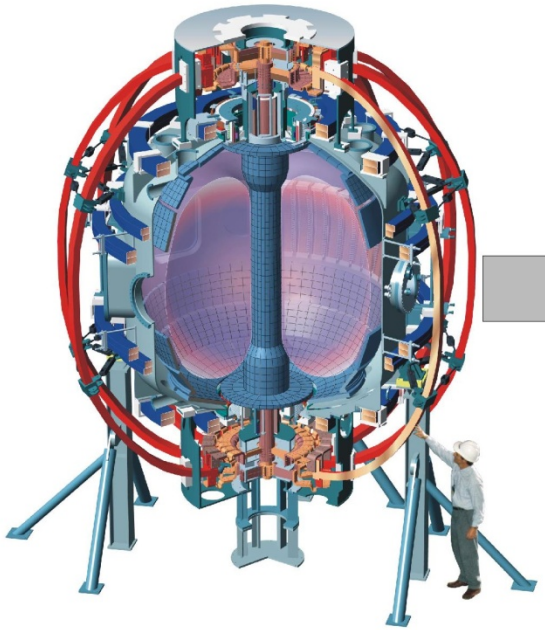
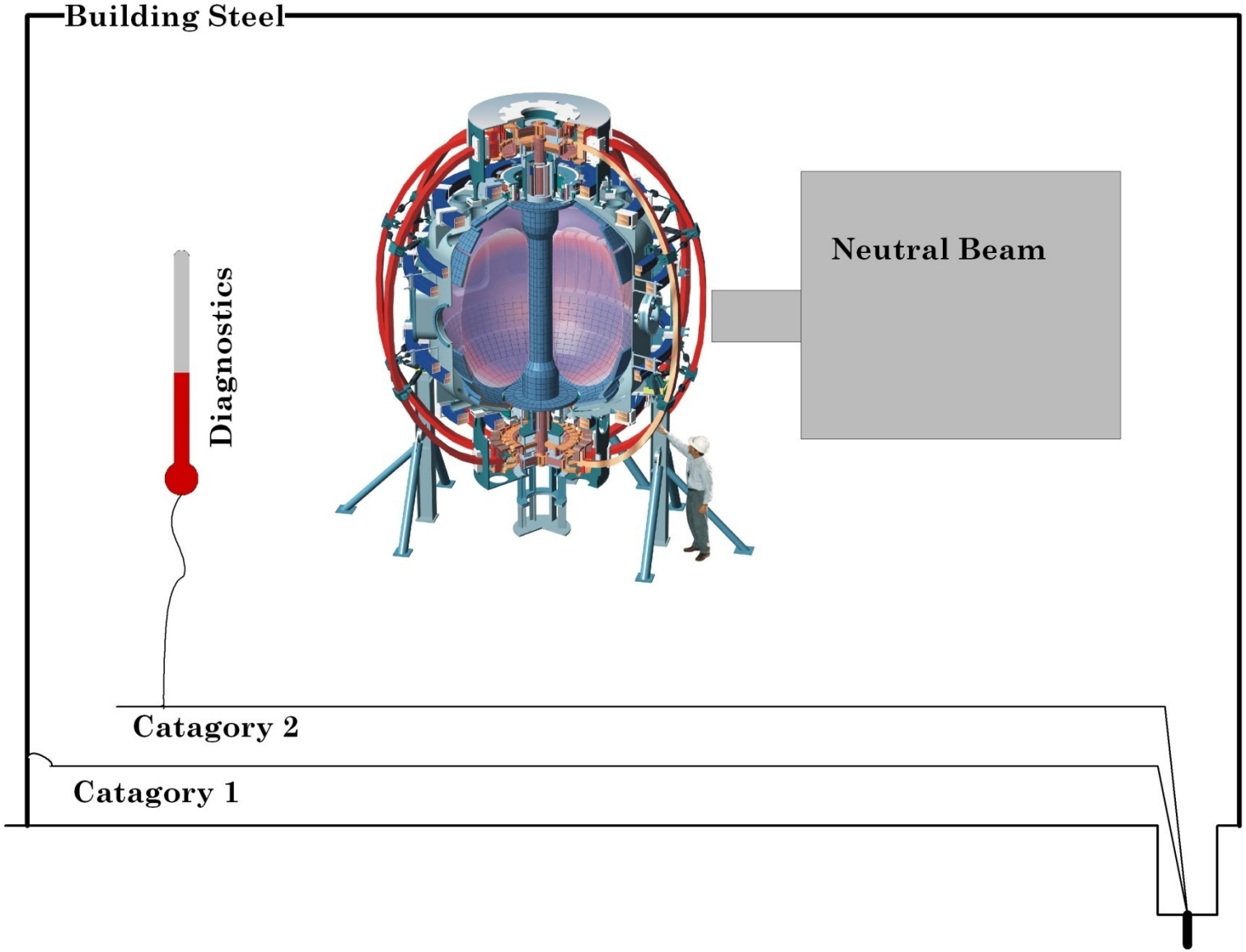
NSTX-U
Grounding & PCS

