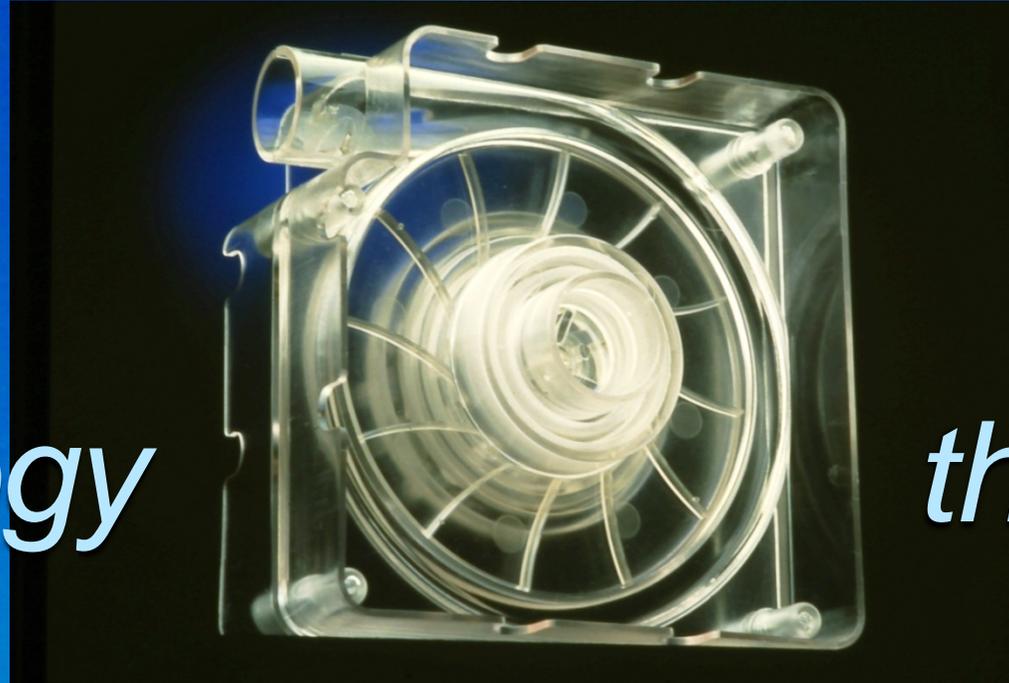


Aspirated Smoke Detection

Part 1

Technology



that Sniffs!

Dr Martin Cole, FTSE, HonFIEAust, CPEng(ret)
DiNenno Laureate

Where it all began



Bushfire research

- 1960's, CSIRO sought to control the threat of bushfires
- Proposed: prescribed burning to reduce fuel load
- Ignition from aircraft, to reach vast, inaccessible forests
- Needed airborne instruments for smoke levels
 - Nephelometer* developed in WW2 for visual range (UK)
 - Nephelometer* adapted for air pollution 1967 (USA)
- CSIRO further develop nephelometer for airborne use
- CSIRO discover how to calibrate using pure gases (F12)

*Cloud density monitor (smoke, dust, water vapour)

Meanwhile at PMG (Telecom):

Risk of fire a major concern -

- Higher density cabling with higher heat build-up
- Increasing use of flammable PVC insulated cabling
- Higher intensity fires, more-rapid fire growth
- Toxic and Corrosive fumes (HCl)
- Existing fire and smoke detectors too slow



Teaming-up

- PMG engages CSIRO
- Test every kind of fire and smoke detector
- Benchmark against the nephelometer prototype
- They called it “VESDA”
 - Very Early Smoke Detection Apparatus
- VESDA worked!



Len Gibson (PMG) and David Packham (CSIRO)

