



TEST PLAN WORKSHEET

PROGRAM DEPUTY APPROVAL

PD Signoff: _____ Date: _____
 Ops Reviewer Signoff: _____ Date: _____
 Expiration Date (max. 90 days from approval): _____
 Presentation Required? yes no

COMPLETION INFORMATION

Completion Date: _____
 Crew Chief 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: Special FOPT for Diagnosing Machine Transport

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Date Submitted: Sep. 30, 2005

Revision Number: 1

Brief Purpose of Test

Examine transport quality of October 2005 setup with new energy
 Address question identified by 12 GeV task force of ability of CEBAF to realize design optics and beam profile propagation.

Anticipated Benefits

Same as above.

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 = 8 μ A) ^a	X
CW	

a. The standard current for pulsed beam operation is 8 μ A. If your test requires pulsed beam current >8 μ A, then specify the required current and provide a brief explanation next to the specified current.

Beam Energy (select one)

Beam Off	845 MeV (1-pass)	1.645 GeV (2-pass)	2.445 GeV (3-pass)	3.245 GeV (4-pass)	4.045 GeV (5-pass)	Other (specify)
						5.41 GeV

Beam Termination Point (select one)

Hall A	Hall B	Hall C	BSY Dump	NE Stub Dump	45 MeV Dump	Other (specify)
X ^a	X	X	X			

a. Any of the above with 5 pass beam

Type of Test (select one)

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

Time Required

Total time required: 8 hours. Can be done in installments.

There are many tests (Table 1), each of which can be executed independent of the other. They do not need to follow the order shown. The following applies to each test:

- a. Setup: 5 minutes (can be done prior to test non-invasively)
- b. Main test: 15-20 minutes.
- c. Backout Procedure: 1 minute

In case of anticipated time overrun, the first order guideline is as follows, conditioned on PD approval:

The test should terminate on the following two conditions, whichever happens LAST:

1. The 8 hour time limit is reached
2. The first 10 data sets are finished (up to 9A-AT). Normally this should take only 4 hours.

In other words, the first 10 sets are of higher importance than the remainder, but we should try to get as many sets as possible if the first 10 sets are done within the one-shift limit. Given the time estimates, PD may allow extra time beyond one shift to finish the entire set.

Preferred Time of Test

October 9th startup period

Staff Required to Execute the Test (including contact info)

OPS can execute test plan. Page Y. Chao (6292) prior to test. A demo from Chao for the first data set may be constructive depending on when this is executed.

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.).

Special Hazards/Safety Considerations (enter “None” if not applicable)

HAZARD (describe the specific potential hazard[s]; e.g., MPS or PSS interlocks disabled, work near energized equipment, etc.):

RISK (characterize the risks involved [e.g., beam damage to beamline components, electrocution of personnel by contact with magnet leads, etc.] and assess the level of risk per the *EH&S Manual, Section 3210, Hazard Identification and Characterization*):

CONTROLS (describe what specific measures will be used to mitigate the hazard; if the risk assessment [i.e., risk code] is ≥ 3 , list the applicable work control document [SOP, OSP or TOSP]):

Setup Procedure (ArcN to ArcN+1)

This test consists of many sub-tests, each of which can be executed independent of the other. The tests are identified by section, in particular Arc number, in the machine where the FOPT corrector kicks will be launched. For example the test in which kicks are launched from Arc 1 to Arc 2 will be identified as “Arc1 to Arc2 test”. The steps, given in the following, are common to all tests, with references to section-specific information summarized in Table 1. A **Worksheet (Table 2) is provided at the end of this test plan to help keep track of its progress. Please also make **ELOG** entries as indicated in the procedure to ensure proper information transfer.**

1. Refer to Worksheet to identify outstanding tests. Select one of the outstanding tests for execution. All statements below apply to the consecutive **Arcs N** and **N+1**, alternatively referred to as upstream and downstream arcs.

In the case where corrector kicks are launched from **Arc 9**, **Arc N+1** is to be understood as **BSYA**.

The last case involves taking special FOPT over the entire 5 passes. Same procedure will be applied.

