

# Introduction

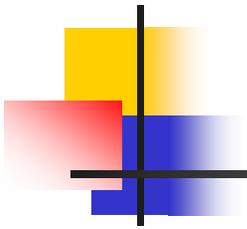
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Stacey Nordt

Computer Science

NC A&T State University

**Project Description:** Converting a Visual C++ program into LabView for testing the 2280 system.

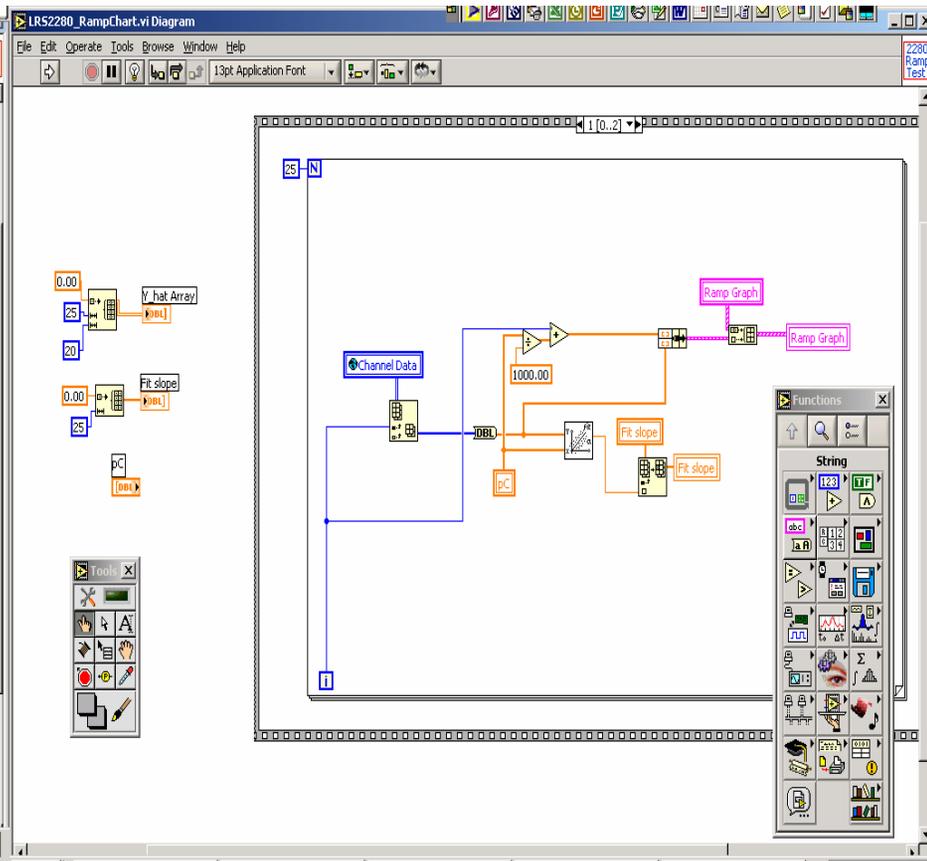
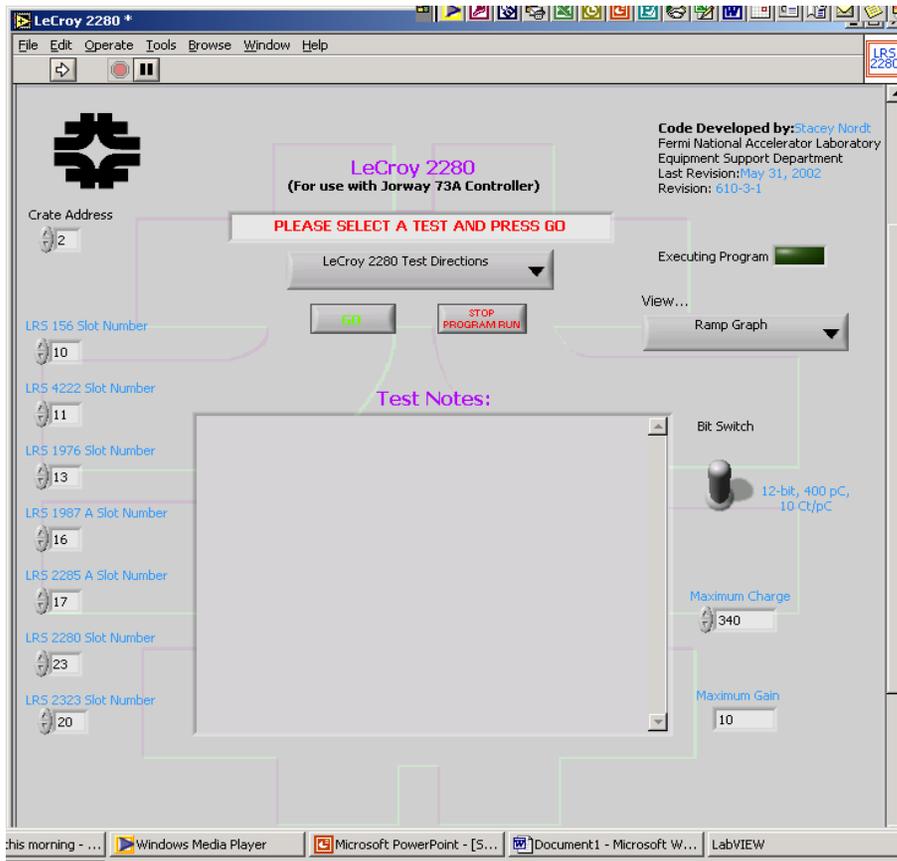