Telephone Exchange tests



Return Air Grill

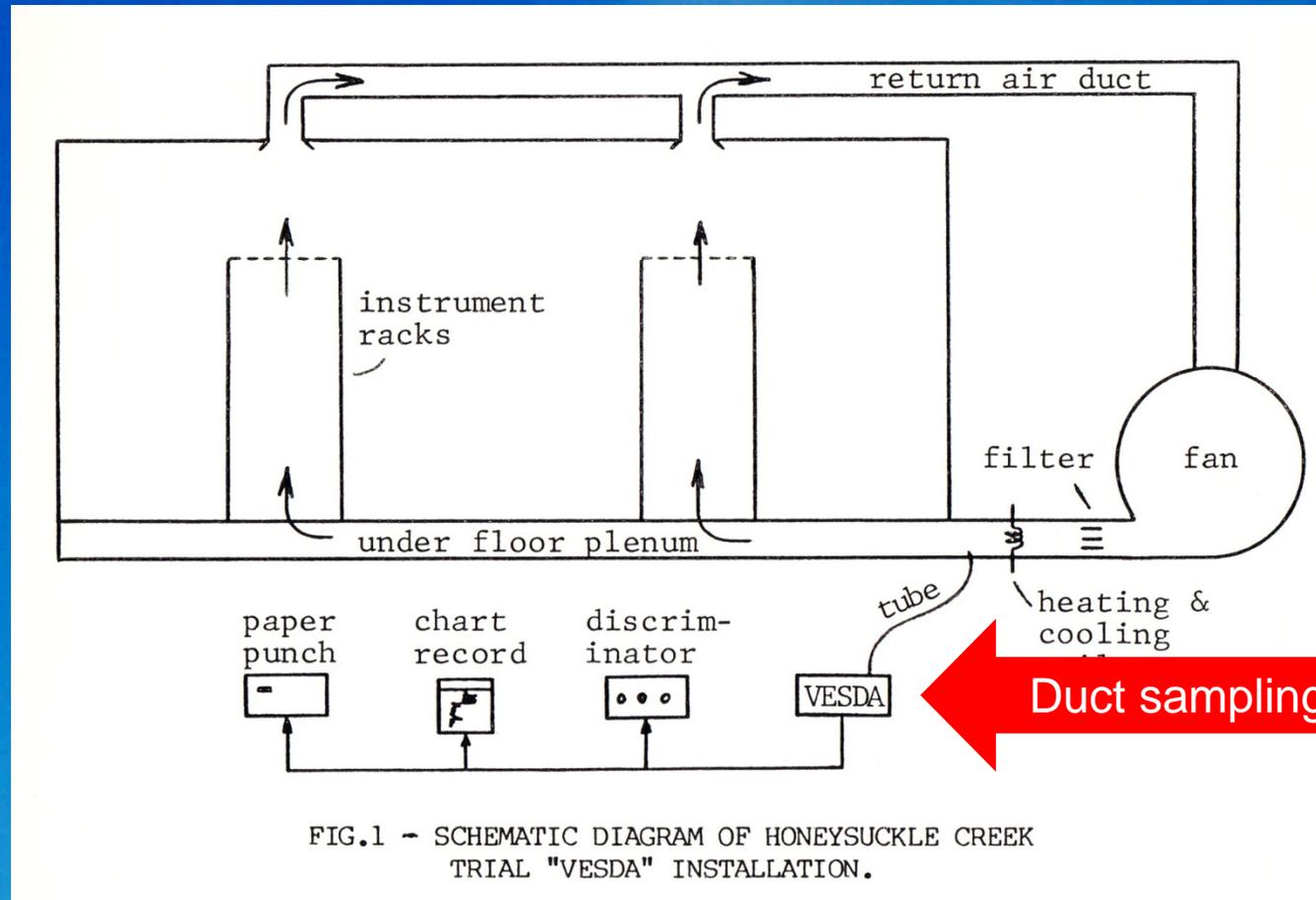
AIR/SMOKE CIRCULATION

Supply Air Registers

Smoke Detectors
miss out

VESDA testing

- Conceived as a DUCT detector



Packham & Gibson 1975

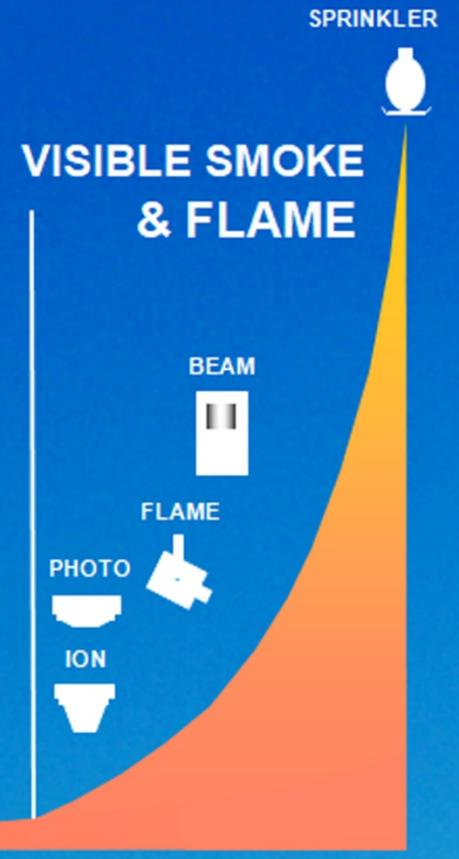
VESDA operation

**~1 hour earlier
warning =**

Fire prevention!

