DISPLAY WEEK 2009 REVIEW/INDUSTRY DIRECTORY ISSUE

Information DISPLAY

SID
SOCIETY FOR INFORMATION DISPLAY

Official Monthly Publication of the Society for Information Display • www.informationdisplay.org

August 2009
Vol. 25, No. 08

Display Week 2009 Dazzles San Antonio

COMMERCIAL SUCCESS OF FLEXIBLE AND E-PAPER DISPLAYS

TOUCH TECHNOLOGY ABOUNDS AT DISPLAY WEEK 2009

EMERGING LCD PRODUCTS AND TECHNOLOGIES

PICO-PROJECTION TECHNOLOGY

IMPROVED OLED DISPLAYS

Plus

PROJECTION TECHNOLOGY BEHIND BEIJING'S SUMMER GAMES

2009 DIRECTORY OF THE DISPLAY INDUSTRY

Journal of the SID August Preview

See Everything! …
about your display's performance!

Radiant Imaging's PM-PTS™ (Production Test Sequencer) system brings you a potent marketplace advantage by enabling you to test and calibrate your displays with unmatched accuracy, consistency, and cost-efficiency. Our complete, proven turnkey solution provides comprehensive QC/QA testing for front and rear projection systems, LCD and plasma FPDs, CRTs, and FEDs. With extensive test definition capabilities and high-speed operation, PM-PTS improves your product performance while reducing testing costs while increasing throughput by automating your entire test sequence and reporting results relative to pass/fail criteria you define.

Tests include Display Brightness, Brightness Uniformity, Contrast Ratio, Display Color, Color Uniformity, Gamma Distortion, Focus, Gray Scale, and Convergence. Moreover, PM-PTS also detects Point and Line Defects, Mura Defects (blemishes), and can even quantify individual Mura and overall display performance on a JND (Just Noticeable Difference) scale with our **TrueMURA™ analysis module**. All supported by Radiant's world-class technical support team, multiple PM –PTS configurations can help you achieve the pixel resolution, dynamic range, and cost required to excel in any application.

Incorporate Radiant's PM-PTS in your display testing and calibration and you will swiftly see an unmistakably positive difference – in your displays, and in your bottom line.

Please contact Sales@RadiantImaging.com for a free White Paper on Display Defect Detection!

RADIANT IMAGING

22908 NE Alder Crest Dr., Suite 100, Redmond, WA 98053, USA
Phone: +1 425 844-0152 FAX: +1 425 844-0153
www.radiantimaging.com

RADIANT IMAGING

__COVER:__ The ambitious and spectacular opening ceremonies of the 2008 Summer Olympics in Beijing, China, involved thousands of performers and special effects and was enhanced with a non-stop panorama of digitally projected images on all suitable surfaces inside the "Bird's Nest" stadium. And 147 DLP projectors were on-hand, all made and installed by Christie Digital Systems of Canada.

CREDIT: Cover design by Acapella Studios, Inc. 2008 Beijing Olympics photo courtesy of Christie Digital Systems, Inc.

Next Month in *Information Display*

OLED Technology Issue
- Commercializing AMOLED TV
- OLEDs: Promises, Myths, and TVs
- Disruptive Nature of OLED Business Ecosystems
- Tablets in Digital Desks for Education
- *Journal of the SID* September Contents

INFORMATION DISPLAY (ISSN 0362-0972) is published eleven times a year for the Society for Information Display by Palisades Convention Management, 411 Lafayette Street, 2nd Floor, New York, NY 10003; Leonard H. Klein, President and CEO. EDITORIAL AND BUSINESS OFFICES: Jay Morreale, Editor-in-Chief, Palisades Convention Management, 411 Lafayette Street, 2nd Floor, New York, NY 10003; telephone 212/460-9700. Send manuscripts to the attention of the Editor, ID. Director of Sales: Michele Klein, Palisades Convention Management, 411 Lafayette Street, 2nd Floor, New York, NY 10003; 212/460-9700. SID HEADQUARTERS, for correspondence on subscriptions and membership: Society for Information Display, 1475 S. Bascom Ave., Ste. 114, Campbell, CA 95008; telephone 408/879-3901, fax -3833. SUBSCRIPTIONS: Information Display is distributed without charge to those qualified and to SID members as a benefit of membership (annual dues $100.00). Subscriptions to others: U.S. & Canada: $55.00 one year, $7.50 single copy; elsewhere: $85.00 one year, $7.50 single copy. PRINTED by Sheridan Printing Company, Alpha, NJ 08865. Third-class postage paid at Easton, PA.

Information DISPLAY

AUGUST 2009
VOL. 25, NO. 8

For Industry News, New Products, Current and Forthcoming Articles, see www.informationdisplay.org

editorial

Looking Forward

by Stephen Atwood

It was just a short 2 months ago when we all gathered in San Antonio for the annual meeting that brings everyone in the display industry together. As you are no doubt aware, many people were not able to make the trip to Display Week 2009 for personal or business reasons because we were in the middle of a very rough economic downturn worldwide. (If you happen to be re-reading this editorial several years from now, I hope you are appreciating the contrast between the better economy you are hopefully enjoying and what we were dealing with back in 2009.) Throw in a worldwide epidemic of the H1N1 virus and there was no shortage of challenges involved in either holding or attending the conference.

Similarly, most companies are challenged right now just by keeping the doors open and salaries paid. But as much as we are all struggling with the present, Display Week was clearly about the future and provided a much-needed outlet for everyone's creative sides to emerge. From big companies to small start-ups, innovation and optimism were everywhere. If this event is a reflection of the face of the industry, then what I saw was an industry full of new ideas, constantly adapting to the marketplace, and looking way beyond 2009 with high hopes for the future.

To give you a good picture of what Display Week 2009 was like, we asked a team of freelance writers, all names familiar to those of you who read *ID* regularly, to canvass the show and give us reviews of the most interesting things they saw and heard. These are in many cases their own opinions based on years of experience in their fields, and very enlightening as a result. SID President and regular contributor Paul Drzaic covered three technology areas: E-paper, reflective displays, and OLED technology. All manner of flexible displays were covered by Robert Zehner. Alfred Poor tackled the complex field of projection technology, where this year's small was the new "big," as well as the incumbent world of LCDs, where big was still "big." (Our own Jenny Donelan, with assistance from SID President-Elect Munisamy Anandan, provided a portion of the backlighting content for the LCD report.) We were somewhat astonished to see that over 25% of the exhibitors at Display Week were somehow involved in touch-screen technology. This almost escaped us and prompted a late invitation to Geoff Walker, Product Marketing Manager for NextWindow, who graciously got on-board to help us cover this rapidly growing part of the industry. Working with this team and compiling their wonderful summaries was an honor for us. I hope they add valuable context to your appreciation of the industry, whether or not you made it to San Antonio.

We also bring you this month a very interesting behind-the-scenes story about last year's opening and closing ceremonies for the Beijing Summer Olympics. If you had looked closely at the numerous and wonderful special effects going on during the ceremonies, you might have seen that projection technology played a major role and that there seemed to be an awful lot of projectors being simultaneously choreographed for the presentations. In fact, there were 147 DLP projectors on-hand, all made and installed by Christie Digital Systems of Canada. We were able to get the company's Principal Engineer, Terry Schmidt, to take the time to write about the entire process of installing those projectors, as well as aiming, testing, and choreographing them into a live show viewed all over the world. When I first discussed the article with Terry, I had no idea how significant an undertaking the entire effort was, and while I do not

(continued on page 35)

Information DISPLAY

Executive Editor: Stephen P. Atwood
617/306-9729, satwood@azonix.com
Editor-in-Chief: Jay Morreale
212/460-9700, jmorreale@pcm411.com
Managing Editor: Jenny Donelan
603/924-9628, jdonelan@pcm411.com
Administrative Assistant: Ralph Nadell
Sales Manager: Danielle Rocco
Sales Director: Michele Klein

president's corner

A Very Intense Week

Paul Drzaic
President, Society for Information Display

By the time you read this, the SID 2009 Symposium will be long past, and in the Northern Hemisphere we will all be getting near the end of our summer. Still, the Symposium is the most important offering that SID provides its members, so a recap is in order.

It is not possible to review the meeting without recognizing the extraordinary events that shaped the year. The worldwide economic crisis that began in late 2008 tightened travel budgets for nearly every company. We also had the misfortune of the eruption of the H1N1 ("swine flu") pandemic in early 2009, right about the time when people were making their travel plans. I heard privately that many companies made it extremely difficult for employees to get approval to travel for any reason due to fear of the flu.

So, not surprisingly, attendance at this year's meeting was light. What was surprising to me, though, was the intensity of the attendees who did come. A large majority of the participants at SID 2009 had very serious reasons to be there, and making their presence known at the symposium took precedence over both monetary concerns and possible health issues. Speaking to exhibitors and symposium organizers alike, I heard that the people who did attend SID 2009 were quite engaged, which helped make up for the lower head count.

So what did we see at SID 2009? Several themes were evident. OLED displays were quite prominent, ranging from bright, beautiful televisions, to head-mounted displays, to super-thin flexible examples, to displays for mobile devices, to simple screen-printed indicators. OLED displays are making a major statement through a wealth of technical approaches and market strategies. Not every approach, nor every technology, will succeed, but there is enough momentum to remove any doubt from my mind that OLED displays will be one of the major growth media in the coming years.

Electronic paper was another ubiquitous theme, with bigger and more refined displays being shown by a number of companies. This year brought better color, some improved animation capability, and higher-quality flexible displays compared to past years. Examples of MEMS, liquid crystal, and electrowetting displays showed that there will continue to be strong competition in e-paper technology for some time.

Other hot areas included pico projectors, 3-D displays, and touch interfaces, as well as the usual improvements in the incumbent LCD technologies. Overall, it is clear that the display-development community remains vibrant, and SID showed the technologies that will help lead the industry out of the current recession.

Finally, a word on future Display Week locations. While San Antonio was quite nice, and the nearby River Walk an easy place to escape to, we have also heard that SID's major exhibitors strongly prefer more mainstream meeting cities, with easy access from overseas. SID has responded to these requests, so that next year's meeting will be held in Seattle, and in future years in places such as Los Angeles, Boston, Las Vegas, and San Diego, and possibly San Francisco. So, I look forward to SID 2010 in Seattle; be assured that we are already planning some special themes for that meeting. ■

Society for Information Display
1475 S. Bascom Ave., Ste. 114
Campbell, CA 95008
408/879-3901, fax -3833
e-mail: office@sid.org
http://www.sid.org

Put us on display.

And look your very best.

Display your finest qualities with our new LuxVu™ enhanced glass products. LuxVu begins with low reflectance, transparent conductive and anti-reflection coatings applied to precision glass. But that's only the start. We can customize any LuxVu product to include additional optical coatings, printing, precision masks, etching, busbar, machining, and assembly for total integration from a single source. LuxVu delivers accurate, cost-effective print-to-packaging efficiency, with high volume capabilities.

From glass fabrication to complex integrated display products, call 877-6-ABRISA or visit www.abrisa.com today.

Abrisa. Putting our best on display.

Coat. Etch. Print. Precisely.

ABRISA

Complete Glass & Coating Solutions

877.6.ABRISA (877.622.7472) fax 805.525.8604 200 S. Hallock Dr. Santa Paula, CA 93060 www.abrisa.com

Abrisa Glass Company Sycamore Glass Components ZC&R Coatings for Optics

Display Week 2009 Review: Touch Technology

Touch screens exploded in numbers and capabilities this year.

by Geoff Walker

THIS YEAR was an amazing breakthrough for touch at Display Week 2009. First, there were 27 exhibitors showing touch screens and/or controllers and another 27 showing touch-related products and services. The latter included conductive inks (2), films and coatings (5), glass (3), adhesives (1), integration (3), bonding (6), aftermarket enhancement (3), haptics (1), stylus (1), and market research (2). The total of 54 touch-related exhibitors was more than 25% of the total number of exhibitors at the show! Second, the Symposium included 16 papers directly focused on touch. This is a radical departure from previous years, when the number of papers on touch never exceeded two per year. I'm confident that these characteristics made Display Week 2009 the most touch-oriented conference anywhere in the world.

In another breakthrough statistic, 2009 was the first year that analog resistive was not the most-exhibited touch technology. This year that honor went to projected capacitive, with 11 manufacturers showing product or technology demonstrations versus seven for analog resistive. Finally, one of the unique characteristics of touch at Display Week 2009 was the fact that there was at least one example of 12 of the 13 touch technologies on display (all except vision-based optical such as developed by Microsoft and GestureTek). That made Display Week 2009 an incredible place to be for attendees interested in learning about touch (Table 1).

Geoff Walker is Product Marketing Manager at NextWindow, a manufacturer of optical touch screens. His industry experience also includes GRiD Systems, Fujitsu Personal Systems, Handspring, Tyco Electronics/Elo TouchSystems, and his own consulting firm (Walker Mobile, LLC). He can be contacted at geoff@walkermobile.com or 408/506-7556.

Projected Capacitive

The most interesting projected-capacitive (pro-cap hereinafter) demonstrations were from 3M and Gunze. 3M showed a 19-in. LCD multi-touch monitor with a 10-touch ITO-based pro-cap touch screen. The performance of this touch screen was excellent; in fact, it was the best monitor-scale pro-cap touch screen that I have ever seen. Curiously, 3M has not yet decided whether to offer it as a standalone component; the company was offering only the complete monitor as the centerpiece of a $999 "multi-touch development kit."

Table 1: Touch technologies on display at Display Week 2009

Touch Technology	Exhibitors
Projected capacitive	11
Analog resistive	7
LCD in-cell, on-cell, and out-cell	5
Digital resistive	3
Force sensing	2
Conventional infrared	2
Acoustic Pulse Recognition™	1
Dispersive Signal Technology™	1
Optical	1
Surface acoustic wave	1
Surface capacitive	1
Waveguide infrared	1

Gunze demonstrated a new "direct-printing-technology film" in the form of a pro-cap touch sensor. This is very exciting new technology; it offers the possibility of replacing the conventional process of laminating micro-fine (10-µm) wires between glass and PET with a simple, low-cost printing process. The printed lines on the pro-cap touch sensor were barely visible; to my eye the sensor looked equal to or better than conventional wire-based sensors.

N-trig introduced a battery-powered pen for its dual-mode pro-cap laptop touch screen. Putting the power source in an aftermarket pen allows N-trig to remove the electrostatic pen-energizing coil from the touch screen, transferring some of the cost from the laptop OEM to the end-user. SMK demonstrated a pro-cap touch screen for netbooks that supported 10 simultaneous touches (that's a lot of fingers on a small screen!); Touch International showed a 22-in. product, the largest ITO-based pro-cap touch screen at the show; Tyco Electronics/Elo TouchSystems introduced its new single-layer pro-cap for mobile devices; and Zytronic demonstrated an elegant zero-bezel pro-cap touch screen with capaci-

0362-0972/08/2009-008$1.00 + .00 © SID 2009

tive sensing pads around the edges. Other exhibitors demonstrating pro-cap touch screens included Nissha, Panjit, Wacom, and Wintek.

LCD In-Cell

Display Week 2009 provided the LCD manufacturers with another opportunity to show progress in integrating touch into the structure of an LCD. Unfortunately, in my opinion, little actual progress was demonstrated.

First, some terminology clarification is in order. "In-cell" touch actually exists in three forms, as shown in Table 2. Display Week 2009 included in-cell touch-technology demonstrations from five LCD manufacturers, as shown in Table 3.

Digital Resistive

At Display Week 2008, there was only one sample of digital resistive (shown by Wintek), and it was presented in a very low-key manner. At Display Week 2009, digital resistive had a much higher profile. Stantum, Wintek, and Apex Material Technology (AMT) all showed significant new products in this emerging technology area.

Stantum had a 9-in. digital-resistive touch screen intended for use in netbooks (Fig. 1). The patterning on this touch screen was in 2-mm squares, so the resolution was quite impressive. Handwriting recognition worked reasonably well on this touch screen. Stantum has a single-chip controller due out later this year (essential for design wins in the netbook space), and the company is confident that it can achieve the Windows-7 logo (another essential element of success).

Wintek showed a prototype of a 16-in. wide-aspect digital-resistive touch screen, configured with approximately 20 conductors on the long side (Fig. 2). To my knowledge, this is the largest digital-resistive touch screen that's been shown to date (although there are industry rumors that J-touch in Taiwan has developed a 22-in. commercial product). While digital resistive can theoretically support as many simultaneous touch points as there are X-Y intersections in the sensor, a Wintek booth staff-person said that the 16-in. prototype was limited to three simultaneous touches due to the bandwidth of the controller (assuming 50 Hz per touch point, as specified in the Microsoft logo specification).

Wintek also showed a prototype 4.3-in. digital-resistive touch screen configured as a 64 ×

Table 2: Clarification of LCD in-cell touch terminology

Term	Integration Method
In-cell	The touch sensor is physically inside the LCD cell. The sensor can take the form of micro-switches (contact-closure or so-called "resistive"); capacitive-sensing ITO electrodes (capacitive) or light-sensing phototransistors (optical).
On-cell	The touch sensor is an X-Y array of capacitive-sensing ITO electrodes deposited on the top or bottom surface of the color-filter substrate (this method is capacitive only).
Out-cell	This new term, recently coined by AUO, describes the configuration in which a standard touch screen (typically only resistive or projected-capacitive) is laminated directly on top of the LCD during manufacture. The key difference is that this configuration requires an additional piece of glass. Since this term hasn't entered common usage yet, some LCD manufacturers still refer to this configuration as on-cell.

Table 3: LCD in-cell, on-cell, and out-cell touch demonstrated at Display Week 2009

Manufacturer	Type	Author's Comments
Ampire & Hannstar	In-cell optical	Ampire, a controller manufacturer, partnered with Hannstar to develop a prototype of in-cell optical installed in a netbook. However, to simplify the difficult problem of sensing in-cell optical touch from total darkness to full sunlight, the company designed the prototype to work only with a laser-pointer light pen.
LG Display	In-cell and out-cell capacitive	LG's in-cell capacitive performed very poorly. There was a very large amount of cursor lag; movement of more than a few inches per second resulted in the ink devolving into random segments; and there was at least a half-finger's worth of cursor jitter. LG's out-cell capacitive performed acceptably with no unusual characteristics.
NEC	In-cell capacitive	NEC's in-cell capacitive was only on display for the first half-day of the show due to demo hardware failure, so I was unable to view it.
Samsung	On-cell capacitive and out-cell resistive	Samsung's on-cell capacitive worked acceptably, but it showed unusually severe pooling. Samsung's out-cell digital resistive was used to demonstrate a gesture recognizer that allowed up to three touches, but the recognition seemed to be grossly unreliable.
TMD	Out-cell capacitive and resistive	Although TMD has previously shown in-cell optical, at Display Week 2009 a booth staff-person stated that TMD's in-cell and on-cell capacitive and resistive were still under development and not ready to be shown yet. TMD's out-cell capacitive had no unusual characteristics, but its out-cell resistive had an exceptionally light activation force, almost as light as capacitive!

Fig. 1: This on-screen keyboard used a digital-resistive touch screen from Stantum. The booth staff-person was able to touch type on this screen even without tactile feedback.

36 matrix. This very high-resolution device was developed jointly with Stantum.

AMT demonstrated a new 20-segment digital-resistive touch screen. While Stantum's and Wintek's designs are intended to compete directly with pro-cap in applications such as netbooks that require "all points addressable" (APA) functionality, AMT's new product is aimed at vertical-market applications in which the number and location of simultaneous touches are applications-specific.

Other Touch Technologies

Although pro-cap, LCD in-cell, and digital-resistive technologies accounted for more than half of the touch screens shown at Display Week 2009, there were some interesting nuggets to be found in several of the other touch technologies, as follows.

- NextWindow demonstrated its latest optical touch screens in both desktop and large-format (> 30-in.) sizes. The desktop demonstrations were in the form of components used by HP and Dell in their TouchSmart and Studio One all-in-one consumer PCs (respectively). Optical is the first touch technology to penetrate the consumer desktop space in high volume, and NextWindow is the first optical-touch-screen manufacturer to have achieved the Windows-7 logo. NextWindow has shipped more than a half-million touch screens into the consumer PC market thus far.
- Tyco Electronics/Elo TouchSystems demonstrated the first multi-touch surface-acoustic-wave (SAW) touch screen. The move to multi-touch was accomplished by adding a second set of reflectors around the edge of the screen. This second set reflects the surface acoustic waves across the diagonal of the screen; the controller uses the X, Y, and "U" (Elo's designation for the diagonal direction) waves to unambiguously triangulate the location of two touches. Elo also demonstrated a very elegant zero-bezel Acoustic Pulse Recognition (APR) touch screen with capacitive touch pads and a scroll-dial along one edge. All the circuitry for the touch pads and scroll dial was on the back of the glass; the on-glass circuit capability was provided by Felam Glasline in Germany.

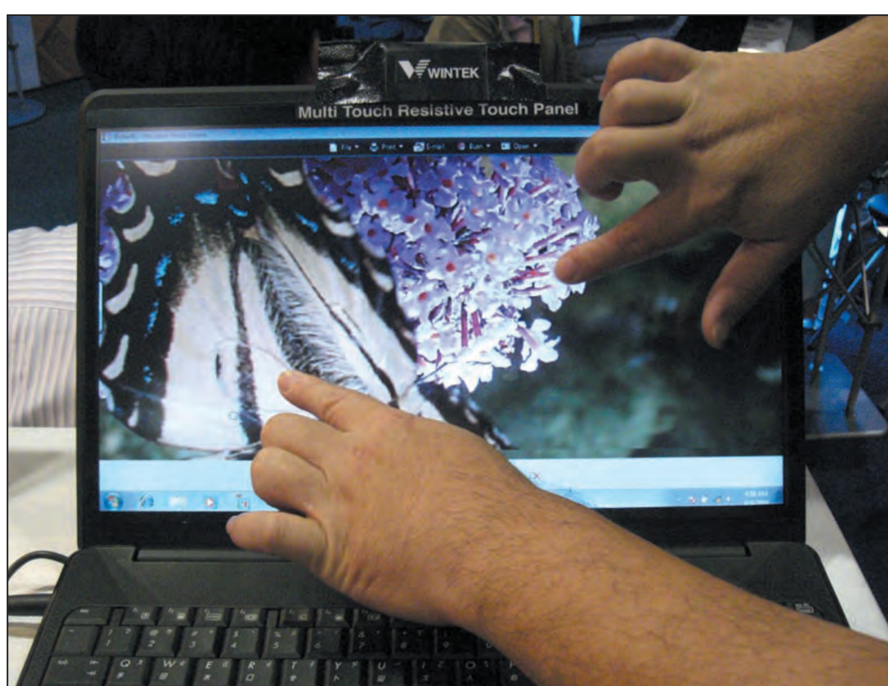


Fig. 2: This prototype of a 16-in. wide-aspect digital-resistive multi-touch touch screen from Wintek is installed in a laptop. This is probably the largest digital-resistive touch screen that has been shown to date.

- Fujitsu demonstrated an improved 5-wire analog-resistive controller that was developed in response to customer requests for faster response. It certainly is fast – I was able to draw circles at 60 in./sec (as fast as my arm and hand could move!) without any loss of data points.
- Nissha showed a prototype of a force-sensor added to an analog-resistive mobile-phone touch screen, presumably in an attempt to mimic the BlackBerry Storm's "Click-Through" technology. The performance was uneven, however, with the result that significantly different levels of force were required at different screen locations. Nissha agreed that the implementation was not ready for production yet.
- RPO, which has changed its focus from the mobile-phone space to the netbook and laptop space, showed a 7-in. waveguide infrared touch screen intended for netbooks. The maximum border width was about 6 mm and the maximum bezel height was slightly over 1 mm. The touch screen used only three IR LEDs, two on the long side and one on the short side (this results in very low power consumption, one of the key advantages of waveguide infrared).
- Vissumo (a spin-out from QSI Corp.) demonstrated its force-sensing touch technology (Fig. 3). Several of the hardware models in its booth showed very clearly one of the technology's unique advantages – the ability to create a 3-D touch surface that can incorporate any rigid material (stone, glass, steel, plastic, ceramic, *etc.*) as well as LCDs, speakers, snap-domes, electric motors, and other hardware. No other touch technology can do this.

Fig. 3: *This display features a mockup of a gas pump using Vissumo's force-sensing touch screen. Rugged outdoor touch applications such as this take advantage of force-sensing's high degree of resistance to adverse environmental conditions.*

Summary

There was so much touch technology on the floor at Display Week 2009 that it could not all be seen in one day. Projected capacitive leaped to the forefront of the touch technologies on display, surpassing analog resistive for the first time. LCD in-cell made a rather poor showing, with little visible progress over the last year. Digital resistive emerged as a lower-cost alternative to projected capacitive. Interesting examples of all the other touch technologies were present. It was one heck of a show! ■

Display Week 2009 Review: OLEDs

OLEDs seem poised to wrest some market share from dominant display technologies.

by Paul Drzaic

AT LEAST FOR ME, the last couple of SID meetings have reinforced the notion that the major display manufacturers are taking organic light-emitting diode (OLED) displays quite seriously and bravely taking the plunge to compete against liquid-crystal displays (LCDs). Obviously, OLED-display manufacturers are not students of history or they would have given up long ago. LCD technology has clearly been hard to beat. Through history, it has conquered almost every rival, regardless of investment and entrenchment – one has only to look at cathode-ray tubes and field-emission displays as examples of technologies that have been beaten down by LCDs. Nevertheless, this SID symposium showed that not only are OLEDs appearing in unconventional guises, but they are also taking on LCDs directly in applications such as televisions and monitors.

So what was different this time around? Well, for one, there was simply "more" – more sizes, more applications, and more areas of innovation. OLED displays are still being viewed as a premium alternative to LCDs, but the quality of the displays, and some novel form factors, showed why these displays are attractive to early adopters of new technologies.

The most extensive set of OLED-based products was shown by Samsung Mobile Display. SMD exhibited OLED displays in a number of form factors and application areas. An impressive 31-in. 1920 × 1080 HDTV display capable of rendering the broad color gamut that is so attractive in OLED units was the first display most people saw when approaching the Samsung booth, and many lingered for a long, long look. Inside the Samsung pavilion, many more surprises awaited. OLED displays with over 300-ppi resolution for mobile devices, 3-D OLED displays, and super-thin OLED displays only 50 μm thick were all being shown. One example that showed the unique potential of OLEDs was the incorporation of a color video display into a smart-card format. The display drew its power wirelessly from a nearby radio-frequency antenna (Fig. 1).

eMagin took OLED displays in a different direction, with its latest head-mounted units. The images were shown at SXGA resolution (1280 × 1024 triad pixel array), with each individual pixel only 12 μm on a side. When I tested the display myself, I found that the colors were saturated, the image quality was high, and the videos rendered seamlessly. eMagin is aiming these displays at applications in commercial, consumer, and military markets.

Other impressive demonstrations appeared in various places around the exhibit floor. LG

***Paul Drzaic** serves the electronic-display industry through Drzaic Consulting Services; drzaic.consulting@gmail.com. He is also the President of the Society for Information Display.*

***Fig. 1:** Samsung Mobile Display showed this smart card with an integrated color OLED display, driven by a wireless power source.*

0362-0972/08/2009-012$1.00 + .00 © SID 2009

Display showed ruggedized 15- and 3-in. AMOLED panels in its booth. TMD showed its line of long-life OLED displays, with a 4.15-in. display rated for 60,000 hours (almost 7 years!) at 200 cd/m^2. Following an alternative path, Ignis Innovation, an intellectual property creator and technology development company out of Quebec, demonstrated a number of OLED units driven using amorphous-silicon backplanes, the same backplane technology that has been perfected by the LCD industry. Ignis has taken the practical approach of using clever sensing and compensation circuitry to overcome the image artifacts that appear over time when a-Si backplanes are used to drive OLED displays. Ignis claims that with the compensation running, any image artifacts that arise are erased by modifying the local drive voltage, overcoming the major hurdle that has prevented a-Si backplanes from being used in OLEDs

Innovation continued in the form of a number of materials and fabrication methods necessary to build long-lived attractive OLED displays. Corning was honored with a Display Component of the Year Award for its Jade glass, specially designed to provide stability, uniformity, and high yields for the fabrication of LTPS backplanes. Add-Vision demonstrated its screen-printable OLED technology, showing a credit card with an emissive logo powered by a radio-frequency power source. Universal Display Corp. demonstrated its latest white-OLED emitters, built using the company's phosphorescent molecular technology. It also showed a wearable, curved OLED display, built in collaboration with LG Display and L3 Corp. (a photograph appears in the Flexible Display review in this issue.)

Kodak showed white-light panels built using both internal and external light extraction technology, more than doubling the light output from a standard OLED stack not using these designs. Novaled continues to lead in the development of its PIN-type OLED displays, claiming an encapsulation regime that enables lifetimes up to 110,000 hours and efficiencies up to 50 lm/W. It's important to note that general lighting applications are also driving OLED development, and SID will be supporting the connection between OLED lighting and displays in future meetings.

So why OLEDs? For many people, greater contrast, wider color gamut, and superior response time provide a more satisfying viewing experience than that of LCDs. For applications and designs for which a super-thin format is required, an LCD might be hard-pressed to match a 50-μm display stack, or provide full-motion video in a highly flexible format, or beat OLEDs in power consumption when showing many types of images. In all cases, the lifetimes and quality of OLED displays – definite drawbacks in the past – have reached a level that is acceptable to consumers. Will LCDs disappear? Unlikely! Will OLED displays start encroaching into LCD territory or enabling new display applications? That seems like a safe bet. ■

Display Week 2009 Review: LCDs

LCD innovation continues to set the standard.

by Alfred Poor

DISPLAY WEEK 2009 may have been held in the hill country of Texas, but the terrain of the display world is decidedly flat these days. From the exhibit hall to the meeting rooms, from displays for pockets to walls, it was clear in San Antonio that LCD technology is the standard against which all challengers must continue to be measured. While novel and exotic technologies garnered a large share of the attention at the exhibition, the LCD industry is the engine that is truly driving the market. If you were lucky enough to be on the show floor in June, you saw a number of developments that made the forceful point that LCD technology is not about to surrender its dominant position any time soon. On the contrary, the technology is pressing ahead with significant improvements on a variety of fronts.

Backlighting

One of the most significant demonstrations of this ability to advance the state of the art of LCD panels was the broad application of solid-state LED backlights, which are known for their environmentally friendly materials, lower-energy consumption, and better temperature and shock tolerance compared with conventional fluorescent backlight tubes. Although they are often used in an edge-lighting array, when the LEDs are instead placed in a matrix behind the panel, they can support local dimming, which boosts contrast performance while also providing energy savings. Local dimming is not new, but the art of it is being refined, as evidenced by manufacturers such as Samsung, which featured side-by-side demonstrations of displays using local dimming versus those not using it. In these demonstrations, the reduced power consumption was clearly evident, though very dependent on the type of content being displayed.

Although there were some new wrinkles on the LED-backlight theme at the show, one of the most dramatic examples was to be found in the Samsung exhibit, where demonstrations of "needle thin" edge-lit LED technology resulted in a 24-in.-diagonal LCD panel that was a mere 3.5 mm thick. A 12.1-in. panel using a similar design and destined for notebook applications was just 1.64 mm thick. And LG Electronics showed its UltraThin HDTV panels that use LED blacklights, with a 47-in. unit that was 5.9 mm thick.

LED backlights are also becoming part of the standard toolkit for display designers. NEC Displays, Hitachi, Toshiba, and Optrex all showed a variety of LCD panels designed

Fig. 1: *LG's multiview digital signage presented three different images, depending on viewer perspective.*

Alfred Poor *is editor and publisher of the online* HDTV Almanac *and a freelance writer covering technology topics with special emphasis on displays. He is also a Technical Editor with* ECN (Electronic Component News) *and past Chair of the SID Delaware Valley Chapter. He can be reached at apoor@verizon.net or 215/453-9312.*

0362-0972/08/2009-014$1.00 + .00 © SID 2009

for industrial applications in which extra-long lifetimes are required. For example, Toshiba showed an LCD panel with a white-LED backlight rated with a mean-time-between-failure (MTBF) rate of 70,000 hours. Up until recently, white LEDs have not lasted nearly this long, and the extended life opens up a range of new display applications for this technology. Planar showed a low-power 29-in. LCD digital-signage panel that produced 500 cd/m^2 using just 30 W of power, thanks to an LED backlight.

Another fascinating demonstration from Samsung was a portrait-mode LCD panel – such as you might employ for digital signage – that used white LEDs for the backlight. A mobile device with a simple photosensor was placed in front of it, and data was transferred from the panel to the mobile device. How did it work? The backlight was modulated at a frequency much higher than what would be visible to viewers to transmit the digital data. According to a Samsung representative, the white LEDs support 1–2-MHz modulation, but an RGB LED backlight could support up to 40 MHz per channel. This could make it possible to transfer a great deal of data in a very short time, opening up all sorts of enticing application possibilities.

A final note about backlights: It's a sign of the times (both economic and LCD-centric) that Endicott Research Group, among other companies, has been putting together retrofit LED units for customers with a need to replace CCFLs with LEDs. "These retrofits are not going to be around forever," notes Bill Abbott, Corporate Distribution Manager and Global Market Strategist for ERG, meaning that the business opportunity will eventually taper off, but for the time being, they do represent a decent bit of business aimed at helping customers upgrade their equipment during lean times.

Other LCD Innovations

Energy-saving designs were prominently showcased. In addition to the local-dimming efforts mentioned above, Sharp displayed new "Memory LCD" reflective panels that have memory circuitry for each pixel, which makes it possible to refresh the image just once per second. This saves a great deal of power compared with standard designs. The color version of this panel appeared to be fairly low contrast, but the monochrome example was very legible.

Fig. 2: The addition of cyan and yellow to RGB on a large scale made viewers take notice of Sharp's 60-in panel on display at the show.

A clever approach to making reflective LCD panels readable in low-light conditions was presented in Poster Paper P-75, "Improved Optical Characteristics of a Front-Light System Using Fine-Pitch Patterned OLEDs," from Seiko Epson. The title more or less says it all; by placing tiny OLED devices inside a top glass layer with a barrier, light is prevented from going out the top of the display. Instead, the light is directed down at the surface of the display, providing light for reflection. The result is more efficient operation with a broader viewing angle than edge-lit front-light designs.

For digital signage, LG demonstrated a portrait LCD panel that produced three different images depending on the viewing angle (Fig. 1). Similar designs have been shown before with smaller panels intended for applications such as automotive-dashboard displays, but this was much larger. And in one of the SID keynote addresses, InJae Chung, Executive Vice President and CTO of LG Display, described another innovative use of controlling the viewing angle on LCD panels. LG's "Viewing Image Control" technology allows a selectively switchable viewing angle of a display – or even just a portion of the display – that can be used as a privacy feature.

Sharp demonstrated a 60-in. LCD panel that used five-primary-color filters, adding cyan and yellow to the standard red, green, and blue (Fig. 2). The result is a panel capable of showing over 130% of the typical color gamuts used today, including improved performance for metallic images. The resulting rich imagery made this panel a stand-out in the "stop you in your tracks" category at Display Week.

And, of course, Samsung showed its Display of the Year Gold Award-winning 240-Hz LCD panel, which fights motion blur by interpolating three additional frames between each frame in a 60-Hz signal.

Adding a Dimension

3-D displays based on LCD technology were also generating excitement at Display Week this year. There were LCD panels that produced 3-D images using active shutter glasses and others that used passive glasses. And there were autostereoscopic demonstrations at many exhibits, including NEC Displays, Toshiba, and LG.

One of the most intriguing autostereoscopic devices was on display at the 3M booth. The company makes a lenticular film that presents one image to the left eye and another to the right eye. Unlike most similar designs, however, the 3M film does not have to be aligned with the display's subpixels, which makes the fabrication of the panel much simpler. Instead of displaying left and right images at the same time, however, it displays just a left image, then just a right image. It achieves this by using LED edge lights on both sides. A light guide causes light from one side to project only to one eye and light from the other side to the other eye. The 3-D image is created by changing the image on the panel in sync with alternating the backlight from one set of LEDs to the other.

The result is a time-sequenced presentation of the two images that make the 3-D image. A side benefit is that if a viewer gets too far off-axis from the stereoscopic "sweet spot," the viewer still sees the uninterrupted image intended for just one eye. This 2-D image is a bit fainter – it is only receiving half the light of the 3-D image – but is completely legible. This simple design is very effective, and a wide-QVGA panel using this technology is expected to appear in a commercial product before the end of this year.

Wait Until Next Year!

This summary just scratches the surface of the LCD news at Display Week this year. From new printable display technologies to integrating touch technology, from advances in substrates to liquid-crystal materials, from lower energy consumption to fabrication processes that are friendlier to the environment, a wide range of advances were presented in the meeting rooms and on the show floor. If you missed the LCD developments exhibited at Display Week 2009, you missed a lot of developments in the display industry as a whole. ■

Display Week 2009 Review: Flexible Displays

The technology moves closer to "product" status.

by Robert Zehner

DISPLAY WEEK 2009 marked a turning point in the development of flexible displays. While there were still a number of technical presentations and posters detailing new scientific findings on ways to manufacture flexible electronics, this year a handful of firms appear to be on the verge of launching non-glass active-matrix display products in high-volume consumer products.

This move from the lab toward the factory was made clear in the opening-day keynote address from Martin Jackson, CTO of Plastic Logic. Jackson spent very little time reviewing the organic-transistor technology behind Plastic Logic's E Ink electrophoretic-display technology that won its originators a Nobel Prize and would have been viewed as just short of magic a decade ago. Instead, he focused primarily on the challenges of building a business around it. "One of the difficulties with a new technology," Jackson said, "is convincing people to use it." In response to this difficulty, Plastic Logic is building not just a first-of-its-kind plastic display, but also an ultra-thin wirelessly connected reader device to bring those displays to the market. According to Jackson, the Plastic Logic reader will officially be launched at CES 2010 in January, although details of price and availability have not yet been announced.

Edzer Huitema from Dutch start-up Polymer Vision told a similar story in his invited symposium talk on Tuesday. Much like its competitors at Plastic Logic, Polymer Vision has tooled up an organic-transistor-backplane production line to mate with E Ink's electrophoretic display film. However, Polymer Vision's display is not just bendable, but also rollable. Prototypes of its Readius handheld wireless reader have the display wrapping around the exterior of the unit when not in use, then unfurling for reading or Web surfing. Huitema's data show that the display performance remains rock-solid, even after 15,000 roll–unroll cycles. Unfortunately, recently published interviews with Polymer Vision CEO Karl McGoldrick suggest that the market launch of the Readius has been sidelined by the economic slowdown, which has dried up sources of capital. Actual product is still yet to come from this company. (For earlier references to Polymer Vision in *Information Display*, see "The Past, Present, and Future of Electronic Paper" in the January 2008 issue.)

Two other flexible e-paper displays caught my eye: LG Display's in-panel touch demon-

Fig. 1: *An example of numerous other flexible displays shown at Display Week was this curved e-paper display that Taiwanese panel-maker Wintek created by heating and bending a thin glass substrate.*

Robert Zehner *is Director at E Ink Corp. He can be reached at rzehner@eink.com.*

0362-0972/08/2009-018$1.00 + .00 © SID 2009

strator and Wintek's curved glass display. Although LG Display has previously showed monochrome and color electrophoretic displays on ultra-thin stainless steel, this year they upped the ante by adding in-panel touch sensing. Visitors were able to use finger touch to interact with an 11.5-in. UXGA prototype constructed with E Ink's Vizplex electrophoretic film, navigating forward and backwards in an electronic document. Using in-panel touch allows LG Display to preserve the brightness and contrast of the reflective display, while also supporting flex and curvature. Wintek was also showing a curved electrophoretic display, built using a glass backplane (Fig. 1). The trick, according to Wintek, is to use relatively thin glass (0.3 mm) and to apply heat while bending to form the backplane into its final shape. While the resulting display is not truly flexible, there may be applications where a non-flat panel with a fixed curvature may fit the bill.

OLED makers are also making progress toward commercializing flexible emissive displays. I spent some time chatting with Rui-Quing Ma of Universal Display Corp. about the 4-in. QVGA flexible OLED display (co-developed with LG Display), integrated into a curved wrist-mounted unit that served as the centerpiece of UDC's booth (Fig. 2). "What makes this display special is how close it is to mass production," he answered. "One of the samples that we're showing has been around for over a year, and it still looks great."

Looking back 2 or 3 years, I have to imagine that many of the flexible demonstrators shown at SID were lucky to last through the week; *i.e.*, if they were not changed out every night for a fresh sample. They seem to be more substantial now. On the other hand, the flexible OLEDs in Samsung's booth tended to the more conceptual. Consider, for example, the "flapping display," a 4-in. flex OLED suspended by one edge and fluttering in the breeze from a nearby fan. Nearby was a prototype of an electronic identity card with an embedded OLED display, apparently powered by an RF field projected from a coil placed a few inches behind the card. The display stepped through photos of a woman's face from a variety of angles, reminiscent of scenes from science fiction movies such as *Minority Report* or *Total Recall*.

Fig. 2: *Universal Display Corp. exhibited a 4-in. QVGA OLED panel integrated into a wrist-worn information device. Built using stainless flex TFTs supplied by LG Display, the display is only 0.3 mm thick and is held to a constant curvature within the device housing.*

In the trade-show world, there were very little true surprises; most of the above demonstrations and talks were well-publicized in advance of Display Week, to ensure that customers and press were on-hand. Hewlett-Packard, however, managed to deliver some excitement with a Monday morning press release announcing the launch of its new eSkins display technology. H-P did not officially exhibit at Display Week; the only way to see the first samples of eSkins was by private appointment. And so, Tuesday afternoon, I strolled a few blocks from the convention center to meet up with Ken Abbott, H-P's director of emerging technology, at an area hotel. After a brief introduction to the eSkins concept, Abbott revealed a series of prototypes, including both basic black films and an eye-popping trio of cyan, yellow, and magenta displays. The eSkins displays are thin, flexible plastic composites that can switch from highly colored to nearly invisible (H-P quotes 50–65% transparency) in about half a second. Abbott was tight-lipped about the underlying display technology, calling it "electrokinetic" – my unconfirmed best guess is that it is based on collecting or spreading colored fluid droplets, similar to an electrowetting display. Currently, eSkins are monochrome, with relatively coarse pre-defined segments and icons. That said, after attending H-P's symposium presentation by Tim Koch, it seems this might just be a first step in creating a full-color active-matrix reflective display by combining the eSkins imaging layers with H-P's inorganic flexible TFTs built using a similar process.

Given the quality of the samples shown at Display Week 2009, it seems that flexible displays will slowly but surely follow in the footsteps of flat-panel displays, moving from the lab to the factory to the aisles of the local electronics store, and finally to desktops, briefcases, and living rooms around the world. Judging by the attendance at talks and the large crowds gathered at author-interview tables and in front of demos on the exhibit floor, there are plenty of fans eager to see this technology succeed. ■

Information
DISPLAY
SID
Official Monthly Publication of the Society for Information Display

2009 INDUSTRY DIRECTORY

Information Display's
23rd Edition of the
Directory of the Display Industry

Directory of the Display Industry

ID's twenty-third annual directory of the display industry.

COMPILED AND EDITED BY JAY MORREALE

Part I, beginning on this page, is a listing of products and services relevant to the display industry. Part II, the company directory, begins on page 6.

Part I: Products and Services

ADHESIVES

☐ Acheson Colloids ☐ Aculon ☐ Adhesives Research ☐ Chomerics ☐ Conductive Compounds ☐ CPFilms ☐ Dawar Technologies ☐ Delo Industrial Adhesives ☐ Diemat ☐ DuPont Display ☐ DYMAX Corp. ☐ EPCONSEIL ☐ EXFO Photonic Solutions. ☐ **Eyesaver International** ☐ GE Silicones ☐ GZO Technologies ☐ Intelicoat Technologies ☐ Master Bond ☐ Miyachi Unitek Corp. ☐ Nagase America Corp. ☐ Nippon Paper Industries Co. ☐ Sekisui S-Lec American ☐ Sheldahl ☐ Sheldahl Display Products ☐ Soken Chemical America ☐ Specialty Tapes ☐ Venture Tape Corp.

ANTIREFLECTION COATINGS

☐ **Abrisa Industrial Glass** ☐ Aculon ☐ Aither Optics ☐ All American Display Solution ☐ Anders Electronics PLC ☐ Arrow OEM Computing Solutions ☐ **Astra Products** ☐ Bell Microproducts ☐ Berliner Glas U.S. ☐ Bookham ☐ Colorado Concept Coatings ☐ **Corning Incorporated** ☐ CPFilms ☐ Dawar Technologies ☐ **Dontech** ☐ DuPont Display ☐ EuropTec ☐ Evaporated Coatings ☐ **Eyesaver International** ☐ Fraunhofer IOF ☐ Fujitsu Components America ☐ Glaswerke Haller GmbH ☐ GZO Technologies ☐ Horizon Technology ☐ Jaco Electronics ☐ JDS Uniphase ☐ Man & Machine ☐ Metavac ☐ MIRWEC Film ☐ Monitech Industrial Display ☐ Nagase America Corp. ☐ Nanogram ☐ Nippon Paper Industries Co. ☐ Nitto Denko America ☐ O & S Research ☐ Optical Polymers International ☐ Optics Balzers AG ☐ Parker Chomerics / Silver Cloud ☐ Performance Coatings International ☐ Photo Sciences ☐ Purdy Electronics Corp., ☐ Schott North America ☐ Sheldahl Display Products ☐ Sumitomo Osaka Cement Co. ☐ Sycamore Glass Components ☐ **TFD** ☐ Tredegar Performance Films ☐ Unaxis (Shanghai) Co.☐ Unaxis Optics USA ☐ White Electronic Designs Corp. ☐ Zeon Chemicals ☐ Zytronic

ANTIREFLECTION SCREENS

☐ Aculon ☐ All American Display Solution ☐ Anders Electronics ☐ Arrow OEM Computing Solutions ☐ **Astra Products** ☐ Bell Microproducts ☐ Bookham ☐ CI Lumen Industries ☐ CYRO Industries ☐ Dawar Technologies ☐ **Dontech** ☐ **ELDIM SA** ☐ EuropTec ☐ **Eyesaver International** ☐ General Digital Corp. ☐ Glaswerke Haller GmbH ☐ Horizon Technology ☐ Jaco Electronics ☐ Lumen Technology International ☐ Nagase America Corp. ☐ O & S Research ☐ Optical Filters ☐ Optical Polymers International ☐ Parker Chomerics / Silver Cloud ☐ **Solomon Systech** ☐ White Electronic Designs Corp.

ANTISTATIC CHEMICALS AND DEVICES

☐ Aculon ☐ Albemarle Corp. ☐ Conductive Compounds ☐ **Dontech** ☐ Evaporated Coatings ☐ Nanofilm ☐ Performance Coatings International ☐ Sumitomo Osaka Cement Co. ☐ Tempo Clean Room Foam ☐ Tredegar Performance Films ☐ TW Clean

ASSOCIATIONS AND PROFESSIONAL SOCIETIES

☐ EPCONSEIL ☐ German Flat Panel Display Forum ☐ Human Factors and Ergonomics Society ☐ Society for Information Display ☐ U.K. Displays and Lighting Knowledge Transfer Network ☐ VESA

BACKLIGHTS (FOR LIQUID-CRYSTAL DISPLAYS)

☐ All American Display Solution ☐ Anders Electronics ☐ Applied Concepts ☐ Arrow OEM Computing Solutions ☐ **Astra Products** ☐ Bell Microproducts ☐ Bi-Search International ☐ Bright View Technologies ☐ Brightside Technologies ☐ Brimar, Ltd. ☐ Briteview Technologies ☐ C3 Laser Corp. ☐ Capstone Visual Product Development ☐ CI Lumen Industries ☐ DATA MODUL AG ☐ Dawar Technologies ☐ **Dontech** ☐ DuPont Display ☐ EarthLCD ☐ **ELDIM SA** ☐ Fonon Display & Semiconductor Systems ☐ Fonon Technology International ☐ Fusion Optix ☐ GE Plastics ☐ Global Lighting Technologies ☐ GZO Technologies ☐ Heatron ☐ Hong Kong Applied Science & Technology Research Institute Co.☐ Horizon Technology ☐ i-sft GmbH ☐ The IFM Company ☐ Industrial Electronic Engineers ☐ Interface Displays & Controls ☐ International Display Consortium ☐ IntertechPira ☐ Jaco Electronics ☐ JKL Components Corp. ☐ Korry Electronics Co. ☐ Landmark Technology ☐ LCD Lighting ☐ Lumen Technology International ☐ Luminus Devices ☐ Lumitex ☐ Man & Machine ☐ Microsharp Corp.☐ Nagase America Corp. ☐ NDF Special Light Products B.V ☐ OMT Digital Display Technology (Shenzhen) Ltd. ☐ OSRAM Opto Semiconductors ☐ Physical Optics Corp. ☐ Purdy Electronics Corp.☐ Pure Depth ☐ Quadrangle Products ☐ Southwall Technologies ☐ Supertex ☐ Telios Tech ☐ Thomas Electronics ☐ **3M Optical Systems** ☐ Tredegar Performance Films ☐ US Micro Products ☐ White Electronic Designs Corp. ☐ Wintek Electro-Optics Corp.

