

A new board for the Gen-3 ARC combining functions of scientific CCD temperature controller, shutter controller and vacuum sensor controller.

Physical format:

- 9" x 4" 4-layer PCB.
- ARC controller slot compatible.

Data interface:

- Duplex 57.6 kBaud serial link to ARC Timing board over the backplane.
- Hardware reset can be commanded from Timing board.
- Optional USB2 interface available if board is used outside of the ARC controller.
- LCD display interface (16 x 4 characters).

Processor:

- 32MHz microcontroller. Loop speed 1Hz.
- On-chip EEPROM to save user configuration.
- Socketed EEPROM used to store sensor calibration. Has room for up to seven 128-point sensor calibration curves.

Power:

- Circuit powered from ARC 5V bus.
- For small heater powers (<3 W total) ARC 5V or 16.5V bus can be used (link selectable).
- For higher powers an external 5-15V PSU must be used .

Temperature Sensor Inputs:

- 2x Hi-resolution (5mK RMS noise) 4-wire channels.
- 2x Lo-resolution (10mK RMS noise) 4-wire channels.
- Variable bandwidth single-pole digital filtering of all temperature sensor data.

Compatible sensor types:

- Standard Pt100.
- Lakeshore DT670.
- Low-cost 1N4148 diode.

Auxiliary Analogue Inputs:

- 1x 12-bit input, range 0-10V.
- 1x Pressure sensor input (MKS 970 or Pfeiffer PKR251 compatible).

Servo outputs:

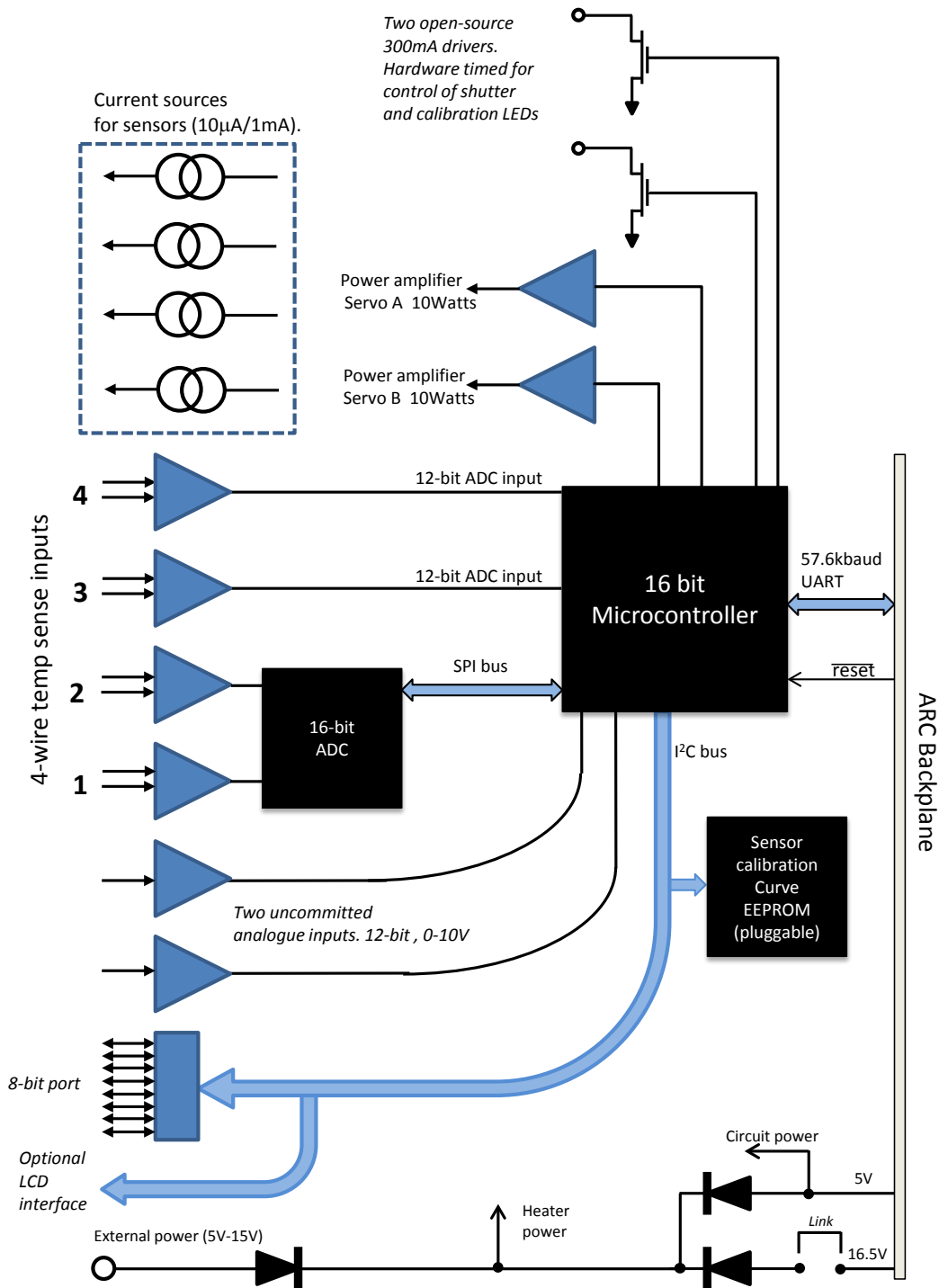
- 2x 9W independent P-I servo loops.
- Linear output for low-noise.
- Tunable P,I and maximum slope constants.
- Programmable alarm and "servo-kill" temperature thresholds.
- Automatic shutdown in case of overload or cable faults.
- Telemetry on heater voltage/current/power.
- 10mK stability.

Auxiliary Digital IO:

- 8-bit Parallel port, bits individually usable as inputs or outputs.
- 2x open-drain MOSFET switches to drive shutter or calibration LED. 300mA max.
- 2x 5V TTL outputs indicating status of the two servos (on/ off/ at temperature).
- 2x 5V TTL temperature alarm outputs.
- 1x 5V TTL Pressure alarm output.

Hardware timers:

- 2x 32-bit timers to control open-drain MOSFET switches.

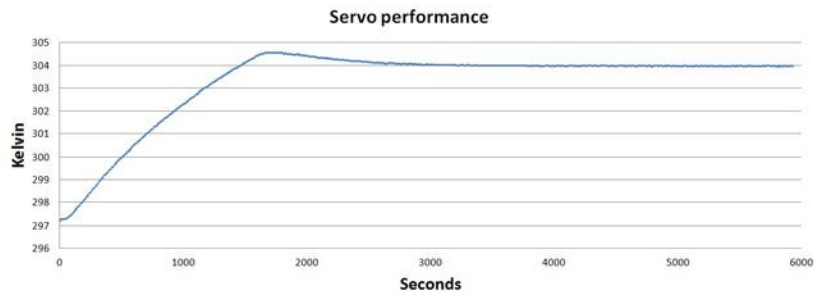


System Schematic



Performance example:

A dummy thermal mass was servoed on the laboratory bench. The graph shows the response to a step change in demand temperature. Stability is 11mK RMS over the final 2000s of the test.



Optional extras:

- A choice of two backlit LCD displays with 8 display pages. 8 x 2 and 16 x 4 character formats.



- Pt100 and 1N4148 temperature sensors with robust electrical connections for easy mounting inside a camera cryostat. Two or four wire operation. Physical format 14 x 9mm. M3 attachment point. (1N4148 and Pt100 calibration curves come pre-programmed in the controller)

