

Fall 2006



VIEWPOINT SYSTEMS, INC.

Viewpoint News

Viewpoint Upgrades Legacy Maverick Missile Flight Control Surface Test Fixtures

Tight Team Integration with Moog Aerospace and Viewpoint Leads to a Winning Solution.

Customer: Moog Aerospace, East Aurora, NY

Moog is a worldwide manufacturer of precision control components and systems. Moog's high performance actuation products control military and commercial aircraft, satellites, and space vehicles, launch vehicles, missiles, and automated industrial machinery. More information can be found at www.moog.com.

The Challenge

End of line (EOL) testing of product is a difficult task regardless of the industry. Many factors need to be considered, and in the end once a system is established and running it is rarely upgraded due to the cost and time needed to recertify the system. The challenge placed before Viewpoint: Work hand-in-hand with Moog engineers to replace five EOL flight control surface test systems for the Maverick missile with a fixture consisting of new components, a modern test executive system, and ensure the new system produces matching results.

Further complicating the process was a compressed timeline, limited access to the original fixture as it was still being used to EOL test product, and the integration of a large team of people working in Rochester, NY at Viewpoint's home office, onsite in East Aurora, NY, and final product test in Salt Lake City, UT.

The Solution

With limited access to the original test fixtures because of their geographic location, we spent an initial planning period at Moog traversing the fixtures to fully understand their operation, talking with end users, and assessing areas of potential project pitfalls. To ensure data correlated between the new and old systems, data was collected from the five units prior to placing them into bonded storage for final validation of the new fixture. With this knowledge in hand, we returned to Rochester and built simulation systems for the fixture and product to allow us to work offsite. This offline testing and verification with the simulators greatly simplified the integration effort on-site and reduced the amount of time spent on-site doing final integration.

During final integration, only minor issues needed to be addressed as major test steps and sequences had been addressed at the simulation phase. Working closely with Moog onsite, we were easily able to integrate into the Moog team to bring the real system to life.

Technical Highlights

Two design goals propagated through this project: use as many commercial off the shelf (COTS) components as possible, and leverage code written for other Moog projects in the new system. One major code leverage was our flexible, XML-driven, object-oriented test executive which has been proven on other projects. Reuse of code enabled us to focus on designing test steps and implementing the software and hardware requirements specific to this system. Major features of the system:

- PC-based data acquisition system using LabVIEW
- 22 customized test steps – Test steps can be designed off-line, off the fixture, and then integrated and tested at the last minute.
- Complete data retention and archival. Raw data saving for selected steps. Ability to generate HTML reports.
- Siemens PLC for controlling safety and all fixture tooling.
- Compumotor 6K 8-axis motion controller with Gemini drives interfaced through Viewpoint's own 6K VI Motion Library (www.viewpointusa.com/prod_6k.asp)
- 4 NI-PCI 6544 (DIO-32-HS) High Speed Digital I/O for Serial Encoder Measurement
- NI-PCI-6731 and NI-PCI-6289 for general purpose AI/AO

Conclusion

The true measure of success was the final validation. The Moog analysis team was able to take product with known results and successfully correlate the data between the old and new system. The new test fixture was delivered and validated successfully against the legacy test stand, all on an extremely short timeline. The system exceeds Moog's expectations in its ease of use and maintainability, while adding important realtime hardware protection of product, tooling, and people.

National Instruments Training

For detailed course descriptions, prerequisites, and up to the minute schedule, go to www.ViewpointUSA.com/training.

LabVIEW Basics

Basics I: Introduction	3 days	11/13–11/15 12/11–12/13 1/22–1/24	\$1595	<i>25% discount if scheduled concurrently with Basics I</i>
Basics II: Development*	2 days	11/16–11/17 12/14–12/15 1/25–1/26	\$1095	

LabVIEW Intermediate

Intermediate I: Successful Development Practices	3 days	10/30–11/1	\$1595	<i>25% discount if scheduled concurrently with Intermediate I</i>
Intermediate II: Performance and Connectivity*	2 days	11/2–11/3	\$1095	

* Indicates prerequisite required

Don't see a course listed here? Call 585-475-9555 to inquire about other courses offered by National Instruments and Viewpoint Systems. Viewpoint can also custom tailor a training course to meet your company needs. All classes are held at Viewpoint's Certified Training Center in Rochester. To register go to www.ni.com/training or call 585-475-9555.



