

The system:

- distribution of the RF signals
- from the cavity/klystron
- to the low-level loops, measurement points and interlocks

Some issues:

- some signal paths are sensitive to the reflections from unterminated ends
- minimize group delay for critical cables
- organization of high number of cables in one rack
- some cables used as attenuators – cooling and proper laying
- custom developed RF manipulation devices for better performance
- use of “intelligent” patch panels
- try to prevent any unnecessary transitions and connections
- cost of one coaxial joint: ~40 to ~100 CHF
- together ~900 RF manipulation devices, out of which ~500 developed and built in house

Authors:

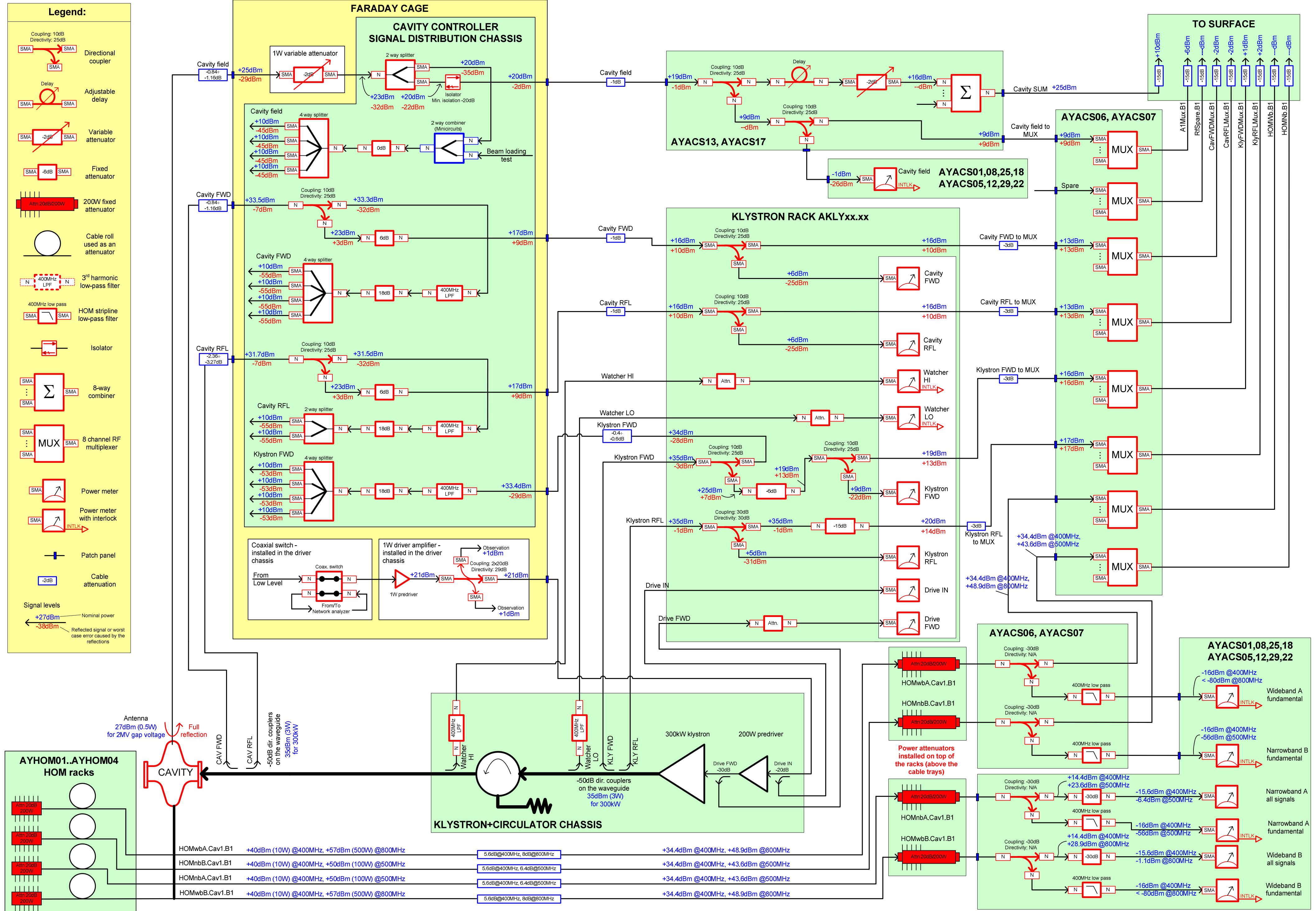
- Philippe Baudrenghien
- Luca Arnaudon
- Daniel Valuch

Signals for one unit:

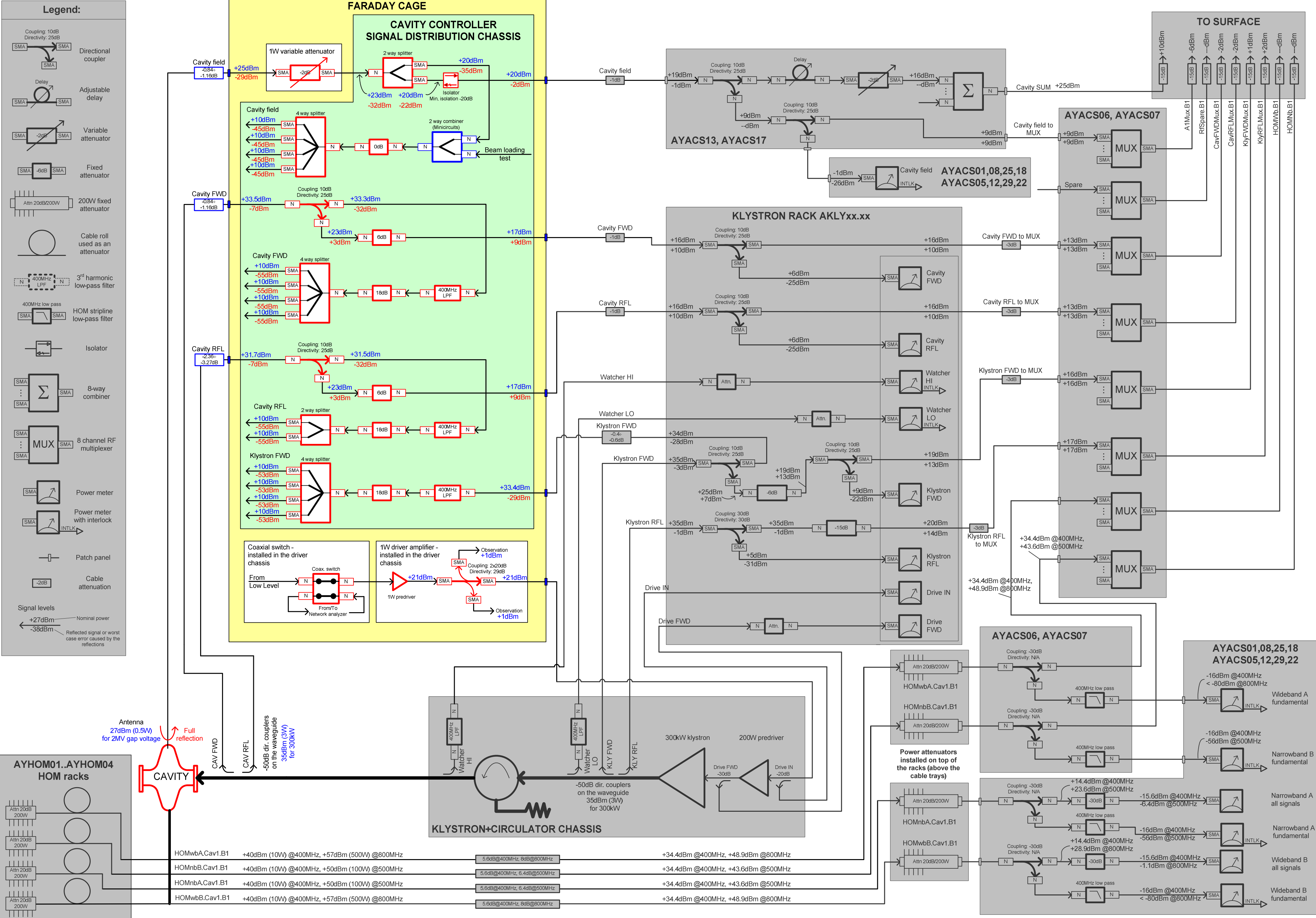
- cavity field (antenna)
- cavity forward
- cavity reflected
- klystron forward
- klystron reflected
- klystron watcher fwd/rfl
- klystron drive fwd/rfl
- cavity HOM narrowband for meas.
- cavity HOM wideband for meas.
- cavity HOM narrowband terminated
- cavity HOM wideband terminated

