

Holographics

International



Canada Focus: Abrams, Cossette, Dyens
Stereography: What, Why and How
Lake Forest: Scrap Book

Summer 1988 Number 4
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—The International Magazine of Holography—



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Summer 1988
Number 4

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Cover: "Pencils" true colour hologram made by Paul Hubel of the Department of Engineering Science, Oxford University, Britain. Photo by JJ Scarpetti.

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Holographics

International

Summer 1988

Number 4

Editorial

5

News

6

Natural colour hologram from Britain/Damn good colour from MIT/Shakespeare for the masses/New York Museum's International Directory/Prize for RCA Graduate

Calendar

11

Lab Notes

12

Fred Unterseher

First part of his paper on Pulse Holography

Stereo Photography

14

David Pizzanelli

How to photograph and view in three dimensions

Lake Forest

18

A quick look at the International Symposium on Display Holography

Medical

21

Sunny Bains

The Holoendoscope: makes high resolution holograms of your insides

Canada Focus

22

Marie Andrée Cossette's art work and her course at the MIT Media Lab

Canada Focus

26

A review of Claudette Abrams' "Personal Effects"

Commercial

29

J Sharpe Smith

How holograms on clothing are catching on in the USA

Canada Focus

31

George Dyens' holosculpture opens in two New York Galleries

HI Directory and Buyer's Guide

32

Details of the new directory and how to get a free listing

Holographics International

34

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Editorial

Yes, you may well complain that this issue is late. There are, as you might expect, reasons for this, but I'm sure you're more interested in the following: I'm sorry, I'll try not to let it happen again (again).

Lake Forest

I had a great time at the Lake Forest Symposium. I haven't tried to write a proper conference report because I think it would only be of benefit to those who attended the conference. We have covered some of the papers presented at the conference in the news and features sections. If you feel this is inadequate, please write and tell me.

To those who I met for the first time at Lake Forest, let me say hello again. I found meeting all of you incredibly inspiring, and your response to the magazine made it all

seem worthwhile (sort of). Please keep in touch.

Stereo Photography

You will, no doubt, notice the number of stereo pictures in this issue. I hope you like them and find our explanation of how to see them useful. I understand that 80% of people should be able to see them after practicing. I would be interested to hear your comments on the way we've used stereo photographs in

this issue, and how difficult it was to get the 3-D effect.

I was skeptical as to whether or not printing in stereo was a good idea or not until I managed to see my first stereographs. It makes such a difference when looking at a picture of a hologram. Anyway, as usual, I am open to your suggestions on this issue.

HI Directory and Buyer's Guide

You may feel you have had enough of directories if you paid for an advertisement in the Museum of Holography's publication. I don't blame you. You may be interested to know, however, that Holographics International has never insisted on payment in advance for advertising. Our policy is to invoice with a proof copy.

You can, of course, pay in advance if you wish, but I'm sure those of you who are once-bitten will find our arrangement more satisfactory.

Please send in a copy of the form for your free listing in the guide if applicable, whether you are a subscriber or not, as soon as possible. I'm sure you won't be disappointed when the our Directory and Buyer's Guide comes out in the new year.

Subscription/Free Copy Enquiries

The best way to reach Holographics International if you have an enquiry about your subscription is *by mail*. The phone number at the front of every issue of HI is an editorial/advertising number only. Subscriptions are processed and dispatched at a different location and the facilities to investigate such enquiries are there.

Things can take some time to be processed, it's true, and I know that can be frustrating. But rest assured, we are doing our best to get copies out to you as quickly as we can and we will continue to do so.

Send us Information!

Some of you may wonder why there are three stories about one company in the news section, and none about the work you've been doing. Try to remember the last time you sent us a letter telling us about the fascinating project you're involved with. Mind a complete blank...? So maybe next time you'll drop us a line and a picture, or just give us a call. That's all.

Sunny Bains

True Colour: Needed Technology, not Finance

Dear Holographics International,

First of all I would like to praise to the highest degree all of the efforts made to produce this beautiful magazine. You are doing a fantastic job and I hope the excellent standard of the first three issues is kept. Thank you and good luck!

In the last issue (Spring 1988, Number 3) there were many misleading and even wrong statements in the commercial column "Colour Holography: Naturally the Best". Investment alone has not held back true colour holography; technology has too — probably even more so! The main reason that true colour holography has not advanced as fast as people expected is that all the attempts, at least to my knowledge, have been small, dim, and not really true colour (the only exception being Kubota's "Dojo".) Investments will not be made until good results are presented. Kodak will not want a hologram of a green box of film!

As far as I know, there has never been a hologram that accurately reproduces all the colours, especially yellow, violet, purple and blue (except, perhaps, holograms made by pseudocolour techniques or by superimposing rainbows.) This comes from the fact that, as your article said, everyone just uses "red, green and blue" to record the image. As described in the article about my work in this issue, the choices of the blue wavelength, the green wavelength, and the recording material are *crucial*. Before Ilford blue-green emulsions came out two years ago, silver halide

could not record good blue holograms and therefore could not record good colour holograms — this is probably why Kubota used dichromated gelatin.

The quality of available colour reproduction should not depend on the object — you cannot produce natural colour using "just red and green" unless the object is only red, white and green (and even then the colour will not necessarily be natural because many reds and greens reflect blue components too.)

I just hope that the "informed Holographer" does not trivialize the work done to produce the hologram on the cover of this magazine and relate it to the statements made in the last issue. It took about two years of research to get this result: working with different types of silver halides, photopolymers, and dichromated gelatins, making test after test (hundreds), exploring colour theory and psychophysics, and getting suggestions and advice from many minds. Lin et al laid out the basic ideas in 1966 and since then the only substantial true colour hologram, at least that I have seen, was made by Kubota. There is good reason why the commercial holographer has not provided the services — because it hadn't been done — at least not very well.

Paul Hubel
University of Oxford
Department of Engineering Science

PS Careful, Lego fluorescence!



"Pencils" natural colour hologram by Paul Hubel. This hologram can be seen at the "Images in time and space" exhibition in San Jose, California and at the Museum of Holography in New York (see calendar for details). Photo by JJ Scarpetti, Rowland Institute of Science. See page 14 for stereo viewing instructions.

True Colour: Oxford Blue

Work done at Oxford University's Department of Engineering Science has produced the truest (most lifelike) colour hologram to date. The hologram, shown, of a mug full of colour pencils betters the holograms which preceded it because of the laser beam wavelengths used to expose it. The wavelengths chosen by the Oxford researchers combine to create a larger number of colours than ever before, making the finished hologram more realistic than had previously been possible.

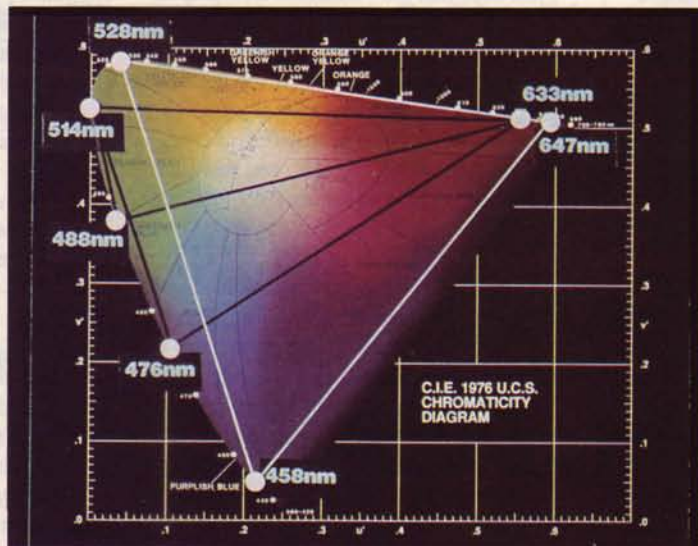
Scientists have been trying to make true colour holograms since the mid sixties. Their attempts have met with varying degrees of success, but even the best could not reproduce bright yellows or purples properly. According to Paul Hubel who conducted the Oxford research under the supervision of Prof Solymar and Andrew Ward, it is easy to see why earlier efforts failed. They see the answer in the CIE chromaticity diagram (shown).

To see what colours any three laser wavelengths can produce you simply find the points on the scale on the outside of the diagram which

represent the three wavelengths used, and join them to make a triangle. The colours inside the triangle can be made by the beams and the others cannot.

Other researchers had been using wavelengths of 514nm for green with 647nm for red. By drawing a line between these points, it is clear that almost all of the yellows will

be excluded from the final hologram. For blue they used 488nm or 476nm which respectively either eliminated or severely restricted the range of purples and blues available. The new colours, 647nm, 528nm and 458nm for red, green and blue respectively give a far better colour range in that no set of colours is completely excluded.



1976 CIE chromaticity diagram with recording wavelengths used for true-colour holograms. The white triangle includes the range of colours obtained by this method.

One possible reason why researchers had not used these wavelengths previously is that before 1976 the colour chart was thought to be a different shape. Triangles drawn with the old wavelengths did not seem to exclude as many colours.

The main problem, however, was the lack of photo materials sensitive to the very deep blue 458nm beam. The Ilford blue-green material used in the Oxford research only emerged two years ago, and it was the introduction of this material, with its sensitivity to deep blue, which was crucial to the success of the project.

Funding for the research was provided by the UK Science and Engineering Council and the Rowland Foundation.

New Dimension Folds

The Danish company New Dimension Laser Systems has now been wound up. Lawyers are dealing with the remnants of the Copenhagen based company which had worked in commercial holography and embossing. Shortly before the company's demise, Managing Director Teit Rizau had been removed in favour of Jacob Lunoe.

Holovision in Receivership

The British company Holovision, a holographic agency, has been in receivership since late spring. According to the company's accounts, Holovision lost between £50,000 and £80,000 in the financial year 1986/87. All assets and monies have been taken over by National Westminster Bank PLC, holder of their mortgage. As yet, it is not known what effect this will have on company directors Paul Nathan and Oran Muduroglu who are now based in the US and who are trading there under the name Holovision.

Leonardo Late

The special holography issue of Leonardo, due to come out this autumn, has now been put back for a year and so is planned for autumn 1989. The special issue, guest edited by Louis Brill, is to be entirely devoted to holography and its use as an art medium.

Britain Banks on English Bard

In two year's time, most of the population of Britain will be carrying a colour hologram of William Shakespeare on their person. The hologram will be on their new cheque guarantee cards, to be issued from the beginning of next month. The hologram, which was commissioned by the Association for Payment Clearing Services (APACS) was made both in Britain and the United States and constitutes the public's largest ever exposure to colour holography.

The first step in the production of the Shakespeare hologram was to make a master. This was done by Advanced Dimensional Displays (ADD) in California. An actor was dressed up as Shakespeare and a movie was taken of him with the camera moving from one side to the other to show different views. Each frame of the movie was then colour separated into red and green so that for each movie picture there were now two different black and white pictures.

To make the master hologram they used one 8x10 inch plate

which was split into two sections. A very thin hologram was then made of each of the colours for all of the 120 frames, so that the red holograms were lined up on top with the green on the bottom.

This master was then sent to Applied Holographics in England where a new hologram had to be made to combine the two images for mass production. To do this, the two-in-one hologram was illuminated with a mask over it. The mask covered up all but two slits, one for each colour and each a few millimeters wide, which run at right angles to the thin holograms on the plate. When this was illuminated, both of the images, red and green, appeared in the same place, though the light came in from different angles.

These two superimposed images were the object of a new hologram made on photoresist using one reference beam. The difference in the angles of the two object beams, produced by the slits being at different heights, caused the images to come out in different colours in



"Shakespeare" embossed multicolour stereogram for the new British cheque cards. Photo by David Pizzanelli.

the final hologram.

The reason that masks had to be put over the master hologram was to do with the mass production process. Embossed holograms are almost exclusively made as rainbow holograms for reasons of brightness. This rainbow effect is created by using a slit mask.

The final hologram, then, consists of 120 sets of 2-D coloured images, but we see 3-D because of stereopsis (see article on stereo). This is then embossed in the usual way.

Because the hologram is a rainbow hologram, the flesh tones only look fleshy at certain positions.

Other problems include the fact that, with only red and green components in the hologram, the colours are quite limited and so do not look totally natural. Fuzziness in the final image is thought to be caused by the red and green images having been distorted differently during the colour coding process.

APACS chose to make their hologram of Shakespeare because of his apolitical nature and because of his instant recognizability. Over the next two years, 25 million critics will be able to review the performance of the smiling actor who played him.

Swell Colour

MIT Media Lab researchers are using a new in-situ swelling technique to produce colour holographic stereograms from computer graphics. This technique may at last bring colour to holographic computer aided design and other kinds of computer based holographic imaging. The MIT team can also pre-distort computer graphics thus eliminating the distortions which the holographic process inevitably introduces.

