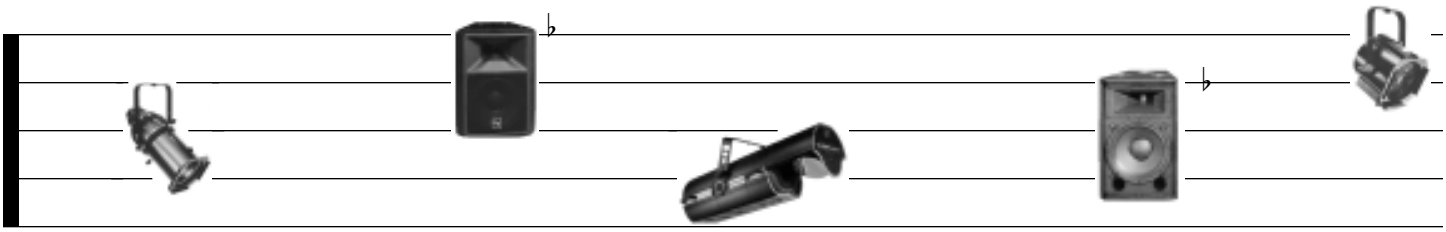
Jack A. Frost Ltd.

STAGE NOTES



Jack A. Frost Ltd. **Volume 2, Issue 2**

Supply and Rental of Power, Lighting, Sound and Staging Equipment

In This Issue

Lighting with Personal Computers

Lighting with Personal Computers

In the Distant Past

The first time I designed lighting for a show in a real theatre was at my university in 1972 - yes, we had lighting systems in theatres even then.

Lighting involved a lot of paperwork. First there was the initial stage of consultations with the director and designers: looking at drawings, renderings, and colour swatches; understanding the directors intention; getting to know the theatre and its equipment; watching rehearsals to take notes on lighting and to try to “see the light” that would work on the stage.

Then came the planning stage: working out the actual lighting requirements; writing a preliminary synopsis of cues; drawing the lighting plot; preparing the dimmer and circuit schedules; preparing the colour-cutting list. All of these documents were again revised when grim reality, in its various guises, imposed its modifications during the hang and focus.

Finally, there was all the paper generated during the cueing sessions: the revised synopsis of lighting cues with its descriptions and times; the interminable barrage of notes on changes required for times, colours, instrument types, levels and hanging positions.

Most important were the cue sheets written by the lighting board operator. Our 60-dimmer system was controlled by a 4-scene preset console. This intimidating piece of early electronic architecture featured 240 sliders on the preset wing, while the main console contained 120 three-position assign switches, 12 submasters, three-position assign switches for each submaster, and two grand masters. Like all lighting consoles of the era, it was essentially an intricately wired concoction of switches, potentiometers, and capacitors. One could accomplish marvellous things on this behemoth, but every switch setting and level had to be precisely noted, and every change carefully plotted. More than one cueing session - and its attendant hours of work - was lost or hopelessly compromised because an operator failed to document every change clearly.

Between the first cueing session and opening night, of course, the plot, cue sheets, and every other piece of paperwork had so many insertions and revisions that a number of total re-draws and rewrites were required.

Lighting a show meant that one became submerged in a sea of numbers: dimmer numbers, circuit numbers, cue numbers, gel numbers, levels, wattages, times, etc., etc. Without even considering the mountain of tables and hieroglyphics known as the cue sheets, I could count on going through at least two substantial pads of quad-ruled paper by the time we reached opening night. Fortunately, by 1972, quill pens and parchment had recently been replaced by ballpoint pens, pencils, and smooth paper. Some wild-eyed zealots on the cutting edge actually used typewriters to create the final revisions of the various schedules and synopses.

Apart from all the usual complications and trauma of lighting a show, our university theatre had one other factor we had to cope with - fluctuating voltage. This meant that a scene which looked wonderfully moody and mysterious during a technical rehearsal might turn into something between a dim glow and a blackout during a subsequent performance. As awesome as our sixty 2,000-watt dimmers seemed to us at the time, our lighting system was by no means the greediest consumer of electricity in the building we shared with other university disciplines.