Signals for one beam:

- RF SUM
- 8 coax links to the surface (RF MUX)



Cavity, Low level and Faraday cage

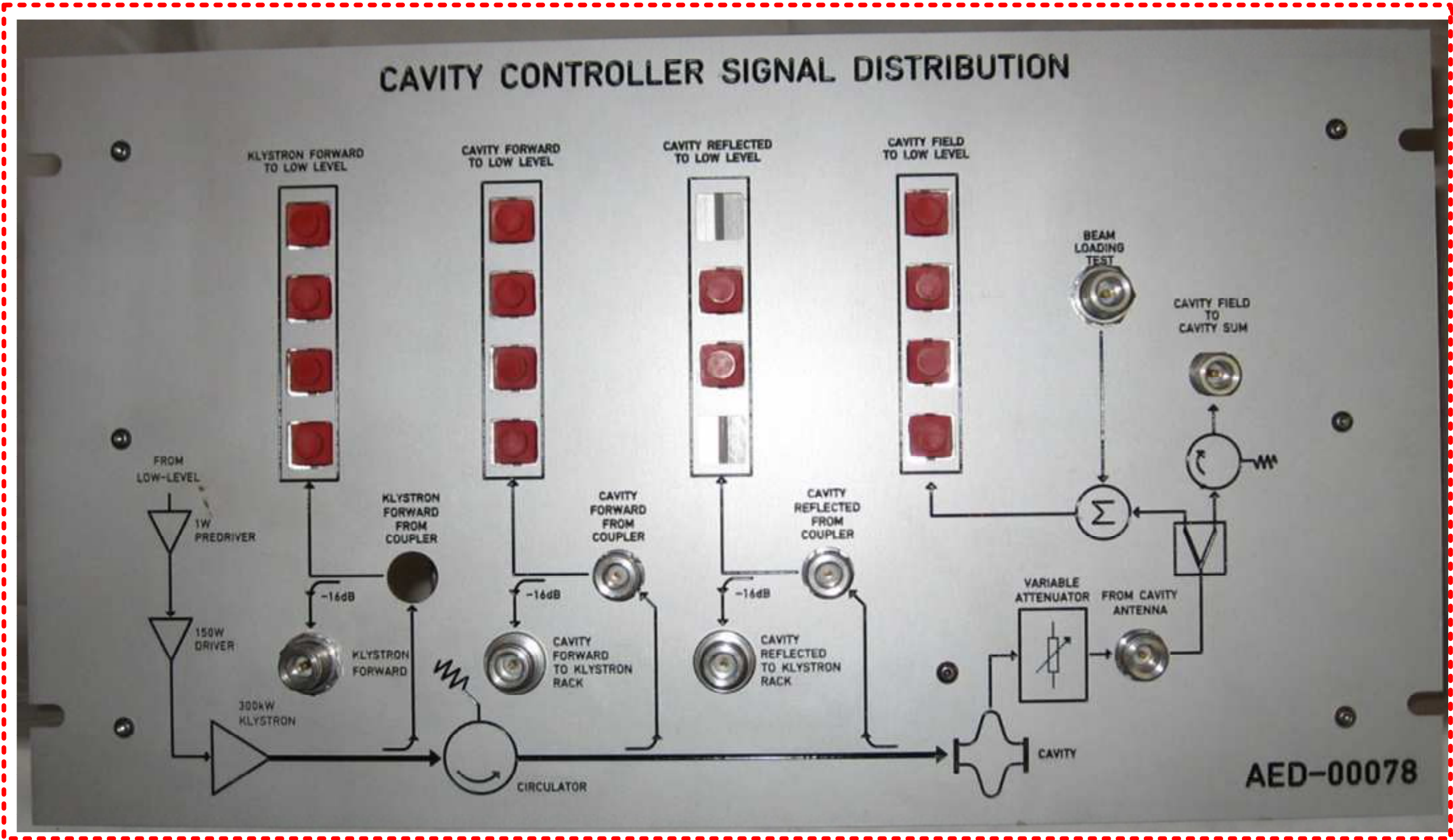


Cavity controller rack (Faraday cage)

