

1998

# An integrated marketing communications plan: photon dynamics

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AN INTEGRATED MARKETING COMMUNICATIONS PLAN:  
PHOTON DYNAMICS

A Project Report

Presented to

The Faculty of the School of Journalism and Mass Communications  
San Jose State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

by

Jim Campbell

May 1998

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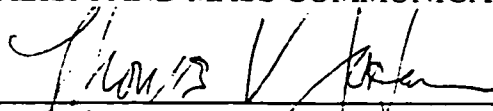
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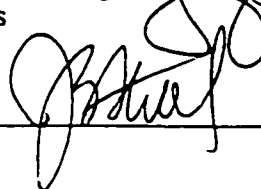
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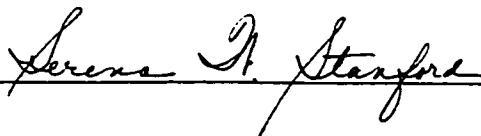


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## **ABSTRACT**

### **An Integrated Marketing Communications Plan:**

#### **Photon Dynamics**

By James E. Campbell

This project is a comprehensive Marketing Communications program designed for a growing, high technology company - Photon Dynamics. This plan is intended to assist the company in its sales and marketing efforts by providing the basic guidelines for developing their first marketing communications program. This plan discusses the development of marketing objectives and marketing messages. In addition, this plan explores the most efficient communication vehicles to deliver these messages to the desired audience. It discusses the unique problems that the company faces, and provides specific examples of new sales collateral, presentations, white papers, and other marketing tools to meet their marketing communications objectives.



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*This project is a comprehensive, integrated marketing communications plan for a growing, high technology company in the early stages of development*

## **Situation Analysis**

### The Company

Photon Dynamics is a leading worldwide supplier of test, inspection, and repair systems for the flat panel display (FPD) industry. The company's systems are used to control, monitor and refine the manufacturing process to increase yields and reduce materials loss. Photon Dynamics has been in the FPD test, inspection, and repair industry since 1990.

There are only 30-40 FPD manufacturers in the entire world, making Photon Dynamics' potential customer base extremely small. Most FPD manufacturers are located in Asia, with Japan, Korea and Taiwan accounting for a substantial majority of the total worldwide production of FPDs (Stanford University, 1995). Photon Dynamics has developed a worldwide sales and support infrastructure with a focus on Japan and Korea to better serve this customer base.

Photon Dynamics offers a suite of products to inspect virtually all types of FPDs and to address all key areas of test, inspection and repair throughout all major stages of the manufacturing life cycle from research and development to commercial production. The company's test products include systems that locate and characterize electrical defects, process defects, and contamination on partially completed flat panel display substrates. Photon Dynamics' inspection products perform flat panel inspection at the assembly stage

to detect and locate various optical defects. The company's repair products perform laser cut and weld repair functions at the active array, cell, and module stages based on information generated by test and inspection systems. Photon Dynamics systems are designed to work with nearly all flat panel display designs and technologies.

Photon Dynamics has been issued 21 U.S. patents for its FPD test, inspection and repair technologies and has other U.S. and foreign applications pending. The company has received contracts from the United States Display Consortium (USDC) and the Advanced Research Projects Administration (ARPA). The company's main headquarters is located in Milpitas, California, with offices in Korea and Japan. Photon Dynamics has been publicly traded on the NASDAQ exchange since November 1995 under the symbol, PHTN.

#### Product/Price

Photon Dynamics' In-Process Test (IPT) systems use the company's proprietary Voltage Imaging technology to detect, locate, quantify and characterize defects during the early stages of panel production. These systems use proprietary image processing software to display pixel images and other information which allows manufacturers to determine whether individual pixels or lines of pixels are functioning properly. In addition, these systems generate point and line defect data to specify the exact location of each defect. IPT test systems range in price from \$1 million to \$1.5 million.

Photon Dynamics' Flat Panel Inspection (FIS) systems use the company's proprietary N-Aliasing technology to inspect panels for optical defects towards the end of the panel assembly process. FIS systems are also designed to perform inspection after the final assembly of the panels. These systems use a single, high-resolution camera driven by the company's N-Aliasing software to quantitatively measure critical optical qualities and precisely locate pixel defects. FIS inspection systems range in price from \$400,000 to \$1 million.

Photon Dynamics' Integrated Laser Weld (ILW) system uses laser technology to repair "opens" and "shorts" in LCD panels at all major stages of production. The ILW automatically locates defects based on information from the IPT and the FIS systems, and repairs "shorts" by cutting away excess material and "opens" by welding a new connection to a recovery ring. These systems range in price from \$400,000 to \$800,000.

### **Photon Dynamics' Product Line**

<u>Product</u>	<u>First Shipped</u>	<u>Function</u>	<u>FPD Technology</u>	<u>Manufacturing Stage</u>
IPT-1*	1991	In-process testing	AMLCD	Research and development Pre-production
IPT-E	1994	In-process testing	AMLCD	Research and development Pre-production
IPT-MPS	1995	High throughput in process testing	AMLCD	Production
FIS-100*	1992	VGA inspection	ALL	Research and development Pre-production Production
FIS-200	1993	VGA inspection	ALL	Research and development Pre-production Production
FIS-250	1995	SVGA inspection	ALL	Research and development Pre-production Production
FIS-300	1995	XGA inspection	ALL	Research and development Pre-production Production
ILW	1993	Repair	AMLCD and passive matrix LCD	Production

The company's proprietary Voltage Imaging technology, used in its IPT systems, allows for non-contact, true functional testing of flat panel displays. The technology uses a proprietary combination of materials in a light transmission modulator, which is placed above a portion of the panel, and measures variations in the voltage signals emitted by light. Through the use of a specialized camera and digital image processing software, a video image representing the voltage of each individual pixel can be produced which provides a “map” of the panel defects. The use of this non-contact test technology allows the system to be easily adapted to different panel sizes by simply increasing or decreasing the area to be scanned by the modulator.

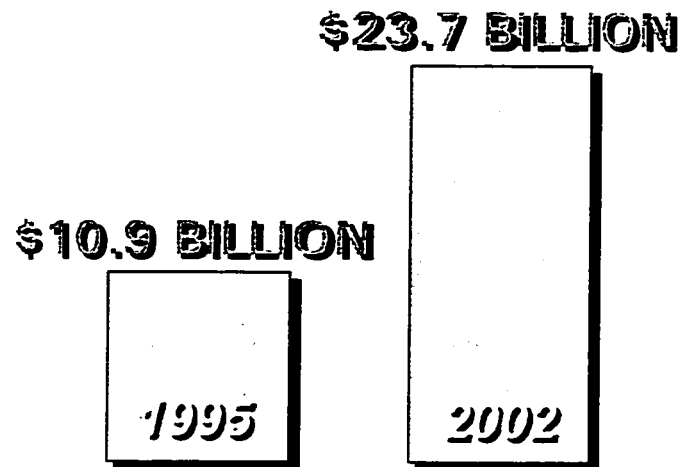
Photon Dynamics' proprietary N-Aliasing technology, used in its FIS systems, is an advanced image processing software technology that enables the use of a single, high resolution camera to inspect FPD panels at a more advanced stage in the manufacturing process. This procedure generates a complete set of images for each individual pixel from multiple perspectives. The images are then processed and interlaced to provide a high-resolution image of the entire panel. This allows operators to easily measure critical optical qualities and to identify and locate defects.

### FPD Market Overview

The market for FPDs has grown significantly in recent years due to the increasing popularity of portable computers and other electronic devices that use information displays. Increasing demand for FPDs combined with a sophisticated and expensive FPD

manufacturing process has created a tremendous demand for advanced test, inspection, and repair systems (Castellano & Mentley, 1994). The FPD market is estimated to have grown from approximately \$4.4 billion in 1990 to approximately \$10.9 billion in 1995, and will grow to approximately \$23.7 billion in the year 2002 (Castellano, Mentley & Weichert, 1996). FPD manufacturers will continue to purchase more test, inspection, and repair equipment to increase production and panel quality.

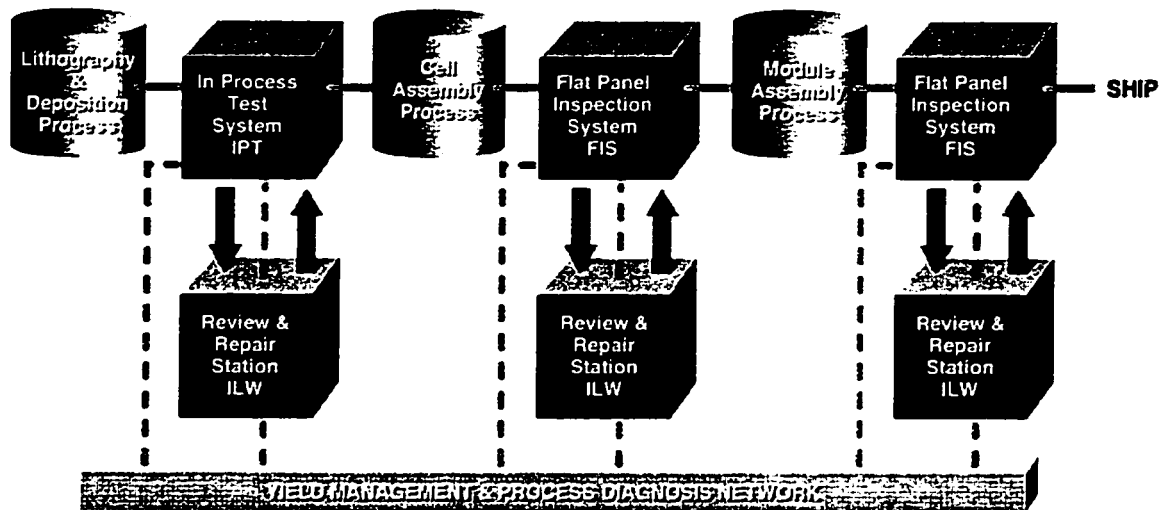
### *Worldwide Market for Flat Panel Displays*



The high cost of producing FPDs has limited the number of applications for which they can be used (Electronic Industries Association of Japan, 1996). Photon Dynamics believes that improvements in FPD manufacturing yields and waste reduction will provide FPD manufacturers with the opportunity to achieve greater market penetration by reducing their costs, particularly in highly sensitive markets such as personal computers and consumer electronics. The company further believes that lower costs and higher

resolutions may lead to a proliferation of FPD applications and a corresponding increase in demand for panels.

**Photon Dynamics' products and the FPD manufacturing process:**



Distribution

Photon Dynamics sells its products mainly through a direct sales force. Sales offices are located in the USA, Japan, and Korea. The company also uses independent representatives in Taiwan (Kromax International Corp.) and in Japan (IHI Co. Ltd.) to distribute their products. The company plans to establish an independent representative in Korea in the near future.

The Japanese market represents 60% of Photon Dynamics' revenue, while Korea represents 25%, Taiwan 5% and USA 10%. Photon Dynamics' customer base includes the world's leading FPD manufacturer, Sharp Corporation (Stanford University, 1995).

LG Electronics, Inc., AT&T, Flat Panel Display company B.V., Fujitsu, Ltd., Hitachi, Ltd., Kopin Corporation, LG Electronics, Litton Systems Canada Limited, Optical Imaging Systems, Inc., Planar Systems, Inc., Raychem Corp., Samsung Electronics Co., Ltd., Sharp Corp., Standish Industries, and Xerox PARC.

### Competition

Although Photon Dynamics is the only company to offer a full line of products covering test, inspection, and repair, competition exists in each of the company's three product categories. For in-process testing, competitors include DTI, Orbotech, Tokyo Cathode, and KLA Instruments. For final inspection products, competitors include Advantest, Minato, Otsuka, and Orbotech. Competition for repair systems includes NEC, Hoya, and Florod. In addition to a less than complete product line, competitive systems do not offer the thorough test capabilities that Photon Dynamics offers. Inferior testing capabilities can severely compromise the quality of a flat panel display, and quality is a major competitive issue FPD manufacturers. Although Photon Dynamics believes that its systems offer the very best combination of price, speed, and thorough test capabilities, some competitive products are a less expensive alternative. Maintaining Photon Dynamics' market share will require a continued high level of investment in engineering, research and development, marketing, customer service, support, and communication.



## **Marketing**

### Problems

When Photon Dynamics first released products in 1990, the company encountered many performance and reliability problems. Over the past few years, the products have gone through major improvements and technological advances to address these issues. Some FPD manufacturers who used the early versions of Photon Dynamics equipment have been dissatisfied with the company and are unaware that new and improved products exist.

There are many FPD manufacturers that are not aware of the benefits of using automated machine-vision equipment to perform test, inspection, and repair functions. These companies use human vision to manually inspect each panel, or they use outdated testing equipment. Both of these methods are slow and inaccurate, but are still used in production by some manufacturers.

Photon Dynamics competitors pose a significant challenge to the company by offering a less sophisticated solution at a lower cost. Some FPD manufacturers are not aware of the quality control problems associated with lower priced systems, and may be attracted to their cheap price tag.

### Opportunities

Photon Dynamics participates in one of the fastest growing industries in the world. FPD manufacturers are currently building new factories to keep up with increasing

demand, and will continue to do so for many years to come. Each of these factories will contain multiple manufacturing lines, each of which can support ten to twenty test, inspection, and repair systems (Stanford Resources, 1996).

The many FPD manufacturers that do not currently use automated machine vision systems represent a significant opportunity for Photon Dynamics. As the cost of a flat panel display continues to decrease, it is important for manufacturers to increase production throughput and product quality to remain competitive. Because of a lack of speed and reliability, non-mechanized solutions such as human vision cannot keep up with high production outputs.

The technology and reliability of Photon Dynamics' systems has improved dramatically in the past few years, giving the company a tremendous opportunity to establish itself as an industry leader. Seven out of the top ten FPD manufacturers in the world are currently using the improved Photon Dynamics equipment for research and development, and in some cases for full production. This is proof that the company's products are technologically sound and can be extremely beneficial to FPD manufacturers.

Photon Dynamics is the only company that offers a single vendor, end-to-end solution for test, inspection, and repair. The company has the largest installed base and has more FPD production experience than any other company, enabling Photon Dynamics to differentiate itself from the competition.

### Objectives

Photon Dynamics' marketing objective is to position the company as the most experienced, reliable, technologically advanced supplier of FPD test, inspection, and repair systems in the industry. The company would like to increase market share by 15%, increase customer base by 1-3 new companies, and increase sales revenue by 20% in 1998.

### Strategy

Photon Dynamics must position itself as a technology leader by continuing to offer solutions that increase product quality and output for all phases of the FPD manufacturing process, including research and development and mass production. The company must penetrate the large untapped market of FPD manufacturers that do not currently use automated machine-vision solutions. This should be done by educating these manufacturers as to the benefits of this type of equipment. This market represents approximately 70% of the total FPD test, inspection, and repair equipment market (Stanford Resources, 1996). Most importantly, the company must implement an integrated marketing communications plan to increase the awareness of Photon Dynamics products and technology to help facilitate these marketing and sales objectives.

## **Marketing Communications**

### Objectives

Photon Dynamics marketing communications objective is to increase awareness of Photon Dynamics' products and technology within the company's existing customer base as well as potential customers in the FPD marketplace.

### Problems

Photon Dynamics currently does a poor job of regularly delivering information to existing customers and potential customers. Existing customers are rarely informed of improvements in products and technology, and potential customers are not aware of the benefits of Photon Dynamics systems over human inspection techniques. The company lacks high quality technical information that communicates the features and benefits of each product and provides proof of Photon Dynamics' capabilities. There is no distribution plan or schedule in place for delivering this type of information. Since the company's existing and prospective customer base is small and very specific, traditional mass-marketing communication vehicles will not work efficiently (Peppers, Rogers, 1996). However, other targeted delivery vehicles should be easy to implement and highly effective.

