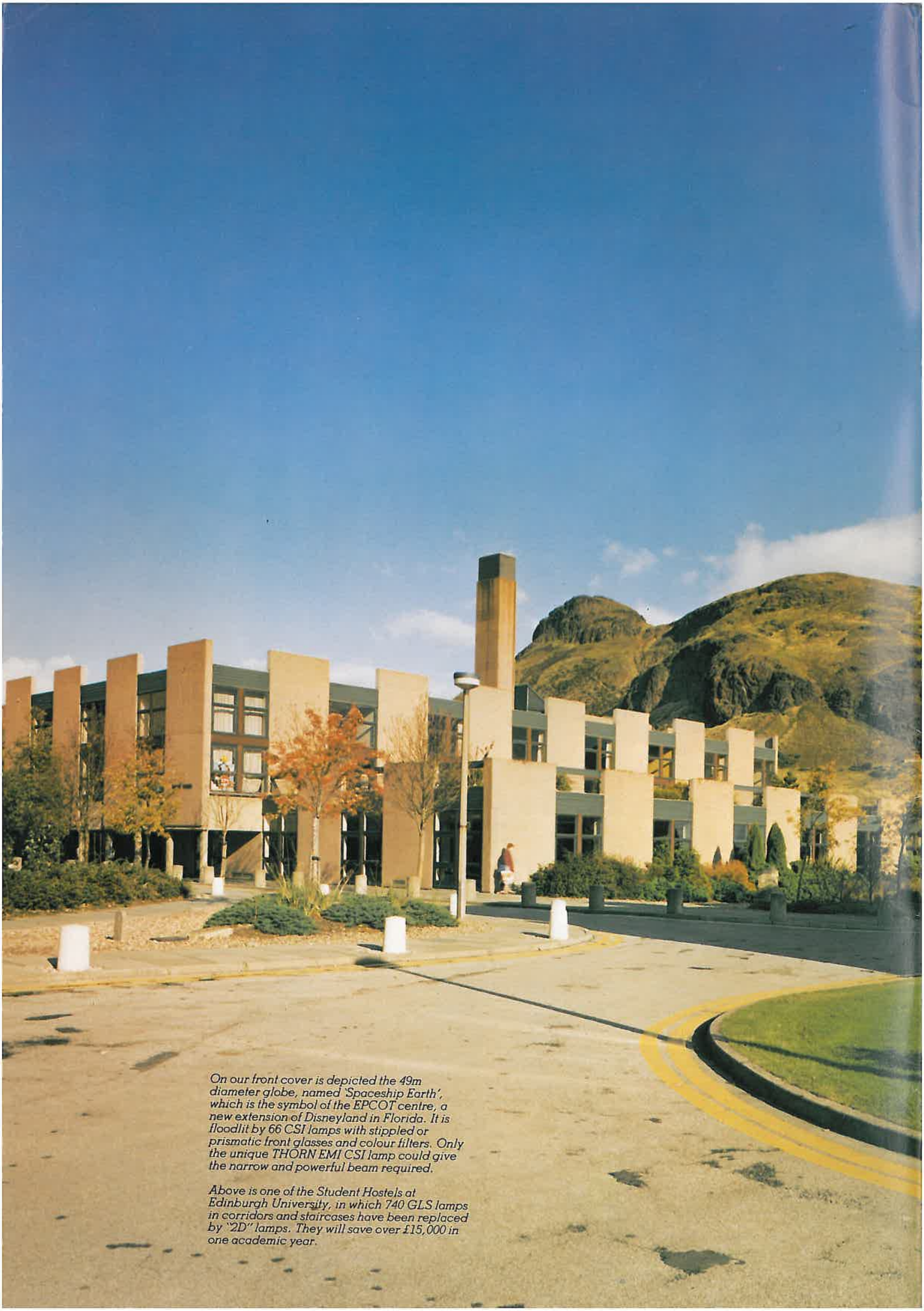
Lighting Journal 26



On our front cover is depicted the 49m diameter globe, named 'Spaceship Earth', which is the symbol of the EPCOT centre, a new extension of Disneyland in Florida. It is floodlit by 66 CSI lamps with stippled or prismatic front glasses and colour filters. Only the unique THORN EMI CSI lamp could give the narrow and powerful beam required.

Above is one of the Student Hostels at Edinburgh University, in which 740 GLS lamps in corridors and staircases have been replaced by "2D" lamps. They will save over £15,000 in one academic year.

Lighting Journal 26

Winter 1983

This issue of the *Lighting Journal* is mainly concerned with the impact of three types of lamp on the art of lighting design. Two of these lamps are unique to THORN EMI. The first, the now world-famous CSI lamp, originally developed for lighting football pitches to the levels required for outdoor television, has become an essential tool in other fields of that art, and has completely superseded the giant carbon arc lamps previously used in outdoor locations. Its use at the renowned Shea Stadium at New York, as well as that of linear metal-halide floodlights at two other famous stadia in the USA is described in an article by Peter Bleasby a well known figure in the lighting world in the UK, now carving a name for himself on the other side of the Atlantic.

It is followed by a description of the economic benefits arising from the use of SON lamps in the City of Westminster, written by the Senior Public Lighting Engineer of that city. Another new lamp, exclusive to the company, is the 2D which is rapidly gaining ground as a replacement for tungsten-filament lamps in situations were exceptionally long burning hours have hitherto made for high lamp-replacement costs, and, because of its unique design, has inspired other fittings manufacturers to design luminaires to take it.

Economic advantage from increased life and light-output has always been the reason for advances in lamp technology and we print an article describing how the use of the 'Vivatron' electronic starter can cut down maintenance costs and avoid damage to fluorescent tubes. Here again much research has had to be made into the best methods of achieving these aims, and the new starter is undoubtedly a major advance in fluorescent lamp technology.

