



# *Canberra CAM Products*



***Alpha Beta ECAM,  
NetCAM,  
ASM1000***

# Alpha Beta ECAM



- Alpha and Beta spectroscopy with 2048-channel MCA
- Multiple compensation algorithms – peak fit and exponential fit
- LANL-designed cyclone separator inlet
- Sampler /detector /MCA in all-weather enclosure
- Temperature and altitude compensation, optional GPS and anemometer
- Wireless and hardwired Ethernet communications
- RadNet compliant with optional encryption and authentication
- Remote configuration and calibration

# NetCAM System



- Provides data analysis and networking for up to 8 Alpha Sentry CAM heads
- 300MHz P-class CPU
- Multiple compensation algorithms – peak fit and exponential fit
- Wireless and hardwired Ethernet communications
- RadNet compliant with optional encryption and authentication

# ***ASM1000 redesigned***

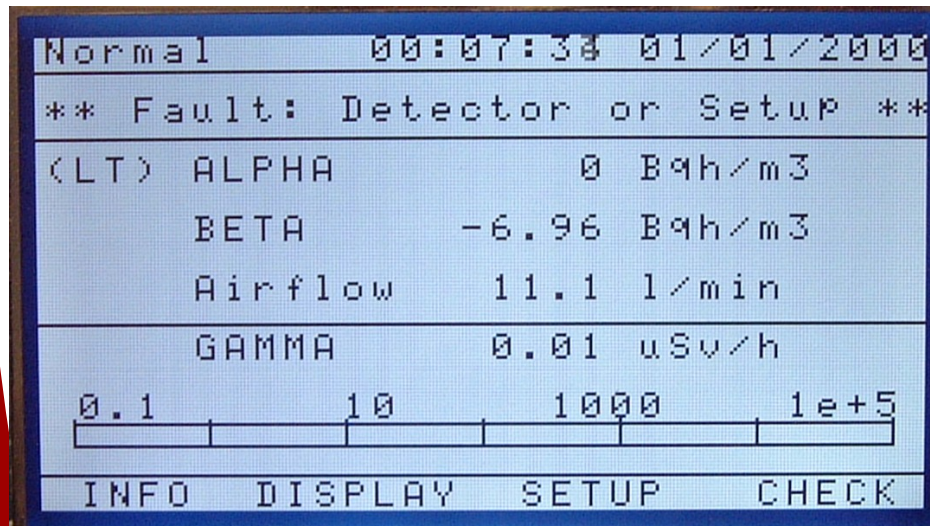


- ***Functionally identical – no need to modify operating procedures***
- ***Larger display***
- ***300MHz P-class CPU***
- ***Programming & set-up utilities are now compatible with Windows2000 and XP***

# ***iCAM Product Line Recent Developments***

# V2 Hardware

- ▶ **Hardware changes to support new features/options:**



**New brighter display**

**Optional amber beacon for first alarm level**

**(& new Areva corporate colours!)**



- ◆ **Optional Remote Head to come**



# Hardware Changes

- ▶ ***New System/display board – 90% identical but:***
  - ◆ ***New more readable display***
  - ◆ ***Extra serial port from CPU to support remote head***
  - ◆ ***Otherwise identical circuitry***
  - ◆ ***Not backward compatible (new display is thicker & requires changes to door hardware)***
  - ◆ ***Mk1 boards still made to support Mk1 iCAMs***
- ▶ ***New I/O board:***
  - ◆ ***Identical circuitry as before but with added driver hardware for optional amber beacon***
  - ◆ ***Fully backward compatible***
  - ◆ ***Improved connectors on amplifier – backward compatible***
- ▶ ***New smaller more efficient PSU***
  - ◆ ***Higher reliability***
  - ◆ ***Backward compatible***