### Strategies

Educate existing and potential customers as to the benefits of Photon Dynamics products by identifying target audiences and delivering a unified, customer-focused

message emphasizing technological expertise, reliability, and product benefits. These messages must be delivered using a variety of vehicles on a regular basis, including independent sources such as the media to add credibility (Boone & Kurtz, 1995).

### Tactics

Photon Dynamics will develop new marketing communication deliverables, such as product brochures, technical articles, and applications notes covering each product category. These deliverables will be based on the key features and benefits of each product category. Appropriate vehicles for distribution of this information, including trade shows, presentations, direct mail, and published papers will be implemented. The information will be distributed to targeted customers using direct and indirect methods such as trade shows, direct mail, sales presentations, public relations, feature articles, and presented papers.

### MarCom Messages

The following messages will be maintained throughout Photon Dynamics' integrated marketing communications plan. At least several of these messages should be featured in each communication piece:

- Photon Dynamics is the most experienced, reliable, technologically advanced supplier of FPD test, inspection, and repair systems in the industry
- Photon Dynamics products provide unique benefits for helping manufacturers fulfill their key needs: lower costs and improved yields.

- Photon Dynamics' products and technologies have dramatically improved over the past years, and are very accurate and reliable.
- Photon Dynamics systems are suitable for mass production environments as well as research & development and pilot production applications.
- Photon Dynamics is the only company that offers a single vendor, end-to-end solution for test, inspection, and repair.
- Photon Dynamics products and technology are superior to human inspection and other outdated methods such as 'open-short' tests.

### Audience

Photon Dynamics' audience includes the company's existing customer base as well as potential customers. Within these groups there are two main targets; managers and engineers. Management is most concerned with the bottom line, and how Photon Dynamics' can improve and maximize manufacturing operations. The engineers, who are in many cases the end-users of the product, are interested in technical sophistication and easy operation. They want their equipment to be the best in the industry, and they want it to improve processes in order to make their jobs easier.

### **Advertising**

Advertising will not play a role in the initial stages of the Photon Dynamics plan. The lack of a mass available market due to the company's limited customer base makes advertising a less effective vehicle for Photon Dynamics' messages, and would not be an efficient use of the budget (Peppers, Rogers, 1996). However, trade magazines will play

an important roll in communicating the Photon Dynamics marketing communications messages through a public relations campaign. Advertising in these publications may be appropriate in the future to maximize exposure and increase name recognition. Since the company's customer base is so small and the products are sold on an extremely long consultative sales cycle, it would not make sense to have advertising campaigns that focus on product features. The appropriate goal for future advertising campaigns is to maintain the company's credibility and image. Such a campaign should contain the following objectives:

- Improve the general awareness of the company and its products
- Reinforce credibility as an industry leader
- Develop and maintain an image of reliability and experience
- Develop and maintain the company's position as a technology leader

### Media

The most effective media exposure for Photon Dynamics is through the publishing of technical papers and editorial articles in FPD trade magazines. Due to the company's small customer base, mass media vehicles such as television, radio, and newspapers are not appropriate. Trade magazines focusing on the Flat Panel Display Industry as well as automated testing and measurement technologies are the most important for Photon Dynamics. This includes such publications as Solid State Technology, Micro Magazine, Nikkei Microdevices, Test & Measurement World, The Clock, Semiconductor International -Test Floor section, and Information Display. These publications are well

established in the FPD industry, and have high readership within the FPD manufacturing community.

## **Sales Promotion**

### **Corporate Brochure**

As product benefits and corporate messages are more clearly defined with a high-tech focus, comprehensive changes in product and corporate brochures must be made. A new corporate brochure is needed to present the corporate philosophy, capabilities, and general information on the three product families (see Appendix 1). This piece will give a brief history of Photon Dynamics, and describe how the company's products and technologies impact the FPD manufacturing industry. The main message will be that Photon Dynamics products have evolved from an R & D tool to a mass production tool. It will also discuss each of Photon Dynamics' proprietary technologies, N-Aliasing and Voltage Imaging, and how they provide benefits to the test, inspection, and repair process. Due to their complexity, these technologies will be visually represented with a combination of process photography and computer illustration. The brochure will also contain general information on Photon Dynamics' training, service, and support offerings. Each of the company's product categories will be described as well as their applications to the manufacturing process.

The corporate brochure will target upper management of FPD manufacturers, but must also be able to inform a broader audience. This will allow the piece to be used as a



tradeshow handout or a direct mail piece, since it will give a comprehensive overview of the company's products and capabilities.

### Product Data Sheets

In addition to a corporate brochure, a new data sheet will be created for each product. Product data sheets will be highly technical and will be targeted to the engineers and technicians that operate the equipment. These data sheets will provide detailed information including performance specifications, maintenance and facility requirements, available options, equipment layout, and component specifications. The front side of the data sheet will include the name and model of the product as well as a photograph. Using bullets and short blocks of text, the data sheet will describe the key features, benefits, and applications. The key product benefits will be prominently displayed at the top of the sheet to instantly catch the reader's attention and quickly describe the product's purpose. A short paragraph will follow that gives more details as to the product's capabilities.

Each data sheet will highlight four main topics: Superior Technology, Reliability, High Performance, and Industry Leadership. These four categories support Photon Dynamics' marketing messages, and will provide an opportunity to offer specific examples and statistics. Each of these categories will have several features and benefits listed in bullet form. This format will be used for each product category to create a simple, consistent format (see Appendix 2).

### Application Notes

Application notes are equivalent to white papers and will present a much more in-depth discussion of the technologies and applications of Photon Dynamics' systems. These papers will contain samples of test results and detailed descriptions that serve as the proof of Photon Dynamics' stated capabilities. Photon Dynamics' applications engineers and product engineers will write these papers (see Appendix 3).

Applications notes can be delivered directly to engineers and end-users through e-mail, fax, and regular mail. A schedule of one application note per quarter will be implemented to maintain a consistent flow of technical information to the customer. An applications note schedule listing upcoming topics will be produced and sent to the appropriate audience. This schedule will give the customer a preview of what they can expect from Photon Dynamics' engineers, and will give the customer an opportunity to suggest topics of interest.

Each of Photon Dynamics' product families and technologies will receive equal representation as a topic for application notes. In addition, industry trends and new technologies will also be explored. This will help position Photon Dynamics as a company that is constantly in touch with the latest FPD industry trends.

### Trade Shows

Trade shows are an effective way for the company to interface with existing and potential customers while presenting the latest information and advances in products and

technology. Photon Dynamics had exhibited at trade shows in the past, but has done so infrequently and without planning. The company has no set schedule in place and no strategy for what should be accomplished at a trade show. In addition, Photon Dynamics has never participated in a trade show in Korea, which is quickly emerging as a major FPD market. It is important that the company present invited papers at technology and application seminars that are offered at all trade shows. This is an excellent forum for reaching the decision-makers of FPD manufacturers, and is a great way to increase exposure and credibility.

The focus of the trade show exhibits and papers will be based on the latest releases and improvements of the company's products and technology. The themes will be tied to key market issues, customer needs, technological breakthroughs, and new product capabilities consistent with the marketing messages. Trade show themes should correspond with published technical articles whenever possible to maximize exposure.

The following objectives should be met when participating at a trade show:

- Generate 5-10 solid new customer leads
- Demonstrate products
- Invite press coverage
- Face to face interaction with existing customers
- Present invited papers supporting key capabilities
- Learn about our competitors and their products (Marken, 1996)

All trade shows will include a give-away item to stimulate booth traffic and give further exposure to Photon Dynamics' name. Such items may include pens/pencils, golf balls, stress balls, mugs, etc. Give-away items can also have a connection to product and

technology applications. For example, magnifying glasses or binoculars could be given away to promote the improved vision capabilities of Photon Dynamics' systems. Such items could incorporate a catch phrase such as "Defect Detection Systems" or "Better Vision" as well as the Photon Dynamics logo. The following chart illustrates the proposed trade show schedule for 1998, including suggested give-away items.

EVENT	LOCATION	PRESENTED PAPER	TECHNICAL SESSION	PREMIUM
LCD Int.	Chiba, Japan	n/a	Enhancements in Throughput Test Coverage	Golf balls
Display Works	San Jose, Ca.	Panel Design for In-Process Test	Recent Improvements in Laser Repair Techniques	mag. glass
SEMIC ON Korea	Seoul, Korea	6 New Tests for Final Inspection	n/a	Golf balls
SID	USA	Test, Inspection, repair Overview of latest technology	n/a	Pens

### World Wide Web Site

A web site will be an effective way for Photon Dynamics to deliver information to existing and potential customers, the press, and the investment community. Photon Dynamics' web site will be designed to offer information on the company, products, financial information, press releases, and employment opportunities. Each of these subjects will have their own section on the web site, and can be accessed from a link on the home page (see Appendix 4). The company section will include information very similar to the corporate brochure, including a brief history. The product section will contain information similar to the product data sheets, but will not include product specifications. Due to security concerns, this would not be an appropriate vehicle to distribute specifications or other proprietary information such as application notes. If

security measures such as an access code were implemented, this may prove to be a convenient way to deliver such information in the future. The financial information section is targeted to the investment community, and will include a copy of the company's prospectus as well as quarterly financial results. The press release section will serve as a library of all Photon Dynamics press releases. They will be listed by the topic as well as the date of release. The employment opportunity section will be a useful tool for recruiting new employees. It will be updated regularly by Human Resources, and will list and describe all available positions within the company. This section will include a special e-mail address so that prospective employees can send their resumes directly to the Human Resources department.

### Direct Mail

For the type of information that Photon Dynamics needs to deliver, such as application notes, direct mail offers the most efficient means of delivery. The advantages of direct mail are selectivity, intensive coverage, speed, flexibility, completeness of information, and personalization (Boone & Kurtz, 1995). Direct mail offers Photon Dynamics an opportunity to target specific customers with specific information. For example, application notes dealing with FIS systems would be sent to FIS users, not to IPT or ILW users. Direct mail as well as other direct channels such as e-mail and fax will be used to distribute application notes, technical updates, technical articles, and press releases. Reprints of published papers and articles on Photon Dynamics will also be used as a

direct mail piece. A direct mail campaign will be used at least once per quarter in conjunction with the production of application notes, press releases, etc. As these items are produced, they will be sent to the appropriate audience and can then be followed up with a phone call from the salesperson. This gives the salesperson the opportunity to make contact with the customer, and also serves to confirm that the customer has received and read the information. This practice will not only educate the customer, it will also establish a regular link between the customer and the salesperson.

### Personal Selling Tools

The main objective for personal selling tools is to provide the salesperson with enough proof of the company's capabilities to allow him or her to make the sale (SEMI, 1995). The most appropriate sales tool for Photon Dynamics is face-to-face sales presentations. Standard sales presentations for the company as well as each product will describe major product features, point out strengths, and cite illustrative successes (Boone & Kurtz, 1995). All product categories will be represented in a basic corporate overview presentation. As needs arise, these presentations can be personalized to meet the needs of specific customers or prospects (see Appendix 5). A library of all presentations will be established so that all sales personnel have access to the same presentations. A library will also help ensure that presentations are up-to-date and cover all products and technologies. To provide more technical and detailed support, sales materials will also include samples of test outputs, applications notes, etc. These will be used in conjunction with presentations as a leave-behind item. Multi-media tools, such as self-running

software demos are highly effective, and should be incorporated in the future as budgets allow. These demos could include video clips that demonstrate the actual operation of a system, and examples of the information it can capture. This is another excellent piece to be used as a leave-behind that can continue to sell the equipment after the salesperson has left. Self-running demos can also be used in a direct mail campaign. They can be mailed internationally to a large number of contacts to act as a substitute for a face to face demonstration.

### **Public Relations**

Public relations is an efficient, indirect communications channel for promoting products as well as the prestige and image of a company (Boone & Kurtz, 1995). Public relations is a high priority for building awareness in the company's new marketing communications plan. Promoting products and building a strong corporate image are two key elements of the plan. In addition, it is especially important that Photon Dynamics' messages are continually reinforced through independent sources such as the press. Using the press to deliver these messages will help to establish and maintain credibility (Boone & Kurtz, 1995).

Initially, Photon Dynamics' public relations program will consist of three main components. These components include press release distribution (see Appendix 6), editorial opportunities, and trade show support. Selecting the appropriate PR firm will be based on FPD industry experience, start-up experience, and cost of services. It is most

critical for the PR firm to have a good understanding of the FPD industry. Referrals from other companies in the industry will be solicited, and these referrals will be given priority based on their experience. It is also important that the firm understands Photon Dynamics unique challenges as a start-up company, including a limited budget. The right firm must be able to deliver the three main components of the plan within a limited budget, but should also have a plan for future growth. As Photon Dynamics grows, the roll of the PR firm will be expanded to include product launches, promotions, and other special events.

Press releases will be sent out at a rate of at least one per month. The content will be based on company news, product updates, large orders, and technological breakthroughs. The PR firm will be asked to assemble a schedule of editorial opportunities in appropriate trade publications. They will consult with the company to help tailor the content of articles and technical papers so that they fit within the guidelines of the publication. The goal of the public relations program is to issue at least one press release per month and have one editorial or technical article published per quarter. In addition, the PR firm will be expected to facilitate at least one major cover story or special insert feature per six month period in one of the company's targeted trade magazines. Published papers and editorials will be reprinted and used for sales and marketing collateral, trade show handouts, and direct mailings.

The PR firm's performance will be evaluated based on the number of news releases and technical articles that are published in a six-month time frame. The PR firm will



provide a clipping service that will allow for easy measurement of the number of press articles on the company. After each six-month period, the performance of the firm as well as the PR program will be evaluated and modified as needed.

### **Budget**

The following spreadsheet represents a forecast of Photon Dynamics' 1998 Marketing Communications budget based on this plan. These figures are estimated costs in round numbers based on historical data.

<b>MarCom Component</b>	<b>Q1 '98</b>	<b>Q2 '98</b>	<b>Q3 '98</b>	<b>Q4 '98</b>	<b>TOTALS</b>
PR	7500	7500	9000	9000	33000
Prod. Lit.	13000	7000	5000	5000	30000
Trade Shows	10000	15000	10000	0	35000
Presentation Materials	1000	1000	1000	1000	4000
Advertising	0	0	0	2000	2000
Direct Mail	2000	2000	2000	2000	8000
<b>Total MarCom Budget</b>	<b>33500</b>	<b>32500</b>	<b>27000</b>	<b>19000</b>	<b>112000</b>

### **Timeline**

Full implementation of this new Marketing Communications Plan will take approximately one year. The chart below indicates the approximate timeline for implementation.

Oct. '97	Nov. '97	Dec. '97	Jan. '98	Feb. '98	Mar. '98	Apr. '98	May '98	June '98	July '98	Aug. '98	Sept. '98
PR program	LCD Int. trade show JAPAN	App. Note - direct mail	Display Works trade show USA		App. Note - direct mail		SID trade show USA	App. Note - direct mail			App. Note - direct mail
	Tech. paper			Tech. paper			Tech. paper			Tech. paper	
press release	press release	press release	press release	press release	press release	press release	press release	press release	press release	press release	press release
			Trade pub. cover					Trade pub. cover			

### Measurement and Evaluation

The success of this plan will be measured by the increase in the awareness of Photon Dynamics within the Flat Panel Display Industry, including existing and potential customers. To measure this increase, a survey will be sent to 5000 contacts consisting of existing customers and potential customers (see Appendix 7). To stimulate participation, a gift item, such as a Photon Dynamics t-shirt will be offered to those individuals that participate in the survey. The survey will target upper management and engineering contacts within the audience. Each question will be given a numeric value based on the response given. These values will be totaled, and an average score will be produced. The survey will be given prior to and after implementation of the marketing communication plan. The average scores of both surveys will be compared to determine and measure any increase in awareness. The success of this plan will also be measured by evaluating the number of press clippings that are generated after this plan is implemented.

