

# Difference Orbit Measurement Procedure

Revision: 1.1; 4/24/98

Keeper: D. Douglas, x7512

URL: <http://www.jlab.org/~douglas/FEL/procedures/difforbproc.pdf>

**Purpose:** Lattice diagnosis and verification

**Beam Conditions:**

60 pC/bunch

2 Hz

200 microsecond pulse length

Beam to 2G00 dump

**Procedure:**

1. Verify nominal injector operation using injector check procedure
2. Verify module phasing (cavities on crest and gang phase advanced 9.6 degrees)
3. Verify nominal operating beam spots on all viewers ITV1F00 through ITV2G00.
4. Deactivate 2G00 raster (optional but convenient)
5. Verify BPMs are reading in pulsed mode
6.
  - a. center beam on all viewers and in all BPMs
  - b. record beam positions on all viewers and in all BPMs
  - c. open an x-term or dterm window and copy data acquisition script "getbpm" from ~douglas/difference\_orbits/getbpm to a local file getbpm
  - d. change permissions on the getbpm script to allow anyone to run or modify it:

```
unix prompt> chmod 777 getbpm
```

7. Perform an all-save to record machine state; under remarks, put "all-save for difference orbit measurement on (date and time)"

*OVERVIEW: In the following, change each corrector by the indicated amount, record downstream beam positions using the getbpm script, and restore the corrector to the original excitation. The indicated corrector variations are simulation based only and may be freely modified. However, please note any variations in the indicated field of the attached form.*

8. At each relevant girder (e.g. 1F01, 2F06, etc), record bpm data as follows.

- a. Run getbpm script to record a first baseline:

```
unix prompt > getbpm > (girder_name)baseline1
```

for example,

```
unix prompt > getbpm > 1F00baseline1
```

- b. Change the horizontal corrector on the girder by the positive amount recommended in Table 1.  
c. Verify the beam steers downstream by a maximum of ~10 mm. If not, modify the corrector so the maximum downstream offset (as read on OTRs and BPMs) is ~10 mm.  
d. Record the implemented corrector change in Table 1.  
e. Run data acquisition script for the first horizontal data-grab:

```
unix prompt> getbpm > (girder_name)Hplus
```

for example,

```
unix prompt > getbpm > 1F00Hplus
```

- f. Restore the corrector setting, and take a second baseline reading:

```
unix prompt>getbpm > (girder_name)baseline2
```

for example,

```
unix prompt>getbpm > 1F00baseline2
```

- g. Repeat steps 8b – 8e using the horizontal corrector change to the negative direction and recording the data into a file (girder\_name)Hminus  
h. Repeat step 8f writing the third baseline reading to a file (girder\_name)baseline3.  
i. Repeat steps 8b – 8e using the Table 1 vertical corrector change in the positive direction, and record the data to a file (girder\_name)Vplus.  
j. Repeat step 8f writing the fourth baseline reading to a file (girder\_name)baseline4.  
k. Repeat steps 8b – 8e using the vertical corrector change to the negative direction, and record the data to a file (girder\_name)Vminus.  
l. Repeat step 8f writing the fifth baseline reading to a file (girder\_name)baseline5.

At this point, you should have nine files with names of the following forms:

(girder_name)baseline1	(girder_name)Hplus
(girder_name)baseline2	(girder_name)Hminus
(girder_name)baseline3	(girder_name)Vplus
(girder_name)baseline4	(girder_name)Vminus
(girder_name)baseline5	

9. Repeat step 8 for each of the 8 girders in Table 1. You should end up with 72 data files. E-mail the directory location of the files (BUT NOT THE FILES!) to D. Douglas: [douglas@jlab.org](mailto:douglas@jlab.org)

Table 1: Recommended Corrector Variations/Form for Recording Actual Variations Used in Measurement

Girder:	Corrector shifts in g-cm:					
	H, ideal	H, +actual	H, -actual	V, ideal	V, +actual	V, -actual
1F00	±60			±60		
1F02	±150			±150		
2F00	±150			±150		
2F02	±250			±250		
2F04	±250			±250		
2F06	±250			±250		
2F08	±250			±250		
2G00	±250			±250		