2. Refer to [Table 1](#) for test configuration and parameters pertinent to the selected test.
3. The accelerator must be known to have been set up prior to this test with the following hardware & transport properties satisfied up to the end of **ArcN+1**
 - a. XY-coupling in entire beam path is suppressed to ORFP spec.
 - b. Dispersion in entire beam path is suppressed to ORFP spec.
 - c. Orbit aperture measured by AC 30 HZ is to ORFP spec.
 - d. Stable RF in both linacs
4. Make sure all quadrupoles are properly cycled in **NS, NE, NA, NR, [N+1]S, [N+1]E, [N+1]A and [N+1]R** regions.

5. Twiddle save all corrector settings in **NS, NE & NA** region.
6. FSD mask all BLM's.
7. Open an X-window. Go to the directory
[/a/opsdata/optics/Gold_daily/](#)
Data acquisition will be done here.
- 8.

Test Procedure (ArcN to ArcN+1)

1. Keep all locks specified under “**Locks to be left on**” in Table 1 for test of interest running. Any additional orbit lock **upstream** of **Arc N-1** may be run if it helps stability.
2. **Important!!!** Turn all correctors shown under “**Correctors taken off loop**” in Table 1 off loop corresponding to test of interest.
3. Display relative BPM spikes for **Arc N**, **Linac N+1** and **Arc N+1**. This is best done through the BPM view-by-pass screens.
4. Zero POS once (for later orbit restoration if needed).
5. Run the special FOPT **v5** script:
 - a. From third mouse button, go to
 Optics Tools -> Fopt v5
 FOPT GUI will appear in a few seconds.
 - b. Under **Regime** tab,
 Select “Custom with excitation Specified in File”
 Enter -1 for “Minimum Current”
 Enter 15 for “Number of Samples”
 Enter 5 for “Test Samples”
 Turn **ON** the “partial data” selector.
 Turn **OFF** the “lock” selector. This will prevent FOPT from turning off locks.
 Turn **ON** the “auto scale” selector.
 - c. Under **Files** tab, enter, or browse to select, the path and file name given under “**FOPT File**” in Table 1 corresponding to test of interest. For example,
 /a/opsdata/optics/fopt3/1Ekick1005.cor
 - d. Under **Select** tab, select the data acquisition region as specified under “**Data region selected**” in Table 1. (Table 2 if new FOPT is used).
 - e. **Very Important!!!** Make sure the locks specified under “**Locks to be left on**” in Table 1 corresponding to test of interest (see footnote) are still running. All other locks should be off.
 - f. In the X-window opened in Setup step 7, type the command listed under “**EZLOG Command**” in Table 1 corresponding to test of interest. For example for 1A-2A run, type
 1APOS
 A **time stamp**¹ should appear, followed by the message “**msg: all connected**”. Let this process run until the end of current FOPT session.

1.This will be recorded in the worksheet. See step 6.

If instead error messages appear such as complaining about not being able to connect to some signals, the signals in questions should be addressed first (Page Chao¹).

- g. Wait 5 seconds. Press the “**Begin**” button in FOPT GUI.
 - h. Monitor the progress of FOPT from the display under the **Progress** tab. Verify that the BPM spikes show orbit changes consistent with the displayed progress.
 - i. Make sure final data is complete as reported by FOPT progress report. In case of FOPT abort due to current loss or other reasons, and if operational condition permits, repeat steps 1 through 5 until FOPT succeeds in completing the data. Also in case of FOPT failure type **Cntrl-C** to stop EZLOG in the X window, and restart it when restarting FOPT. The entire FOPT run from beginning to end should be contained in a single EZLOG run. Namely, FOPT “begin” should follow the start of an EZLOG session and FOPT completion should precede the stopping of the **same** EZLOG session. **No abortion of EZLOG should happen in the middle of an FOPT run, even if FSD caused FOPT to suspend for many minutes.**
 - j. After a successful FOPT run, wait 5 seconds then type **Cntrl-C** to stop EZLOG in the X window.
6. Make entry in attached Worksheet (Table 2) marking completion of specific test. Record the following:
 - a. Date & time test completed.
 - b. ELOG number for FOPT autolog
 - c. ELOG number for test report of step 6.
 - d. EZLOG file time stamp (not the whole string, only the last 4 numbers indicating hour and minute such as 14_22).
 7. Make ELOG entry on important information concerning the test (e.g., suspected machine anomaly during test, BPM failure, etc.).
 8. Go to twiddle save panel saved in Setup step 5. Make sure all correctors are restored to original settings. If not, manually restore.
 9. Restore locks to running configuration.

