

# Testronics

a tester company with vision

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## Model 505A Automated Optical Inspection System

*Low cost, quick to program, easy to use*



### Applications:

- High Mix, Low Volume
- Medium Mix, Medium Volume
- New Product Introduction
- Line Change Verification
- First Article Inspection
- Large Boards & Backplanes
- Components with no electrical test coverage (Transparent to Test)

### Typical Fault Detection:

- Missing components
- Reversed components
- Polarity Mark detection
- Solder defects (excessive, insufficient, bridging, etc)
- Color markings & text verification
- Placement / position defects
- Tombstoning & Billboarding
- Part present when it should be absent (no load)
- Bent & missing connector pins / missing pin in hole

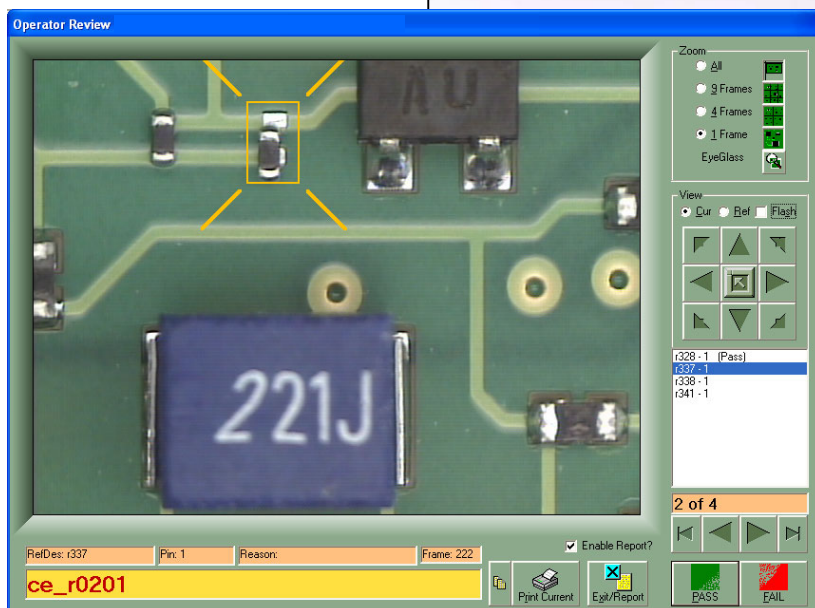
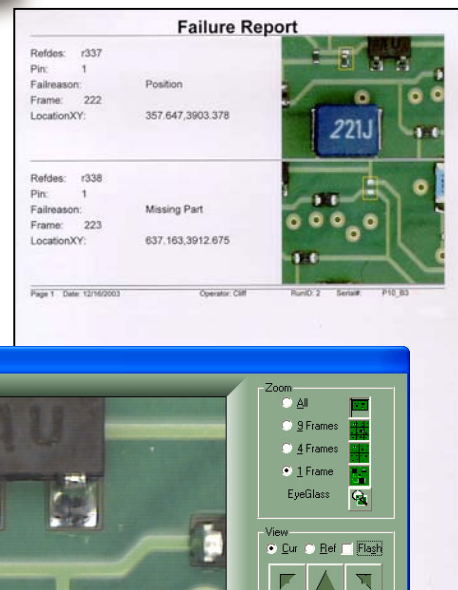
**Advanced AOI Capabilities** - Our low cost Automated Optical Inspection systems have more capability, more algorithms, and more user tools than virtually any AOI system available at any cost. Inspecting 100,000 pieces of the same part number is easy. Inspecting 25 pieces and having only couple of hours to develop the program is a far more challenging task. This is when you need the capabilities and tools of an advanced AOI system from Testronics.

**High Mix / Low Volume, NPI & First Article** applications are where Testronics AOI systems excel above all other systems, regardless of price.