CABLES

☐ All American Display Solution ☐ Apollo Display Technologies ☐ Arrow OEM Computing Solutions ☐ Avocent Corp. ☐ Axon' Cable ☐ Bell Microproducts ☐ Communications Specialties ☐ DATA MODUL AG ☐ Dawar Technologies ☐ Jaco Electronics ☐ Meritec ☐ Monitech Industrial Display ☐ Nicomatic ☐ Peter's Co. ☐ Purdy Electronics Corp.☐ Quadrangle Products ☐ Thomas Electronics

CATHODES

☐ e beam ☐ Kurt J. Lesker Co. ☐ Thomas Electronics

CCD IMAGERS AND CAMERAS

☐ Aaeon Systems ☐ Albemarle Corp. ☐ Cyantek Corp. ☐ **ELDIM SA** ☐ Gamma Scientific ☐ Horiba Jobin Yvon ☐ Nanofilm ☐ Schott North America

CLEANING AGENTS

☐ Albemarle Corp. ☐ Cyantek Corp. ☐ Nagase America Corp. ☐ Nanofilm ☐ PVA TePla AG

COATING EQUIPMENT

☐ Coating & Converting Resources ☐ Colorado Concept Coatings ☐ MBraun ☐ MIRWEC Film ☐ Performance Coatings International ☐ Trovato Manufacturing

COLOR-MATCHING SYSTEMS

☐ B&W TEK ☐ **Dontech** ☐ **ELDIM SA** ☐ Genesis Microchip ☐ Klein Instruments Corp. ☐ Konica Minolta ☐ Konica Minolta Photo Imaging U.S.A. ☐ Ocean Optics ☐ Optek Technology ☐ Photo Research ☐ **Radiant Imaging** ☐ Unaxis Optics USA

CONNECTORS AND SOCKETS

☐ Apollo Display Technologies ☐ Axon' Cable ☐ DATA MODUL AG ☐ ITT Electronic Components ☐ JAE Electronics ☐ Meritec ☐ Nicomatic ☐ Purdy Electronics Corp. ☐ Quadrangle Products ☐ SMK Electronics Corp. ☐ Thomas Electronics

CONSULTANTS AND ANALYSTS

☐ Abbie Gregg Inc. ☐ Advanced Manufacturing Group ☐ AGC Systems ☐ Apollo Display Technologies ☐ Applied Concepts ☐ Applied Technology International ☐ Breault Research Organization ☐ Capstone Visual Product Development ☐ Display Asia ☐ Display-Metrology & Systems ☐ e beam ☐ ECSIBEO AB ☐ EPCONSEIL ☐ G2D Technologies ☐ German Flat Panel Display Forum ☐ GZO Technologies ☐ i-sft GmbH ☐ Informative View ☐ IntertechPira ☐ ITO America Corp. ☐ Kent State University, LCI ☐ Kristel Displays ☐ Logystyx UK ☐ Lumen Technology International ☐ Meko ☐ Murgence ☐ National Quality Assurance US ☐ nFlexion ☐ Optical Research Associates ☐ Performance Tech Associates ☐ Pixel Interconnect ☐ Alan Sobel ☐ Systemation Technology ☐ Tannas Electronics ☐ Thomas Electronics ☐ Veritas et Visus

CONVERTERS, DIGITAL/ANALOG, ANALOG/DIGITAL

☐ Astro Systems ☐ Bell Microproducts ☐ Cabletime USA ☐ DATA MODUL AG ☐ Jaco Electronics ☐ Kristel Displays ☐ Monitech Industrial Display ☐ NDF Special Light Products B.V ☐ Quadrangle Products. ☐ Systemation Technology ☐ Thinklogical

CONVERTERS, DIGITAL/VIDEO

☐ Anders Electronics ☐ Astro Systems ☐ Bell Microproducts ☐ Cabletime USA ☐ Capstone Visual Product Development DATA MODUL AG ☐ **ELDIM SA** ☐ Gennum Corp. ☐ Jaco Electronics ☐ Landmark Technology ☐ Monitech Industrial Display ☐ Quadrangle Products ☐ Systemation Technology. ☐ Thinklogical

CONVERTERS, POWER

☐ Applied Concepts ☐ Arista Corp. ☐ Capstone Visual Product Development ☐ Crane Aerospace and Electronics ☐ DATA MODUL AG ☐ ELDEC Corp. ☐ **Endicott Research Group** ☐ House of Batteries

☐ Jaco Electronics ☐ Landmark Technology ☐ NDF Special Light Products B.V ☐ Orbit International Corp. ☐ Purdy Electronics Corp., ☐ Quadrangle Products ☐ Supertex ☐ Zippy Technology Corp.

COUNTING EQUIPMENT
☐ Kurt J. Lesker Co.

CRT DESIGN SERVICES
☐ Brimar, Ltd. ☐ CELCO (Constantine Engineering Laboratories Co.) ☐ e beam ☐ Lynch Systems ☐ Monitech Industrial Display ☐ Optical Research Associates ☐ Thomas Electronics

CRT MONITORS
☐ Aaeon Systems ☐ Arrow OEM Computing Solutions ☐ Brimar, Ltd. ☐ e beam ☐ FIMI Philips ☐ Image Systems Div./Richardson Electronics ☐ Kristel Displays ☐ Lynch Systems ☐ Monitech Industrial Display ☐ Precision Display Technologies Corp. ☐ Quest International ☐ Samsung Semiconductor ☐ Teltron Technologies ☐ Thomas Electronics ☐ **3M Touch Systems** ☐ Timeline

CRT TESTING LABORATORIES
☐ Brimar, Ltd. ☐ CELCO (Constantine Engineering Laboratories Co.) ☐ e beam ☐ Gamma Scientific ☐ Monitech Industrial Display ☐ Photo Research ☐ Quest International ☐ **Radiant Imaging** ☐ Thomas Electronics

DEFLECTION AMPLIFIERS
☐ Brimar, Ltd. ☐ CELCO (Constantine Engineering Laboratories Co.) ☐ Citronix ☐ Thomas Electronics

DEFLECTION YOKES
☐ Brimar, Ltd. ☐ CELCO (Constantine Engineering Laboratories Co.) ☐ Thomas Electronics

DEPOSITION EQUIPMENT
☐ Aixtron AG ☐ ANS ☐ Dimatix ☐ DOOSANDND Co.☐ FUJIFILM Dimatix ☐ Kurdex Corp. ☐ Kurt J. Lesker Co. ☐ MBraun ☐ OTB Display ☐ Sunic System ☐ Trovato Manufacturing

DEPOSITION SERVICES
☐ Aculon ☐ Colorado Concept Coatings ☐ CPFilms ☐ **Dontech** ☐ Evaporated Coatings ☐ Fraunhofer IPM ☐ FUJIFILM Dimatix ☐ HVT.☐ Kent State University, LCI ☐ Kurdex Corp. ☐ Metavac ☐ Sheldahl ☐ **TFD** ☐ Unaxis (Shanghai) Co.☐ Unaxis Optics USA

DIGITAL FILM RECORDERS
☐ Brimar, Ltd. ☐ CELCO (Constantine Engineering Laboratories Co.) ☐ Thomas Electronics

DIGITAL VIDEO SYSTEMS
☐ Aaeon Systems ☐ Adtec Digital ☐ Avocent Corp. ☐ Cabletime USA ☐ Capstone Visual Product Development ☐ Communications Specialties ☐ DATA MODUL AG ☐ Digital View Group ☐ EPIX ☐ Genesis Microchip ☐ Gennum Corp. ☐ IntelliMats ☐ Thinklogical ☐ Westar Display Technologies

DIGITIZING TABLETS/DIGITIZERS
☐ Bell Microproducts ☐ N-trig ☐ **Slencil** ☐ Wacom Technology Corp.

DISABLED DISPLAY USER AIDS
☐ Aaeon Electronics ☐ Immersion Corp. ☐ Man & Machine

DISPLAY DRIVERS AND CONTROLLERS
☐ Aaeon Electronics ☐ All American Display Solution ☐ Apollo Display Technologies ☐ California Micro Devices Corp. ☐ Capstone Visual Product Development ☐ DATA MODUL AG ☐ Dawar Technologies ☐ Digital View Group ☐ EarthLCD ☐ **ELDIM SA** ☐ **Endicott Research Group** ☐ Jaco Electronics ☐ Westar Display Technologies

DISPLAY HOUSING, RUGGEDIZED
☐ All American Display Solution ☐ Apollo Display Technologies ☐ Arrow OEM Computing Solutions ☐ Bell Microproducts ☐ Capstone Visual Product Development ☐ CELCO (Constantine Engineering Laboratories Co.) ☐ Computer Dynamics ☐ DATA MODUL AG ☐ **Dontech** ☐ DuPont Display ☐ EarthLCD ☐ Esterline Advanced Input Systems ☐ EuropTec ☐ **Eyesaver International** ☐ GE Plastics ☐ General Digital Corp. ☐ GM Nameplate ☐ GZO Technologies ☐ Hong Kong Applied Science & Technology Research Institute Co. ☐ Horizon Technology ☐ Image Systems Div. / Richardson Electronics ☐ Industrial Displays ☐ IntelliMats ☐ Interface Displays & Controls. ☐ Jaco Electronics ☐ L-3 Communications, Interstate Electronics Corp. ☐ Monitech Industrial Display ☐ Orbit International Corp. ☐ Parker Chomerics / Silver Cloud ☐ Precision Display Technologies Corp. ☐ Purdy Electronics Corp. ☐ Quest International. ☐ White Electronic Designs Corp.

DISPLAY SIMULATION AND MODELING SYSTEMS
☐ Brimar, Ltd. ☐ Display Asia ☐ **ELDIM SA** ☐ Global Lighting Technologies ☐ Kent State University, LCI ☐ Pure Depth ☐ sim4tec GmbH ☐ Tannas Electronics ☐ Thinklogical

DISPLAY SUBSYSTEMS
☐ Aaeon Electronics ☐ **Abrisa Industrial Glass** ☐ Algolith ☐ All American Display Solution ☐ Anders Electronics ☐ Applied Concepts ☐ Bell Microproducts ☐ Brimar, Ltd. ☐ Cabletime USA ☐ Capstone Visual Product Development ☐ CELCO (Constantine Engineering Laboratories Co.) ☐ Citronix ☐ ColorLink ☐ Compass Technology Co. ☐ Computer Dynamics ☐ DATA MODUL AG ☐ Dawar Technologies ☐ Dialog Semiconductor ☐ **Dontech** ☐ EarthLCD ☐ Esterline Advanced Input Systems ☐ General Digital Corp. ☐ Gennum Corp. ☐ Hampshire Co. ☐ Horizon Technology ☐ i-Chips Technology/ Daitron ☐ The IFM Company ☐ Industrial Displays ☐ Interface Displays & Controls ☐ Jaco Electronics ☐ JDS Uniphase ☐ Kopin Corp. ☐ L-3 Communications, Interstate Electronics Corp. ☐ Landmark Technology ☐ Man & Machine ☐ Nemoptic SA ☐ Orbit International Corp. ☐ Planar Systems ☐ Purdy Electronics Corp. ☐ Quadrangle Products ☐ Silicon Monitor ☐ Alan Sobel ☐ **Solomon Systech** ☐ Systemation Technology ☐ Tannas Electronics ☐ Thinklogical ☐ Thomas Electronics ☐ **3M Optical Systems** ☐ Unaxis Optics USA ☐ Wacom Technology Corp.

DISPLAY SYSTEM INTEGRATORS
☐ Aaeon Electronics ☐ Adtec Digital ☐ AKG Technology ☐ Anders Electronics ☐ Apollo Display Technologies ☐ Applied Concepts ☐ Arrow OEM Computing Solutions ☐ Bell Microproducts ☐ Brimar, Ltd. ☐ Capstone Visual Product Development ☐ CELCO (Constantine Engineering Laboratories Co.) ☐ CI Lumen Industries ☐ DATA MODUL AG ☐ Dawar Technologies ☐ Digital View Group ☐ **Dontech** ☐ Dynamic Digital Depth USA ☐ EarthLCD ☐ Esterline Advanced Input Systems ☐ Fraunhofer IOF ☐ Fraunhofer IPM ☐ Fusion Optix ☐ General Digital Corp. ☐ Hitachi Electronic Devices USA ☐ Horizon Technology ☐ Image Systems Div./Richardson Electronics ☐ Industrial Displays ☐ Industrial Electronic Engineers ☐ Interface Displays & Controls ☐ Jaco Electronics ☐ Kristel Displays ☐ L-3 Communications, Interstate Electronics Corp. ☐ Lumen Technology International ☐ Man & Machine ☐ Miyachi Unitek Corp. ☐ Monitech Industrial Display ☐ Motion Research Corp. ☐ N-trig ☐ Orbit International Corp. ☐ Planar Systems ☐ Purdy Electronics Corp. ☐ Quadrangle Products ☐ **Solomon Systech** ☐ Stealth.Com ☐ Systemation Technology ☐ Thinklogical ☐ Thomas Electronics

DISTORTION CORRECTION DEVICES
☐ Algolith ☐ CELCO (Constantine Engineering Laboratories Co.) ☐ Monitech Industrial Display ☐ Thomas Electronics

ELECTROLUMINESCENT DISPLAYS (inorganic)
☐ Brimar, Ltd. ☐ Colorado Concept Coatings ☐ DDP ☐ The IFM Company ☐ Industrial Electronic Engineers ☐ Planar Systems ☐ Schott North America ☐ Sheldahl Display Products ☐ **Solomon Systech** ☐ Supertex ☐ Telios Tech

ELECTRON GUNS
☐ e beam ☐ Thomas Electronics

EYE AND HEAD MOVEMENT TRACKERS
☐ Anders Electronics ☐ Brimar, Ltd. ☐ CopyTele

FIBER-OPTIC FACEPLATES
☐ Anders Electronics ☐ Brimar, Ltd. ☐ CopyTele ☐ Schott North America

FIELD-EMITTER DISPLAYS
☐ Anders Electronics ☐ Brimar, Ltd. ☐ Colorado Concept Coatings ☐ CopyTele

FILTERS
☐ **Abrisa Industrial Glass** ☐ Aither Optics ☐ **Astra Products** ☐ Bell Microproducts ☐ Berliner Glas U.S. ☐ Bright View Technologies ☐ California Micro Devices Corp. ☐ Colorado Concept Coatings ☐ ColorLink. ☐ CYRO Industries ☐ **Dontech** ☐ **ELDIM SA** ☐ EuropTec ☐ Evaporated Coatings ☐ **Eyesaver International** ☐ Glaswerke Haller GmbH ☐ H. W. Sands Corp. ☐ Interface Displays & Controls ☐ Jaco Electronics ☐ JDS Uniphase ☐ Korry Electronics Co. ☐ Metavac ☐ O & S Research ☐ Optical Filters ☐ Optical Polymers International ☐ Optics Balzers AG ☐ Parker Chomerics / Silver Cloud ☐ Performance Coatings International ☐ Schott North America ☐ Southwall Technologies ☐ Stemmerich ☐ Sumitomo Osaka Cement Co. ☐ Sycamore Glass Components ☐ **3M Optical Systems** ☐ **Touch International** ☐ Unaxis (Shanghai) Co.☐ Unaxis Optics USA ☐ Zytronic

FLAT-PANEL DISPLAYS
☐ **Abrisa Industrial Glass** ☐ Axon' Cable ☐ Bell Microproducts ☐ CI Lumen Industries ☐ Colorado Concept Coatings ☐ Compass Technology Co. ☐ Computer Dynamics ☐ DATA MODUL AG ☐ Dawar Technologies ☐ Dialog Semiconductor ☐ Double Sight Displays ☐ DuPont Display ☐ EarthLCD ☐ **ELDIM SA** ☐ Fonon Technology International ☐ Fujitsu Components America ☐ German Flat Panel Display Forum ☐ GM Nameplate ☐ ITO America Corp. ☐ Jaco Electronics ☐ Landmark Technology ☐ MIRWEC Film ☐ Nitto Denko America ☐ Plastic Logic ☐ Rofin-Sinar ☐ Scienstry ☐ Sheldahl Display Products ☐ Alan Sobel ☐ Stealth.Com ☐ Taiyo Yuden (USA) ☐ Tannas Electronics ☐ Timeline ☐ TPO Displays Corp. ☐ US Micro Products ☐ UTI Technology

FLAT-PANEL MATERIALS
☐ Albemarle Corp. ☐ **Astra Products** ☐ Axon' Cable ☐ Bell Microproducts ☐ Colorado Concept Coatings ☐ Compass Technology Co. ☐ Delo Industrial Adhesives ☐ Dialog Semiconductor ☐ **Dontech** ☐ DuPont Display ☐ Glaswerke Haller GmbH ☐ GM Nameplate ☐ H. W. Sands Corp. ☐ ITO America Corp. ☐ Meritec ☐ MIRWEC Film ☐ MOXTEK ☐ Nitto Denko America ☐ Optical Polymers International ☐ Pixel Interconnect ☐ Plastic Logic ☐ Rofin-Sinar ☐ Sheldahl Display Products ☐ Taiyo Yuden (USA) ☐ TPO Displays Corp. ☐ Vitex Systems

FLAT-PANEL MODULE DRIVE SYSTEMS
☐ Axon' Cable ☐ Bell Microproducts ☐ Compass Technology Co. ☐ DATA MODUL AG ☐ Dialog Semiconductor ☐ DuPont Display ☐ EarthLCD ☐ GM Nameplate ☐ ITO America Corp. ☐ MIRWEC Film ☐ Nitto Denko America ☐ Pixel Interconnect ☐ Plastic Logic ☐ Taiyo Yuden (USA) ☐ TPO Displays Corp. ☐ Westar Display Technologies

FLEXIBLE CIRCUITS
☐ Axon' Cable ☐ Bell Microproducts ☐ Compass Technology Co. ☐ DATA MODUL AG ☐ Dialog Semiconductor ☐ DuPont Display ☐ Esterline Advanced Input Systems ☐ GM Nameplate ☐ IntertechPira ☐ ITO America Corp. ☐ Meritec ☐ MIRWEC Film ☐ Nitto Denko America ☐ Pixel Interconnect ☐ Plastic Logic ☐ Sheldahl Display Products ☐ Vitex Systems

FOCUS COILS
☐ Brimar, Ltd. ☐ CELCO (Constantine Engineering Laboratories Co.) ☐ Thomas Electronics

GETTERS
☐ DuPont Display ☐ NDF Special Light Products B.V ☐ SAES Getters U.S.A. ☐ Thomas Electronics

GLASS=-CUTTING/SCRIBING EQUIPMENT
☐ **Abrisa Industrial Glass** ☐ Advance Reproductions Corp. ☐ Applied Photonics ☐ Colorado Concept Coatings ☐ Rofin-Sinar ☐ TLC International

GLASS FOR CRTS
☐ **Abrisa Industrial Glass** ☐ Berliner Glas U.S. ☐ Brimar, Ltd. ☐ **Corning Incorporated** ☐ **Dontech** ☐ e beam ☐ **Eyesaver International** ☐ Glaswerke Haller GmbH ☐ Monitech Industrial Display ☐ Sekisui S-Lec American ☐ Thomas Electronics ☐ Unaxis Optics USA ☐ Viox Corp.

GLASS FOR FLAT-PANEL DISPLAYS
☐ **Abrisa Industrial Glass** ☐ **Astra Products** ☐ Basler AG ☐ Berliner Glas U.S. ☐ Brimar, Ltd. ☐ Colorado Concept Coatings **☐ Corning Displays ☐ Corning Incorporated** ☐ **Dontech** ☐ DuPont Display ☐ EuropTec ☐ **Eyesaver International** ☐ Fonon Technology International ☐ Glaswerke Haller GmbH ☐ Jaco Electronics ☐ Monitech Industrial Display ☐ O & S Research ☐ Rofin-Sinar ☐ Schott North America ☐ Sekisui S-Lec American ☐ Stemmerich ☐ Tannas Electronics ☐ Tianma Microelectronics (USA) ☐ Viox Corp.

GRAPHICS BOARDS
☐ Capstone Visual Product Development ☐ DATA MODUL AG ☐ Dawar Technologies

☐ Dynamic Digital Depth USA ☐ EarthLCD ☐ Eurotech / Applied Data Systems ☐ Hong Kong Applied Science & Technology Research Institute Co. ☐ Image Systems Div./Richardson Electronics ☐ Imagine Graphics. ☐ Industrial Displays ☐ Jaco Electronics ☐ Systemation Technology

GRAPHICS PROCESSORS
☐ Algolith ☐ Anders Electronics ☐ Capstone Visual Product Development ☐ DATA MODUL AG ☐ Eurotech / Applied Data Systems ☐ Interface Displays & Controls ☐ Jaco Electronics

GRAPHICS WORKSTATIONS
☐ Arrow OEM Computing Solutions ☐ ColorLink ☐ CRLO Displays ☐ The MicroOptical Corp. ☐ Monitech Industrial Display ☐ Motion Research Corp. ☐ Thomas Electronics ☐ White Electronic Designs Corp. ☐ Zygo Corp.

HEAD-MOUNTED DISPLAYS
☐ Arrow OEM Computing Solutions ☐ ColorLink ☐ CRLO Displays ☐ Forth Dimension Displays ☐ Fraunhofer IOF ☐ Fraunhofer IPM ☐ MicroEmissive Displays ☐ The MicroOptical Corp. ☐ Microvision ☐ Monitech Industrial Display ☐ Motion Research Corp. ☐ Schott North America ☐ Thomas Electronics ☐ White Electronic Designs Corp. ☐ Zygo Corp.

HOLOGRAPHIC DIFFUSERS
☐ Luminit ☐ Photo Sciences ☐ Physical Optics Corp. ☐ Pure Depth ☐ Wavefront Technology

ICs (VIDEO, GRAPHICS, AND DISPLAY)
☐ California Micro Devices Corp. ☐ Dialog Semiconductor ☐ Genesis Microchip ☐ i-Chips Technology / Daitron ☐ Jaco Electronics ☐ Kawasaki Microelectronics ☐ Kopin Corp. ☐ Maxim Integrated Products ☐ **Microsemi Corp.** ☐ Monitech Industrial Display ☐ Silicon Image ☐ Silicon Monitor ☐ **Solomon Systech** ☐ Supertex ☐ VP Dynamics Labs

IMAGE COMPRESSION
☐ Aaeon Systems ☐ Algolith ☐ Brightside Technologies ☐ ColorLink ☐ Monitech Industrial Display

IMAGE STORAGE
☐ Brightside Technologies

IMAGE TUBES
☐ Brimar, Ltd. ☐ Monitech Industrial Display ☐ Teltron Technologies

IMAGERS AND CAMERAS
☐ All American Display Solution ☐ Alternative Vision Corp. ☐ Basler AG ☐ Brightside Technologies ☐ EPIX ☐ Horiba Jobin Yvon ☐ Schott North America ☐ Thinklogical

INVERTERS, POWER
☐ Applied Concepts ☐ DATA MODUL AG ☐ Dawar Technologies ☐ **Endicott Research Group** ☐ Jaco Electronics ☐ Kristel Displays ☐ Landmark Technology ☐ **Microsemi Corp.** ☐ Monitech Industrial Display ☐ Quadrangle Products ☐ **Solomon Systech**

JOYSTICKS
☐ DATA MODUL AG ☐ Esterline Advanced Input Systems ☐ Orbit International Corp. ☐ US Micro Products ☐ White Electronic Designs Corp.

KEYBOARDS
☐ AKG Technology ☐ Arista Corp. ☐ DATA MODUL AG ☐ Esterline Advanced Input Systems ☐ Fujitsu Components America ☐ General Digital Corp. ☐ GM Nameplate ☐ Interface Displays & Controls ☐ Man & Machine ☐ Orbit International Corp. ☐ US Micro Products ☐ White Electronic Designs Corp.

LAMPS

backlighting
☐ Applied Concepts ☐ Bright View Technologies ☐ Briteview Technologies ☐ CI Lumen Industries ☐ **Corning Incorporated** ☐ DATA MODUL AG ☐ **Dontech** ☐ **ELDIM SA** ☐ Esterline Advanced Input Systems ☐ Fraunhofer IPM ☐ Heatron ☐ i-sft GmbH ☐ JKL Components Corp. ☐ Jaco Electronics ☐ LCD Lighting ☐ Landmark Technology ☐ Logystyx UK ☐ Lumileds Lighting ☐ Lumitex ☐ NDF Special Light Products B.V ☐ Purdy Electronics Corp. ☐ Pure Depth ☐ Seoul Semiconductor Co. ☐ Thomas Electronics ☐ **3M Optical Systems** ☐ Ushio America ☐ Wintek Electro-Optics Corp.

DOMESTIC AND COMMERCIAL LIGHTING
☐ **Abrisa Industrial Glass** ☐ Bright View Technologies ☐ **Corning Incorporated** ☐ **ELDIM SA** ☐ Fraunhofer IPM ☐ Heatron ☐ NDF Special Light Products B.V ☐ Ushio America

projection
☐ **ELDIM SA** ☐ Fraunhofer IOF ☐ Jaco Electronics ☐ Ushio America

LIGHT-EMITTING DIODES
☐ All American Display Solution ☐ Bridgelux ☐ Bright View Technologies ☐ Colorado Concept Coatings ☐ **ELDIM SA** ☐ Esterline Advanced Input Systems ☐ Fraunhofer IOF ☐ GrafTech International ☐ IntertechPira ☐ Jaco Electronics ☐ Lumileds Lighting ☐ Luminus Devices ☐ Lumitex ☐ Nagase America Corp. ☐ NDF Special Light Products B.V ☐ Optek Technology ☐ OSRAM Opto Semiconductors ☐ Purdy Electronics Corp. ☐ Pure Depth ☐ Quadrangle Products ☐ Schott North America ☐ Seoul Semiconductor Co. ☐ Sharp Microelectronics of the Americas ☐ US Micro Products ☐ Ushio America

LIQUID-CRYSTAL DISPLAYS
☐ **Abrisa Industrial Glass** ☐ AU Optronics Corp. ☐ CI Lumen Industries ☐ Colorado Concept Coatings ☐ Computer Dynamics ☐ **Corning Incorporated** ☐ DATA MODUL AG ☐ **ELDIM SA** ☐ Esterline Advanced Input Systems ☐ Everbouquet International Co. ☐ Forth Dimension Displays ☐ Jaco Electronics ☐ Kent State University, LCI ☐ MOXTEK ☐ Nagase America Corp. ☐ Rofin-Sinar ☐ Schott North America ☐ Scienstry ☐ Sheldahl Display Products ☐ Alan Sobel ☐ Tannas Electronics ☐ Tianma Microelectronics (USA) ☐ Timeline. ☐ Toshiba America Electronic Components ☐ TPO Displays Corp. ☐ US Micro Products ☐ UTI Technology ☐ VP Dynamics Labs

MAGNETIC SHIELDING
☐ **Abrisa Industrial Glass** ☐ Ad-Vance Magnetics ☐ **Astra Products** ☐ Bell Microproducts ☐ Chomerics ☐ Colorado Concept Coatings ☐ **Dontech** ☐ Esterline Advanced Input Systems ☐ EuropTec ☐ **Eyesaver International** ☐ Glaswerke Haller GmbH ☐ GM Nameplate ☐ Optical Filters ☐ Zytronic

MANUFACTURING EQUIPMENT
☐ Applied Photonics ☐ Axometrics ☐ **Azores Corp.** ☐ B&W TEK ☐ Basler AG ☐ Benchmark ☐ Capstone Visual Product Development ☐ Coating & Converting Resources ☐ **Corning Incorporated** ☐ Dark Field Technologies ☐ DisplayCheck ☐ DOOSANDND Co. ☐ **ELDIM SA** ☐ EXFO Photonic Solutions ☐ Exitech ☐ ITO America Corp. ☐ Jenoptik Automatisierungsteckni ☐ Klein Instruments Corp. ☐ Konica Minolta ☐ Kurdex Corp. ☐ LC-TEC Automation AB ☐ Lynch Systems ☐ Micronic Laser Systems AB ☐ MIRWEC Film ☐ Miyachi Unitek Corp. ☐ NDF Special Light Products B.V ☐ New Wave Research ☐ New Way Air Bearings ☐ OTB Display ☐ Photomaching ☐ Pixel Interconnect ☐ Preco Industries ☐ PVA TePla AG ☐ Rofin-Sinar ☐ Scienstry ☐ Sensor Products LLC ☐ Sun-Tec America, LLC ☐ Synova S.A. ☐ Tempo Clean Room Foam ☐ TGI Technologies ☐ Thinklogical ☐ TLC International ☐ Toddco ☐ Tricor Systems ☐ Unitek EAPRO (Miyachi Unitek Corp.)

MARKET RESEARCHERS/PUBLISHERS
☐ AGC Systems ☐ Breault Research Organization ☐ Dempa Publications ☐ Display Asia ☐ Display Bank ☐ EPCONSEIL ☐ iSuppli ☐ Laser Photonics ☐ Meko |☐ Performance Tech Associates ☐ Photonics Spectra ☐ The Rankin Group ☐ Reed Business Information ☐ USDC ☐ Veritas et Visus

MASKS
☐ Adtek Photomask ☐ Advance Reproductions Corp. ☐ **Corning Incorporated** ☐ DYMAX Corp. ☐ Kurdex Corp. ☐ Lite Enterprises ☐ Micronic Laser Systems AB ☐ Photo Sciences ☐ Pure Depth ☐ Specialty Tapes ☐ Synova S.A.

MATERIALS FOR

electrochromic displays
☐ Aaeon Systems ☐ Colorado Concept Coatings ☐ Conductive Compounds ☐ **Dontech** ☐ Evaporated Coatings ☐ Five Star Technologies ☐ Monitech Industrial Display ☐ Taiyo Yuden (USA) ☐ Telios Tech ☐ Vitex Systems

electroluminescent displays
☐ Acheson Colloids ☐ Aculon ☐ Albemarle Corp. ☐ Applied Technology International ☐ **Astra Products** ☐ Brimar, Ltd. ☐ CPFilms ☐ CYRO Industries ☐ Coating Materials ☐ Colorado Concept Coatings ☐ Conductive Compounds ☐ **Dontech** ☐ DuPont Display ☐ Esterline Advanced Input Systems ☐ Evaporated Coatings ☐ Five Star Technologies ☐ Fraunhofer IPM ☐ IntertechPira ☐ Sheldahl ☐ Sheldahl Display Products ☐ Taiyo Yuden (USA) ☐ **3M Optical Systems** ☐ Vitex Systems

electromechanical displays
☐ CYRO Industries ☐ Coating Materials ☐ Conductive Compounds ☐ **Dontech** ☐ Evaporated Coatings ☐ Fraunhofer IPM ☐ Immersion Corp. ☐ Nanofilm ☐ Sharp Microelectronics of the Americas ☐ Taiyo Yuden (USA) ☐ Telios Tech ☐ White Electronic Designs Corp.

electronic-ink displays
☐ Acheson Colloids ☐ Advance Reproductions Corp. ☐ Albemarle Corp. ☐ Applied Technology International ☐ **Astra Products** ☐ CPFilms ☐ Conductive Compounds ☐ Dialog Semiconductor ☐ DuPont Display ☐ Five Star Technologies ☐ Kent Displays ☐ Plastic Logic ☐ Sartomer Company ☐ Sheldahl ☐ SiPix Imaging ☐ **Solomon Systech** ☐ Taiyo Yuden (USA) ☐ Vitex Systems

light pens
☐ CPFilms ☐ Schott North America

light-emitting-diode displays
☐ **Abrisa Industrial Glass** ☐ Advance Reproductions Corp. ☐ Albemarle Corp. ☐ **Astra Products** ☐ Brightside Technologies. ☐ CYRO Industries ☐ Coating Materials ☐ Conductive Compounds ☐ **Dontech** ☐ Five Star Technologies ☐ GrafTech International ☐ Heatron ☐ IntertechPira ☐ Labsphere ☐ Lumitex ☐ Nagase America Corp. ☐ Nanogram ☐ OSRAM Opto Semiconductors ☐ Optek Technology ☐ Phosphor Technology ☐ Seoul Semiconductor Co. ☐ Taiyo Yuden (USA) ☐ Vitex Systems

organic light-emitting-diode displays
☐ ASF Future Business GmbH ☐ Advance Reproductions Corp. ☐ Albemarle Corp. ☐ Applied Technology International ☐ **Astra Products** ☐ Brimar, Ltd. ☐ CPFilms ☐ CYRO Industries ☐ Cambridge Display Technology ☐ Coating Materials ☐ Conductive Compounds ☐ Dialog Semiconductor ☐ **Dontech** ☐ DuPont Display ☐ Five Star Technologies ☐ Fraunhofer IPM ☐ Heatron ☐ IntertechPira ☐ Kurt J. Lesker Co. ☐ Labsphere ☐ Main Tape Co. ☐ Meritec ☐ Nagase America Corp. ☐ Nanogram ☐ OLED-T ☐ Powertip Technology ☐ Schott North America ☐ Sensient Imaging Technologies GmbH ☐ **Solomon Systech** ☐ Taiyo Yuden (USA) ☐ Tredegar Performance Films ☐ Universal Display Corp. ☐ Vitex Systems ☐ e-Ray Optoelectronics Technology Co.

PLASMA DISPLAYS
☐ **Abrisa Industrial Glass** ☐ Advance Reproductions Corp. ☐ Applied Technology International ☐ Arrow OEM Computing Solutions ☐ **Astra Products** ☐ Bi-Search International ☐ CYRO Industries ☐ Coating Materials ☐ **Dontech** ☐ DuPont Display ☐ EuropTec ☐ **Eyesaver International** ☐ Genesis Microchip ☐ Gennum Corp. ☐ Glaswerke Haller GmbH ☐ GrafTech International ☐ Miyachi Unitek Corp. ☐ Nanofilm ☐ Nanogram ☐ Phosphor Technology ☐ Rofin-Sinar ☐ Sartomer Company ☐ Sheldahl Display Products ☐ Soken Chemical America ☐ Southwall Technologies ☐ Taiyo Yuden (USA) ☐ **3M Optical Systems** ☐ Tredegar Performance Films ☐ Viox Corp. ☐ Zeon Chemicals

spacers
☐ Dana Enterprises ☐ H. W. Sands Corp. ☐ Soken Chemical America

thin films
☐ Aculon ☐ Advance Reproductions Corp. ☐ Aither Optics ☐ Colorado Concept Coatings ☐ Conductive Compounds ☐ **Dontech** ☐ Evaporated Coatings ☐ Fonon Technology International ☐ MIRWEC Film ☐ PVA TePla AG ☐ Rofin-Sinar ☐ Sheldahl Display Products ☐ Taiyo Yuden (USA) ☐ Vitex Systems

touch screens
☐ AKG Technology ☐ Aculon ☐ Advance Reproductions Corp. ☐ **Astra Products** ☐ Conductive Compounds ☐ **Dontech** ☐ EarthLCD ☐ eGalax_eMPIA Technology ☐ Evaporated Coatings ☐ Five Star Technologies ☐ Fujitsu Components America ☐ Glaswerke Haller GmbH ☐ N-trig ☐ Nagase America Corp. ☐ Stantum ☐ Sheldahl Display Products ☐ Taiyo Yuden (USA) ☐ **Touch International** ☐ Touch Panel Laboratories Co.

MATERIALS HANDLING
☐ Aculon ☐ Benchmark ☐ DuPont Display ☐ Laser Photonics ☐ Lynch Systems ☐ New Way Air Bearings ☐ Photomaching ☐ Precision Technology Group ☐ Pure Depth. ☐ Tempo Clean Room Foam ☐ Toddco

MEDICAL DISPLAYS
☐ Aaeon Electronics ☐ Aaeon Systems ☐ **Abrisa Industrial Glass** ☐ All American

Display Solution ☐ Anders Electronics ☐ Apollo Display Technologies ☐ Arista Corp. ☐ Arrow OEM Computing Solutions ☐ Avocent Corp. ☐ Bell Microproducts ☐ ColorLink ☐ Communications Specialties ☐ **Corning Incorporated** ☐ DATA MODUL AG ☐ DuPont Display ☐ EarthLCD ☐ Esterline Advanced Input Systems ☐ EuropTec ☐ Eurotech / Applied Data Systems ☐ Fraunhofer IOF ☐ Fraunhofer IPM ☐ Fusion Optix ☐ General Digital Corp. ☐ Gennum Corp. ☐ GM Nameplate ☐ Horizon Technology ☐ Image Systems Div./Richardson Electronics ☐ Industrial Displays ☐ Jaco Electronics ☐ Kristel Displays ☐ L-3 Communications, Interstate Electronics Corp. ☐ Matrix Orbital ☐ MOXTEK ☐ NDF Special Light Products B.V ☐ Planar Systems ☐ Purdy Electronics Corp. ☐ Quest International ☐ Sharp Microelectronics of the Americas ☐ Sheldahl Display Products ☐ **Solomon Systech** ☐ Telios Tech ☐ Teltron Technologies ☐ Tianma Microelectronics (USA) ☐ US Micro Products ☐ Wintek Electro-Optics Corp.

MEMS
☐ Aculon ☐ Benchmark ☐ Colorado Concept Coatings ☐ **Corning Incorporated** ☐ Fraunhofer IPM ☐ Microvision ☐ Schott North America ☐ Synova S.A. ☐ Texas Instruments DLP Div.

MICE AND OTHER POINTING DEVICES
☐ Artificial Muscle ☐ Esterline Advanced Input Systems ☐ Fujitsu Components America ☐ **Slencil**

MICROCHANNEL PLATES
☐ Physical Optics Corp.

MICRODISPLAY IMAGERS
☐ ColorLink ☐ **Corning Incorporated** ☐ CRLO Displays ☐ Forth Dimension Displays ☐ MicroEmissive Displays ☐ MOXTEK ☐ Unaxis (Shanghai) Co.

MONITOR MOUNTING DEVICES
☐ Capstone Visual Product Development ☐ Chief Manufacturing ☐ Double Sight Displays ☐ Ergotron ☐ General Digital Corp. ☐ Innovative Office Products ☐ Quest International

OLEDs
☐ Aculon ☐ Albemarle Corp. ☐ Anders Electronics ☐ Colorado Concept Coatings ☐ DATA MODUL AG ☐ **ELDIM SA** ☐ eMagin Corp. ☐ Esterline Advanced Input Systems ☐ Fraunhofer IPM ☐ H. W. Sands Corp. ☐ IntertechPira ☐ Jaco Electronicsc. ☐ MIRWEC Film, Inc. ☐ Nagase America Corp. ☐ Novaled AG ☐ OSRAM Opto Semiconductors ☐ Powertip Technology ☐ PVA TePla AG ☐ Schott North America ☐ Sheldahl Display Products ☐ sim4tec GmbH ☐ Synova S.A. ☐ Trovato Manufacturing ☐ Universal Display Corp. ☐ US Micro Products ☐ Vitex Systems

OLED DEVICES
☐ Aculon ☐ All American Display Solution ☐ Anders Electronics ☐ Bright View Technologies ☐ Cambridge Display Technology ☐ DATA MODUL AG ☐ Dialog Semiconductor ☐ DuPont Display ☐ eMagin Corp. ☐ Fraunhofer IOF ☐ Fraunhofer IPM ☐ H. W. Sands Corp. ☐ IntertechPira ☐ Kurt J. Lesker Co. ☐ MBraun ☐ Novaled AG ☐ Photo Sciences ☐ Powertip Technology ☐ sim4tec GmbH ☐ Toshiba America Electronic Components. ☐ Universal Display Corp. ☐ US Micro Products. ☐ Vision Display System Co ☐ Wintek Electro-Optics Corp.

OPTICAL COATINGS
☐ **Abrisa Industrial Glass** ☐ Aculon ☐ Adhesives Research ☐ Aither Optics ☐ Anders Electronics ☐ Applied Technology International ☐ Arrow OEM Computing Solutions ☐ **Astra Products** ☐ Bi-Search International ☐ Bookham ☐ Capstone Visual Product Development ☐ Colorado Concept Coatings ☐ Conductive Compounds ☐ **Corning Incorporated** ☐ CPFilms ☐ Dana Enterprises Intl. ☐ **Dontech** ☐ DYMAX Corp. ☐ EuropTec ☐ Evaporated Coatings. ☐ **Eyesaver International** ☐ Fraunhofer IOF ☐ Fujitsu Components America ☐ Fusion Optix ☐ GE Plastics ☐ Glaswerke Haller GmbH ☐ GZO Technologies ☐ Intelicoat Technologies ☐ Jaco Electronics ☐ JDS Uniphase ☐ Kent State University LCI ☐ Labsphere ☐ LOFO High Tech Film GmbH ☐ Master Bond ☐ Metavac ☐ MIRWEC Film ☐ Nagase America Corp. ☐ Nanofilm ☐ Nanogram ☐ O & S Research ☐ Ocean Optics ☐ Optek Technology ☐ Optical Polymers International ☐ Optics Balzers AG ☐ Parker Chomerics / Silver Cloud ☐ Performance Coatings International ☐ Photo Sciences ☐ Purdy Electronics Corp. ☐ Schott North America ☐ Sheldahl ☐ Sheldahl Display Products ☐ Sycamore Glass Components ☐ **TFD** ☐ **3M Optical Systems** ☐ Tredegar Performance Films ☐ Unaxis (Shanghai) Co.☐ Unaxis Optics USA ☐ Vitex Systems ☐ White Electronic Designs Corp. ☐ Zeon Chemicals ☐ Zytronic

OPTICAL COMPONENTS
☐ **Abrisa Industrial Glass** ☐ Aculon ☐ Aither Optics ☐ **Astra Products** ☐ Bookham ☐ CELCO (Constantine Engineering Laboratories Co.) ☐ Colorado Concept Coatings ☐ ColorLink ☐ **Corning Incorporated** ☐ DDP ☐ **Dontech** ☐ eMagin Corp. ☐ Evaporated Coatings ☐ Exitech ☐ Fonon Technology International ☐ Fraunhofer IOF ☐ Fresnel Technologies ☐ Fusion Optix ☐ Gamma Scientific ☐ Hinds Instruments ☐ Horiba Jobin Yvon ☐ Jaco Electronics ☐ JDS Uniphase ☐ Lumen Technology International ☐ Luminit LLC ☐ Metavac ☐ MOXTEK ☐ NDF Special Light Products B.V ☐ O & S Research ☐ OMT Digital Display Technology (Shenzhen) ☐ Optek Technology ☐ Optics Balzers AG ☐ OSRAM Opto Semiconductors ☐ Parker Chomerics / Silver Cloud ☐ Photo Sciences ☐ Physical Optics Corp. ☐ Purdy Electronics Corp.☐ Stemmerich ☐ Sycamore Glass Components ☐ Thinklogical ☐ **3M Optical Systems** ☐ Unaxis (Shanghai) Co. ☐ Unaxis Optics USA. ☐ Zeon Chemicals ☐ Zygo Corp.

OPTICAL DESIGN SERVICES
☐ **Abrisa Industrial Glass** ☐ Aither Optics ☐ AVO Photonics ☐ Benchmark ☐ Capstone Visual Product Development ☐ DDP ☐ **Dontech** ☐ EuropTec ☐ Fraunhofer IOF ☐ Fresnel Technologies ☐ Fusion Optix ☐ GZO Technologies ☐ Heatron ☐ Jaco Electronics ☐ Lumen Technology International ☐ Microsharp Corp. ☐ Optek Technology ☐ Parker Chomerics / Silver Cloud ☐ Physical Optics Corp. ☐ Purdy Electronics Corp. ☐ **Radiant Imaging** ☐ sim4tec GmbH ☐ Unaxis Optics USA ☐ Zygo Corp.

PC-BASED TEST EQUIPMENT
☐ Axometrics ☐ Benchmark ☐ Capstone Visual Product Development ☐ Dark Field Technologies ☐ DisplayCheck ☐ Gamma Scientific ☐ Klein Instruments Corp. ☐ Pixel Interconnect ☐ **Radiant Imaging** ☐ Tricor Systems ☐ Zygo Corp.

PHOSPHORS (inorganic)
☐ Brimar, Ltd. ☐ e beam ☐ H. W. Sands Corp. ☐ IntertechPira ☐ Nanogram ☐ NDF Special Light Products B.V ☐ Phosphor Technology ☐ Thomas Electronics

PHOTOLITHOGRAPHY CHEMICALS
☐ Albemarle Corp. ☐ **Azores Corp.** ☐ Cyantek Corp. ☐ Pure Depth

PHOTOLITHOGRAPHY EQUIPMENT
☐ Horiba Jobin Yvon ☐ Micronic Laser Systems AB ☐ Pure Depth ☐ PVA TePla AG

PHOTOLITHOGRAPHY SERVICES
☐ Adtek Photomask ☐ Advance Reproductions Corp. ☐ Photo Sciences ☐ Pure Depth ☐ Sheldahl Display Products ☐ Unaxis Optics USA

PHOTOMASKS
☐ Aculon ☐ Advance Reproductions Corp. ☐ Arrow OEM Computing Solutions ☐ Bi-Search International ☐ DuPont Display ☐ GrafTech International ☐ Miyachi Unitek Corp.

PLASMA DISPLAYS
☐ DATA MODUL AG ☐ **ELDIM SA** ☐ Rofin-Sinar

PLASTIC MOLDING EQUIPMENT
☐ GM Nameplate

PLASTIC MOLDINGS
☐ Fresnel Technologies ☐ Parker Chomerics / Silver Cloud ☐ Tempo Clean Room Foam

POLARIZERS
☐ **Abrisa Industrial Glass** ☐ Aither Optics ☐ Bi-Search International ☐ Bookham ☐ Brimar, Ltd. ☐ Chomerics ☐ ColorLink ☐ Dana Enterprises ☐ **Dontech** ☐ DuPont Display ☐ **ELDIM SA** ☐ EuropTec ☐ **Eyesaver International** ☐ Jaco Electronics ☐ MOXTEK ☐ Nagase America Corp. ☐ Nanogram ☐ Nitto Denko America ☐ Optical Filters ☐ Pixel Interconnect ☐ Pure Depth ☐ Tredegar Performance Films ☐ Unaxis Optics USA ☐ Zytronic

POLYMER FILMS
☐ Chomerics ☐ CPFilms ☐ CYRO Industries ☐ **Dontech** ☐ DuPont Display ☐ EuropTec ☐ Fusion Optix ☐ GE Plastics ☐ GiantPlus Technology Co. ☐ Jaco Electronics ☐ Kent State University, LCI ☐ Microsharp Corp. ☐ Nanofilm ☐ Nanogram ☐ Nitto Denko America ☐ Photo Sciences ☐ Pure Depth. ☐ Rofin-Sinar ☐ Sheldahl Display Products ☐ Tredegar Performance Films ☐ Wavefront Technology ☐ Zeon Chemicals

POWER SUPPLIES, HIGH VOLTAGE
☐ Applied Concepts ☐ Arrow OEM Computing Solutions ☐ Brimar, Ltd. ☐ CELCO (Constantine Engineering Laboratories Co.) ☐ Crane Aerospace and Electronics (ELDEC) ☐ DATA MODUL AG ☐ ELDEC Corp. ☐ **Endicott Research Group** ☐ House of Batteries ☐ Jaco Electronics ☐ Keithley Instruments ☐ MKS Instruments ☐ Monitech Industrial Display ☐ NDF Special Light Products B.V ☐ Supertex ☐ Thomas Electronics

PRINTERS (FOR DISPLAY FABS)
☐ APS America ☐ Dimatix ☐ FUJIFILM Dimatix ☐ US Micro Products

PRINTERS, INK JET
☐ **ELDIM SA** ☐ FUJIFILM Dimatix ☐ US Micro Products ☐ Xennia Technology

PRINTHEADS (FOR DISPLAY FABS)
☐ US Micro Products

PROJECTION DISPLAYS
DLP/DMD and LCoS
☐ Algolith ☐ Benchmark ☐ Brightside Technologies ☐ CRLO Displays ☐ Colorado Concept Coatings ☐ **Corning Incorporated** ☐ Forth Dimension Displays ☐ Fraunhofer IOF ☐ Fraunhofer IPM ☐ Gennum Corp. ☐ GrafTech International ☐ Light Blue Optics ☐ OMT Digital Display Technology (Shenzhen) ☐ Schott North America ☐ Silicon Monitor ☐ Syntax Groups Corp. ☐ Telios Tech ☐ **3M Optical Systems** ☐ Unaxis (Shanghai) Co.

