LIGHTS!

JOURNAL OF LIGHTING FOR ENTERTAINMENT AND ARCHITECTURE INCORPORATING TABS

SEPTEMBER 1995

VOL. 6 ISSUE 1

ISSN 0958-7217

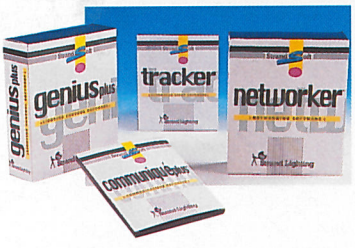
06

9 770958 721012

LANDMARKS IN LIGHTING

DIGITAL SYSTEMS

Intensity, Colour, Movement ...



... NOW THE CHOICE IS YOURS WITH STRAND'S INTEGRATED SOFTWARE SOLUTIONS

- A choice of direct action or command line operating systems with Genius Plus™ or Lightpalette® software
- A choice of intensity control channel capacity
- Additional "attribute" channels used with Tracker™ application software for controlling moving lights and scrollers
- Communiqué Plus™ application package, extending communication capabilities to other equipment
- And ShowNet™, the Strand ethernet network for remote video and signal distribution with Networker™ application software.

Strand's 430/530 control desk working with EC90 Supervisor digital dimmers - offering status reporting, System Wide Control and special security features - combines intensity control with motion control of Hyperbeam 1288/1200 scanners into a comprehensive lighting system.

Call today for further information.

Strand Lighting

Strand Lighting Limited, Grant Way, Isleworth, Middlesex, TW7 5QD, UK. Telephone 0181 560 3171 Facsimile 0181 568 2103

LONDON • ROME • WOLFENBÜTTEL • BRUSSELS • STOCKHOLM • LOS ANGELES • NEW YORK • TORONTO • HONG KONG

LIGHTS!
INCORPORATING TABS

EDITORIAL

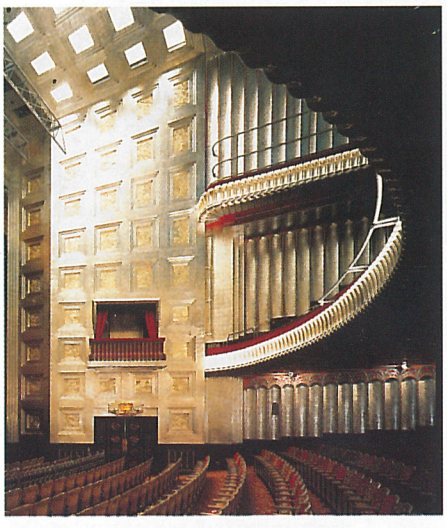
This issue of ***Lights!*** marks a departure from the format we have evolved over the last few years. Turning the pages it will soon become evident why this became necessary. One explanation is that the subject of creative lighting for entertainment and the equipment that does its bidding has become increasingly complex and varied, to the point where a brief resumé is simply not enough. So in this issue we have taken the bold step of only talking about a single subject - that of lighting controls. We have not set out to write another catalogue of what is currently available, but have attempted to put into context everything from a basic two preset manual LX desk to Galaxy. We have also added some background explanation, not just of what they do, but why. And we hope to have shown the progression and development of lighting controls in response to and indeed in close consultation with, designers and operators and how technical advances in electronics and software have been harnessed for this cause.

We have moved a long way from the days of brass and rosewood switch boards, in fact many of the control systems are extremely recent in introduction with Strand now probably having the most modern range anywhere - not bad for a company that started life in 1914! But it is because of this long involvement with the theatre and subsequently television and architectural control needs that we have been able to distil these decades of knowledge into equipment using the most advanced electronic designs and methods of manufacture.

Today, however the desk itself is only part of the lighting control system. It was not long ago that analogue signals were the common means of communicating fader levels to dimmers to control light intensity. But then came DMX 512 which rapidly became embraced as the international protocol for control to dimmer communication. Now we have ethernet systems such as Strand's ShowNet borrowing from the computer world a new proven standard of connectivity. But there is also MIDI and a whole number of other standards for different purposes. What are they all for? What is suitable for my theatre or TV studio? And where do I go to find out?

We hope this special issue of ***Lights!*** will answer some of these questions for those of you considering upgrading to a new system or designing for a new venue. At one time you didn't have much real choice. If your needs and budget were modest you had a suitably modest control desk. But today the entry level is highly affordable and the level of capability high. With the advent of user selectable software, it is you who choose just how much or how little control capability to purchase to match your aspirations and budget. The age of customised, bespoke lighting control systems has arrived.

But even if you are not planning to buy a new control desk now, why not keep this copy of ***Lights!*** ready for when you do. But having read this issue you might just decide that perhaps it is time to replace your old system. After all, high capability lighting controls have never been so affordable as they are today.



Matthew Weinreb/Max Fordham & Partners.

Savoy Theatre, Auditorium.

***Lights!** is published in three editions - English, North American and German.*

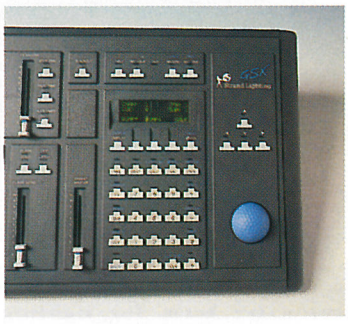
Editorial Board: David Brooks, BSc., CEng, MIEE, DMS. Edward Pagett BSc(Hons), AMIEE. Mike Cawte NDD. Jane Hall.

Lights! is the official journal of Strand Lighting Limited,
Strand Lighting, Grant Way, Isleworth, Middlesex TW7 5QD, England.
Telephone: +44 (0) 181-560 3171 Fax: +44 (0) 181-490 0002
Internet: lights @ stranduk.com

Incorporates TABS - owned and published by Strand since 1937.
 Vol. 6, Issue 1. ISSN 0958-7217

Produced by: Barrie James West Associates and printed in England.

IN THIS ISSUE

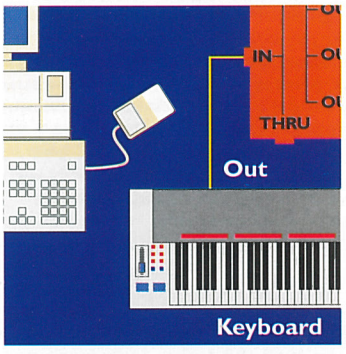


Strand Library

The Strand GSX range of lighting consoles on page 6.

Strand Library

The attributes of moving lights on page 10.



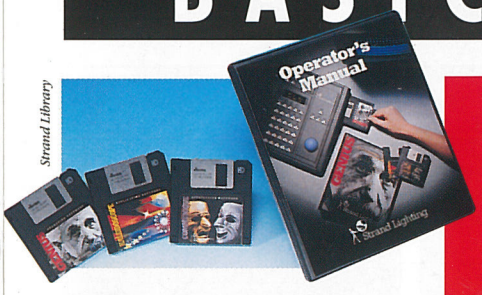
The Midi (Musical Instrument Digital Interface) Connection on page 12.

Strand Library

Galaxy Nova™ - Strand's prestige memory lighting console on page 14.

***Front cover:** Strand Control Desks.*

BASIC PRINCIPLES OF LIGHTING CONTROL



Strand Library

We frequently talk and write about 'entertainment lighting' as a collective term for lighting performances in the theatre, for television, motion picture, concerts and others. One factor links these diverse activities together - creating a visual composition with light.

Where these areas of entertainment lighting diverge is on the subject of controlling the light. In the theatre and with concerts, the audience stays in one place. The action is live and continuous. Lighting is tuned to the response of the human eye, and is stylised, sometimes in contradiction to that of nature. Changes between one lighting 'state' and another can be complex and sophisticated, fast or imperceptibly slow.

In television, the audience views a scene through a camera from a variety of angles, dictating a different approach to lighting. A subtle change from one scene to another - a primary function for a theatre control - is performed by a vision mixer. A fade to blackout is rare.

Cinematography, motion picture lighting is different again, with each sequence being painstakingly set up and lit separately, in a similar manner to a portrait photographer's.

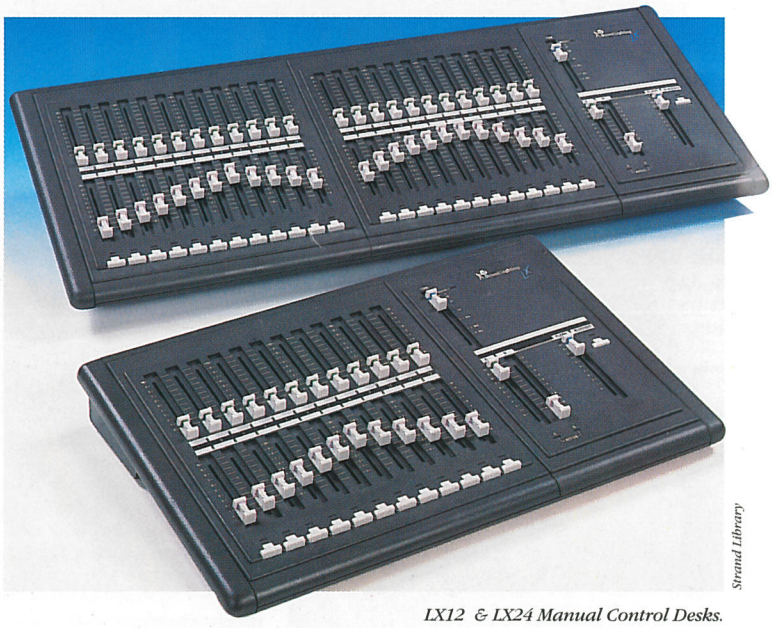
Thus the art of lighting for 'entertainment' consists of two elements - the static and the dynamic. It is the dynamic effects - the way the lights fade from one picture or 'state' to the next - that is the business of the lighting control system.

TWO PRESET MANUAL CONTROL

In its simplest form, a lighting control desk changes intensities from the current 'state' to the succeeding one. This requires two settings or 'presets'. A manual control desk, such as the Strand LX12 or LX24, has two presets, each with its own master control slider. One preset can be active (i.e. controlling the lighting currently on stage) by moving its master control to full, while the other is 'blind' (i.e. inactive - a change to any channel fader will not affect the lighting on stage) by moving its master control to zero. This two-preset way of working allows each scene to be noted as a complete list of dimmer levels, and reproduced by manually pre-setting each new scene in sequence.