# Facts About LabView

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- Laboratory Virtual Instrument Engineering Workbench
- developed by National Instruments
- part of "G" programming language
- uses terminology, icons and ideas that are familiar to technicians, scientists and engineers
- generates charts, graphs and customized, user-defined graphics
- compatible with PC's running Microsoft Windows, UNIX/Linux, MacOS, and Concurrent PowerMax operating systems

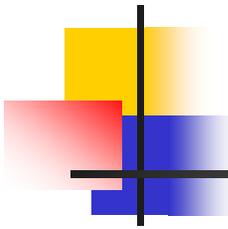
# Front Panel and Block Diagram



# A Lesson in LabVIEW: first things first



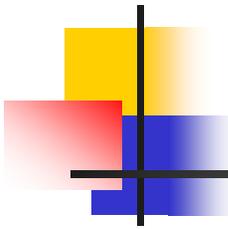
- Two day Tutorial
- Mentors Galore!  
Tim Kasza, Mike Behnke,  
Rick Mahlum, Joseph  
Jaskierny



# Facts about CAMAC

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- Computer Automated Measurement And Control
- Modular data handling system
- Used at almost every nuclear physics laboratory
- Primary application is data acquisition

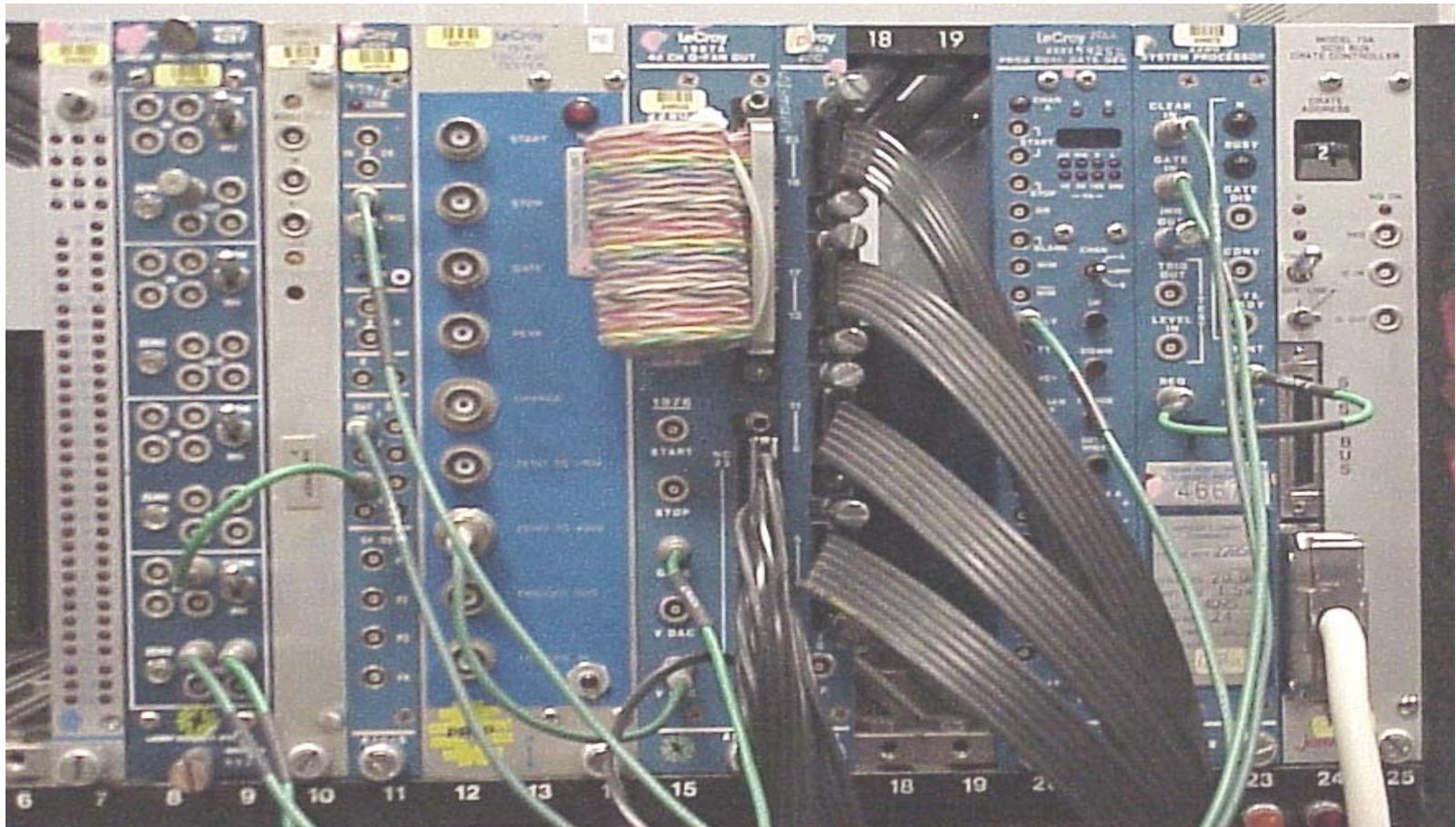


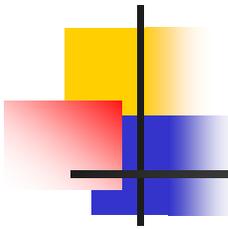
# 2280 System

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- **LRS 2323 – Programmable Dual Gate Generator**
- **LRS 4222 - Gate and Delay Generator**
- **LRS 428F - Fan In/Fan Out**
- **LRS 2280 - ADC System Processor**
- **LRS 2285A – Charge ADC**
- **LRS 1976 - TDC and ADC Tester**
- **LRS 1987A - 48 Channel Charge Fan Out**
- **Fermi 156 – Power Supply Controller**
- **Interface Standards DTM 399 – Backplane Display**
- **Jorway 73A – Crate Controller**

