

Shot Type 7: BLO Checklist for Short-pulse Operation S-AB-P-212 Rev A

Intent:

This procedure is used by the Beamlines Operator for a propagating shot in short-pulse mode of operation.

Beam paths shall have no obstructions.

Type	Beamline	Termination Options
7	1, 2	<ul style="list-style-type: none"> • Omega TC • EP TC Backlighter • EP TC Sidelighter

Prerequisites (for each beamline):

- BLO Short-pulse Pre-Operations Checklist complete per S-AB-P-146
- Targeting Alignment complete per S-AB-P-nnn.
- A Type 3 shot with satisfactory pulse width, energy and beam profile

Note:

Laser alignment expires after 120 minutes. If 120 minutes have passed (or will have passed at the time of shot) since alignment, inform the SD and realign (or re-check IRAT, IRDP and SPDP Pointing and Centering) at his instruction. If alignment expires, re-start the procedure at step 7.

Checklist

	Review the Master Template when the SD sends the PRESHOT signal.	
	<ul style="list-style-type: none"> • Review the SRF and the Beamlines Configuration and Filtration pages for the RID. • Confirm the Beamlines and beam paths to be included in the shot. 	
1	<ul style="list-style-type: none"> • Confirm or correct the M W C status of the software processes listed in the Master Template or verbal instructions from the SD. <input type="checkbox"/> • Include the NTOD in the template. • Press the “Accept” button on the Template review pop-up when complete. 	
2	Add a line to the Beamline Shot Excel file and fill out the required filtrations for this upcoming shot per the SRF and with input from System Science. <input type="checkbox"/>	
3	Issue the ALT’s Checklist. Coordinate with the ALT to make any necessary configuration changes for the ALT’s Configuration Table. <input type="checkbox"/>	
	(continues)	

4 If the previous shot on this beamline was Type 5, wait 25 minutes from T-0 before continuing.

Insert the GCC calorimeter into the beam path.

5

	OK	N/A	
UC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LC	<input type="checkbox"/>	<input type="checkbox"/>	

Re-start the PEPC (if not running) per S-AB-P-136.

6

	OK	N/A	
BL1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BL2	<input type="checkbox"/>	<input type="checkbox"/>	

Ensure the SP-POL's are in the correct position.

7

	In	Out	N/A	
BL1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BL2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Insert the Injection calorimeter into the beam path.

8

	OK	N/A	
BL1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BL2	<input type="checkbox"/>	<input type="checkbox"/>	

Verify Injection with IRAT(w/o SP Pol) or OPCPA:

1. Use the imaging GUI to view the Injection-ASP on the fine pointing and course centering software imposed references.
2. Verify that the beam is pointed and centered on the references to within 5 pixels.
3. If the beam is misaligned, use the appropriate pointing and centering mirrors to align the images onto their references.

9

	IRAT	OPCPA	
HTS Rate		5 Hz	<input type="checkbox"/>
Injection Throttle		10%	
Sources Throttle		10%	
Selection Waveplate	8500	0	
IRAT Throttle	Min +2°		

	OK	N/A	Time of alignment
BL1	<input type="checkbox"/>	<input type="checkbox"/>	
BL2	<input type="checkbox"/>	<input type="checkbox"/>	

(continues)

Insert the Injection ASP beam block.

10		OK	N/A	□
	BL1	<input type="checkbox"/>	<input type="checkbox"/>	
	BL2	<input type="checkbox"/>	<input type="checkbox"/>	

Insert the SY calorimeter and/or CAM1 into the beam path.

11		OK	N/A	□
	BL1	<input type="checkbox"/>	<input type="checkbox"/>	
	BL2	<input type="checkbox"/>	<input type="checkbox"/>	

Remove the Injection calorimeter from the beam path.

12		OK	N/A	□
	BL1	<input type="checkbox"/>	<input type="checkbox"/>	
	BL2	<input type="checkbox"/>	<input type="checkbox"/>	

On the Beamlines WCS GUI load the correction file saved during pre-operations.