The final article returns to the theme of the high-pressure sodium lamp and describes the problems involved in lighting an indoor sports centre in the West of England. It is fair to say, in fact, that the issue covers a number of important advances in the lighting field.

Contents

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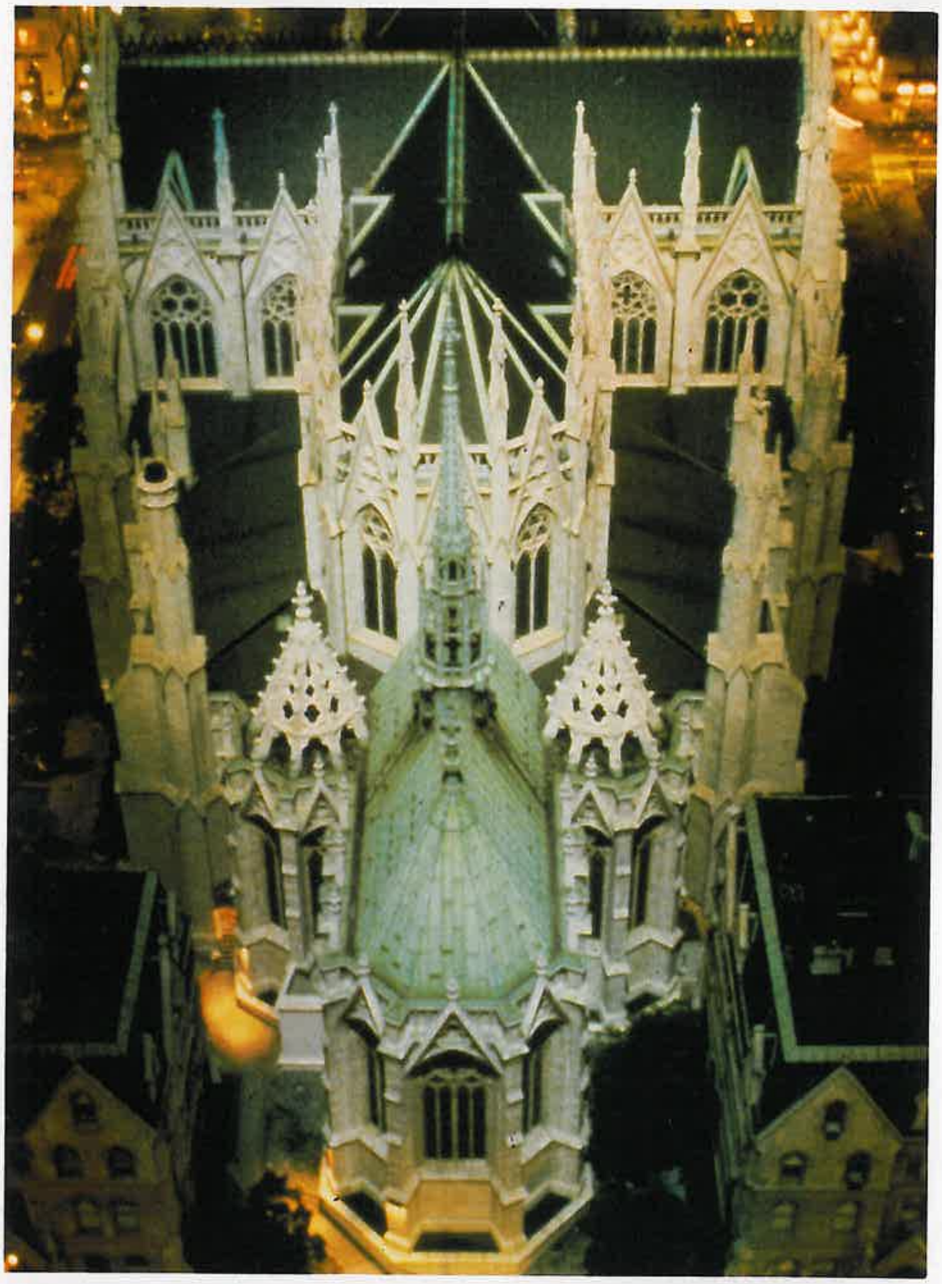
A Tale of Two Cities



New York

When CSI lamps were first installed in a trial installation on the roof of the Helmsley Palace Hotel in Manhatten, to floodlight the facade and courtyard below, an ill-aimed beam from one of them lighted the Lady Chapel of the adjacent St Patrick's Cathedral. The effect was so striking that the Helmsley family decided to extend the floodlighting scheme to cover both buildings.

