



FEL TEST PLAN WORKSHEET

PROGRAM DEPUTY APPROVAL

FEL Exp Coordinator Signoff: _____ Date: _____
 PI Reviewer Signoff: _____ Date: _____
 Expiration Date (max. 90 days from approval): _____
 Presentation Required? yes no

COMPLETION INFORMATION

Completion Date: _____
 Crew Chief/PI Signoff: _____
 Comments (partial completion, etc.): _____

NOTE: Information addressing the appropriate content of each of the following sections can be found in Section 2.0 of the Test Plan Instructions.

Test Plan Title: ARC 1 Setup

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Brief Purpose of Test

This is a draft setup procedure for Arc 1 for the FEL. It describes the steps used in setting up the launch orbit into the first dipole and then looking at the beam trajectory through the arc dipoles. This assumes the magnets are behaving properly and the alignment is within tolerance, but it is a setup from scratch without reference to a gold or STANDARD file.

Anticipated Benefits

Beam Conditions Required

Complete all of the following tables, entering a value or an **X** in the appropriate spaces:

Beam Type/Current (enter value)

Beam Type	Beam Current
Beam Off	
Pulsed (std. current = 1 μ A) ^a	X
CW	

a. The standard current for pulsed beam operation is 1 μ A. If your test requires pulsed beam current >1 μ A, then specify the required current and provide a brief explanation next to the specified current.

Beam Energy (select one)

Beam Off	350 keV	10 MeV	42 MeV	Energy Recovery dump
			X	

Beam Termination Point (select one)

Inj Dump	ER Dump	Straight Ahead Dump	Other (specify)
	X		

Type of Test (select one)

Invasive (disrupts beam delivery)	Non-invasive (does not disrupt beam delivery)
X	

Time Required

Approximately 2 shifts

Preferred Time of Test**Staff Required to Execute the Test (including contact info)****Controlled Access Requirements**

None

Hardware and/or Software Changes Required

NOTE: If software changes are part of the test plan, include the name of the application, the old revision level, the new revision level, and if applicable, whether or not it is possible to roll back to the old revision level (are there hardware limitations, etc.).

None

Setup Procedure

Section 1.0 Preliminary Setup Steps

Section 2.0 Setting up the orbit through the dipoles

Section 3.0 Setting the momentum of the beam

Section 4.0 Checking the phase advance through the arc

Section 5.0 Measuring the Input/Output Emittance

Section 6.0 Measuring the Momentum Acceptance of the Arc

1.0 Preliminary Setup Steps

- 1 . Verify Magnets 'ON' at their nominal downloads, on hysteresis curves.
- 2 . Supercal BPM's. Verify that there are NO BPM alarms.
- 3 . Viewers and framegrabber working.
- 4 . Synchrotron light monitors and adjustable telephoto lens working.
- 5 . Shut the correctors after the quad triplet 'OFF'.

- 6 . Set the dipoles in the arc to zero integrated field.
- 7 . Cross calibrate BPM offsets against adjacent quadrapoles.
- 8 . Measure emittance, alpha and beta and set quads to match going into the arc.

