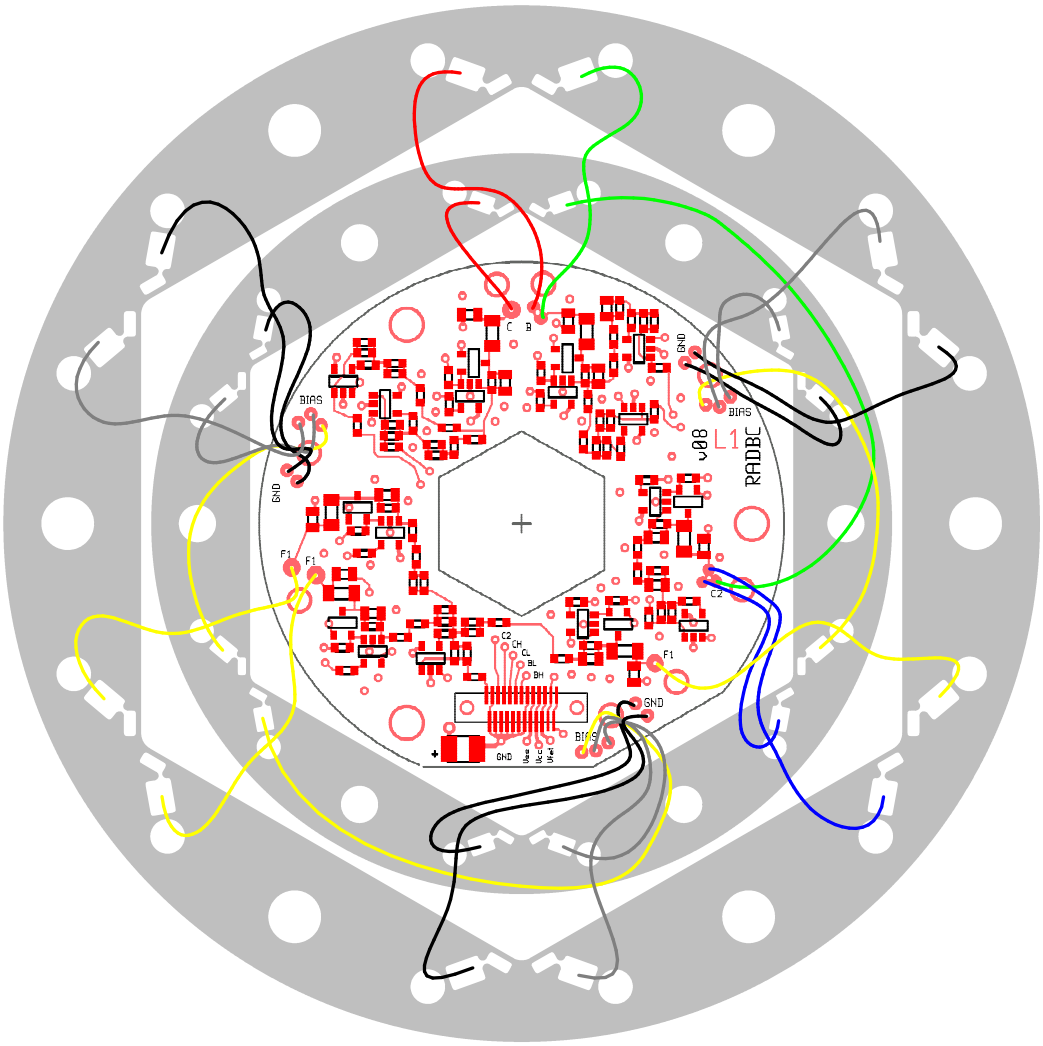
MSL RAD BC-Detector Stack Assembly Instructions

Stephan I. Böttcher

July 22, 2007



1 Introduction

The BC-stack consists of two PinABC detectors on ceramic carriers, and one printed circuit board (PCB) RADBC-v08s, plus mounting hardware. The lower detector is the C-detector, which will be glued to the anticoincidence scintillator. The top detector is the B-detector. The PCB is on top.

