Detectors
  - Require separate power from the control panel / alternate source
  - Used for perimeter glass breakage detection
  - May protect several windows at the same time
  - Follow instructions for proper placement
- ALWAYS test your glass break detectors with an approved glass break simulator (for recommended simulator and testing guidelines see installation instructions that come with the glass break detector)

Input Devices - Burg

Honeywell

- Characteristics of breaking glass
  - Breaking glass produces waves of sound
    - Amplitude
    - Pitch
    - Duration

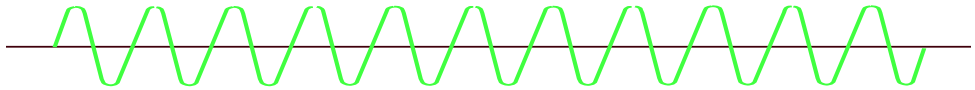


  - Sound varies and depends on size and type of glass
  - Room acoustics effect sound waves
    - Curtains, blinds, furniture can block sound
    - Very large rooms have little reflective sound

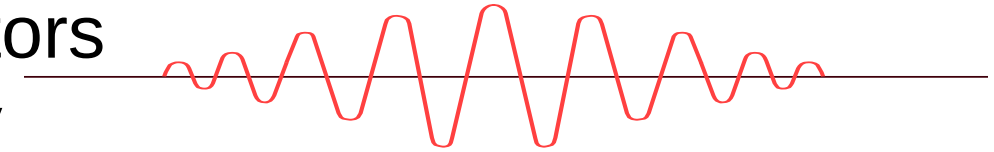
Input Devices - Burg

Honeywell

- Types of Glass Break Detectors
  - Audio switch
    - Simple microphone that picks up loud noises
    - Non discriminating



  - Audio discriminators
    - Advanced technology
    - Senses Forced Entry (Breaking Glass, Splintering Wood)



  - Combination Sensors
    - Shock & Audio
    - Flex Sensors

Input Devices - Wireless

Honeywell

- Wireless (Radio Frequency – RF)
  - Wireless input devices may also communicate with control panel (most Ademco systems)
  - Requires
    - Receiver and Transmitters
  - Options
    - Supervised or Non-supervised
    - Single Or Multi-zoned

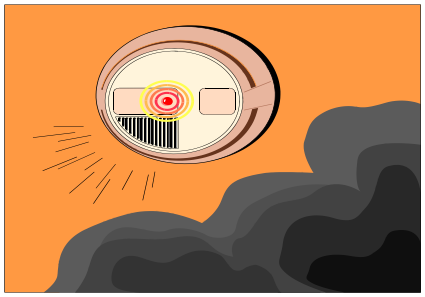
Honeywell

Initiating Devices

- Fire
  - Automatic
    - **Smoke Detectors**
    - **Heat Detectors**
    - **Water Flow Switches**
    - **Fire Box (Pull Stations)**
- Property
  - Temperature Detectors

Honeywell

Automatic Initiating Devices

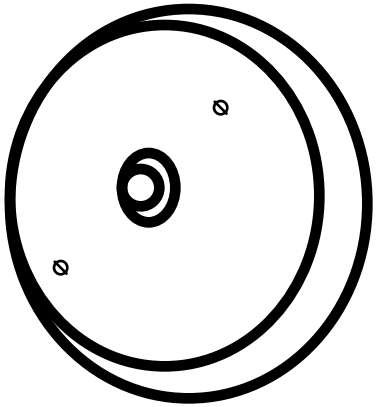


- Smoke Detectors
  - Photoelectric models
    - Works with light scattering principle
    - Contains light and photosensitive sensor
    - During normal operation - light does not fall on sensor
    - Smoke in chamber causes light to reflect onto the photoelectric-eye, causing an alarm condition
  - Ionization models
    - Small amount of radioactive material ionizes chamber
    - Current flows in chamber due to ionized air particles
    - Smoke decreases conductivity, causing alarm condition