Rack: AYLL101	Rack: AYLL102	Rack: AYLL103	Rack: AYLL104	Rack: AYLL105	Rack: AYLL106	Rack: AYLL107	Rack: AYLL108	Rack: AYLL109	Rack: AYLL110
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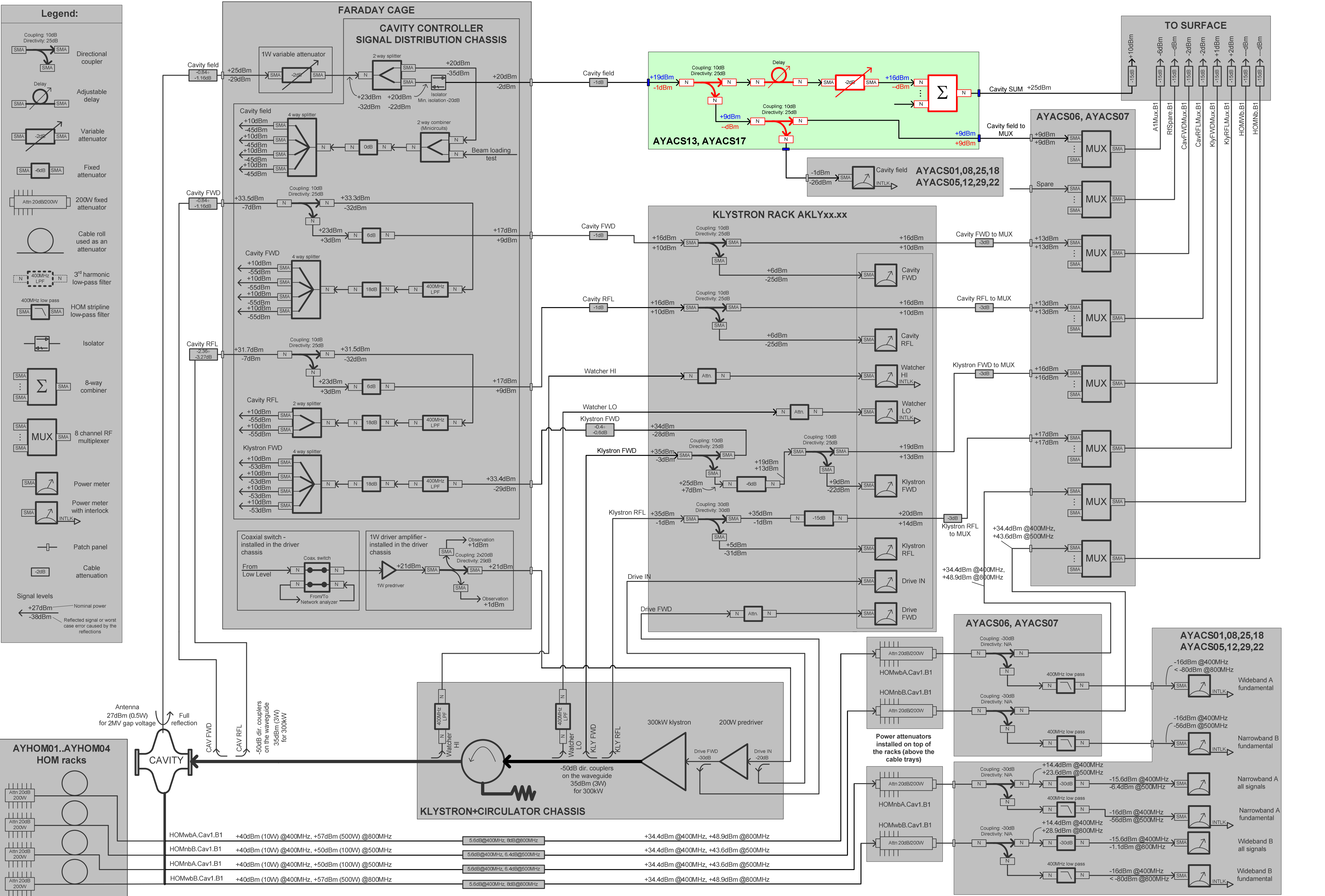
Cavity controller signal distribution chassis:

- one chassis per beam
- provides signal routing for other customers
- 4-way fan-out for the low level systems in the cavity rack
- provides sufficient isolation of the low-level system from a “non-reliable” customer (to keep the control loops stable in case unterminated lines)

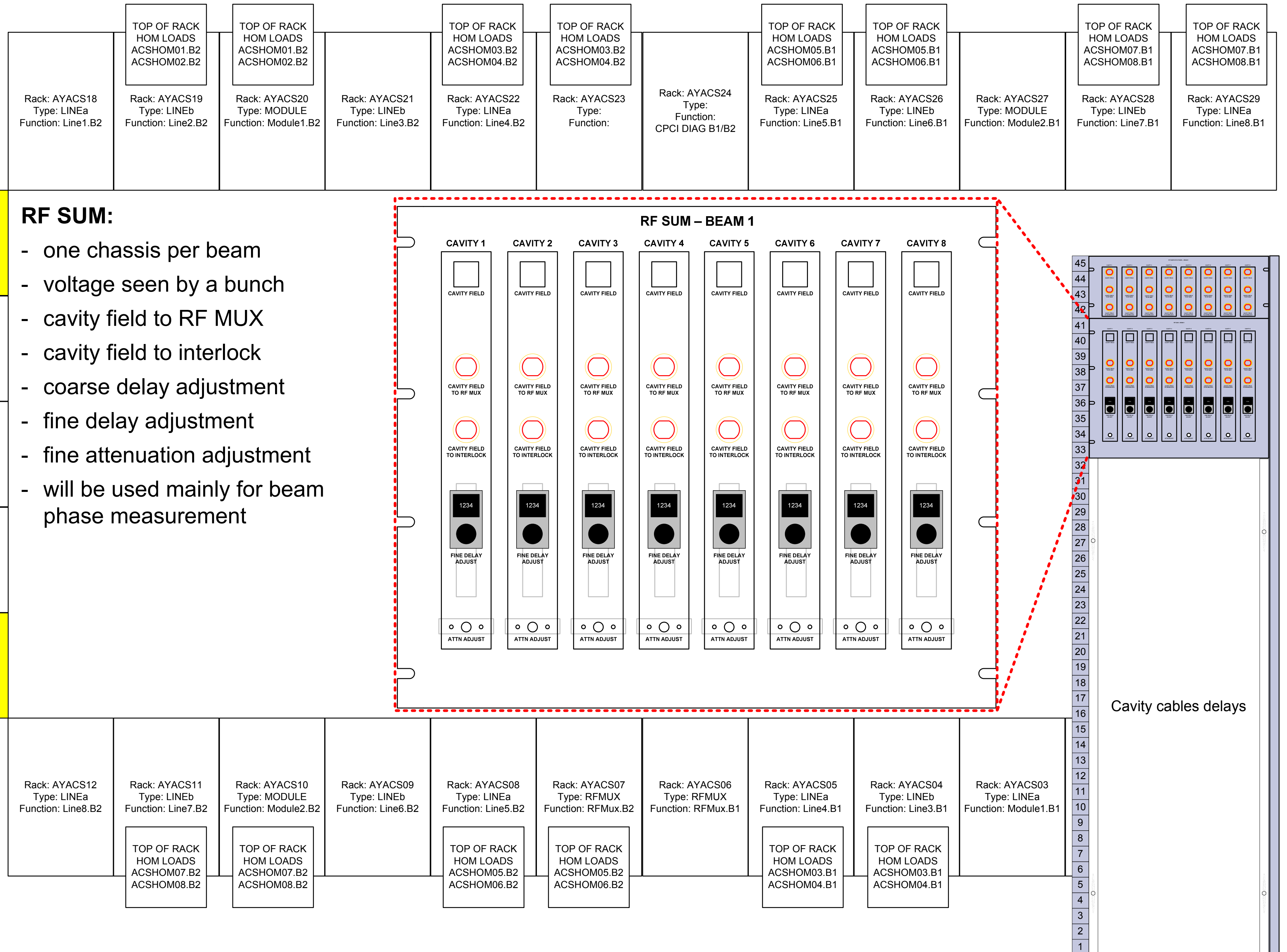


4	3U	patch for cables arriving from the top
5	6U	RF Feedback Special CavContrl VME crate
4	1U	Interconnect
4	2U	Fan
4	4U	Reserved for Instrumentation (Oscilloscope, Counter, Synthesizer)
3	6U	Klystron and Tuner Loop Special CavContrl VME crate
3	1U	Interconnect
3	2U	Fan
2	3U	1W Predriver + Ant. Calib. Attenuator + Coax. switch
2	1U	Fan
1	6U	Cable Manipulation: power splitter, coupler

