



DSG NPS Collaborators' Meeting Update

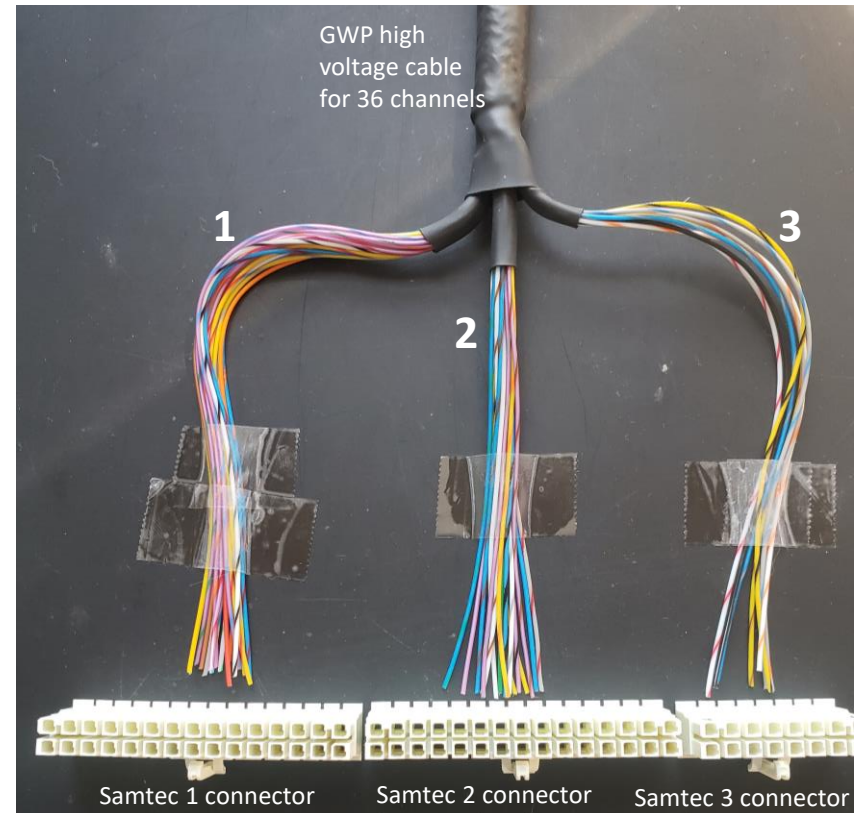
Aaron Brown and the Detector Support Group
02/25/2021

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- Radial-to-SAMTEC High Voltage (HV) Cables
 - Fabrication
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- HV Schematic
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- Conclusion

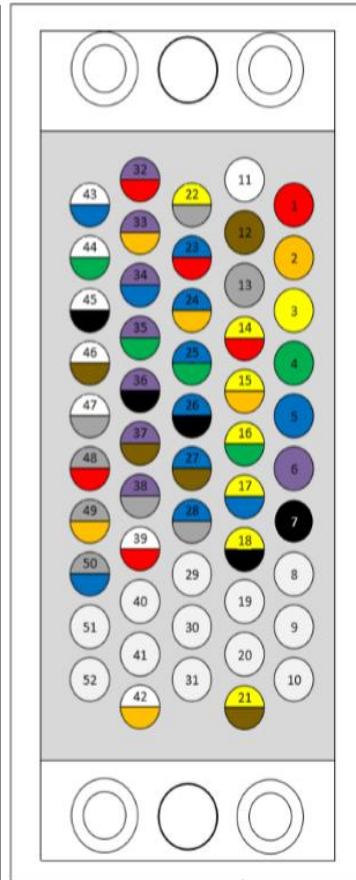
Radial-to-SAMTEC HV Cables: Fabrication

- Cables being fabricated by Mindy Leffel – five of 40 complete
- Grounding wire connected to each braided shield at Radial connector end
- SAMTEC connectors (labeled 1, 2, and 3) have 15, 15, and 6 HV channels, respectively

