

LV power supply for TILECAL

Power supply - system overview

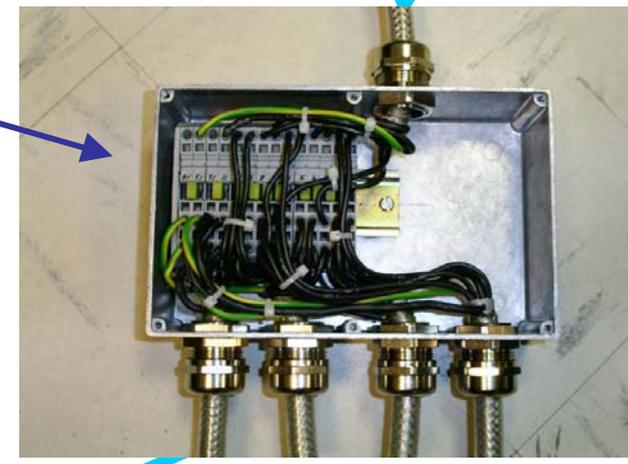
- LV Power supply
 - One superdrawer power supply
 - 8 output levels required
 - 4 x 5V, 1 x 3.3V, 3 x 15V
 - Total output power ~ 380W
 - Environment
 - radiation
 - magnetic field
 - water cooling
 - placed in each finger of TILECAL
 - includes remote control & measurement
 - Bulk 200VDC supply & AUX circuits in USA15



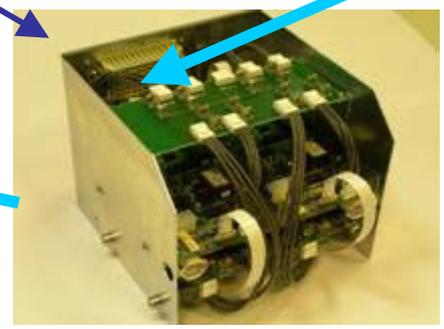
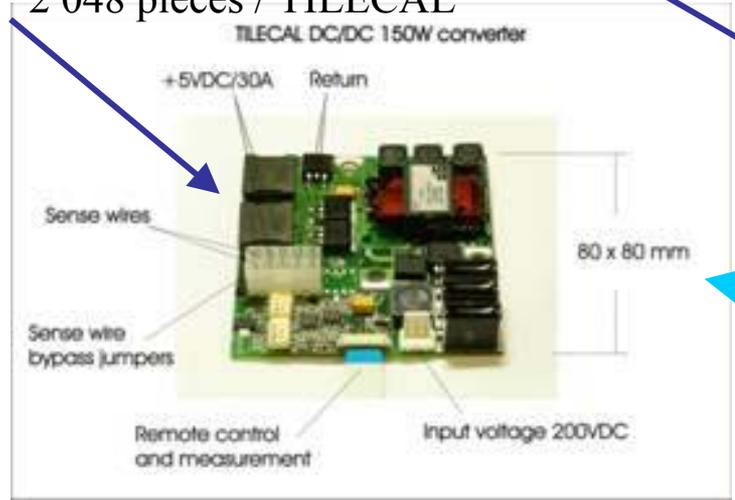
- **Main Power supply**
 - 3x200 V DC, 1kw/channel
 - 22 pieces
 - TESLA Hloubětín prototype



- **Distribution box**
 - 64 pieces
- **„LV Box“**
 - 256 pieces
 - 8 bricks / box
 - ELMB Motherboard
 - Fuse board



- **„Brick“**
 - Isolated forward converter running on 300kHz
 - 2 048 pieces / TILECAL



8x

- **AUX Board**

- Signals

- Clock synchronisation
 - Brick init, Locks (recover SEE)
 - Power for ELMB-MB
 - Power for ELMB