Acquire GOLD model for the whole machine:

This part does not need beam. It needs be done once at the end of the test plan. Machine can be returned to normal operation.

10. Execute the following:
 - a. Bring up an x-term on an ops computer.
 - b. Go to the /a/opsdata/optics/Gold_daily/ directory:
cd /a/opsdata/optics/Gold_daily

1. These files have been tested as of 10/08/05 with no problem. Any new problem would indicate BPM's disconnected after this date.

- c. Type the following command:

```
GetFOPTModel
```

Note: As part of normal running, this script may spit out the following message that can be ignored:

```
CDEV Directory Warning: No service matches "MMSHLBPASS" - "get VAL",  
default to caService
```

Also ignore the following message if it appears:

```
cdevClientService::connect Error: Cannot find host for server "designModel" in  
domain "ARTMODEL"
```

Also: In some UNIX shell you may need to type

```
source GetFOPTModel
```

instead

11. However note any other anomaly during this run (Model server errors etc.) in the ELOG.
12. **Make sure all UNIX processes invoked in this procedure are terminated.** This is done by typing in the X-window the following:

```
ps -ef | grep ezlog
```

and look for nontrivial entries indicating ongoing ezlog processes. If any is found under the current username, kill it.

Table 1: FOPT files used & Correctors to be cycled before FOPT for each matching region

Test	FOPT File in /a/opsdata/ optics/fopt3/	Correctors taken OFF loop	Locks to be left ON	Data region selected	SEE BPM pass selec- tion	Dump- let IN	EZLOG Com- mand
0R-1A	0Lkick1005.cor	None	enlk0r	5 MeV 60 MeV + NL 1S/A/R/L 2S/A/R/L	1	2R	0RPOS
1A-2A	1Ekick1005.cor	1S10H 1E02H 1E01V 1E03V	Injorb/enlk0R enlk1A enlk2A	1S/A/R/L 2S/A/R/L 3S/A/R/L	1	3R	1APOS
2A-3A	2Ekick1005.cor	2S10H 2E02H 2E01V 2E03V	Injorb/enlk0R Arc1Orb/enlk1A enlk2A	2S/A/R/L 3S/A/R/L 4S/A/R/L	2	4R	2APOS
3A-4A	3Ekick1005.cor	3S10H 3E02H 3E01V 3E03V	Injorb/enlk0R Arc2Orb/enlk1A enlk2A	3S/A/R/L 4S/A/R/L 5S/A/R/L	2	5R	3APOS
4A-5A	4Ekick1005.cor	4S10H 4E02H 4E01V 4E03V	Injorb/enlk0R Arc3Orb/enlk1A enlk2A	4S/A/R/L 5S/A/R/L 6S/A/R/L	3	6R	4APOS
5A-6A	5Ekick1005.cor	5S10H 5E02H 5E01V 5E03V	Injorb/enlk0R Arc4Orb/enlk1A enlk2A	5S/A/R/L 6S/A/R/L 7S/A/R/L	3	7R	5APOS
6A-7A	6Ekick1005.cor	6S10H 6E02H 6E01V 6E03V	Injorb/enlk0R Arc5Orb/enlk1A enlk2A	6S/A/R/L 7S/A/R/L 8S/A/R/L	4	8R	6APOS
7A-8A	7Ekick1005.cor	7S10H 7E02H 7E01V 7E03V	Injorb/enlk0R Arc6Orb/enlk1A enlk2A	7S/A/R/L 8S/A/R/L 9S/A/R/L	4	9R	7APOS
8A-9A	8Ekick1005.cor	8S10H 8E02H 8E01V 8E03V	Injorb/enlk0R Arc7Orb/enlk1A enlk2A	8S/A/R/L 9S/A/R/L AT Hall B	5	Hall B	8APOS
9A-AT	9Ekick1005.cor	9S08H 9E02H 9E01V 9E03V	Injorb/enlk0R Arc8Orb/enlk1A enlk2A	9S/A/R/L AT Hall B	5	Hall B	9APOS
1R-2A	1Rkick1005.cor	MBT1R01H MBT1R03H MBT1R06H MBT1R02V MBT1R04V	Injorb/enlk0R Arc1Orb/enlk1A enlk2A	1S/A/R/L 2S/A/R/L 3S/A/R/L	1	3R	1RPOS

