

III. Physikalisches Institut RWTH Aachen

V. Commichau K. Hangarter  
AMS02 TIM/CERN May 9, 2002

## **AMS02**

**Universal Slow Control Module**

**USCM3S2 (Non Flight Version)**

**USCM3S3B (Flight Version)**

Hardware

&

Software

&

Flight Board Production

## **USCM3S3B Hardware:**

MCU: DS80C390

Memory: 128 K ROM **OTP**, 128 EEROM, 2 X 128 RAM

LVDS I/O: 16 bi-directional, 8 Output (Address)

3 Control (Direction, Strobe, Acknowledge)

Analogue Inputs: 32 Channels, 12 Bit Res., 0..4.096V

Analogue Output: 16 Channels, 12 Bit Res., 0..4.096V

Temperature Sensors: 8 Ports for DS1820

Serial I/O: 2 X TTL I/O

CAN BUS: 2 Ports

Software Power Switch, Seven Fold Latch Up Control,  
Watch Dog, Non Ex. Address Trap

**Power Flip-Flop** : to detect first power up state !

Power Consumption: 0.2A@5VDC

### **USCM3CON:**

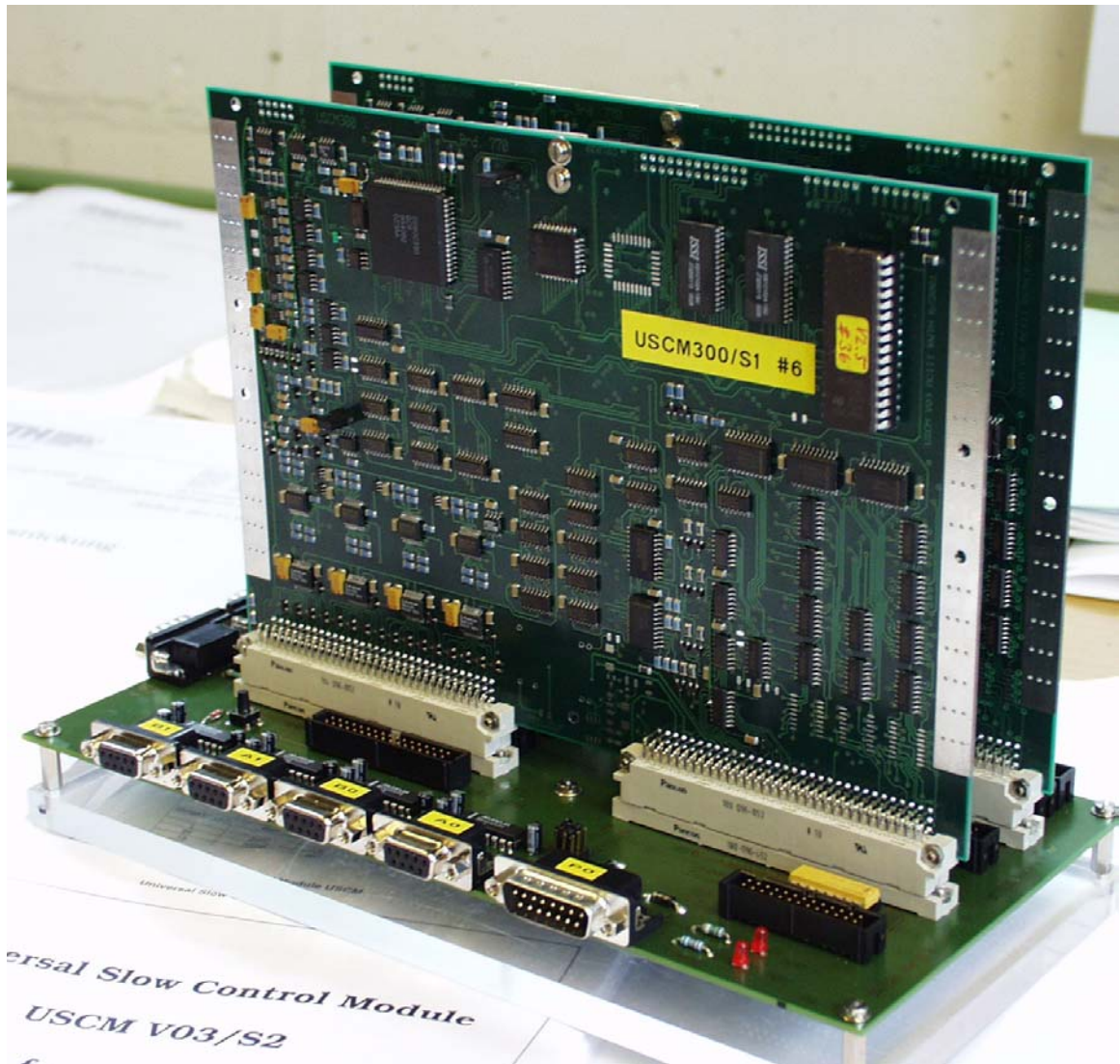
Dual USCM slot motherboard for debugging available.  
All ports accessible via commercial connectors.

**Look also for actual info's at:**

<http://www.physik.rwth-aachen.de/group/IIIphys/Electronics/AMS-II/HARDWARE/hardware.htm>

## **USCM3S2 & USCM3CON**

**70 USCM3S2 and 35 USCM3CON  
produced (stored at ACIII & ETH)**



## **USCM Software**

### **Multi Tasking Monitor V2.8**

- Timer interrupt driven task switching, 4 tasks
- Time slice 1 ms per task

#### **Task 1**

Interrupt driven serial I/O, 2 channels, 19200 resp. 9600 Baud used for debugging and program download. May be used later for special peripherals.

#### **Debugging features:**

description of commands available at:

<http://www.physik.rwth-aachen.de/group/IIIphys/Electronics/AMS-II/Software/hlpout.pdf>

Memory (internal, external, SFR etc.) inspect and modify

Assemble- and disassemble possibility

Breakpoint in and tracing of tasks 2, 3 and 4

Hardware test functions

## **USCM Software**

### **Task 2**

Peripheral (Dallas temperature sensors, ADC/DAC, LVDS) I/O

### **Task 3**

CANbus I/O, 2 channels using the 2.0B format with 29 bit extended ID at 1 Mbit. Top Layer AMS CAN protocol. Used for commands from and data transfer from/to Main DAQ Computers as well as program- and data download.

### **Task 4**

is dedicated to the special user application. A configuration file will be downloaded to the non-volatile EEROM. It will be interpreted at runtime by software, which is intended to be the same for all users. The peripherals will be accessed via interface routines executed by the other tasks.

### **Advantages**

Well tested system, developed from AMS I. Last minute software updates possible by download to EEROM.

### **Disadvantages**

All code is written in assembler. Linkage of C-routines not (yet?) possible.

## **USCM3S3B Production Status:**

**Active components** for up to 80 units, besides the resistors, capacitors and crystal in hand.

**Crystals** ordered from STATEK, delivery 07/02

**Resistors, capacitors** will be delivered by **MIT**

## **Production Plan concluded:**

**Board production** : MIL-P-55110D, NASA conform solder stop (Standard MIL surface)

**PRINTCA DK (good AMS01 experience)**

**Board Assembly: ELFAB CH (good PSRD experience)**

**Board software load & tests** : RWTH-AC & ETH

**# units to be produced:**

**80 USCM3S3B (flight version)**

**2 units USCM3S2 to be sent to CSIST for QM1 procedure**