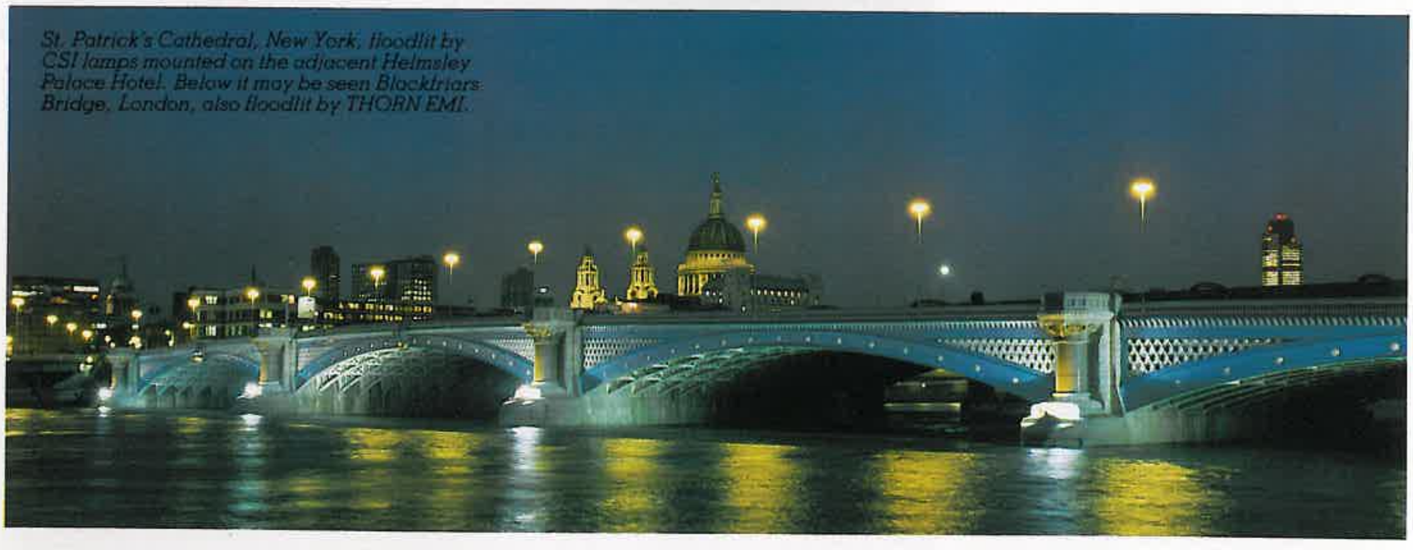
The CSI floodlights are located 200m (600ft) above the ground on the top of the 51 storey building — it is believed that it is the loftiest floodlighting installation in the world. Only six lamps were needed to light both the cathedral and the hotel courtyard while one lighted the facade of the latter building.

Such is the accuracy of the beam of these 1kW floodlights that even with a throw of 200m (600ft) the lighting is confined to the Cathedral and the hotel, leaving the adjacent buildings in darkness. The total load is 7kW, the floodlights being mounted on a revolving frame to facilitate maintenance.

London

Like most of the bridges over the Thames, Blackfriars Bridge is floodlit at night. Originally tungsten filament lamps were used, but today the City Corporation has had them exchanged for metal-halide lamps lighting the cast-iron arches and SON lamps lighting the piers. The total load has been reduced from 9.2kW to 3.4kW and the much longer life of the lamps has reduced maintenance costs.

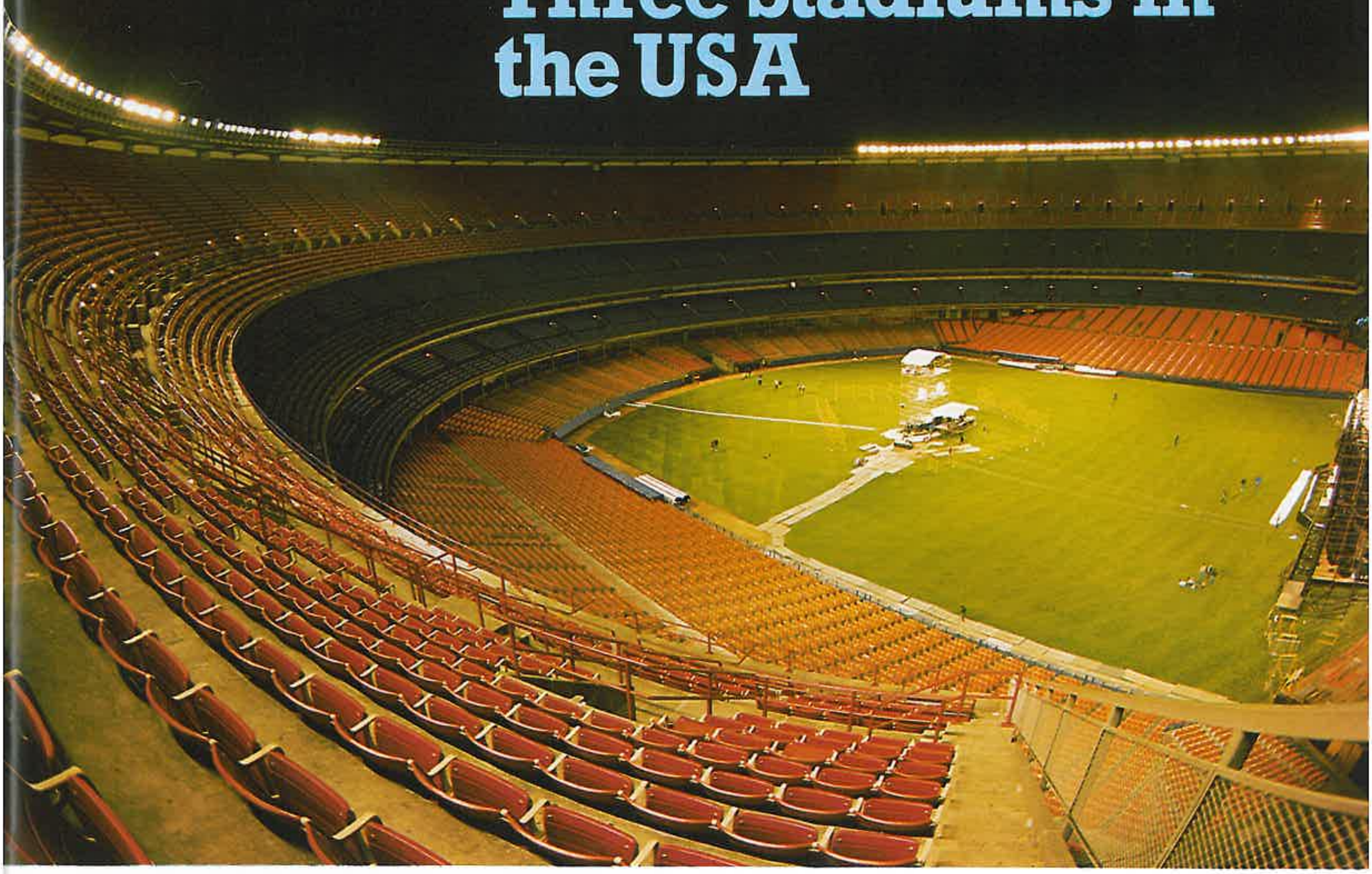
It is scarcely surprising that both these and the CSI lamps were used in the three remarkable installations described on the following pages of this Journal.