2R-3A	2Rkick1005.cor	MBT2R01H MBT2R03H MBT2R06H MBT2R02V MBT2R04V	Injorb/enlk0R Arc2Orb/enlk1A enlk2A	2S/A/R/L 3S/A/R/L 4S/A/R/L	2	4R	2RPOS
3R-4A	3Rkick1005.cor	MBC3R01H MBC3R02H MBC3R03H MBC3R02V MBC3R04V	Injorb/enlk0R Arc3Orb/enlk1A enlk2A	3S/A/R/L 4S/A/R/L 5S/A/R/L	2	5R	3RPOS
4R-5A	4Rkick1005.cor	MBC4R01H MBC4R03H MBC4R06H MBC4R02V MBC4R07V	Injorb/enlk0R Arc4Orb/enlk1A enlk2A	4S/A/R/L 5S/A/R/L 6S/A/R/L	3	6R	4RPOS
5R-6A	5Rkick1005.cor	MBC5R02H MBC5R03H MBC5R09H MBC5R02V MBC5R04V MBC5R07V	Injorb/enlk0R Arc5Orb/enlk1A enlk2A	5S/A/R/L 6S/A/R/L 7S/A/R/L	3	7R	5RPOS
6R-7A	6Rkick1005.cor	MBC6R01H MBC6R03H MBC6R08H MBC6R02V MBC6R04V MBC6R07V	Injorb/enlk0R Arc6Orb/enlk1A enlk2A	6S/A/R/L 7S/A/R/L 8S/A/R/L	4	8R	6RPOS
7R-8A	7Rkick1005.cor	MBC7R03H MBC7R06H MBC7R09H MBC7R02V MBC7R04V MBC7R06V	Injorb/enlk0R Arc7Orb/enlk1A enlk2A	7S/A/R/L 8S/A/R/L 9S/A/R/L	4	9R	7RPOS
8R-9A	8Rkick1005.cor	MBC8R01H MBC8R04H MBC8R08H MBC8R02V MBC8R04V MBC8R08V	Injorb/enlk0R Arc8Orb/enlk1A enlk2A	8S/A/R/L 9S/A/R/L AT Hall B	5	Hall B	8RPOS
9R-AT	9Rkick1005.cor	MBC9R01H MBC9R03H MBC9R04H MBC9R02V MBC9R04V MBC9R05V	Injorb/enlk0R Arc9Orb/enlk1A enlk2A	9S/A/R/L AT Hall B	5	Hall B	9RPOS
0R-AT	0Lkick1005B.cor	None	enlk0r	5 MeV 60 MeV+ NL All Arcs AT Hall B	1	Hall B	ALLPOS

Backout Procedure

1. Restore twiddle saved correctors in **NS/NE/NA**.
2. Put correctors back on loop (except lock correctors)
3. Restor standard locks

Test Results

Result & automatically logged data will be analyzed off-line.

- 1.

Table 2: Worksheet for Automatch Software Preparation Test

Test	Time of Test	FOPT Autolog Number	Test Report ELOG Number	EZLOG Time Stamp	Executed by
Inj to Arc1					
Arc1 to Arc2					
Arc2 to Arc3					
Arc3 to Arc4					
Arc4 to Arc5					
Arc5 to Arc6					
Arc6 to Arc7					
Arc7 to Arc8					
Arc8 to Arc9					
Arc9 to BSY					
1R to 2A					
2R-3A					
3R-4A					
4R-5A					
5R-6A					
6R-7A					
7R-8A					
8R-9A					
9R-AT					
0R-AT					