

Main Injector Note #MI-0190
MI Instrumentation: Locations and Rack Layouts
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The following is a list of tunnel equipment required for installation in the main injector for use in the instrumentation and LLRF systems. Included are cable information and instrumentation rack layouts for various service buildings.

LLRF

- Phase Feedback Detector
 - This will be the old MR F10 stripline detector. It will be installed in the MI-60 straight, upstream of QF604, between the ion pump and the fourth RF station. It should be located with its upstream outputs one quarter RF wavelength from the cavity. The detector is 60.25" in length and is connected to the MI-60 control room with four 7/8" heliax.

Flying Wires

- Two wire can assemblies, 18" flange to flange, one configured vertically 1m upstream of the multiwire near Q103, one configured horizontally 1m downstream of the Horizontal IPM (Q102). Cabling for motors, resolvers, high voltage and PMT signals up to MI-10 service building where electronics will be located (MI10117).

Ion Profile Monitors

- Two detector assemblies, 18" flange to flange, one configured vertically 1m upstream of the vertical flying wire, one configured horizontally immediately downstream of Q102 with cabling to electronics in the MI-10 service building (MI-10105 & MI-10106).

DCCT

- One detector, 42" flange to flange, suggest it be located in the MI-60 straight section with electronics in MI-60 service building.
 - Locate immediately upstream of the pinger between QF602 & QD603, cabled to the MI-60 SE control interface room (MI60119) with 4-RG8 and 3-twinax cables.

Primary Resistive Wall Monitor

- One 42" detector (6" pipe) located in the MI-60 straight section with cabling to the MI-60 service building control room. Signals dedicated to SBD & FBI.
 - Located upstream of Griffen detector between QF602 and QD603. Cabled to MI-60 SE control interface room (MI60118) using one 7/8" heliax and one 1/2" heliax.

Secondary Resistive Wall Monitor

- One 42" detector located in the MI-60 straight section with cabling to the MI-60 service building control room. For use in machine studies.
 - Located downstream of QF606 and cabled to the MI-60 control room with one 7/8" heliax and one 1/2" heliax.

MI ring BPMs

- 203, installed inside all but 5 quads in the main injector. Cabled with four matched RG-58 cables to the combiner box mounted on the side of the quad. The combiner box is cabled with two RG-8 to the BPM racks in the nearest service building CR. (typically, MIxx114-116)

Large Aperture BPMs

- 5 booster style BPMs, 7-3/8" in length, located at Q101, Q402, Q522, Q608 and Q620. Cabled with 4 RG-8 to the BPM racks of the nearest service building CR.

Toroids

- 2 Pearson model 2854 with ceramic gaps, 16" flange to flange, one near Q102 and cabled with one RG58 and one 3/8" heliax to MI-10 (MI-10117), the other near Q521 and cabled the same to the MI-52 kicker building.

Dampers

- One horizontal and one vertical.
 - Horizontal has a 20.25" detector located 5.34m upstream of Q304 and a 48.25" kicker located 5.34m downstream of Q306 (center to center)
 - Vertical has a 20.25" detector located 6.52m upstream of Q305 and a 48.25" kicker located 6.52m downstream of Q307 (center to center)
- Each detector cabled with two 1/2" heliax to MI-30 CR (MI30105), each kicker cabled with four 1/2" heliax to the MI-30 kicker room.

Schottky

- A horizontal 24" FtoF detector located immediately downstream of QF602 and a vertical 24" FtoF detector located immediately upstream of QD603. Each detector cabled with two 1/2" heliax to the MI-60 SE control interface room (MI60119).

Multiwire

- Two multiwire assemblies, 16.75" flange to flange. Located 1 meter downstream of the horizontal FW (~Q102) and the other located immediately upstream of the kickers at Q103, cabled with a 26C RG-174 bundle and a 10C #22 cable to electronics in the MI-10 service building (MI10117).

Transverse Wideband Pickups

- Two stripline detectors (H&V), 64" flange to flange. Horizontal detector located immediately downstream of the horizontal schottky (QF602), Vertical detector located immediately upstream of the vertical schottky (QD603). Each detector cabled with four 1/2" heliax to MI-60 CR.

Pinger

- One Pinger reused from the MR(E48). Device is 68.75" long. Located immediately upstream of the vertical wideband stripline (above) near QD603.

Griffen Detector

- Located immediately upstream of the DCCT between QF602 and QD603. Cabled with two 7/8" heliax to the MI-60 CR.

Abort Toroid

- Pearson 3100 located at upstream end of abort line air gap. Cabled with one 3/8" heliax and one RG58 to the MI-40 service building (MI-40105).

