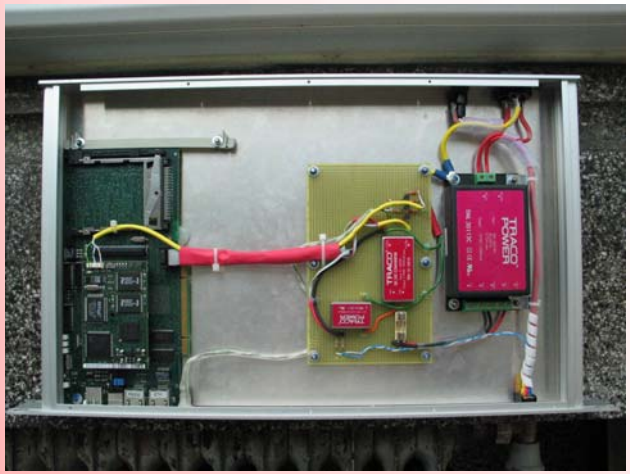
cosylab
CONTROL SYSTEM LABORATORY

The MicroIOC

First customer:

SLS @ PSI

In 2003



25 pieces for Australia

Spring 2005

From Custom

To Production

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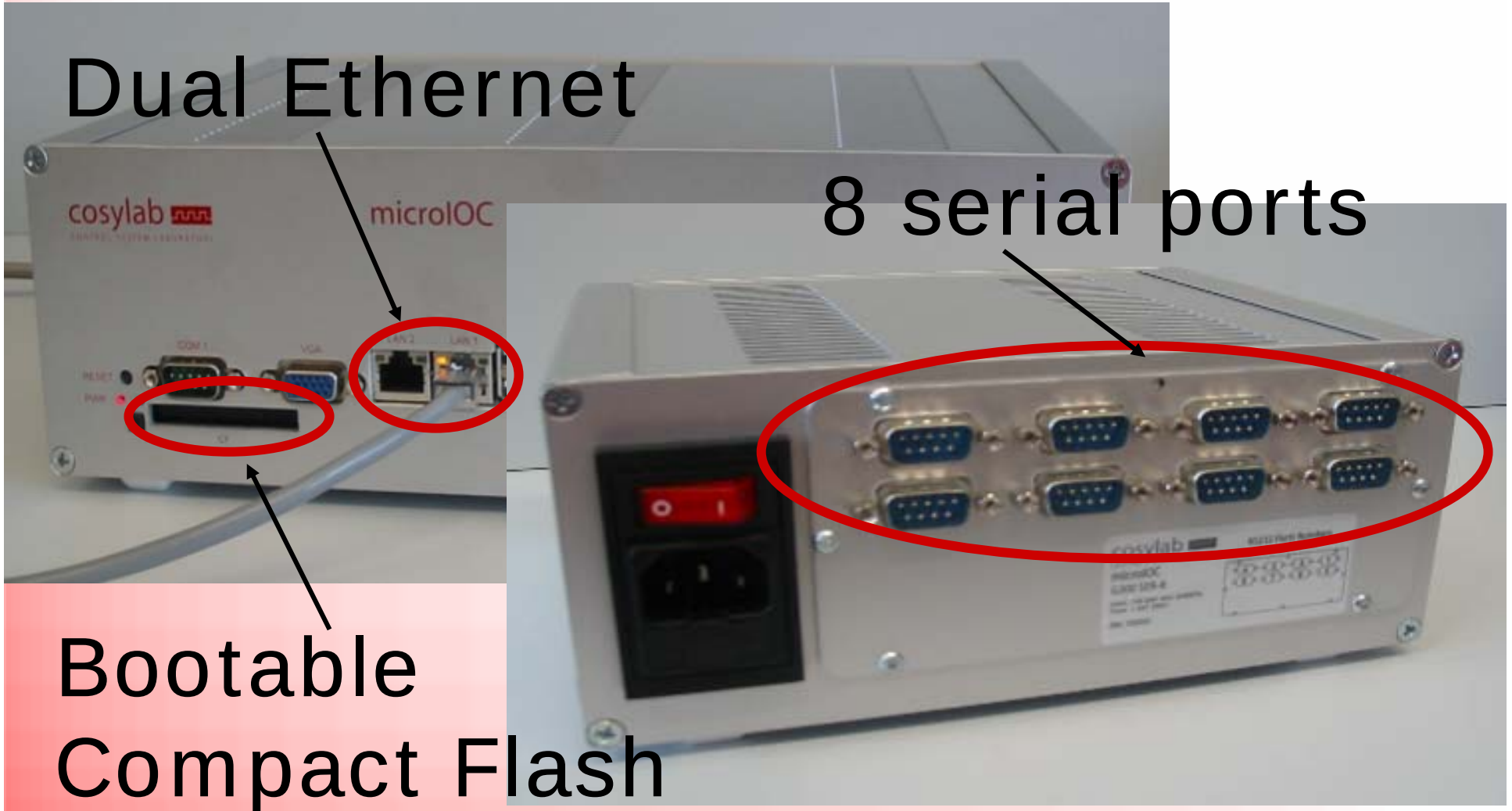
Dilemma

