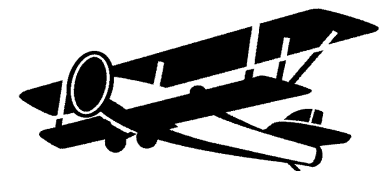


**SID Week 2013**  
**Vancouver, BC, Canada**

# ***How to Resize LCDs for Fun and Profit***

By  
Lawrence E Tannas, Jr.  
President  
Tannas Electronic Displays, Inc.  
Orange, California, USA

***21, 22 & 23 May 2013***

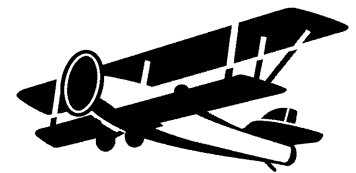


# Resizing an LCD Enabler

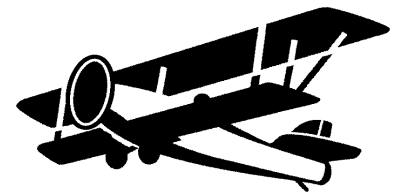


# Presentation Outline

- Resizing Design Rules
- Qualification Testing
- Size and Shape Options
- Serving Two Applications
- Summary of Patents
- *Offering Prototypes,  
License & Machinery*

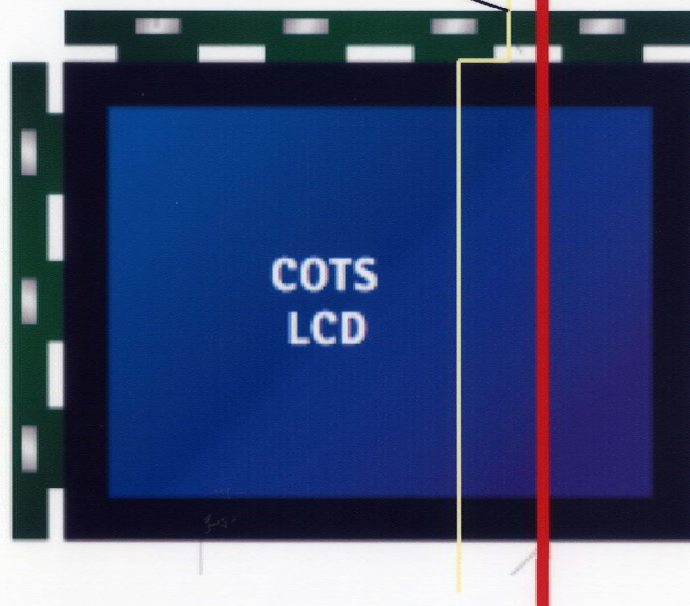


# Resizing Design Rules

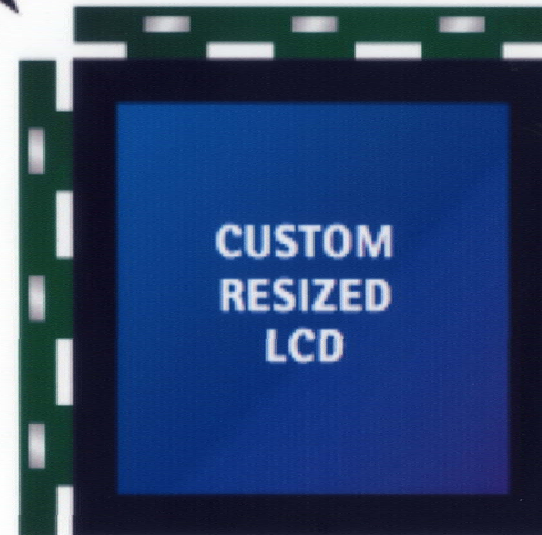


Alternate Cut Line

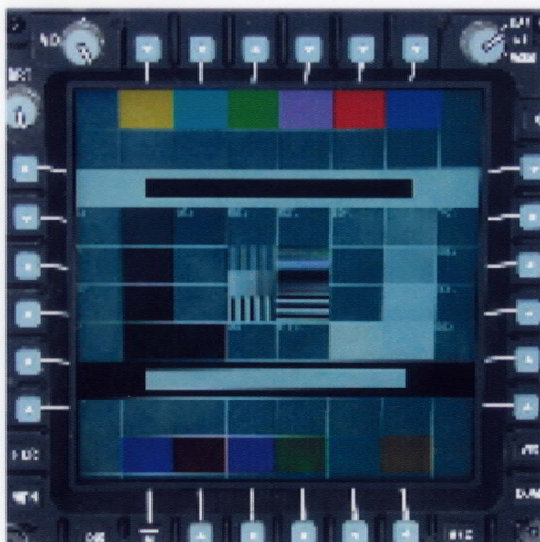
Cut Line



Disassemble  
Cut Circuit  
Cut Glass  
Reseal & Test

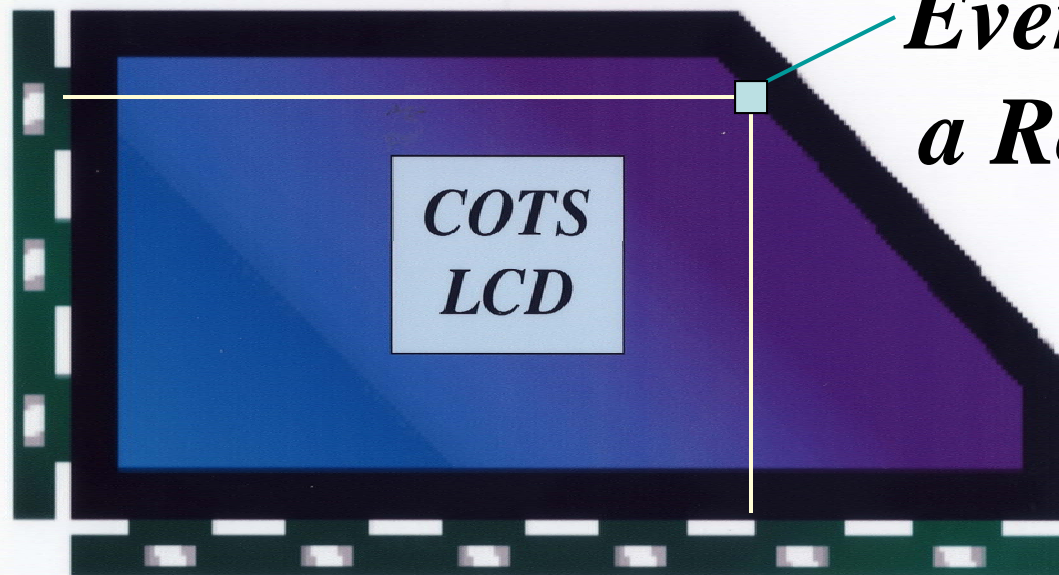


*Cut  
Between  
TAB Chips*





# Odd Sizes and Shapes



*Every Pixel Needs  
a Row & Column  
Driver*



# Only the Size Changes

- Cut off end of electronic shift register:
- Cut glass away from image start point:

*Electrical interface stays the same*

# Only the Size Changes

- Cut off end of electronic shift register:
- Cut glass away from image start point:

*Electrical interface stays the same*

*Optical properties stay the same*

# Only the Size Changes

- Cut off end of electronic shift register:
- Cut glass away from image start point:

*Electrical interface stays the same*

*Optical properties stay the same*

*Image resolution stays the same*

# Only the Size Changes

- Cut off end of electronic shift register:
- Cut glass away from image start point:

