<table>
<thead>
<tr>
<th>Table of Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Goal</td>
</tr>
<tr>
<td>• LabVIEW</td>
</tr>
<tr>
<td>• Virtual Instrument</td>
</tr>
<tr>
<td>– Front Panel</td>
</tr>
<tr>
<td>– Block Diagram</td>
</tr>
<tr>
<td>– Icon and Connector Pane</td>
</tr>
<tr>
<td>• Drift Scope</td>
</tr>
<tr>
<td>• Diagrams</td>
</tr>
<tr>
<td>– Relay</td>
</tr>
<tr>
<td>– Circuit</td>
</tr>
<tr>
<td>• Our Elevation VI</td>
</tr>
<tr>
<td>– Front Panel</td>
</tr>
<tr>
<td>– Block Diagram</td>
</tr>
<tr>
<td>• Summary</td>
</tr>
</tbody>
</table>
Our Goal

• To learn how to use LabVIEW

• To develop a VI to control a radio telescope in drift mode

• To be able to read the position of the telescope
LabVIEW…

• is a graphical programming language
• uses icons to create applications
• creates tests and measurements, data acquisition, instrument control, datalogging, measurement analysis, and reports generation applications

DAQ
Virtual Instrument (VI)

• Programs within LabVIEW are called virtual instruments
• Contain three main components:
  1) the front panel
  2) the block diagram
  3) the icon and connector pane
Front Panel

- Built with controls (knobs, buttons, dials, and other input devices) and indicators (graphs, LED’s, and other displays)
- Controls simulate instrument input devices and supply data to the block diagram of the VI
- Indicators simulate instrument output devices and display data the block diagram acquires or generates
Front Panel

Temp Scale

deg C
deg F

Temperature

85
Block Diagram

- Controls the front panel objects by using graphical representations of functions
- Includes terminals, subVI’s, functions, constants, structures, and wires, which transfer data among other block diagram objects
Block Diagram
Icon and Connector Pane

• **Icon**
  – A graphical representation of a VI
  – Can contain words, images, or both
  – Identifies the VI as a subVI in another VI’s block diagram

• **Connector Pane**
  – A set of terminals that correspond to the controls and indicators of a VI
  – Defines the inputs and outputs that can be wired to the VI so it can be used as a subVI
Icon and Connector Pane

Icon

Connector Pane
Drift Scope

- Only moves in elevation position
- Always points at the meridian (due South)
- Waits until the object comes across its path
Relays
Circuit
Our Elevation VI

- Uses LabVIEW to move the motor
- Acts as a drift scope
- Measures the angle moved
Our Elevation Front Panel

Clockwise (CW): OFF
Counter Clockwise (CCW): OFF
Down: OFF

Status of Control Relays

Azimuth
CW
CCW

Elevation
UP 2
DOWN 2

Azimuth Position
45 135 90

Elevation
45 22.5 90

Angle Moved
16.43

Shut Down
Angle Measure Experiment

Actual Angle vs. Angle Reading

\[ y = -0.53739 + 1.0411x \quad R = 0.99371 \]
Summary

- LabVIEW is a graphical programming language.
- A VI contains a front panel, block diagram, and icon and connector pane.
- A drift scope only moves in the elevation position.
- Our VI acts as a drift scope and measures the angle moved.
Acknowledgements

• This work has been supported in part by NASA/MU-SPIN (NNG04GD62G), NASA’s Science Mission (NNG04GD62G) and NASA URC through a subgrant from Tennessee State University (NCCW-0085).

• Special thanks to Dr. James Payne, Dr. Donald Walter, Ms. Irene Scott, and other URIA faculty and students.
Go TEAM!!