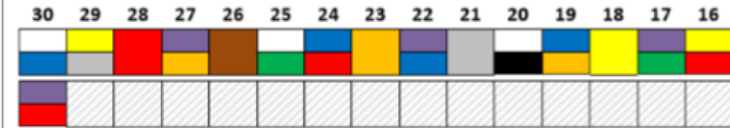


Color Codes

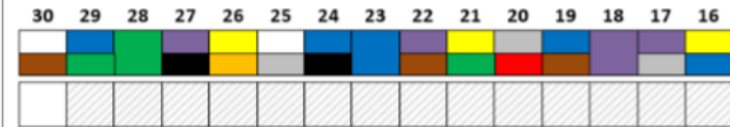
	Radiall 52		Samtec 1 (30pin)	Samtec 2 (30 pin)	Samtec 3 (16 pin)
Channel	Pin Number	Wire color	Pin Number		
HV00	43		30		
HV01	22		29		
HV02	1		28		
HV03	33		27		
HV04	12		26		
HV05	44		25		
HV06	23		24		
HV07	2		23		
HV08	34		22		
HV09	13		21		
HV10	45		20		
HV11	24		19		
HV12	3		18		
HV13	35		17		
HV14	14		16		
HV15	46			30	
HV16	25			29	
HV17	4			28	
HV18	36			27	
HV19	15			26	
HV20	47			25	
HV21	26			24	
HV22	5			23	
HV23	37			22	
HV24	16			21	
HV25	48			20	
HV26	27			19	
HV27	6			18	
HV28	38			17	
HV29	17			16	
HV30	49				16
HV31	28				15
HV32	7				14
HV33	39				13
HV34	18				12
HV35	50				11
Return	11			15	
Return	21				8
Return	32		15		
Safety Loop	42				1



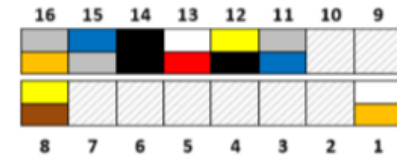
Radiall 52-pin connector (left) and Samtec connectors (right) pin assignments