*Electrical interface stays the same*

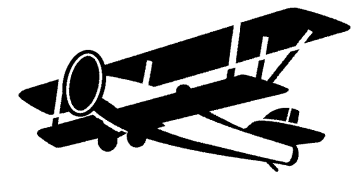
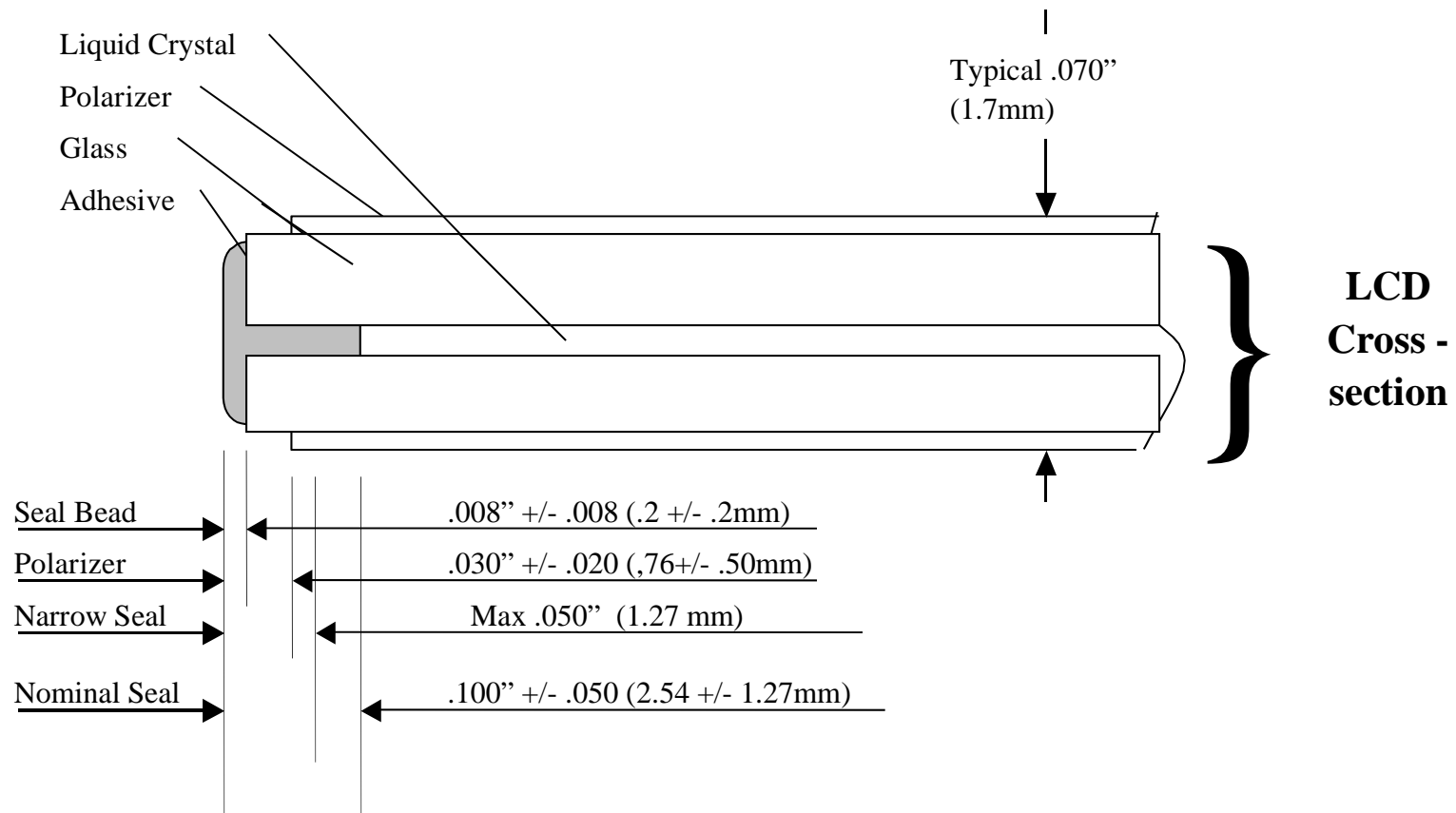
*Optical properties stay the same*

*Image resolution stays the same*

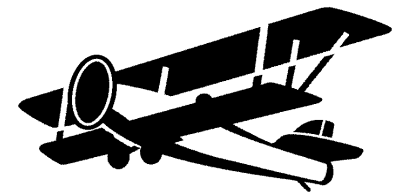
*Environmental capability does not change*



## TANNAS-SIZED™ LCD Seal Details

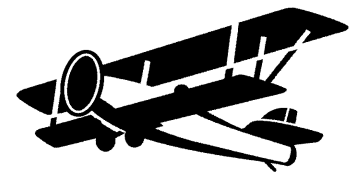


# Qualification Testing



# Qualification Testing

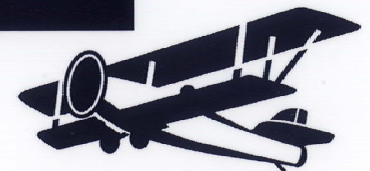
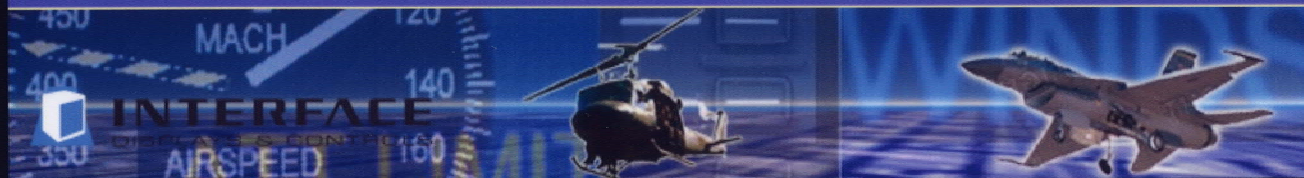
- BAE - Military Electronics
- GD Canada – Vehicle Electronics
- Interface Displays & Controls, Inc., Avionics
- TED - ARINC Commercial Avionics
- TED - Boiling Water to Dry Ice 10 times
- TED - Life Test five years



