ELECTROSONIC WORLD

ELECTRONIC IMAGES, VIDEO, LIGHTING, AV & MOTION PICTURE CONTROL

No. 8

INSIDE

Read about world wide applications of video displays, big electronic images, audio visual systems, lighting control and automatic motion picture systems.

THE BIG ELECTRONIC IMAGE

Electrosonic is the Big Image company. As a manufacturer of equipment to enhance the performance of big screen and multi-screen imaging, and as systems engineers providing complete audio visual solutions for entertainment, business and public services.

Shown here are two examples. On the left the center big image display shows workstation graphics at Detroit, Michigan's Metropolitan Integrated Transportation System Control (See Page 11). On the right a striking videowall display is installed in the lower concourse area of Geneva Station, Switzerland. (See Page 3).

Both these big screen installations are based on Electrosonic PICBLOC™ and PROCUBE™ products.

Mystery

Mystery Lodge at Knotts Berry Farm, Buena Park, CA, shown on the left, is an amazing show produced by BRC Imagination Arts. The automatic show presentation system was built by Electrosonic to BRC's tight specification. Read about it on Page 16.

The Grand Palais complex in Lille, home of an AVIATOR T180 console.

Celco in Lille and Manchester

The Celco division of Electrosonic Ltd offers a unique range of lighting control consoles and dimmers for live entertainment. While the original designs were based on the needs of the "rock'n'roll" touring market, the new consoles are suitable for touring, conventional theatre, TV studios and multi-purpose venues.

A steady stream of Celco products is finding its way into a wide range of fixed installations. A couple of recent projects are the delivery of the top-of-the-range AVIATOR™ consoles to the Grand Palais in Lille, France and to The Green Room Theatre in Manchester, England.

Both venues took delivery of "T" versions of AVIATOR. This version retains the "hands-on" approach of all Celco products, but includes a rate playback section making it suitable for conventional theatre work.

...continued on Page 8

NAUTICUS, Norfolk VA has AV system engineering by Electrosonic Systems Inc.

Systems Worldwide

Electrosonic engineers complete audio visual control and presentation systems wherever big images are required, but especially for museums, visitors' centers, decision spaces and public display. The emphasis is on systems which allow us to develop the market and maintain expertise in the use of our products.

Recent important installations have included the complete AV systems at Telecom World in Hong Kong, described in a feature article on Page 12, and the engineering of many of the interactive and big screen displays at the USA National Maritime Center, NAUTICUS, described on Page 13.

Telecom World in Hong Kong uses networked computers for its interactive displays.

As this issue of ELECTROSONIC WORLD went to press we had just completed important installations at the American Museum of the Moving Image in New York, the American Museum of Natural History, also in New York, and the newly opened Futurevision attraction at the Granada Studios Tour in Manchester, England. More details on Page 4.

Currently our systems order book includes groundbreaking big image display systems for installation in Europe, the USA and the Pacific Rim.

An IMAGEMAG™ videowall is used in the "Electronic High Street" exhibit at Granada Studios Tour.

Lighting Control in Singapore

The recently refurbished Holiday Inn Parkview in Singapore has an IMAGINE™ architectural lighting control system for the public area lighting. IMAGINE is ideal for large lighting installations requiring automatic multi-scene operation.

Lighting design is by Project Lighting Design of Singapore, working to the brief of interior designers Leese Robertson Freeman of Hong Kong. The Electrosonic dimming system was supplied and commisioned by our local dealers LSI Singapore.

Helvar

As described on Pages 4 and 5 Electrosonic architectural lighting control products are now managed and distributed by the Lighting Division of The Helvar Electrosonic Group, but they are always available to support Electrosonic systems installations.

The main lobby at Holiday Inn Parkview, Singapore, uses IMAGINE dimmers.

EDITORIAL

Welcome to the eighth issue of our bi-annual publication ELECTROSONIC WORLD. We hope that you find within it some stories of interest whether you are an end user, a consultant, a re-seller of our equipment or even a competitor. We have always believed that news of good examples of the use of lighting control and audio-visual techniques helps raise standards everywhere, and we are just as willing to learn from the experience of others, as we are to share our experience with everyone with an interest in our fields of activities.

It is now about six years since Electrosonic Ltd became part of the Helvar Electrosonic Group. In that time there have been some significant changes in the way we work brought about by a combination of rapid technological change, a major recession, and the creation of a larger group. In late 1995 an important decision was taken to focus Electrosonic's business on the "digital image". How this affects our approach to our markets is described in more detail in "Company News" on Page 5.

In today's competitive and fast moving markets all businesses must have a clear idea where they "add value". It may be in the origination of a product, but is often in the level of support and long term commitment. We have elected to concentrate on those product areas and business activities where we give best value, and in the process have discontinued some of our "traditional" products, even including some where we were industry pioneers.

We are already reaping the benefits, and we expect our customers to do so too. High investment in new products is resulting in products which add value to our customers' businesses. These new products are opening up exciting new applications for all of us.

ELECTROSONIC WORLD

An occasional publication of:

Electrosonic Ltd,
Hawley Mill,
Hawley Road, Dartford,
Kent DA2 7SY,
United Kingdom.
Telephone +44 (1322) 22 22 11
Fax +44 (1322) 28 22 82

Multivision Electrosonic Ltd.,
94 Scarsdale Road,
North York, Ontario M3B 2R7,
Canada.
Telephone +1 (416) 449 1700
Fax +1 (416) 449 5131

Electrosonic Systems Inc,
10320 Bren Road East,
Minneapolis, MN 55343 USA.
Telephone +1 (612) 931 7500
Fax +1 (612) 938 9311

Electrosonic Ltd.,
603-5 Wilson House,
19-27 Wyndham Street,
Central, Hong Kong.
Telephone +852 2525 1828
Fax +852 2877 5811

Electrosonic Systems Inc,
3320 N. San Fernando Blvd,
Burbank, CA 91504 USA.
Telephone +1 (818) 566 3045
Fax +1 (818) 566 4923

Electrosonic specialises in the manufacture of lighting control, video display, movie and audio-visual products and systems. Electrosonic distributors and correspondents are in other major countries throughout the world.

Electrosonic GmbH,
Hans Böckler Strasse 60,
40764 Langenfeld,
Germany.
Telephone +49 (2173) 71007
Fax +49 (2173) 81008

Electrosonic World is
© Electrosonic Ltd. 1996
Editor: Robert Simpson
Research and Production:
Yvonne Hegarty
Research Assistant: Julie Reid

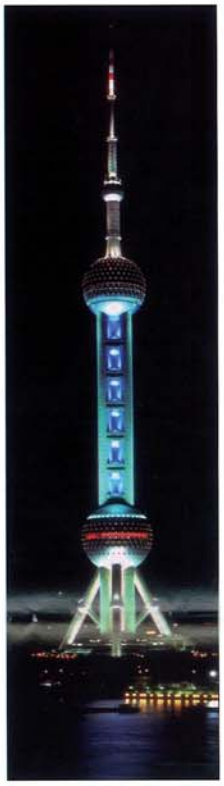
INTERNATIONAL PROJECT NEWS

One of the strengths of the Helvar Electrosonic Group is that it thinks and works internationally. These pages describe some recent projects undertaken by Electrosonic which have involved international co-operation to complete.

SHANGHAI TV TOWER

The new Shanghai TV Tower uses Electrosonic IMAGINE™ lighting control for its exterior lighting. The 460m high tower is the third highest in the world and the highest in Asia. It stands on the banks of the Huangpu River in the newly developed area of Pu Dong, directly opposite the famous Shanghai Bund. The tower entertains two million visitors a year.

The tower was designed by the East China Architectural Design Institute, and built by Shanghai No. 1 Construction Corporation. Two huge spheres, 40m and 50m diameter, are joined together by three 9m diameter tubes. The spheres contain public entertainment facilities in addition to the TV and radio transmission equipment. Five intermediate levels link the three tubes and make up a family hotel.



The 460m high Shanghai TV Tower at night.

Odelic

The overall exterior lighting scheme for the tower was designed, supplied and commissioned by Odelic (formerly Ohyama Lighting) of Tokyo. They used advanced CAD colour rendering programs to present different possible schemes to the client. The lighting is almost entirely made up of metal halide discharge lamps, many coupled to fibre optics. High power xenon arc projectors sited at ground level throw shafts of light to the top of the tower.

The idea is that, when dusk falls, the lighting of the tower continually changes in varying patterns throughout the evening. 27 full size IMAGINE racks are located at various levels within the tower and control 320 20A circuits of lighting. In this case the IMAGINE modules are mainly being used as programmable solid state power switches. Five SCENESET™ controllers are used, all controlled by a SCENE MANAGER™.

Our Hong Kong office worked closely with Odelic during the specification of the project and also helped with the final programming of the system. Through a quite different supply route, in a sale handled by our Toronto office, we also supplied the project with three 4x4 PROCUBE™ videowalls, which are installed in the public areas.

The Morgan Stanley Boardroom at Yebisu Garden Place in Tokyo, Japan.

Tokyo Boardrooms for Morgan Stanley

Electrosonic's project engineering and project management expertise is in evidence at the new Yebisu Tower headquarters of Morgan Stanley in Tokyo. Here we were commissioned to provide complete audio visual systems for two Information Technology training rooms, two Development training rooms, a Boardroom, a Multi-Purpose room, and smaller elements for the Video Conference and Interview rooms.

The work in Tokyo came about after Electrosonic had completed two prestige projects in 1994 and 1995 for Morgan Stanley in London. Apart from the confidence engendered by this earlier work, an important reason for Electrosonic being chosen for the Tokyo project was the presence in Tokyo of Toyo Eizo, our long-standing distributor, who both assisted us during the installation phase, and who provides after-sales support.

One of the IT Training Rooms, with Sun workstations.

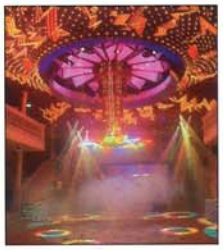
In Tokyo all six main rooms were equipped with Barco 1208 Graphics projectors. While the training rooms used front projection, the Boardroom and Multi-Purpose room used back projection with Maratel high resolution screens. As far as practicable the various rooms used equipment to a common specification; for example AMX room control, Extron interfacing, Autopatch routing, Shure microphones, Panasonic VCRs, Denon show sound, Baldwin-Boxall/DNH speech reinforcement, Canon video cameras, Sabine feedback eliminators and Elmo TRV35 slide to video converters (although the Boardroom used direct slide projection with Kodak projectors).

Projection needed to be of the highest standard because a principal source for Morgan Stanley is the Sun Workstation. In the special case of the IT Training rooms, Hyperconvertor scan conversion was provided to allow simple remote monitoring and video recording of computer images. While the detailed system design for the project was by Electrosonic, it was done to a tight brief prepared by Morgan Stanley's advisers, Modelock Consultants.

The Development Training Rooms have flexible layouts and are back to back, so can open out to one space as shown here.

Palacio instals AVIATOR

A discotheque has to be special to instal a top professional lighting desk - but Palacio, in the Paris suburb of Ivry-sur-Seine is very special. Accommodating 3,000 people and costing FF 25million Palacio is equipped with the very latest sound, laser, video and lighting equipment.



Palacio disco in France uses AVIATOR EPX. Photo from World Disco Review.

Top of the lighting inventory is a Celco AVIATOR™ console. The EPX version is installed, ideal because of its big channel capacity (360) and compact footprint. Celco Division worked closely with French distributor Sonoss to ensure Palacio's needs were met.

PICBLOC in Geneva and Hong Kong

Electrosonic's videowall products are used worldwide. Sometimes we undertake the complete project engineering, but more often the system packaging is done by local partners. Two examples of the effective international application of PICBLOC™ image processing and PROCUBE™ displays are shown here.

The installation in Geneva referred to on Page 1 is to be found in an underground shopping concourse, beneath the main Geneva railroad station. It consists of a 4x6 videowall sourced by S-VHS tape and standard laserdisc. It is used for advertising and to promote cinema programmes. It is sited next to Café Video ROM, a café where customers can surf the Internet.

The videowall is well sited for promotion to the large number of people who pass through the concourse every day; and it is big enough to have impact at a distance.

An HMV store in Hong Kong using a 4x4 videowall for media product promotion.

The final installation and programming was done by local dealer 16.36 Productions Audio-Visuelles, supported by our video distributor for Switzerland, AV Ganz of Zurich.

Hong Kong

The Helvar Electrosonic Group office in Hong Kong supports group sales in the Pacific Rim markets, but it does not trade itself. Most trading is through local distributors. The Electrosonic distributor in Hong Kong is Light Sound Image Systems Ltd and in turn one of their main videowall dealers is Pro United.

Pro United have had success in selling videowalls into the retail display market, especially in respect of the sale of media products. Shown here is their latest installation for HMV Records. The 4x4 floor-to-ceiling PROCUBE videowall can be seen right across the large store, and is unaffected by the fluorescent lighting directly overhead.

In common with many other Electrosonic media-based customers, HMV uses the videowall to show the products on sale and for special promotions.

The videowall under Geneva station has impact across the concourse.

The Inspiration being completed at Helsinki's Masa-yards.

IMAGINE at Sea

February 1996 saw the handing over of *M/S Inspiration*, the newest vessel in the Fantasy class fleet. Carnival Cruise Lines now have no less than six of these 70,367 ton, 2,040 passenger luxury ships which provide 3, 4 and 7 night cruises in the Caribbean from the Port of Miami and Fort Lauderdale.