# V2.00 Firmware

- ▶ **Automatically detects whether fixed filter of MF head fitted**
  - ◆ **Backwards compatible to Mk1 hardware**
  - ◆ **Auto-detects display type, fixed or MF filter mech, local or remote head etc**
- ▶ **Includes on-screen MF test, manual step commands etc**
- ▶ **Improved spectrum display**
  - ◆ **ROI & Rn/Th progeny peak regions marked**
  - ◆ **Energy scale**
  - ◆ **Scrolling cursor**
- ▶ **Will control Amber Alert Beacon**
  - ◆ **(With V2 hardware)**
- ▶ **Now at V2.10**
- ▶ **No changes to proven compensation algorithms and activity calculations & alarms**

# *Why a Moving Filter?*

- ▶ *US & UK like fixed filters – allows off-line measurement*
- ▶ *Regular manual filter changes required*
  - ◆ *Inconvenient/expensive in some locations*
  - ◆ *Regular visits required ~ min. weekly*
- ▶ *Solution – An automatic filter change mechanism*
  - ▶ *iCAM/MF*
- ▶ *Advantages*
  - ◆ *Long term unattended operation in inaccessible or unfrequented locations*
  - ◆ *Reduced operating costs*
  - ◆ *Improved performance – through use of higher resolution filter*

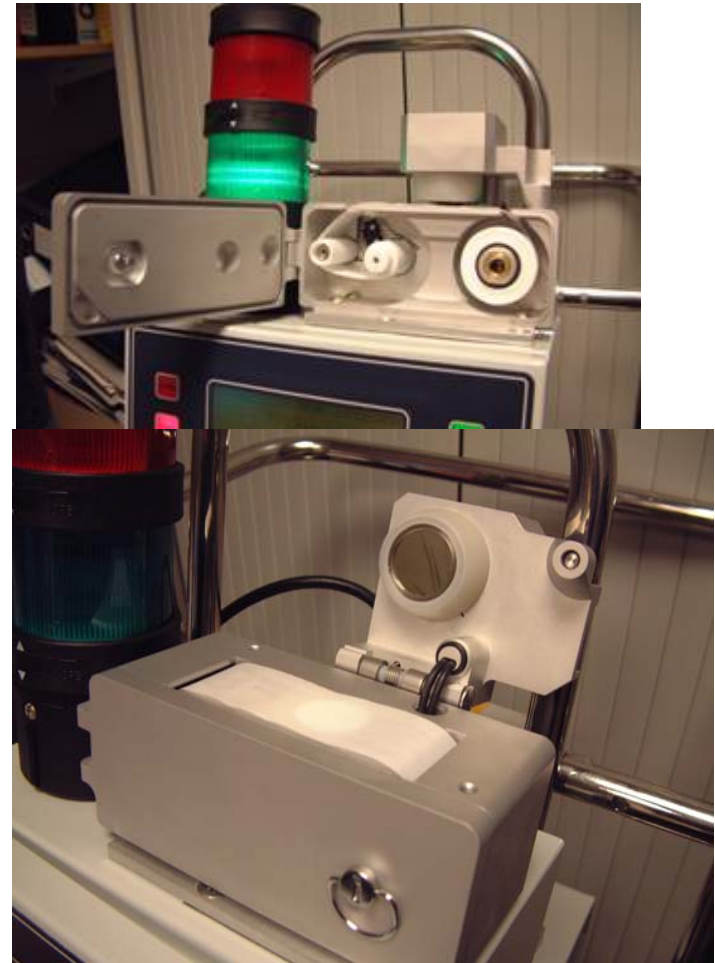
# ***iCAM Moving Filter***

- ▶ ***New mechanism fits in place of fixed filter head***
  - ◆ ***Existing iCAMs upgradeable***
- ▶ ***Uses same detectors, amplifiers & algorithms as fixed head iCAM***
  - ◆ ***Firmware V2.00 or greater required to control MF mechanism motor***
- ▶ ***FSLW filter roll***
  - ◆ ***(same roll as MGPI BA33 & ABPMs)***
  - ◆ ***15 m roll***
  - ◆ ***> 9 months autonomy @ 1 change per day***
- ▶ ***Filter DP measurement now included***
- ▶ ***Lower MDA than with GFA filter***
  - ◆ ***FSLW filter gives better resolution/spectrum shape***

