TT2A Mercury Jet Experiment

The Cryogenic System

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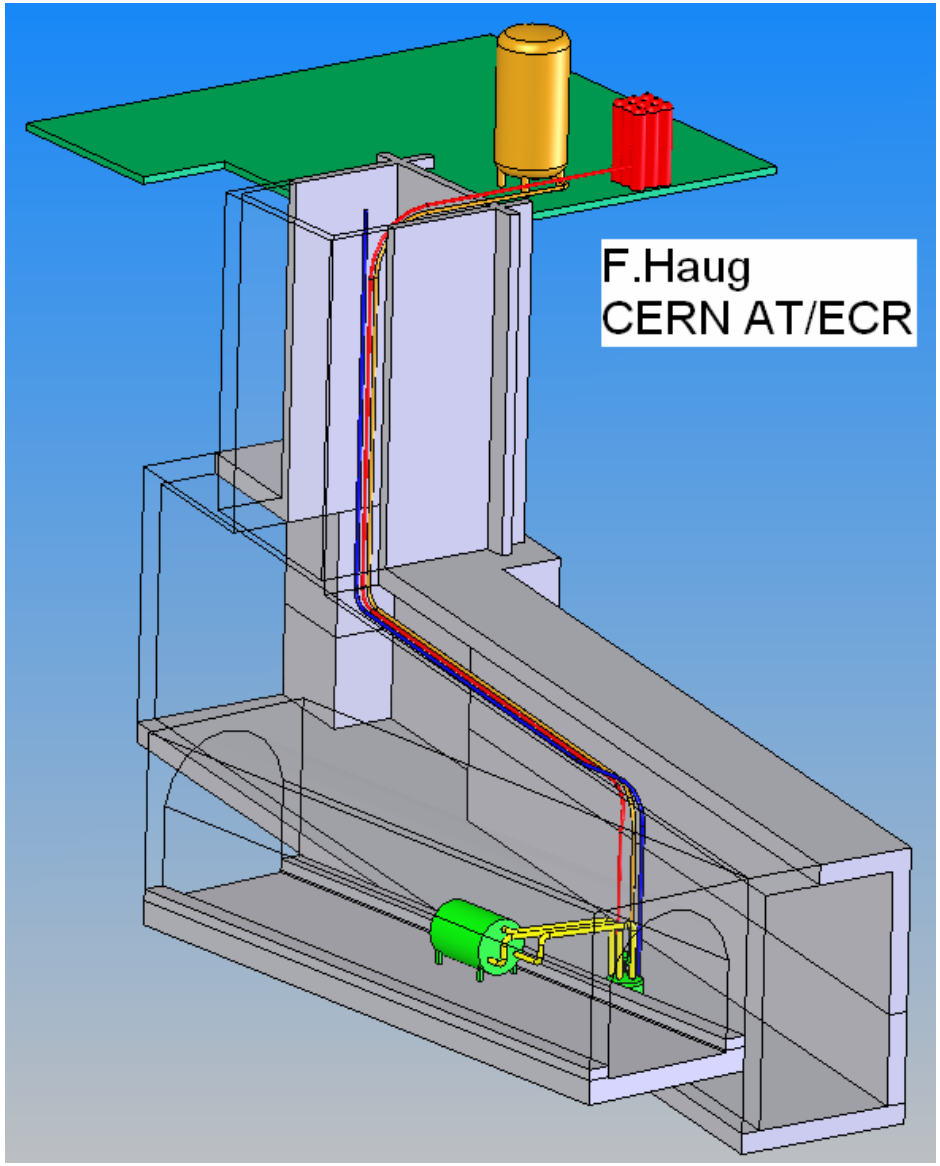
Layout of the Cryosystem