- Marketing or technical presentation?
  - We sell those things
  - We're proud that we designed them
- Asking **YOU** for advice:
  - Is it a good idea?
  - Does it solve people's needs?
  - Which types or microIOCs are useful?

The microIOC Concept

- Signals in, EPICS/CA out
  - A smart "black box" IOC
  - attach motors, serial and GPIB devices
  - plug&play, no building, configuring, etc.
- Offer EPICS devices
  - E.g. EPICS scope, EPICS motor controller
- Use it stand-alone at accelerators, beam lines and other experimental systems, where VME would be overkill

microIOC – Second Generation in 2004



What the User Wants:

- The microIOC is a black box for installation:
  - with a built-in EPICS database
  - already with preconfigured records
  - everything must be very user friendly, with wizards, in a plug&play manner..

- And made of standard components:
  - a reliable power supply (55 years MTBF)
  - an onboard PC104(+) linux/RTEMS processor
  - Off-the-shelf parts to replace
    - No moving parts (fan, disk) to break in first place

The microIOC Family

- Small 9”
- Display 13”
- Rack mount 19”

Integrate Devices into EPICS

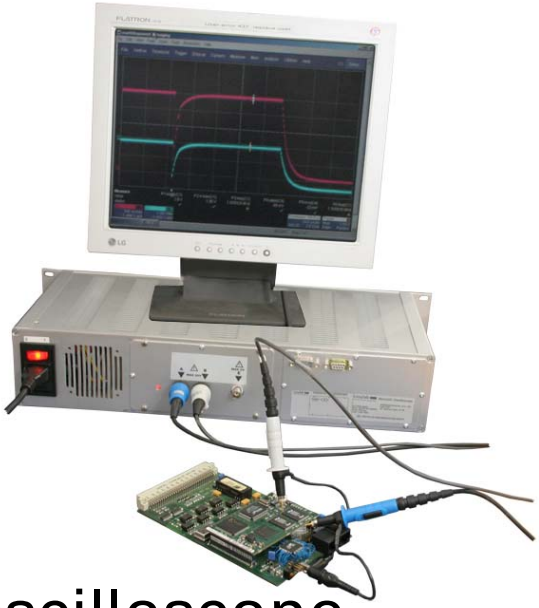
USB/Ethernet camera

GPIB

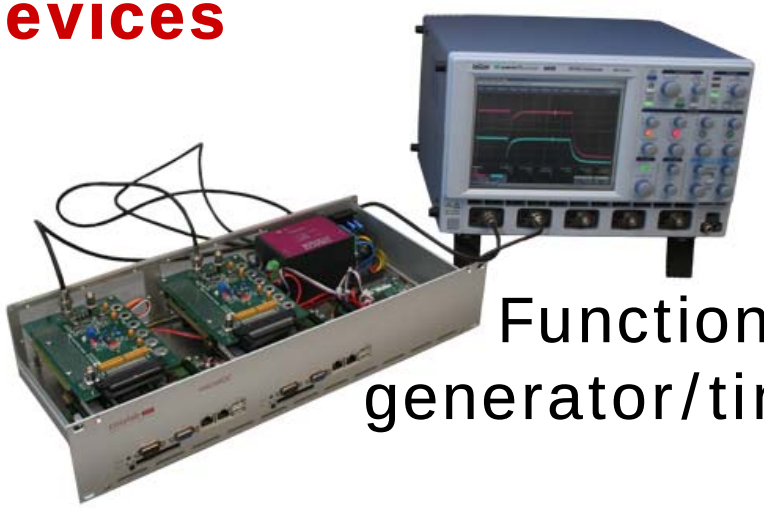
RS 232/422/485

Analog/digital I/O

EPICS Devices

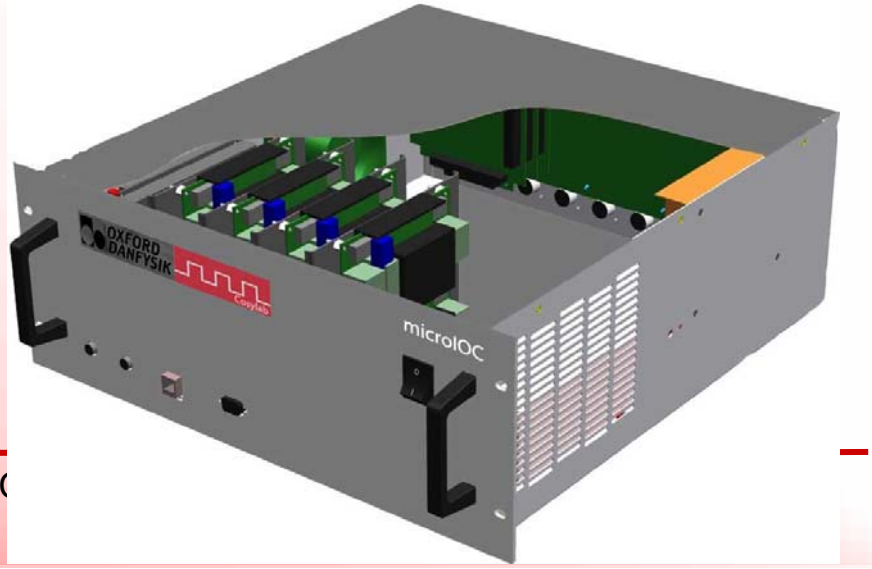


Oscilloscope

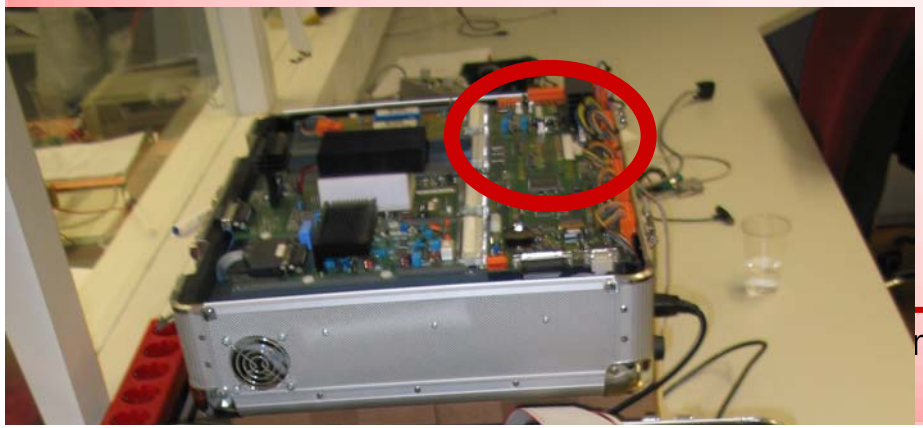


Function generator/timing

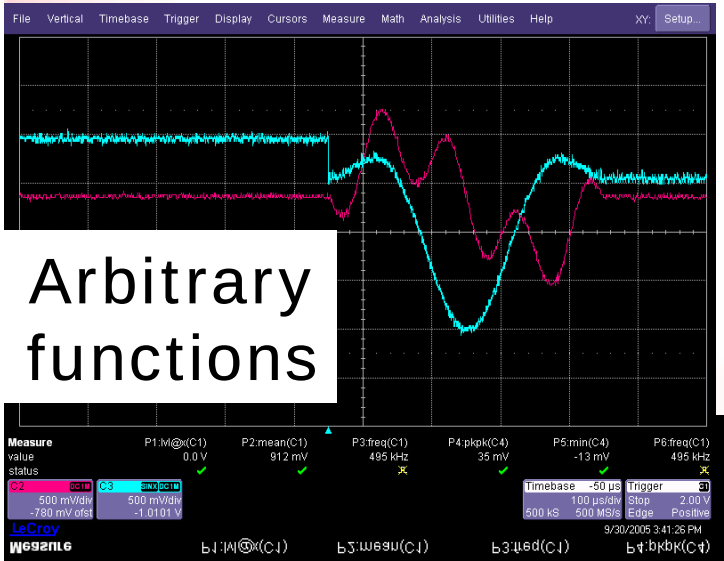
Motor controller/driver



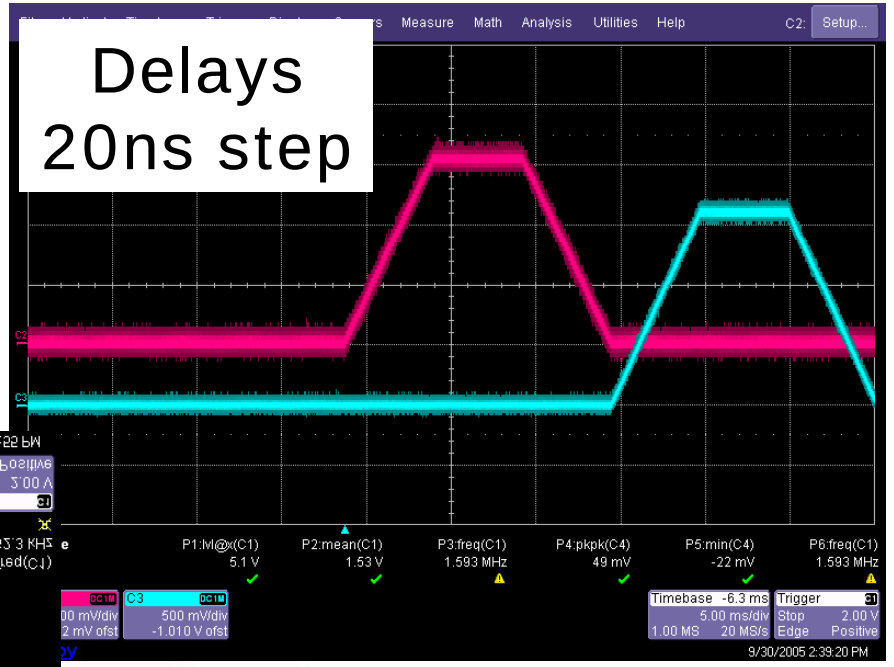
Danfysik power supply



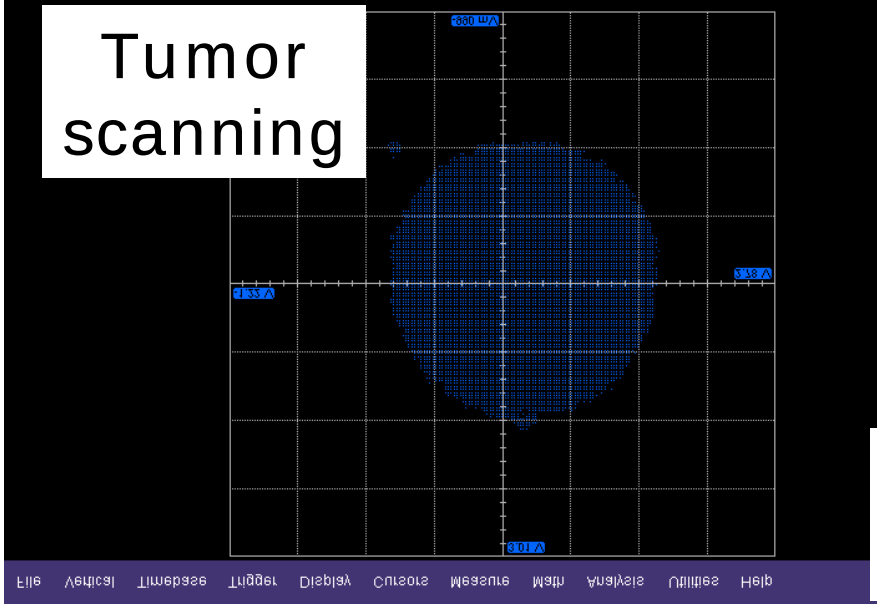
Function Generator and Timing Made of Commercial off-the-shelf Parts



