

Automated Gas Distribution System

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Outline

- Background Information
 - Cyclotron
 - lon Sources
- Gas Distribution
 - How It Works
 - Current Gas Distribution System
 - Ideal Gas Distribution System
- Materials
- Design
- Development
 - Power Supply & Vacuum
 - Pressure Gauge
 - Pneumatic Valve & Manifold
 - NI Chassis
- Labview Software Development
 - Pseudo Code
 - 8 Block Diagram
- Video Demonstrations

Background Info.

ION INTERACTIONS

Cyclotron

Commissioned in 1967

PRECISI

K500 and K150 Cyclotrons

K500 SUPERCONDUCTING CYCLOTRON FACILITY TEXAS A&M UNIVERSITY - CYCLOTRON INSTITUTE

IDM SPECTROMETER



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1,2 - ("Facilities - cyclotron,") 3 - ("Cyclotron,")

Background Info.

lon Sources

Produces and inserts ions into the cyclotron for acceleration

H⁻ Ion Source

ECR Ion Source



4, 5 - ("Facilities - cyclotron,")

Gas Distribution

Current Gas Distribution System

Supplies a specified amount of gas to the ECR, and H⁻ Ion Sources.

How it Works

- Multi-Port Manifolds
- 2-3 Channels & needle valves connected To Gas Chamber
 - Separate Manually Operated Vacuum (PURGING)
 - Works at GROUND (0) voltage

- **Setup Process**
- Close all Gas Container & Valves
- Select Gas (Set Dials)
- Purge System (Connect Vacuum)
- Fill Gas (Open Selected Valve)

Gas Distribution

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Current Gas Distribution System

The System Faults

- Manually Operated Set-up
- Time Consuming
- Waste excess Gas
- Confusing
- 🚳 unsafe area!!!

Gas Distribution Ideal Gas Distribution System

Labview Instruments control gas distribution electronically.

The Pros of New System

- Reduces Manual Labor
- Controls Multiple gas ports
- Less Time Wasted
- Less Gas Wasted
- As simple as Pushing a Button
- Ensures a Safer Process



Materials

- Pneumatic Valves
- National Instrument cDAQ-9174 Chassis
- NI 9422 Input Module
- NI 9474 Output Module

- 110 AC Power Supply
- Vacuum Pump
- InstruTech BumbleBee with pressure gauge
- Air controlled solenoids



Power Supply Shelf Design Pressure Gauge Shelf



Vacuum & Power Supply



Pressure Gauge



Pneumatic Valves & Manifold



NI Chassis & Final Product



Labview Software Development

Pseudo Code

- Close all Valves
- Select Gas
- Purge System
- Open Selected Gas





Labview Software Development

Block Diagram

Hierarchy Design

 System Checks Checks Valves Position Checks Foreline Pressure Checks Manifold Pressure 		in Operations	System S Closes All Shuts dov Operation	 System Shutdown Closes All Valves Shuts down Labview Operations 	
Constantly Checks Foreline Pressure	Constantly Checks Valve Position	Constantly Checks Manifold Pressure	Purging Sequence	Open Valve Sequence	

Video Demonstration

- http://www.youtube.com/watch?v=PGw_pOCjH-M&feature=plcp
- http://www.youtube.com/watch?v=kgEkhQfAjEQ&fea ture=plcp

Results

IT WORKS!!!



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