Test Procedure

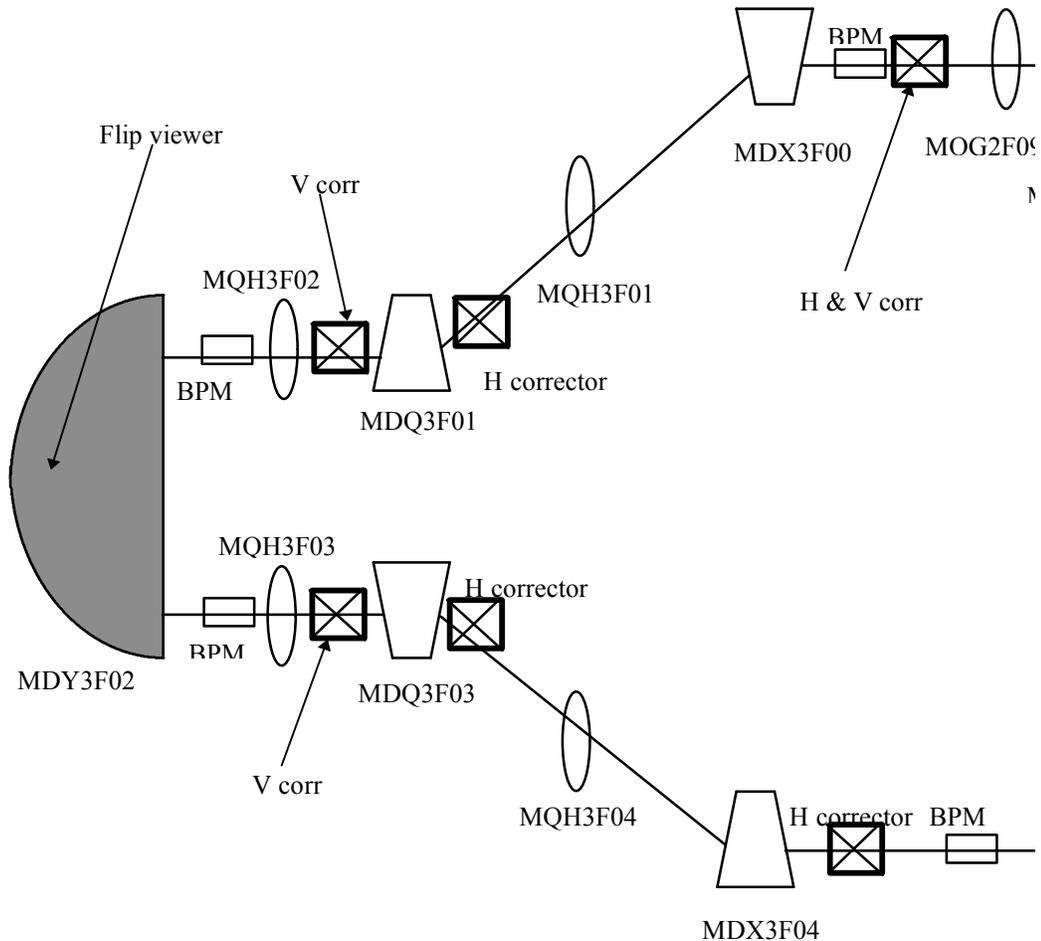


Figure 1

2.0 Setting up the Orbit Through the Dipoles

- 1 . Thread the beam to the OTR viewer before the first dipole, MDX3F00.
- 2 . Cycle the quadrupole after the optical chicane, MQG2F07, through hysteresis and use the air core corrector in front of the third dipole in the optical chicane, MDW2F06B, to center the beam horizontally in the quadrupole by minimizing the motion on the OTR viewer.
- 3 . Cycle the quadrupole after the optical chicane, MQG2F07, through hysteresis and use the vertical corrector after the wiggler to steer the beam to the central vertical position in the first quadrupole.

- 4 . Repeat centering the beam horizontally in the third quadrupole using the shunt on the fourth dipole in the optical chicane. If there is insufficient sensitivity on the OTR viewer, switch to the downstream OTR viewer in the dump.
- 5 . Repeat centering the beam vertically in the third quadrupole using the vertical corrector in the middle of the optical chicane.
- 6 . Repeat steps 2 - 5 twice to minimize the offset in the first quadrupole caused when the fourth dipole shunt is adjusted.
- 7 . Mark the OTR viewer with the spot for a beam centered in the quads.
- 8 . Set the arc dipoles to their design values.
- 9 . Thread the beam to the BPM upstream of the 180 degree bend, MDY3F02.
- 10 . Wobble the quadrupole, MQH3F01's field +/-1 amp. Adjust the momentum to center the beam in the quad and record the offset in the BPM.
- 11 . Center the beam vertically in the BPM using the vertical corrector upstream of MDX3F00.
- 12 . Pop in the flip viewer and center the beam horizontally on the viewer using the horizontal corrector upstream of dipole MDQ3F01.
- 13 . Use the vertical corrector downstream of MDQ3F01 to center the beam on the viewer vertically.
- 14 . Thread beam to 1st BPM in the backleg.
- 15 . Wobble the field +/- 1 amp in the quad MQH3F03 while observing the beam motion at the 1st BPM in the backleg.
- 16 . Use the shunt on the 180 degree dipole, MDY3F02, to center the beam horizontally in the quad, MQH3F03.
- 17 . Use the vertical corrector after the dipole MDQ3F01 to center the beam vertically in the quad.
- 18 . Record the GOFF's for the BPM adjacent to MQH3F03.
- 19 . Wobble the quad MQH3F04's current by +/-1 amp while watching beam motion on the 1st BPM in the backleg.
- 20 . Use the vertical corrector adjacent to MQH3F03 to center in quad MQH3F04 vertically.
- 21 . Use the horizontal corrector after the dipole MDQ3F03 to center in the quad MQH3F04.
- 22 . Record the offset in the BPM with the beam centered in the quad.

3.0 Setting the Momentum of the Beam

- 1 . View the beam on the BPM's at the entrance and exit of the 180 bend.
- 2 . Crest the cryomodule cavities sequentially using the spike/crest screens.

Backout Procedure

- 1.

Test Results