LIQUID-CRYSTAL DISPLAYS
☐ AU Optronics Corp. ☐ Aaeon Systems ☐ Advance Reproductions Corp. ☐ Albemarle Corp. ☐ All American Display Solution ☐ Anders Electronics PLC ☐ Apollo Display Technologies ☐ Applied Technology International ☐ Arima Display Corp. ☐ Arista Corp. ☐ Arrow OEM Computing Solutions ☐ **Astra Products** ☐ Basler AG ☐ Bell Microproducts ☐ Bi-Search International ☐ Brightside Technologies ☐ Brimar, Ltd. ☐ CI Lumen Industries ☐ CPFilms ☐ CRLO Displays ☐ CYRO Industries ☐ Coating Materials ☐ Colorado Concept Coatings ☐ **Corning Displays** ☐ **Corning Incorporated** ☐ Dialog Semiconductor ☐ **Dontech** ☐ DuPont Display ☐ ECSIBEO AB ☐ **ELDIM SA** ☐ EarthLCD ☐ Emerging Display Technologies Corp. ☐ Everbouquet International Co. ☐ Five Star Technologies. ☐ Fonon Technology International ☐ Forth Dimension Displays. ☐ GE Plastics ☐ Genesis Microchip ☐ Gennum Corp. ☐ GiantPlus Technology Co. ☐ GrafTech International ☐ Hitachi Electronic Devices USA ☐ Horizon Technology ☐ Industrial Electronic Engineers ☐ International Display Consortium ☐ i-sft GmbH ☐ The IFM Company ☐ Jaco Electronics ☐ Jiya LCD Co. ☐ Kent State University LCI ☐ Kopin Corp. ☐ Korry Electronics Co. ☐ Kristel Displays ☐ Kyocera Industrial Ceramics Corp. ☐ LXD ☐ Lumen Technology International ☐ MOXTEK ☐ Main Tape Co. ☐ Matrix Orbital ☐ Meritec ☐ Microtips Technology ☐ Monitech Industrial Display ☐ Motion Research Corp. ☐ NDF Special Light Products B.V ☐ NKK Switches ☐ Nanofilm ☐ Nanogram ☐ Nemoptic SA ☐ Nippon Paper Industries Co. ☐ Optrex America. ☐ Planar Systems ☐ Powertip Technology ☐ Purdy Electronics Corp.☐ Pure Depth ☐ Quadrangle Products ☐ Quest International ☐ Rofin-Sinar ☐ Samsung Semiconductor ☐ Sartomer Company. ☐ Scienstry ☐ Sharp Microelectronics of the Americas ☐ Sheldahl ☐ Sheldahl Display Products ☐ Silicon Monitor ☐ Soken Chemical America ☐ **Solomon Systech** ☐ Sunic System ☐ Tannas Electronics ☐ Telios Tech ☐ **3M Optical Systems** ☐ Tianma Micro-electronics (USA) ☐ Timeline ☐ Toshiba America Electronic Components. ☐ Tredegar Performance Films ☐ US Micro Products ☐ Unitek EAPRO (Miyachi Unitek Corp.) ☐ Vision Display System Co. ☐ White Electronic Designs Corp. ☐ Wintek Electro-Optics Corp. ☐ Zeon Chemicals

PROJECTION CRTs
☐ Algolith ☐ Brimar, Ltd. ☐ e beam ☐ Gennum Corp. ☐ Hitachi Electronic Devices USA ☐ Monitech Industrial Display ☐ Telios Tech ☐ Teltron Technologies ☐ Thomas Electronics

PROJECTION SCREENS
front
☐ **ELDIM SA** ☐ Glaswerke Haller GmbH

rear
☐ **Abrisa Industrial Glass** ☐ **Astra Products** ☐ **Dontech** ☐ **ELDIM SA** ☐ Fusion Optix ☐ Microsharp Corp. ☐ Physical Optics Corp. ☐ **3M Optical Systems** ☐ Zytronic

RADIOMETERS
☐ Display Asia ☐ DYMAX Corp. ☐ EXFO Photonic Solutions ☐ Gamma Scientific ☐ Konica Minolta ☐ Konica Minolta Photo Imaging U.S.A. ☐ Labsphere ☐ Optronic Laboratories ☐ Photo Research ☐ **Radiant Imaging** ☐ UDT Instruments ☐ Westboro Photonics

REPAIR AND MAINTENANCE

of display systems
☐ AKG Technology ☐ Jaco Electronics ☐ Pixel Interconnect

of high-voltage power supplies
☐ Brimar, Ltd. ☐ Crane Aerospace and Electronics (ELDEC) ☐ ELDEC Corp. ☐ MKS Instruments ☐ NDF Special Light Products B.V.

SCANNERS (document and film)
☐ CELCO (Constantine Engineering Laboratories Co.) ☐ NDF Special Light Products B.V ☐ Optical Polymers International

SCOREBOARDS/STADIUM DISPLAYS
☐ Avocent Corp. ☐ The IFM Company

SCRIBERS
☐ Applied Photonics ☐ Exitech ☐ Fonon Technology International ☐ New Wave Research ☐ Photomaching ☐ Rofin-Sinar ☐ Sycamore Glass Components

SEALANTS
☐ Delo Industrial Adhesives ☐ Diemat ☐ DYMAX Corp. ☐ GE Plastics ☐ GE Silicones ☐ Master Bond ☐ Venture Tape Corp.

SIMULATOR DISPLAYS
☐ Arrow OEM Computing Solutions ☐ Brimar, Ltd. ☐ Interface Displays & Controls ☐ Jaco Electronics ☐ Kristel Displays ☐ Lumen Technology International ☐ MOXTEK ☐ **Solomon Systech** ☐ Tannas Electronics ☐ Telios Tech ☐ Teltron Technologies ☐ Thomas Electronics

SINGLE CRYSTAL
☐ Kopin Corp.

SOFTWARE FOR DISPLAYS

design and optimization software
☐ **ELDIM SA** ☐ Kent State University, LCI ☐ Reactive Technologies ☐ Stantum ☐ Sanayi System Co.☐ sim4tec GmbH

graphics systems software
☐ Aaeon Electronics ☐ CELCO (Constantine Engineering Laboratories Co.) ☐ DATA MODUL AG ☐ Display Asia ☐ Dynamic Digital Depth USA ☐ Portrait Displays ☐ Reactive Technologies

image processing software
☐ Algolith ☐ Brightside Technologies ☐ Capstone Visual Product Development ☐ Dynamic Digital Depth USA ☐ EPIX ☐ Genesis Microchip ☐ Gennum Corp. ☐ Portrait Displays ☐ Tricor Systems

optical analysis software
☐ autronic–Melchers GmbH ☐ Breault Research Organization ☐ DisplayCheck ☐ Gamma Scientific ☐ Kent State University, LCI ☐ Klein Instruments Corp. ☐ Optical Research Associates ☐ Sanayi System Co. ☐ Tricor Systems ☐ ZEMAX Development Corp. ☐ sim4tec GmbH

signal processing software
☐ Capstone Visual Product Development ☐ Fraunhofer IPM ☐ Motion Research Corp. ☐ Stantum ☐ Sanayi System Co.

TEST AND MEASUREMENT EQUIPMENT

automatic convergence systems
☐ Microvision

automated test equipment
☐ autronic–Melchers GmbH ☐ Aerotech ☐ Axometrics ☐ Basler AG ☐ Benchmark ☐ Cambridge Display Technology ☐ Capstone Visual Product Development ☐ Chroma ATE ☐ Dark Field Technologies. ☐ Display-Metrology & Systems ☐ Display-Check ☐ Dr. Schenk of America ☐ **ELDIM SA** ☐ GZO Technologies ☐ Gamma Scientific ☐ Hinds Instruments ☐ Horiba Jobin Yvon ☐ ISRA Surface Vision ☐ Instec ☐ Integral Vision. ☐ J. A. Woollam Co.☐ KLA-Tencor ☐ Keithley Instruments ☐ Klein Instruments Corp. ☐ Micromanipulator Co. ☐ Micronics Japan Co. ☐ Microvision ☐ Otsuka Electronics Co. ☐ Photo Research ☐ Pixel Interconnect ☐ Quantum Data ☐ **Radiant Imaging** ☐ Sensor Products ☐ TGI Technologies ☐ Tricor Systems ☐ UDT Instruments ☐ Westar Display Technologies ☐ Westboro Photonics ☐ Zygo Corp.

colorimeters
☐ autronic–Melchers GmbH ☐ B&W TEK ☐ Display-Metrology & Systems ☐ **ELDIM SA** ☐ Gamma Scientific ☐ Instrument Systems GmbH ☐ Integral Vision ☐ Interface Displays & Controls ☐ Klein Instruments Corp. ☐ Konica Minolta ☐ Konica Minolta Photo Imaging U.S.A ☐ Microvision ☐ Photo Research ☐ **Radiant Imaging** ☐ Westar Display Technologies ☐ Westboro Photonics

convergence gauges
☐ Klein Instruments Corp. ☐ Konica Minolta Photo Imaging U.S.A.

gonioreflectrometers
☐ autronic–Melchers GmbH ☐ Display-Metrology & Systems ☐ **ELDIM SA** ☐ Gamma Scientific ☐ Horiba Jobin Yvon ☐ Microsharp Corp. ☐ Microvision ☐ Microvision, Inc. ☐ Optronic Laboratories. ☐ **Radiant Imaging** ☐ Westboro Photonics

hot stages
☐ Instec ☐ Integral Vision ☐ Micromanipulator Co.

microscopes
☐ CELCO (Constantine Engineering Laboratories Co.) ☐ ColorLink ☐ Dana Enterprises ☐ **ELDIM SA** ☐ Instec ☐ Klein Instruments Corp. ☐ Micromanipulator Co. ☐ Zygo Corp.

photometers
☐ autronic–-Melchers GmbH ☐ B&W TEK. ☐ Display-Metrology & Systems ☐ **ELDIM SA** ☐ Gamma Scientific ☐ Image Systems Div./Richardson Electronics ☐ Instrument Systems GmbH ☐ Integral Vision ☐ Klein Instruments Corp. ☐ Konica Minolta ☐ Konica Minolta Photo Imaging U.S.A. ☐ Labsphere ☐ Lumetrix Corp. ☐ Microsharp Corp. ☐ Microvision ☐ NDF Special Light Products B.V ☐ Optronic Laboratories ☐ Photo Research ☐ **Radiant Imaging** ☐ Tricor Systems ☐ UDT Instruments ☐ Westar Display Technologies ☐ Westboro Photonics

spectrometers
☐ autronic–Melchers GmbH ☐ Astro Systems ☐ B&W TEK ☐ Chroma ATE ☐ Display-Metrology & Systems ☐ **ELDIM SA** ☐ Fraunhofer IOF ☐ Fraunhofer IPM ☐ Gamma Scientific ☐ Horiba Jobin Yvon ☐ Instrument Systems GmbH ☐ Integral Vision ☐ Klein Instruments Corp. ☐ Konica Minolta Photo Imaging U.S.A. ☐ Labsphere ☐ MKS Instruments ☐ Microvision ☐ Ocean Optics ☐ Optronic Laboratories ☐ Otsuka Electronics Co. ☐ Photo Research ☐ Pure Depth ☐ Quantum Data ☐ **Radiant Imaging** ☐ Unigraf OY ☐ Westar Display Technologies ☐ Westboro Photonics

video generators
☐ autronic–Melchers GmbH ☐ Astro Systems ☐ Chroma ATE ☐ **ELDIM SA** ☐ Microvision ☐ Pixel Interconnect ☐ Pure Depth ☐ Quantum Data ☐ Unigraf OY ☐ Westar Display Technologies

video oscilloscopes
☐ **Abrisa Industrial Glass** ☐ Applied Technology International ☐ Basler AG ☐ Berliner Glas U.S. ☐ Bookham ☐ CPFilms ☐ CYRO Industries ☐ DuPont Display ☐ EuropTec ☐ **Eyesaver International** ☐ Fusion Optix ☐ J. A. Woollam Co. ☐ JDS Uniphase ☐ Metavac ☐ Microvision ☐ Nanofilm ☐ Ocean Optics ☐ Photo Sciences ☐ Physical Optics Corp. ☐ Pure Depth ☐ Sekisui S-Lec American ☐ Sheldahl ☐ Southwall Technologies ☐ Sumitomo Osaka Cement Co. ☐ Sycamore Glass Components ☐ **3M Optical Systems** ☐ Tredegar Performance Films ☐ Unaxis (Shanghai) Co.☐ Unaxis Optics USA ☐ Zeon Chemicals

THIN FILMS
☐ **Abrisa Industrial Glass** ☐ Acheson Colloids ☐ Aculon ☐ Adhesives Research ☐ Advance Reproductions Corp. ☐ Aither Optics ☐ Applied Technology International ☐ Basler AG ☐ Berliner Glas U.S. ☐ Bookham ☐ Coating Materials ☐ Colorado Concept Coatings ☐ CPFilms ☐ CYRO Industries ☐ **Dontech** ☐ DuPont Display ☐ EuropTec ☐ Evaporated Coatings ☐ **Eyesaver International** ☐ Fonon Technology International ☐ Fusion Optix ☐ Horiba Jobin Yvon ☐ J. A. Woollam Co. ☐ Jaco Electronics ☐ JDS Uniphase ☐ Kent State University, LCI ☐ Kurdex Corp. ☐ Kurt J. Lesker Co. ☐ Main Tape Co. ☐ Metavac ☐ MIRWEC Film ☐ Nanofilm ☐ Nanogram ☐ O & S Research ☐ Ocean Optics ☐ Optics Balzers AG ☐ Parker Chomerics / Silver Cloud ☐ Photo Sciences ☐ Physical Optics Corp. ☐ Pure Depth ☐ PVA TePla AG ☐ Rofin-Sinar ☐ Schott North America ☐ Sekisui S-Lec American ☐ Sheldahl ☐ Sheldahl Display Products ☐ **Solomon Systech** ☐ Southwall Technologies ☐ Specialty Tapes ☐ Sumitomo Osaka Cement Co. ☐ Sycamore Glass Components ☐ **TFD** ☐ **3M Optical Systems** ☐ Tredegar Performance Films ☐ Unaxis (Shanghai) Co. ☐ Unaxis Optics USA ☐ Vitex Systems ☐ Zeon Chemicals

3-D DISPLAY SYSTEMS
☐ Aaeon Systems ☐ CI Lumen Industries ☐ ColorLink ☐ DuPont Display ☐ Dynamic Digital Depth USA ☐ **ELDIM SA** ☐ Fraunhofer IPM ☐ Industrial Electronic Engineers ☐ Jaco Electronics ☐ Microsharp Corp. ☐ Microvision, Inc. ☐ MOXTEK ☐ Physical Optics Corp. ☐ Planar Systems ☐ Pure Depth ☐ Seereal Technologies GmbH ☐ Sharp Microelectronics of the Americas ☐ Telios Tech ☐ Toshiba America Electronic Components

TOUCH DISPLAYS
☐ Aaeon Electronics ☐ **Abrisa Industrial Glass** ☐ Aculon ☐ AKG Technology ☐ All American Display Solution ☐ Anders Electronics ☐ Arista Corp. ☐ Arrow OEM Computing Solutions ☐ Artificial Muscle ☐ Basler AG ☐ Bell Microproducts ☐ Capstone Visual Product Development ☐ CI Lumen Industries ☐ Computer Dynamics ☐ DATA MODUL AG ☐ Dawar Technologies ☐ Digital View Group ☐ **Dontech** ☐ DuPont Display ☐ EarthLCD ☐ eGalax_eMPIA Technology ☐ Elo TouchSystems ☐ Esterline Advanced Input Systems ☐ Eurotech / Applied Data Systems ☐ **Eyesaver International** ☐ Fujitsu Components America ☐ GM Nameplate ☐ Hampshire Co. ☐ Hong Kong Applied Science & Technology Research Institute Co. ☐ Horizon Technology ☐ Immersion Corp. ☐ Industrial Displays ☐ Industrial Electronic Engineers ☐ Interface Displays & Controls ☐ IR Touch Systems Co. ☐ Jaco Electronics ☐ Kristel Displays ☐ Kyocera Industrial Ceramics Corp. ☐ L-3 Communications, Interstate Electronics Corp. ☐ Lumen Technology International ☐ N-trig ☐ NKK Switches ☐ Orbit International Corp. ☐ Parker Chomerics / Silver Cloud ☐ Planar Systems ☐ Purdy Electronics Corp. ☐ Pure Depth ☐ Quest International ☐ RPO ☐ Schott North America ☐ Sheldahl Display Products ☐ **Slencil** ☐ **Solomon Systech** ☐ Stantum ☐ Stealth.Com ☐ Telios Tech ☐ **3M Touch Systems** ☐ **Touch International** ☐ Touch Panel Laboratories Co.☐ TPO Displays Corp. ☐ US Micro Products ☐ Vissumo Touch Systems ☐ Wacom Technology Corp. ☐ White Electronic Designs Corp.

TOUCH SCREENS
☐ Aaeon Systems ☐ **Abrisa Industrial Glass** ☐ Acheson Colloids ☐ Aculon ☐ AKG Technology ☐ All American Display Solution ☐ Apollo Display Technologies ☐ Applied Technology International ☐ Arista Corp. ☐ Arrow OEM Computing Solutions ☐ Artificial Muscle ☐ **Astra Products** ☐ Basler AG ☐ Bell Microproducts ☐ The Bergquist Co. ☐ Bi-Search International ☐ Capstone Visual Product Development ☐ Coating Materials ☐ Computer Dynamics ☐ **Corning Incorporated** ☐ CPFilms ☐ CYRO Industries ☐ DATA MODUL AG ☐ Dawar Technologies ☐ **Dontech** ☐ DuPont Display ☐ EarthLCD ☐ eGalax_ eMPIA Technology ☐ Elo TouchSystems. ☐ EuropTec ☐ **Eyesaver International** ☐ Fujitsu Components America ☐ GE Silicones ☐ General Digital Corp. ☐ GM Nameplate ☐ GUNZE USA ☐ GZO Technologies ☐ H. W. Sands Corp. ☐ Hampshire Co. ☐ Horizon Technology ☐ Image Systems Div./Richardson Electronics ☐ Industrial Displays ☐ Intelicoat Technologies ☐ Interface Displays & Controls. ☐ IR Touch Systems. ☐ Jaco Electronics ☐ L-3 Communications, Interstate Electronics Corp. ☐ Liyitec ☐ Lumen Technology International ☐ Main Tape Co. ☐ Microtips Technology ☐ N-trig ☐ Nanofilm ☐ Nippon Paper Industries Co. ☐ Parker Chomerics / Silver Cloud ☐ Purdy Electronics Corp. ☐ Pure Depth ☐ Quadrangle Products ☐ Quest International ☐ RPO ☐ Schott North America ☐ Sheldahl ☐ Sheldahl Display Products ☐ **Slencil** ☐ SMK Electronics Corp. ☐ **Solomon Systech** ☐ Stantum ☐ Stealth.Com ☐ Telios Tech ☐ **3M Optical Systems** ☐ **3M Touch Systems** ☐ Toshiba America Electronic Components ☐ **Touch International** ☐ Touch Panel Laboratories Co. ☐ US Micro Products ☐ Vissumo Touch Systems ☐ Wacom Technology Corp. ☐ White Electronic Designs Corp. ☐ Wintek Electro-Optics Corp. ☐ Zytronic

TOUCH TABLETS
☐ Aaeon Systems ☐ **Abrisa Industrial Glass** ☐ Artificial Muscle ☐ Bell Microproducts ☐ DuPont Display ☐ GM Nameplate ☐ Hampshire Co. ☐ Jaco Electronics ☐ Lumen Technology International ☐ N-trig ☐ RPO ☐ Schott North America ☐ Sheldahl Display Products ☐ **Slencil** ☐ Stantum ☐ Telios Tech ☐ **3M Touch Systems** ☐ Wacom Technology Corp.

TOUCH-SCREEN STYLUS
☐ N-trig ☐ **Slencil** ☐ Wacom Technology Corp.

TRACKBALLS
☐ Esterline Advanced Input Systems ☐ Orbit International Corp. ☐ Stealth.Com ☐ US Micro Products

VACUUM EQUIPMENT
☐ Instec ☐ Kurdex Corp. ☐ Kurt J. Lesker ☐ MBraun ☐ MKS Instruments ☐ OTB Display ☐ SAES Getters U.S.A. ☐ Trovato Manufacturing ☐ VAT

VACUUM FLUORESCENT DISPLAYS
☐ EarthLCD ☐ Industrial Electronic Engineers ☐ Matrix Orbital ☐ Optical Polymers International ☐ Telios Tech

VIDEO AMPLIFIERS
☐ Brimar, Ltd. ☐ CELCO (Constantine Engineering Laboratories Co.) ☐ Thomas Electronics

VIDEO AND DISPLAY STANDARDS
☐ AGC Systems ☐ Avocent Corp. ☐ Genesis Microchip ☐ Human Factors and Ergonomics Society ☐ IntelliMats ☐ Pure Depth ☐ VESA

VIDEO CUBES
☐ Gennum Corp.

VIDEO INTERFACES
☐ Arrow OEM Computing Solutions ☐ Astro Systems. ☐ Avocent Corp. ☐ Bell Microproducts ☐ Cabletime USA ☐ Capstone Visual Product Development ☐ Communications Specialties ☐ DATA MODUL AG ☐ Digital View Group ☐ eGalax_eMPIA Technology ☐ Genesis Microchip ☐ IntelliMats ☐ Jaco Electronics ☐ Systemation Technology ☐ Thinklogical ☐ VESA ☐ Westar Display Technologies

VIDEO WALLS
☐ **Astra Products** ☐ DATA MODUL AG ☐ **ELDIM SA** ☐ Gennum Corp. ☐ Jaco Electronics ☐ Landmark Technology ☐ Unigraf OY

VIEWING SCREENS
☐ **Abrisa Industrial Glass** ☐ **Astra Products** ☐ **ELDIM SA** ☐ IntelliMats ☐ Optical Polymers International ☐ Physical Optics Corp. ☐ Telios Tech ☐ **3M Optical Systems**

VIRTUAL IMAGING
☐ Brimar, Ltd. ☐ Fraunhofer IPM ☐ Sensor Products

VIRTUAL-REALITY DISPLAYS
☐ Brimar, Ltd. ☐ Dynamic Digital Depth USA ☐ Forth Dimension Displays ☐ Fraunhofer IPM

WIRE
☐ Avocent Corp. ☐ DATA MODUL AG ☐ Peter's Co. ☐ Purdy Electronics Corp. ☐ Quadrangle Products. ☐ Thomas Electronics

X-RAY IMAGE STORAGE SCREENS
☐ Aaeon Systems ☐ DATA MODUL AG ☐ Phosphor Technology ☐ Physical Optics Corp.

X-RAY IMAGING
☐ Aaeon Systems ☐ DATA MODUL AG ☐ Esterline Advanced Input Systems ☐ Phosphor Technology ☐ Physical Optics Corp. ☐ Schott North America

Part II: Companies

Listings are in strict alphabetical order. Punctuation, spaces, and the initial definite article "The" are ignored. Numbers (3-D, 3M, 01), symbols (&), and abbreviations (Co., Corp., Inc., Ltd.) are listed as though fully spelled out.

AAEON ELECTRONICS, INC., 3 Crown Plaza, Hazlet, NJ 07730-2496
Designers and manufacturers of single-board computers, panel PCs, and industrial LCD workstations. Providers of industrial chassis and embedded controllers, and OS support. ODM/OEM projects and system integration opportunities are welcome.
Paul Yang, Dir. Sales & Mktg
732/203-9300, fax -9311
email: sales@aaeon.com
www.aaeon.com

AAEON SYSTEMS, INC., 445 Capricorn Street, Brea, CA 92821
Manufactures and marketers of a wide range of OEM/ODM industrial PCs all over the world. Providers of reliable and high-quality embedded SBCs, full-sized SBCs, half-sized SBCs, industrial high-brightness LCDs, and system products including operator panels, robust panel PCs, medical PCs,embedded controllers, Industrial chassis, firewall products, and related accessories.
Sean Park, Marcom Specialist
714/671-1800, fax -1802
email: info@aaeonsystems.com
www.aaeon.com

ABBIE GREGG, INC., 1130 East University Dr., Suite 105, Tempe, AZ 85281
Providers of engineering and consulting services. FPD, flexible display, cleanroom lab, and manufacturing area layout and facility design. Fit-up of FPD, nanotech semiconductor and biomed, process, test, and assembly equipment. Process and cost analysis for display scale-up. Tool and process manufacturability and outsourcing support. Factory simulation and modeling, CAD services. Yield enhancement and troubleshooting. Process, test, and cleanroom training.
Abbie Gregg, Pres.
480/446-8000, fax -8001
email: agi@abbiegregg.com
www.abbiegregg.com

ABRISA INDUSTRIAL GLASS, INC., 200 S. Hallock Dr., Santa Paula, CA 93060
Providers of OEM-fabricated glass components for electronic, optic, industrial, and lighting applications. Fabrication includes precision machining, cutting and edging services, glass strengthening, precision coatings, screen printing, and cleanroom packaging through lean manufacturing methodologies.
Denise Puchbauer, Mktg. Mgr.
805/421-5411, fax -8604
email: dpuchbauer@abrisa.com
www.abrisa.com

ACHESON COLLOIDS, 1600 Washington Ave., Port Huron, MI 48060
Manufacturers of highly conductive screen-printable, silver, carbon, and dielectric inks designed to be compatible with sputtered ITO substrates or, as an alternative, to ITO film in touch screens or display applications.
Greg Gaitens, Sls. Mgr.
1-800/255-1908, fax 810/984-1446
www.achesonindustries.com

ACULON, INC., 11839 Sorrento Valley Rd., San Diego, CA 92121
Formulates and manufactures specialty chemical coatings for ITO and silicon that significantly enhance the surface wetting and conductivity of materials used in organic LEDs and TFTs.
Eric L. Bruner, Pres.
858/350-9474, fax 858/350-9422
email: bruner@aculon.com
www.aculon.com

AD-VANCE MAGNETICS, INC., 625 Monroe St., P.O. Box 69, Rochester, IN 46975
Worldwide supplier of custom-fabricated magnetic shields, magnetic shields for CRTs, photomultiplier shields, shielded enclosures, computer-monitor shields, and magnetic-shielding alloy sheet and foil (0.002–0.062 thick).
Kay Nixon-Davis, V.P. Sls.
574/223-3158, fax -2524
email: kay@advancemag.com
www.advancemag.com

ADHESIVES RESEARCH, INC., 400 Seaks Run Rd., Glen Rock, PA 17327
Providers of custom-engineered optically clear ITO-compatible PSA-coated products for touch screen, LCD, and flat-panel-display components. Self-wetting adhesives for surface protection of displays. Dual-stage adhesives for encapsulation of rigid and flexible LCDs, OLEDs, and other displays.
Mary Lawson, Electronics Bus. Mgr.
717/235-7979, fax 717/227-8275
email: mlawson@arglobal.com
www.adhesivesresearch.com

ADTEC DIGITAL, 408 Russell St., Nashville, TN 37206
Developer of digital and IPTV products and solutions including encoders, decoders, multiplexers, ad servers, and management servers. With over 20 years experience in media distribution and control, Adtec offers customers rock-solid engineering, powerful features, and the ability to generate unmatched bottom-line revenue.
Megan Kipp, Public Relations Coordinator
615/256-6619 ext.120, fax 615/256-6593
email: megank@adtecinc.com
www.adtecinc.com

ADTEK PHOTOMASK, 4950 Fisher St., Montreal, Quebec H4T 1J6, Canada
Providers of a full range of optical, e-beam, and laser-write photomasks to the microelectronics, optoelectronics, photonics, MEMS, medical, and semiconductor industries.
Peter Erhart, Gen. Mgr.
514/737-7030, fax -9893
email: perhart@adtekphotomask.com
www.adtekphotomask.com

ADVANCE REPRODUCTIONS CORP., 100 Flagship Dr., North Andover, MA 01845
Providers of photolithography services utilizing Micronic Laserwriters. Photomasks on sizes ranging up to 32-in. square imaged on soda-lime or quartz material coated with chrome or iron ***oxide*** *and features down to 1 um. CAD and photoplotting (mylar) services are also offered.*
Steve Abimo, Sls. Mgr.
978/685-2911, fax -1771
email: stevea@advancerepro.com
www.advancerepro.com

ADVANCED MANUFACTURING GROUP, 9880 S. Pioneer, Santa Fe Springs, CA 90670
Professional management and engineering company specializing in manufacturing integration and optimization. Targets rapid cost reduction and productivity gains by applying advanced manufacturing technologies and methods.
Craig Alen, Sr. V.P.
562/949-6088, fax -4431
email:
sales@advancedmanufacturinggroup.com
www.advancedmanufacturinggroup.com

AEROTECH, INC., 101 Zeta Drive, Pittsburgh, PA 15238
Manufacturer of nanopositioners; planar air-bearing stages, high-speed gantries, single- and multi-axis linear, rotary, and lift stages; brushless linear and rotary servomotors and drives; stand-alone, PC-card, and software-only motion controllers; goniometers; and optical mounts.
Stephen McLane, Corp. Mktg. Mgr
412/963-7470, fax 412/963-7459
email: sales@aerotech.com
www.aerotech.com

AGC SYSTEMS LLC, 94 E. Springtown Rd., Long Valley, NJ 07853
Providers of digital-television consulting, technology and business planning, committee liason, intellectual property analysis, management and due diligence, and market research and strategy.
Aldo Cugnini, Pres.
908/872-5155
email: acugnini@agcsystems.com
www.agcsystems.com

AITHER OPTICS, INC., 15 Freeman Place, Level 2, Hamilton, Ontario, Canada L8N 2G6
Providers of display privacy and sunlight-visibility enhancement technology. Innovative enhancement that can address performance gaps of conventional display privacy and anti-glare technologies.
Alex Martin, Development Contact
905/526-8114, fax 905/526-7967
email: alexm@aitheroptics.com
www.aitheroptics.com

AIXTRON AG, Kackertstr. 15-17, Aachen 52072, Germany
Manufacturers of MOVPE and CVD equipment for the deposition of compound semiconductors, multi-component oxides, metals, SiGe and organic materials. Organic vapor-phase depostion (OVPD) equipment for the production of OLEDs for flat-panel displays and other applications; high throughput and very low cost of ownership.
Bastian Marheineke, Dir. of Sls.
+49-(0)-241-8909-0, fax -40
email: b.marheineke@aixtron.com
www.aixtron.com

AKG TECHNOLOGY, INC, 1225 Benito Ave., #M, Alhambra, CA 91803
Technical sales, marketing, and design organization with extensive experience in LCD touch technology. Combined with a quality

product offering, flexibility, and manufacturing bandwidth, kiosk, gaming, POS, industrial, and medical integrators, along with OEM's extensive range of touch technology and solutions, are provided. AKG product strategy enables our entire sales team to deliver significant customer value, and foster long-term, trusting business relationships. Value-add integrators and vertical market OEM benefits include significant reductions in cost and speed to the market.
Kevin Duffy, Director of Sales Operation
978/973-0172, fax 941/697-8108
email: sales@akgtech.com
www.akgtech.com

ALBEMARLE CORP., 451 Florida St., Baton Rouge, LA 70801
Manufacturers and marketers of commercial, developmental, and custom chemicals and materials for a variety of displays. Also offering contract chemical process development, scale-up, and manufacturing services.
Bo Brantley, Bus. Mgr.
225/388-7454, fax -8985
email: bo_brantley@albemarle.com
www.albemarle.com

ALGOLITH, INC., 400 Isabey, Montreal, Quebec H4T 1V3, Canada
Providers of image-enhancement solutions and a range of products that includes software, hardware, IP cores, as well as DSP codes that meet the exacting needs of digital-TV consumers, post-production houses, IPTV or digital broadcasters, and media server manufacturers.
Robert Young, V.P. Sls. & Mktg.
514/335-9867 x3629, fax 514/333-9873
email: ryoung@algolith.com
www.algolith.com

ALL AMERICAN DISPLAY SOLUTION, 230 Devcon Dr., San Jose, CA 95112
Providers of embedded computer and display product solutions. Offering dedicated technical support, high-tech integration facility and world-class manufacturers to help OEMs to get to market faster.
Mark Deyermond, Dir. Display Sls.
978/470-0444, fax -3563
email: displaysolutions@allamerican.com
www.allamericanlcd.com

ALTERNATIVE VISION CORP., P.O. Box 4055, Los Altos, CA 94024-1055
A certified VAR for Foveon X3® CMOS image sensors. Global providers of tools and support for the development of cameras incorporating Foveon sensors. Distributors of Han Vision cameras with sensors in Europe and the Americas.
Dave Gilblom, Pres.
650/625-0318, fax 650/240-4005
email: dave.gilblom@alt-vision.com
www.alt-vision.com

ANDERS ELECTRONICS PLC, 48-56 Bayham Place, London N4I 0EU, U.K.
Global supplier of standard and custom LCD solutions, integrated display systems, embedded PCs and meters, backed by first-class quality, service, and value-added engineering expertise.
Paul Hooper, Sls. Mgr.
+49-(0)-70-7-380-8681,
fax +49-(0)-70-7-874-1908
email: info@anders.co.uk
www.anders-electronics.com

ANS, INC., 421-1 Mogok-bung, Pyungtaek-City, Kyunggi-do 459-040, Korea
Developers, manufacturers, marketers, and service providers of OLED deposition/encapsulation systems, plasma dry-etching systems, sputtering systems, evaporation systems, and high-vacuum systems for the flat-panel display and semiconductor market.
B. K. Chun
+82-031-612-5000, fax +82-031-666-5532
email: sales@ansinc.co.kr

APOLLO DISPLAY TECHNOLOGIES, LLC, 85 Remington Blvd., Ronkonkoma, NY 11779
Distributors and manufacturers of controllers, value-added enhancements, and kit solutions for passive-matrix color/monochrome and character/graphics LCDs as well as active-matrix TFT-LCDs. Also available a wide range of display integration solutions for industrial control, machine automation, medical, POS/kiosk displays, LAN and WLAN networking, and digital signage.
Richard McKay, Managing Dir.
631/580-4360, fax -4370
email: sales@apollodisplays.com
www.apollodisplays.com

APPLIED CONCEPTS, INC., 397 State Rt. 281, P.O. Box 1175, Tully, NY 13159
Designers, manufacturers, and marketers of specialty power-conversion technologies and services to improve performance in all areas related to LCD (FPD) system integration, including dc-to-ac inverters and turnkey-engineered LED backlighting solutions using I-Drive™ LED converters.
Suzanne Thomas, LED Project Mgr./Strategic Relationship Mgr.
315/696-6676, fax -9923
email: sales@acipower.com
www.acipower.com

APPLIED PHOTONICS, INC., 7432 E. Tierra Buena Lane, Suite 101, Scottsdale, AZ 85260
Providers of proprietary laser solutions to the FPD and semiconductor markets. Laser technology replaces traditional mechanical tools with laser light for a variety of applications, including laser-separation, edge-chamfering, laser-annealing, and laser-marking systems for Gen 5-8 LCD and cell-phone processing.
Eugene Feng, Dir. Bus. Dev
480/998-2333, fax -2201
email: gfeng@appliedphotonics.com
www.appliedphotonics.com

APPLIED TECHNOLOGY INTERNATIONAL, INC., 70 W. Red Oak Lane, White Plains, NY 10604
Distributors of Sumitomo ITO targets in ratios from 60/40 to 98/2. IWO targets for ultra-smooth OLED films and other TCO targets; indium tin and nickel-alloy metallic targets, indium ingots, alloys, wire, foil, and ribbon. Recycling of indium scrap.
David Roseman, Sls. Mgr.
914/682-0424, fax -0431
email: droseman@appliedtechnology.com
www.appliedtechnology.com

APS AMERICA, 1210 223rd St., Suite 311, Carson, CA 90745
Specializing in the design, manufacture, and customization of thermal-printer mechanisms, controller boards, and OEM-finished printers. Products and solutions are available for the most rigorous applications. Standard offerings can meet any printing requirement in 2–4-in. paper widths. Unique solutions can be developed in partnership.
Brian OMalley, Natl. Sls. Mgr.
310/834-6900, fax -6996
email: sales@aps-printers.com
www.aps-printers.com

ARIMA DISPLAY CORP., No. 248-47, Shin-Sheng Rd., LEPZ, Chian-Jen District, Kaohsiung 806, Kaohsiung 806 Taiwan, R.O.C.
Manufacturers of monochrome STN, color STN, and TFT-LCDs, ranging in sizes from 1.3 to 7.5 in. for various applications (mobile telephones, medical, instrumentation, etc.). Up-to-date facilities and R&D team support.
Cindy Yu, Sls. Rept.
+886-7-8130666, fax +886-7-8310555
email: cindyyu@arimadisp.com
www.arimadisp.com

ARISTA CORP., 41300 Boyce Rd., Fremont, CA 94538
Developers, manufacturers, and providers of integration services for ruggedized computers in harsh industrial environments and mission-critical applications by providing a wide range of products.
Paul Shu, Dir. Bus. Dev.
510/226-1800, fax -1890
email: sales@aristaipc.com
www.aristaipc.com

ARROW OEM COMPUTING SOLUTIONS, 7459 S. Lima St., Englewood, CO 80112
Provides OEMs complex flat-panel-display services such as design and integration, touch screens, coatings and enhancements, industrial/ruggedized LCDs, open-frame LCDs, kiosk applications, backlighting, inverters and cables, custom enclosures, and stainless steel.
Local Sls. Rep.
1-888-427-2250
www.arrownacp.com

ARTIFICIAL MUSCLE, INC., 749 N. Mary Ave., Sunnyvale, CA 94085
Designers and manufactures of linear actuators based on its proprietary electroactive polymer artificial muscle (EPAM) technology. EPAM devices are lightweight, virtually silent, and highly power-efficient alternatives to conventional electromagnetic or piezoelectric actuators. AMI's latest smartTOUCH actuators enable customization and programming of haptics effects and vibratory feedback into products ranging from the latest handheld multimedia devices to medical instrumentation displays to toys. This new smartTOUCH actuator technology revolutionizes tactile feedback and vibratory applications by enabling a whole new world of alternatives to the clicks and buzzes of conventional actuator technologies.
Peter Gise, Mktg. Mgr.
408/215-7338, fax 408/245-0361
email: peter.gise@artificialmuscle.com
www.artificialmuscle.com

ASF FUTURE BUSINESS GmbH, 4 Gartenweg, Bau Z025, Ludwigshafen. 67063 Germany
Developers of a set of organic materials required for a phosphorescent OLED system. Key components include triplet emitters with a focus on a deep blue as well as a suitable host and blocker materials.
Matthias Koch, Bus. Dev. Mgr.
+49-621-60-76805, fax -76818
email: matthias.koch@basf.com
www.basf

ASTRA PRODUCTS, INC., P.O. Box 479, Baldwin, NY 11510
Suppliers of optical-quality cell-cast acrylic filters (contrast enhancement, glare reduction) with anti-reflection, anti-scratch, and anti-bacterial coatings. Also, reflectors, transflectors, white and colored diffusers, edge light guides, edge light reflectors, and front- and rear-projection screens. Available in sheet form or fully fabricated.
Mark Bogin, Pres.
516/546-4315, fax 516/868-2371
email: mbogin@astraproducts.com
www.astraproducts.com

ASTRO SYSTEMS, INC., 418 Cloverleaf Dr., Baldwin Park, CA 91706
Providers of test and measurement equipment including digital and analog video generators, HDMI protocol analyzers, HDMI distributors, and interface adapters. Fully compliant with HDMI 1.3.
Cristian Garcia, Test & Measurement Bus. Mgr.
626/336-7001, fax -7005
email: cris@astro-systems.com
www.astro-systems.com

AU OPTRONICS CORP., Headquarter: No. 1, Li-Hsin Rd. 2, Hsinchu Science Park, Hsinchu 30078, Taiwan, R.O.C
USA branch office: 9720 Cypresswood Drive, Suite 241, Houston, TX 77070, USA
Manufacturers of TFT-LCDs with the capabilities to serve from small-to-medium and large-sized TFT-LCD modules (from 1.5 to 65 in.). A full range of quality panels includes applications for LCD TVs, desktop monitors, notebook PCs, general displays, mobile phones, DSC/DVC, digital frames, and handheld devices.
832/678-3610, fax -3630
email: usa@auo.com
AUO.com

AUSTRIA MICROSYSTEMS, 8601 Six Forks Road, Suite 400, Raleigh, NC 27615
Focusing on the areas of power management, sensors and sensor interfaces, portable audio and automotive access in the communications, industrial, medical, and automotive markets, complemented by full-service foundry services.
Sonja Pieber, Media Relations
919/676-5292, fax 509/696-2714
email: sales.americas@austriamicrosystems.com
www.austriamicrosystems.com

AUTRONIC-MELCHERS GmbH, Greschbach Str. 29, Karlsruhe 76229, Germany
Manufacturers of instruments for display characterization and developer of DIMOS; 1D, 2D, and 3D display modeling and simulation software. DMS-goniometers, DMS-

POLYGONIOSCOPE, and The CONOSCOPE are fully integrated systems for the automated measurement of luminance, color, viewing angle, response time, BRDF, and moving-picture artifacts of any display technology (LCD, OLED, MEMS, reflective displays, etc.). Also, LC-cell and material measuring systems (tilt and twist angle, voltage-holding ratio, rotational viscosity, etc.) are available.
Lars Becksmann, Sls. & Mktg.
+49-721-96264-45, fax +49-721-96264-85
email: sales@autronic.melchers.de
www.autronic-melchers.com

AVO PHOTONICS, 700 Business Center Dr., Suite 125, Horsham, PA 19044
Specializing in photonic design, development, and manufacturing solutions for the military/aerospace, medical, communications, and industrial markets. Providers of support services from design through production.
Mike Vinson, V.P. Bus. Devel.
215/441-0107 x109, fax -9219
email: sales@avophotonics.com
www.avophotonics.com

AVOCENT CORP., 4991 Corporate Dr., Huntsville, AL 35805
Wireless solutions include KVM switching and broadcasting devices that provide wireless connectivity between monitors, keyboards, mice, and audio devices to computers up to 100 ft. away. These plug-and-play solutions require no drivers, software, or operating system upgrades.
Matt Nelson, Dir. Strat. Bus., Wireless Tech.
256/217-1318
email: matt.nelson@avocent.com
www.avocent

AXOMETRICS, INC., 103 Quality Circle, Ste. 215, Huntsville, AL 35806
Axometrics manufactures a line of instruments for measuring the complete polarization properties of the optical films and elements used in displays, including LCD components and LCOS. All Axometrics polarimeters make high-speed accurate measurements and are ideal for applications in research and development, quality assurance, process monitoring, and high-volume inspection. Axometrics's AxoScan Panel Mapper System quickly measures cell gap, pre-tilt, rubbing direction, and twist angle on any mode LCD panel. Axometrics' Traverse Scanning In-Line system is suited for monitoring in-line film processes.
Charles W. Davis, Pres.
256/489-0051, fax 256/971-2073
email: charles.davis@axometrics.com
www.axometrics.com

AXON' CABLE, INC., 1314 Plum Grove Rd. Schaumburg, IL 60173
Manufacturers in the high-tech field of interconnect solutions. Many alternative cabling systems for displays are available.
Marge Chesters
847/230-7800, fax -7849
email: m.james@axoncable.com
www.axoncable.com

AZORES CORP., 260 H Fordham Rd., Wilmington, MA 01887
Designers and manufacturers of photolithography equipment for flat-panel displays with its core product being the Model 5200 for Gen 2–3 substrates requiring 0.8–4-μm resolution. Providers of local support throughout Europe, Asia, and the Americas.
Elvino da Silveira, Pres./CEO
978/657-7270, fax 978/658-6349
email: elvino@azorescorp.com
www.azorescorp.com

B&W TEK, INC., 825 Dawson Dr., Ste. 1-4, Newark, DE 19713
Manufacturers of cost-efficient TE-cooled CCD InGaAs and PbS array spectrometers (200–2900 nm) with built-in 16-bit digitizer and USB 2.0 plug-and-play interface, long-term stability, and high dynamic range; and enhanced response for low UV and NIR measurements. Ideal for LED, LCD, and display device characterization and testing. OEM modules available.
Mie Mie Joe Strickler, Sls./Mktg.
302/368-7824, fax -7830
email: mie@bwtek.com
www.bwtek.com

BASLER AG, An der Strusbek 60-62, Ahrensburg 22926, Germany
Providers of state-of-the-art inspection equipment for display substrates. Providing the highest sensibility even at the fastest throughputs. Based on proven technology without substrate-size limitations.
Patrick Wulff
+49-(4102)-463-299, fax -309
email: patrick.wulff@baslerweb.com
www.baslerweb.com

BELL MICROPRODUCTS, 800 Vets Hwy., Suite 310, Hauppauge, NY 11788
Flat-panel-display division combines leading flat-panel technologies with value-added capability. Offering a comprehensive line of LCD support products.
Keith Morton, Dir. FPD Mktg.
631/265-8355, fax -2190
email: fpdmarketing@bellmicro.com
www.bellmicro.com

BENCHMARK, 3535 Tech Dr., Rochester, MN 55901
Providers of comprehensive custom product design and global manufacturing services for pico-projectors and other miniaturized optical products. Developers of processes and equipment to build and test leading-edge products, including submicron alignment; bonding with index-matching adhesives, and illumination, color, and image testing with optical targets. Prototyping and pilot-line production in the U.S. with the ability to seamlessly transfer production lines to Europe and Asia and manufacture high-volume products globally. Also offers its OEM customers a unique total solution for the design and manufacture of their products. Medical, military, aerospace, telecom, and other certifications available. Opto-microelectronics capabilities include wire-bonding, flip-chip–on–flex, laser welding, helium-leak testing, and precision adhesive dispensing down to 2 nl. Manufacturing-equipment capabilities include active and passive alignment, optical testing, stress testing, and more.
Susan Johnson, Sr. Bus. Devel. Exec.
507/280-2473
email: susan.johnson@bench.com
www.bench.com

THE BERGQUIST CO., 18930 West 78th St., Chanhassen MN 55317
Manufacturers of 5-wire resistive touch screens engineered to withstand high-usage harsh-environment applications. These high-performance touch screens feature high-clarity/high-contrast displays designed to survive the rigors of a variety of mission-critical extreme-environment applications.
1-800-347-4572, fax 952/835-0430
email: webmaster@bergquistcompany.com
www.bergquistcompany.com

BERLINER GLAS U.S., 117 Underwood Rd., Williamsburg, VA 23185
Manufacturers of glass substrates for innovative display solutions for applications such as industrial, business or medical, navigation systems, flat panels, and more. Available in different thicknesses and functional multi-layers and design possibilities.
Martin F. Wenzler, Pres.
757/229-9368, fax -5213
email: mwenzler@berlinerglasus.com
www.berlinerglas.com

BI-SEARCH INTERNATIONAL, INC., 15131 Woodlawn Ave., Tustin, CA 92780
Authorized and value-added distributor for LG Display. Offering LG Display TFT-LCD panels from 6.4 to 55.0 in. Also, distributor of Dicon Electronics' affordable high-tech controller card, TFT-LCD monitor, and LCD peripherals. Also, provider of repair services for defective TFT-LCDs.
Peter Park, Sls. Mgr.
714/258-4500, fax 714/258-4512
email: reception@bisearch.com
www.bisearch.com

BOOKHAM, INC., 3640 Westwind Blvd., Santa Rosa, CA 95403
The ColorLoc™ Optical Components Portfolio offers color wheels, dichroic filters, light pipes, front-surface mirrors, anti-reflection coatings, and UV/IR filters. The Thin-Film Product Portfolio offers display engineers the tools to optimize color, heat, noise, and UV/IR radiation in next-generation systems.
Bruce Kuhlman, Dir. Global Sls., Thin Films
707/636-1100, fax -1199
email: sales@bookham.com
www.bookham.com

BOTEST SYSTEMS GmbH, Reichenäcker 11, 97877 Wertheim, Germany
A technology company active in the field of test systems for high-tech industries. One focus is on systems for plastic electronics, especially lifetime and functionality testing, defect analysis, and photo-current measurements in OLED and organic solar cells and other applications of organic semiconductors.
Thomas Däubler, Head, Measurement Division
+49-934-29362-28, fax -39
email: sales@botest.com
www.botest.com

BREAULT RESEARCH ORGANIZATION, 6400 E. Grant Rt., #350, Tucson, AZ 85715
A full-service optical engineering firm, providing software and engineering services to turn creative visions into working prototypes. ASAP™ Optical Software is tailor-made to design, analyze, and improve display systems.
Kristi Helmrich, West Regional Sls. Mgr.
520/721-0500, fax -9630
email: khelmrich@breault.com
www.breault.com

BRIDGELUX, INC., 1170 Sonora Ct., Sunnyvale, CA 94086
Bridgelux is the first new U.S.-based light-emitting-diode (LED) chip company in the past 20 years. The Company's focus is bringing innovation to light by providing high-power, energy-efficient. and cost-effective LED solutions. Bridgelux actively supports its customers by delivering value-added application-specific solutions that will open up new markets in solid-state lighting (SSL). Customers leverage Bridgelux's technology to replace conventional lamp and luminaire technologies (such as incandescent, halogen, and fluorescent lighting solutions) with solid-state products that provide high performance and energy-efficient white light for general lighting applications. Bridgelux's current and future-generation products support global clean energy initiatives by reducing energy consumption and offering environmentally friendly solutions.
Brian Fisher, Dir., Corporate Mktg.
408/990-7563, fax 408/990-7501
email: brianfisher@bridgelux.com
www.bridgelux.com

BRIGHT VIEW TECHNOLOGIES, INC., 5151 McCrimmon Pky, Suite 200, Morrisville, NC 27560
Developers of microstructure-based optical films for LED lighthing and display applications.
Douglas W. Adams, VP Bus Dev & Mktg.
919/228-4373, fax 919/228-4371
email: dadams@brightviewtechnologies.com
www.brightviewtechnologies.com.