St. Patrick's Cathedral, New York, floodlit by CSI lamps mounted on the adjacent Helmsley Palace Hotel. Below it may be seen Blackfriars Bridge, London, also floodlit by THORN EMI.

Peter Bleasby

Lighting Three Stadiums in the USA



The interior of Shea Stadium, New York, described on pages 8-10.

Peter Bleasby is Technical Director for THORN EMI Lighting Inc. in the United States. His responsibilities include the activities of the local application engineering (LED) facilities, and the technical sales function. Before joining the US team in 1978, he was Zone Chief Lighting Engineer in Birmingham, England.

Over the past 18 months THORN EMI Lighting in the United States has obtained the contracts for the field lighting at three major sports stadiums. Each job was completely different and yet a common theme runs through all three — the use of modern, compact energy-efficient light sources, which in turn results in better utilization of the light produced.

MINNEAPOLIS

The Hubert H. Humphrey Metrodome in Minneapolis is a spectacular structure by any standards. It seats up to 63,000 spectators on two levels, the lower tier being below ground level. A huge concrete wall surrounds the upper tier, surmounted by a double skinned inflated fabric roof, whose major dimensions are 183m (500ft) × 244m (800ft) × 58m (190ft) high. Twenty 100 horsepower fans are available for roof inflation, and the fabric is restrained by a network of criss-crossing 75mm (3") diameter cables. Moveable seating adjusts the playing area for baseball or American football.

There are several fundamental problems of lighting within such a stadium. The highest solid structure available for floodlight support is at the junction of the fabric roof and the reinforced concrete walls. The incident angle of lighting from this position is too low either for player comfort, or for reasonable glare control for spectators opposite. Moving the equipment to the optimum position on the roof requires not only lightweight floodlights, since they are now supported entirely by air pressure, but also a bucket-hoist of unreasonable proportions for maintenance from field level.

A compromise solution was reached by using a position lower down the roof slope at a point above the front edge of the upper tier of seating. By mounting the floodlights on steel lattice trusses that are lowered 24m (80ft) by a motor drive, maintenance can be carried out from the upper seating level.

Choice of floodlight

Conventional symmetrical-beam floodlights at this lower position would still not have been entirely satisfactory. To restore visual comfort for players and spectators, a light distribution with a wide fan-shaped horizontal beam and a sharp cut-off above the peak in a vertical direction was specified.

THORN EMI have had such a floodlight in their sports lighting armoury for a number of years. It is known as the ON1500, and utilises the 1500 watt MBIL un-jacketed double ended metal halide lamp. The resulting combination is similar to a large tungsten halogen (quartz) floodlight but with the important addition of an internal auxiliary reflector. This has the dual function of providing the sharp vertical cut off so necessary for low mounting heights, and redirecting light that would otherwise be wasted back into the beam, thereby increasing the overall efficiency.

The final design

The final layout for this stadium comprises four, 22m (72ft) long trusses down each side of the field, and two 17m (56ft) trusses across the end opposite the scoreboard. Each truss houses between 40 and 80 floodlights, with ballasts mounted behind the floodlights to ensure that each truss is laterally balanced about the two support cables. Special stirrups (yokes) were designed to support each floodlight about its centre of gravity. Exact balance was vital, since aiming effectively had to be completed on freely swinging trusses in their lower position. Special aiming protractors with large scales and spirit levels were constructed, which clamped on to the front of each floodlight. Floodlights were then set to computer-calculated angles related to the true horizontal, and to the angle that the truss suspensions made with the centre line through the stadium. The accuracy of this operation was within half a degree, and not one floodlight had to be re-set.

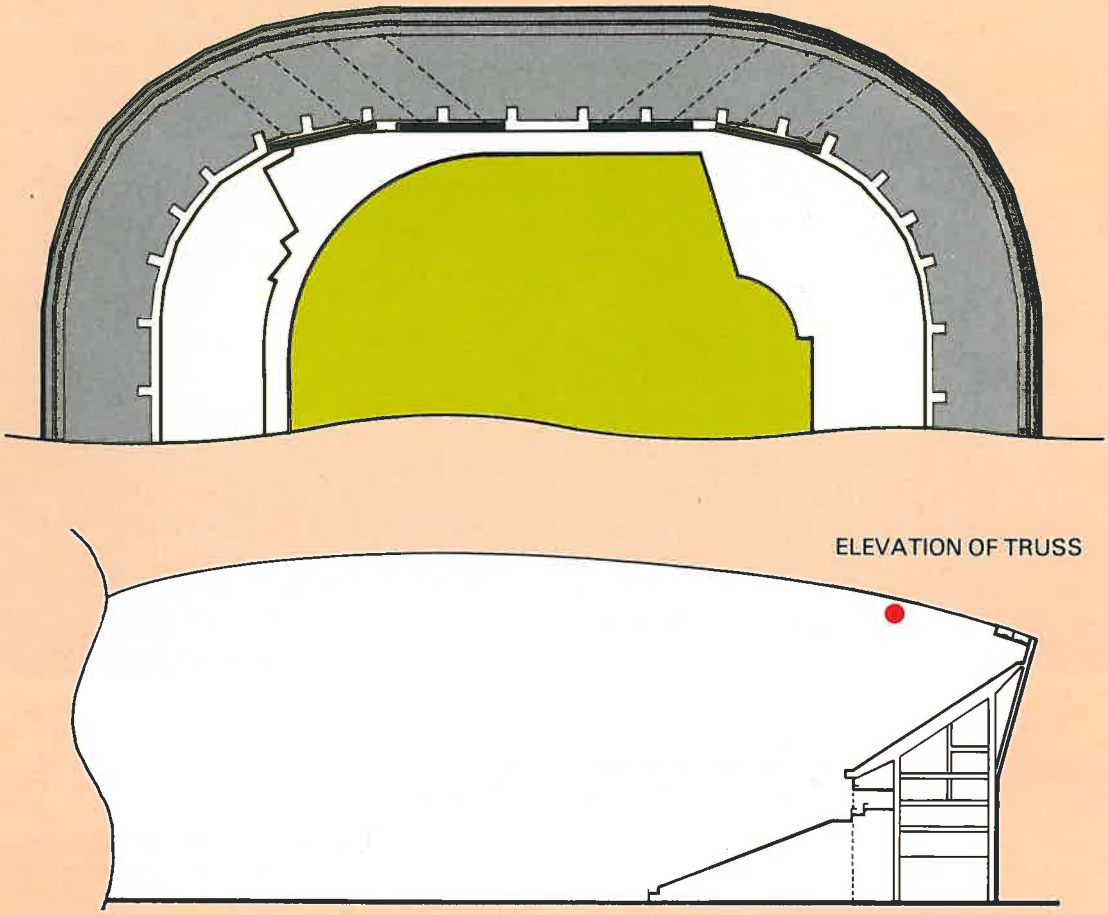
Floodlights are aimed in threes to facilitate a one-third, two-thirds and full-on switching arangement.