All six ships are equipped with Electrosonic dimming systems for the public area lighting in restaurants, bars and lounges. The ships have been appearing at the rate of about one a year since 1990, so while the earlier ships had DIGIDIM™ equipment, the most recent have used the more compact IMAGINE™ dimmers. In the case of the *Inspiration* seven fully equipped dimmer racks were supplied to meet the lighting control needs of the interior designer, Joe Farcus.

The *Inspiration* is interesting because it is also the location for a lot of Electrosonic videowall equipment.

IMAGEMAG controlled videowalls above the bars.

68 Hantarex 28" video monitors are installed for video entertainment and advertising, mostly arranged in 2x2 groups. A total of 13 IMAGEMAG™ and nine VCUs are used for image processing and show control.

The project required international co-operation, with the end customer in the USA, the shipbuilder in Finland (Kvaerner Masa-Yards) and the main equipment delivered from the UK. Our distributor in Finland, Light & Sound Tech was responsible for the commissioning of both the video and the lighting control systems.

ESTA down under

The Australian War Memorial in Canberra has a permanent museum area, and the most recent exhibition to open there marked the 50th anniversary of the end of World War II.

The exhibition makes extensive use of the Memorial's collections, from uniforms to crashed aircraft. Supporting sound tracks use the latest Electrosonic ESTA II™ products to enhance the atmosphere of the exhibition.

"Read all about it!" followed by an extract from Prime Minister Chiffley's speech declaring war is over, part of the 1945:War and Peace Exhibition at the Australian War Memorial.

Len Skipper, the Senior Designer at the AWM says "Over the last ten years the AWM has been using *Electrosonic Tapeless Audio* machines as an effective and reliable method of presenting audio displays to our visitors, eight hours a day, seven days a week. We found this technology reduced our maintenance costs compared to conventional tape systems. The latest ESTA II product with its PCMCIA re-recordable flash card has provided greater flexibility, and meets our need for quick message changes when required."

The sounds of machine gun fire and the jungle accompany this exhibit of a Japanese bunker.

The ESTA tapeless audio system is now in its third generation, with thousands of channels installed in museums and visitors' centres worldwide. ESTA II offers multi-channel CD quality sound with zero maintenance. Our Australian distributor, Electrosonic Systems, a division of Evans Deakin Engineering, supplied the ESTA equipment to the AWM.

Visitors can hear the reminiscences of sailors in this reconstruction of a corvette mess deck.

Centas revolve in Sweden

Centas AB is our videowall dealer in Sweden. Besides selling our IMAGESTAR, IMAGEMAG and PICBLOC products, they also have an active rental department, meeting the needs of conferences and exhibitions in the Nordic area.

They specialise in moving videowall displays; often using flown videowalls on traveller tracks. At the LLB Exhibition in Stockholm they demonstrated our products using a three-sided rotating display which showed IMAGEMAG and IMAGESTAR with monitors (above), and IMAGESTAR with cubes (below).

SEAFARI in WAKAYAMA

The USA Systems Division of Electrosonic recently delivered two special format automatic film projection systems to Porto Europa, a theme park on a man made island offshore from Wakayama, a city just south of Osaka, Japan. The systems are used in a simulated underwater adventure ride.

While Electrosonic's main product lines are devoted to the electronic image, we recognise that there are limits to the size that electronic images can be presented. It is still the case that for really bright big images of very high resolution, film projection remains the most cost effective method (even if the images themselves have been created either on a computer or with computer assistance).

In theme park work it is often the case that projection systems are required to have a light output in the range 15,000 to 150,000 lumens, with a resolution far superior to HDTV. This compares to a maximum of around 6,000 lumens with HDTV resolution available from the brightest of the current video projectors.

Electrosonic's Systems Division will, therefore, engineer fully automatic motion picture presentation systems when the requirement is outside the capability of an all-electronic solution, and are currently working on a large number of such systems for installation in the USA, Europe and the Pacific Rim.

8/70 Format

The Wakayama systems were built to the requirements of MCA Recreational Services, the project managers, for an attraction called *Seafari*. In this attraction the audiences are carried on a large motion base, and they are very close to the screen. The image is back projected within a themed set, and the screen viewed by the audience is actually elliptical, with a width of 9m (about 30ft) and height of 7m (23ft). To get the required realism 70mm film in the 8/70 format (8 perforation pull down instead of the conventional 5) is used, running at 26 frames per second.

A still from the undersea adventure film Seafari from Rhythm & Hues. It can be seen in Wakayama, Japan.

Electrosonic designed, assembled and installed the projection systems, film handling equipment, and projection control systems. This included the facility for generating timecode direct from the film for both the sound system and the motion base control computer to follow.

The *Seafari* film was made by the Special Projects Division of Rhythm & Hues, of Hollywood, CA. It was two years in the making, and needed a team of 20 people and a battery of Silicon Graphics Machines to produce. The film features a dolphin with a "backpack" translator unit that allows the dolphin to communicate with the audience in Japanese or English. For those who cannot get to Japan to see this superb film, it can sometimes be seen on request at Electrosonic's Burbank, CA, facility. (But, sorry, we don't have the simulator base to go with it!).

ARCHITECTURAL LIGHTING CONTROL

Lighting control equipment based on thyristor dimmers has always been part of Electrosonic's product range. These products are now handled by the EMAL division of the Helvar Electrosonic Group, but their development is still done at Hawley Mill, and the products are available for Electrosonic Systems. Here we report on some recent lighting control projects.

SCENEVIEW on the CENTURY

The new cruise ship *Century* has a massive lighting control system for the public areas. It uses Helvar Electrosonic IMAGINE™ which has recently been enhanced with several new additions to the range, both in hardware and software.

Century was built by the Jos. L. Mayerwerfdt yards of Papenburg, Germany for the owners Celebrity Cruises. It is built to the highest standards to operate 7 day cruises out of Fort Lauderdale, FL. The lighting designer for the systems for which Helvar Electrosonic was responsible was Paul Marantz of Fischer Marantz (New York).

The main atrium of the Century. Lighting control by Helvar Electrosonic.

The system supplied was in three parts. One was for the restaurants, bars, casino, health club, atrium, foyer and corridors. Another was for house lighting, and the third was for the outside security and emergency lighting. All three used IMAGINE equipment, with an overall total of 36 dimmer racks and 18 SCENESET™ control units.

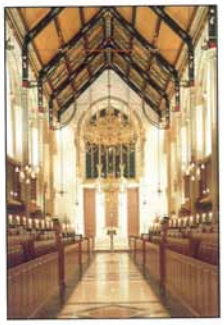
The system for the outside lighting used special relay units with fail-safe ON. In addition to hundreds of channels of standard dimmers, the dimmer racks used many channels of dual transistor dimmers, optimised for controlling the new types of electronic transformer. But the most significant new introduction was the use of two new computer programs for overall supervision and control.

One of these is SCENE SCHEDULER. This operates the public area lighting so that preset lighting scenes come on at specified times of day. The clock information is derived from the ship's clock, so time changes due to longtitude changes are accounted for. The other is SCENEVIEW™. This program monitors the activities of all lighting channels on the system. Abnormal conditions can be identified from a central position. Both programs work under the Windows™ operating system and are part of a suite of lighting control programs which are under continuous development at Electrosonic.

One of the many bar and restaurant areas on the *Century* with IMAGINE lighting control.

The technical and operational requirements for lighting control systems used on cruise ships are unusual and demanding. Helvar Electrosonic has unrivalled experience in meeting them.

The SCENEVIEW computer program allows continuous monitoring of lighting circuits, and stores both diagrammatic and photographic information about the areas under control.



Riverside walk by the Thames in London, and the Tonbridge School Chapel both use Helvar Electrosonic lighting control. (Tonbridge photo by Charlotte Wood).

SCENESET Versatility

The Electrosonic SCENESET™ products, now available with both AMBIENCE and IMAGINE dimmers, and now distributed by Helvar Electrosonic, are used not only in hotels and restaurants, but also in churches, offices, auditoria and even for external architectural lighting.

An unusual application is the control of riverside lighting along the Thames in London, where in a scheme designed by Hilson Moran Partnership an IMAGINE control system is used, utilising photocell and time-clock controls to assist lamp life and energy saving. As for churches, a recent example is the recently rebuilt Tonbridge School Chapel where lighting designer Ray Rogers chose an Electrosonic SCENESET control. The system was installed by W.S. Parsons.

Lighting designers Project Lighting Design of Singapore have been involved with several prestige projects including Pacific Place Bangkok, Hotel New Otani Singapore, and, as mentioned on Page 1, the Holiday Inn Parkview Singapore. They specified Electrosonic dimming systems, which were delivered by dealers Dyntec Audio Co in Bangkok and LSI Singapore in Singapore.

Project Lighting Design of Singapore specified IMAGINE lighting control for the main lobby of Pacific Place II in Bangkok, left, and the main public areas of the New Otani Hotel in Singapore, right.

Cinecittá

Helvar Electrosonic's most experienced dealer for architectural lighting control in Germany is Wiesinger Architectural Lighting of Nürnberg. Recently they have delivered the complete lighting control systems for Cinecittá, a 3,000 seat 12-cinema multiplex shown on the right. The entire lighting system for the theatres and foyers is under IMAGINE control, using no less than 280 dimmer channels.

RECENT PROJECT NEWS

Futurevision, AMNH and AMMI

Just as this edition of ELECTROSONIC WORLD was being prepared our Systems Divisions in the USA and UK completed a number of interesting projects. These included video and interactive systems for the American Museum of the Moving Image, the American Museum of Natural History, both in New York, and Futurevision, a new attraction at Granada Studios Tour in Manchester, England.

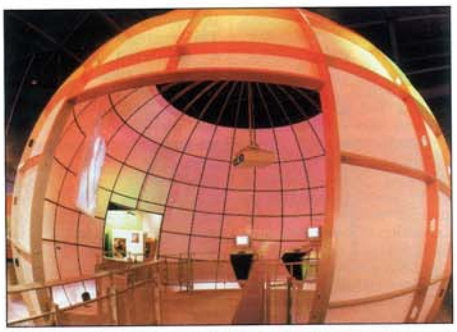
The American Museum of the Moving Image is in a building which is part of the Astoria Studios complex, opened in the 20s and used by film makers such as WC Fields, and, more recently Woody Allen. The museum was founded in 1988 by its present director and guiding light, Rochelle Slovin. In April 1996 the exhibition area was redesigned to take a core display "Behind the Screen".

Ali C. Holek was the exhibition designer for "Behind the Screen"; Electrosonic Systems Inc worked closely with both the museum's curatorial staff and their design consultants to realise the required audio visual and computer systems integration.

Early 1996 also saw the completion of a two year project at the American Museum of Natural History. Here Ralph Appelbaum Associates were appointed to redesign the Mammal Halls. Electrosonic Systems Inc, working directly for the museum in co-operation with RAA, was entrusted with the engineering of the interactive stations, video replay systems and theater facilities. Much playback equipment is centrally located, but the Apple Powermacs used for interactive work were located in the exhibits. This required a monitoring network to check continuous performance – the monitoring computer also checks the performance of the laserdisc players used in the standard playback installations.

The special effects exhibit, left, and the Chroma Key Study, right. Two of the exhibits at AMMI. Photographs by David Sundberg for AMMI.

Over in England Granada Studios Tour has opened a new attraction called "Futurevision". This exhibition, designed by exhibition designers Button Csáky, shows the immediate future in respect of computers and TV as they affect everyday life. The exhibition was opened by Arthur C. Clarke by direct satellite link from his home in Sri Lanka. Electrosonic's Systems Division was responsible for all the automatic show playback systems, and worked closely with sponsor ICL in realising the computer-interactive exhibits.



The Internet exhibit area at Futurevision, the new Granada Studios Tour attraction.

COMPANY NEWS

GROUP TOUR

The Helvar Electrosonic Group (HES) is spread around the world. Here is a brief review of where we are to be found, and what each office or establishment does.

Hawley Mill, near Dartford, in the UK is the international headquarters of the Electrosonic part of HES, and for the Celco division of Electrosonic. It is also the base for the Energy Management and Architectural Lighting Control (EMAL) division of Helvar, and for Helvar Ltd, the UK sales company for EMAL products and Helvar lighting components.

Electrosonic's International Headquarters at Hawley Mill, near Dartford in the UK.

HES Headquarters in Helsinki.

Hawley Mill is set in five acres of landscaped grounds with the River Darenth flowing through them. Besides the corporate activities, Hawley Mill has extensive product development laboratories, and a large systems engineering facility. The main construction hall can accommodate display structures up to 10m (33ft) high.

30 miles away at Maidstone the HES Group has a modern electronics assembly factory. It manufactures most of the group's EMAL products, the Celco products and all Electrosonic UK's video and audio visual products. It is equipped with surface mount assembly machinery, automatic testing equipment and an efficient sheet metal fabrication facility. It also provides warehouse facilities for group products.

HES Group headquarters are in Helsinki. In well equipped buildings of mixed age there are product development laboratories and high speed automatic production lines for electronic ballasts. About 40km away in the town of Karkkila a showpiece factory houses the production lines for wirewound ballasts. These are produced on Helvar-designed fully automatic production lines producing ballasts at the rate of over 25 million pieces per year.

