PIP2IT SRF HPRF Distribution Final Design Review Charge

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Revision History

Revision	Date Release	Originator: Role:	Description of Change
A	5/23/2019	Coordinator	

Revision control is managed via Fermilab Teamcenter Workflows.

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1. Introduction

The PIP2IT HPRF distribution system in review today will be used for the transfer of RF power to the SRF cavities known as HWR, SSR1, and SSR2. The system must be capable of delivering power to the cavities safely and efficiently and must protect the amplifiers from reverse power. The content of review today begins at the output flange of the high power amplifier, and ends at entrance of the input coupler to the cryomodule.

For the HWR cryomodule there are 8 transmission lines with independent amplifiers and cryomodule couplers for each line. For the SSR1 cryomodule there are an additional 8 transmission lines, amplifiers and crymodule couplers. Each line is equipped with its own circulator and directional coupler. The SSR1 cavity location will also be the testing location for the SSR2 cryomodule. The SSR1 distribution design should be capable of handling SSR2 power levels which are higher than SSR1.

Upon completion of this review, the engineering team can procure and install the rest of the equipment.

2. Review Agenda

SRF HPRF Distribution Review Agenda

Location: Huddle

Date: 5/30/2019

Time: 8AM

Indico Site: https://indico.fnal.gov/event/20563/

Participants:

Victor Grzelak	AD/ENG/RF	Role: Coordinator
John Reid	AD/ENG/RF	Role: Chair
Doug Horan	Argonne	Role: Reviewer
Brian Chase	AD/ENG/RF	Role: Reviewer
Dave Peterson	AD/ENG/RF	Role: Presenter
Jim Steimel	PIPII/PIPII/TIO	Role: Presenter

Agenda details:

I. Introduction: Victor Grzelak
   1) Charge presentation and goals for review

II. Overview & Functions: Dave Peterson
   1) Functional requirements & physical layout

III. Calculations & Technical Specifications: Jim Steimel
   1) Technical requirements & other considerations

IV. Interfaces: Dave Peterson
   1) How the design satisfies the need

V. Cost Schedule: Jim Steimel
   1) Resource loaded schedule & Distribution BOE,

VI. Closeout – John Reid
   1) Discussion and closing remarks

3. Review Charge Statement

The primary charge of this committee is to technically evaluate the efficacy of the RF power distribution system design for the HWR and SSR1/SSR2. The secondary charge is to determine if the system would sufficiently protect itself.

The committee is asked to respond to the following questions:

1. Are there any unresolved issues that may have significant safety, cost, schedule or performance impacts?
2. Are the risks properly assessed and is the mitigation plan adequate?
3. Does the RF distribution design support the project requirements?
4. Are the interfaces properly addressed in the design?
5. Are the available technical drawings and documentation complete and available?
6. Have lessons learned been implemented?
7. Is the PIP2IT SRF HPRF distribution final design complete enough to procure the rest of the equipment and complete installation?

4. Acronyms

List and define any relevant acronyms as necessary.

PIP2IT	Proton Improvement Plan 2 Injector Test
HPRF	High Power Radio Frequency
PDR	Preliminary Design Review

5. Reference Documents

The below documents are to be considered in the review, the documents denoted with parenthesis are courtesy documents and are not under review.

Requirements		
1	HPRF Distribution Functional Requirements Specification	ED0010272
2	HWR HPRF Distribution Technical Requirement Specification	ED0010279
3	SSR1 HPRF Distribution Technical Requirement Specification	ED0010280
4	HWR RF 7kW Circulator Specifications	ED0010274
5	SSR1 RF 7kW Circulator Specifications	ED0010275
6	(162.5 MHz 3kW RF Power Amplifier Technical Specifications)	ED0010271
7	(162.5 MHz 7kW RF Power Amplifier Functional Specifications)	ED0003673
8	(162.5 MHz 7kW RF Power Amplifier Technical Specifications)	ED0010278
9	(325 MHz 7kW RF Power Amplifier Technical Specifications)	ED0004290
Interfaces		
10	Technical Specification for interface HWR	ED0002529
11	Fermilab Interface Control Document for SSR1	ED0004129
12	Interface Specification Document HWR RF Distribution - HWR RF Power Amplifier	ED0010281
13	Interface Specification Document HWR RF Distribution - SSR1 RF Power Amplifier	ED0006356
14	ISD for PIP2IT HWR RF Distribution LLRF and Cooling Systems	ED0010273
15	ISD for PIP2IT SSR1 RF Distribution LLRF and Cooling System	ED0010276
Risk & Safety		
16	HWR Distribution Risk Assessment	ED0010148
17	SSR1 Distribution Risk Assessment	
18	Updated Safety by Design Assessment Table	ED0010151
19	Failure Mode Effect Analysis	ED0010159
Design		
20	Circuit Schematic of HWR	ED0010283
21	Circuit Schematic of SSR1	
22	Engineering Calculations and Engineering Notes	ED0010277
Additional Model		
23	Overall Design	F10109884
24	3D Model and Release Drawings of HWR RF input coupler interface	F10054498
25	3D Model of RF Distribution Between Amplifier and HWR Coupler	F10109885
26	3D Model and Release Drawings of SSR1 RF input coupler interface	F10049253
Procurement, Production & Installation		
27	RF Circulator Verification Test Document	ED0010285