An assembly jig is provided with three pins to align the mounting bolts.

The picture on the front page shows the PCB on the inside, surrounded by the B-detector carrier, and the C-detector carrier on the outside. Not to scale.

Think of Michael Ende's *Scheinriese* (illusionary giant) who appears the larger the further distant he is.

The wiring is drawn with the proper colors, except for the white wires, which are drawn gray.

2 Assembly Steps

Step 1: Make sure the wires are staked on the detector carriers.

Step 2: Put mounting bolts on the three pins of the jig.

Step 3: Lower the C-detector over the bolts. The blue anti reflective coating (ARC) on the downside, the wires going up.

There are two possible orientations of the detector versus the mounting bolts. For the PCB to fit, the bolts must be in the 3, 7, and 11 hours positions, with the red and green wires at 12 o'clock.

Step 4: Lower 0.4 mm distance pieces over the three bolts.

Step 5: Thread the wires of the C-detector through the corresponding holes in the carrier of the B-detector. The ARC on the downside.

Step 6: Lower the B-detector over the bolts while pulling the C-detector wires through the holes.

Step 7: Route the wires along the inside of the outer edge of the carrier so that they reach the location of the corresponding holes in PCB. The wire must not reach outside the diameter of the detector carrier.

Step 8: Stake the wires to the B-detector carrier. About **TBD** 10 mm free wire between staking points.

Step 9: Lower **TBD** distance pieces over the three bolts.

Step 10: Cover the hexagonal hole in the PCB with Capton tape. Cover the free sticky area of the tape from the backside with another piece of Capton tape, to eliminate any change to have it stick to the detector surface. Make sure that piece does not itself stick to the PCB. Prepare handles on the Capton for easy later removal.

Apply a 'remove before flight' label to the Capton, if available. The Capton shall be removed just before closing the telescope housing in the calorimeter housing.

Step 11: Thread the wires through the corresponding holes in the PCB.

Step 12: Lower the PCB over the bolts while pulling the wires through the holes.

Step 13: Lower compliant washers over the bolts.

Step 14: Fix screws on the bolts. Torque **TBD**.

Step 15: Stake the wires in the PCB holes.

Step 16: Trim and strip the wires and solder to the corresponding pads.

3 Wiring Details

Each detector has twelve wires:

Red Center segment.

Green Center ring.

Blue Crosstalk guard ring.

3×Yellow Three outer segments.

3×White Chip guard ring contacts (redundant).

3×Black Backside ground contacts (redundant).

- Wires of the same color, from the same detector, are equivalent.
- All black wires are *ground*, and shall be routed to the nearest GND pad.
- All white wires are *chip guard* and shall be routed to the nearest BIAS pad.

- The three yellow wires of the B-detector are *unused outer segments*. These yellow wires shall be routed to the nearest BIAS pad.
- The three yellow wires of the C-detector are the anticoincidence channel readout. These yellow wires shall be routed each to an individual F1 pad. The three F1 pads are individual but equivalent preamp inputs.
- The blue wires of both detectors belong to the silicon anticoincidence channel and shall be routed to the C2 pad.
- The green wire of the B-detector also belongs to the silicon anticoincidence channel and shall be routed to the C2 pad.
- The red and the green wire of the C-detector are the C-channel of the silicon telescope. These wire shall be routed to the pad that is erroneously maked "B".
- The red wire of the B-detector is the B-channel of the silicon telescope and shall be routed to the pad that is erroneously maked "C".

4 Attention

1. The labels for the B and C inputs are swapped on the PCB.
2. The corresponding wires of the B- and C-detectors are routed from very close locations, one through the hole and the other straight from the pad. The red, green, and yellow wires must not be swapped between B- and C-detector.

5 Missing

1. Part numbers for the mounting hardware.
2. Torque.
3. ...