LabVIEW Code Challenge

Do you think you have what it takes? **Greg Givan** from **Cooper Power Systems** took up our challenge from the summer and is now the proud owner of a \$100 gift certificate. Are you jealous that **Greg Givan** from **Cooper Power Systems** name is printed here and not yours? If so, put down everything you are doing and take up this issues challenge. Don't wait, do it now!

Use LabVIEW to solve this issue's challenge:

Write a program that reads three nonzero integers and determines if they could be used to form a right triangle.

Read submission rules at: www.ViewpointUsa.com/CodeChallenge/fall2006.asp. Our prize gift certificate is \$50 and will be awarded to the winner prior to publication of our next issue.

Viewpoint is Growing, Again!

Viewpoint Systems is proud to announce the addition of Chris Kneappel to our staff! Chris joins us from Viatran Corporation and brings with him his extensive experience with hardware/software integration. Outside of work Chris enjoys spending time with his family and motor sports, including but not limited to dirt, street, snow, and water.

Viewpoint continues to grow in the Rochester/Buffalo area and we are always on the lookout for someone who has what it takes. Are you ready to embark on a journey of self discovery and adventure at every turn? Current job descriptions for openings can be found on our website www.ViewpointUSA.com/employment.asp

Viewpoint News Your Informational Resource Website Redesign in Progress!

We have been working hard on updating our website. The pages are being reorganized to allow one to find information easier and we are adding a lot more content about our capabilities, personnel, and ways we can improve your productivity and profitability.

Intrepid Viewpoint News readers will quickly notice we publicized our new website in this same space last issue, and if you didn't notice for shame on you. We are so excited about our new website we couldn't relegate talking about it to just one issue. Go, now, www.viewpointusa.com!

And of course we invite you to send us your feedback!

Tips and Techniques: Hiding Control Structures

Benjamin Hysell – Systems Engineer, Viewpoint Systems (with special credit given to John Shannon and his Basics I class)

Tested with LabVIEW 6.1 and LabVIEW 8.0

As a professional software engineer, I rely on standards to make my job easier. LabVIEW coding standards allow two different software engineers to share code between them and each is able to read one another's code. Standards become even more important as software teams grow. Often in small teams, two to seven people, one can often find the original developer of a VI, walk over, and begin to question them about the functionality of the VI if it is unclear. Attempting to do that same procedure in a team of 50 becomes near impossible... just the act of figuring out who made what adjustment to the code when and who is now responsible for it can be a very difficult task. Thus, as team size grows, following coding standards becomes more and more important. As a quick example of a few prevalent LabVIEW standards, let's examine Figure 1.

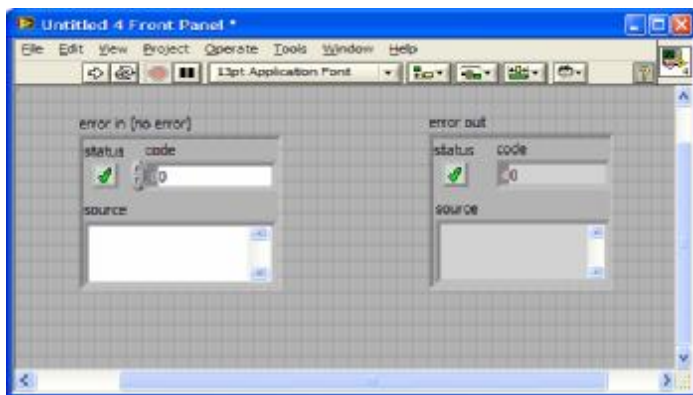


Figure 1. Normal Looking Front Panel

Everything looks all well and good, however once we peer into the block diagram we make a horrible discovery.

