



**TEST PROCEDURE**

TITLE

**Beam Tube Bakeout Power Supply Functional Test**

APPROVALS:	DATE	REV	DCN NO	BY	CHK	DCC	DATE
DRAWN: W. Althouse	11/6/98			n/a	n/a	n/a	n/a
CHECKED:							
APPROVED: W. Althouse							
DCC RELEASE:							

The objectives of this procedure are to 1) check that the electrical circuit comprising the beam tube, return cables and power supplies are functioning properly, 2) validate and/or calibrate the data acquisition channels associated with power supply electrical operation, 3) verify that the data acquisition system functions properly in the presence of the power circuit induced magnetic fields, and 4) verify that data system control of the power supplies functions properly. The procedure will initially test one PS at a time, then both together.

Date: \_\_\_\_\_ Lead Operator: \_\_\_\_\_

BT Module: \_\_\_\_\_ Aided By: \_\_\_\_\_

Equipment Required:

Available (Y, N)

- 1. DVMs (4 ea.) \_\_\_\_\_
- 1. Clamp-on current meter 0-1000A \_\_\_\_\_

Completed  
(initials) \_\_\_\_\_

**1 PREPARATION:**

1.1. Metering (at test point panel on PSIO):

- + and - output voltages
- Voltage across current monitoring shunts
- Current in each return cable (clamp-on measurements)

1.2. Verify both power supplies ready to turn on (cooling H2O filled and operating, all PS internal switches (e.g. SW6) set correctly, manual mode (reference voltage set to INTERNAL). \_\_\_\_\_

1.3. Verify that fuses at PT transformers in B2 panel are installed and circuit closed. \_\_\_\_\_

**2 TEST SEQUENCE: PS1 ALONE**

2.1. Turn on PS1 per manual procedure \_\_\_\_\_

2.2. Turn voltage up slowly, watch current: load s/b approximately 19.1 mohms (200A @ 3.8V, 500A @ 9.6V, 2000A @ 38V, 3500A @ 67V). \_\_\_\_\_



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- 2.3. Record measurements on data sheets and observe long enough to evaluate stability \_\_\_\_\_
- 2.4. Dial output to 0. Test function of emergency trip pushbuttons (2). \_\_\_\_\_
- 2.5. Shut PS1 down and lock out main breaker. \_\_\_\_\_
- 3 TEST SEQUENCE: PS2 ALONE**
- 3.1. Turn on PS2 per manual procedure \_\_\_\_\_
- 3.2. Turn voltage up slowly, watch current: load s/b approximately 20.9 mohms (200A @ 4.2V, 500A @ 10.4V, 2000A @ 42V, 3500A @ 73V). \_\_\_\_\_
- 3.3. Record measurements on data sheets and observe long enough to evaluate stability \_\_\_\_\_
- 3.4. Dial output to 0. Test function of emergency trip pushbuttons (2). \_\_\_\_\_
- 3.5. Shut PS1 down and lock out main breaker. \_\_\_\_\_
- 4 TEST SEQUENCE: PS1 AND PS2 TOGETHER, REMOTE CONTROL**
- 4.1. Verify data system controls set to OFF \_\_\_\_\_
- 4.2. Connect a meter from V+ to V- at each supply \_\_\_\_\_
- 4.3. Turn on PS1 and PS2 per manual procedure \_\_\_\_\_
- 4.4. Set PS1 and PS2 reference voltage from INTERNAL to EXTERNAL \_\_\_\_\_
- 4.5. Set  $I_{high}$  to 100A and set control operation to MANUAL. Verify that PS1 ~4.5V and PS2 ~4.8V,  $I_{ret1} \sim I_{ret2} \sim I_{ret3} \sim I_{ret4} \sim 117A$  (measured current higher than  $I_{set}$  because controls are calibrated for tube at 150 C) \_\_\_\_\_
- 4.6. Set  $I_{high}$  to 250A. Verify that PS1~11.3V and PS2~12.2V and  $I's \sim 295A$  \_\_\_\_\_
- 4.7. Set  $I_{high}$  to 850A. Verify that PS1~38.3V and PS2~41.7V and  $I's \sim 1000A$  \_\_\_\_\_
- 4.8. Set  $I_{high}$  to 1500A. Verify that PS1~67V and PS2~73V and  $I's \sim 1750A$ . \_\_\_\_\_
- 4.9. Set computer control to OFF. Verify that both power supplies move smoothly (more or less) to 0 volts over ~30 sec. \_\_\_\_\_
- 5 SECURE POWER SUPPLIES**
- 5.1. Shut down per manual and lock out main breaker panel at rear of PS container. \_\_\_\_\_

END OF PROCEDURE

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Data Sheet - PS1 test alone ( $R_{load} = 19.1$  ohm nominal at 25 C):

Date/time:							Who:			
AC volts in:	$\Phi 1$ :		$\Phi 2$ :		$\Phi 3$ :					
V(nom)	0	3.8	9.6	38.3	67					
I/leg (nom)	0	100	250	1000	1750					
V+										
V-										
V <sub>RT1 shunt</sub>										
V <sub>RT2 shunt</sub>										
I <sub>RT11</sub>										
I <sub>RT12</sub>										
I <sub>RT13</sub>										
I <sub>RT14</sub>										
I <sub>RT21</sub>										
I <sub>RT22</sub>										
I <sub>RT23</sub>										
I <sub>RT24</sub>										
Other										
Other										
Other										
Other										
Other										
Other										

# TEST PROCEDURE: Beam Tube Bakeout Power Supply Functional Test

Data Sheet - PS2 test alone ( $R_{load} = 20.9$  ohm nominal at 25 C):

Date/time:							Who:				
AC volts in:	$\Phi 1$ :			$\Phi 2$ :			$\Phi 3$ :				
V(nom)	0	4.2	10.4	41.7	73						
I/leg (nom)	0	100	250	1000	1750						
V+											
V-											
V <sub>RT1 shunt</sub>											
V <sub>RT2 shunt</sub>											
I <sub>RT11</sub>											
I <sub>RT12</sub>											
I <sub>RT13</sub>											
I <sub>RT14</sub>											
I <sub>RT21</sub>											
I <sub>RT22</sub>											
I <sub>RT23</sub>											
I <sub>RT24</sub>											
Other											
Other											
Other											
Other											
Other											
Other											

# TEST PROCEDURE: Beam Tube Bakeout Power Supply Functional Test

Data Sheet - Remote control of both supplies together:

Date/time: \_\_\_\_\_ Who: \_\_\_\_\_

$I_{\text{high set}}$	0	100	250	850	1500	_____	_____	_____
$I/\text{leg (nom)}$	0	117	295	1000	1750	_____	_____	_____
$V_{\text{PS1}}$	_____	_____	_____	_____	_____	_____	_____	_____
$V_{\text{PS2}}$	_____	_____	_____	_____	_____	_____	_____	_____

From data acquisition computer screen:

$I_{\text{RETURN1}}$	_____	_____	_____	_____	_____	_____	_____	_____
$I_{\text{RETURN2}}$	_____	_____	_____	_____	_____	_____	_____	_____
$I_{\text{RETURN3}}$	_____	_____	_____	_____	_____	_____	_____	_____
$I_{\text{RETURN4}}$	_____	_____	_____	_____	_____	_____	_____	_____
Other	_____	_____	_____	_____	_____	_____	_____	_____
Other	_____	_____	_____	_____	_____	_____	_____	_____
Other	_____	_____	_____	_____	_____	_____	_____	_____
Other	_____	_____	_____	_____	_____	_____	_____	_____