Honeywell

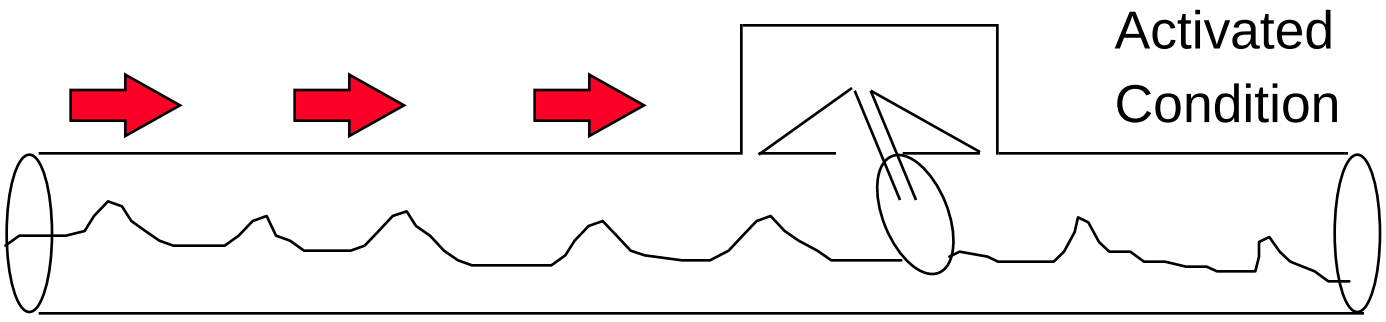
Automatic Initiating Devices

- Heat Detectors
  - May be fixed temperature type
    - i.e... 135F*
  - May be rate of rise type
    - 5 Degrees F* in 20 Seconds
    - 15 Degrees F* Per Minute
  - Combination Heat Detectors are available (ROR and FIXED)
  - Used in high steam or dusty environments
    - Garages
    - Kitchens
  - Re-settable or disposable
  - Not a life safety device



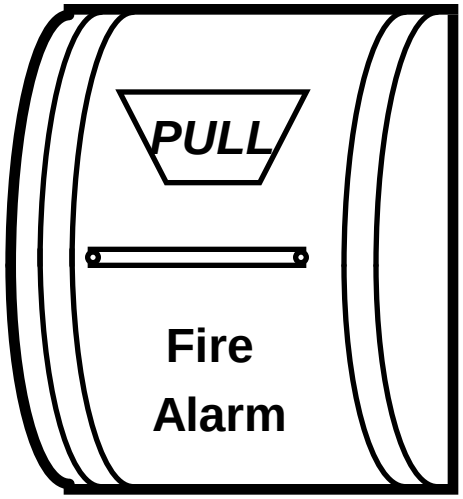
Automatic Initiating Devices

- Water-Flow Switch
  - Any flow of water from a sprinkler system equal to or greater than that from a single automatic sprinkler head will result in activation of this switch and subsequently indicate an alarm condition



Manual Initiating Devices

- Fire Box (Manual Pull Station)
  - When shorted trips an alarm (usually fire)
  - Installed in the normal exit path
- Types of Fire Box
  - Single Action
    - Pull handle once
  - Glass Break
    - Glass rod or plate is broken
  - Double Action
    - Lifting of a cover or opening a door



Input Devices - Property

Honeywell

Automatic Initiating Devices

- Temperature Detectors
  - Digital
  - Fixed or programmable operation
  - Used in...
    - Cold storage
    - Freezers
    - Computer rooms
  - Require power from the control panel / alternate source

Burglar & Fire Alarm Basics

Output Devices

Honeywell

Output Devices

Honeywell

- Controlled by the panel
- Can be visual, audible or both
- Can be local or remote
- More than one may be activated at any given time

Audible Output Devices

Honeywell

- An audible alarm signal lets people know the alarm system has been activated
- Devices may be mounted inside or outside based on level of protection required
- May consist of:
  - Sirens
  - Bells
  - Buzzers
  - Horns
  - Voice Drivers

Automatic Initiating Devices

- A visual signal lets users know the status of the alarm system if activated
- Visual devices may be mounted inside or outside
- May consist of...
  - Strobe lights
  - LED's
  - Line carrier ie. X10 Pro
  - On / Off site printer