BRIGHTSIDE TECHNOLOGIES, INC., 1310 Kootchay St., Vancouver, B.C. V5K 4R1
Developers and licensers of high-dynamic-range technology including the world's first HDR display, HDR projection and camera technology, and backward-compatible JPEG- and MPEG-HDR codecs to compress HDR files without information loss.
Gary Yurkovich, V.P. Sls. & Corporate Dev.
604/228-4624, fax -4622
email: gary.yurkovich@brightsidetech.com
www.brightsidetech.com

BRIMAR, LTD., Greenside Way, Middleton, Manchester, M24 1SN U.K.
Developers, manufacturers, marketers, and providers of support of high-performance full MIL-SPEC CRTs, LCDs, associated drive electronics, and complete monitors for defense, industrial, and commercial (film recording, imaging, and projection) applications.
David P. Eldridge, Sls. Dir.
+44-161-681-7072, fax +44-161-682-3838
www.brimar-ltd.com

BRIMER, INC., 25020 Avenue Stanford, #110, Valencia, CA 91355-4672
Developers, manufacturers, marketers, and providers of support of high-performance full MIL-SPEC CRTs, LCDs, associated drive electronics, and complete monitors for defense, industrial, and commercial (film recording, imaging, and projection) applications.

Iwan G. Dodd, Pres. & CEO
661/295-5770, fax -5087
email: sales@brimarinc.net
www.brimar-inc.com

BRITEVIEW TECHNOLOGIES, INC.,
1810 Eber Rd., Unit C, Holland, OH 43528
Manufacturers of LCD backlighting systems and components, including the flat collimator that uses total internal reflection to emit light to achieve very high efficiency. It is especially suitable for dual-mode backlight operation. The system uses CCFLs as well as LEDs as the light sources. Also available are custom-made CCFL lamps, inverters, and LED drivers.
Chen-Yu Tai, Pres.
419/868-7290, fax -7291
email: cytai@briteview.com
www.briteview

C3 LASER CORP., 3217 Yattiko Pl.,
Longwood, FL 32779
A Division of Fonon, specializing in an OEM product line of CO_2 and fiber lasers, demonstrating advancements in fiber laser applications, wafer and glass panel processing, and laser-based deep engraving.
Eric Crawford, Sls. Mgr.
407/804-1000, fax -1002
email: info@C3laser.com
www.C3laser.com

CABLETIME USA, 400 Valley Rd., Suite 100, Mt. Arlington, NJ 07856
Manufacturers of the MediaStar family of TV and video distribution systems which includes the new MediaStar Evolution MPEG-2/4 encoding and decoding system, MediaStar Pro Cat5/5c/6 audio and video delivery system, and MediaStar Compact.
Ed Carabetta, Pres.
973/288-8010, fax -8110
email: e.carabetta@cabletime.com
www.cabletime.com

CALIFORNIA MICRO DEVICES CORP., 490 N. McCarthy Blvd. #100, Milpitas, CA 95035
Suppliers of application-specific analog and mixed-signal semiconductor products for the mobile handset, digital consumer electronics, and personal-computer markets. Key products include protection devices for mobile handsets, digital consumer-electronics products such as digital TVs, and personal computers as well as analog and mixed-signal ICs for mobile handset displays.
Richard Haas, Marcom Dir.
408/934-3108, fax -2998
email: richardh@cmd.com
www.cmd.com

CAMBRIDGE DISPLAY TECHNOLOGY (CDT), LTD., Bldg. 2020, Cambridge Business Park, Cambridge, CB23 6DW, U.K.
Specializing in the research, development, and commercialization of polymer organic light-emitting-diode (P-OLED) technology for flat-panel displays, lighting, sensors, and photovoltaics.
Eric Mayes, Sr. Prod. Mgr.
+44-(0)-1954-713-600, fax -620
email: emayes@cdtltd.co.uk
www.cdtltd.co.uk

CAPSTONE VISUAL PRODUCT DEVELOPMENT, 266-B Nooseneck Hill Rd., Exeter, RI 02822
Specializing in engineering, prototyping, and certification of visual products. Providers of LCD-enhancement design and video controllers to image processing and display metrology systems.
Lewis Collier, Pres.
401/392-1023, fax 401/397-9193
email: LCollier@CapstoneVisual.com
www.CapstoneVisual.com

CELCO (CONSTANTINE ENGINEERING LABORATORIES CO.), 14 Industrial Ave., Mahwah, NJ 07430
Designers and manufacturers of the highest-resolution state-of-the-art deflection and focusing components for CRT displays, including air-traffic control, medical, projection displays for flight simulators, imaging devices, head-up and helmet-mounted displays, thermal imaging, and CELCO Digital Film recorders.
Art Weirgin, Sls. Mgr.
201/327-1123, fax -7047
email: info@celco-nj.com
www.celco.com

CELCO (CONSTANTINE ENGINEERING LABORATORIES CO.) 2, Pacific Division, 8660 Red Oak St., Rancho Cucamonga, CA 91730
Manufacturers of FURY and FIRESTORM digital film recorders for the motion-picture and video-to-film industry. Also, manufacturers of X-Y direct-drive deflection amplifiers.
John Constantine, Dir. Mktg.
909/481-4648, fax 909/481-6899
email: john@celco.com
www.celco.com

CHIEF MANUFACTURING, INC., 8401 Eagle Creek Pkwy., Ste. 700, Savage, MN 55378
Manufacturers of mounting lifts and accessories or LCD, DLP™, and CRT projectors and flat-panel displays utilizing plasma and LCD technologies.
952/894-6280, fax -6918
email: chief@chiefmfg.com
www.chiefmfg.com

CHOMERICS, 77 Dragon Court, Woburn, MA 01801
Manufacturers of advanced materials for electromagnetic interference (EMI) and rf shielding and thermal management used in electronics and telecommincations devices. Careful management of these thermal interfaces is crucial to maintaining the reliability and extending the life of power-conversion equipment and appliances.
Bob Foster, Prod. Commun.
781/939-4850 x4304, fax 781/933-4318
email: chomailbox@parker.com
www.chomerics.com

CHROMA ATE, INC., 7 Chrysler, Irvine, CA 92618
Providers of a complete measurement solution to the display industry. R&D strategy is focused on developing state-of-the-art technology, applying product-management discipline and delivering better products and system solutions to satisfy a growing market. Driven to provide better service, unique solutions, and technical support to help customers excel in today's high-demanding environment.
Von Estacio, Regional Sls.Mgr.
949/421-0355, fax -0353
email: vone@chromaus.com
www.chromaus.com

CI LUMEN INDUSTRIES, 80 Davids Drive, Hauppauge, NY 11788
Supplier of LCD enhancements and LCD monitor solutions for government and industry. Proprietary in-house capabilities, notably optical bonding and LED backlight manufacture, provide sound platforms for supply of a full spectrum of enhancements to LCDs. These enhancements enable improved luminance, contrast, reliability, and performance. Additionally, a large variety of large-format DID monitors for use in digital signage, teleconferencing, kiosk, and information-display applications are offered.
Paul Kline, Exec. VP
631/435-0035, fax -2330
email: pkline@ci-lumen.com
www.ci-lumen.com

CITRONIX, INC., 5342 Halsted Ave., Carmichael, CA 95608 USA
Designer and manufacturer of deflection amplifiers for CRT projection display systems on flight simulators and electron-beam deflection systems for the past 30 years. Specializing in replacing other outdated and out-of-production deflection amplifiers.
Al Pletz, Chief Engr.
916/489-9858, fax 916/481 0288
email: citronix@aol.com
www.citronixdeflection.com

COATING & CONVERTING RESOURCES, N56 W24701 N. Corporate Circle, Sussex, WI 53089
Manufacturers of equipment capable of applying coatings with high precision and uniformity to display substrates in web or sheet form. Products include single- and multi-slot coating dies, die positioners, fluid-delivery equipment, and coating systems.
Jerry Schmidt, Prod. Mgr.
262/246-7200, fax -5992
email: JCS@ccres.com
www.ccres.com

COATING MATERIALS, 30150 South Wixom Road, Wixom, MI 48393
A supplier of sputtering targets for the large-area coating market. A new division, Coating Materials, increases awareness and market penetration into the field of PVD coatings to extend market presense in decorative coating, tool coating, and other segments of this growing market. Providers of all forms of Al, bronze, Cr, Cu, Hf, Mo, Nb, Ni, Ag, SS, Ta, Ti, Sn, W, Zn, and Zr sputtering targets.
Joe P. Cruzen, Sls./Mktg.
1-888-267-1883, fax 248/446-0280
email: jcruzen@coatingmaterials.com
www.coatingmaterials.com

COLORADO CONCEPT COATINGS LLC, 1110 N. Boise Ave., Loveland, CO 80537
Custom manufacturer and distributor of prototype to high-volume coated products for various applications. Suppliers to a diverse global customer base, providing products to universities, R&D facilities, the U.S. Military, fabrication houses, and small-to-large companies and corporations. Products are used in a wide range of applications from front- and rear-surface mirrors to optics, LCDs, and other displays, EMI, heater, biotech, aerospace, military, and many others. In addition to coating, many other services such as custom cutting, patterning, etc., are offered along with other value-added services, providing a "one-stop shop" opportunity.
Shane Vincent, Pres.
970/635-2797, fax -3054
email: svincent@coloconcept.com
www.coloconcept.com

COLORLINK, INC., 5335 Sterling Dr., Suite B, Boulder, CO 80301
Providers of innovative polarization control solutions for customer-defined performance and cost requirements. Products are utilized in demanding polarization applications including consumer electronics, medical diagnostics, avionics, photography, and more.
John Korah, Prod. Devel. Engr.
303/544-9115, fax 303/545-5802
email: korah@colorlink.com
www.colorlink.com

COMMUNICATIONS SPECIALTIES, INC., 55 Cabot Ct., Hauppauge, NY 11788
Manufacturers of the Pure Digital Fiberlink® line of all-digital fiber-optic transmission systems for video, audio, and data; Deuce® video scalers, and the Scan Do® family of scan converters.
Paul Seiden, Dir. Sls.
631/273-0404, fax -1638
email: info@commspecial.com
www.commspecial.com

COMPASS TECHNOLOGY CO., LTD., Suite 10, 5th Fl., Chiaphua Centre, 12 Siu Lek Yuen Rd., Shatin, New Territories, Hong Kong
Manufacturers of flex tape. Processes from 1 to 4 metal layers with vias down to 8.5 μm and line/spaces at 38 μm. Providers of embedded or surface-mounted components onto the flex for a full turnkey solution.
Robert Sheppard, Dir. Tech. Mktg.
916/296-0107
email: Robert_Sheppard@CGTH.com
www.compass-flex.com

COMPUTER DYNAMICS, 7640 Pelham Rd., Greenville, SC 29615
Manufacturers of enclosed and open-frame flat-panel-display systems, both computers and monitors, for OEM and end users in an array of industries, including hazardous outdoor and indoor environments. Custom and semicustom design capabilities.
Appl. Eng. Sls. Dept.
864/627-8800, fax 864/675-0106
email: CDIsales@gefanuc.com
www.cdynamics.com

CONDUCTIVE COMPOUNDS INC., 17 Hampshire Dr., Unit 8, Hudson, NH 03051
Since 1994, Conductive Compounds, Inc., has been developing materials for electronic assembly applications. Products are manufactured in a facility in Hudson, New Hampshire, about 40 miles north and east of Boston. Products include solvent- and water-based electrically conductive and resistive inks and coatings, electrically conductive adhesives, solvent-based phosphor binder systems, barium titanate capacitance inks, radio opaque inks, thermally conductive epoxy potting materials, silver chloride inks, zinc-filled inks, and UV-curable screen-printable dielectrics, encapsulants, and coatings. Products are sold worldwide for use in military, aerospace, automotive, medical, computer, consumer electronics, industrial control, and other markets.

Applications include membrane switches, disposable medical devices and sensors, EL panels, touch screens, solar panels, circuit assemblies, antistatic foam packaging, potentiometers and rheostats, thermal targets, printed heaters, OLED panels, and a wide variety of others. In-house laboratory capabilities include state-of-the-art viscosity/rheology testing, differential scanning calorimetry (DSC), thermogravimetric analysis (TGA), Instron. Providers custom formulations for new and unique applications in the printed-electronics industry.
Carolee Dalton, Account Representative: Inside Sales
603/595-6221, fax 603/595-6228
email: caroleed@conductivecompounds.com
conductivecompounds.com

COPYTELE, INC., 900 Walt Whitman Rd., Melville, NY 11747
Manufacturers of a revolutionary thin phosphor-based active-matrix color flat-panel display that preserves the desirable characteristics of CRT display, achieves a brightness up to 1000 cd/m^2, has superb contrast, an efficient electron-emission system, proprietary 40-V color phosphors, built-in pixel memory, and long life. Operates in any video application including TV.
Anthony Campisi, Engr. Dir.
631/549-5900, fax -5974
email: acampisi@copytele.com
www.copytele.com

CORNING DISPLAYS, HP-CB-06, Corning, NY 14831
Providers of Flatness Measurement Technology of LCD Image Masks that have superior repeatability and accuracy to meet next-generation flatness requirements.
Mehrdad Mahmoudi, Bus. Dev. Mgr.
607/974-2610, fax -1861
email: mahmoudim@corning.com
www.corning.com

CORNING INCORPORATED, Display Technologies, One Riverfront Plaza, MP-HQ-01-W1, Corning, NY 14831
Manufacturers of glass substrates for active-matrix LCDs. Premium-quality substrates are used in LCD televisions, notebook computers, flat-panel desktop monitors, and portable electronic and communications devices.
John Geniviva, Dir. Mktg.
607/974-9000, fax -7097
email: display@corning.com
www.corning.com/displaytechnologies

CPFILMS, INC., 21034 Osborne St., Canoga Park, CA 91304
Manufacturers of specialty sputtered coated films used in various display-related applications including EL backlighting, touch/pen-entry devices, EMI shielding, antirefelctive screen enhancement, and even new displays such as electronic paper and LCDs.
Bunny R. Buckley, Sls. Mgr.
818/882-5744, fax -6519
www.cpfilms.com

CPFILMS, INC. 2, Precision Coated Films Div., 4129 The Great Rd., Fieldale, VA 24089
Providers of full-service film enhancement under one roof. These processes include deep-dyeing, vacuum metallizing, and coating and laminating, including ClearSil® brand specialty silicone, non- and low-extractable silicone release films and optically clear PSA films. Any of these processes may be combined to meet industry specific requirements. Development of new materials and pilot-coating services are available.
Doug Goldstein, New Bus. Dev. Mgr.
276/627-3332, fax -3406
email: indprods@cpfilms.com
www.cpfinudsprod.com

CRANE AEROSPACE AND ELECTRONICS (ELDEC), 16700 13th Ave. West, P.O. Box 97027, Lynnwood, WA 98046-9727
Designers and manufacturers of high-quality high-reliability low- and high-voltage power products for military and commercial aerospace applications.
Peter Truss, Prod. Mktg. Specialist
425/743-8673, fax -8562
email: electronics@craneae.com
www.craneae.com

CRLO DISPLAYS, LTD., 1 St. David's Dr., St. David's Business Park, Dalgety Bay Dunfermline, Scotland, U.K. KY11 9PF
Sold under the brand name of CRL Opto, CRLO Displays Ltd. supplies F-LCOS microdisplay technology generating full-motion full-color (24 bit) from a single microdisplay. The microdisplay is an all-digital device that delivers 720-line HDTV at high frame rates.
Ryan West, Sls. Mgr.
+44-(0)-1383-828-800, fax -801
email: sales@crlopto.com
www.crloptp.com

CYANTEK CORP., 3055 Osgood Ct., Fremont, CA 94539
Manufacturers of process chemicals for display manufacturing that includes metal etchants, positive resist developers, resist strippers, and cleaners.
Gary Grossklaus
510/651-3341 x23, fax 510/651-3398
email: garyg@cyantek.com
www.cyantek.com

CYRO INDUSTRIES, 100 Enterprise Dr., Rockaway, NJ 07866-5055
Manufacturers of ACRYLITE® AR acrylic sheet, offering an abrasion and impact-resistant protective filter for optical displays and improves clarity with increased light transmission while reducing unwanted glare. ACRYLITE® RP Rear Projection has outstanding brightness and sharp contrast from any viewing angle.
Roger Lee, MFC Sls. & Mkt. Dev. Specialist
909/646-3490, fax 732/909-7167
www.cyro.com

DANA ENTERPRISES INTL., INC., 43006 Osgood Rd., Fremont, CA 94539
Distributors of polarizers manufactured by Sanritz, Fujioka-City, Japan; spacers for LCDs, manufactured by Sekisui Chemical, Osaka, Japan; and equipment for LCD manufacturing exported by Com-Tech Ltd., Tokyo, Japan. Offering precision polarizer die-cutting services – no tooling needed.
David K. Nakamura, Pres.
510/498-4446, fax -4447
email: dave@danaenterprises.com
www.danaenterprises.com

DARK FIELD TECHNOLOGIES, INC., 70 Robinson Ave., Orange, CT 06477
Manufacturers of high-resolution laser and camera systems for on-line real-time detection of visual defects in display films, polarizing films, brightness enhancement films and glass. Defects of 1 µm and larger can be detected on-line.
Timothy A. Potts, Pres.
203/298-0731, fax 203/298-0732
email: tapotts@darkfield.com
www.darkfield.com

DATA MODUL AG, Landsberger Str. 322-322b, 80687, Munich, Germany
Distributor and system integrator of displays with the broadest product range of nearly all major FPD suppliers and also own products under BATRON, Conrac, and DATA MODUL brands. High-quality alphanumeric and graphic modules with brilliant contrast and wide viewing angle in TN or STN, but also chip-on-glass (COG) modules are in the BATRON product line. Besides a huge variety of standard products, customization to the application design up to full custom displays and modules are possible.
Armin Scheuerer, Dir. QM/QA, QMR
+49-89-560-17-0, fax -119
email: AScheuerer@data-modul.com
www.data-modul.com

DAWAR TECHNOLOGIES, 1020 Ave., Pittsburgh, PA 15233
Manufacturer certified to ISO 9001-2000 standards. Provider of manufacturing and engineering services for high-volume, low-volume, and prototype projects. Product line includes touch screens, integrated touch monitors, membrane switches, graphic overlays, keypads and labels, Duraswitch® technology, and smart cards.
Kimberly Kearns, Mgr., Mktg. Services
412/322-9900 x305
email: kkeams@dawar.com
www.dawar.com

DDP, 445 South Douglas St., El Segundo, CA 90245
Providers of engineering, innovative design, LED protypes, and test and evaluation services, and tailored LED solutions for specific indication and illumination applications.
Dave Smoot, Natl. Sls. Mgr.
1-800-421-6815, fax 310/640-7639
email: dave@datadisplay.com
www.datadisplay.com

DELO INDUSTRIAL ADHESIVES, Delo-Allee 1, Windach, 86949, Germany
Providers of bonding technology, specializing in sealants for OLEDs and flexible displays offering the lowest WVTR values combined with excellent glass and extraordinary temperature and humidity resistance.
Daniel Lenssen, Bus. Devel. Mgr.
+49-8193-9900-242, fax -5242
email: daniel.lenssen@delo.de
www.delo.de

DEMPA PUBLICATIONS, INC., 1-11-15 Higashi-Gotanda, Shinagawa-ku, Tokyo 141-8715, Japan
Publishers of Display Devices, covering the dynamic display scene by explaining technologies for large FPDs, microdisplays, projection systems, and innovative drivers and controllers. Market statistics and strategy reports round out the coverage.
Masaharu Hasegawa, Gen. Mgr., Intl. Div.
+81-3-3445-61111, fax +81-3-3447-4666
email: displaydevices@dempa.co.jp
www.dempa.net

DFF-GERMAN FLAT PANEL DISPLAY FORUM, Lyoner Str. 18, Frankfurt D-60528, Germany
DFF, the German Flat-Panel Display Forum, is an industry-led association of European FPD material and component suppliers, equipment manufacturers, display manufacturers, system integrators, end users, and research institutes. Currently representing 74 members.
Joerg Winkler, Prj. Mgr.
+49-69-6603-6603, fax -2633
email: joerg.winkler@vdma.org
www.displayforum.de

DIALOG SEMICONDUCTOR, Neve Strasse 95, D-73230 Kirchheim/Teck-Nabern, Germany
Manufacturers of highly integrated mixed-signal ICs to support ultra-low-power capabilities of emerging display technologies such as electronic-paper displays, active- and passive-matrix OLEDs, and low-power MEMS and LCDs.
Mike Hopkins, Mktg., USA and Europe
+49-7021-805-0, fax -100
email: birgit.hummel@diasemi.com
www.dialog-semiconductor.com

DIEMAT, INC., 19 Central St., Byfield, MA 01922
Manufacturers of adhesives and sealing glasses for semiconductors and optelectronics. Adhesives offer unmatched thermal conductivity for die-attach and other applications. Glasses hermetically seal at low temperatures.
Roy Harvey, Sls. & Mktg. Mgr.
978/499-0900 x20
email: r-harvey@diemat.com
www.diemat.com

DIGITAL VIEW GROUP, 18440 Technology Dr., Bldg. 130, Morgan Hill, CA 95037
Supplier of advanced interface solutions for flat-panel-display systems. Controllers provide solutions for a wide range of applications from avionics to x-rays. Offering an extensive range of flat-panel controller boards, on-screen display (OSD) boards,and interconnection cabling.
Stephen Simons, Sls. Mgr.
408/782-7773, fax 408/782-7883
email: ssimons@digitalview.com
www.digitalview.com

DIMATIX, INC., 2230 Martin Ave., Clara, CA 95050-2704
Providers of piezoelectric printheads, micropumps, and related components including printing systems for manufacturing and prototyping FPDs, PLED displays, flex circuits, RFID antennas, PCBs, photovoltaic devices, fuel cells, EAS, and other applications requiring the precise deposition of functional fluids.
Tim Luong, Sls. Engr.
408/565-7455, fax 408/565-0311
email: tluong@dimatix.com
www.dimatix.com

DISPLAY ASIA, Yongsan-ku, Seoul, Korea
Publisher of Korea's only display-dedicated magazine. Ready to assist the Korea display market based on 30 years of company history.
Sean Lee, Publisher
+82-11-248-1005, fax +82-2-3273-0888
email: sean@displayasia.net
www.displayasia.net

DISPLAY BANK, 4320 Stevens Creek Blvd., Suite #230 San Jose, CA 95129
Displaybank is a display research institute specializing in market analysis, providing insight into the industry's future. With extensive coverage including analysis of LCD, PDP products for end-users, panels, modules, and components, Displaybank is continuously renowned for its accurate and reliable information sourcing.
Jae Shin, Mgr., Mktg./Business Development
408/615-5000, fax 408/615-5004
email: jae@displaybank.com
www.displaybank.com

DISPLAY-METROLOGY & SYSTEMS, Marie-Alexandra-Str. 44, Karlsruhe D-76135, Germany
Offering products (customer specific and off-the-shelf) and consulting services in the field of display metrology, such as novel compact measuring devices (e.g., optical transient recorder, OTR-3) and illumination systems (e.g., ISO-lux). A new high-resolution BRDF/BSDF measurement approach is available as an instrument (BSDF-Meter) and for licensing.
Michael E. Becker, CEO
+49-0721-981-2268, fax -2268
email: mail@display-metrology.com
www.display-metrology.com

DISPLAYCHECK, 266-B Nooseneck Hill Rd., Exeter, RI 02822
Suppliers of machine-vision inspection solutions for reflective, emissive, and microdisplay devices, materials, optical engines, and projectors. Systems provide high-performance physical and functional testing of display devices with flexible and extensive test suites.
Lewis Collier, Pres. & CEO
401/392-1023, fax 401/397-9193
email: LCollier@DisplayCheck.com
www.DisplayCheck.com

DONTECH, INC., 700 Airport Blvd., Doylestown, PA 18901
Manufacturers of custom optical and EMI/RFI filters for display enhancements. Vargard anti-reflective films, VCF conductive films, anti-reflective and conductive coatings, night-vision filters, dichroic filters, optical fine wire mesh, transparent heaters, enhanced touch screens, optical bonding, and display-enhancement services available. Vandal glass, large display filters, privacy filters also available.
Jeff Blake, Dir. Sls. & Mktg.
215/348-5010, fax 215/348-9959
email: jblake@dontechinc.com
www.dontechinc.com

DOOSANDND CO., LTD., 397-2, B3-22, Moknae-Dong, Danwon-Gu, Ansan-City, Kyunggi-Do, Republic of Korea 425-100
Manufacturers of AMOLED and PMOLED deposition and encapsulation equipment for R&D, pilot, and mass production, including cluster- and in-line type with innovative technology and customer support service.
Hyuen-Yong Hoang, Sls. Mgr.
+82-31-599-2420, fax +82-31-491-2213
email: tigon@doosan.com
www.doosandnd.com

DOUBLE SIGHT DISPLAYS, 18009 Sky Park Circle, Ste. K, Irvine, CA 92614
Manufacturers of LCDs, desktop solutions, and a complete line of LCD mounting hardware.
Dario Dellamaggiore, Dir., Sls. & Mktg.
877/896.5237
email: dario.dellamaggiore@doublesight.com
www.doublesight.com

DR. SCHENK OF AMERICA, LLC, 1890 Wooddale Dr., Ste. 600, Woodbury, MN 55125
Offering display inspection systems such as Chess in-line and off-line scanners that inspect all panel sizes and types, including bare glass; ITO-coated substrates, color filters, OLED, and poly-OLED structures used in the flat-panel industry, as well as float glass and AR and low-E coated glass used in many other industries.
Jochen Koenig, Managing Dir.
651/730-4090, fax -1955
email: salesus@drschenk.com
www.drschenk.com

DUPONT DISPLAY, Wilmington, DE 19880
Developers of process technology, proprietary materials, and films for the LCD, OLED, and PDP industries. Product offering includes direct-bonding enhancement technology; solution-process OLED technology and OLED materials; Fodel® lead-free paste; and optical films for flat-panel and flexible displays.
Erin Mills, Mktg.
310/860-6160, fax 310/601-7123
email: displays@usa.dupont.com
www.displays.dupont.com

DYMAX CORP., 318 Industrial Lane, Torington, CT 06790
Broad range of one-part solvent-free electronic materials cure in seconds upon exposure to UV/visible light. They do not emit HAPs or VOCs upon cure. UV-curable materials are used in a wide variety of applications for circuit protection and electronic assembly. The products are electrically insulating and are designed for various operations including conformal coating, encapsulation, bonding, keypad coatings, thermal management, and masking. IPC approved, MIL-I-46058C and UL-listed self-extinguishing grades are available. Most products are available in multiple-viscosity grades, so the material flow may be tailored to the individual application.
860/482-1010, fax 860/496-0608
email: info@dymax.com
www.dymax.com

DYNAMIC DIGITAL DEPTH USA, INC.,
Suppliers of a range of 3-D "without glasses" LCD and plasma displays and 2-D- to3-D content conversion solutions used in digital signage, television, personal computers, and mobile telephones.
C. Yewdall, CEO
310/566-3340, fax -3380
email: info@DDD.com
www.ddd.com

E BEAM, INC., 21070 SW Tile Flat Road, Beaverton, OR 97007
Research and development company of electron tubes, especially CRTs and their components. Providers of phosphor screening services and cathodes, consulting services, testing, prototypes, and electronics.
Bernard K. Vancil, Pres.
503/628-0703, fax -1194
email: bernie@ebeaminc.com
www.ebeaminc.com

E-RAY OPTOELECTRONICS TECHNOLOGY CO., LTD., 9F, 249-1 Chung Hsiao East Rd., Section 3, Taipei 106, Taiwan
Designers, manufacturers, and distributors of small-molecule OLED materials, including a full range of fluorescent dopants and host, as well as hole-injection, hole-transport, and electron-transport materials. Proprietary portfolio includes over 20 patents (granted and pending).
Titan Chung, Asst. Mgr., Mktg.
+886-3-426-8958, fax +886-3-427-3897
email: titan.chung@eray-tech.com
www.eray-tech.com

EAGLE VISION DISPLAYS, 3350 Scott Blvd., Bldg. 50, Santa Clara, CA 95054
Designers and manufacturers of high-performance custom and standard flat-panel-display controller solutions. Offering a wide range of products including PC and in-monitor standard and custom controllers using the very latest technology.
Mike S. Yi, Sls. Mgr.
408/748-1545 x22, fax -1543
email: mikey@evdisplays.com
www.evdisplays.com

EARTHLCD, 32901A Calle Perfecto, San Juan Capistrano, CA 92675
Manufacturers of intelligent LCD modules (ezLCD) that allow the design-in of a color LCD within a few weeks. ezLCDs can be driven by an 8-bit micro to provide a color GUI for as little as $130.00.
Steve Cipolla, Pres.
949/248-2333, fax -2392
email: steve@earthlcd.com
www.earthlcd.com

ECSIBEO AB, Chalmers Industriteknik, Chalmers Teknikpark, Gothenburg, SE-41288 Sweden
Developers and licensers of LCD technology and providers of R&D services to develop new LCD products.
Johan Felix, Managing Dir.
+46-31-7724373, fax +46-31-827035
email: johan.felix@ecsibeo.se
www.ecsibeo.se

EGALAX_EMPIA TECHNOLOGY INC., 11F, No 302, Rueiguang Road, Nei Hu District, Taipei, TAIWAN
Providers of high-quality high-performance design, technical support, and competitive pricing. Touch-screen products include resistive and capacitive touch controllers, and SAW and IR solutions. Video products include hybrid PCTV controllers, digital TV+PC cam controllers, video/audio capture devices, and skype phone applications.
Kaye Tsng, Sls Dept., Asst. Mgr.
+ 886-2-8751-5191 (or 408/858-8850), fax + 886-2-2797-8808
email: kaye@eeti.com
www.eeti.com

ELDEC CORP., 16700 13th Ave. W., P.O. Box 97027, Lynnwood, WA 98046-9727
Designers and manufacturers of high-quality high-reliability low- and high-voltage power supplies for military and commercial aerospace CRT and AMLCD applications.
Peter Truss, Prod. Mktg. Specialist
425/743-8673, fax -8562
email: info@craneaerospace.com
www.craneaerospace.com

ELDIM SA, 1185 rue d'Epron (Ancienne), 14200 Herouville Saint Clair, France
Manufacturers of video photometers and colorimeters and inspection systems for LCDs, FEDs, LEDs, plasma displays, CRTs, microdisplays, instrument clusters, lighted panels, etc. Instruments allow viewing-angle and BRDF characterization, uniformity and mura inspection, and quantitative imaging. Interface with Simpulation software: Polarization measurements in angle; spectral measurements in angle; calibration instruments for LEDWall on-line processes. Advanced measurements for the lighting industries. Automatic stages plus temperature systems.
Vincent Leroux, Gen. Mgr.
+33-2-31-947-600, fax +33-2-31-940-950
email: sales@eldim.fr
www.eldim.fr

ELO TOUCHSYSTEMS, Diestsesteenweg 692, Kessel-Lo 3010, Belgium
Manufacturers and marketers of surface-wave (overlays and on-tube) resistive (four and five wire), and infrared technologies into retail, industrial, hospitality, medical, gaming, financial, as well as many other markets that use touch screens to improve business or enhance customer service.
Karine Piette
+32-16-35-2100, fax -2101
email: elosales@elotouch.com
www.elotouch.com

ELO TOUCHSYSTEMS, INC., 301 Constitution Dr., Menlo Park, CA 94025
Providers of the optimum touch solution. Offering the broadest touch technology, including surface wave (IntelliTouch, iTouch, Secure Touch); resistive (AccuTouch, AT4; infrared (Carroll Touch); and capacitive (projected and surface).
Elo Sales
1-800-ELO-TOUCH, fax 650/361-4747
email: eloinfo@elotouch.com
www.elotouch.com

eMAGIN CORP., 2070 Route 52, Hopewell Junction, NY 12533
Providers of active-matrix OLED micro-displays, prism optics, and integrated modules to the military, industrial, and consumer OEMs, and the Z800 3DVisor, a 3-D personal-display device, direct to consumers.
425/887-7878, fax 425/882-7373
email: sjones@emagin.com
www.emagin.com

EMERGING DISPLAY TECHNOLOGIES CORP., 15 Hammond St., Ste. 310, Lake Forrest, CA 92620
Manufacturers of active and passive LCDs, ranging in sizes from 1.5 to 1.7 in. for all types of applications.
Chris Angelou, V.P.
781/721-0048
www.edtc.com

ENDICOTT RESEARCH GROUP, 2601 Wayne St., Endicott, NY 13760
Manufacturers of a broad range of DC-AC inverters for powering CCFL-backlit LCDs from single- to multi-lamp designs. New Smart Force™ family of high-efficiency LED driver boards power a wide range of industrial and medical LED-backlit LCDs and can be used with Smart Force™ LED rails with proprietary thermal management. New Smart Force™ SFW Series of generic DC-to-AC inverters consists of only 12 part numbers that cover a wide range of applications for ease of selection. Pricing is competitive with key offshore competitors, while functionality is superior, including wide input voltages and onboard dimming.
Bill Abbott, Global Market Strategist
607/754-9187, fax 607/754-9255
email: sales@ergpower.com
www.ergpower.com

EPCONSEIL, 18 rue des Clos Saint Marcel, Sceaux, 92330, France
Providers of semiconductor and FPD device and technology sourcing; due diligence; economic intelligence; market surveys; and trading.
Edward Pierrot, Gen. Mgr.
+33-1-46-60-62-17
email: edward.pierrot@epconseil.com
www.epconseil.com

EPIX, INC., 381 Lexington Dr., Buffalo Grove, IL 60089
Designers and manufacturers of frame grabbers, cameras, image acquisition, and processing software, and video to disc computer. Systems for machine vision, medical imaging, high-speed video analysis, and a variety of other applications.
Charlie Dijak, Sls. Mgr.
847/465-1818, fax -1919
email: sales@epixinc.com
www.epixinc.com

ERGOTRON, INC., 1181 Trapp Rd., St. Paul, MN 55121
Manufacturers of display-mounting solutions, including wall- and desk-mount arms, desk stands, mobile carts, floor stands, and vertical lifts. Each product is designed to enhance the viewing experience, reduce stress, and improve productivity in todays computing and entertainment environments.
651/681-7600, fax -7715
email: sales@ergotron.com
www.ergotron.com

ESTERLINE ADVANCED INPUT SYSTEMS, 600 W. Wilbur Ave., Coeur d'Alene, ID 83815
Operators of a world-class ISO 9001:2000 certified facility that incorporates a full service design-to-manufacture methodology for its customers. Specializing in custom control panels, input systems, and applications-specific keyboard solutions. Diverse customer base includes major medical, industrial, military, and gaming industry OEMs worldwide.
Janice Kelly, Mktg. Asst.
208/635-8316, fax 208/635-8716
email: jkelly@advanced-input.com
www.advanced-input.com

EUROPTEC, Aeschwuhrstr. 21, Oftringen CH-4665, Switzerland
Manufacturers of display-enhancement products such as ruggedized etched antireflective filters, high-impact safety glass, electromagnetic shielding, glass and polymer laminates, screen printing, reflective filters, etc.
Andreas Lauterburg, CEO
+41-62-788-7777, fax -7779
email: info@EuropTec.com
www.EuropTec.com

EUROTECH / APPLIED DATA SYSTEMS, 10260 Old Columbia Rd., Suite G, Columbia, MD 21046
Developers of systems that run low-power-consuming small mobile wireless applications with display interfaces and power applications for verticals such as POS/kiosks, digital signage, medical instrumentation, etc.
Hilary Tomasson, VP Mktg.
301/490-4007 x113, fax -4582
email: hilary.tomasson@eurotech.com
www.eurotech-inc.com

EVAPORATED COATINGS, INC., 2365 Maryland Rd., Willow Grove, PA 19090
Manufacturers of standard and custom coatings for military, aerospace and commercial industries. Coatings include night vision (NVIS) filters, anti-reflection, indium tin oxide (ITO), transparent gold, anti-static, and other custom composite transparent conductive coatings. These films are utilized in applications that demand excellent durability and environmental stability including heads-up displays, RFI/EMI shielding, heaters, LCD fabrication, LED products.
Patrick Wenrich, Sls. Engr.
215/659-3080, fax 215/659-1275
email: sschaffer@evapcoat.com
www.evaporatedcoatings.com

EVERBOUQUET INTERNATIONAL CO., LTD., 13F-3, No. 8, Lane 280, Sec. 6, Minchuan E. Rd., Nei-Hu 114, Taipei, Taiwan
Worldwide LCD supplier of medium- and small-sized standard, custom, and semi-custom TFT-LCDs, STN-LCDs, FSTN-LCDs, TN-LCDs, HTN-LCDs, etc. ISO certified.
Doris Shiao, Sls. Mgr., Intl.
+886-2-2633-1253, fax +886-2-2631-2881
email: rayharn@everbouquet.com.tw
http://www.everbouquet.com.tw/

EXFO PHOTONIC SOLUTIONS, INC., 2260 Argentia Rd., Mississauga, Ontario L5N 6H7, Canada
Designers and manufacturers of UV spot-curing systems. In-line spot curing delivers unmatched levels of precision, control, and repeatability to a broad range of manufacturing processes.
Tim Adams, Dir. Sls. & Mktg.
905/821-2600, fax 905/821-2055
email: bdg.toronto@exfo.com
www.exfo.com

EXITECH, INC., 10216 NW 47 St., Sunrise, FL 33351
Builders of industrial laser machining systems for the manufacture of microlens arrays and precision patterning of thin films and black-matrix materials for DPDs, LCDs, ELs, OLEDs, and FEDs. Also, operation of a laser R&D applications development laboratory.
Mike Heglin, Sls. Mgr.
954/746-3717, fax -6336
email: mheglin@exitechinc.com
www.exitechinc.com

EYESAVER INTERNATIONAL (ESI), 348 Circuit St., Hanover, MA 02339
Manufacturers of custom value-added display-enhancement filters, specializing in optical film laminations and LCD brightness-enhancement. Products include A/R-coated glass and acrylic, ITO glass, view-control films, A/R and A/G films, and anti-glare films, EMI shielding, vandal-resistant filters, and IR-blocking films. Lamination capabilities include LCD enhancements, vandal-resistant filters, and large-format lamination for screens up to 120 in. 50,000 sq. ft. manufacturing facility equipped with four clean rooms.
Marianne Wilson, Mgr., Sls./Mktg.
781/829-0808, fax -9963
email: mwilson@eyesaverinternational.com
www.eyesaverinternational.com

FIMI PHILIPS, via S. Banfi 1, Saronno 21047, Italy
Designers and manufacturers of displays for professional applications such as medical and public information. Providers of innovative and advanced solutions meeting specific customer requirements.
Silvio Bonfiglio, Mktg. Mgr.
+39-02-9617-5237, fax -5305
email: Silvio.Bonofiglio@philips.com
www.fimi.philips.com

FIVE STAR TECHNOLOGIES, INC., 6801 Brecksville Rd., Suite 200, Independence, OH 44131
Manufacturers of ElectroSperse™ conductive inks and pastes, designed for use as electrodes, linearization patterns, and interconnects in touch screens and displays. ElectroSperse inks enable direct printing of fine-line interconnects for use in projected capacitive and resistive touch sensors. Select grades also offer lower firig temperatures, resulting in lower ITO resistance shift.
Timothy E. Fahey, V.P., Business Development
216/447-8497, fax 216/447-9424
email: sales@fivestartech.com
www.fivestartech.com

FONON DISPLAY & SEMICONDUCTOR SYSTEMS, 3217 Yattika Pl., Longwood, FL 32774
Providers of laser equipment as a standalone system or as a component for an in-line system, specializing in the semiconductor and flat-panel-display industries.
Edgardo Rodriguez, Sls. Mgr.
407/804-1000, fax -1002
email: fonon.dss@fonon.com
www.fonon.com

FONON TECHNOLOGY INTERNATIONAL, 400 Rinehart Rd., Lake Mary, Fl 32746
Inventor and manufacturer of laser equipment based on Zero Width Laser Cutting Technology® (ZWLCT®). Provider of innovative and effective laser and industrial technology, focusing on high-growth industries for advanced laser-based material processing equipment.
Teri Edwards, Sls. Admin.
407/804-1000, fax -1002
email: dnikitin@fonon.com
www.fonon.com

FORTH DIMENSION DISPLAYS, LTD., 7 St. Davids Dr., St. Davids Business Park, Dalgety Bay, Dunfermline, KY11 9NB, Scotland
Developers, manufacturers, and suppliers of digital time-domain imaging (TDI™) single-chip microdisplays using a proprietary fast-switching liquid-crystal technology.
Robert Hoffman, Sls. Dir.
661/257-0960, fax -4210
email: sales@forthdd.com
www.forthdd.com

FRAUNHOFER INSTITUTE FOR APPLIED OPTICS AND PRECISION ENGINEERING (IOF), Albert Einstein Str. 7, Jena 07745, Germany
Application-oriented research and development at Fraunhofer IOF focuses on optical systems technology with a view to continually improving the control of light from generation via guiding and manipulation up to its application. A unique feature of the Fraunhofer IOF is the combination of expertise in optics and precision mechanics. The IOF designs and develops costumer-specific solution for optical systems.
Stefan Riehemann
+49-3641-807-236, fax +49-3641-807-602
email: stefan.riehemann@iof.fraunhofer.de
www.iof.fraunhofer.de

FRAUNHOFER INSTITUTE FOR PHOTONIC MICROSYSTEMS, Maria-Reiche Str. 2, Dresden 01109, Germany
Providers of customer specific developments in fields of microelectronic and microsystems technology in Dresden, serving as a business partner that supports the transition of innovative ideas into new products. Develops and fabricates innovative MEMS technology products in its own clean-room facilities, up to small pilot series production. With modern equipment and about 240 scientists, the range of projects and expertise covers sensor and actuator systems, microscanner, spatial light modulators, lifetronics and organic materials and systems.
Ines Schedwill, Mktg./PR
+49-351-8823-238, fax -266
email: Ines.Schedwill@ipms.fraunhofer.de
www.ipms-fraunhofer.de

FRESNEL TECHNOLOGIES, INC., 101 W. Morningside Dr., Ft. Worth, TX 76110
Manufacturers of molded plastic Fresnel lenses and related optical components, as well as IR transmitting materials and optics made from them. Specialties include lens arrays for passive IR applications, diffusers and microlens arrays for illumination, and optics for environmental monitoring at 3.4 µm. Design assistance, tooling, and production services and diamond machining available.
Nelson E. Claytor, Pres.
817/926-7474, fax -7146
email: nclaytor@fresneltech.com
www.fresneltech.com

FUJIFILM DIMATIX, INC., 2230 Martin Ave., Santa Clara, CA 95050-2704
Providers of piezoelectric printheads, micro-pumps, and related components including printing systems for manufacturing and proto-

typing FPDs, PLED displays, flex circuits, RFID antennas, PCBs, photovoltaic devices, fuel cells, EAS, and other applications requiring the precise deposition of functional fluids.
Tim Luong, Sls. Engr.
408/565-7455, fax -0311
email: tluong@dimatix.com
www.dimatix.com

FUJITSU COMPONENTS AMERICA, INC., 250 E. Caribbean Dr., Sunnyvale, CA 94089
Supplier of 4-, 5-, and 7-wire resistive touch panels in 1.8–17.3-in. (diagonal) sizes using film-glass, film-film, and film-film-plastic construction. Many are available off-the-shelf and some are designed to fit standard-sized LCDs to simplify and reduce OEM product development time. Also, developers of custom panels to meet product's specifications. All Fujitsu touch panels are RoHS compliant.
Bruce DeVisser, Prod. Mktg. Mgr.
408/745-4928, fax -4971
email: bdevisser@fcai.fujitsu.com
http://us.fujitsu.com/touchpanels

FUSION OPTIX, 179 Sidney St., Cambridge, MA 02139
Offering a range of light-management solutions for the display industry, including high-performance optical films such as volumetric diffusers and system solutions such as LED backlight-unit designs.
Chuck French, VP Mktg.
617/649-1010 x105, fax -1015
email: chuck.french@fusionoptix.com
www.fusionoptix.com

G2D TECHNOLOGIES, LLC, 17702 E 108th St N, Owasso, OK 74055
Consultants specializes in teaching manufacturers to do their own display enhancements, including Direct Optical Bond (sometimes called Index Matching). The G2D Direct Bond process will never yellow or crystallize and the process is reworkable to eliminate scrap.
Dan Holden, Dir Customer Development
918/272-4710
email: dan.holden@g2dtech.com
www.g2dtech.com

GAMMA SCIENTIFIC, 8581 Aero Dr., San Diego, CA 92123
For over 45 years, providers of display test and measurement equipment. Currently providing NIST-traceable test and measurement services as well as manufacture display measurement and characterization equipment, including high-sensitivity spectroradiometers, gonio-spectroradio-meters, photometers, primary standards, and tungsten-and LED-based light sources and standard light sources.
Eric Nelson, Sls. Mgr.
858/279-8034, fax 858/576-9286
email: info@gamma-sci.com
www.gamma-sci.com

GE PLASTICS, 1 Plastics Ave., Pittsfield, MA 01201
Providers of materials solutions through engineering thermoplastic resins, films, silicone-based products and technology platforms. As a global materials supplier and distributor, GE provides solutions to customers in multiple industries, including displays.
Michael Ku, Global Industry Mgr.
email: michael.ku@ge.com
www.geplastics.com

GE SILICONES, 260 Hudson River Rd., Waterford, NY 12188
Manufacturers of silicone products used for display assembly, for the environmental/ thermal protection of internal components, and for hardcoating plastics. Products include adhesives, sealants, potting/encapsulant compounds, conformal coatings, and hardcoats.
Sara Korzen, Mktg. Mgr.
518/233-5692, fax -3938
email: sara.Korzen@ge.com
www.gesilicones.com

GENERAL DIGITAL CORP., Optical Bonding Laboratories, 8 Nutmeg Rd. S., South Windsor, CT 06074
Providers of optical bonding, film lamination, and optical film-enhancement product and services. Capable of delivering sunlight-readable LCDs through backlight enhancement, film enhancement, bonding, or a combination of all. Also, providers of LCD ruggedization and specialization or customization.
Tenell Rhodes, V.P. Sls.
860/282-2900 x145, fax -2244
email: SID@generaldigital.com
www.GDOptiLabs.com

GENESIS MICROCHIP, INC., 2525 Augustine Dr., Santa Clara, CA 95054
Providers of imaging- and video-processing systems enabling superior picture quality in flat-panel TVs, LCD-monitor products, and other consumer-electronics products. The company is the primary driver of the new DisplayPort digital interface standard.
Ernest Lin, Sr. V.P. Pres., Worldwide Sls.
408/919-8400, fax 408/986-9644
email: ernest.lin@gnss.com
www.gnss.com

GENNUM CORP., 4281 Harvester Dr., Burlington, Ontario L7L 5M4, Canada
Incorporating specialized algorithms, the GF9350 with VXP™ technology provides adaptive de-interlacing and 10-bit image processing for exceptional image quality in display applications up to 1080p. The GS8000 HDMI/DVI Equalizer allows for extended HDMI/DVI cable lengths.
Nancy Wong, Mktg. Comm. Spec.
905/632-2999 x4160, fax 905/633-7033
email: nancy-w@gennum.com
www.gennum.com

GERMAN FLAT PANEL DISPLAY FORUM (DFF), Lyoner Str. 18, 60528 Frankfurt/Main, Germany
An industry-led association of European FPD material and component suppliers, equipment manufacturers, display manufacturers, system integrators, end users, and research institutes. With more than 65 member companies, the DFF is promoting the leading position of the European FPD industry and working together on a networking platform across the entire value chain, leading to new business opportunities. DFF provides its members with working groups and DFF advocacy, news services, training and eduaction, fairs and conferences, and competence brochure.
Susanne Bieller, Managing Director
+49-69-6603-1633, fax -2633
email: susanne.bieller@vdma.org
www.displayforum.de

GIANTPLUS TECHNOLOGY CO., LTD., No. 15, Industrial Rd., Lu-Chu Li, Toufen 351, Miaoli Hsien, Taiwan, R.O.C.
Designers and manufacturers of small-to-medium-sized LCD panels and modules.
Jack Cheng, Sls. Dir.
+886-37-611-611 x18100, fax -612
email: jackcheng@giantplus.com.tw
www.giantplus.comtw

GLASWERKE HALLER GmbH, Alte Quernheimer Strasse 24, 32278 Kirchlengern, Germany
Processors of technical glass for all kinds of displays. Specializing in glass for ATM, public displays, and kiosk systems with AR (anti-reflection) or AG (anti-glare) coating. Also, offering all types of heating glass, UV- and IR-radiation shielding, and vandalismn protection.
Norbert Alluskewitz, Sls. Mgr. Export
+49-52-23-75-71-19, fax +49-52-23-75-71-36
email: alu@hallerglas.de
www.hallerglas.de