**SPIE Paper, 12 April 2007**

## **Validation of resized commercial AMLCD technology for cockpit avionics**

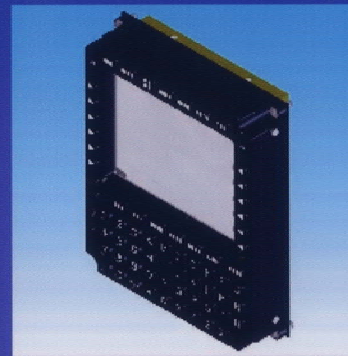
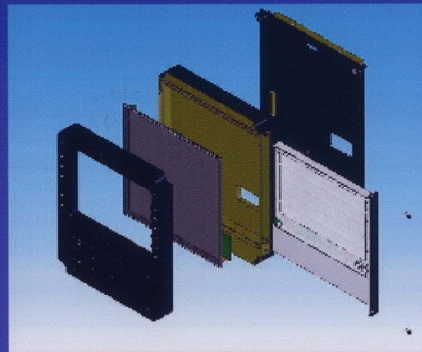
Priya Bendale, Ph.D.  
Interface Displays & Controls, Inc  
Oceanside, CA 92056





## Display head assembly

- ◆ Laminated Display and backlight (CCFL) assembly integrated into modular head (minimum passive enhancement used)
  - Integrated within existing ARINC 739 Cockpit display unit design (minimize cost)



