

# LTCC Gas System Status

01 May 2018

## **Current Status**

The LTCC gas system has been partly refurbished, with the notable exception of the Recovery or Distillation unit and the ASME pressure vessels.

The Recovery or Distillation unit, does not meet JLAB Pressure System Requirements.

The Recovery or Distillation unit, is required for C4F10 recovery.

The Recovery or Distillation unit is the only reason for the pressure control and gas return part of the system to exist.

Procurement and Installation of major system components is required to complete the gas system.

## **Procurement and Installation of Major System Components**

- The Return Tank - ASME pressure vessel, 1500-2000 gal capacity
- The Pressure Control Tank - ASME pressure vessel, 200 gal capacity
- The Recovery or Distillation Unit - C4F10 gas is recovered and collected here.
- Radiator Gas – C4F10 gas procurement – PR 376850 waiting on signatures

## **The Recovery Unit - Do we go NEW or Re-USE the current unit?**

There are only 2 options for this;

#1 Certify the legacy unit is within pressure system compliance and OK to operate  
**-- Question for the pressure systems committee to determine**

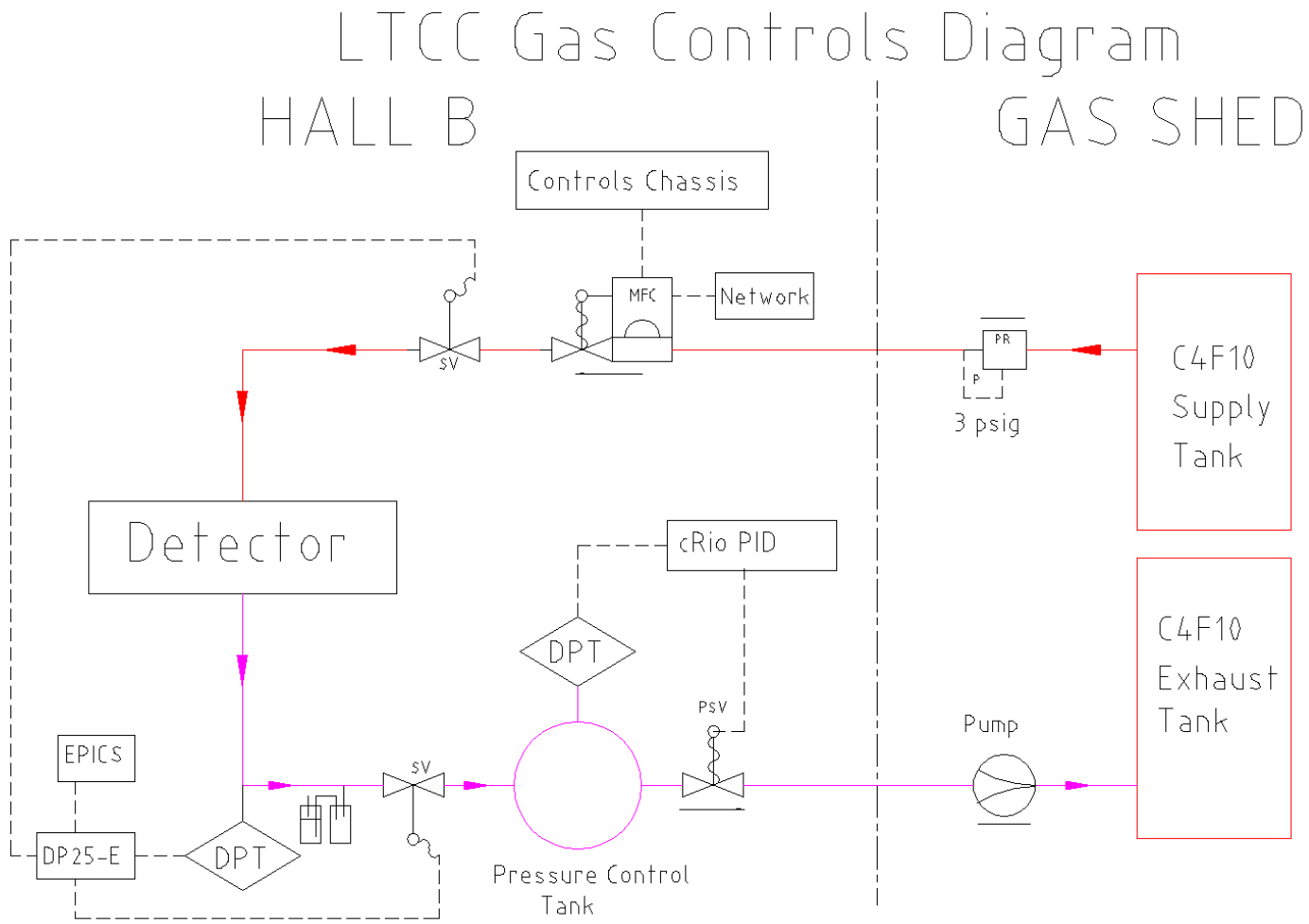
#2 Design and fabricate a new unit in accordance with JLAB pressure system requirements