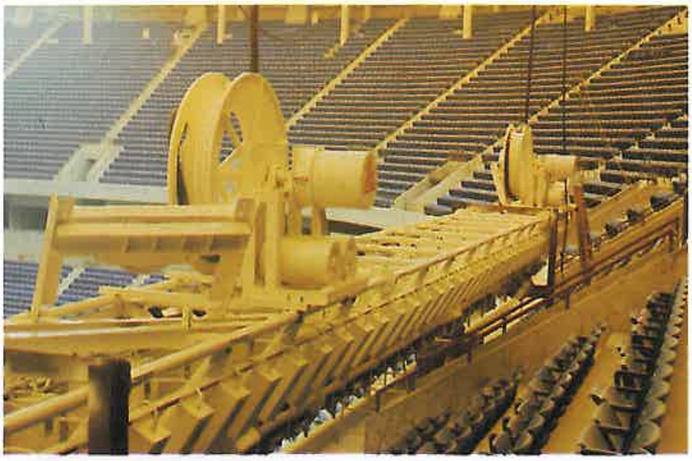
A total of 559 floodlights were installed. 406 floodlights are used for football (or soccer) and 469 for baseball. Initial average illuminances were as follows.

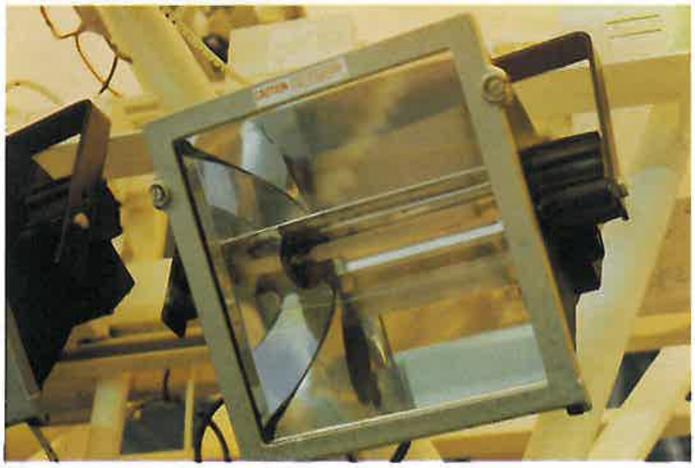
	Lux	Foot-candles	Uniformity (max:min)
Football			
15° to Vertical from each major side	1600-2100	152-196	2.2:1
Baseball (infield only)			
15° to Vertical across base lines	2400-2900	220-267	1.3:1
15° to Vertical from outfield	1600-1900	149-181	1.4:1
Baseball (entire)			
15° to Vertical across base lines	1500-2000	143-190	3:1
15° to Vertical from outfield	950-1400	89-120	6:1

The top picture is a general view of the completed stadium at Minneapolis, below can be seen one of the lighting trusses lowered for maintenance and, on the facing page are a close-up of a truss showing the lifting motors and floodlights, an aerial view of the stadium in daylight and a close-up of one of the floodlights.

Part section and plan of the stadium, showing position of lighting gantries.







At the top of the page is a general view of Soldier Field Stadium in Chicago. The daylight view below shows the original installation mounted on the Greek collonade and indicates the difficult weather conditions in which some of the work was carried out.

CHICAGO

Soldier Field, in Chicago, is an open air stadium seating 65,000, originally constructed in 1926 on the shore of Lake Michigan. It is classical in design, with a colonnade on either side. Soldier Field is used for many purposes, and is the home of the Chicago Bears Football team.

Previous lighting had consisted of 5kW incandescent floodlights mounted on top of the colonnades, supplemented by 1500 watt metal halide floodlights, pole mounted at each end of the stadium. The total connected load was over 1000kW, producing only 800 lux (75 foot-candles) average, with all the consequent problems of short lamp life and expensive 5kW projector lamps.