Abort SWIC

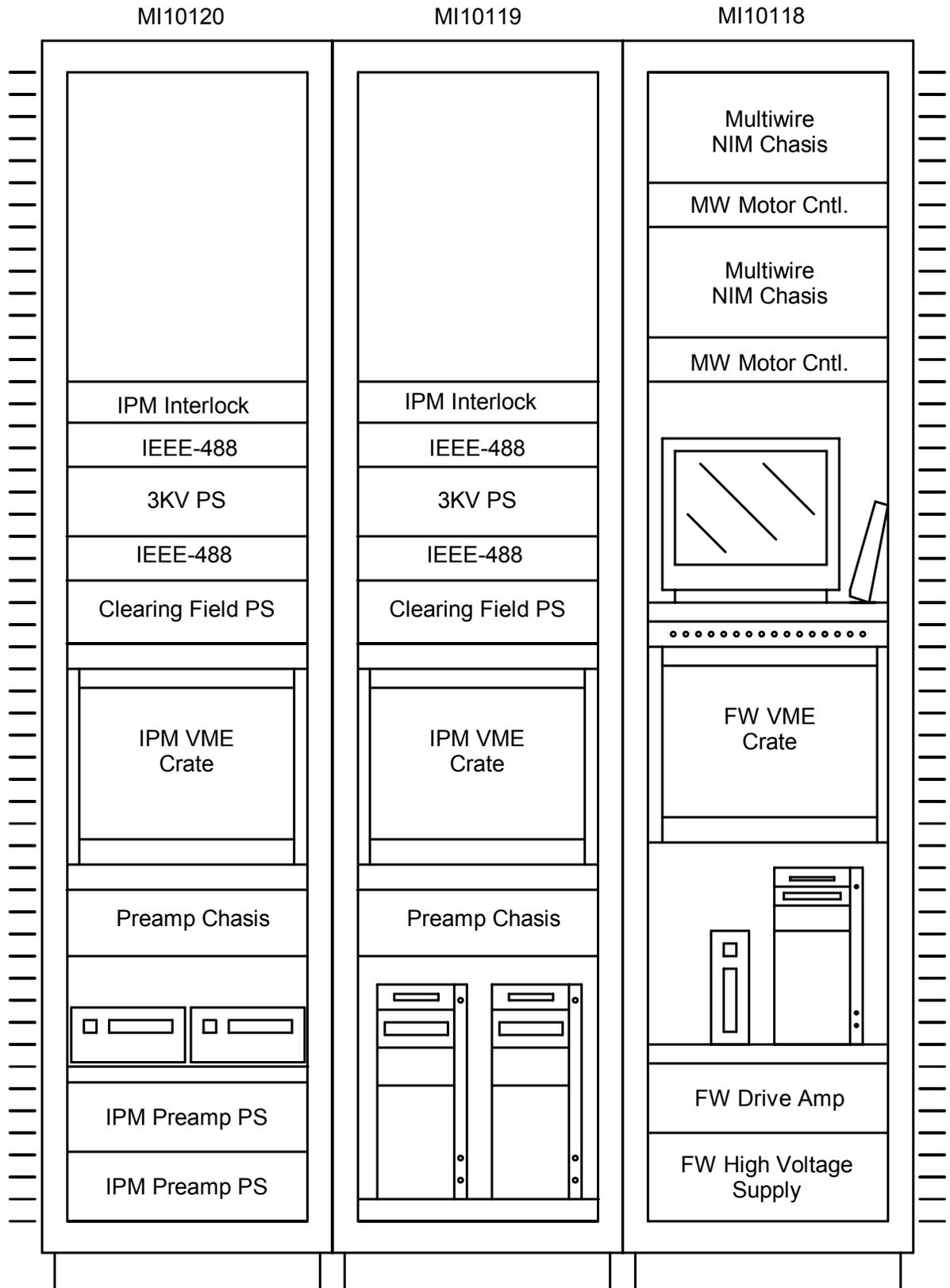
- Located at the downstream end of the abort line air gap cabled with one RG58 and two Beldon #8773 to the MI-40 service building (MI-40105).

