SLAC Traveler for LCLS BC1 Tweaker Quadrupole Magnets

This traveler is intended to cover reception, preparation, mechanical fiducialization, and magnetic measurements of the BC1 tweaker quadrupole magnets. Two of these magnets were ordered for BC1 empirical dispersion correction.

Receiving:

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

Received by (initials):	
Date received (mmm-dd-yyyy):	
SLAC barcode number:	001028
Vendor serial number from magnet label:	3
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:	SA-

Place Duplicate Bar-Code Sticker Here:	SLAC LCLS 001028

Preparation:

A beam direction arrow, with text "beam direction", is to be affixed to the top and connector side of the magnet, preferably by stenciling or rubber stamp, or by sticker supplied by LCLS; the internal magnet wiring is complete as supplied by the vendor.

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, location of the geometric axis of the pole tips of the magnet, and location of tooling

balls with respect to the center of this geometric axis when the poles are aligned precisely at ±45 degrees to horizontal and vertical axes.

CMM technician (initials):	

URL of on-line CMM fiducialization data:

\\web002\www-group\met\Quality\FIDUCIAL REPORTS\

Magnetic Measurements:

1) Verify that the magnets are complete and undamaged, including wiring connections.

Incoming inspection OK (initials):	ADF
Date of arrival to mag. meas.(mmm-dd-yyyy):	8-10-2006

The magnet wiring scheme is as shown:

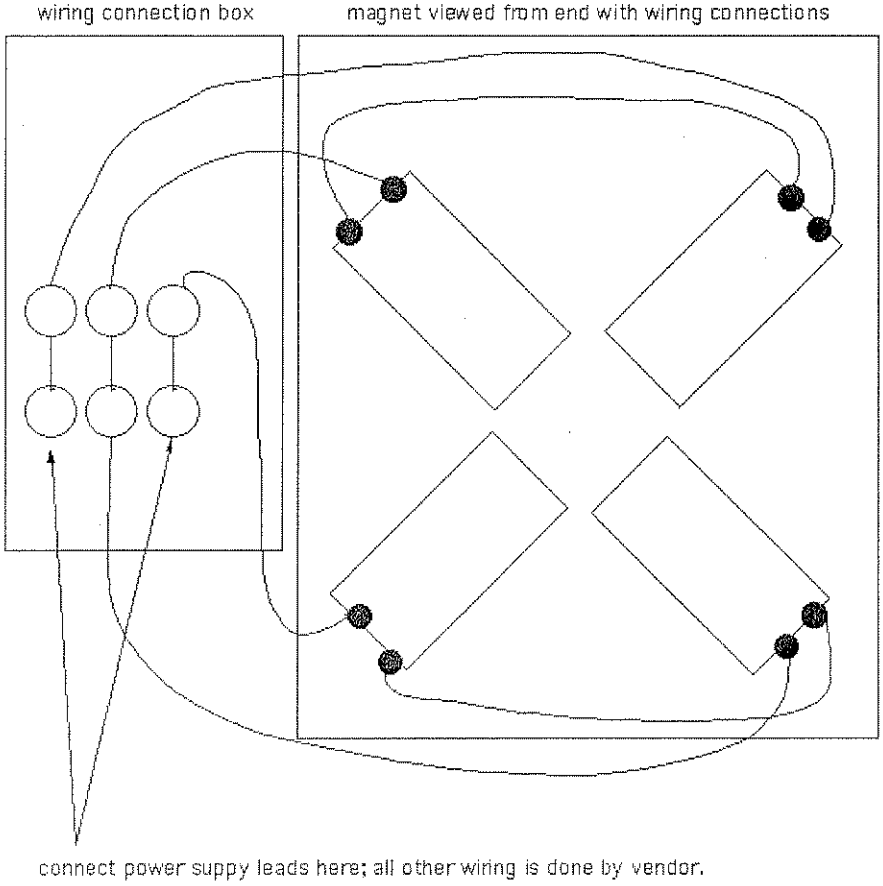


Figure 1: Schematic wiring diagram

2) Verify there is a large, clear electron beam direction arrow placed on at least one side of the magnet.