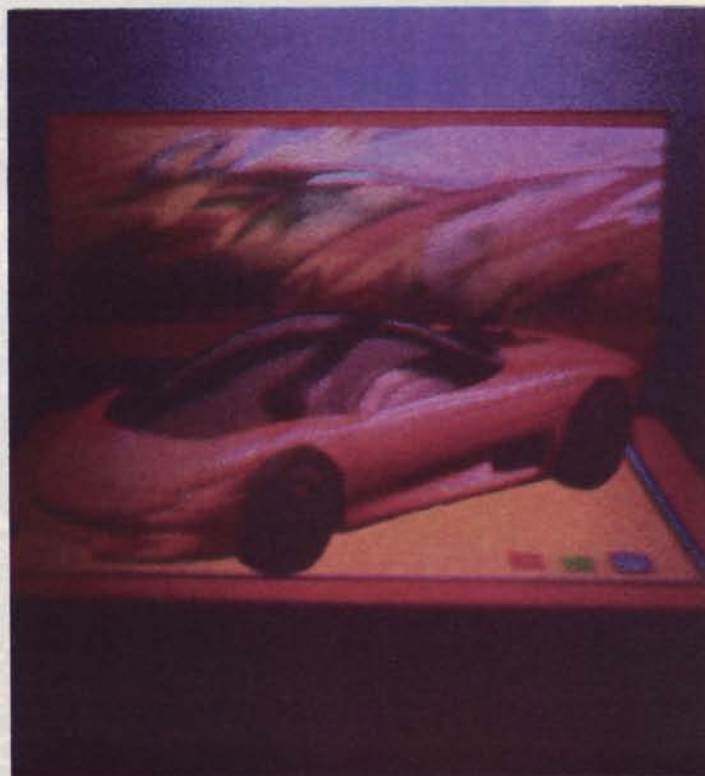
To make these colour stereograms, they first process the graphics they are provided with to get a set of "views" of the graphic "object". To add colour, the original graphics have to be separated

into three primary colours, red, green and blue. These three sets of 2-D pictures are made into transmission stereograms by making holograms of each 2-D image just a few millimeters wide lined up in order on three plates.

The last step is to make a final hologram of all three stereograms, with each image coming out in the right colour. This is done by pre-swelling the holographic emulsion to change the wavelength of light reflected to the viewer.

This process traditionally involves removing the hologram from the set-up after exposing each colour in order to treat it chemically. If not carefully replaced, the colours could be badly misregistered. The MIT researchers, however, have developed a way to do this without having to move the plate, thus improving colour registration.

The hologram shown, was made from General Motors data by Stephen Benton, Julie Walker, Wendy Plesniak and Mike Klug.



The MIT Media Lab computer generated colour hologram. Photo by David Pizzanelli.

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Dutch Call for Papers

The organizers of "Europe Holography", an international conference to be held in The Netherlands next summer, have issued a call for papers. The conference, to be held at Zernike Sciencepark in the first week of July next year, hopes to attract speakers on all aspects of holography. For further information contact Europe Holography, PO Box 171-9300 AD Roden, The Netherlands. Tel (+31) (50) 74 57 45.

Dinosaurs in Canada

Light Impressions Europe have completed an order for 10 million dinosaur holograms for use as premiums on cereal packaging for General Foods, Canada. The holographic dinosaur stickers were applied automatically using the Collamat high speed labelling system at the printing plant in Canada. This method efficiently updates and replaces manual application which would have made an order of this size impossible, and represents a major breakthrough in holographic technology.

IERE Conference

The organizers of the Second International Conference on Holographic Systems, Components and Applications have issued a call for papers. The conference, to be held at the University of Bath in Britain, will take place in the second week of September of next year. Organised by the Institution of Electronic and Radio Engineers, the conference will deal with research being done in all areas of applied holography. For further information, write to the Conference Secretariat, IERE, Savoy Hill House, Savoy Hill, London WC2R 0JD. Tel (+44) (1) 240-1871.

Bulletin Board for FAST Information

Leonardo announces an electronic bulletin board for those interested in holography. The service, only available on MCI and TYMNET phone lines in the USA, will give monthly reports on events, conferences, grants, jobs, and books etc. The service also covers other areas



Hotstamper checking print stamped with new Whiley foils.

New Foils

Embossed hologram producers, Light Impressions Europe, have produced a new range of holographic hot stamping foils in co-operation with foil manufacturers George M Whiley. The new range of foils includes a variety of adhesive releases which can be formulated to individual specification. Fully automated hologram application techniques are now in operation.

Timely Venture

Light Impressions Europe have entered the holographic watch market with a series of nine hologram designs specifically for watch faces. These circular holograms in 2D/3D measure 30mm in diameter, but can be produced to individual specifications. Designs include numbers, spatial themes and a

watch face that simply says "MEN!". Individual designs, company logos, personal names or messages can also be incorporated into these watch face holograms which can also be used on bracelets, brooches, badges and earrings.

Vibration Isolation from Photon Control

New products including enhanced damping concepts are featured in a new optical tables and isolation systems catalogue from Photon Control. Products include: the new EDC series of metal honeycomb core optical tables and modular-designed vibration isolation systems; large joined optical tables bolted together on-site to form large working areas for complex

laser experiments; and smaller sized optical breadboards and isolated workstations on which sensitive instruments can be mounted to provide the maximum immunity from vibrations. For further information, contact John Webster at Photon Control Limited, Kings Court, Kirkwood Road, Cambridge CB4 2PF. Tel (+44) (223) 323071.



Duncan Young's "Fish on a stick". Photo by David Pizzanelli.

Fans Fooled by Fakes

Wembley stadium, home of the English Football Association Cup final, used holograms made by the De La Rue Company on Cup final tickets this year, in order to stop counterfeiting. Nonetheless, unscrupulous forgers made copies of the tickets, with foil where the holograms should have been, and sold

thousands in football-mad Liverpool. The counterfeit tickets were easily spotted at the stadium because of the missing hologram, but conned fans say that more publicity about the hologram could have prevented them being swindled in the first place.

See page 14 for stereo viewing instructions.

Reilly Riled by Directory Delays

It is now a full year since the New York Museum of Holography's International Directory was due to come out. Delays have occurred because the Museum, which cannot afford to have the book printed, has been trying to find a new publisher. So far, Mirage Holograms (Britain), Holographics International (Britain), and Ross Books (USA) have been approached to take on the publication.

John Reilly, editor of the New York Museum of Holography's International Directory of Holography, says he has been continually kept in the dark about arrangements to have the book published. At the Lake Forest Symposium on Display Holography in July, ex-MOH Director Ian Lancaster publicised that Ross Books would indeed publish the directory but six weeks later, Mr Reilly had still not been informed of this by any agent

Young Prizewinner

Duncan Young, one of this year's graduates from the Royal College of Art, won the London United Investment award for his work in the degree show. The £10,000 prize will, he says, enable him to rent a studio and so carry on with his own creative work. Young was one of two people to receive the award, which was given for excellence in the technological arts, during the Design and Communications show at the end of June.

Gabor Medal

The Royal Society in Britain has accepted a gift from André Gabor for the establishment of a medal in memory of his brother, Dennis Gabor, who invented holography in 1947. The Gabor Medal will be awarded by the society biennially, starting in 1989, accompanied by a gift of £1000. It will normally be awarded for acknowledged distinction of work in the life sciences, particularly in the fields of genetic engineering and molecular biology but may also be awarded to researchers working in any branch of science that Gabor contributed to.



RCA Degree Show piece by Claudius Modebe

of the Museum. More importantly, he has had difficulty in getting the museum to pay for essential work done by typesetters and graphic artists many months after payment was due.

In early September Mr Reilly met with a Lawyer appointed by the Museum and it was agreed that Reilly would finish work on the directory providing all debts incurred by the museum were paid off. The lawyer agreed to pay by Friday of that same week but, ten days later Mr Reilly was still waiting to be contacted. In all, the Museum owes approximately \$10 000 for work carried out on their behalf. Advertising, paid in advance, is thought to have brought in over \$20 000 to the museum. It is not known where money to refund advertisers will come from if the directory is not published.

Events Calendar

28th July — 30th November

Exhibition of Multi-coloured holograms by John Kaufman. Holographic Visions, 300 South Grand Avenue, Los Angeles, California, USA. Tel (+1) (213) 687-7171.

15th August — 30th September

Exhibition of Holograms at the Space Coast Science Centre, 1510 Highland Avenue, Melbourne, Florida, USA.

3rd — 31st October

"Palace of Light Exhibition" in the Diarama, Regents Park, London, Britain, to celebrate 15th Anniversary of Daguerre. Holograms of mainly British artists will be shown in the main gallery.

14th Oct 1988 — 5th Feb 1989

"Images in Time and Space" at The Pavilion, San Jose, California, USA.

15th Oct 1988 — 10th Jan 1989

Exhibition of Holograms at the Orlando Science Centre, 810 E Rollins, Orlando, Florida, USA.

17th — 22nd October

George Dyens' "Big Bang II" at the Alternative Museum, 17 White Street, New York City, New York, USA. Tel (+1) (212) 966-4444.

19th — 24th October

Canadian Holography in France: Abrams, Boissonet, Cadell, Cossette, Deaton, Dyens, Page and Snow in "La Forum des Arts de L'Univers Scientifique et Technique" at the Parc des Expositions, Toulouse, France.

24th — 25th November

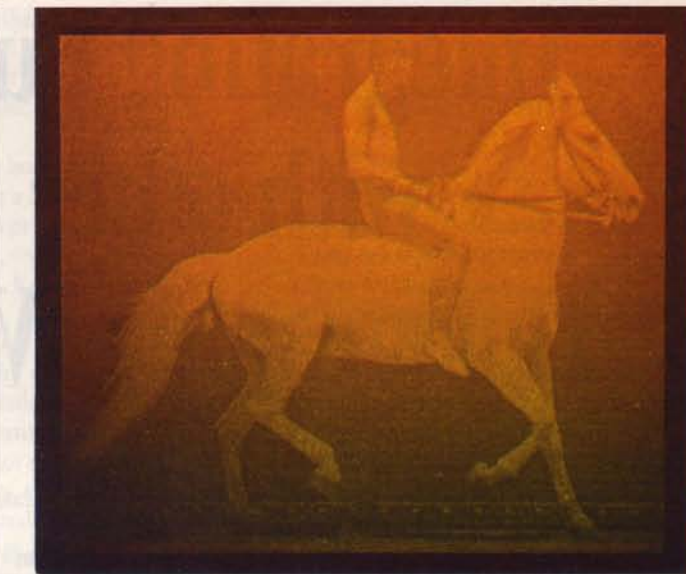
French-German Colloquium on Applications of Holography: Treatment and Interpretation of Information in Holography. To be held in Saint Louis, France. For further details, contact Jocelyne Striebig, Holo 3, 4 rue Charles Peguy, 68300 Saint Louis, France.

Other Exhibitions

Elusive Image, West End Market Place, 603 Munger, Suite 316, Dallas, Texas, USA.

Elusive Image, Travis Walk, Suite 114, 4514 Travis Street, Dallas, Texas, USA.
Hologram Gallery, Tivoli Gardens, Copenhagen, Denmark.

Hologram Museum/Gallery, Drottninggatan 100, 1160 Stockholm, Sweden.



David Pizzanelli's Muybridge Animation "Man on a White Horse". One of at least two holographic pieces which were submitted for the new photographic exhibition at the Victoria and Albert Museum in London, Britain, but were turned down. There will not, now, be any holograms at the show.

Holomagic, Number 917, 17th Avenue SW, Calgary, Alberta, Canada.

Holos Gallery, 1792 Haight Street, San Francisco, USA.

Interference Hologram Gallery, 008-1179A King Street W, Toronto, Ontario, Canada.

Laser Light Expressions, G 12 Denawen Avenue, Castle Cove, Australia.

Light Fantastic, the Trocadero, Coventry Street, Piccadilly Circus, London, Britain.

Light Fantastic, Covent Garden, London, Britain.

Museum for Holography and New Visual Media, Pulheim/Koln, West Germany.

Museum of Holography, 1134 West Washington Boulevard, Chicago, Illinois, USA.

Museum of Holography, 11 Mercer Street, New York City, New York, USA.

Museum of Holography, Les Halles, Paris, France.

Ontario Science Centre, 770 Don Mills Road, Toronto, Ontario, Canada.

Wonderlight Holography Exhibit, 2018 R Street NW, Washington DC, USA.



Holographic Visions, the LA Gallery which is presently showing John Kaufman's work.

If you run, or just know of, a hologram gallery or museum not listed here, or if there are future exhibitions which you would like to have listed here, please send information to us at Holographics International, BCM-Holographics, London WC1N 3XX, Britain.

Integrating Pulse with other Holographic Work

The aim of the pulse holography project undertaken at Holocom GmbH was to investigate the possibilities for pulse laser masters to be integrated with other holographic techniques, in particular transfer holograms for mass production formats. The pulse laser system used was designed and developed with Dr John Webster.

