SLAC Traveler for LCLS BC2 Dipole Magnets

(May 4, 2007)

This traveler is intended to cover reception, preparation, mechanical fiducialization, and magnetic measurements of the four bunch-compressor-2 (BC2) chicane dipole magnets. These magnets are about 54 cm long and have MAD designations of: BX21, BX22, BX23, and BX24, and each has both main and trim coils.

Receiving:

The following information is to be noted upon receipt of the magnets by the SLAC MFD group:

Received by (initials):	
Date received (dd-mmm-yyyy):	
SLAC barcode number:	002800
Vendor serial number from magnet label:	
SLAC approved electrical safety covers? (Y or N):	
SLAC approved lifting eyes? (Y or N):	
Shipping Damage? (Y or N):	
Vendor tests passed on magnet label? (Y or N):	
SLAC drawing number (enter number):	SA-380-

Place a barcode sticker on the magnet and also duplicate the barcode sticker here →	002800

Preparation:

A beam direction arrow, with text "beam direction", is to be applied to the top and/or tunnel aisle side of the magnet with a sticker supplied by LCLS. Tom Borden (3887) will determine the direction.

Beam-direction arrow in place (initials):	ADF

Fiducialization:

Fiducialization may be done before or after magnetic measurements. The magnet is to be fiducialized by the CMM group. This will require the installation of removable tooling balls,

4) Mark the polarity near the **main** magnet leads with clear "+" and "–" labels as shown above.

Main coil polarity chosen from Fig. 1 is (P or N):	P

5) Also mark the **trim** leads with clear "+" and "–" labels such that, with the trim supply outputting positive current, the trim coil *increases* the absolute value of the magnetic field established by the main coil. This will set the trim polarity as "positive" for BX21 and BX24 and "negative" for BX22 and BX23, as described in PRD 1.1-010.

Trim coil polarity chosen from Fig. 1 is (P or N):	P

6) Connect the **main** magnet terminals (not the trims), in the correct polarity as established above, to a unipolar power supply with maximum current $I \geq 200$ A (assuming this current produces about 8.6 kG-m integrated field). Leave the trim coil disconnected for now.

7) Run the magnet up to 200 A for ~1 hour to warm it up (record temperature).

Ambient temperature (°C):	28.62	°C
Final magnet temperature (°C):	34.55	°C

8) Standardize the magnet, starting from zero to 200 A and back to zero, through three full cycles, finally ending at zero, with a flat-top pause time (at both 0 and 200 A) of 10 seconds. Use a ramp rate of 10 A/sec, if possible, and record the ramp rate used.

Standardization complete (initials):	ADF	
Ramp rate used (A/sec):	10	A/sec

9) Maintaining this cycle history, measure the length-integrated vertical dipole field, $\int B_y dl$, from 0 to 200 A in 20-A steps, including zero (11 'up' measurements). Please record (below) the current necessary to achieve 5.0 kG-m (max.) and call P. Emma at 283-7706 if it is more than 10% different than 115 A. If the maximum integrated field is <5.0 kG-m at 115 A, and after calling 283-7706, please record the current necessary to achieve this field and re-standardize up to the new current, starting the procedure again from that point. Then, still maintaining the cycle history, measure $\int B_y dl$ back down from 200 A to 0 in 20-A steps, including zero (11 'down' measurements).

Main coil excitation current at 5.0 kG-m:	114.46	Amps
Filename & run number of $\int B_y dl$ up & down data:	Wiredat. rn 2	

10) Maintaining the standardization cycle, ramp the magnet back up from zero to a current of 115 A (with trim current at zero), and then carefully verify the peak magnetic field at the physical center of the magnet (in x, y, and z) by using a well calibrated Hall probe.

16) **For the BX24 magnet only**, perform this final thermal test. Run the **main** current up to 200 A, and with **trim** also set at its maximum operating current of +12 A, measure the magnet temperature after it stabilizes (~1 hour). Record the temperature below.