# 2280 System



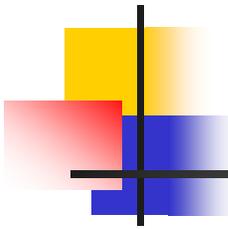


# First LRS 2280 Test

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## Camac I/O Test

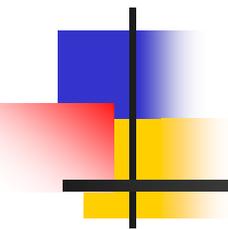
- Prerequisite for actual project
- Checks function codes for Q and X response



# Project 2280

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- ✓ Data Table
- ✓ Ramp Test
- ✓ Deviations Test
- ✓ Differential Non-Linearity Test



# Data Table

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The data table was established so that the user could see the actual data values being read out of the 2285 A within a twenty-step range. The table also outputs the pC values, DAC words, residuals, worst residuals, maximum values, gains, and the pedestals.

# Data Table

LR52280\_Ram280c.vi

File Edit Operate Tools Browse Window Help

Data Table

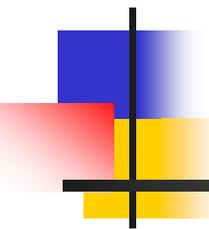
	step 16: Data	Residual	step 17: Data	Residual	step 18: Data	Residual	step 19: Data	Residual	Maximum Value	Gain	Pedestal	Worst Resi
Header	0	0.000	0	0.000	0	0.000	0	0.000	0	0.00	0	0.000
<b>PASSED</b> Channel 1	3225	-0.098	3396	0.087	3568	-0.728	3739	-0.543	3739	10.07	486	1.608
<b>PASSED</b> Channel 2	3176	-0.092	3348	-0.814	3519	-0.535	3690	-0.257	3690	10.08	436	0.961
<b>PASSED</b> Channel 3	3238	0.148	3409	-0.506	3579	-0.160	3750	-0.814	3750	10.02	513	1.073
<b>PASSED</b> Channel 4	3229	0.666	3402	0.592	3576	-0.483	3749	-0.557	3749	10.17	463	1.187
<b>PASSED</b> Channel 5	3126	-0.741	3297	-0.070	3469	-0.399	3641	-0.729	3641	10.10	379	0.906
<b>PASSED</b> Channel 6	3255	0.312	3426	-0.102	3597	-0.515	3768	-0.929	3768	10.04	526	1.207
<b>PASSED</b> Channel 7	3280	-0.020	3452	-0.223	3624	-0.426	3796	-0.629	3796	10.10	532	1.589
<b>PASSED</b> Channel 8	3340	-0.153	3517	0.169	3695	-0.508	3873	-1.186	3873	10.43	504	1.589
<b>PASSED</b> Channel 9	3412	-0.162	3593	0.083	3775	-0.673	3957	-1.429	3957	10.66	513	1.128
<b>PASSED</b> Channel 10	3353	-0.141	3529	-0.132	3705	-0.123	3881	-0.114	3881	10.35	537	0.823
<b>PASSED</b> Channel 11	3295	-0.046	3469	-0.307	3643	-0.568	3816	0.171	3816	10.22	516	-0.871
<b>PASSED</b> Channel 12	3375	-0.273	3553	0.247	3732	-0.234	3911	-0.714	3911	10.50	519	1.208
<b>PASSED</b> Channel 13	3352	-0.552	3530	-0.106	3709	-0.660	3888	-1.214	3888	10.50	497	1.327
<b>PASSED</b> Channel 14	3234	-0.502	3407	0.575	3583	-1.348	3756	-0.271	3756	10.24	449	1.038
<b>PASSED</b> Channel 15	3244	-0.219	3416	-0.560	3588	-0.902	3759	-0.243	3759	10.10	498	1.171
<b>PASSED</b> Channel 16	3372	-0.450	3549	-0.219	3726	0.012	3905	-1.757	3905	10.42	537	1.935
<b>PASSED</b> Channel 17	3360	-0.469	3537	0.559	3716	-0.414	3895	-1.386	3895	10.47	511	1.336
<b>PASSED</b> Channel 18	3235	-0.032	3406	0.079	3577	0.189	3749	-0.700	3749	10.06	498	1.195
<b>PASSED</b> Channel 19	3279	0.421	3451	-0.053	3623	-0.526	3795	-1.000	3795	10.09	535	-0.947
<b>PASSED</b> Channel 20	3426	-0.805	3605	0.263	3786	-0.668	3967	-1.600	3967	10.59	545	1.126
<b>PASSED</b> Channel 21	3316	-0.289	3493	-0.064	3671	-0.839	3848	-0.614	3848	10.43	480	1.362
<b>PASSED</b> Channel 22	3248	-0.168	3419	0.183	3591	-0.465	3762	-0.114	3762	10.08	506	0.726
<b>PASSED</b> Channel 23	3386	-0.265	3566	-0.467	3746	-0.669	3925	0.129	3925	10.58	510	1.162
<b>PASSED</b> Channel 24	3387	-0.768	3562	-0.079	3738	-0.389	3914	-0.700	3914	10.33	576	1.405
Dac Word	8912		9469		10026		10583					
pC	272		289		306		323					