All of the transfer holograms described were produced from pulse masters, the transferring techniques are focused on reduced image holograms for their potential application to mass production formats. Although our results were encouraging, many problems still exist. Our practical approach to the project is outlined in this paper of preliminary findings.

Processing

Bleach: Ferric EDTA
 C10H12FEN2NaOs.3H2O 60 grams
 Ethylenedinitrilotetraacetic acid Sodium iron
 III salt trihydrate
 Potassium Bromide 30 grams
 Sulfuric Acid 10 ml
 Distilled Water to make 1L
 Bleach until clear. Wash in running water.

Post Bath: (to suppress printout)
 Glacial Acetic Acid (any commercial STOP
 bath) — use suppliers directions for diluting.
 Agitate for 1 to 2 minutes. Wash in running
 water.

Drying:
 As a final bath after the last wash, a wetting
 agent can be used.
 Agepon1 part + 200 parts distilled water
 1/2 to 1 minute is a sufficient treatment
 time. Squeegee from the direction of the hol-
 ogram's reference beam. Air dry.

The additional processing chemistry regimes
 we explored were —

II Developer: J Webster (formula for pulse
 holography)

Bleach: J Webster (formula for pulse holo-
 graphy)

III Developer: Neofin Blue

Bleach: Ferric Nitrate

A Versatile System

In order for the pulse system to record H1
 holograms for specific transfer requirements,
 it is advantageous to work backwards. The
 transfer technique planned for use can deter-
 mine the particulars for the H1 recording.
 This is especially relevant when considering
 reduced image transfers. For the pulse cam-
 era to be applicable for a variety of transfer
 techniques it is desirable to have an adjustable
 and flexible system that is easy to operate.
 The camera adjustment capabilities in Fig 1
 (1 through 5) contribute to simple and versa-
 tile operation, further elaboration is de-
 scribed below along with pre exposure prepa-
 rations that help the whole procedure run
 smoothly. The intended overall approach is
 more closely related to a photo studio.

Pulse Master (H1) Recording

Laser: JK Pulse Ruby Laser 2000 (wvl
 694.3nm)
 HSL4 Holocamera System 10J
 Pulse Duration 25ns
 Coherence Length 1m +
 Maximum Repetition Rate 2 pulses/minute
 Vertical polarization
 All calculations concerning safety standards
 have been made to exceed conventional re-
 quirements.

Optics: Wedge beam splitter, reflectivity ap-
 proximately 80%, one side anti-reflection
 coated

Front Surface Mirrors

Collimating Mirror, focal length 2m, 22
 inches diameter

High Energy Negative Lenses 75, 55 & 25

Conventional diffusion screen 50x60cm

Assorted neutral density filters 0.10-0.60µd

Alignment laser: Helium Neon

Holographic Materials: Agfa-Gevaert Holo-
 test 8E75HD NAH Triacetate film, polyester
 film, glass plates. Ilford Ltd 175 micron PE
 637/T9105 Red sensitive film.

Holographic Processing Chemistry: Over a
 two and a half year period three processing
 regimes were used, the formulas for the pre-
 ferred regime are indicated below.

Developer: Quephe
 Sodium Sulphite 30grams
 Sodium Carbonate 60g
 Quenol (Hydroquinone) 8g
 Phenidon 2g
 Distilled water to make 1Litre

Just prior to development add — 1 gram of
 Ascorbic acid (vitamin C) per 100ml of the
 above developer solution. It is important that
 the ascorbic acid is completely dissolved in
 the solution.

Develop for 2 to 4 minutes at 19 degrees
 centigrade for an approximate density of 2.8.
 Wash in running water for 1 to 2 minutes.

The developer may be used for master as well
 as transfer transmission holograms. In the
 case of transfers, development to a 2.2 den-
 sity is preferred, and the addition of ascorbic
 acid to the developer can be deleted. The
 following bleach is also recommended for
 transfer transmission holograms.

Simplicity of Operation

1. Calculate desired object/subject distance to
 the H1. (Figure 1, Number 1)
2. Reference Beam (Figure 1, Numbers 4 &
 5)
 - A. Brewster's angle preferred (4)
 - B. Beam character — usually collimated
 (5)
3. Equal Beam Path lengths (Figure 1, Num-
 ber 2)
 - A. Guidelight (HeNe alignment laser)
 - B. String or measuring device
4. Object Beam Lighting (Figure 1, Number
 3)
 - A. Bounce Cards (for fill lighting)
5. Ratios
 - A. Oscilloscope readings
 - B. Insert neutral density filters
6. Small Film Tests (for previewing)
 - A. Preloaded (for tests as well as the
 final hologram)
 - B. Spray mount film holder
7. Quick Reversal Holographic Processing
 Chemistry

Pre Exposure Preparations

1. Safety First — Always
 Use a diffusion screen for illumination in the
 Object beam. Care should be taken to avoid
 ambient light
2. Appearance — Objects should be treated
 in much the same way as in CW holography
 regarding surface texture, highlights (hot
 spots) etc. Subjects, either people or animals,
 can be previewed in red light or by looking at
 them through a red filter. Cosmetics are not
 always necessary and seem even less so when
 the intended transfer is a reduced image hol-

ogram.

3. Green Safe Light — Ample illumination of the room area with the proper frequency of green is advisable, even during the exposure.

4. Previewing (for the final image) — A second surface mirror placed where the exposure will be and of the same size as the final hologram can be used to determine the subject's position, facial expression, overall image composition etc.

5. Red Light — A red light that mimics pulse ruby red can be used, to preview the positioned subject or object, by the holographer.

6. Hand held green safe light — Light used by the holographer to direct towards the subject to aid in determining the proper moment for the exposure.

7. Practice — Practice is often necessary for the holographer as well as the subject when motion is being carried out by the subject.

CW Image Plane Transfers from Pulse Ruby Masters

All of the transfer techniques described below were used to produce holograms from masters <H1s> recorded with a pulse ruby laser of wavelength 694.3nm.

In order to broaden the range of applications for pulse originated holograms, the two major considerations for transfers were the change of frequencies and image size in the transfer hologram.

We produced transfer holograms with a variety of CW lasers using a number of frequencies. Concentration was primarily focused on the usage of Argon, with wavelengths 457.9nm and 488.9nm, Krypton at 647.1nm and HeNe at 632.8nm.

We considered varying the image size in the transfer hologram by exploring the possibilities for recording reduced imagery with the use of simple condensing lenses.

We found that the major difference between reduced image rainbows and reflection plus achromat transmission reductions is that the size of the transfer image can be adjusted to be the distance of the lens to the transfer (H2) hologram for rainbows, but is more or less predetermined by the object/subject distance to the H1, in the master recording, for the reflection and achromat transfers.

Next issue: How to make Reduced Image Transfers.

Figure 1: Side view of a split beam overhead setup, positions for the components are indicated with descriptions below including the camera's adjustment features.

Camera adjustment features:

1. Distance — Object/Subject to H1
2. Equal beam path adjustment
3. Object beam adjustment
4. Reference beam angle adjustment (Brewster's angle)
5. Collimating mirror distance adjustment (diverging, converging)

Camera Components:

- BS — Beam Splitter
- RL — Reference Lens
- RM1 — Reference Mirror
- RM2C — Collimating Reference Mirror
- RM3 — Overhead Reference Mirror
- H1 — Master Hologram
- OM1,2,3 — Adjustable Object Mirrors
- OCL — Object Collimating Lens
- OL — Object Lens
- OM4 — Object Mirror
- DS — Diffusion Screen
- O/S — Object/Subject

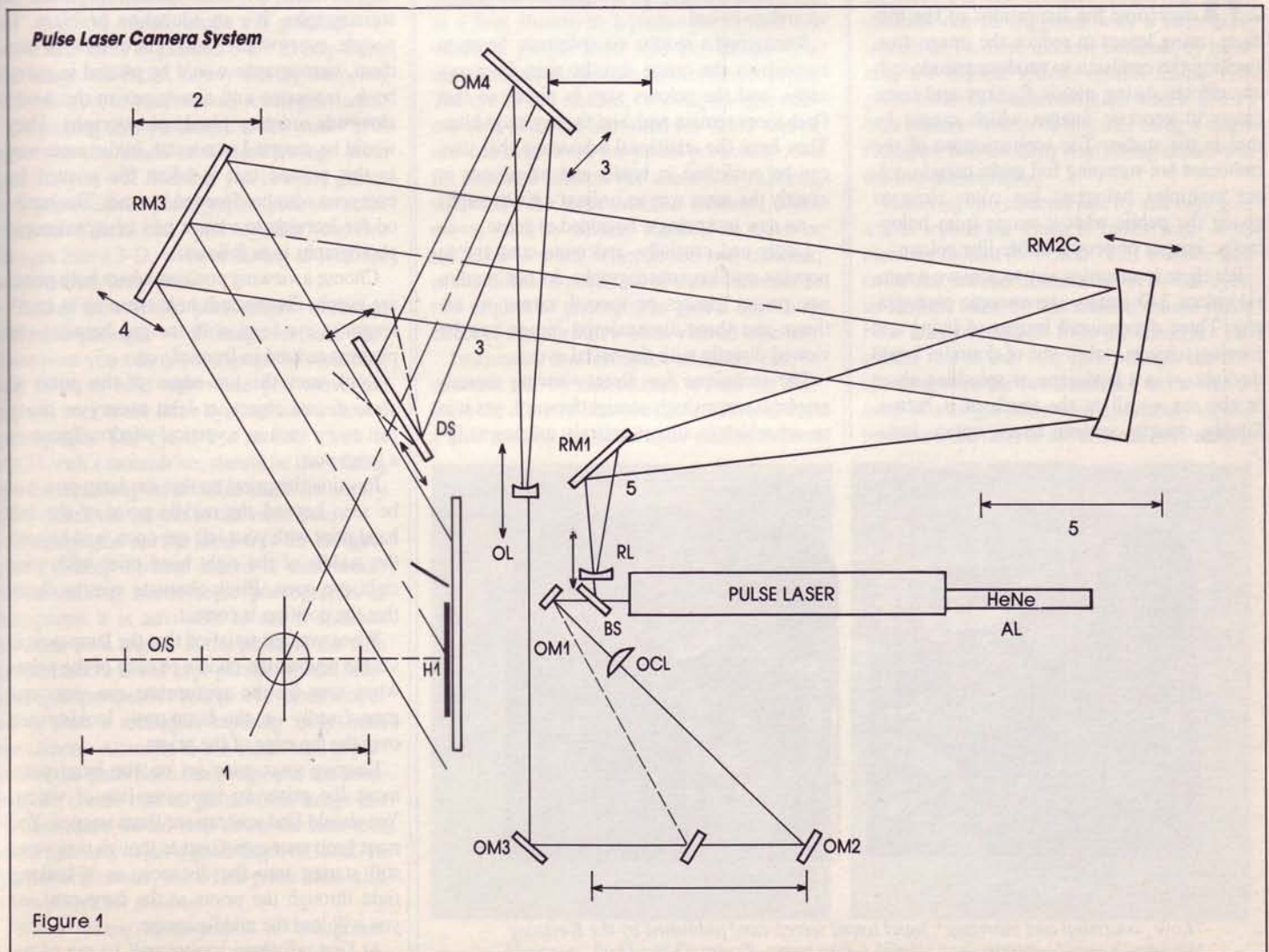


Figure 1



"Delphi" sequential stereographs using a hand held camera by Rob Munday of the Royal College of Art.

Many and valiant have been the attempts of holographers everywhere to overcome the limitations of the medium, using lenses to reduce the image size, swelling the emulsion to produce pseudo-colour effects, using movie footage and computers to generate images which cannot be shot in the studio. The sophistication of the embossed hot-stamping foil multi pseudo-colour multiplex hologram has come close to giving the public what it wants from holography: images of people in life-like colour.

But there is an easier way to achieve a natural colour 3-D image: stereoscopic photography. Three dimensional images of living and moving subjects, taken out of doors in broad daylight — in a landscape or splashing about in the sea — all at the touch of a button. Simply, cheaply, without lasers, optics, isola-

tion table or having to wait about in the dark for hours praying your neighbors would shut up and go to bed.

Stereographs require no reference beam to reconstruct the image, can be seen from any angle, and the colours stay in place, so that flesh tones remain pink and the sky stays blue. They have the additional advantage that they can be published in books and magazines in exactly the same way as ordinary photographs — no new technology, no added expense.

Lastly and crucially, and quite contrary to popular opinion, stereographs do not require any proper glasses or special viewer to see them: the three-dimensional image can be viewed directly with the naked eyes.

The technique for direct-viewing stereographs is surprisingly straightforward, yet it is an art which is almost entirely unknown. Ig-

Stereographs and the Direct View

norance of this simple method remains the only obstacle to the universal acceptance of stereographs. It's an education problem. If people everywhere only knew how to see them, stereographs would be printed in every book, magazine and newspaper in the world alongside ordinary planar photographs. They would be accepted as normal, in the same way as this printed text is taken for granted by everyone who has learned to read. The method for learning to view a pair of stereoscopic photographs is as follows:

Choose a viewing position where both prints are evenly illuminated, hold them up at arm's length at eye level with the gap between the pictures centred in front of you.