**-- Requires an experienced engineer to design, JLAB Pressure Systems Design Authority, and welding, brazing, and soldering work**

## **Advantages of The Distillation Recovery Mode of Operation**

- Eliminates Gas Loss Due to Ambient Pressure Changes
- Permits recovery of gas prior to maintenance
- Permits recovery of gas during down times

# The LTCC Distillation Recovery Operation

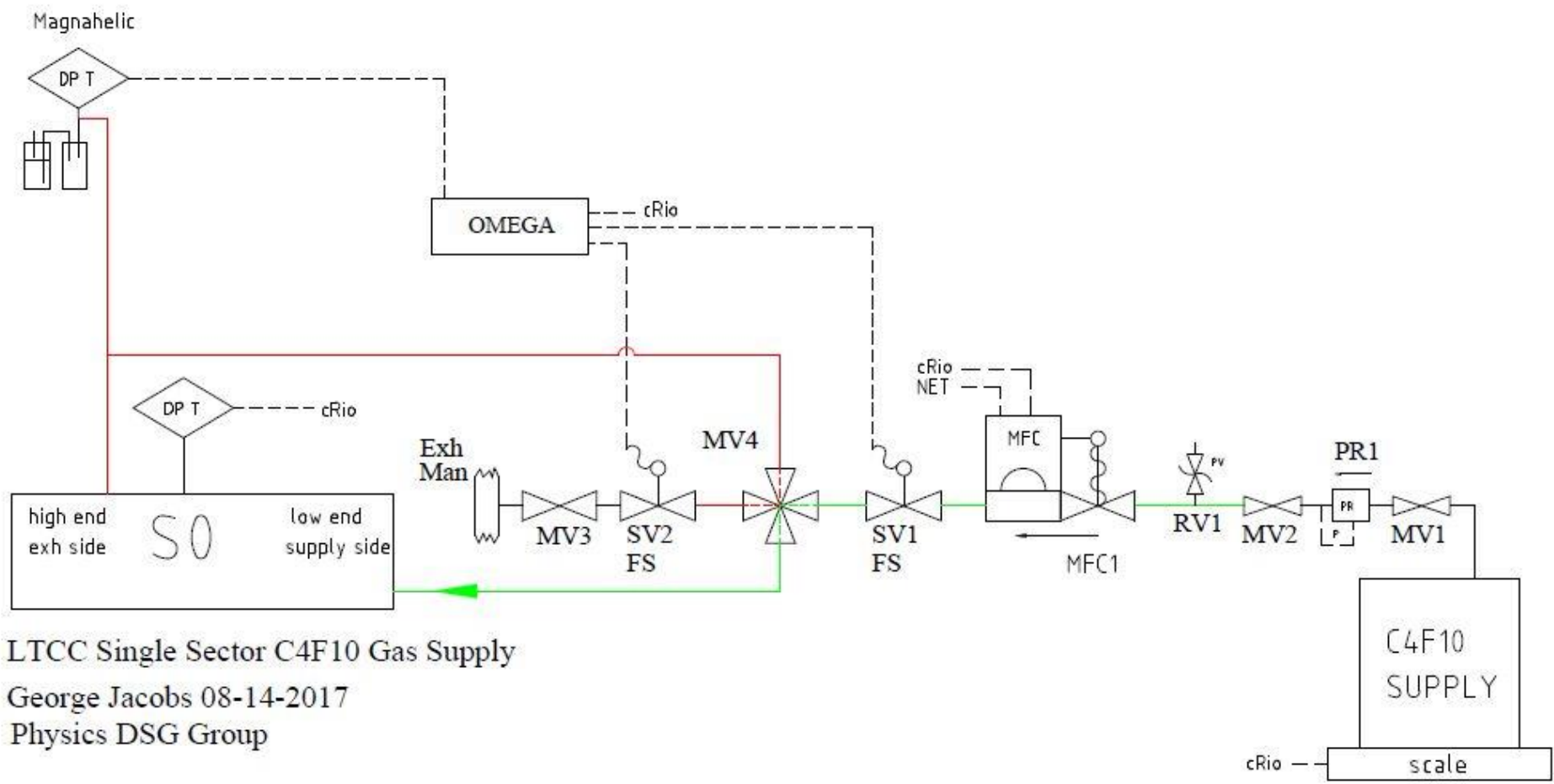


CLAS Cerenkov Gas System Controls Diagram  
Physics DSG Group  
George Jacobs 03-28-2016

# Current Operation – LTCC S5 Test

Gas is supplied to LTCC S5 as shown in the below diagram.

This configuration results in a 100% gas loss operation.