The change from one scene to the other is performed by reducing the master fader controlling the active preset, and increasing the master fader on the 'blind' preset. This action is called a 'crossfade', and enables a smooth transition from one scene to another. Early manual control desks had a characteristic which could seriously affect the change of lighting, and ruin the planned effect. With two presets set up for two scenes, one is live and the other is blind, and a spotlight set to the same intensity in both scenes will begin and finish at the correct intensity. But during the crossfade the light will have dimmed (because the live master was moved down) and then brightened (because the blind master was moved up). This can destroy a picture where the actor is downstage centre for a soliloquy whilst the scene around him changes. If the light on him remains constant the audience will not notice the subtle change of mood or location but if the actor's light fades and then brightens the audience is distracted and the dramatic moment may be lost.

The problem of crossfade 'dip' has been resolved with modern manual controls incorporating dipless crossfade circuits. But to avoid the problem in performance with an older type of desk, two methods are possible: firstly if the lighting change is not very complicated (say, two or three lights have to change, with the remainder staying at their present levels), then the fade can be performed on the live preset only. This is called a 'move fade', and in the dictionary of lighting control definitions, it has a special characteristic. There can be many 'move fades' occurring at the same time. Depending on how many fingers the console operator has available, a series of moves can be plotted and performed with different fade times, all on the same preset. This is in contrast to the crossfade, of which only one may be performed at a time. The other method of minimising 'dip' is if the change is more complex (only one spotlight remains at a constant level) with all others moving to new levels, then a 'split' crossfade can be used. Moving the incoming preset master in advance of the live master enables the dip to be minimised.



Strand Library

LX12 & LX24 Manual Control Desks.

Manual preset desks can give many special lighting effects to your performance. Some desks have a choice of manual or timed crossfades. A timed crossfade enables you to perform something like a dawn sequence or the change from day to night so smoothly that the audience is unaware of the change.

If your desk is fitted with flash buttons, the range of possible effects is enormous. A flash button causes a channel to be switched instantly to full, or to the level set by a flash master fader. This gives the opportunity for lightning effects, flickering firelight effects or chase effects, depending on your dexterity, of course!

In the past, the trend was for manual control desks to become larger and larger. More channels were required as lighting styles changed. More presets were added to allow a series of fast cues to be performed without frantic re-setting of two presets. However, the time taken to adjust the lighting levels and note the positions of each fader (so that they could be reproduced during the show) was getting too long, and there was an obvious need for an automated system to relieve the console operator of this burden, and to speed-up rehearsal time. Thus was born the concept of the memory console.

MEMORY CONTROL

The memory console emulates a large manual desk by following the four basic operations of a stage lighting control desk:

1 - adjusting the lighting intensity on stage to give the desired effect.

2 - recording the levels so they can be recalled and repeated during the performance.

3 - modifying the recorded state during rehearsal, and recording the changes.

4 - taking the recorded information and replaying it during the performance.

Using a memory console, the operator creates the lighting state by entering the numerical reference of the luminaire on a keyboard and either moving a continuous fader wheel or typing in an intensity level directly. When all the lights are set up, and the stage is properly lit, a memory number is allocated to the scene (by typing in another number), and the lighting state is recorded. To reproduce the same scene during the rehearsal, the original memory number is recalled, and the lighting levels are transferred to the playback - this is similar to setting up a blind (inactive) preset on a manual desk. When the fade button is pressed, the memory system fades the 'preset' onto stage, in the same way that the manual system crossfades between presets. If the scene has to be altered (if part of the stage is too dark, for example), the offending channel number is typed in again, and the wheel acts on the level of the channel in question to increase or decrease the lighting level from its current position. The revised state is then re-recorded, and the control system is set up for the show. During the performance, the memory numbers are normally used in sequence, each one being transferred to the playback in the correct order, and faded on stage in the time required by the designer.

The first memory controls were developed primarily to make more efficient use of the lighting designer's time during rehearsal and plotting sessions. Developments continued over the years, as the power and capacity of the electronics increased. In response to the ever-broadening expectations from spectacular shows, the capabilities of the machines has likewise increased. The modern memory system is not only a 'productivity enhancer', it offers the creative designer a host of techniques to manipulate huge numbers of channels and dimmers, and to control a large number of lighting changes in subtle ways.

Inevitably, advances in microprocessor design and the reduction in the cost of memory chips has meant a great increase in the capabilities of modern memory systems. We are now entering an era of automation, and memory systems are available to control position and colour (referred to as attributes) as well as the intensity of the light. Digital dimmers are capable of sending information to the operator on their performance and current status to receive, display, or log.

The Savoy Theatre, which gained a Special Design Award in the LIF's Lighting Design Awards 1994.

Matthew Weinreb/Max Fordham & Partners.

GLOSSARY OF TERMS

AMX *Multiplex protocol for transmitting information using analogue levels from a control console to dimmers.*

Application Software *A software programme that adds specific features to the Foundation Software used with a lighting console.*

ASCII Basic text file format *Adopted for memory lighting consoles to provide a common file transfer format for sharing lighting data between different consoles.*

Blind *When changes made at the control do not affect the current lighting state. For example, when a master fader is at zero and a preset is being prepared for the next scene.*

Blackout *To switch all channels off.*

Board *One of the names for a control desk, derived from 'switchboard'.*

Build *A gradual increase in light.*

Bump *To momentarily flash channels up or down.*

Channel *The control path from the desk to the dimmer.*

Channel Number *Reference number which is entered on the keypad to control the intensity of a light.*

Chase *Continuous effect comprising a series of steps which are activated in sequence, each containing a channel or group of channels.*

Circuit *The electrical path from the dimmer to the luminaire.*

Console *One of the names for a control desk, derived from organ console.*

Crossfade *The gradual change of lighting where one lighting state completely replaces another. By definition only one crossfade can occur at a time.*

Cue *(1) A change in a given lighting state (2) A signal given by the stage manager to start a change in the lighting.*

Cue Number *Reference number given to a lighting change memory. Typically an integer, but decimal numbers are given to cues inserted into a previously recorded sequence.*

Decimal Number *A reference number for a cue which includes a decimal point. This is used to insert a new lighting change between two other previously recorded cues.*

Delay Time *The time associated with either the outgoing or incoming part of a lighting change, which lapses after the beginning of the cue, before the part commences.*

Dimmer *The part of a lighting system which controls the power to the light, and thus intensity of the light source.*

Dipless Crossfade *A type of fade between two presets where channels with the same intensity in both presets do not dim and then brighten during the change.*

DMX *Multiplex protocol for transmitting information digitally from a control console to dimmers, or automated lighting units.*

Effects *Automatic sequence of lighting events (eg. chase, flash, flicker etc).*

Ethernet *Data signal wiring system for computer networks which is being adopted for high speed data transmission connecting lighting consoles, dimmers, remote video displays as a complete network.*

Fader *A linear potentiometer used for manual control of intensity, either as an individual channel control device, or a submaster, or Grandmaster.*

Fade Time *The time associated with a cue between the start and completion of the lighting change.*

Flicker *Effect which oscillates channel levels randomly to give the effect of flames.*

Foundation Software *A software programme that provides basic operating features for the lighting console. (see also Application Software).*

Grandmaster *A master controller which has total control of the output of the desk. Also the name of a large resistance dimmer switchboard of the 1930's.*

Independent *Channels which are locked to one part of a lighting console (e.g. one submaster) and therefore only respond to actions from that controller.*

Inhibitive *Refers to a submaster which sets the maximum level of the channels associated with it. Sometimes referred to as a "Front of House" master.*

LCD Liquid Crystal Display

Macro *A sequence of instructions used on a memory console to perform a function, which can be memorised to be performed by a single instruction.*

Master *A fader which has over-riding control over other faders. For example, the 'A' master of a manual control desk controls the individual levels of each fader in the 'A' preset.*

Memory *An electronic record of a lighting state which can be re-called during the performance.*

MIDI Musical Instrument Digital Interface *A Communication protocol used to synchronise lighting consoles with other control systems, or to link two consoles together to duplicate the actions for backup purposes.*

Move Fade *A fade from one lighting state to another in which only the channels with a new intensity level move; all others remain static. Many move fades can occur at the same time.*

Page (of Submasters) *A collection of memories used simultaneously across a group of submasters.*

Patching *The process of temporarily linking a luminaire circuit to a particular dimmer.*

Playback *The part of a memory control which changes the current lighting to another lighting state recorded in the memory.*

Plot *A list of instructions detailing the changes in lighting for the entire production.*

Pot *Abbreviation for 'Potentiometer'. Potentiometer A variable resistance control element.*

Preset *For manual desks, the group of faders which control the dimmers. Most manual desks have two presets so one scene can be set up 'blind' whilst the other is active.*

Proportional Patch *A software feature to connect a group of dimmers to a control channel, where the dimmer levels may be set to be a proportion of the current level of relevant channel.*

Random *An effect where a series of presets are activated individually, in a random sequence.*

Record *The action of electronically storing the lighting state.*

Remainder Dim *An instruction which maintains the levels of any currently selected channels, while forcing all other active channels to zero.*

Remote *A method of controlling the lighting at a distance from the main lighting console.*

ShowNet™ *Strand Lighting's Ethernet data protocol for the transmission of video and DMX signals.*

Slider *A linear potentiometer used for manual control of intensity, either as an individual channel control device, or a submaster, or Grandmaster.*

Soft Key *Control push button where the function can change dynamically depending on the current status of the system.*

SWC System Wide Control *A control protocol which permits simple remote devices (push button wall stations, or hand-held controls) to control dimmer levels and presets directly.*

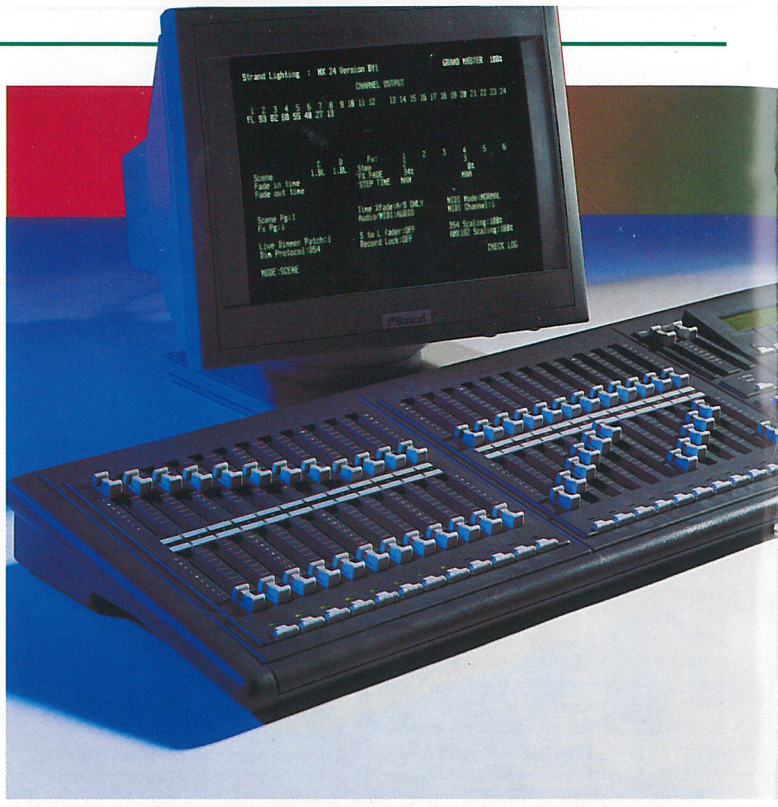
Undo *A memory system feature which cancels the last instruction, and returns the console to its previous condition.*