The Company's CEO, Senior Vice President of Sales and Marketing, and General Manager have agreed to evaluate this plan at a senior staff meeting. Implementation of the plan will be done gradually over time as budgets and needs dictate.

### References

- Castellano, J., Mentley, D., & Weichert, A., (1996). Flat Information Displays Market and Technology Trends. Palo Alto, CA: Author.
- Castellano, J., & Mentley, D., (1994). Liquid Crystal Display Manufacturing. Palo Alto, CA: Author.
- Boone, L., & Kurtz, D., (1995). Contemporary Marketing Plus. Fort Worth, TX: The Dryden Press.
- Stanford University. (1995). Flat Panel Displays: Views from the US and Japan. Proceedings from the Flat Panel Display Seminar Series (pp. 43-49, 56-58). Palo Alto, CA: Author
- Semiconductor Equipment and Materials International. (1995). The Fundamentals of Product Marketing. Mountain View, CA: Author.
- Electronic Industries Association of Japan, (1996). Display Technology Library. Redondo Beach, CA: InterLingua Information & Translation.
- Marken, G., (1996, April). Trade Show PR - Emphasize Show and Substance. Public Relations Quarterly, pp. 45-48.

McDonald, M., (1995). Marketing Plans: How to Prepare Them: How to Use Them.

Oxford: Butterworth-Heinemann.

Peppers, D., Rogers, M., (1996, February) . Advertising in the One-to-One Future. *Info*

*World* [Online]. Available: <http://www.peppersrogers.com/articles/info21296.html>

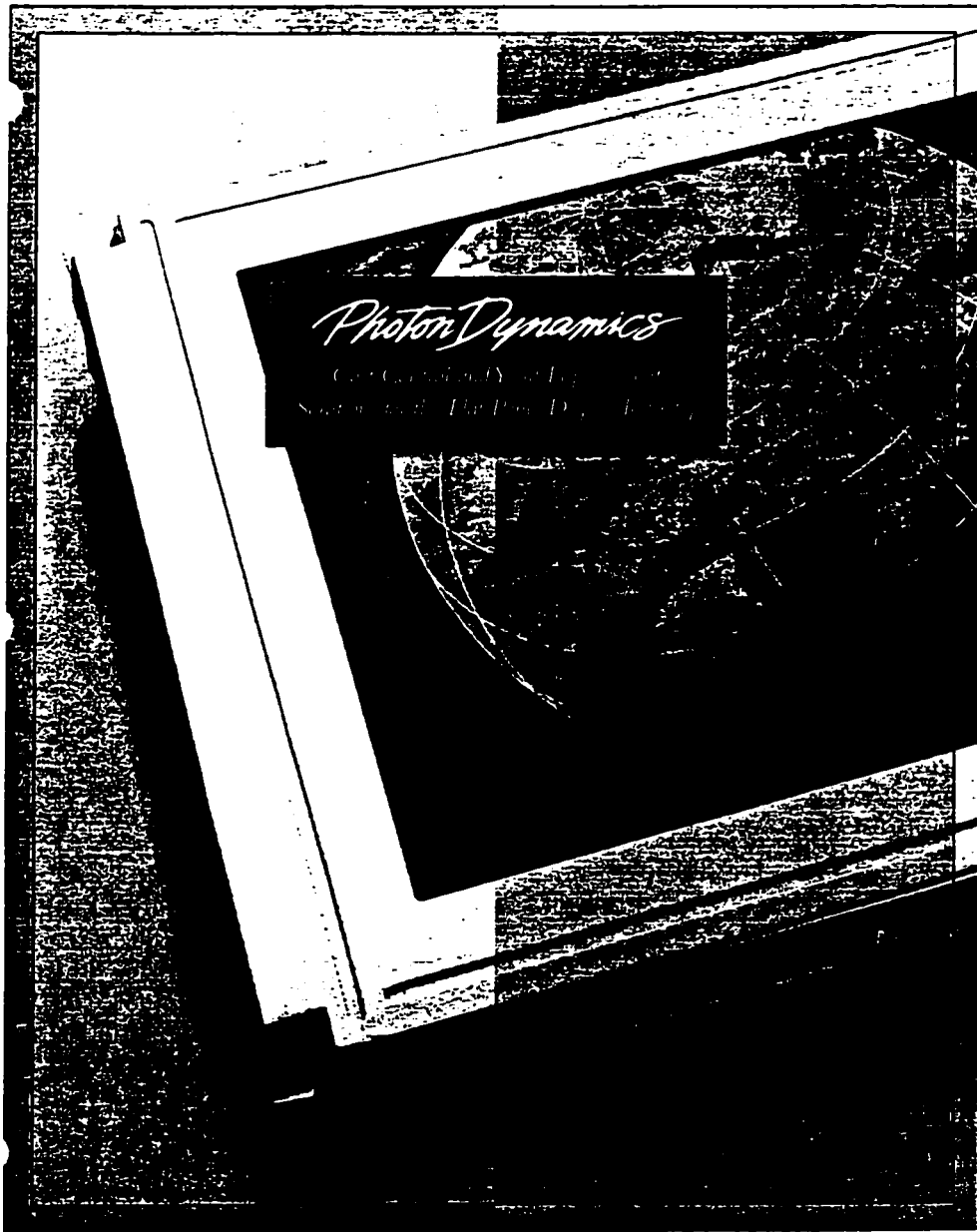
[1997, August 10]

Peppers, D., Rogers, M., (No date) . *The Five "I"s of One-to-One Marketing* [Online].

Available: <http://www.peppersrogers.com/articles/five-i.html> [1997, August 10]

# **APPENDIX 1**

## **NEW CORPORATE BROCHURE**



# *Photon Dynamics*

*Get Control of Light and  
Solve the Problems of the Future*

The flat-panel display (FPD) industry has grown rapidly in recent years. Estimated annual growth rates and projections indicate the overall health and growth of the display technology market through the next several years. While the automotive industry introduced flat-panel displays as an alternative to cathode-ray tube (CRT) displays, the energy and consumer goods companies have introduced and introduced FPDs for direct broadcast reception in the low-cost and home market. Today, flat-panel displays add value to countless consumer and commercial products.

While one can draw many parallels between FPD production and the semiconductor industry flat-panel display production is far more material intensive. First, accurate substrate test and repair followed by automated display inspection can lower production cost substantially. Early defect detection prevents

later material investment in failed product and prevents excessive process control optimization. Early intervention can also reduce the number of failed panels of particular geometry, thereby increasing the yield of the

product. Elements that contribute to FPD industry the increasing potential application of machine vision technologies to characterize flat-panel designs. Early test system products allows customers to test array matrix displays and repair array accuracy in laboratory and production environments. Early semi-automated inspection systems combine standard cameras with advanced image processing to standardize quality criteria. Today, Photon Dynamics provides vision-based systems for high-volume production. Customers in Japan, Korea, Taiwan,

Photon Dynamics  
is focused  
machine vision  
image processing

#### Array Test ArrayChecker Systems

ArrayChecker is a vision-based system for testing array displays. The system consists of a camera, a light source, and a computer. The camera is positioned to view the array display from a top-down perspective. The light source is positioned to illuminate the array display from the side. The computer is connected to the camera and the light source. The system is used to test array displays for defects such as missing pixels, dead pixels, and stuck pixels. The system can also be used to test array displays for defects such as missing rows, missing columns, and missing subpixels.

ArrayChecker is a vision-based system for testing array displays. The system consists of a camera, a light source, and a computer. The camera is positioned to view the array display from a top-down perspective. The light source is positioned to illuminate the array display from the side. The computer is connected to the camera and the light source. The system is used to test array displays for defects such as missing pixels, dead pixels, and stuck pixels. The system can also be used to test array displays for defects such as missing rows, missing columns, and missing subpixels.

#### Array Repair ArraySaver Systems

ArraySaver is a vision-based system for repairing array displays. The system consists of a camera, a light source, and a computer. The camera is positioned to view the array display from a top-down perspective. The light source is positioned to illuminate the array display from the side. The computer is connected to the camera and the light source. The system is used to repair array displays for defects such as missing pixels, dead pixels, and stuck pixels. The system can also be used to repair array displays for defects such as missing rows, missing columns, and missing subpixels.

*Dynamics  
used on  
vision and  
processing.*

*Europe and U.S. markets. The company has also  
newly opened three European manufacturing plants.*

*The company's manufacturing plant  
in Europe is in Bologna, Italy. The  
plant is capable of producing  
products used in the automotive  
industry. This in-Dynalco plant has  
been an important manufacturing plant  
for rapidly developing production  
systems. Each generation of equipment  
makes use of the latest technology available  
for the industry. The in-Dynalco*

*operates with other companies to test, inspect  
and repair products with material-handling robots, products  
of high-speed machinery, and step-less control networks.*

*The computer-based in-Dynalco manufacturing  
plant is a 100% computerized plant. The plant is  
able to produce a wide range of products  
and is capable of producing products  
used in the automotive industry. The  
plant is capable of producing products  
used in the automotive industry. The  
plant is capable of producing products  
used in the automotive industry.*

*In 1997, Pretz Dynamics opened its manufacturing  
plant in East and opened new supply houses in Korea. It also  
made these plants in Japan. Continued investment in plant  
and product quality is a continuing theme. The company  
will also be producing products used in the  
automotive industry. Experts in machine tools and energy prices, they promise  
to add stream of new products to meet your industry needs  
for flat-panel component test, repair, and inspection.*

production. The company's multi-level  
technology has been used in a number of  
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**Flat Panel Inspection  
PanelMaster Systems**

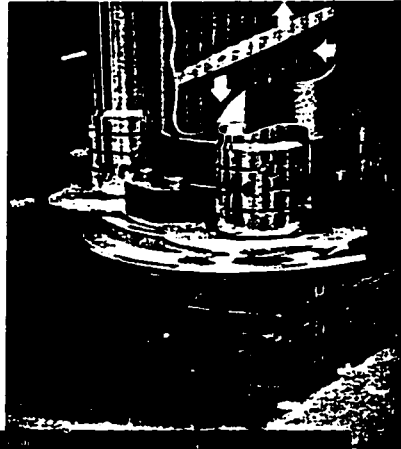
The company's PanelMaster Systems  
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### Voltage Imaging

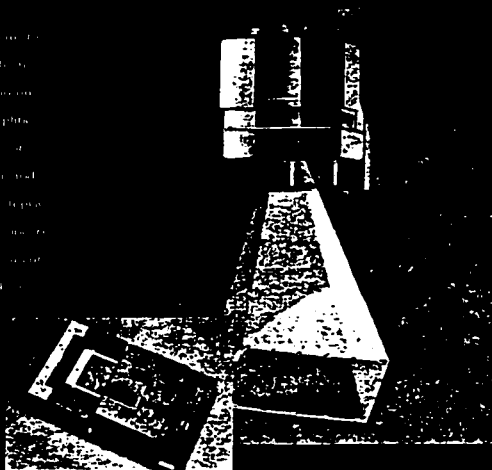
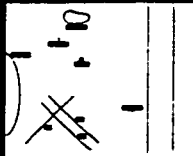
The third-generation of proprietary Voltage Imaging technology gives ArmyChecker systems unique ability to measure pixel voltage. The technique moves an electro-optical sensor across display substrates under test without physical contact. Electro-optical modulation reflects or scatters light supplied by the tester according to the strength of discrete electrical fields produced by individual pixels in the test area. Photon Dynamics designed camera, signal-processing and image-processing subsystems convert light intensity information from the sensor into voltage information. System software creates a false-color voltage map that corresponds to the display under test. Customers use the color image and numerical data to detect and characterize circuit breaks, shorts and less obvious defects such as leaky pixel transistors or faulty storage capacitors. Since the pixel voltage largely determines liquid-crystal display quality, Voltage Imaging provides superior information to AMLCD manufacturers. Makers of other FPD technologies find Voltage Imaging a safe, effective means for pinpointing row or column line voids and cross-dielectric shorts.

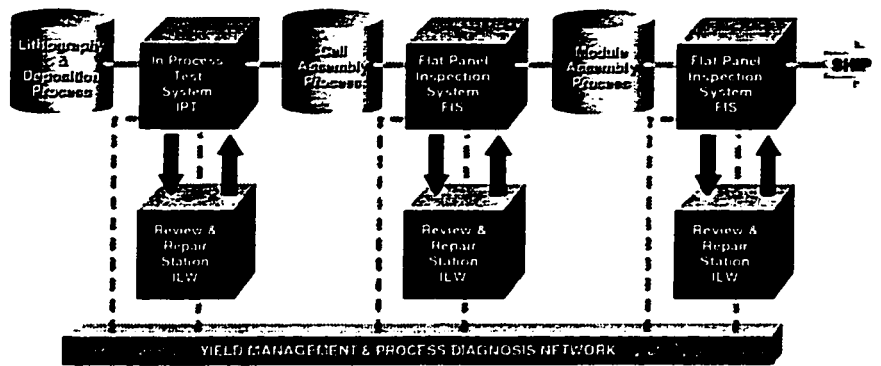


### N-Aliasing

Following the Aliasing technology, Photon Dynamics offers the next step in defect inspection: the N-Aliasing process. This new technology uses a patented image processing algorithm to ensure that the system finds the same FPD's defects in the same places, not just once on the display, but in a fixed position on the display. The system includes a patented pixel processor and an image analysis tool that can identify and locate defects on the display. The system is developed by Photon Dynamics and is used to find and locate defects on the display. The system is the result of the Aliasing technology. Photon Dynamics

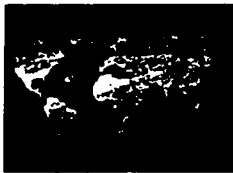
...the next step in the technology  
in the field of  
display inspection.





#### Customer Commitment

No other company has as much expertise in flat-panel test, inspection and repair or more years of production experience with the world-leading FPD manufacturers. Photon Dynamics develops technologies through close interaction with customers in order to provide the most efficient, cost-effective solutions. The company has worked with customers to lower costs, increase quality and raise manufacturing throughput over three generations of systems. Photon Dynamics looks forward to meeting new productivity challenges with new products, and new customers.



#### Worldwide Presence

Manufacturing, Research and Development facilities in San Jose, California (the capital of Silicon Valley) provide easy access to world-class technologies and services. Photon Dynamics can dispatch systems, parts and know-how to manufacturing centers around the world. Subsidiary companies in Japan and Korea stock parts and offer expertise to customers located in the two major centers of LCD production. In Taiwan, Kromax provides expert sales and service support. Advances in electronic communications gives customers around the globe faster, more efficient access to Photon Dynamics' resources.



#### Training and Service

Customer partnerships continue long after system installation. Photon Dynamics' technical support personnel stand ready to help customers maintain high levels of system performance. Customers can obtain a wide range of training courses for all products. Courses cover system theory, programming, operation, applications and maintenance. Training and maintenance services tailored to specific needs can be delivered on site, at the customer's facility, or at Photon Dynamics' headquarters in San Jose.