GLOBAL LIGHTING TECHNOLOGIES (GLT), INC., 55 Andrews Circle, Brecksville, OH 44141
Developers of the patented MicroLens™ pixel-based light-extraction technology which enables the production of the most-efficient LED-based LCD backlights featuring higher brightness, reduced parts count, and lower cost for applications from portables/handhelds to LCD TVs. New MicroLens™ light guides offer exceptional thinness (down to 0.4 mm or less) to provide the slimmest molded light guide. BLUs available for backlighting LCDs and keypads/keyboards in a wide array of consumer products, including smart phones and laptop and desktop PCs. Three far-east production facilities enable fast delivery of production quantities of MicroLens™ molded light guides.
David DeAgazio, Dir. Sls. Worldwide
440/922-4584, fax -4585
email: info@glthome.com
www.glthome.com

GM NAMEPLATE, 2040 15th Ave. W., Seattle, WA 98119
Custom manufacturers of 4-wire, 5-wire, and X-Y matrix touch screens and user interface displays. Offering design and engineering assistance, along with many value-added capabilities including bezels, housings, membrane switch overlays, and shielding.
Melissa Sherrard, Mktg. Mgr.
206/284-2200, fax -3705
email: info@gmnameplate.com
www.gmnameplate.com

GRAFTECH INTERNATIONAL, LTD., 12900 Snow Rd., Parma, OH 44130
Manufacturers of the eGraf® Spreader-shield™ natural-graphite heat spreaders that are thermal-management solutions having high in-plane thermal conductivity. Available with P/S adhesives, they are effectively used in PDP and LCDs to spread and dissipate heat. The heat spreaders are available in sheet form, can be laminated with a number of materials, and are easy to roll or die cut to any size, shape, and thickness. Their thermal conductivity can be custom designed, tailorable up to 500 W/mK, with form factors to meet customer needs.
David Longscherff, Dir. Sls.
717/285-2657
email: david.longscherff@graftech.com
www.egraf.com

GUNZE USA, 2113 Wells Branch Parkway, #5400, Austin, TX 78728
Manufacturers of transparent analog-resistive touch panels adhering to the highest-quality standards in custom designs and standard products, including circular polarizers and anti-reflective treatments in the 4, 5, and 8-wire glass and polycarbonate substrates.
John W. Stetson, Sls. Mgr.
512/990-3400, fax 512/252-1181
email: sales@gunzeusa.com
www.gunzeusa.com

GZO TECHNOLOGIES, LLC, 17702 E. 108 St. North, Owasso, OK 74055
Provides support to manufacturers on how to bring the optical direct-bond process in-house. The process is guaranted not to yellow or crystalize. Also, has the expertise in automation, UV protection, ruggedization, and GPS receivers.
Dan Holden, Dir. Sls.
877/227-4710
email: dan.holden@GZDtech.com
www.GZDTECH.com

H. W. SANDS CORP., 1003 W. Indiantown Rd., Suite 215, Jupiter, FL 33458
Providers of innovative high-quality applications in security, imaging, transaction cards, electrophotographic, and custom synthesis. Three divisions: (1) specialty chemicals for the imaging industry; (2) card-technology materials including NIR-blockiing inks along with function, decorative, and security materials provider; and (3) SANDS-SECURE® security materials, products, and solutions for anti-counterfeiting, brand protection, piracy, fraud, and diversion.
Jeffrey Strahl, V.P.
+1-561/743-8090, fax +1-561-743-4088
email: jstrahl@hwsands.com
www.hwsands.com & www.sands-secure.com

HAMPSHIRE CO., INC., 3227 N. 31st St., Milwaukee, WI 53216
Manufacturers of touch-screen controllers and software technology (TSHARC™). Electronics and software solutions support all analog and resistive and capacitive touch screens regardless of the manufacturing technology.
Kevin Brown, Sls. Mgr.
414/873-4675, fax -4775
email: kbrown@hampshirecompany.com
www.hampshirecompany.com

HEATRON, INC., 300 Wilson Ave., Leavenworth, KS 667048
Offering a wide range of high-power LED-lighting design, development and manufacturing services, technology competencies including optics, thermal management, power sources and drivers, cost-effective production and assembly capabilities, and in-depth industry and technology expertise.
Chris Knopp, Account Mgr.
913/651-4420, fax -5352
email: sales1@heatron.com
www.heatron.com

HINDS INSTRUMENTS, INC., 7245 NW Evergreen Pkwy, Hillsboro, OR 97124
Provider of birefringence measurement technology for metrology applications. The Exicor® product line provides high sensitivity and speed for mapping in-plane and vertical birefringence in a variety of optical materials and components.
Doug Mark, Sls. Engr.
503/690-2000, fax -3000
email: sales@exicor.com
www.exicor.com

HITACHI ELECTRONIC DEVICES USA, 1000 Hurricane Shoals Rd., Lawrenceville, GA 30043
Offering a variety of small-to-medium-sized STN, CSTN, and TFT displays utilizing CCFL and LED backlighting, high brightness, wide viewing, and touch-panel technologies. Also offering value-added driver boards (Chameleon Brand) which provide customers with complete display head for immediate use.
Thom Schmitt, Gen. Mgr. Sls.
770/409-3020, fax 770/409 3028
email: Thom.Schmitt@hedus.com
www.hedus.com

HONG KONG APPLIED SCIENCE & TECHNOLOGY RESEARCH INSTITUTE CO., LTD., 1/F Photonics Centre, 2 Science Park East Ave., Hong Kong Science Park, Shatin, Hong Kong
Developers of backlight units to serve different customer needs, including low-cost LED backlight modules, an active dynamic driving scheme that provides high image quality, low-power consumption, and simple thermal management without the need for color filters.
Enboa Wu, V.P.
+852-3406-2866, fax -2801
email: enboa@astri.org
www.astri.org

HORIBA JOBIN YVON, 3880 Park Ave., Edison, NJ 08820
HORIBA offers a wide range of metrology solutions for the display industry. From spectroscopic ellipsometers to characterize multiple film thickness and optical constants to mass-flow controllers for gas control, residual gas analyzer for vacuum measurements, and mask particle-detection systems. Providers of solutions at each FPD processing step.
Eric Teboul, Dir., Thin Film Div.
732/494-8660, fax -8796
email: eric.teboul@jobinyvon.com
www.jobinyvon.com

HORIZON TECHNOLOGY, 1 Rancho Circle, Lake Forest, CA 92630
Offering a full range of display products and solutions, including LCD screens, inverters, controller boards, touch screens, LCD kits, industrial and medical displays, and sunlight-readable displays.
Matthew Cutone, V.P. Sls.
949/595-8244, fax -8248
email: display@horizontechnology.com
www.horizontechnology.com

HOUSE OF BATTERIES, 10910 Talbert Ave., Fountain Valley, CA 92708
Batteries nad custom battery-pack assemblies.
Steve Hanley, Sls. Mgr.
1-800-432-3385, fax 714/962-7644
email: sales@houseofbatteries.com
www.houseofbatteries.com

HUMAN FACTORS AND ERGONOMICS SOCIETY, P.O. Box 1369, Santa Monica, CA 90406-1369
The 4400 members of HFES include psychologists, engineers, designers, and scientists worldwide who share the goal of systems, tools, consumer products, environments, and equipment that are safe and effective for those who operate and maintain them.
Lois Smith, Commun. Dir.
310/394-1811, fax -2410
email: lois@hfes.org
www.hfes.org

HVT, INC., 3150 Clinton Ct., Norcross, GA 30071
HVT is a display repair depot with complete LCD-panel repair capabilities, tab and flex bonding, polarizer replacement, contact assembly, and prototype capabilities for all industries.
Jenny Holtsclaw, Bus. Dev. Mgr.
770/495-4881, fax -4885
email: jenny@hvtnet.com
www.hvtnet.com

i-CHIPS TECHNOLOGY, INC. / DAITRON, INC., 568 E. Weddell Dr., Suite 8, Sunnyvale, CA 94089
Designers and manufacturers of high-performance display processors for image scaling, video de-interlacing, and frame-rate conversion. Applications include flat-panel displays, video walls, projections, scan converters, broadcast equipment, and medical imaging systems.
Pierre Sicard, Product Line Mgr.
408/541-0156 x101, fax -0792
email: psicard@daitron.com
www.i-chipstech.com

i-SFT GMBH, An der Weidenmuehle 2, 67598 Gundersheim, Germany
Manufacturers of customized AMLCDs. Ruggedized display modules are engineered using leading-edge technology to be super efficient, extremely reliable, and robust.
Peter Bullen, Dir., Intl. Sls.
+49-6244-9197-378, fax -333
email: peter.bullen@i-sft.de
www.i-sft.de

THE IFM COMPANY, LTD., Cherwell Innovation Centre, 77 Heyford Park, Upper Heyford, Bicester, Oxfordshire OX25 5HD, U.K.
IFM uses novel, patented technology to provide a controllable electronic display that is sunlight readable, achieved by combining plastic LCDs, transflective layers, and EL backlights for nighttime illumination into thin formidable displays.
Nick Herring, Sls. & Mktg. Mgr.
+44-(0)-1869-238-060, fax -061
email: nick.herring@theifmcompany.com
www.theifmcompany.com

IMAGE SYSTEMS DIV./RICHARDSON ELECTRONICS, 12975 12th Ave. N., Plymouth, MN 55441
Providers of medical and custom displays (LCDs and CRTs), calibration products, software, lamination, and integration services.
Geoff Smith, Bus. Devel. Mgr.
952/935-1171, fax 952/935-1386
email: geoffs@rell.com
www.imagesystemscorp

IMAGINE GRAPHICS, LTD., 14 Alban Park, Hatfield Rd., St. Albans AL4 0JJ, U.K.
Manufacturers and distributors of Pixel Perfect™ AGP and PCI graphics cards with truly pixel-accurate resolutions. Windows drivers with screen rotation for all makes and models of wide-screen displays. Digital, analog, and HDTV outputs. Custom and OEM developments available.
Jonathan Law, Sls. Mgr.
+44-(0)-1727-844-744, fax +44-(0)-1727-811-660
email: sales@imaginegraphics.co.uk
www.imaginegraphics.co.uk

IMMERSION CORP., 801 Fox Lane, San Jose, CA 95131
Manufacturers of TouchSense® actuators, control boards, and firmware that allow tactile feedback to be added to touch screens, providing the sensation of pressing physical buttons. Results can include unmistakable confirmation, improved interactivity and usability, and power differentiation.
Steve Kingsley-Jones, Dir. Prod. Mgmt.
408/467-1900, fax -1901
email: skingsleyjones@immersion.com
www.immersion.com

INDUSTRIAL DISPLAYS, 15 Minneakoning Rd., Suite 105, Flemington, NJ 08822
Designers and manufacturers of display products for industrial, marine, and military applications with and without touch screens. Extensive experience in sunlight-readable and deep-dimming applications.
Jerry Kalajian
908/806-2255, fax -3376
email: Jerry@IndustrialDisplays.com
www.IndustrialDisplays.com

INDUSTRIAL ELECTRONIC ENGINEERS (IEE), 7740 Lemona Ave., Van Nuys, CA 91405
Specializing in the development, design, manufacture, enhancement, and ruggedization of electronic displays. Capability of integrating any combination of display, keypad, touch screen, interface, controllers, cable, backlight, and mechanical packaging.
Edwin Bernard
818/787-0311 x237, fax 818/782-3798
email: ebernard@ieeeinc.com
www.ieeinc.com

INFORMATIVE VIEW, 689 Pinehurt Dr., Rio Vista, CA 94571
Consulting services for technical, marketing, and business appraisals of new products in electronic displays, lamps, ergonomics, and electronic materials. Expertise includes signage, avionics, OLEDs, electroluminescence, LCDs, FEDs, field-emission cathodes, backlighting, phosphors, and filters.
Paul H. J. Beatty, Consultant
707/374-3077, fax 707/374-3077
email: phjbeatty@informativeview.com
www.informative.com

INNOVATIVE OFFICE PRODUCTS, INC., 100 Kuebler Rd., Easton, PA 18040
Manufacturers of flexible ergonomic mounting arms and supports for flat-panel monitors, CRTs, and keyboards. Custom design and OEM services available.
Tim Jancar
1-800-524-2744, fax 610/253-9521
email: sales@lcdarms.com
www.lcdarms.com

INSTEC, INC., 5589 Arapahoe Ave., Ste. 208, Boulder, CO 80303
Designers and manufacturers of microscope thermal stages, thermal chucks, and thermal plates with programmable precision temperature controllers. New products include automatic liquid-crystal test equipment, liquid crystall cells, and cell holders.
Henry Zou, Product Specialist
303/444-4608, fax -4607
email: sales@instec.com
www.instec.com

INSTRUMENT SYSTEMS GmbH, Neumarkter Str. 83, 81673 Munich, Germany
Manufacturer of light-measuring instruments for research and industrial applications. Turnkey solutions are offered for LED and display measurements on a spectroradiometric base. The portfolio includes array and scanning sprectoradiometers, imaging photometers and colorimeters, integrating spheres, goniometers, led test sockets, and optical probes.
Petra Jürgens, Mtkg.
+49-89-45-49-43-0, fax +49-89-45-49-43-11
email: info@instrumentsystems.com
www.instrumentsystems.com

INTEGRAL VISION, INC., 49113 Wixom Tech Dr., Wixom, MI 48393
Manufacturers of SharpEye™ and IVSee™ inspection stations for the detection of functional and cosmetic defects in LCOS, OLED, MEMS, e-paper, LCD, and other emerging display technology panels. New products include LumenEye™, a photometric measurement system.
Arthur Harmala, V.P. Sls.
248/668-9230, fax -9384
email: aharmala@iv-usa.com
www.iv-usa.com

INTELICOAT TECHNOLOGIES, 700 Crestdale St., Matthews, NC 28105
Stratfx™ hardcoat films in clear and antiglare versions that are chemical and abrasion resistant in widths of up to 60 in. Optically clear adhesive films: regular or low-tack free-standing PSA with high adhesion in widths up to 60 in.
Jon Hayward, Bus. Mgr., Optical Films
704/845-4398, fax -4335
email: jhayward@intelicoat.com
www.intelicoat.com

INTELLIMATS LLC, 3959 Electric Rd. SW, Ste. 330, Roanoke, VA 24018
Manufacturers and distributors of the only dynamic digital floor display. A wireless Windows-based PC is incorporated inside a portable floor-mat display less than 1 in. thick with four 15-in. LCD screens, creating a 30-in. viewing area. Non-slip, portable, unique, and networkable.
Debra Saunders, Dir. Mktg. & Sls.
540/904-5670 x103, fax 540/904-5673
email: dsaunders@intellimat.com

INTERFACE DISPLAYS & CONTROLS, INC., 4630 North Ave., Oceanside, CA 92056-3509
Engineering and design of custom AMLCDs for rugged applications. MCDU, CDU, and flat-panel displays qualified to RTCA D0 160D, ARINC 739A-1 with Ethernet, RS 232, 422 NTSC, and RS-170. COTS operating systems (VX Works®, MS Windows®, XPE, etc.) applications software.

Brent Barker, V.P. Sls. & Mktg.
760/945-0230, fax -0239
email: bbarker@interfacedisplays.com
www.interfacedisplays.com

INTERNATIONAL DISPLAY CONSORTIUM (IDC), 4080 McGinnis Ferry Rd., Ste. 1007, Alpharetta, GA 30040
Distributors of NEC factory-built displays in various sizes for applications requiring high-temperature harsh-environment color LCDs featuring square configurations, as well as traditional portrait and landscape configurations.
Greg Echols, Pres.
770/886-3960, fax -3978
email: greg@idclcd.com
www.idclcd.com

INTERTECHPIRA, 19 Northbrook Dr., Portland, ME 04105
Providing industry executives with strategic information and analyses pertaining to advanced materials and technologies driving development of innovative products. Serving niche segments of the lighting and displays, high-performance color fillers and fibers, energy and advanced materials, and electronic materials and devices industries by producing international conferences and publishing focused, relevant reports on which actionable business decisions can be based. Industry executives benefit by identifying the market and technical trends affecting their business.
Patricia Kinzer, Head of U.S. Production
207/781-9604, fax -2150
email: pkinzer@intertechusa.com
www.intertechpira.com

IR TOUCH SYSTEMS, CO., LTD., 6 Cranford Ave., San Carlos, CA 94070
Providers of robust IR touch screens from 6 to 100 in., with superior optical clarity, fast response time, high accuracy, and scratch resistance. Includes no-drift and vandal-proof features for demanding indoor/outdoor applications.
Cindy Wang, Bus. Devel. N.A.
650/585-2195, fax -2340
email: cindy@irtouchusa.com
www.irtouchusa.com.

ISRA SURFACE VISION, 4357 Park Dr., Suite J, Norcross, GA 30093
Providers of glass-inspection solutions that span all phases of the glass-production process from drawing to the final-quality inspection. Manufacturers of automated glass inspection for the flat, automotive, display, coated, and architectural glass markets.
David Beck, Acct. Mgr. Glass
770/449-7776, fax -0399
email: info.surface@isravision.com
www.isravision.com

iSUPPLI CORP., 1700 E. Walnut Ave., Suite 600, El Segundo, CA 90245
A global leader in displays and electronics value chain research. Covering all aspects of the displays market and providing comprehensive and reliable market-intelligence available.
Jennifer Bamber-Repcik
310/524-4007, fax -4050
email: info@isuppli.com
www.isuppli.com

ITI CORP., 8401 Baseline Rd., Boulder, CO 80303
Providers of integrated engineering services including design, development, and manufacturing of industrial ink-jet deposition and printing solutions and ink-jet development tools which deliver outstanding performance and cost-effective operation for high-value production processes.
Cindy Morgan, V.P. Dev. Tools
303/443-1036, fax -6191
email: CMorgan@iticorp.com
www.imagingtechnology.corp.com

ITO AMERICA CORP., 7700 S. River Pkwy., Suite 1650, Tempe, AZ 85284
Providers of equipment, materials, and components used in display module and high-precision board assembly. Primary focus is on anisotropic conductive film and related technologies such as precision SMT or weilding.
Eric Thran, Tech Sls. Mgr.
480/998-2250, fax 602/296-0483
email: customerservice@itousa.com
www.itousa.com

ITT ELECTRONIC COMPONENTS, 666 East Dyer Rd., Santa Ana, CA 92705
Suppliers of connectors, including circular, rectangular, fiber-optic, rf, power and high voltage, audio and application custom-specific connectors, PCMCIA and compact flash-card connectors and enclosures, and cable assemblies.
Allison Turner, Mktg. Commun. Mgr.
617/969-3700, fax 617/243-8380
email: allison.turner@itt.com
www.ittcannon.com

J. A. WOOLLAM CO., INC., 645 M St., Ste. 102, Lincoln, NE 68508
Manufacturers of the FP M-2000 that provides thickness and refractive-index metrology on single- and multiple-layer films used in the display industry, including ITO, a-Si, polysilicon, SiO_2, nitride, resist, color filters, metal films, and more.
James Hilfiker, Sls/Mktg. Mgr
402/477-7501, fax -8214
email: sales@jawoollam.com
www.jawoollam.com

JACO ELECTRONICS, INC., 145 Oser Ave., Hauppauge, NY 11788
Provider of display technology. Designers, developers, and integrators of comprehensive flat-panel-display and embedded-computing solutions for a myriad of markets and applications.
Leslie J Girsky, V.P. Bus. Develop.
877/373-5226 x3067, fax 631/231-1051
email: lgirsky@jacoelect.com
www.jacodisplays.com

JAE ELECTRONICS, 142 Technology Dr., #100, Irvine, CA 92618
Manufacturers of electrical connectors for use in the data/telecom, mobile wireless, consumer, computer, industrial, instrumentation, medical, and automotive industries. Provider of the electronics industry with solutions to complex design requirements.
Julia Marin, Mktg. Svcs. Mgr.
949/454-6077, fax 949/753-2699
www.jae.com

JDS UNIPHASE, 2789 Northpoint Pkwy., Santa Rosa, CA 95407
Providers of products for projection and direct-view displays: front-surface mirrors; light-engine components including color wheels and UV/IR filters; and direct-view AR coatings, conductive AR coatings, ruggedized display filters, mesh laminates, LowOhm™ ITO coatings, and thin-film LCD heater panels.
Commercial and Consumer Product Sales
707/525-6957, fax -7841
email: customer.services@jdsu.com
www.jdsu.com

JENOPTIK AUTOMATISIERUNGSTECKNI, Konrad-Zuser Str. 6, Jena 07745, Germany
Specializing in laser-based solutions for the TFT industry. Applications include precision laser cutting of glass as well as ceramics and semiconductors using the "Made in Germany" benchmarked VOTAN laser systems.
Michael Degel, Prod. Mgr.
+49-3641-651890, fax -653408
email: michael.degel@jenoptik.com
www.automation-jenoptik.com

JIYA LCD CO., 615 Acorn St., Deer Park, NY 11729
Manufacturers of LCD products and LCM technology, consisting of TN, STN, and FSTN types and resolutions of up to 640 x 480.
David Cheng, Mgr.
631/595-1515, fax -1521
email: micny@erols.com
www.jiyalcd.com

JKL COMPONENTS CORP., 13343 Paxton St., Pacoima, CA 91331
Supplier of custom cold-cathode fluorescent lamps, specialty UV fluorescent lamps, CCFL inverters, and custom-engineered backlight assemblies for high-bright LCD panels. Provides the aircraft, automotive, and medical industries with color-matched LED, xenon, and krypton high-intensity lamps, indicators, and displays.
Jon Cole, Sls. Rep.
818/421-7244 x123, fax 818/897-3056
email: sales@jkllamps.com
www.jkllamps.com

KAWASAKI MICROELECTRONICS, 2570 N. First St., 3rd Floor, San Jose, CA 95131
Provider of application-specific integrated-circuit (ASIC) technology. Image-processing ASIC intellectual property for LCD panels can make poor panels look better and good panels look great. Other ASIC IP for LCDs include frame-rate control, LVDS Rx/Tx, RSDS Tx, Mini-LVDs Tx, voltage detector, on-chip oscillator, SSCG (analog/digital), I^2C controller, and PPL.
1-888-500-5574, 408/570-0555
www.k-micro.us

KEITHLEY INSTRUMENTS, INC., 28775 Aurora Rd., Cleveland, OH 44139-1891
Manufacturers of electrical test instruments and systems to meet measurement needs in production testing, process monitoring, product development, and research. End uses include advanced materials research, semiconductor device testing, and production of electronic products.
Ellen McDock
440/248-0400, fax -6168
email: publisher@keithley.com
www.keithley.com

KENT DISPLAYS, INC., 343 Portage Blvd., Kent, OH 44240
A leader in the advancement of ChLCD products on glass, plastic, and other substrates. An array of standard display products is available on glass, with plastic ChLCD products to become available.
Tony Emanuele, Sls. Mgr.
330/673-8784, fax -4408
email: sales@kentdisplays.com
www.kentdisplays.com

KENT STATE UNIVERSITY, LIQUID CRYSTAL INSTITUTE, P.O. Box 5190, Kent, OH 44242-0001
The Industrial Partnership Program of the Liquid Crystal Institute provides educational and protyping services for developers of liquid-crystal devices. The LCI also accepts sponsored research projects related to displays.
Philip J. Bos, Assoc. Dir, LCI
330/672-2511, fax 330/672-2796
email: pbos@lci.kent.edu
www.lci.kent.edu

KLA-TENCOR, 160 Rio Robles, San Jose, CA 95134
Market segments span from semiconductor and data-storage manufacturing to MEMS, optoelectronics, material science, and general scientific research – a range of industries that measure surface topography to either control their process or research new material characteristics. Typical parameters measured include flatness, roughness, curvature, peak-to-valley, asperity, waviness, texture, volume, sphericity, slope, density, stress, bearing ratio, and distance mainly in the micron to nanometer range. Products range from benchtop stylus and optical profilers used in research environments to automated high-resolution profilers for advanced IC and data-storage production facilities.
Brian Crawford, Dir. Sls.
408/875-3000
email: brian.crawford@kla-tencor.com
www.kla-tencor.com

KLEIN INSTRUMENTS CORP., 321 S.W. Fourth Ave., Suite 200, Portland, OR 97204
Manufacturers of test equipment since 1983, including convergence gauges, colorimeters, and inspection microscopes. Also, precision calibration instruments for the commercial, medical, and military industries.
Mark Koepping, Sls. Mgr.
503/245-1012, fax -8166
email: sales@kleininstruments.com
www.kleininstruments.com

KONICA MINOLTA, 725 Darlington Ave., Mahwah, NJ 07430
Manufacturers and marketers of a complete line of display-measuring instrumentation. Included are instruments for measuring white balance and monitor calibration, light and light sources, color temperature, luminance, illuminance, and absolute chromaticity valves.
Janice Maurer, Special Project Mgr.
1-888-473-2656, fax 201/574-4201
email: jburke@ph.konicaminolta.us
www.konicaminolta.us

KONICA MINOLTA PHOTO IMAGING U.S.A., INC., Instrument Systems Div., 725 Darlington Ave., Mahwah, NJ 07430
Manufacturers of instruments for measurement and numerical control of white balance, convergence, chromaticity, spectral characteristics, and geometry of color displays, light meters, and spot meters to measure luminance, illuminance, chromaticity values, color temperature in Kelvin, and UV radiation.
John McCasland, Mktg. Services Mgr.
201/574-4251, fax -4201
email: jmccasland@ph.konicaminolta.us
www.minoltadisplay.com

KOPIN CORP., 125 North Dr., Westboro, MA 01581
Manufacturer of microdisplays for the consumer electronics, industrial, and military markets. Over 20 million CyberDisplays for digital cameras, personal video eyewear, thermal-weapon sights, and head-mounted displays have been shipped.
Alan Richard, Dir. Tech. Mktg.
508/870-5959, fax -0660
email: arichard@kopin.com
www.kopin.com

KORRY ELECTRONICS CO., 901 Dexter Ave. N., Seattle, WA 98109
Designers and manufacturers of AMLCD displays and Nightshield® night-vision filters for aerospace cockpit applications.
Bruce Mitchell, Dir. Sls.
206/281-1300, fax -1365
email: info@korry.com
www.korry.com

KRISTEL DISPLAYS L.P., 555 S. Kirk Rd., St. Charles, IL 60174-3406
Manufacturers of total LCD/CRT display solutions for OEMs. Complete LCD kits, open-frame modules, metal or plastic enclosed (6.446 in.). High-performance LCD enhancements, sunlight readable, anti-reflection, glassbonding, EMI/RFI shielding, and touch systems. Custom solutions available. ISO 9001:2000 certified.
Kevin Michael, Sls. Mgr.
630/443-1290 / 1-888-584-3963, fax -1390
email: sales@kristel.com
www.kristel.com

KUKA CONTROLS GmbH, 17821 E. 17th St., #160, Tustin, CA 92780
Developers of real-time software, operating systems, motion control, graphical interfaces, handhelds, dynamic algorithms, PC-based hardware, and application programming.
Ernie Rankin, Dir. Bus. Dev. USA
714/505-1485, fax 714/595-1149
email: sales@kuka-controls.com
www.kuka-controls.com

KUKA REAL-TIME PRODUCT, 17821 E. 17th St., #293, Tustin, CA 92780
Software development company specialiizing in real-time software, operating systems, motion control, graphical interfaces, handhelds, dynamic algorithms, PC-based hardware, and application programming.
Ernie Rankin, Bus. Dev., Americas
714/505-1485, fax -1149
email: sales@kuka-rtousa.com
www.kuka-rtousa.com

KURDEX CORP., Thin Film Equipment Div., 343 Gibraltar Dr., Sunnyvale, CA 94089
Manufacturers/suppliers of high-precision production equipment for large-area substrates up to 2 m. Providers of tools for R&D/pilot and high-volume production. Equipment products include sputtering, evaporation, box coaters, PECVD, RIE etching, and PR stripping. Options include stand-alone or configured to full automatic cassette-to-cassette reactors or cassette-less substrate transfer system, cluster, or in-line systems. Systems include flat panel display and solar cell manufacturing. Solar cell manufacturing equipment for wafers, glass and flex.
William H. Kneeland, Dir. Sls. & Mktg.
408/734-8181, fax -5151
email: whk@Kurdex.com
www.Kurdex.com

KURT J. LESKER CO., 1925 Rt. 51, Clairton, PA 15025-2700
Providers of sources and solutions for the deposition of organic materials. Manufacturers of the CMS Combinatorial and OLED systems based on the Octos®, Spectros®, and Luminos® platforms. Torus® produces magnetron sputter guns, organic material evaporation sources, materials/targets, and vacuum-related support products.
Duane Bingaman, V.P.
412/387-9200, fax 412/384-2745
email: salesus@lesker.com
www.lesker.com

KYOCERA INDUSTRIAL CERAMICS CORP., 5713 E. Fourth Plain Blvd., Vancouver, WA 98661
Manufacturers of LCD modules: color or monochrome, active-matrix (TFT) or passive-matrix (STN), transmissive or transflective, 320 x 240 to 800 x 480 formats, 4-in. diagonals, LED or CCFL backlights, optional 4-wire touch screens.
Joe Maurer, Distribution Sls. Mgr.
1-800-826-0527, fax 360/750-6184
email: joe.maurer@kyocera.com
www.americas.kyocera.com/kicc/LCD

L-3 COMMUNICATIONS, INTERSTATE ELECTRONICS CORP., 602 East Vermont St., Anaheim, CA 92803
Providers of GPS technologies and producers of ruggedized displays for military and industrialization applications.
Greg Martz, Commun. Mgr.
714/758-0500, fax -4148
email: Greg.Martz@L-3com.com
www.iechome

LABSPHERE, 231 Shaker St., P.O. Box 70, North Sutton, NH 03260
Provider of innovative test and measurement technologies for light measurement, sensor calibration, diffuse reflectance materials, and spectroscopy accessories.
603/927-4266, fax -4694
email: labsphere@labsphere.com
www.labsphere.com

LANDMARK TECHNOLOGY, 172 Component Dr., San Jose, CA 95370
Manufacturers of custom very-high-brightness (CCFL or LED) backlights, LCD modules, open-frame monitors in sizes from 6.4 through 42 in. LCDs. Also, high-performance inverters, LED driver boards, A/D adapters, dimming pots, and light sensors.
Ron Copps, V.P. Mktg. & Sls.
408/434-9302 x101, fax 408/434-0954
email: rcopps@landmarktek.com
www.landmarktek.com

LASER PHOTONICS, LLC, 41 Skyline Dr., Suite 1001, Lake Mary, FL 32746
Designers and manufacturers of industrial grade CO_2 *and fiber laser material processing equipment for the automotive, aerospace, medical, electronics, defense, semicoductor, and flat-panel-display markets. Applications include laser cutting, welding, cladding, scribing, dicing, singulation, UID marking, and engraving.*
Dmitri Nikitin, Pres.
407/804-1100, fax -1002
email: info@laserphotonics.com
www.laserphotonics.com

LC-TEC AUTOMATION AB, Tunavagen 281, Borlange SE-78173, Sweden
Offering both standard and customized manufacturing equipment for the LCD industry. Both manually controlled equipment for smaller-volume R&D manufacturing as well as fully automatic equipment for high-end volume manufacturing are available.
Peter Grufman, Mgng. Dir.
+46-243-7940-80, fax -89
email: peter.grufman@lc-tec.se
www.lc-tec.com

LCD LIGHTING, INC., 37 Robinson Blvd., Orange, CT 06477
Custom designers and manufacturers of miniature and sub-miniature fluorescent lamps for avionics displays. Available in straight, U or serpentine bent lamps in diameters from 2.0 to 38 mm for performance under any range of requirements, plus custom phosphor blending, lamp-wiring harnesses, heaters, and reflective backplanes.
Al Hudson, Mgr., Sls. & Mktg.
203/795-1520 x3013, fax -2874
email: ahudson@LCDL.com
www.LCDL.com

LIGHT BLUE OPTICS, UK Office: Platinum Bldg., St. John's Innovation Park, Cambridge, CB4 0WS, U.K.
U.S. Office: 4775 Centennial Blvd., Suite 103, Colorado Springs, CO 80919-3309
Light Blue Optics (LBO) is a privately owned company, developing and supplying miniature projection systems. LBO's patented holographic laser projection technology delivers high-quality video images that remain in focus at all distances. The technology's efficiency, small-form factor, robustness, and cost advantages make it ideally suited for deployment in multiple markets including automotive, industrial, and consumer electronics.
Tamara Roukaerts, Dir. Commun.
+44-1223-428525, fax -433350
email: tamara.roukaerts@lightblueoptics.com
www.lightblueoptics.com

LITE ENTERPRISES, 70 Bridge St., #11, Pelham, NH 03076
Defect inspection of large-area photomasks (6 x 6 in. and larger) for 3.0 μm and smaller defect sizes.
D. Ronning, Pres.
603/635-8327, fax -7211
www.lite.enterprises.com

LIYITEC INC., #9, Singye St., Gueisan Township, Taoyuan County, Taiwan 33341
Randy Yuan, Mktg. Mgr.
+886-3-359-1055 x121, fax -2055
email: randy.yuan@liyitec.com
www.liyitec.com

LOFO HIGH TECH FILM GmbH, Weidstrasse 2, 79576 Weil am Rhein, Germany
Manufacturers of solvent cast films for optical applications, mainly for various functions in LCDs. Developers of innovative films for other display systems and optical storage systems.
Ulrich Siemann, Bus. Devel.
+49-7621-703-114, fax -313
email: info@lofo.com
www.lofo.com

LOGYSTYX UK, LTD., Kingsclere House, Fox's Lane, Kingsclere, Newbury, Berks RG20 5SL, U.K.
Offering technical and managerial consultancy services including management support, due-diligence reviews, commercial and technology analyses, on-site lectures, and conference organization. Current client base includes academia, industry, venture-capital providers, and government departments.
Chris Williams, Dir.
+44-1635-298-395, fax -299-214
email: chris@logystyx.co.uk
www.logystyx.co.uk

LUMEN TECHNOLOGY INTERNATIONAL, 521 E. Lake Dr.
Providers of LCD enhancements, including glass lamination, passive and active enhancement for increased brightness, sunlight viewability, NVIS compatibility, and complete design and solution assistance. Also, specialized avionics LCDs.
Richard McCourt, Pres.
631/766-9629, fax 631/288-8659
email: rmccourt@lumentec.com
www.lumentec.com

LUMETRIX CORP., 1505 Carling Avenue, Ste. 301, Ottawa, Ontario K1Z 7L9
Manufacturers of imaging photometers and imaging spectroradiometers capable of measuring luminance and spectral distribution and uniformity, contrast vs. viewing angle, BRDF, etc. Applications include avionics panel balancing, graphics analysis, display measurements, architectural and roadway lighting, and more.
Tim Moggridge, Pres.
613/729-0614, fax -9067
email: info@lumetrix.com
www.lumetrix.com

LUMILEDS LIGHTING, 370 W. Trimble Rd., San Jose, CA 95131
Providers of LCD backlight solutions using Luxeon LED technology for LCD TVs, LCD monitors, and various custom-sized LCD displays. Luxeon solutions offer huge advantages over conventional CCFL technology as well as other LED solutions.
Mark Pugh, V.P. Strategic Dev.
408/435-6673, fax -5902
email: mark.pugh@lumileds.com
www.lumileds.com

LUMINIT LLC, 20600 Gramercy Pl., Bldg. 203, Torrance, CA 90501
Luminit is a privately held, high-technology company specializing in custom and standard holographic diffuser solutions. Luminit has commercial experience that covers 3-D, automotive, and avionics displays and lighting as well as other applications. Light-shaping diffusers are available directly or through its network of domestic and international distributors.
Kevin Rankin, Global Accounts Mgr.
310/320-1066, fax -8067
email: krankin@luminitco.com
www.luminitco.com

LUMINUS DEVICES, 1100 Technology Park Drive, Billerica, MA 01821
Designers and manufacturers of patented PhlatLight™ LEDs, unique high-power solid-state sources based on photonic lattice technology and customized for a variety of applications, including microdisplay projection and large-screen HD LCD TVs, video projectors, avionics displays, and lighting sources.
Matt Mazzuchi, Dir. Sls. & Bus. Dev.
781/932-7831, fax -7835
email: mmazzuchi@luminus
www.luminus.com

LUMITEX, INC., 8443 Dow Circle, Strongsville, OH 44136
Providers of backlighting designs using the full range of fiber-optic technology, including UniGlo® and other innovative fiber-optic panels to light cell-phone keypads, computer keyboards, and a variety of membrane switch applications that require tight space tolerances and minimal thicknesses. Using SMT LED light sources, panels provide exceptional thinness (to 0.2 mm), uniform brightness, and low power, with no heat or EMI, outstanding design flexibility, quick turn-around and low NRE, unit, assembly and maintenance costs. New Lumitex West facility, formerly Poly-Optical Products, provides strategically located design of engineered lighting solutions with volume manufacturing from Lumitex Asia's new production facility in Taipei.
Walt Schulz, Sls. Mgr., Electronics
440/243-8401, fax 440/243-8402
email: info@lumitex.com
www.lumitex.com

LUMETRIX CORP., 1505 Carling Ave., Ste. 301, Ottawa, Ontario K1Z 7L9
Manufacturers of imaging photometers capable of measuring wide dynamic range (up to 1,000,000:1 (20 bits) by using electronic bracketing technology. Applications include avionics panel balancing, display measurements, architectural, roadway lighting, and more.
Tim Moggridge, Pres
613/729-0614, fax -9067
email: info@lumetrix.com
www.lumetrix.com

LXD, INC., 7650 First Place, Oakwood, OH 44146
Manufacturers of standard and custom LCDs. Specializing in long-life high-reliability products featuring wide temperature ranges, fast response times, and wide viewing angles. Innovators in large-area and sign displays. Colored polarizers also available.
Chuck Oravec, Sls. Mgr.
440/786-8700, fax -8711

LYNCH SYSTEMS, INC., 601 Independent St., Bainbridge, GA 39817
Manufacturers of TV glass pressing machines. Cost-effective production of high-quality television and computer monitor glass in screen sizes from 1 to 42 in. on the diagonal.
Jim Wassel, V.P. Sls.
229/248-3070, fax 229/243-0987
email: jimw@lynchsystems.com
www.lynchsystems.com

MAIN TAPE CO., 1 Capital Dr., Ste. 101, Cranbury, NJ 08512
Manufacturers of KLEENTAPE™ protective tapes. Specifically manufactured in a clean environment to meet the stringent requirements of electronics manufacturers. Products used for protecting LCD components, backlights, polarizers, and diffuser films during the manufacturing assembly, transport, and packaging.
Maria Mulvaney, Inside Sls. Mgr.
1-800-858-0481, fax 920/892-6219
email: maria.mulvaney@maintape.com
www.maintape

MAN & MACHINE, INC., 3706 West St., Landover, MD 20785
Specializing in LCD enhancement, customization, brightness enhancement, integration, repairs, refurbishment, and sales. Small-batch services are available. Also, water-resistant keyboards and mice.
Lenny Merryman
301/341-4900 x44, fax -4078
email: Lenny@mmimd.com
www.man-machine.com

MASTER BOND, INC., 154 Hobart St., Hackensack, NJ 07601
Manufacturers of adhesives, sealants, and coatings for electro-optic and laser applications. Product line includes both one- and two-component epoxy resin compunds and one-component UV-curable compositions.
Robert Michaels, V.P. Sls.
201/343-8983, fax -2132
email: main@masterbond.com
www.masterbond.com

MATRIX ORBITAL, 524 17th Ave. SW, Suite 302, Calgary, Alberta, Canada T2S 0B2
Manufacturer of LCDs (character and graphic) and VFDs, specializing in RS232, I2C, and USB communication interfaces. Features include keypad interfaces, PC bay inserts, general-purpose outputs (GPOs), and Dallas 1-wires.
Clare Wagner, Sls. Rep.
403/229-2737 x200, fax -1963
email: jgelfand@matrixorbital.ca
www.matrixorbital.com

MAXIM INTEGRATED PRODUCTS, 120 San Gabriel Dr., Sunnyvale, CA 94086
Offering LED drivers for LCD panels and LED light sources for projection systems as well as a family of serializer/deserializer chipsets ideal for driving WVGA, VGA, and dual-view displays in automotive navigation and infotainment systems.
Maxim/Dallas Direct Distribution
1-888-629-4642, 1-800-992-1884
email: sales@maxim-ic.com
www.maxim-ic.com

MBRAUN, INC., 14 Marin Way, Stratham, NH 03885
Manufacturers of OLED/PLED thin-film evaporation gloveboxes designed for the deposition of multilayer thin films. Product configurations range from stand-alone bell jars to automatic loading systems in gloveboxes for wafer coating, ranging in size from 24 to 300 mm.
Chris Chausse, Sls. Mgr.
603/773-9333
email: c.bartlett@mbraunusa.com
www.mbraunusa.com

McLAUGHLIN CONSULTING GROUP, 945 Hamilton Ave., Menlo Park, CA 94025
Provider of opportunity analysis in displays and display components; market entry/market success strategies; deal-making and partnerships; investment due diligence; start-up formation and support; technology licensing. In-depth industry survey capability of top execs; established reputation for directness and integrity.
Adrienne Hefter, V.P. Operations
650/323-1179, fax 650/319-1805
email: info@mcgweb.com
www.mcgweb.com

MEKO, LTD., 134 Upper Chobham Rd., Camberley, Surrey GU15 1EJ, U.K.
Market researcher consultancy and publisher providing advice and data for the European display and TV markets. Combining technical understanding with practical experience of the market.
Bob Raikes, Managing Dir.
+44-(0)-1276-22677, fax -64004
email: bobr@meko.co.uk
www.meko.co.uk
email: mbkey@memsoptical.com

MERITEC, 1359 W. Jackson St., P.O. Box 8003, Painesville, OH 44077
Manufacturer of a complete line of flat flexible cable assemblies utilizing Hirose DF-9 and DF-19 connectors, ZIF and ZIFLOC terminations, with numerous termination options, power cables, and power extender cables. RoHS compliant and UL listed.
Ken Braund, Bus. Unit Mgr.
440/354-3148 x239, fax -0687
email: kbraund@meritec.com
www.meritec.com

METAVAC, 4000 Point Street, Holtsville, NY 11742
Manufacturers and developers of thin film, optical, and electro-optical products serving the defense, commercial, and life-sciences industries. Products include ruggedized display shields, EMI/RFI shielding, contrast-enhancement and polarized display filters, night-vision-compatible filters, and specialty coatings for optoelectronic applications.
Richard Zinkiewicz, Sls. Mgr.
631/447-7700, fax -7715
email: rzinkiewicz@metavac.com
www.metavac.com

MICROMANIPULATOR CO., INC., 1555 Forrest Way, Carson City, NV 89706
Manufacturers of a complete line of analog probe stations and accessories, including large-area flat display device boards, LED, and optoelectronic device probers.
Melissa Wickstead, Sls. & Mktg. Supervisor
775/882-7694, fax -7694
email: info@micromanipulator.com
www.micromanipulator.com

MICRONIC LASER SYSTEMS AB, P.O. Box 3141, Nytorpsvägen 9, Täby S-18303, Sweden
Manufacturers of laser pattern generators for TFT-LCDs and color-filter photomasks. LRS15000 Gen 7 and 8 TFT-LCDs. MMS1500 registration measurement system for Gen 7 and 8 photomasks. MP80+ pattern generator for passive-matrix LCD photomasks.
Tobias Perrson, Sls. Dir.
+46-8638-5200, fax -5290
email: tobias.perrson@micronic.se
www.micronic.se

MICRONICS JAPAN CO., LTD., 2-6-8 Kichijoji Hon-cho, Musashino-shi, Tokyo, 180-8508 Japan
The Liquid Crystal Viscosity Coefficient Measurement System (Lvic), jointly developed with Tohoku University and the Aomori Support Center for Industrial Promotion, measures three types of rotation viscosity coefficients and the Miesowiez viscosity co-efficient by using the MVS method (a measurement of three viscosities by separate fitting).
Eiichi Horie
+81-422-21-0201, fax -3810
email: chorie@mjc.co.jp
www.mjc.co.jp

THE MICROOPTICAL CORP., 33 South West Park, Westwood, MA 02090
Manufacturers of non-immersive ergonomical electronic eyewear that serves military, medical, industrial, and consumer-electronics market.
Tony Ho, Dir. Bus. Dev.
781/326-8111, fax -4110
email: hot@microoptical.net
www.microoptical.net

MICROSEMI CORP., 2381 Morse Ave., Irvine, CA 92614
Manufacturers of high-performance analog and mixed-signal ICs that control CCFLs and LEDs. Providers of advanced lamp balancing technology for LCD-TV applications.
Jim Gentile, Sr. V.P. Worldwide Sls.
949/221-7115, fax 949/756-0308
email: jgentile@microsemi.com
www.microsemi.com

MICROSHARP CORP., LTD., 52 Shrivenham Hundred Business Park, Watchfield, Oxfordshire 5N6 8TY, U.K.
Developers of light-manipulation solutions. These include novel backlights, projection TVs, and polymer optical films. Designers and manufacturers of bespoke surface-structured optical films, and contract R&D in display optics.
Nicholas Walker, CEO
+44-1793-782878, fax -78464
email: n.walker@microsharp.co.uk
www.microsharp.co.uk

MICROTIPS TECHNOLOGY, 3452 Lake Lynda Dr., Suite 215, Orlando, FL 32817
Manufacturers of all types of LCDs: custom, monochrome, color STN, and color TFT. Engineering and sales support both in North America with factories in Taiwan and China.