MI Detector Cable List

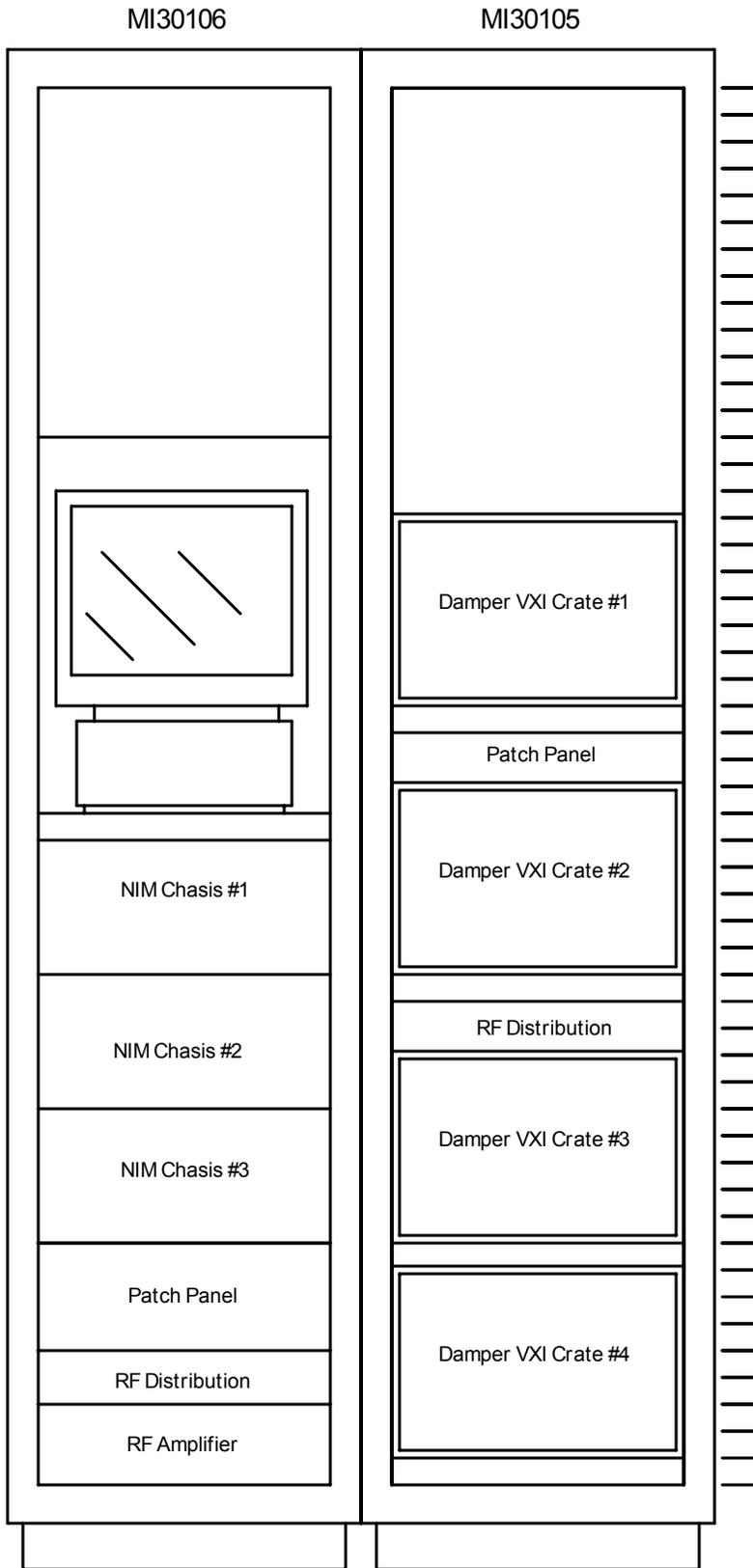
Detector	Detector Location	Electronics Location	Cabling
MI-60 Region Detectors			
MR F10 Stripline	Upstream QF604	MI-60 CR	4 - 7/8" Helix
DCCT	QF602-QD603	MI-60 SE CIR; Rack #MI60119	4 - RG8; 3 - RG108 Twinax
Resistive Wall Mon. #1	QF602-QD603	MI-60 SE CIR; Rack #MI60118	1 - 7/8" Helix; 1 - 1/2" Helix
Resistive Wall Mon. #2	QF602-QD603	MI-60 CR	1 - 7/8" Helix; 1 - 1/2" Helix
Horizontal Schottky	Dnstream QF602	MI-60 SE CIR; Rack #MI60119	2 - 1/2" Helix
Vertical Schottky	Upstream QD603	MI-60 SE CIR; Rack #MI60119	2 - 1/2" Helix
Horiz. Wideband Stripline	QF602-QD603	MI-60 CR	4 - 1/2" Helix
Vertical Wideband Stripline	QF602-QD603	MI-60 CR	4 - 1/2" Helix
Griffen Detector	QF602-QD603	MI-60 CR	2 - 7/8" Helix
MI-10 Region Detectors			
Horizontal IPM	Dnstream Q102	MI-10 CR; Rack #MI10120	2 - RG8-RED; 4 - RG58-RED 4 - 30C bundle RG174
Horizontal Flying Wire	Dnstream Q102	MI-10 CR; Rack #MI10118	2 - Red RG58; 2 - 1/2" Helix 1 - 3PR#18 shielded; 1 - 2C#12 BLDN 8718
Multiwire #MW102	Dnstream Q102	MI-10 CR; Rack #MI10118	2 - 26C bundle RG174; 1 - 10C#22
Vertical IPM	Dnstream Q103	MI-10 CR; Rack #MI10119	2 - RG8-RED; 4 - RG58-RED 4 - 30C bundle RG174