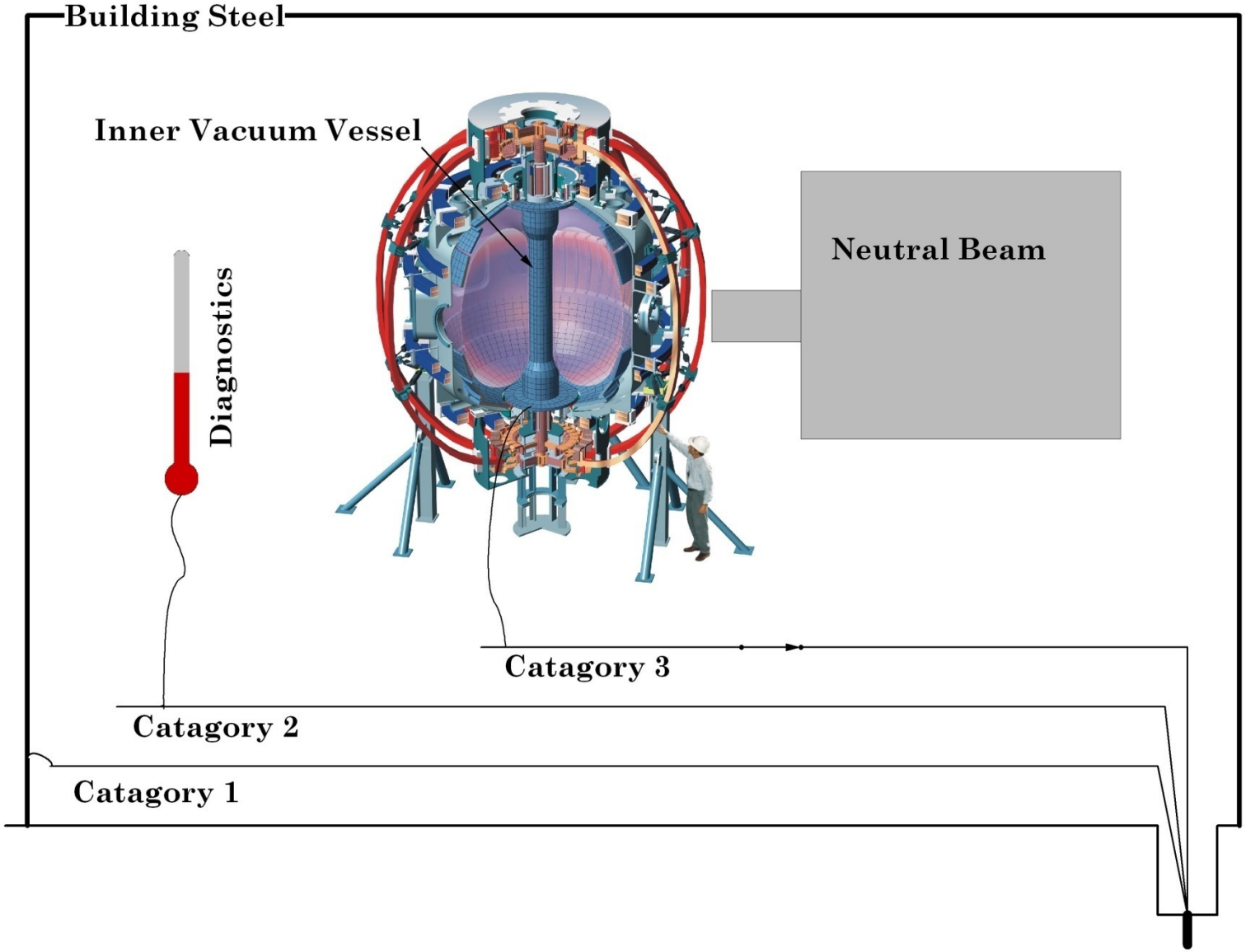
Building Steel

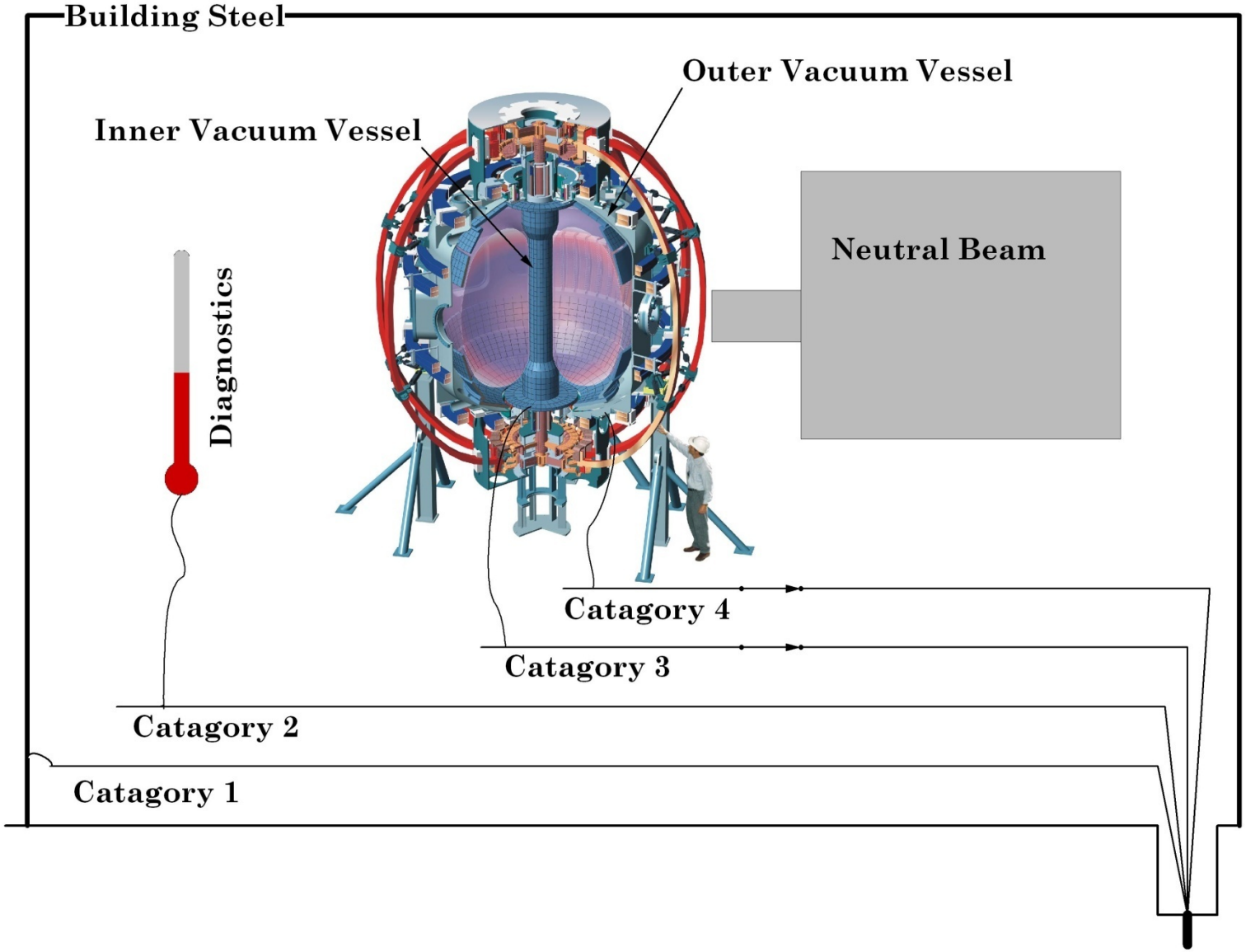


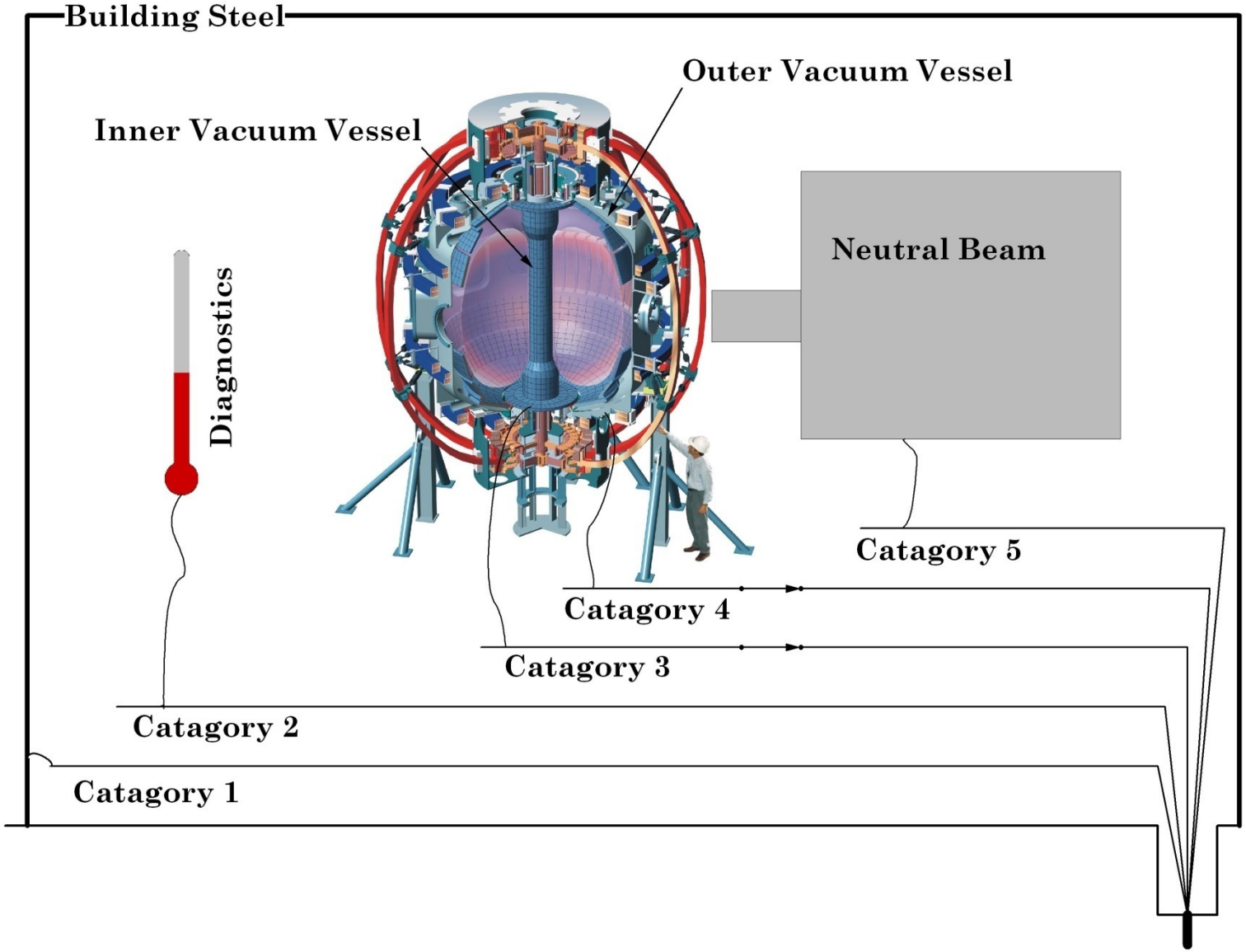
Neutral Beam

Catagory 1

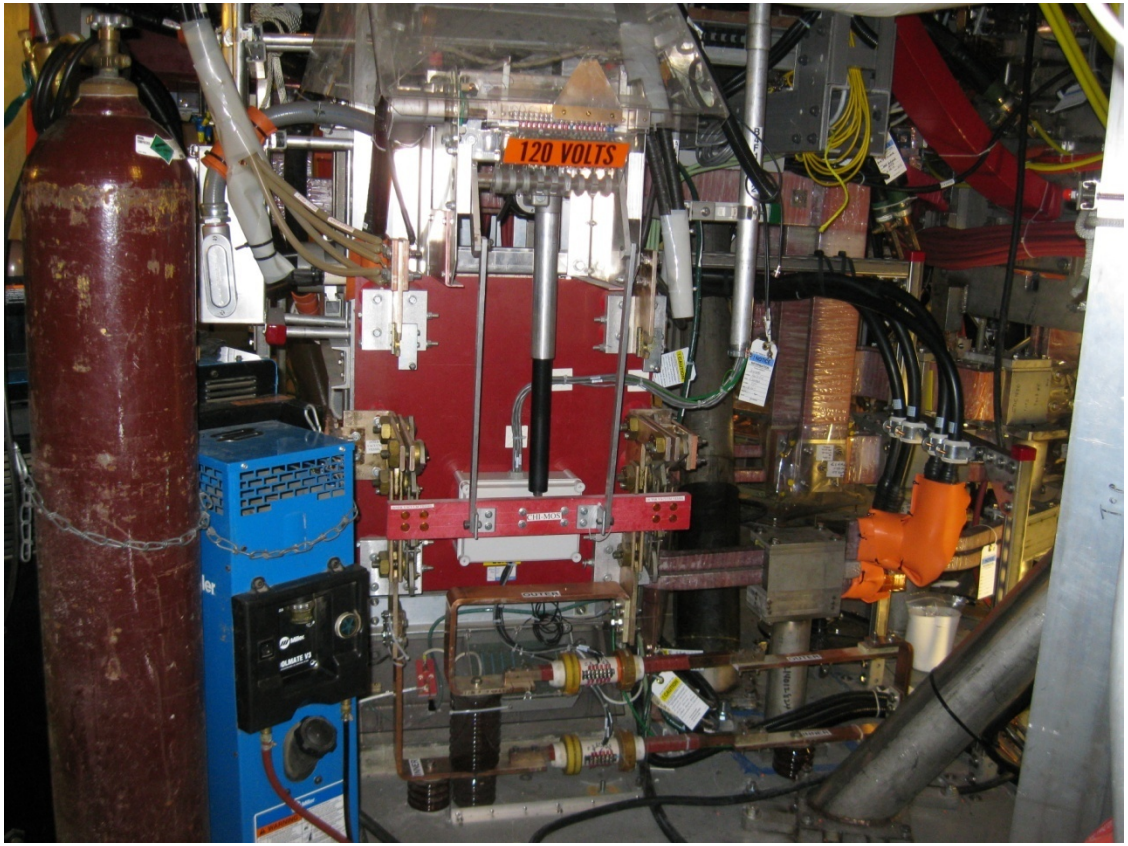

Building Steel
Diagnostics
Neutral Beam
Catagory 2
Catagory 1

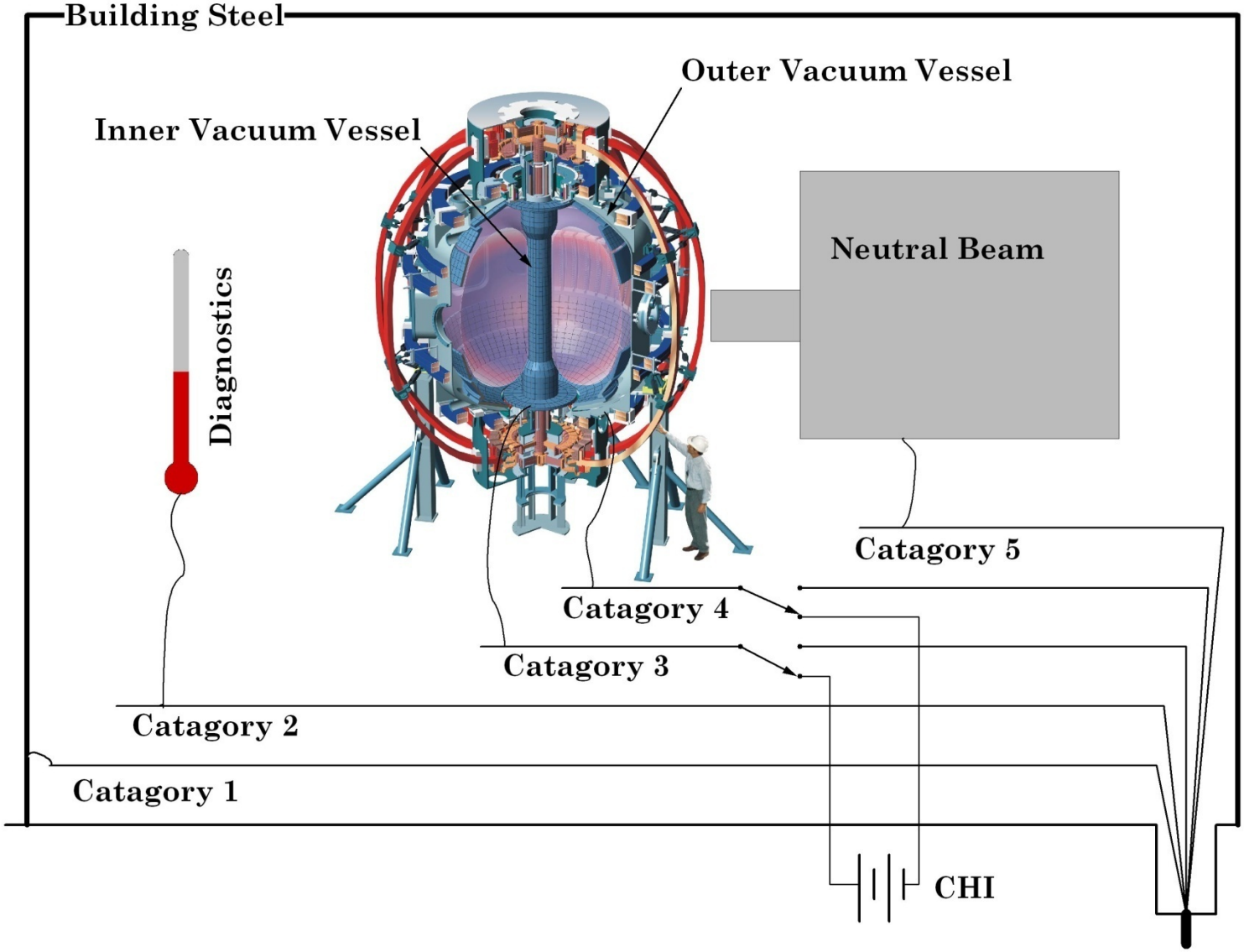

Building Steel
Inner Vacuum Vessel
Diagnostics
Neutral Beam
Catagory 3
Catagory 2
Catagory 1