Look over the top edges of the prints to some distant object, at least twenty or thirty feet away, such as a vertical window frame or a lamp-post.

Position the prints so that the lamp post can be seen beyond the middle point of the left hand print with your left eye open, and beyond the middle of the right hand print with your right eye open. Blink alternate eyes to check that the position is correct.

When you are satisfied that the lamp-post is visible beyond the middle of each of the prints when seen by the appropriate eye, set your gaze fixedly on the lamp-post, looking just over the top edge of the prints.

Keeping your gaze set on the lamp post, move the prints up into your line of vision. You should find you can see three images. You must keep your eyes fixed as though they were still staring into the distance, as if looking right through the prints at the lamp-post, or you will lose the middle image.

At first, all three images will be out of fo-



"Love, courtship and marriage" hand tinted stereo card published by the Keystone View Company circa 1901.

graphy e Art of Viewing

cus, ignore the outer two and concentrate on the one in the middle; once you have "locked on" to it, the middle image will gradually resolve into focus in glorious 3-D! To help bring the image into focus, slowly moving the prints towards you, to your normal reading distance.

Repeating this procedure a few times will give you the knack of direct-viewing. With practise you will find that you can just glance at a pair of stereo photographs, pick out some distinctive detail and "pull together" the two images into a 3-D, without having to look for a convenient lamp-post.

Taking stereoscopic photographs works on the same principle — an image for each eye. Next time you take a photograph of someone, ask them to hold still while you move the camera over to the other eye and take a second photograph. The eye-to-eye action, which is easier with a motordrive, should be like sliding the camera along an invisible shelf: do not try to re-centre the subject in the viewfinder.

Stereographs are the ideal way for holographers to keep a visual record of their work. When making stereoscopic photographs of holograms it is advisable to use a slidebar mounted on a tripod. If the plane of the film in the camera is not kept parallel to the hologram, the perspective will be a keystone shape, rather than a rectangle, tapering away from the camera. Attempts to use a shift lens to pre-distort the distortions can compound the problem. To ensure that all parts of the image are in focus, one should stop down the lens to a small aperture to get a good depth of field. To get the best results, use a fine grain film, with a low ASA/ISO number.

When taking stereographs of holograms hanging in an exhibition, one should be on



"Flowers" sequential stereographs by David Pizzanelli taken using a camera and slidebar mounted on a tripod.

guard against even slight reflections being seen coming off the glass. What might go unnoticed as a faint shadow in a planar photograph can suddenly resolve itself into the silhouette of the photographer when it is perceived in depth. The eye-to-eye method, or using a single camera on a slide bar are ideal for static scenes, and can even work for posed portraiture, but for animated subjects like animals or children, and where the scene contains elements which move, such as smoke, windblown trees or traffic, it is much better to use two cameras, as the different positions of these elements in two sequential photographs give a disturbing effect of image rivalry when viewed together.

Instamatic and compact cameras can be mounted side by side or base to base (to minimise the distance between the lenses) and with a little practise the two shutter release buttons

can be triggered together within about an eighth of a second or faster. Single lens reflex cameras can be triggered with a twin cable release or, on more modern cameras, by twinning the electric remote control leads. This gives electric synchronisation which allows both cameras to expose together using a single flashgun, thus avoiding conflicting shadows in the two photographs.

Mounting two cameras side by side may give a lens separation which is rather wide — as much as 150mm (6 inches). This is more than twice the normal distance between the eyes, so subjects taken by this method should really be at least twelve feet from the cameras. The golden rule is the 1:30 ratio, that is the distance between the two cameras (or the movement of a single camera on a slidebar) should be about a thirtieth of the distance between the



"Florence" by David Pizzanelli, taken with a Nimslo camera using lenses #1 and #4.

cameras and the closest part of the scene. This rule works for close-up too, thus an object 30 inches away needs a lens separation of just one inch, whilst a view across a valley might require a separation of several feet.

Trim stereoscopic prints so that both views match, taking care that they are set at the same height, and that the image in one is not rotated with respect to the other: all details should be on parallel horizontal lines to their counterparts on the other print. Edges should be cropped so that the foreground areas correspond. Make sure that each print is no more than 60mm (2 3/8 inches) wide, and mount them side by side, so that the furthest details in the scene are no further apart than 63mm (2 1/2 inches) apart. Your prints are now ready to be viewed by the method described. It is advisable to view them before sticking them down to check that the left hand print is on the left hand side: if the prints get switched around, the image will be pseudoscopic.

To someone who has mastered the art of direct-viewing, it seems bewildering that stereographs are (almost) never seen anywhere. The reasons go back to the first discovery of stereopsis (literally 'solid seeing') by Sir Charles Wheatstone, just a short time prior to the announcements by Daguerre and Fox Talbot which brought photography into the public domain.

Although the art of direct-viewing a stereoscopic image was known and practised, all the early advocates, Wheatstone, Brewster, Claudet, put their energies into designing special viewers and devices which would allow someone with the feeblest eyesight to see the ster-

eoscopic image. There was almost no effort made to educate people in the art of viewing the image directly. This was in part a symptom of the age, being one of inventions and devices, the patent literature abounds with strange mechanical aids to almost every human function. Also many of the early stereoscopic images were daguerreotypes, which were even more difficult to see than holograms, being made on silver plated copper, the dark part of the image was a base metal surface onto which light had to fall obliquely or the image was lost. A person wearing pale coloured clothes might see more of his own reflection than the image of the photograph. So several viewers were designed, most were variations on the same theme: a box with lenses and a flap which controlled and limited the light falling on the plate.

But even saddled with the limitations of having to be seen by means of a cumbersome viewer, stereoscopic daguerreotypes and the paper prints on card which succeeded them enjoyed enormous success. Interestingly, modern books on photography ignore this fact as though it were taboo.

In an age without television, when few people could afford to travel, the stereoscope gave people a lifelike glimpse of far away places they might never hope to visit. The ritual of getting out the viewer and the collection of stereoscopic cards was like getting out a favorite board-game or musical instrument.

Interest spread across Europe and to the United States. In the 1860s more than a thousand photographers were producing cards in large quantities until, in the mid-1870s, the

market began to be flooded, having reached incredible proportions. The total number of views ran into many, many millions.

As with Mr Rubik and his famous cube, all crazes loose their impetus eventually and go into decline, and so it was with the stereoscope.

The act of viewing stereographs by means of a wooden viewer was very different from the act of looking at ordinary photographs. Photographs could appear anywhere in books, magazines, newspapers and would be seen casually everyday in several contexts, whereas getting out the stereoscope and the cabinet of cards was a special event. Unfortunately there was a limit to the number of occasions someone could examine any particular card before the novelty wore off and, at the same time, there was a limit to the number of different cards one could reasonably collect. These factors alone meant that the craze was doomed to finish when it reached its natural limits: when everyone had a huge collection of cards and was bored with all of them.

The photograph has continued to survive in a social context because of its renewed novelty, its ephemeral nature: the vast majority of photographs we see come to us in the form of printed material which we look at and discard.

It could have been different. People had never seen photographs before, so they were not pre-disposed to viewing flat photographs as we are today. If the need for a viewer had not been established at the outset, progress would have been made to teach people how to view stereoscopic photographs directly, and today they might be in common use.

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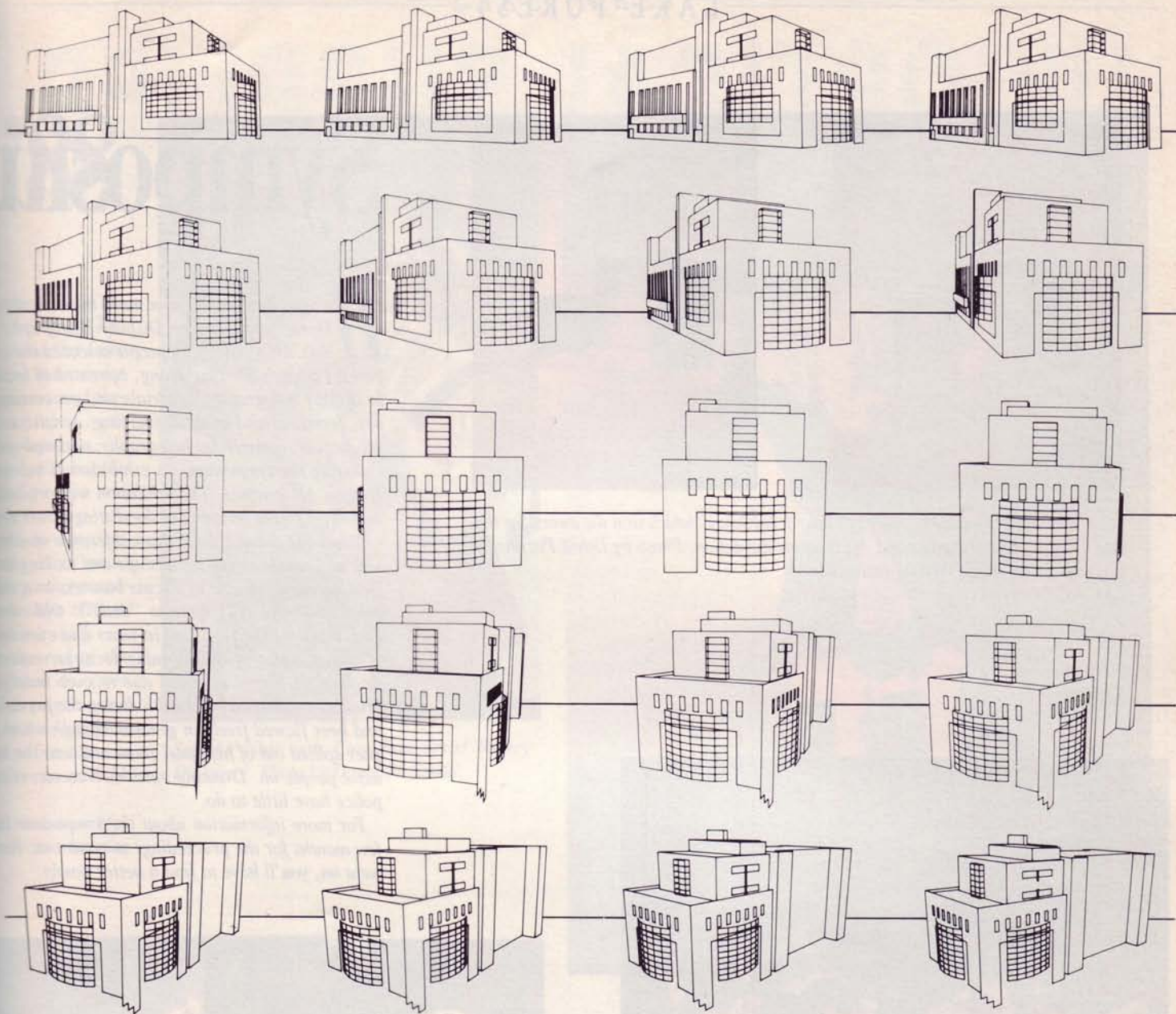
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Mike Teitel's piece entitled "Murray's Fourth Birthday" which won the award for the best artistic work at the Durand Art Institute exhibition. Photo by David Pizzanelli. See page 14 for stereo viewing instructions.

Symposium

Holographers came from more than twenty countries to the Third Symposium on Display Holography at Lake Forest College's Dr Tung Jeong, consisted of lectures on display holography: materials and processing; history; technical and medical imaging; artistic techniques; production; commercial holography; and new technologies.

During the symposium, an exhibition of holography was held at the Durand Art Institute. The exhibition was organized by Dr. Jeong and contained pieces by many of the distinguished artists in the field.

It was the social side of this conference which made it so enjoyable as well as "renewing old friendships and making new ones" (most people were able to discuss business in a relaxed way, even some who were only there to "deal"). Old enemies met each other for the first time in years and even admired each other.

In fact, some of the morning lectures, especially on the second week, were poorly attended due to over indulgence in drinking to each other's health during the previous evening and beer flowed freely in general, though when a photographer spilled out of his motel room and into the lot outside, he moved people on. Drinking outside, it seems, is an offense which the police have little to do.

For more information about the symposium lectures, contact a few months for the proceedings to come out. For information on what went on, you'll have to find a better gossip.



Coffee break for conference organizer Dr Tung Jeong, Japanese artist Setsuko Ishii, and the rest. Photo by David Pizzanelli.



American Bank Note's Ed Dietrich chatting to Heidi von der Gathen, also of the US, who lectured on building an interactive children's environment. Photo by David Pizzanelli.



Paula Durrer, photographer, and David Pizzanelli.