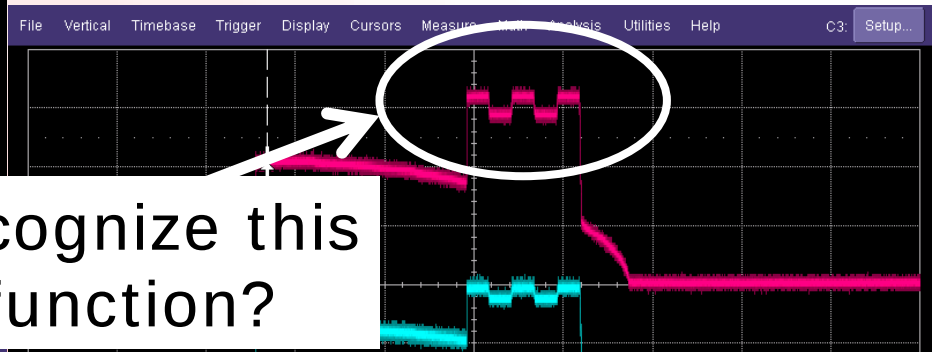
Arbitrary functions



Delays 20ns step

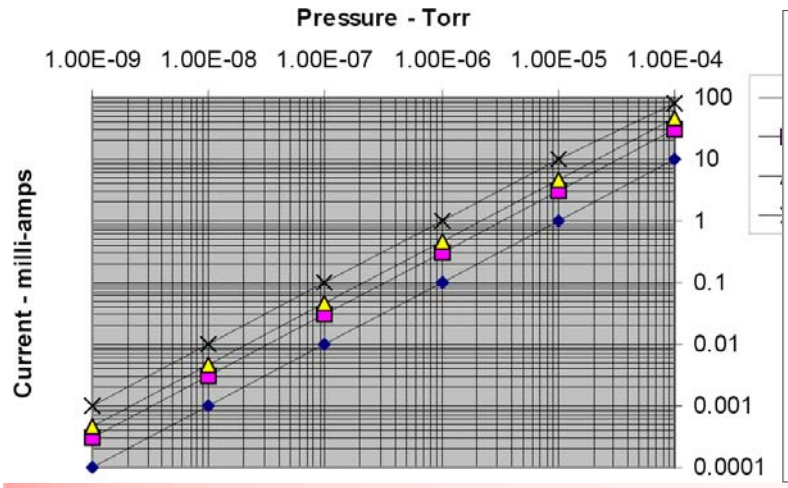


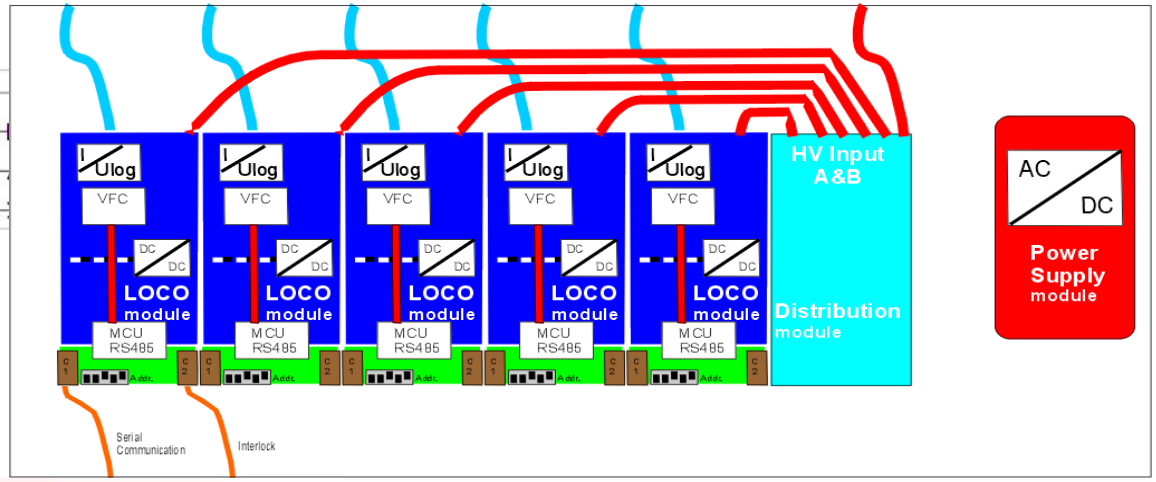
Tumor scanning