Low price, high performance

### 0201 Inspection

Operator review screen & failure print out

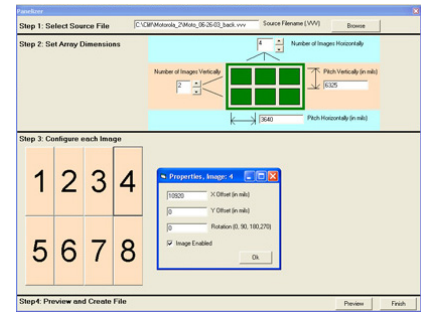


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## Summary of Advanced Features / Options of the 505A:

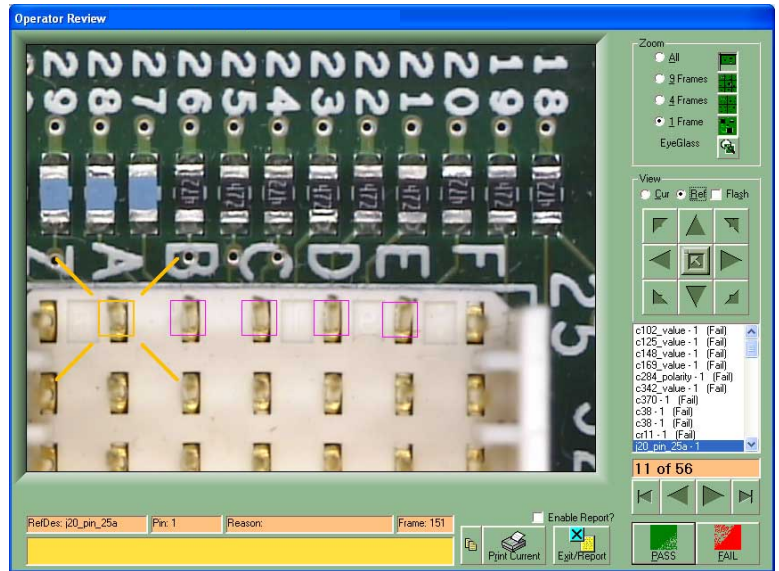
- 4<sup>th</sup> generation system software
- Interactive / dynamic inspection with external 24 channel I/O
- Visual Basic programming language added for advanced applications
- Multiple cameras are now available with different resolutions and field of view sizes
- Bar codes & 2d matrix can be read through the camera eliminating scanning by the operator
- Multiple lighting options are now available to support advanced applications
- Graphical utility utilizing transparent overlays to quickly create new library parts
- Algorithms now accept Hue, Saturation, and Luminance parameters as well as Red, Green & Blue
- Panelization utility with global or individual image rotation & offset
- Local & global fiducials are now supported
- Support for panel X-OUTS during runtime
- Advanced inspection algorithms
- Offline programming
- Offline repair / review



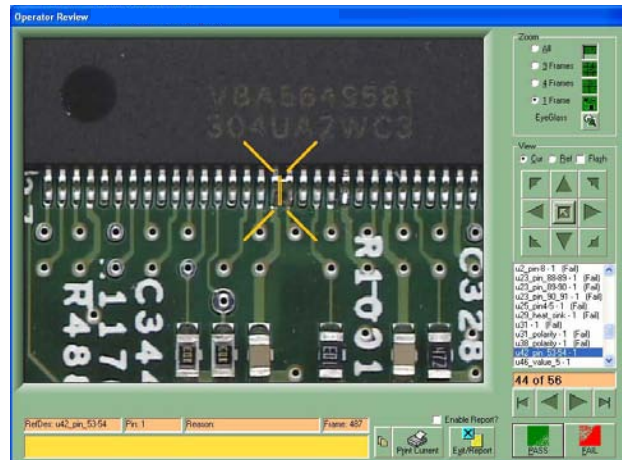
Panelizer utility with individual image editing