Symposium '88

Holographers came from more than twenty countries to take part in the Third Symposium on Display Holography at Lake Forest College, Illinois, USA. Over 200 people attended the conference, organised by Lake Forest College's Dr Tung Jeong, consisted of lectures on all of the main topics in display holography: materials and processing; history education and theory; technical and medical imaging; artistic techniques and concepts; mass production; commercial holography; and new technological developments.

During the symposium, an exhibition of holographic art was opened at the Durand Art Institute. The exhibition was organised by Melissa Crenshaw and contained pieces by many of the distinguished artists in holography.

It was the social side of this conference which made it special, however. As well as "renewing old friendships and making new ones," as the cliché goes, most people were able to discuss business in a relaxed way (though there were some who were only there to "deal"). Old enemies and rivals were civil to each other for the first time in years and even admired each other's work.

In fact, some of the morning lectures, especially towards the end of the week, were poorly attended due to over indulgence by conference delegates drinking to each other's health during the previous evening. Champagne, wine and beer flowed freely in general, though when a party held by one holographer spilled out of his motel room and into the lot outside, the police came to move people on. Drinking outside, it seems, is an offence in Illinois, and the police have little to do.

For more information about the symposium lectures, you'll have to wait a few months for the proceedings to come out. For information about what else went on, you'll have to find a better gossip.

the award for the
David Pizzanelli.



Setsuko Ishii with Canadian artist Sidney Dinsmore. Photo by David Pizzanelli.



American Bank Note's Ed Dietrich chatting to Heidi von der Gathen, also of the US, who lectured on building an interactive children's environment. Photo by David Pizzanelli.



Paula Dawson and American holography lecturer Doris Vila resting in the shade. Photo by David Pizzanelli.

Paula Dawson
a holographer
everybody
instructions.

'88

to take part in the
Lake Forest College, Illi-
nois, organised by Lake
Forest College. All of the main topics
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phy, the police came to
Illinois, and the

you'll have to wait a
moment about what else



Setsuko Ishii with Canadian artist Sidney Dinsmore. Photo by David Pizzanelli.



Australian artist Paula Dawson, one of the stars of this year's conference, giving a lecture on her work (bar!) Photo by David Pizzanelli.



Paula Dawson and American holography lecturer Vila resting in the shade. Photo by David Pizzanelli.



Paula Dawson's laser transmission hologram of her bar which is to become part of a holographic installation. Shown at The Lasersmith's in Chicago, it's depth took everybody by surprise. Photo by David Pizzanelli. See page 14 for stereo viewing instructions.

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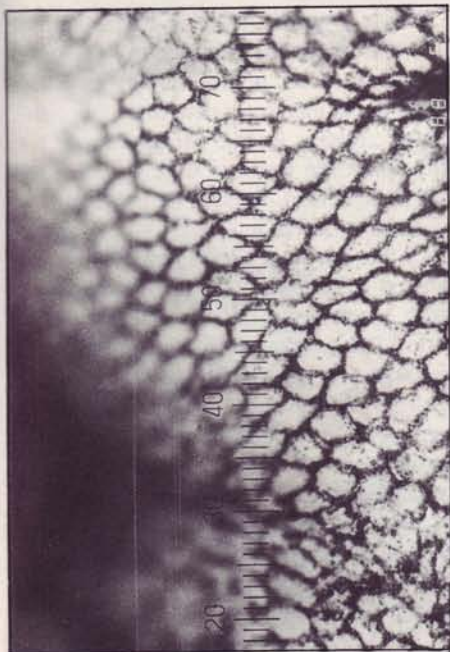
The Holographic Endoscope

A device which allows microscopic analysis of living tissue without it ever leaving the body has been invented by researchers in the United States. The "holoendoscope" (from the words holography and endoscope) is an instrument which, when inserted in the body like an endoscope, will take a three dimensional picture of tissue. The picture, or hologram, can then be put under the microscope and the cell structure examined as if it were the real thing.

The holoendoscope is basically a stainless steel tube, with a width of 10mm and a length of 86mm. At one end it has a cartridge which holds the holographic film, an 8mm diameter disc, tilted at an angle. At the other end an optical fibre supplies the laser beam which illuminates the tissue.

A shuttering system was developed, composed of a rotating slit of a given diameter, in series with a slower mechanical shutter. By choosing the proper radius along the rotating slit, the pulse duration can be varied. The laser beam is focused at the slit to shorten the rise and decay time of the pulse. Because living tissue is in constant movement, very short exposures of the order of 10⁻⁴s are needed.

The hologram is formed by the clean laser beam passing through the film once and then being scattered by the object (tissue) back onto the film. The two beams form an interference pattern which exposes the plate. When developed, this pattern will scatter light in exactly the same way that the original tissue did, ie. it will look exactly like the real tissue.



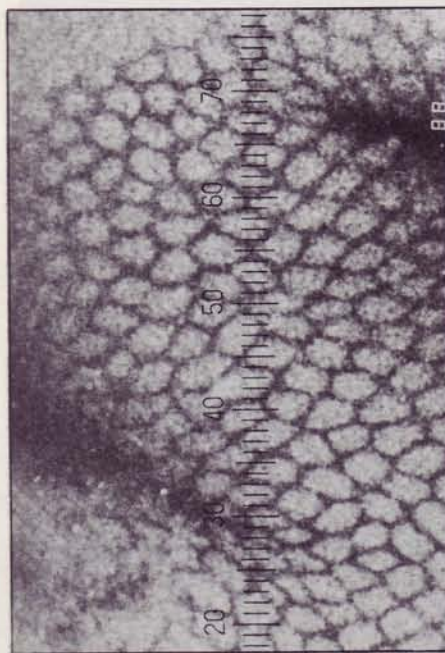
Tissue sample seen through microscope, 31.25 mm/division.

The instrument was designed by Bjelkhagen, Friedman and Epstein of the Biomedical Engineering Department, Northwestern University, Illinois. They were funded to do research into digestive diseases, and for this reason they based their research on investigating the colon.

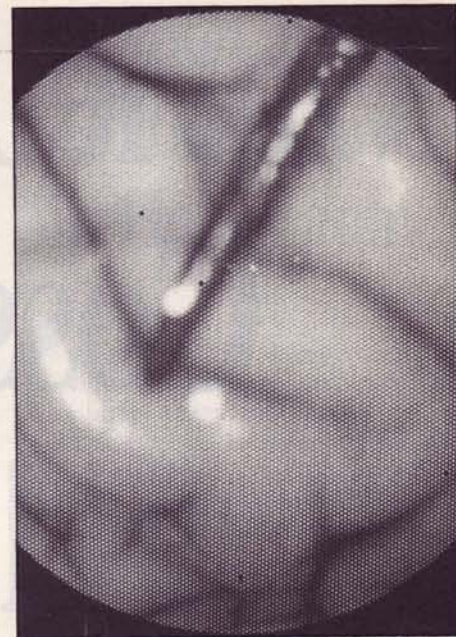
They started off by using the holoendoscope on an anaesthetized dog. The instrument was passed through a tube into the dog's colon and positioned with the film pressed against the tissue. The hologram was then exposed, removed and chemically processed. The result seemed fine when viewed with the naked eye, but under the microscope the resolution and contrast were poor. To improve these properties, they looked at tissue staining.

In tissue, each constituent (eg capillaries, glands, collagen) will scatter or absorb light to a different extent. Also, they will scatter and absorb differently depending on the wavelength (colour) of the light. The Northwestern work was based on the following theory: if a wavelength was chosen which matched one of the absorbing structures, such as blood in blood vessels, then the resolution and efficiency of the final hologram would improve.

However, not all interesting structures absorb, but they could be made to do so artificially by staining. In this case, all tissue could be made suitable for holography. The next step, therefore, was to find matching stain and laser colours to make the resolution and contrast good enough so that cells could be seen clearly under a microscope.



Holographic image of the same tissue sample, seen through microscope, 31.25 mm/division.



Stained tissue sample as seen through conventional fibre optic endoscope.

This was done by experimenting on preserved tissue samples in glass, rather than in a real animal. Two laser colours and fifteen dyes were tested. The dyes were checked for how well they stuck to the tissue as well as contrast in the final hologram. One of the more successful combinations was trypan blue dye with a krypton laser. The photographs show views of the hologram when viewed under a microscope, and the actual tissue when viewed the same way. The scale on the microscope was 31.25 microns per division.

The Northwestern team hope to repeat the experiment with a dye inside an animal within the next couple of months. The main foreseeable problem is the fastness of the dye. During the in vitro tests it took 60 seconds to successfully dye the tissue. In a living animal the tissue will be more difficult to stain. However this is not seen as an insurmountable problem. As there has been little need for such high resolution dyes in the past, they are technologically quite primitive. Now that they are needed, research will no doubt unearth dyes with the right amount of staying power.

The instrument could find uses in a number of fields, such as gynecology, urology and dermatology, as well as investigating digestive disorders. Mr RM Kirk, consultant surgeon and editor of the journal of the British Royal College of Surgeons, said that he finds the new instrument very exciting. Since the holograms would show pictures of living cells, rather than chemically-treated dead ones seen with existing techniques, distortion would be prevented, he said. The holoendoscope has great potential, he believes, to become a new and useful tool for the investigation of the body.

by Sunny Bains

Marie Andrée Cossette and her Holograms

While holographic technique is still in its "research stage", Marie Andrée Cossette, adventurer in the field, is exploring avenues which some would qualify as being heretical. Marie Andrée Cossette lives in Quebec City and she has been working with holographic technique for ten years now. In fact, she was the first Canadian artist to experiment with the medium. Her first ex-

hibit in 1983 was favorably received by the critics.

The productions in her career can be divided into three periods. The first could be called "photo-holographic". During this period we see the transition from photography, the artist's initial medium, to holography. The object, the anecdote and the technique take up all of the artistic space. Although she is in a



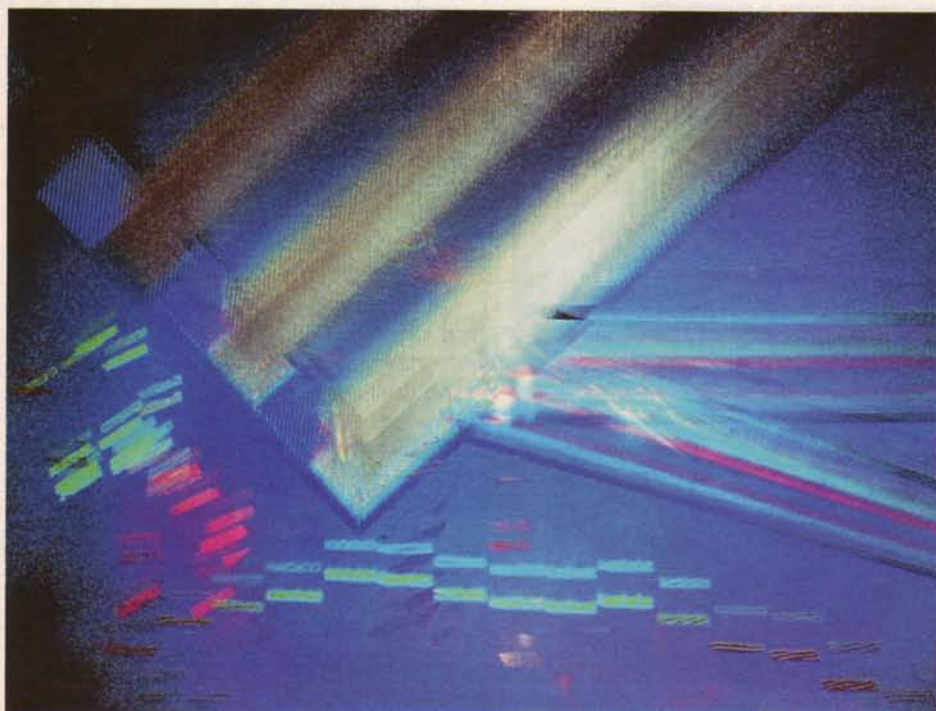
Marie Andrée Cossette, 1988, "Luminescence": white light transmission hologram.

transitory stage, the technique of holography is already largely assimilated.

In 1984, another transformation takes place. Colours become more subtle and, more importantly, subjects become more symbolic. Reflection gives way to the joys of holographic discovery. To the three dimensions of holography is added a fourth: the artistic dimension. This "fourth" dimension will become more and more present in Marie Andrée's later works.

1987 is a turning point in Marie Andrée Cossette's career. She is invited to the Massachusetts Institute of Technology in Cambridge to put together a new course on holographic creation for the Media Laboratory. While there she works in close collaboration with Steve Benton, inventor of the white light transmission hologram.

Is it her meeting with Benton or is it the imposed reflection of her course preparation which brings about the third change in her works? The anecdote has now completely disappeared. The production of her elements creates an artistic space which belongs to the realm of dreams. Objects are simply supports for light, and recording fringes are now domesticated. Subtle fragments of glass break the light and shatter it into iridescent arabesques. Thus captured, the light satisfies an ancestral human desire: dreams have broken through the looking glass and into reality.