SMOKE DENSITY

FIRE INCIPIENT STAGE - NO VISIBLE SMOKE



“ALERT”

“ACTION”

“FIRE”

Conventional Detectors

TIME

VESDA ADJUSTABLE ALARM SETTINGS

Fire Suppression Systems

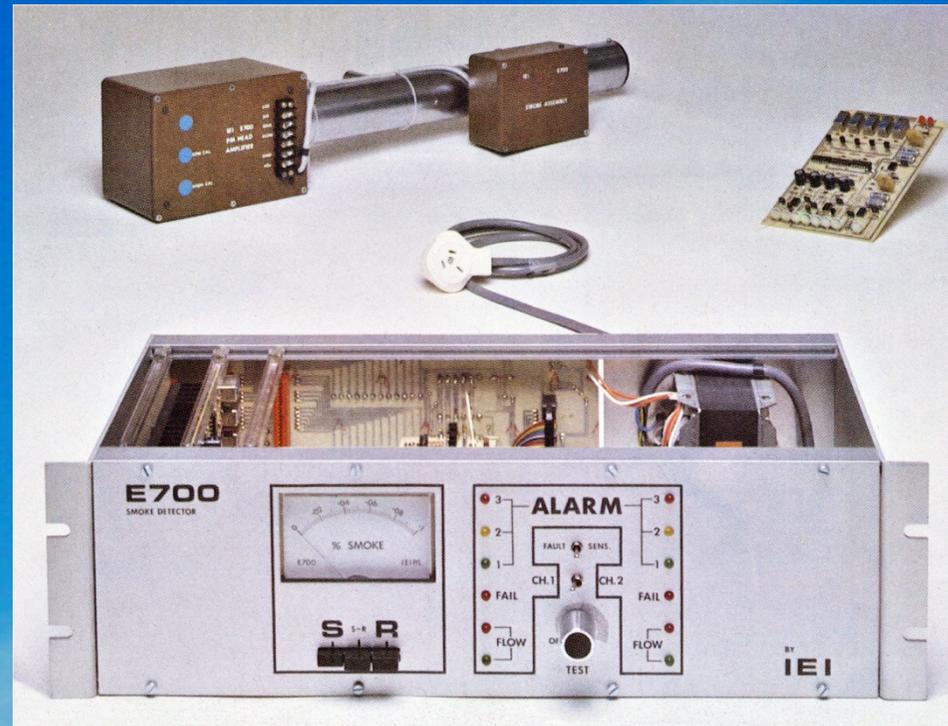
Commercialisation

- Initial efforts with “big business” fail (3 yrs!)
- Telecom Aust. re-opens tender 1978 - IEI bids
- BAC/FFE wins \$60k (2019\$250k) + 60 unit order
- But CSIRO staff unhappy - encourage IEI (no \$)



Commercialisation

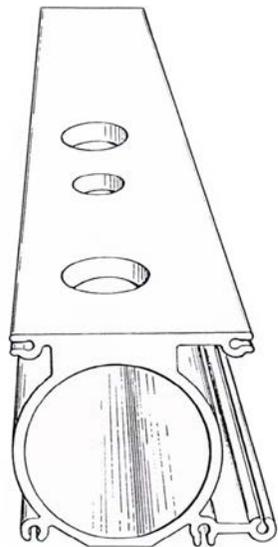
- IEI develops a more advanced model (Mk.1) 1979
- By 1980, IEI prevails over BAC/FFE in marketplace
- Great support from SEC Vic & other utilities
- Telecom Aust. becomes a reluctant customer



IEI VESDA Mk.2 (1983)

