

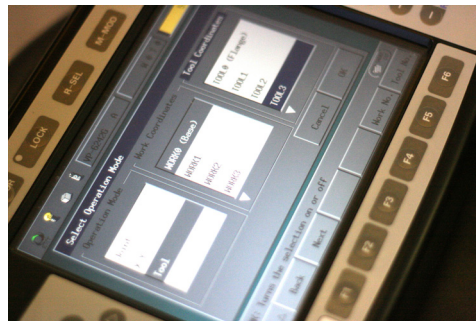
DisplayTEST™

For Software Regression Testing



USING DISPLAYTEST FOR SOFTWARE REGRESSION TESTING

The core of the standard DisplayTest product revolves around using a camera to inspect a monitor or screen. The basis of DisplayTest for Software Regression Testing (SRT) uses the camera inspection to make sure the monitor is displaying the correct content. DisplayTest-SRT helps engineers to apply stimulus to a device and confirm correct behavior on the screen by monitoring other outputs. With this capability, every software revision can be extensively and automatically tested against a software specification after every revision is released. The results are thorough and uncompromised tests for a complete test-driven development.



DisplayTest-SRT is designed to test device firmware by verifying screen content

- Touch Screen
- Functional Tests
- Acquisition
- LCD screens
- Automated Defect Prevention
- Unit Tests
- Video
- Monochrome
- LCD symbolic
- Tracking
- Quality Output
- Pass/Fail Criteria
- Test Sequences
- Configure Steps
- Configure Loops
- Control Pneumatics
- Control Power Supply
- Analog/Digital Output
- Quality Control
- Correct Calibration
- Real-world units
- Automated Pattern Generator
- Keypad Button Assembly
- LCD Alignment
- VideoMaster
- Final Assembly Test
- Flat Panel Displays
- OEM Vision Integrators
- Software Correctness
- Code Size Tracking
- Simulation Time
- Characterization test

SCREEN INSPECTION

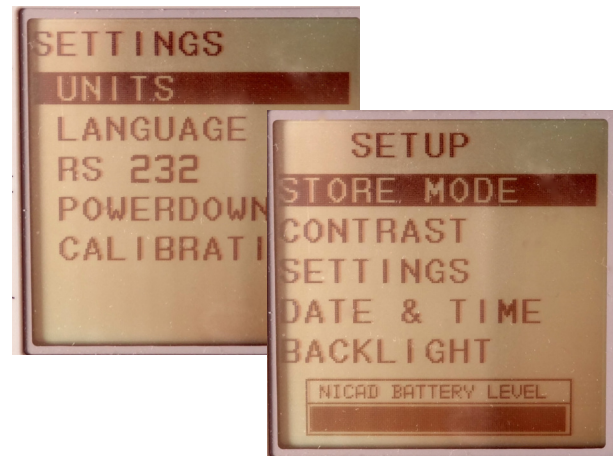
Camera, lens and lighting selection highly depend on the resolution, size, and color of the display screen that is tested. For pixelated displays, the camera that inspects the screen should have at least four times the number of pixels of the display under test. Screen sizes can vary from 2" LCDs up to 70" HDTVs.



This LCD showed an errant row of pixels after a screen clearing command when the device went into standby.



DisplayTest-SRT tests the menu functionality on 46" consumer LED/LCD TV.



With the addition of pneumatic or electrical actuators, the system can verify the correct responses to physical button presses, including holding buttons down.

AUXILIARY CONTROLS & INPUTS

Alongside the camera used for screen monitoring, DisplayTest-SRT can automate an endless array of controls and sensors to fully automate product testing. Steppers and servos can actuate knobs and buttons, while electrical signals are sent or measured. Command signals such as RS232, CAN, or USB can tell a device what to do. Sounds can be played or recorded as stimulus and response of a device. In every case the stimulus is precisely controlled and repeated for each test, and the response of the firmware is precisely recorded and measured in multiple ways.



Stepper motor actuates knob and verifies the correct behaviour of the software.