The Karkkila factory in the Finnish forests is the biggest single ballast factory in Europe.

HES offices in Germany, Rödermark (above) and Langenfeld (below).

Electrosonic's offfices in Toronto (above) and Burbank (below).

Minneapolis

Minneapolis is the North American headquarters of Electrosonic. It is responsible for sales in the USA, Canada and Latin America, representing about half of Electrosonic's business. Because of the importance of these markets, the Minneapolis office has product responsibility for Electrosonic's display products, and is closely involved with overall product development strategy. The Minneapolis facility has a large systems assembly area, in addition to display assembly and warehousing facilities.

The Minneapolis office is supported by regional representatives and by offices in Toronto, Canada, and Burbank, California. Toronto has some engineering facilities, and is unique in the group in providing a limited rental service for videowall systems. This is mainly used to support our dealers. Burbank is sited to be near key customers in the important leisure and entertainment market. The team there has special engineering experience in all kinds of large image presentation, including all electronic and film based systems.

The American headquarters of Electrosonic are in Minneapolis.

Back in Europe HES Group has its own offices in Stockholm, Sweden; Milan, Italy; and Rödermark and Langenfeld, both in Germany. Langenfeld is the main office for Electrosonic video display products in Germany.

We do significant business in Pacific Rim countries. To support this, HES Group has a sales office in Hong Kong. It does not trade, but acts as an extension of Hawley Mill, Minneapolis and Helsinki. Its advantage is that it is in the same time zone as the markets it serves.

The HES group factory at Maidstone, UK, is equipped with automatic assembly equipment.

ISO 9000

The Karkkila and Maidstone factories have been approved to ISO9002 for several years, and in 1995 the design and engineering offices of Electrosonic at Hawley Mill and Helvar in Helsinki both achieved approval to ISO9001. The Minneapolis operation is currently working towards achieving ISO9001.

While these achievements will assure customers we take quality seriously, they are not an end in themselves, and are just the start of a program of continuous quality improvement. We have now embarked on a full TQM program involving everyone in the company – we want not only to be known for fine products, but also as a good company to do business with, and as a good company to work for.

Facts and Figures

We are often asked how many people work for Electrosonic, what its turnover is and so on. Every year the Helvar Electrosonic Group issues a compact report giving the latest information. As at mid 1996 the numbers, converted to US Dollars, were approximately as follows:

The Electrosonic Group employs 310 people, does 50% of its business in North America and has a turnover of $45million.

The larger Helvar Electrosonic Group employs 800 people and has a turnover of $130 million. The group is ultimately owned by the privately held Veho-Mercantile interests which have a combined annual turnover of $810 million.

Workstation graphics being displayed on a videowall in the demonstration room at Hawley Mill.

DIGITAL DISPLAY

As indicated on Page 1, Electrosonic is focussing its activities on "The Big Picture", and the Helvar Electrosonic Group (HES) as a whole is organizing itself to best respond to market needs.

EMAL

As from the beginning of 1996 all EMAL (Energy Management and Architectural Lighting) activities have been managed by the "Helvar" part of HES. The EMAL division is managed from Hawley Mill, and is responsible for the development and sales of lighting control products and systems. The OEM Division, responsible for components for the lighting industry, is based in Helsinki.

So while the development of dimmers and similar products will continue within Electrosonic, and Electrosonic will continue to promote and sell lighting control systems, Electrosonic's main focus is now on big images and the environments in which they are needed.

We expect that there will be a rapid move towards digital methods of image origination and display, and that we will be in the front line of such developments. We will be making a contribution wherever "the big picture" is needed – but we are realists, we will always use the most appropriate technology, and we expect to be using film, slides and analog video for a long time yet!

Celco

We shall maintain and develop our activities in show control and automatic presentation. Significantly our Celco Division remains under Electrosonic management. We believe Celco's "show business" approach is a vital ingredient to our long term success, and that it fits better under the Electrosonic umbrella than it would under the Helvar EMAL division.

Electrosonic's video and systems development activities take place on both sides of the Atlantic. Teams in Minneapolis, Burbank and Hawley Mill meet frequently and work as one.

HELVAR 75 Years

Helvar was founded in 1921, so it has just passed its 75th Anniversary. It was originally set up as a trading company to trade between Helsinki and Warsaw, hence the name HELVAR. Ironically not very much trade has been done by Helvar with Poland until recently. Now Poland takes a significant volume of fluorescent lighting ballasts produced by the Karkkila plant.

Helvar has a long history of electrical manufacturing. Products included switchgear, radios and televisions. When consumer electronics were phased out, Helvar became the Sony distributor in Finland, a position it held, through a subsidiary Helectron, until quite recently, when Sony set up their own distribution company.

Ballasts for fluorescent lighting first became a Helvar product 50 years ago. Right from the start Helvar looked for the most efficient way of making ballasts, so that now they boast the most highly automated ballast production lines in the world. Helvar was also among the first with electronic ballasts, introducing standard electronic ballasts in 1981, and dimmable electronic ballasts in 1983. Now the full automation strategy is being applied to electronic ballast manufacture, with major investments being made in the most up-to-date automatic assembly machinery.

The product that was to bring Helvar and Electrosonic together was the thyristor dimmer. Helvar started manufacturing these in 1965, just one year later than Electrosonic!

RETAIL DISPLAY, TRADESHOWS AND PROMOTIONS

These pages describe the use of Electrosonic videowall products in retail display, trade shows and special promotions.

High Definition Grand Prix

Marlboro has a travelling exhibit to promote its brands at events throughout Europe. It is an exciting simulator ride which visits motor shows, fairs, rallys, motor races and other events. Electrosonic provided the video engineering.

Our client here was Intersim Ltd., who designed and engineered the simulator itself and the overall exhibit. The original concept and production was by Gail Aston of Charles Stewart & Co Kirkaldy Ltd. who organizes promotions for Marlboro.

The simulator ride uses HDTV to give the best possible image quality. We supplied a video system based on the Barco 1609 HDTV video projector and Sony HDL2000 high definition laserdisc player. To entertain those waiting to go on the ride there is a 3x2 PROCUBE™ videowall mounted on the side of the exhibition truck.

The main photograph, taken when the whole show came to Hawley Mill for the day, shows the exhibition truck on the left, and the trailer mounted simulator pod on the right. The smaller photo shows the inside of the pod and its big high definition screen.

Sporting Goods Videowall

A radio station inside a ballpark running a successful sporting goods store. Unlikely – but true!

KRLD is located in the Texas Rangers ballpark in Arlington, Texas. Fan Central is the store, and in it a videowall stands majestically over an orderly line up of sporting merchandise.

"Fan Central HAS to attract people on the way to games. It's got to be big, bright and dynamic. Our 5x5 Electrosonic videowall is just perfect – definitely a PLUS to our retail/broadcast environment" says Lisa Limbock, Director of Sports Merchandising.

KRLD Fan Central with 5x5 videowall from Electrosonic.

One of three IMAGEMAG displays installed in each of 60 Media Play stores.

80 Store roll-out for Media Play

Founded by Musicland Stores Corporation, the Media Play chain offers a wide range of media products under one roof. The stores are great for browsers, and Media Play's aim is that you should be entertained as you choose.

Videowall displays have proven to be ideal for special promotions. Electrosonic started work with the Musicland Group by providing videowall displays for their Sam Goody and Suncoast stores. The close relationship thus forged gave Musicland the confidence to commission Electrosonic to take on the systems integration and project management for Media Play.

In common with other retail oriented projects, this required a "roll out". The scale of supply and support required is considerable, because a large number of stores must be simultaneously equipped. It is way beyond just doing a single installation. Electrosonic tackles the problem by refined system design, careful project management, and by teamwork with local service companies.

Each of the first 60 Media Play stores was equipped with three 3x3 monitor videowalls. These use IMAGEMAG processing, and are installed as attractions within the music, movie and video game departments. Each display can run a stand-alone show using PICBOX programming; but all displays are also under VCU show control, allowing them to be used for displaying special Media Play advertisements, usually prepared in conjunction with sponsors.

2xVIEW

The most recent 20 Media Play stores have taken a different approach. They use the big and bright 2xVIEW display to promote feature movies. The siting of the displays at the end of the center aisle ensures maximum impact, and the very shallow depth of the displays (30") ensures that valuable selling space is not wasted.

We find that different retail customers have different requirements in respect of both the kind of system they want, and the way in which they want their installation programs managed. We were very appreciative of the comments made by Musicland's Manager of National Electronic Services, Rusty Bell who said "the main reason we chose Electrosonic was because they have some of the best products on the market, and are very supportive and service oriented".

A 2xVIEW system being used for movie promotion at a Media Play store.

MERVYN'S make up with IMAGEMAG

Mervyn's Department Stores have so far installed seven videowall displays devoted to the subject of make-up in stores round the USA. Placed in strategic ground floor locations, they provide both product information and advice on how to apply the cosmetic products.

Each installation consists of a 3x3 IMAGEMAG™ controlled videowall. It can run a free-running program, with videowall effects programmed by tones recorded on the laserdisc carrying the video via a PICBOX™ control unit. However, in order to provide information required by individual customers, the display can also be controlled by a touch panel. As can be seen from the photo, the touch panel stands forward of the videowall and is based on product photographs.

The Mervyn's videowall displays promote the ULTIMA II line of lipsticks and cosmetics from Revlon.

Interactive videowall in the cosmetics department at Mervyn's. Note the neat integration into the store fixtures.

The Daewoo "Motor Show" at West Acton, with Electrosonic videowall behind the featured car.

Daewoo Motor Show goes IMAGESTAR

Daewoo Cars of the UK, a subsidiary of the giant Korean Daewoo company, have initiated an entirely new way of selling cars to the UK market.

They sell direct to the public from their own showrooms. The flagship sites are called "Motor Shows", and are very well appointed with product displays, interactive databases, complimentary refreshments and play areas for children. They are sited next to major retail developments.

At the centre of each Motor Show is a podium on which the latest model or concept car is displayed. Now in an expanding number of locations the central display is surmounted by a videowall. First installations at Rotherham, Derby, Nottingham, Ealing, Thurrock, Norwich, Glasgow, and Dudley use an Electrosonic framewall 3x3 display with IMAGESTAR™ videowall processing.

Electrosonic worked closely with Daewoo's showroom fitout contractors Campbell & Armstrong to complete this most interesting use of videowalls in the retail sale of cars.

Pyramid Wall for Pool

The photograph on the right shows an unusual videowall installation which can be seen at the new Düsseldorf swimming and recreation centre in Germany.

The display is at the entrance to the "beach" area and is built onto a plexiglass base which contains a water fountain system. It was installed by our German company, Electrosonic GmbH, and is sourced by both videotape and Sony CRV disc.

The 15 monitors are arranged in a pyramid format, and this requires special processing to split the incoming images. Initially the display showed a continuous "video waterfall", but now it is being more extensively used for music videos and promotion.

Scholastic Workstation

When designers Lee H. Skolnik Architecture and Design Partnership were charged with renovating Scholastic Inc's New York City showroom, they looked for technology to help bind the space together, and to provide both a backdrop and teaching tool.

Scholastic Inc are a major publisher of children's and educational books, videos and software. The "Lab" in New York is a space used for marketing, product training and promotion. Skolnik decided to integrate a high brightness videowall into the space, to support formal presentations and to act as a backdrop at other times.

An Electrosonic 3x3 Framewall is installed, and it is run from PICBLOC-3™ processing equipped for both composite video and workstation inputs. In the latter case images up to 1280 x 1024 can be shown wihout loss of picture information. It is ideal for software presentations given from the installed Apple Power PC 8500AV machines.

Electrosonic videowall with workstation digitiser installed in Scholastic Inc's NYC marketing facility.

Rogers Communications used 50 cube videowall to support a four city launch of their WAVE® service.

Rogers, Bridgewater and Thunder

Three stories from North America show the versatility of the videowall medium. When Rogers Communications launched their new WAVE® service for providing high speed access to the Internet via cable, they went to Multivision Electrosonic, our Toronto office, for videowall support.

At the John Joseph Moakley Center for Technological Applications at Bridgewater State College our local dealer Boston Convention Network (BCN) supplied a permanently installed Electrosonic frame-

A videowall enhances the entrance of the John Joseph Moakley Center.

Paramount Parks use pre-show videowalls for the *Days of Thunder*® attraction.

wall with IMAGESTAR processing. It provides a high-tech welcome to the building, and is used for presenting college information, welcome notices, overflow coverage, special programs and CNN live programming.

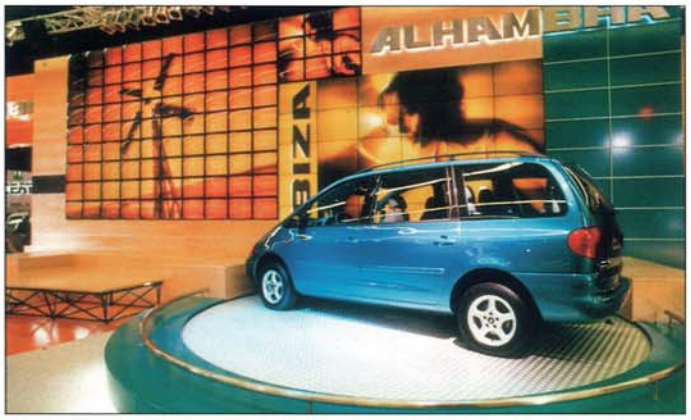
Videowalls are often used to run "pre-shows" at major attractions. An example is the Days of Thunder® attraction at Paramount Theme Parks, where back-to-back Electrosonic videowalls entertain the crowds waiting to ride the exciting simulator experience.