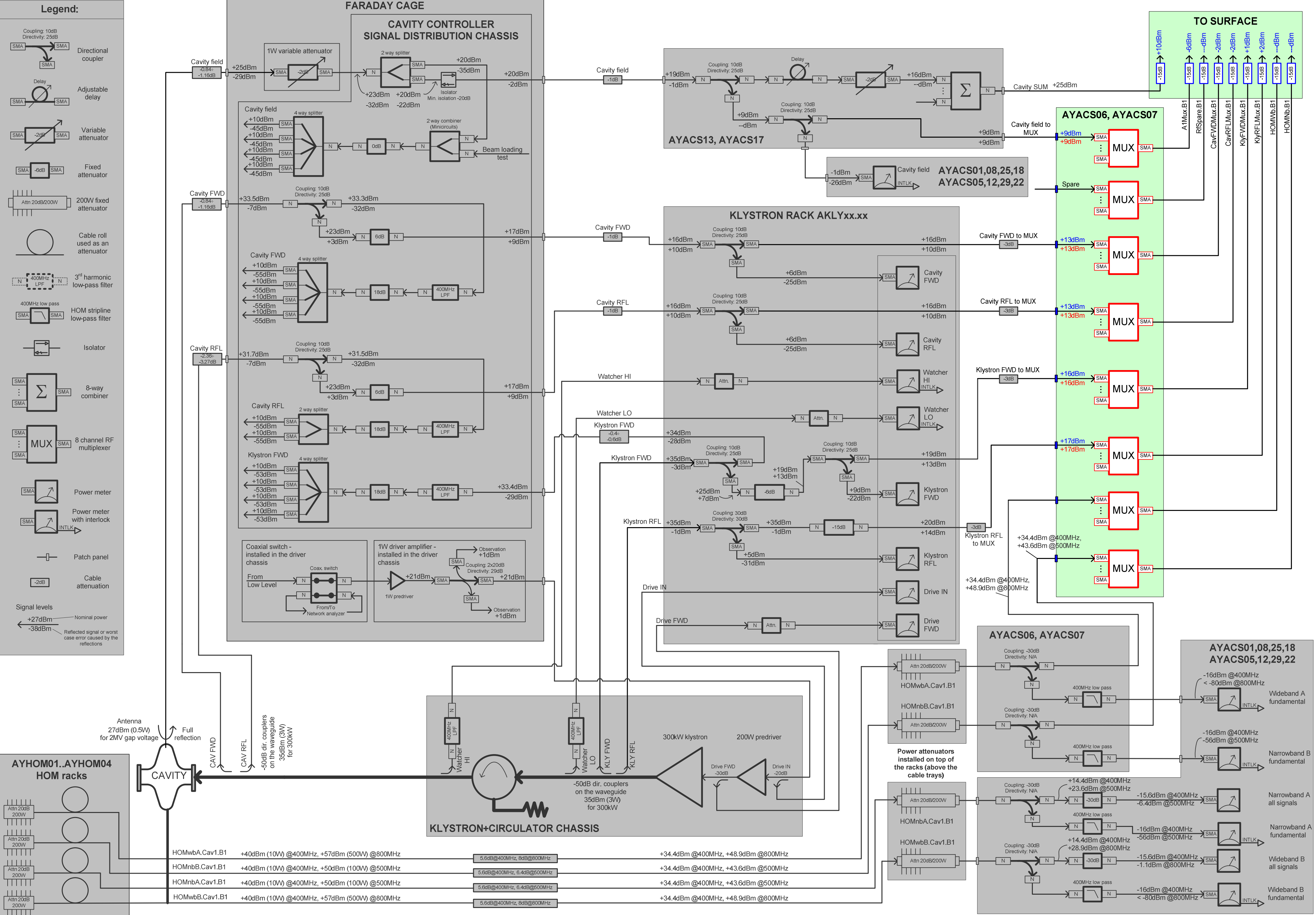
RF sum	
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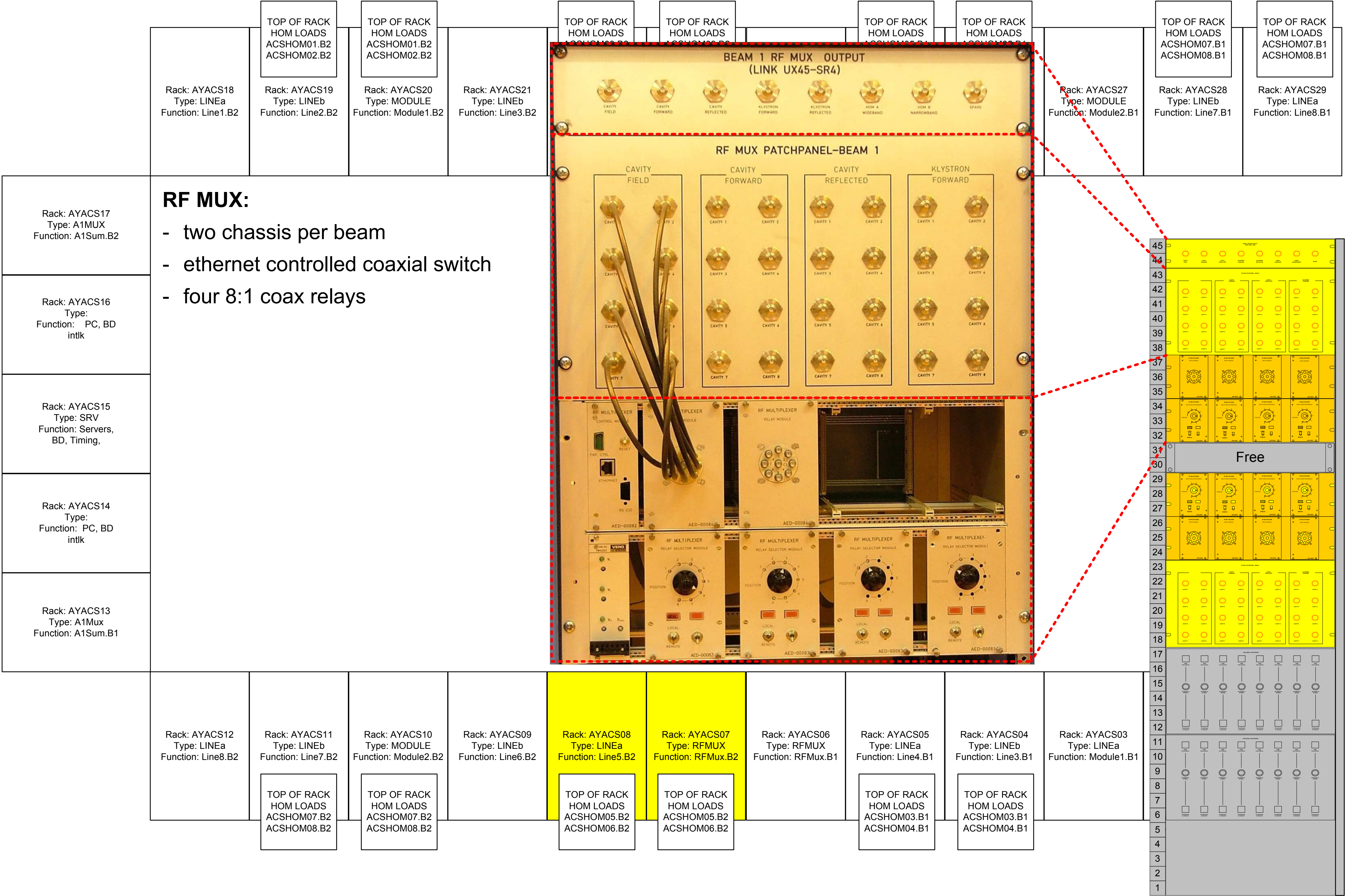
RF SUM