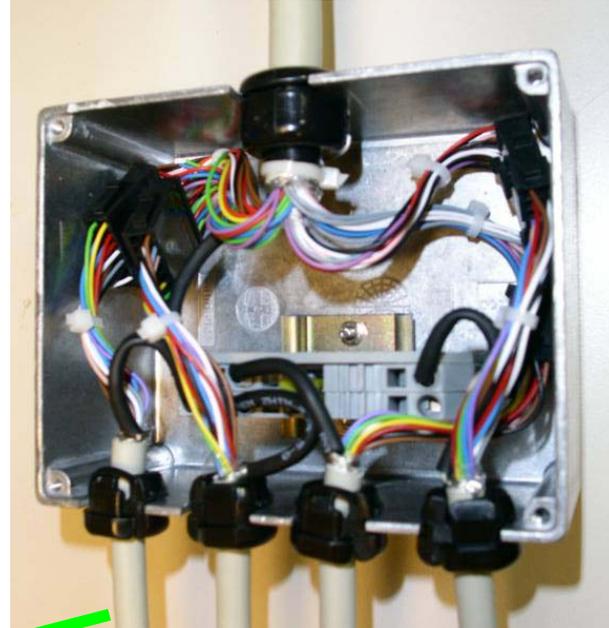
- 64 pieces / TILECAL

- **AUX Distribution box**

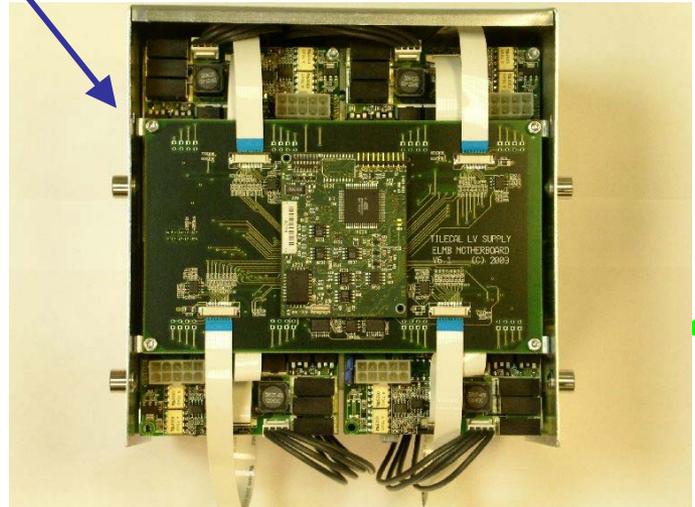
- 64 pieces / TILECAL
 - 24TP cable to 4*7TP cables