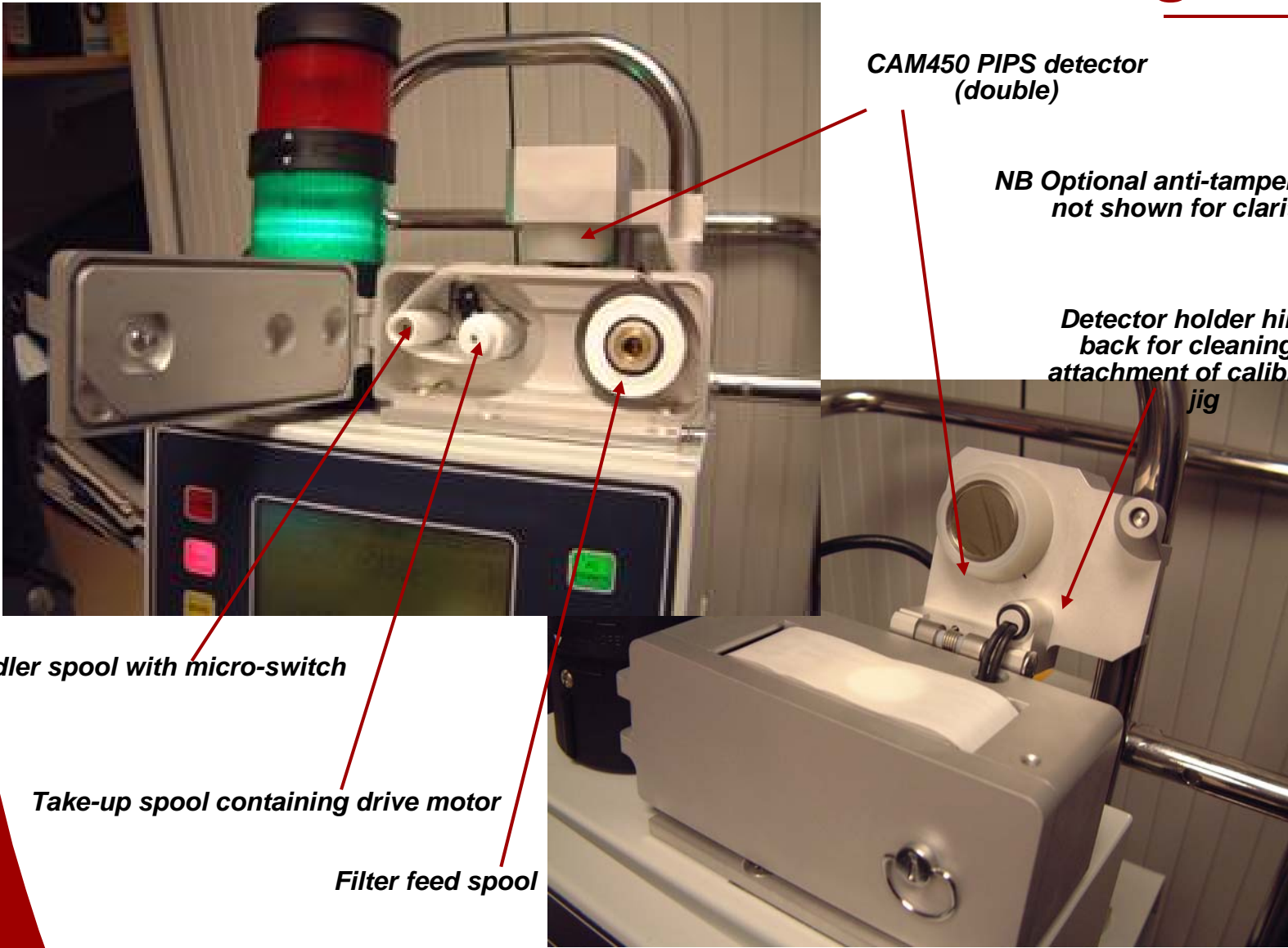


# ***iCAM Moving Filter***

- ▶ ***Filter steps on automatically on any or all of the following conditions:***
  - ◆ *fixed time interval: default is daily*
  - ◆ *fixed air volume*
  - ◆ *Low flow rate: default 20 l/min*
  - ◆ *High pressure drop: clogged filter*
  - ◆ *High activity*
  - ◆ *High Background: As calculated by compensation algorithm*
- ▶ ***All step triggers are selectable/editable by the user via Config software***
- ▶ ***Broken filter tape detected***



# ***iCAM Moving Filter***



***CAM450 PIPS detector  
(double)***

***NB Optional anti-tamper grille  
not shown for clarity***

***Detector holder hinged  
back for cleaning or  
attachment of calibration  
jig***

***Idler spool with micro-switch***

***Take-up spool containing drive motor***

***Filter feed spool***

***Still to Come*** |

# ***iCAM with Moving Filter: 3 versions***

- ▶ ***iCAM/MF – already released***