Marie Andrée Cossette, 1988, "Luminescence": white light transmission hologram.

By Magella Paradis PhD, Art Historian,
with translation by Sheila Hadvick.



Marie Andr   Cossette, 1988, "Luminescence": white light transmission hologram.



Marie Andr   Cossette, 1988, "Souvenir Spatial": white light transmission hologram.

Creation and the Critical Sense in Holography

In the autumn of 1987, Marie Andr   Cossette, holographer and visual arts professor at Universit   Laval in Quebec City, Canada, set up and taught an experimental workshop on creative holography for the Spatial Imaging Group of the Media Laboratory at the Massachusetts Institute of Technology, USA. The workshop, designed by Cossette, was dedicated to the development of concepts and techniques in holographic creation as well as a new educational and artistic approach to holographic studies.

The project to design a course on holographic creation for the Media Lab at MIT came about after she had been in contact with Prof Stephen Benton for several years. He was familiar with her work and approach, and her educational concerns in holography. She believes that it was her way of handling photographic aesthetics in courses at the School for Visual Arts in Quebec City that had impressed him.

She does an enormous amount of research for the content of her courses, opening them up to what is currently being done in the field, to the artists, and to their different approaches. As a result, she has put together a considerable book-like collection of visual documentation designed for the teaching of holography at her own university. Several holographers from around the world have helped her to make up a fantastic, documented slide collection on holograms.

Her twelve years of research, combined with her own creations and teaching experience in photography and design had qualified her to develop a new aesthetic approach to holography for the Media Laboratory at MIT. The subsequent awarding of a sabbatical year by Universit   Laval allowed her to accept Professor Benton's invitation.

As in other courses she has taught, she began by putting together a study guide which was the body of the course. It included the underlying philosophy, objectives and methods. She was aiming to encourage the students to develop an ability to analyze and synthesize when considering the organization of the visual elements, since these same elements ensure the convincing quality of a holographic image. This structured reflection opens them up to choice and creativity, and takes them beyond the technical contingencies, she believes.

"I see visual learning as being the ability



Marie Andrée Cossette at work at the Media Lab, MIT, Cambridge, USA.

to *not* immediately accept a result, even if technically it is a success. Rather, it is the ability to ask oneself questions about the visual content and about oneself. It means *not* being afraid of criticism," she says.

"It is important in holography that the creative process happens at the same time as the learning of the techniques. It would be illusory to think that once a technique is mastered, one is in a position to create works of art. This medium, like others, requires a deepened understanding of the visual approach. As a teacher, I have always been interested in looking at the expressive, conceptual, aesthetic and critical aspects, as well as the technical ones. The challenge offered to me at the Media Laboratory was most interesting, and I think I handled it well as the workshop is still going on."

She sees the workshop as being a course rather than just a workshop. She combined the important theoretical aspect with the practical so that the students had a wide range of possibilities in the organisation of holographic space. The teaching project, with its lectures, demonstrations, technical exercises, thematic assignments and visits to exhibits, was designed to guide the students through their elaboration and application of a coherent visual presentation.

Most of the students had a technical or scientific background and found that initially they sometimes found her artistic language hard to understand.

"There was a bit of hesitation when, for example, I spoke of ephemeral or transient concepts. However, I must say that the exercises and projects which I proposed to my students helped clarify certain visual characteristics and quickly gave meaning to my vocabulary," she recalls.

Through these reflections on aesthetics, the students had to explore such assets as lighting, texture and colour in order to meet the requirements of the chosen themes. Certain projects involved simply making one hologram, whereas others required two or three holographic images. One of the challenges in this area was coherency in the sequencing of images.

She used various means, including her sizeable slide collection.

"Thanks to these slides, I was able to show the approaches of many artists and researchers in fields as varied as architecture, design, photography, fine arts and holography. These slide presentations were always accompanied by a variety of up-to-date articles concerning the creation as well as the technique involved in holography," she says.

With the support of Prof Benton, she was also able to have the New York artist, Rudie Berkhout, come and speak about his approach and show some of his holograms. This meeting was not only enriching for all, she says, but very motivating for the students: it gave them the chance to intensify their own vision of the process involved in the production of

holograms.

The students also visited two holography exhibits which were held in Boston. As a follow-up, she invited them to write a summary in which they had to formulate their own opinion and develop their critical abilities.

These observational approaches to holographic creativity complimented the exercises and assignments in which they created their own works. In these projects, they were asked to defend the conceptual process as well as the organisation of space and chromatics.

The experience of teaching and experimentation at the Media Laboratory also brought her many things personally. Firstly, she learned a lot from Prof Benton.

"Working closely with a science researcher who is sensitive to artistic creation is very gratifying for an artist. His professionalism was also a great contribution for me."

She feels so positive about her experience at MIT that she already foresees doing a series of different courses on holographic creation.

However, she says that, most importantly, the experience has given her motivation which allowed her to realize that she needs to set up her own laboratory in Quebec City in order to continually pursue her own creative works and develop educational projects which will be truly novel.

by Elaine Hémond



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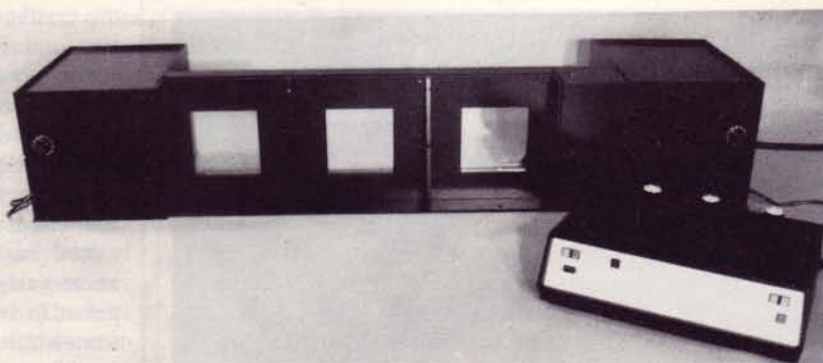


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Claudette Abrams' "Personal Effects"

After sliding the tray into the assembly of the dishwasher he placed his ear next to the hot sheet metal. The sound of the dancing spray and jiggling plates helped him to ignore the constant dispatch of the others.

He was tired and this was his way of catching a ninety second nap. He would rest his hands on the controls, feigning the gestures of an engineer. The others thought he had an eccentrically intimate understanding of things mechanical in nature.

lation comprised of three rectangular aquaria, each filled with water and supporting fish, each tank set at eye level on identical and plain metal stands. Into each tank is projected a hologram, and at the base of each stand is a rectangular white card onto which is clearly set a text. The tiny fish swim serenely and almost happily in the clear and determined aqua-environments, while the gallery itself takes on the atmosphere of an observation room, or control room of some massive and industrial facility. The holograms, which ap-

through a well-considered use of crafted and assembled motifs (all of which project depth, from the sculptural nature of the installation, to the illusion of the holographic images, to the implied narratives of the texts). She has composed a visual and textual installation that, in spite of the contemporary significance of the technology employed, creates archetypal references and allusions of human endeavour and demise.

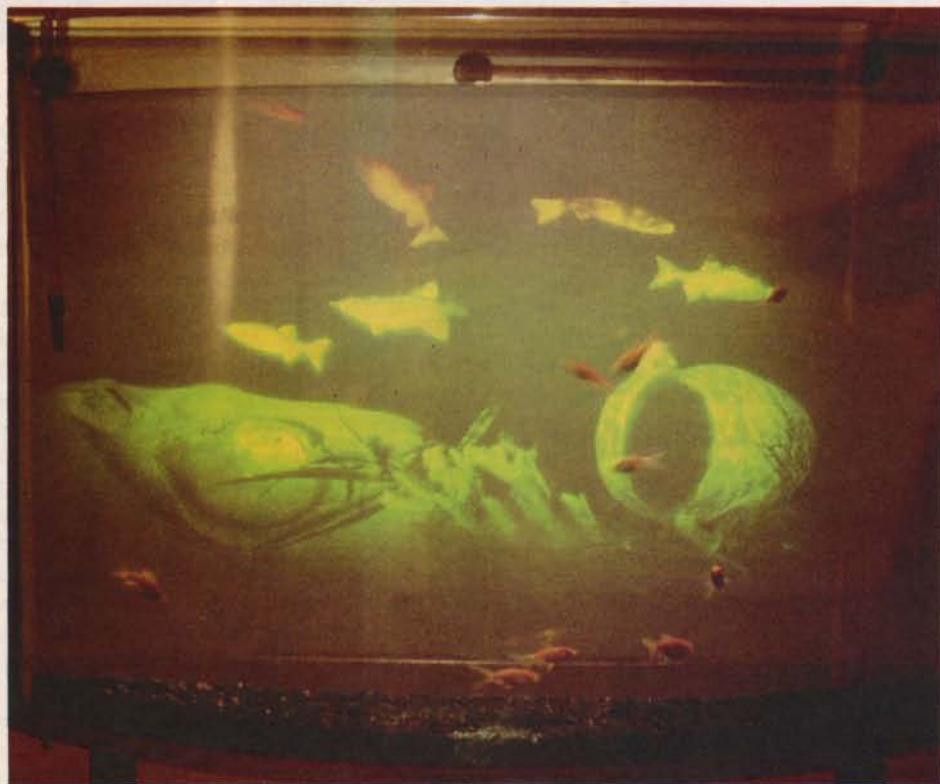
Upon entering the gallery, the viewer is almost immediately struck by the serenity of the environment, and by a sense of buried time, inscribed information, and by a meditative, post-tragedy hum.

One is easily set into the role of archaeologist, an intellect driven by desire, compelled to examine and to gaze, to carefully stir about below the surfaces, exploring and diving, confronted with the remains of human and natural incident: time-linked remains cast in an on-going creation. The viewer is compelled to reassemble the temporal realities from which certain artifacts, like the holographic urn in one of the tanks, come (for example, the vision and pretexts that caused them to be made). Inevitably, due to the tidy artifices of the work, the viewer apprehends an irony of existence.

The installation has an industrial age surface, in contradiction to the dust-free grace of its relationship to light (in terms of the holographic medium employed). The metalwork of the tanks and their stands is unfinished. The gurgling of the air bubbles pumped into the tank water is audible. The room is darkened, with pools of light around the operating elements.

The holographic images themselves point to past activity or process, not to present time. The earthenware might be centuries old, the car tire is an industrial image, and the shoal is a result of a specific natural process.

Contemplating the installation, the viewer can imagine him or herself inside the tanks, as a diver encountering human and natural debris (a sand shoal, for example, is formed by the consistent settling of sand particles). These images seem suspended outside of their own time and suggest a catastrophic termination.



Claudette Abram's "Personal Effects": holographic installation.

Because the machines were so loud and his English lacked conviction, the others tended to yell at him. They barricaded him with carts of filet mignon and chocolate cake and cigarette butts in the mashed potatoes and gravy.

He wondered if the others had ever had such a strong feeling of *deja vu*."

One of the three texts written by the artist for "Personal Effects", a holographic instal-

pear submerged in the water in each of the tanks, are of a car tire, an earthenware pot and a sandy shoal. These holograms are convincing elements of the aqua-environments in each of the tanks.

In *Personal Effects*, Claudette Abrams has clearly cast and signified the natural and artificial objects of her artistic concern, as well as thematic objectives, in a literary sense,



Detail of one of the pieces in Claudette Abram's "Personal Effects" collection.

The viewer's entry, or dive, into the installation metaphorically describes the viewer's very place in the environs of the artwork. As the diver or archaeologist looks for clues in order to reassemble the past events, so does the viewer move through Abrams' art.

Abrams' work suggests an abeyance of process, a stationary view of human existence — only the fish and water move. The texts under each tank describe brief moments, each a single situation that sets the mental condition of the two female and one male characters described. The text linked to the car tire hologram is about a woman, whose car ride in ended by a blowout. She is under a "rush of horror" as the lights of another grow larger in the mirror. In the text linked to the hologram of the shoal, a female character sits immobilised with a "list of things to be done" after imagining herself "surrounded by the Swiss Alps and goats." In the text quoted above, which is under the hologram of the urn, the character is locked into the certainties of a situation, as he has often been before, and is so isolated from others that he wonders if they have ever felt what he feels.

The prevalent irony of the work is that the viewer can readily recognise each of the textual and visual scenarios, have a sense of a full picture, be confident in this sense and its implicit knowledge. It is only when the viewer considers the full installation as an assemblage or finds of human vision and demise, that the artifice of the work becomes patently evident, and the viewer's self-image becomes fractured and submerged.

The work moodily acknowledges the overlap of apparently independent life cycles. It is similar in feeling, say, to finding someone's remains and considering when your own will be found.