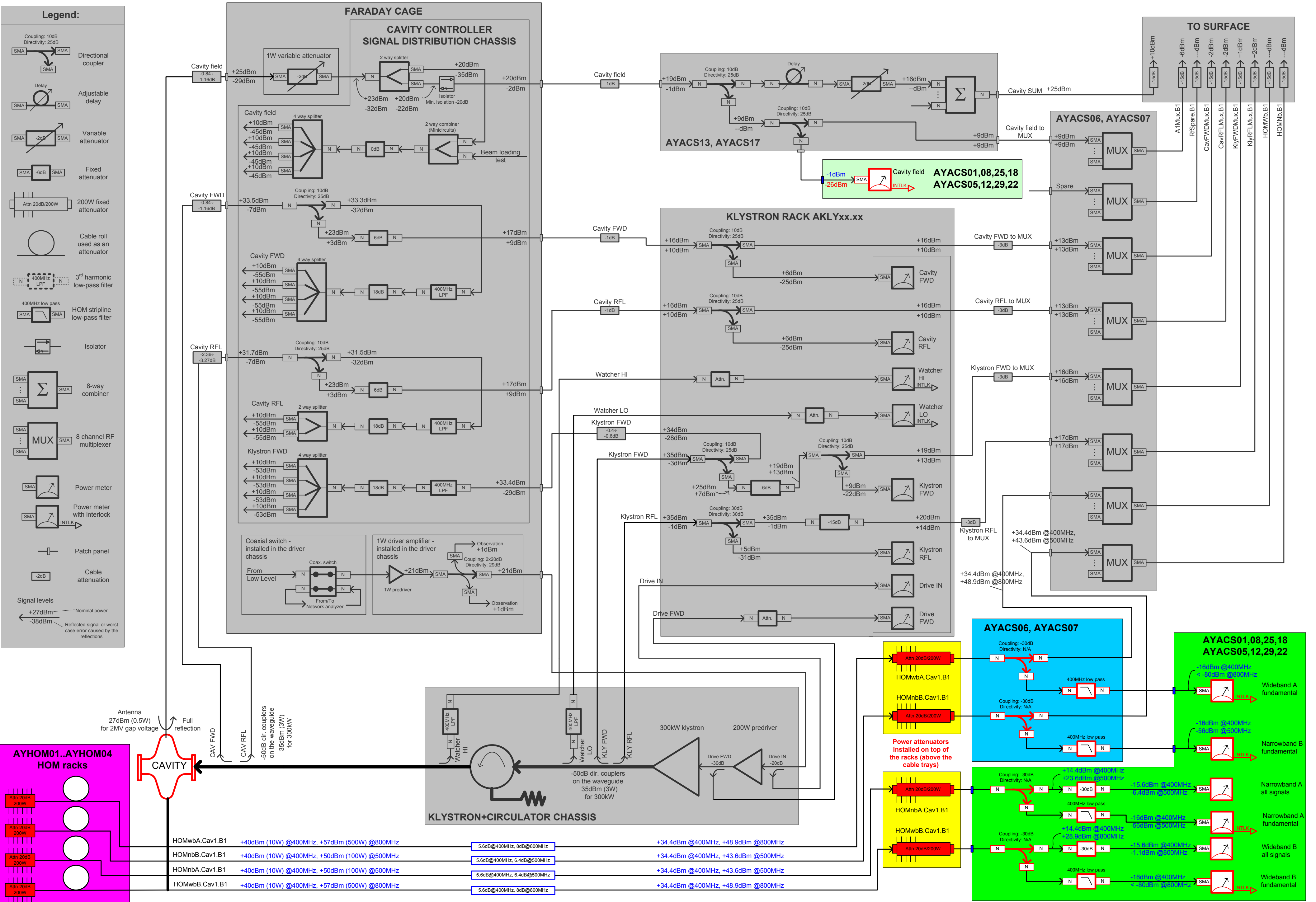
RF MUX	
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RF MUX