Josh Massie, Sls. Mgr.
407/273-0204, fax -0771
email: josh@microtipsusa.com
www.microtipsusa.com

MICROVISION, 11802 Kemper Rd., Auburn, CA 95603
Manufacturers of display test systems. The SS410 is a turnkey system that incorporates a high-resolution CCD camera, spectrometer, and positioning system for automatic testing of any type of display. The SS420 features an integrated goniometer for automatic off-axis testing. A response-time module provides automatic measurements of LCD gray-scale transitions, motion blur, and MPRT. Also offering automatic test suites that test in full accordance to the ISO 9241-300, ISO 13406-2, ISO 9241 (3 & 8), TCO 5.0, and VESA 2.0 standards.
Bryan Arnett, Appl. Engr.
530/888-8344, fax -8349
email: bryan@microvsn.com
www.microvsn.com

MICROVISION, INC., 6222 185th Ave. NE, Redmond, WA 98052
Designers and developers of high-precision scanning systems and related technologies that enable personal and projection displays and image-capture products for a broad range of industrial, military, professional, and consumer products.
Ian Brown, V.P. Sls. & Mktg.
425/936-6836
email: sales@microvision.com
www.microvission.com

MIRWEC FILM, INC., 601 South Liberty Dr., Bloomington, IN 47403
Providers of coating machines, technology and test or toll coating services in clean rooms. Featuring patented Micro Gravure® coating system which is widely used for production of information-display films.
Ryo Yamanami, Coating Mgr.
812/331-7194, fax 812/331-1119
email: coating@mirwecfilm.com
www.mirwecfilm.com

MIYACHI UNITEK CORP., 1820 S. Myrtle Ave., Monrovia, CA 91017
The Eapro Division specializes in the reflow soldering of power supplies, heads, and thermodes for hot-bar reflow soldering. Applications include LCD attachment such as that used in the manufacture of displays for cell phones, laptop computers, and automotive applications.
Chris Helsch, Eapro Sls. Mgr.
619/445-4756
email: chris.helsch@miyachiunitek.com
www.miyachiunitek.com

MKS INSTRUMENTS, INC., 90 Industrial Way, Wilmington, MA 01887-4610
Manufacturers of process control systems for advanced manufacturing processes, such as thin-film manufacturing for flat-panel displays. The company's instruments, components, and subsystems power, measure, control, and monitor critical parameters within the manufacturing environment.
Lisa Robillard, Marcom. Mgr.
978/284-4000, fax -4999
email: mks@mksinst.com
www.mksinst.com

MONITECH INDUSTRIAL DISPLAY, 100 Bathurst Dr., Waterloo, Ontario N2V 1V6 Canada
Specializing in supporting and replacing legacy products. LCD solutions allow easy replacement and mechanical solutions for any display application.
Kevin Conquergood
519/725-2222, fax -4300
email: sales@monitech.com
www.monitech.com

MOTION RESEARCH CORP., 1165 Eastlake Ave. E, Suite 100, Seattle, WA 98109
Creators of the first consumer head-up displays, SportVue and VersaVue. An information-display and monitoring solutions provider for sports and industrial applications.
Mike Claudio, V.P. Sls. & Mktg.
206/352-1771 x112
email: mclaudio@motionresearch.com
www.motionresearch.com

MOXTEK, 452 West 1260 North, Orem, UT 84057
Manufacturers of broadband wire-grid polarizers up to 8 in. on the diameter for use in consumer displays, scientific instruments, and industrial and military applications. Providers of polarizers ranging from UV to LWIR.
Jim Meyer, Prod. Mgr.
801/225-0930, fax 801/221-1121
email: wabraham@moxtek.com
www.moxtek.com

N-TRIG, 15 Atir Yeda St., Kfar Saba, Israel
Abi Solomon, Dir. Mktg.
+972 9 7999 600
email: abis@n-trig.com
www.n-trig.com

NAGASE AMERICA CORPORATION, 2880 Lakeside Dr., Suite 116, Santa Clara, CA 95054
Yukari Matsuda, Sls. & Mktg. Mgr.
408/567-9728, fax 408/567-9729
email: ymatsuda@nca-nagase.com
http://www.nagaseamerica.com

NANOFILM, 10111 Sweet Valley Dr., Valley View, OH 44125
Developers of optically clear thin films including hydrophobic, hydrophilic, anti-static, UV rejecting, anti-reflective, IR rejecting, abrasion and chemical resistant, and conducting. Markets include optical, architectural, transportation, and consumer, electronics/displays. Technologies include self-assembling nanolayers, nanocomposites, formulation, surface chemistry/physics, and application development.
John Swett, V.P. Sls. & Mktg.
216/447-1199 x 160, fax -1137
email: jswett@nanofilm.com
nanofilmtechnology.com

NANOGRAM, 165 Topaz St., Milpitas, CA 95035
Creaters of high-refractive-index particles with precise size and phase control and very uniform distribution and superior surface properties. Process can achieve a 0.30 increase in refractive index while maintaining a greater than 90% transparency.
Clifford Morris, V.P. Sls. & Mktg.
408/719-5304
email: cmorris@nanogram.com
www.nanogram.com

NATIONAL QUALITY ASSURANCE US, 4 Post Office Square Rd., Acton, MA 01720
Performs ISO 9000, ISO 14001, AS9100, QS9000, and TickIT registrations. Expertise in the aerospace, transportation, distribution, printing, professional services, automation, food, electronics, and computer hardware and software industries.
Nia Carignan, Mktg. Supervisor
1-800-649-5289, fax 978/263-0785
email: iso@nqa-usa.com
www.nqa-usa.com

NATIONAL SEMICONDUCTOR CORP., 2900 Semiconductor Dr., Santa Clara, CA 95051
Providers of complete silicon solutions for a wide range of display applications, including CRTs, LCDs, small-format displays, and digital TV. Product portfolio includes power management, audio, interface, driver, and controller products.
Craig Zajac, Tech. Mktg. Engr.
408/629-2501, fax 408/629-2478
email: ig.zajac@nsc.com
www.national.com

NDF SPECIAL LIGHT PRODUCTS B.V, Leemstraat 40-44, 4705 RH Roosendaal, The Netherlands
Producers of high-end customized cold-cathode fluorescent lamps (CCFLs) by using a unique patented technology. Products used in professional LCD applications; aircraft, spacecraft, and emergency lighting; as well as in decorative applications such as POS and shop lighting. Also, developers of customized inverters.
C. M. M. van't Westeinde, Managing Dir.
+31-165-538-630, fax +31-165-539-630
email: c.westeinde@ndf.nl
www.ndf.eu

NEMOPTIC SA, 1 rue Guynemer, 78114 Magny-Les-Hameaux, France
Developers and manufacturers of bistable display modules (BiNem®) that feature zero power consumption for static images. Supplier of black and white display modules in customized sizes (16 in. typical) and resolutions (60 x 120, 600 x 800 typical). Also, BiNem display evaluation kits available.
T. Emeraud
+33-(0)-1-3930-5160, fax -5161
email: t.emeraud@nemoptic.com
www.nemoptic.com

NEW WAVE RESEARCH, INC., 48660 Kato Rd., Fremont, CA 94538
Developers of high-quality laser-based systems and modules for the microelectronics and analytical instrumentation industries.
Lin Tso, Dir. Mktg. Services
510/249-1550, fax 510/249-1551
email: lasers@new-wave.com
www.new-wave.com

NEW WAY AIR BEARINGS, 50 McDonald Blvd., Aston, PA 19014
Improve yield with non-contact control of FPD glass handling. Every time glass touches down, yield also goes down. But New Way Conveyor Air Bearings provide a combination of air pressure and vacuum that is ideal for non-contact control, holding it precisely for AOI, direct-write lithography, probing, repair, and any number of other applications. They are also ideal for non-contact conveyance between processes, even at high speeds (2 m/sec). With New Way's porous media™ technology, air-pressure issues from millions of submicron-sized holes across the entire bearing surface, virtually eliminating contact even for Gen 10 or Gen 11 glass. Modular air-bearing components are robust and easy-to-use in scalable arrays. Product line also includes flat round air bearings, flat rectangular air bearings, air bushings, vacuum preloaded air bearings, and air slides. Components are available from stock and offer all the advantages of frictionless motion.
Michael Wright, Dir., Mktg.
610/494.6700, fax 610/494.0911
email: mwright@newwayairbearings.com
www.newwayairbearings.com

NFLEXION LLC, 5757 CEntral Avenue, Boulder, CO 80301
nFlexion provides interim executive services to early stage display technology companies and management consulting to larger corporations. The company has expertise in general management (CEO level), strategic planning, fund raising, business development, and strategic planning.
Mark Willner, Managing Partner
303/667-0300
email: mwillner@nflexion.com
www.nflexion.com

NICOMATIC, 165 Veterans Way, Suite 200, Warminster, PA 18974
Manufacturers of the flat flex cable, FFC card cable, connectors, tactile metal domes, and dome arrays, along with other products for membrame switches.
Phil Heft, Sls. Mgr.
215/444-9580, fax -9581
email: sales@nicomatic.net
www.nicomatic.net

NIPPON PAPER INDUSTRIES CO., LTD., 1551 Higashidaira, Higashimatsuyma, Saitama 555-002, Japan
Manufacturers of clear and antiglare hard-coat films (triathetylcellulose, PET). Thermal transfer film for CRT and FED phosphor screens. Also, dry films of various photo-resists for electric devices.
Hirofumi Katayama, Gen. Mgr.
81-493-22-9451, fax -9456
email: hiro.katayama@nipponunipac.co.jp

NITTO DENKO AMERICA, INC., 48500 Fremont Blvd., Fremont, CA 94538
Manufacturers of a full line of polarizing and compensation films for LCD manufacturing, repair, and ruggedizing. Product line includes films to improve display brightness, contrast, and viewing angles, as well as anti-reflective, anti-glare, and other coating technologies. Also, manufacturers of flexible printed circuits, double-coated tapes, and surface-protective films for LCDs.
Steve Suzuki, Sls. & Mktg. Mgr.
510/445-5431, fax -5480
email: steve.suzuki@nitto.com
www.nittousa.com

NKK SWITCHES, 7850 E. Gelding Dr., Scottsdale, AZ 85260
Manufacturers of more than 3 million different toggle, rocker, pushbutton, slide, rotary, and keylock switches and displays. This extensive selection also includes LCD programmable

switches and displays. Committed to provide all the right switches for audio/visual and broadcast applications.
Jeff Kroening, Product Dev. Mgr.
480/991-0942, fax 480/998-1435
email: sales@nkkswitches.com
www.nkksmartswitch.com

NOVALED AG, Tatzberg 49, Dresden, Saxony 01307, Germany
Providers of OLED technology and materials to display and lighting manufactures for making the most power-efficient and easy-to-manufacture OLED devices. The unique doping approach of PIN OLED™ technology leads to the lowest operating voltages combined with high-current efficiencies.
Gerd Günther
+49-(0)-351-796-580
fax +49 (0)-351-796-5829
email: info@novaled.com
www.novaled.com

O & S RESEARCH, INC., 1912 Bannard Street, Cinnaminson, NJ 08077
O&S Research is a leading manufacturer of anti-glare cover glasses, contrast enhancement filters and heaters for liquid crystal displays and CRTs used primarily in aircraft cockpit applications for the commercial, business and defense aircraft industries. Products include conventional AR coated glass, conductive AR coated glass for EMI shielding, index-matched conductive coated glass for bonding applications, NVIS filters and linear and circular polarizing filters.
Anderson McCabe, President
856/829-2800, fax 856/829-0482
email: a.mccabe@osresearch.com
osresearch.com/optsciences.com

OCEAN OPTICS, INC., Thin Films Div., 8060A Bryon Dairy Rd., Largo, FL 33777
Providers of a full range of photonics components and systems, including optical monitoring systems, optical-fiber amplifiers, optical fibers, and optical add/drop multiplexers. The Sea Changer Eolex Engine is a dichroic color-mixing accessary for the ETC Source Four® ellipsoidal fixture.
Rob Randelman, V.P. Sls. & Mktg.
727/733-2447, fax -3962
email: Rob.Randelman@oceanoptics.com
www.oceanoptics.com

OLED-T, Innova Science Park, Enfield EN3 7XH, U.K.
Providers of high-performance small-moleculeorganic materials for use in the manufacture of organic light-emitting diode (OLED) displays. The materials can also be used for lighting and flexible displays.
Myrddin Jones, Chief Exec.
+44-20-8344-8460, fax -8494
email: mjones@oled-t.com
www.oled-t.com

OMT DIGITAL DISPLAY TECHNOLOGY (SHENZHEN) LTD., #10-1 South, Maquling Industrial Park, Nanshan District, Shenzen 518057, China
Providers of R&D, manufacturing, and marketing of various components (including display lasers, micro-optic parts, and coating products), and light engines for display applications.
Dexin Jin, Sls. & Mktg. Dir.
+86-755-2671-0102, fax -0525
email: dexinjin@o-netcom.com
www.omtdisplay.com

OPTEK TECHNOLOGY, 1645 Wallace Dr., Carrollton, TX 75006
OPTEK is a leading manufacturing and solutions provider for sensing and illumination covering the infrared, visible, and ultraviolet spectrum. Offering standard as well as application-specific products for a variety of markets, including, but not limited to, office machines, industrial equipment, encoders, automotive electronics, military and high-reliability applications, medical diagnostic equipment, and solid-state lighting. Headquartered in Carrollton, Texas, the company is ISO/TS16949:2002 and BS EN ISO 9001:2000 certified, as well as ITAR registered.
Reyne Parks, Mktg. Specialist
1-800-341/4747, fax 972/323-2396
email: visibleled@optekinc.com
www.optekinc.com

OPTICAL FILTERS, 13447 South Mosiertown Rd., Meadville, PA 16335
Manufacturers of laminates to enhance electronic displays. Providers of EMI shielding, sunlight readability, impact resistance, transparent heaters, specialty coatings, and touch-screen enhancement. Glass and plastic substrates, non-glare, anti-reflective, anti-scratch, and hard-coated materials. Design and manufacture locations in both Europe and North America.
Peter Fisher, Group Sls. Dir.
814/333-2222, fax -4338
email: peter@opticalfilters.com.uk
www.opticalfiltersusa

OPTICAL FILTERS, LTD., 14 Bertie Rd., Thame, Oxon OX9 3XA, U.K.
Designers and manufacturers of optical filters providing improved sunlight readability, privacy, impact resistance, and EMI shielding to electronic displays using optical polycarbonates, acrylics, polarizers, non-glare, anti-reflective, and ITO-coated glass with optical lamination in clean-room facilities.
Peter Fisher, Sls. Dir.
+44-(0)-1844-260-377, fax -355
email: peter@opticalfilters.co.uk
www.opticalfilters.co.uk

OPTICAL POLYMERS INTERNATIONAL, 110 W. Main St., Milford, CT 06460
Manufacturers of instrument display readout windows, contrast-enhancement filters, IR filters, and barcode scanner exit windows. Custom and standard windows are manufactured from proprietary cast ADC thermoset optical sheet supporting LCD, VF, LED, and all other display technologies.
Michael B. Smith, Dir.
203/882-9093, fax 203/882-9150
email: mikesmith<opi@snet.net>

OPTICAL RESEARCH ASSOCIATES, 3280 E. Foothill Blvd., Suite 300, Pasadena, CA 91107
Developers of optical and illumination design software. Providers of CODE V® for image-forming optics and LightTools® for innovative illumination design, including backlit and projection displays, automotive instrumentation, LEDs, reflectors, and more. Supplier of optical engineering services.
Stuart David, Dir. Sls.
626/795-9101, fax 626/795-0184
email: info@opticalres.com
www.opticalres.com

OPTICS BALZERS AG, Neugruet 35, 9496 Balzers, Liechtenstein
Optics Balzers AG (former Oerlikon Optics) enables innovative optical solutions for more than 60 years. As a global leader in optical thin-film components and subassemblies, Optics Balzers focuses on selected markets such as advanced lighting, automotive, bio-photonics, projection display, and sensors and imaging. The company possesses a comprehensive know-how in optical thin-film coatings, glass processing, patterning, sealing, and optical subassemblies.
Dirk von Frajer, Head, Mktg. & Sls.
423/388-4444, fax 423/388-5405
email: info@opticsbalzers.com
www.opticsbalzers.com

OPTREX AMERICA, INC., 46723 Five Mile Rd., Plymouth, MI 48170
Designers and manufacturers of OEM flat-panel-display solutions for telecommunications and non-PC Internet devices; test, measurement, and diagnostic instruments; handheld data-management equipment; and automotive and avionics displays. Active-matrix technologies include active-MLA, TFT, VHC, HPC, and TFCC, with a broad range of color and monochrome modules. OLED modules also available.
John Cramer, Dir. Bus. Dev. & Procurement
734/416-8500, fax -8520
email: jcramer@optrexusa.com
www.optrex.com

OPTRONIC LABORATORIES, INC., 4632 36th St., Orlando, FL 32811
Designers and manufacturers of industrial- and research-grade light-measurement instrumentation for science, industry, and the military, specializing in LED test and measurement systems, scanning spectroradiometers, multi-channel spectroradiometers, radiometers/photometers, integrating sphere systems, and calibration standards and services.
Alex Fong, V.P. Sls. & Mktg.
407/422-3171, fax 407/648-5412
email: info@olinet.com
www.olinet.com

ORBIT INTERNATIONAL CORP., 80 Cabot Ct., Hauppauge, NY 11788
The electronics segment (ORBIT Instrument Div. and TULIP Development Laboratory, Inc.) has experience in the process of adapting and/or ruggedizing COTS AMLCD flat-panel displays for severe environment and military applications. The Power Units segment (BEHLMAN Electronics) supplies custom display power supplies for military and rugged applications.
Sam Berhumoglu, VP. Sls. & Bus. Dev.
631/435-8300, fax 631/435-8458
email: samberg@orbitintl.com
www.orbitintl.com

OSRAM OPTO SEMICONDUCTORS, 1150 Kifer Rd., Suite 100, Sunnyvale, CA 94086
OSRAM is part of the Industry Sector of Siemens. Its subsidiary, OSRAM Opto Semiconductors GmbH in Regensburg (Germany), offers its customers solutions based on semiconductor technology for lighting, sensor, and visualization applications. OSRAM Opto Semiconductors has production sites in Regensburg (Germany) and Penang (Malaysia). Its headquarters for North America is in Sunnyvale, California (USA), and for Asia in Hong Kong. OSRAM Opto Semiconductors also has sales offices throughout the world.
Kate Cleveland, Mkt. Mgr.
248/277-8018, fax 248/596-0395
email: info@osram-os.com
www.osram-os.com

OTB DISPLAY, Luchthavenweg 10, 5657 EB, Eindhoven, The Netherlands
Provider of in-line OLED production solutions. These solutions not only include integrated manufacturing equipment but also all know-how and support necessary to help customers, from display design to mass-produced small-molecule and polymer OLED displays.
Sander Aarden, Sls. Engr.
+31-40-2581-580, fax +31-40-2509-872
email: sales@otbdisplay.com
www.otbdisplay.com

OTSUKA ELECTRONICS CO., 3-26-3 Shedai-tajika, Hirakata, Osaka 573-1132, Japan
Developers and manufacturers of inspection systems for FPDs including the LCD Evaluation System, Cell-Gap Inspection System, Color-Filter Spectral Inspection System, Film-Thickness Monitor, and Moving-Picture Response-Time Measurement System.
+81-72-855-8550, fax -8557
www.photal.co.jp

PARKER CHOMERICS/SILVER CLOUD, 525 Orange St., Millville, NJ 08332
Custom manufacturer and supplier of precision display windows and assemblies. Windows can include application-driven materials for EMI-RFI shielding and various display enhancements. Anti-reflective or anti-glare surfaces are available. Complete window assemblies can include molded bezels, touch systems, EMI shielding, and more.
Robert C. Cowperthwait, Prod. Mgr.
856/825-8900, fax 856-825-8969
email: robert.cowperthwait@parker.com
www.silver-cloud.com

PERFORMANCE COATINGS INTERNATIONAL, 10 Henderson Drive, West Caldwell, NJ 07006, USA
Manufacturers of high performance UV-curable coatings for polymeric substrates. PCI's Vueguard 901 & 801 series of optical clear hard coats for the optoelectronic industry are renown for the unmatched abrasion, wear, chemical and anti-fog properties.
George E. Drazinakis, Pres. & CEO
973-227-5401, fax -5402
email: gdrazinakis@pcoatingsintl.com
www.vueguard.com

PERFORMANCE TECH ASSOCIATES, 13130 Central Ave., #8004, Boulder Creek, CA 95006
Providers of technical sales and marketing consulting services to the hi-tech industry, with special emphasis on displays (LCDs, OLEDs, and PDPs) and the OEM market. Specializing in helping non-U.S. and U.S. companies expand their sales channels, and

increase their sales, by locating, interviewing, qualifying, and signing the best manufacturers' sales representatives (reps or independent professional sales agents) and industrial distributors. Contacts of over 1000 top-tier reps and distributors that sell into the OEM market.
John Schlatter, Sls. & Mktg. Consultant
831/338-1451, fax 831/338-3691
email:
schlatter@FlatPanelDisplayExperts.com
www.FlatPanelDisplayExperts.com

PETER'S CO., LTD., No. 359 Leou Shiu Rd., Wu Jiang, Jiang Su, Taiwan
Providers of the assembly of wiring harnesses and cable used in CRT and LCD interconnection to OEMs. Manufactures of flexible flat cable in pitches from 0.5 to 2.54 mm.
Calvin Kuo, V.P.
+86-512-63455-489, fax -412
email: calvin@szpeters.com

PHOSPHOR TECHNOLOGY, LTD., Norton Park, Norton Rd., Stevenage, Hertfordshire SG1 2BB, U.K.
Manufacturers and developers of inorganic phosphors for CRTs, FEDs, PDPs, LEDs, x-ray imaging, IR, and UV detection, and other radiation-detecting scintillators.
Gerry Sorce, CEO
+44-(0)-1438-364-343, fax -344
email: sales@phosphor-technology.com
www.phosphor-technology.com

PHOTO RESEARCH, INC., 9731 Topanga Canyon Place, Chatsworth, CA 91311
Manufacturers of photometers, colorimeters, and spectroradiometers used worldwide for display testing, R&D, and ergonomics. Products used extensively in the automotive, aerospace, computer, flat-panel display, and digital projector markets.
Mike Klein, Dir. Sls. & Mktg.
818/725-9750 x125, fax -9770
email: mike.klein@photoresearch.com
www.photoresearch.com

PHOTO SCIENCES, INC., 2542 W. 237th St., Torrance, CA 90505
Specializing in patterning and etching microscopic features into a wide variety of coatings on substrates ranging from metal to glass to wafers to ceramic.
Patrick Decatrel, Dir. Sls.
310/784-7460, fax -3642
email: sales@photo-sciences.com
www.photo-sciences.com

PHOTOMACHING, INC., 4 Industrial Dr., Unit #40, Pelham, NH 03076
Providers of laser contract manufacturing services and builders of custom laser tools. Specializing in high-precision ITO and thin-film patterning for the display industry.
Ronald D. Schaeffer, CEO
603/882-9944, fax 603/886-8844
email: rschaeffer@photoimaging.com
www.photoimaging.com

PHOTONICS SPECTRA, 2 South St., Berkshire Common, Pittsfield, MA 01201
Photonics magazine serving industries that use photonic technology: lasers, imaging, fiber optics, optics, electro-optics, and photonic component manufacturing.
David Dover, Assoc. Publisher
413/499-0514, fax 413/442-3180
email: photonics@laurin.com
www.Photonics.com/spectra

PHYSICAL OPTICS CORP., 20600 Gramercy Pl., Torrance, CA 90501
Providing active production design and technology innovation in a number of areas such as light shaping diffusers, holographic lightpipes, optical components, real-time 3-D displays, video compression, wireless communications, high-resolution screens, and x-ray imaging optics.
Carol Jacobs, Mktg.
310/320-3088, fax -5961
email: CarolJacobs@poc.com
www.poc.com

PIXEL INTERCONNECT, INC., 8215 Tualatin Sherwood Rd, Suite 200, Tualatin, OR 97062
Providing turnkey LCD and flat-panel-display assembly, repair, and enhancement lines and services. TAB bonding, film lamination, and film removal equipment and processes are the acknowledged industry standard worldwide.
Scott Cockey, Pres.
503/885-8444, fax 503/210-0328
email: scottco@pixel-interconnect.com
www.pixel-interconnect.com

PLANAR SYSTEM, 1195 NW Compton Dr., Beaverton, OR 97006
Providers of a large portfolio of display solutions for industrial, medical, and commercial and dynamic signage.
Bill Hanrahan, Dir. N. A. Sls., Industrial Bus. Unit
503/748-7483, fax -5987
email: bill_hanrahan@planar.com
www.planar.com

PLASTIC LOGIC, LTD., 34 Cambridge Science Park, Milton Rd., Cambridge, Cambridgeshire, CR4 0FX, U.K.
Developer of flexible plastic electronics technology. Fabricator of flexible displays on its prototype line, woking with manufacturing partners towards volume module production for e-readers and e-signage applications.
Joao de Oliviera, Bus. Devel. Mgr.
+44-1223-706-000, fax -006
email: info@plasticlogic.com
www.plasticlogic.com

PORTRAIT DISPLAYS, INC., 6663 Owens Dr., Pleasanton, CA 94568
Provider of embedded visual-enhancement software for computer and television displays. Established its OEM business model as the leading provider of Pivot® Pro rotational software, and later in emerging markets with its DisplayTune® display management utilities. Products can be licensed in either standard or custom-branded configurations.
Martin Fishman, COO & V.P. Worldwide Sls. & Mktg.
925/227-2700 x222, fax -2705
email: mfishman@portrait.com
www.portrait.com

POWERTIP TECHNOLOGY, INC., 26231 Enterprise Court, Lake Forrest, CA 92630
Manufacturers of high-quality LCDs. Offering custom LCD glass panels, a wide range of standard monochrome character and graphic modules, CSTN, analog and digital TFTs, OLEDs, sign boards, lenses, and lens modules.
Leslie Tsai, Dist, Sls. Mgr.
949/859-8168, fax -8118
email: sales@powertipusa.com
www.powertipusa.com

PRECISION DISPLAY TECHNOLOGIES CORP., 4635 Longley Lane, Bldg. 109, Reno, NV 89502-5976
Designers and manufacturers of high-fidelity CRT and flat-panels displays used for simulation and commercial applications. Offering complete turnkey display systems for a wide variety of cockpits including fighters, air transports, helicopters, tanks, and submarines.
Jonathan D. Garman, CEO
775/825-4488, fax -4489
email: precisiondisplays.com
www.pdt-usa.com

PRECISION TECHNOLOGY GROUP, 41 Skyline Dr., Suite 1005, Lake Mary, FL 32746
Designers and manufacturers of industrial grade CO_2 and fiber laser systems for precision applications, including a patented method for splitting glass without any chips or microcracks.
Sharon Fleischner, Mrktg. Asst.
407/804-1000, fax -1002
email: sharon@ptgindustries.com
www.ptgindustries.com

PRECO INDUSTRIES, INC., 9705 Commerce Pkwy., Lenexa, KS 66219
Manufacturers of close-tolerance screen printers, assembling laminators, die cutters, laser cutters, and pressure-forming machinery used for flexible circuitry, displays, medical biosensors, and RFID applications. Customer-driven custom-built designs account for over half of production output.
Ron Hofmann, V.P. Sls. U.S.A.
913/541-0066, fax -9088
email: sales@precoindustries.com
www.precoindustries.com

PRIME VIEW INTERNATIONAL (PVI), 2961 W. MacArthur Blvd., Suite 118, Santa Ana, CA 92704
PVI was the first TFT-LCD maker in Taiwan and specializes in small-to-medium-sized displays. Involved in industrial display applications for many years. Custom-made TFT service is available.
Gary Chin
714/540-5433, fax 714/540-5122
email: garyc@pvi.com.tw
www.pvi.com.tw

PURDY ELECTRONICS CORP., AND DISPLAYS, 720 Palomar Ave., Sunnyvale, CA 94085
Designer and manufacturer of FPDs, custom display subsystems, and related electronics and optical accessories. Products include a-Si and poly-Si LCDs, white LEDs and high-bright backlights, optical films, touch panels, controller cards, inverters, and cabling.
Jody Lee, Dir. Sls. & Operations
408/523-8225, fax 408/733-1287
email: sales@purdyelectronics.com
www.purdyelectronics.com

PURE DEPTH, INC., 255 Shoreline Dr., Suite 610, Redwood City, CA 94065
Developer of Multi-Layer Display (MLD™) technology that allows two or more LCD panels to be stacked and separated by physical depth, allowing for real visual depth effects and an increase in response time of up to 4.5 sec.
Russell Rheingrover, Dir.
650/632-0800, fax -0818
email: russell@puredepth.com
www.puredepth.com

PVA TEPLA AG, Plasma Systems Div., Hans-Riedl-Strasse 5, D-85622, Feldkirchen Germany
Specializing in advanced microwave-powered plasma systems for semiconductor, flat-panel-display, and solar-cell manufacturing. Manufacturer of fully automated systems for front-end or chip-packaging applications, also serving the MEMS- and wafer-bumping markets. Main applications in the FPD manufacturing of OLEDs and PLEDs are the large-area cleaning and activation of ITO layers and unique surface conditioning prior to ink-jet printing.
Gerhard Liebel, V.P. Sls. Mktg.
Semiconductor Equipment
+49-(0)-89-90503-0, fax -185
email: plasma@pvatepla.com
www.pvatepla.com

Q-LAB CORP., 800 Canterbury Rd., Cleveland, OH 44145
Provider of affordable easy-to-use and low-maintenance weathering and light-stability test equipment.
James Gauntner, U.S. Sls. Mgr.
440/835-8700, fax -8738
email: info@q-lab.com
www.q-lab

QUADRANGLE PRODUCTS, INC., 28 Harrison Ave., Bldg 16D, Englishtown, NJ 07726
Engineering and manufacturing company providing a broad range of products and solutions for interfacing to a wide variety of LCDs. Developer of multiple solutions to solve the cable issues involved with interfacing to LCDs, controllers/single-board computers, inverters, and backlights.
Scott McDonald, Engrg. Mgr.
732/792-1234, fax -8305
email: sales@quadrangleproducts.com
www.quadrangleproducts.com

QUANTUM DATA, INC., 2111 Big Timber Rd., Elgin, IL 60123
Inventors of test instruments that help manufacturer's next-generation video, audio, and control products to market faster and without interoperability problems. These instruments simultaneously improve a manufacturer's time-to-market and interoperability with other manufacturer's products. Features include signal emulation, signal analysis, troubleshooting, and compliance testing. Instruments used in product development, certification, manufacturing, installation, and service environments. Sells and services OEMs and resellers, as well as selling private label test instruments to other OEMs.
Chuck Evans, Gen. Sls. Mgr.
847/888-0450, fax -2802
email: cevans@quantumdata.com
www.quantumdata.com

QUEST INTERNATIONAL, INC., 65 Parker St., Irvine, CA 92618
Specializing in the sales and repair of all medical-imaging peripherals since 1982. An authorized reseller of NEC and Mitsubishi and an authorized distributor and service center for the entire line of Totokus ME series of LCDs. ISO 9001 registered.
Jennifer Coleman, Mktg. Mgr.
949/581-9900, fax -4011
email: jennifer@questinc.com
www.questinc.com

RADIANT IMAGING, INC., 22908 NE Alder Crest Dr., Suite 100, Redmond, WA 98053
Providers of CCD-based imaging systems for light and color measurement, and illumination engineering tools and services. Applications addressed include display systems, instrument panels, keyboards and keypads, lighting, and material characterization. Four major product areas are ProMetric® light and color-measurement systems; Source Imaging Goniometers®, and Radiant Source Models®; Imaging Sphere systems for characterizing scatter and appearance, luminous intensity distributions and viewing-angle performance; and application-specific systems incorporating ProMetric technology. These system solutions provide customers with enhanced design capabilities, greater product development efficiency, improved manufacturing productivity, and increased competitive effectiveness.
Hubert Kostal, V.P.
425/844-0152, fax 425/844-0153
email: kostal@radiantimaging.com
www.radiantimaging.com

THE RANKIN GROUP, LTD., 17821 E. 17th St., #160, Tustin, CA 92780
Providers of cost-effective advertising, marketing, public relations, and Internet services with tangible results for business-to-business and high-tech companies.
Ernie Rankin, Pres.
714/832-4100, fax -3211
email: rankin@rankin-group.com
www.rankin-group.com

REACTIVE TECHNOLOGIES, Minneapolis, MN
Developers of interactive entertainment products for the retail industry. The React1 product provides a tabletop surface for restaurants that allows patrons to order food and drinks, play games, surf the Internet and interact with others in the restaurant. Everything one can do on their iPhone and/or home PC, they will be able to do on their table.
Mark Rinehart, Pres.
email: mark@reactivetech.com
www.react1.com

REED BUSINESS INFORMATION, 225 Wyman St., Waltham, MA 02451
Business-to-business information provider, covering 23 market sectors with more than 100 market-leading publications and 75 Web sites, as well as a range of services.
Don Grennan
973/920-7090
www.reedbusiness.com

ROFIN-SINAR, INC., 40984 Concept Dr., Plymouth, MI 48170
Offering innovative laser technology for the processing of glass and glass substrates. Lasers provide a non-contact process highly suitable for delicate materials. Ideal applications for glass processing are cutting high-quality edges without micro-cracks, precision edge insulation of solar cells, scribing of solar cells, removal of coating, and surface-treatment of flat panel screens.
Sales
734/455-5400
email: info@rofin.com
www.rofin.com

RPO, INC., Innovations Bldg., 124 Eggleston Rd., Acton, ACT 0200, Australia
Developers and manufacturers of Digital Waveguide Touch™ (DWT), a touch-screen technology based on optical waveguides. It has been utilized in low-cost mobile devices, as well as higher-value professional applications and is designed for high-volume manufacturing. Integration kits are now available.
Ian Maxwell, Exec. V.P. Bus. Dev.
+61-2-6125-4968, fax -8977
email: inquiries@rpo.biz
www.rpo.biz

SAES GETTERS GROUP, Viale Italia 77, Lainate, Milan 20020, Italy
Providers of innovative getter devices to meet the vacuum and gas filling requirements of cathode-ray tubes, field-emission displays, plasma-display panels, and OLED displays.
+39-02-93178-267, fax -320
www.saesgetters.com

SAES GETTERS U.S.A., INC., 1122 E. Cheyenne Mtn. Blvd., Colorado Springs, CO 80906
Manufacturers of evaporable and non-evaporable getter products for PDPs, FEDs, CRTs, MEMS, and electronic devices. Also, desiccants and alkali metal dispensers for OLEDs and dispensers for safe mercury deposition in CCFL lamps.
Ron Petersen, Appl. Engr.
928/476-4412, fax 719/576-5025
email: ronald_o_petersen@saes-group.com

SAMSUNG SEMICONDUCTOR, INC., 3655 N. First St., San Jose, CA 95134
Manufacturers of a wide variety of display products, especially TFT devices for portable computer and desktop monitor applications.
Carl H. Steudle, Dir. Sls./Mktg., TFT Display Products
1-800-423-7364, fax 408/544-4919
email: www.samsung.semi.com

SANAYI SYSTEM CO., LTD., #705 Incheon IT Tower, 592-5 Dohwa-Dong, Nam-Gu, Incheon, 402-711, Korea
Sanayi System Co., Ltd., provides simulation software for the TechWiz LCD. Product and service areas cover design and optimization of all electrical and optical characteristics of LCDs.
Sang-Ho Yoon, CEO
+82-32-254-2520, fax +82-32-254-2521
email: support@sanayisystem.com
www.sanayisystem.com

SARTOMER COMPANY, INC., Oaklands Corporate Center, 502 Thomas Jones Way, Exton, PA 19341
Supplier of specialty raw materials for UV/EB formulations including (meth acrylic monomers, acrylated resins, and specialty polymers. Key product features for the display area include optical properties, broad refractive index, barrier properties, varied dielectric properties, and adhesive properties.
Henry Miller, Mgr., UV/EB Technical Development
610/363-4100, fax -4140
email: contact@sartomer.com
http://www.sartomer.com

SCHOTT NORTH AMERICA, INC., 555 Taxter Rd., Elmsford, NY 10523
A technology-driven international group that sees its core purpose as the lasting improvement of living and working conditions through special materials and high-tech solutions. The company's main areas of focus are defense, household-appliance industry, pharmaceutical packaging, optics and opto-electronics, information technology, consumer electronics, lighting, automotive engineering, and solar energy.
Michelle deCastro, Appl. & Mkt. Devel.
914/831-2254, fax -2346
email: michelle.decastro@us.schott.com
www.us.schott.com

SCIENSTRY, INC., 1110 E. Collins Blvd., Suite 120, Richardson, TX 75081
Manufactures of NPD-LCD film and film LCDs. NPD-LCD film or 3G Privacy Film is the latest (3rd) generation of liquid-crystal microdroplet displays (LCMDs), having a similar function as PDLC, but much more advanced in all electro/optical features. A non-linear polymer system has been successfully used to eliminate haze in-clear state, to solve overdriving problem, and chemical stability problems. NPD-LCD has haze-free or ultra clearness, very low driving voltage (10 V) and extremely long lifetime (more than 100 millions times of on-off switching), and high multiplexing capability. Standard size of NPD-LCD film includes 125 x 280 cm.
Breanna Curry, Admin. Asst.
972/690-5880, fax -5888
email: info@scienstry.us
www.scienstry.us

SEEREAL TECHNOLOGIES GmbH, Blasewitzer Str. 43, Dresden 01307, Germany
Providers of advanced 3-D holographic solutions based on todays technologies and interactive realtime computing, full HD resolution, and freedom of movement to allow several users to experience. With over 140 patents and patent applications, SeeReal is a leader in the field of real-time holographic 3-D enabling display technology.
Jörg Röder, Head of Administration
+49-(0)-351-450-3240, fax -3250
email: jr@seereal.com
www.seereal.com

SEKISUI S-LEC AMERICAN, LLC, 1786 Dividend Dr., Columbus, OH 43228
Developer of interlayer film technology for laminated displays.
Michael Dent, Sls./Mktg.
614/527-5250, fax -5257
email: mjdent@s-lec.us
www.s-lecfilm.com

SENSIENT IMAGING TECHNOLOGIES GmbH, CP Areal A, Sensientstr. 3, Wolfen D-06766, Germany
Specializing in the manufacture of high-tech chemicals for electrophotography (xerography) and OLEDs; especially high-purity hole-and electron-transport materials, emitters, hole-blocking materials, and dyes and pigments.
Andreas M. Richter, Managing Dir.
+49-(0)-3494-63-6963, fax -6906
email: syntec@syntec-sensient.com
www.syntec-sensient.com

SENSOR PRODUCTS LLC, 300 Madison Ave., Suite 100, Madison, NJ 07940
Manufacturers and distributors of tactile pressure-sensing solutions; sensors are used in applications such as tire testing to semiconductor manufacturing and R&D labs to space missions. Providers of in-house pressure mapping analysis and regional technical seminars.
Jennifer Siegel, Mktg. Mgr.
973/884-1755, fax -1699
email: sales@sensorprod.com
www.sensorprod.com

SEOUL SEMICONDUCTOR CO., LTD., 148-29, Kasan Dong, Keumchun-gu, Seoul 153-023, Korea
Manufacturers of LED products, including power LEDs, top-emitting LEDs, chip LEDs, LED lamps, high-flux LEDs, custom displays, LED dot matrices, and photosensors.
Boris Kim, Gen. Mgr.
+82-2-2106-7420, fax +82-2-858-5537
email: boris@seoulsemicon.com
www.seoulsemicom.com

SHARP MICROELECTRONICS OF THE AMERICAS, 5700 N.W. Pacific Rim Blvd., Camas, WA 98607
Manufacturers of a full line of displays, including passive-matrix monochrome and active-matrix color, as well as electroluminescent displays. Displays range in size from 2.4 to 29.5 in. (UXGA) on the diagonal. Offering both graphics and audio-visual-type displays.
Kraig Kawada, Sr. Dir., Display Mktg.
360/834-8928, fax -8992
email: kawada@sharpsec.com
www.sharpsec.com

SHELDAHL, 1150 Sheldahl Rd., Northfield, MN 55057
Manufacturers of roll-to-roll coatings of ITO, and patterned ITO, on thin (6–250 μm) plastic films. Other metal and dielectric coatings and value-added capabilities such as patterning, sheeting, laminating, and adhesive coatings are available for the display, aerospace, and electronics markets.
John Ehlert, Tech. Sls. Mgr.
507/663-8448, fax 507/664-8448
email: john.ehlert@sheldahl.com
www.sheldahl.com

SHELDAHL DISPLAY PRODUCTS, 1150 Sheldahl Road, Northfield, MN 55057-9444
Providers of material solutions to support resistive and capacitive touch sensor, smart windows, and electroluminescent product applications. Products include coated and patterned ITO, screen printing, and specialized tooling on thin plastic films all produced on state-of-the-art volume roll-to-roll manufacturing equipment. Customized materials and value-added services are also available.
Sales
507/663-8564, fax -8300
email: displayproducts@sheldahl.com
www.sheldahl.com

SILICON IMAGE, INC., 1060 E. Arques Ave., Sunnyvale, CA 94085
Providers of DVI transmitters, DVI receivers, and intelligent panel controllers for the PC/display market, and HDMI and DVI controllers and digital video processing chips for the consumer-electronics market.
Dani Edelberg, Sls. Admin.
408/616-4097, fax 408/830-9530
email: sales@siliconimage.com
www.siliconimage.com

SILICON MONITOR, 47460 Fremont Blvd., Fremont, CA 94538
Developers of a family of configurable and scalable pixel processors, targeting the current limitations of TFT-LCD modules, especially consumer-based products such as LCD TVs, multifunction monitors, front/rear-projection TVs/projectors, and a variety of LCD-based products.
Hiten Patel, V.P. Mktg. & Bus. Devel.
510/578-3209
email: hiten@siliconmonitor.com
www.siliconmonitor.com

SIM4TEC GmbH, Arnoldstr. 18b, 01307 Dresden, Germany
Providers of comprehensive simulation software in the field of organic electronics for a variety of different applications. Main focus is on the OLED modeling software SimOLED which can model the complete optoelectrical characteristics of multilayer OLEDs (e.g., current density, luminance, and efficiency). All software products come with an intuitive and user-friendly interface from which the user can quickly communicate with the calculation kernel. This enables fast learning cycles and a detailed understanding of the physical processes involved. Furthermore, developers of commercial products may benefit from a reduced time-to-market and a significant reduction of R&D costs by using simulation software.
Robert Nitsche, Dir.
+49-351-4466499, fax +49-351-44039520
email: info@sim4tec.com
www.sim4tec.com

SIPIX IMAGING, INC., 47485 Seabridge Dr., Fremont, CA 94538
Manufacturers of custom electronic-paper display modules. Key benefits include a display image retained with power removed, flexibility, durability, colors, no glass, ~180º viewing angle. Selected applications include smart cards, pricing labels, and indicators.
Mike Beames, V.P. Sls. & Mktg.
510/743-2916, fax 510/743-2872
email: mike.beames@sipix.com
www.sipix.com

SLENCIL COMPANY, 36 South Main St., P.O. Box 210, Orange MA 01364-0210
Manufacturers of commercial duty tethered stylus designs and stylus tethers, as OEM components for the touch-screen industry. Originator of the tethered COILPEN found in commercial settings all over the world. Products meet the needs of most touch-screen technologies, as well as providing a means to tether third-party stylus designs. Inventory and supply corporate custom colored units to complement product design and corporate image at no extra cost. Made in USA
William D. Goodwin, Sls. Mgr.
978/544-2171, fax 978/544-2812
email: WDG.sid@slencil.com
www.slencil.com

SMK ELECTRONICS CORP., 1055 Tierra del Rey Chula Vista, CA 91910
Manufacturers of film-on-glass and glass-on-glass resistance-type touch screens. Options include anti-smudge, anti-glare polarization films and force-feedback capabilities. Recently introduced is a capacitive touch screen for hand-held devices with multi-touch and gesture input capabilities featuring a super high transparency of 93%. SMK also produces various connectors including FPC connectors that are appropriate for the display industry.
George Sawyer, Mktg. Mgr.
619/216-6477, fax -6499
email: sawyer@smkusa.com
www.smkusa.com

ALAN SOBEL, PH D, PE, 1307 Beechwood Drive, Ann Arbor, MI 48103
Consultant specializing in display devices and systems, with over 40 years experience in gas discharges, electronic circuitry, vacuum systems, optical systems, and night-vision systems. Expert witness, technical writer, and Asscociate Editor, Journal of the SID; *licensed professional engineer, New York and Illinois.*
734/995-8414, fax 734/995-8414
email: as1285@columbia.edu

SOCIETY FOR INFORMATION DISPLAY, 1475 S. Bascom Ave., Ste 114, Campbell, CA 95008
International society for the presentation, exchange, and preservation of information-display technology. Sponsor of annual Symposium, Seminar, and Exhibition. Publishers of Information Display Magazine, Journal of the SID, *as well as other publications.*
Jenny Bach, Data & Office Mgr.
408/879-3901, fax -3833
email: office@sid.org
www.sid.org

SOKEN CHEMICAL AMERICA, INC., 110 Habersham Dr., Suite 101, Fayetteville, GA 30214
Manufacturers of acrylic pressure-sensitive adhesives for optical films and protection films. Also, Acrylic micropowders for light diffusion.
Tomonari Ksauga
770/371-5051, fax -5052
email: kasuga@sokenchem.com
www.soken-ce.co.jp/english/index.html

SOLAR TECHNOLOGIES, INC., 26180 Enterprize Way, Bldg. 100, Lake Forest, CA 92630
Suppliers of TFT-LCD screens, IntraKit LCD kits, touch screens, inverters, controller boards, and flat-panel-display solutions. Offering semi- and fully customed high-resolution LCD kitted solutions. Experts in EOL, legacy, and obsolute panels.
Chuck O'Connor, VP Sls.
949/458-1080, fax -1081
email: sales@lcdsolar.com
www.lcdsolar.com

SOLOMON SYSTECH, LTD., 6/F, No. 3 Science Park E. Ave., Hong Kong Science Park, Shatin, N.T., Hong Kong
Providers of display IC products under its own global brand. Products include TFT/CSTN LCD driver controller ICs, OLED drivers, graphic controllers, e-paper driver controller ICs, and microdisplay controller iCs.
H. H. Huang, Sls. Dir.
+852-2207-1111, fax +852-2267-0800
email: sales@solomon-systech.com
www.solomon-systech.com

SOUTHWALL TECHNOLOGIES, 3975 E. Bayshore Rd., Palo Alto, CA 94303
Designers and producers of technologically advanced thin-film coatings that selectively absorb, reflect, or transmit light, enhancing or enabling all electronic display products. Roll-to-roll manufacturing technology provides high-performance thin films in flexible, easily integrated package. Products include transparent conductive film for EMI shielding and silver reflective film for optical mirrors and reflectors. Specifically designed to increase performance of many electronic displays.
Gen Minase, Dir. Display Prod. Sls.
650/962-9111, fax 650/967-8713
email: gminase@southwall.com
www.southwall.com

SPECIALTY TAPES, DIV. OF RSW, INC., 4221 Courtney Rd., Franksville, WI 53126
Manufacturers of pressure-sensitive adhesive tapes that are specially engineered as protective masks, anti-static protective masks, backlight reflection, light-blocking applications, and double-coated reflective for rim sheet applications.
Gary King, Tech. Sls.
262/835-0748, fax -0749
email: sales@specialtytapes.net
www.specialtytapes.net

STANTUM, 107 cours Balguerie Stuttenberg, 33300 Bordeaux, France
Stantum has been the pioneering company in multi-touch display technology since 2002, and in 2005 was the first company to market commercial products using a truly reliable multi-touch user interface. Today, Stantum's breakthrough technology portfolio is available under license for products covering every aspect of multi-touch interaction: touch panels, multi-touch controllers, intellectual property cores, and multi-touch software framework.
+33-556-460-344, fax +33-556-792-215
email: contact@stantum.com
http://www.stantum.com

STEALTH.COM INC., 4-530 Rowntree Dairy Rd., Woodbridge, Ontario L4L 8H2 Canada
An ISO-9001 registered manufacturer that specializes in high-performance industrial-grade computer systems and peripherals that include rackmount PCs, flat-panel monitors, rugged portable PCs, and industrial-grade keyboards. Stealth's products are in demand by the scientific, telecommunications, industrial/commercial, and control markets.
E. Boutilier, Gen. Mgr.
905/264-9000, fax 905/264-7440
email: ed@stealthcomputer.com
www.stealth.com

STEMMERICH, INC., 4728 Gravois Ave., St. Louis, MO 63116
Distributor of specialty glass for the display and electronic industries. Complex configurations, precision-edge profiles (ground, polished). R&D pilot projects to production runs with quick on-time deliveries.
Colleen Weber
314/832-7726, fax -7799
email: colleenweber@stemmerich.com
www.stemmerich.com

STERIDIAN CORP., 201 N.E. Park Plaza Dr., Suite 165, Vancouver, NH 98684
Developer of a unique light valve for micro-projection engine systems that will revolutionize HDTV and business projector performance and economics by utilizing highly specialized liquid-crystal light-valve projection engines and software technologies.
Steven Hix, CEO
360/885-1900 x681, fax -3290
email: shix@steridian.com
www.steridian.com

SUMITOMO OSAKA CEMENT CO., LTD., 910 Sylvan Ave., Ste. 210, Englewood Cliffs, NJ 07632
Manufacturers of functional coated (AR, AR-NIR) plastics.
Yutaka Shibata, Gen. Mgr.
201/816-8270, fax -3670
email: info@sumiocus.com
www.socnb.com

SUN-TEC AMERICA, LLC, 15207 N. 75th St., Suite 106, Scottsdale, AZ 85260
Manufacturer of film lamination and labeling machines used throughout the display industry. Provider of cost-effective machines for R&D and small-scale production to fully automated machines used in high-volume automated production lines.
Michael Choi, Mktg. & Sls.
480/922-5344, fax 480/556-9677
email: r-tobiesen@sun-tec.net
www.sun-tec.net/english

SUNIC SYSTEM, LTD., 333-1, Wonchon, Youngtong-gu, Suwon, Kyonggi-do, 443-822 Korea
Developers and manufacturers of mass-production equipment, such as OLED evaporation systems, spotters, CVD, and dry etchers.
Joo-Hwan Lee, Mgr.
+82-31-219-1103, fax +82-31-217-2223
email: jhlee@sunic.co.kr
www.sunic.co.kr

SUPERTEX, INC., 1235 Bordeaux Dr., Sunnyvale, CA 94089
Technology-based producer of high-voltage analog and mixed-signal semiconductor components. Key markets include drive EL and LED-backlight displays for multiple applications.
Al Loring, Area Sls. Mgr.
845/357-0305, fax -0486
email: all@supertex.com
www.supertex.com

SYCAMORE GLASS COMPONENTS, 417 Border Ave., Sycamore, IL 60178
Custom fabrication of flat glass and acrylic to meet customer specifications. Materials include anti-reflective etched diffusers, filters,

borofloat, front-surface mirrors, AR Plastar acrylic, water-white, Corning 1737, Corning Eagle 2000, soda lime, or customer-supplied laminates. Processes include CNC scribing, slicing/dicing, CNC machining, chemical tempering, drilling, and sawing.
Steve Berk, Gen. Mgr.
815/895-8533, fax -7829
email: sales@sycamore-glass.com
www.sycamore-glass.com

SYNOVA S.A., Chemin de la Dent d'Oche, Ecublens 1024, Switzerland
Manufacturer of advanced laser-cutting systems for the semiconductor, electronic, automotive, solar, flat-panel display, and medical industries. Its proprietary Laser MicroJet® technology enables accuracy, quality and yield improvements in numerous precision manufacturing processes. Thanks to a hair-thin water jet guiding the laser beam, an unsurpassed cut quality is achieved, without heat damage and deposition. The Laser Stencil System (LSS) is a high-speed damage-free tool (no heating or warping) for thin metal mask cutting; no post-treatment is required.
Arnaud Brule, Mktg. Mgr.
+41-21-694-35-00, fax -01
email: info@synova.ch
www.synova.ch

SYNTAX GROUPS CORP., 20480 E. Business Parkway, City of Industry, CA 91789
Manufacturers of high-value HD-ready "Olevia" LCD TVs featuring premium specifications, affordable prices, and its "iDEA" digital video-processing technology for crisp, clear pictures with precise colors, sharp resolutions, and audio synchroniza-tion through an advanced digital sound processor (DSP).
Denis Karpeles, Sr. V.P. Sls.
909/859-8400, fax 909/859-8401
email: deniskarpeles@syntaxgroups.com
www.syntaxgroups.com

SYSTEMATION TECHNOLOGY, INC., 100 E. Nasa Road One, Suite 101, Webster, TX 77598
Manufacturers of controller boards with cables for most LCDs, single-board computers, custom LCD boards, and all type of display interfaces. Military and industrial video outputs supported.
Ray Hill, Engr.
281/332-7186, fax -7188
email: rayhill@systemation-inc.com
www.systemation-inc.com