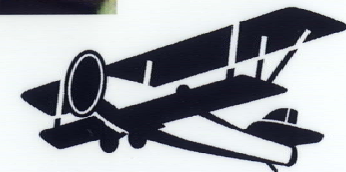
**TANNAS-SIZED™ LCD 5" x 5"**







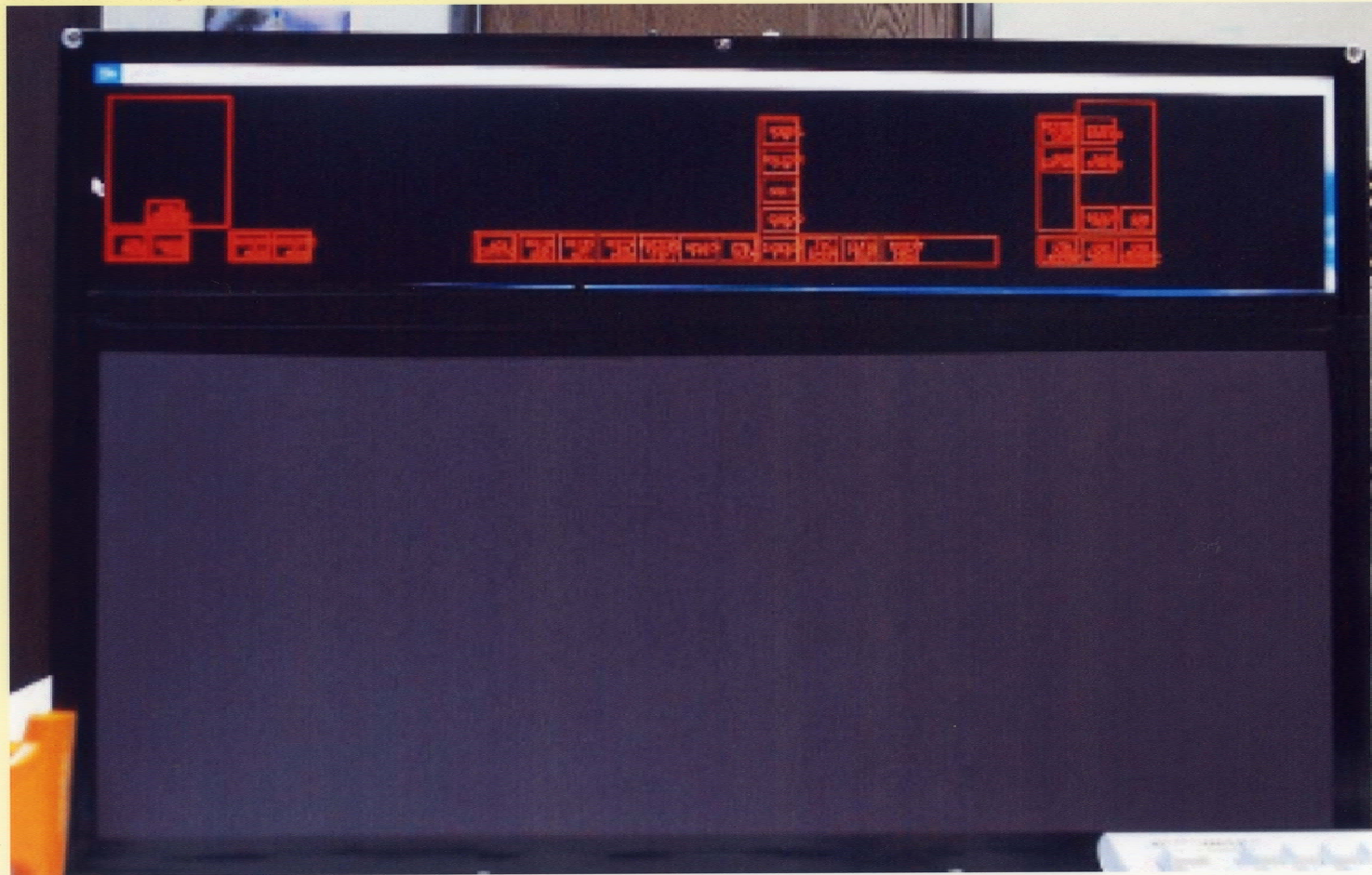
# Tactical Displays, Inc







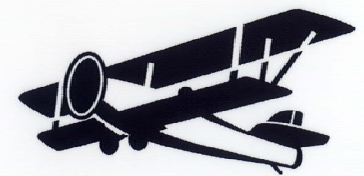
# Tactical Displays, Inc



## Replace Plasma Panel

**TED** Tannas Electronic Displays, Inc. ///

*Slide 16*



# Serving Two Applications

- *Digital Signage*
- *Aerospace and Industrial*



# *Digital Signage Applications*

**Large Sizes**

**Large Volume**

**Stretch or Bar Type**

**(Excluding Aerospace Applications)**



DSE  
Annual Show  
