

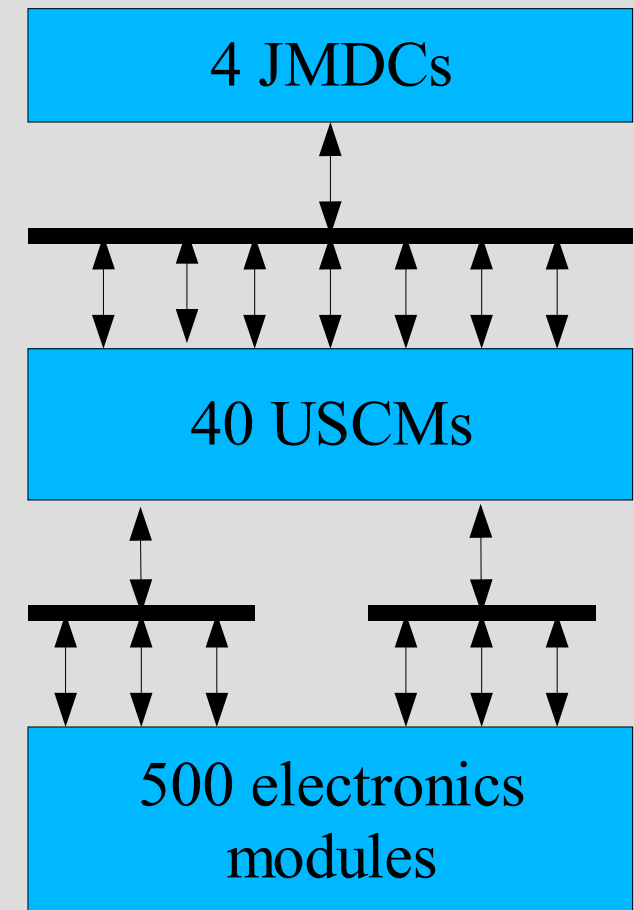
USCM software flight plan

Why do we have a USCM?
How does its software work?
How is it being used so far?

Software for flight?

What's the USCM about?

- Translate between analog / digital signal lines and generic AMS blocks
- Concentrate / distribute communications with JMDC
- Acquire slow sensor readouts asynchronously
- Run some control algorithms autonomously



The USCM hardware (briefly)

- Dallas 80C390 8-bit microprocessor @ 16MHz
- 128 KB RAM, 128 KB ROM, 128 KB EEROM
- Uplink: 2 CAN bus connections (1 Mbit/s)
- Downlinks:
 - 2 serial ports (RS232 protocol, TTL levels)
 - 16 DAC, 32 ADC channels (12-bit, 4 Volt amplitude)
 - 8 Dallas 1-wire busses for up to 255 external temperature sensors
 - ~30 LVDS digital signalling lines

USCM software layout

Pre-emptive time-sliced multitasking of 4 jobs:

- (1) Serial connection, debug/bootloader console
- (2) Asynchronous analog & digital signal exchange with client boards and sensors (“downlinks”)
- (3) CAN communication with JMDCs (“uplink”) and execution of commands
- (4) TBC user-specific application program(s), may contain autonomous control loops

Tasks 2 and 3 communicate by shared memory

More on USCM software

- ADC, DAC and Dallas readings done asynchronously all the time, can be disabled, off by default on power-up
- LVDS lines form a parallel “memory” bus or are used to carry LeCroy serial protocol
- Serial lines are used for debug console, can be reassigned for other uses

ROM vs. EEROM software

- USCM holds 2 copies of its software
 - ROM: unmodifiable after final board assembly
 - EEROM: can be exchanged at any time
- ROM is complete program, not just a boot loader → USCM can function without EEROM program
- EEROM also holds configuration data
- EEROM space **limited**
- Optionally call ROM routines to save EEROM code size

USCM usage to date

- TRD gas system: actually controlling valves since July 2003
- Controlling UHVG boards via serial console or CAN bus
- J-crate / JPD integration tests / development
- TVT tests of modules
- CryoCooler electronics run by USCM
- **Others we never heard about?**

EM UG crate using USCM



(Picture by A.Bartoloni)

TODO before flight -- ROM code

- ROM version has no known problems
- Development essentially **done**, only small incremental improvements now
- Flight electronics **ready** (on its way to CERN), but some final modifications needed
- Freeze of "flight software" will be defined by time of request for delivery
- Request & HW modification as late as feasible!
- Qualification tests by EM crate integrators?

TODO -- EEROM code

- EEROM expected to change continuously until final assembly, possible even during flight
- Development needs input about **users'** needs now
- All users have EM boards since April 2003
--- almost **no** feedback so far...
- Note that after mid-2004 the Aachen USCM team will no longer exist!

Conclusions

USCM hardware: done
USCM software: as ready as can be
USCM users: *silently* happy?