MI Detector Cable List

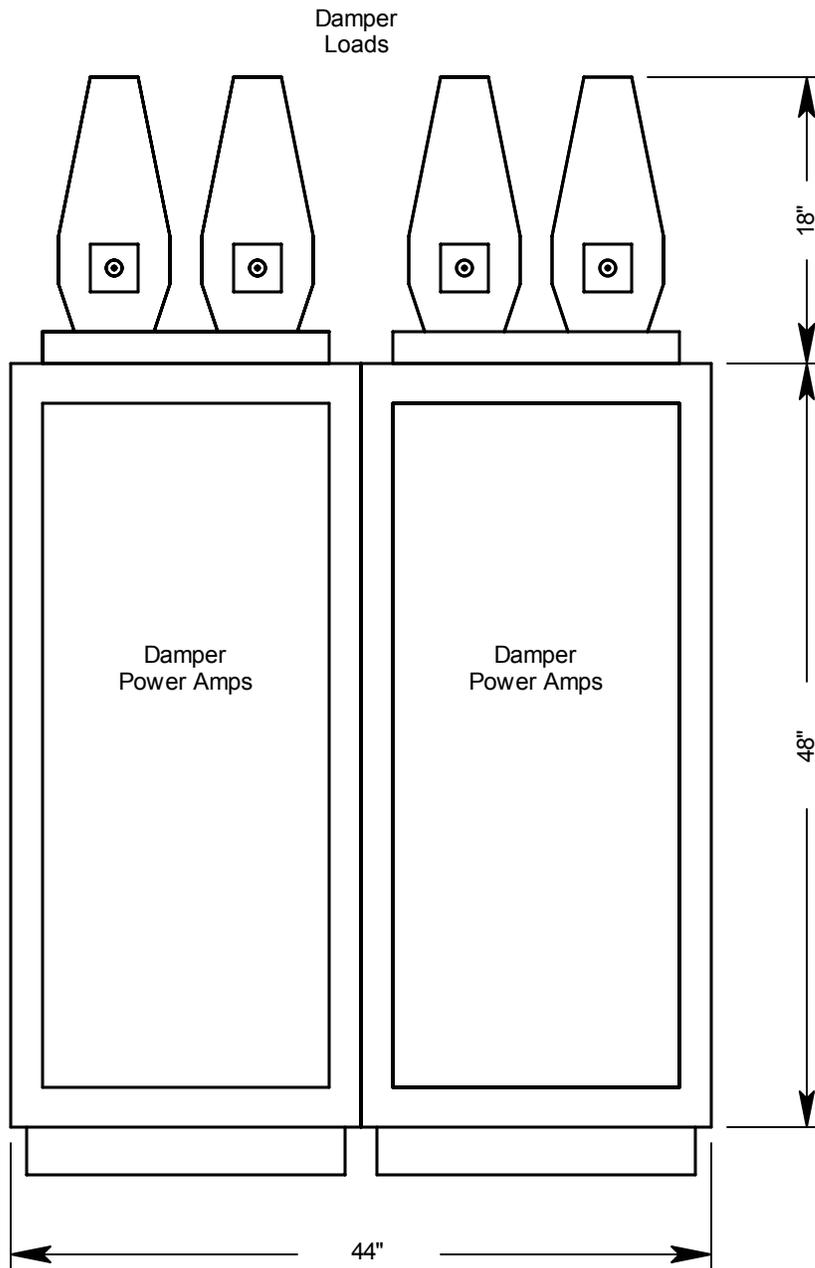
Detector	Detector Location	Electronics Location	Cabling
MI-10 Region Detectors	(continued)		
Vertical Flying Wire	Dnstream Q103	MI-10 CR; Rack #MI10118	2 - Red RG58; 2 - 1/2" Heliac 1 - 3PR#18 shielded; 1 - 2C#12 BLDN 8718
Multiwire #MW103	Dnstream Q103	MI-10 CR; Rack #MI10118	2 - 26C bundle RG174; 1 - 10C#22
Proton Injection Toroid	Upstream Q102	MI-10 CR; Rack #MI10118	1 - 3/8" Heliac; 1 - RG58
Multiwire #MW101	Dnstream Q101	MI-10 CR; Rack #MI10118	2 - 26C bundle RG174; 1 - 10C#22
Multiwire #MW104	Upstream Q104	MI-10 CR; Rack #MI10118	2 - 26C bundle RG174; 1 - 10C#22
Multiwire #MW851	Dnstream Q851	MI-10 CR; Rack #MI10118	2 - 26C bundle RG174; 1 - 10C#22
Multiwire #MW852	Dnstream Q852	MI-10 CR; Rack #MI10118	2 - 26C bundle RG174; 1 - 10C#22
Other Detectors			
Proton Extraction Toroid	Upstream Q521	MI-52; Rack #MI52107	1 - 3/8" Heliac; 1 - RG58
Hor. Damper Pickup	Dnstream Q304	MI-30 CR; Rack #MI30105	2 - 1/2" Heliac
Vert. Damper Pickup	Upstream Q305	MI-30 CR; Rack #MI30105	2 - 1/2" Heliac
Hor. Damper Kicker	Dnstream Q306	MI-30 Kicker Room	4 - 1/2" Heliac
Vert. Damper Kicker	Upstream Q307	MI-30 Kicker Room	4 - 1/2" Heliac
Abort Toroid	ABT Line Air Gap	MI-40 CR; Rack #MI40117	1 - 3/8" Heliac; 1 - RG58
Abort Line SWIC	ABT Line Air Gap	MI-40 CR; Rack #MI40117	2 - 27PR#22 BLDN 8773; 1 - RG58-RED 1 - 1/4" I.D. Argon supply line