TAIYO YUDEN (USA) INC., 440 Stevens Avenue #300, Solana Beach CA 92075
Now in its 59th year, Tokyo-based Taiyo Yuden Co., Ltd., is a worldwide manufacturer of surface-mount and leaded passive components, Bluetooth modules, CCFT inverters, and recordable digital media. Provider of line of low-profile DC/AC inverters designed to drive CCFL backlighting for LCDs. Also, provider of superior design techniques to provide some of the market's lowest profile CCFL inverters. Drivers provide OEMs with a tremendous advantage in meeting the continuing miniaturization design requirements of laptop computers, flat-panel displays, and other electronics-based durable goods.
Linda Suarez, Sls.
1-800-263-4532, fax 858/350-6854
email: lsuarez@t-yuden.com
www.t-yuden.com

TANNAS ELECTRONICS, 1426 E Dana Place, Orange, CA 92866
Resizing COTS LCDs for custom sizes and licensing of resizing technology under the trademark "Tannas-Sized" LCDs. Providing consulting services in displays, technical design, seminars, expert witness, technical and business critiques, photometry, colorimetry, avionics, and display-based products.
Lawrence E. Tannas, Jr., Pres.
714/633-7874, fax 714-633-4174
email: l.tannas@tannas.com
www.tannas.com

TELIOS TECH, LLC, 26081 Merit Circle, Laguna Hills, CA 92653
Specializing in display solutions for the automotive, defense, medical, and entertainment sectors. Expertise includes ruggedized solutions from industrial to military applications, kiosk and custom enclosures for industry leaders. Also, LCD repair and global procurement.
Celeste Miller, Acct. Mgr.
949/831-8471, fax -1549
email: celeste@teliostech.com
www.teliostech.com

TELTRON TECHNOLOGIES, INC., 2 Riga Lane, Birdsboro, PA 19508-1303
Manufacturers of cathode-ray tubes (CRTs), camera tubes, and display monitors for military, medical, avionics, and simulator applications.
Clyde A. Mock, Mktg. Mgr.
1-800-835-8766, fax 610/582-0851
email: teltron@ptd.net
www.teltrontech.com

TEMPO CLEAN ROOM FOAM, 1227 North Miller Park Court, Visalia, CA 93291
Stock and custom static dissipative protective packages for coated glass including molded boxes for square and round substrates and edge protectors for non-standard sizes. Low particulate, no dimethicone, test reports posted on Web site. Labor savings result from reduced handling and reduced damage.
Doug Rogers, Pres.
559/651-7711, fax 559/786-2128
email: tempogloss3000@yahoo.com
www.tempo-foam.com

TEXAS INSTRUMENTS, Worldwide Corporate Office, 12500 TI Blvd., Dallas, TX 75243
Designers and manufacturers of analog technologies, digital signal processing (DSP), and microcontroller (MCU) semiconductors. Providers of semiconductor solutions for analog and digital embedded and applications processing.
Amber Pizano, Marcom/Media relations
214/567-0325, fax 214/480-3160
email: a.pizano@ti.com
www.ti.com

TEXAS INSTRUMENTS, DLP DIV., 6550 Chase Oaks Blvd., #8447, Plano, TX 75023
Developer's of DLP™ technology, a leading projection technology enabling data and video projectors, HDTVs, and digital cinema. This technology is now available for development with the availability of DLP development kits and chipsets that will enable dozens of new applications.
Cheraina Dunn, Mktg. Mgr.
214/567-0833, fax -9977
email: cvick@ti.com
www.DMDDiscovery.com

TFD, 1180 N. Tustin Ave., Anaheim, CA 92807
Manufacturers of ion-sputtered thin films for FPDs (LCDs, microdisplays, and OLEDs). Offering solutions of ITO, IMITO™, to (LC or epoxy) LTITO™ for plastic and color filters, black chrome, hermetic solderable metallizations, BBAR (anti-reflective), hot/cold mirrors, and many other coatings. Extended services include glass fabrication, etch and patterning to 2-μm lines, ruggedization and bonding to LCDs, and touch panels. Panel sizes up to 28 x 36 in. with high-volume capability (MIL 1-45208).
Saleem Shaikh, Pres.
714/630-7127, fax fax -7119
email: sales@tfdinc.com
www.tfdinc.com

TGI TECHNOLOGIES, INC., 27 Briarbrook Dr., Briarcliff Manor, NY 10510
Manufacturers and service providers of cell-gap tester, luminance/response-time/viewing-angle tester, rubbing machine, custom FPD lab equipment and measurement systems, equipment condition-based monitoring (CBM), premature failure detection and forecast.
Zong Kai, V.P. FPD Engrg.
914/923-5070
email: inquiry@tgitechnologies.com
www.tgitechnologies.com

THINKLOGICAL, 100 Washington St., Milford, CT 06460-3133
Manufacturers of video extenders, KVM extenders, and digital crosspoint switches for applications with DVI or RGB video, RGB to DVI, and DVI to RGB. All transmission is digital over 1–4 strands of fiber-optic cable.
1-800-291-3211, fax 203/783-9949
email: sales@thinklogical.com
www.thinklogical.com

THOMAS ELECTRONICS EUROPE, 22 Rue Rene Char, Dijon 21000, France
Manufacturers of high-performance display components for all applications including high-voltage power supplies and deflection coils. Services include the repair and overhaul of all high-voltage power supplies regardless of manufacturer.
J-M. Perreaut, V.P. TE Europe
+33-380-600-290, fax -294
email: perreaut.jm@thomaselectronics.com
www.thomaselectronics.com

THOMAS ELECTRONICS OF N.Y, 208 Davis Parkway, Clyde, NY 14433
Manufacturers of a full line of CRTs, CRT assemblies, and ruggedized LCDs for military, industrial, and professional applications. Capabilities include the refurbishment/ overhaul of all display regardless of the OEM.
William Kuney, Sls.
315/923-2051, fax -4401
email: bill.kuney@thomaselectronics.com
www.thomaselectronics.com

THOMAS ELECTRONICS, COLORADO, 11101 East 51 Ave., Denver, CO 80239
Manufacturers of digital photographic printers and e-beam control systems. Advanced electron-gun and e-beam analysis available with control systems evaluation and fabrication. Refurbishment of imaging and display systems are also available.
Jes Cottrell, Natl. Photo Imaging Sls. Mgr.
303/574-1888, fax -1903
email: jes.cottrell@thomaselectronics.com
www.thomaselectronics.com

THOMAS ELECTRONICS, ILLINOIS, 330 S. LaLonde Ave., Addison, IL 60101
Manufacturers of electromagnetic display components offering a full line of deflection yokes, focus coils, beam-alignment devices, and mounting systems for all imaging yokes. Complete precision machine shop and tool room provides additional services for all machining requirements.
Patricia Rohlfes, Cust. Service
630/543-6444, fax -0287
email: patti.rohlfes@thomaselectronics.com
www.thomaselectronics.com

THOMAS ELECTRONICS, INC., 100 Riverview Dr., Wayne, NJ 07470
Manufacturers of CRTs, CRT assemblies, and LCD backlights designed for the industrial and military marketplace. Applications include avionics, photoimaging, simulation, and tactical displays. Value-added services available for LCD ruggedization and color displays.
Dennis Young, V.P. Appl. Engrg.
973/696-5200, fax -8298
email: sales@thomaselectronics.com
www.thomaselectronics.com

THOMAS ELECTRONICS, UK, Lansdowne House, Suite 182, 792 Wilmslow Rd., Didsbury, Manchester H2O 6UG, U.K.
Designers and distributors of CRTs, CRT assemblies, and LCD backlights for the military, industrial, and professional markets. Applications include avionics, photoimaging, simulation, telecine, and air-traffic control.
Rainer Kolbeck, V.P. TE U.K.
+44-161-445-8977, fax +44-161-448-1715
email:
rainer.kolbeck@thomaselectronics.com
www.thomaselectronics.com

3M OPTICAL SYSTEMS DIVISION, 3M Center, Bldg. 260-5N-10, St. Paul, MN 55144-1000
Providers of Vikuiti™ display-enhancement solutions for the electronic-display industry that includes transmissive display products, polarizers for transflective-mode LCDs, high-contrast projection screens, touch panels, and anti-reflective solutions.
Customer Service
1-800-553-9215, fax 1-888-271-3358
email: opticalsystems@mmm.com

3M TOUCH SYSTEMS, INC., 300 Griffin Brook Park Dr., Methuen, MA 01844
Providers of technical innovation, product reliability, and customer service to touch-device manufacturers and systems integrators and resellers around the world.
1-888/659-1080
email: touch@mmm.com
www.3mtouch.com

TIANMA MICROELECTRONICS (USA), INC., 1218 John Reed Court, City of Industry, CA 91745
Manufacturers of LCD modules and glass panels.
Anicee, Office Mgr.
626/336-8188, fax -8110
email: anicee@tianma.com
www.tianma.com

TIMELINE, INC., 2785 Pacific Coast Hwy., # 283, Torrance, CA 90505
Seller of LCDs, both alphanumeric and graphic types, flat-panel displays, and other display technologies such as monitors both enclosed and non-enclosed. Buyer of excess and overstock inventories.
(310) 784-5488, fax -7590
email: mraa@earthlink.net
www.timeline-inc.com

TLC INTERNATIONAL, World Headquarters, Linden Corporate Center, 9849 North 21 Avenue, Phoenix, AZ 85021-1825
Manufacturers of the Gen-3 TLC Phoenix-600 and TLC Summit Gen-6 high-accuracy computerized mechanical glass cutters that utilize carbide wheels to singulate rectilinear/circular/curvilinear/free-form parts from thin flat single-sheet/laminated substrates. Stationary stage. Windows O/S with seamless interface to AutoCAD. Proprietary rotating cutting head with incorporated CCD camera for on-stage measurement/inspection and quick, repeatable targeting for precise alignment. Consumable tooling includes carbide and diamond wheels, axles, restrainers, wheelholders and custom wheelholders for other manufacturers scriber models. Outsource R&D Lab for prototype and continuing support for TLC equipment customers and prospective buyers. Training and 24/7 technical service.
Maribeth V. Linden, V.P. Global Sls./Mktg.
602/296-1886 Direct, fax 602/866-8280
email: mlinden@tlcinternational.com
www.tlcinternational.com

TODDCO, 9235 Trade Place, Suite J, San Diego, CA 92126
Manufacturers of affordable custom hotbar bonding equipment used in chip-on-flex, chip-on-glass, or flex (TAB) attach. Computer-controlled manual to fully automatic systems available for ACF tacking and bonding or reflow soldering.
Allen Bratty, Sls. Mgr.
858/271-9229, fax -9269
email: abratty@toddco.com
www.toddco.com

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC., 19900 MacArthur Blvd., Ste. 400, Irvine, CA 92612
Toshiba Matsushita Display Technology Co., Ltd., (TMD) is a leading designer, developer, and manufacture of LCDs. Noted for the advancement and manufacturing of displays using a low-temperature polysilicon (LTPS) process, and offering a wide selection of LCD modules for mobile and notebook PCs cellular phones, handheld devices, automotive, and industrial applications.
Steve Vrablik, Bus. Dev. Dir. LCD
847/484-2400, fax 847/541-7287
email: steve.vrablik@taec.toshiba.com
www.lcd.toshiba.com

TOUCH INTERNATIONAL, 2222 W. Rundberg Lane, Suite 200, Austin, TX 78758
Manufacturers of high-quality touch screens, touch monitors, digitizers, EMI filters, and anti-reflective vandal shields, and bonded laminations with supporting electronics. Offering world-wide engineering and product solutions.
Kelly Leff, Mktg. Commun. Specialist
512/646-8292, fax 512/491-6381
email: sales@touchintl.com
www.touchintl.com

TOUCH PANEL LABORATORIES CO., LTD., 3-2750-1046, Motoachioji-machi, Hachioji-City, Tokyo 193-0826, Japan
Takao Tsukahara, Mgr., Monitor Division
+81-42-686-1110, fax +81-42-689-5823
email: tsukahara@touchpanel.co.jp
www.touchpanel.co.jp

TPO DISPLAYS CORPORATION, No. 12, Ke Jung Rd., ChuNan 350, Miao-Li County, Taiwan, ROC
TPO is a combination of two industry leaders: Toppoly Optoelectronics Corp. and Philips Mobile Display Systems (MDS). TPO offers a highly competitive product and technology portfolio of distinctive value-added displays to meet customer display requirements in the telecommunications, consumer-electronics, automotive, information-display, and avionics arenas.
Karen Peng, Mgr., Mktg. Commun. Div.
+886-37-586393 ext. 22416,
fax +886-37-586168
email: karen.peng@tpo.biz
www.tpo.biz

TREDEGAR PERFORMANCE FILMS, INC., 30 Maple Ave., Marlin, PA 17951
Manufacturers of temporary protective films for smooth, matte, and textured surfaces. Protected optical surfaces include glass substrates, plastic substrates, polarizers, diffusers, microreplicated structures, and coated films. The patented technology provides consistent protection.
Beth Powell, Prod. Mgr.
570/544-7606, fax -7678
email: bpowell@tredegar.com
www.tredegarfilm.com

TRICOR SYSTEMS, INC., 1650 Todd Farm Dr., Elgin, IL 60123
Designers and manufacturers of stock and custom products, including video photometers, inspection systems, gloss measurement and surface analysis systems, and image-processing software. Contract manufacturers of electro-optical mechanical devices for many applications
Tom Allen, Mktg. Mgr.
847/742-5542, fax -5574
email: info@tricor-systems.com
www.tricor-systems.com

TROVATO MANUFACTURING, INC., 66 North Main St., Fairport, NY 14450
Servicing the scientific and educational communities with advanced solutions for thin-film vacuum-deposition processes. Systems are turnkey and fully automated for optimum constituent variant research. Specializes in OLED, SSL, and PV materials research.
Mike Maiorino, Sls. & Mktg. Mgr.
585/377-8070, fax 585/377-3811
email: mike@trovatomfg.com
www.trovatomfg.com

TW CLEAN, 2205 Faraday Ave., Suite B, Carlsbad, CA 92008
Providers of groundable static control cleanroom garment systems in labcoat and coverall styles including electrically connected hoods and conductive footwear. Guaranteed for 2 years or 100 washes to 35 megaohm surface resistance panel to panel.
Michele McSwain, V.P.
760/438-7788, fax -6868
email: michele@techwear.com
www.twclean.com

U.K. DISPLAYS AND LIGHTING KNOWLEDGE TRANSFER NETWORK (UKDL), Bletchley Park Science & Innovation Centre, Milton, Keynes, MK3 6EB, U.K.
Promoters of knowledge transfer to facilitate technology exploitation and commercial growth amongst the members. Offering free membership to companies and academics working in FPD, SSL, gas plasma, and printable lighting.
Susan Lee, Oper. Dir.
+44-7917-445-673, fax +44-1635-299-214
email: info@ukdisplaylighting.net
www.ukdisplaylighting.net

UDT INSTRUMENTS, 8381 Aero Dr., San Diego, CA 92123
Manufacturers of photometers, radiometers, position sensors, and colorimeters. Offering NIST traceable calibration services.
Eric Nelson, Sls. Mgr.
858/279-8034, fax 858/576-9286
email: sales@udtinstruments.com
www.udtinstruments.com

UNAXIS (SHANGHAI) CO., LTD., Bldg. #33, 76 Fu Te Dong San Rd., Waigaoqiao Free Trade Zone, Pudong, Shanghai 200131, P. R. China
Providers of optical coating, substrate fabrication, and subassembly manufacture for the projection display, lighting, instrument, imaging, automotive, as well as biotechnology markets. Fabricators of mirrors, filters, beam splitters, prisms, lenses, and other components from a variety of materials. Also, provides the assembly of coated optical elements into optomechanical and/or optoelectronic assemblies.
David Wu, Sls. Engr.
+86-(21)-5057-4646, fax -4647
email: sales.optics.sh@unaxis.com
www.optics.unaxis.com

UNAXIS OPTICS USA, INC., 16080 Table Mountain Pkwy., Ste. 100, Golden, CO 80403
Manufacturers of coated optical components and subassemblies for the optics and photonics industry. OEM production capabilities go beyond optical coating, including substrate fabrication, subassembly manufacture, design assist, and full turnkey supply-chain management.
Ed Yousse, Natl. Sls. Mgr.
303/215-4105, fax 303/273-2995
email: ed.yousse@unaxis.com
www.optics.unaxis.com

UNIGRAF OY, Ruukintie 3, Espoo FIN-02330 Finland
Designers and manufacturers of PC-based test equipment. Products include video test generators, industrial controllers, high-resolution frame grabbers, and a 20.6-Hz sampling scope.
William Down, Intl. Sls. Mgr.
605/362-6240, fax -7961
email: bill@unigraf.fi
www.unigraf.fi

UNITEK EAPRO (MIYACHI UNITEK CORP.), 1820 S. Myrtle Ave., Monrovia, CA 91016
Manufacturers of flat-panel-display (FPD) repair stations for LCD/PDP repair and low-volume production, designed to handle both TAB and COG applications and can accommodate displays measuring from 3 to 80 in. wide. Available with either pulsed heat or constant heat reflow power supplies, systems can handle LCDs only, PDPs only, or both LCDs and PDPs.
Barbara Kuntz, Marcom. Mgr.
626/930-8560, fax 626/599-7906
email: barbara.kuntz@miyachiunitek.com
www.miyachiunitek.com

UNIVERSAL DISPLAY CORP. (UDC), 375 Phillips Blvd., Ewing, NJ 08618
UDC is an OLED technology development and licensing company. Winner of the SID/Information Display Magazine 2003 Gold Award winner for its commercial phosphorescent OLED (PHOLED^{TM}) materials, UDC offers materials with up to four-times-higher power efficiency than conventional OLED materials having excellent color quality and lifetime. Developer of next-generation technologies, including transparent and flexible OLEDs.
Janice K. Mahon, V.P. Tech. Commercialization
609/671-0980 ext. 206, fax -0995
email: jkmahon@universaldisplay.com
www.universaldisplay.com

US MICRO PRODUCTS, INC., 6207 Bee Caves Rd., Suite 330, Austin, TX 78746
Distributors of an extensive line of TFT, OLED, character, graphic, and segmented displays in a wide range of sizes for both the commercial and industrial industries. Available in custom shapes, sizes, interfaces, temperature specs, and more.
Jackie Hatfield, Inside Sls. Engr.
512/385-9000, fax 512/325-9002
email: jhatfield@usmicroproducts.com
www.usmicroproducts.com

USDC, 60 South Market St., #480, San Jose, CA 95113
Developers of the display industry by funding supply-chain technical projects, analyzing and benchmarking industry activity, publishing industry reports, and facilitating company and investor interactions through organizing meetings and conferences.
Heidi Hoffman, Dir. Mktg. & Commun.
408/277-2400, fax -2490
email: usdc@usdc.org
www.usdc.org

USHIO AMERICA, 5440 Cerritos Ave., Cypress, CA 90630
USHIO America, Inc., is a leading manufacturer and distributor of lighting products and associated services and control gear in North and South America. Established in 1967 as a subsidiary of USHIO, Inc., in Tokyo, Japan, USHIO now carries over 3500 general-lighting and specialty products. These "Lighting-Edge Technologies" are provided to a variety of industries such as general illumination, audio-

visual, photographic, stage, studio and television, semiconductor, printed circuit, video projection, cinema, UV curing, germicidal, horticulture, graphic arts, flashlight, scientific, medical, dental, ophthalmic, infrared heating, and many others.
Denny Huang, Sr. Mktg. Coordinator
714/229.3173
email: PRESS@ushio.com
www.ushio.com

UTI TECHNOLOGY INC., 1392 Poinsettia Ave., Suite E, Vista, CA 92081
A leading integrator of LCD monitors for industrial applications, including open-frame monitors, touch-screen monitors, high bright monitors, and signage monitors.
M. S. Lee, Gen. Mgr.
760/295-2917, fax 760/295-2932
email: lee@utitechnology.com
www.utitechnology.com

VAT, 500 West Cummings Park, Woburn, MA 01801
Developer and manufacturer of quality vacuum valves. Products include gate, control, angle, fast-closing, throttle, pressure control, retro-fit, and customized valves for applications such as pump isolation, load locks, beam lines, and other vacuum applications.
Joyce Mackiewicz, Mktg.
781/537-5410, fax 781/935-3940
email: joycem@vatvalve.com
www.vatvalve.com

VENTURE TAPE CORP., 30 Commerce Rd., Rockland, MA 02370
Manufacturers of pressure-sensitive adhesive tapes for various high-technology applications, including flat-panel displays, OLED displays, mobile telephone displays, as well as other advanced electronic equipment systems.

VERITAS ET VISUS, 3305 Chelsea Place, Temple, TX 76502
Market researcher and publisher providing a series of specialty newsletters about the display industry, including flexible substrates, display standards, 3-D, high resolution, and touch panels.
Mark Fihn, Publisher
254/791-0603
email: mark@veritasetvisus.com
www.vertasetvisus.com

VESA (VIDEO ELECTRONICS STANDARDS ASSN.), 860 Hillview Ct., Ste. 150, Milpitas, CA 95035
A worldwide organization with more than 150 members that promotes and develops timely, relevant, open display, and display-interface standards, ensuring inter-operability and encouraging innovation and market growth.
Joan White, Committee and Member Services Mgr.
408/957-9270, fax -9277
email: moderator@vesa.org
www.vesa.org

VIOX CORP., 6701 Sixth Ave. So., Seattle, WA 98108
Manufacturers of custom glass frits and powders for the display industry. Applications include dielectric layers, barrier rib, and seal glasses. Providers of glass development, laboratory samples, and volume manufacturing services for high-purity technical glasses.
Harlan Brown, V.P. Sls. & Mktg.
206/763-2170, fax -2577
email: hrbrown@viox.com
www.viox.com

VISION DISPLAY SYSTEM CO., LTD., No. 68, You-Yi Rd., Junan, Miaoli, Taiwan 350, R.O.C.
Manufacturers of small/medium modules, including OLEDs, TFT-LCDs, mono STN-LCDs, color STN-LCDs, TN/HAN LCDs, etc. Suppliers of display modules to worldwide cutting-edge technology teams such as mobile phones, PDAs, DSC, MP3, instruments, and a variety of consumer electronics products.
Andrew Chang, Senior Dir.
+886-37-580-699, fax -702
email: andrewch@vds.com.tw
www.vds.com.tw

VISSUMO TOUCH SYSTEMS, 801 Robinson Drive #200, North Salt Lake, UT 84054
Vissumo's new Force Panel Technology shatters the limitations of existing touch-screen products, extending the range of operator interactions possible in terms of robustness, size, materials, and shapes.
Russ Robinson, Business Development Mgr.
801/677-1800, fax 801/677-1790
email: russ.robinson@vissumo.com
www.vissumo.com

VITEX SYSTEMS, 2184 Bering Dr., San Jose CA 95131
Licenser of intellectual property and provides related engineering expertise to enable organic light-emitting-diode (OLED) display manufacturers and producers of organic opto-electronic devices to speed time-to-market of thinner, lighter, lower-cost products. Solutions include Barix™ proprietary encapsulation process technology; flexible glass next-generation flexible barrier substrate; and the Guardian™ deposition system tool. The company was incubated at Battelle Memorial Institute, the world's largest independent private non-profit research foundation and was spun off as an independent company in 1999.
Chyishan Suen, Pres. & COO
408/325-0366, fax 408/519-4470
email: csuen@vitexsys.com
www.vitexsys.com

VP DYNAMICS LABS (MOBILE) LTD, Unit 202, 2/F, Photonics Centre, No. 2 Science Park East Avenue, Hong Kong Science Park, Shatin, N.T., Hong Kong
An R&D house in disruptive technologies and new business models based on visual perception (VP) technology, enabling displays with lower power, higher resolution, excellent brightness, and better contrast. Based upon the visual-perception process inside the human brain, VPW display driven by the proprietary VPW engine, creates four times (4x) higher perceived virtual resolution with virtual pixels without adding more physical pixels in a high-density-pixel-packed mobile display.
Vincent Phan, CEO
852/2607-4238, fax 852/8147-9887
email: vp@vp-dynamics.com
www.vp-dynamics.com

WACOM TECHNOLOGY CORP., 1311 SE Cardinal Ct., Vancouver, WA 98683
Developers of CapPLUS touch-input technology and PENABLED-patented cordless battery-free pen-input technology for use in a wide variety applications. PENABLED technology is also offered with touch (Pen + Touch) including support of multitouch. Solutions are available in support of any display size; interfaces with either serial or USB.
Steve Sedaker, Dir., Component Sls.
360/896-9833 x136, fax -9724
email: steve.sedaker@wacom.com
www.wacom.com

WAVEFRONT TECHNOLOGY, INC., 7350 Somerset Blvd., Paramount, CA 90723
Offering proprietary and patented products and custom manufacturing services for producing microstructured optical films with custom geometries for light-management diffraction, packaging, and security applications. Products can be produced via roll-to-roll manufacturing or large flat-panel replication.
Philip Chu, V.P. Bus. Devel.
562/634-0434, fax -7758
email: information@wft.bz
www.wft.bz

WESTAR DISPLAY TECHNOLOGIES, INC., 4 Research Park Dr., St. Charles, MO 63304
Westar's display quality-assurance systems help customers quantify display electro-optical performance. Companies worldwide use Westar systems to monitor and improve display performance across all display technologies, from LCD to OLED, and all display sizes, from pico displays to cell displays to the world's largest flat-panel TVs. Provider of a full range of solutions for every stage of the display industry's supply chain, including fully automated, environment-controlled measurement systems used at major manufacturers' module assembly plants, to digital TFT testers used for manual and automated inspection of TFT panels by major computer brands to repair valuable display stock. Also maintains an in-house, state-of-the-art measurement laboratory, providing measurement services to the display industry.
Dave Heiligenstein, Pres.
636/300-5101, fax 636/300-5105
email: daveh12@westar.com
www.westardisplaytechnologies.com

WESTBORO PHOTONICS (FORMERLY INSTRUMENTS SYSTEMS CANADA), 1505 Carling Ave., Ste. 301, Ottawa, Ontario K1Z 7L9, Canada
Suppliers of high-quality light-measurement solutions with emphasis on display and LED measurements (luminance, chromaticity, NVIS, luminous intensity, flux, etc.). Manufacturers of the next generation of the Compact Array Spectrometers series – the CAS 140CT with completely re-designed optics, especially efficient stray light rejection and enhanced dynamic range.
Ken Richardson, Sr. Tech. Sls. Rep.
613/729-0614 x522, fax -9067
email: info@wphotonics.com
www.wphotonics.com

WHITE ELECTRONIC DESIGNS CORP., 21333 NW Jacobsen Rd., Hillsboro, OR 97124
Providers of enhanced optical performance AMLCD solutions associated with outdoor commercial/industrial applications. Additional services include keypads, graphic overlays, advanced semiconductor packaging, and high-density memory-chip products. Complete system integration enables a combination of these elements.
503/690-2460, fax -2490
email: info@wedc.com
www.wedc.com

WINTEK ELECTRO-OPTICS CORP., 1665 E. Highland Dr., Ann Arbor, MI 48108
Designers and manufacturers of standard and custom LCDs and modules. Wide range of display technologies including TN, monochrome and color STN, FSTN, DSTN, COG, COF, TFT, OLED, touch panels, and backlight products.
Philip Hughes, Dir.
734/477-5480, fax -0741
email: phughes@wintekeo.com
www.wintek.com.tw

XENNIA TECHNOLOGY, LTD., Monroe House, Works Rd., Letchworth, Hertfordshire, SG6 1LN, U.K.
A leading industrial ink-jet integration company developing new fluids, industrial printing, and micro-dispensing technologies for a wide range of applications, including displays, printed electronics, pharmaceutical, and special graphics.
Hannah O'Brien, Mktg. Mgr.
+44-1462-705220, fax -705221
email: enquiries@xenia.com
www.xennia.com

ZEMAX DEVELOPMENT CORP., 3001 112th Ave. NE, Suite 202, Bellevue, WA 98004-8017
Publishers of the ZEMAX Optical Design Program which can be used for both sequential and non-sequential ray tracing. Software can be used to conceptualize, design, optimize, analyze, tolerance, and document virtually any optical system.
Sls. Dept.
425/822-3406, fax 425/889-4687
email: sales@zemax.com
www.zemax.com

ZEON CHEMICALS L.P., 4111 Bells Lane, Louisville, KY 40211
ZeonorFilm® isotropic and retardation films exhibit excellent transparency, dimensional stability, and light transmission for display light management applications. Applications include polarizers and support films in polarizers, LCD panels, touch-screen, mobile phone, and electronic-paper applications. Additionally, ZeonorFilm can be used for bio-diagnostic applications. ZeonorFilm is manufactured by Optes, Inc. and is sold in North America by Zeon Chemicals.
Toshiro Katayama, Product Manager
502/775-2000, fax -2025
email: zeonex@zeonchemicals.com
www.zeonex.com

ZIPPY TECHNOLOGY CORP., 107, No. 50, Min Chyuan Rd., Shin Tien City, Taipei County, R.O.C.
Producers of highly efficient and safe piezo inverters. The inverters save power and prevent the burning and smoking of the inverter.
Nelson Chou, Sls. Rep.
+886-2-2918-8512, fax +886-2-2915-5765
email: nelson_chou@zippy.com.tv
www.zippy.com

ZYGO CORP., Laurel Brook Rd., Middlefield, CT 06455
Designers and manufacturers of non-contact measuring systems providing productivity and yield improvement in color filter, IJP, TFT, and OLED processes.
Brian Monti, V.P. Sls. & Mktg.
860/347-8506, fax -8372
email: inquire@zygo.com
www.zygo.com

ZYTRONIC, Whiteley Rd., Blaydon on Tyne, Tyne & Wear NE21 5NJ, U.K.
Designers and manufacturers of a range of technologies that optimize the performance of electronic-display applications. The company's principle products include award-winning touch-sensor technologies, optical filters for enhanced performance and protection, and special filters to minimize electromagnetic emissions. In addition, the company can offer complex-shaped glass composites for specialized applications.
Mark Cambridge, CEO
+44-(0)-191-414-5511, fax -0545
email: info@zytronic.co.uk
www.zytronic.co.uk

NOTES

NOTES

NOTES

Display Week 2009 Review: E-Paper and Reflective Displays

Momentum builds for electrophoretic and other reflective technologies.

by Paul Drzaic

MORE THAN AT ANY OTHER TIME in the past, this year's SID Symposium provided strong evidence that the value of paper-like displays is finally being recognized. Reflective LCDs have been around for about 40 years, and electrophoretic displays for about 30 years. Early uses of LCDs were in low power, relatively low-resolution applications such as watches and calculators. Despite this long history, there has rarely been a set of high-resolution applications that took advantage of the positive aspects of reflective displays, while also balancing their shortcomings as compared to conventional backlit LCDs. These days, though, increased interest in mobile devices that are low power and can be used in any viewing environment has finally resulted in greater demand for electronic-paper solutions. Now, major companies and startups alike are promoting their visions of e-paper.

E Ink, more than any other company, helped establish the modern view of what a reflective paper-like display should be. The SID Business Conference opened with the announcement that Taiwanese company PVI and E Ink had agreed to terms for PVI to acquire E Ink for the sum of $215 million. (For more on the acquisition, see "E Ink to Be Acquired by Prime View International" in the Industry News section of the July issue of *ID*.)

Paul Drzaic *serves the electronic-display industry through Drzaic Consulting Services; drzaic.consulting@gmail.com. He is also the President of the Society for Information Display.*

In its booth on the exhibit floor, E Ink showed its latest developments in reflective color displays, including several panels capable of rendering animations in small windows within the panel. E Ink Vice President of Marketing Sriram Peruvemba indicated that E Ink plans on launching color products next year (Fig. 1).

A number of major display companies were demonstrating electronic-paper panels that used the electrophoretic-display medium sourced from E Ink. NEC had an impressive example in its exhibit – a 13.8-in. panel with 43% reflectivity, 16 gray levels, and a resolution of nearly 150 ppi.

Another company showing a range of e-paper products in its booth was iRex Technologies, an early proponent of electronic-paper displays. The CTO of iRex, Alex Henzen, also presented a well-attended symposium paper on the prospects for full-color e-paper displays using subtractive-color schemes. Henzen noted that the electrophoretic displays of today will provide increasing levels of performance (Fig. 2), but some challengers, such as cholesteric displays and electrowetting displays, may be better suited for bright, full-color displays.

Fig. 1: *E Ink showed color prototypes at Display Week.*

Fig. 2: *With 16 gray levels, an integrated touch screen, WiFi connectivity, and more, this electronic reader from iRex Technologies embodies most of the desirable features of today's electronic readers.*

0362-0972/08/2009-020$1.00 + .00 © SID 2009

Success breeds competition, and a number of companies made it very clear that E Ink's digital ink technology is not the only game in town. In the electrophoretic arena, SiPix Imaging has tightened its relationship with Taiwanese panel maker AU Optronics Corp. through substantial investments. The SiPix booth had an e-reader panel from the collaboration with AUO. Wintek was also showing at its booth a number of electronic-paper displays that had been built using SiPix films.

There were also multiple reminders that electrophoretic technology is not the only option for reflective displays. Qualcomm, for example, showed the latest advances in its Mirasol displays in its booth. The Mirasol display relies on micromechanical elements that produce color through the same mechanism of reflective interference that gives butterfly wings their iridescence. The displays are effectively bistable; one particularly striking demonstration showed that a 2.2-in. panel required less than 1 mW of power to hold an image. While current displays are still relatively small in area, the capability for video-rate performance, good color in a sunlight-viewable reflective display, and a low-power static mode makes this technology a serious candidate in the reflective race (as well as the race for advanced mobile displays) (Fig. 3).

At the Display Week Business Conference, Mary Lou Jepsen of Pixel Qi (a spin-off from the One Laptop per Child initiative) showed slides of the company's new display prototype. The panel works as a reflective display in bright ambient lighting conditions, including direct sunlight, and has an appearance somewhat similar to electrophoretic-based displays. Unlike electrophoretic displays, however, the display also has a backlight for low-ambient-light conditions, which produces a full-color image. Because it is based on conventional liquid-crystal technology, it should also possess response times suitable for motion video. Jepsen claims that the display entry into the marketplace will benefit by compatibility with the existing LCD manufacturing infrastructure. No other details regarding the actual construction or specific performance are available from the company at this time.

Sharp demonstrated an interesting set of polymer-network liquid-crystal displays, which rely on a liquid-crystal layer coupled to a reflective surface that switches from scattering to transparent. These displays were connected to a memory element built into the display backplane, so the display is effectively bistable, possessing a low-power memory capability.

Liquavista also emerged as a contender on the electronic-paper front, demonstrating both reflective and transflective electrowetting displays. The reflectivity of these displays is quite respectable, with the capability of switching at video rates. The company has recently shifted focus away from simple displays for high-volume consumer items toward high-resolution, reflective display products.

Electronic skins were a hot topic in San Antonio. Kent Displays exhibited its Reflex line of products, featuring a thin polymer "skin" that can be thermoformed around various shapes, and then switched between multiple colors. Imagine a cell phone that instead of vibrating, turns red, blue, or green based on the identity of the caller! The skins, which draw power only when switching, hold potential for numerous applications (Fig. 4).

Fig. 3: *This Qualcomm Mirasol display holds an image using less than 1 mW of power.*

Hewlett-Packard also presented a paper on its vision of electronic skins, showing samples of plastic film that could switch between intensely colored and less-colored states. The film is fabricated on a roll/roll basis.

Overall, many of these displays were somewhat reminiscent of the magical newspapers that appeared in the popular Harry Potter movie series: paper-like displays, but with areas of color and animation, providing a mix of static and dynamic images. I believe that technology is catching up with vision in these cases. Much of that technology is still in the demonstration category, but the race is definitely on to roll out the best applications with these new capabilities and get them to market. ■

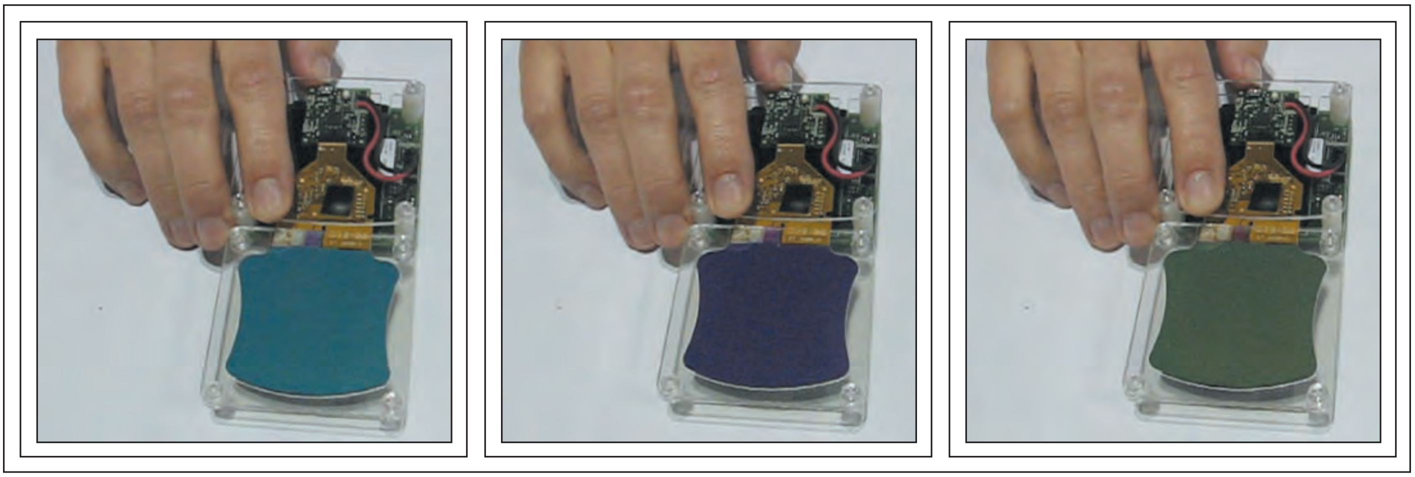


Fig. 4: *Electronic-skin technology from Kent Displays allows switching between multiple colors.*

Display Week 2009 Review: Projection

Pico projectors begin to come of age, and new projection technologies appear as well.

by Alfred Poor

IN RECENT YEARS at the annual SID Symposium, front-projection technology has played a shrinking role compared with that of flat panels and related components. Even so, a broad range of demonstrations and research results provided a rich resource for those interested in projection. The biggest buzz at this year's show was the rapidly evolving pico-projector market segment.

Pico projectors are devices small enough to be incorporated into a typical mobile phone or similar portable device. With device volumes measured in single-digit cubic-centimeter sizes, this product segment is just coming to market in significant quantities, but much work continues to be done on components, from light sources to imagers. Some of the areas of investigation include increasing light output, reducing or eliminating speckle from laser light sources, and decreasing power consumption.

Corning demonstrated its G-1000 solid-state green laser that draws about 60 mW, suitable for compact projection devices. The laser uses optical frequency doubling to convert output from an infrared laser to obtain green light. The company has a reference design board that includes the laser and has already announced an agreement to provide green lasers to Microvision for its pico-projector products. The green laser is an important development for pico-projector applications. While red and blue compact lasers have been readily available, devices have had to rely on alternate sources of green light, such as LEDs, which are limited in terms of light output and light management. Corning expects to have the G-1000 in commercial production by the end of 2009 (Fig. 1).

OSRAM presented a paper on a compact RGB laser module (20.4: "Compact RGB Laser Module for Embedded Laser Projection") that combines the lasers with a driver ASIC and optical components. The device can be contained in a 7-mm-tall package that measures just 6.5 cm^3.

3M also presented a paper on its new MM200 mobile projection engine. Using a color LCOS imager and a white-LED light source, the device is rated at 8 lm at 1-W LED power. The VGA resolution (640 × 480) engine has an external

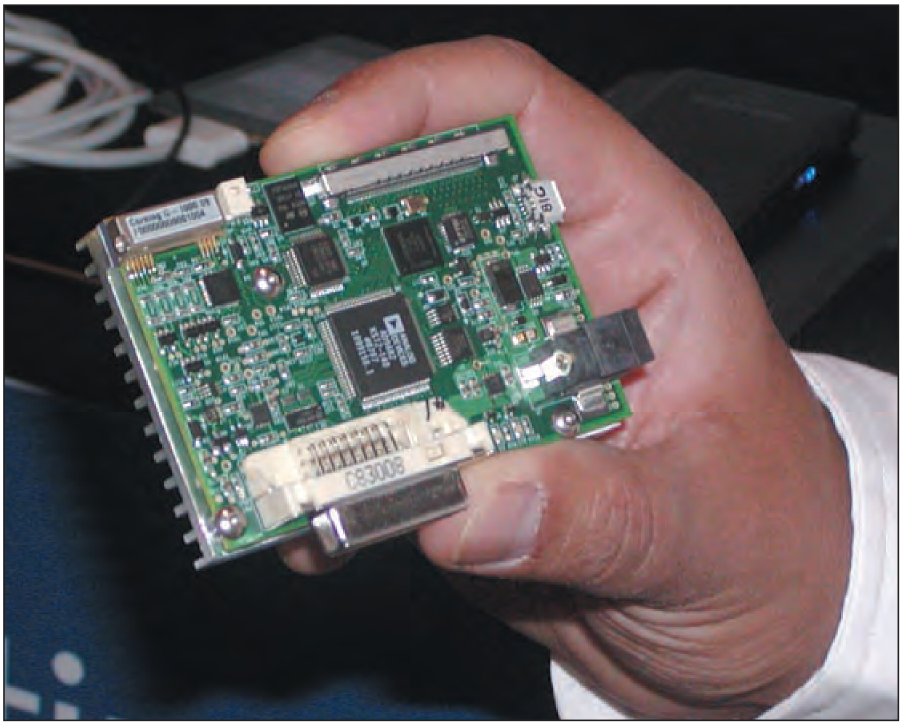


Fig. 1: Corning demonstrated a prototype controller board with its green laser (rectangular component at top left).

Alfred Poor is editor and publisher of the online HDTV Almanac *and a freelance writer covering technology topics with special emphasis on displays. He is also a Technical Editor with* ECN (Electronic Component News) *and past Chair of the SID Delaware Valley Chapter. He can be reached at apoor@verizon.net or 215/453-9312.*

0362-0972/08/2009-022$1.00 + .00 © SID 2009

volume of just under 14 cm^3. For complete devices, Microvision showed its new SHOW WX pico projector that is scheduled to ship this summer. The wide-VGA resolution (848 × 480 pixels) image is rated at much more than the existing color space used in TV today. It is rated at 10-lm light output and is designed to be able to show an entire movie on a single charge of its internal battery. Micron also demonstrated a prototype pico-projector device with wide-quarter-VGA (WQVGA) resolution using an imaging panel based on the recently acquired ferroelectric liquid-crystal–on–silicon (FLCOS) technology from Displaytech. This allows memory, image processing, and light-driver control to be incorporated into one chip along with the display panel itself, resulting in a compact device (Fig. 2).

Texas Instruments showed an example of a new Samsung personal media player scheduled to ship in Korea that includes an embedded pico projector using TI's 0.17-in. HVGA DLP chip. This chip, the 2009 SID/*Information Display* Display of the Year Silver Award winner, is now also available in a DLP Pico-Projector Kit using LED illumination resulting in a 7-lm-rated output; the kit is compatible with Beagle Board for system development (Fig. 3).

Fig. 2: *The prototype pico projector by Micron used the Displaytech FLCOS technology to create an image that was both large and legible, even in the exhibit hall at Display Week 2009.*

New Approaches

A variety of novel projection technologies was presented at Display Week. One of the most intriguing of these was covered by a paper and a poster presented by researchers from the University of Washington, which described a scanning optical-fiber projection engine for pico projectors. The tip of a single optical fiber is vibrated to create a scanning image. The piezoelectric vibrating device, fiber end, and optics can be fit into a 1-mm-diameter package that is 9 mm long. The fiber can transport the output from RGB light sources and the modulating circuitry. The angle of the tip's deflection can be adjusted electronically, which in turn controls the "throw" of the projector without the need for any zoom-lens optics. The poster reported throw angles ranging from 20° to 100°, simply through adjusting the voltage applied to the piezoelectric component.

Fraunhofer IPMS demonstrated a tiny MEMS array that is designed for a raster scan image with small dimensions that can be used for laser projection. The array can scan a line at a time, as contrasted with a single-pixel device that has to be scanned horizontally and vertically to create an image or with a matrix panel that can create a complete image at one time. The new device can achieve a 10° deflection with a 1-msec response time. According to a Fraunhofer IPMS representative, the same technology could be used to create a full-image panel.

The Big and the Small

Novel technologies were presented for both big and small front projectors. Fraunhofer IPMS presented a paper describing a projection system using an OLED panel as both the imager and the light source. Optics can project the image onto a small screen, with applications ranging from a head-mounted system to pico projectors in mobile devices.

At the other end of the size range, Christie Digital Systems presented a paper that addresses the problem of laser speckle for large projectors such as those used in digital cinema. By "piping" the light from the image to the projection optics along a fiber-optic cable, the coherence of the light beam is reduced to the point that speckle can no longer be observed. This has the added benefit of separating the lasers from the projection head, which can simplify the system installation. This was just one of several papers and technology demonstrations that illustrated the significant progress that is being made at reducing the speckle that can be a distraction for laser-illuminated displays.

In short, while projection technology did not take a front-row position at Display Week 2009, there was enough new technology and reports of advances to warrant our keeping an eye on the big (and small) screens. ■

Fig. 3: *This new personal media player from Samsung is intended for the Korean market and includes an embedded pico projector based on the TI chipset.*

case study

High-Power Projectors Illuminate Opening Ceremonies at 2008 Beijing Summer Games

In August of 2008, the world took in an amazing spectacle as the opening ceremonies of the summer Olympic Games unfolded. Display technology, including projectors, played a major role in enabling this event.

by Terry Schmidt

THE ambitious and spectacular opening ceremonies of the 2008 Summer Olympics in Beijing, China, involved thousands of performers and special effects. The event, designed to dazzle both the 91,000 attendees and a live TV audience of approximately 800 million viewers, was enhanced with a non-stop panorama of digitally projected images on all suitable surfaces inside the 2,777,089 ft.^{2} (258,000 m^2 [a]) "Bird's Nest" stadium. For these live ceremonies, advance planning, technical competence, comprehensive testing, and system reliability were paramount.

Projectors helped make all this possible, and the ones used in the opening ceremonies were made and installed by Christie Digital Systems of Canada. Although the project began with discussions in 2007, this part of the story begins in April 2008, some 5 months before the games, when a team of managers, engineers, and technologists from Christie had begun working feverishly to organize what was going to be the world's most ambitious outdoor digital video display to date.

Project Outline

The overall display concept for the opening ceremonies involved the blending of multiple high-power digital video projectors on "parapets" or cantilevered plywood platforms from two separate balcony levels with "flown" projectors hoisted high into the roof structure of the stadium. The idea was that the highest elevated projectors would beam images anywhere to the stadium floor. The Tier 2, or lowest balcony units, would beam images to the floor as required on people-powered

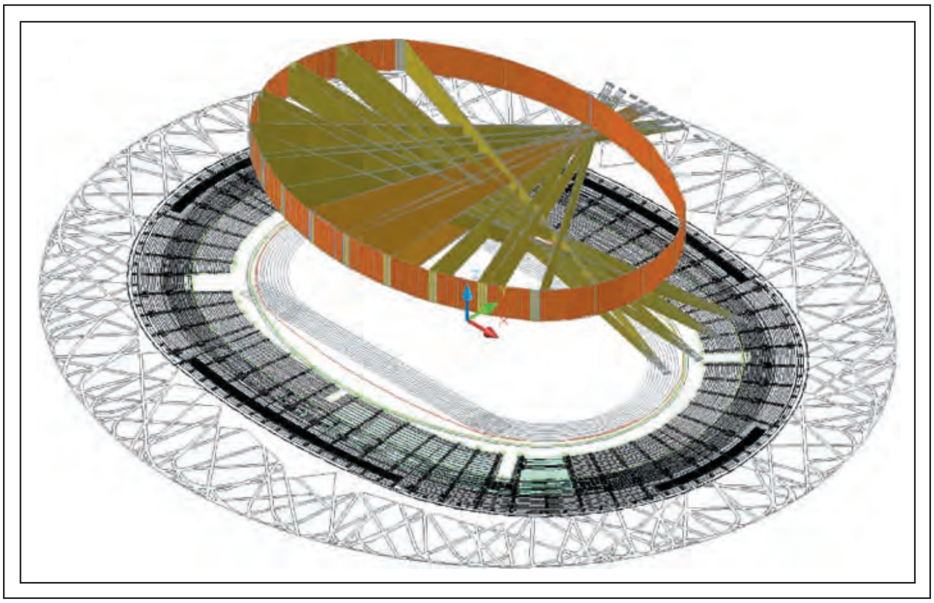


Fig. 1: A bird's eye view of the "Bird's Nest" stadium in Beijing shows a conceptual layout of digital-cinema projectors from Tier 3 to the roof "Raceway" at top, cross-firing a distance of 700 ft. Source: Christie Digital Systems.