In fact, our brownouts were being caused by the university’s computer department. In that era, all computers were mainframes: large, temperature-sensitive, number-crunching, paper-spewing, and fabulously expensive machines. Just keeping these things at the right operating temperature could draw more power than a brightly-lit curtain call.

For the vast majority of the populace, including theatre people, computers were mysterious and threatening creatures. Popular culture had already produced some computer dystopias - HAL 9000 of “2001" was a relatively recent cybernetic villain. I had no occasion to visit the air-conditioned sanctuary of these mythic beasts, although we saw their acolytes every day vanishing upstairs with their homework assignments: tall stacks of punch cards balanced precariously on thick textbooks which had gnostic terms like COBOL and FORTRAN emblazoned on their spines.

Computers...and Lighting?

The notion of computers being intricately involved in the creation of lighting designs would have seemed absurd, had it ever

occurred to us. It's true that the very first memory consoles had been installed in a few theatres. Expensive, relatively rare, and often notoriously unreliable, they had already created an entire new genre of theatrical horror stories.

While computer technology was starting to insinuate itself into the realm of lighting control, no-one could envision it becoming part of the design process. Design was artistic and improvisational, requiring creativity and the ability to respond to last minute changes. Computer programs required labourious preparation (by experts who were certainly *not* artists) to run large amounts of relatively repetitive data. Theatres ran on small budgets, and lighting designers were either itinerant specialists or overburdened technical directors. Computers were large machines which demanded lots of money and real estate, and had to be programmed in specially air-conditioned rooms by strange characters (we didn't call them "nerds" or "propeller-heads" then) who talked to the machines in arcane languages. Computers did not move.

Over the next ten years, lighting instruments got better, and lighting consoles became more sophisticated and reliable. Lighting systems started to have more dimmers and fixtures, and shows tended to have more lighting cues. Lighting designers had to use a lot more paper.

Early PCs

By 1982, there was an inkling of change. The microprocessor had been developed, and a few people in the theatre were playing about with Commodore 64s, Altairs, Apples, TI-99s, and "Trash-80s". We called these pioneers "toy freaks". In that year you could buy the first IBM PC: no hard drive, two floppy drives, monochrome monitor, 256K RAM - all for a mere $6,000. Some people were taking notes on early text editors, compiling simple databases, and the inventors of Visicalc had invented something called the "spreadsheet". These "tools" were around, but seemed to take more time than doing things the old-fashioned way.

Of course, once a list or chart was prepared, you could modify very quickly, save, and print. Hmmmm...all those revisions.

As the decade progressed, more people started to use computers for organizing the mass of information that had to be compiled for the lighting of a show. Some just made notes and lists on word processors. Others tabulated equipment and cue information in spreadsheets. The adventurous started to devise databases which would allow them to plug in and manipulate information.

Modems and computer communications were in vogue, and we communicated via local bulletin board system, blazing along with our 300 and 1200-baud modems. Some of the BBS operators started to create links between systems. The Internet - in its text-based form - was available to some university theatre people, and in the mid-80s *CallBoard* was inaugurated, creating an electronic technical theatre community across North America.

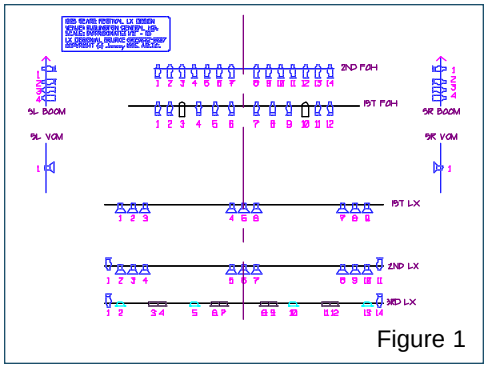


Figure 1

Stage managers were some of the early enthusiasts of theatre technology, with the word processor saving them substantial time in the preparation of notices, lists, and script revisions. Stage managers were among the first to bring laptop computers into the theatre. This was when laptop computers weighed 18 pounds, and users could be identified by the flatness of their laps.