Samtec 1 connector



Samtec 2 connector

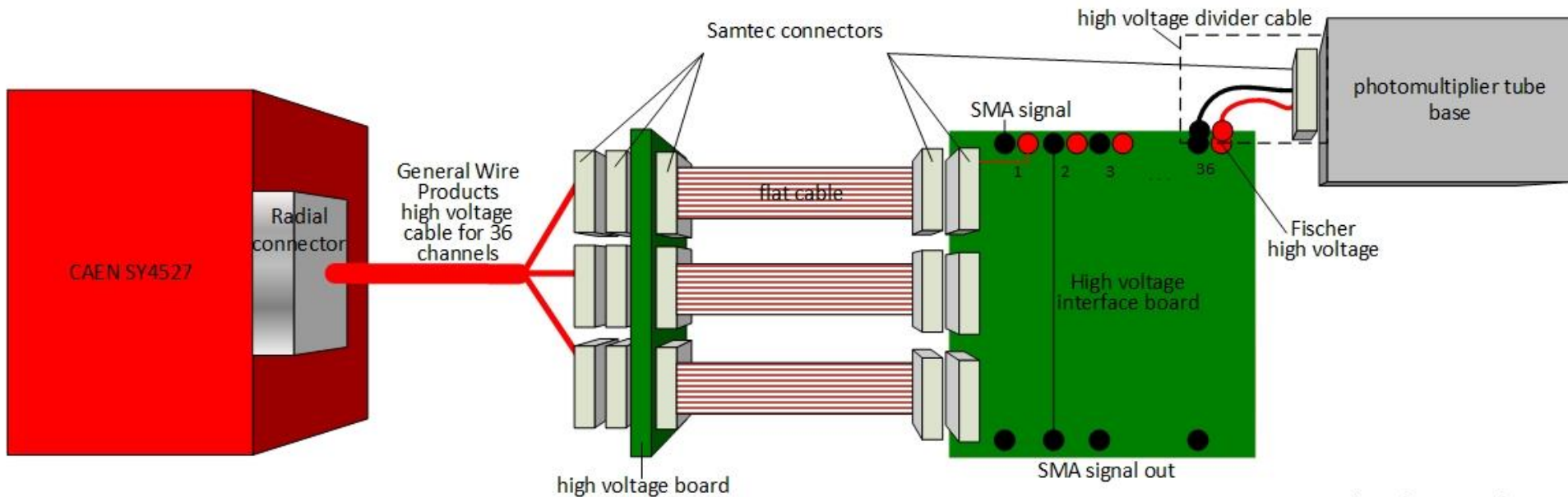


Samtec 3 connector

NPS Samtec Connectors Wire Colors
M. A. Antonioli
01/28/21

Table shows wire color for each HV channel, return, and the safety loop

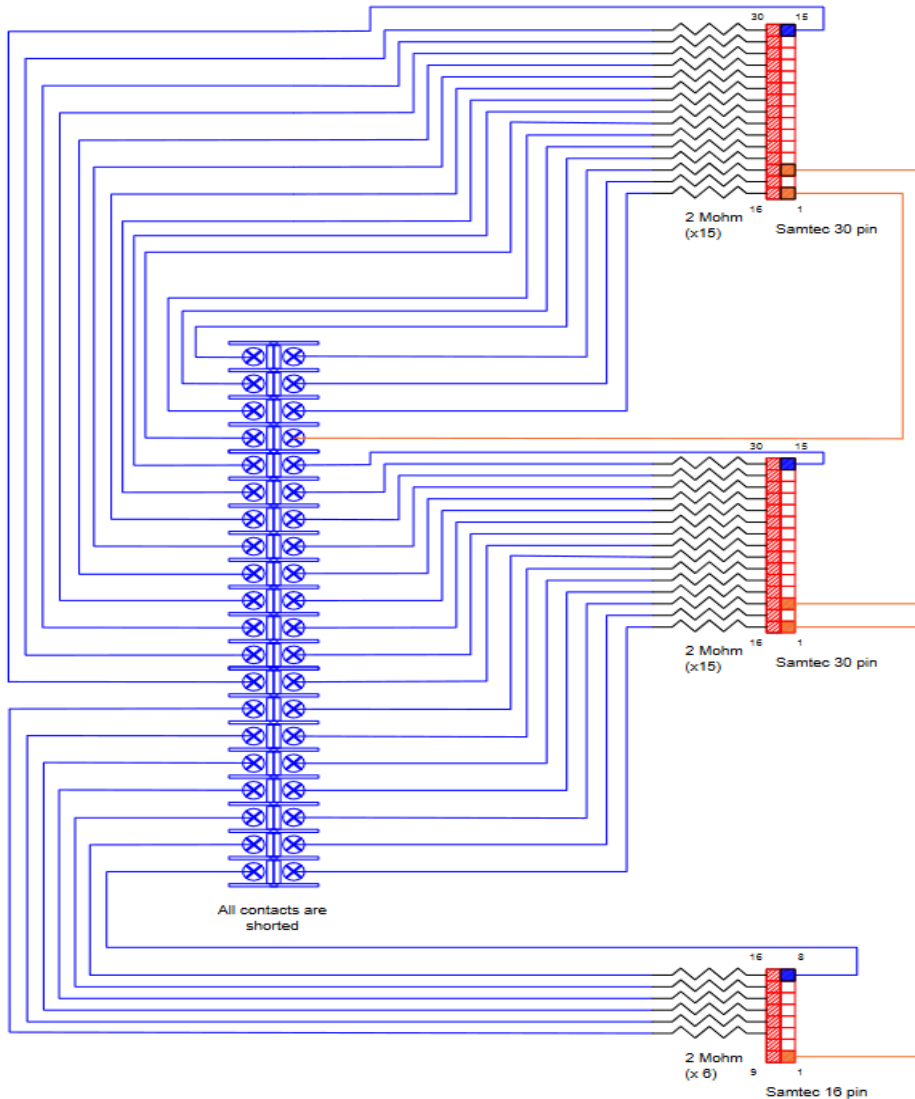
HV Schematic



NPS High Voltage Path
2/23/2021
M. A. Antonioli

- Mindy Leffel is fabricating the high voltage cables