Main Injector Transverse Profile Instrumentation
Rack Layout (MI-10)

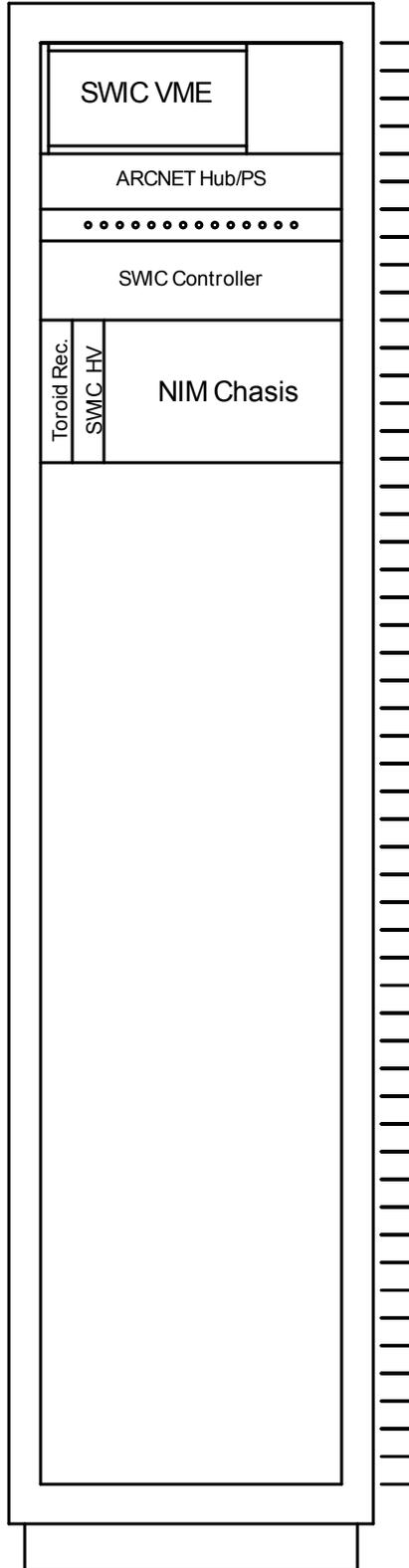


Main Injector Proton Damper Low Level Equipment
Rack Layout (MI-30)



Main Injector Damper High Level Equipment
(MI-30 Kicker Room)

