MICE RF Amplifier Status

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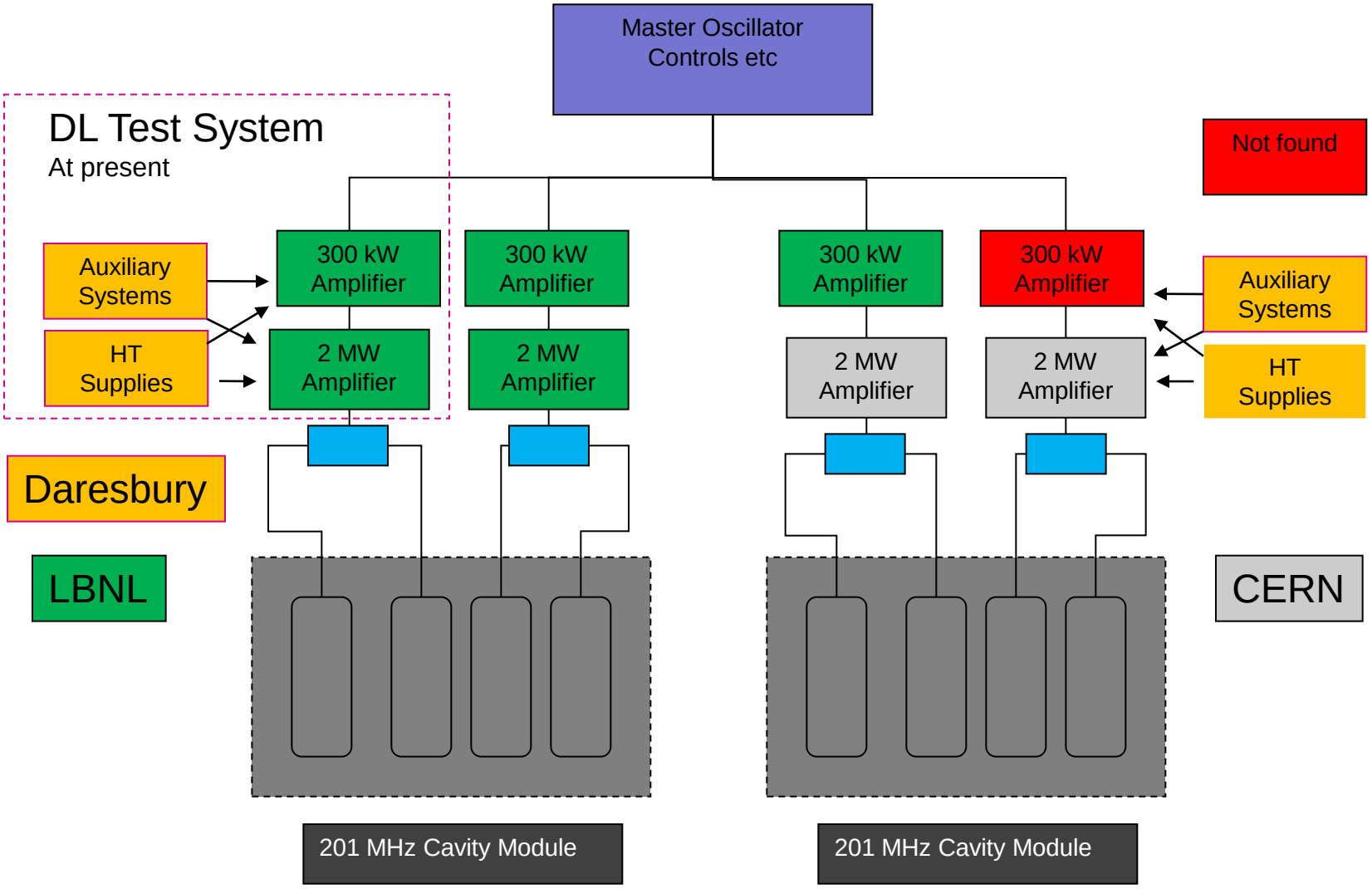
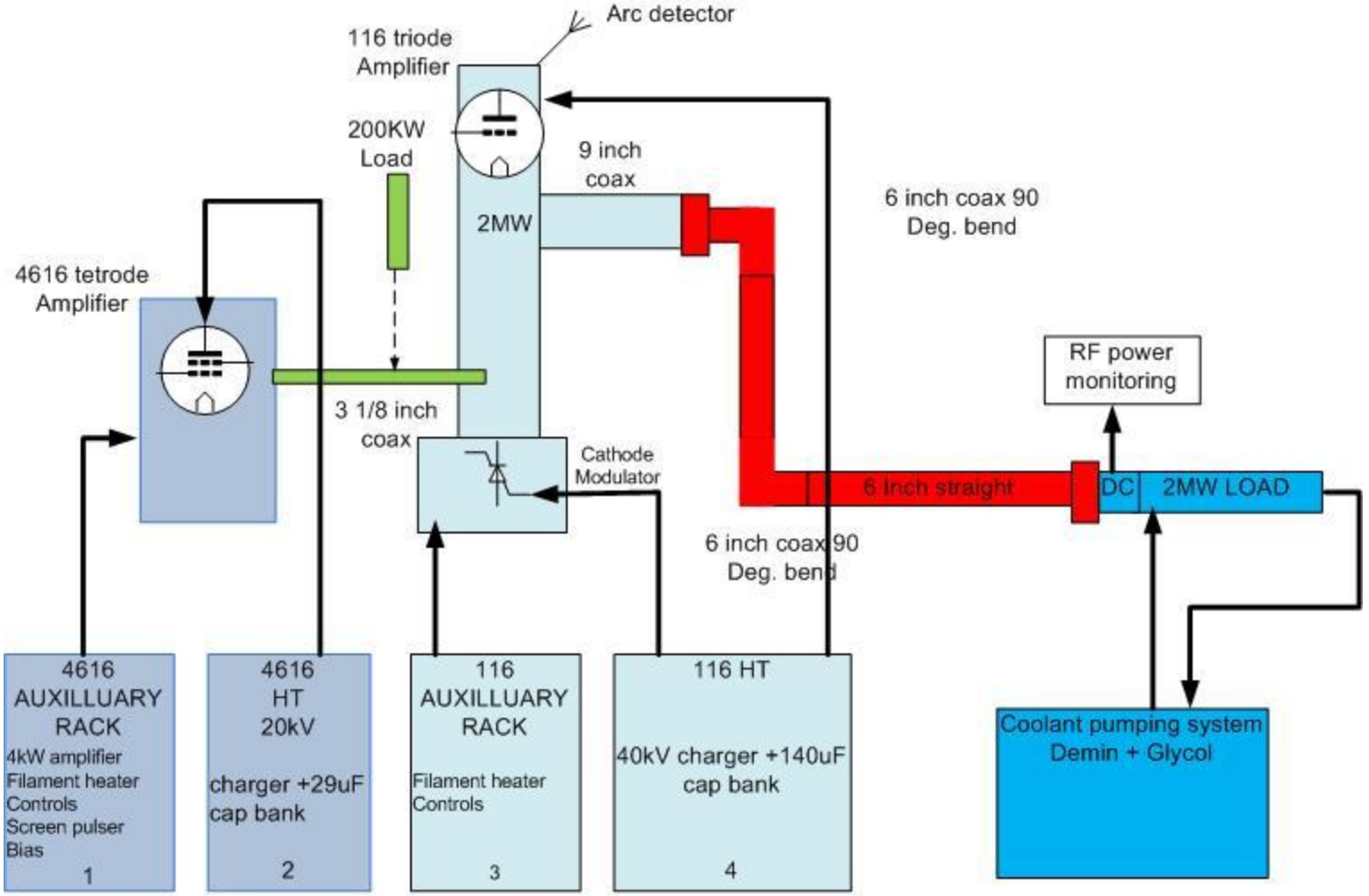
Amplifier status