Las Vegas

# Digital Signage: a New Paradigm







Simulated





Simulated



# *Aerospace and Industrial Applications*

**Small Sizes**

**Small Volume**

**Highly Customized**

# *Definition*

**Aerospace and Industrial industries in which**

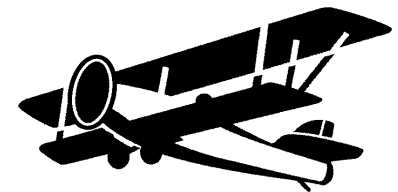
*resized displays are used*

*By*

*trained, in-training, and/or licensed operators*

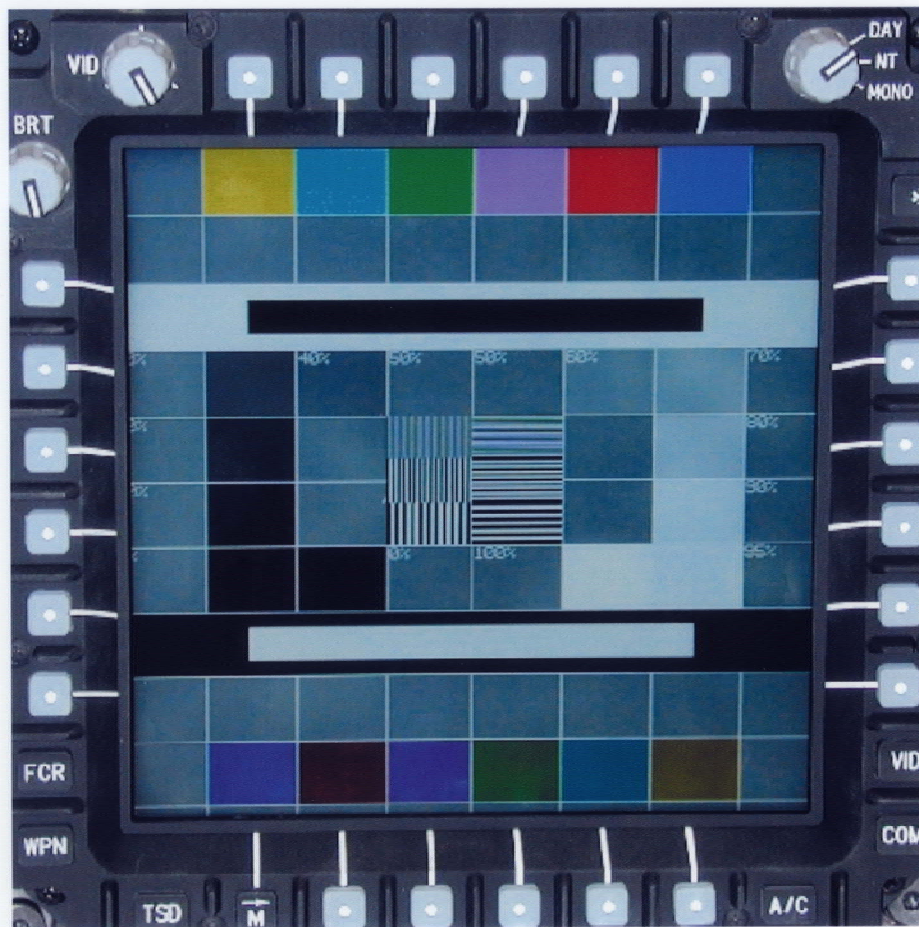
**to control and/or monitor the performance  
of a computer, machine, system, device,  
and/or process in real time.**