- **ELMB-MB**

- 256 pieces / TILECAL

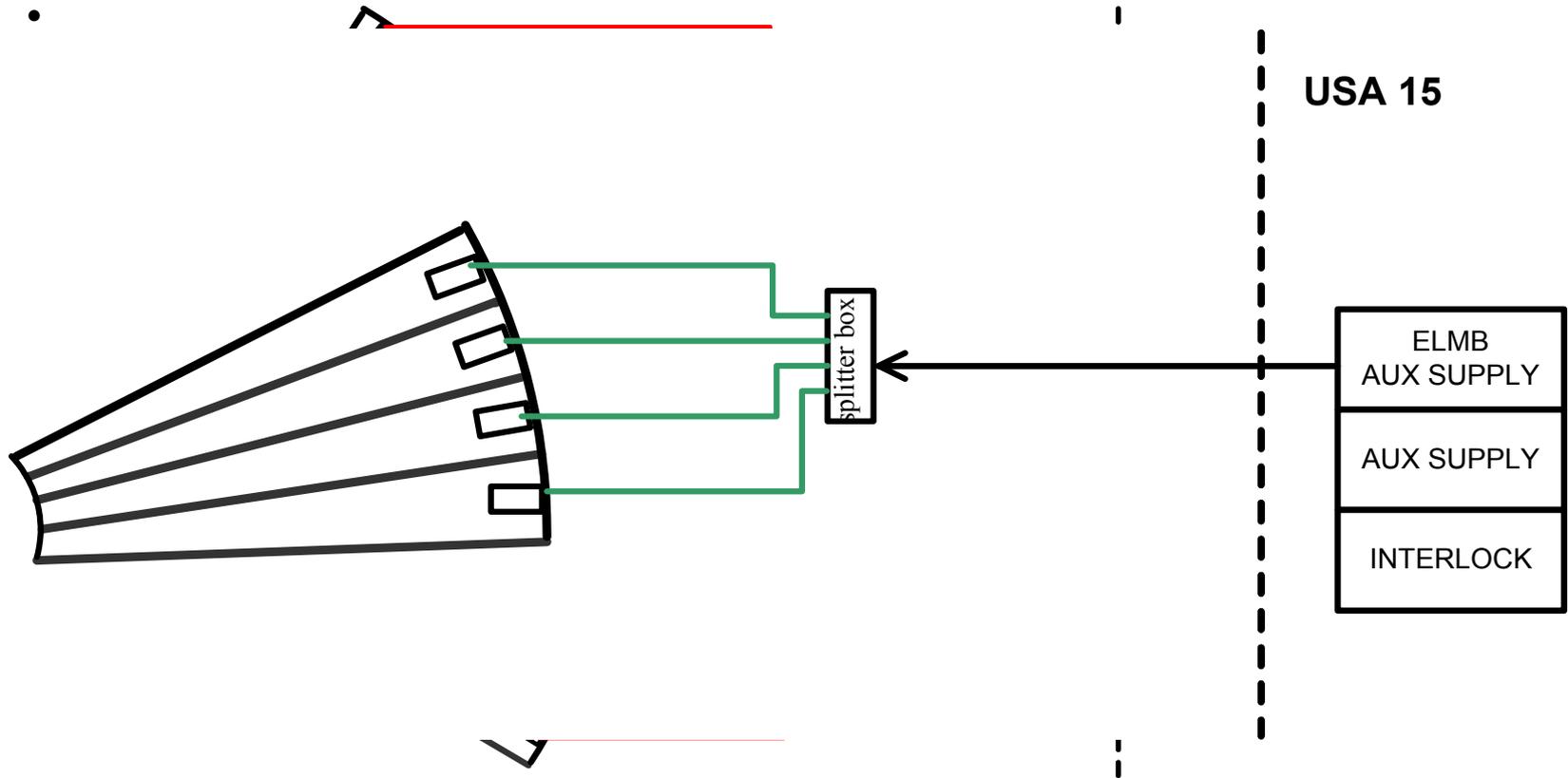


(Old version)



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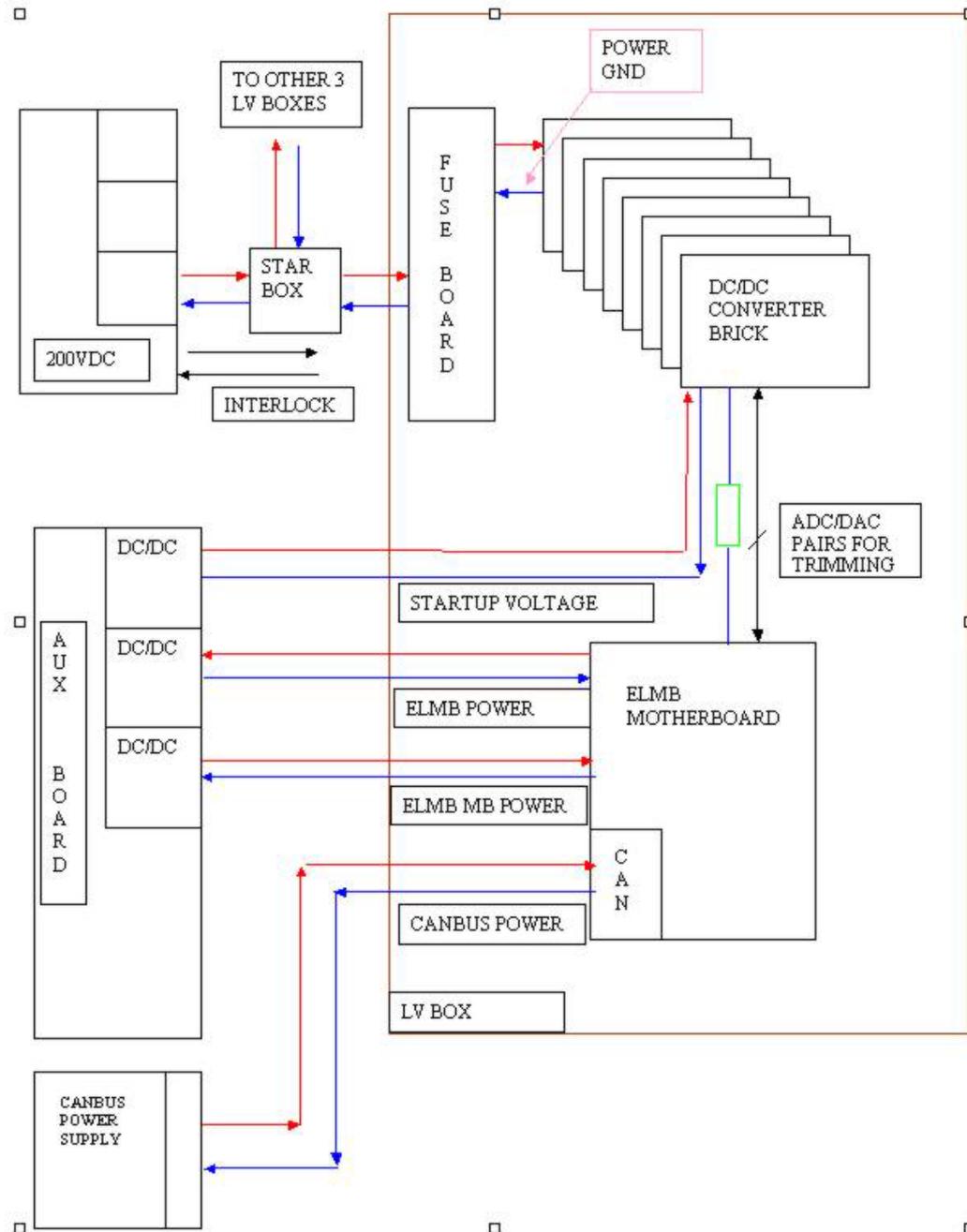
EMC - Cables

- Cables
 - 200VDC
 - Overall shielded
 - 3 x TP x AWG14
 - AUX cable
 - Overall shielded
 - 24 x TP AWG27
 - CANbus
 - Overall shielded
 - 2 x TP AWG20
 - 2 x TP AWG24