TOP
PERSPECTIVE
VIEW

extrusion

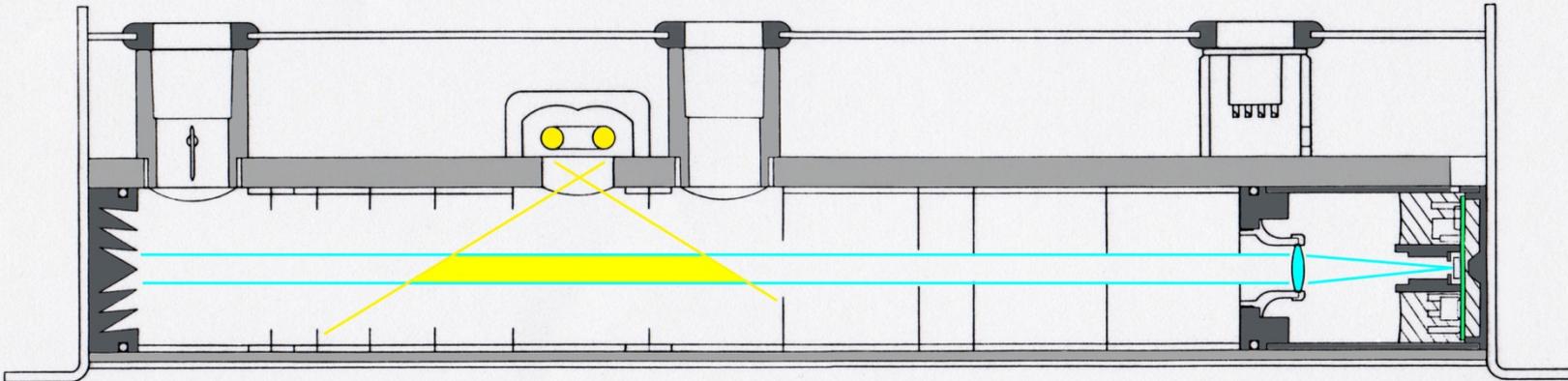


- More robust
- More dependable
- More features
- 24V DC



Air in

Air out



Xenon Lamp

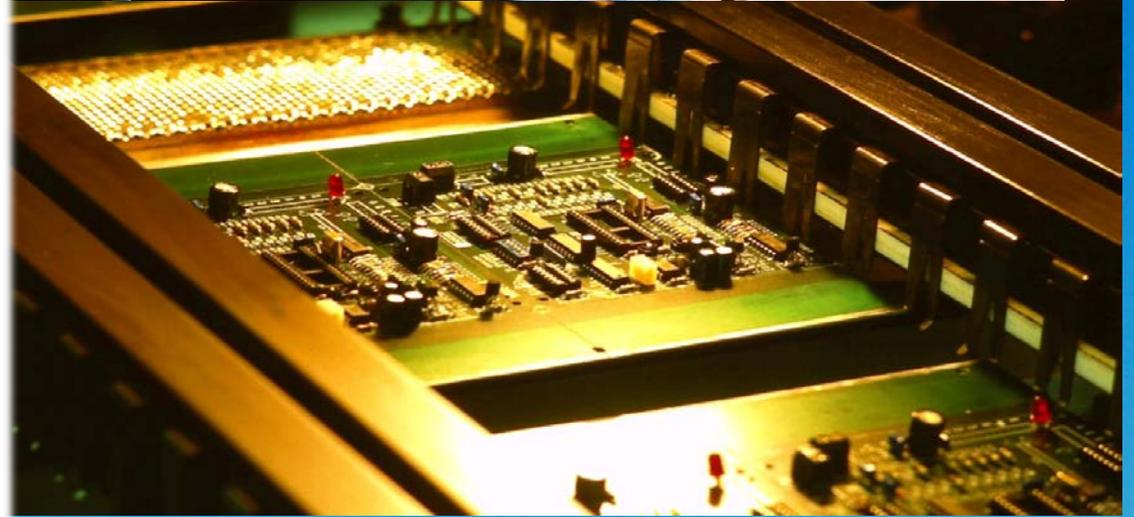
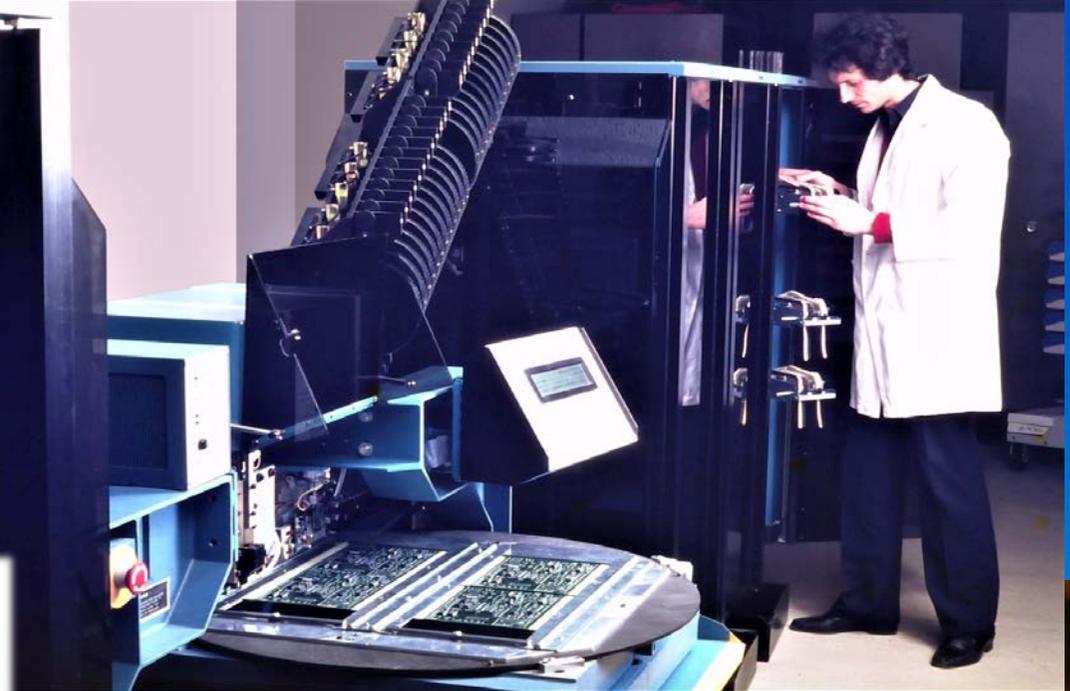
Receiver