***“SKILLED USES”***





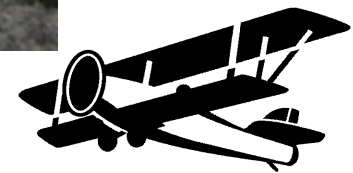
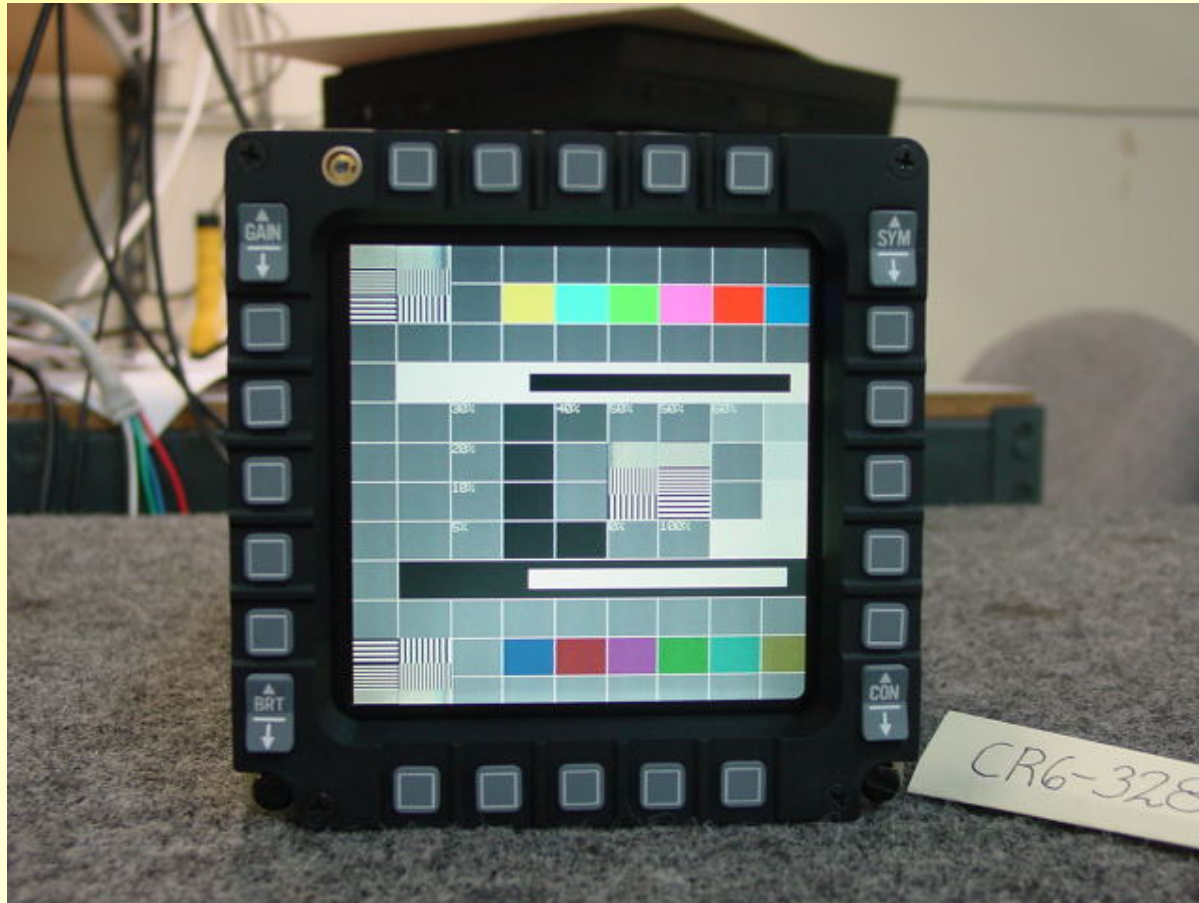
# Licensee: Symbolic Displays, Inc.