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## **APPENDIX 2**

### **NEW PRODUCT DATA SHEET**

## FIS-300 Flex P System Specifications

<b>Model</b>	FIS-300 Flex P
<b>Capacity</b>	6000/12000/18000/24000
<b>Weight</b>	250 lbs (113 kg)
<b>Dimensions</b>	14 1/8" x 17 1/8" x 13 1/4"
<b>Material</b>	Aluminum
<b>Finish</b>	Black
<b>Power</b>	115V, 60Hz
<b>Power Cord</b>	6 ft
<b>Features</b>	• Easy to use • 2000lb capacity • 180° rotation • Locking casters • 15" x 15" opening

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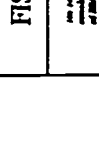


Diagram showing the dimensions of the FIS-300 Flex P System. The overall dimensions are 14 1/8" wide, 17 1/8" high, and 13 1/4" deep. The opening is 15" wide and 15" high. The diagram also shows the placement of the power cord and the locking casters.

## Flat Panel Inspection System

### FIS-300 Flex P

The FIS-300 Flex P System is a portable, lightweight inspection system designed for use in a wide variety of applications. It is the only inspection system that is both portable and capable of inspecting large areas.

- Weighs only 250 lbs (113 kg) and folds flat for easy storage and transport.
- Inspects up to 2000 sq ft (186,000 sq ft) of area.
- 180° rotation allows for easy access to all angles.

**Advantages:**

- Easy to use
- 2000lb capacity
- 180° rotation
- Locking casters
- 15" x 15" opening

**Applications:**

- Inspection of large areas
- Inspection of difficult-to-access areas
- Inspection of high ceilings
- Inspection of large structures
- Inspection of large equipment

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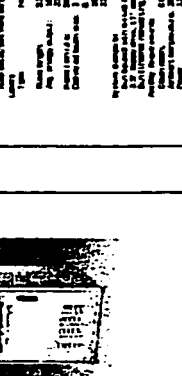


Image of the FIS-300 Flex P System, showing the main unit and the inspection head. The unit is compact and portable, designed for easy use in a variety of settings.

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Diagram of the FIS-300 Flex P System showing the main unit and the inspection head. The diagram also shows the dimensions of the system and the placement of the power cord.

## IPTMPS System Specifications

**General Description:**  
 The IPTMPS system is a fully integrated, turnkey system for the measurement and control of process variables. It is designed for use in a wide range of industrial applications, including chemical, pharmaceutical, and food processing. The system is easy to install and operate, and provides accurate, reliable data for process control and optimization.

**Key Features:**  
 • High accuracy and precision  
 • Easy to use and maintain  
 • Flexible and scalable architecture  
 • Comprehensive safety features  
 • Full compliance with industry standards

**System Components:**  
 The IPTMPS system consists of the following components:  
 • Process Variable Transmitters (PVTs)  
 • Control System (CS)  
 • Operator Interface (OI)  
 • Data Acquisition System (DAS)  
 • Safety System (SS)

**Performance:**  
 The IPTMPS system is designed to provide the following performance characteristics:  
 • Accuracy: ±0.1% of full scale  
 • Precision: ±0.05% of full scale  
 • Response Time: <math>10^{-3}</math> seconds  
 • Resolution: 16-bit  
 • Sampling Rate: 1000 samples per second  
 • Data Storage: 100,000 samples  
 • Power Consumption: 100W

**Compliance:**  
 The IPTMPS system is fully compliant with the following standards:  
 • IEC 61508 (Safety Integrity Level 3)  
 • IEC 61511 (Process Safety Management)  
 • IEC 61513 (Availability)  
 • IEC 61514 (Maintainability)

**Process Variable Transmitters (PVTs):**  
 The PVTs are used to measure process variables such as temperature, pressure, and flow. They are designed for high accuracy and precision, and are easy to install and maintain.

**Control System (CS):**  
 The CS is the central processing unit of the IPTMPS system. It is designed to provide accurate and reliable control of process variables. It is easy to use and maintain, and provides comprehensive safety features.

**Operator Interface (OI):

**Data Acquisition System (DAS):**  
 The DAS is used to acquire and store process data. It is designed to provide high accuracy and precision, and is easy to use and maintain.

**Safety System (SS):**  
 The SS is used to ensure the safe operation of the IPTMPS system. It is designed to provide comprehensive safety features, including trip and interlock logic.**

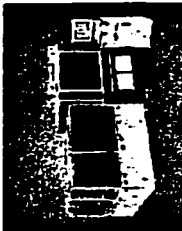
## In Process Test System

**Key Features:**  
 • High accuracy and precision  
 • Easy to use and maintain  
 • Flexible and scalable architecture  
 • Comprehensive safety features  
 • Full compliance with industry standards

**System Components:**  
 The IPTMPS system consists of the following components:  
 • Process Variable Transmitters (PVTs)  
 • Control System (CS)  
 • Operator Interface (OI)  
 • Data Acquisition System (DAS)  
 • Safety System (SS)

**Performance:**  
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 The CS is the central processing unit of the IPTMPS system. It is designed to provide accurate and reliable control of process variables. It is easy to use and maintain, and provides comprehensive safety features.

**Operator Interface (OI):

**Data Acquisition System (DAS):**  
 The DAS is used to acquire and store process data. It is designed to provide high accuracy and precision, and is easy to use and maintain.

**Safety System (SS):**  
 The SS is used to ensure the safe operation of the IPTMPS system. It is designed to provide comprehensive safety features, including trip and interlock logic.**

## ILW System Specifications

**1. Laser**  
 1.1 Type: CO<sub>2</sub> laser  
 1.2 Wavelength: 10.6 μm  
 1.3 Power: 100 W  
 1.4 Beam diameter: 10 mm  
 1.5 Spot size: 10 mm  
 1.6 Spot speed: 10 mm/s  
 1.7 Spot diameter: 10 mm  
 1.8 Spot speed: 10 mm/s  
 1.9 Spot diameter: 10 mm  
 1.10 Spot speed: 10 mm/s

**2. Control System**  
 2.1 Type: Computerized  
 2.2 Wavelength: 10.6 μm  
 2.3 Power: 100 W  
 2.4 Beam diameter: 10 mm  
 2.5 Spot size: 10 mm  
 2.6 Spot speed: 10 mm/s  
 2.7 Spot diameter: 10 mm  
 2.8 Spot speed: 10 mm/s  
 2.9 Spot diameter: 10 mm  
 2.10 Spot speed: 10 mm/s

## Integrated Laser Review & Repair System

**1. Laser**  
 1.1 Type: CO<sub>2</sub> laser  
 1.2 Wavelength: 10.6 μm  
 1.3 Power: 100 W  
 1.4 Beam diameter: 10 mm  
 1.5 Spot size: 10 mm  
 1.6 Spot speed: 10 mm/s  
 1.7 Spot diameter: 10 mm  
 1.8 Spot speed: 10 mm/s  
 1.9 Spot diameter: 10 mm  
 1.10 Spot speed: 10 mm/s

**2. Control System**  
 2.1 Type: Computerized  
 2.2 Wavelength: 10.6 μm  
 2.3 Power: 100 W  
 2.4 Beam diameter: 10 mm  
 2.5 Spot size: 10 mm  
 2.6 Spot speed: 10 mm/s  
 2.7 Spot diameter: 10 mm  
 2.8 Spot speed: 10 mm/s  
 2.9 Spot diameter: 10 mm  
 2.10 Spot speed: 10 mm/s

## **APPENDIX 3**

### **APPLICATION NOTES**



## APPLICATIONS NOTE - MODULE INSPECTION TESTS

---

### INTRODUCTION

As the flat panel display market becomes more and more competitive, the quality of the display becomes a more critical issue for manufacturers. Producing a display of consistent high quality can be the determining factor for remaining competitive in the industry. Automated testing at the module assembly stage is an important key to insuring optimum quality of the finished product. Human visual inspection, which is still used by some manufacturers, is especially ill suited for providing reliable data at the module stage. This is due to the following known problems associated with human visual inspection:

- Human vision cannot accurately detect defects due to limitations in sensitivity
- Human vision does not result in quantifiable data
- Human vision does not yield consistent defect detection due to human subjectivity
- Human vision is slow and cannot be used in a fully automated environment

Photon Dynamics understands that product quality is a key factor in FPD manufacturing. To insure high product quality, we are dedicated to providing superior automated flat panel test solutions with a test library that provides the widest test coverage. We continue to develop our test library to provide the optimum balance of throughput and test coverage to FPD manufacturers. Photon Dynamics is pleased to announce the addition of the following module tests to the already extensive defect detection library of the FIS 250 and 300 Systems:

1. FLICKER
2. IMAGE RETENTION
3. GRAY SCALE GRADIENT
4. DISPLAY PATTERN POSITION
5. CROSSTALK

#### 1. Flicker

The flicker test is designed to measure the time periodic intensity variations of user defined subregions across the LCD panel. The intensity variations typically have a time period matching the frame refresh rate of the panel, which can range from 30-70 Hz. The intensity variations are caused by non-symmetrical data voltages at the pixel when the voltage polarity is switched between refresh frames. The asymmetric voltage is caused by capacitance leakage inherent in the thin film transistor.

The test is carried out by employing a high speed CCD camera capable of 500 frames/sec to obtain a set of temporal samples that exceed the Nyquist criteria, and whose integration window does not significantly attenuate the higher frequencies. To support the requirement of 30-100 Hz measurements the integration window will never be longer than 2.5 msec. Correspondingly, the sampling frequency will never be below 400 Hz.

## APPLICATIONS NOTE - MODULE INSPECTION TESTS

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The results of the flicker test are the percent maximum peak-to-peak, the standard deviation of the time series for each sub-region test, and an estimate of the largest frequency component in the signal. The flicker test is considered to have failed if the percent peak-to-peak deviation from the mean is greater than the one specified by the user, if the percent standard deviation from the mean is greater than the one specified by the user, and if the percentage of the failed regions is greater than the one specified by the user. The test also gives plots of flicker data and its corresponding power spectral density. The plots are shown in Figures 1 and 2.

### 2. Image Retention

The image retention test is designed to measure the switching response time of the display. Depending on the duration of the soak time, it can measure the discharge rate of the pixel capacitor or the electro-mechanical hysteresis of the liquid crystal.

In the test, there are two evaluation modes. The first one is the "Intensity Deviation Mode." In this mode, the test is evaluated when the intensity deviation is within a user specified percentage of the discharge intensity. The panel is considered to have failed if it does not reach this prescribed percentage within the "Maximum Discharge Time." The panel is also considered to have failed, if the percentage of failed regions is greater than the user specified "Maximum Region Failures."

The second one is the "Discharge Time Mode." In this mode, the test is evaluated at a specific period of time after the transition from the charge (soak) to the discharge pattern. The test is considered to have failed if the intensity of the prescribed panel region is not within the "maximum percentage deviation" specified by the user. The panel is also considered to have failed, if the percentage of failed regions is greater than or equal to the user specified "maximum Region Failures." A plot of the curve is also available with this test, and it is shown in Figure 3.

### 3. Gray Scale Gradient

The Gray Scale Gradient test is designed to measure the percentage change between displayed gray levels. The test can be used to determine if data offset voltages are correct, and to determine if gray level signals are being properly decoded and sent to the display.

The test is carried out by writing a pattern which consists of either vertically or horizontally arranged bars. Please see Figure 4 for the illustration. Each bar contains one uniform gray level, and they are arranged in sequential order. The individual gray bar pattern is developed for Red, Green, Blue, and Monochrome. Given this pattern, the test measures the percent variation between the neighboring bars.

-1- The test measures the percent variations between the levels, the gamma value, the probability of match to the measured gamma value, and the datalog plots of measured gray levels. The test is considered to have failed, if the percentage difference between the levels exceed the user or FIS specified "percentage gray variation."

## APPLICATIONS NOTE - MODULE INSPECTION TESTS

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### 4. Display Position Checking

The test is designed to measure the position of a pattern written to the display to determine if the pattern is at the correct coordinates. This test checks the functionality of the row and column drivers and shift registers. It is also checks the timing between the H-sync and the data.

The test is carried out by writing a pattern which consists of a grid of vertical and horizontal lines centered in each data and gate driver block. Please see Figure 5 for the illustration. The display position is measured by using the Line Defect Detection. Since the center location of the data and gate driver blocks are known, the test is considered to have failed, if the location of the lines are not accurate. The test will report the amount of pixel shift in X and Y directions. This is achieved by reporting either the driver block location or a pattern shift over the entire display.

### 5. Crosstalk

The crosstalk test is designed to measure the influence of a full drive signal square pattern centered in the display on the surrounding regions. The gate or data signals that are addressing the full drive region can cross talk with the region surrounding the addressed square and cause a brightness variation.

The test is carried out by writing a full drive signal square pattern at the center of the display. Please see Figure 6 for the illustration. For "normally white" displays, the pattern would be a black square. In the surrounding region, the measurement ROIs are arranged. The ROIs are positioned across an imaginary borders. These imaginary borders are formed by extending a line out from each side of the square pattern centered at the display. Please see Figure 6 for the illustration. The size of ROIs can also be varied.

The user can specify the maximum brightness variation within ROI, and the maximum brightness variations amongst the ROIs (maximum delta variation). The test is considered to have failed, if any of the variation exceeds the limits specified by the user.

### SUMMARY

Quality tests, such as Flicker, Image Retention, Gray Scale Gradient, Display Pattern Position, and Crosstalk, are not possible with human vision, therefore the quality of the panel is compromised when human inspection methods are used by FPD manufacturers. With the addition of these 5 new tests, Photon Dynamics continues to provide superior technology and solutions for automated flat panel inspection. Product quality, yield improvement, and lower production costs are all key factors for successful flat panel manufacturing. Photon Dynamics will be sending you more information in the next few weeks that will provide you with the latest procedures and technology to help you improve these key manufacturing issues.