Burglar & Fire Alarm Basics

System Communications

Honeywell

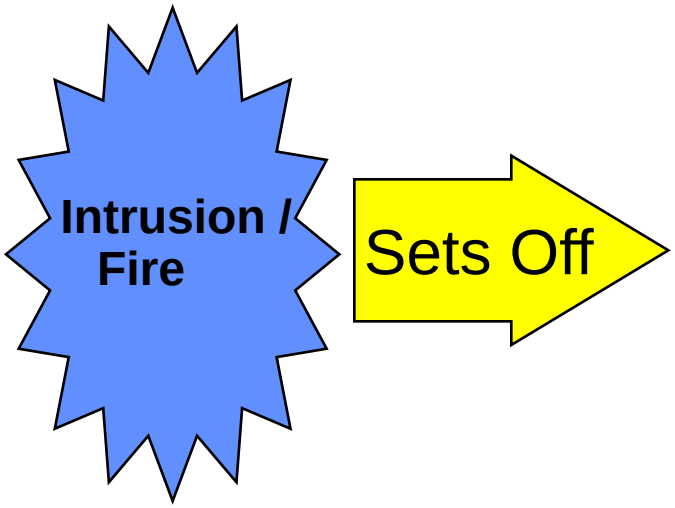
Alarm Communications

Honeywell

- Local
- Central Station

Local Alarm System

Honeywell



Sets Off

On Premises Alarm Signal

- Bells
- Lights
- Sirens

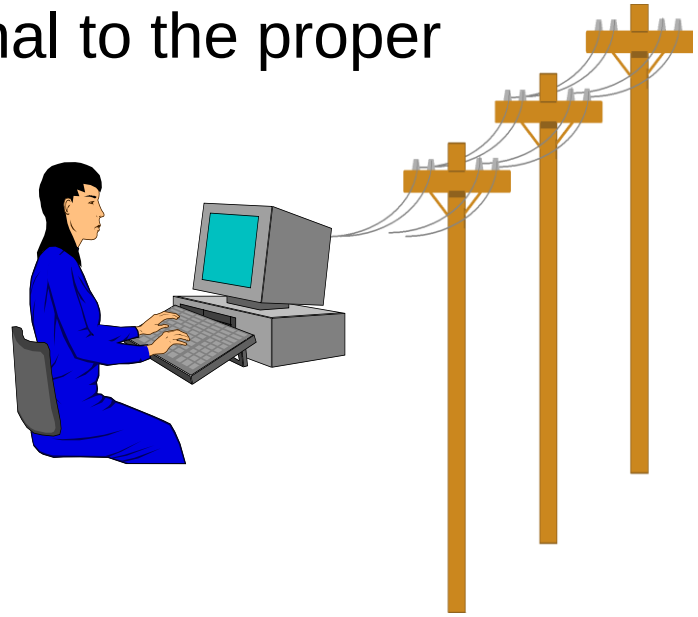
Possible Response

- Neighbor
- Passer By
- Police Patrol

Communication Devices

Honeywell

- Digital communicator
  - Uses existing phone line to send a signal to a central monitoring station staffed 24 hours a day
  - Signal consists of:
    - **Subscriber account number**
    - **Alarm identifier code**
    - **Zone / code identifier**
  - Central station then forwards signal to the proper authorities for response



Communication Devices

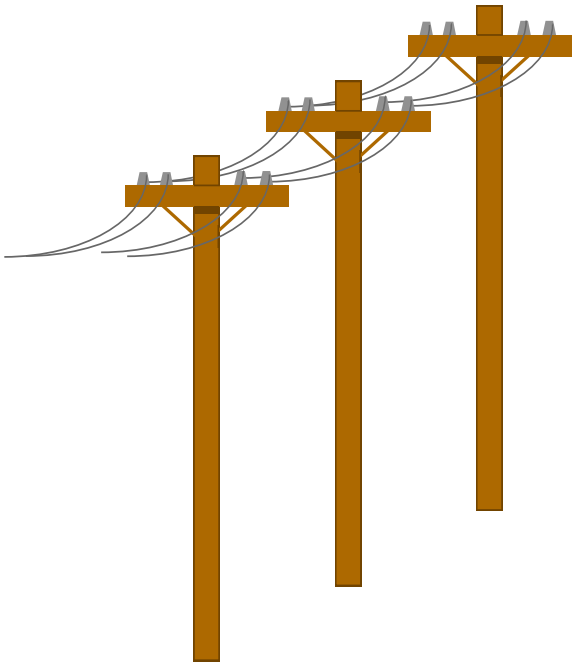
Honeywell

- Digital Communicator
  - Contact ID Transmission Format

Example : 2546 - E - 131 - 01 - 007

2546	=	Subscriber Account Number
E	=	Event Qualifier [E=New Event & R = Restore]
131	=	Event Code [131= Perimeter Burglary]
01	=	Partition Number
007	=	Zone or User Number

