

<b>Subject:</b>	<b>X13B Beamline Radiological Interlock Test</b>		
<b>Number:</b>	LS-PPS-0041	<b>Revision:</b>	A
		<b>Effective:</b>	06/22/2006
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\*Approval signatures on file with master copy.

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[Revision Log](#)

Test Reason:	Test Result:	<input type="checkbox"/> Passed	<input type="checkbox"/> Failed
	Test Type:	<input type="checkbox"/> Full	<input type="checkbox"/> Partial
Test Date:	Start Time:	Finish Time:	
Tester 1:	Assistant 1:		
Tester 2:	Assistant 2:		

**PREPARATION:**

- Inform control room operator that test will be done. \_\_\_\_\_
- Obtain additional test keys - Refer to [Table 1](#) for a listing of additional Keys. \_\_\_\_\_
- Turn off 'Red Tag' switch on x-ray ring interlock and apply LOTO to X-Ray Security system. \_\_\_\_\_
- Verify that vacuum valves and water interlocks are OK on the beam lines that will be checked for Phase I beamlines or connect user interlock test jumper. \_\_\_\_\_

1. Search Sequence:
  - Search the hutch
    - The overhead lights go out \_\_\_\_\_
    - The red interior light comes on \_\_\_\_\_
    - The audible alarm sounds for 13 to 15 seconds minimum \_\_\_\_\_
    - The hutch interlock sign turns on \_\_\_\_\_
  
2. Open hutch door
  - The hutch interlock sign goes out \_\_\_\_\_
  
3. If hutch has more than one check station, press second check station (CS-2).
  - Nothing happens \_\_\_\_\_
  - Press CS-1, exit hutch, close door, press CS-E.
    - Interlock does not activate \_\_\_\_\_
  
4. Press CS-1, close hutch door and wait.
  - Hutch interior lights come on in not more than 20 seconds for small hutches and not more than 50 seconds for large hutches. \_\_\_\_\_
  - Press CS-E.
    - Interlock does not activate \_\_\_\_\_
  
5. Press interior search buttons in order, close door, press CS-E, note that alarm comes on, open and close door, press CS-E again. (This must all be done in less than the timeout interval noted in step 4)
  - Interlock does not activate \_\_\_\_\_

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6. Shutter Enable:  
 Place latch device on door lock(s) so key can be removed. Place switch holders on door switches. Search hutch, put door key in SRU and turn. Open photon shutter.  
 The Safety Shutter "enable" light does not come on until the end of the warning interval \_\_\_\_\_

7. Emergency Stops:  
 Total number of Emergency Stops in hutch \_\_\_\_\_  
 The person inside presses an Emergency Stop Button.

	<b>ES1</b>	<b>ES2</b>	<b>ES3</b>
The shutter "enable" light goes out	_____	_____	_____
The ES indicator comes on	_____	_____	_____
The ES latch cannot be reset unless the SOR key is turned	_____	_____	_____

Repeat step 7 for each ES button.

8. Door Switches: Search hutch Open safety shutter and photon shutter.  
 The "Beam On" sign turns ON \_\_\_\_\_

<b>Door:</b>					
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>

Remove holder from switch 2.  
 RIB latch light comes ON \_\_\_\_\_

9. Replace holder on switch 2.  
 RIB cannot be reset unless SOR key is turned. \_\_\_\_\_

10. Remove holder on switch 1.

Safety shutter closes	_____	_____	_____	_____	_____
Photon shutter closes	_____	_____	_____	_____	_____
RIA latch light comes on	_____	_____	_____	_____	_____
Hutch interlock drops out	_____	_____	_____	_____	_____
"Beam On" sign goes out	_____	_____	_____	_____	_____
RIA can't be reset w/o SOR	_____	_____	_____	_____	_____

Replace holder on switch 1.

11. Solenoid Release Units (SRU)/Key Banks:  
 Search hutch, leave shutter closed.  
 Hutch Kirk key (KKH) cannot be removed from SRU unless button is pushed \_\_\_\_\_

12. Open safety shutter and photon shutter.  
 KKH cannot be removed even if button is pushed \_\_\_\_\_

13. Close shutters. Turn KKH and note where solenoid unit stops rotation. Push the button and turn key just beyond this point, but not far enough to actuate "key removed" switch. Release the button and leave key in this position. Open shutter(s), remove KKH, and replace.

RIA latch light comes on	_____
RIB latch light comes on	_____
The safety shutter closes	_____
The photon shutter closes	_____

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Note: Steps 14 & 15 involve the removal of the transfer/lockout key. Complete action steps 14 & 15a if the interlock system contains an SRU designated for the transfer/lockout key and is separate from the Hutch KK SRU. Complete action step 15b only, if the interlock system contains a transfer key bank that is wired to the control panel and there is no SRU solely designated for the transfer key. The response should be the same for either test.