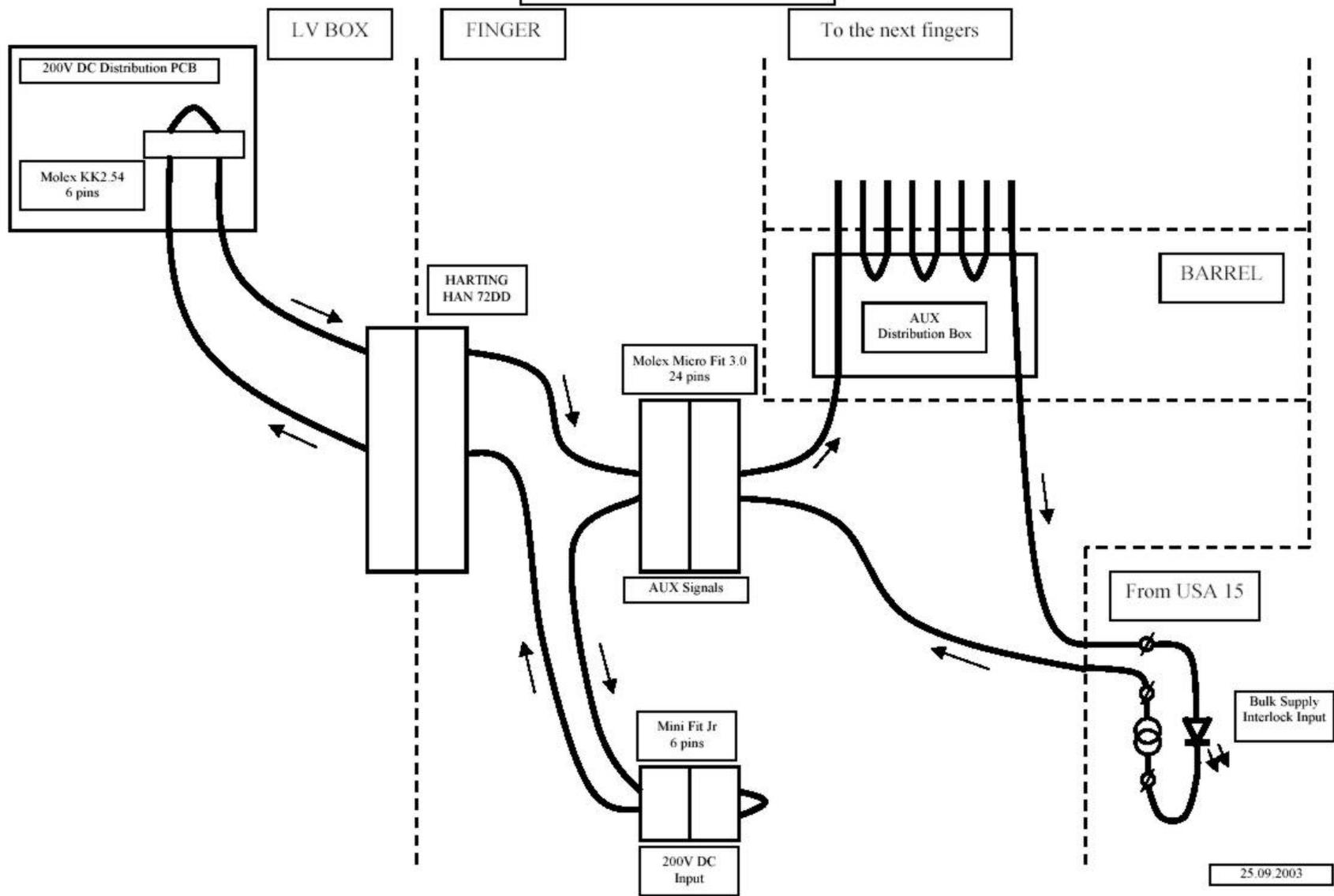
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EMC – grounding

- Isolated auxiliary power
- Symmetrical analogue control signals inside LV box
- Ground potentials of bricks separated by resistor network
- Isolated CANBUS power



Connection of the Interlock



25.09.2003

LV power supply for TILECAL

Sources of EMI

- LV brick 300kHz switching frequency & load
 - Output current is DC – no AC parts measured
 - Input filter designed as LPF with cutoff freq. $\sim 3\text{kHz}$
 - Input filters for LV boxes
 - common mode
 - possible synchronization of all converters by central 300kHz clock
 - LV box magnetically shielded by iron sheet + iron of TILECAL finger
- 200VDC supply in USA15
 - 200kHz switching frequency
 - Uses PFC
 - Input power spread between phases of 3 phase mains network
- Other potential sources
 - CAN bus - STP
 - 300kHz clock distribution - STP