Tesco go 2xVIEW

A number of Electrosonic videowalls have been installed into Tesco Supermarkets in the UK. They are installed as part of the redesign of the "Leisure World" section by the Sloane Group of companies, and are used to promote the sale of videos.

The first stores used 3x3 monitor walls with IMAGEMAG™ control; more recent installations are using the compact 2xVIEW projected display. The photos here show the difference.

Tesco videowalls. A monitor wall at the Harlow store, above, and a 2xVIEW display at the Borehamwood store, below.



This 99 monitor/25 cube wall was supplied by Proquip to Seat for the Frankfurt Motor Show. Photo by the show producers, Sono Multivision of Barcelona.

CAR WALLS

Automobile manufacturers and sellers worldwide use videowalls as a dynamic part of their promotions; at trade shows, in showrooms and at product launches. A few recent examples are illustrated here.

Exhibit Group Giltspur of Avon, MA, designed a show environment complete with vegetation, swamps, the sounds of screeching monkeys and thundering elephants for the Land Rover booth at the 1996 Detroit International Auto Show. The booth was supported by a 3x6 cube videowall running action footage (provided by Vermont Studios of Putney, VA). Media 1 Inc of Boston, MA was the AV contractor who supplied the videowall and complete media system, which Land Rover subsequently bought for use at other shows including those in Chicago and New York. The videowall uses Toshiba cubes with Electrosonic C-THROUGH™/PICBLOC-3™ processing and control.

Over in Europe the Frankfurt Motor show is one of the "big ones". Proquip Rentals are always active there, and one of their most spectacular installations was for Seat of Spain. The giant 99 monitor, 25 cube wall shown above was sourced by four Betacam machines with specially produced material from Sono Multivision of Barcelona. The show was programmed to interact with a troupe of dancers and elicited such comments as "one of the best programmed videowalls I have ever seen", and "I was drawn to the stand by the video images". Proquip find C-THROUGH the best way to program such complex displays.

To celebrate 100 years of the American automobile General Motors mounted an exhibition in the lobby of their Manhattan office. The display showcases historic and present day models including a 1903 Cadillac. A videowall was chosen to support the exhibit because of the need to perform in high ambient light. AV dealers Gail & Rice of Detroit selected a 4x4 PROCUBE™/PICBLOC system.

General Motors have often chosen our Toronto office, Multivision Electrosonic Ltd, to support them for Canadian Motor Shows. A recent example is the Saturn "Video Arch" shown here. A 2x10 cube display surmounted their stand for the Canadian Auto Show Tour.

General Motors Exhibition at their Manhattan offices celebrated 100 years of the American Automobile

Land Rover's "Jungle" at the Detroit, Chicago and New York Auto Shows used an 18 cube videowall from Media 1 of Boston.

Delphi Automotive Systems' unusual video display at the SAE trade show, Detroit.

Magna International used a videowall to support their presentations at SAE Detroit.

Multivision Electrosonic has also supported the parts suppliers to the automobile industry. At the SAE show in Detroit two examples were the stands of Magna International and Delphi Automotive Systems. Magna used a theater style presentation, with their own auto seats, to present their product range. It used a 3x4 PROCUBE wall.

Delphi's display was an unusual 18 monitor videowall display viewed through a transparent automobile chassis. The C-THROUGH videowall control program was used not only to control the videowall effects, but also to trigger the mechanics of the plexiglass vehicle to simulate the effects turns and uneven surfaces.

The GM-Saturn Video Arch gave a 24ft wide image 9ft in the air at the Canadian AutoShow Tour.

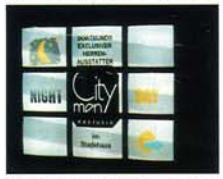
View across the tracks to the videowall at a Dortmund underground station. Programme material is networked.

Underground Network

Networked videowalls are beginning to become a fact; and an interesting example is to be found in two underground stations in Dortmund, Germany. Here 3x3 IMAGEMAG™ videowalls have been installed by Media Direct of Dortmund, who are financing the project from advertising revenue received from local companies. The walls also display daily news updates and information films from Stadtwerke Dortmund, the operator of the underground system who rent the space to Media Direct.

The videowall systems were supplied by our German company, Electrosonic GmbH. Each system is sourced from a SHOW-MANAGER. The SHOW-MANAGER stores compressed video on its computer hard disc memory, which can be updated at any time by Media Direct over ISDN telephone lines. SHOW-MANAGER schedules the playout of news, advertisements, information films etc according to plan, and logs the playout for billing audit purposes.

SHOW-MANAGER is supplied to Electrosonic GmbH by Scheiner Interaktive Medien. It is now in use in a number of installations in Germany where users need to download new programme material and new scheduling information from a distance.



Typical advertisement on a Dortmund wall.

M9 in Lisbon

In the last year our Celco Division has started to offer video products to complement their range of lighting control consoles. The first product is the M9 videowall controller. This unique product is a videowall processor for 9 monitors (expandable to 36) which is DMX compatible, meaning that it can be controlled by lighting control consoles of the kind used for live entertainment.

The Celco NAVIGATOR™ console is available with a "personality card" making it suitable for the control of videowalls via the M9. Rock City in Lisbon, Portugal, is an American style diner with live entertainment for audiences of 300+. In its comprehensive armoury of sound and light, installed by Audium, is a NAVIGATOR, originally controlling a nine monitor wall, now upgraded to a 4x4 using two M9 videowall controllers.

Rock City in Lisbon uses a videowall directly controlled by the lighting console. Photo from World Disco Review.

LIVE ENTERTAINMENT AND EVENTS

These pages describe the use of Celco lighting control and Electrosonic videowall products in live entertainment, sports and special events.

ProCon of Hamburg used a Celco AVIATOR for lighting control at the RSH Awards in Kiel.

CELCO and PICBLOC win the awards

The products of Electrosonic's Celco and Video Display divisions are widely used for awards ceremonies and conventions. Celco lighting consoles and C-THROUGH™ videowall control are ideal for those events which require tight programming, but which also need "hands on" control to match the actual event. Just a few of the stories from round the world are related here.

A Celco lighting console supported the MTV Europe Awards in Paris. Photo by Steve Moles.

ProCon is a Hamburg, Germany, based rental and production company which has recently purchased an AVIATOR™ R360 lighting console. It was first used for controlling a massive lighting rig in Kiel, Germany on the occasion of the RSH awards. The lighting designer was Jerry Appelt who commented on the R360 purchase "I could run all my generics from its vast quantity of channels, and it has a theatre way of operating which a rock'n'roll guy can operate. But what really swung the decision was its easy-to-understand operator's manual; we now have three or four guys that can run an AVIATOR".

When the MTV Europe Awards event was held at the Zenith arena in Paris eight bands performed in two hours, each with their own stage set. The complex lighting design was by Allen Branton, and lighting contractor was LSD. A top of the range Celco console controlled the conventional (non-moving) lighting.

Our Danish videowall distributors, ComTech of Copenhagen, provided a videowall backdrop for the 1996 Danish Grammy Music Awards. They installed a 4x4 PROCUBE™ videowall driven by PICBLOC-3™ processing. The show used two camera crews, one to cover the event for the TV broadcast, and the other to provide live source material for the videowall. The videowall was also used for showing interviews with artistes not present in the studio.

Impact

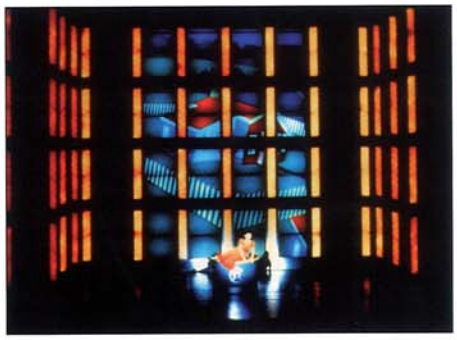
The 1996 meeting of the USA National Association of Television Programming Executives (NATPE) was held in Las Vegas. Morning sessions for 2,000 delegates were in the Grand Ballroom of the Mirage Hotel, and here the stage set used a 6x6 PROCUBE videowall supplied by Impact Audio Visuel of Montreal. The videowall was sourced by live camera and CRV disc players. A special feature was that the wall was built in two halves, which parted to allow award winners to make their way on stage.

ComTech supplied the PROCUBE videowall for the Danish Grammy Awards.

Impact Audio Visuel supplied the videowall for the NATPE convention. Normally a 6x6 (top) it could part into two 6x3 (bottom) to allow award winners to take the stage.

HOW TO SUCCEED

The 1995 Broadway production of *"How to Succeed in Business Without Really Trying"* opened to rave reviews from the New York papers and TV stations. The *New York Times* made specific mention of the elaborate video graphics "giving the show a contemporary kick", and also praised the humorous use of video.



"Rosemary Pilkington" dreams of her suburban house in "How to succeed".

At Electrosonic we have been involved with image projection on stage since the 1960s. Many productions used our multi-image slide projection systems, and now we are beginning to see increasingly imaginative use of the possibilities of video and graphics projection.

How to Succeed won the 1962 Pulitzer prize for drama for Frank Loesser (music and lyrics) and Abe Burrows (book). The fast-moving musical tells how J. Pierrepont Finch, an ambitious window cleaner, rises to the top of The World Wide Wicket Company following the guidelines from his trusty handbook. Director Des McAnuff brought the musical into the 90s with some subtle changes of dialog, by commissioning new orchestrations (Danny Troob) and new choreography (Wayne Cilento) – but the show remains, in the words of Sheryl Flatow, "virtually – and proudly – devoid of heart, sincerity and sentiment".

Designer John Arnone had the task of retaining the '60s setting, but doing so in '90s way. He built into the formal office building set 32 video screens in a way which to start with makes them seem just like part of the set. Only as the show progresses do the images extend the reach of the set; by showing a stylised New York skyline as you "ride up" the elevator, or by showing the suburban house in which one of the characters dreams that she will be "Happy to keep his dinner warm", or even becoming the interior of the exclusive executive washroom. At one point the set becomes a TV Studio, and then live cameras are used to exploit the video possibilities of the system.

A dynamic New York skyline presented on the videowall.

The video production was by Batwin & Robin Productions. With the exception of the live video, all the material shown was originated as computer or cartoon moving graphics, and transferred to laser video disc for replay. The video system itself was engineered by Scharff Weisberg who, like B&R, have considerable experience of serving the needs of Broadway Theater.

Scharff Weisberg

Scharff Weisberg organized custom made video "cubes" for back projection based on Pioneer "engines". They selected Electrosonic PICBLOC-3 and C-THROUGH for videowall image processing and control and used ES5003 serial controllers for disc player and switcher control. Barry Grossman, project engineer with Scharff Weisberg, emphasises how important it was to be able to edit the show transitions in real time on the set, as opposed to doing it in pre-production. This ensured that the video didn't dictate the show timing, and could be changed to match the actors' actual moves. Josh Weisberg, Director of Scharff Weisberg, makes the point that reliability is everything in live theater presentations.

Lille and Manchester

...continued from Page 1.

The Grand Palais in Lille consists of the Zénith concert hall, conference auditoria and exhibition facilities. It caters for everything from the Bartenders Exhibition (actually the Fédération Nationale des Boissons) to classical and pop concerts.

The rapid turnround of events in the concert hall demands lighting control which provides both the sophistication required by today's performers, and the simplicity of operation needed in the real world. Grand Palais' lighting designer Xavier Durand commented on the choice of an AVIATOR T180 console "this multi-purpose desk is so simple to operate, but the technology behind it is a step ahead. The accessibility of AVIATOR is perfect, and in half an hour I could do everything".

The Green Room

The Green Room in Manchester caters for experimental theatre, revue and new talent.

Technical Manager Steve Curtis, who selected an AVIATOR T180EPX with FUSION™ dimmers for The Green Room refurbishment, comments:

"I was keen on Celco because theatre operators need to improvise at times. It's good for fast work - there's a two-day turnround here, so it needs to be quick for plotting."

"You can bang in all the states from a keypad. The 'rate benders' allow us to match the speed of the pre-recorded fade times to the real action. I like the 'fine' mode which works well for experimental groups who like light levels in the 10-15% range".

The upgrade to FUSION dimmers means "It's useful for the wide variety of lighting that comes in – 5Ks, HMIs, fluorescents. The ability to turn the dimmer into a switch and run it from the desk puts the control in front of the operator. And finally there's the ability to parallel dimmers to control big loads".

Just because The Green Room is small does not mean that it does not require a high level of technology. Says Steve "We want to operate to the same level of sophistication as the major European theatres".

Canada Day

Commissioned by the Canadian Broadcasting Corporation, the 6x10 videowall shown above was the centrepiece of the Canada Day celebrations on the steps of the Parliament Buildings in Ottawa.

The team from Multivision Electrosonic (our Toronto office)worked for four weeks with CBC to ensure everything was right for the live broadcast. The final installation was done during torrential downpours, but everything was fine on the night.