MTC 1-3-82

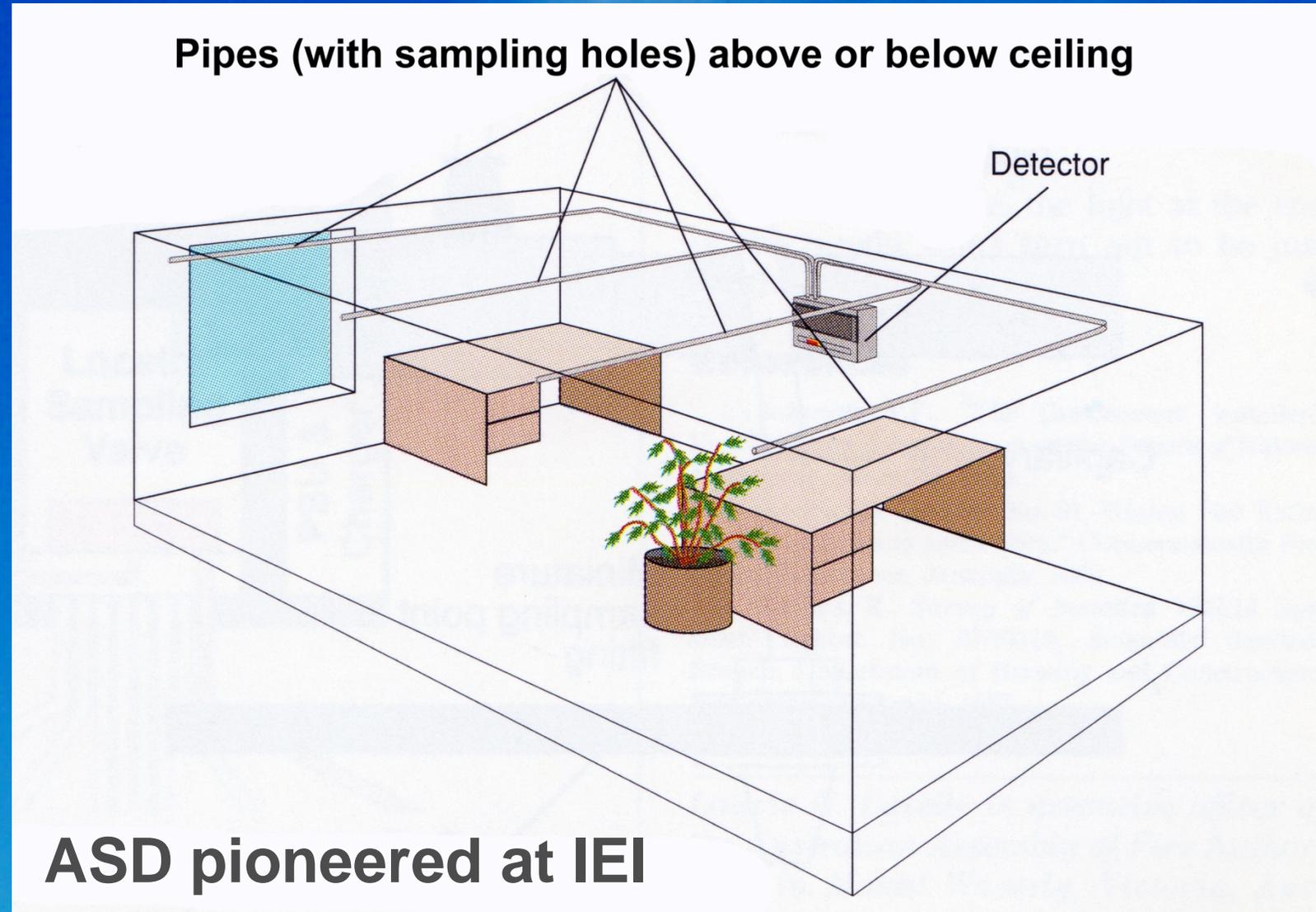
8 Zone bar-graph rack

VERY EARLY SMOKE DETECTION APPARATUS