Step	Description
⊕ Setup (0)	
⊖ Main (9)	
🖥️ Configure to Display image Black ...	Set the Data to Disp
📷 Acquire Image	Action, Vision Acq.
📷 Inspect Image	Action, Vision Assis
🖥️ Close Previous Image	Set the Data to Disp
🖥️ Configure Image to Display Green...	Set the Data to Disp
📷 Acquire Image	Action, Vision Acq.
📷 Inspect Green Deffect	Action, Vision Assis
🖥️ Display Test Image Setup	Set the Data to Disp
🖥️ Configure to Display image Black ...	Set the Data to Disp
<End Group>	

Steps: **MainSequence** Variables

The test sequence is created and maintained in the Sequence Editor, which provides the ability to customize settings, perform actions, take measurements, and verify the measurement or image results.

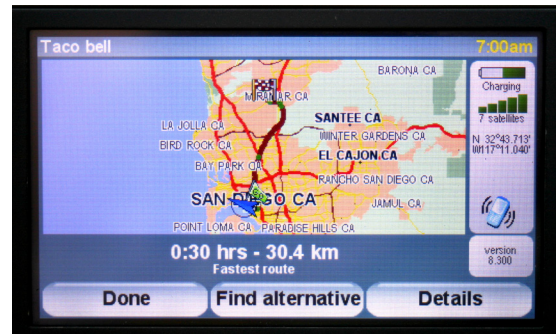
CREATING TEST SEQUENCE

Once the cameras and lighting, as well as electrical inputs and outputs are working, the next step is to create a sequence of tests according to the product requirements. The test sequence will setup and execute each test one-by-one and record the result of the test. Since there can be many test cases, test authoring time and execution time can be critical. In the example shown to the left, over 1800 steps were written by an operator with no software experience, and the test executed completely in about 6 hours. DisplayTest-SRT uses a sequence editing environment with easy-to-edit steps that require no programming. Custom interfaces and setup screens can be developed to match specific product designs or needs. While the test is still being developed, one or more steps can be executed to validate the them as they're created.

EXECUTING TEST

After the test is complete it can be run over and over again on updated versions of firmware. During the test, the user interface can display images as well as input or output values. Images and results are all automatically stored step-by-step in a database so that results can be analyzed.

DisplayTest-SRT provides easy and reliable regression testing for software. It allows engineers to iterate faster and perform complete testing without compromise.



RF GPS Signals and battery power are simulated and the correct actions of the software can be tested over an endless variety of real-world conditions.

Our engineers build the display and regression tester around National Instrument's PXI connected to custom cabling to suit the customer's product. Other hardware and software from NI may include:

- NI Switch Executive
- NI TestStand
- NI Vision Development Module
- NI Vision Assistant
- NI Switch Matrix hardware

Display Test gives programmers the ability to:

- Place any format image on multiple displays and display inputs (HDMI, VGA, Component)
- Use Optical Character Recognition (OCR) to verify the correct words or letters on the display
- Verify contrast, aspect, alignment or shapes
- Store or capture images or video of the correct (or incorrect) behavior during test

Cyth's DisplayTest components include:

- NI TestStand, with basic steps
- Cyth ExpressPlus steps for TestStand
- Cyth DisplayTest steps
- NI VideoMaster Generators (optional)
- NI Vision Assistant for TestStand (LV Vis License)
- NI Vision Acquisition Drivers
- Cyth Easy User Interface (customizable)
- Camera, Light, Lens, Accessories
- 50 Hours consulting and customization

ABOUT CYTH SYSTEMS

Cyth Systems is a leading integration and engineering firm with a proven track record of success designing and building automated test and embedded control systems. Our goal is to help you develop quality products with minimized schedule, risk, and cost. Our unique approach allows for systems that are maintainable, flexible, reliable, and achievable within time and budget constraints.

For more information about Cyth Systems DisplayTest SRT, visit www.cyth.com/displaytestsrt

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