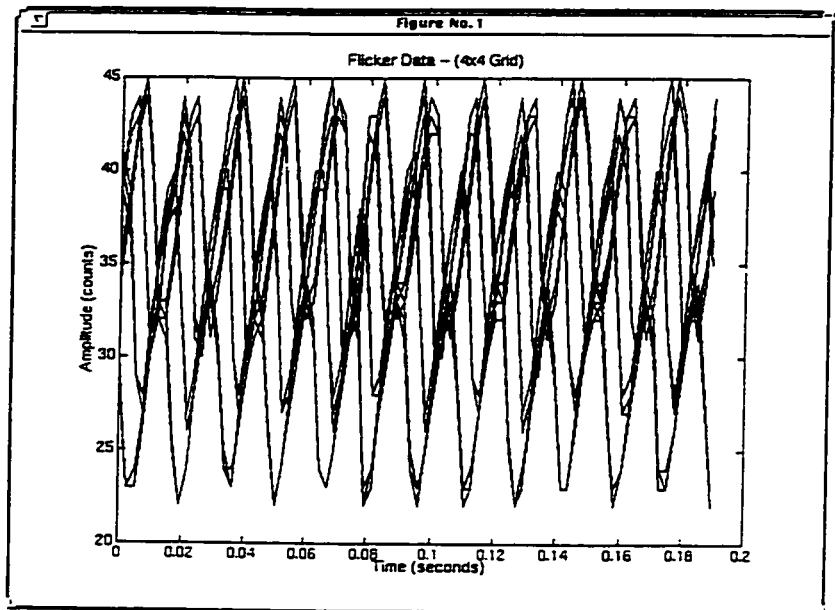
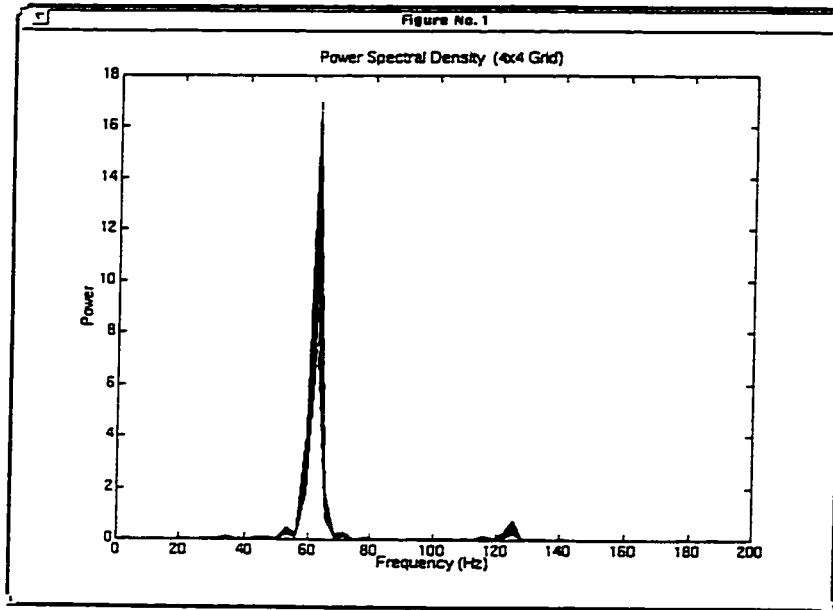


FIGURE 1: Plot of Flicker Data



**FIGURE 2: Power Spectral Density of Flicker Data**

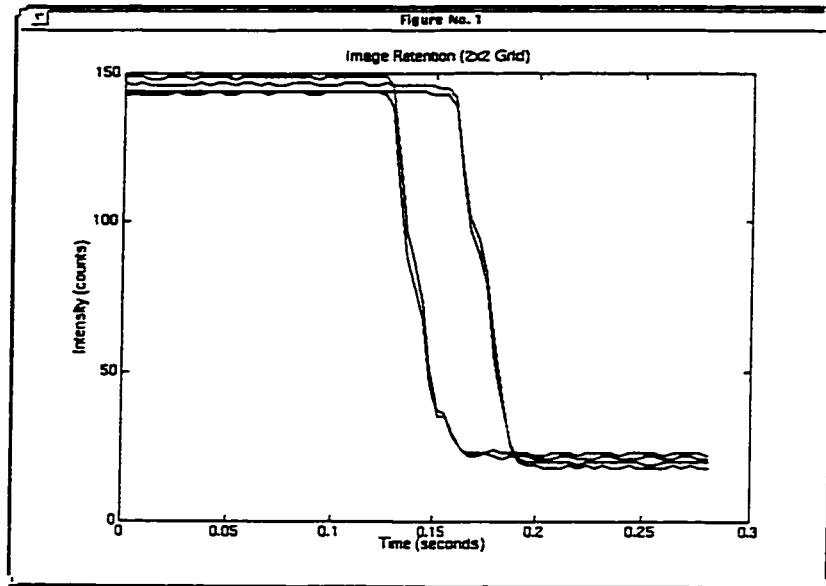


FIGURE 3: Image Retention Curve

## APPLICATIONS NOTE - ENHANCED N-ALIASING

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### INTRODUCTION

Reducing production costs and producing a consistent high quality display are the key challenges for flat panel manufacturers. Leading panel manufacturers are realizing that automated testing of the panel at the cell and module assembly stages will increase the yield rates and the consistency of the panel quality. Automated testing systems must have high detection sensitivity, accurate defect characterization, high throughput and low system cost. The heart of any automated machine vision based tester is the CCD camera. Selection of the CCD camera can greatly effect detection capability, throughput and system cost. Camera cost increases and speed decreases with increased CCD resolution.

Photon Dynamics introduces Enhanced N-Aliasing technology which offers improved sensitivity and defect characterization while using lower resolution CCD cameras. As LCD panel manufacturers continue to increase panel resolutions, the Enhanced N-Aliasing technology allows current CCD camera resolution to keep pace with the increasing panel resolution.

### DISCUSSION

Several key, competing factors influence the performance and selection of the CCD camera resolution of an flat panel inspection system.

- 1) Maximum resolution of the panels to be inspected.
- 2) Accurate defect characterization
- 3) Maximize Detection Sensitivity
- 4) Maximize System throughput

System test time is proportional to the amount of data to process, which is proportional to the resolution of the CCD. In addition to data processing time, higher resolution CCD cameras require longer times to transfer the image from the camera to the image processing memory buffer.

- 5) Minimize System Cost

System price increases as the camera resolution increases due to higher resolution CCD and additional image processing memory.

## APPLICATIONS NOTE - ENHANCED N-ALIASING

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### **Aliasing**

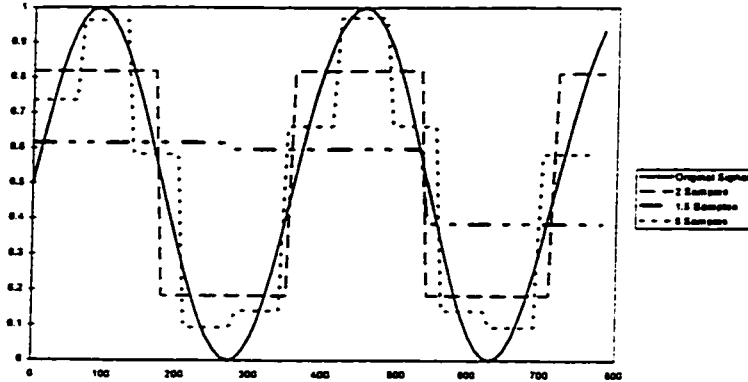
Panel resolution effects the resolution of the CCD camera. If the CCD resolution is too low the panel will be under sampled and aliasing of the signal will occur. The CCD resolution must be high enough to satisfy the Nyquist limit, which is a fundamental theorem that applies to the sampling of any frequency bandlimited signal. The periodic pattern of display pixels can be considered frequency bandlimited. The Nyquist theorem states that in order to accurately reproduce the original signal ( the defective pixel), the sampling frequency must greater than or equal to two times the signal frequency. The effect of aliasing is a low frequency modulation of the original signal. In practice a display contains a variety of spatial frequencies, the pixel pitch frequency and the black chrome matrix between individual pixels are two examples of two different spatial frequencies. The pixel pitch frequency has a lower spatial frequency compared to the black chrome mask. If the sampling frequency is two times the pixel pitch frequency then the pixel signal can accurately be reproduced. The problem is that the sampling frequency is less than the black mask frequency, which will result in aliasing of the pixel signal.

### **Sensitivity and defect characterization**

The sampling frequency will also dictate how accurately the original signal shape and peak are reproduced. Reproducing the signal shape is important to accurately characterize the defect. For example, to determine if defect signal is comprised of two adjacent pixels and what the orientation of those adjacent pixels are. Measuring the full signal peak is important for maximizing detection sensitivity. The figure below shows a periodic signal and different sampling frequencies of that periodic signal. The first sample is taken with 5 samples per period. This accurately reproduces the signal period and signal profile. The second sample is taken with 2 samples per period, at the Nyquist limit. The signal period is accurately reproduced, but the profile and amplitude are not as accurate. The third sampling rate is 1.5 samples per period. In this case the signal period and profile are not reproduced.



## APPLICATIONS NOTE - ENHANCED N-ALIASING



### Photon Dynamics Solution

Photon Dynamics developed the Enhanced N-Aliasing technique in order to maintain sampling frequency for high resolution panels while maintaining high throughput and low system cost. The shaded areas of the table indicate which resolution CCD camera Photon Dynamics uses for inspecting various types of displays. The tables also provides the number of CCD pixels per LCD pixel without the Enhanced N-Aliasing technique applied. It is clear that the Nyquist limit is not met for SVGA panels with the 1.6 Mpix CCD and XGA, EWS panels with the 4.2 Mpix CCD if Enhanced N-Aliasing is not utilized.

Panel (Resolution) / CCD-to-LCD ratio	1.6 Mpix CCD (1536 x 1024)	4.2 Mpix CCD (2029 x 2044)	6 Mpix CCD (3072 x 2048)
VGA (640 x 480)	15.00	15.00	15.00
SVGA (800 x 600)	9.50	9.50	9.50
XGA (1024 x 768)	1.56	5.80	5.80
EWS (1280 x 1024)	0.88	3.35	3.35

Enhanced N-Aliasing technique captures an image at the resolution shown in the above table, and performs a filtering operation on this image to remove variations due to aliasing. The CCD camera is then microstepped in the X direction a fraction of a CCD pixel width. A second image is captured and the Enhanced N-Aliasing filtering is performed. The microstepping, image capture and Enhanced N-Aliasing filter process is repeated N times. The N- number of filtered images are constructed into one large high resolution image. The result of microstepping is an

## APPLICATIONS NOTE - ENHANCED N-ALIASING

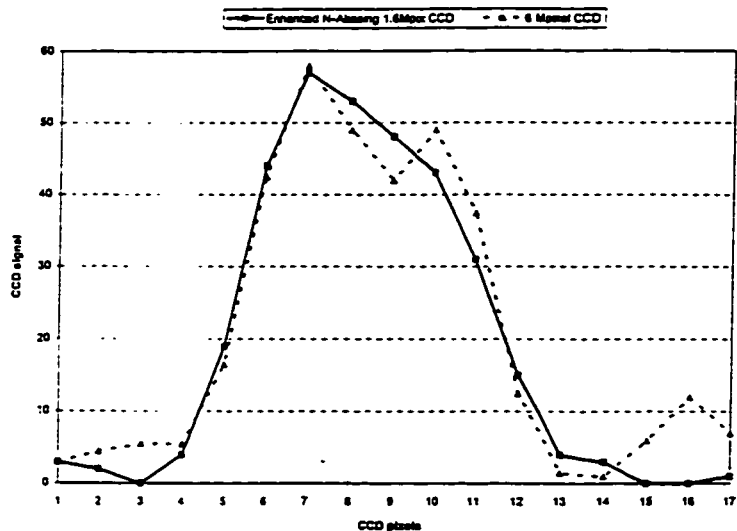
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increase in the sampling frequency. The table below indicates the effective sampling frequency of the high resolution image after the application of the Enhanced N-Aliasing filtering and microstepping.

Panel (Resolution) / Effective CCD-to-LCD ratio	1.6 Mpix CCD (1536 x 1024)	4.2 Mpix CCD (2029 x 2044)
VGA (640 x 480)		
SVGA (800 x 600)		
XGA (1024 x 768)	6.25	
EWS (1280 x 1024)	3.50	

## APPLICATIONS NOTE - ENHANCED N-ALIASING

The effective sampling frequency for the 1.6Mpix CCD using the Enhanced N-Aliasing method is greater than the 4.2 Mpix CCD without the Enhanced N-Aliasing technique and provides 95% of the resolution of a 6 Mpix CCD. This allows the use of the 1.6 Mpix CCD to provide accurate detection and characterization of SVGA panels while keeping system cost low and throughput high. While the 6 Mpix CCD provides good resolution the camera cost is high and speed is low. Additional problems such as sensor uniformity and defects increase with higher resolution sensors. Uniformity can diminish the available dynamic range of the sensor thus effecting sensitivity. CCD defects can cause false detection. The figure below shows signal profiles from Enhanced N-Aliasing (1.6 Mpix CCD) and a 6 Mpix CCD on a SVGA panel with Strong - Weak Adjacent Blue pixel defect.



The Enhanced N-Aliasing technique requires that several images to compose a single high resolution image for processing. High throughput is achieved by parallel processing. The Enhanced N-Aliasing filtering and image defect analysis processing for the previous image is performed in parallel with the capture of the next image. Defect characterization for the previous test also takes place in parallel with the entire Enhanced N-Aliasing image acquisition for the current test. The sequence is shown in the timing chart.

## APPLICATIONS NOTE - ENHANCED N-ALIASING

Image 1	Microstep & capture Image 2										
	Image 1 N-Alias Filter, Defect Process										
		Microstep & capture Image 3									
		Image 2 N-Alias Filter, Defect Process									
				Microstep & capture Image N							
				Image (N-1) N-Alias Filter, Defect Process							
					Image N N-Alias Filter, Defect Process						
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Previous</td> <td style="width: 15%;">Test</td> <td style="width: 15%;">Defect</td> <td style="width: 15%;">Characterization</td> <td style="width: 15%;"></td> <td style="width: 15%;"></td> </tr> </table>						Previous	Test	Defect	Characterization		
Previous	Test	Defect	Characterization								

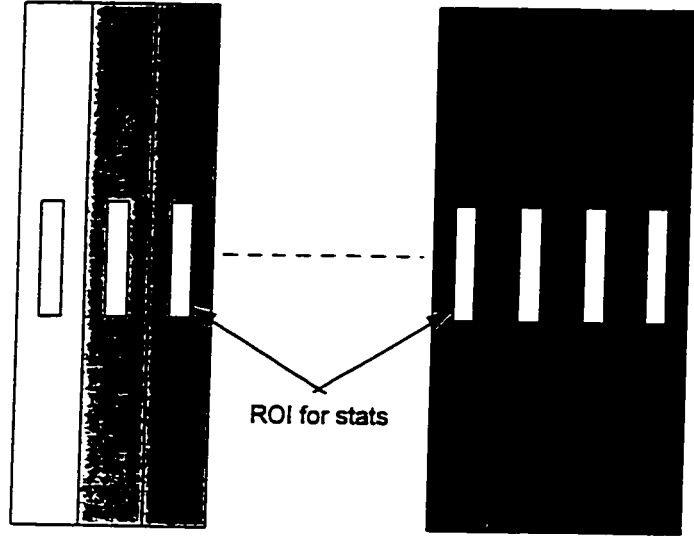
### Color Filters

The previous sampling frequency calculations listed in the tables were based on monochrome panel resolutions. For color panels, particularly color stripe, the pixel count is 3 times greater in the x direction. For example, a VGA resolution panel pixel count would be 1920 x 480. In this case, the 6 Mpix camera resolution would have a sampling frequency of 1.96 CCD-to-LCD pixels which does not satisfy the Nyquist sampling limit.

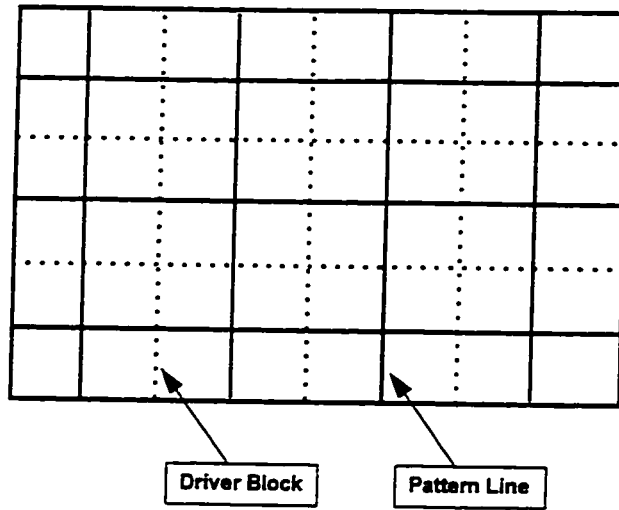
When red, green and blue bandpass color filters are used in the CCD optical system, this will allow sampling of specific color pixels. The color filter effectively reduces the resolution of the display. The effectively reduced display resolution allows the CCD sampling to satisfy the Nyquist limit.

