

# Hall B Drift Chamber Re-establishing Region 3 Gas Supply

B. Eng/M. McMullen  
Detector Support Group  
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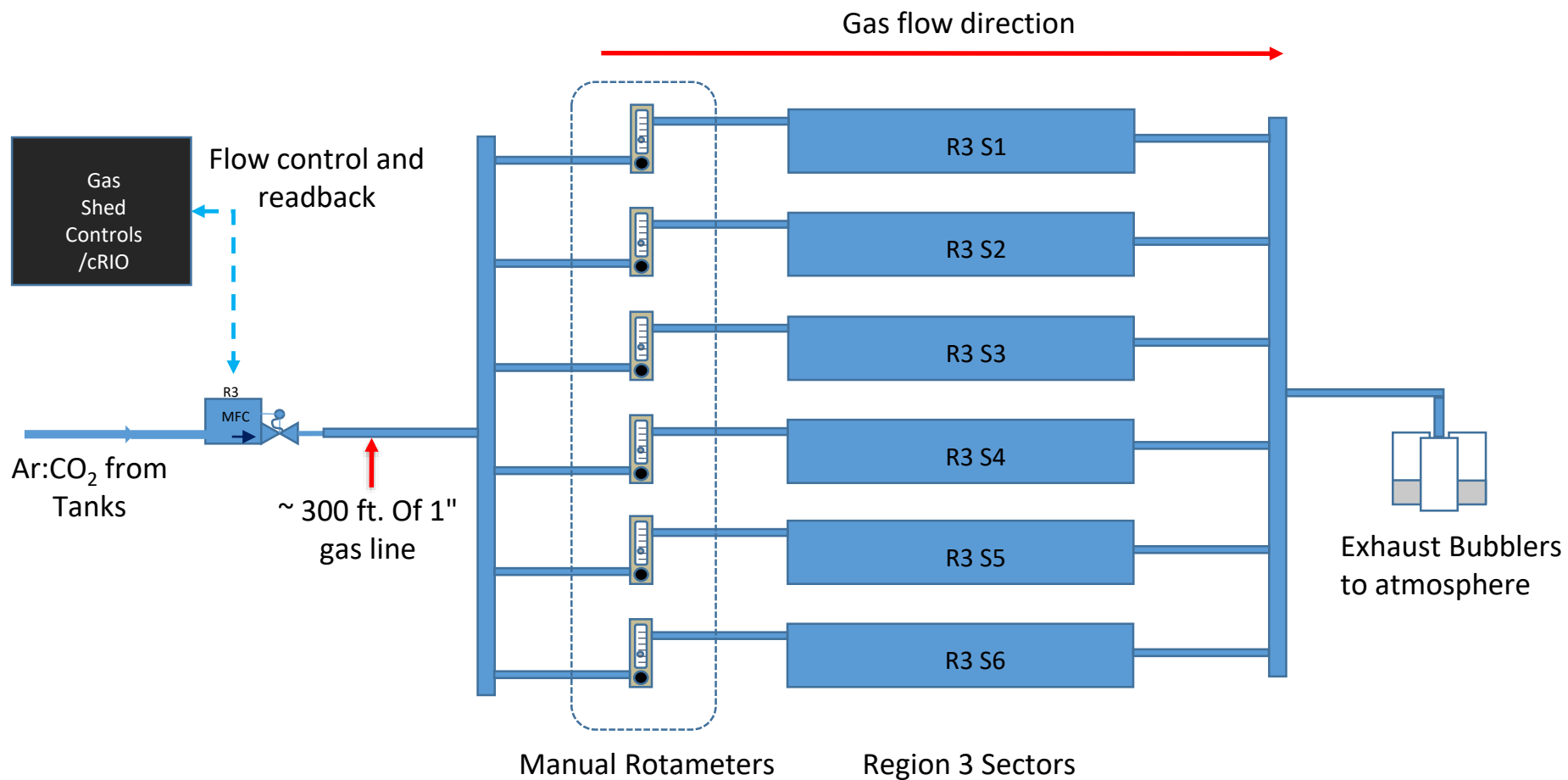
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# Roles

- DSG's responsibility
  - Controls software and hardware
    - cRIO, programming any sensors/instruments
  - Troubleshooting
    - Controls software
- Hall B Engineering responsibility
  - Set points
  - Gas supply
  - Hardware (piping, valves, etc)
  - Troubleshooting

# Region 3 Six Sector Gas Supply Diagram



# Operation

- R3 mass flow controller (MFC) supplies gas via rotameters to sectors
- Rotameters balance gas flow to sectors
  - Used since tubing length isn't equal and sectors have different leak rates
- Gas exhausted via bubbler
  - Bubbler controls over/under pressure

# Set Points

- MFC requires differential pressure  $\Delta P > 10$  psid across it to control flow
  - Max  $\Delta P = 40$  psid, burst  $\Delta P = 1500$  psig
  - During normal operations, pressure regulator upstream of R3 MFC is set to 15 psig
- Gas flow for normal operations is 36 lpm
  - For MEDCON6 gas flow reduced to 12 lpm
    - Both at MFC and via rotameters
    - Supply gas Ar gas
  - [DSG Note 2020-12](#)

# Resuming MEDCON5 Operations

- Change gas flow mode back to normal operations
  - Mixing Ar and CO<sub>2</sub>
  - Normal flow rates
- All MFCs resumed their normal flow rates except for R3
  - Couldn't flow more than ~20 lpm, lower flows worked okay
- After troubleshooting, determined rotameters needed to be reverted to previous settings
  - Rotameters were causing flow restriction after MFC, not allowing enough flow

# Timeline

- Hall B requests lower setpoints to MEDCON6 Mode
  - Flush Ar from tank to replace with Ar:CO<sub>2</sub> mixture
- Hall B sets mode to normal operation and begins mixing gas
  - Finds R3 not able to flow requested amount
  - Increases pressure to 40 psid with no improvement
- Requests DSG assistance in troubleshooting
  - All MFCs are online and responsive
  - Valve position indicates R3 MFC is opening fully to flow, but cannot
    - Suggests possible further troubleshooting with MFC hardware
- Hall B finds rotameters weren't set to proper positions for normal flow rates



# Conclusion

- System worked mostly as intended
  - Hall B troubleshot their area of expertise as did DSG
  - Collaborative effort
- Improvements
  - While MEDCON6 was an extraordinary situation, having a checklist to go in/back out would have been helpful
    - Much of setup was created on the fly in order to automate system as much as possible to reduce need for staff to come on site
  - DSG suggests nitrogen flow system for long shutdowns
    - Nitrogen ~ 50 times cheaper than argon
  - Communicate with DSG via new mailing list
    - [dsg-hallb\\_dc@jlab.org](mailto:dsg-hallb_dc@jlab.org)