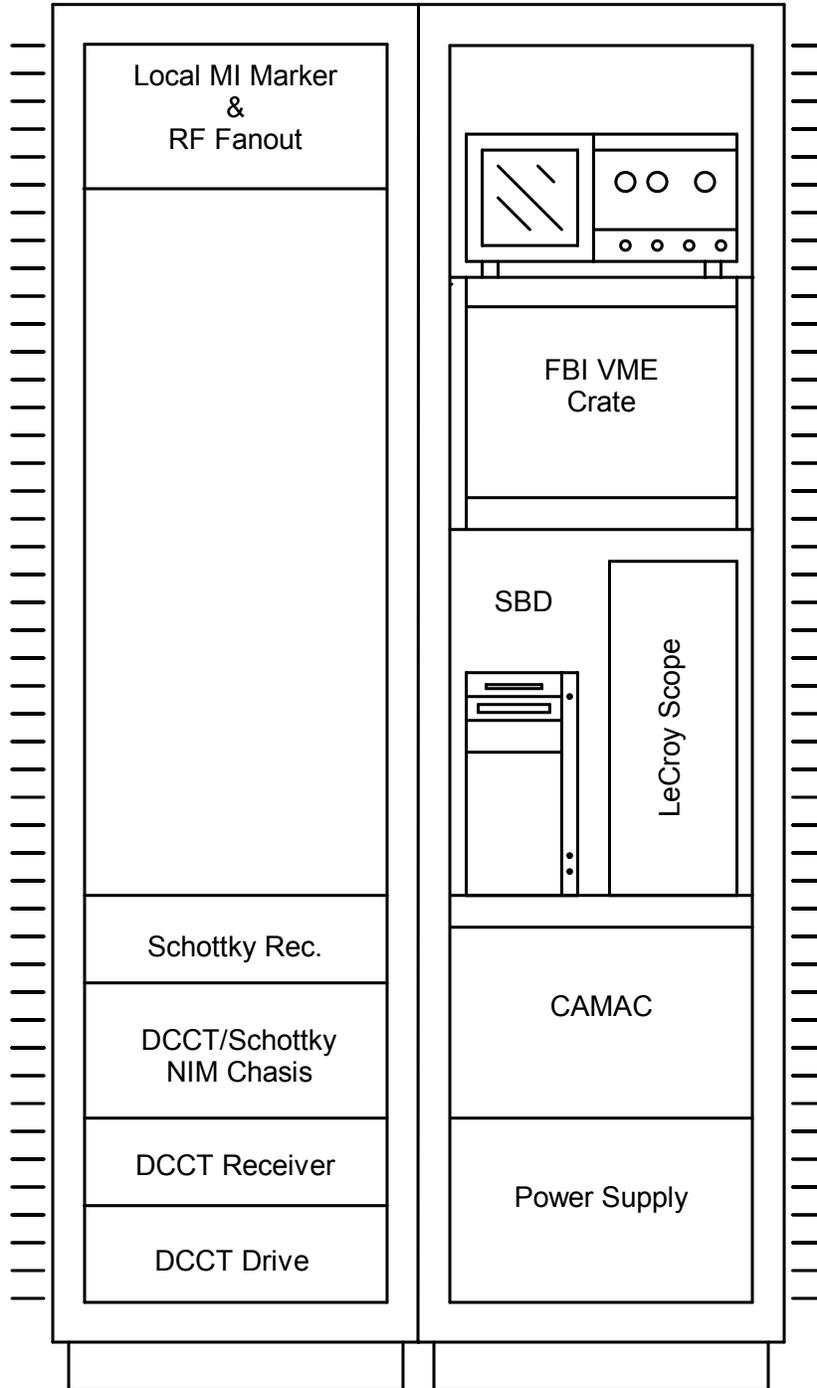
MI40118



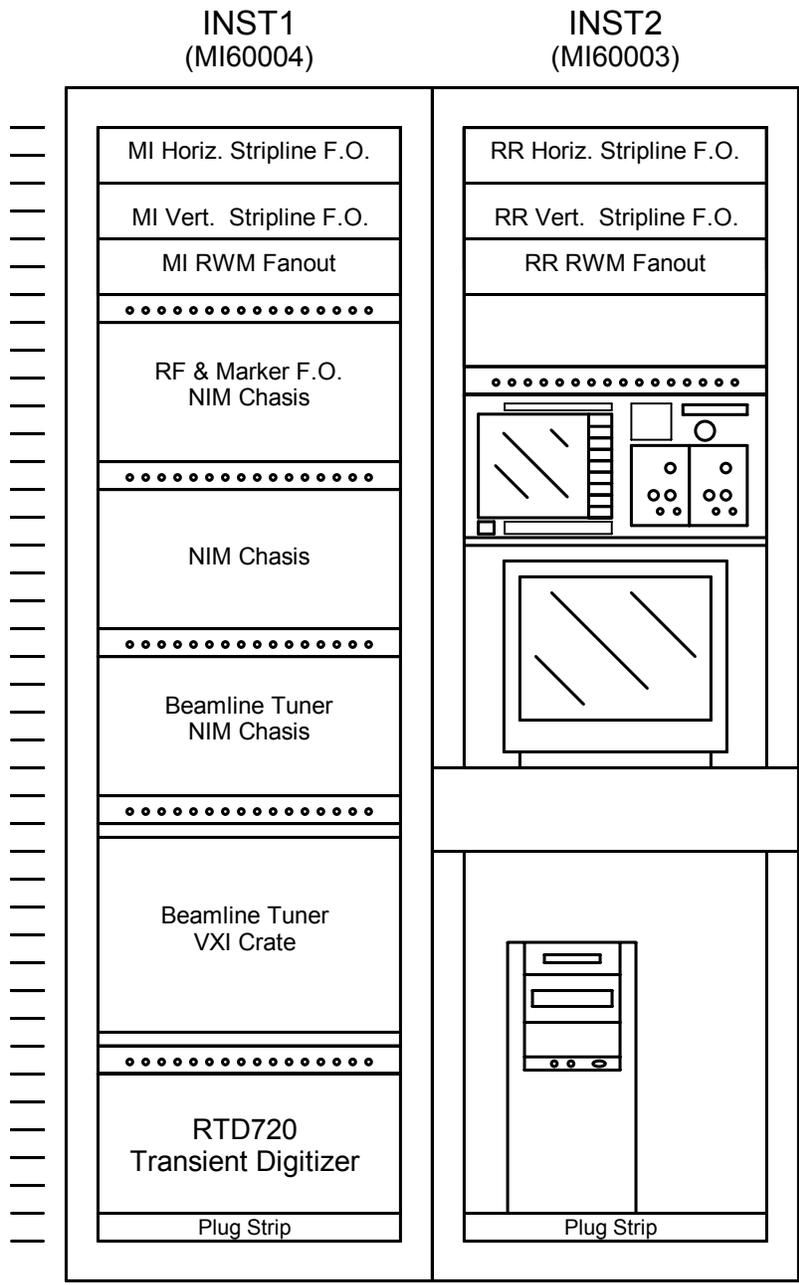
Main Injector Abort Line Instrumentation Rack
Layout (MI-40)