Building Steel
Outer Vacuum Vessel
Inner Vacuum Vessel
Neutral Beam
Diagnostics
Catagory 4
Catagory 3
Catagory 2
Catagory 1


Building Steel
Outer Vacuum Vessel
Inner Vacuum Vessel
Neutral Beam
Diagnostics
Catagory 5
Catagory 4
Catagory 3
Catagory 2
Catagory 1

- McBride Switch

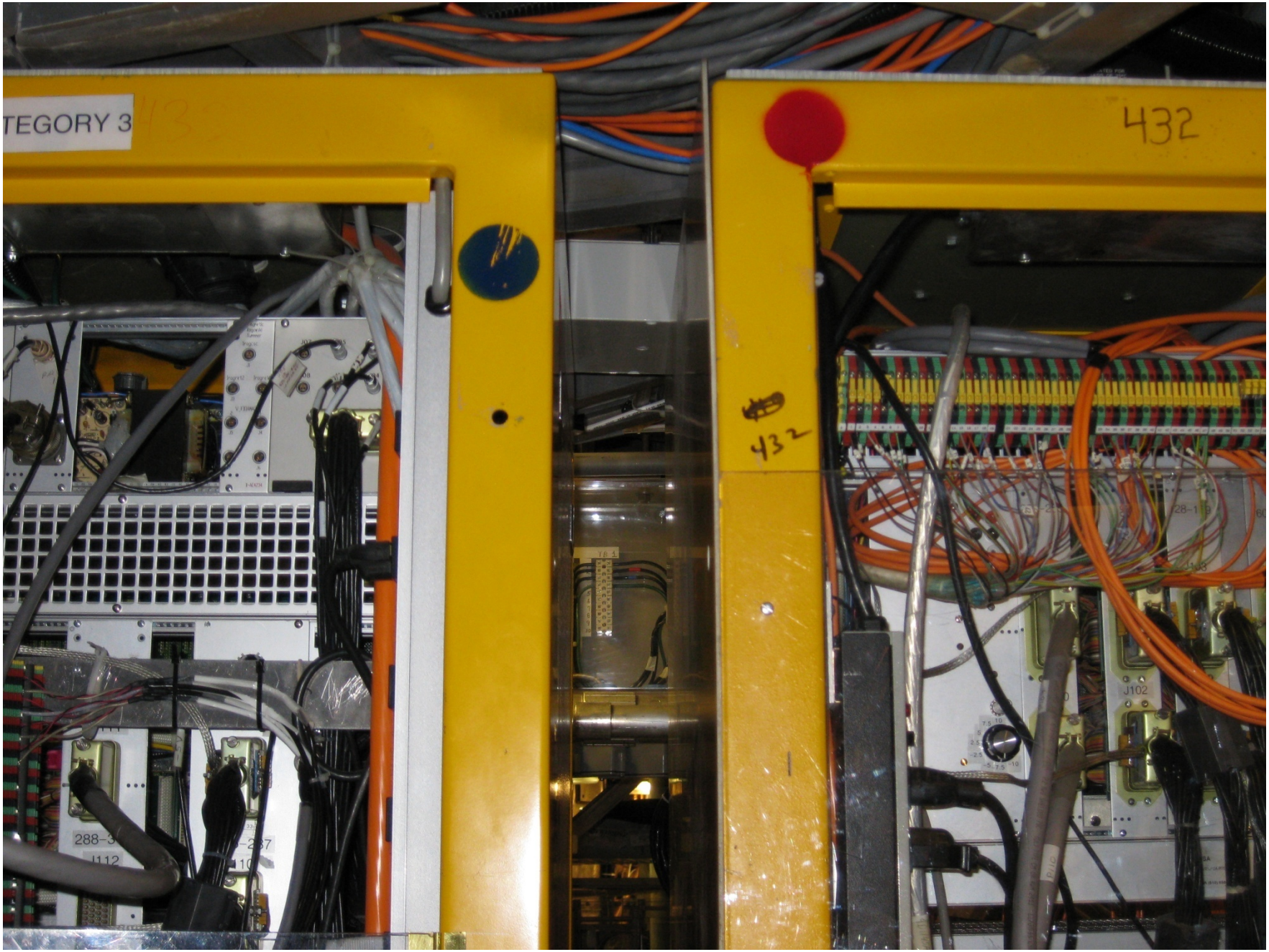



Building Steel
Outer Vacuum Vessel
Inner Vacuum Vessel
Neutral Beam
Diagnostics
Catagory 5
Catagory 4
Catagory 3
Catagory 2
Catagory 1
CHI