Radial-to-SAMTEC HV Cables: Testing



Test chassis internal schematic developed in AutoCAD

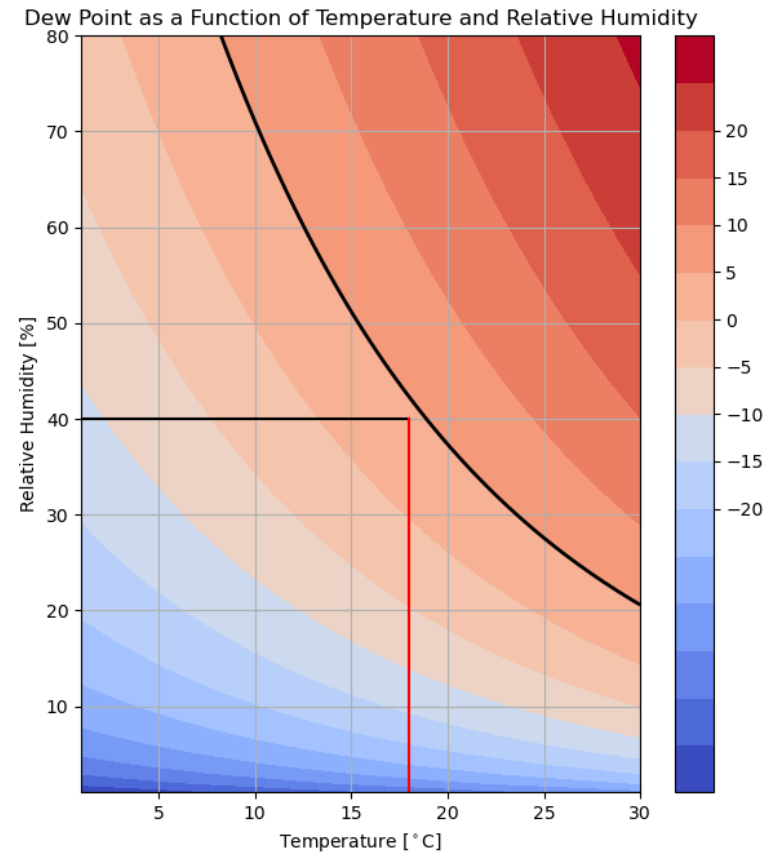
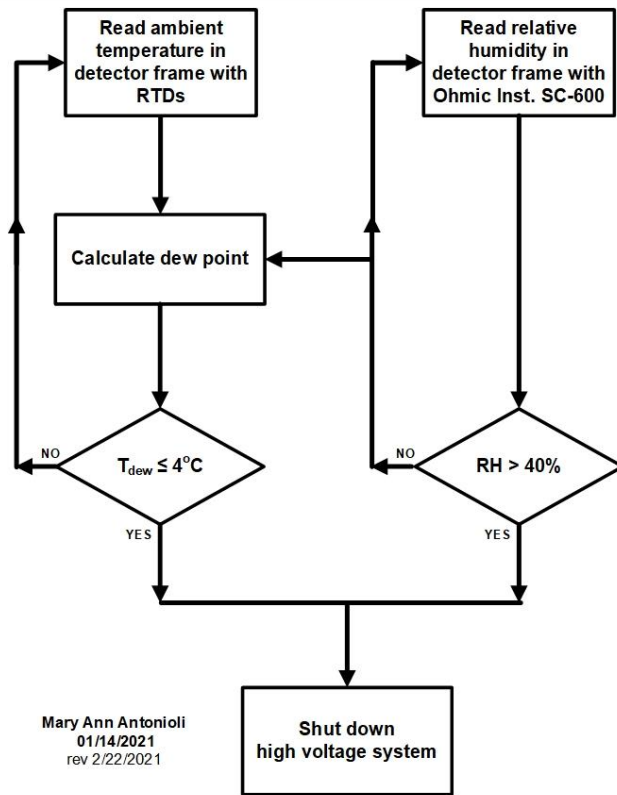
- Testing goals
 - Observe cables' SAMTEC connectors at 1100 V
 - Verify neighboring channels don't change voltage or current if a channel, or adjacent channel, is turned off
- Marc McMullen is developing the Test Chassis