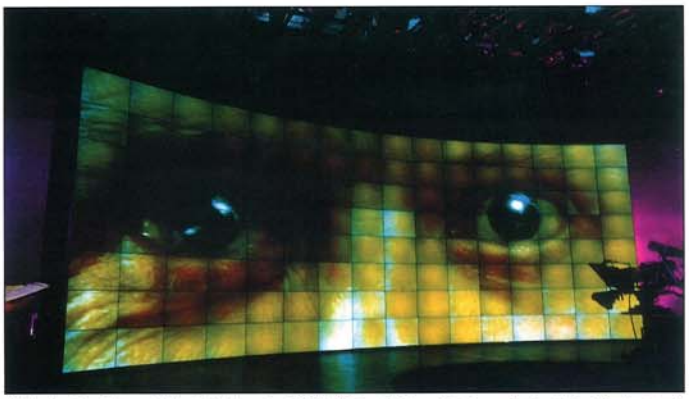
The picture shows the Electrosonic PROCUBE™ videowall behind a number of Canada's leading athletes, contenders for the Atlanta Olympics.

Tommy

The team of Des McAnuff, director, John Arnone, designer and Batwin & Robin Productions, video designers who did *"How to succeed"* also presented *"Tommy"*, the Pete Townshend musical, first on Broadway, then Germany, and now London.

Creative Technology Ltd provides the projection and video equipment for the London production. In addition to 56 Kodak slide projectors for back projection and Pani scene projectors with PIGI scrollers front projecting onto gauze, this includes 48 Barco 2850 monitors, 13 in a flown structure and 35 in a truss forming a proscenium arch. All the monitors are controlled by an Electrosonic PICBLOC™ processing system.

The "Tommy" London Production by Pola Jones uses projection and video systems supplied by Creative Technology, including PICBLOC processing.



A 16x8 cube videowall installed on the BBC's "Megalab" set by Proquip Rentals. Electrosonic PICBLOC control with Pioneer cubes. Photograph by Neil Higgins.

The Eyes Have It on TV

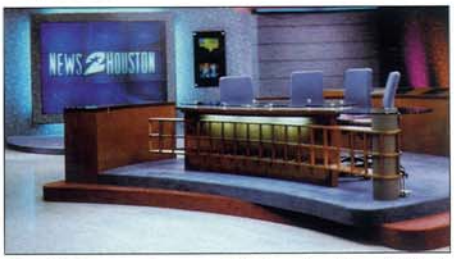
Videowalls are widely used in television productions for several reasons. They work well on fully lit sets; they provide excellent support for any studio or live audience present, and they integrate well into set design where they can take advantage of both live and pre-recorded video. Electrosonic PICBLOC-3™ processing and C-THROUGH™ programming are favourites with producers and hire companies because of the ease of programming, modularity and high quality images.

Steve Wasserman, General Manager of KPRC, Houston, TX, says of the videowall used on their news set, designed by Broadcast Design International Inc, Carlsbad, CA "Our Electrosonic videowall has given us a great deal of versatility and credibility that we didn't have before. We are continually impressed by how much the wall can do. Our news segments have been greatly enhanced by the high resolution output and the creative control of the videowall".

Megalab

The largest videowall rental operation in the United Kingdom is Proquip Rentals, who have a huge fleet of cubes and monitors and hundreds of channels of Electrosonic PICBLOC-3 image processing. A lot of their work is for TV shows. The amazing photo above is of the "Megalab" set, where a 128 cube wall was delivered, rigged, cabled, balanced, show rehearsed, shown live to 13million viewers, derigged and removed all within a 25 hour period in Studio 6 at the BBC Television Centre. Proquip commented on the amazing way the PICBLOC-3 wipe effects worked on the huge screen.

The advantages of the C-THROUGH/PICBLOC combination are also demonstrated on the French Antenne 2 programme "Déjà Dimanche". This uses 32 Barco monitors and a Barco 8100 LCD projector as a backdrop to the set. The system is used in an uncoventional way, all images are different, so the PICBLOC system is used as a multiple framestore for image "freezes". Furthermore the facility in PICBLOC to adjust the colour is used so that all the images take on a hue appropriate to the scene (so the picture here with a blue cast is deliberate!).



The KPRC news set uses an Electrosonic videowall. Photo courtesy Tim Saunders, President BDI Inc.

"Déjà Dimanche" from Antenne 2 makes full use of PICBLOC's programming facilities.

Another Proquip Rentals installation. The Mentorn production for the BBC series "You Decide" used a 6x3 wall for graphics, video replay and for audience voting. Photo Paul Sansom.

Giant Slam Dunk for Every Seat

The University of North Carolina's Dean E. Smith Center seats 21,572 people, and in common with all arenas has the problem of giving audiences, whether they be for the Tar Heel NCCA basketball team or for graduation ceremonies, a close up view.

Arena sports are often covered for television, but the benefit of this is not always available to the fans actually at the game. Big screen video solves the problem. It both allows the fans on site to see the action replays, and can be used to rouse support and to run pre- and post- match advertising, promotional material and press conferences.

Videowalls based on projection cubes give the highest image resolution and very acceptable image brightness for indoor arenas. They also give the lowest cost per square foot or square metre of display. This is an important factor in the arena application, where the problem is getting a display which is big enough to serve its purpose.

Viewing angle constraints, arising both to ensure a bright picture, and to make it easy for the audience to see both the live action and playbacks at the same time, mean that most arena applications need four displays. For some arenas it is possible to site the four displays in the center of the arena in a "gondola". The gondola usually carries electronic scoreboards, and may also carry additional lighting and audio equipment.

6x6 Cube Wall

However, if a gondola is inappropriate, the displays must be installed at the perimeter. This results in much longer viewing distances and the need for larger displays. At UNC they have installed four 6x6 Electrosonic PROCUBE videowalls, each with PICBLOC image processing. Each display is 16ft x 13ft, and, as can be seen from the picture, this gives a very acceptable "across the pitch" image.

The UNC Office of Sports' Steve Kirschner says that "the fans' reaction to the newly installed videowalls is very positive. They love the opportunity to see a great dunk from a different angle, and a lot closer up than they normally would".

McDonalds Crew Rally used seven videowalls with PICBLOC control, video engineering by IDT.

McWALLS

Gerry Wilkinson and his team at Image Design Technology are the most experienced videowall rental operation in Australia, so when clients need big videowall support for exhibitions or conferences, they usually turn to IDT.

A major client is McDonalds who put on team and motivational events not only for Australia, but also for the Pacific Rim markets. In November 1994 the Asia Pacific Managers Conference was held at the Entertainment Center in Sydney. The following year the same set design was used for the "McDonalds Crew Rally" for all McDonalds employees in New South Wales.

The set made impressive use of multiple videowalls, which allowed high brightness displays without any problems arising from ambient or set lighting. The set used seven videowalls, a mixture of monitor and cube walls with a total of 41 Pioneer cubes and 25 Hantarex monitors. The walls were powered by two Electrosonic PICBLOC-3 cardcages, three Betacam SP™ players, an Apple Mac computer and six live cameras. C-THROUGH computer program control ensured that the events were easy to manage.

IDT is a dealer for our Australian distributor, Electrosonic Systems, (a division of Evans Deakin Engineering).

CONTROL, DECISION AND PRESENTATION ROOMS

Electrosonic specialises in engineering complete big screen and multi-screen presentation systems for control rooms, decision spaces and presentation rooms. In addition Electrosonic's image processing products are supplied to value added resellers and systems integrators for incorporation in their own systems.

HALO 2 at BNR

Bell Northern Research (BNR) is the research and development arm of Northern Telecom. It is now very active in Europe, and has recently opened HALO 2, a flexible, purpose built marketing suite sited in Hertfordshire, England.

HALO 2 is used for explaining and demonstrating BNR's "broadband" technology for use in both business and consumer applications. It consists of eight separate areas, each with its own distinct function; for example meeting room, conferencing suite, system display and demonstration environments.

Electrosonic was commissioned by the BNR project design team to design and instal an integrated audio-visual system for the whole complex. The principle is that any member of BNR's staff can move round the different areas using only a single lightweight cordless hand control. An alternative touch-screen control system can be used when more extensive control is needed. Some sub-systems are unique to an area, but many of the source devices can be shared.

The control system co-ordinates the activities of video and data projection systems, a 24 channel IMAGINE™ lighting control system, audio sub-systems, floor-to-ceiling display reveal panels, ten display systems each with channel selection and remote volume control, and a comprehensive source system equipped with CD-I, 35mm slides, visualisers, computers and VCRs.

Electrosonic designed the system, based on AMX technology, to be modular and software based. This allows it to be re-configured or extended as the client's needs change. To help ensure trouble-free operation, Electrosonic provided training in the use of the system to BNR staff, and runs a system maintenance contract which includes on-line system analysis and fault diagnosis from Hawley Mill.

The headend room is part of the tour at HALO 2.

Audio-visual presentation methods always work best when integrated into appropriate environments. BNR's HALO 2 is a fine example of this in practice.

The conferencing suite (above) and a well equipped meeting room (below). Both with control systems integrated by Electrosonic.

Part of the massive launch control room set of Goldeneye, with its 11x6 cube videowall. Photo Neil Higgins.

GOLDENEYE shot with PICBLOC

The James Bond film *Goldeneye* was well up to form, with the required doses of megalomania and explosive action. The film used two videowalls in the sets, which were rented to the production by Proquip Rentals Ltd. Electrosonic PICBLOC™ image processing was used as the heart of the systems.

The film, produced by Eon Productions, was shot in an old Rolls Royce factory in Leavensden, Herts, UK, now converted to large sound stages and renamed the Millenium Studios. One set required a massive "launch control room" with complex dynamic imagery. Another set, M's office, also used a videowall. Both represented fictional examples of the use of large live graphics and video displays in decision spaces.

The decision to use videowalls was taken by the producers on the grounds that they needed the ability to show complex multiple imagery, and they required high screen brightness to allow the use of fully lit sets. The launch control room set used a massive 11x6 array of Pioneer cubes (actually one cube top centre was replaced by the "Goldeneye" itself) all under PICBLOC/C-THROUGH™ control and sourced from no less than eight Apple Macintosh™ computers and laserdisc players. Justin Owen designed the spectacular graphics.

M's office had a comparatively small 12 cube videowall.

There is an interesting technical problem in filming videowalls which are based on scanned images. Unless the camera shutter is synchronized to the display, black bars can appear on the filmed image. For *Goldeneye* all the computer and video sources were genlocked together, and the reference video sync was also fed to the Panavision® camera.

Scottish Hydro

Scottish Hydro has recently refurbished its control room in Pitlochry. It features a 4.2m x 2m high resolution graphics display to view real time SCADA (Supervisory Control And Data Acquisition) information, designed and installed by Electrosonic.

The needs of this kind of display are quite different from those of a "video" display, even if, superficially, the displays look similar. At Electrosonic we are able to provide a systems engineering service for any large image display. We use our own image processing equipment and software where appropriate. We use the most suitable projection method, and we custom build where necessary. If we don't have relevant processing equipment or software ourselves, then we happily integrate third party material.

The Scottish Hydro installation is a case in point. Here the requirement is that the display behave as a multi-user X-Windows server on a Unix network, and that the final output of the display is at 3840 x 2048 pixels. There is a need for a high refresh rate to eliminate flicker, but the image update rate is slow. An important feature is the ability to display any application residing on the network within an X-Window.

Workstation

Working with Scottish Hydro we determined that M3i's VsaX™ software was ideal for the task. The system supplied consists of a Sun workstation fitted with six graphics cards running the VsaX software. This feeds a custom built display system arranged to occupy minimum depth, while still allowing easy maintenance access.

The display consists of six 67" high gain rear projection screens each served by an NEC 9PG graphics projector. A mirror arrangement allows all the projectors to be sited below the screen level, and to withdraw on telescopic runners for access.

Flexibility

Eric Davidson, the system control manager at Scottish Hydro, was responsible for specifying the system. He says "The X-Windows display gives us total flexibility, allowing displays to be changed to accommodate not only power system changes, but also changes in operating practice. Any image available on an operator's monitor can be displayed on the display wall, including some specially created to make best use of its size. So far we have only scratched the surface in using it, but it will be something that will change and evolve over its life to meet our changing needs. It will not be long before we begin to wonder how we ever managed without it!"

A general view of Scottish Hydro's control room with the high resolution display in the background.

One of the video conference rooms.

Hong Kong Telecom Videoconferencing

On Page 12 we describe a major permanent exhibition at Hong Kong Telecom. At the same time as we were engineering the interactive displays for that, we were also engineering an extensive audio visual system to cover the needs of two video conference rooms, a 100 seat lecture theatre, a boardroom, a conference suite and four meeting rooms.

All the facilities are interconnected, resulting in the need for a complex switching and control system; but one programmed to be simple to use. All the rooms include video, data, slide and overhead projection, and have linked AMX control. Many source machines, such as Hi and Lo band U-Matic, S-VHS, laserdisc, CD-I, Betacam and DAT are shared. A big broadcast switch is installed which allows meetings or pre-recorded material to be shown in all the rooms from the 4th to the 42nd floor.

The central control room.

As usual with Electrosonic, the entire system was factory built and system tested before being shipped to site. The videoconferencing system was useful during system commissioning!

The lecture theatre is equipped with 4 language simultaneous interpreting.

Controlling the Traffic

Traffic management is a worldwide problem. As highways must operate at full capacity, any interruption can be costly. An investment in highway management ensures that highways are used efficiently and safely. Electrosonic videowall display systems are being incorporated into the control rooms of such schemes to provide a better overview to the operating staff, press and VIP visitors.