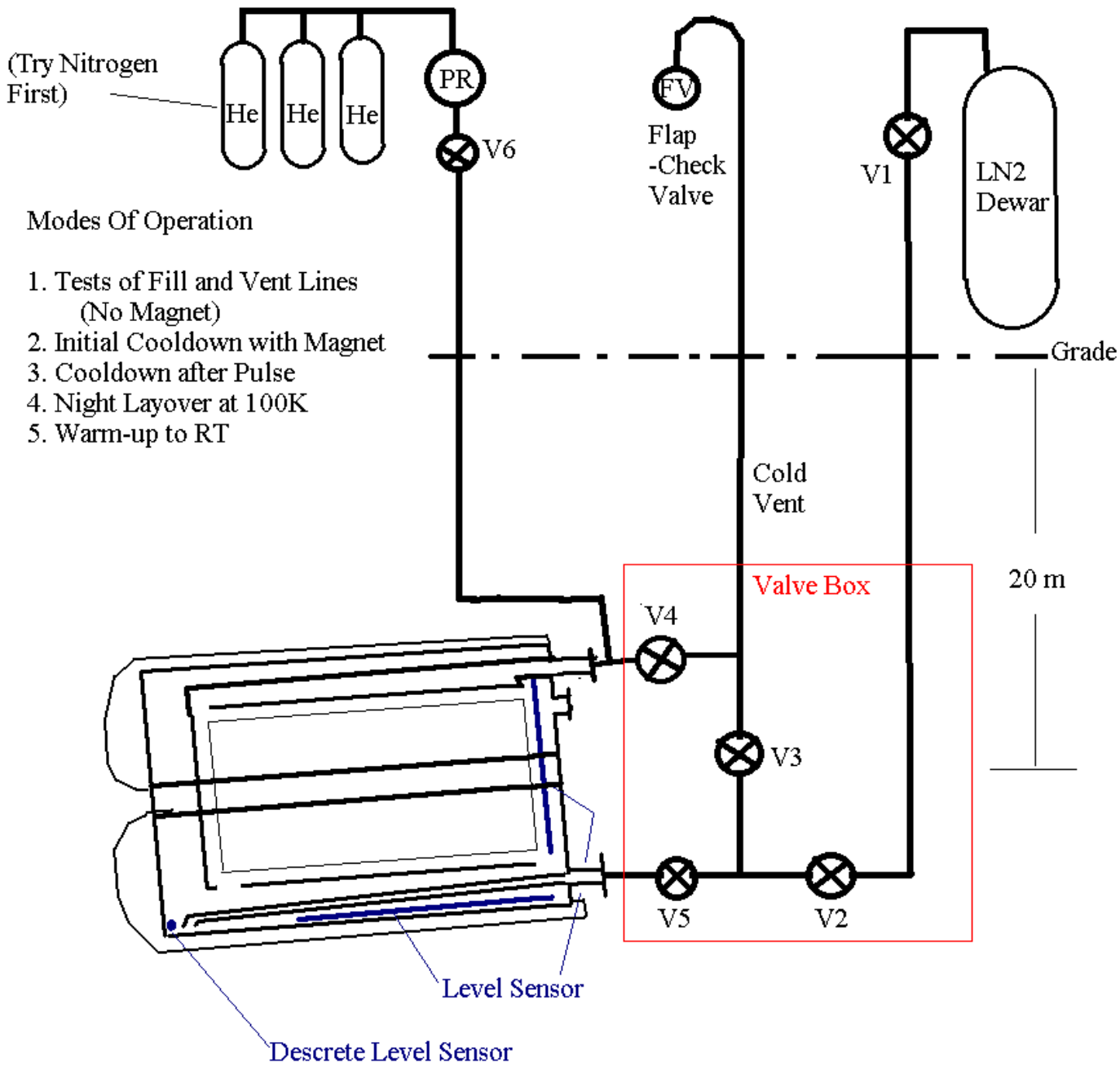


The “SPECIFICATION” of the cryogenic cycle is:

1. Initial fill of the magnet cryostat slowly over many hours -12 hours

2. Operation of the magnet on the following cycle:

- When the magnet is at ~80 K, empty the cryostat and neighbouring beam lines, to prevent activation by the beam, in ~2-3 minutes.
- After energizing the magnet, ~10 s, cool the magnet with LN2 to ~80 K in ~30 minutes or less.



Scheme agreed at CERN, December 2004, drawn by Peter Titus

Design and Costing of the Cryogenic System

1. The input line from the storage vessel to the cryostat is recommended to be 1 cm diameter bore.

2. The vent line is recommended to be 7.5 cm diameter bore to allow the cryostat to be filled in <30 minutes.

3. The total cost of manufacture, installation, commissioning and operation is estimated to be £318k.

This includes controls, staff costs and taxes but not the storage container which is assumed to be supplied by CERN.