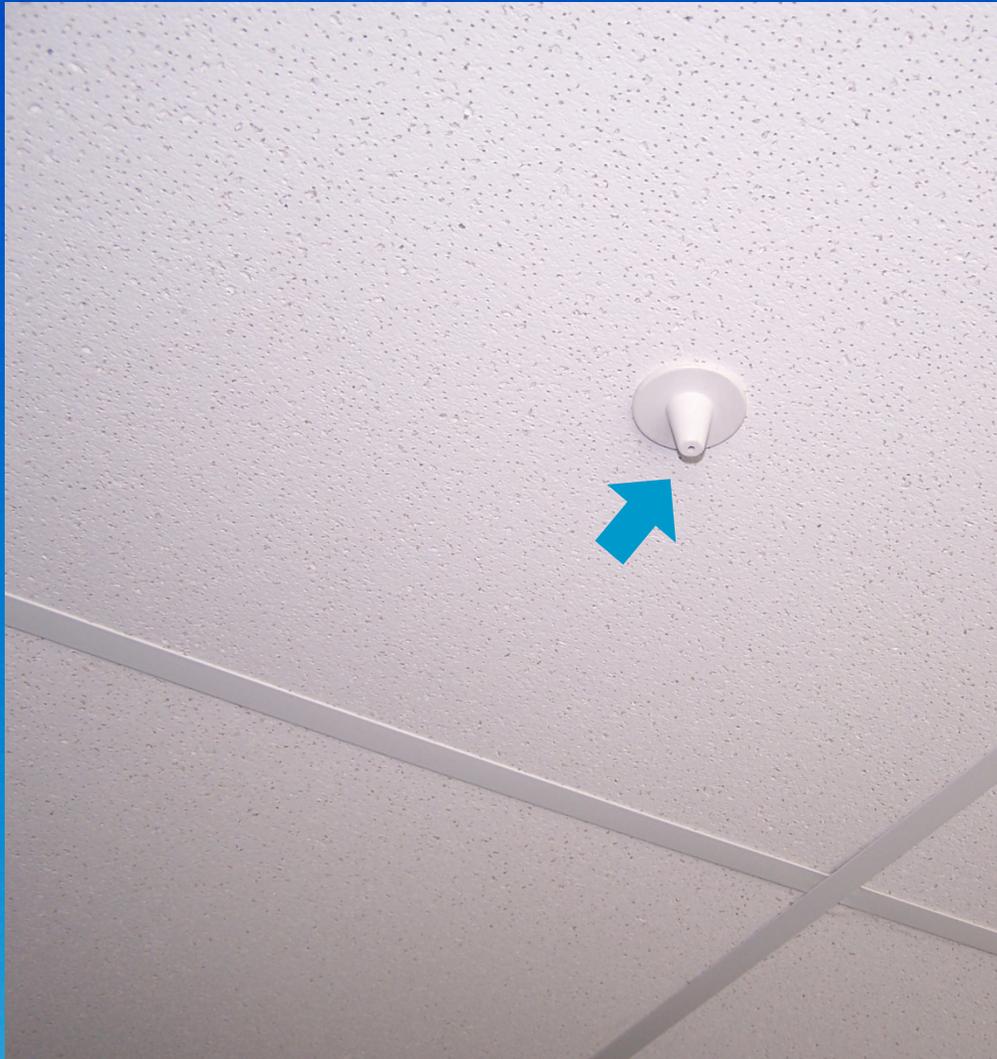
IEI Automated Manufacturing (1986)



Aspirated Smoke Detection (ASD)



