

Cryogenic Summary - Testing D4L102 in MAGCOOL

5/17/04

- Description
- Test Conditions
- Tests Performed
- Operating Summary
- Detail Operation
- Summary

General Description – D4L102

- The magnet is installed horizontally on test bay – 0% slope.
- Cooldown/warmup supply in non-lead end, helium return from lead-end.
- In liquid cool mode, JT flows are fed mainly from non-lead end with some from lead end.
- Warm bore tubes inserted and evacuated during quench tests.
- Warm bore tubes are open for field measurements.
- Information on the Warm Bore Tube and measuring device can be obtained from
 - A. Marone - andym@bnl.gov
 - G. Ganetis – ganetis1@bnl.gov
 - D. Sullivan – dans@bnl.gov

Operation Summary

- 4/28 Start Cooldown at 2 pm
- 4/29 Cooldown I
- 4/30 Cooldown I
- 5/01 Cool down 80k to 5k
- 5/05 shut off 1000amp shut off 4000amps
- Strip heater 4000 amps 1st quench @ 6548 amps
- Liquid cooling quench @ 6716 amps
- 5/06-10 Field measurement for left bore
- 5/11-12 Field measurement for right bore

Tests Performed for D4L102 5/05/04

- 1st test group (forced flow cooling ~ 4.6 K),
 - Shut off - 1000 A
 - Shut off - 4000 A
 - Strip heater- 4000 A
 - 1st quench - 6548 A
 - No quench - 7071 A
- 2nd test group (liquid cool ~ 4.6 K),
 - 1st quench - 6716 A
- Put back into forced flow cooling – 4.6K

Test Performed 5/06/04

- Field measurement for the left bore
- 1. AC cycle quench at 6191 amps
- 2. AC cycle @ 6400 amps

Test Performed 5/07/04

1. 1 AC Cycle @ 6400 Amps.
2. 6 DC Loops @ 6400 Amps.

Test Performed 5/10/04

- 1 AC cycle @ 6400 amps
- 4 DC loops @ 6400 amps

Finish field measurement for the left bore.