### SUMMARY

Enhanced N-Aliasing offers the best total solution for inspection of high resolution flat panel displays. The Enhanced N-Aliasing approach balances the competing inspection factors of high throughput, minimizing CCD resolution, minimizing system hardware cost and maximizing system sensitivity and characterization accuracy.



**FIGURE 4: Gray Scale Gradient Test Pattern with ROIs**



**FIGURE 5: Display Position Checking Test Pattern**

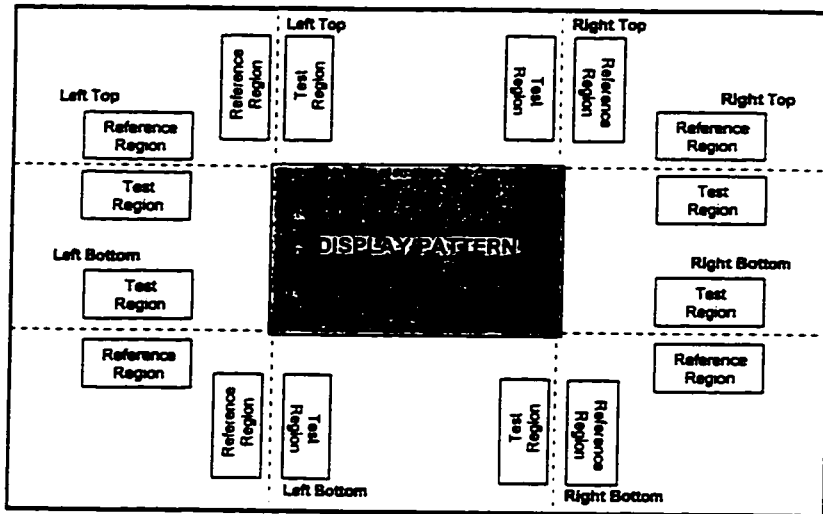


FIGURE 6: Crosstalk Test Pattern with ROIs

## **APPENDIX 5**

### **CORPORATE SLIDE PRESENTATION**





**Headquarters:** Milpitas, California  
**Other Offices:** Tokyo, Japan  
Seoul, Korea

**NASDAQ Symbol: PHTN**



## ***Corporate Highlights***

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- ◆ **Industry Leadership**
  - Worldwide presence: in 7 out of the top 10 FPD manufacturers
  - Recognized by USDC & ARPA
- ◆ **Patented Technology**
  - 25 Patents - many others in process
- ◆ **Experience**
  - Entered the FPD industry in 1990
  - Industry-experienced management team.

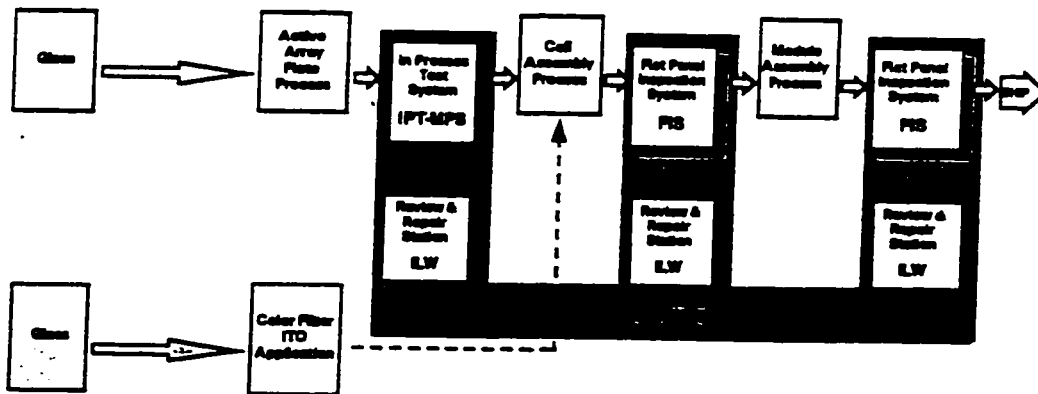


## Technology Advantages

- ◆ **Cell & Module Inspection (FIS)**
  - ◆ Surpasses inaccurate, inconsistent human inspection
  - ◆ Allows SPC, process tracking and defect analyzation
- ◆ **In Process Testing (IPT-MPS)**
  - ◆ Probe card free - Shorting bar technology
  - ◆ Provides key process insights
  - ◆ Size and resolution flexible
- ◆ **Integrated Laser Repair (ILW)**
  - ◆ Allows for repair of panels
  - ◆ Automatically takes defect files from IPT & FIS systems



## Integrated Tool Set



## ***FIS 250 Flat Panel Inspection System***

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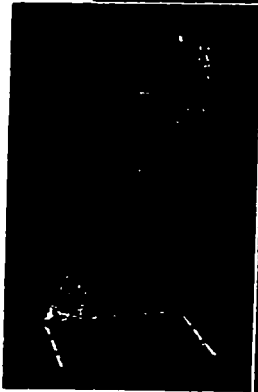
The Flat Panel Inspection System  
for consistent, accurate measurement  
of cell and module quality

- ◆ **Largest Worldwide Installed Base**
- ◆ **User-Configurable Software**
- ◆ **Highest Throughput**
- ◆ **Widest Defect Classification Library**
- ◆ **Inspects All Flat Panel Display Technologies**



## ***FIS 250 Flex P Configuration***

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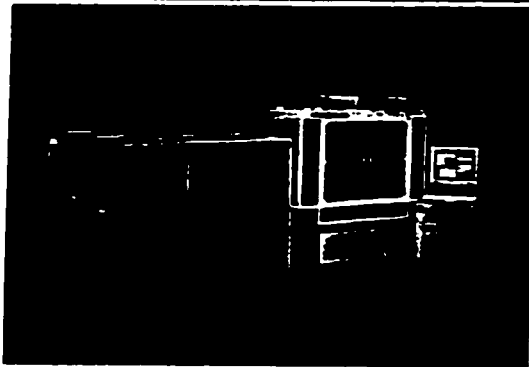
The Flat Panel Inspection System  
for consistent, accurate measurement  
of cell and module quality

- ◆ **Largest Worldwide Installed Base**
- ◆ **User-Configurable Software**
- ◆ **Highest Throughput**
- ◆ **Widest Defect Classification Library**
- ◆ **Inspects All Flat Panel Display Technologies**



## ***IPT-MPS Flat Panel Display Test System***

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The full function, In Process Test System for in-line array testing

- ◆ Highest Test Coverage
- ◆ Lowest False and Mis-Detection
- ◆ Less than 1 Minute Per Panel
- ◆ New MEGA Voltage Imaging
- ◆ Lowest Cost Per Panel
- ◆ New Precision Gap Control



## ***ILW Laser Repair System***

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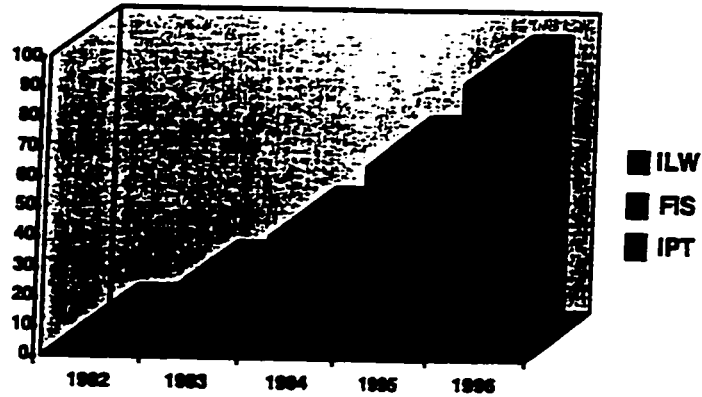


The Review System with Integrated Laser Cut & Weld for flat panel arrays, cells, and modules

- ◆ Defect Navigation For Fast Defect Location Through Test Data File
- ◆ Open Access With Inspection Or Array Testers
- ◆ Flexible, User-Defined Binning Functions
- ◆ Macro Function For User-Defined Repeat Operations
- ◆ Auto-Marking for Traceability
- ◆ Advanced Software Platform

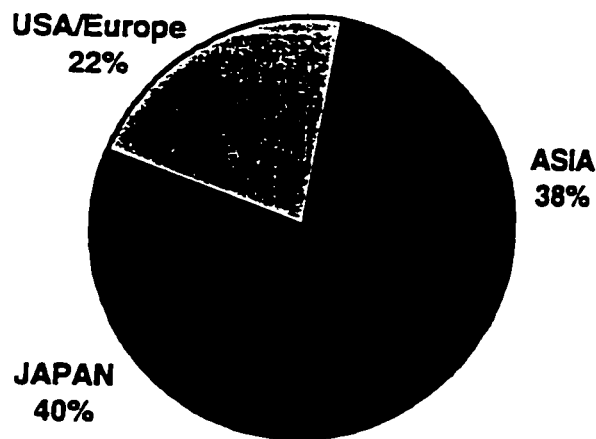


## Photon Dynamics Installed Base



Photon Dynamics has the largest installed base in the industry

## Worldwide Product Distribution



## **Unique Product Characteristics**

- ◆ Breakthrough Proprietary Technology
- ◆ Software Configurable
- ◆ Extensible To Emerging Technologies and Applications
- ◆ Common Data Compatibility & SPC

~~Photon Dynamics~~

## **Photon Dynamics Offers:**

- ◆ Advanced, patented Technology
- ◆ The most industry experience
- ◆ The only integrated test, inspection, repair solution
- ◆ The lowest cost of ownership
- ◆ Shortened production ramp time from R&D to mass production

~~Photon Dynamics~~

**APPENDIX 6**

**PRESS RELEASES**



Company Contact:  
Jim Campbell  
Photon Dynamics, Inc.  
(408) 433-3922 Fax (408) 433-3925  
e-mail: jimc@phodyn.com

**PHOTON DYNAMICS REPORTS RECORD REVENUE AND EARNINGS  
FOR QUARTER AND NINE MONTHS ENDED JUNE 30, 1996**

Milpitas, CA. - July 30, 1996 - Photon Dynamics, Inc. (Nasdaq: PHTN) today reported record sales and earnings for the third quarter and nine months ended June 30, 1996.

For the quarter, revenue grew 59 percent to \$7.7 million, up from \$4.9 million in the same quarter a year ago, driven by a 100 percent increase in product sales to \$7.6 million. Lower margin government contracts now account for less than two percent of revenue. As a result, gross margin for the quarter climbed to 47 percent, up from 37 percent in the same quarter a year ago. Net income for the quarter increased to \$825,000, up from \$110,000 reported in the same quarter of fiscal 1995. Earnings per share were 11 cents on 7.7 million shares compared with two cents on 5.4 million shares outstanding in the quarter a year ago.

For the nine months ended June 30, 1996, product revenues were \$18.9 million, up from \$8.9 million in the first nine months of the last year, reflecting a 111 percent growth in product sales. Net income was \$2.1 million, or 29 cents per share on 7.3 million shares outstanding, compared to \$167,000, or four cents on 5.4 million shares. As of June 30, 1996, Photon Dynamics had cash and investments of \$11 million and long and short-term debt totaling less than \$1 million.

There were several highlights for the quarter ending June 30, 1996. The Company added Mr. Vincent Sollitto as its CEO and Mr. C.J. Meurell as its Vice President, General Manager for the Test and Repair Division. These two additions strengthen the management team at Photon Dynamics. Several new versions of products were shipped this quarter. For Test Systems, a process monitor version of the MPS was introduced. Advances in throughput were also made to the MPS product line. For Inspection Systems, significant improvements in throughput and sensitivity were achieved and integrated into the FIS Systems. These enhancements can be sold as an upgrade for all existing FIS systems currently in the field. For Repair Systems, a new version of the ILW Repair System has shipped. This new product has the capability to handle larger

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glass sizes, which the industry is rapidly moving towards. This system employs many of the same basic system components as the MPS product, which will provide a savings in manufacturing costs and an improvement in customer support.

"Our market continues to expand," said Mr. Vince Sollitto, Photon Dynamics' chief executive officer. "Major flat panel manufacturers are continuing to adopt our sophisticated automated test, inspection and repair systems to increase yields and ensure product quality as panels continue to grow in size and complexity."

Photon Dynamics, based in Milpitas, California, is a leading worldwide supplier of test, inspection, and repair systems for the flat panel display industry. Founded in 1986, the Company currently has approximately 90 employees worldwide, with subsidiaries in Japan and Korea. The Company has been issued over 21 U.S. patents for flat panel display, test, and inspection technologies, and has other U.S. and foreign applications pending. As the only company with systems addressing all key areas of flat panel display, test, inspection and repair, Photon Dynamics is positioned to provide the complete solution for integrated yield and cost management systems for FPD manufacturers throughout the world. Photon Dynamics is listed on the Nasdaq National Market under the symbol PHTN and can be found on the World Wide Web at <http://www.phtn.com/>.

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**PHOTON DYNAMICS BOOKS LARGEST ORDER EVER WITH  
2 JAPANESE FPD MANUFACTURERS**

*Representing the largest order ever received in the Company's history, Photon Dynamics cites reliability, yield enhancement, and recent throughput improvements in its In Process Test - Mass Production System (IPT-MPS) as the catalyst for explosive demand by FPD manufacturers*

Milpitas, California – August 27, 1996 – Photon Dynamics, Inc. (Nasdaq: PHTN), a leading manufacturer of test, inspection, and repair systems for the flat panel display (FPD) industry, today announced the booking of a multi-million dollar order for 5 In Process Test - Mass Production Systems (IPT-MPS). The Company plans to deliver the recently enhanced IPT-MPS systems to two major Japanese active matrix liquid crystal display (AMLCD) manufacturers by the end of 1996.

The names of the customers were not released due to proprietary agreements. The systems were sold through Ishikawajima-Harima Heavy Industries Co. (IHI) an independent supplier of Photon Dynamics test systems in Japan. Optimized for use in a mass production environment, Photon Dynamics' IPT-MPS system enables manufacturers to detect various defects throughout the manufacturing cycle to provide vital yield improvement information and to avoid unnecessary materials loss.

"Photon Dynamics' proven yield enhancement capabilities make our IPT-MPS systems ideally suited for the production needs of these companies," said Alan Nolet, Senior Vice President of Sales for Photon Dynamics. "Our deep penetration of the Japanese market indicates a high degree of acceptance of our technology by global leaders in FPD manufacturing."

Based on Photon Dynamics' proprietary Voltage Imaging™ technology, the IPT-MPS offers an automated, non-contact testing solution. By detecting defects better than open/short tests or optical tests, the IPT-MPS is a key solution for major yield improvements for flat panel manufacturers trying to lower production costs and maximize profits. Non-contact testing allows the MPS to easily test multiple panel sizes without expensive change-over hardware or costly down time. Recent enhancements to

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the IPT-MPS allow for multiple tests to be performed in less than one minute on super video graphics array (SVGA) panels as large as 11.3". Further test time reductions are currently under development, along with a "Poly Silicon TFT" product configuration.

Photon Dynamics, based in Milpitas, California, is a leading worldwide supplier of test, inspection, and repair systems for the flat panel display industry. Founded in 1986, the Company currently has approximately 90 employees worldwide, with subsidiaries in Japan and Korea. The Company has been issued over 21 U.S. patents for flat panel display, test, and inspection technologies, and has other U.S. and foreign applications pending. As the only company with systems addressing all key areas of flat panel display, test, inspection and repair, Photon Dynamics is positioned to provide the complete solution for integrated yield and cost management systems for FPD manufacturers throughout the world. Photon Dynamics is listed on the Nasdaq National Market under the symbol PHTN and can be found on the World Wide Web at <http://www.phtn.com/>.