Problems of mounting positions

The major obstacle to any re-lighting programme at Soldier Field is the fixed location of the floodlights. The main position is on the colonnades, which are set back 64m (210ft) from the field. At this distance, mounting heights of around 49m (160ft) would normally be recommended in order to maintain good illumination on vertical surfaces across the width of the field, and at the same time, limit the discomfort glare to the spectators opposite. Unfortunately, the tops of the colonnades are a mere 32m (104ft) above field level. To aggravate the problem further, the colonnades are offset lengthwise from the field centre, the poles at each end are only 30m (100ft) above field level but set back even further than the colonnades, and any proposal to use more or higher poles has to contend with the high cost of caisson foundations into reclaimed land.

A new lighting specification based on initial values had been issued by the Chicago Park District, summarised in the table to the left of this column.

	Lux	Ft candles	Uniformity
Horizontal	1300	120	2:1
15° to Vertical from each side	1800	170	2.5:1
15° to Vertical from each end	1000	90	2:1

A part section and plan of the Soldier Field Stadium, showing the relationship of the floodlights and colonnades to the playing area.

The problem of glare to spectators was resolved by specifying a maximum intensity for any colonnade mounted floodlight towards the front row of spectators opposite. A figure of 75,000 candelas was considered to be within the capabilities of modern equipment, and to prove compliance, photometric data and aiming diagrams had to be supplied. These would show that, at the high aiming angles necessary to achieve uniform vertical illuminance on the far side of the field, an excessive amount of light was not aimed into the spectators' area.

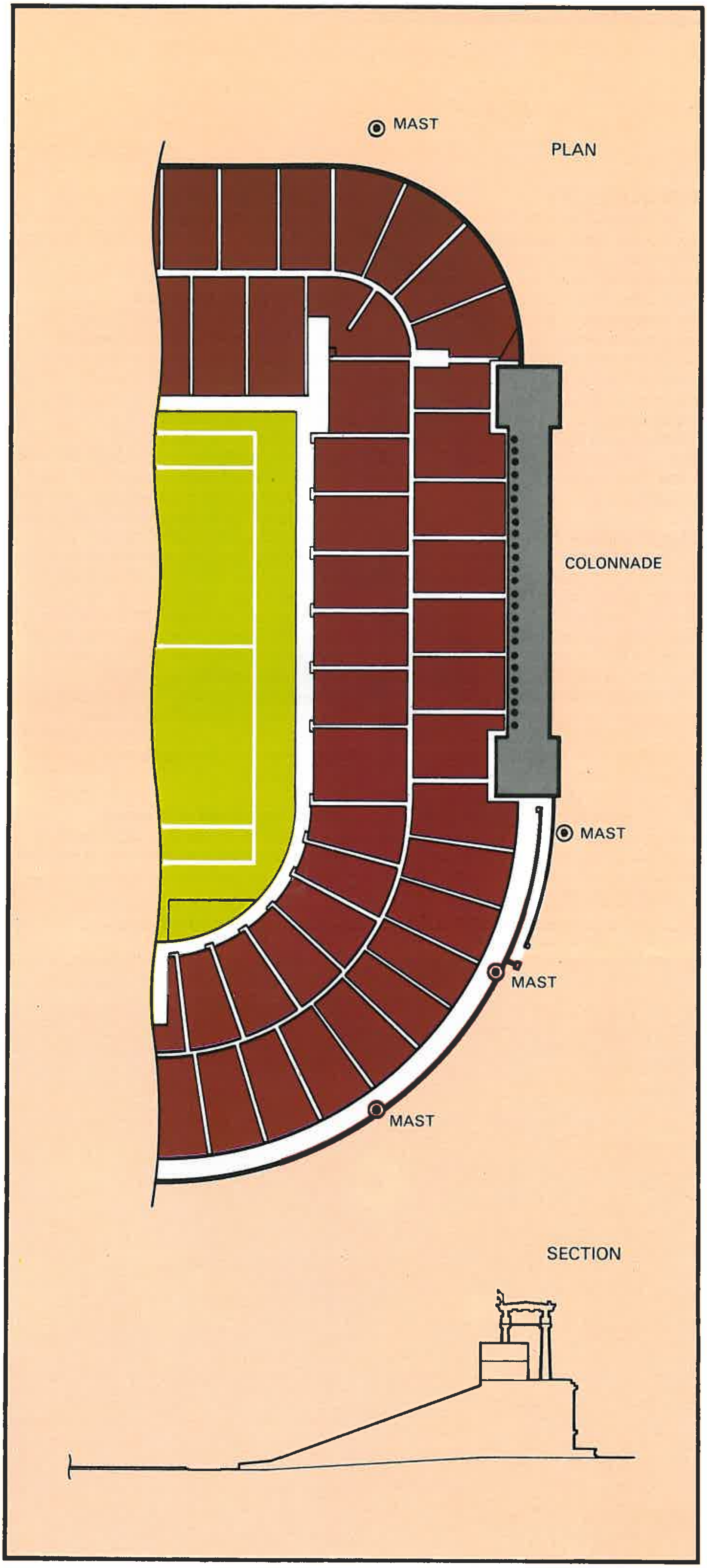
Alternative proposals

Two possible equipment layouts were evolved. One utilised 533mm (21")diameter conventional symmetrical floodlights with 1500 watt metal halide lamps. Generally, these would have had to be of the narrow beam types to cope with the long throw and have glare shields to reduce the spill into the spectators' area. The greatest efficiency (beam factor) that could be expected of such devices is around 30%. Some of the proposed solutions required double-stacking the floodlights on the colonnades, or additional poles, or both.

The best solution

The THORN EMI solution was a single row of 118 ON1500 floodlights with 1500 watt MBIL lamps mounted on each colonnade, using only the existing steelwork that had supported the 5kW incandescent floodlights. These were supplemented by one additional pole at each end with 21 narrow angle ONN floodlights. At the south end, four existing poles, each with 15 — ONN floodlights were used to raise the vertical illuminance for the benefit of the end zone TV camera, and similarly, two existing poles were utilised at the north end. The total number of floodlights is 398 with a connected load of 647 kW.