Wait Time *The time a following cue waits after the start of the preceding cue, before it automatically commences.*

In general, the style of the lighting console used for any production depends on the number of channels it is controlling. As we shall see later, the number of channels doesn't necessarily relate to the number of dimmers used. In small scale applications of 12, 24 or 48 channels, is typical to use a two preset manual console, connected to the same number of dimmers - a console with one channel fader dedicated to adjusting the level of each dimmer. However, as the size of the lighting installation increases, and as we move into the domain of the memory console, there can be a point where several dimmers are used for one purpose (controlling a single cyclorama colour for example), and controlling each dimmer individually is wasteful. In this case a series of dimmers is controlled by a single dimmer. This process is called 'patching' and if the dimmers are pre-set to one channel so that they are different relative levels to one another, it is called 'proportional patching'.

is effectively a master control for an individual preset, so that an MX 12 has 12 submasters, there's 24 on the MX 24 and 48 on the MX 48. To add to the flexibility of this, there are 6 selections of submaster scenes (they are called 'pages') for each console, so even quite a complex show with up to 192 unique lighting states (MX 48 x 6 pages) can be performed by using each submaster in turn, and switching to the next page when the last submaster in the sequence is reached.

Recording each lighting scene couldn't be easier. By simply switching the MX into 'record' mode, the top preset row of channel faders is used to set the channel levels, and when the scene is complete, one of the submaster flash buttons is pressed. This action records the current lighting state into a submaster, whereupon the next scene is set up, and recorded on another submaster. Even when the MX is set to its 'scene' mode (using the bottom preset faders as submasters) the top preset can actively adjust individual channel levels.



MX Lighting Console.

THE X-RATED MEMORY CONSOLES: MX, GSX, LBX

BEGINNING WITH THE MX RANGE...

On the ladder of capacity and sophistication, beginning with the two preset LX desks, the MX is a few rungs upwards. The MX range (or Mantrix MX as it is known in North America), which comprises 12, 24 and 48 channel versions, is a natural progression from the manual to the memory console. MX combines the simplicity of a two-preset manual console with the sophistication of a concert lighting control desk. Setting up the lighting levels is identical to using a manual desk, and the MX can be used exclusively as a manual desk for very simple shows. But if the lighting demands some speedy fades, or sophisticated effects, then the MX comes into its own.

The software of the MX can re-configure the two presets of channel faders so that one preset operates as a series of submaster faders. This feature is common on larger concert lighting consoles where complete lighting states are automatically loaded onto submasters to be available to fade up or be flashed on and off as required. Each submaster

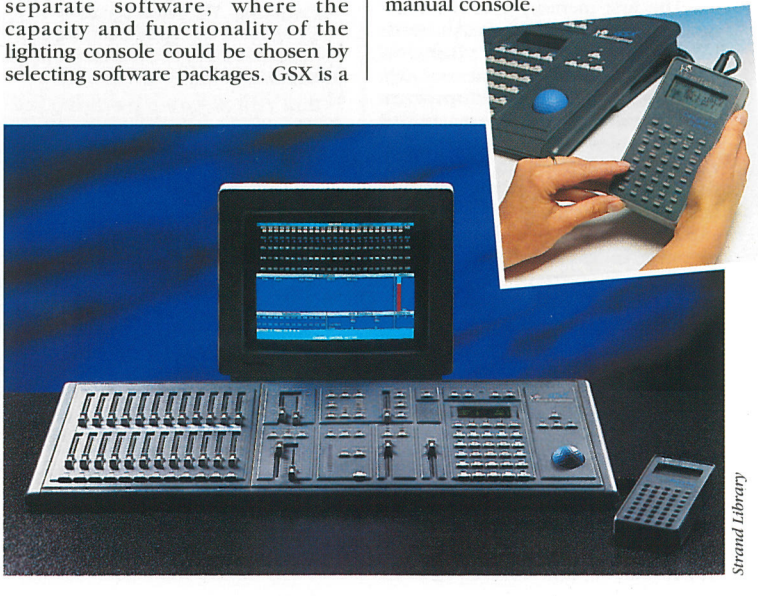
This is not the end of the story for the MX. The lighting states may also be re-played on a conventional cross-fade playback, fading each scene in sequence without using the submasters. Also there are effects. Special effects are automated sequences which can flash selected channels up and down, creating repetitive lighting changes which would be difficult to perform consistently by hand. For example, the effect of neon signs flashing in Times Square, or flashes of lightning can be programmed into the MX for use anywhere in the show.

The MX is also an excellent teaching tool. Students can learn the basics of lighting control by using the two preset manual faders, and then progress to the memory section, including the concept of patching dimmers to channels (MX can use its control channels for up to 512 dimmers) and recording a sequence of lighting cues. MX is equipped for MIDI as well, and this provides a useful link to other lighting consoles, as well as sound synthesisers and sequencers.

GSX Lighting Console.

THE LINK TO THE FUTURE

Moving upwards into the area of full memory systems, we encounter the GSX and LBX. GSX launched the idea of PC-style hardware and separate software, where the capacity and functionality of the lighting console could be chosen by selecting software packages. GSX is a small, compact memory console with 24 dedicated submasters. The LBX, its stablemate, is another hybrid console; this time combining the memory capabilities of the GSX with the 'hands-on' flexibility of a manual console.



Strand Library

Strand Library

Strand's Genius™ Operating Software.

LBX has 96 control faders which can be re-configured in software to be two presets of 48 channels, two 36 channel presets and 24 submasters, 72 channel single preset fader with 24 submasters, or a straight 96 channel single preset console. Both GSX and LBX use Strand's Genius™ foundation operating software which is available in channel capacities of 25 to 125, all controlling a maximum of 512 dimmers. One immediate advantage of the software philosophy is that, for example, a 50 channel GSX can be expanded to 75 channels by the addition of Genius 25 channel upgrade software. It is loading the Genius software that turns the GSX into an operational control.

GSX is a compact, lightweight ergonomic console with 24 submasters, two playbacks - manual and auto - a level & rate wheel, an auto playback. It has 'Go' and 'Stop/back' functions, 3 Effects playbacks with 'Go', 'Stop/back' and manual step, soft function keys and a Grand Master fader and Blackout. An LCD display on the console panel provides detailed information and describes the functions of the 'soft' (unassigned) keys at any time.

In addition to this, the LBX offers 96 re-configurable channel/ submaster faders plus an internal auto-voltage selecting power supply.

As you would expect from a Strand memory console, the GSX and LBX running Genius have a powerful specification. Genius continues Strand's philosophy of ease of use, and even has a choice of how you enter the information (you may prefer to type in percentages rather than digits). To help with setting the lighting, the channel control can mix channels, cues and submasters, undo any change, switch off lighting fast using REMDIM (remainder dim) or solo.

Recording is made easier than ever with auto selection of the next free cue number, recording with and without submasters, renumbering, updating features and undo. For the performance, there are two playbacks, automatic and manual, plus 24 submasters. The submasters can have programmable fade times, and up to 12 can be set as inhibitive. Simple chase effects are available with 3 effects memories. A total of 10 macros provide short cuts to more complex actions of up to 32 key presses. Macros can also be used for automated control triggered through the keypad, submasters, handheld remote or by date and time.

There are two proportional patches, and show storage and retrieval on MS-DOS compatible 3.5" disks offers automatic backup copies of the show, plus the usual copying of cues, submasters, effects and setup memories.

The power of the GSX with Genius is impressive by itself, and for many users the Genius Operating Software answers all their needs and more. But what do you do if the lighting designer wants a selection of effects, up to 30 effects memories, audio control of effects and macros, scroller control? You buy a copy of Kaleidoscope, the Genius application software which adds a wide range of effects, and direct 'intelligent' control of scrollers. Kaleidoscope gives accurate scroller control that is not possible from ordinary DMX 512 intensity control desks used for this purpose.

The options don't finish there. Genius is capable of much more through its connectivity with other systems, and this is available for the price of the second application program called Communiqué. Communiqué is for applications where the GSX or LBX is to be operated as part of a larger lighting system. Communiqué provides an additional 12 external submasters, macros triggered by external +10V signal or by configurable serial input or ASCII control and ASCII remote go, MIDI, MIDI Show Control, plus DMX-input to accept another desk's control signal.

A major benefit with separate software for the GSX and LBX is its ability to be updated when new features are required. The latest version of Genius, Kaleidoscope and Communiqué is now version 1.2a, which expands the software to include:

- Five pages of submasters now give a total of 120 memories in addition to the 200 cues already available.
- An active submaster memory remains if the page is changed, until the fader is returned to zero (or full for an inhibitive submaster) when the new selection is collected for use.
- Functions like Macro, Inhibitive and Independent are assigned to the submaster faders, and work across all 5 submaster memory pages. The In/Out fade times are recordable per page.
- The current submaster page is always displayed in the submaster window banner.
- The submaster page can be changed by SUB+ and SUB- keys in both Output and Preview screens.
- Each of the 24 submasters can now be set to Independent, so that the channel control cannot steal control from the submasters.
- Each of the 24 submasters can now be inhibitive.
- The submaster displays have been improved and enhanced.
- The current control mode of the LBX is displayed in the submaster window.
- Effects step recording and the LCD display of numbers entered has been improved.

The design of desk for MX, GSX and LBX uses a range of ergonomically designed fader and control panels in self-coloured grey, high impact injection moulded engineering grade plastic. The faders themselves are inset to avoid accidental damage. The key tops are configured for 'finger tip' control. Used together, or with the similarly styled LX as a remote submaster control, in more complex arrangements the desks will harmonise both visually and where appropriate, with each other.

Strand Library

LBX Lighting Console.