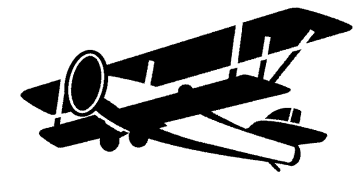
Apache Longbow Multipurpose Displays designed and manufactured by Symbolic Displays, Inc.  
(6" x 6")



# Aerospace Licensee: SGB Enterprises, Inc.



# F-35 Simulator Display Made by Driven Technology Using TANNAS-SIZED™ LCD Made from 2 Resized 8''x10'' = 8''x20'' with .1'' mullion



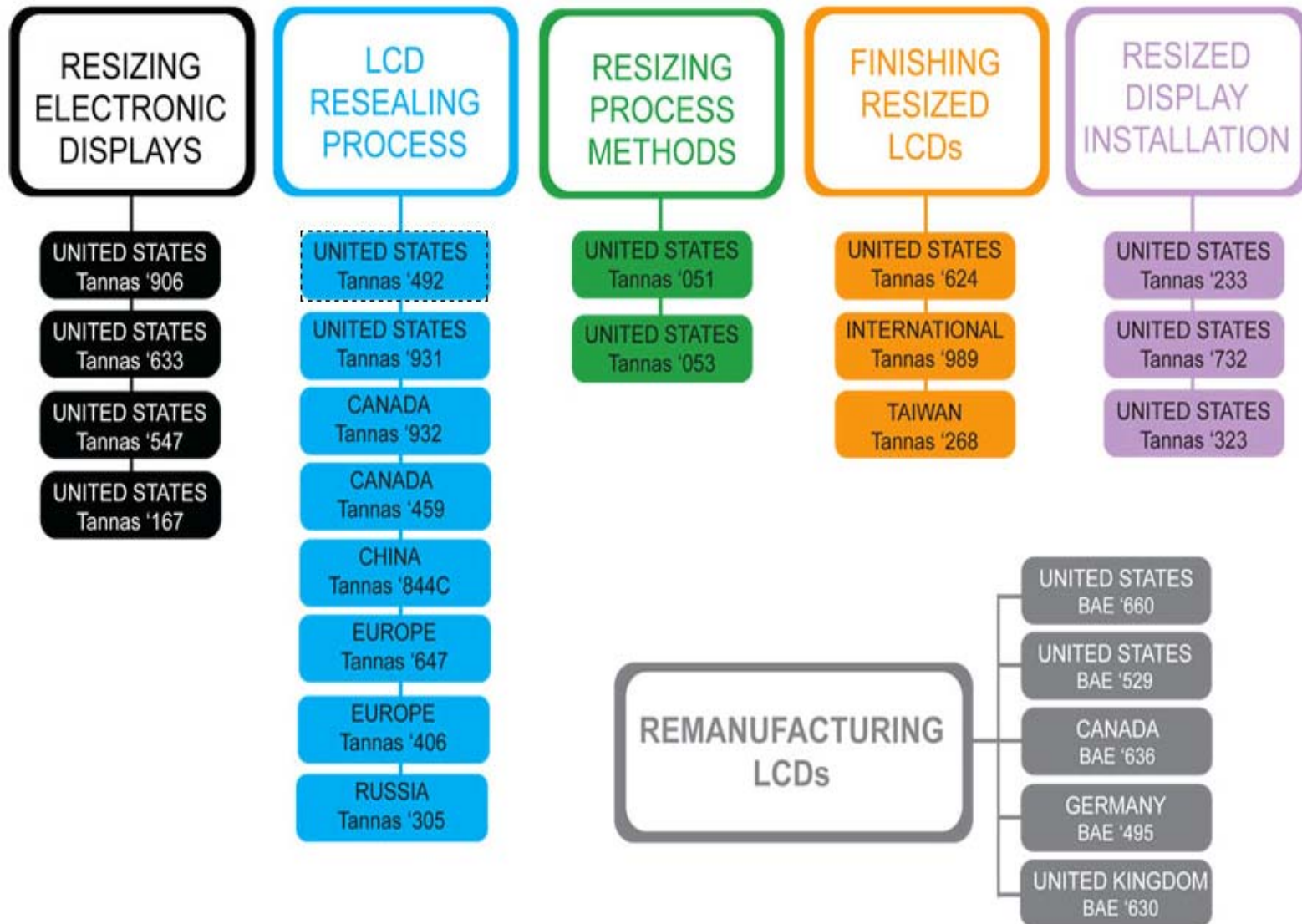


# Summary of Patents

- BAE has several patents for resizing & Tannas has rights to Use and Sublicense World Wide.
- Tannas has patents for method of getting seal between the plates in US, Canada, Europe, China and Russia.
- Tannas has patents pending for advanced methods for resizing displays World Wide.