  - ◆ ***For ambient sampling***
  - ◆ ***With integral sampling head***
- ▶ ***iCAM/MFA – to be released ~ Q2 2007***
  - ◆ ***For remote sampling via pipe or hose***
    - ***From ducts or through walls or cabinets***
  - ◆ ***Integral sampling head***
  - ◆ ***For low to medium activity levels***
- ▶ ***iCAM/MFS – to be released Q4 2007/Q1 2008***
  - ◆ ***Sampling head separated from controller***
  - ◆ ***For remote sampling of high activity levels***
  - ◆ ***High Integrity, v well sealed, vv low leakage***

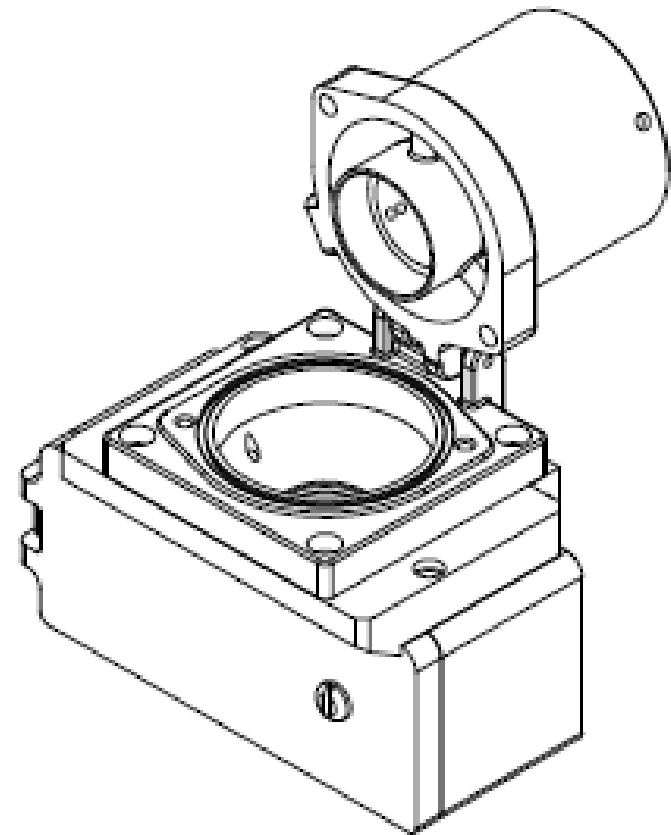
# Version iCAM/MFA

- ▶ **Version for sampling via pipe or hose**
  - ◆ **From duct or through wall/cabinets**
  - ◆ **Ideal for wide area environmental monitoring systems**
  - ◆ **Identical sampling/deposition to iCAM/D**
- ▶ **Leakage < 10 cc/min typ.**
- ▶ **Head hinges back for access to the detector or to change the filter roll.**
- ▶ **In service at CEA Saclay, Euratom (Luxembourg) & Lithuania**