MI60119

MI60118



Main Injector Beam Intensity Monitor
Rack Layout (MI-60)



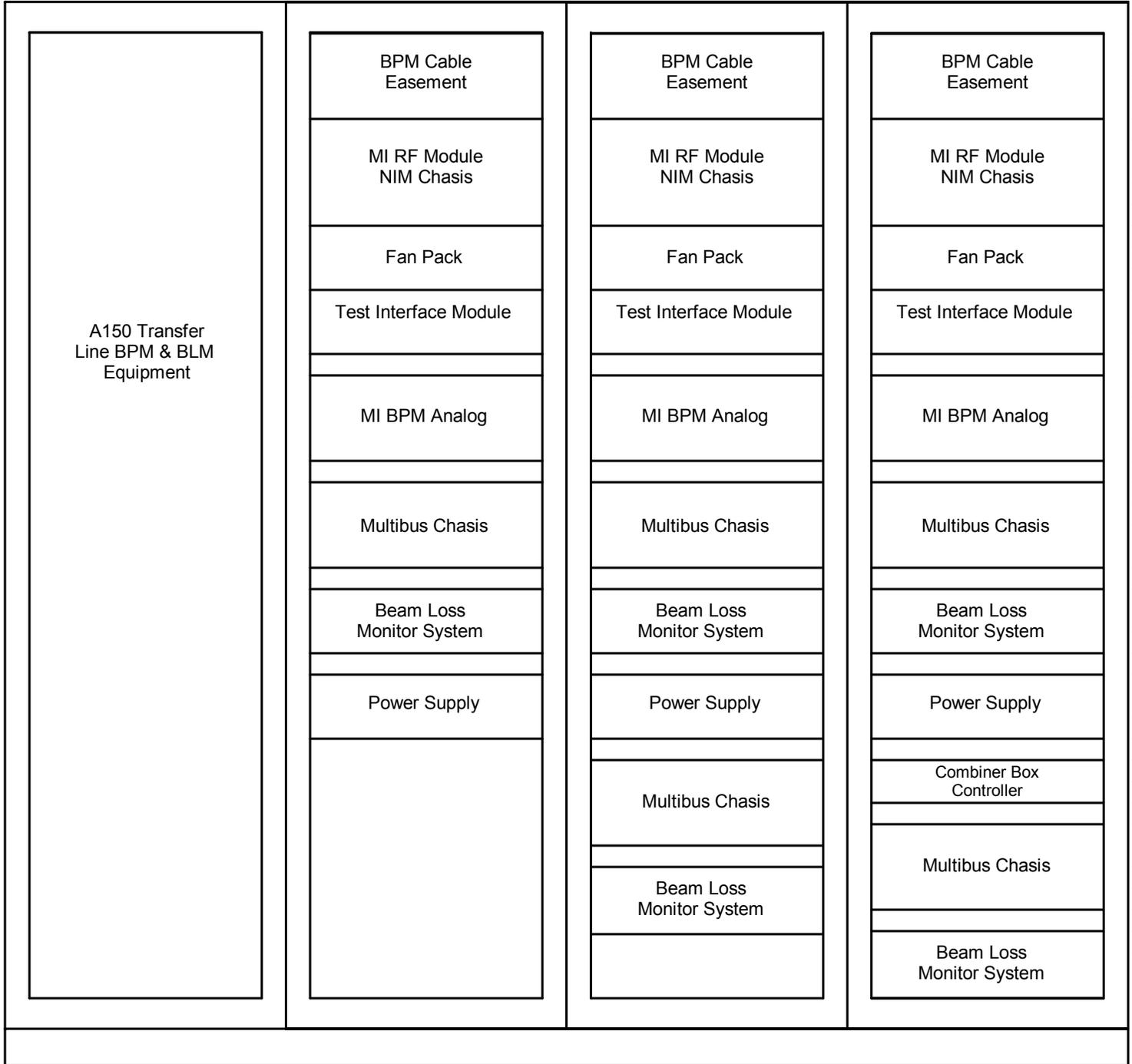
MI-60 Control Room Instrumentation Racks