- First medium power (300kW) amplifier and power supply system tested 2008
- Refurbishment and rebuild of first high power (2MW) amplifier complete October 2009
- Power supplies for first 2MW amp 100% complete
- Two further 300kW amplifiers awaiting repair
- Second 2MW amplifier stripped awaiting repair
- Two refurbished 2MW CERN amplifiers partly tested, inspected and awaiting build (in three parts currently)
- Still need to build 3 more sets of power supplies
- One more 300kW amplifier to buy/acquire

RF system components



Test system at Daresbury



Daresbury test setup for proving amplifiers/power supplies

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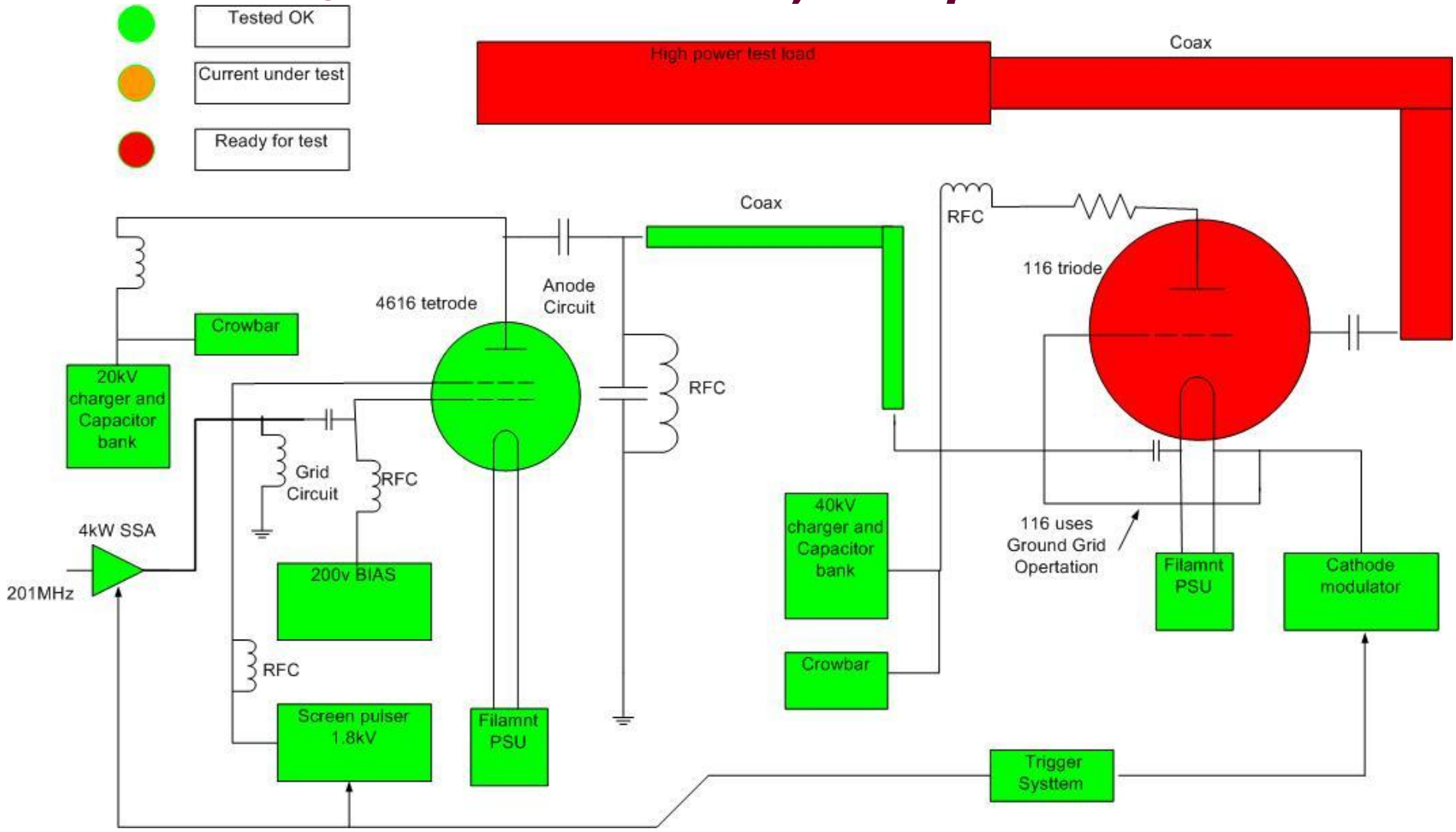
Current status of components



2MW amplifier status

- Final electrical checks September 2010 – crowbar/cathode modulator systems complete
- Drive 4616 amplifier and 2MW amplifier connected via flexi and tuning stub
- Water system, air blowers and compressed air have all been on
- Filament test to 500Amps on tube
- All auxiliary power supplies have been checked out ok
- Safety paperwork needs completing before we power system

2MW amplifier system

- Amplifier output
- Tuning stub to aid impedance matching between drive amplifier and large amplifier
- Input coax from 250kW amplifier
- Amplifier local control system