ANNOUNCING THE STRAND 430, 530 & 550 RANGE OF LIGHTING CONSOLES

THE CONCEPT

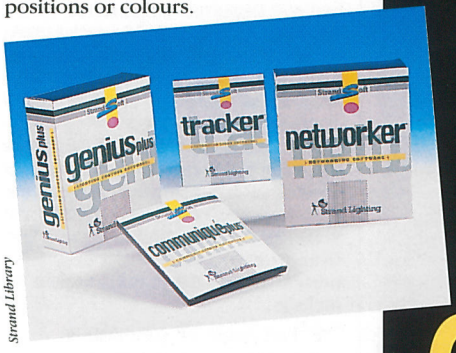
When Strand launched the revolutionary GSX console in 1993, a new era in lighting control systems began. Leaving a past behind where memory lighting controls were designed for one purpose, with a capacity and functionality defined at the time of manufacture, the GSX, soon joined by the LBX, offered a common hardware platform where the number of channels and the control functions available were chosen by the user from a suite of software products.

The success of this philosophy which has been tried and tested throughout the world, provides users the opportunity to customise their lighting control to their needs. Users only pay for their required level of facilities, with the option to upgrade at any time. There is a standardisation in the hardware specification which is produced using high-tech manufacturing processes in our plant in Kirkcaldy, Scotland, and there is the opportunity of maintaining a dialogue with customers through the life of the console as new features are added to the software.

Strand has taken this concept, and taken it forward for the mid-range, high capability sector. This didn't mean that we simply expanded the software to a higher capacity desk. We took account of the current requirements and future desires of the operators of mid range consoles; requirements which included a greater use of DMX 512 (the digital multiplex dimmer protocol) for functions other than dimming, plus the future ideas for lighting system networks, and particularly user customisation.

The adoption of DMX for other non-dimming functions has been growing for several years, particularly for colour scrollers, and automated lights. Adding a colour scroller to a luminaire means that the unit has 2 independent DMX addresses, one for the dimmer intensity, one for the colour. With an automated unit (such as a Hyperbeam scanner with its beam diverting mirror, and integral dimming, colour changing, gobos etc), the number of DMX signals required jumps to over 20.

Conventional desks merely consume dimming channels to control these other DMX driven functions (called "attributes"), but the process becomes impossible to manage for an automated light with in excess of 20 attributes. Not only are these attributes costly in control channels, they are difficult to address and control. Although setting up positions, colours and intensities is a simple extension of the intensity memory system process, when the recorded cue is played back not only do the dimmers fade to another level, the position and colour changes too. Thus careful planning is needed to prevent an action like, "fade to blackout" from resetting all the attributes to their zero levels, positions or colours.



Strand Library

In memory system language, intensities can be controlled as either the Latest action Taking Precedence (LTP), or, in the case of the same channel being controlled by a group of submasters, the Highest level Taking Precedence (HTP). Obviously, the idea of highest level of pan and tilt, or the highest colour is meaningless, but the latest colour selected is logical. Thus in GeniusPlus and Lightpalette Operating Software, dimming DMX signals can follow either HTP or LTP, depending on the situation, whereas movement, position and colour are LTP functions only.

Both GeniusPlus and Lightpalette software are designed so that each channel number has 99 associated attribute addresses giving plenty of headroom for the future. For example, 1.1 controls the intensity of channel 1, 1.2 is its colour, 1.3 is pan, 1.4 is tilt etc.

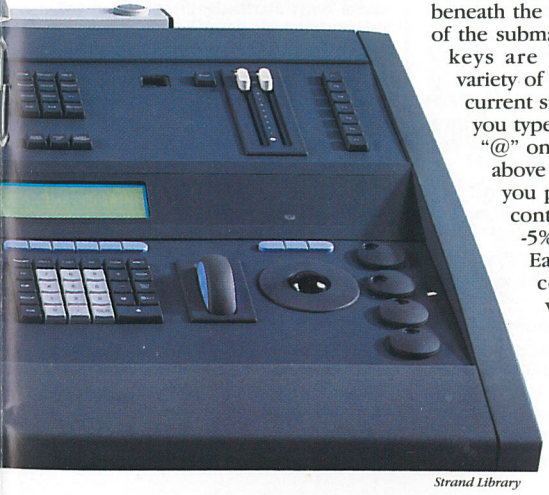
Strand 550 Lighting Console.

The processor knows that intensity can be a LTP or HTP level, combined with other levels where necessary, then mastered, and recorded as a state. Similarly it knows that an attribute is LTP only, it is not mastered, and is recorded as a move (or tracking) cue, recording only the changes since the last change. The control of attributes is integrated within the software. Most importantly you do not consume control channels if attributes are needed; they are available in addition, to a maximum of 250 with GeniusPlus or Lightpalette 350 channel software, or 500 for GeniusPlus or Lightpalette 1500 software. Hence in the new concept, describing a console in terms of its channel capacity is an obsolete idea. It is how many intensity channels, how many attributes, and how they work together that determines the suitability of a console now.

THE HARDWARE

The Strand 430, 530 and 550 consoles are based on proprietary PC components, with a PC motherboard, power supply and hard disk at the centre of the system. The Strand 430 has a 486 DX2 processor hence the "4", and controls up to 350 dimming channels and up to 150 attributes. The "30" refers to 30 submasters. For more channels, up to 1500 and 500 attributes, the Strand 530 has a Pentium 90 processor and 30 submasters, and the Strand 550 has a Pentium 90 and 54 submasters.

A basic numbering system of identification has been adopted for the hardware in place of names; firstly because it is now the software which defines the characteristics and capabilities of the console, and secondly, being based on PC hardware, it means that we can integrate the latest components, and radically change the capabilities of the machine without introducing a new name each time. In fact, three consoles have been made obsolete even before they were put into production! However, this goes to show that the concept of separating hardware and software has another benefit - that Strand's users can keep up to date without too much complication or expense.



Strand Library

A brief journey inside the console will show the motherboard, in the middle of the chassis, powered by a standard PC power supply, a hard disk drive on shock mounts, standard PC interface cards for VDUs, and serial ports (with capacity for future expansion), plus the Strand designed and manufactured pcbs for control panel interfaces, displays, multiplex inputs/outputs etc.

One of the most important factors for the operator is the control surface, and here Strand has combined thirty years of experience in designing memory systems in both the UK and the USA, to produce the most flexible and ergonomic arrangement for a multi-purpose control system of the 1990's. The two-tier console has all the controls within easy reach for the operator, with the main channel control facilities grouped together in the lower right hand section, the playbacks in the centre, with half the total complement of submasters to the left. On the top tier, there are the remaining submasters, floppy disk drive, control and display routing switches, grand master controls, power switch (suitably shielded) and seven user-programmable buttons.

Strand Library

Strand 430 Lighting Console.

Between the two tiers, and inclined to optimise the viewing angle, are three large graphics LCD displays. These provide local mimic displays of the keyboard actions, plus they provide labels for the context-sensitive keys immediately beneath the LCDs, and labels for six of the submasters. Context-sensitive keys are push buttons with a variety of uses, depending on the current situation. For example, if you type a channel number and "@" on the keyboard, the LCD above offers some short cuts if you press the adjacent "soft" context-sensitive key; +5%, -5%, FULL, OFF and so on. Each primary action of the console may include a wide range of control options, some of which are available as labelled keys, some as "soft" keys.

The channel control section differs from many other lighting consoles in that to the right of the channel intensity wheel are the Attribute controls. These are used in conjunction with Tracker software, when the entry of channel number not only gives access to the dimmer intensity, but the pan and tilt functions are automatically connected to the tracker wheel, the colour function appears on the top wheel of the four flat encoder wheels, and the other three wheels can be used to scroll through the remaining attributes which are relevant to that luminaire number.

THE CONCEPT

As Microsoft Word converts your PC into a word processor, GeniusPlus™ or Lightpalette® turns the Strand 430/530/550 into a lighting console. GeniusPlus is based on Genius for GSX & LBX, but expanded to give more channels and more direct "hands-on" features, and Lightpalette is based on the world-famous Lightpalette 90 operating system.

Both Genius Plus and Lightpalette, which start at 100 channels, can be increased in 50 or 200 channel blocks to 350 channels for the Strand 430, and to 1500 channels for the Strand 530 and 550. The number of attributes available follows in scale to the channel capacity, to a maximum of 250 for 350 channels, and 500 attributes for 1500 channels. In addition, there are application programs to provide extra features.

The equivalent of Kaleidoscope, the special effects package for GSX and LBX, is built into GeniusPlus and Lightpalette. The optional Communiqué-Plus™ is the enhanced, expanded version of Communiqué for GSX/LBX, offering connectivity to other computers through the serial ports, MIDI interfaces, and remote control features. Networker™ provides the software and interface card for connecting the console to ShowNet™, Strand's Ethernet network, and Tracker™ provides the added facilities for controlling DMX colour scrollers and automated lights.

THE SETUP SCREEN

With such a comprehensive lighting console as the Strand 430 range, it defies concise description to explain each feature in depth, but you can understand some of the power of the software by looking at the console's setup screen.

By pressing the 'setup' routing switch, you have access to the default settings and user options of the console. This is an important feature in the philosophy of the software, which truly is designed for 'user preference'. In addition to the expected system defaults, fade times, channel levels and so on, there are two levels of preference: the system preferences, and the operator preferences. With the system preference, it is possible to switch the cue list display to show the most relevant information; playbacks only, or with submasters, or effects. Should the playback facilities have a single playback only, dual playbacks, and how should they interact? On a highest or latest takes precedence basis? The decision does not change the memory, or the recorded cues, it simply allows the operator to 'tune' the facilities for a particular show.

The customer preferences have been developed from a huge input of requests and requirements from our users all over the world. Strand stands alone in its development of operational philosophies for control systems. In Europe, the adoption of the Galaxy, which was a natural development from the Richard Pilbrow specified Lightboard consoles of the mid 1970's, created a generation of 'direct action' console operators who expected to type in channel 6 @ 5 and see channel six at half immediately. However, the Strand Lightpalette consoles in North America, and equally successful throughout the world, had developed in response to a Broadway requirement for 'command line' working, where the instruction was entered by the operator, and checked before being actioned. In that environment, channel 6 @ 5 * would be used, where * was the 'execute' instruction. For the Lightpalette operator, instructions were entered as they would be verbalised, "Record this lighting in Cue 10 with a Time of 5 seconds, execute", but this would be turned round in direct action language to a cryptic "This lighting, Cue 10, time 5 seconds, record", and when the record button is pressed, the action happens.

Thus, it is possible, through the setup procedure to decide if you want to work either in 'direct action' or 'command line' style which affects not only the way channel levels are input, but also the syntax for recording, and entering all other functional instructions.