The largest example is to be found at the *TransGuide Traffic Management Center* in San Antonio, Texas. Here Allied Signal was appointed main contractor for the ATMS (Advanced Traffic Management System) covering 170 miles of highway initially, but intended eventually to cover several hundred miles within Texas. The system depends on a comprehensive installation of sensors, signalling and TV surveillance - all linked by a fiber optic digital network.

Working alongside video system sub-contractor MZB Video Solutions Inc, Electrosonic was appointed sub-contractor for the overview displays in the massive TransGuide control room. These can be easily seen by all operating staff and from a large viewing gallery which overlooks the operations room. The display consists of no less than 80 PROCUBE™ projection units arranged in three blocks. Two flanking 4x4 displays are used for live video. In principle it would be possible for each display to show 16 separate images, but in practice the smallest images shown are 2x2, and for a major incident a full 4x4 magnification can be shown.

The center 12x4 array is normally used for showing the outputs of three computer graphics displays. These are generated by DEC workstation X-terminals, and the displayed resolution is 1280 x 1024. The entire display system is based on PICBLOC™ image processing, using standard video digitisers for the magnified video images and Electrosonic Workstation digitisers for the graphics images. These have a sophisticated system of pixel convolving to ensure that the incoming image exactly matches the display, with no loss of image content or blank screen area.

The *TransGuide Traffic Management Center* in San Antonio, Texas uses videowalls for overview.

The MITSC Control Room in Detroit, Michigan, uses a videowall for both surveillance video and graphics.

Korea

Not every Department of Transportation requires such big overview displays. In Seoul, Korea, our videowall distributor, Joong Won Systems, supplied the equivalent of the local DoT with a 3x3 PROCUBE/PICBLOC videowall to improve their overview facilities. As can be seen from the photo, the control room has many standard video monitors doing surveillance. Any image can now be put up on the "big screen" to improve the handling of major incidents. The videowall is equipped to show both video and computer graphics, again using the Workstation Digitiser to show 1280 x 1024 images.

Detroit

In downtown Detroit, Michigan, the DoT have MITSC, the Metropolitan Integrated Transportation System Control; this combines ATMS with ATIS (Advanced Traveler Information System). Here Electrosonic worked as display sub-contractor to Rockwell Autonetics Electronics Systems Division, specialist in the integration of traffic management systems. Again the display is a 3x3 PROCUBE/PICBLOC videowall, but the flexibility of operation is exceptional.

Each cube has two inputs, one composite NTSC and one RGBS analog. The RGBS inputs are connected to the output of the PICBLOC processor, and the composite inputs to the output of a video matrix switch. The PICBLOC processor is equipped with both video and Workstation digitisers, so the entire display can show every combination from nine separate video images to one large computer graphic map. In this case the graphics resolution is 1024 x 768. A computer running Electrosonic's C-THROUGH™ software is used to configure the display.

For systems of this kind we work either as a display systems sub-contractor to a major systems integrator, or as the supplier of image processing equipment to other systems houses.

Traffic Management Center in Seoul, Korea, using a 3x3 videowall to assist overview.

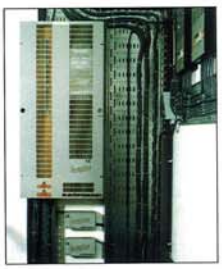
The big screen at Management Centre Europe uses a Barco 8100 projector; the ceiling mounted CRT projector is used for a smaller screen when partitions are closed.

Management Europe

Mediatone SA of Brussels is Electrosonic's distributor in Belgium. Besides engineering videowall systems, they do a lot of work for conference centres and early in 1996 they completed the audio visual and lighting control installations for the Management Centre Europe complex in Brussels.

This has no less than 18 conference rooms; many of which are separated by adjustable partitions to create larger spaces. The six areas most comprehensively equipped each use Electrosonic MRC room control and Barco Graphics projectors. When the largest space is opened up, a Barco 8100 LCD "light cannon" is used to get a really big bright picture.

The conference rooms use a total of 48 channels of Electrosonic IMAGINE™ lighting control. Partition position sensors provide inputs to the IMAGINE system to ensure that lighting is controlled independently or collectively according to the partition status.



IMAGINE dimmers neatly installed at MCE.

JUPITER II LAUNCH DISPLAY

Electrosonic has recently delivered a giant videowall display to Kourou in French Guyana. It is installed in the new control room for the Ariane 5 satellite launchers under the Jupiter II program. The display is nearly 7m wide and 4m high. It is required to work in normal ambient light, to occupy a shallow depth, and to provide clear visibility to the launch control staff who are seated at control consoles which may be up to 12m away.

The requirement is for a display which can change format during the countdown process. Thus, for example, early in the countdown the display shows many "screens" of status information and a few screens of video information derived from cameras around the launch site.

Countdown

As countdown progresses the emphasis changes, with some of the detailed information no longer required, being replaced by much larger real life images.

To meet the changing requirement Electrosonic delivered an 8x6 videowall using PROCUBE projectors and PICBLOC-3 image processing. The combination gives a highly economical and flexible big-image display. It can show many different images simultaneously, culminating in a 6x6 image of the launch itself, still accompanied by data on the other screens.

The display is configured for eight VGA inputs and eight video inputs. Individual data images need only be of VGA resolution because the maximum magnification used for data is 2x2, and the viewing distances are too great to benefit from higher resolution (although the system can easily be upgraded to show workstation graphics if required). The screens of the videowall are slightly faceted to ensure that all the launch staff, who are seated at consoles arranged in a fan shaped layout, see an evenly illuminated image. The display is controlled by the Electrosonic C-THROUGH computer program which automatically reconfigures the display as countdown progresses.

For this project Electrosonic was sub-contracted to Thomson-CSF who was the main contractor for the control room to CNES. CNES in turn operates the launch site on behalf of the European Space Agency. At the same site our colleagues at Electrosonic Systèmes of Paris supplied a complete AV system in the nearby Space Museum.

The launch control room during commissioning.

A view of the control room through the viewing gallery glass wall during a launch.

The giant videowall under test at Hawley Mill.

MUSEUMS AND TOURISM

Electrosonic manufactures many products which have applications in museums and tourist visitor centres. Our Systems Division can also provide a complete audio visual project engineering service. These pages describe typical product applications and complete projects.

INTERACTIVE IN HONG KONG

Telecom World is the ultimate in corporate exhibitions, occupying 34,000 sq ft and two floors of Hong Kong Telecommunications' new 42 floor corporate headquarters. Telecom World, designed by MET Studio Ltd, informs, educates and entertains.

Electrosonic was awarded the AV system design and build contract. It was a particularly interesting one because it represented a watershed in "museum" type AV installations, with a far greater proportion of imaging being derived from computer sources than from videodisc. But it also showed that technology must always be subservient to the design and story content, because slide projection was also widely used.

The City Street section of Telecom World.

Log-in card

At the reception, visitors are given a Telecom World card, and the first action is to "log-in". The card records personal details and language choice, and is the only means of access to the interactive, virtual reality and information point exhibits. By recording the age of visitors, it is possible to tailor some of the exhibits to the likely knowledge of the visitor. Exhibit software is designed so that cards must be inserted and removed before the action starts, which ensures that visitors don't leave their cards in an exhibit by mistake.

From the registration terminals visitors move to "Humble Beginnings". The sound of Morse code being transmitted permeates the atmosphere. There is an old telephone – lift the earpiece and turn the handle, and a message can be heard. Turn the dial of an old radio and tune in to more information. At the end of this area is the first of seven information terminals which provide the visitor with a summary of what they have seen, and more details on some of the subjects covered.

Among the many interactive exhibits are "Dial versus touchpad", "Sam and the soundwaves", "Call out a colour" and "Signalling with light". All demonstrate communication and physics principles in an entertaining and informative way. As one would expect from a telecommunications company, Telecom World allows the visitor access to the outside world. There are live links to the Stanley Satellite Station on the other side of the island, and to the Hong Kong Science Museum.

City Street

The "City Street" display gives the visitor the feel of Hong Kong. It encompasses two floors and makes much use of slide projection for effect and atmosphere. Exhibits within it show the role of telecommunications in business life, the money markets, video conferencing and cellular phones. The final exhibition area, "Just Imagine", is a glimpse of the future; it makes use of special effects to add an air of mystery to the display.

On the way out visitors can check out at a terminal that asks them what they have learned at Telecom World. If they answer correctly they are rewarded with a personalized certificate as a memento of their visit.

All the computers used to run the interactive exhibits run on a network. Although the exhibits themselves can run without the network if necessary. The central server is used to distribute the visitor data, collect performance data and monitor exhibits. This ensures both that all exhibits run smoothly, and that network speed is not an issue.

EASY+

While all the interactive exhibits are based on standard PCs all the "show" elements of Telecom World run automatically from Electrosonic VCU show controllers. Electrosonic EASY+ software is used, because this is ideal for controlling any combination of lighting, video, slide projection and special effects.

A total of eight separate EASY+ shows are installed. Most audio is derived from videodiscs or computer, but there are also some ESTA™ sourced sound channels.

The start of the exhibit area. Notice the elegant interactive terminal with card reader slot.

The optical fibre exhibit.

The Telecom World Production Team

The following were the main companies involved:

Designers:	MET Studio Ltd
Exhibit fabricators and contractors:	Maltbie Associates
	Beck Interiors
AV Systems designers and engineers:	Electrosonic Ltd
AV program production:	McLean English
Lighting design:	DHA Design
Interactive software production:	Media Projects International

Telecom World Facts and Figures

Some notable numbers relating to the audio visual engineering:

Amplifier channels:	123
Loudspeakers:	126
AV cables:	65km
Computer systems:	40
Full size 19" rack cabinets:	32
Display monitors:	48
Slide projectors:	55

The *Fragile Planet* exhibit at Heysham uses fibre optics in a show about the effect of increased energy consumption.

Atoms, Burns and Vikings

The distinction between museums and visitors' centres is now blurred, and there is no end to the subjects which can form the basis of a day out. Event Communications are leading designers of visitor attractions, and often we join their "design and construct" team, being responsible for the audio visual engineering within their designs.

Three of their recent projects illustrate the variety of subject matter. At Heysham, in the northwest of England, Nuclear Electric have a new exhibition which presents the emotive subject of nuclear generated electricity. Event's brief was to present the subject in an informative, memorable and entertaining way. They did so by creating six presentation areas, each of which runs a complete automatic show, with programmed sound, lighting, video and special effects.

How nuclear fission works **has a back projected magician and LCD projection inside a crystal ball.**

Singing Kitchen **at Heysham**

The shows can run continuously in synchronization for maximum throughput, or in cascade when visitor traffic is light. The most elaborate show is *The Singing Kitchen*, part of the *Powerquest* presentation which shows the place of nuclear power in the energy balance. The message is presented by animated kitchen characters, and reinforced by video images which appear as the "windows" of the kitchen. The kitchen chorus, made for Event by McAndroids, includes the swinging frying-pan, smiling saucepans, rhythmical pop-up toaster, lid-raising teapot, frantic vacuum cleaner, inscrutable blender and hyperactive radio.

The show automation is all under Electrosonic VCU control. Most shows were programmed using our mixed media program EASY, but for the kitchen ANCOR was used for "live" programming. All shows use the ES1406 programmable audio mixer; which allows sound levels to be dynamically balanced between exhibits.

Scotland

Event designed two attractions for the west coast of Scotland which opened for the 1995 season. The Burns Heritage Centre at Ayr was completely re-fitted out (although some 15 year old Electrosonic equipment was retained for part of the pre-show!) and now features a new audio visual interpretation of *The Tam O'Shanter*. This uses large screen multi-video projection combined with lighting and special effects.

Vikingar !

30 miles away at Largs *Vikingar!* commissioned by Cunninghame District Council, is a dramatic show on the Viking link with Scottish history. The dramatic show features Odin, God of war, in the form of a 3m high carved head which sinks into the rock set with dramatic lighting and special effects in an AV production by McLean English.

All three attractions benefit from Electrosonic's control experience, "lifetime" products, and IMAGINE™ permanent installation dimmers.

MIXED MEDIA

This page describes some applications using Electrosonic equipment and computer programs for large scale mixed media control.

The Megane Convention in Barcelona. 92 slide projectors back projecting onto sailcloth screens up to 30m high.

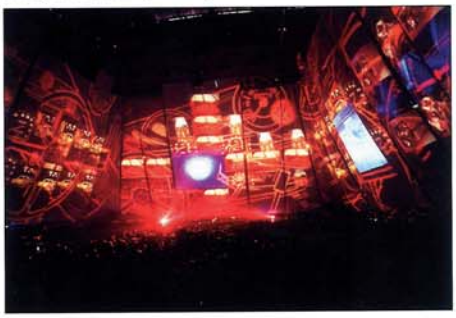
MULTI IMAGE for MEGANE

When Renault launched the Megane in Europe, they did so in style at the Barcelona indoor stadium with a two day convention for their European sales forces and for their suppliers. The presentation system used more than 100 projectors of different sizes.

Our colleagues at Electrosonic Systèmes of Paris were closely involved with this event. While much presentation and product launch work is today done using entirely video and electronic presentation techniques, the really big occasions require high power optical systems based on slides or movie film in order to achieve images which are of the required size and brightness. The Megane Convention was no exception.