Affordable CADD

But technical directors and lighting designers were still awaiting their own "killer application" - the one that would free them from their drafting (and re-drafting) tables. In the early to mid-80s, some rudimentary drawing programs were available for PCS, but true Computer Assisted Drafting and Design (CADD) programs that would actually be adequate for theatrical use were not. A usable CADD program still required a mini-computer; and a complete package of computer, program and plotter could be expected to cost approximately $100,000.

Within a few years, the situation changed radically. Personal computers became cheaper and more powerful, and some remarkably capable and affordable CADD programs were developed for the PC. For many designers and technical directors (this one included) *Generic CADD* was the program which liberated them from the drafting table. The program was powerful enough for professional theatre use, relatively inexpensive, could run on a modest PC, and was easy to learn.

By the end of the decade, one could put together a less than state-of-the-art PC and version 5 of *Generic CADD* for less than $2,000. Remarkably accurate plots could be generated on a standard dot-matrix printer. The major "industrial grade" applications, like *AutoCAD,* were used by a few of the larger companies and educational institutions, but were financially out of reach for most small theatres and independent designers and technical directors.

By the late 1980s, many of us were creating our lighting plots - and quickly revising them - in CADD programs. (Figure 1) We were than correlating this with all the other forms of paperwork required to execute a design. Lighting paperwork programs were also being developed at the same time. These were essentially specialized database programs that let you enter the information about each fixture just once, and then print the various combinations of schedules, gel cutting lists, etc., as you needed them. The program which set the standard for this genre was John McKernon's *Lightwright.*

Whether working by hand, on the PC, or a combination of the two, we were still creating the lighting plot and the lighting paperwork separately. As always, the two sets of information had to be constantly cross-checked and kept in synch with each other. Any time a lighting fixture is

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Stage Notes
Volume 2, Issue 2

Jack A. Frost Ltd.
3245 Wharton Way
Mississauga, ON L4X 2R9

Tel (905) 624-5344
1-800-263-7678
Fax (905) 624-2386

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an effect on dimmers, circuits, colours, power consumption, and inventory of fixtures. This information has to be updated in the lighting paperwork. Often, changes are made starting at the paperwork, so the plot has to be corrected to reflect them. All of this, of course, has to reflect the actual current state of the fixtures, cables, gels and dimmers in the lighting rig. Any breakdown in this process can lead to chaos when attempting to make the right fixture illuminate the right actor with the right colour at the right time.

What could be done to eliminate this "double entry" method, and to eliminate its inherent risk of getting out of synch? After all, the whole point of using a computer is that you should never have to do anything more than once, whether it's creating a form letter, or making a drawing of your theatre.

In fact, many CADD programs do allow such information to be attached to a drawing. The symbol of a lighting fixture can be placed on a plot, and the details of that fixture - dimmer, type, position, colour, wattage, etc. - can be attached to it. This information can be displayed on the plot, and also extracted in database format.

I preferred to use this method of creating lighting paperwork, rather than using another program. This meant that I only had to enter or edit in one program, rather than two. Once changes were made to the lighting plot, I could print out a new set of paperwork in minutes. The one limitation to this in affordable CADD programs was a limited range of options in displaying this data on the drawing.

There is another "double entry" issue. Lighting plots are traditionally drawn in a plan - a "birds-eye" view of the theatre. A section view is also included to give a vertical perspective from the side of the stage. This is useful in calculating beam angles and for avoiding obstructions. A three-dimensional CADD program would allow one to generate this view very easily. Unfortunately, the low-cost CADD programs used by most theatre people were two-dimensional - the inexpensive 3D programs were simply inadequate for the job, and adequate 3D programs were too expensive for most theatrical users.

