

**Princeton Plasma Physics Laboratory
NSTX Machine Proposal**

Title: **Neutral Beam Checkout**

OP-XMP-127

Revision: **0**

Effective Date: **7/15/2015**

Expiration Date:
(2 yrs. unless otherwise stipulated)

Proposal Approvals

Responsible author: **Dan Boyer**

Mark Dan Boyer II

Date: **7/15/2015**

ATI (NSTX Physics Ops): **Dennis Mueller**

Dennis Mueller

Date
7/15/15

RLM (NSTX Expt. Research Ops): **S. Gerhardt**

Date

Responsible Division: **Experimental Research Operations**

Procedure Requirements

designated by RLM

	NSTX Work Permit		T-MOD (OP-AD-03)
	Independent Review		ES&H Review

RESTRICTIONS AND MINOR MODIFICATIONS

Approved by RLM

REVIEWERS (designated by RLM)		
<u>Organization/Position</u>	<u>Name</u>	<u>Signature</u>
ATI	D. Mueller	<i>Dennis Mueller</i>
Test Director		
Independent Reviewer		
NB system	T. Stevenson	
RF systems		
FCPC systems		
Diagnostics		

TRAINING (designated by RLM)			
Training required: No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> Instructor _____			
Personnel (group, job title or individual name)	Read Only	Instruction	Hands-On
RLM _____			

NSTX MACHINE PROPOSAL

TITLE: Neutral Beam Checkout	No. OP-XMP-127
AUTHORS: D. Boyer, S. Gerhardt, D. Mueller, T. Stevenson	DATE: 7-15-2015

1. Overview:

The purpose of this XMP is to demonstrate the ability to inject any of six beams into NSTX-U plasmas with confidence. It can also be used as a first test of NB control for NSTX-U from PCS.

2. Justification:

In order to use neutral beam injection during physics operations with confidence, it will be necessary to first inject beams into L-mode plasmas to allow for assessment of the neutral beam armor, beamline heating, neutron diagnostics, and beam operations.

3. Plan:

General notes:

1. Control of beam timing during this XMP can be done through the PCS if the NBI category is available for use at the time of running. This is left to the discretion of the operator.

Note that it will be necessary to connect the FOMD output cable to the legacy TFTR beta-feedback chassis on the 138' level.

Record how beams are controlled: _____

2. After the first shot with beams, document that the neutron detector was functioning.

Neutron detector functioning: _____

3. Repeat shots as requested by Neutral Beam operations.

Beam settings:

Voltage should be set to 90keV with >200ms pulses (500ms preferred) for each of the beams being tested. Exact beam pulse length is at the discretion of the operator.

Plasma conditions:

Target plasma conditioned determined by the physics operator and test director based on conditions at time of execution. Plasmas should have a minimum current flat-top plasma current of 500kA and an outer gap ~10cm. Plasma flat-top durations should be at least 300 ms.

The necessary shots can be accomplished using one of two options:

Option 1: One source per shot

1. For each shot, fire one of the available sources into the target plasma. Confirm with Neutral Beam operations before proceeding between each shot. Record the shot numbers for each source below:

Shot numbers (1A)

Shot numbers (1B)

Shot numbers (1C)

Shot numbers (2A)

Shot numbers (2B)

Shot numbers (2C)

Option 2: Multiple beams in each pulse.

If sufficiently long pulses are possible at the time of the XMP, multiple beams can be pulsed per shot (one at a time for >200ms) to reduce the number of shots required. Record shot numbers and indicate which beams were pulsed (and the time of the pulse) below:

Shot number, source timing

Shot number, source timing

Shot number, source timing

Shot number, source timing

Shot number, source timing

Shot number, source timing

4. Required machine, beam, ICRF and diagnostic capabilities:

Normal plasma operations requirements.

Successful completion of XMP-126 (Ip & R control).

Desired diagnostics include core radiated power, EUV spectroscopy of metal lines from LoWEUS, XEUS, and MonaLISA.

5. Sign off at run time:

5.1 Permission to Proceed:

Physics Operations Head

Neutral Beam Operations Head

5.2 Documentation of results:

Documentation of the results completed, attached to proposal and sent to Ops. Center with copies to Cognizant Physicist and Head of Physics Operations.

Cognizant Physicist/Test Director