## Support:

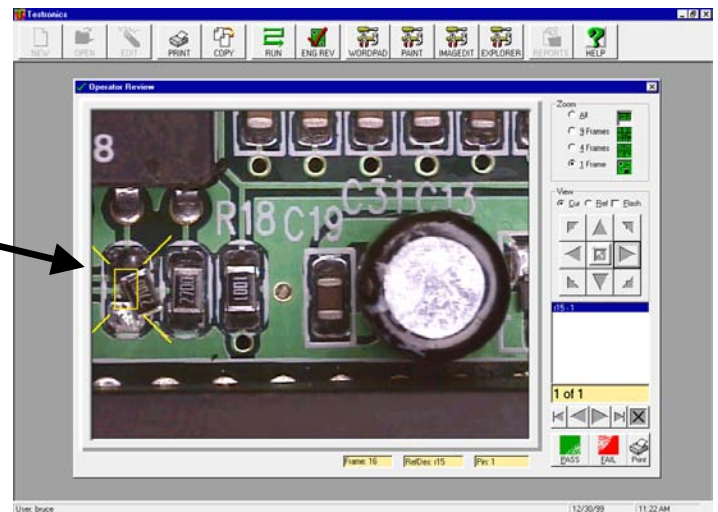
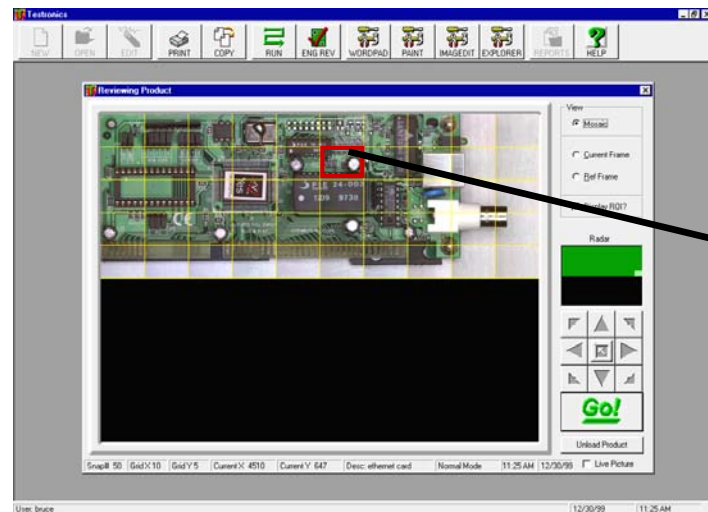
- Free software updates for the life of the system
- Unlimited on-line / e-mail support at no charge
- Free unlimited factory training during the 1<sup>st</sup> year
- Optional on-site installation and training available
- Latest software version information posted on web site



Bent connector pin inspection. Backside pin – in – hole inspection is also supported



Solder bridge



During inspection the entire board is displayed as an array of snaps. Each snap represents an inspection area of .64" x .48". Any failed components cause that specific snap to be marked in red. Both pass and fail images can be saved to create an inspection archive.

After inspection a review screen pops up, stepping the operator through each of the failures. Multiple zoom levels, error tagging from a user defined list, and stepping to other areas or failures are all standard features. Also, while reviewing the failures, the system can concurrently inspect the next board.