Lighting Design Programs

The requirements for a specialized Lighting CADD program are now fairly clear. It has to allow one to draw or import a three-dimensional drawing of the performance space. It has to allow the placement of symbols of various lighting fixtures, and allow various kinds of information about those fixtures to be attached to those symbols. Some flexibility is required in the way that information is displayed in the drawing, and one should be able to automatically create various reports from that information. One should be able to view the performance space and lighting rig from several angles. Finally, it has to be affordable.

Figure 2

One example where those requirements have been met quite well in a low-cost package is Crescit Software's *Design Suite*. While it does not possess - or require - all the features and flexibility of a full-fledged CADD program, it does provide tools which automate a number of functions, and can save a lot of time. Its CADD module, *SoftPlot (Figure 2)*, allows symbols of lighting fixtures to be placed on the drawing, with data displayed in a usable format. Outlines of the beams of light from these fixtures can also be shown, so one can quickly tell if the fixture selected will actually do the job. The drawing can be rotated to show different points of view, and one can even show a "body" on the stage to see how the light will fall on the actors. All of the information in the drawing can be used to generate various printed reports, providing complete integration of the lighting plot and lighting paperwork.

The most impressive part of the suite is *LightShop*. (Figure 3) This is a database which now contains information on over a thousand lighting fixtures, and goes into impressive detail about each one. A fixture can be selected, and a screen full of information pops up, including a photograph of the unit. The height and distance from the actor can be entered, and the size of beam and the light output is calculated. This is shown in numbers and in a geometric diagram which shows the light beam hitting an actor. The gel colour can be selected, and the colour is displayed in another window, along with its effect on the amount of light output. The full range of bulbs available for each fixture is also available for selection.

One can select an inventory of fixtures in *LightShop*, and then import the lot into *SoftPlot* to build the lighting plot. *LightShop* is so comprehensive that it is often sold on its own. Here at Frost, we field many queries from our clients about the capabilities of some pretty obscure lighting fixtures. We use *LightShop* to tell clients what these units can do, and which lamps can be used in them.

Bill Kirby, the programmer and theatre buff who developed the software, understands the budget limitations of small non-profit and educational theatres. In fact, he can often be found helping out high school productions near his home and company headquarters in Blyth, Ontario. Crescit's programs run under Windows.

Lighting Visualization

Ever since computers entered the consciousness of lighting designers, the real holy grail has been lighting visualization - the ability to design lighting in a form of visual reality. This would make it possible to actually see and record lighting cues before ever hanging a light in the theatre.

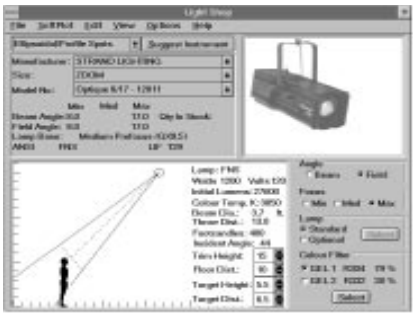


Figure 3

There are some very pressing economic reasons for wanting this capability. The business of actually recording the lighting cues is a time-consuming process - particularly with a large lighting rig. It is also very expensive, since setting levels requires that almost nothing else can be done on the stage, tying up the theatre and its crew. So, while the lighting designer is supposed to be doing something wonderful and refined, the producer watches the meter ticking over at several hundred - or several thousand - dollars per hour, and breathes rather warmly down the designer's neck. It does not make for the most creative environment.

So what if one could take the CADD program several steps further? Let's make a three-dimensional drawing of our theatre with the set in place, and place the lighting fixtures in our plot. Then, let's project lighting beams from our fixtures onto our set, having the beams show colour and patterns, with the light flowing realistically over the different levels and surfaces.