BIT SWITCH

12 bit

15 bit

Return to Main Menu

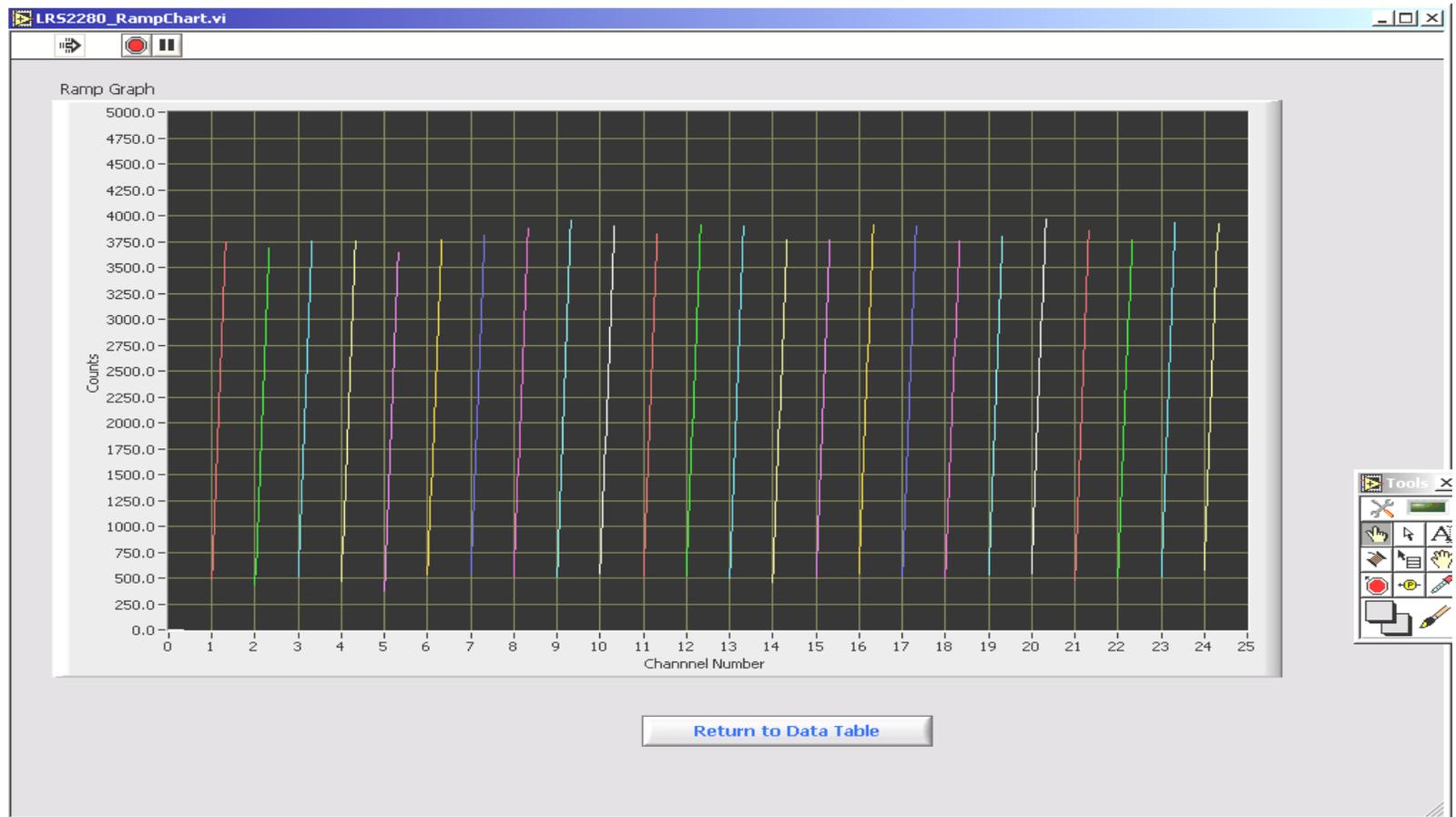


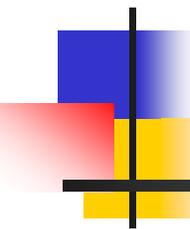
# Ramp Test

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The Ramp Test was built to plot the ADC output (counts) versus charge of each channel of the 2280 system on a graph. There are 20 data points on the graph to represent the number of steps.