In this situation, all three advantages of the "ON" and "ONN" floodlights came into play. The internal auxiliary reflector of the "ON" provided the necessary sharp cut off at the high aiming angles, the overall efficiency of the optical system at 51% showed itself in a reduced quantity of floodlights, and this, together with its compact dimensions, enabled the installation to proceed with almost no additional mounting steelwork. It is understood that some of the other more conventional layouts would have required the services of a helicopter for the installation of their associated steelwork.



NEW YORK CITY

The Shea Stadium in New York was opened in 1964, and besides sportsmen, famous names that have appeared at Shea are as varied as Pope John Paul and the Beatles. It was the first stadium in the USA to be constructed without supporting columns within spectators sight lines. It is approximately a 240° segment of a circle, 213m (700ft) in diameter, with a capacity of 55,000 for both baseball and football. On the roof, 46m (150ft) above field level, there is a continuous catwalk for floodlighting equipment.

Dips in supply voltage

One of the problems that confronts any major sporting event or locale is power supply dips affecting metal halide floodlighting equipment. This can black-out an event for up to 20 minutes while lamps cool down, re-strike and run up. This is particularly troublesome where extensive TV coverage is involved. Such a problem confronted the Consolidated Edison Company of New York, which supplies power in and around the City. It is unfortunate that the peak of the baseball season and the peak summer air conditioning load occur together, aggravating the supply stability problems.

One of the major customers of "Con Ed" who are affected by this is the New York Mets Baseball Team, which leases Shea Stadium from New York City. When it was discovered that THORN EMI had a solution to this power dip problem we were rapidly introduced to both Shea Stadium and the Mets management.

The CSI lamp specified

The THORN EMI solution was the use of the well-known CSI sealed beam lamp, various installations of which have been described in previous issues of this Journal. Its efficiency exceeds that of a conventional floodlight by approximately 50%. In addition to its small physical size, light weight and interchangeable front lenses, run-up is achieved in under 60 seconds and it has a colour-rendering index exceeding 80. A less well known feature of the CSI lamp, but one that was most important in this connection, is its ability to restrike when the lamp is hot. By the use of a specially developed ignitor, which produces high voltage high frequency pulses in synchronism with the power supply, the hot-start version of the lamp can be made to restart within 2 seconds of a power interruption.

Much improved efficiency

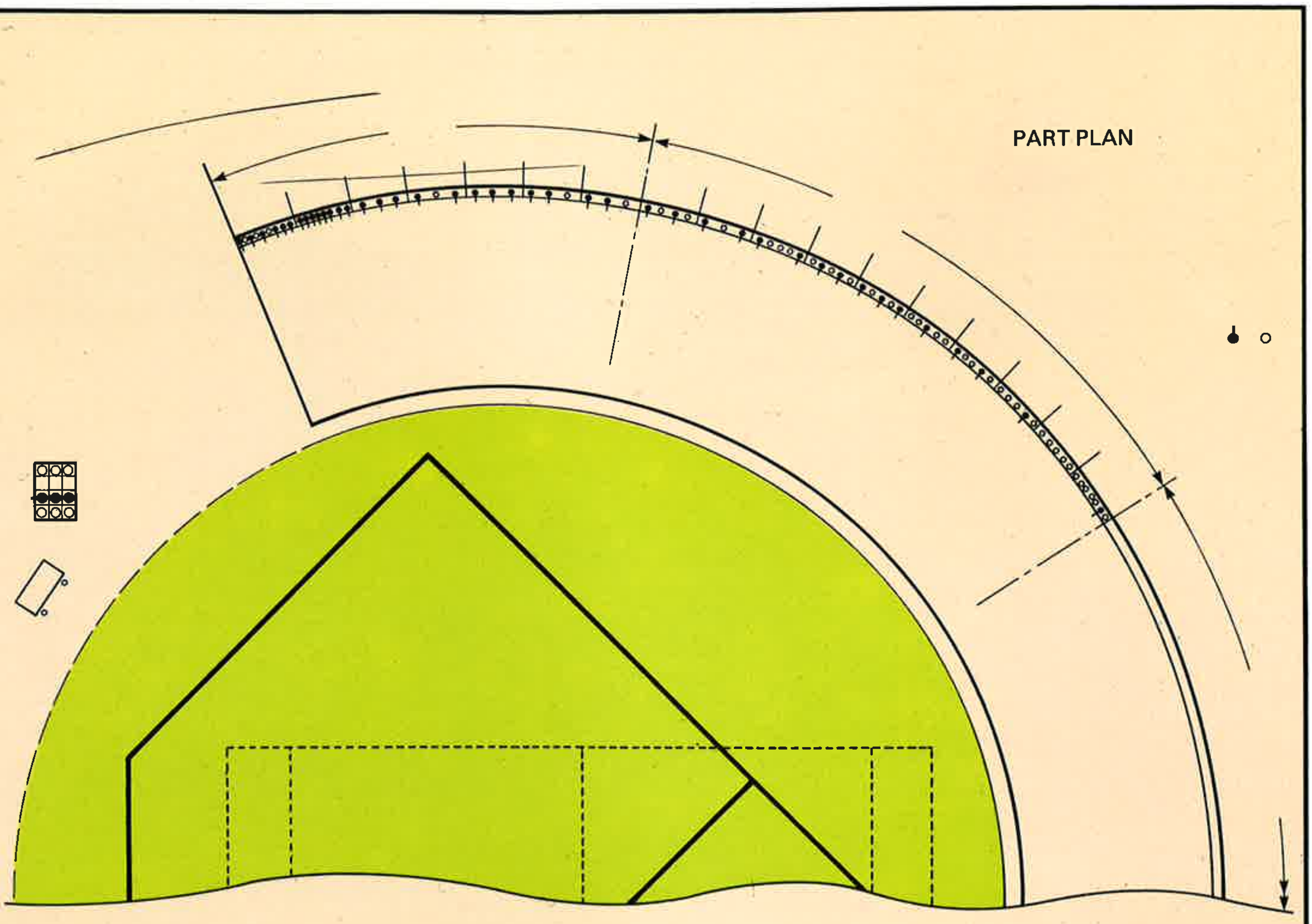
Although it was this latter feature that was initially of interest, it was the efficiency of CSI that made the re-lighting of Shea Stadium a financial possibility.