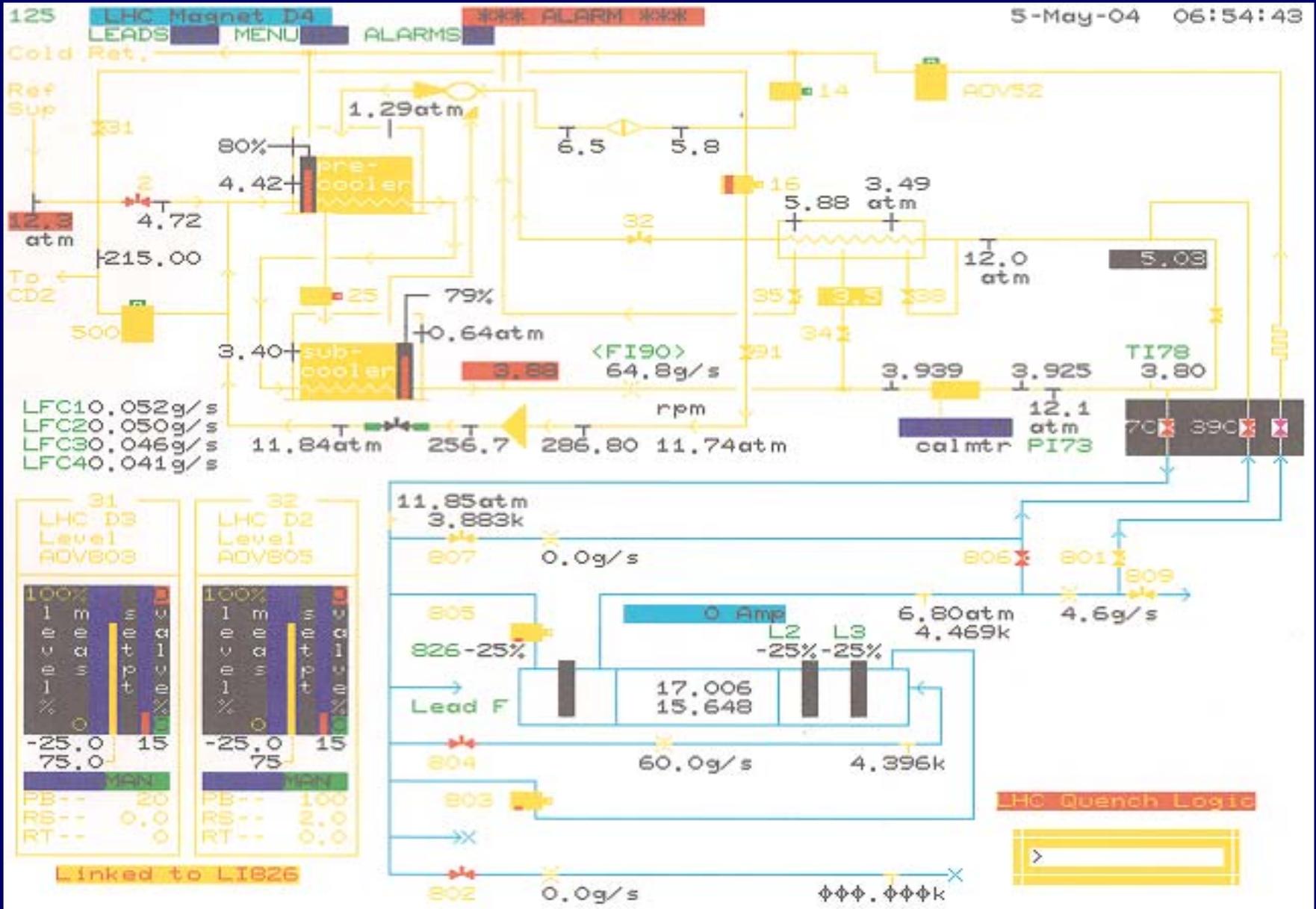
Test Performed 5/11/04

- Field measurement for the right bore
- 1 AC Cycle @ 6400 amps
- 6 DC Loops @ 6400 amps

Test Performed 5/12/04

- 1 AC Cycle quench @ 1323 amps
- 1 AC Cycle @ 6400 amps
- 4 DC loops @ 6400 amps
- Test completed . 15:00 hrs
- 5/13/04 started warm-up