LTCC Single Sector C4F10 Gas Supply  
George Jacobs 08-14-2017  
Physics DSG Group

## LTCC S5 Operational Details

- Gas flows from MFC as required to maintain a minimum detector pressure and fill level. (100% GAS LOSS)
- Gas exits the bubbler to limit pressure below max limit. (100% GAS LOSS)
- LTCC S5 initial C4F10 fill required 75 kg (100% GAS LOSS)
- Average C4F10 gas usage for S5 from 02 Feb to 25 April 2018 = 0.42 Kg/day
- Initial gas fill plus usage for 83 days of operation – 112 kg (100% GAS LOSS)

## Advantages of the Current Operational Setup

- The Distillation System is not required.
- Does not require 40-60 man hours per month to operate.
- Minimal equipment overhead.

## Disadvantages of the Current Operational Setup

- Significant Gas Loss due to ambient pressure changes.
- Large detector pressure fluctuations due to ambient pressure changes.
- Detector gas volume may not be recoverable prior to maintenance.
- Detector gas volume cannot be recovered during down times.



### Advantages of the Distillation Recovery Process;

Recovers gas that would be lost due to ambient pressure changes.

Recovers gas from a detector prior to maintenance.

Maintains detector pressure with a relatively tight band.

Recovers gas during down times.

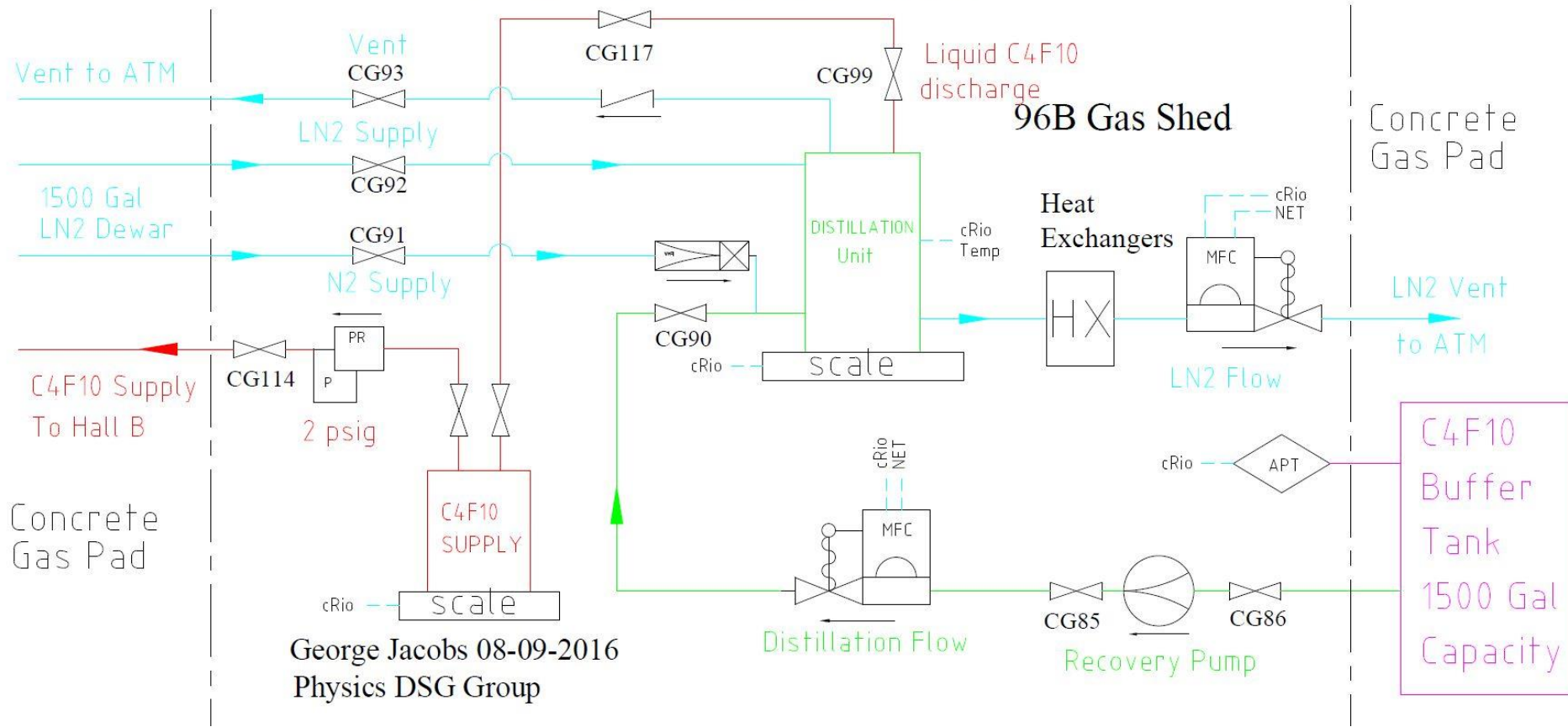
### Disadvantages of the Distillation recovery Method;

Complex and expensive equipment overhead required.

Manual startup and shutdown process by trained and qualified operator.

Requires 40-60 man hours per month to operate.

# LTCC C4F10 Distillation System



George Jacobs 08-09-2016  
Physics DSG Group

# C4F10 Distillation Recovery System