Ambient temperature (°C):	—	°C
Final stable BX24 magnet temperature at 200 A (°C):	—	°C

17) Measure the inductance and resistance of the **main** and **trim** magnet coils:

Inductance of **main** coil (mH):	12.6	mH
Resistance of **main** coil (Ohms):	.1653	Ohm
Inductance of **trim** coil (mH):	4.4	mH
Resistance of **trim** coil (Ohms):	.4	Ohm

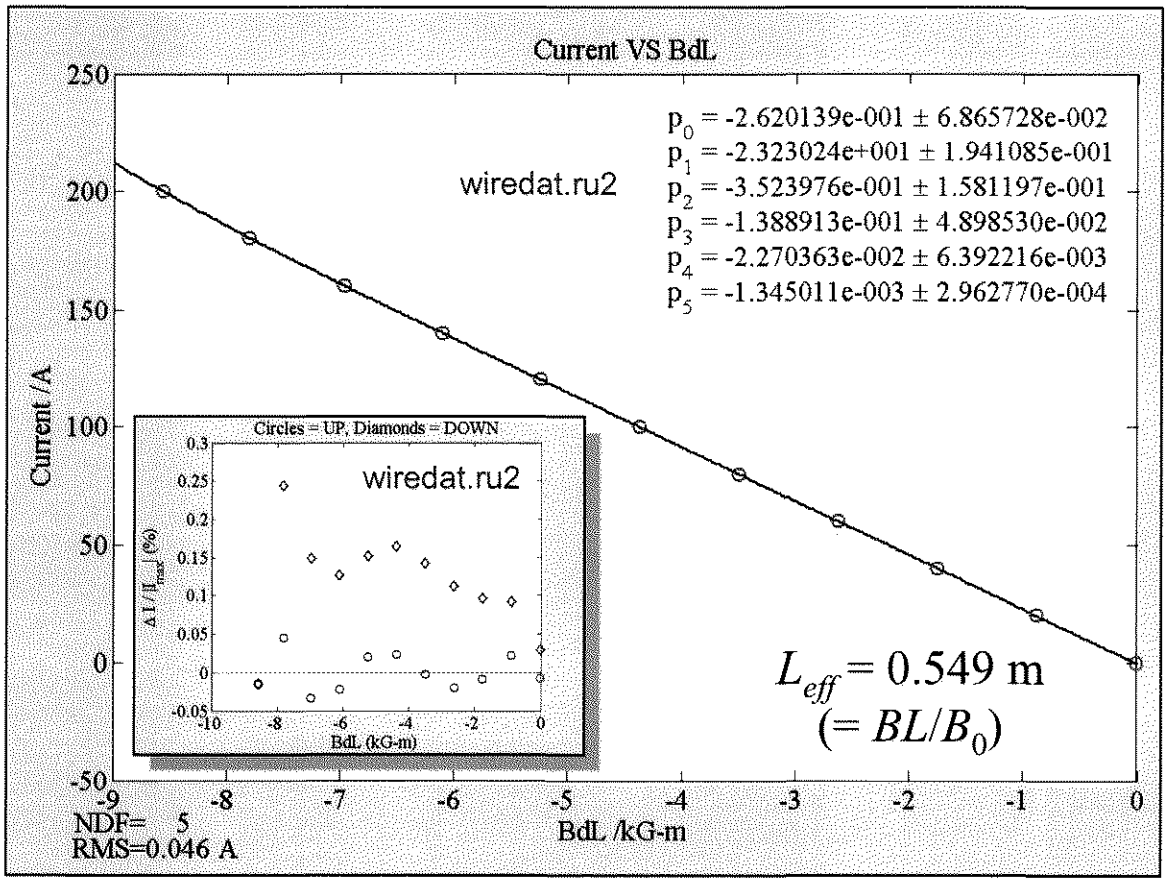
18) Upon completion of tests, send traveler to Paul Emma at mailstop 103.