The operator setup preferences are available in both the GeniusPlus and Lightpalette versions of operating software. Lightpalette for the Strand 430 range will offer more than a default set of GeniusPlus "command line" options, however, as it will also include additional screen formats and features specific to the Lightpalette style of working.

** Lightpallette Software will be available during 1996.*

Intel & Pentium are registered trademarks of Intel Corporation.

DIVINE ATTRIBUTION

The story starts with the digital dimmer protocol DMX512. This is the standard signal, adopted worldwide, for lighting consoles to communicate information to dimmers. The intensity level for each dimmer is sent as a digital code; for the technically-minded it's a single 8-bit byte (an 8-digit binary number) for each dimmer. Eight bits provides 256 unique levels from off (0) to full intensity (255), and over the years, memory lighting consoles have been developing with a seemingly relentless catalogue of sophisticated features to enable the 256 steps to be manipulated, stored, combined, arbitrated and sent to the dimmers to create a wealth of different lighting effects.

An agreed international protocol is an exciting concept. It unlocks previously untapped innovation, bringing new opportunities to the growing numbers of people with DMX control systems. Colour changers have been available almost as long as artificial light itself, but with a DMX console, remote control of colour is as simple as extending the DMX data cable to each unit in turn, and setting a DMX 'address' on each unit. The ubiquitous scanners, such as the Strand Hyperbeam, with their high intensity discharge sources, dichroic colour mixing, beam diverting mirror, gobos and prism effects are also controlled by multiple DMX signals. Effects projectors are also available with DMX, as are smoke machines. As the use of the dimming signals for other applications increases, a new term is required to describe them, for as we shall see later, the concept of fading up and down doesn't really match the movement of a mirror, or the choice of a gobo. The term used for the other, non-dimming, uses of DMX signals is "attributes".

Let's first look at what the "attribute" DMX signals mean practically. Inset is an example of how a Hyperbeam captures a block of DMX signals, and uses the 'dimmer' levels to represent the position of the beam, the colour, a gobo position etc. Each DMX cable can transmit 512 individual DMX levels; each level has a unique address number. During the setting up procedure, the Hyperbeam is given a 'start address'. This DMX address begins a sequence of 17 addresses, and each level is used for one function of the luminaire.

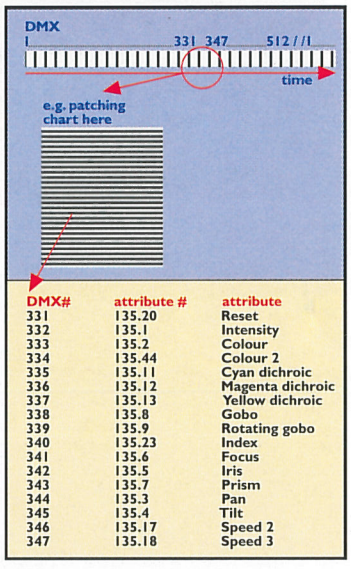
As the DMX signal increases from zero, which would normally define the off level for a light connected to a dimmer, the function to which it refers alters proportionally to the DMX level. For example, the mirror's pan movement will move from one extreme to the other as the DMX level changes from zero to 255 in unit steps - zero, and it points left, 128 and it is in the centre, 255 and it points to the right. Similarly, the other attributes' positions are related to a proportion of the 256 steps in the DMX signal.

Unfortunately, the relationship between DMX signals and the individual attributes of various scanners is far from consistent. Different units have a variety of types of attribute, and even when the attributes are similar between units, the implementation of the DMX control depends on the product designer's individual preferences. So inevitably there is a patch, a sort of telephone exchange, linking a DMX number with a particular attribute. With Tracker software for the new consoles, the Strand 430, 530 and 550, a library of twelve of the world's most popular automated units is provided to simplify the patching process. Only the start DMX address and Strand's library reference number for the chosen unit are needed to patch all the attributes in the correct order.

Although the current batch of scanners available today use fewer than 25 attributes in total, Tracker software, and the operating software with which it integrates (GeniusPlus and Lightpalette) have a wider vision of the future, and will accommodate up to 99 attributes per control channel, including the intensity. This concept of having attributes linked to a channel is where the real advancement in the new generation of memory controls can be experienced.

With a conventional DMX lighting console each attribute function, such as pan, tilt and colour requires individual and direct control, and this is achieved by patching a control channel to each DMX output. For a Hyperbeam scanner not only are we using 17 DMX signals to control all the functions, we also require 17 channel numbers to be allocated too. With a relatively modest complement of ten such units, a colossal 170 channels of the memory system's capacity is allocated to them.

Then the operational problems begin; remembering which channel numbers are the dowser of unit number 6, the colour of unit 3 and the pan movement of number 10 requires the memory of an elephant,



DMX#	attribute #	attribute
331	135.20	Reset
332	135.1	Intensity
333	135.2	Colour
334	135.44	Colour 2
335	135.11	Cyan dichroic
336	135.12	Magenta dichroic
337	135.13	Yellow dichroic
338	135.8	Gobo
339	135.9	Rotating gobo
340	135.23	Index
341	135.6	Focus
342	135.5	Iris
343	135.7	Prism
344	135.3	Pan
345	135.4	Tilt
346	135.17	Speed 2
347	135.18	Speed 3

A Hyperbeam 1288, controlled by channel 135, with a DMX start address of 331.

or a huge cross-reference sheet. Then there's the question of recording and performing the multi-attribute changes; if the console works on a 'preset' principle where each memory is a unique record of all the DMX levels, rather than a 'tracking' console (like Lightpalette 90 and Galaxy Nova, which are able to record only changes), the change from one memory to another can force all attributes to reset to their zero level, particularly if the cue calls for a blackout.

The Strand 430, 530 and 550 consoles bring a fresh approach to solving these problems. Each channel number in the system is capable of controlling a total of 99 individual attributes. The trick is that each unique channel number is in fact a two decimal place number, but the decimals are hidden from the user (unless specifically needed). Thus the operator types 33, and controls all attributes simultaneously, but the console understands this as channel 33.01 (intensity, on the wheel), 33.02 (colour on a rotary encoder), 33.03 (pan on the trackerball), 33.04 (tilt, trackerball), 33.05 (cyan dichroic, rotary), 33.06 (magenta dichroic, rotary) etc. The advantage is immediate; access to all attributes of a particular unit through the use of a single channel number. The new Strand consoles are equipped with 4 additional flat rotary encoder wheels, where the top wheel is always colour, and the remaining three can be scrolled through the attribute list to control three chosen functions at a time.

An added benefit to this scheme is that the software can recognise the difference between an intensity (it's always entered as a whole number or as a 'point 1'), and an attribute (point 2 to point 99). The difference is vital in memory system architecture. The intensity of light can be controlled from a variety of sources, the channel control, the playbacks, a group of submasters to name three. If the same channel exists in a variety of locations, the console arbitrates and outputs either the highest level (known as 'Highest level Takes Precedence' or HTP), or the latest change (known as 'Latest action Takes Precedence', or LTP). With attributes, the concept of the highest level (HTP) isn't logical when controlling a colour scroller, for example, as which is the highest between blue and pink? However, the idea of the latest colour chosen, blue, followed by pink (LTP) is understandable for the operator and the computer. Thus the software differentiates between the attribute which may be both HTP'd or LTP'd (intensity only), and those which may be LTP'd only (position, colour, gobo etc); in fact, this group contains everything except intensity. With this difference defined, the console can then treat the attributes differently, and this is the crux of the system - only intensities take part in fades to zero, attributes change only to a new position when specifically instructed.

But this is not the end of the story. Individual attributes can be controlled by entering the decimal point number directly on the keyboard, and if submasters are used with attribute channels, some exciting options exist. For example, if the submaster includes a selection of attribute channels, with their intensity levels defined, the console will perform a change to the new look when the submaster fader is moved to full. However, if the submaster includes only one attribute for its group of channels (e.g. pan, or tilt, or colour) the submaster will manually control the attribute live.

The control of multi-attribute luminaires has been made more elegant, and simpler for the Strand console operator by some basic lateral thinking by our software design team, the use of decimal channel numbers, and Tracker software.

WHAT IS NETWORKING?

The Strand 430 range of consoles incorporate PC technology - the 430 is based on a 486 processor, and the 530 and 550 have Pentium 90 processors. This technology offers several advantages, one of which being the ability to 'network'. Networking is common practice where a group of PCs are used in a single office location. It enables all PCs to work with each other, sharing files, database information and peripherals such as printers and modems.

In the world of entertainment lighting, there has been a move to expand the capability of memory controls, over the years, to include ever higher levels of interactivity and use of remote controls, VDU displays, printers, remote editing; and high-capability peripheral devices such as digital dimmers have created a need to expand the lighting systems' networking capabilities.

With PC technology, the initial problems of networking have been solved, and have matured to the point where most new PCs offer the facility as standard, and the cost of networking components are low.

Strand has decided to adopt the world-wide PC networking solution of Ethernet as the communication system for its ShowNet™ network system. Ethernet is simply a wiring convention, and an interface specification for transmitting packets of data. The cabling methods, although specialised, are well understood by specialist companies, test equipment is readily available to check the entire network, and connection methods and standard socket boxes are readily available. Thus we are inventing nothing new - we are adopting existing practice and knowledge.

Ethernet describes the communication system. What ShowNet networking offers is the ability for a console or consoles to communicate between themselves, to share facilities such as printers, incorporate remote console and VDU displays for the production desk, and to connect to peripheral devices such as additional dimmers and DMX devices. Many of these features have been in use for many years, but they previously required specialist wiring for each facility; three coax cables for each remote monitor, additional cables for handheld remote controls, special cable sets for each remote console position, DMX cables and connections for dimmers and scrollers and so on. What Ethernet offers is a high bandwidth, high speed data route which can accommodate several screens of VDU displays, many DMX lines, interactive controls, printer data etc, through a single cable. So Strand's ShowNet is a means not only to simplify and tidy up an installation, but also to create an integrated control system.

To access specific data available at any point in the ShowNet system, a device is required to interpret all the data and select exactly what is required. This requires a 'node' and multipurpose Ethernet node which offers connections for DMX signals, and up to two VGA monitors. SN100 may be permanently installed by wall-mounting using the bracket supplied, or simply connected temporarily to any Ethernet output where access to specific signals is needed. SN100 operating software is supplied with Networker™ application software, and is installed via the floppy disk drive of the SN100.

Looking into the future, the SN100 is already equipped with a 3.5" disk drive, a keyboard port, MIDI connections, RS485 and RS232 ports, two slider faders, and four selection keys, to provide complete access at a remote point for many other features currently available at the console, or anticipated in the near future, while leaving sufficient flexibility for the unknown.