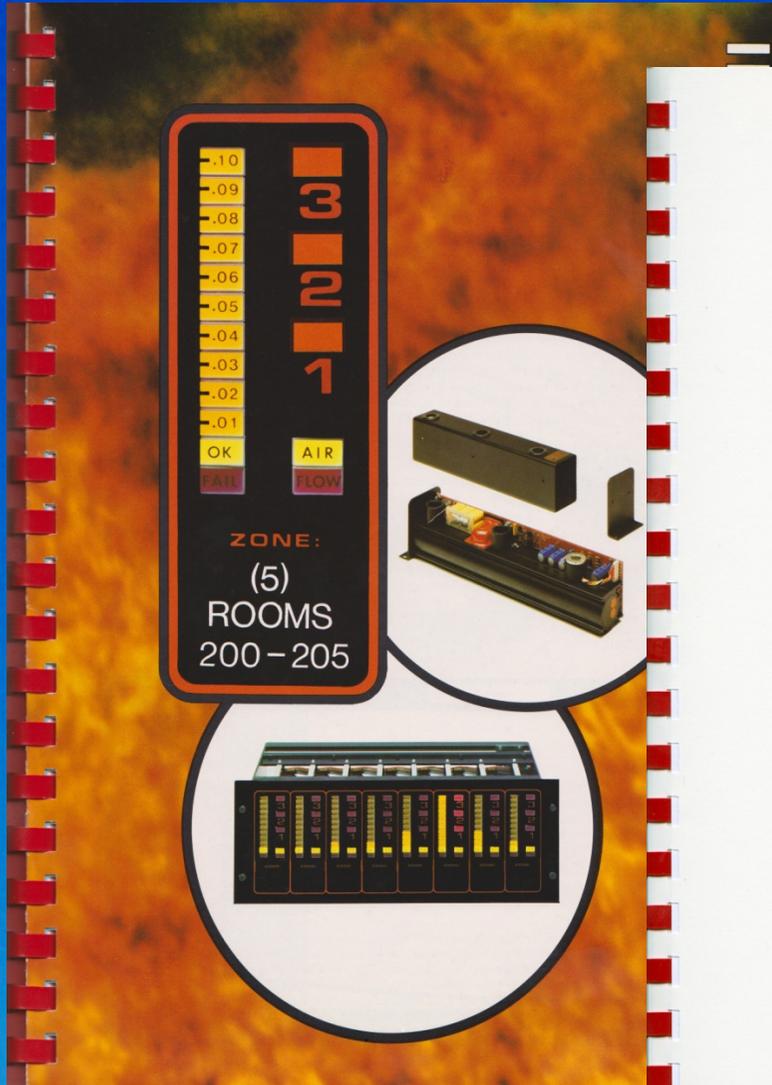
Aspirated Smoke Detection (ASD)



Sampling holes, typically 3mm ϕ

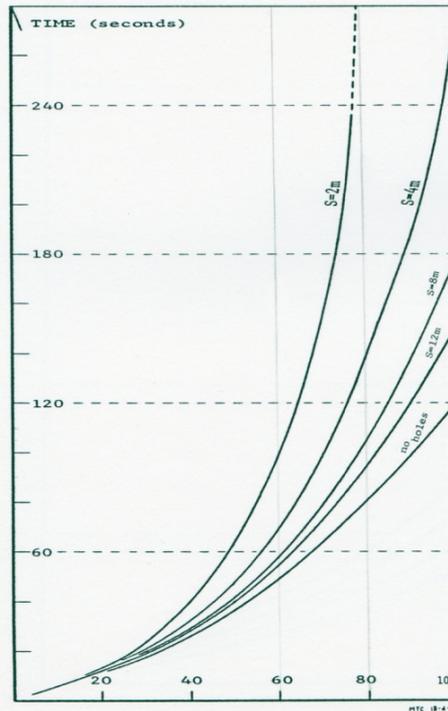
ASD pipe system design manual

“RED BOOK” (Cole 1983)