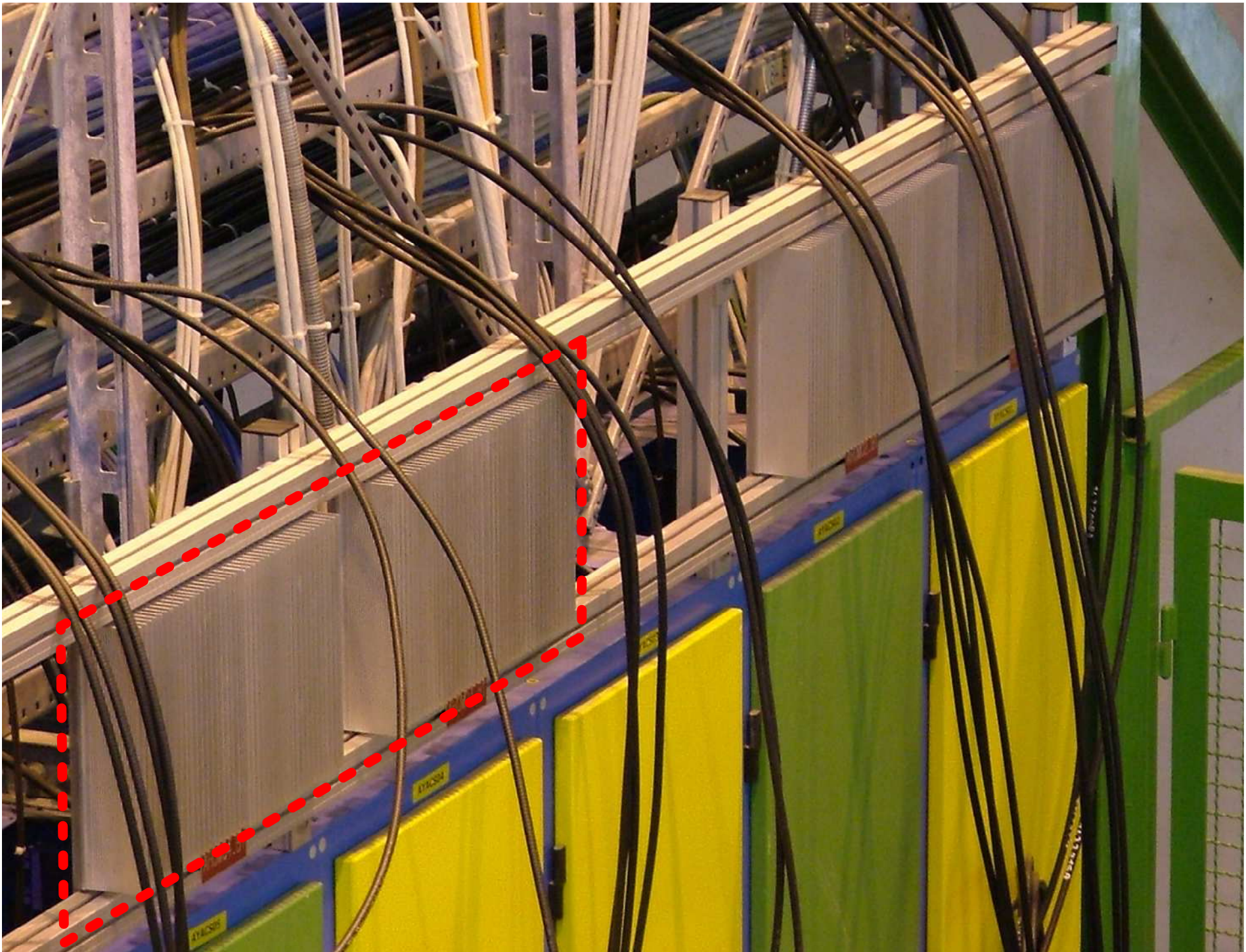


Line racks and HOM treatment

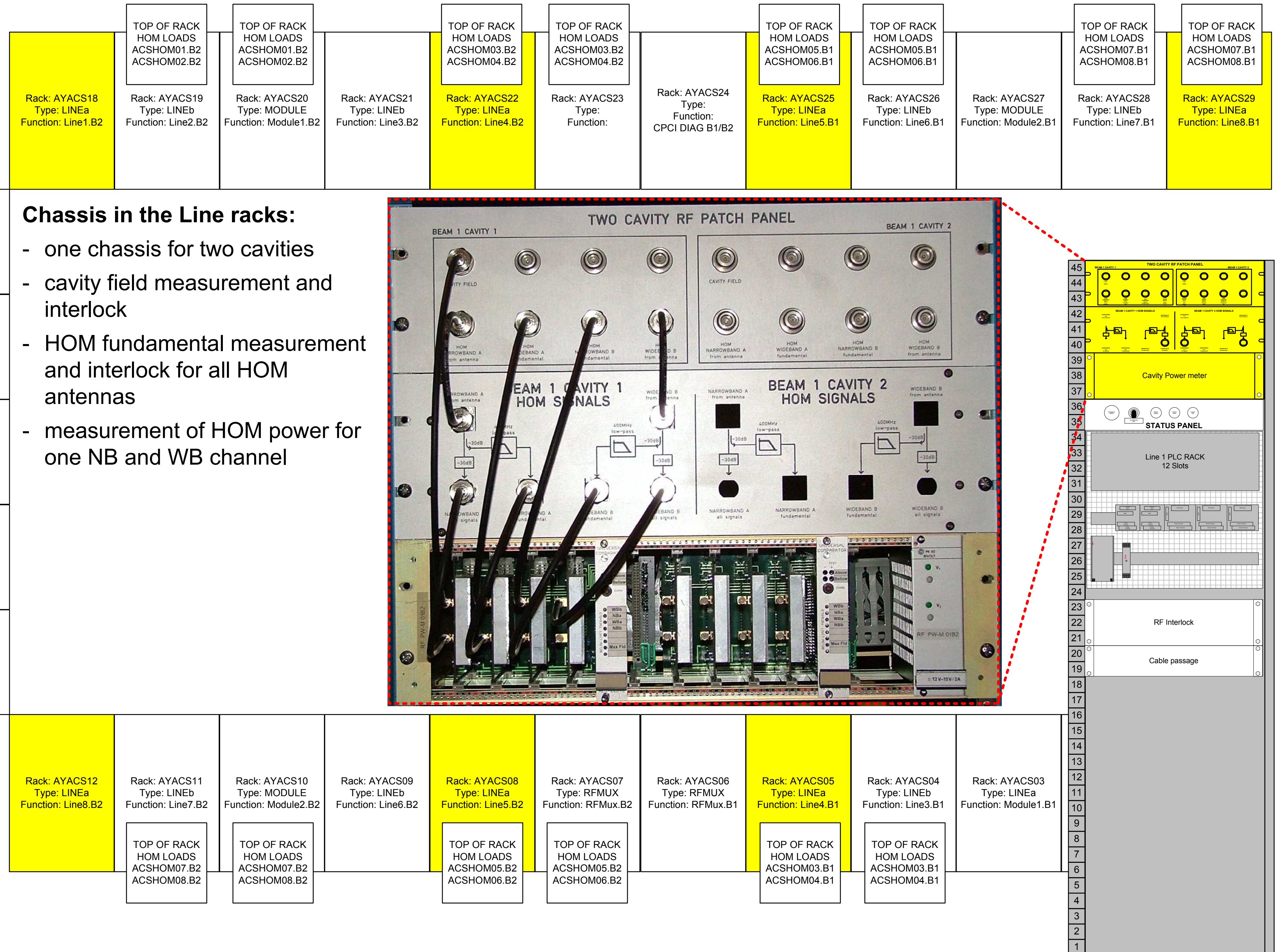


HOM attenuators (on top of the racks)