Personal Effects also imparts a Jules Verne quality, a fascination with and optimism inspired by machinery and industrialization. And yet, this hopefulness is undermined by the artwork's ability to coolly encapsulate nature and human ruin (including artifacts of language) in the clear and simple lines of metal, glass and light.

Abrams' use of holography in her art making is more than competent and interesting. As an artist, she has developed subtle and resonant aspects of this technological process, in terms of its application for mixed media installation. Her work deserves attention, not only for its intrinsic merits as artwork, but for its contribution to the development of holography as a rich and inspired medium for artistic creation.

by Fred Gaysek

The original "Personal Effects" collection has been divided since this review was written, but pieces of it can be seen at the following venues:

The Pavilion, San Jose, California, USA from 14 October 1988 to 5 February 1989; FAUST, Toulouse, France from 19-24 October 1988; The Ontario Science Centre, 770 Don Mills Road, Toronto, Ontario, Canada, on permanent display; Holomagic Gallery, 917-

17 Avenue SW, Calgary, Alberta, Canada, on permanent display. For more details of these and other exhibitions, see the Calendar.

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T-Shirt Market: Up for Grabs

Technical breakthroughs in hologram manufacturing and application methods have just recently made hologram adorned apparel a retailing reality. Whether it's combining a hologram with an astronaut, dinosaur or a crazed-looking surfer, transfer companies and screenprinting companies alike are hustling to come up with a unique look in apparel that they hope will set the young alight.

Holograms are showing up on T-shirts, but they're not just stuck on the shirt at random. They work as an integral component of the transfer or screenprint design.

Both 2-D/3-D and 3-D holograms have their marketing advantages in terms of clothing. Jay Thirkell, sales manager of F&M Expressions Unlimited in Fort Lauderdale, Florida uses both types.

"A 3-D hologram is better with the older, more fashionable market because of the beauty and detail in it, but it needs full sunlight to really come alive. A 2-D/3-D is more colourful in more types of light — the kids really love it."

Although holograms fixed to T-shirts are a new phenomenon in the customised apparel market, some companies have already experienced encouraging results in merchandising the product.

Holographic Dimensions Inc of Miami, a hologram manufacturer, has sold 500,000 holograms for T-shirt decoration to 15 countries within the last sixth months. This includes France, Britain, West Germany, Italy, and Australia.

T-shirts with holograms and ink designs have also received a warm welcome in initial marketing in the US. Diversified Graphics Ltd of St Louis, a 30-year-old screenprinting company, test marketed its product recently in local retail shops and sold 50% of the trial inventory on the first day.

"The retailers were calling for more stock after the item was on the shelf only one day," says David Fry, Diversified Graphic's national sales manager. "We were ecstatic; I've never seen a reaction like that in retail be-

fore."

F&M, a nine-year-old transfer manufacturer and distributor, premiered its holographic transfers at The Super Show '88 in Atlanta in February. "Every qualified T-shirt shop that I spoke with made an order. The reaction was phenomenal. It's a new boost for them. It's the new thing that will break their spring and maybe even make their whole summer," F&M's Thirkell says.

Because holographic apparel is merely in its infancy, the competition to get a foothold in the market is stiff.

In transfer form, at least one company attaches the holograms to the transfer with a glue that disappears with heat. The hologram and transfer then go onto the shirt simultaneously with a conventional heat press. In a holographic pre-print, the hologram may be attached with a heat press either before or after the printing. No one technique is used by all firms active in this; new methods seem to be cropping up even as the trend gets a good retailing foothold.

Because holograms are applied with basically the same process as a transfer, they are natural for integration into that market.

"We want the T-shirt transfer shops to get the product first. We want them to be on the cutting edge, because that's what they need to compete with the larger department stores. Department store buyers tend to follow the trends they have seen somewhere else," Thirkell says.

But preprint companies have been hustling also. "We are using holograms from other holographers as well as our own, so we have a good stock image inventory," notes Kevin Brown, owner of Holographic Dimensions. "We built up our inventory because we realised this would be a big thing and the key element was getting it in front of the buyers — we wanted to get on in the US market fast."

The newness of holograms makes their marketing a wide-open venture with different companies choosing different avenues. You will find holograms with transfers and

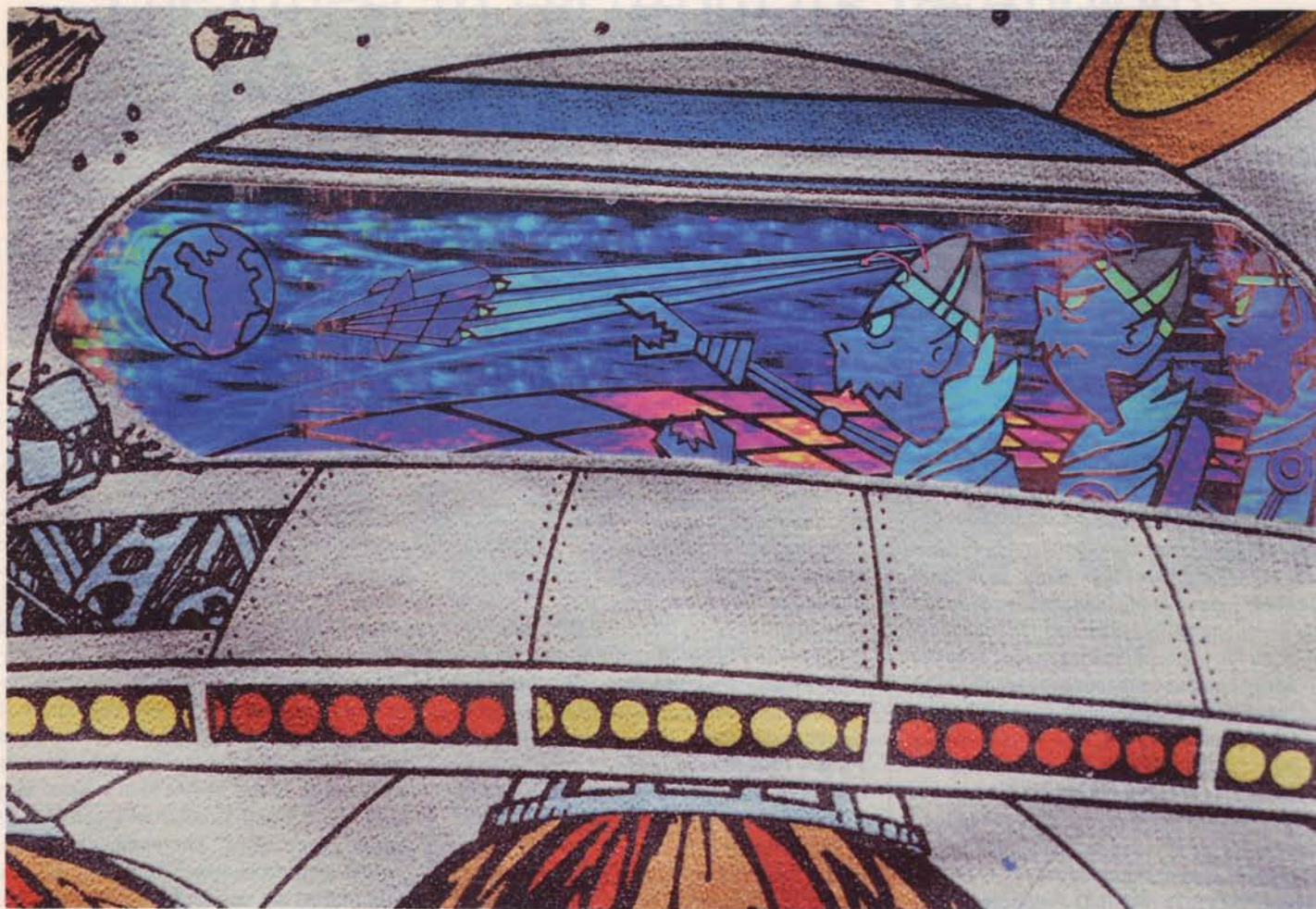
screenprints in preprint form, as well as in separate transfer form. Holograms may also be purchased separately so any shop can create its own look.

Companies such as Diversified Graphics are putting a great deal of thought into merchandising. The company has target marketed major department stores and specialty shops to sell the line of holographic T-shirts that it manufactures and screenprints. It has already sold to such chains as KG Men's Wear, May D&F, Belk's and Nordstrom's and has its sights set on more. The company's target market spans from ages 5 to 25. Fry says the firm started by deciding what artwork and holograms would appeal to consumers going to the boy's and young men's sections of a store. It then chose major themes and developed artwork around stock holograms obtained from Light Impressions of Santa Cruz, California.

"For the younger age group, we developed designs with zebras, dinosaurs, and astronauts," Fry says, "Australian scenes and surfers appeal mostly to the 12-25 age group. But skateboarding is so popular that we developed a shirt for each age division. The older group's has a realistic skateboarder with a hologram skull at the bottom of his skateboard, and the younger design has a creature on the skateboard."

Thirkell says that F&M has found popularity with a "New York" design that features a 3-D Statue of Liberty hologram and a "Paris" shirt that has a 3-D Eiffel Tower hologram. "They are very simple designs, but the name of a famous place seems to be a popular fashion statement today," says Thirkell.

Also important to marketing plans is pricing. Affixing a hologram on a T-shirt makes it a more up-market item, but it can't be overpriced if it's going to sell to the youth market. Holographic Dimensions, for example, is wholesaling its hologram designs on Hanes T-shirts for \$9, and it expects retailers to set prices at \$15 to \$20. The company is also selling 2-inch by 2-inch holograms with 10-colour transfers for \$3.50. A hologram alone



T-shirt by Holographic Dimensions Inc. of Miami, Florida

will go for 20 cents per square inch. F&M is wholesaling its five-colour hologram transfers for \$2.50.

As far as marketing is concerned, licensed holograms are an obvious direction for this trend to move. Walt Disney and Harley Davidson holograms have already appeared in Europe. In the United States, however, companies are still busy negotiating for these rights.

"Licensing holograms in the US is wide-open because no one is doing it yet," says Brown. "Holographic Dimensions is currently sorting through a number of possibilities — it will take only a few strong licenses to penetrate the market." The company has already developed its own character that it will license — Holoman and his Holodog, Laser — a sort of 21st century Buster Brown and his dog, Tag.

Diversified Graphics is currently in negotiations with the National Football League to screenprint a licensed line of designs to include all 26 teams. "The NFL approached us not only because they believe the hologram is a great vehicle for sales but, more importantly, because they want to be like MasterCard and guard against counterfeiting," Fry states.

Other companies that have approached him with an interest in licensed hologram T-shirts are Swatch of America and Coleco, which

manufactures Cabbage Patch Kids.

The declining cost of holograms has been key to their integration into the custom apparel industry, of course, but another missing link was the way to affix the holograms to shirts. That link was found about two years ago by Heat Seal Co, a British transfer company and one of the first to develop a heat-applied adhesive process. "As a holographer, I was looking for a way to get my holograms onto shirts, so I approached Heat Seal and purchased a licence to its application method," says Brown. "So what we have here is a very durable, machine-washable hologram incorporated into a bold graphics design on a T-shirt."

One indication of the competitiveness of holographic T-shirts is the fact that not all companies are prepared to divulge the name of their adhesive supplier. But each seems equally confident of the quality of their glue. "Our shirts have been wash-tested 40 times," claims Thirkell. "We're dealing with the patent holder for putting Mylar-based holograms on fabric. If it falls off, we'll pay for the shirt."

There are signs that there will be some court action surrounding the adhesives. All of the companies who have developed hologram-application processes have been quick to apply for patents.

Litigation notwithstanding, more companies will probably join the competition searching for a piece of the holographic pie. Hologram distribution plans of companies point towards a saturation of the garment decoration market. The images may soon be found on towels, caps, oven gloves, aprons and more fashionable garments.

"Our future plans include working with garment manufacturers as far as placing designs and customizing designs for their up-market activewear lines going into the boutique, pajama and surf markets," says Thirkell.

Fry agrees with Thirkell, and predicts that the holographic garment decoration market will only become more congested. "What will happen now, unless we can come up with some difficult-to-achieve patents, is other manufacturers will buy holograms and attach them to their shirts. Then it will get down to who has the best graphics. It will be an all out race."

by J Sharpe Smith

Adapted, with permission, from "The Press Magazine", Weisner Publishing, 5951 S Middlefield Road, Littleton, CO 80123, United States.

Dyen's Big Bang II in the Big Apple

Georges Dyens, Canadian sculptor and holographer, former artist in residence at the Museum of Holography in New York, is opening the season this autumn with two exhibitions of his works, at the Museum of Holography and at the Alternative Museum of New York.

Dyens' creates "environmental installations" by integrating sculpture, holography, fibre optics and electro-acoustic music. His "holosculptures", which use electronic systems to evolve through time and space, are more "spectacular" than traditional sculpture or holography.

He is a graduate of the Ecole Nationale Supérieure des Beaux-Arts of Paris and the New York Holographic Laboratories and has been awarded the Premier Grand Prix de Rome and Prix Suisse (Biennale de Paris).