NSTX CAT. 2 DIAG. GND. BUS
OTHER GROUNDS PROHIBITED


NSTX CAT. 2
OTHER GR
CAUTION
4BA049BG (W)
4BA044BG (W)
DIAGNOSTIC GROUND
480

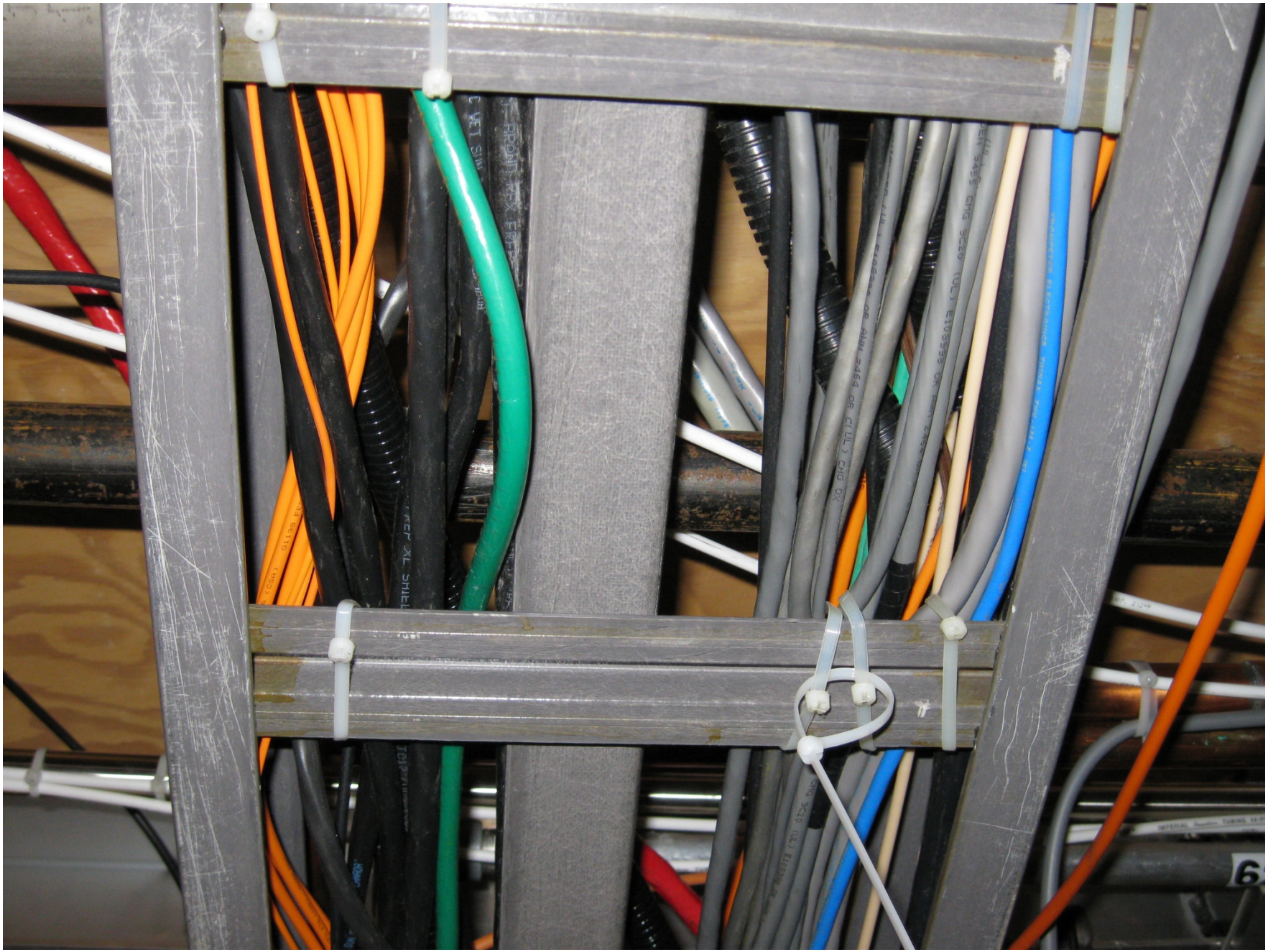

5726
OUTER VV
CAT. 4 DIVIDER
C-AE4061-502
823
431
CATEGORY 4

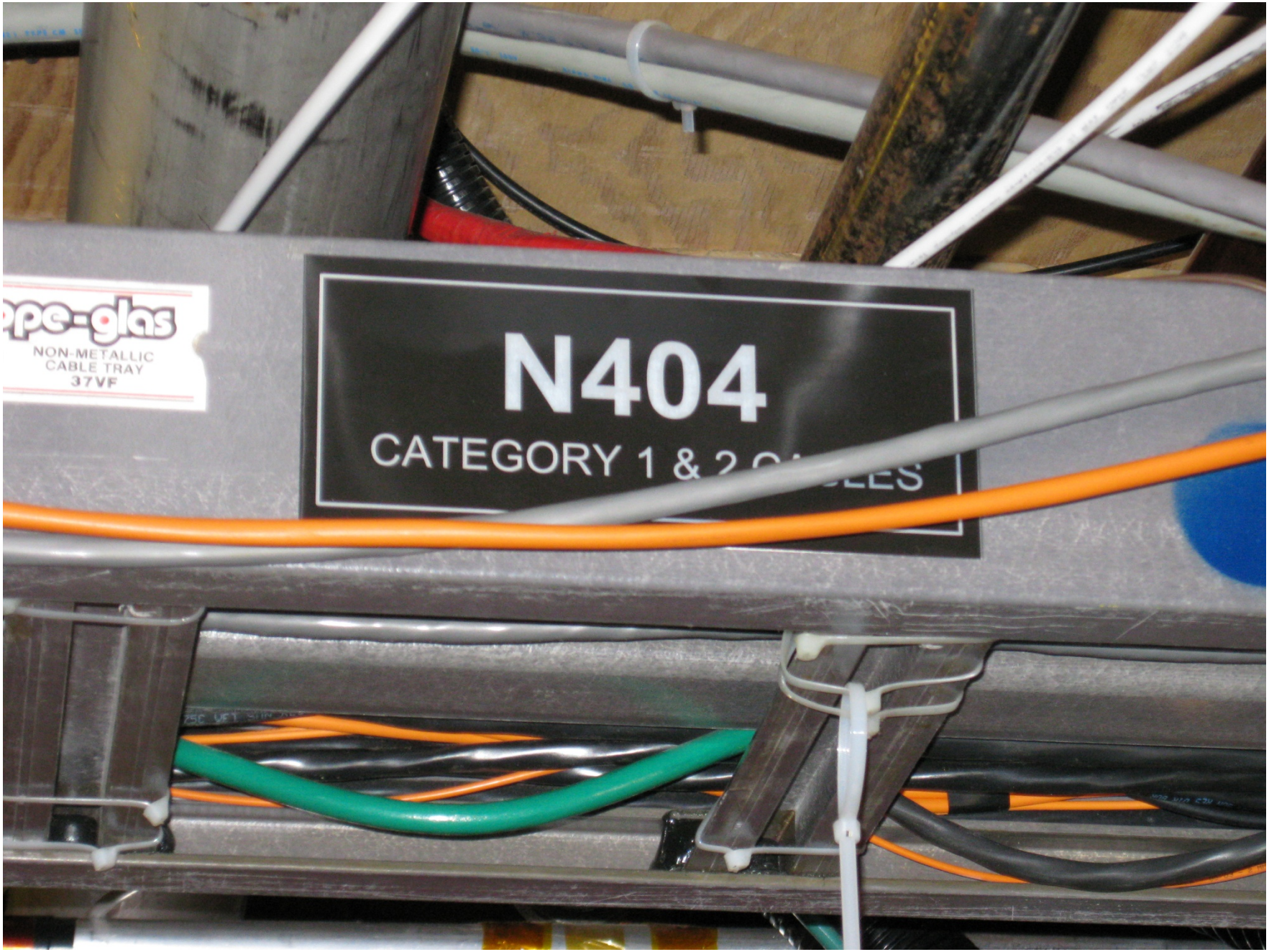

TEGORY 3
432
432
J102


LLT-820
820
LLT-819
<3>
LLT-900
LLT-160
WARNINGEQUIPMENT AT INNERVACUUM VESSEL GROUN


CTC-EE-436
CATEGORY 2


N428
CATEGORY 2i CABLES
N404

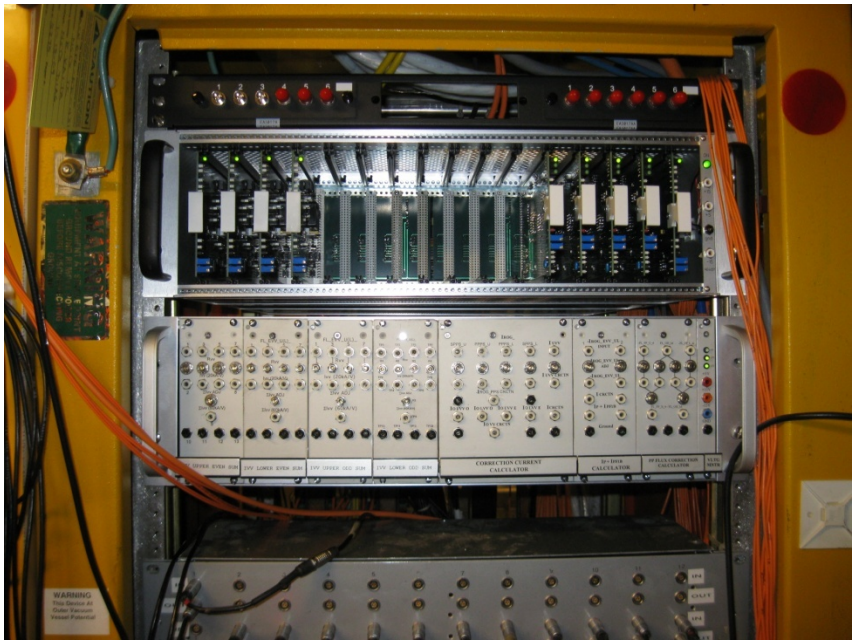



pe-glas
NON-METALLIC
CABLE TRAY
37VF
N404
CATEGORY 1 &

Ground Fault Monitor

Analog Links

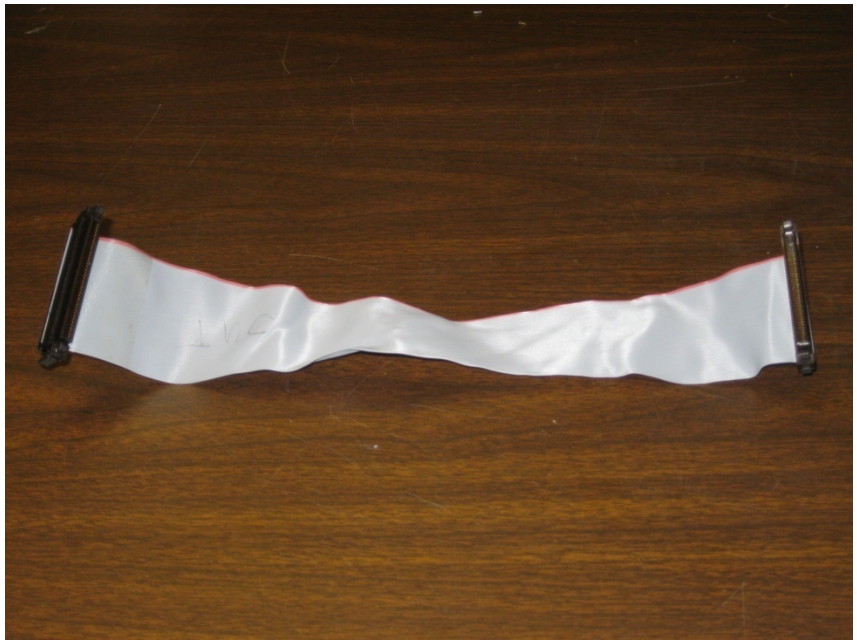
- 25kHz bandwidth
- ±10V
- ≈1km fiber length



Real Time Control Hardware

Front Panel Data Port (FPDP)

- 32 bit parallel data path
- Uni-directional
- 40MHz clock rate
- No addressing
- 80 wire cable
- Multi-drop



Serial FPDP

- FPDP over fiber-optic links
- Over 10km on single mode fiber
- The “Systran”

Control Computers

- Redundant Computers
- One system live
- One system hot spare/ development
- Both receive live inputs

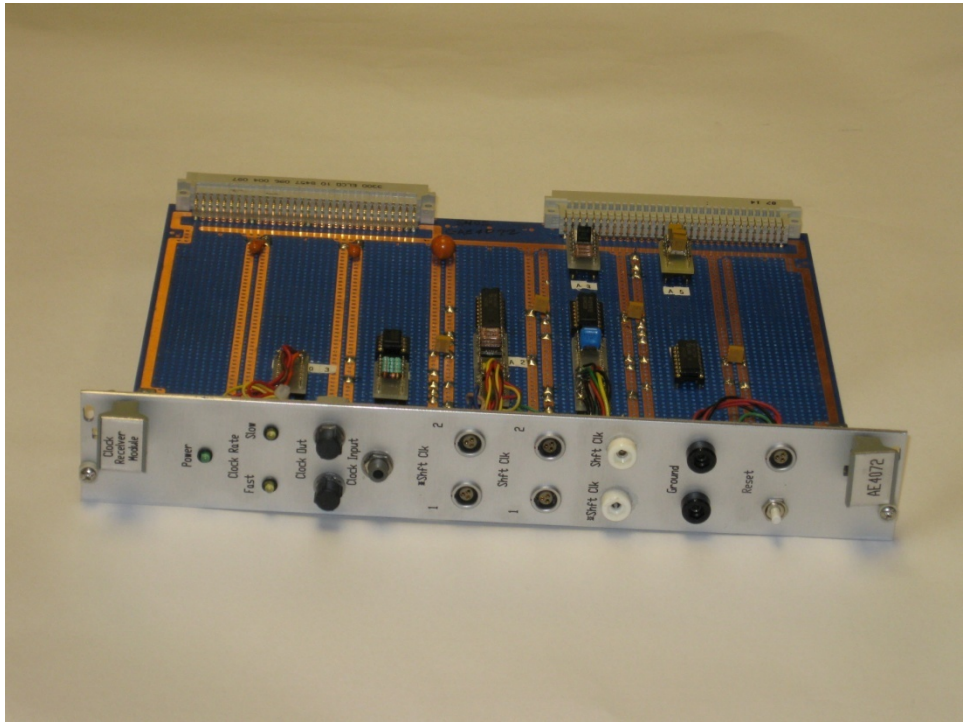
Rear of control computer

Systran

- Front Panel Data Port (FPDP) to fiber optic
- Fiber optic to FPDP

Timing Module

- Provides common clock signal to all modules
- 5,000 Hz during shot



FPDP Input Mux Module FIMM

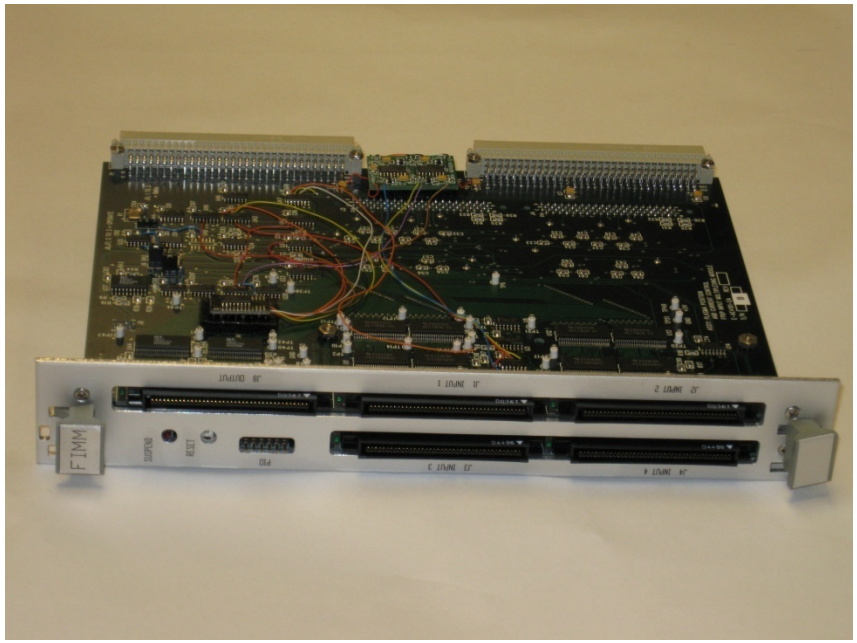
- 1024 Word FIFO on each input
- Four inputs to one output
- Status to EPICS