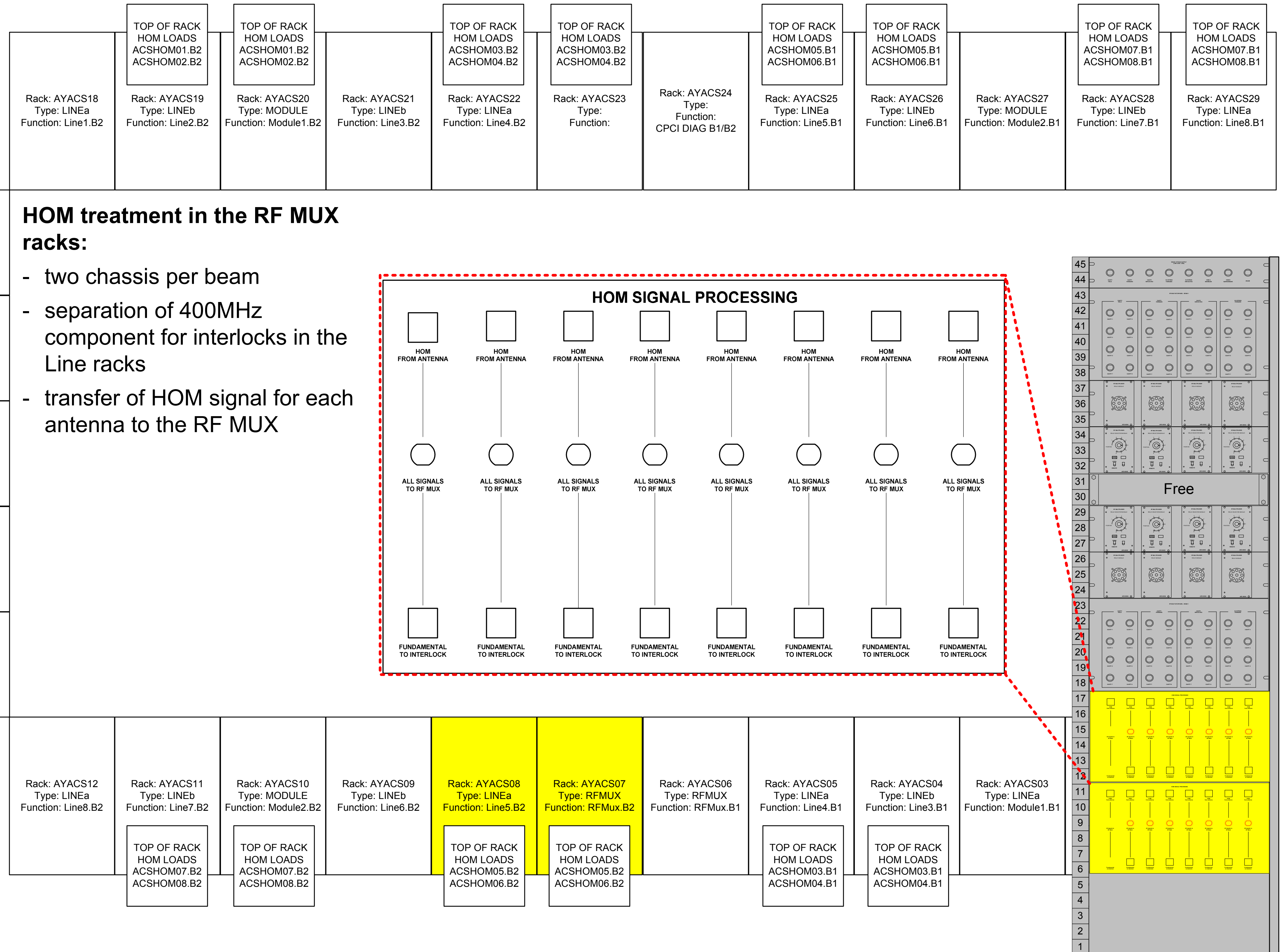
		TOP OF RACK HOM LOADS ACSHOM01.B2 ACSHOM02.B2	TOP OF RACK HOM LOADS ACSHOM01.B2 ACSHOM02.B2		TOP OF RACK HOM LOADS ACSHOM03.B2 ACSHOM04.B2	TOP OF RACK HOM LOADS ACSHOM03.B2 ACSHOM04.B2		TOP OF RACK HOM LOADS ACSHOM05.B1 ACSHOM06.B1	TOP OF RACK HOM LOADS ACSHOM05.B1 ACSHOM06.B1		TOP OF RACK HOM LOADS ACSHOM07.B1 ACSHOM08.B1	TOP OF RACK HOM LOADS ACSHOM07.B1 ACSHOM08.B1
	Rack: AYACS18 Type: LINEa Function: Line1.B2	Rack: AYACS19 Type: LINEb Function: Line2.B2	Rack: AYACS20 Type: MODULE Function: Module1.B2	Rack: AYACS21 Type: LINEb Function: Line3.B2	Rack: AYACS22 Type: LINEa Function: Line4.B2	Rack: AYACS23 Type: Function:	Rack: AYACS24 Type: Function: CPCI DIAG B1/B2	Rack: AYACS25 Type: LINEa Function: Line5.B1	Rack: AYACS26 Type: LINEb Function: Line6.B1	Rack: AYACS27 Type: MODULE Function: Module2.B1	Rack: AYACS28 Type: LINEb Function: Line7.B1	Rack: AYACS29 Type: LINEa Function: Line8.B1
Rack: AYACS17 Type: A1MUX Function: A1Sum.B2	Power attenuators on top of the Line racks: - two heatsinks/four attenuators per cavity - custom developed attenuators, should withstand high peak power - very robust design, internally five stage attenuator 1-1-3-3-12dB, - each chip is 250W Pin capable - the resistive layer is cast in a resin to prevent potential arcing											
Rack: AYACS16 Type: Function: PC, BD intlk												
Rack: AYACS15 Type: SRV Function: Servers, BD, Timing,												
Rack: AYACS14 Type: Function: PC, BD intlk												
Rack: AYACS13 Type: A1Mux Function: A1Sum.B1												
	Rack: AYACS12 Type: LINEa Function: Line8.B2	Rack: AYACS11 Type: LINEb Function: Line7.B2	Rack: AYACS10 Type: MODULE Function: Module2.B2	Rack: AYACS09 Type: LINEb Function: Line6.B2	Rack: AYACS08 Type: LINEa Function: Line5.B2	Rack: AYACS07 Type: RFMUX Function: RFMux.B2	Rack: AYACS06 Type: RFMUX Function: RFMux.B1	Rack: AYACS05 Type: LINEa Function: Line4.B1	Rack: AYACS04 Type: LINEb Function: Line3.B1	Rack: AYACS03 Type: LINEa Function: Module1.B1	Rack: AYACS02 Type: LINEb Function: Line2.B1	Rack: AYACS01 Type: LINEa Function: Line1.B1
		TOP OF RACK HOM LOADS ACSHOM07.B2 ACSHOM08.B2	TOP OF RACK HOM LOADS ACSHOM07.B2 ACSHOM08.B2		TOP OF RACK HOM LOADS ACSHOM05.B2 ACSHOM06.B2	TOP OF RACK HOM LOADS ACSHOM05.B2 ACSHOM06.B2		TOP OF RACK HOM LOADS ACSHOM03.B1 ACSHOM04.B1	TOP OF RACK HOM LOADS ACSHOM03.B1 ACSHOM04.B1		TOP OF RACK HOM LOADS ACSHOM01.B1 ACSHOM02.B1	TOP OF RACK HOM LOADS ACSHOM01.B1 ACSHOM02.B1