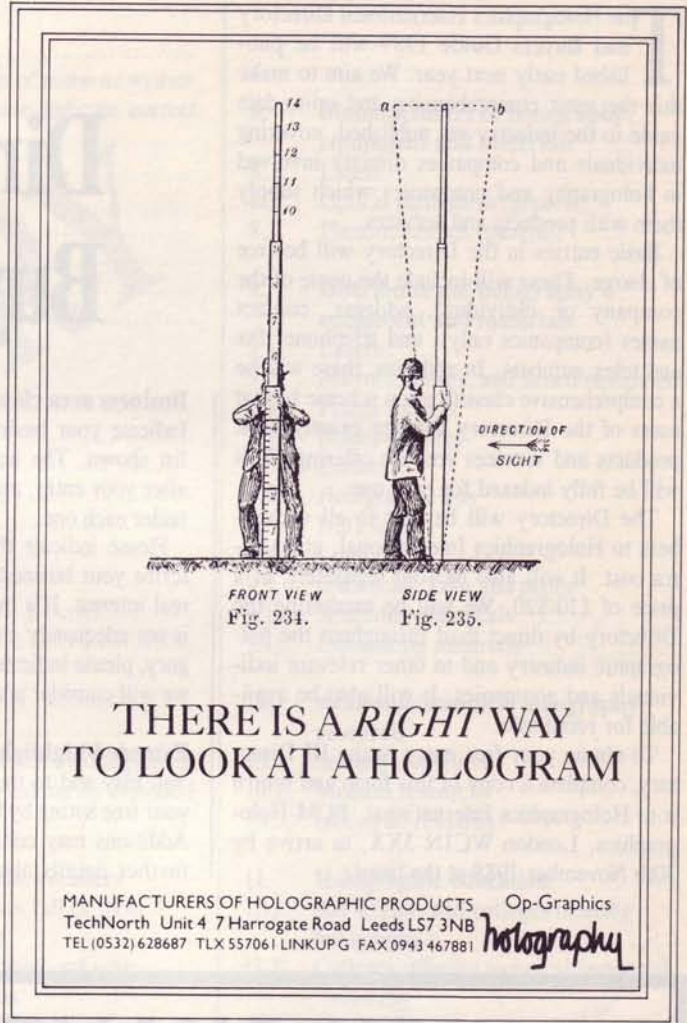
His works — large, bleached, transmission shadowgrams —

have been produced in a number of places: the New York Holographic Lab (consultant — Dan Schweitzer); the Atelier Holographique de Paris (consultants — Pascal Gauchet and Jonathan Collins); Holographics North (consultant — Dave Stevens); and at the Museum of Holography in New York.

Dyens has recently been commissioned to design a permanent monument integrating a half-metre square hologram in Montreal.

The Alternative Museum will be showing Dyens' "Big Bang II", described as a "technological stonehenge", in September and October, while the Museum of Holography will be featuring his work until February of next year (see calendar for full details).

Both shows are available for touring. Contact Carole Brisson in Montreal, Canada, on (+1) (514) 598-8860.



Georges Dyens', 1987, "Big Bang Number II": holographic effects.

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Basic entries in the Directory will be free of charge. These will include the name of the company or individual, address, contact names (companies only), and telephone, fax and telex numbers. In addition, there will be a comprehensive classification scheme so that users of the Directory can see exactly what products and services you are offering. This will be fully indexed for easy use.

The Directory will be sent to all subscribers to Holographics International, at no extra cost. It will also be sold separately, at a price of £10/\$20. We will be marketing the Directory by direct mail throughout the holographic industry and to other relevant individuals and companies. It will also be available for retail sale.

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Directory and '89 Buyer's Guide

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2. Origination for mass production

- 2.1. Stereograms/integral
- 2.2. Continuous wave
- 2.3. Pulsed
- 2.4. Pseudo-colour
- 2.5. Stock images

3. One-offs and limited editions

- 3.1. Stereograms/integral
- 3.2. Continuous wave
- 3.3. Pulsed
- 3.4. Pseudo-colour
- 3.5. Natural colour
- 3.6. Portrait service
- 3.7. Animated holograms

4. Holographic fine artists**5. Galleries, museums, retailers**

- 5.1. Commercial galleries (all or most holograms on sale)
- 5.2. Galleries of holographic art with changing exhibitions
- 5.3. Permanent or semi-permanent exhibitions
- 5.4. Museums of holography (curating)
- 5.5. Private galleries (not open to general public)
- 5.6. Retail outlets for holograms and holographic items
- 5.7. Museums and art galleries which often show holograms
- 5.8. Scientific exhibitions of holography

6. Commercial applications of display holography

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- 6.2. Business promotional products
- 6.3. Holographic novelties (jewellery, cards, badges, etc.)

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- 7.3. Holographic optical elements
- 7.4. Head-up displays

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- 8.3. Photo-materials (general)

9. Distributors of holography equipment and materials

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- 9.2. Mirrors, lenses, and bench equipment
- 9.3. Fringe lockers
- 9.4. Isolation tables
- 9.5. Etalons
- 9.6. Holographic kits
- 9.7. NDT kits
- 9.8. Lighting
- 9.9. Chemicals, film and plates
- 9.10. Speciality chemicals
- 9.11. Laminating materials

10. Academic/scientific holography research

- 10.1. Scientific research
- 10.2. Medical research
- 10.3. Industrial research

11. Holographic education

- 11.1. Art schools and colleges offering holography
- 11.2. Colleges offering technical/industrial training
- 11.3. Speciality holography colleges/courses
- 11.4. Tutors
- 11.5. Providers of educational materials

12. Other holographic services

- 12.1. Consultants
- 12.2. Marketing and distribution
- 12.3. Wholesalers
- 12.4. Hot stamping of holograms
- 12.5. Rental of holography studios
- 12.6. Rental of holographic equipment
- 12.7. Model makers
- 12.8. Holography agencies

13. Publications on holography

- 13.1. Newsletters
- 13.2. Magazines
- 13.3. Other publications

14. Other organisations involved in holography

- 14.1. Holography societies and associations
- 14.2. Other organisations

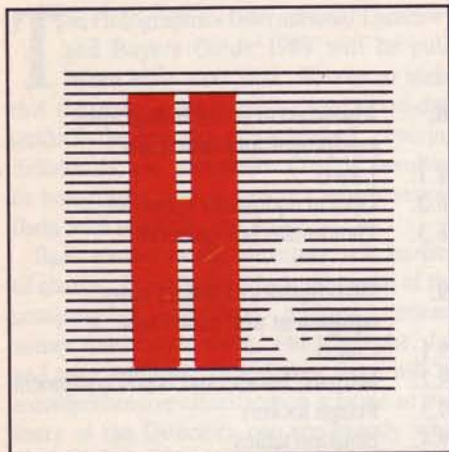
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Full, half and quarter page display advertisements are available. All such advertisers will have a reference to their advert included with their free entry, and they will be listed in the index to advertisers.

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If part of your business is not adequately covered by these classifications, please suggest additional categories:

Please attach the name and address of anyone else you know who would qualify for an entry in the Directory but has not received a form (or give them a copy of this form).



Back Copies

Holographics International has back copies of all issues available for sale. They can be ordered by filling in a copy of the subscription form shown. At present, issues one and two can be purchased for £5 or US\$8. Issue three sells for the cover price of £3 or US\$5. For the future, we intend to offer all back issues at the higher price except for the one preceding whichever issue is current.

Advertising Index

Agfa-Gevaert Limited	17
AH Prismatic Limited	35
Chicago Museum of Holography	27
Crown Roll Leaf Incorporated	8
Global Images Incorporated	36
Holocrafts	28
Hologram Industries	2
Holos Gallery	16
Holo/Source Corporation	28
Ilford Photo Company	4
Keystone Scientific Company	25
Laza Holograms	32
Light Impressions Limited	20
Op-Graphics Holography	31
UK Optical Supplies	20

We hope you have found this issue of Holographics International informative and interesting.

In future issues we will continue to cover artistic, scientific and commercial uses of holography and to look at the people and companies who are researching into, marketing and making holograms. Each issue will feature technical articles, news of the latest developments in the world of holography and independent reviews.

Our subscription price has now increased to £15 or US\$25 for four quarterly issues to include a copy of the Holographics International Directory and Buyer's Guide, which will be published in the first quarter of 1989. Our cover price remains unchanged at £3 or US\$5, but since the Directory will be sold at £10 or US\$20, it makes a subscription even better value.

We plan to make our directory the most comprehensive guide yet to the people and companies involved in all aspects of holography. It will be fully classified to allow holographers, or those interested in doing business with holographers, to find each other easily. Details of how to make sure of your free listing and advertising rates are shown on the previous page.

To subscribe, please send a completed copy of the form below, and a cheque payable to Holographics International, to: Holographics International, BCM-Holographics, London WC1N 3XX. Or, if you prefer, we can invoice you.

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 Address
 Postcode/Zip Country
 Telephone number.....

Please indicate the nature of your business or profession. (Circle more than one if applicable.)

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- Embossed Hologram Manufacturer (b)
- Holographics Artist (c)
- Commercial Holographer (d)
- Optical Equipment Manufacturer/Supplier (e)
- Photo Materials Manufacturer/Supplier (f)
- Industrial/Scientific Holographer (g)
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- Advertising/Public Relations (i)
- Publishing/Writing (j)
- Other (please specify)

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Don't forget that we are always glad to receive news about exhibitions, new products, technical developments, etc, in all areas of holography. Put us on your mailing list.

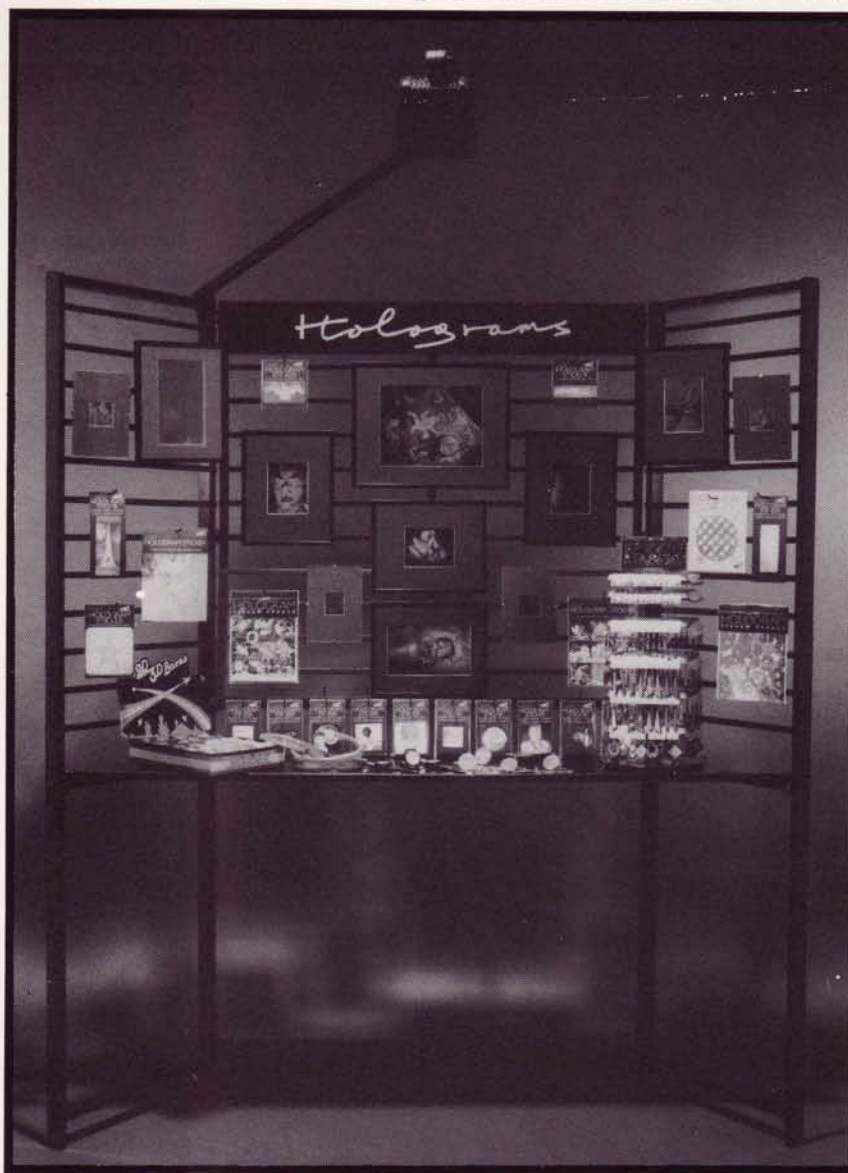
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Pictured above: Floor Standing Unit displaying Film Holograms, Laser Jewellery, Laser Discs, Laser Spex, Hologram Jigsaws, Stickers and Boxes.

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