# Ramp Graph



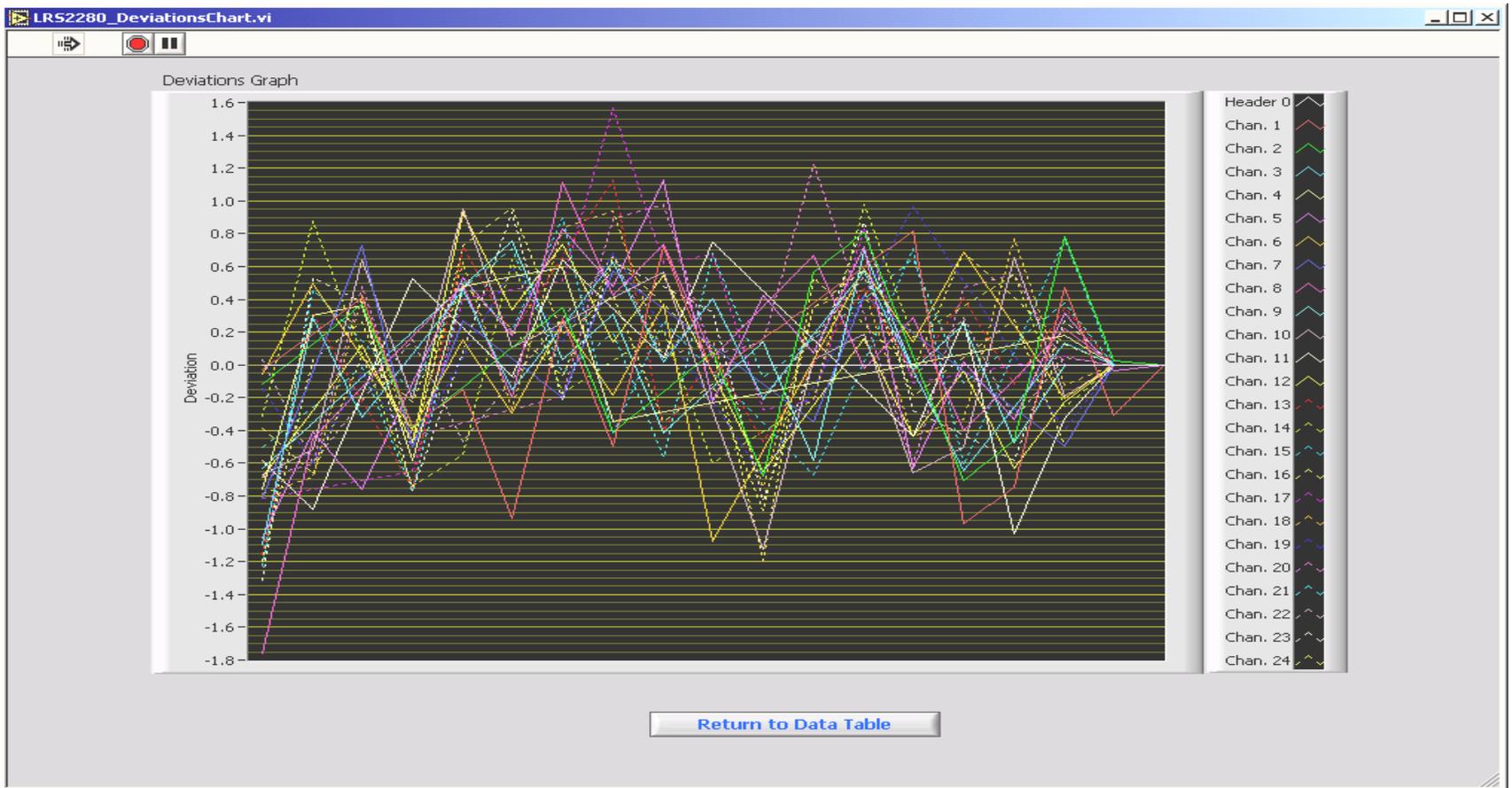


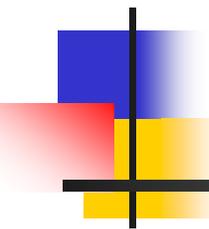
# Deviations Test

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This test outputs a graph that plots the residuals and the pC with the data received from each channel of the 2280 system. The graph allows the user to see if the residuals are within a certain range for testing purposes.

