PIP2IT HPRF Distribution

Quality Control Plan

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Revision History

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| Revision | Date Release | Originator:Role: | Description of Change |
| A | 8/12/2020 | Coordinator |  |
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*Revision control is managed via Fermilab Teamcenter Workflows.*

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# Introduction

This QC plan covers the work to be performed on the procurement, testing and installation of the 650MHz HPRF distribution system to be used at PIP2IT. In the scope of this QC plan, there will be 6 usable distribution lines, each line contains transmission lines, two directional couplers and a circulator.

# Travelers and Procedures

Circulator testing is based off procedure ED0012540 “650 MHz circulator acceptance test” All data collected during QC tests and measurements will be captured in the “650MHz HPRF Distribution Acceptance” vector traveler. There will be six travelers, each will be dedicated to one distribution line containing data for one circulator and two directional couplers.

# QC test and measurements

Transmission lines, directional couplers and circulators shall be inspected upon receipt. All circulators and directional couplers will be serialized and labelled upon this initial inspection. All data collected will be captured in the “650MHz HPRF Distribution Acceptance” vector traveler.

Each circulator should go through three step examination before being used in a distribution line; an inspection, a set of network analyzer measurements, and set of high power tests. The acceptance test criteria is detailed in ED0012540 “650 MHz circulator acceptance test” documentation.

Each dual directional couplers should be measured with a network analyzer before being used in the distribution system. The parameters to be measured include return loss at all 4 ports, insertion loss, coupling ratio and directivity. All data for directional couplers will be added to the “650MHz HPRF Distribution Acceptance” vector traveler.

Needed equipment

* Network Analyzer
* Power Meters
* WR1150 short and load
* Temperature regulated water system

# Vendor communication

FNAL will receive 1 circulator before the production phase begins, upon receiving FNAL will complete the acceptance testing and approve the continuation of production. This condition will be negotiated in the purchasing contract

Vendor will provide test results which shall be stored in “650MHz HPRF Distribution Acceptance” vector traveler. The L3 manager shall review and approve the results of the validation testing prior to shipping to Fermilab.

# Installation

Mechanical support structures should comply with the standard described in documents of Fermilab Engineering Manual and ESH DocDB Document 4112-v1, FESHM 5100 - Structural Safety FINAL.

Critical lift point documentation will be produced for circulator and large transmission lines.

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# Control of Non conformances

Nonconformances which are identified while completing the “650MHz HPRF Distribution Acceptance” traveler shall be documented via a Discrepancy Report in Vector. Any nonconformance’s identified outside of a traveler shall be documented in the PIP-II SharePoint site’s Nonconformance list.

All Nonconformances identified by DAE shall be communicated to the L3 primarily via email.

#  Training and Qualification

Ding Sun will be performing the acceptance testing of the circulators. Ding has prior work experience in testing amplifiers, working in the RF department of the Accelerator Division.