Hardware Interlock System Development

Location	Signal Type	Qty	Sensor	Comments
Crystal array	Temperature	112	Type K thermocouples	Within NPS crystal array (56 front - 56 rear)
Crystal zone cooling circuit	Temperature	4	4-wire RTDs	Dual sensors on input and output coolant manifolds
Electronics zone cooling circuit	Temperature	4	4-wire RTDs	Dual sensors on input and output coolant manifolds
		4		Dual sensors on top and bottom heat exchangers
Detector internal frame	Humidity	20	Resistive RH	Dual humidity sensors in 10 locations
	Temperature	20	4-wire RTDs	Dual temperature sensors in 10 locations
In NPS frame	Switch on/off	2	Coolant leak sensor	Monitors for leaks in the cooling circuits
On frame access panel	Switch on/off	2	Contact micro switch	Protects personnel from HV when servicing
External ambient (Hall)	Temperature	2	4-wire RTDs	
	Humidity	2	Resistive RH	
Crystal zone chiller	Pressure	1	Crystal array zone chiller	All parameters are read from the chiller's RS232 communication port
	Set readback temperature	1		
	Coolant temperature	1		
	Status	1		
Electronics zone chiller	Pressure	1	Electronics zone chiller	All parameters are read from the chiller's RS232 communication port
	Set readback temperature	1		
	Coolant temperature	1		
	Status	1		

- Tentative number of signals: ~180 monitored signals
- Signal readout from sensors
 - To Keysight → cRIO → EPICS
 - To cRIO → EPICS

Hardware Interlock System Development



NPS Hardware Interlock System Fault Chart
Frame Humidity and Dew Point

- Minimum coolant temperature of chiller is 5°C
 - Dew point should be interlocked at $\leq 4^{\circ}\text{C}$
 - For operational temperature of 18°C , max $\text{RH} \leq 40\%$
 - Providing margins for humidity and temperature sensors accuracies

CSS-BOY Screens Development

00-35 ●	01-35 ●	02-35 ●	03-35 ●	04-35 ●	05-35 ●
00-34 ●	01-34 ●	02-34 ●	03-34 ●	04-34 ●	05-34 ●
00-33 ●	01-33 ●	02-33 ●	03-33 ●	04-33 ●	05-33 ●
00-32 ●	01-32 ●	02-32 ●	03-32 ●	04-32 ●	05-32 ●
00-31 ●	01-31 ●	02-31 ●	03-31 ●	04-31 ●	05-31 ●
00-30 ●	01-30 ●	02-30 ●	03-30 ●	04-30 ●	05-30 ●
00-29 ●	01-29 ●	02-29 ●	03-29 ●	04-29 ●	05-29 ●
00-28 ●	01-28 ●	02-28 ●	03-28 ●	04-28 ●	05-28 ●
00-27 ●	01-27 ●	02-27 ●	03-27 ●	04-27 ●	05-27 ●
00-26 ●	01-26 ●	02-26 ●	03-26 ●	04-26 ●	05-26 ●
00-25 ●	01-25 ●	02-25 ●	03-25 ●	04-25 ●	05-25 ●

Snippet of Module/Channel Power CSS-BOY screen

- Screen enables user to turn off channels individually
- Buttons to be added
 - Turn off slot
 - Turn off crate
 - Turn off both crates

Conclusion

Work is progressing smoothly

Thank You