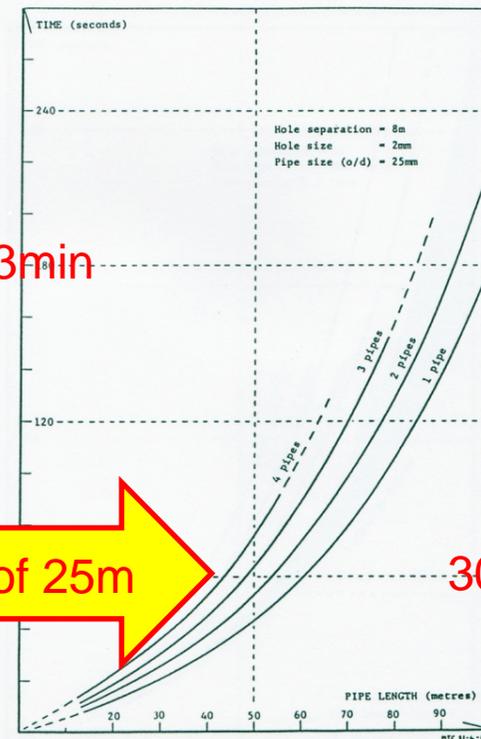
RESPONSE TIMES - 4.7 Watt FAN ENCLOSURE

Hole Separation



RESPONSE TIMES - 4.7 Watt FAN ENCLOSURE

Number of Pipes



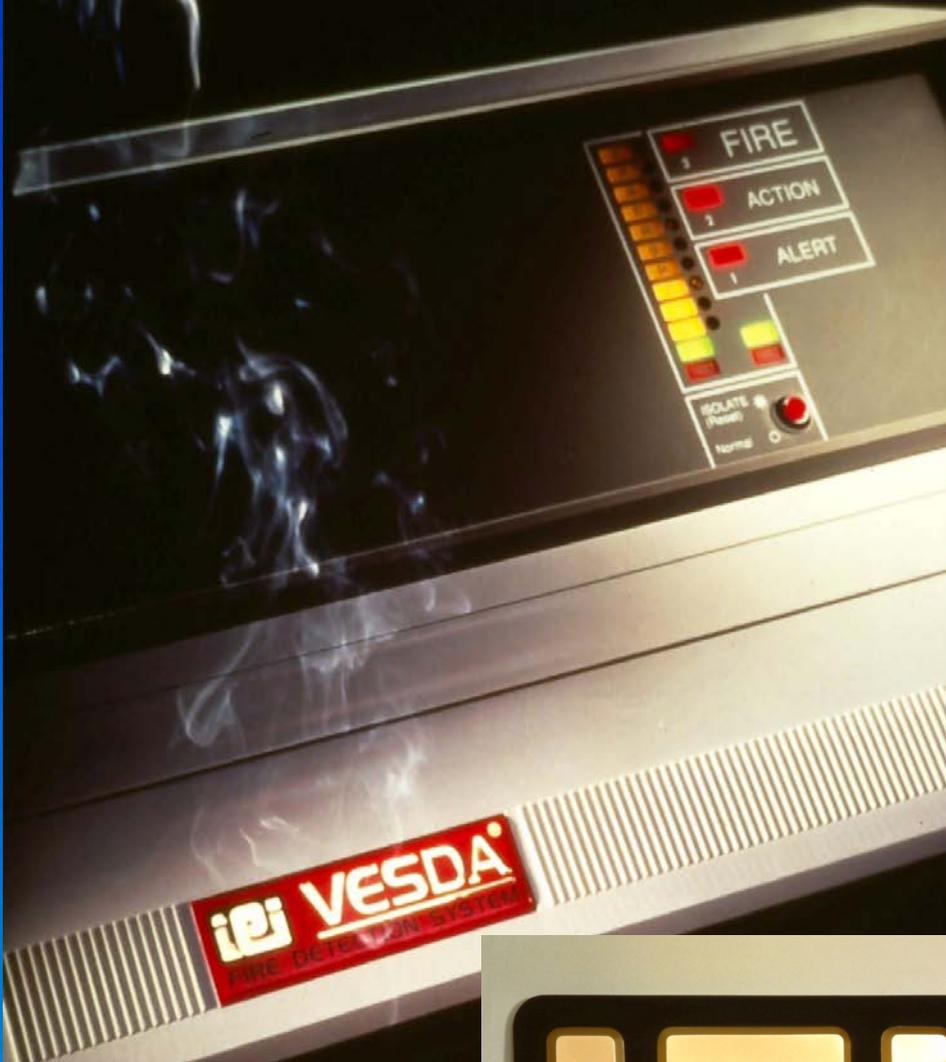
3min

1 pipe of 100m

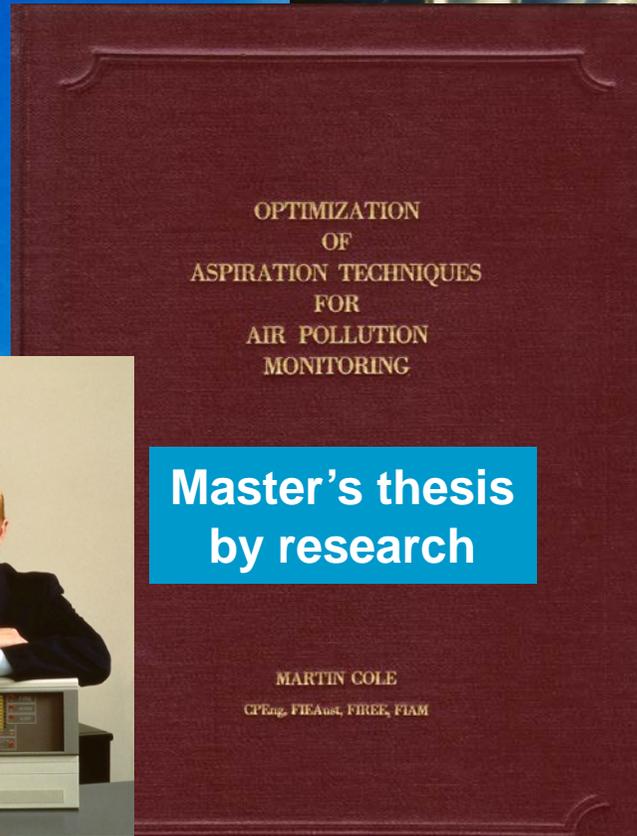
4 pipes of 25m

30sec

IEI VESDA Mk.3 (1990)



Revolutionary
ASPIRATOR
4x efficiency



Master's thesis
by research



Revolutionary
dust filter

Now please see part 2