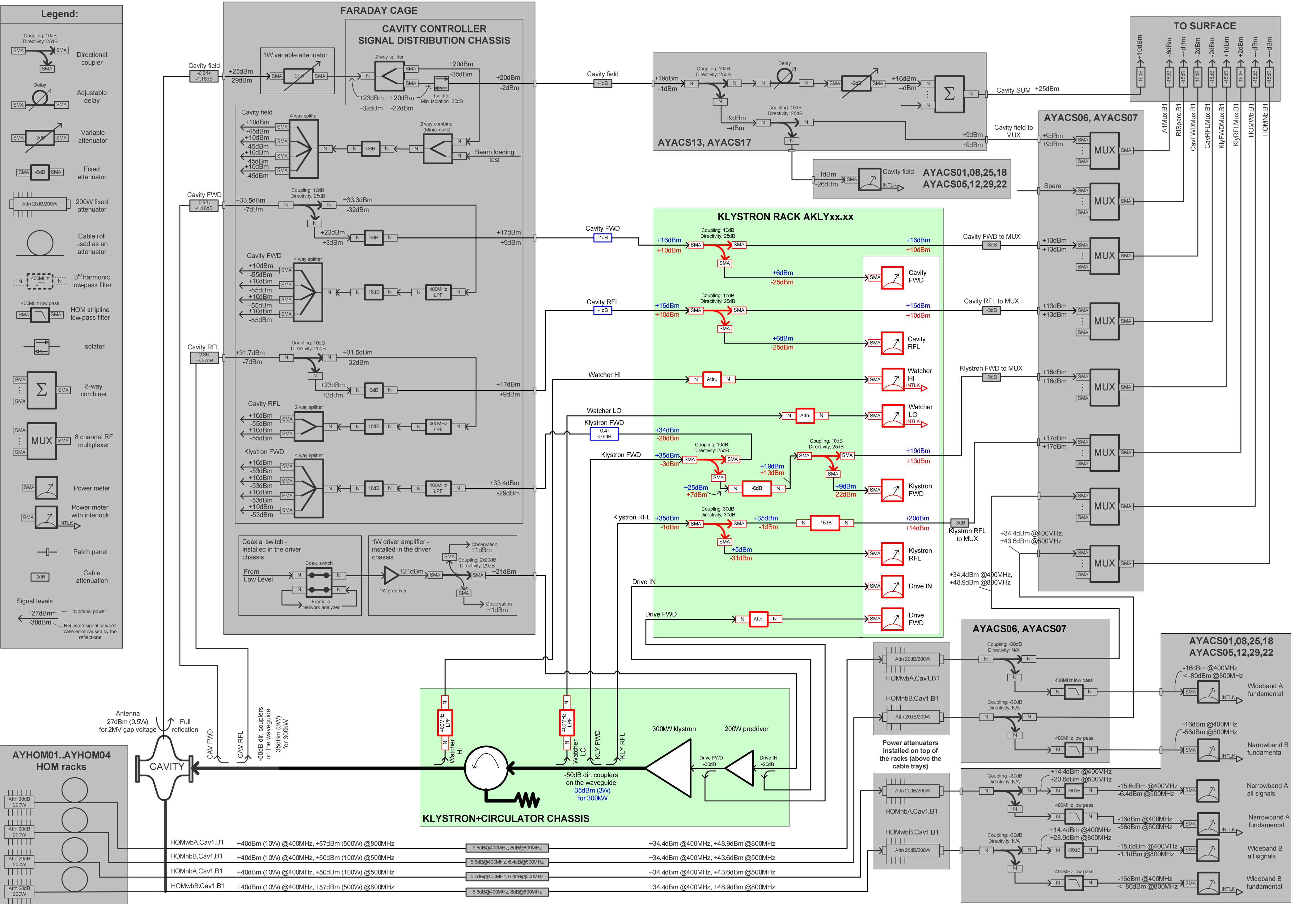
Cavity “Line A” racks



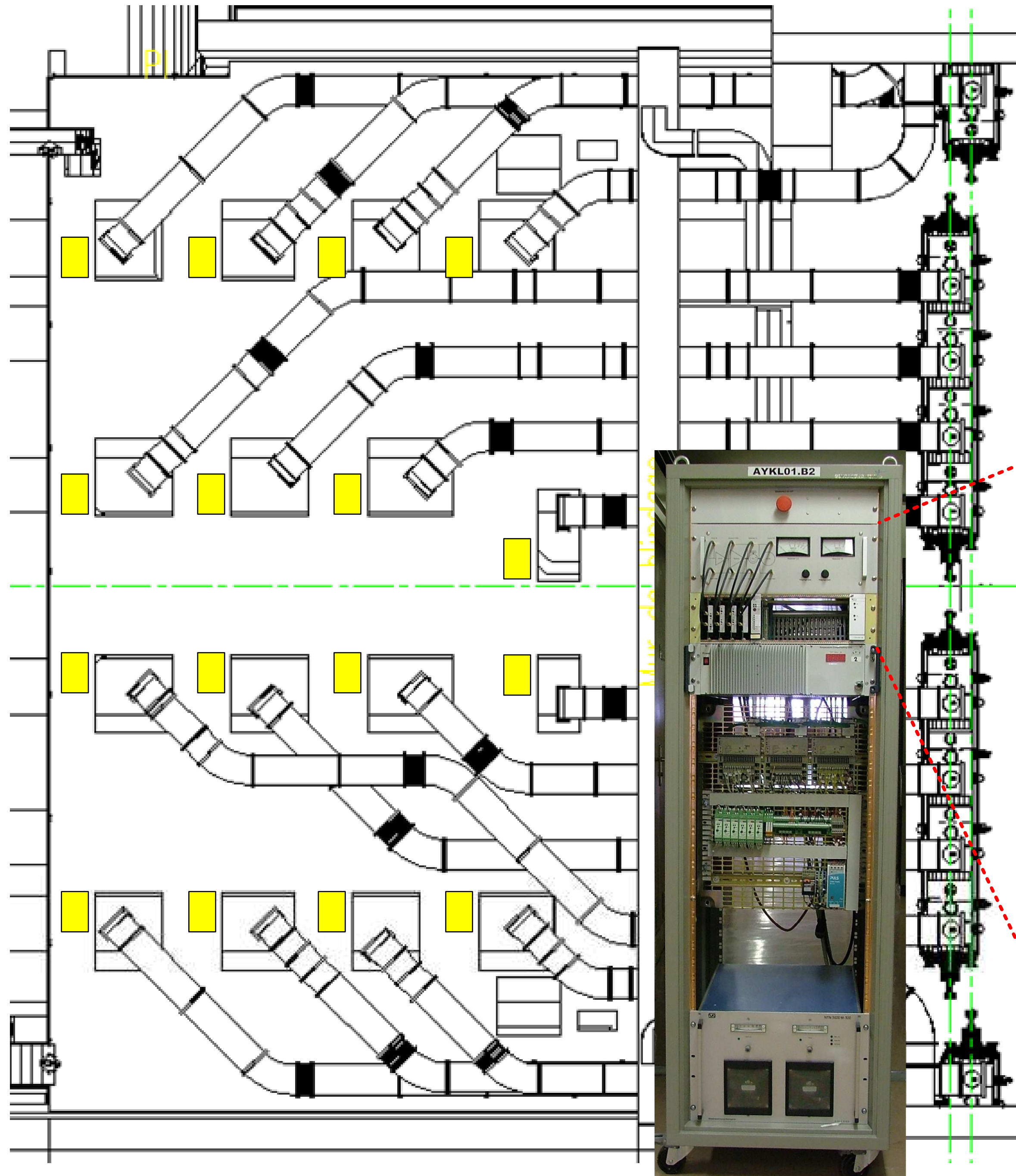
HOM treatment – 4 filter banks in the RF MUX racks



Klystron rack



Klystron racks



Chassis in the Klystron racks:

- one chassis per klystron
- measurement of klystron pre-drive, klystron drive
- measurement of klystron fwd and rfl
- measurement of cavity fwd and rfl
- interlocks for klystron output signal