  PC60 directory

  PC62 input status

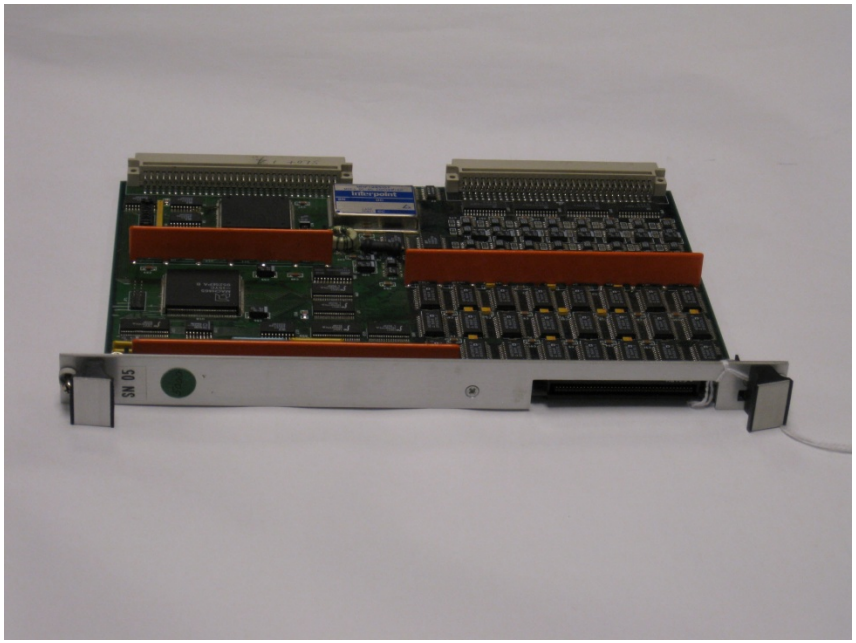
  PC63 output status

  PC64 GIS status



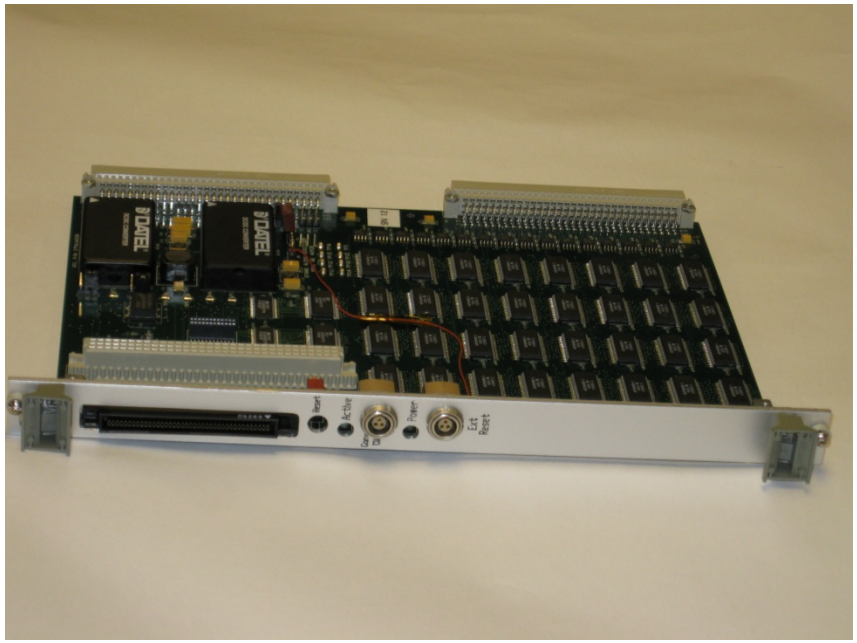
Merlin Digitizer

- All but 2 replaced by SADs
- Require VME based computer for operation



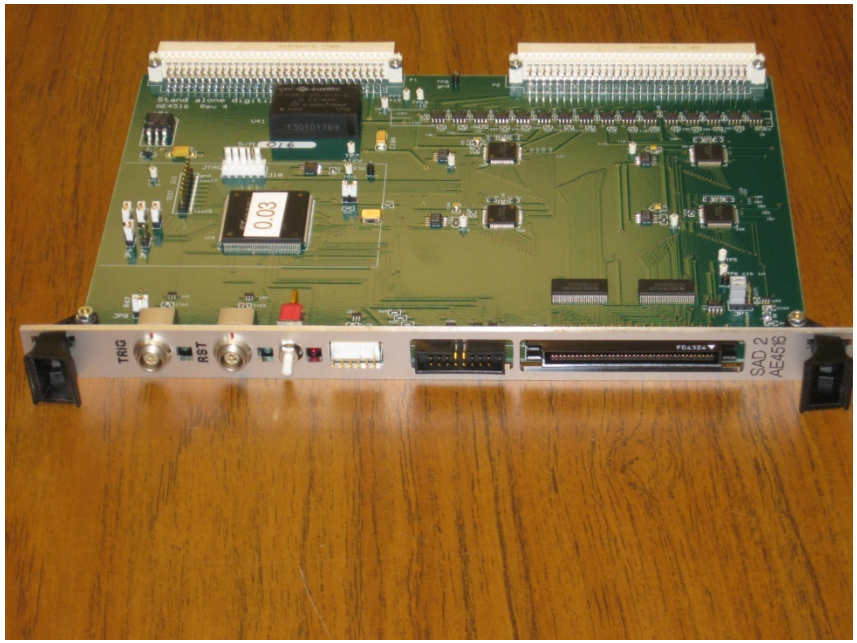
Stand Alone Digitizer SAD

- 32 Analog Inputs
- ±10 volt input range
- 14 bit output padded to 16 bits



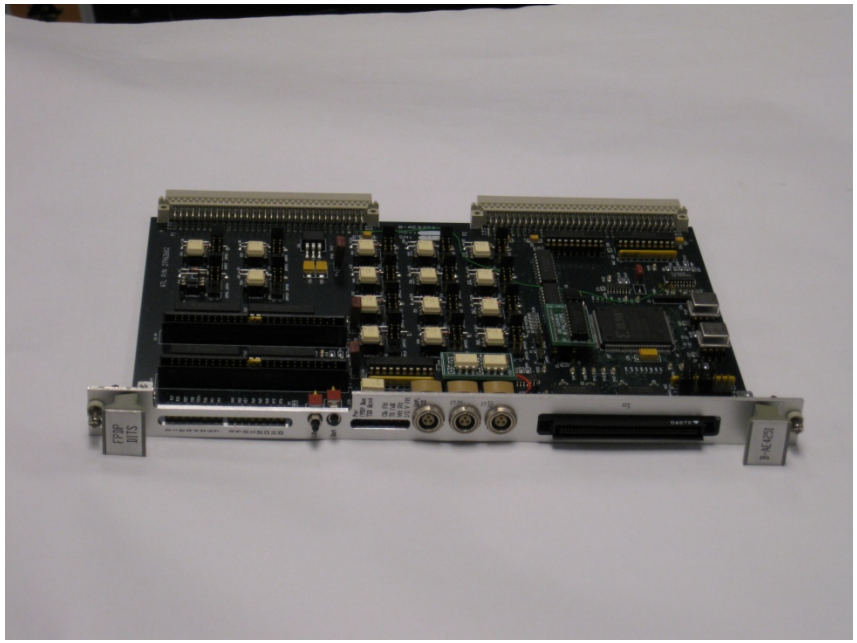
Stand Alone Digitizer Mark 2

- Improved version of SAD
- Multiple Units supported
- 50kHz capable



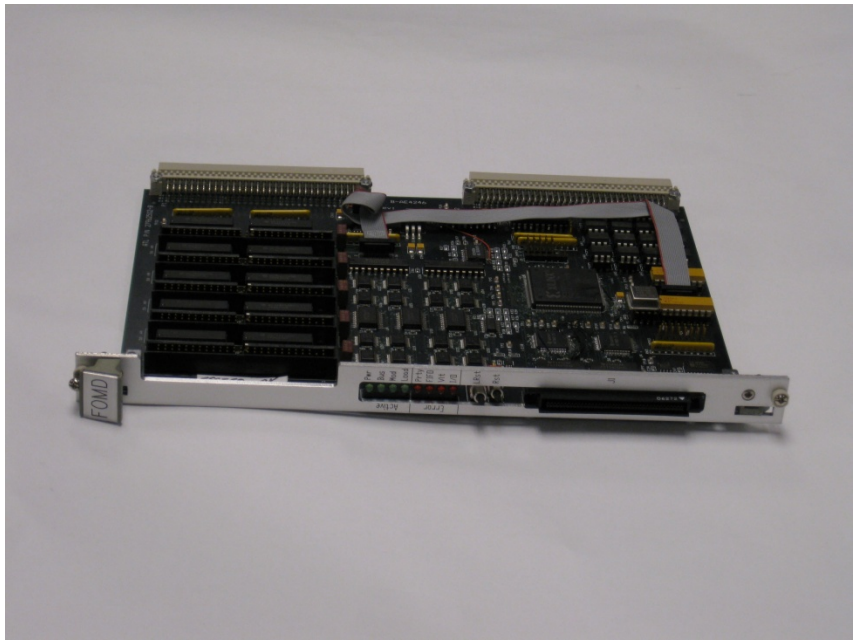
Digital Input & Time Stamp DITS

- 32 bit digital input
- 48 bit 1μsec time stamp per read
- Block count
- Unique bit pattern



FPDP Output Module, Digital FOMD

- Four 16 bit outputs
- Drives Opto22 boards directly
- Optional opto-isolator outputs



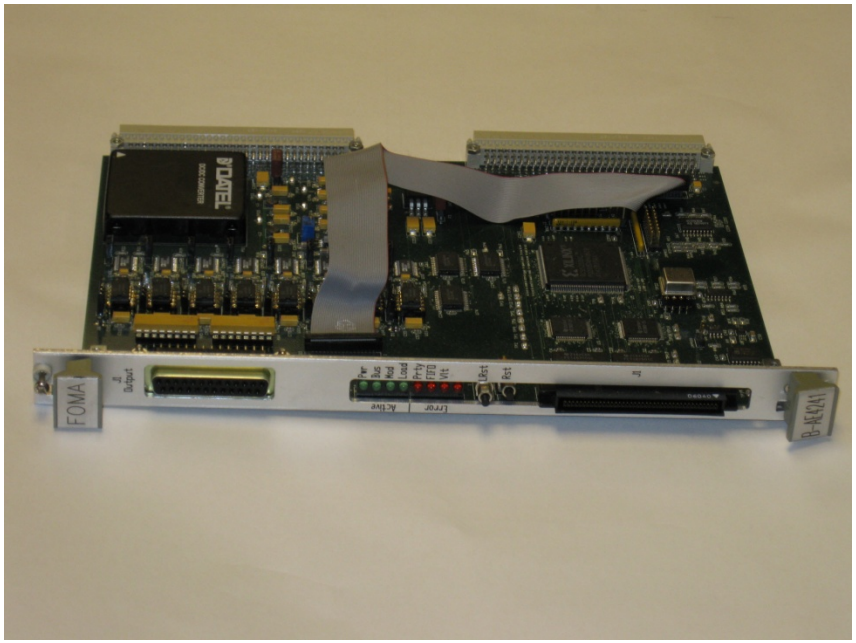
Opto22 interface board

FPDP Output Module, Analog FOMA

- Eight analog outputs
- 14 bit resolution
- Output range selectable on per channel basis:

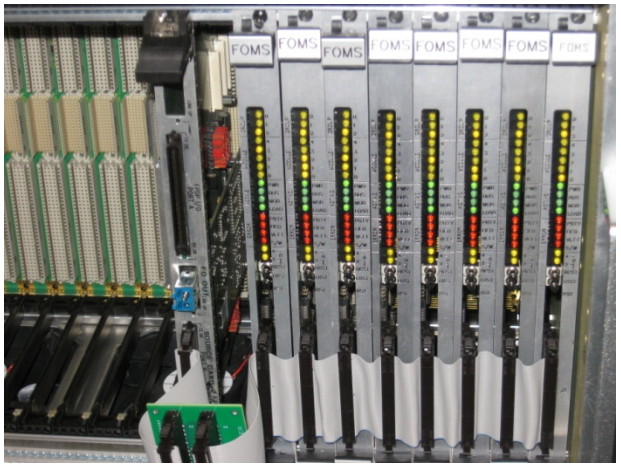
  ±10.24 volts

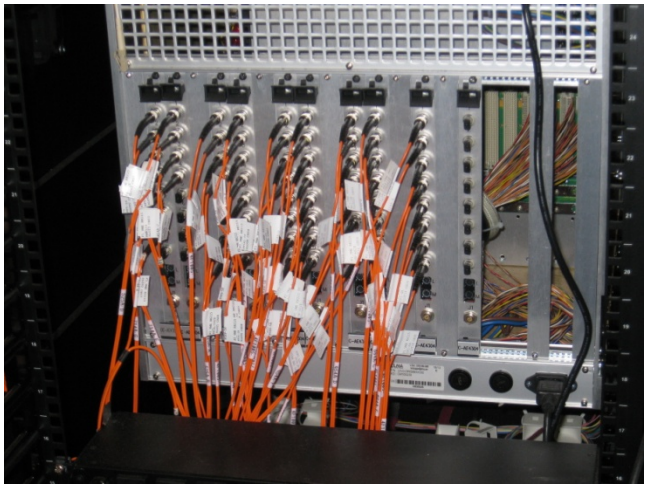
  0 to 10.24 volts



FPDP Output Module – Serial FOMS

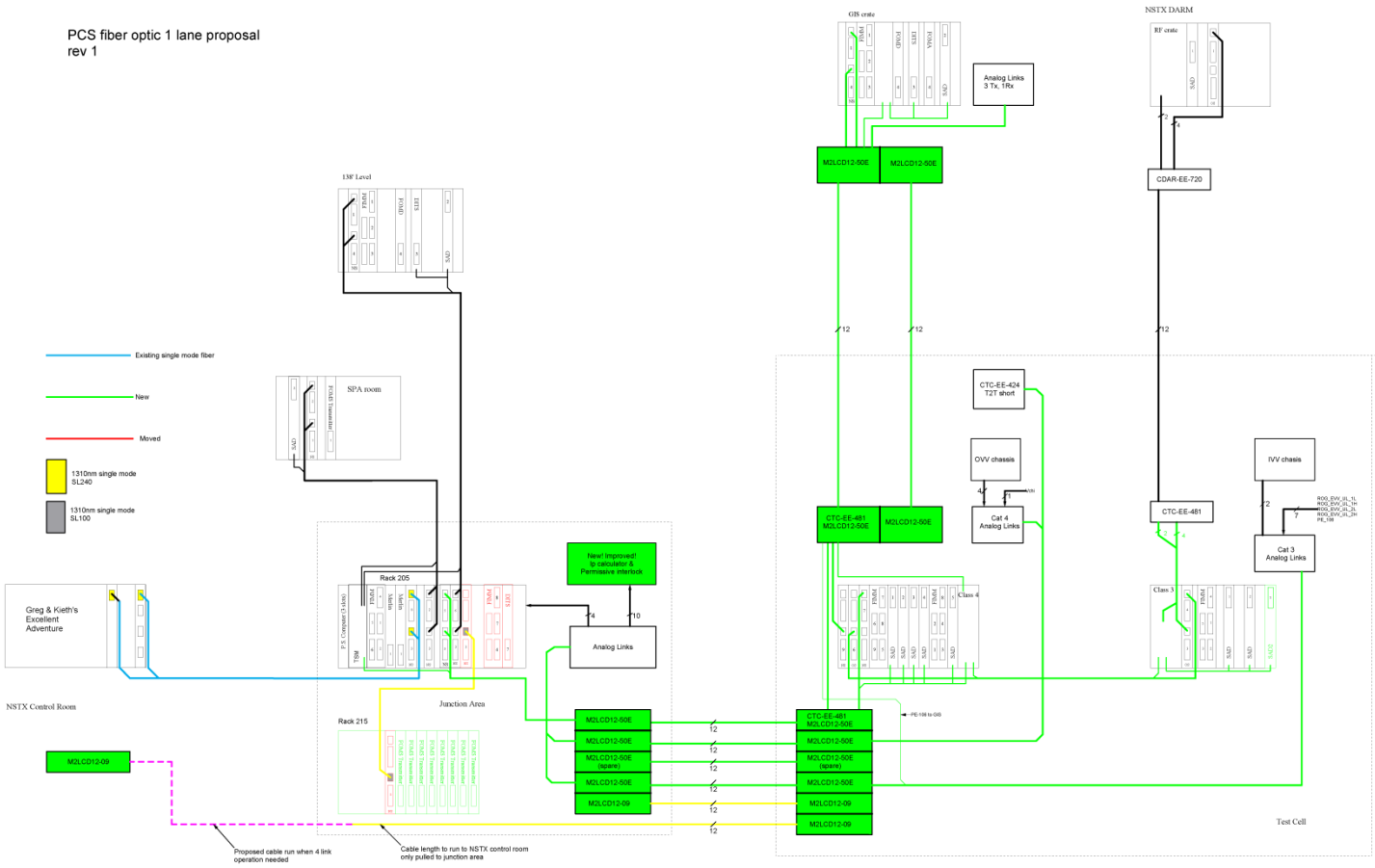
- Interface from FPDP to power supply control modules
- Eight links per module
- Each Transrex uses 2 links
- Each SPA sub-unit uses 1 link