Forced Flow Operation - 5/05/04



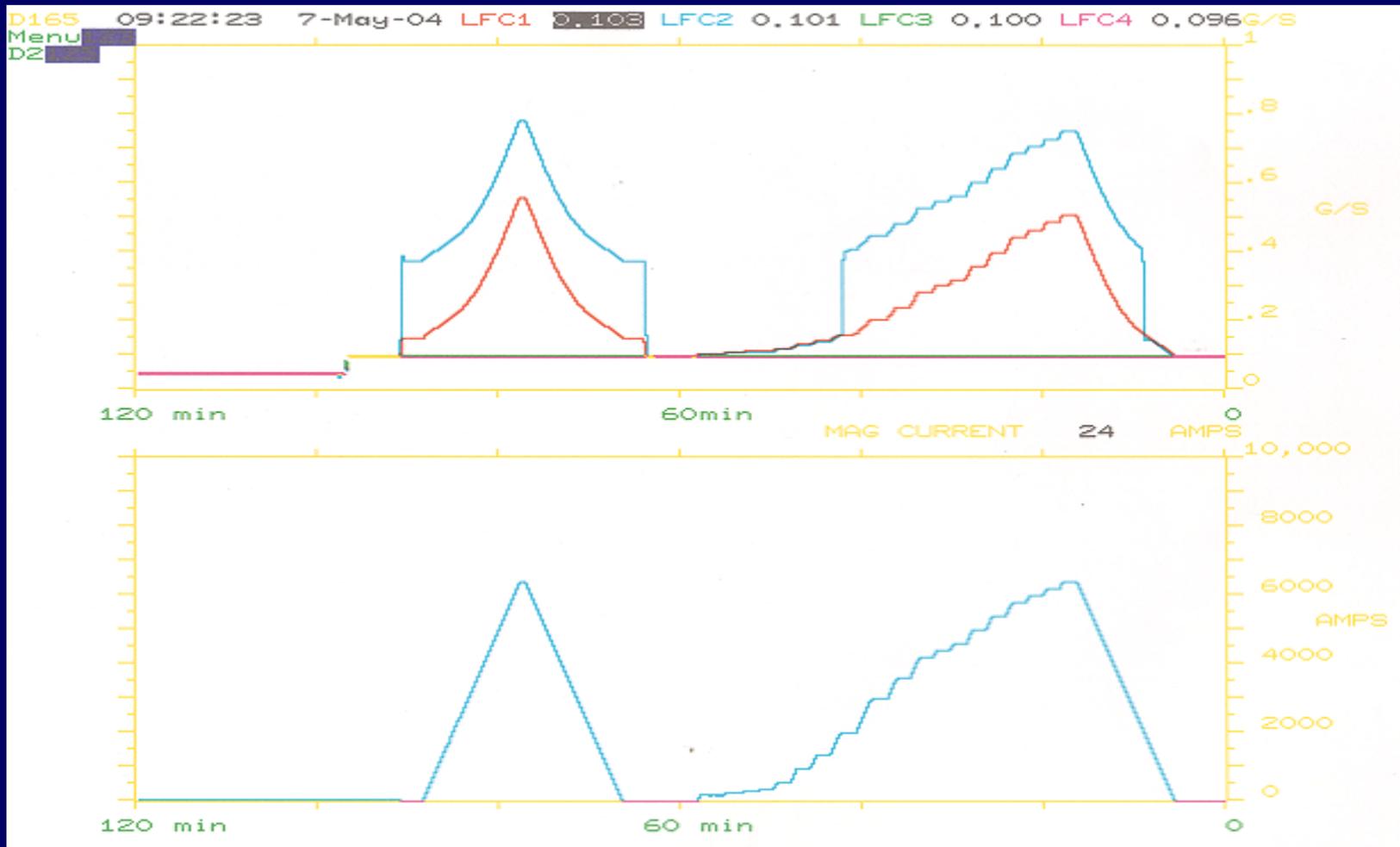
Current Leads

- Operate same way as previous D2 magnets.
- Separate flow controllers for the 7500 A leads.
The (-) lead demands more flow than the (+) lead
- Performed AC Cycle @ 6400 amps
- Performed 4 DC Loops @ 6400 amps