13		OK	N/A	□
	BL1	<input type="checkbox"/>	<input type="checkbox"/>	
	BL2	<input type="checkbox"/>	<input type="checkbox"/>	

Fine Beamline alignment with IRAT(w/o SP Pol) or OPCPA:

1. Set HWP1 (Injection Throttle) to pass 100% of the OPCPA beam.
2. Check final alignment on the IRDP ASPs. Use the DM to make small perturbations to the alignment on the IRDP pointing camera.
3. Insert and verify Shot pinholes are inserted and are the correct size.

14		IRAT	OPCPA (w/o SP Pols)	OPCPA (w/ SP Pols)	□
	HTS Rate		5Hz	0.1Hz	
	Injection Throttle		100%	100%	
	Sources Throttle		50%	50%	
	Selection Waveplate	8500	0	0	
	CSF Pass 2 & 3	CSF Waveplates	CSF Waveplates	PEPC	
	IRAT Throttle	Max			

	OK	N/A	Time of alignment
BL1	<input type="checkbox"/>	<input type="checkbox"/>	
BL2	<input type="checkbox"/>	<input type="checkbox"/>	

(continues)

Correct wavefront with the Beamline WCS, per S-AB-P-138.

Notes: 1) Corrections expire after 1 hour. 2) WCS correction can occur no sooner than 25 min. after a Type 5 shot.

- Note if using OPCPA:** On the WCS GUI, open “Options and Parameters” (Screw Driver and Wrench Icon”. Select the Shack-Hartmann Sensor tab. Click in the trigger box. Set the HTS channels to 5Hz or 0.1Hz. Also, set the Image Acquisition Timeout to >11,000.
- 15

	OK	Time of Correction	N/A
BL1	<input type="checkbox"/>		<input type="checkbox"/>
BL2	<input type="checkbox"/>		<input type="checkbox"/>

Run the *PropagateToSPDP* macro.

- 16

	OK	N/A
LC	<input type="checkbox"/>	<input type="checkbox"/>
UC	<input type="checkbox"/>	<input type="checkbox"/>

Set Throttles for propagation to SPDP.

- 17

	IRAT	OPCPA (w/o SP Pols)	OPCPA (w/ SP Pols)
HTS Rate		5Hz	0.1Hz
Injection Throttle		Min	Min
Sources Throttle		5%	5%
Selection Waveplate	8500	0	0
CSF Pass 2 & 3	CSF Waveplates	CSF Waveplates	PEPC
IRAT Throttle	Min		

- 18

Remove the SY calorimeter and CAM1 from the beam path.
 (continues)

Fine alignment to SPDP with IRAT(w/o SP-Pol) or OPCPA:

- Verify that the beam is pointed and centered on the references to within 2 pixels.
- Use IRHR3 to make small perturbations to the alignment on the SPDP pointing camera.

19

	IRAT	OPCPA (w/o SP Pols)	OPCPA (w/ SP Pols)
HTS Rate		5Hz	0.1Hz
Inj. Throttle		Min	Min
OPCPA		5%	5%
Selection Waveplate	8500	0	0
CSF Pass 2 & 3	CSF Waveplates	CSF Waveplates	PEPC
IRAT Throttle	Min		

	OK	N/A	Time of alignment
BL1	<input type="checkbox"/>	<input type="checkbox"/>	
BL2	<input type="checkbox"/>	<input type="checkbox"/>	

Insert the SPDP ASP beam block.

20

	In	N/A
LC	<input type="checkbox"/>	<input type="checkbox"/>
UC	<input type="checkbox"/>	<input type="checkbox"/>

Remove all cross-hairs.

21

	OK	N/A
BL1	<input type="checkbox"/>	<input type="checkbox"/>
BL2	<input type="checkbox"/>	<input type="checkbox"/>

(continues)

Correct wavefront with the GCC WCS, per S-AB-P-138. Using the reference from the last targeting. Corrections expire after 1 hour.