14. With hutch interlocked, leave shutter(s) closed.  
     Beam line transfer key can be removed only if button  
     on SRU is pushed \_\_\_\_\_  
     Open safety shutter. (Photon shutter remains closed)  
     Beam line transfer key can't be removed even if button  
     is pushed \_\_\_\_\_
15. Close safety shutter.  
     15a. SRU test: "Cheat" SRU as described in step 13. Open safety shutter, remove the key  
     and replace.  
     15b. Transfer key Bank: Obtain spare transfer bank key (see [Table 1](#)). Insert spare key in  
     transfer bank and turn to the enable position. Open Safety Shutter  
     RIA latch light comes on \_\_\_\_\_  
     RIB latch light comes on \_\_\_\_\_  
     The safety shutter closes \_\_\_\_\_  
     SPA comes on \_\_\_\_\_  
     SPA can't be reset w/o SOR \_\_\_\_\_  
     Reset RIA and RIB
16. Emergency Stop: Open photon and safety shutter. Press an emergency stop button.  
     RIA latch light comes on \_\_\_\_\_  
     RIB latch light comes on \_\_\_\_\_  
     Hutch interlock drops out \_\_\_\_\_  
     ES indicator comes on \_\_\_\_\_  
     Safety Shutter Closes \_\_\_\_\_  
     Photon Shutter Closes \_\_\_\_\_
17. Photon Shutter Function:  
     Close Safety and Photon Shutter and then Secure the hutch.  
     The Photon Shutter "enable" light does not come on until the end of  
     the warning interval. \_\_\_\_\_
18. Open Photon Shutter (Safety Shutter remains Closed).  
     Attempt to remove hutch door key from the hutch SRU.  
     Cannot remove key. \_\_\_\_\_
19. Break hutch security (Safety Shutter remains Closed).  
     Attempt to Open Photon Shutter.  
     Photon Shutter will not Open.
20. Secure hutch. Observe the photon shutter while it is opened and closed.  
     The mechanism moves freely and without hesitation \_\_\_\_\_

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21. Shutter Enable Key:

Open the safety shutter. Remove the Control Room Shutter Enable Key for this beam line, and then replace the key.

- The safety shutter closes \_\_\_\_\_
- RIA latch light comes on \_\_\_\_\_
- The "Control Room Shutter Enable" light goes out \_\_\_\_\_
- The SPA latch comes on (after the key is back on) \_\_\_\_\_
- The safety shutter cannot be opened \_\_\_\_\_

Reset RIA and SPA

22. Master Shutter Control:

Open the Safety Shutter.

Turn "Auto Open" key to "ON" (if key switch is installed on beamline).

At the Control Room Operator's Console, switch the shutter master enable to "Inhibit" and back to "Enable"

- The safety shutter closes \_\_\_\_\_
- And then re-opens \_\_\_\_\_

Turn "Auto Open" key to "OFF" - Disregard this step if key switch is not installed.

Switch the master enable to "Inhibit" and back to "Enable"

- The safety shutter closes \_\_\_\_\_
- And does NOT re-open \_\_\_\_\_

23. Reach-Back:

One person goes to the x-ray equipment area and resets the indicators for RIAX and RIBX at SR100.

Open the safety shutter and photon shutter.

Remove switch holder from door **switch 2**.

- RIB latch light comes on \_\_\_\_\_
- RIBX "Loop Enabled" indicator goes out \_\_\_\_\_
- RIBX "Loop Disabled" indicator comes on \_\_\_\_\_

Replace switch holder.

- RIBX cannot be reset \_\_\_\_\_

Reset RIB

- RIBX CAN be reset \_\_\_\_\_
- ("Loop Enabled" indicator comes on) \_\_\_\_\_

24. Remove holder from door **switch 1**.

- RIA latch light comes on \_\_\_\_\_
- RIAX "Loop Enabled" indicator goes out \_\_\_\_\_
- RIAX "Loop Disabled" indicator comes on \_\_\_\_\_
- The safety shutter closes \_\_\_\_\_
- The photon shutter closes \_\_\_\_\_
- RIAX cannot be reset \_\_\_\_\_

Reset RIA

- RIAX CAN be reset \_\_\_\_\_
- ("Loop Enabled" indicator comes on) \_\_\_\_\_

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25. Door Switch Function: Remove the holders from the switches. Remove the latch device from the door lock(s). Stand inside the hutch and open and close the door.

All door switches operate freely and each makes a "click" when door is opened

(Complete test for each set of door switches)

Door:					
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>

\_\_\_\_\_

26. Safety Shutter Function:

Search the hutch. Locate the safety shutter associated with the beam line by tracing the beam pipe through the shield wall. Do not rely on labels on the shutter mechanism. Open the shutter.

The correct shutter opens \_\_\_\_\_

No other shutter at that saw tooth opens or attempts to open \_\_\_\_\_

Close the safety shutter.

The mechanism moves freely and without hesitation \_\_\_\_\_

27. Remove user interlock test jumper (if applicable). \_\_\_\_\_

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