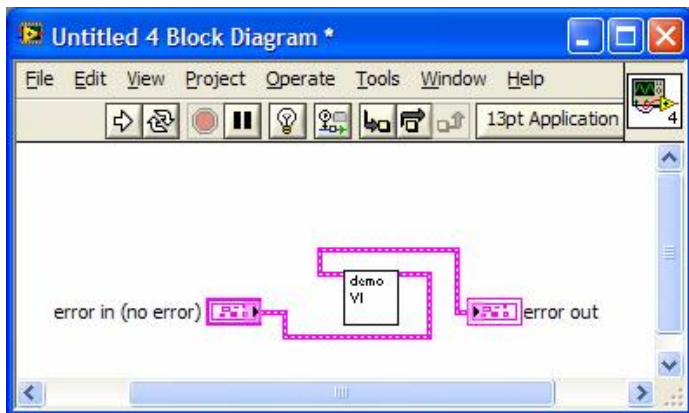


Figure 2. ::Insert Screams of Horror::

When people break standard coding conventions in LabVIEW, they make debugging and reading code a potential nightmare.

I bring you this tip in the hopes it will only be used for good, and not evil as I am about to show you. Know it well, just in case you come across an evil software engineer, with this knowledge you will be able to defeat him and his non-standard ways.

Let's examine Figure 3.

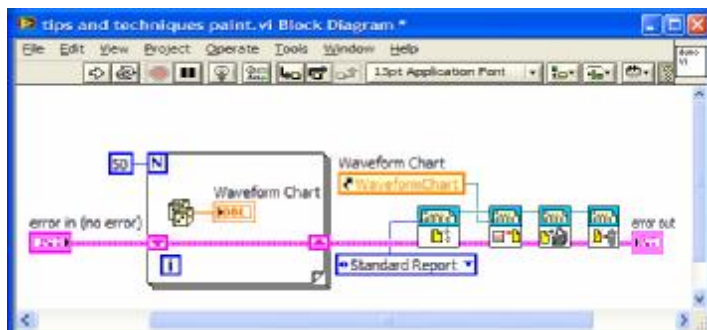


Figure 3. A nice clean VI, no worries and no issues.

However how would you react if the next time you opened up the VI you found this?

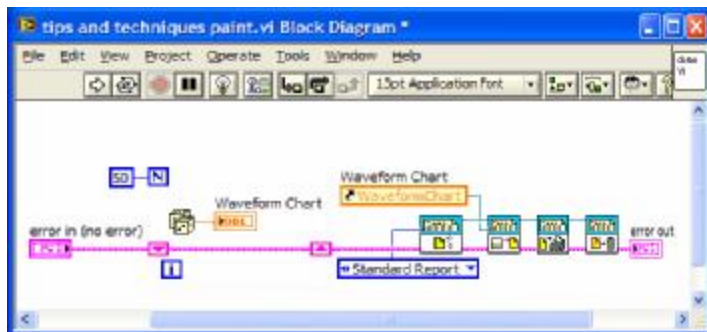


Figure 4. Where is the For Loop?

The run arrow is a solid white, the VI still appears to run, what happened to the For loop? All of the typical regalia of a For loop is there, the count terminal, the iteration terminal, and even the shift registers for the error terminals. Where did the for loop go?

Our For loop is still there, however it has been painted white. To make your own invisible For loop follow these steps:

1. Start a new VI, navigate to the block diagram and lay down a For loop. Notice this does work with other control structures, however the effect isn't as pronounced with case structures or sequence structures
2. Select the 'Set Color' tool from the tools pallet and change the foreground color to white.

Click with the 'Set Color' tool on the For loop and watch it disappear.

Viewpoint News

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*Designed to be Right.
Engineered to Work.*

Notes from the Editor:

Welcome to another exciting issue of the Viewpoint News! This issue was to be devoted to our brand new website, where we would explore all of its new functionality and really show off some of the great work that has gone into its redesign. However we need to wait until next quarter to explore the website so that we may bring you:

Viewpoint & Moog Aerospace Upgrade Legacy Maverick Missile System—Read how Viewpoint paired with Moog Aerospace to accomplish this complex task.

Viewpoint is Growing, Again! - Meet Chris Kneepel, our newest Viewpoint Engineer.

Tips and Techniques—Hiding control structures on the block diagram.

National Instruments Training Schedule—Check out upcoming classes taught in our beautiful training facility right here in Rochester.

LabVIEW Code Challenge—Do you have what it takes? Finally someone stepped up last issue, meet **Greg Givan** from **Cooper Power Systems**, he stepped up and met our challenge. Can you meet the current one?

As always, we are constantly looking for the next great challenge and we look forward to partnering with you to conquer it.

-ben
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