Operations - 5/7/04

AC Cycle followed by a DC loop @6400 amps

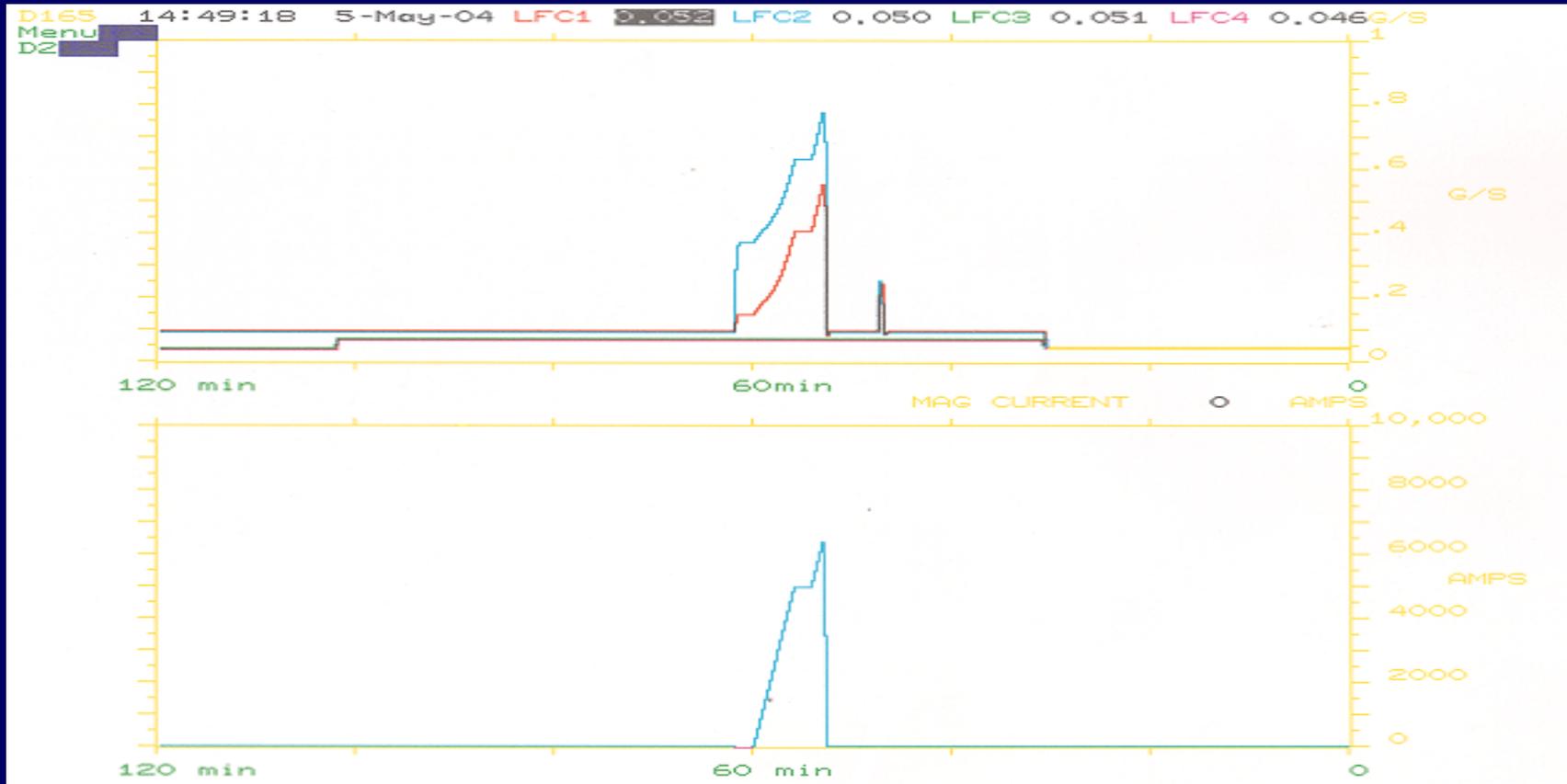
Upper figures – lead flow, Lower figures - current



Current Leads

- Flow control for AC cycle and DC loop are the same as that for D2
 - For AC cycle at 10 A/s ramp up directly to 6400 A,
 - Tare flow is ~ 0.15 g/s for (+) lead
 - Tare flow is ~ 0.38 g/s for (-) lead
 - For DC loop at 10 A/s with 70 seconds stop at various pre-selected currents,
 - The tare flow is 0.10 g/s for (+) lead for all currents
 - The tare flow is 0.10 g/s for (-) lead below 2000 A and 0.35 g/s afterward, (or reduced back to 0.10 g/s below 2000 A with stop during ramp down)
- Unused leads are set at 0.100 g/s.

Lead Flow and Current During Ramping of D4L102 – Liquid Cool
Ramp rate is 20 A/s. Below 10 A, Tare flow is 0.10 g/s. Above 10 A, Tare flow is 0.20 g/s for (+) lead & 0.35 g/s for (-) lead. Wait ~ 2min for voltage recovery at 5000 A. Curves appear to be different from previous tests because the time scale is 120 min. as field measurement (not for quench test).
Upper Figure: Lead Flow – Blue for (-) Lead and Red for (+) Lead.
Lower Figure: Current as a Function of Time



Summary

- Complete quench test and field measurement for D4L102 with two warm bore tubes.