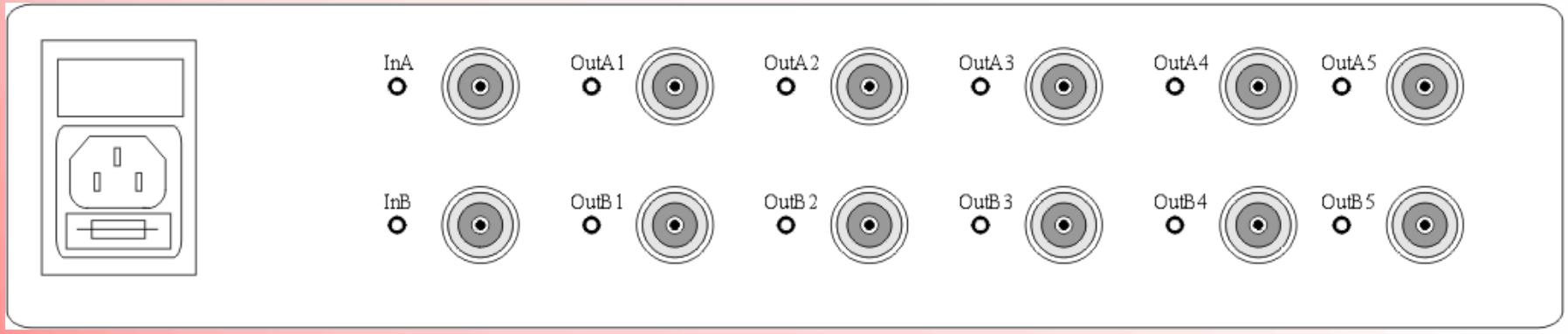


Recognize this function?

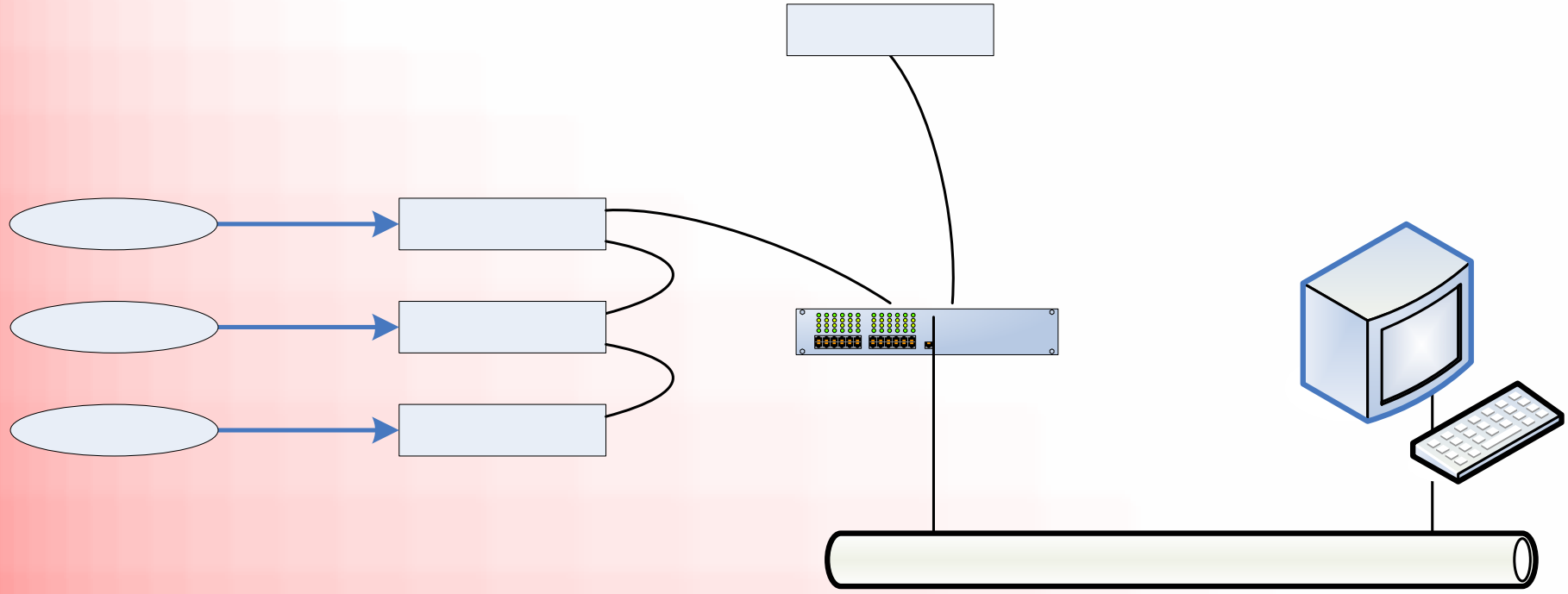
LOCO: Connect up to 10 Pumps on one HV PS and Measure Pressure in Each