Some very advanced programs were developed in this area, usually in graduate computing and physics programs in a number of universities.. Those using a technique called "radiosity" could achieve some remarkably realistic results - a blue light bouncing off a yellow floor would cast a green uplight onto the wall behind it. They produced some fascinating demonstrations, but required days of programming, and some very expensive workstations. Photo-realistic images required a lot of horsepower.

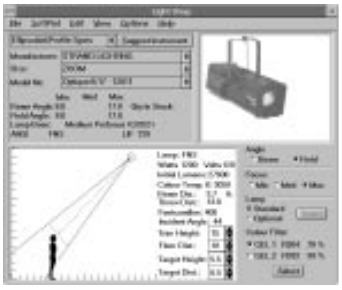
But photo-realistic images are not really necessary. A relatively simple "wire-frame" image of the beam which gives some indication of brightness and colour is quite sufficient for an experienced lighting designer. Being able to respond to changes in the intensity of all your lights quickly - in real time if possible - is most important. Ideally, one should be able to bring a lighting control console into a design office, and feed the control signal from the lighting console into the PC running the lighting program. As dimmers are faded up on the console, you would be able to see the beams of light appearing in the image of your stage which is displayed on the PC monitor.

With a program like this, the lighting cues could be set outside the theatre, before the fixtures were even rigged. This could be particularly useful in the time-consuming task of setting the focus positions for robotic moving light fixtures. The console could be brought into the theatre with the cues already programmed and, with any luck, only minor "tweaking" would be required. The time and money savings could be enormous. You can also give the director a clear idea of what the lighting is going to look like. This, of course, could be a good thing or a bad thing.

Crescit Education Software Bundle

The Educational Bundle has all the industry standard features and functions that every student and instructor of lighting design requires. A great deal for these best sellers.

Light Shop

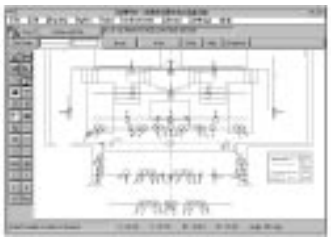


Light Shop is a Windows based software tool for lighting designers, technical directors, technicians, architects and others in the stage and studio lighting industry. Light Shop provides all the photometric information needed for more than 1500 instrument manufacturers world-wide with its included database.

Virtual Light Lab

Virtual Light Lab allows lighting designers, teachers, or students to experiment with light, shadow, and colour effects in a simulated lighting studio. A model and background are selected, then lights are positioned around the model. Moving a light or changing a colour is as simple as dragging a light icon or a colour swatch with the mouse. A library of nearly 500 standard filter colours is included, as well as four models and three backdrops. Up to 32 lights can be mounted in locations surrounding the model, and each light can be individually coloured and dimmed.

SoftPlot Lite



SoftPlot Lite is a Windows based software tool for lighting designers, directors, technicians and students providing the necessary tools for the creation and maintenance of lighting design plots and paper work reports. Combined with Light Shop, it is a powerful, yet easy to operate stage lighting design system.

Stage Lighting the CD-ROM

The first multimedia Stage Lighting CD-ROM based on a book written by Dan Redler which explorers hundreds of topics in Light and Vision, Light Sources, Colour, Special Effects, Dynamic Lighting and The Process of Stage Lighting. Includes 1000 glossary terms, facts and figures, technical drawings, animations and video clips and over 300 photographs from theatrical performances.

By the early 1990's, serious attempts were underway in a number of places to create such a program, one that would run on affordable PC hardware. One of the groups working towards a solution was based in the lighting department at the CBC in Toronto. Several years ago, they demonstrated a prototype at an annual product showcase hosted every January in Toronto by the Canadian Institute for Theatre Technology. It required two computers, three programs, and one custom operating system, but it was intriguing, and generated a lot of excitement.

A couple of years later at the same event, the program had been developed and refined to run on a single PC. It was the first public demonstration of the first commercial program of this kind in the world. The developers formed a company called CAST Lighting, and named the program *WYSIWYG*, standing for "What You See Is What You Get".