Each Strand 430, 530 and 550 installation will in future include a form of Ethernet installation. All new installations will be equipped with Ethernet as a matter of course. Smaller venues will use ShowNet™ for distributing data to a stalls position, whereas large installations will use a comprehensive wiring system to accommodate scroller and automated lighting positions, and additional dimmer connection points.

Although there have been many computer connection schemes developed, Ethernet has become the industry standard, and a direct affect of this has been the growth in equipment designed for Ethernet, and the inevitable reduction in prices in a market-led environment.

The first two buzz words you need to know are "10 base 2" and "10 base T". These refer to the elements of the network cabling.

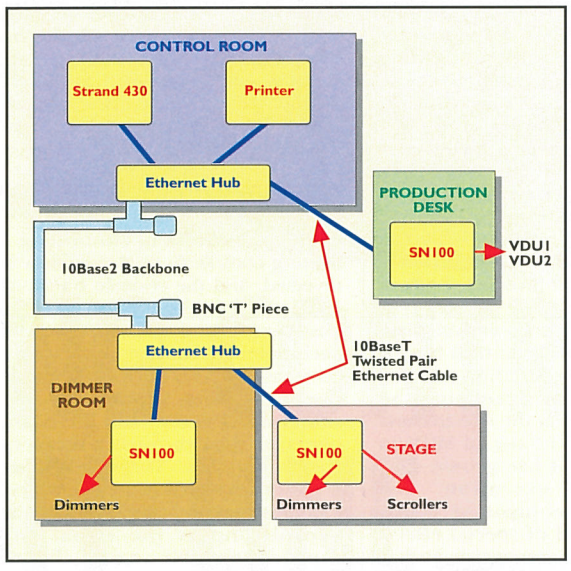
10Base2 refers to 10MHz (data transmission rate per second) Baseband (the bandwidth of the signal) 2 (two wires). The cable used is relatively cheap coax cable, terminated in BNC connectors. The different parts of the system are all connected to a single cable, which is called the 'backbone'. This is a very simple, and cheap installation system, and it has advantages for basic installations (such as a console to production desk cable run only). However, the disadvantages for a larger installation are that if the cable is damaged or disconnected at any time, the remaining part of the network will fail. The 'T' connection has to be made to the rear of the peripheral, and is therefore cumbersome, and terminators are needed at each end of the line.

10BaseT also refers to 10MHz (data transmission rate per second) Baseband (the bandwidth of the signal), but the wiring is Twisted pair telephone cable. The cabling system is based on a star network linking each computer to a central "Hub". Hubs are positioned around the building where convenient for the 'home run' of cable to a wall socket. Hubs are linked together usually by a 10Base2 backbone, and each different part of the system is connected together via a single cable, in a star formation around an Ethernet hub. Although this is more complex, and involves additional hardware hubs than the 10Base2 scheme, it has advantages for larger installations where Ethernet is used as the connection system between the console and remote dimmers, scrollers, the production desk, automated luminaire positions and so on. This is the suggested solution for most users, and the particular advantages are that if any 10BaseT cable is damaged or disconnected at any time, the remaining part of the network will continue unaffected. The connection to each peripheral is made using a telephone type cable, which is light weight, and easy to use. The connection uses a telephone type (RJ45) plug.

The examples shown describe how the majority of office computer networks are created. The number of hubs is determined by the particular geography of the site, and the requirements for individual outlet points. Ethernet hubs of different capacities are available, and the decisions surrounding the best configuration for any application is one of the reasons why specialist contractors should be employed to install the system.

ANNOUNCING THE STRAND SN100

The Strand SN100 is a microprocessor device for providing access, at a remote location, to signals present at a Strand 430, 530 or 550 console operating Networker™ software. SN100 is a multipurpose Ethernet node which offers connections for DMX signals, and up to two VGA monitors. SN100 may be permanently installed by wall-mounting using the bracket supplied, or simply connected temporarily to any Ethernet output where access to specific signals is needed. SN100 operating software is supplied with Networker™ application software, and is installed via the floppy disk drive of the SN100.



ETHERNET & SHOWNET™

When you have described a typical office installation you can develop the idea into the theatre or TV studio environment. In place of the office computers, servers, printers and modems, there will be lighting consoles, hand held remotes, remote VDUs and printers.

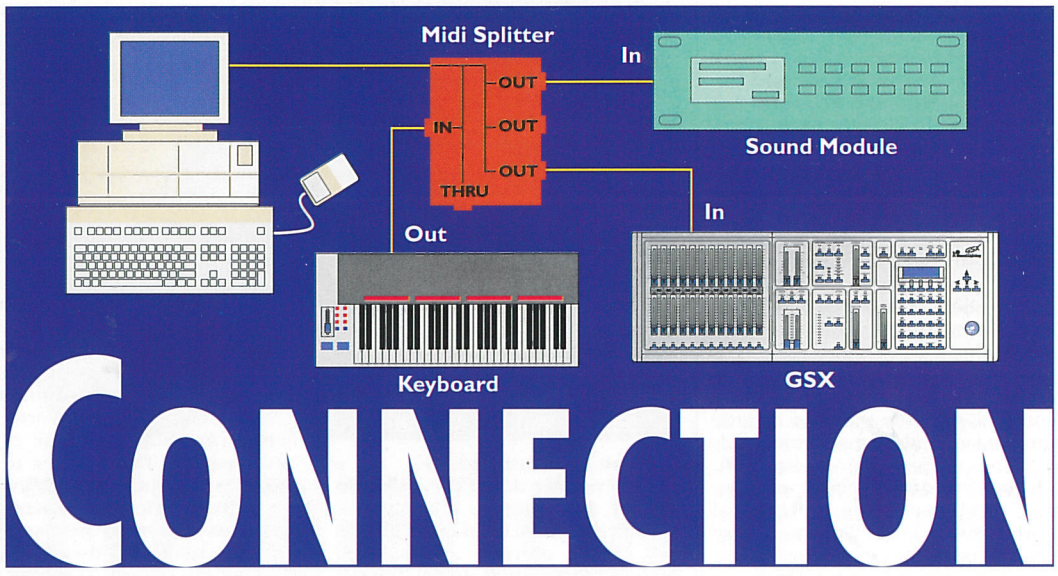
Remember, this is still at an early stage of development, not in terms of our technical R&D, as the technology is tried and tested, but in terms of user requirement and application in the entertainment lighting field.

In a typical lighting control application, the SN100 is used in the same way as any other Ethernet-compatible peripheral device. Its purpose is to provide an interface between discrete signals in the real world, and the compressed, high bandwidth data provided by the Ethernet cable.

In future, the use of the Ethernet system will encompass many other applications such as full tracking backup, and so even if the venue hasn't an immediate requirement for an Ethernet installation, one should be considered to take advantage of anticipated uses in future.

It is commonly asked whether a PC network (e.g. Novell) can be connected to Strand's ShowNet to share common resources such as printers? As a general rule, the answer is no. When a PC network is operating, there are times when some software will reserve the entire capacity for a particular task (e.g. printing). This will have the effect of halting the communication for the lighting part of the system, resulting in very slow response. Under certain circumstances, the two networks may be linked, and this is done by ensuring the connection points of each network are separated on different hubs, with the systems connected together through 'gateways'.

THE MIDI CONNECTION



MIDI - an acronym for Musical Instrument Digital Interface - has been not so much a 'thing' more a way of life for musicians since about 1984. It is a communications protocol (a code by which equipment can transmit and receive messages) which enables electronic instruments to be connected together and controlled from either a central timing computer, or linked directly to each other.

The protocol describes specific messages that are transmitted to say a particular musical note has been hit, or released, or to say that a switch or keyboard control has been altered. If several instruments are linked together (synthesiser, electric piano, drum machine etc), the protocol enables these messages to be addressed to each instrument individually so that a 'master' instrument can control the others directly.

Thus it is possible for a single musician to 'play' many keyboards, each with a different voice and tone, by playing one keyboard only and using the MIDI linking system to play the other instruments at the same time. If a computer is part of the system all the key depressions and volume changes can be recorded as a sequence of instructions while the music is played, and the MIDI system expands to the point where the computer (or, sequencer as it is known) can reproduce the effect with typically computerised precision. This is not intended to replace the human element of live music, but simply to augment the sound as played live by the musicians.

But what has this to do with lighting? The data transmitted back and forth along the MIDI link is related to the information needed by a lighting control to function. Keyboard notes are analogous to faders; voice switches are similar to push buttons; instrument addresses can be thought of as control desks. In other words, it looks like a compatible system. But that is not quite the case.

Although the MIDI protocol defines each musical note as a code (middle C is 3C in HEX for example), and although an International MIDI Association (IMA) and MIDI Manufacturers' Association (MMA) exist, regrettably there is no communality in MIDI lighting codes from different control desks. Strand, as a member of MMA, is involved in discussions to create a standard for defining control functions, but for now, each manufacturer makes its own decisions of which code means what.

So we have a system which enables the MIDI link to do just about everything except talk between MIDI-equipped lighting desks of different manufacturers. This is but a small limitation in comparison with the power of MIDI for lighting. Systems have been developed which use the output of a sequencer to control dimmers directly. This has many uses in the special effects market, but the limitation of 128 dimmed levels (MIDI has an 8-bit protocol, 7 bits of which are available as 'levels', whereas Strand's consoles calculate to 32 bits, rationalised to 8 bits or 256 levels), and the relative complexity of programming the sequencer will limit the effectiveness of this system. The use of MIDI in lighting control has grown into remote fade execution, the synchronised control of bump buttons, control of special effects and automated, repetitive audio-visual controls.

All of Strand's recent control consoles are equipped with MIDI capability. Starting with the MX , the basic manual/memory console range for 12 to 48 channels, the 125 channel GSX, LBX right through to the new Strand 430, 530 and Strand 550 high capability, mid range memory consoles.

Desks with so many capabilities as the Strand range become really interesting both back stage, and ON-stage when a MIDI capability is added to the equation.

MIDI is a means to an end rather than an end in itself, and this is one of the reasons why some users find it difficult to understand. So let's take a look at the main functions of MIDI with lighting consoles today.

LIVE CONTROL

Each control fader, switch, push button on a lighting console can have a MIDI code. So if another MIDI compatible product is sending the correct codes out through the MIDI link, and the console is set to MIDI IN mode, it will receive the instructions in real time, and act accordingly. For example, a MIDI sequencer computer could be controlling a series of music sequencers, and simultaneously instruct the lighting console to flash some of the submasters at a point in the music sequence.