# ***iCAM/MFA***



# *Version iCAM/MFS*

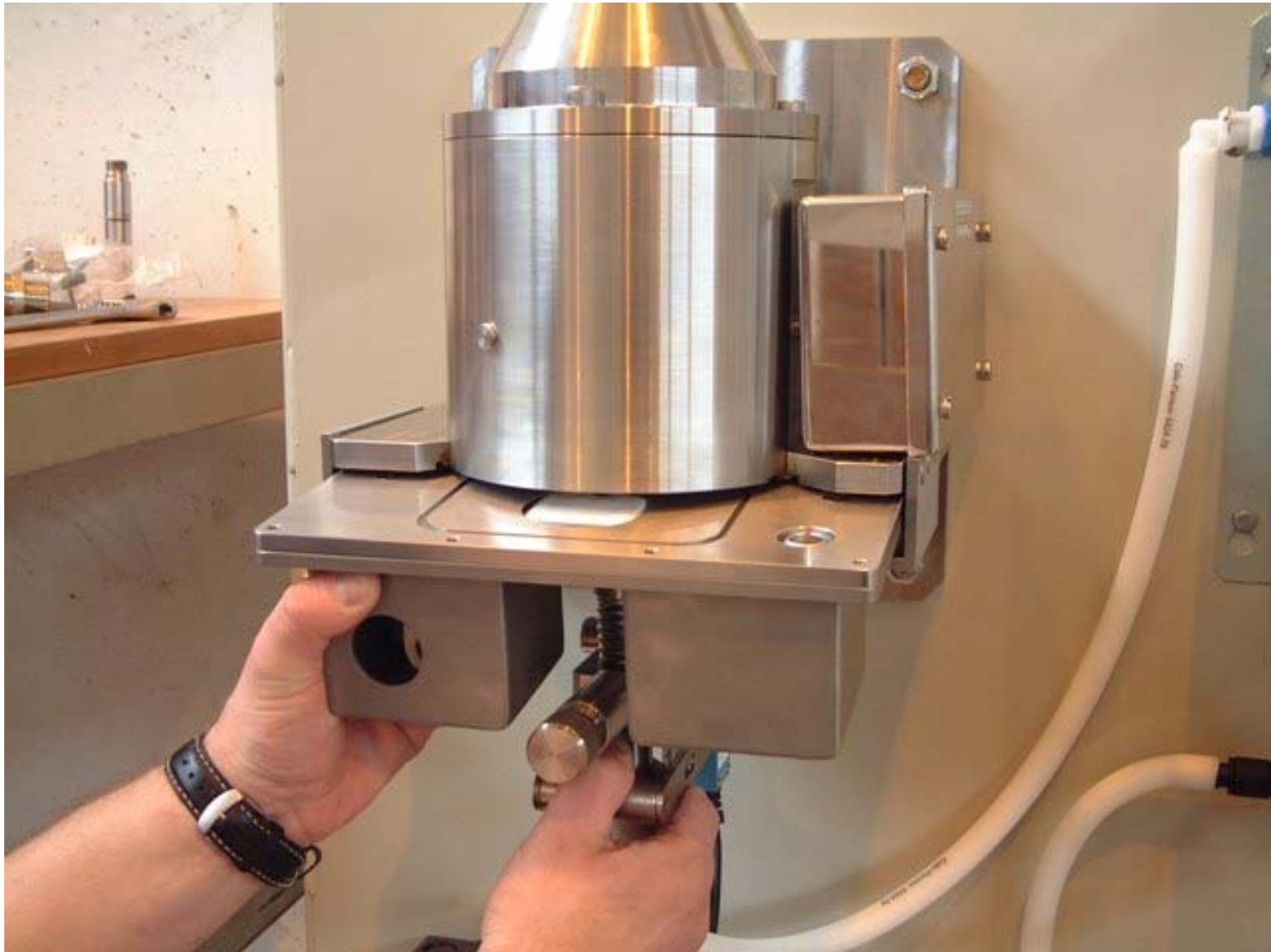
## ▶ ***Completely New Remote Sampling Head***