## Patents Available for Licensing

As of 13.OCT.2011



**PUT A DISPLAY  
ANYWHERE**

***CUT TO FIT***

***Properties Remain the  
Same***

***TED Offers Resizing Technology:***

- 1 Resize LCDs up to 46''**
- 2 License Technology**
- 3 Sell Cut & Seal Machinery**

# Sell Cut & Seal Machinery

- Machinery for development & prototyping
- Up to 46" diagonal LCD size
- Cutting and sealing capability
- \$65K per machine set



# LCD Resize Cutting Machine



**TED** [Tannas Electronic Displays, Inc. ///](http://Tannas Electronic Displays, Inc. ///)

# Demonstrations Available

- Must be interested in becoming a licensee
- Deposit of \$10K needed
- Refundable \$5K
- Completed in ½ Day period
- Demonstration using 46" LCD for bar type LCD



# RESIZING LCDs FOR CUSTOM APPLICATIONS

LCDs to Fit Just About Anywhere!

The resizing process has a high yield and is cost effective. Performance and reliability of the original display are preserved.

**TED (Tannas Electronic Displays, INC.)**

LCD GLASS RESIZING SERVICE FOR INDUSTRY WORLDWIDE

Licenser / Proprietor, Orange, California, USA

Contact: Larry Tannas, PHONE: 1 714 633 7874, CELL: 1 714 342 7067  
l.tannas@tannas.com, www.tannas.com

## LICENSEES FOR DIGITAL SIGNAGE APPLICATIONS

**ANNAX Anzeigesysteme GmbH**

Munich, Germany

Contact: Wolfgang Elbert, Wolfgang.elbert@annax.de  
PHONE: +49 89 614 436 30  
www.annax.com

**BMG MIS (Formerly AEG MIS)**

Ulm/Germany

Contact: Otto Bader,  
PHONE: +49 731 59099 203  
FAX: +49 731 59099 49 203  
otto.bader@bmgmis.de,  
www.bmgmis.de

**LITEMAX Electronics Inc.**

Shin-dian City, Taiwan

Contact: David King,  
PHONE: +886 2 89191858  
FAX: +886 2 89191300  
davidking@litemax.com

**MRI (Manufacturing Resources International, Inc.)**

Atlanta, Georgia, USA

Contacts: Bill Dunn, bdunn@mri-inc.net,  
Peter Kaszycki, pkaszycki@mri-inc.net  
PHONE: 1 770 295 1201  
www.mri-inc.net/sub-contact.asp

**STI Co., Ltd. (Systems Technology, Inc.)**

Anseong-City, Gyeonggi-Do, 456-824, Korea

Proven in-house resizing facilities

Contact: Yong-Seok Jin, Sales Manager, PHONE: +82 31 205 4844 (x2282), jysist@stinc.co.kr, www.stinc.co.kr

**TOVIS Co., Ltd**

7-10 Songdo-dong, Yeonsu-Gu, Incheon, 406840, Korea

Contact: Young Hong Kim, Ex VP/COO, PHONE: +82 32 712 5102, yhkim@tovism.com

**Vitrolight Technology Co. LTD**

Shanghai, China

Contact: Jianbo Wu, PHONE: +86 21 1364 4132, FAX: +86 21 5186 1793,  
jianbo.wu@vitrolight.com, www.vitrolight.com



Digital Signage Atop Taxi



## LICENSEES FOR AEROSPACE AND INDUSTRIAL DISPLAYS

**SDI (Symbolic Displays, Inc.)**

Santa Ana, California, USA

Contact: Tony Lopez, Director of Sales,  
PHONE: 1 714 258 2811 (x105)  
tonyl@symbolicdisplays.com, www.symbolicdisplays.com

**SGB Enterprises, Inc.**

Santa Clara, California, USA

Contact: Joe Padula, VP Business Development  
PHONE: 1 661 294 8306  
joe@sgbent.com, www.sgbent.com



Aerospace / 4 ATI



**TANNAS ELECTRONIC DISPLAYS INC.**  
CONSULTING & RESIZING LCDs

# Newest License GSD

Gumi-city, Gyungbuk, Korea



*THANK YOU  
FOR YOUR  
INTEREST*