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e-mail: jimc@phodyn.com

### PHOTON DYNAMICS AWARDED TOP HONORS FROM TWO PROMINENT GROWTH INDICES

Milpitas, California -- September 23, 1996 -- Photon Dynamics, Inc. (Nasdaq: PHTN), a leading manufacturer of test, inspection, and repair systems for the flat panel display (FPD) industry, today announced they recently received top honors from Silicon Valley Technology Fast 50 and from Individual Investor magazine. Photon Dynamics was named one of the fastest growing technology companies in the Silicon Valley and the Country.

A profile of Photon Dynamics will be featured in an upcoming edition of the San Jose Business Journal. The Company will also be honored at an awards banquet for the 1996 Silicon Valley Technology Fast 50. This annual award is sponsored by Nasdaq, The Economic Development Team of Joint Venture-Silicon Valley and Deloitte & Touche LLP. The Company will also be included in the National Technology Fast 500 which acknowledges the fastest growing technology companies throughout the United States.

Photon Dynamics was also prominently listed in Individual Investor's popular "America's Fastest Growing Companies" issue. Individual Investor selects the stocks for this index by using their proprietary "II Power Rating". This measure incorporates 12 fundamental variables, such as historical revenue, earnings, and cash-flow growth. Each of these variables is rated on a scale of zero to five. Photon Dynamics received a rating of 54 out of a possible 60.

"It is always an honor to receive such recognition. We have a great group of people who take pride in our Company and in the success of our customers," said Vince Sollitto, CEO of Photon Dynamics. "Photon Dynamics has kept pace with the requirements that new technologies have imposed on the flat panel display industry. Listening to our customers as well as a strong commitment to research and development are key elements of our success."

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Photon Dynamics' systems have been selling well in the difficult to penetrate Japanese market. Japan is a key market for the global FPD industry. In the past three months alone, Photon Dynamics booked a multi-million dollar order from a repeat customer and has added four new Japanese FPD manufacturers to their client base.

The Company's growth has been spurred on by sales of its In Process Test Systems for Mass Production (IPT-MPS) which was first introduced in 1995. Photon Dynamics IPT-MPS system enables manufacturers to detect various defects throughout the manufacturing cycle and provides vital yield improvement information to avoid unnecessary materials loss. Based on Photon Dynamics' proprietary Voltage Imaging technology, the IPT-MPS is an automated, non-contact testing solution. Recent enhancements to the IPT-MPS allow for multiple tests to be performed in less than one minute on super video graphics array (SVGA) panels as large as 11.3"

Photon Dynamics, based in Milpitas, California, is a leading worldwide supplier of test, inspection, and repair systems for the flat panel display industry. Founded in 1986, the Company currently has approximately 90 employees worldwide, with subsidiaries in Japan and Korea. The Company has been issued over 21 U.S. patents for flat panel display, test, and inspection technologies, and has other U.S. and foreign applications pending. As the only company with systems addressing all key areas of flat panel display, test, inspection and repair, Photon Dynamics is positioned to provide the complete solution for integrated yield and cost management systems for FPD manufacturers throughout the world. Photon Dynamics is listed on the Nasdaq National Market under the symbol PHTN and can be found on the World Wide Web at <http://www.phtn.com/>.

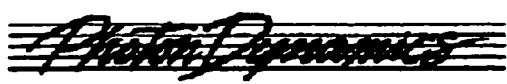
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## **APPENDIX 4**

### **WORLD WIDE WEB SITE**

Home About Us Products & Technology Investor Information Press Releases Company Opportunities

# Welcome To




*"Cost control and yield improvement solutions for the flat panel display industry through a full range of test, inspection and repair systems."*


PHOTO DYNAMICS  
6320 Westchester Ave.  
SAN JOSE, CA 95119  
Tel: (408) 225-9999  
Fax: (408) 225-2019

IPT VIS ILW

## Products and Technology



## Press Releases



Press Releases are listed in date order with the most recent listed first.

Date	Title of Press Release
July 28, 1997	Photo Dynamics Announces New 400 Euro and Euro Products
July 21, 1997	Photo Dynamics Launches New 400 Euro and Euro Products
July 12, 1997	Photo Dynamics Announces New 400 Euro and Euro Products
April 24, 1997	Photo Dynamics Reports Second Quarter Results and 12 Month Performance Update
April 2, 1997	Photo Dynamics Launches New 400 Euro and Euro Products
February 12, 1997	Photo Dynamics Announces New 400 Euro and Euro Products
December 9, 1996	Photo Dynamics Announces New 400 Euro and Euro Products
October 28, 1996	Photo Dynamics Announces New 400 Euro and Euro Products

## **APPENDIX 7**

### **AWARENESS SURVEY**



# Photon Dynamics Flat Panel Display Industry Survey

Please take a moment to fill out this brief evaluation/survey form. This information will help us create new and better ways to serve our clients needs. Thank you in advance for your cooperation and participation.

**Your Job Title:** (please check one)

- Management
- Engineer
- Operations
- Purchasing
- Other \_\_\_\_\_

**Does your company currently use machine vision or human vision to inspect FPDs**

- machine vision
- human vision

**If applicable, what types of machine vision tools do you use to inspect or repair FPDs?**

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**How familiar are you with Photon Dynamics test, inspection, and repair systems for FPDs?**

- Very Familiar
- Somewhat familiar
- Not Aware of Photon Dynamics

**Please indicate the number of published articles or reports you may have seen in the past year regarding Photon Dynamics?**

- 5 or more
- 3 or 4
- 1 or 2
- Have not seen any

**Does your company currently use Photon Dynamics systems?**

- YES
- NO

**If yes, on a scale of 1-10 (1=poor 10=excellent), how would you rate the performance of Photon Dynamics' systems?**

please circle one      10    9    8    7    6    5    4    3    2    1

**Do you find Photon Dynamics technology to be superior to other machine vision systems?**

- YES
- NO

**In what specific areas do you find Photon Dynamics' technology to be superior or inferior to other systems or methods?**

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**On a scale of 1-10 (1=poor 10=excellent), how would you rate the ability of Photon Dynamics' systems to increase your throughput and product quality?**

please circle one      10    9    8    7    6    5    4    3    2    1

**How would you rate the QUANTITY of technical information and updates you receive from Photon Dynamics?**

- Excellent
- Good
- Fair
- Poor

How would you rate the QUALITY of technical information and updates you receive from Photon Dynamics?

- Excellent
- Good
- Fair
- Poor

How often would you like to receive technical information from Photon Dynamics?  
Your Job Title: (please check one)

- Quarterly
- Monthly
- Bi-Monthly
- Weekly
- Other

Are there any specific types of information that you are NOT receiving about Photon Dynamics technology and products?

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Are there any additional comments you would like to make regarding Photon Dynamics?

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*Thank you!*

## **APPENDIX 8**

### Original Project Proposal

# **Photon Dynamics**

## **Marketing Communications Proposal**

**Presented to:**

**Professor Tom Jordan  
San Jose State University**

**Prepared by:**

**Jim Campbell**

**April 30, 1996**

**In fulfillment of the final project for  
Interdisciplinary Studies Masters Degree:  
Marketing Communications**

*This proposal is for the design and implementation of a comprehensive, integrated marketing communications program for a growing, high-technology company*

**SITUATION ANALYSIS:**

**The Company**

Photon Dynamics is a leading worldwide supplier of test, inspection and repair systems for the flat panel display (FPD) industry. The Company's systems are used to control, monitor and refine the manufacturing process to increase yields and reduce materials loss. Early detection also allows for defect repair before further manufacturing steps make the defect less accessible.

Photon Dynamics believes that more of its systems have been used by manufacturers of active matrix liquid crystal displays (AMLCDs) and other advanced FPDs to test, inspect and repair FPDs than any other currently available competitive system and that this experience has enabled it to become a leading technical innovator of test, inspection and repair equipment for advanced FPD manufacturers.

Photon Dynamics offers a suite of products to inspect virtually all types of FPDs and to address all key areas of FPD test, inspection and repair throughout all major stages of the manufacturing life cycle, from research and development to commercial production. The Company's test products include array test systems that locate, count and characterize array electrical defects, contamination and other defects on partially completed flat panel display substrates. All of the Company's product lines interface with one another through proprietary software systems used to store data and generate reports and other information vital to the manufacturing process.

Photon Dynamics has been issued 21 U.S. patents for its FPD test, inspection and repair technologies and has other U.S. and foreign applications pending. The Company has received contracts from the United States Display Consortium (USDC) and the Advanced Research

Projects Administration (ARPA). Photon Dynamics has been issued over 21 U.S. and foreign patents. Its main headquarters is located in Milpitas, California, with offices in Korea and Japan. Photon Dynamics has been publicly traded on the NASDAQ exchange since November, 1995 under the symbol, PHTN. Photon Dynamics has been in the FPD test, inspection, and repair industry since 1990. When the company first introduced its products, many performance and reliability problems existed, however, in the last couple of years, the products have gone through major improvements. This has given Photon Dynamics a tremendous opportunity for success and growth. Photon Dynamics offers 3 different product families, including In Process Test, Final Inspection, and Repair.

#### **Product/Price**

Photon Dynamics currently offers 3 product categories. Each is described below:

##### ***In-Process Test Systems (IPT Systems)***

Photon Dynamics' In-Process Test (IPT) systems use the Company's proprietary Voltage Imaging technology to detect, locate, quantify and characterize electrical, contamination and other defects in AMLCD panels after the completion of the first major step of production. These systems range in price from \$800,000 to \$1.4 million. IPT systems utilize one of Photon Dynamic's proprietary technologies called "Voltage Imaging." Voltage Imaging measures variations in the voltages emitted from the individual pixels on the array. These variations are read by a special modulator that produces a "map," with the location of all defects. This process allows for a non-destructive testing because contact is never made with the panel under test.

##### ***Flat Panel Inspection Systems (FIS Systems)***

Photon Dynamics' Flat Panel Inspection (FIS) systems use the Company's proprietary N-Aliasing technology to inspect virtually any type and size of commercially available FPD panel

for optical defects after the initial assembly stage. These systems range in price from \$400,000 to \$1 million. These systems test the flat panel at the middle (cell stage) and end (module stage) of the manufacturing process. FIS systems utilize Photon Dynamics' other proprietary technology called "N-Aliasing." N-Aliasing processes images in such a way as to reduce interference and yield a particularly clear image of the test panel. This process simulates human vision, but is far more reliable.

***Integrated Laser Repair System (ILW System)***

Photon Dynamics' Integrated Laser Weld (ILW) system uses laser technology to repair opens and shorts in AMLCD and passive LCD panels at all major stages of production. These systems range in price from \$400,000 to \$800,000.

**Distribution**

Photon Dynamics sells its products mainly through a direct sales force. The Sales Department is comprised of a Vice President and a sales force of 5 people covering the USA, Japan, and Korean territories. We also have an independent representative in Taiwan (Kromax International Corp.) and one in Japan (IHI Co. Ltd. - for IPT systems only). Photon Dynamics' revenue is obtained primarily through a direct sales force and to a lesser extent through IHI (for the Company's IPT systems in Japan). Photon Dynamics is in the process of establishing a subsidiary in Korea to provide sales and service to its Korean customers. Taiwan is served through the U.S. and through a manufacturer's representative in Taiwan.

Photon Dynamics maintains its sales and service office at its headquarters in Milpitas, California. The Company employs worldwide approximately 24 marketing, sales and service personnel. In Asia, the Company has a subsidiary in Tokyo, Japan, which provides direct sales



and service support. The Asian sales and service operations are staffed by direct marketing, sales and service personnel located in Japan and Korea.

### **Competition**

Photon Dynamics is the only company to offer a full line of products covering test, inspection, and repair, however, we do have competitors in each of our product categories. For In process testing, our competitors include DTI, Orbotech, Tokyo Cathode, and KLA Instruments. For final inspection, competitors include Advantest, Minato, Otsuka, and Orbotech. For Repair systems, competition includes NEC, Hoya, and Florod. The key advantage that some of our competitors have over us is speed, which is an important consideration for our customers. However, the competition sacrifices the thoroughness of their testing in order to increase speed. This results in a lower quality product for the manufacturer. The company that can offer the best combination of product quality and test speed will be the most successful. Price is a factor, but there is not a big discrepancy between Photon Dynamics and our competitors.

### **MARKETING:**

#### **Problems**

There are two major problems with Photon Dynamics' existing marketing communications plan; the lack of consistent, high quality information, and the absence of good distribution vehicles. Photon Dynamics needs to create marketing materials based on how their products benefits apply to the customers needs. The company must dramatically increase the production and quality of documents that are technology focused to prove the company's technical leadership. Photon Dynamics needs to position itself as *the* most experienced, technologically superior solution for test, inspection, and repair of flat panels.

### **Opportunities**

Photon Dynamics participates in one of the fastest growing industries in the world - flat panel displays. FPD manufacturers are currently building new factories to keep up with increasing demand, and will continue to do so for many years to come. Each of these factories will contain multiple manufacturing lines, and each line can support ten to twenty test, inspection, and repair systems (Stanford Resources, 1996).

The FPD manufacturers that do not currently use automated, machine vision systems represent a significant opportunity for Photon Dynamics. As the cost of a flat panel display continues to decrease, it is important for manufacturers to increase production throughput and product quality to remain competitive. Because of a lack of speed and reliability, non-mechanized solutions such as human vision cannot keep up with high production outputs.

### **Objectives**

Photon Dynamics' marketing objectives are to position the company as the most experienced, reliable, technologically advanced supplier of FPD test, inspection, and repair systems in the industry. The company would like to increase market share by 15%, increase customer base by 1-3 new companies, and increase sales revenue by 20% in 1998.

### **Strategy**

Photon Dynamics will position itself as a technology leader by continuing to offer solutions that increase product quality and output for all phases of the FPD manufacturing process, including research and development and mass production. The company also wants to penetrate the large untapped market of FPD manufacturers that do not currently use automated machine-vision solutions by educating them as to the benefits of this type of equipment. This market

represents approximately 70% of the total FPD test, inspection, and repair equipment market (Stanford Resources, 1996).

### **Tactics**

Educate existing and potential customers as to the benefits of Photon Dynamics products by identifying target audiences and delivering a unified, customer-focused message emphasizing technological expertise, reliability, and product benefits. Photon Dynamics will develop a new marketing communication plan including deliverables such as product brochures, technical articles and applications notes covering each product category (test, inspection, repair). These deliverables will be based on the key features and benefits of each product category.

## **MARKETING COMMUNICATIONS**

### **Problems**

Photon Dynamics currently does a poor job of delivering information to customers and potential customers on a regular basis. Existing customers are not informed of improvements in products and technology, and potential customers are not aware of the benefits of Photon Dynamics systems over human inspection techniques. The company lacks high quality technical information that communicates the features and benefits of each product and provides proof of Photon Dynamics' capabilities. No distribution plan exists for this type of information. Since the company's existing and prospective customer base is so small and very specific, traditional mass-marketing communication vehicles will not work efficiently. However, other targeted delivery vehicles should be easy to implement and highly effective.

### **Objectives**

Photon Dynamics marketing communications objective is to increase awareness of Photon Dynamics' products and technology within the company's existing customer base as well as potential customers in the FPD community.

### **Strategy**

Dramatically increase the awareness of Photon Dynamics, their products, and their capabilities. Create a compelling story that will help create demand for Photon Dynamics products. Position the company as the most experienced, technologically advanced manufacturer of FPD test, inspection, and repair solutions.