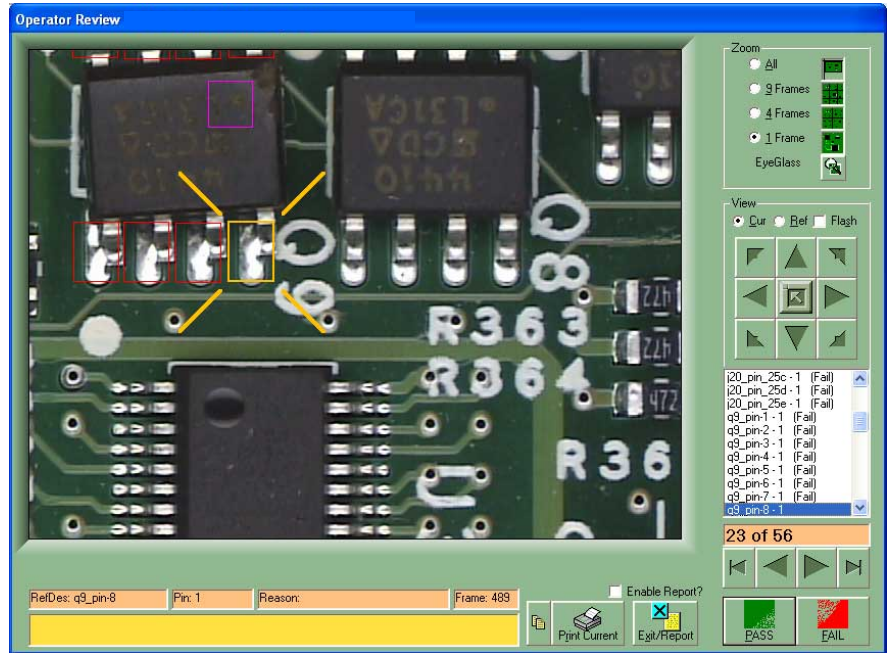
## Model 505A System Specifications & Details

<b>Maximum Inspection Area:</b>	505A: 18" x 24" (45cm x 61cm)
<b>Image acquisition System</b>	Camera: Color CCD, Fstop is user adjustable Field of View: .64" x .48", 1 pixel = .001" (25.4 micron) Optional .32" x .24", 1 pixel = .0005" (12.5 micron) Light Source: High Frequency Fluorescent Linear Light, Height is adjustable Commercial state-of-the-art Frame Grabber Technology
<b>Throughput / Inspection Time</b>	Approximately .3 seconds per each .64" x .48" inspection area, Board load / unload: 2 – 3 seconds typical 6" x 8" board total inspection throughput: approximately 30 seconds
<b>Programming</b>	Programming can be done either with or without CAD data. The CAD data is matched to the component library to automatically define the Region of Inspection, (ROI) around each component. A graphical user interface is used to fine tune ROI placement and to allow the user to drag and drop additional ROI's onto items that were not part of the CAD data, (polarity marks, component text, through hole, etc). First article programming time, approximately 10 minutes Production ready AOI programming time for average sized assembly, approximately 1 – 2 hours (with libraries)
<b>Off Line Programming</b>	Optional Off-Line programming station is available. The programmer uses the 505A to scan several different assemblies of the same part number. The images are then accessible via Ethernet to the Off-Line Programming Station. The programmer then creates the inspection program and can even execute it against the other assemblies' stored images. This keeps the on-line 505A system interruption to an absolute minimum. Included is the off line programming software, PC, 19" display, color printer, DVD R/W for image archiving & bar code scanner.
<b>System Software</b>	Windows XP operating system Microsoft Access Database for data collection Test results review with simultaneous inspection of next board Flash / toggle between failed image and reference image Fiducial recognition using pattern matching algorithm Individual images are stored as .bmp files Graphical panelization tool with X-out capability during inspection Parts library viewer / browser User definable error messages & error codes First article inspection mode Quick program utility to create an inspection program without using CAD data
<b>Algorithms</b>	Roicorr – Pattern matching with correlation. Prominate features are matched against features of the reference image. Roicorr 180 – Same as Roicorr, but rotates image 180 degrees on fail. (Used for text on resistors.) Histogram – One dimensional profile of the image is created and matched against the reference image's profile. Histcorr – Same as Histogram, but with correlation. Scoring is based on area rather than amplitude as with Histogram. Diff – Detects the differences between the reference image and the image under inspection. Review – Forces an operator review.
<b>Failure Reporting</b>	Color printout of defect, serial number, operator, date, time, X-Y location and reason of failure
<b>Datalogging</b>	All inspection information is stored in a Microsoft Access Database. A complete inspection report as well as a failures only report are provided. Additional reports are easily created using Microsoft Access or a 3 <sup>rd</sup> part package. The user has the option of saving failed images for archival.
<b>Offline Repair</b>	An optional offline repair / review station is available. Included is the repair / review software, PC, 19" display, color printer, DVD R/W for image archiving & bar code scanner.
<b>CAD Data Structure</b>	ASCII text file containing: -package type or part number.....reference designator.....part centroid x.....part centroid y.....rotation.....comments(optional)- The 505A edit & align module provides the ability to graphically align the cad data to the assembly. Supported is the ability to graphically manipulate the CAD data using, in any combination: rotate, flip, move, mirror X, mirror Y
<b>X-Y Stage</b>	UUT moves in Y direction, Camera moves in X direction
<b>PC &amp; Peripherals</b>	PC computer, 19" monitor, keyboard, & mouse
<b>Support &amp; Warranty</b>	One year parts and labor Free world wide telephone / e-mail support Free factory training during the first year Free software upgrades for the life of the system
<b>Dimensions &amp; Facilities</b>	505A: 33" wide x 36" deep x 23" high, 92 Lbs. (42 kg), Power: 90-240 VAC @ 2A, 50/60 Hz
<b>Options</b>	Off-Line programming station Off-Line repair / review station Multiple Cameras, up to 4, (1 standard view + 3 optional): High magnification camera for 0201 and ultra fine pitch inspection (.010" pitch devices) Large field view for inspecting large components High focus to enable high reliability inspection of tall connector pins Visual Basic scripting language for advanced applications 24 channel Input / Output module to dynamically change the condition of the UUT while under program control Alternate lighting source On-site installation and training Universal, high precision fixture High speed motor / drive screw Color Ink Jet Printer Black & White strip printer Optional product covers and interlocks Mobile system cabinet with removable wheels