The Jones Residence,
New Event , Burglary On Zone # 7



Alarm Communications – A Review…

Honeywell

Intrusion/ Fire

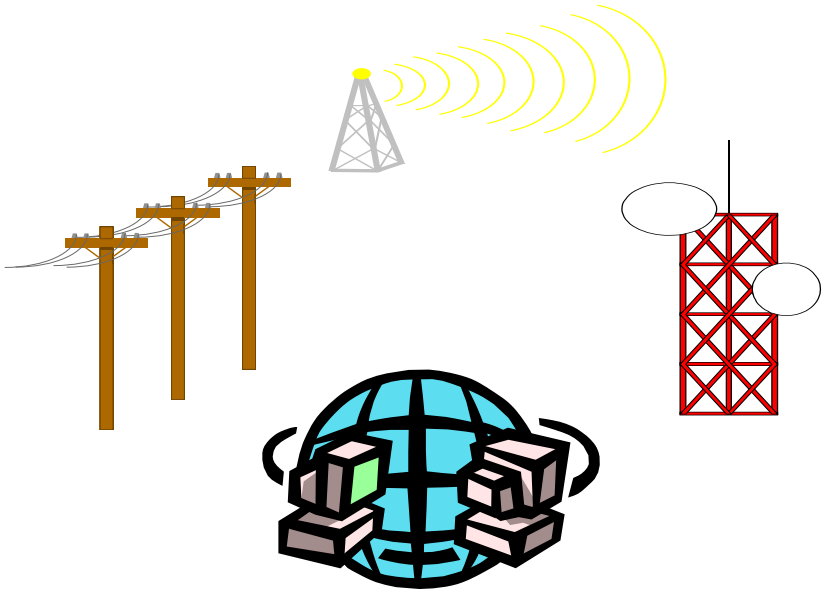
Sets Off

Alarm Signal

Over

Telephone Lines

To



Central Station

- Confirms Alarm
- Calls Police
- Contacts Owner

ANSI/SIA

Honeywell

***ANSI/SIA CP-01-2000**, a* **FALSE ALARM REDUCTION standard,** *calls for manufacturer's to* **default** *control panels as follows:*

- **60 second exit delay**
- **30 second entry delay**
- **30 second dialer delay**
- **Auto stay arming enabled**
- **Cancel verify option is enabled (displays on keypad)**
- **Swinger suppression defaulted to 1 report per zone per armed period**

What the ***Best*** of the ***Best*** know…

Honeywell

Power Calculation

It is vital on any installation to ensure that device power needs do not exceed the available panel power output. Your panel is rated to provide a set amount of current on the auxiliary power output. You MUST add up the current draw of all devices you plan to attach to this output – this number should ***never*** exceed the maximum output. If maximum output is exceeded you will need to add a power supply, like the Ademco AD12612.

Example 1

Panel available aux power = 500mA

Devices attached to aux power:

2x Keypads = 120mA each = 240ma

1x Wireless receiver = 60ma

1x Motion detector = 25mA

Total = 325mA

GOOD

Example 2

Panel available aux power = 500mA

Devices attached to aux power:

4x Keypads = 120mA each = 480ma

3x Motion detector = 25mA each = 75mA

Total = 555mA

NOT GOOD

Add optional power supply

What the ***Best*** of the ***Best*** know…

Honeywell

Vital equipment

- Have the following with you / on your service vehicle at ***all*** times: (installers and troubleshooters / service techs)
  - Ademco alpha keypad (need for programming / troubleshooting)
  - Voltage meter (preferably digital)
    - Measure AC and DC voltages
    - Continuity
    - Ohm / resistance
  - Telephone Butt / Hand set

Honeywell

Vanguard Security Corporation

www.DIYalarms.net