FPST 1373 Detectors Outline

I. Detector operation
   a. Mimics human sense
      i. Not as accurate
      ii. Longer to limit nuisance alarms
      iii. Will be there at all times
      iv. More accurate reporting
   b. Signal distinguishable
      i. Different from background
      ii. Sensitivity: the level at which the detector will activate
      iii. Transport lag

II. Detector activation
   a. Manual pull stations
      i. Coded: Sends unique alert for which pull station was pulled
         1. Not common, typically at community level
      ii. Non-coded: Same alert from all pull stations
         1. Common in buildings
      iii. Single action
         1. Allows for quick activation
      iv. Double action
         1. Minimizes nuisance alarms
      v. Break glass
         1. Discourages nuisance alarms
         2. Creates safety hazard
      vi. Not break glass
      vii. Specifications
         1. Red
         2. Obvious
         3. Usable
            a. 42 to 48 in above floor
            b. 5 ft of exit
            c. 200 ft travel distance
   b. Heat
      i. Oldest type
      ii. Lowest nuisance alarm rate
         1. Relatively high sensitivity
         2. Ceiling mounted
      iii. Fixed temperature
         1. Activates when the element reaches a specified temperature
      iv. Rate of rise
         1. Responds to a change in temperature
      v. Must review manufacturer data sheets to understand how detector operates
   c. Smoke
      i. More rapid response than heat detectors
         1. Nuisance sources (other particles)
            a. Cooking

b. Dust
c. Humidity

2. Away from air supply
    a. Consider air currents when placing

ii. Ionization: Uses small amount of radioactive material to cause a change in conductance when smoke is present
    1. Faster response to flaming fire due to particle sizes

iii. Photoelectric: Uses a light emitter and receiver to monitor for a change in light received as a result of smoke
    1. Light scattering: Smoke enters a normally dark chamber and light reflects off of smoke to receiver
        a. Spot detectors
    2. Light obscuration: Smoke partially blocks light from an emitter to a receiver
        a. Linear detectors
        b. Maintenance required to ensure proper alignment between emitter and receiver
    3. Better than ionization detectors for smoldering fires
    4. Performs well on flaming fires

iv. Video
    1. Computer algorithm determines when smoke is observed based on changes in background image

v. Air sampling
    1. Constantly monitoring through multiple ports
        a. Network of tubes monitored for integrity
        b. Small area covered

d. Light
    i. Very fast response (speed of light)
        1. Must have line of sight
    ii. Selected based on fuels burned
        1. Most common hydrocarbon fuels have similar wave lengths emitted
        2. UV
        3. IR
        4. Combination

e. Gases
    i. Can look for products of incomplete combustion
    ii. Not typically used as fire detectors

f. Water flow
    i. Not responding to fire itself

III. Detector types

a. Spot
    i. One location, must have products travel to it
    ii. All activation methods can be spot detectors

b. Linear
    i. A line is observed, products anywhere in line causes activation

    ii. Heat and photoelectric obscuration
c. Non-restorable: A detector that must be replaced after it has activated
    i. Sprinkler head is one example
d. Restorable: A detector that will return to its normal condition once the products from the fire are removed and can still be used
    i. Smoke detector is an example
e. Conventional
    i. All signals give the same response on a given circuit
f. Addressable
    i. Each device has a unique identification at the panel
g. Multi-criteria
    i. Reduced nuisance alarms
        1. Can have lower sensitivities for each type to get faster response
        2. New detectors required to not alarm due to common nuisance sources