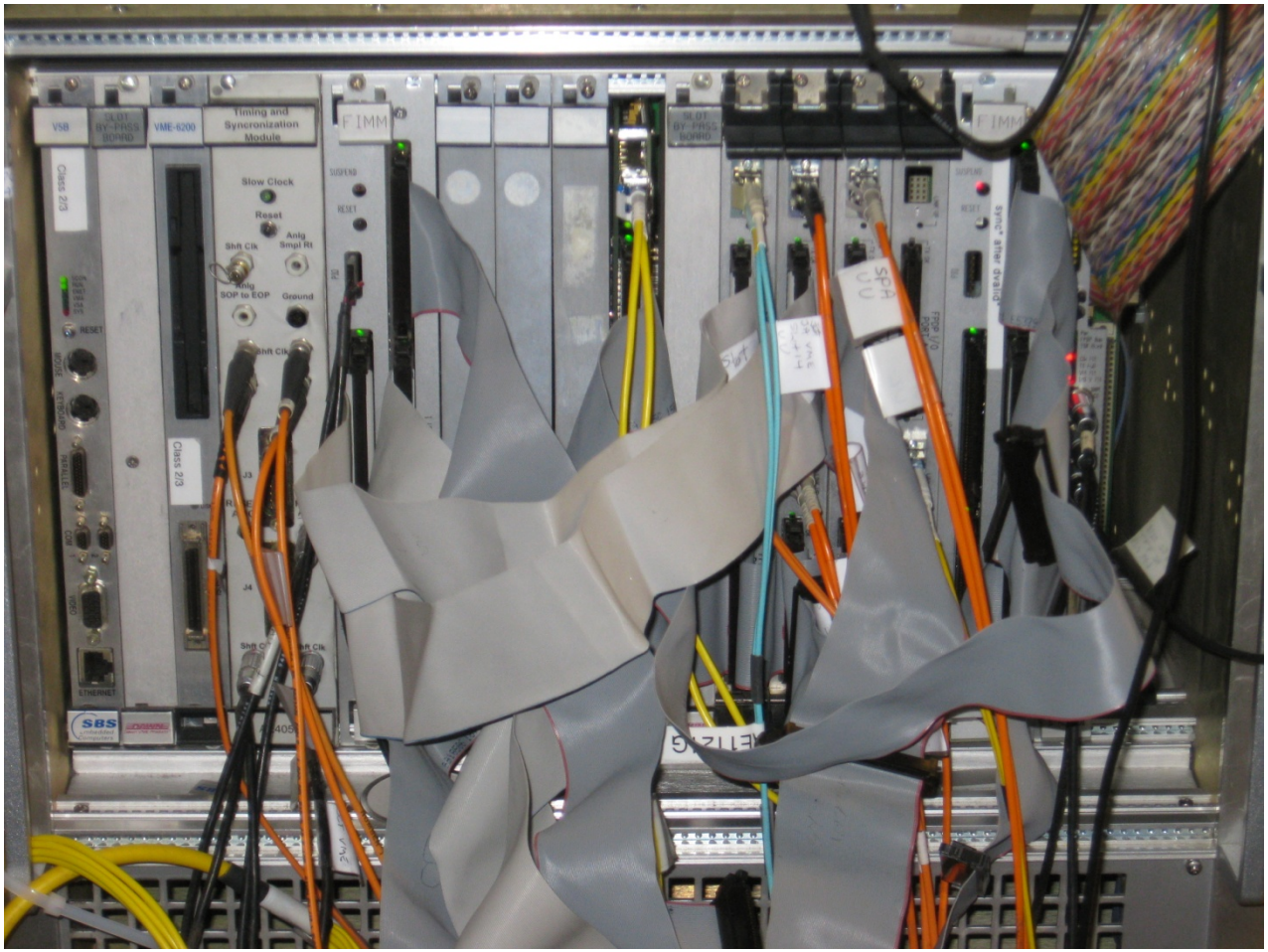
Transrex Power Supply

One lane signal path

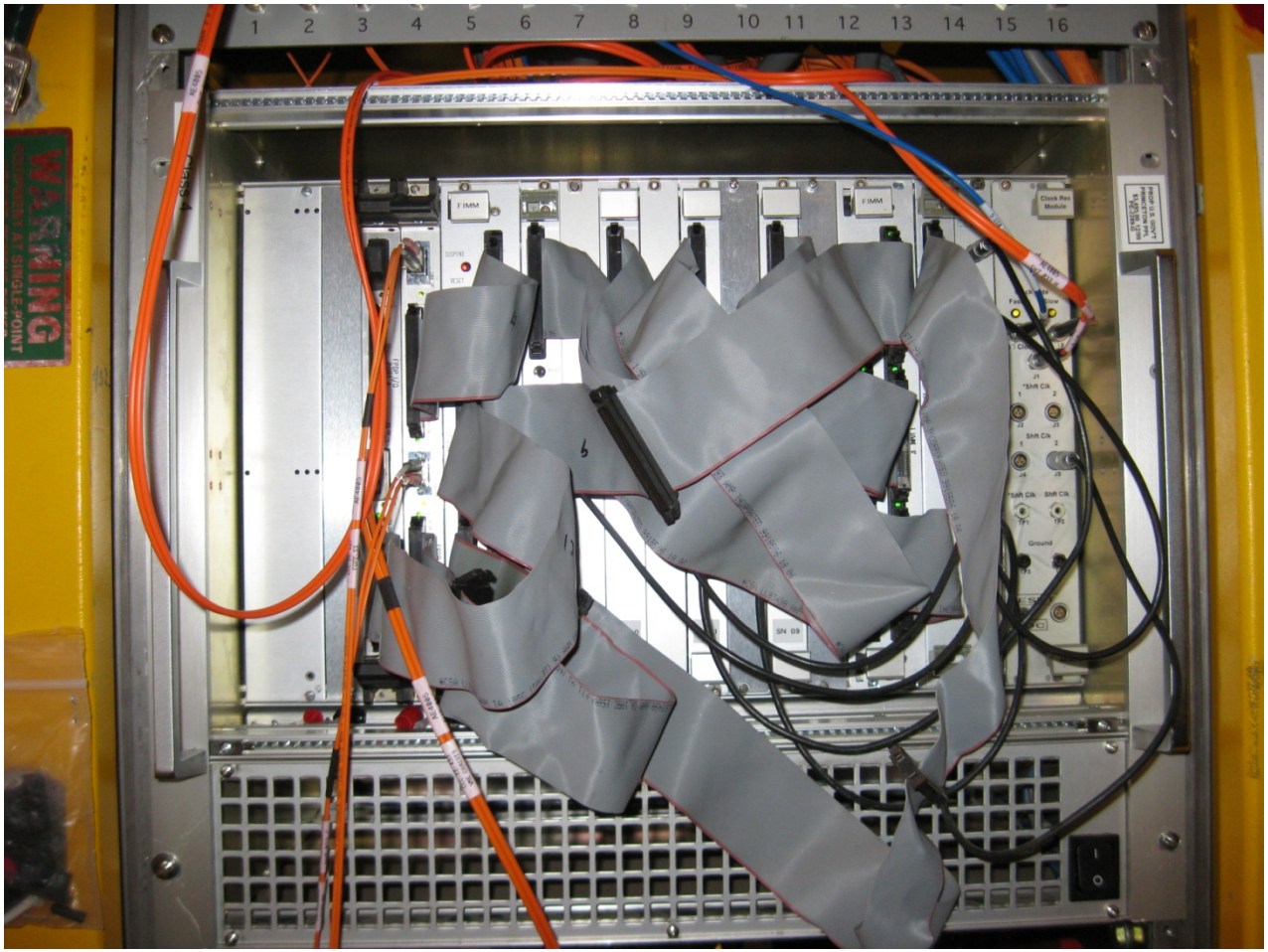


Automatic Latency Test

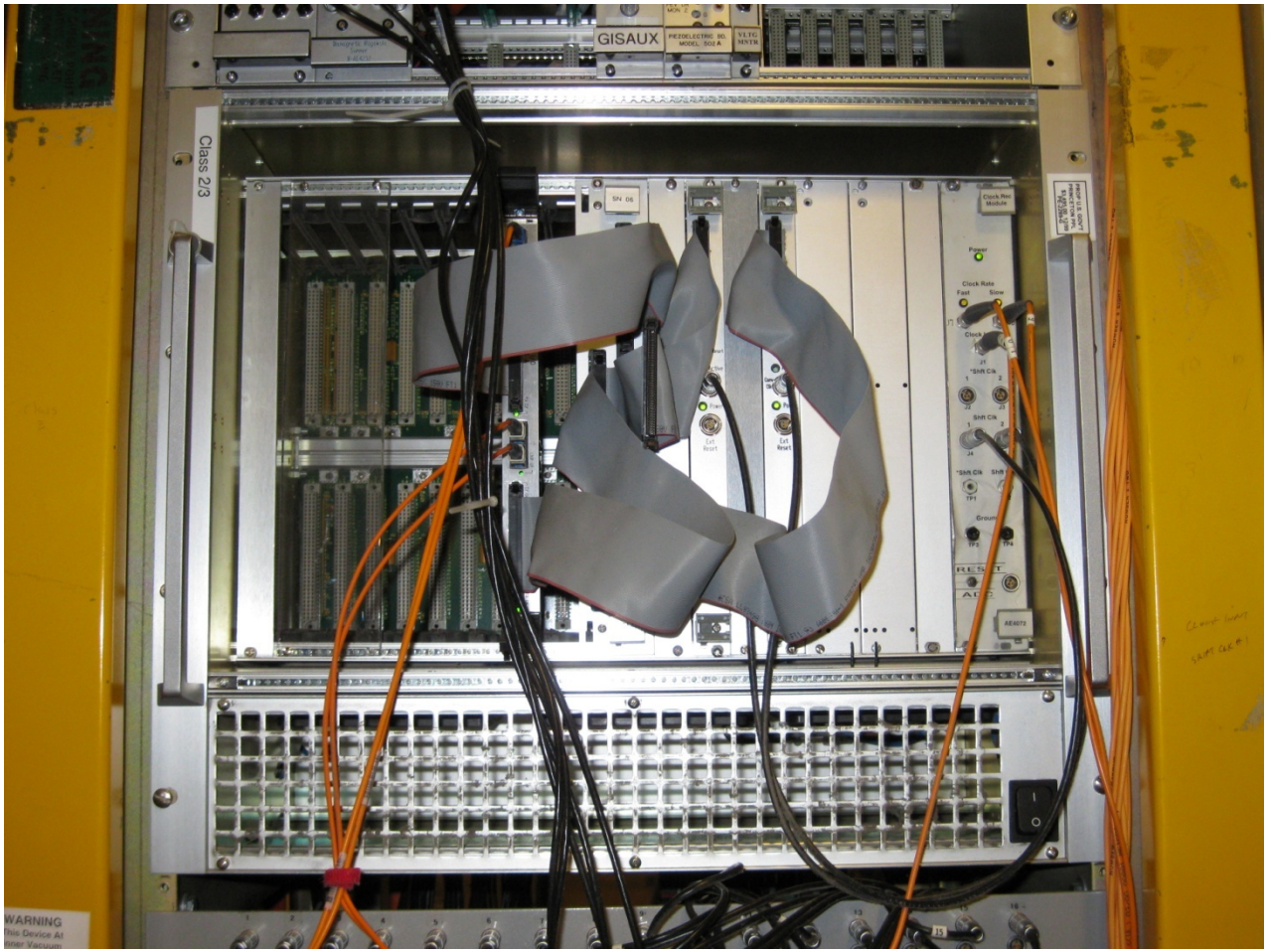
Junction Area Crate



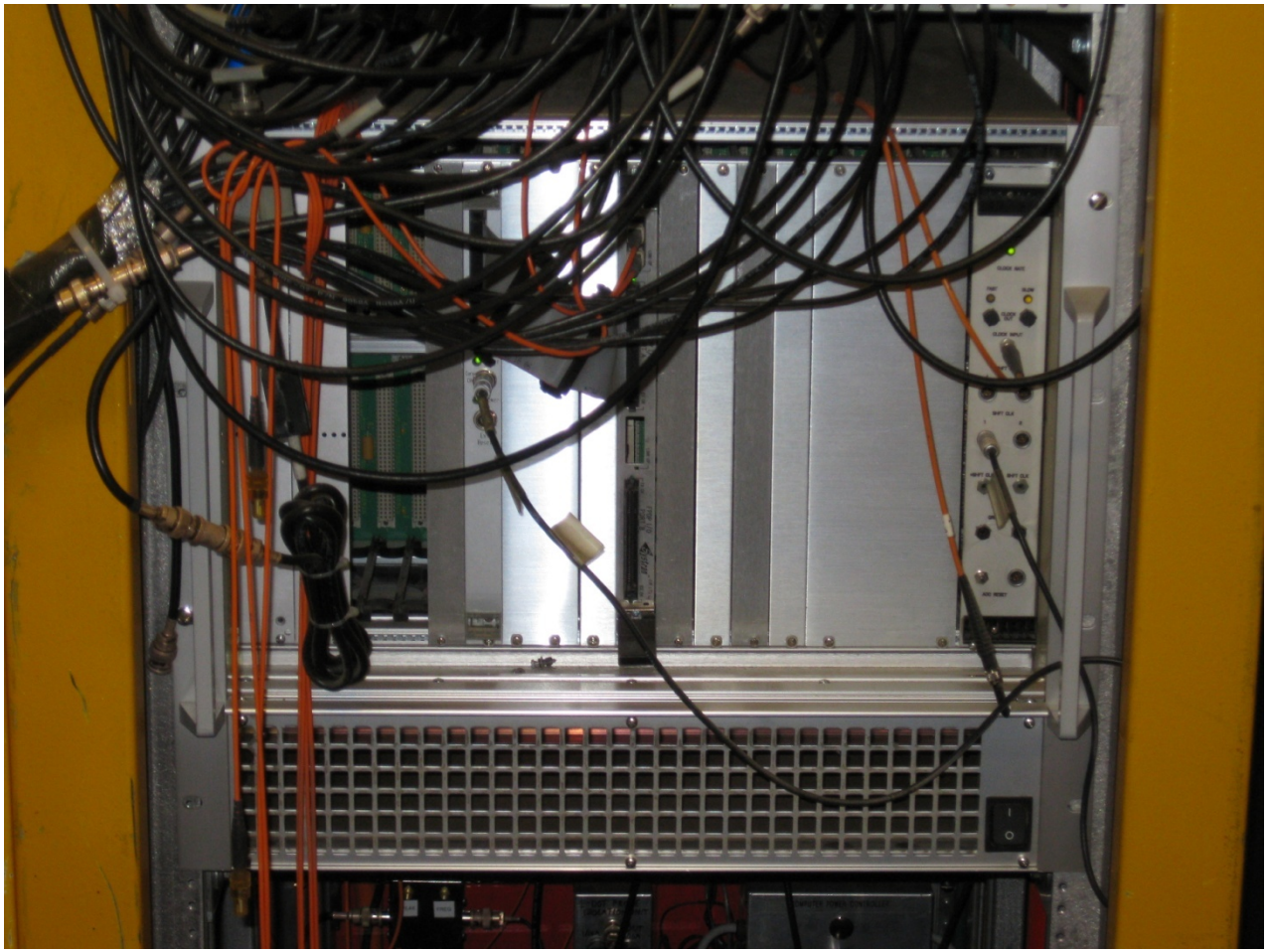