**Manual Inspection** varies from operator to operator, shift to shift, and even with the time of day. Manual inspection is also very subjective depending on the discretion and ability of the inspector. The Model 505A Automated Optical Inspection system is a cost effective solution that is easy to use, easy to program, and is highly flexible across many different applications.

The Model 505A automatically inspects the assembly, identifying only those joints and components on the board which are faulty and or questionable. The operator can then quickly review the indicted components, tag the failures and release the passes.



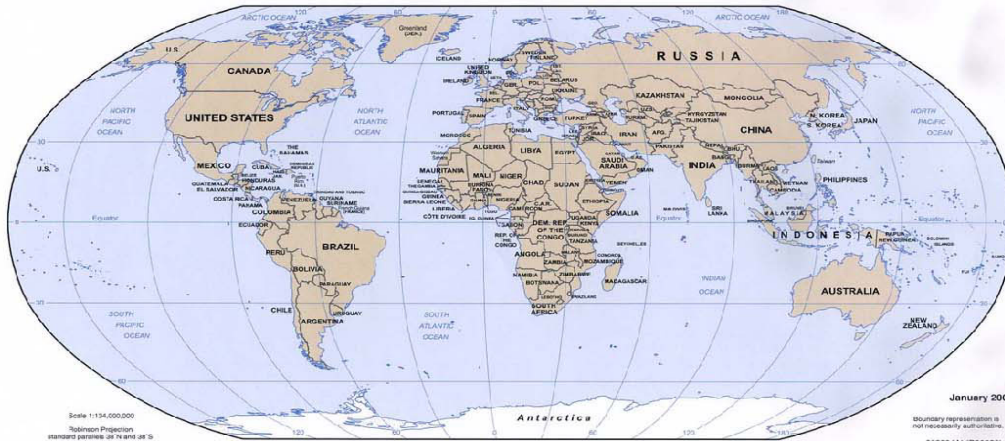
**The model 505A Vision Inspection System from Testronics:**

- Quantifies a Subjective Process
- Provides a Structured Sequence to Inspection
- Improves Process Control and Yield
- Increases Throughput

**Testronics**  
Since 1982

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