The requirement was to surround the audience with imagery. This was done using boat sail cloth as the "screens". The screens were as high as 25-30m (80-100ft). Three different imaging systems were used.

Three "conventional" screen areas, each about 9m wide, were served by front projection video using double ganged Barco 8100 projectors. The entire screen surface was also served by high power front projection systems based on travelling filmstrip from ETC. The ETC system uses 7kw xenon lamps to project a wide filmstrip. In fact two different moving strips, with very precise speed and position programming, are fitted in each projector. For the Megane Convention no less than ten ETC projectors were used.



This picture shows some of the slide projectors in use, but with their images superimposed by the giant ETC filmstrip images.

EASY

The ETC system is excellent for scene projection, but is not ideal for detailed photographic images. So the entire screen area was also served by a back projection system based on 92 slide projectors. The projectors used were a special version of the Kodak Ektapro supplied by Electrosonic Systèmes. The "5050" projector is fitted with an interface which allows it to be directly controlled by the EASY computer program, without any separate dissolve unit or interface. In the version used at Barcelona, the choice of lamp, the use of coated optics, a new heat filter and the use of special lenses achieve 3700 lumens light output for each projector.

The use of multi-image slide projection on such a big scale brought both excellent image quality and a dynamic to the show, achieved by skilful programming to precisely match the sound track and other effects.

While the ETC system had its own computer control, the entire slide projection and video systems were controlled by the Electrosonic EASY+ mixed media control program. This can control up to 96 projectors, 48 serially controlled devices, 64 analog channels and 192 relays.

Transperience

The photo shows "The Fragile Earth" Theatre, part of Transperience, near Bradford, UK, run by the West Yorkshire Transport Museum Trust. While based on real vehicles, Transperience has a wider aim, and includes many exhibition areas. Several of these were designed by the York based design consultancy IDEAS Ltd.

Electrosonic helped IDEAS with the provision of mixed media control systems. The Fragile Earth system alone used 13 slide projectors, 4 video projectors, 48 lighting channels and 4 sound channels.

EASY in the Sky

The rebuilt London planetarium uses the Electrosonic EASY+ computer program for its master show control. The installation is an example of the flexible way in which we work.

We normally work in one of two ways; either as a manufacturer of standard products which value added resellers incorporate in their system or application, or as systems engineers where we take responsibility for a complete system or subsystem. In the case of the London Planetarium project we worked on an "intermediate" basis.

The Madame Tussauds organization, which runs the planetarium, has its own Audio Visual Department who often do their own "project engineering". So in this case they bought directly items such as the planetarium projector, sound system and lighting control; but commissioned Electrosonic to supply the slide and video projection system and the master control system.

We supplied a 486 computer system configured for EASY+, a program ideal for planetarium work. In this case EASY+ controlled:

- **the DIGISTAR II Planetarium projector from Evans & Sutherland, by calling up sequences for the projector held in its Sun SPARC Station™ control computer.**
- **50 slide projectors for All Sky, Panorama and general effects. These were Kodak Ektapro fitted with Electrosonic Systèmes direct computer interface (no separate dissolve unit or serial controller needed).**
- **a Strand Galaxy lighting console via a MIDI serial control output.**
- **the audio (ADAT) and video (Virtual Video Recorder) sources via serial control.**

The London Planetarium at Madame Tussauds has been completely rebuilt within its outer shell, and uses the latest show equipment.

The EASY computer program provides clear device and cue status information

- **slew mirrors and motion platforms for the video projectors via Electrosonic digital and analog interfaces. The interfaces are also used for many other special effects.**

In addition to supplying and commissioning the main show control computer and its interfaces, Electrosonic delivered the slide projectors and the video projectors, with their associated line doublers. Here two Barco 701S projectors were supplied for mounting on programmable moving platforms installed in the central equipment pod; and one Barco 1101 projected across the huge 20m dome to produce a main central picture.

The SOE exhibit is themed to the interior of a bomber.

Secret War

A new exhibition has recently opened at London's Imperial War Museum. "Secret War" presents the history of clandestine warfare, and addresses the question of its contemporary significance.

The designers of "Secret War" were Land Design Studio. Their design is based on themed areas, each one covering a particular subject and incorporating appropriate artefacts from the IWM's collection. Thus the World War 2 S.O.E. operation is presented within the deconstructed airframe of a Halifax bomber; exhibits on MI5 and MI6 are redolent of polished wood and stainless steel; and a brutalist backdrop is used for The Secret Soldiers, an exhibit describing the work of the SAS and SBS.

ESLINX

The complete exhibition makes subtle use of programmed lighting, background sound and video sequences. There are also interactive exhibits allowing visitors to access greater detail – for example interviews with spies or with people involved in covert operations. Audio visual programme production was by Spiral Production.

Electrosonic's Systems Division engineered the AV systems. Control of the exhibits is based on Electrosonic ESLINX™ and ESTA™ technology, which provide the benefit of minimum maintenance because they are "solid state", while still allowing easy re-programming should it ever be required later.

Museum of Rugby

The Rugby Football Union has spent many millions of pounds developing Twickenham Stadium. Built within the new East Stand the £1.7 million Museum of Rugby was opened in January 1996.

Designed by Robin Wade & Partners, the museum houses the finest collection of rugby memorabilia in the world. Visitors enter the museum through old turnstiles and proceed through 14 themed display areas, culminating in a set which evokes the big match with big screen projection and six-channel surround sound.

Other exhibits include a "commentary box" where you can hear the commentary on famous games while watching a video monitor, and the tour finishes in an AV theatre running continuous rugby films.

Electrosonic installed all the video and audio programme playback systems for the project, based on the extensive use of ESLINX control, ESTA-II sound playback, laserdisc video playback and Barco projection.

MIXED MEDIA

This page describes some applications using Electrosonic equipment and computer programs for large scale mixed media control.

The Megane Convention in Barcelona. 92 slide projectors back projecting onto sailcloth screens up to 30m high.

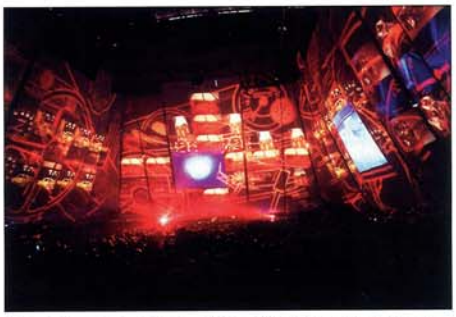
MULTI IMAGE for MEGANE

When Renault launched the Megane in Europe, they did so in style at the Barcelona indoor stadium with a two day convention for their European sales forces and for their suppliers. The presentation system used more than 100 projectors of different sizes.

Our colleagues at Electrosonic Systèmes of Paris were closely involved with this event. While much presentation and product launch work is today done using entirely video and electronic presentation techniques, the really big occasions require high power optical systems based on slides or movie film in order to achieve images which are of the required size and brightness. The Megane Convention was no exception.

The requirement was to surround the audience with imagery. This was done using boat sail cloth as the "screens". The screens were as high as 25-30m (80-100ft). Three different imaging systems were used.

Three "conventional" screen areas, each about 9m wide, were served by front projection video using double ganged Barco 8100 projectors. The entire screen surface was also served by high power front projection systems based on travelling filmstrip from ETC. The ETC system uses 7kw xenon lamps to project a wide filmstrip. In fact two different moving strips, with very precise speed and position programming, are fitted in each projector. For the Megane Convention no less than ten ETC projectors were used.



This picture shows some of the slide projectors in use, but with their images superimposed by the giant ETC filmstrip images.

EASY

The ETC system is excellent for scene projection, but is not ideal for detailed photographic images. So the entire screen area was also served by a back projection system based on 92 slide projectors. The projectors used were a special version of the Kodak Ektapro supplied by Electrosonic Systèmes. The "5050" projector is fitted with an interface which allows it to be directly controlled by the EASY computer program, without any separate dissolve unit or interface. In the version used at Barcelona, the choice of lamp, the use of coated optics, a new heat filter and the use of special lenses achieve 3700 lumens light output for each projector.

The use of multi-image slide projection on such a big scale brought both excellent image quality and a dynamic to the show, achieved by skilful programming to precisely match the sound track and other effects.

While the ETC system had its own computer control, the entire slide projection and video systems were controlled by the Electrosonic EASY+ mixed media control program. This can control up to 96 projectors, 48 serially controlled devices, 64 analog channels and 192 relays.

Transperience

The photo shows "The Fragile Earth" Theatre, part of Transperience, near Bradford, UK, run by the West Yorkshire Transport Museum Trust. While based on real vehicles, Transperience has a wider aim, and includes many exhibition areas. Several of these were designed by the York based design consultancy IDEAS Ltd.

Electrosonic helped IDEAS with the provision of mixed media control systems. The Fragile Earth system alone used 13 slide projectors, 4 video projectors, 48 lighting channels and 4 sound channels.

EASY in the Sky

The rebuilt London planetarium uses the Electrosonic EASY+ computer program for its master show control. The installation is an example of the flexible way in which we work.

We normally work in one of two ways; either as a manufacturer of standard products which value added resellers incorporate in their system or application, or as systems engineers where we take responsibility for a complete system or subsystem. In the case of the London Planetarium project we worked on an "intermediate" basis.

The Madame Tussauds organization, which runs the planetarium, has its own Audio Visual Department who often do their own "project engineering". So in this case they bought directly items such as the planetarium projector, sound system and lighting control; but commissioned Electrosonic to supply the slide and video projection system and the master control system.

We supplied a 486 computer system configured for EASY+, a program ideal for planetarium work. In this case EASY+ controlled:

- **the DIGISTAR II Planetarium projector from Evans & Sutherland, by calling up sequences for the projector held in its Sun SPARC Station™ control computer.**
- **50 slide projectors for All Sky, Panorama and general effects. These were Kodak Ektapro fitted with Electrosonic Systèmes direct computer interface (no separate dissolve unit or serial controller needed).**
- **a Strand Galaxy lighting console via a MIDI serial control output.**
- **the audio (ADAT) and video (Virtual Video Recorder) sources via serial control.**

The London Planetarium at Madame Tussauds has been completely rebuilt within its outer shell, and uses the latest show equipment.

The EASY computer program provides clear device and cue status information

- **slew mirrors and motion platforms for the video projectors via Electrosonic digital and analog interfaces. The interfaces are also used for many other special effects.**

In addition to supplying and commissioning the main show control computer and its interfaces, Electrosonic delivered the slide projectors and the video projectors, with their associated line doublers. Here two Barco 701S projectors were supplied for mounting on programmable moving platforms installed in the central equipment pod; and one Barco 1101 projected across the huge 20m dome to produce a main central picture.

The SOE exhibit is themed to the interior of a bomber.

Secret War

A new exhibition has recently opened at London's Imperial War Museum. "Secret War" presents the history of clandestine warfare, and addresses the question of its contemporary significance.

The designers of "Secret War" were Land Design Studio. Their design is based on themed areas, each one covering a particular subject and incorporating appropriate artefacts from the IWM's collection. Thus the World War 2 S.O.E. operation is presented within the deconstructed airframe of a Halifax bomber; exhibits on MI5 and MI6 are redolent of polished wood and stainless steel; and a brutalist backdrop is used for The Secret Soldiers, an exhibit describing the work of the SAS and SBS.

ESLINX

The complete exhibition makes subtle use of programmed lighting, background sound and video sequences. There are also interactive exhibits allowing visitors to access greater detail – for example interviews with spies or with people involved in covert operations. Audio visual programme production was by Spiral Production.

Electrosonic's Systems Division engineered the AV systems. Control of the exhibits is based on Electrosonic ESLINX™ and ESTA™ technology, which provide the benefit of minimum maintenance because they are "solid state", while still allowing easy re-programming should it ever be required later.

Museum of Rugby

The Rugby Football Union has spent many millions of pounds developing Twickenham Stadium. Built within the new East Stand the £1.7 million Museum of Rugby was opened in January 1996.

Designed by Robin Wade & Partners, the museum houses the finest collection of rugby memorabilia in the world. Visitors enter the museum through old turnstiles and proceed through 14 themed display areas, culminating in a set which evokes the big match with big screen projection and six-channel surround sound.

Other exhibits include a "commentary box" where you can hear the commentary on famous games while watching a video monitor, and the tour finishes in an AV theatre running continuous rugby films.

Electrosonic installed all the video and audio programme playback systems for the project, based on the extensive use of ESLINX control, ESTA-II sound playback, laserdisc video playback and Barco projection.

TECHNOLOGY

Electrosonic uses the latest technology in its products and projects. This page describes some of the techniques being used or investigated.

High-tech at Hawley Mill

The product development laboratories at Hawley Mill have received considerable investment in CAD tools to help create better products and to shorten the time to market. At the same time legislation has required an extension to our testing facilities, and the search for greater product performance has led to the use of the latest component technology.

Until recently our engineers designed a circuit, but had the printed circuit layouts done by sub-contractors. This was leading to delays, and it was becoming obvious that some sub-contractors were not up to laying out large complex multi-layer boards with narrow track spacings. We now have two full Intergraph™ workstations with VeriBest™ PCB Designer software. This not only lays out the complex circuitry, but also keeps track of all product documentation and parts lists.

We have development systems for many advanced programmable products. These include "standard" microprocessors, advanced RISC processors, EPLDs and FLEX™ logic. New development tools include those associated with high speed network technology.

EMC tests in progress.

