	T1 & 7	<b>F2</b> Control System Upg	rade Commissioning Plan	
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Test #10 Check tha XTPAGEs Rev 4). If if accepta Operation facility co	- RS 54: at duplicate signals removed fr (see Table 3 in Document-651 f duplicate signals remain, cher able by Controls group leader, ns group leader, and T1 & T2 pordinator.	rom Duplicate signals 70 approval given b ck mentioned.	removed, or y individuals	

ONY 6519

## This section has been tested and verified by the following people:

	Name (print)	Role	Signature	Date
Tested by:				
Verified by:			n de la Cali	

## **Final Safety Test with Beam** 7

The purpose of the following tests is to confirm that signals going to the Central Safety System (CSS) from the T1 & T2 PLC to allow/disallow beam in BL1A as well as the beam overcurrent protection system are behaving as expected. These tests require beam to be run in BL1A.

Perform these tests after shielding has been restore operation. These tests are not part of included in the commission should be documented for f	all ed o of th ing r futur	other commissioning tests have ver BL1A, and the cyclotron ar e official commissioning require eport, but are included as an add re reference.	men ition	en completed, the LLA are ready for IESTING STARTED Ats and will not be JUNE 21, 2016 hal safety check and C 8:30 M
Action	$\checkmark$	Result	$\checkmark$	Comment
Test #1 – "B1A:T1:TGTRDY": i) Begin with all systems configured normally and the B1A:T1:TGTRDY, B1A:T2:TGTRDY, and B1A:COL:STATOK signals present	~	i) <i>B1A:T1:TGTRDY</i> , <i>B1A:T2:TGTRDY</i> , and <i>B1A:COL:STATOK</i> signals display OK in EPICS and on XTPAGE	V	
ii) Extract beam down BL1A	$\checkmark$	ii) Beam is successfully extracted down BL1A	~	
iii) In the PLC code force <i>B1A:CG2:STATOK</i> to be NOT OK or disconnect the appropriate wire in the PLC BOP	~	iii) The T1 cooling system trips OFF, Beam trips OFF, <i>B1A:T1:TGTRDY</i> displays NOT OK	$\checkmark$	

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		corea	50 110, 2	_ Itelease Da		1
<ul> <li>iv) Attempt to run beam down BL1A</li> <li>v) Defeat "T1 Vacuum OK" in the T1</li> <li>Cooling System On interlock chain; Turn the T1 cooling package ON</li> </ul>			<ul> <li>iv) Beam cannot be extra BL1A</li> <li>v) T1 cooling package tu B1A:T1:TGTRDY displays</li> </ul>	rns ON, OK	Request colAs to be open 2 (	iolensis ioj ozpubst)
vi) Extract	t beam down BL1A	-	vi) Beam is successfully e down BL1A	xtracted		
Test #2 – 4 i) Begin v normally a B1A:T2:TG signals pre	"B1A:T2:TGTRDY": with all systems configured and the B1A:T1:TGTRDY, GTRDY, and B1A:COL:STATOK esent		i) <i>B1A:T1:TGTRDY, B1A:</i> and <i>B1A:COL:STATOK</i> sign OK in EPICS and on XTPAC	T2:TGTRDY, 1als display		
ii) Extract	t beam down BL1A	$\checkmark$	ii) Beam is successfully e down BL1A	xtracted		
iii) In the l to be NOT appropriat	PLC code force <i>B1A:CG4:STATOK</i> OK or disconnect the te wire in the PLC BOP	$\checkmark$	iii) The T2 cooling system Beam trips OFF, <i>B1A:T2:T</i> displays NOT OK	GTRDY		
iv) Attemp	ot to run beam down BL1A	$\checkmark$	iv) Beam cannot be extra BL1A	cted down		
v) Defeat Cooling Sy the T2 coo	"T2 Vacuum OK" in the T2 stem On interlock chain; Turn ling package ON	~	v) T2 cooling package tu B1A:T2:TGTRDY displays (	rns ON, DK	/ Regrod 12 Col B solenits	Col A + to be good
vi) Extract	t beam down BL1A	$\checkmark$	vi) Beam is successfully e down BL1A	xtracted		
Test #3 – 4 i) Begin v normally a B1A:T2:TG signals pre	"B1A:COL:STATOK": with all systems configured and the B1A:T1:TGTRDY, GTRDY, and B1A:COL:STATOK essent		( i) <i>B1A:T1:TGTRDY, B1A:</i> and <i>B1A:COL:STATOK</i> sign OK in EPICS and on XTPAC	T2:TGTRDY, nals display		
ii) Extract	t beam down BL1A	~	ii) Beam is successfully e down BL1A	xtracted	11111-	- 1
iii) In the be NOT OI the curren	PLC code force <i>B1A:T1:FGCOL</i> to K or reduce its trip point below It value	~	iii) Beam trips OFF, <i>B1A:0</i> displays NOT OK	COL:STATOK	trip limit about	e prise t volu
iv) Attem	pt to run beam down BL1A		iv) Beam cannot be extra BL1A	cted down		
v) Defeat	"T1 Col Flow OK" in the B1A rs Ready Signal interlock chain		v) B1A:COL:STATOK disp	lays OK		

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vi) Extract beam down BL1A	vi) Beam is successfully extracted down BL1A	
<b>Test #4 – T1 Current Protection System:</b> i) Begin with all systems configured normally, the <i>B1A:T1:TGTRDY</i> , <i>B1A:T2:TGTRDY</i> , and <i>B1A:COL:STATOK</i> signals present, and the T1 target in Position 0	i) B1A:T1:TGTRDY, B1A:T2:TGTRDY, and B1A:COL:STATOK signals display OK in EPICS and on XTPAGE. The current protection page on XTPAGE indicates that the T1 target is in Position 0	
ii) Set the T1 Position 0 current limit to a value that can be safely exceeded	ii) The current limit is changed successfully	~ Left at IguA limit
iii) Run beam down BL1A at a current pelow the limit	iii) Beam is successfully extracted down BL1A	4
iv) Increase the current until it reaches the limit	iv) When the current reaches the limit the cyclotron current is automatically reduced so that it is no longer at the limit or the beam trips off completely	Saft trip at ~12,4. Relarcos real
v) Repeat the test with the T1 target at a adder position with a target installed	v) The same results are observed as with the test at Position 0	Sot trip at ~ 170A
<b>Test #5 – T2 Current Protection System:</b> i) Begin with all systems configured normally, the <i>B1A:T1:TGTRDY</i> , <i>B1A:T2:TGTRDY</i> , and <i>B1A:COL:STATOK</i> signals present, and the T1 target in Position 0	i) <i>B1A:T1:TGTRDY</i> , <i>B1A:T2:TGTRDY</i> , and <i>B1A:COL:STATOK</i> signals display OK in EPICS and on XTPAGE. The current protection page on XTPAGE indicates that the T2 target is in Position 0	
ii) Set the T2 Position 0 current limit to a value that can be safely exceeded	i) The current limit is changed successfully	Legt at 1944 lim
iii) Run beam down BL1A at a current below the limit	iii) Beam is successfully extracted down BL1A	
iv) Increase the current until it reaches the limit	iv) When the current reaches the limit the cyclotron current is automatically reduced so that it is no longer at the limit or the beam trips off completely	Soft trip of -12,00
v) Repeat the test with the T2 target at a adder position with a target installed	v) The same results are observed as with the test at Position 0	Fos'nI limit sot at 20 Saft trile at ~22

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