Second amplifier system

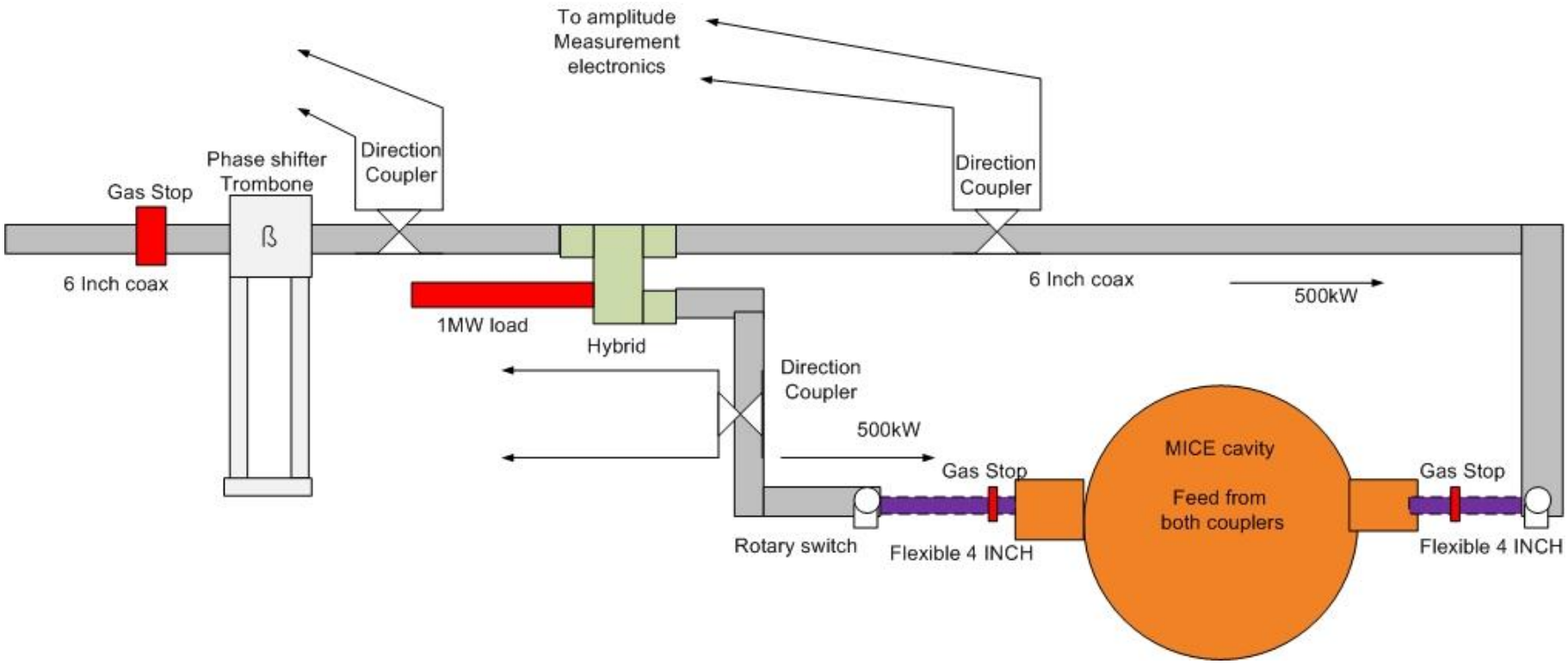
Support stand, wrong height – to match other amps, needs replacing, CERN drawing available

All components from amplifier

Coax design

- Coax system will use large phase shifter to make amplifier immune to reflected power issues
- Hybrid power splitters to divide power before each cavity with a rejection load, this should provide a robust system
- Local phase shifters in each cavity coupler, small range available only, so need to plan coax system carefully to get phase lengths within range at the cavity input couplers – simulation will be done at Imperial college by Saad
- Power monitoring in each section of coax will be linked in to RF control system so that issues can be flagged before faults occur
- Nitrogen gas pressure system with the coax for voltage stand off and interlock
- Plan to have the ability to connect test loads in place of cavity to test amplifier/coax system in its complete configuration – will depend on space for components

Coax layout for each cavity



Hall design in progress

- Working with 3D CAD engineer at RAL to plan layout between the amplifiers and cavities
  - Additional effort from Imperial for amplifier testing and layout/design
- Measurements of system dimensions at Daresbury have been taken
- First step is a simple block diagram showing all components and how they are interconnected
- Then understand how to optimise components with the layout of the hall and the space available
- Result will be a complete parts list required for each cavity that we can go out for tender for when appropriate
- Will liaise with Don Summers to order components

Future plans for this year

- Test of first large amplifier is priority - now
- Amplifier testing likely to take 4 – 6 weeks to optimise the system using old tubes, then replace with new MICE tubes and repeat tests carefully
- Assembly of the first CERN amplifier, refurbished unit however many small parts, CERN have offered to send two people for a few days to aid with the assembly of the unit – we will take up this offer
- Would need to buy more coax components to test this amplifier in our system – coax bends, straights and a combiner
- Test of CERN amplifier scheduled for March 2011
- First amplifier will be delivered and installed in the MICE hall

Conclusion

- Complete first RF amplifier system ready for test, now in progress
- Design of hall components between amplifiers and cavities is in progress and will lead to a formal design of the coax system, how it will be supported and the sequence of installation, this should be done by January 2011
- Funding will allow building of CERN amplifier and refurbishment of other LBNL amplifier systems