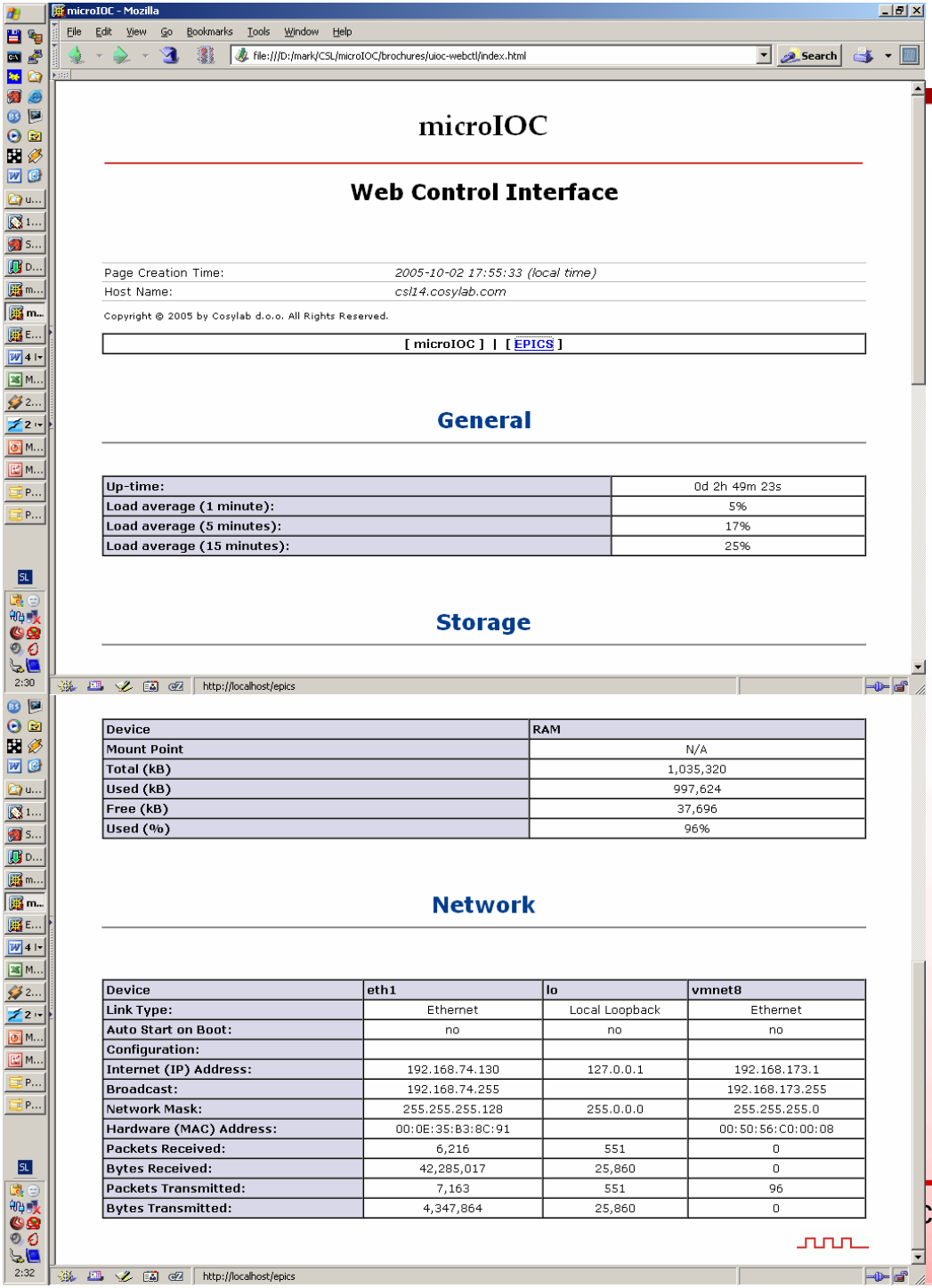




BLM: Integrate Bergoz Beam Loss Monitors and Provide Them with Electric Power



microIOC Web Server



Developing Environment

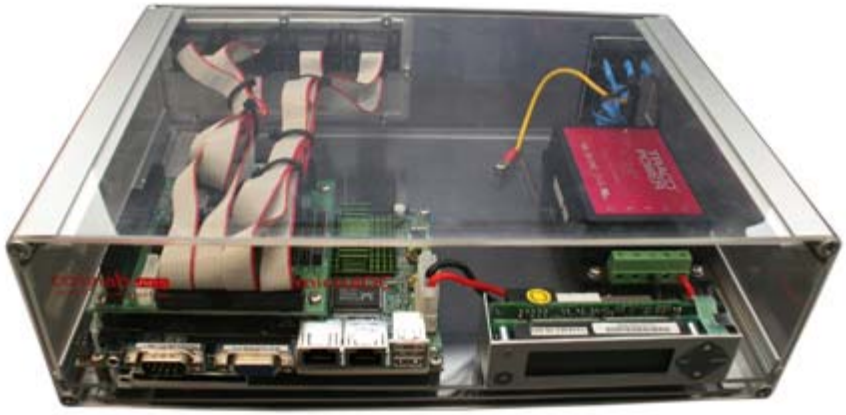
- `export UIOC_SDK_ROOT=/var/uioc/epics-2.0.1-sdk`
- `$ uioc-sdk`
- `uioc:epics$ export UIOC_TARGET=10.0.0.35`
- `uioc:epics$ uioc-update`
- `uioc:epics$ cd example`
- `uioc:example$ make`
- `uioc:example$ uioc-deploy`

Nice Features

Dual microIOC box
- redundant IOC
- more CPU power
- compact

Local console and keyboard

No fans, no disk, no moving parts, boot from flash



The Main User Features Are:

- completely stand-alone, no VME/PCI or boot PC necessary
- plug&play: configure IP (DHCP), connect cables and it works
- simple configuration through Web server, built-in EPICS db
  - VDCT preconfigured db file for standard devices: PLCs, vacuum, timing, motor control and monochromators
  - a simple wizard to configure record names and constants
- installed EDM, Java and Web-based panels for display and setting

Possible Applications

- Diskless booting – reduce boot-up time
- Massively distributed systems (array of telescopes)
- Integrate a few signals here and there (utilities)
- Integrate PLCs into EPICS
- Protocol converter: eg. Modbus - EPICS
- isolate device Ethernet network from other IOCs
- Allows equipment vendors to integrate EPICS
- Network sniffer/debugger, specially for CA
- Office desktop EPICS development/test system
- EPICS course hardware
- Replacement contracts
  - 24h replacement shipping

CONCLUSIONS: What's new about this?

- In principle, nothing
- The real value of the microIOC is in its simplicity and user-friendliness without compromising robustness.
  - because there are many people, who don't have the time to bother how to install and use it in detail.
- **www.microIOC.com**

Implementation Details

- dual Ethernet port allows to separate microIOCs and devices from the rest of the control system
- available with Linux and RTEMS operating systems and on request with vxWorks
- database can be persisted in flash, avoiding problems due to network failures
- hardware components of the microIOC are of high quality and have long life times
  - PS has 500,000 h MTBF (55 years)
- by design, mechanical parts such as hard disks and fans are avoided

Fanless Processors for Everybody