- ◆ ***Up to 10 m from head to controller***
- ◆ ***For high activity sampling***
- ◆ ***High Integrity design***
- ◆ ***Vacuum sealed***
- ◆ ***Removeable cassette for the filter roll***
  - ***Avoids handling highly active filter***
    - ***Filter change can be done outside active area***
- ◆ ***Ideal for fixed pipework***
  - ***No hinging of the head required to change the filter or for calibration***
- ◆ ***Active aerosol testing ( $^{239}\text{Pu}$  &  $^{137}\text{Cs}$ ) in hand***

# Version iCAM/MFS

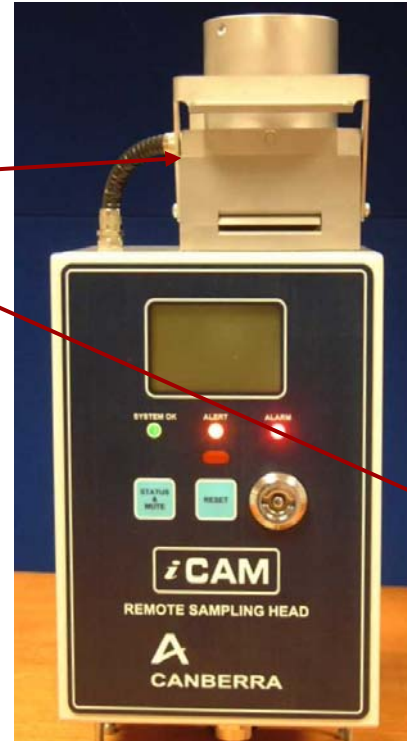


# *iCAM/MFS Sampling Head*



# Also still to come: iCAM Remote Head

- ▶ **Complete remote sampling head**
  - ◆ **Integral flow measurement, electronics, MCA etc**
  - ◆ **Standard fixed card filter or moving filter mechanisms (MF or MFA)**
  - ◆ **Up to 100 m from iCAM control unit**
    - **RS485 connection**
    - **Future: USB & Ethernet/wireless**
  - ◆ **Local display, alarm sounder**
  - ◆ **IR Config port for PDA**
  - ◆ **Optional local AC or remote DC power**



# Remote Head System

- ▶ **Initially RH will require an iCAM controller**
  - ◆ **RH will send spectra to iCAM for processing by standard algorithms**
  - ◆ **Controller plus RH functions as a standard iCAM – same firmware**
- ▶ **Eventually full algorithms will be embedded in RH**
  - ◆ **No controller required**
  - ◆ **Fully independent networkable air monitor**
  - ◆ **Lighter weight portable systems**
  - ◆ **Personal air monitor?**



# ***iCAM Further Developments***

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## ▶ ***Improved Concentration algorithm***

- ◆ ***Auto-adaptive time averaging for faster response to step changes in concentration and lower MDA at v low levels***
- ◆ ***Will replace separate CT, LT and CT/DT, LT/DLT measurements with a single set of measurement***
- ◆ ***Greatly improved beta Rn/Th compensation***
- ◆ ***Display of concentrations of Rn, Th and all progeny separately***
- ◆ ***Lots of testing still to do!***
  
- ◆ ***To be released ~Q1 2008***