Notes:

- 1) WCS correction can occur no sooner than 25 min. after a Type 5, 6 or 7 shot.
- 2) Make sure to click the Ready4_Charge button on the WCS GUI before proceeding to the next step. This will save a reference wavefront image.
- 22 3) If using OPCPA: On the WCS GUI, open “options and parameters” (Screw Driver and Wrench Icon”. Select the Shack-Hartmann Sensor tab. Click in the trigger box. Set the HTS channels to 5 Hz or 0.1 Hz. Also, set the Image Acquisition Timeout to >11,000.

	OK	Time of Correction	N/A
LC	<input type="checkbox"/>		<input type="checkbox"/>
UC	<input type="checkbox"/>		<input type="checkbox"/>

- 23 Direct ALT to check UTD pointing and centering and report the results. Do not continue until this is completed.
- If pointing and/or centering is off more than 25 pixels contact System Science.

- 24 If this shot uses the same PID file as the previous, using the Beamline WCS GUI load the previous shot voltage profile. File is located in:
- /u/epbl/WCS/**BL**#/OnShotMeasurements/**Shot**#/R4Voltages.dat

Otherwise continue to the next step.
 Remove all inserted cross-hairs.

- 25

	OK	N/A
BL1	<input type="checkbox"/>	<input type="checkbox"/>
BL2	<input type="checkbox"/>	<input type="checkbox"/>
- (continues)

Using the Beamline DM, apply and verify WCS PID/USD file per S-AB-P-138. PID/USD file settings expire after 1 hour.

Notes:

- 26
- 1) WCS correction can occur no sooner than 25 min. after a Type 5 shot.
 - 2) Make sure to click the Ready4_Charge button on the WCS GUI before proceeding to the next step. This will save a reference wavefront image.
 - 3) If using OPCPA: On the WCS GUI, open “options and parameters” (Screw Driver and Wrench Icon”. Select the Shack-Hartmann Sensor tab. Click in the trigger box. Set the HTS channels to 5 Hz or 0.1 Hz. Also, set the Image Acquisition Timeout to >11,000.

	OK	PID/USD	Time of Install	N/A
BL1	<input type="checkbox"/>			<input type="checkbox"/>
BL2	<input type="checkbox"/>			<input type="checkbox"/>

- 27 Set all WCS HTS channels to 0.1 Hz.

Remove CSF Waveplates

- 28
- | | OK | N/A |
|------------|--------------------------|--------------------------|
| BL1 | <input type="checkbox"/> | <input type="checkbox"/> |
| BL2 | <input type="checkbox"/> | <input type="checkbox"/> |

Ensure the IRAT and SPDP beams are blocked.

Note: To block the SPDP, instruct the ALT to install a manual block and remove SPDP Laser Injection mirrors.

- 29
- | | IRAT | | SPDP | |
|------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | OK | N/A | OK | N/A |
| BL1 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| BL2 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- 30 If SP-Pol's are required or alignment was completed with OPCPA skip to step 33.
 Yes No

Insert Injection calorimeter.

- 31
- | | OK | N/A |
|------------|--------------------------|--------------------------|
| BL1 | <input type="checkbox"/> | <input type="checkbox"/> |
| BL2 | <input type="checkbox"/> | <input type="checkbox"/> |

(continues)

Align the Sources beam so that it is pointed and centered within alignment tolerances on the Injection-ASP.

32

	OPCPA
HTS Rate	5 Hz
Injection Throttle	10%
Sources Throttle	10%
Selection Waveplate	0

	Time Aligned	N/A
BL1		<input type="checkbox"/>
BL2		<input type="checkbox"/>

Insert the Injection ASP beam block.

33

	N/A	In	Out
BL1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BL2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Remove Injection calorimeter.

34

	OK	N/A
BL1	<input type="checkbox"/>	<input type="checkbox"/>
BL2	<input type="checkbox"/>	<input type="checkbox"/>

Fine alignment to SPDP with OPCA:

- Verify that the beam is pointed and centered on the references to within 2 pixels. Use the IRHR3 to make small perturbations to the alignment on the SPDP pointing camera.