Our products must now meet international standards, for example UL in the USA and CE in Europe. The most difficult tests to conduct are those related to electromagnetic compatibility. Group experience in ensuring that dimmers met the old European standards meant that our Helsinki labs were already well equipped for such tests, and that Hawley Mill had equipment suitable for near field tests. To facilitate full testing of video equipment, Hawley Mill is now the proud possessor of an anechoic EMC "tent".

Printed circuit layout is done on Intergraph™ workstations at Hawley Mill.

Special project developments in image processing, which may well lead to an exciting new range of products from Electrosonic, mean that we are "pushing the envelope" in real time image processing. One project needs a single screen image processor able to display at 1600 x 1200 24 bit resolution, run at 135MHz pixel clock, and carry out image convolution at 67.5MHz. It uses six RISC processors, a large quantity of high speed logic hardware, an ethernet interface and an impressive 152 Megabytes of Synchronous D-RAM, one of the latest memory technologies only just coming on the market.

ASIC

Our quest for better product performance at competitive prices is leading us to using custom ASICs (Application Specific Integrated Circuits). Our new IMAGESTAR™ and PIC-BLOC-4™ products are incredibly compact compared with their predecessors, and yet give improved performance. The key to this is the high performance ASIC, made for us by GPS Semiconductors, which is the major component in the output circuit.

The procedure here is that we develop working product using off-the-shelf programmable logic. In this case the prototype design needed three huge (and very expensive) EPLDs to carry out the task. Once proven, the design was ported down to ASIC - what's more the ASIC worked first time!

The ASIC at the heart of Electrosonic's new videowall processor products.

100,000 hours on MPEG

When Steven Spielberg launched the "Survivors of the Shoah Visual History Foundation" his dream was to acquire videotape testimonies from the world's remaining holocaust survivors in a project made urgent by the advancing age of the survivors. The tens of thousand of interviews would yield over 100,000 hours of field tape. Electrosonic helped solve the problems of dealing with such a mass of material by using the latest video compression technology.

Steven Spielberg with producers June Beallor and James Moll at a desktop computer which can patch in to the transfer process. Photo © 1995 Barry Slobin.

Sam Gustman, Director of Information Technology at the Foundation, and his team had to meet a demanding specification. Field tapes needed to be copied in multiple formats, timecoded, documented and transferred to a massive digital database. Electrosonic was commissioned to design and build the transfer workstations; and, most importantly, to provide the custom control software.

The photograph shows the transfer suite. The 16 identical Electrosonic-built transfer workstations allow incoming tapes to be simultaneously copied to Digital Betacam™, VHS, S-VHS and MPEG-2. Technicians load the bar-coded field master tapes, initiate the transfer on a touch-screen and can then follow the transfer on audio and video monitors.

Electrosonic's machine control software not only controls all the machines, but also generates an automatic slate; marking the name of the survivor, videographer, date, time and other cataloging information at the front of each transfer copy. Copies are recorded with timecode and copyright stripe. Each transfer station generates an electronic log which allows status and fault reports to be automatically sent over a Novell network and via MS Mail™ to personnel in the Foundation's offices and to Electrosonic's office in Burbank.

The transfer suite at the Survivors of the Shoah Foundation. There are 16 transfer stations in all.

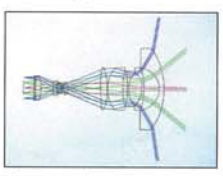
MPEG-2

The Survivors of the Shoah Foundation's transfer suite represents leading edge use of digital video compression technology. Each rack contains an Optivision MPEG-2 compression engine controlled by a Pentium™ PC running Electrosonic's "Digitape" software. This streams the digitally compressed video in real time over a TCP/IP network to a Silicon Graphics "Challenge" computer, from where it is spooled off and stored on an EMASS storage system, to take its place in the Foundation's massive 150 Terabyte multi-media database.

The advanced software developed by Electrosonic for this project, and the experience gained with digital video compression techniques, are of direct relevance to Electrosonic's product development strategy. A much appreciated compliment about Electrosonic's work on the project came from Ricky Kreitman, Survivors of the Shoah Foundation's Transfer Supervisor. He said "We had a wish list for what we needed Electrosonic's control software to do, and we got everything we wanted".

Optical Magic

The 2xVIEW™ display uses a carefully designed optical path to give a uniformly bright image.



Electrosonic commissions Hughes Leitz to develop special projection lenses.

While most of our development work is concerned with electronics, one of our main end products, a big image, often requires special optics. Optical expertise is both in house, developed from over 30 years' experience of projecting images of all kinds, and derived from our specialist suppliers and consultants.

Our new 2xVIEW™ compact display has a carefully designed optical path using first surface mirrors and high gain fresnel lens screens to give a uniform bright image over defined viewing angles.

We often find that standard "videowall" screens are unsuitable for particular installations, and in such cases we work with our screen vendors to develop special screens with, for example, custom lens patterns to direct light in a way which matches the audience placement.

When it comes to movie projection most needs can be met using standard lenses; but even here we sometimes need to commission special lenses, beam diverters, polarizers, light collectors and other optical elements.

20,000 Hours in Las Vegas

A question we are often asked is "how long do the tubes last in a projected videowall?". The cathode ray tube projector which is the basis of most "cube" type videowalls gives a good service life, but the light output from the CRT itself does decline over time. A point is reached where it is both difficult to set up the projector, and the light output is too low to be of use.

Facts on tube life are difficult to come by, and in practice the useful life depends very much on the location of the installation and on the material being shown. Currently most manufacturers will give a figure of around 8,000 hours, based on the tube being subjected to a specified drive, and this being the time by which light output has dropped to 50% of initial light output.

In practice we would agree that this is probably a top limit for cubes being used for rental and similar applications. However, in fixed installations we are finding that if the ambient light conditions are comparatively low, and if the initial set-up does not use maximum available brightness, significantly longer life can be obtained. In the last issue of ELECTROSONIC WORLD we headlined the amazing videowall installed in the reception of the MGM Grand Hotel in Las Vegas. This display runs full motion video 24 hours a day and is, therefore, an excellent proving ground.

Here tubes are being replaced after nearly 20,000 hours, giving an extraordinarily low cost per hour in respect of tube life. Our recommendation to those using projected videowalls in retail display is to budget for tube replacement at around 9,000 hours, and hope to do better – but 9,000 hours is well over two years, 12 hours a day, seven days a week.

The 80 cube wall at the MGM Grand Hotel.

In control rooms using projectors for graphics and diagrams, the life depends entirely on the material being shown, and whether or not tube-burn is detrimental. Curiously it is often not an issue. We have heard of installations of this kind still running the same tubes after 27,000 hours and more.

The Experience Room at GPT's Customer Welcome Centre seats 15 visitors in comfort.

GPT's Coventry Experience

The wide screen has come to Coventry. A brand new "Customer Welcome Centre" has been opened by the Public Networks Group of GPT. It not only has state-of-the-art conference rooms, but boasts a 130° panoramic screen with Dolby™ surround sound. Audio-visual engineering was by Electrosonic's UK Systems Division.

GPT, the joint company of GEC of Great Britain and Siemens of Germany, is the UK's major telecommunications manufacturer and systems supplier. Its Public Networks Group has a continuing need for customer presentations and product demonstrations, and its Customer Welcome Centre is designed to ensure that such events go smoothly. The centre includes eight main meeting spaces, and has excellent catering facilities.

The "Experience Room" is the highlight of any visit to the centre. It is designed for the presentation of a high-impact "house show", and for other complex multi-screen presentations. The main show, produced for GPT by Wyatt & Wyatt, runs fully automatically from three Sony CRV disc players running in sync. They in turn feed a Panoram Technologies Inc Video Panoram™ processing unit, the three outputs of which are line doubled and then fed to three Barco 808 Graphics projectors.

130° Screen

The result is a seamless 130° image which is presented on a compound curved screen for maximum impact. The show is accompanied by multi-channel sound with enhanced bass. However, the Experience Room is not just a one-show room. The projection system can show one, two or three images, from video sources, multi-media personal computers and Unix workstations. The Panoram overlapped "soft edge" projection is used for the main show; in other applications the images from the different projectors are butted or deliberately separate. For example, dual screen presentations can be given when overseas visitors come to the centre; graphics may then be shown in English on one screen, and in the visitor's language on the other.

The GPT Customer Welcome Centre has two other well equipped conference rooms, each with a built in back projection video and graphics display based on Barco 801 data projectors. Both these rooms and the Experience Room have Electrosonic lighting control and AMX touch-screen room control. The latter allows easy selection of show and room conditions, and, in particular, provides easy touch button control of Powerpoint™ presentations.

Telecom '95

In addition to designing and installing the complete control and presentation systems for the main rooms, Electrosonic provided a mobile audio-video trolley for use in three meeting/seminar rooms. GPT also got extra value out of their investment by using the Experience Room widescreen system at the Telecom '95 exhibition in Geneva, prior to its installation in Coventry.

At Electrosonic we strongly believe in the effectiveness of well designed presentation and meeting environments. Besides accumulating considerable expertise in their engineering, we are also developing new product and system concepts to make them still more effective.

One of the conference rooms, with the back projection system in use.

MYSTERY LODGE

Knotts Berry Farm, the popular family theme park in Buena Park, California, presents the amazing *Mystery Lodge*, a "must-see" show for all who appreciate the best in theme park entertainment. *Mystery Lodge* is a production of Knott's Berry Farm and BRC Imagination Arts featuring BRC's Holavision® 3-D system. The automatic show engineering and control is by Electrosonic Systems Inc.

The show is based upon the culture and traditions of the Kwak'wala speaking people of the Pacific Northwest of the USA. As Executive Producer Bob Rogers describes it "In Mystery Lodge, as an aging Indian Storyteller weaves his tale, live on stage, the smoke from his fire magically twists and forms itself into the spirits and characters of his universal human story".

People who see the show come away knowing more about the American Indians; but they also come away saying "how did they do that?". The combination of a good story, the highest quality of presentation design and some magnificently staged illusions is unbeatable. Even show experts, surreptitiously looking round the auditorium and trying to locate things they feel ought to be there and aren't, are baffled as to how the illusions work; and we aren't going to tell you any secrets here – you will have to go and see the show and try and work them out for yourself!

Spirits in the smoke at Mystery Lodge. Photo © BRC Imagination Arts.

Visitors to Mystery Lodge see into a magnificent Big House, complete with totem carvings and an indoor fire. The way in which the spirits seem to weave around the obviously real actor is truly mysterious. But while the actor is real enough, the show does depend on a high degree of automation. A secret "engine room" houses an automatic show presentation system, engineered by Electrosonic to BRC's tight specification.

The "engine room" at Mystery Lodge. The photo, courtesy Knotts Berry Farm, shows the automatic show presentation system engineered by Electrosonic Systems.

Magic

The unique Holavision® concept was first used by BRC at EXPO '86 in Vancouver, where *Spirit Lodge* in the GM Pavilion was praised as the best show at EXPO. Now substantially improved, the technique is completely unobtrusive. The show system built by Electrosonic includes the latest in multichannel digital audio, programmed lighting and special effects control and automatic show control technology. But, again in the words of Bob Rogers "We needed the technology to be invisible. Lots of places wear their technology on the outside. Like a magician, we use the art of misdirection to convince the audience there's no technology, just magic".

Widescreen in Macau

Every November the steep winding streets of Macau, the Portuguese enclave about an hour by ferry from Hong Kong, reverberate to the sounds of Formula-3 motor racing and the Macau Grand Prix. Such is the interest in motor racing there that it now supports a Grand Prix Museum which attracts 10,000 visitors a month.

The exhibits include the winning car of the first race in 1954, a red Triumph TR2 which completed the difficult course at an average speed of 49 mph. Not surprisingly the car exhibits are supported by film material, both vintage and current, which is presented on video displays throughout the exhibition. The Macau Grand Prix Museum has the distinction of being the first Electrosonic customer in Asia to receive the 2xVIEW display system.

Pro United, a major dealer for our Hong Kong Distributor, Light Sound Image Systems Ltd, installed both a 4x2 and a 2x1 display using five 2xVIEW modules. The great benefit of this approach is that it gives the museum some high impact big screen video, without taking up significant floor space.

Pro United also supplied a 4x4 monitor videowall to the museum.

Electrosonic 2xVIEW compact videowall displays installed at the Macau Grand Prix Museum.

Electrosonic and the Electrosonic logo are registered trademarks.

Electrosonic companies that are part of the Helvar Electrosonic Group are identified on Page 2. There are other companies, namely Electrosonic South Africa, Electrosonic Systèmes France, Electrosonic Systems Australia and Electrosonic Iberica Spain, who are independent companies who distribute Electrosonic products, and are licensed to use the trademark.

Trade Marks

The following are registered trademarks of Electrosonic Ltd:
AMBIENCE, C-THROUGH, ESLINX, ESTA, IMAGEMAG, IMAGINE, IMAGESTAR, PICBLOC, PICBOX, PROCUBE, SCENEVIEW, SCENE COMMANDER, SCENEMAKER, SCENE PLANNER, SCENESET, SCENE TIMER, AVIATOR, EXPLORER. FUSION, NAVIGATOR,

The following are registered trademarks of Oy Helvar:
LCS, MIMO, VISION, HELVAR LP.

The trademarks of other companies are recognized, and where known are identified by ™.

Printed in England by Southernprint Typesetting/repro by Word Perfect 99 Ltd.