Beam-direction arrow in place (initials):	ADF

3) Determine the coil connection polarity (with supply outputting positive current) which produces a "positive" field polarity as shown below (all tweaker quads have the same polarity):

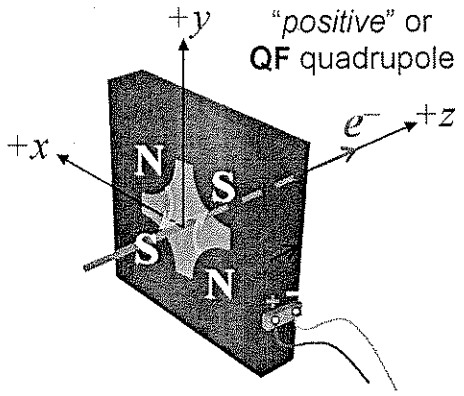


Figure 2. All tweaker quads have "positive" polarity, as shown above, when power supply is outputting positive current.

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

Polarity has been labeled at terminals (initials):	ADF

5) Connect the magnet to a bipolar 12-A power supply, preferably an *MCOR12*. Run the magnet up to 8 A for ~30 minutes to warm it up (record magnet and ambient temperature).

Power supply type (text, *e.g.* MCOR12):	MCOR 12	
Magnet connected and warmed up (initials):	ADF	
Ambient temperature (degrees C):	26.34	°C
Magnet temperature achieved (degrees C):	26.62	°C

6) Standardize the magnet, starting from 0 to +12 A, then through 3 full cycles from +12 A to –12 A and back up to +12 A, finally ending at –12 A (the *MCOR12* ramp rate is not controllable, but a flat-top pause time of 3 seconds is desired at each maximum and minimum current).

Magnet standardized (initials):	ADE
Ramp rate used (Amps/sec):	1 Amps/sec

7) Maintaining the history cycle, measure the length integrated gradient, $\int Gdl$, from −12 A to +12 A in 1-A steps, including zero (25 'up' measurements). Then, still maintaining the history cycle, measure $\int Gdl$ back down from +12 A to −12 A in 1-A steps, including zero (25 more 'down' measurements). Please record (below) the current necessary to achieve an integrated gradient of 2.1 kG and call P. Emma at 2458 **if it is significantly different than 12 A** (*e.g.*, 20%).

Excitation current needed to attain $\int Gdl$ = 2.1 kG:	16.5 Amps

Enter URL of on-line magnetic measurements data (please modify or correct if necessary):

http://www-group.slac.stanford.edu/met/MagMeas/MAGDATA/LCLS/quad/ ~~1228~~ 001028/

Rotating coil designation (coil name):	DG2_54
Rotating coil radius (m):	.012313 m
Data file name of $\int Gdl$ vs. current (file-name & run #):	54rdat.run2

8) Measure field harmonics at −12, −6, +1, +6, and +12 A settings using a 1-inch diameter probe.

Rotating coil designation (coil name):	DG2_54
Data file name of harmonics (file-name & run #):	hardat.run2

9) Measure the inductance and resistance of the full magnet:

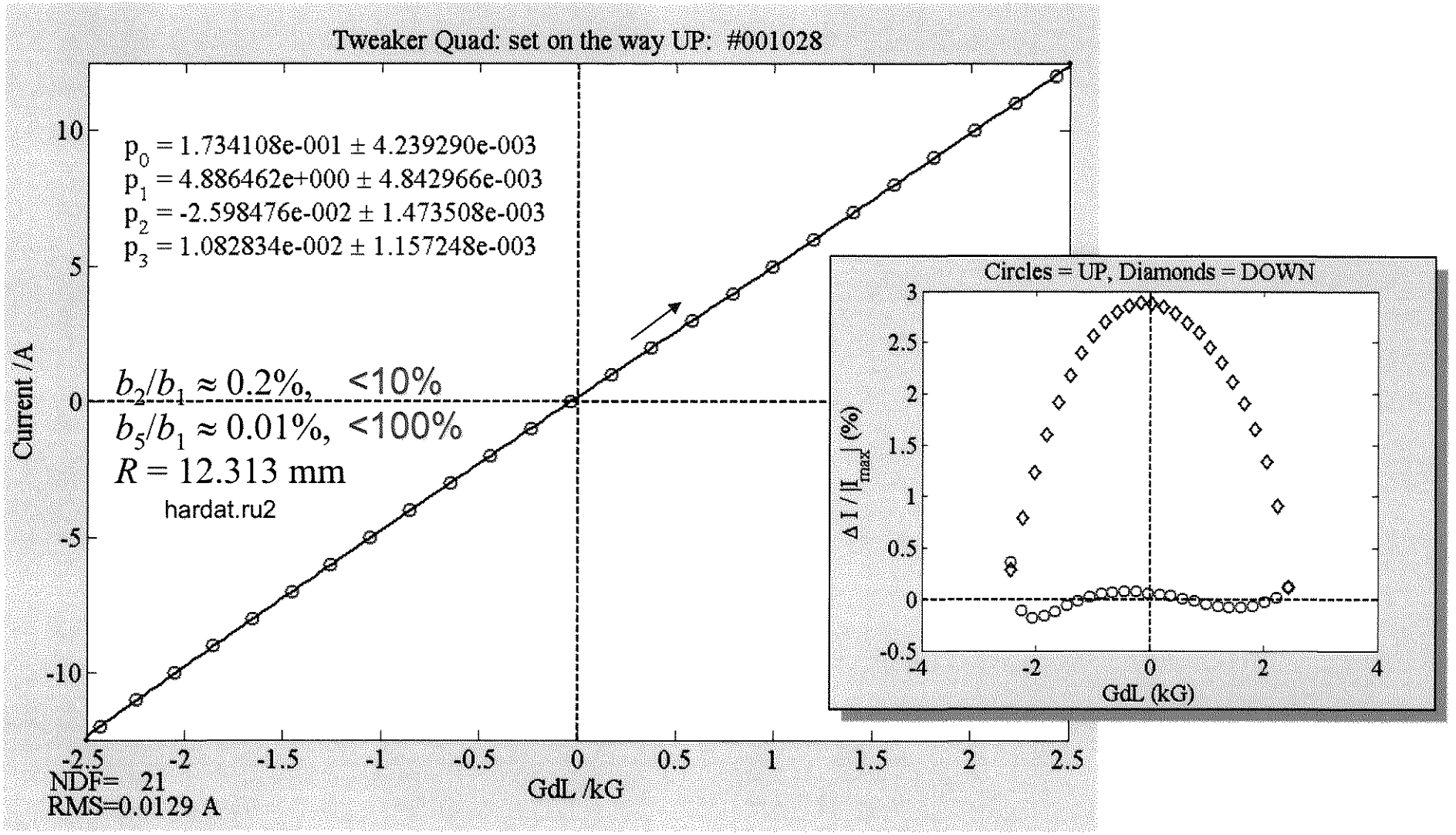
Inductance of full magnet (mH):	1.903 mH
Resistance of full magnet (Ohms):	.25 Ohm

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

Magnet accepted (signed):	Paul Emma
Assigned beamline location (MAD-deck name):	CQ21

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

CQ Tweaker Quadrupole Magnet (measured August 14, 2006)



http://www-group.slac.stanford.edu/met/MagMeas/MAGDATA/LCLS/quad/001028/strdat.ru1

SLAC magnet bar-code: **001028**
vendor serial number: **3**
MAD assignment: **CQ21**

(wrong sign field found on first occurrence of $I = 0$, so I reversed the sign in my file, then asked A. Fischer to fix in web file and explain.)