35

	OPCPA
HTS Rate	0.1 Hz
Injection Throttle	10%
Sources Throttle	5%
Selection Waveplate	0
CSF Pass 2 & 3	PEPC

	OK	N/A	Time of alignment
BL1	<input type="checkbox"/>	<input type="checkbox"/>	
BL2	<input type="checkbox"/>	<input type="checkbox"/>	

(continues)

Insert and confirm the GCC Common Path Filter is inserted and has the same filtration as the ALT's Configuration Table.

36		GCC Common Path Filter		SPDP Filter Wheel Counts	ED Filter			<input type="checkbox"/>
	Compressor	In	Out		In	Out	N/A	
	Lower	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Upper	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Insert and confirm the IRDP "on-shot" mirror is inserted and has the same filtration as the ALT's Configuration Table.

37		Mirror		Filter 1		Filter 2		Filter 3		<input type="checkbox"/>	
		In	Out	In	Out	In	Out	In	Out		N/A
	BL1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	BL2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>

Confirm IR Diagnostic filtrations are ready for the shot.

38			IRAT		IRDP			<input type="checkbox"/>
		NA	Spectrometer		Spectrometer	WFS		
	BL1	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
	BL2	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		

Insert the NTOD Shutter.

39		IN	N/A	<input type="checkbox"/>
	BL1	<input type="checkbox"/>	<input type="checkbox"/>	
	BL2	<input type="checkbox"/>	<input type="checkbox"/>	

Remove the GCC Calorimeter.

40		OUT	N/A	<input type="checkbox"/>
	LC	<input type="checkbox"/>	<input type="checkbox"/>	
	UC	<input type="checkbox"/>	<input type="checkbox"/>	

Adjust the Injection Throttle to pass the specified amount of energy from the Sources beam.

41		OK	HWP-1 Counts	N/A	<input type="checkbox"/>
	BL1	<input type="checkbox"/>		<input type="checkbox"/>	
	BL2	<input type="checkbox"/>		<input type="checkbox"/>	

(continues)

42 Select *lock* from the commands menu of balign for each macro run.

Select *compare* ⇒ (select the appropriate macro) from the Macros pull-down menu.

43

- Review the macro reports for errors. Do not proceed until each macro is clean.
- Review exceptions with the SD
- Print and sign verifying that the correct macro was run.

44 Instruct the ALT to complete his checklist and bring it to the Ante room. Review for completeness and sign.

45 Ensure that the IRAT and SPDP beam block have been inserted for at least 25 min. to allow the Calorimeter to equilibrate.

46 Click the “Checklist” button.

Wait for the SD to review the Beamlines Type 7 SP Propagating Shot checklist

Confirm:

45

- Most recent version of the SRF and the Beamlines Configuration and Filtration pages been reviewed and implemented?
- Type 7 Shot checklist been completed for BL1 and/or 2?
- Confirm the correct macros have been run and confirmed. Note any exceptions.
- Remaining Beam path for BL1 or 2 terminated?
- The required Diagnostics are ready.
- Injection Throttle setting is set to _____%?
- System Science or PI special setups installed/removed?

Participate in the shot

46

- Monitor NT0D for errors between T-10 and T-0, if this device reports ERROR, direct the SD to ABORT the shot.
- Monitor subsystem performance periodically throughout the shot.

47 Select *unlock* from the commands menu of balign and *insert* the GCC Calorimeter.

(continues)

On entering POSTSHOT: Follow the BLO POSTSHOT Procedures in S-AB-P-129.

- 48**
- Give the SD the ALT & BLO Checklists and macro print out.
 - Report any issues or concerns to the Shot Director and receive direction as to how to proceed.
 - In the event of an ABORT: Report any issues or concerns to the Shot Director and receive direction as to how to proceed. (Record the information in the BLO logbook)

(done)

BLO: _____ **Date:** _____ **Time:** _____