[a]Official Web site of the Beijing 2008 Olympic Games: http://en.beijing2008.cn/venues/nst/

Terry Schmidt is Chief Scientist for Christie Digital Systems Canada, Inc. 809 Wellington Street North, Kitchener, Ontario, Canada, N2G 4Y7; telephone 519/744-8005, e-mail: Terry.Schmidt@christiedigital.com. He is also the Director of the Canadian SID Chapter.

0362-0972/08/2009-024$1.00 + .00 © SID 2009

moving screens. The upper balcony, or Tier 3, projectors would cross-fire images to the vertical oval lip of the roof structure called the “Raceway” (Fig. 1).

This coverage would provide maximum flexibility and an impressively large image surface viewable from many angles. From a technical standpoint, the elaborate set-up was challenging because of varying screen surfaces, reflectivity, angles, distances, luminance requirements, and the sheer size of the stadium.

The Projection Equipment

Because the stadium was open-roofed, the requirements for projectors on Tier 3, the upper balcony, included the ability to be safely rigged to high structures, and to withstand exposure to severe outdoor elements. These requirements were satisfied by the Christie Roadster S+20K, which is designed specifically for rental/staging. The projector’s 20,000-lm image is powered by a Ushio 3-kW xenon arc lamp and displays 1400×1050 pixels from its DLP light engine. Various long-throw lenses are motorized to provide remote controllable zoom, focus, and horizontal/vertical offsets.

The challenge on Tier 3 was to cross-fire to a stationary screen composed of a white stretch of fabric covering the tall vertical surface of the inner oval roof ring. Due to the brightness requirement of this massive surface area, which measured approximately 1900 ft. wide by 50 ft. high, earlier testing demonstrated that it was best to overlay three images from three side-by-side projectors on each of the 21 overlapped screens across the stadium and up to the oval raceway. The unit used for this application was the Christie CP2000-ZX digital-cinema projector, which is powered by a 3-kW xenon arc lamp by Ushio. Each of these projectors provided 20,000 lm from a 2048×1080-pixel resolution digital-cinema DLP chip (Fig. 2).

During a visit in April, the Kitchener Digital Cinema team from Christie had to determine if there were any special technical or environmental issues regarding the use of the digital-cinema equipment in Beijing. After inspecting the stadium and referring to local weather statistics, the team concluded that the environmental risks would be low. There was a 0.4% chance that the temperature in Beijing at 8:00 pm on August 8, 2008 – the night of the opening ceremonies – would be over 35ºC which was the specified maximum ambient operating temperature for the projectors. The humidity in Beijing during the month of August averages a modest 77%. The chance that water would come into contact with the projectors was only an issue for those units situated in the lower part of the stadium, where strong winds and rain could disrupt operations. Dust was a problem, as the stadium was still a beehive of hard-hat construction activity in April, though that activity was scheduled to settle down by June. Dust and rain covers were made for all exposed projectors when they were not in use.

The Deployed Systems

Between mid-April and mid-June, the technical staff from Christie’s offices in Beijing and Shanghai along with its Chinese customer, Wincomn, installed the 84 Roadster S+20K projectors. The projectors were divided into two groups: 33 (including three “hot spares”) were “flown” high above the stadium with chain hoists on virtually inaccessible trusses, while 51 projectors were placed on the Tier 2 platforms. A dual-mirror head from High End Systems allowed a computer to aim the bright images over a very wide range of angles. The source material was supplied *via* fiber-optic DVI cable systems from Chinese supplier Cuanbo. The signal sources were 81 Axon Media servers, also from High End Systems, that had the ability to warp and resize on-the-

(a) (b)

Fig. 2: *Both (a) the Christie Roadster S+20K, designed for rental/staging venues, and (b) the Christie CP2000-ZX digital cinema projector were used in the Olympic project.*

fly and aim and project images in any orientation, any size, almost anywhere in the Bird's Nest stadium.

The upper ring, Tier 3, was the location of 63 CP2000-ZX digital-cinema projectors that were organized to light up 21 screens on the upper vertical oval opening in the stadium, where each 75-ft.-wide image was warped, overlapped, and edge-blended by an additional 21 Axon servers. At over 1900 ft. long, this generated the world's largest continuous oval image that became part of the spectacular stadium show (Fig. 3).

Pixel-by-Pixel Overlay onto the Overhead Raceway

The overlay of one or more images for increased brightness is not a new concept. In rental/staging venues, it is often done for redundancy. Accuracy of optical alignment is important in high-resolution applications because double or triple ghost images from each misaligned projector can detract from the image quality. The main goal of careful aiming and lens offset is to eliminate keystone distortion (*i.e.*, skewed imagery).

In the Bird's Nest stadium, the precise aim of the projector depended on the adjustment of the front feet and lens mount, all of which were accessible only by having someone climb out onto the platform and manually adjust it. The staff had to master this feat by trial-and-error alignment, so that when someone's body weight was not on the platform, the system remained perfectly aligned; *i.e.*, the setting made while a staffer was on the platform would change as soon as he got off it, and the staffers had to learn to estimate the difference and adjust accordingly. The large throw distances of 400 to over 700 ft. made the aiming errors due to weight change even more dramatic.

In order to aid accuracy, special "red only" and "green only" alignment test patterns were loaded in Beijing on each of the 63 Tier 3 projectors. The center projector of the three was set to red, and each of the outer two to green. Then careful aim and lens-mount alignment was done two at a time, just like color convergence, on green to red.

The attribute of the lens design that enables an almost perfect pixel-for-pixel overlay is called "lens offset." The design of the lens is a telecentric reverse telephoto designed for a larger-than-normal image size. The precision lens mount is adjustable in both X and Y planes without changing the aim of the lens.

Projecting by Numbers

147:	Number of DLP projectors used in the opening ceremonies for the 2008 Summer Olympic Games.
2.8 million:	Amount of lumens of digital video content projected across and onto the stadium.
200:	Average pounds each projector weighed.
2,777,089:	Square footage of Bird's Nest Stadium.
20:	Number of minutes it took to get from inside one side of the stadium to the other on foot.
262,825,920:	Number of RGB video pixels projected.

This design prevents keystone geometry distortion of the image and rectangular images can project onto the screen and overlay accurately. The long throw distances in the Beijing project minimized matching issues caused by curvature and oblique angles to the screen surface.

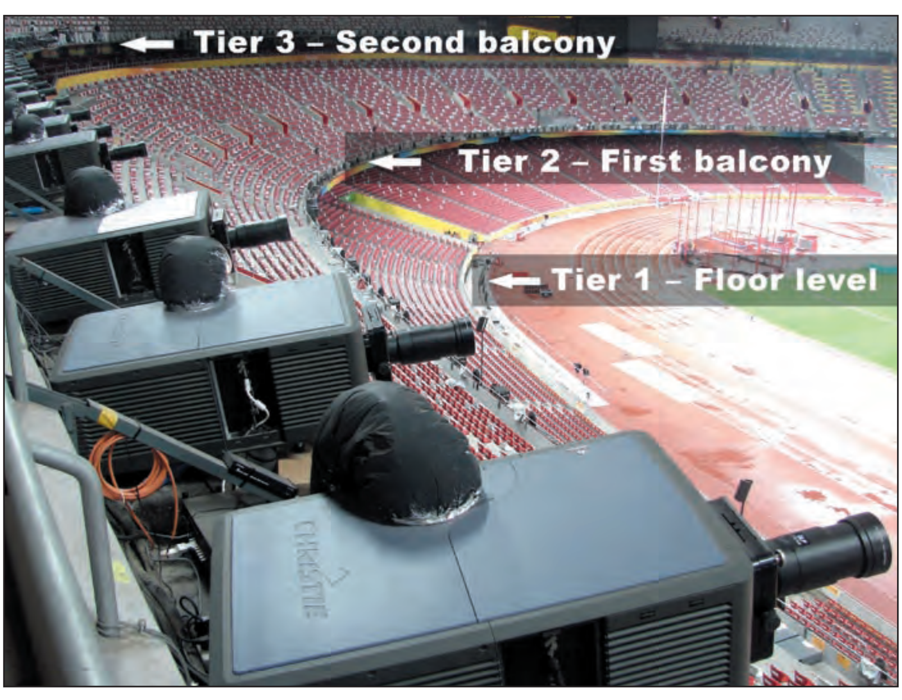


***Fig. 3:** The upper ring projectors were outfitted with customized heat extractors (shown at top of projectors) to help maintain viewable site lines.*

Technology in Action

The following technology issues all figured prominently in the Bird's Nest stadium project:

Edge Blending: This technique is often used in multiple-projector large-scale productions. However, edge-blending had never been applied before to a project as large as the 2008 Being Summer Games' opening ceremonies. The geometry of the raceway was oval and as one continuous screen could be broken down into 21 sub-screens, each was illuminated by three digital-cinema projectors from the opposite side of the Tier 3 level.

Edge-blending is accomplished by overlapping each screen by about 20% with its adjacent neighbor. This results in a double brightness bar at the overlap if left uncorrected. Correcting the brightness level involves adjusting the contrast drive level down from 100%, just where the overlap begins, to 0% in opposing directions to make the overlap region virtually disappear. Of course, the video content of the two projectors must also be adjusted to "flow" properly from one screen to the next and avoid incongruence for moving content that stretches over several different projectors (Fig. 4).

Image Warping: This is a generic video-projection term that refers to restoring an image to corrected geometry for correct viewing, even though a projector may have an oblique angle to a screen. The latter causes image distortion due to projection onto a curved surface. At the Bird's Nest stadium, the corrections for both this and the edge-blending overlap had to be executed with precision. This proved to be a challenge because of the unique oval screen surface of the raceway and its elevated location; almost 100 ft. higher than the projectors, most of which were at an off-angle to the screen.

Heat Extraction: One of the differences in a projector designed for digital-cinema applications *vs.* rental/staging is the standard 8-in.-diameter heat extractor. Located on the top of a cinema projector, it takes advantage of a theater's built-in roof extractor system. These extractors are normally designed to take away more than 600 CFM of unwanted waste heat generated by long-life theatrical xenon arc lamps. For the purposes of the Olympic project, which had no built-in roof extractor system, a small, self-contained inline heat extractor was sourced for each projector on the top Tier 3 location. However, in the stadium, this vent location caused noise and interfered with the first-row guests' sight lines.

After the team installed and tested the heat extractors, Director of Lighting Sha Xiaolan decided that the sound was objectionable, especially in the plush seats of the VIP area. The team settled on a sound-attenuating insulated air-conditioning flex duct to relocate the heat extractor off to the side and out of the first row guests' sight lines. The sheet metal of the heat extractor was also sound damped by 1-in.-thick acoustical foam wrap to reduce sound levels by approximately 6 dB.

Signal Distribution: All video signals for the projection systems were produced by 110 Axon servers supplied by High End Systems. These signals were provided as standard HDTV 1920 × 1080-pixel format on DVI connectors. Because some cable runs were up to 1000 ft. long, each DVI signal was converted at the server to four-channel fiber and converted back at each group of three projectors to DVI again. At this point, it was up-converted to the 2048 × 1080 digital-cinema standard for maximum brightness efficiency of the DLP chip. A DVI splitter was then used to divide the signal to the three projectors.

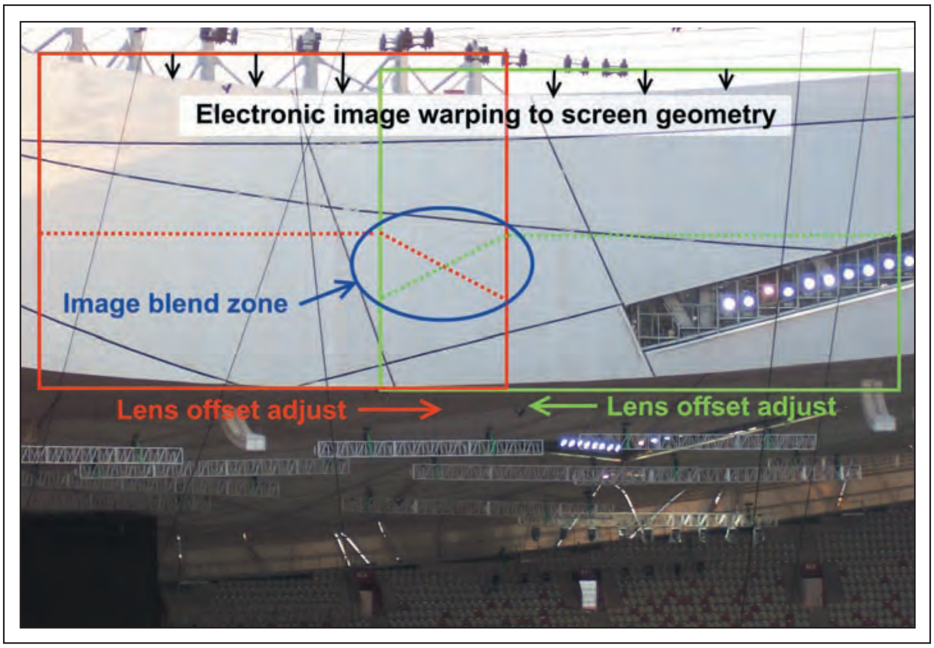


Fig. 4: *Edge-blending (taking place in the image blend zone above) was accomplished by overlapping each screen by about 20% with its adjacent neighbor. Warping (restoring imagery to corrected geometry for proper viewing) was especially difficult on the high oval screen of the raceway. Lens offset adjustments took place on Tier 3.*

Networking: All 147 projectors were connected to the control room *via* two separate Ethernet networks. Each was a complex configuration of copper and fiber that handled logistics. These network connections proved invaluable for a range of reasons; from safe sequencing of powering-up approximately 0.5 MW of projection equipment at 5-sec intervals, to remote status monitoring of various functions and remote diagnostics during installation, testing, and rehearsals. The physical logistics of manually checking a projector on the other side of the stadium was a time- and energy-consuming event to be done as infrequently as possible. It took a long time to traverse the stadium at the Tier 3 level, not counting troubleshooting time.

Unexpected Challenges

During June, the team worked from about 5:00 pm to 5:00 am each night to take advantage of the darkness for rehearsals on the outdoor screen (the stadium roof lip). The necessity of security passes and sophisticated explosives screening made for interesting logistics. For example, no Internet connectivity at the stadium was permitted due to concern about terrorist acts. Conveniently, a Blackberry allowed connectivity many times when it was necessary to communicate with Christie back in Canada.

Another challenge was the weather. From a statistical standpoint, the environmental issues discussed earlier were considered to be manageable. However, while the team was setting up for rehearsals in June, a severe thunderstorm occurred. The overhang and dust/rain covers on the projectors did their job, but there were also roof leaks from the fabric covering the stadium, which resulted in large amounts of water dumping just several feet from some of the projectors. Fortunately, none were harmed.

In addition, it turned out that the month of August was unusually hot, even for Beijing. When the projectors were turned on at 5:00 pm on the day of the show, the temperature was a reported 38ºC – 3º over the maximum operating temperature of the units. By show time at 8:00 pm, the temperature had dropped to 34.5ºC, but the team was still relieved that it did not need to have the heat extractors turned down to reduce noise because it had already solved the acoustic problem with the insulated ducts.

There were of course several challenges of logistics in this very large venue. Safety was always top of mind. All of the projectors were mounted high above seating where a fall of either a person or equipment would have dire consequences. All loose equipment was secured with aircraft cables tied to steel rails embedded in concrete. When adjusting a unit, everyone wore safety harnesses. The team communicated *via* two-way radio sets, but as mentioned above, it still took almost 20 minutes to walk from one side of the Tier 3 level to the other. Multiple and unknown vendors for support equipment such as network switches and fiber-cable runs added more challenges to the task at hand.

Another challenge the team encountered during the project involved a mysterious setup change to its resizing equipment. As the team members would come in to power up all the equipment to work for the night, they would notice that some screen sizes had changed electronically and were no longer perfectly matched to their neighboring screens. They also noticed that the IR remote control for the Cine-IPM2K resizing box feeding all three projectors for each of the 21 "raceway" images did not work well unless it was extremely close to the sensor. These seemingly random changes began occurring more frequently. One night, as the team members were adjusting the last of three units in a row that had changed size from the previous day, another one changed in front of their eyes. It finally occurred to someone that the high-frequency metal-halide lighting that was being used in increasing amounts in rehearsals each day was producing enough noise to be picked up by the IR sensor on the CineIPM 2K, resulting in the unwanted changes. It now became clear that the lighting was also interfering with the range of the remote control. The team covered the IR sensor with double layers of gaffer's tape and the problem disappeared.

One of the serious challenges was remote turn on and status monitoring of all projectors from the small windowless server/control room. It was essential to control and monitor all networked projectors from this location at one end of the stadium. To overcome this problem, custom software was quickly designed and implemented to graphically illustrate real-time connection, as well as the signal and lamp status of all projection systems. The small room, hidden behind one of the two LED scoreboards, also housed 110 Axon servers that supplied the content to all the projectors. Approximately seven room-sized air conditioners were used to disperse the 35 kW of heat produced by all of this equipment in this small space.

Near the end of the team's stay in Beijing, Sha suggested that the converging light beams from the largest cluster of projectors, as viewed across the stadium, were distracting the view of the upper raceway images. In the design line drawings, the converging beams were most efficient for alignment because angles to reach the screen were reduced. In this case, the artistic direction won over technical efficiency and the staff was asked to move and re-align 18 projectors on one side of the stadium, so at least the VIP side could view the images without the distraction of the bright crossover light. In viewing the live event on HDTV from Canada, it was apparent to members of the team that the beams were diverging in some camera angles and converging in others, especially after the large amount of fireworks added smoke to the air.

Summary

For everyone who attended or watched the Beijing Summer Games Opening Ceremonies on August 8, 2008, as well as the Closing Ceremonies and the September Paralympics Opening and Closing Ceremonies, it was apparent that the production was a resounding success for the Chinese people hosting the Games and the technical teams who were involved in producing what will reign, for some time at least, as the most ambitious outdoor digital video display ever. Though everyone involved in the project struggled with technical difficulties and language differences at times, the spirit of co-operation and the "get it done" attitude were excellent, in keeping with the spirit of the Olympic Games themselves.

To see how the projectors performed at the 2008 Beijing Summer Games, visit: http://www.christiedigital.com/AMEN/TechnologyMovies/christieInTheNews/BeijingOlympics2008.htm. ■

Submit Your News Releases

Please send all press releases and new product announcements to:

Jenny Donelan
Information Display Magazine
411 Lafayette Street, Suite 201
New York, NY 10003
Fax: 212.460.5460
e-mail: jdonelan@pcm411.com

Capacitive touch panel controller

Eric Ng
Solomon Systech Limited

A user-friendly interface is always a successful factor of a handheld product design and the touch panel is probably a most welcome solution that provides substantial flexibility for a fancy interface design. Generally, resistive touch panels are adopted in touch interface designs, but are increasingly changing to capacitive touch panels due to the benefits of better durability and higher optical clarity. Besides these physical advantages, capacitive touch panels scale new heights in realizing multi-touch application, which has changed the perception of the touch panel interface. With such distinctive features, the capacitive touch panel will become a mainstream touch technology and bring the market lots of innovative touch interface designs.

To fulfill the market needs, Solomon Systech introduced the touch interface solution, SSD2521 which is a capacitive touch panel controller. This controller integrates all the necessary components and functions into a single chip such as power circuits, panel driving and sensing circuits, high resolution ADC, fast response signal processor and finger tracking unit. To support high accuracy and fast touch detection, the controller adopts several arithmetic algorithms for finger extraction and tracking. It can track up to a maximum four fingers simultaneously and report the absolute coordinate of each finger. In addition, it can detect individual touch incidents and events based on the tracked finger coordinates. SSD2521 supports true multi-touch and can drive up to 5" capacitive touch panels on a WVGA display. SSD2521 is an easy-to-use touch panel controller with excellent cost performance efficiency.

What's beyond ONE? Obviously, TWO, THREE and FOUR!
SSD2521 is capable to detect maximum 4 fingers movement and enables user to operate the system more than a click. With the Multi-Touch feature, many more fascinating functions can be created!

Module cost saving solution - OLED Driver with built-in charge pump from Solomon Systech

Ada Ng
Solomon Systech Limited

Solomon Systech Limited, a world leader in OLED display driver technology, is proud to present the SSD1306, an OLED Driver designed for saving total system cost. With only three capacitors and built-in charge pump, the SSD1306 can support the OLED module at high performance using a low voltage supply (3.3V~4.2V). Moreover, SSD1306 is value-added with an intelligent content scrolling function, which allows size-limited panels to display infinite content.

SSD1306 supports resolutions of up to 128x64 and has intelligent display features for applications such as USB thumb drives, watches, mobile phones and MP3 players.

SSD1306 demonstration

Table 1: System cost comparison between SSD1306 and traditional driver IC.

OLED driver operating voltage supply circuit	SSD1306	Traditional driver IC
External components	3 capacitors	DC-DC converter, Inductor, MOSFET, Schottky Diode, Resistors, Capacitors
PCB layout	Minimized PCB space for 3 capacitors	Large PCB space for whole external DC-DC circuit

ALL ROADS LEAD TO ROME

XXIX International Display Research Conference

Eurodisplay 2009
September 14-17, 2009

Rome, Italy

This fall, the Eternal City hosts Eurodisplay 2009, bringing together the world's top minds to advance the science of electronic displays. Discover the latest developments of display research, technology and applications, including:

- Active Matrix Devices
- Emissive Displays
- Liquid Crystal Technologies
- Perception, Measurement and Standards
- Projection Displays
- Organic Light-Emitting Devices
- Emerging Display Technologies

Mark your calendars now for Eurodisplay 2009 in Rome.

For more information, visit:
www.eurodisplay.org/eurodisplay2009/

SID
Society for Information Display Mid-Europe Chapter

CNR
Consiglio Nazionale delle Ricerche (National Research Council)

Universitá di Roma "La Sapienza"

SID 2010 honors and awards nominations

On behalf of the SID Honors and Awards Committee (H&AC), I am appealing for your active participation in the nomination of deserving individuals for the various SID honors and awards. The SID Board of Directors, based on recommendations made by the H&AC, grants all the awards. These awards include five major prizes awarded to individuals, not necessarily members of SID, based upon their outstanding achievements. The **Karl Ferdinand Braun prize** is awarded for ***"Outstanding Technical Achievement in, or contribution to, Display Technology."*** The prize is named in honor of the German physicist and Nobel Laureate Karl Ferdinand Braun who, in 1897, invented the cathode-rat tube (CRT). Scientific and technical achievements that cover either a wide range of display technologies or the fundamental principles of a specific technology are the prime reasons for awarding this prize to a nominee. The **Jan Rajchman prize** is awarded for ***"Outstanding Scientific and Technical Achievement or Research in the Field of Flat-Panel Displays."*** This prize is specifically dedicated to those individuals who have made major contributions to one of the flat-panel-display technologies or, through their research activities, have advanced the state of understanding of one of those technologies. The **Otto Schade prize** is awarded for ***"Outstanding Scientific or Technical Achievement in the Advancement of Functional Performance and/or Image Quality of Information Displays."*** This prize is named in honor of the pioneering RCA engineer Otto Schade, who invented the concept of the Modulation Transfer Function (MTF) and who used it to characterize the entire display system, including the human observer. The advancement for this prize may be achieved in any display technology or display system or may be of a more general or theoretical nature. The scope of eligible advancement is broadly envisioned to encompass the areas of display systems, display electronics, applied vision and display human factors, image processing, and display metrology. The nature of eligible advancements is not limited and may be in the form of theoretical or mathematical models, algorithms, software, hardware, or innovative methods of display-performance measurement, and image-quality characterization. Each of these above-mentioned prizes carries a $2000

SID honors and awards nominations

Nominations are now being solicited from SID members for candidates who qualify for SID Honors and Awards.

- KARL FERDINAND BRAUN PRIZE. Awarded for an outstanding *technical* achievement in, or contribution to, display technology.
- JAN RAJCHMAN PRIZE. Awarded for an outstanding *scientific* or *technical* achievement in, or contribution to, research on flat-panel displays.
- OTTO SCHADE PRIZE. Awarded for an outstanding *scientific* or *technical* achievement in, or contribution to, the advancement of functional performance and/or image quality of information displays.
- SLOTTOW–OWAKI PRIZE. Awarded for outstanding contributions to the education and training of students and professionals in the field of information display.
- LEWIS & BEATRICE WINNER AWARD. Awarded for exceptional and sustained service to SID.
- FELLOW. The membership grade of Fellow is one of unusual professional distinction and is conferred annually upon a SID member of outstanding qualifications and experience as a scientist or engineer in the field of information display who has made widely recognized and significant contribution to the advancement of the display field.
- SPECIAL RECOGNITION AWARDS. Presented to members of the technical, scientific, and business community (not necessarily SID members) for distinguished and valued contributions to the information-display field. These awards may be made for contributions in one or more of the following categories: (a) outstanding technical accomplishments; (b) outstanding contributions to the literature; (c) outstanding service to the Society; (d) outstanding entrepreneurial accomplishments; and (e) outstanding achievements in education.

Nominations for SID Honors and Awards must include the following information, preferably in the order given below. Nomination Templates and Samples are provided at *www.sid.org/awards/nomination.html*.

1. Name, Present Occupation, Business and Home Address, Phone and Fax Numbers, and SID Grade (Member or Fellow) of Nominee.

2. Award being recommended:
   Jan Rajchman Prize
   Karl Ferdinand Braun Prize
   Otto Schade Prize
   Slottow–Owaki Prize
   Lewis & Beatrice Winner Award
   Fellow*
   Special Recognition Award

   *Nominations for election to the Grade of Fellow must be supported in writing by at least five SID members.

3. Proposed Citation. This should not exceed 30 words.

4. Name, Address, Telephone Number, and SID Membership Grade of Nominator.

5. Education and Professional History of Candidate. Include college and/or university degrees, positions and responsibilities of each professional employment.

6. Professional Awards and Other Professional Society Affiliations and Grades of Membership.

7. Specific statement by the nominator concerning the most significant achievement or achievements or outstanding technical leadership that qualifies the candidate for the award. This is the most important consideration for the Honors and Awards committee, and it should be specific (citing references when necessary) and concise.

8. Supportive material. Cite evidence of technical achievements and creativity, such as patents and publications, or other evidence of success and peer recognition. Cite material that specifically supports the citation and statement in (7) above. (Note: the nominee may be asked by the nominator to supply information for his candidacy where this may be useful to establish or complete the list of qualifications).

9. Endorsements. Fellow nominations must be supported by the endorsements indicated in (2) above. Supportive letters of endorser will strengthen the nominations for any award.

E-mail the complete nomination – including all the above material by **October 9, 2009** – to cnelsonk@comcast.net or sidawards@sid.org or by regular mail to:
Christopher N. King, Honors and Awards Chairman, Society for Information Display,
1475 S. Bascom Ave., Ste. 114, Campbell, CA 95008, U.S.A.

stipend sponsored by Thompson, Inc., Sharp Corporation, and Philips Consumer Electronics, respectively.

The **Slottow–Owaki prize** is awarded for ***"Outstanding Contributions to the Education and Training of Students and Professionals in the Field of Information Display."*** This prize is named in honor of Professor H. Gene Slottow, University of Illinois, an inventor of the plasma display and Professor Kenichi Owaki from the Hiroshima Institute of Technology and an early leader of the pioneering Fujitsu Plasma Display program. The oustanding education and training contributions recognized by this prize is not limited to those of a professor in a formal university, but may also include training given by researchers, engineers, and managers in industry who have done an outstanding job developing information-display professionals. The Slottow–Owaki prize carries a $2000 stipend made possible by a generous gift from Fujitsu, Ltd., and Professor Tsutae Shinoda.

The fifth major SID award, the **Lewis and Beatrice Winner Award,** is awarded for ***"Exceptional and Sustained Service to the Society."*** This award is granted exclusively to those who have worked hard over many years to further the goals of the Society.

The membership grade of **SID Fellow Award** is one of unusual professional distinction. Each year the SID Board of Directors elects a limited number (up to 0.1% of the membership in that year) of **SID members** in good standing to the grade of **Fellow.** To be eligible, candidates must have been members at the time of nomination for at least 5 years, with the last 3 years consecutive. A candidate for election to Fellow is a member with ***"Outstanding Qualifications and Experience as a Scientist or Engineer in the Field of Information Display who has made Widely Recognized and Significant Contributions to the Advancement of the Display Field"*** over a sustained period of time. SID members practicing in the field recognize the nominee's work as providing significant technical contributors to knowledge in their area(s) of expertise. For this reason, five endorsements from SID members are required to accompany each Fellow nomination. Each Fellow nomination is evaluated by the H&AC, based on a weighted set of five criteria. These criteria and their assigned weights are creativity and patents, 30%; technical accomplishments and publications, 30%; technical leadership, 20%; service to SID, 15%; and other accomplishments, 5%. When submitting a Fellow award nomination, please keep these criteria with their weights in mind.

The **Special Recognition Award** is given annually to a number of individuals (membership in the SID is not required) of the scientific and business community for distinguished and valued contribution in the information-display field. These awards are given for contributions in one or more of the following categories: (a) ***Outstanding Technical Accomplishments,*** (b) ***Outstanding Contributions to the Literature,*** (c) ***Outstanding Service to the Society,*** (d) ***Outstanding Entrepreneurial Accomplishments,*** and (e) ***Outstanding Achievements in Education.*** When evaluating the Special Recognition Award nominations, the H&AC uses a five-level rating scale in each of the above-listed five categories, and these categories have equal weight. Nominators should indicate the category in which a Special Recognition Award nomination is to be considered by the H&AC. More than one category may be indicated. The nomination should, of course, stress accomplishments in the category or categories selected by the nominator.

While an individual nominated for an award or election to Fellow may not submit his/her own nomination, nominators may, if necessary, ask a nominee for information that will be useful in preparing the nomination. The nomination process is relatively simple, but requires that the nominator and perhaps some colleagues devote a little time to preparation of the supporting material that the H&AC needs in order to evaluate each nomination for its merit. It is not necessary to submit a complete publication record with a nomination. Just list the titles of the most significant half a dozen or less papers and patents authored by the nominee, and list the total number of papers and patents he/she has authored.

Determination of the winners for SID honors and awards is a highly selective process. Last year less than 30% of the nominations were selected to receive awards. Some of the major prizes are not awarded every year due to the lack of sufficiently qualified nominees or, in some cases, because no nominations were submitted. On the other hand, once a nomination is submitted, it will stay active for three consecutive years and will be considered three times by the H&AC. The nominator of such a nomination may improve the chances of the nomination by submitting additional material for the second or third year that it is considered, but such changes are not required.

Descriptions of each award and the lists of previous award winners can be found at *www.sid.org/awards/indawards.html*. Nomination forms are available at *www.sid.org/awards/nomination.html* where you will find Nomination Templates in both MS Word (preferred) and Text formats. Please use the links to find the Sample Nominations, which are useful for composing your nomination since these are the actual successful nominations for some previous SID awards. Nominations should preferably be submitted by e-mail. However, you can also submit nominations by ordinary mail if necessary.

Please note that with each Fellow nomination, only five written endorsements by five SID members are required. These brief endorsements – *a minimum of 2–3 sentences* to a maximum of one-half page in length – *must state why clearly and succinctly, in the opinion of the endorser, the nominee deserves to be elected to a Fellow of the Society. Identical endorsements by two or more endorsers will be automatically rejected* (no form letters, please). Please send these endorsements to me either by e-mail (preferred) or by hardcopy to the address stated in the accompanying text box. Only the Fellow nominations are required to have these endorsements. However, I encourage you to submit at least a few endorsements for all nominations since they will frequently add further support to your nomination.

All 2010 award nominations are to be submitted by October 9, 2009. E-mail your nominations directly to cnelsonk@comcast.net or sidawards@sid.org. If that is not possible, then please send your hardcopy nomination by regular mail.

As I state each year: "In our professional lives, there are few greater rewards than recognition by our peers. For an individual in the field of displays, an award or prize from the SID, which represents her or his peers worldwide, is a most significant, happy, and satisfying experience. In addition, the overall reputation of the society depends on the individuals who are in its 'Hall of Fame.'

When you nominate someone for an award or prize, you are bringing happiness to an individual and his or her family and friends, and you are also benefiting the society as a whole."

Thank you for your nomination in advance.

– Christopher N. King
SID Honors & Awards Committee

In Memory of Dr. Akio Okoshi

Dr. Akio Okoshi, 83, passed away on May 14, 2009. Dr. Okoshi is known as the inventor of Trinitron technology, which he developed in 1968 in collaboration with Susumu Yoshida and Senri Miyaoka. For those who do not remember, Trinitron aperture-grill technology was a revolutionary innovation that provided Sony with an alternative technology to conventional shadow masks for making color cathode-ray tubes (CRTs). Trinitron CRTs could be made with a cylindrical front face instead of spherical and had continuous R-G-B phosphor stripes in the vertical direction. As a result of this invention, Dr. Okoshi received the Oukouchi Memorial Award from the Japanese TV Association in 1971 and the Purple Medal from the Japanese government in 1973 for the invention of Trinitron technology. Dr. Okoshi also received the The Karl Ferdinand Braun Prize from the Society for Information Display in 1990 for his work on the large-sized outdoor display, the JumboTron.

Dr. Okoshi was born in Kazo City, Saitama Prefecture, Japan. He graduated from the Department of Applied Physics at Waseda University at 1949 and joined Sony in 1950. He also received a doctoral degree from Waseda University in 1985. Dr. Okoshis's farewell ceremony took place on June 22 in Tokyo, with more than 250 people in attendance.

Sarnoff Museum Seeks New Home

For more than 40 years, the David Sarnoff Library has existed within the walls of Sarnoff Corp., a research contractor headquartered in West Windsor, New Jersey. School children, history and technology buffs, and radio and TV fans regularly visit this not-for-profit museum within the corporation's building to view artifacts and files from the early days of broadcasting, displays, and related technologies. Among the unique items in the collection are landmark RCA radios and televisions, the first kinescope and shadow-mask cathode-ray tube, the oldest known electron microscope, early liquid-crystal displays, RCA's first transistors, the first magnetic-core memory, one of the first charge-coupled devices (CCDs) and CMOS microprocessors, and the first thin-film transistor (TFT). The library is also home to boxes of photographs and correspondence from RCA's research, managerial, and public-relations staff.

RCA originally built the David Sarnoff Library to house Sarnoff's papers and memorabilia. It is now a 501(c)(3) that has no corporate relationship with the owner of the RCA trademarks, and only a facility connection with Sarnoff Corporation. It is now time for that connection to end and for the collection to move on. In recent years, Sarnoff Corporation has won an increasing number of U.S. military defense contracts, and the concomitant security requirements do not mesh well with visits from school children on field trips, for example. Dr. Alexander Magoun, the library curator and executive director for the last 11 years, understands this, and in fact expresses gratitude toward the company for housing the museum for as long as it has. "Sarnoff Corporation has been very generous in providing the bulk of our in-kind support," says Magoun, "but like most companies it has to focus on the bottom line." He is, however, concerned about the fate of the thousands of papers, photographs, artifacts, *etc.*, that reflect the life, career, and spirit of the man for whom both corporation and library are named.

This page, from LCD pioneer Louis Zanoni's 1965 RCA notebook showing an experiment with a guest-host LCD, is but one example of the thousands of unique technology artifacts housed at the library. Source: David Sarnoff Library.

David Sarnoff (1891–1971) was a corporate manager and executive (not an engineer or scientist) who became a visionary and champion for broadcast and electronic communications. According to the library's Web site, he "advocated, supported, financed, and oversaw" the development of radio in the first two decades of the last century, and then the development of television from the 1930s to the 1950s. He worked for Marconi Wireless Telegraph Company of America and eventually rose through the ranks of RCA to become president and chairman of the board.

The library is scheduled to move out before the end of the year. What then will be the fate of the Sarnoff collections? Magoun hopes that they will be relocated where they can continue to do the most good. Two facilities are needed: a purpose-built archives professionally staffed to organize, preserve, and make available the two-dimensional historical records of the library; and a professionally staffed museum or other facility to organize, preserve, and exhibit the objects in the museum collection.

"Sarnoff wanted his library to inspire the next generation of high-tech innovators," Magoun says. "My board and I are reviewing proposals from a variety of organizations in state and out to ensure that these milestones in information capture, transmission, and display continue to fulfill his wish and a national need." Magoun says they already have several excellent candidates.

The library welcomes contributions toward underwriting the costs of packing the collections. For more information, visit www.davidsarnoff.org.

— Jenny Donelan

editorial

continued from page 2

want to steal his thunder, I do want to emphasize that this was a monumental logistical effort that could not have been achieved by many others. It shows the tremendous skill and experience that SID members like Terry Schmidt and their companies bring to our industry. As the world watched on television, the brilliant artistic vision of the Chinese organizers was realized through the power of projection-display technology. It's really unfortunate that this project did not get greater ink at the time of the event, but maybe now through the pages of *Information Display* the work can be chronicled for the record. Congratulations from all of us to everyone involved in this great demonstration of projection technology.

For daily display industry news, visit www.informationdisplay.org

sustaining members

Applied Concepts
Applied Photonics
Astra Products, Inc.
AU Optronics Corp.
autronic–Melchers GmbH

BigByte Corp.

California Micro Devices
Canon, Inc.
CDT, Ltd.
Chi Mei Optoelectronics Corp.
Chunghwa Picture Tubes, Ltd.
Corning Japan K.K.
Cytec Industries

Dawar Technologies, Inc.
Dontech, Inc.
DTC/ITRI
Dynic USA Corp.

Endicott Research Group, Inc.
ENEA
Epoxy Technology
e-Ray Optoelectronics Technology Co. Ltd.

FIMI

Global Display Solutions

HannStar
Himax Technologies, Inc.
Hitachi, Ltd.

IDT
IGNIS Innovation, Inc.
Industrial Electronic Engineers, Inc. (IEE)
Industrial Technology Research Institute
Instrument Systems GmbH
IST (Imaging Systems Technology)
iSuppli Corp.
iTi Corp.

Japan Patent Office

Kent Displays, Inc.
Kuraray Co., Ltd.

LG Display Co., Ltd.
Luminit LLC
LXD, Inc.

Micronas GmbH
Micronic Laser Systems AB
Microsemi Corp.
Microvision
Microvision, Inc.
Mitsubishi Chemical Corp.
Mitsubishi Electric Corp.

Nano-Proprietary, Inc.
National Physical Laboratory
NEC Corp.
NextWindow
Nippon Seiki Co., Ltd.
Nitto Denko America, Inc.
Noritake Itron Corp.
Novaled AG
Novatek Microelectronics Corp., Ltd.

Optical Filters, Ltd.

Panasonic Plasma Display Laboratory of America
Parker Chomerics/Silver Cloud
Photo Research
Planar Systems
Plaskolite, Inc.
Polytronix, Inc.
Prime View International

QualComm
Quantum Data, Inc.

Radiant Imaging
Reflexite Display Optics

Sartomer Company, Inc.
Schott North America, Inc.
Shanghai SVA-NEC Liquid Crystal Display Co., Ltd.
Sharp Corp.
Sharp Microelectronics of the Americas
SiPix Imaging
SLENCIL Co.
Sony Chemicals Corp.
Sony Chemicals Corp. of America
Supertex, Inc.

Tannas Electronics
Technology Research Association for Advanced Display Materials (TRADIM)
Teijin DuPont Films Japan, Ltd.
TFD, Inc.
TLC International
Toshiba America Electronic Components, Inc.
TPO Displays Corp.
Trident Microsystems, Inc.

Universal Display Corp.

Vero Veria Corp.

Westar Display Technologies
White Electronic Designs, Inc.
WINTEK Corp.

index to advertisers

Business and Editorial Offices
Palisades Convention Management
411 Lafayette Street, 2nd Floor
New York, NY 10003
Jay Morreale, Managing Editor
212/460-8090 x212
fax: 212/460-5460
jmorreale@pcm411.com

Sales Office – Europe
George Isaacs
12 Park View Court
The Paddock, Eaton Ford
St. Neots, Cambridgeshire
PE19 7SD U.K.
+44-(0)-1480-218400
george@gandg.demon.co.uk

Sales Office – China & Taiwan
Joy Wang
ACE Forum, Inc.
3F-2, No. 5, Sec. 1, Pa-Te Rd.
Taipei 100, Taiwan
+886-2-2392-6960 x204
fax: +886-2-2393-0667
joy@aceforum.com.tw

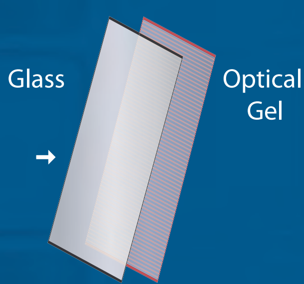
Sales Office – U.S.A.
Palisades Convention Management
411 Lafayette Street, 2nd Floor
New York, NY 10003
Michele Klein, Director of Sales
212/460-8090 x216
fax: 212/460-5460
mklein@pcm411.com

Sales Office – Korea
Jung-Won Suh
Sinsegi Media, Inc.
Choongmoo Bldg., Rm. 1102
44-13, Yoido-dong
Youngdung-gu, Seoul, Korea
+82-2-785-8222
fax: +82-2-785-8225
sinsegi-2@sinsegimedia.info

Let Touch International MakeYour Projected Capacitive Sensor!

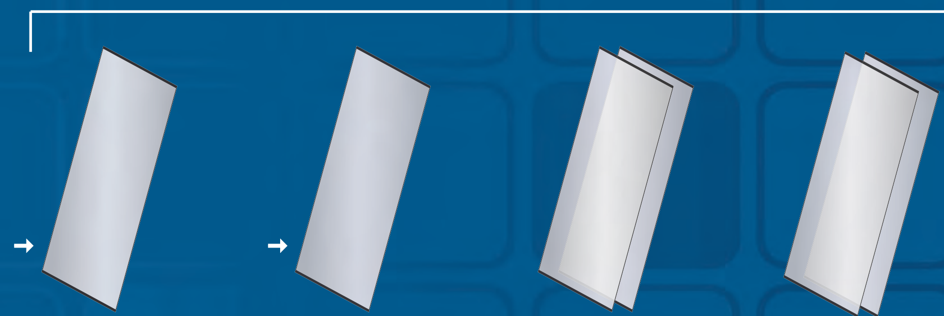
Touch International offers a full line of projected capacitive touch screens in sizes ranging from 3.5″ up to 23″. Need extra ruggedization or certain physical attributes? Touch International is here to help! Contact TI today and have an experienced sales representative walk you through the available options to customize your touch screen to fit the specialized requirements of your application.

Option 1
Cover Glass



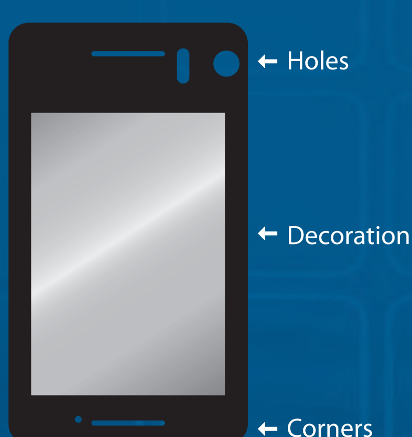
Chemically Strengthened

Option 2
Touch Screen



Single Layer | **Dito** | **Glass / Glass** | **Film / Film**

Option 3
Cosmetic Attributes



Customized Design

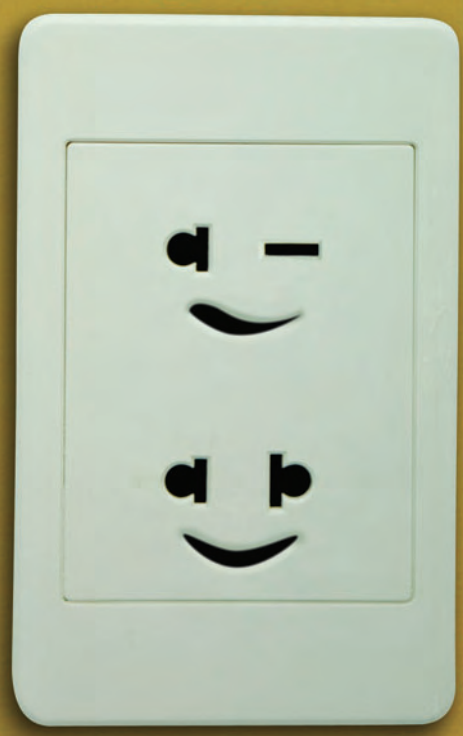
Option 4
Display Enhancements

Optical Bond
Increases Ruggedness

TouchInternational
an enhanced user interface company

2222 W. Rundberg Ln., Suite 200, Austin, Texas 78758
T: 512-832-8292 F: 512-491-6381 | sales@touchintl.com | www.touchinternational.com

Notebooks with Vikuiti™ Films Require Fewer Charges.



Maximizing battery life is a key goal for portable device manufacturers. Vikuiti™ Optical Films can help. For example, 3M offers Vikuiti film combinations that can increase notebook battery life 14 to 17 minutes beyond that of a standard film stack. With the ability to increase brightness up to 44% more than that provided by standard film stacks, these unique Vikuiti film combinations improve energy efficiency. The films enable notebooks, cell phones and other display devices to operate longer on battery power. Go to vikuiti.com to learn more about how Vikuiti films can improve the energy efficiency of your LCDs.

Vikuiti™ Display Enhancement

vikuiti.com
1-800-553-9215

Making displays more energy efficient since 1993.

3M

membership/subscription request

Use this card to request a SID membership application, or to order a complimentary subscription to *Information Display.*

PROFESSIONAL INFORMATION

1. Are you professionally involved with information displays, display manufacturing equipment/materials, or display applications?

110 ☐ Yes 111 ☐ No

2. What is your principal job function? (check one)

210 ☐ General /Corporate /Financial
211 ☐ Design, Development Engineering
212 ☐ Engineering Systems (Evaluation, OC, Stds.)
213 ☐ Basic Research
214 ☐ Manufacturing /Production
215 ☐ Purchasing /Procurement
216 ☐ Marketing /Sales
217 ☐ Advertising /Public Relations
218 ☐ Consulting
219 ☐ College or University Education
220 ☐ Other *(please be specific)* ______________________

3. What is the organization's primary end product or service? (check one)

310 ☐ Cathode-ray Tubes
311 ☐ Electroluminescent Displays
312 ☐ Field-emission Displays
313 ☐ Liquid-crystal Displays & Modules
314 ☐ Plasma Display Panels
315 ☐ Displays (Other)
316 ☐ Display Components, Hardware, Subassemblies
317 ☐ Display Manufacturing Equipment, Materials, Services
318 ☐ Printing/Reproduction/ Facsimile Equipment
319 ☐ Color Services/Systems
320 ☐ Communications Systems / Equipment
321 ☐ Computer Monitors/Peripherals
322 ☐ Computers
323 ☐ Consulting Services, Technical
324 ☐ Consulting Services, Management/Marketing
325 ☐ Education
326 ☐ Industrial Controls, Systems, Equipment, Robotics
327 ☐ Medical Imaging/Electronic Equipment
328 ☐ Military/Air, Space, Ground Support/Avionics
329 ☐ Navigation & Guidance Equipment/Systems
330 ☐ Oceanography & Support Equipment
331 ☐ Office & Business Machines
332 ☐ Television Systems/Broadcast Equipment
333 ☐ Television Receivers, Consumer Electronics, Appliances
334 ☐ Test, Measurement, & Instrumentation Equipment
335 ☐ Transportation, Commercial Signage
336 ☐ Other *(please be specific)* ______________________

4. What is your purchasing influence?

410 ☐ I make the final decision.
411 ☐ I strongly influence the final decision.
412 ☐ I specify products/services that we need.
413 ☐ I do not make purchasing decisions.

5. What is your highest degree?

510 ☐ A.A., A.S., or equivalent
511 ☐ B.A., B.S., or equivalent
512 ☐ M.A., M.S., or equivalent
513 ☐ Ph.D. or equivalent

6. What is the subject area of your highest degree?

610 ☐ Electrical/Electronics Engineering
611 ☐ Engineering, other
612 ☐ Computer/Information Science
613 ☐ Chemistry
614 ☐ Materials Science
615 ☐ Physics
616 ☐ Management/Marketing
617 ☐ Other *(please be specific)* ______________________

7. Please check the publications that you receive personally addressed to you by mail (check all that apply):

710 ☐ *EE Times*
711 ☐ *Electronic Design News*
712 ☐ *Solid State Technology*
713 ☐ *Laser Focus World*
714 ☐ *IEEE Spectrum*

☐ I wish to join SID. Twelve-month membership is $75 and includes subscriptions to *Information Display Magazine* and the quarterly Journal.

☐ I wish only to receive a **FREE** subscription to *Information Display Magazine* (U.S. subscribers only). Questions at left must be answered.

Signature ______________________

Date ______________________

Name ______________________

Title ______________________

Company ______________________

Department/Mail Stop ______________________

Address ______________________

____

City ______________________

State ______________ Zip __________

Country ______________________

Phone ______________________

E-mail ______________________

☐ Check here if you do not want your name and address released to outside mailing lists.

☐ Check here if magazine to be sent to home address below:
(business address still required)

____

____

____

8/09

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO 692 CAMPBELL CA

POSTAGE WILL BE PAID BY ADDRESSEE

ATTN: JENNY BACH
SOCIETY FOR INFORMATION DISPLAY
1475 S BASCOM AVE STE 114
CAMPBELL CA 95008-9901

fold here

tape here