MI60211

MI60212

MI60213

MI60214

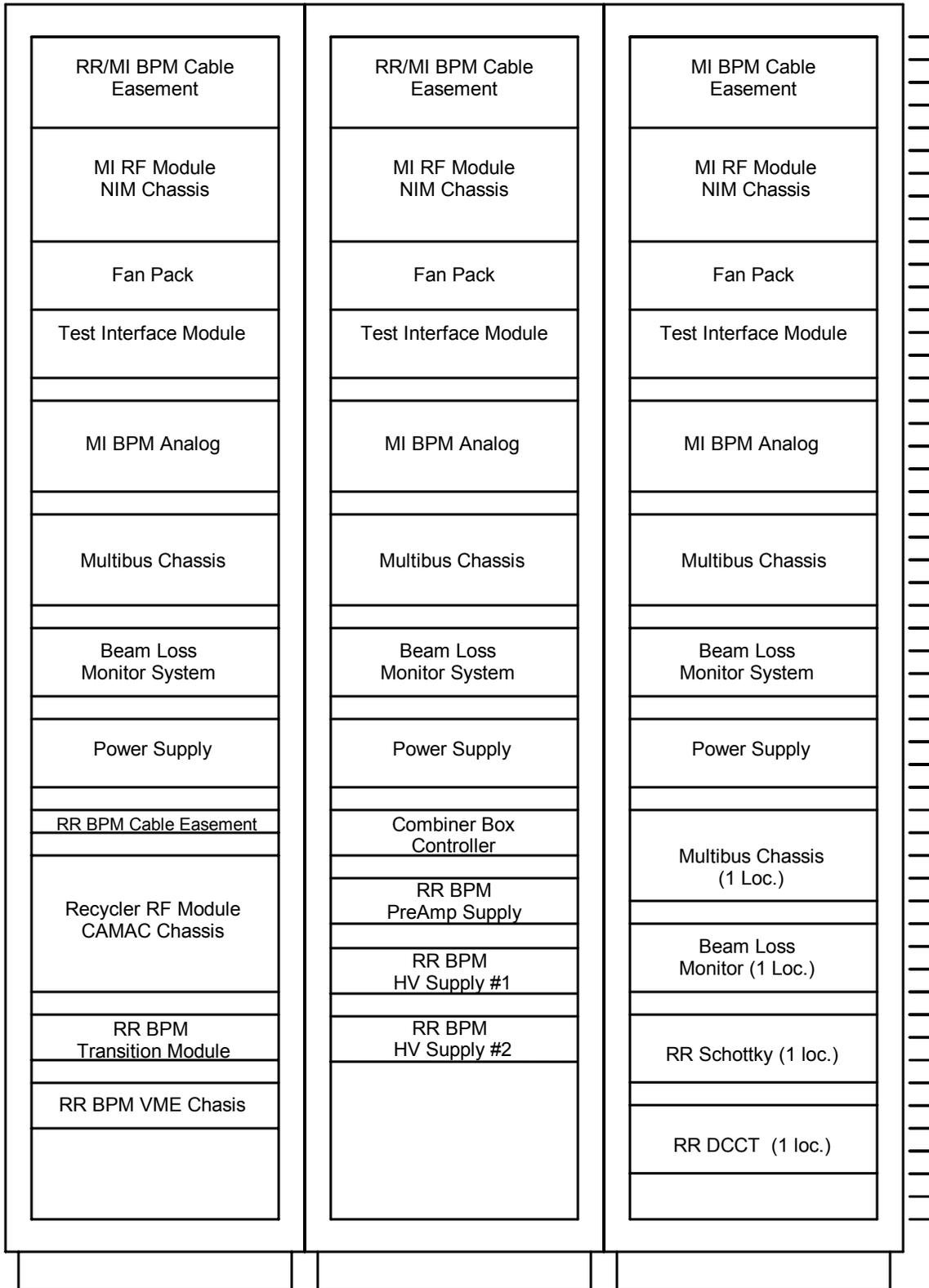


Main Injector BPM/BLM
Rack Layout (MI-60 NW)

MInn116

MInn115

MInn114



Typical Main Injector/ Recycler BPM 8' Rack Layout