Some Issues

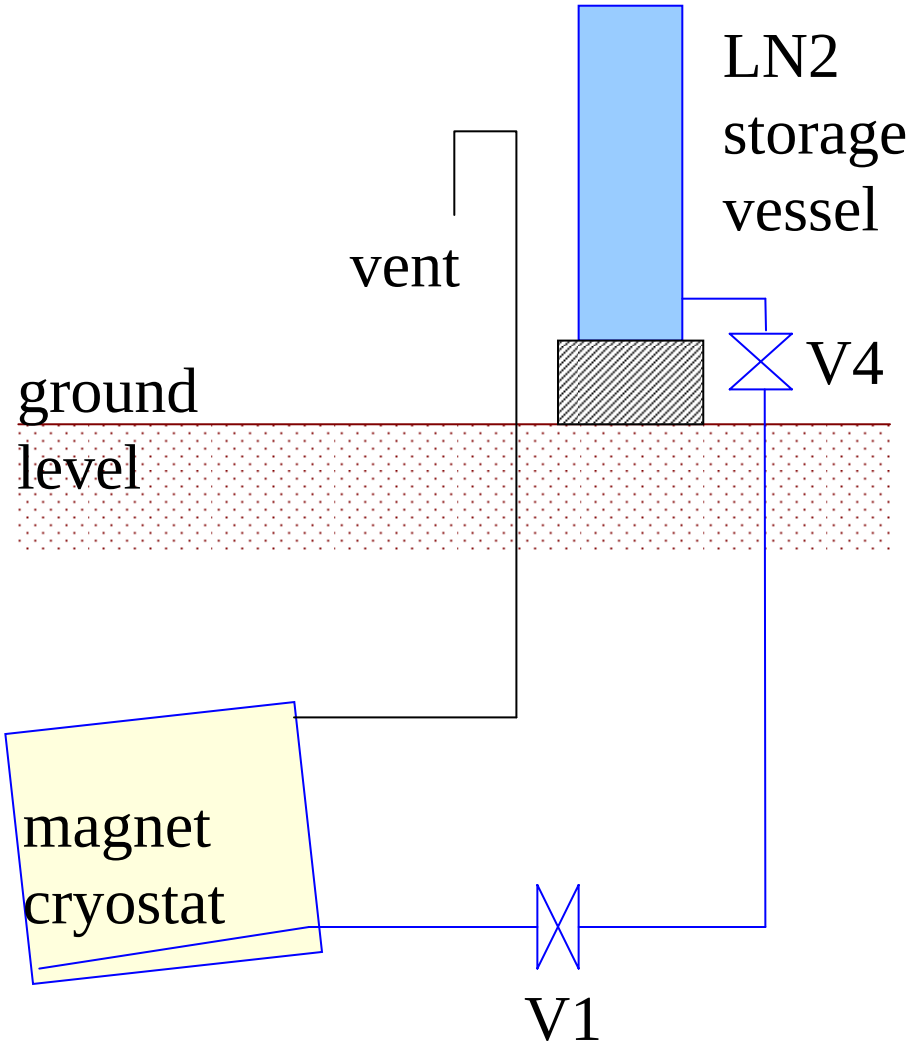
1. **Emptying the Cryostat. It will not be possible to remove the LN2 from the horizontal and vertical parts of the line.** The line is 7 cm diameter and the helium gas, used to remove the LN2 from the cryostat, will bubble through the lines rather than push it out through the vent.

2. Is it necessary to empty the cryostat before each pulse?

The radioactivity of the LN2 will be quite small for only 100-200 beam pulses. It is probably acceptable to release this into the atmosphere.

3. Is there a problem with the irradiation of liquid air trapped in and below the foam insulation on the large end flange of the cryostat?

This needs careful consideration because of the danger of explosion of the oxygen in the liquid air under irradiation.



If the cryostat is not emptied before beam pulses, this would reduce the cycle time and give a very simple cryogenic system