CAT 4 crate



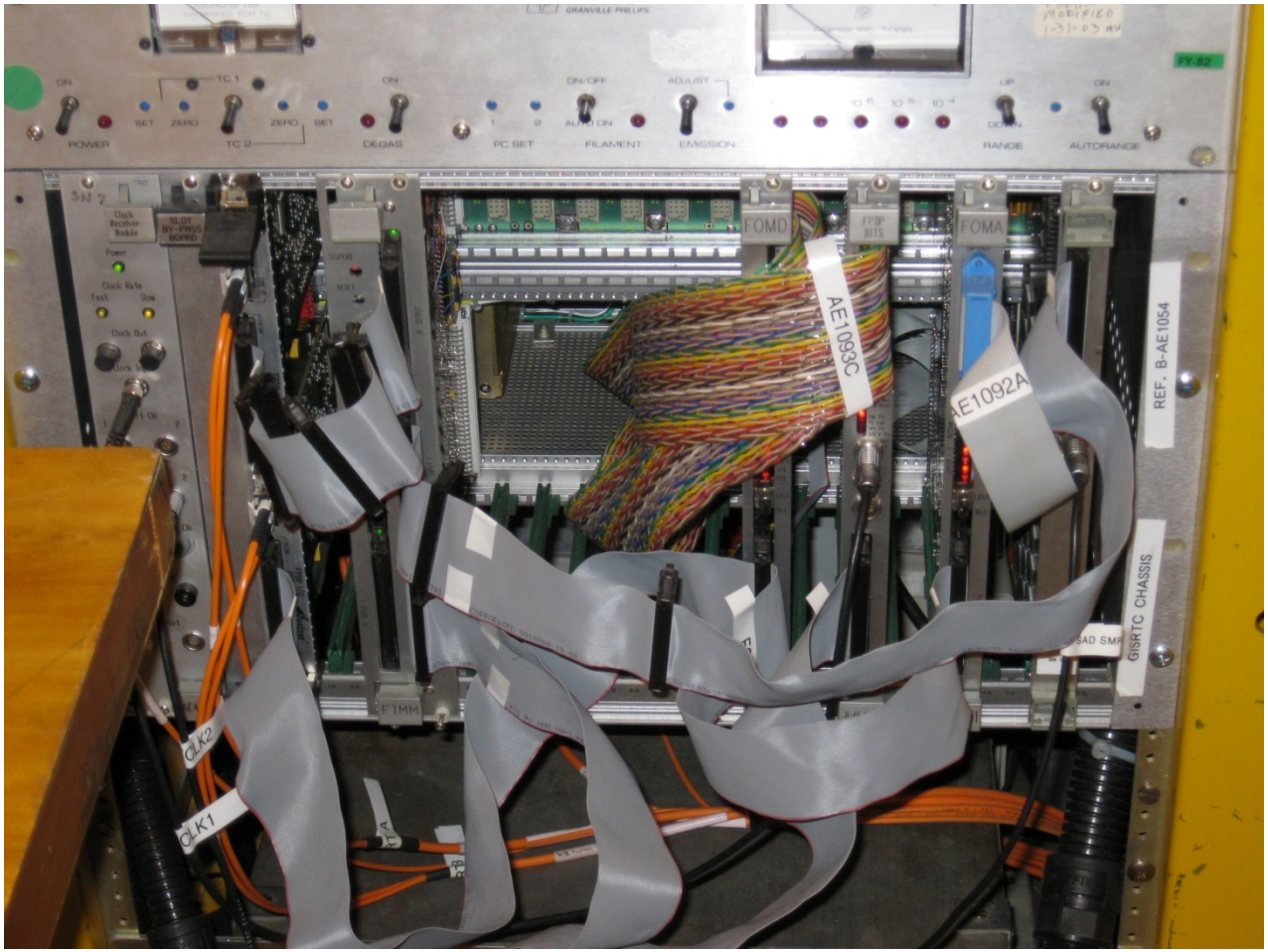
CAT 3 crate



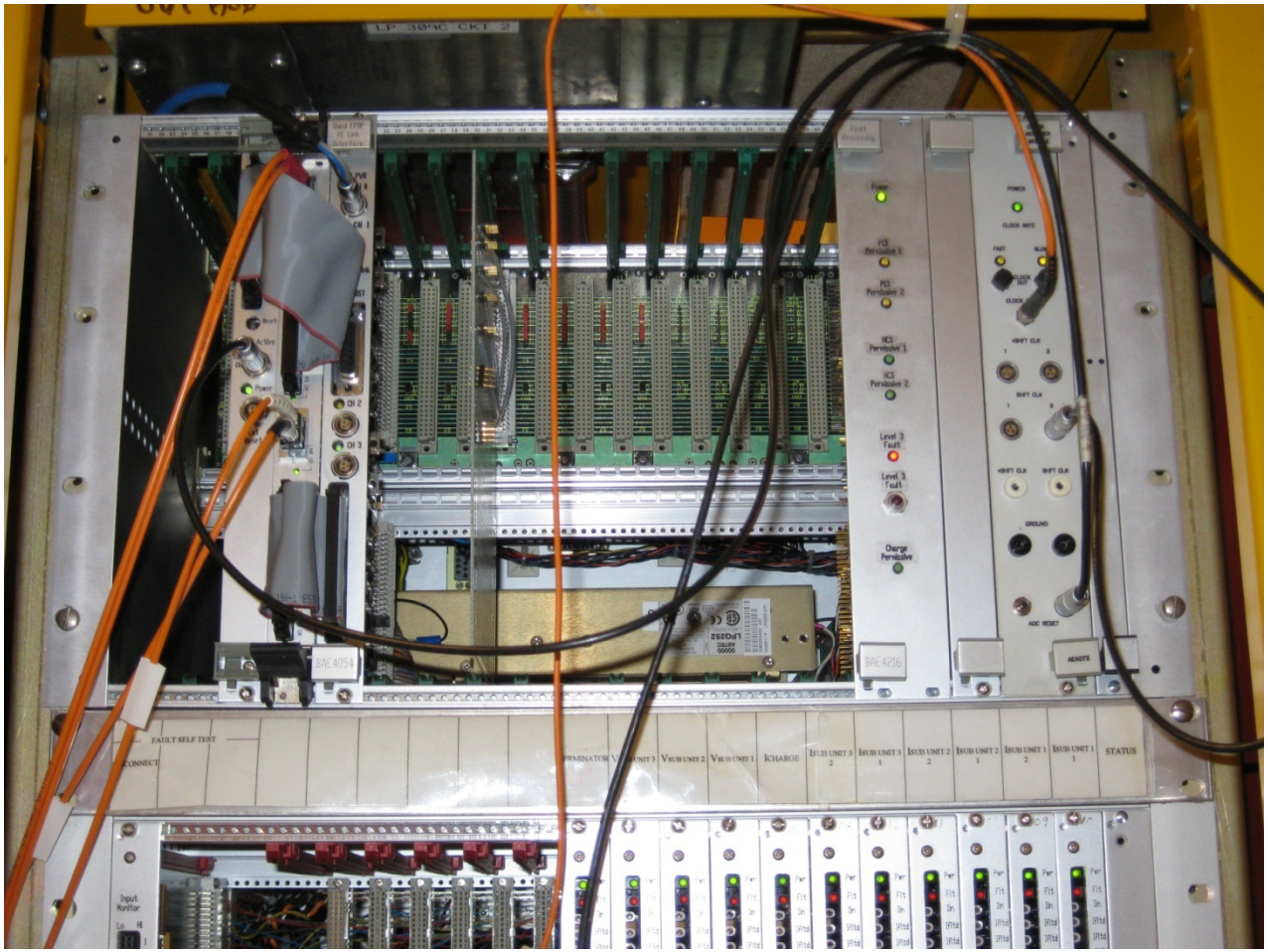
RF crate



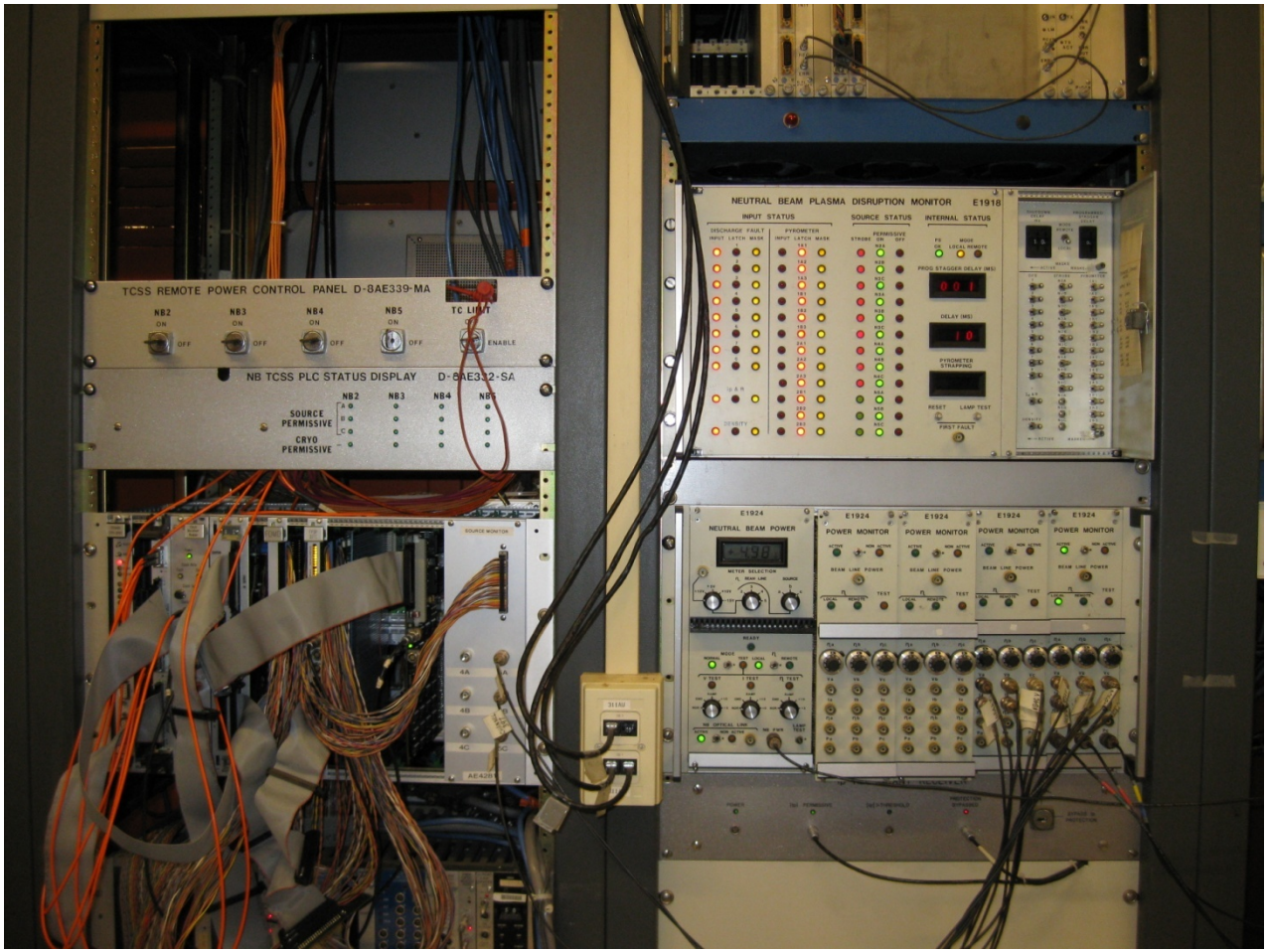
Gas Injection Crate



SPA crate



138’ level crate & NB control



Four lane signal path