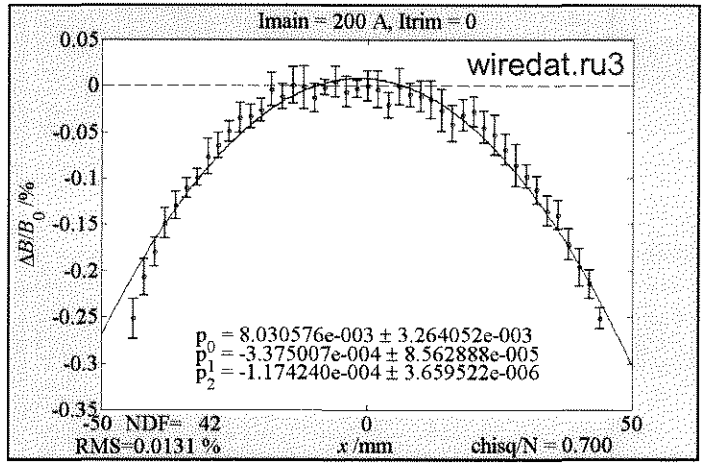
This section is to be completed by P. Emma.

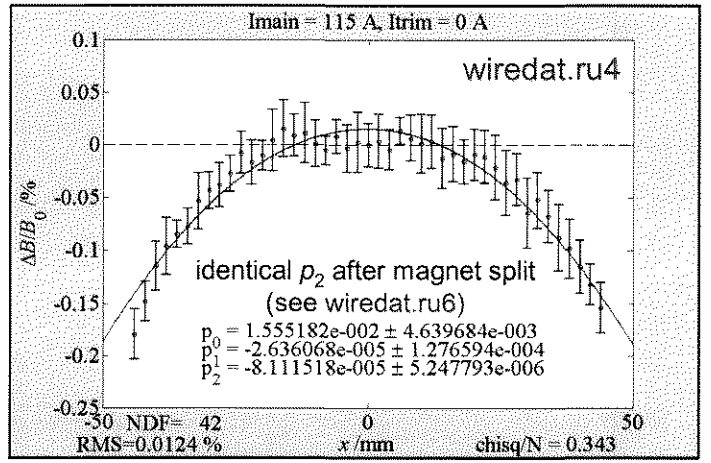
Magnet accepted (signed):	Paul E
Assigned beamline location (MAD-deck name):	BX2.1

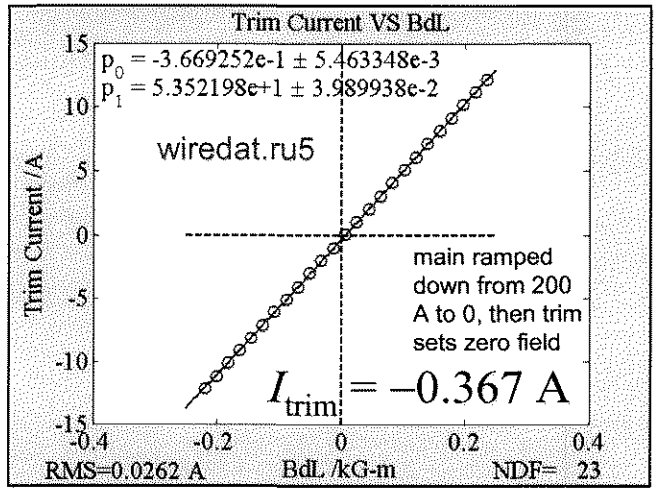
19) Upon full completion, send this traveler to Kathleen Ratcliffe at mailstop 18.

BX2 Dipole (measured Sep, 21, 2007)









TURNS/MAIN-COIL = 110 (2 COILS/MAG)
TURNS/TRIM-COIL = 48 (2 COILS/MAG)
BTRM IVBU = [0 2.2917]

SLAC magnet bar-code: **002800**
serial number: **?**
MAD assignment: **BX21**

http://www-group.slac.stanford.edu/met/MagMeas/MAGDATA/LCLS/dipole/002800/