RECORDED LIGHTING CHANGES

If the process of controlling a lighting console from a sequencer is reversed, and the console transmits MIDI data to the computer, it is possible for the sequencer to record each fader movement, and button press, as a parallel track to the music or sound effect. In rehearsal, the sound effect is run, and the board operator runs through a series of cues in 'real time'. The MIDI settings are then changed in performance, and the sequencer outputs MIDI, the console inputs the signal and reproduces the exact board operation, synchronised to the rehearsed effect.

SYSTEM EXPANSION

A lighting system can also use MIDI as a stand-alone communication system. In its simplest form, MIDI is used to expand a lighting system if there are insufficient channels on a single console. For example, take the case of an MX 48 which is the largest capacity console in the range. To gain an extra 12 channels and dimmers, for example, would usually involve changing the desk to a GSX with the nearest level of software, which is 75 channels. But by connecting an MX 12 to the MX 48 through the MIDI link, the second desk becomes a 'slave' of the first, and the master controls of the MX 48 can control both desks at the same time.

BACKUP

One of the greatest hidden benefits of MIDI in a lighting system is the ability for two consoles to be linked together for the second one to track every action of the first. As the master desk is used, each and every action is transmitted through MIDI to the slave desk which meticulously copies the master. Thus at any time the slave desk has the same memories recorded, the same patching, and is in the same state as the master desk. If anything happens to cause the master desk to fail, the backup is ready to take over simply by swapping the dimmer cables over.

SYSTEM INTEGRATION

With the current expansion in the use of DMX to control colour, movement and sophisticated scanner units, the use of multiple desks is becoming more common for the larger shows. Time is critical, and it is often faster to have a group of operators, each responsible for a section of the lighting control, during the plotting sessions. It is the plotting that requires the large number of operators, because the performance is usually reduced to repeated, and accurately timed, button presses. To simplify the performance, a modification of the MIDI sequencer idea is used to synchronise all of the lighting and stage systems. These 'Show Control' computers use MIDI amongst other protocols to orchestrate performance, which in many cases has to be timed to a fraction of a second. Recent advances have led to the definition of MIDI Show Control (MSC) a new protocol which transmits complete instructions to lighting consoles, rather than a string of individual actions. For example, to fade in cue 23.5 with MIDI, the instruction would look like this in text form: "Press CUE, press 23.5, press TRANSFER to playback, press GO", whereas in MSC terms it is simply "GO CUE 23.5".

MSC is now fully integrated into the GSX, LBX and Strand 430, 530 and 550 consoles. But the best way to learn more about the capabilities of MIDI and MSC is simply to experiment!

Strand Library

LIGHTING CONTROL OFF-LINE

Genius™ Software has established itself as a powerful operating philosophy for the GSX and LBX consoles. In addition, the application programs - Kaleidoscope and Communiqué - expand the Genius base to give comprehensive features usually only available with much larger systems. The introduction of the Strand 430, 530 and 550 range of high-capability consoles, has developed Strand's software concept with the introduction of GeniusPlus and Lightpalette Operating software, and Networker, Tracker and CommuniquéPlus application software.

Even with such powerful software at the operator's disposal, there is frequently too little time to perfect a lighting plot using all of the features on the console during plotting and rehearsal sessions. The problem is often created by the lack of time with the console. One solution to this problem is the Off-Line Editor.

An Off-Line Editor is a software program which emulates the operation of the lighting console on a conventional PC or laptop computer. It provides the means to keep working on the lighting cues remotely from the lighting console, and venue, so if there is insufficient time to plot or edit the show at the GSX, LBX, or one of the Strand 430, 530 and 550, any PC or laptop of suitable specification can provide the answer.

The Genius Off-Line Editor offers the same displays, and operating functions as a fully-equipped LBX or GSX. For the Strand 430, 530 and 550, either GeniusPlus or Lightpalette Off-Line Editors will be available. A simple, clear 'map' of the PC's keyboard indicates which keys may be pressed to operate the PC as a lighting console. The Off-Line Editor is a complete duplicate of the console's software (except it won't provide a direct output to the dimmers) so a show can be edited or created using a floppy disk as the medium which transfers the information to and from the console. A full handbook is also included in the Off-Line Editor software pack.

The idea of separating hardware and software has many advantages and one of the affects of offering a simple upgrade path for the console through the purchase of future application software is a requirement for a demonstration of the new facilities before purchase. Demonstration versions of Strand's Off-Line Editor are ideal for this, as well as giving a low-cost introduction to the operating system of the Strand consoles for training purposes. The demonstration version offers all the features of the full Off-Line Editor with the exception of recording onto disk, and the software is supplied with a keyboard 'map', but no handbook.

If a show is created on a full-specification Off-Line Editor with 125 channels with Kaleidoscope and Communiqué and the disk is transferred to a GSX with Genius 50 channels and no application software, the channels above 50 will be ignored. Secondly, any effects that use the Kaleidoscope features (30 memories, different step types etc) will run as basic Genius effects (max. 3 with chase only).

The Genius Off-Line Editor and the demonstration version offer all the features of a fully-installed GSX or LBX with 125 channel Genius, plus Kaleidoscope and Communiqué.

GENIUS

- Off-Line Editor program for PC with MS-DOS operating system.
- To prepare lighting, special effects, and system setup memories on floppy disk in advance of using the lighting console.
- Emulates either a GSX or LBX console running 125 channel Genius with Kaleidoscope and Communiqué application software.
- Standard PC keyboard used for all GSX/LBX panel control functions.
- Permits playback of recorded memories and effects to be displayed in real time on the PC monitor.
- Supplied with full Genius manual, program disk, security key and waterproof colour keyboard legend.

The GeniusPlus and Light-palette Off-Line Editors and demonstration versions offer all the features of a fully-installed Strand 550 with 1500 channel GeniusPlus (or Light-palette), plus Communiqué Plus, Tracker and Networker.

- Off-Line Editor program for PC with MS-DOS operating system.
- To prepare lighting, special effects, attribute cues and system setup memories on floppy disk in advance of using the lighting console.
- Emulates a Strand 430, 530 or 550 console running up to 1500 channel GeniusPlus or Lightpalette with a full suite of application software.
- Standard PC keyboard used for all panel control functions.
- Permits playback of recorded memories and effects to be displayed in real time on the PC monitor.
- Supplied with full GeniusPlus or Lightpalette manual, program disk, security key and waterproof colour keyboard legend.

The computer requirements to run a Strand Off-Line Editor program are:

- IBM Compatible PC with 486 or better processor.
- SVGA monitor.
- 2Mb RAM minimum (8Mb for Genius plus) with at least 450kb of conventional memory and 1Mb of extended memory.
- 3Mb of free hard disk space (6Mb for Genius Plus).
- DOS 3.30 or higher.

The Galaxy GENERATION

Established as Strand's prestige memory lighting console, throughout most of the world, Galaxy Nova™ continues to be specified for the largest venues, so let's take a look at recent progress.

Strand Library

Strand's Galaxy Nova.

Strand Library

Galaxy Nova™ was conceived as a modular memory system; a system which could not only be tailored to a particular application, but customised to suit the special needs of the installation. Over the years, Galaxys have been supplied in a variety of configurations, in custom finishes, with special modules, and in custom-designed furniture. They are certainly not inexpensive, only perfectly tailored; the Rolls Royce of memory consoles. There have been Galaxy consoles with huge geographic button mimics showing the plan of each lighting socket in the installation, Galaxys with rare walnut veneer to match the theatre decor, Galaxys controlling hundreds of automated lights, Galaxys for TV, Galaxys with refrigerators for the interval refreshments!

Galaxy is considered by operators all over the world as a craftsman's toolbox. In contrast to many consoles where there is a pre-defined series of actions to complete a task, Galaxy has a wealth of more general functions, which when used in different combinations, produce a range of results. As the system is modular, almost every Galaxy is unique, and so it is almost impossible to dictate one method of working. An analogy to describe this idea is to contrast a Juke Box and a synthesiser; both are used to play music. With a Juke Box a specific button is pressed to select a chosen track, and the record or CD is automatically played. With the synthesiser, the musician uses the keys, voices, and backings to create the music.

For the specification-minded, Galaxy is a comprehensive lighting control with custom options and integrated PALS automated lighting control. Its modular panel construction offers many combinations of custom-selectable desk layouts for opera houses, large-scale theatres, concert halls and TV studios. Galaxy controls up to 999 channels, patched to a maximum of 1536 DMX dimmers, with simultaneous D54 and DMX 512 dimmer output protocols. Direct control of colour scrollers and up to 249 automated PALS spotlights with control of pan, tilt and focus is available. The control surface of the Galaxy Nova desk is constructed in modules to allow customisation for a wide range of applications. There are optionally 10 or 20 submasters, and fully programmable special effects. Colour change and automation is fully integrated into the system. Dual floppy disk tracking backup is standard, and full dual electronics with split mode for 100% back up security is an option. Other options include comprehensive designer and remote control.

One of the most important features of the Galaxy is its multi-tasking capabilities. The Galaxy Nova allows two desks to be operated simultaneously (main control desk and remote control desk), and the desks can be equipped identically

Strand Library

Control room with Galaxy Nova.

and work together on the principle of 'last action takes precedence', to give independent, yet simultaneous, control. To suit the precise needs of the venue, or intended performance, multiple control panels can be installed. For example, in a TV situation, where channels are frequently manually adjusted live, two channel control panels (each with a channel entry keyboard and LED display) may be installed for independent control of a key and fill light. Another two channel controls may also be in use in a second desk on the studio floor, all four of them working simultaneously.

TV studios are usually equipped with a single, simple playback with one blind, and one live preset. In theatre situations, where the playback of lighting cues can be more complex, with multi-part timed fades, up to four advanced playbacks may be installed, typically with two in the main desk, and two in a duplicate stalls desk.

The grey laminated control panels incorporate internally-illuminated pushbuttons, and clear LED numeric displays. The primary functionality of the Galaxy Nova is defined by each panel, and the selection of panels, and the number of each chosen, permits the system to be specifically tailored to its intended use. The **Channel Control** includes a keypad, display and wheel to adjust and control channel intensity levels and colour scroll setting. Three versions of the playback are available; a basic theatre playback, an advanced theatre playback, and a TV playback. The basic **Playback** has two wheels for controlling the increasing and decreasing channel levels, either as a manual fade, or to control the times during a timed fade. The **Advanced Playback** is also for theatre, but with the added features of direct access to 6 independent fades in progress, plus a unique 'learn fade profile' feature which memorises the exact profile of a fade (with pauses, changes in rate etc.) and reproduces the fade exactly during a performance. The **Studio Playback** is specifically designed for TV studios with direct access for fading and transferring memories to either the studio output or to a preset. The **Memory and Output** panel has a keypad and display to select memory numbers for recording levels, fade, wait and delay times, motion memories, and for controlling the combined output of the Galaxy Nova through two programmable Grand Master faders and blackout switch.