# Deviations Graph



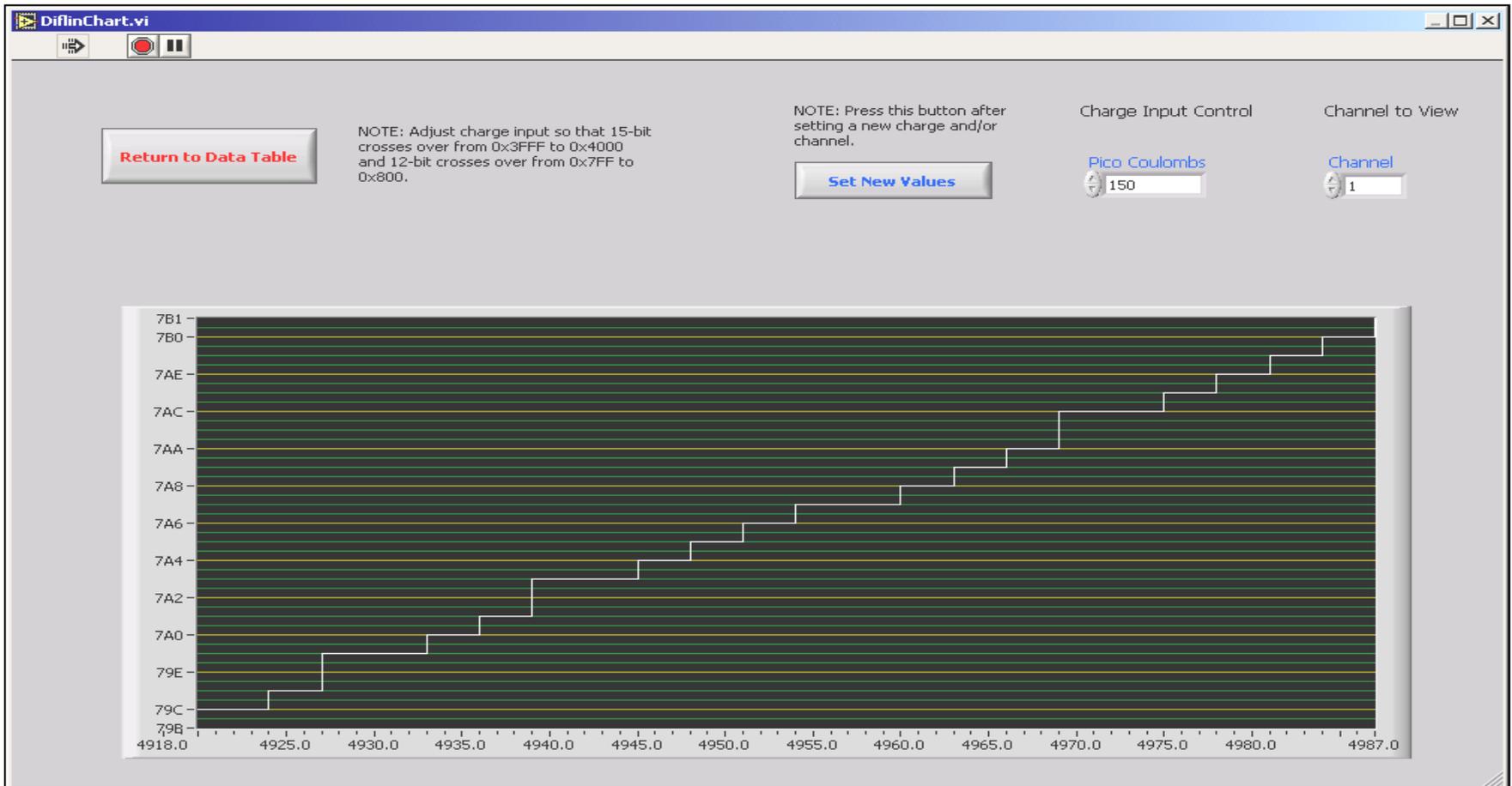


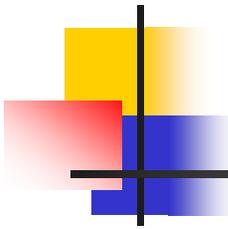
# Diflin Test

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The Diflin Test was meant to test the differential non-linearity of the 2285. The graph displays hexadecimal data for incrementing pC values. The test checks if all data bits catch and that no bits get stuck on or off.

# Diflin Graph



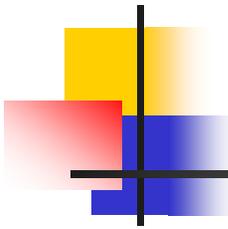


# Problems with Project

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- C++ and Fortran code
- File Corruption
- Lack of Space
- No code for the Diflin graph





# Conclusion

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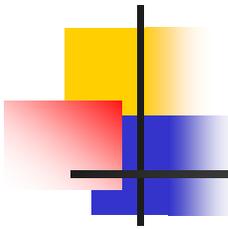
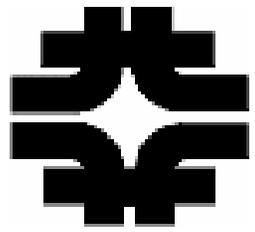
## Status

Although there may be room for some minor adjustments, the 2280 system project has been completed.

## Possible

### Future Adjustments

- Recompiling to newer versions of LabView



# Thank You...

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- Elliot McCrory
- Diane Engram
- Tim Kasza and FCC
- Dr. Davenport
- Dave Peterson
- And all of Fermi National Accelerator Laboratory