### **Tactics**

Provide customers and potential customers with a continuous flow of consistent information that supports Photon Dynamics benefits through direct selling, direct mail campaigns, trade shows, and public relations. All sales tools and advertising messages will be based on product benefits and will contain the messages of technology leadership and product superiority. The key to such a message is to provide documented proof of product capabilities in the form of applications notes, white papers, technical articles, etc.

### **Audience**

The most important audience is Photon Dynamics customers. This group can be categorized in two distinct parts; existing customers and prospective customers. Within the customer group, there are two main targets; upper management and the engineers who operate the equipment. Both are vital, but both have different needs. Upper management is most concerned with the bottom line and what the products will do for their company. They want to know what doing business with Photon Dynamics will benefit them in some way. The engineers/operators are concerned with issues such as how easy our products are to use, and how the products will make their jobs easier.

The press is another audience. They are concerned with which companies have the latest and greatest technology and the most intriguing stories. They want to understand the technology and be the first to tell the world the latest developments.

The investment community is the company's newest audience. Next to the customers, they will scrutinize Photon Dynamics the most, and can have a tremendous impact on the success of a publicly traded company. They must be constantly impressed with the company's messages, and Photon Dynamics must project stability and leadership to them.

#### **ADVERTISING / PUBLIC RELATIONS:**

Photon Dynamics advertising and public relations efforts are currently executed by a "seat of the pants" approach. There is currently no PR firm or advertising agency, nor is there a structured media plan. Some advertising in small trade publications, usually in conjunction with trade show participation, but never on a regular basis. Public relations is a high priority for the new marketing communications plan. As a public company, it is especially important that our image and presence is continually reinforced through the press. For the first 6 months of the plan, PR activities will concentrate on press releases, and editorial opportunities. As the company and the MarCom budget grows, a more aggressive PR campaign consisting of hi-profile product launches and magazine cover stories will be implemented. The new advertising/PR strategy will include an outside agency to handle all advertising and PR matters. The plan will include press releases on a monthly basis and published technical articles as often as editorial opportunities present themselves. Limited advertising will also be incorporated in the plan. There are several fundamental goals that our advertising and PR plan is designed to meet. They are outlined as follows:

- Improve the awareness of the company and its products
- Develop and maintain a consistent corporate image
- Develop and maintain the company's position as an industry leader
- Inform customers as to industry trends & Photon Dynamics solutions

## **Media**

Since Photon Dynamics' customer base is so small, there is no need to use mass media vehicles such as television, radio, or newspapers. The best media exposure will be through various FPD trade magazines and periodicals, including Solid State Technology, Micro Magazine, Nikkei Microdevices, Test & Measurement World, The Clock, Information Display Magazine, and others.

## **SALES PROMOTION:**

### **Brochures**

As product benefits and corporate messages are more clearly defined, comprehensive changes in the company's brochures will need to be implemented. A re-designed corporate brochure will give a broad look at the corporate philosophy, capabilities, and general information on the three product families. It will outline the benefits that are realized by doing business with Photon Dynamics. This piece will mostly target the upper management audience. Each product will also have a product data sheet that goes into much more detail as to features, benefits, applications, and capabilities. It will also include technical specifications to satisfy the engineering audience. Other support brochures for such items as service, training, and accessories will be included.

### **Applications Notes**

Application notes are technical papers that describe the specific technologies that Photon Dynamics products utilize, and will play a key role in the Marketing Communications plan. These papers contain a lot of data and samples of test results, etc. that serve as the proof of the company's capabilities. These papers will be sent directly to the customers via direct mail, and can be used as hand-outs at trade shows.

### **Trade Shows**

Photon Dynamics currently exhibits at two trade shows per year, one in Japan and one in the U.S. We also present invited papers at several other seminars throughout the year. One major problem with our trade show strategy is that we do not exhibit in Korea. Korea is quickly emerging as a major market, and must be included in our plans. The focus of the trade show exhibits and papers will be based on the benefits and applications as defined in the product roadmap. The themes will be tied to key market issues, technological breakthroughs, and our key capabilities. We will evaluate our successes based on the number of new leads generated, press responses, meetings with existing customers, and follow-up responses from customers regarding our presented theme. At each trade show, we will present a published white paper that describes a critical element in the FPD industry that manufacturers are concerned about. We will tailor the topics of these papers to fit the capabilities of Photon Dynamics systems.

#### **General Trade Show Objectives:**

- USA - 2 shows per year
- JAPAN -2 show per year
- KOREA - 1-2 shows per year
- Generate 10-15 solid new customer leads
- Face to face interaction with existing customers
- Present invited papers supporting our key capabilities (at least once per quarter)
- Learn about our competitors and their position

### **World Wide Web Site**

The web presents some interesting value to a company such as Photon Dynamics. It is limited in that we do not have a large potential customer base to reach, in fact it is extremely small. There are only about 30 companies throughout the world that manufacture flat panel displays. However, there are some important benefits that can be realized with a presence on the web. First, as this medium becomes more and more popular, there is a certain status that is

achieved from simply being on the web. More importantly, if you are not on the web, your image may be questioned. In addition, the web can now be used to legally report quarterly and yearly earnings, which can help sell stock as well as lower our printing costs. Another important opportunity on the web is exposure to potential employees. Much of our upcoming success will depend on increasing our headcount by about 50% over the next year or two. A web site allows us to reach a vast audience of potential employees to sell career opportunities at Photon Dynamics. This can help to lower the cost of using a recruiter to place employees. We may be able to use the web to distribute many of our technical sales support documents, such as application notes, but security is a major concern, and much more analysis needs to be done.

#### **Personal Selling Tools**

The main objective for personal selling tools is to provide the salesperson with enough proof of our capabilities to allow him to make the sale. This will mainly include materials that explain the benefits and capabilities of our products. Standard sales presentations for our company as well as each product will be redesigned based on the new benefits defined under the product roadmap criteria. Prior to a specific sales call, goals and objectives will be defined by sales and marketing departments and a customized presentation will be prepared to address the customers key issues. These presentations will be in 35mm slide format or overhead transparencies. Other sales materials will include samples of test outputs, applications notes, etc. We will also explore the use of self running software demos to present such materials on a laptop computer at any customer location.



**BUDGET:**

The following spreadsheet represents a forecast of Photon Dynamics' Marketing Communications budget based on this plan. These figures are estimated costs in round numbers based on historical data.

<b>MarCom Component</b>	<b>TOTALS</b>
PR	40000
Prod. Lit.	26000
Trade Shows	32000
Presentation Materials	6000
Advertising	2000
Direct Mail	12000
<b>Total MarCom Budget</b>	<b>118000</b>

**TIMELINE:**

My goal is to have a completed, detailed marketing plan by the middle of June 1997. The most time consuming part of this project will be re-evaluating each product category. I expect this task to be completed by the end of July. I would like to present the plan to senior staff by the end of August. This will allow several months to measure the success of the plan assuming it is implemented. Evaluation will take place prior to the end of the year.

**MEASUREMENT AND EVALUATION:**

I have received the support of our CEO, Vice President of Sales and Marketing, and our General Manager. They have given me permission to present my Marketing Communications plan at a senior staff meeting when completed. Upper management has agreed to give me their input, and implement any of my ideas if they are deemed valuable. I will evaluate the success of this project based on how much of my plan is implemented by the company, and how well the

plan meets its defined objectives. I consider the most critical part of this plan to be the re-defining of our product benefits and applications. I see this as the biggest weakness in our marketing efforts. If this plan can change the way we approach the communication of our product benefits, it will prove to be quite valuable, even if all of the objectives are not met. A new, comprehensive marketing and marketing communications plan would be extremely successful if it would allow our company to accomplish the following objectives:

- Gain at least one new customer by end of Q4 '96
- Increase market share by 10% by the end of Q4 '96
- Increase sales to exceed expected revenues for Q4 '96
- Increase stock price at least 1 point by end of Q4 '96

#### **RESEARCH:**

The following publications have been reviewed for use in this project:

Castellano, J., Mentley, D., and Weichert, A., 1996. Flat Information Displays Market and Technology Trends (Seventh Edition) pp. 1, 100-126.

Clift, V., 1994. Never Forget That Benefits Make the Sale  
Marketing News, pp. 16 Journal Article

Donath, B., 1993. Marcom Seeks its Mission for the '90s  
Marketing News, pp. 5, 10. Journal Article

Fifield, P., Gilligan, C., 1995. Strategic Marketing Management: Planning & Control, Analysis & Decision, Butterworth-Heinemann.

Howard, C., 1994. Advertising and Public Relations: A Vital Partnership to Help Achieve Your Clients' Goals, Executive Speeches, pp. 19-22 Journal Article

Jain, S., 1996. Marketing, Planning & Strategy, S-W Publications

Marken, G., 1996. Trade Show PR - Emphasize Show and Substance,  
Public Relations Quarterly, pp: 45-48 Journal Article

McDonald, M., 1995. Marketing Plans: How to Prepare Them: How to Use Them, Butterworth-Heinemann.

Page, R., Topping, P. 1995. It's Marketing, Stupid!  
Economic Development Review, pp. 62-66 Journal Article

Sampson, 1995. Advertising: Planning & Techniques (Third Edition), S-W Publications

Schlossberg, H., 1991. PR Agencies Promote Audit to Cut Recession Losses  
Marketing News, pp.6 Journal Article

Schultz, D., Martin, D., Brown, W., 1984. Strategic Advertising Campaigns (Second Edition) pp.  
1-23.

Schultz, D., 1994. Objectives Drive Tactics in IMC Approach  
Marketing News, pp. 14, 18. Journal Article

Schultz, D., 1990. It's Time to Come Up with Strategies, Not Just Tactics  
Marketing News, pp. 11 Journal Article

Test, A., 1995. Trade Show Success, Agency Sales Magazine, Journal Article

Walker, O., Boyd, H., Larreche, J., 1995. Marketing Strategy, International: Planning &  
Implementation, Irwin.

Waugh, T., 1995. Trade Shows Can Create Good Leads, CPA Journal, Journal Article



April 25, 1996

Mr. Tom Jordan  
San Jose State University  
One Washington Sq.  
San Jose, Ca.

Dear Mr. Jordan,

This letter is to inform you that we are aware and in full support of the Marketing Communications plan that Jim Campbell is preparing for our company and for his final Masters Project (non-proprietary version).

Although Jim is the Manager of our Marketing Communications Department, the comprehensive plan he is proposing has many elements that fall outside his day to day responsibilities.

We will allow Jim to present his proposed plan at a senior staff meeting upon completion. At that time, we will make recommendations and implement his ideas as we see fit. Our Company is in need of this type of plan, and we are confident that this project will be of value to us. We look forward to reviewing the finished product later this year.

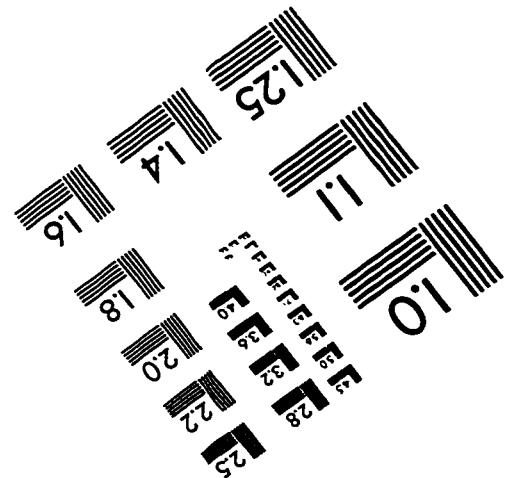
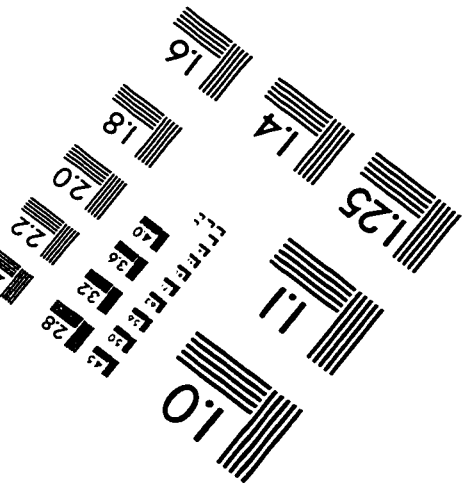
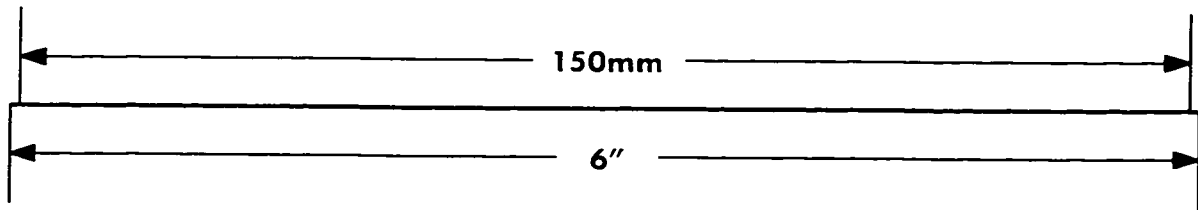
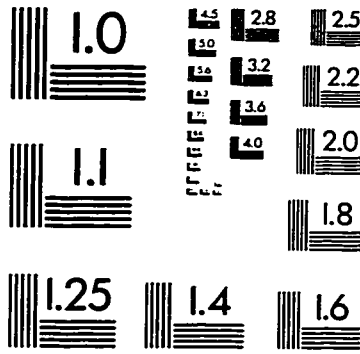
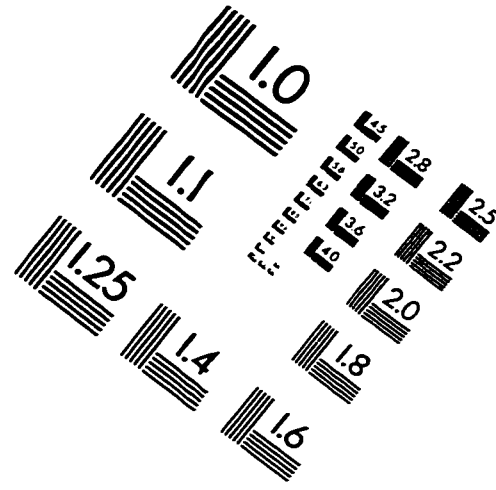
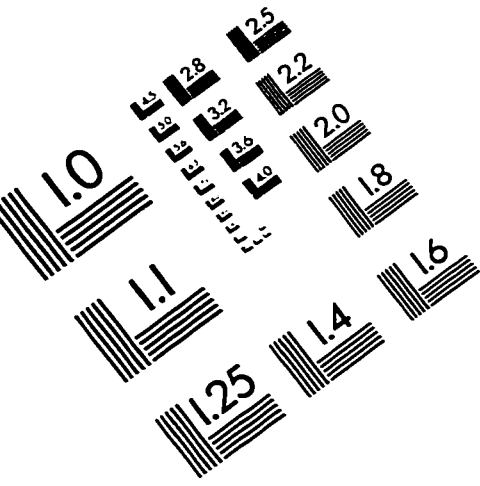
Sincerely,

A handwritten signature in black ink, appearing to read "Alan Nolet", with a long horizontal stroke extending to the right.

Alan Nolet  
Vice President Sales & Marketing

Photon Dynamics, Inc.  
1504 McCarthy Blvd.  
Milpitas, CA 95035  
(408) 433-3922  
Fax (408) 433-3925

# IMAGE EVALUATION TEST TARGET (QA-3)



APPLIED IMAGE, Inc  
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Rochester, NY 14609 USA  
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