WYSIWYG is now used around the world, and its developers have received honours from the theatrical and broadcast industry in a number of countries. If you see a major awards show on Canadian television (or in many other countries), the lighting cues were probably set using this program - and it was done before the set was erected or the lights were hung.

The latest version of *WYSIWYG* no longer requires a lighting console for this process. The program itself writes the lighting cues in a format which can later be loaded into most lighting consoles via floppy disk.

A number of other companies have now entered this field. AVAB's *Offstage* connects the lighting console and the design computer using standard Ethernet, thus using the same hardware which is used in its networked VLC lighting control systems. A company from Montreal called Luxart offers a program called *Microlux*,

which comes in three different versions offering a range of capabilities between Crescit's *Design Suite* and Cast's *WYSIWYG*. Also from Montreal is a company called Kunst Macchina which is developing a program called *Behaviours Technology*.

You may have noticed that a lot of Canadian companies have been mentioned in this article. This is neither an accident nor a case of unbridled Canadian chauvinism. For some reason, the majority of lighting design programs available in the world market today have been developed in Canada. We're not sure why this is so, but there should be at least one graduate degree waiting for the psychology student who wants to attempt an explanation of this curious phenomenon.

Lighting Software in the Schools

The demands of lighting a high school theatrical production are usually fairly modest. Nevertheless, there are some very good reasons for considering the use of lighting design software in productions or course work. Ontario is one of the most active centres for the entertainment industry in the world, producing an enormous amount of live theatre, film, television, film, animation, and music. Entertainment technology provides a surprising amount of employment in this province, particularly for those who are eager to develop the skills to deal with this technology as it develops.

Exposing high school students to examples of this technology gives them a glimpse of a wide range of interesting careers, and an incentive to "learn how to learn". And there is no better opportunity to create a multi-disciplinary project in broad-based technology project than the school show.

Some students can use the CADD programs they are studying to plan the construction of the set. Stage managers can use word processors to keep rehearsals organized and scripts up to date. Posters, programs, and other publicity materials can be created on graphics and desktop publishing programs, and more publicity can be generated on a school Web site. Sound can be prepared on a hard-disk editing program. Of course, there is the wide range of lighting design programs discussed here, and the lighting for the show can be controlled by a PC-based lighting console.

At Frost, we install some of the most advanced lighting systems in Canada, and we keep a constant eye on emerging technology. We have a lot of experience working with schools, providing of equipment, systems, and consultation. Frost has a commitment to working with teachers and schools to help them incorporate technology into their theatres, studios, and curriculum.

If you are interested in finding out more about the types of programs discussed in this article, or other developments in the field of theatre technology, please give us a call.

Paul Court (Paul_Court@jfrost.com)

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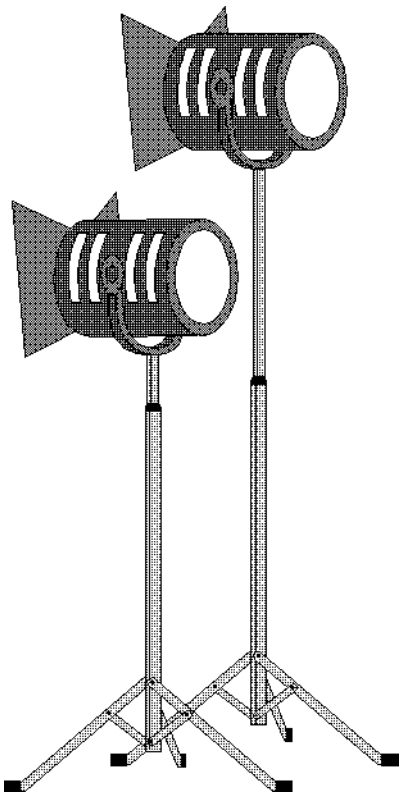

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