Two different types of submasters are available. The **Preset Masters** panel has ten submaster faders with bump buttons and individual displays. Two panels may be installed to give a maximum of 20 overlapping (highest levels take precedence) submasters. In contrast, the **Group Masters** panel operates with a channel control panel to extend the facilities of a channel control with an additional six wheels. This facility was first seen on Strand's Lightboard console of the 1970's, specified by Richard Pilbrow, who envisaged a "palette" of lights which could be balanced and blended to give the designer the desired 'look'. Channels, groups and cues are selected on the host channel control panel, then 'transferred' to a group master wheel. Other selections are transferred to the remaining wheels, which interact on the principle of 'latest action takes precedence' for the balancing process. One of the best liked features of Galaxy Nova is the **Programmable Effects.** This control panel provides manual performance controls for the effects system, plus access to the set-up procedure, which is one of the most simple and elegant programmable effects operator interfaces available. The setup screen takes the operator through an interactive 'question-naire' for pre-programming of up to 99 individual effects, each with up to 256 steps. Channels and memories may take part in any step, there is a wide range of effect types, and the start and completion conditions may be fully integrated with the main lighting sequence. The **Motion Control** panel has a keypad and four wheels to select and control individual attributes of automated luminaires for manual control and recording. Changes of position and colour can be made manually, or integrated within the main lighting sequence. The **Auxiliary System** includes dual 3.5" disk drives for archiving the system memories, and in addition an independent control system is incorporated, which can utilise channel level data saved to disk as a security backup system.

A characteristic feature of Galaxy is that separate keypads are available for channel and memory selection, which is an integral part of the multi-user multi-tasking philosophy. In addition to clear displays on the desktop, there are typically two colour monitors per desk. Larger systems may be equipped with up to four monitors, with the data from 200 channels displayed on a single monitor. Display push buttons allow further information to be displayed, such as memory list, text, and system configuration menus.

The process of selecting panels from an extensive library of ten basic types actually moulds the 'personality' of the system. For example, a playhouse may require only a few panels giving recording and playback facilities only whereas a variety theatre may choose more panels offering 'spontaneous' features, and programmable special effects, but not the advanced automated playback functions. A TV studio would concentrate on panels offering multiple simultaneous control from different locations, fast record and re-recording and shot by shot playback features. An opera house system would provide the lighting designer the means to 'paint with light' using panels to mix and blend lighting states, and to remotely control the functions of an automated spotlight.

It is a lighting designer's system; a lighting control which is more of an artistic tool than a computer. Galaxy's pedigree is obvious from the intuitive and rapid operation to the sophistication of some of the facilities which can only have been included with the help of user experience.

SPECIFICATIONS

- Full-specification, comprehensive memory lighting control with custom options, integrated automated lighting control and digital dimmer feedback facilities.
- Modular panel construction offers many combinations of custom-selectable desk layouts.
- For opera houses, large-scale theatres, concert halls and TV studios.
- Controls up to 999 channels patched to a maximum of 1536 dimmers.
- Simultaneous D54 and DMX 512 dimmer output protocols.
- 10 or 20 submasters.
- Simultaneous control from different locations.
- Fully programmable special effects.
- Colour change and automation fully integrated.
- Upgrade options for existing Galaxy consoles.
- Comprehensive designer and remote control options.
- Dual floppy disk tracking backup.
- Full dual electronics with split mode for 100% back up security.

Galaxy

LATEST FEATURES

Galaxy Nova is immediately distinguished from previous versions by its appearance; grey control surfaces and housing. Hardware improvements include redesigned panels, a new electronics crate, processor and memory cards.

Colour and motion control are further integrated into the primary functionality of the system, with colour controls being directly accessible from the channel control, and positional recording facilities available on both the motion control and memory panels.

The colour control of Galaxy Nova was developed in conjunction with the custom electronics of the ColourCall scroller. The Galaxy can be configured with colour scroller addresses linked to the channel number controlling the intensity of the host spotlight, avoiding the necessity of remembering a separate scroller number. With the scroller identified as a separate entity, the Galaxy Nova then excludes the scroller signal from general fades. For this level of control, the Galaxy outputs signals in its PALS protocol, called MRL. The added advantage of this is that the protocol supports a time parameter which provides the means for very smooth colour changes of up to 4 minutes.

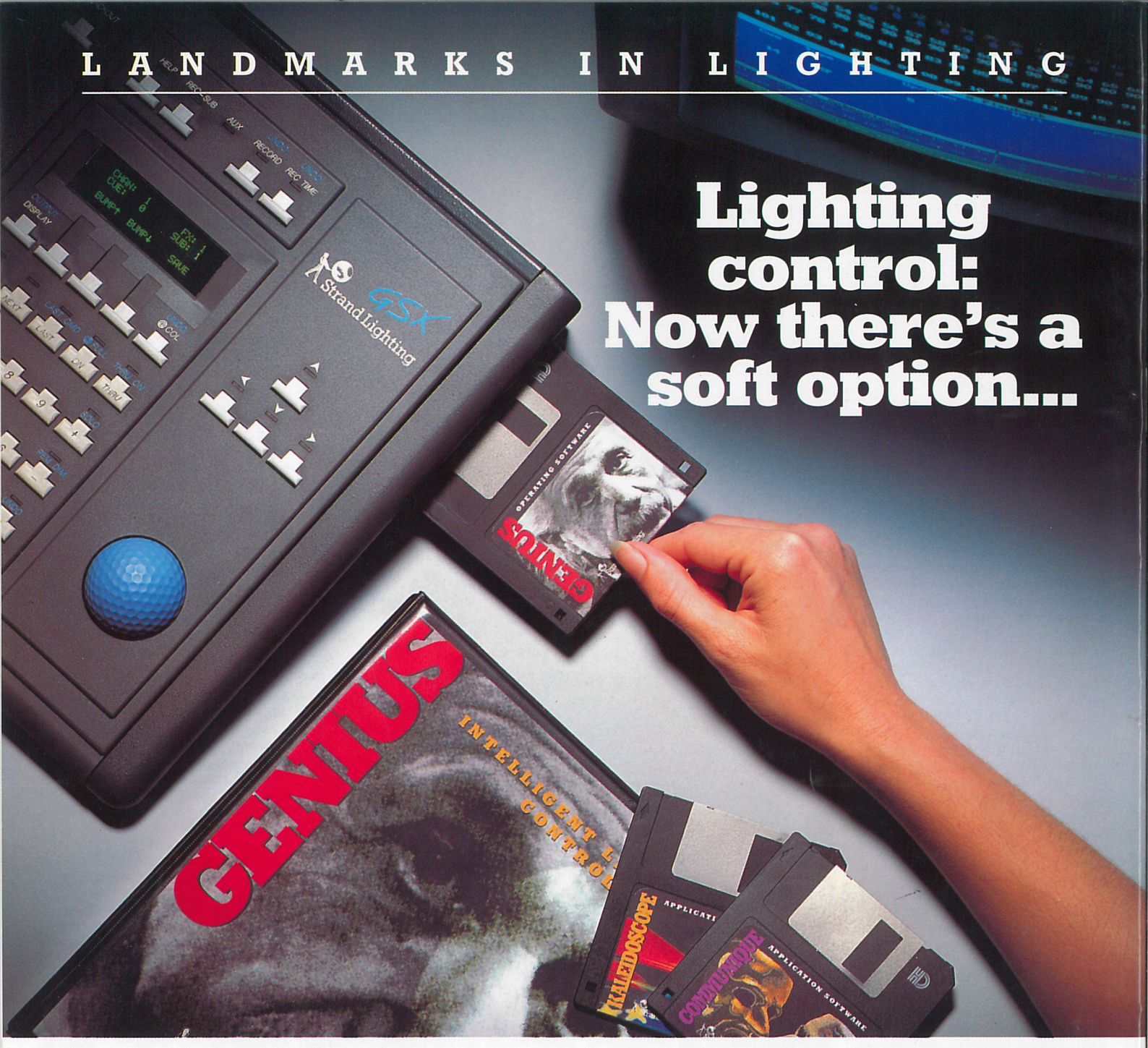
The latest version C2 software has added even more functions to the base program. For example, there are more options for system customisation, and for setting default information. Improvements have been made to the motion control and playbacks (through the preset masters and group masters panels).

For those situations where full tracking backup systems are specified, Galaxy Nova can operate with dual electronics. Another special option is the button mimic panel which not only indicates the status of a channel in relation to its geographic position in the venue, it also provides a primary method of control. By pressing the required button indicator, or group of buttons, the channel numbers are automatically entered for the operator in a channel control.

Galaxy Nova's impressive pedigree, and Strand's record of continuing software development to meet the latest needs of its clients, has confirmed Galaxy's place as one of the world's leading theatre and TV memory lighting control system.

L A N D M A R K S I N L I G H T I N G

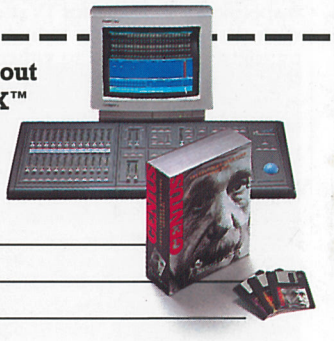
Lighting control: Now there's a soft option...



Strand's GSX™ console announces a new era in lighting control, offering you the flexibility to choose and upgrade your console software via the integral 3.5" disk drive.
Simply select one of the Genius™ foundation applications for 25, 50, 75, 100 or 125 channels, giving full professional functionality, then add Kaleidoscope™ for advanced effects and colour scroller control, and Communiqué™ adding MIDI, Midi Show Control, DMX in, RS-232 control and more. So when the time comes to add features or channels, you won't have to replace your desk - just upgrade your software. It's brilliant!
Ask for more information now!

Strand Lighting

Tell me more about the amazing GSX™ console and the Genius™ suite of programs.



Name
Job Title
Company
Address

Postcode
Telephone
Fax

Strand Lighting Limited, Grant Way, Isleworth, Middlesex, TW7 5QD, UK. Telephone 0181 560 3171 Facsimile 0181 568 2103
LONDON • ROME • WOLFENBÜTTEL • BRUSSELS • STOCKHOLM • LOS ANGELES • NEW YORK • TORONTO • HONG KONG