The existing installation consisted of a combination of 1500 watt tungsten halogen and 1000 watt mercury floodlights, with some mercury lamps over-run at 1500 watts. In total there were 1600 lamps, with a connected load of 2200kW. Maintenance and spare parts were becoming more difficult, and the cost of energy was soaring, especially connected load charges in the summer months. If that were not enough, due to reflector deterioration, the horizontal illuminance on the baseball infield was little over 1100 lux against a minimum recommendation of 1600 lux to the vertical for TV cameras.

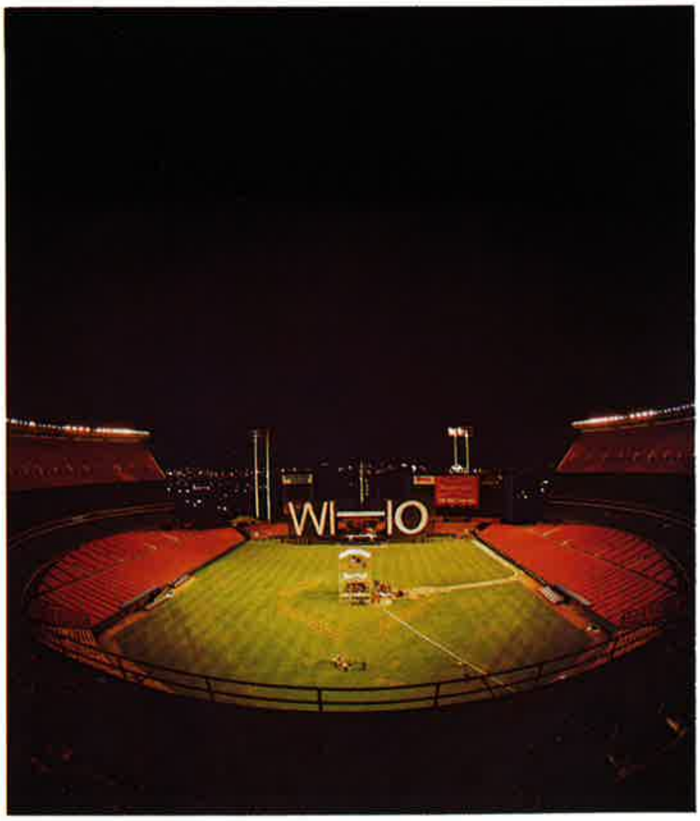
Energy savings effected

By switching the whole installation over to CSI, energy savings of over $200,000 per annum were calculated, with an initial illuminance more than double the existing. A fully hot-restart installation was decided on in view of the importance of the location, with provision for baseball (Mets) and football (New York Jets). The final layout consists of the following:

Common to both sports	360 — OQ1000 HR CSI Floodlights
For baseball only	360 — OQ1000 HR CSI Floodlights
For football only	168 — OQ1000 HR CSI Floodlights
Total	888



The daylight view at the foot of page 8 gives an idea of the size of the Shea Stadium. Below, is a view showing the completed installation set up for a concert of the 'WHO' pop group. Above, is a part plan showing the arrangement of the floodlights and bottom right, a detail of some of the CSI floodlights mounted on their frames.



Maximum total connected load (baseball) is just over 800 kW, including ballast losses.

The OQ1000 floodlights are mounted throughout on the OQB4 4-way bracket, which simplifies installation and reduces aiming time. Ballasts are installed at roof level on the existing racks that had previously housed mercury ballasts. There were two pairs of lighting towers in the outfield, with ballasts mounted at the tower bases. Such is the small physical size of the CSI floodlight that one tower of each pair was unnecessary, and has been abandoned.

Installation programme

Installation scheduling was a major problem, with only the worst winter months of February to April available between the end of the football and the opening of the baseball seasons. Consequently, the job was completed in phases, opening with the baseball infield lighting (temporarily used in conjunction with some of the existing 1500 watt tungsten halogen) and then moving round the roof to the baseball outfield lighting. The whole programme had to be carefully dovetailed into the team's schedule of home and away games during April and May — each time they returned, further progress had been made.

For the extra "football only" floodlights, THORN's contract was directly with the New York Department of Parks and Recreation. These floodlights were installed in late summer in time for the first night football game in October.

Aiming was completed by the well known and trusted rifle-type aiming sight attachment. At one point, slight difficulties were encountered when an early April blizzard buried all the aiming marks!

The final result complies with the new North American IES specification for TV coverage of major sports. It is also noticeably different when comparing the results with other stadiums on TV. Colours are improved, modelling better defined, and the picture is generally crisper.

Diamond Vision

No article on Shea would be complete without mention of DiamondVision. This is a large scale 9m × 12m (30ft × 40ft) full colour action-replay scoreboard, also new in 1982. Besides scores, it is used for player statistics, action replays between innings, candid shots of the crowd, etc., etc. It is noticeable how the better beam control (and hence less stray light) of CSI improves the contrast on the screen compared with other stadia. There is talk of "cueing" the hot-restart CSI installation on and off during the game to dramatise the picture still further. That's a use for hot-restart we hadn't thought of — but why not!

In this action picture of the Shea Stadium, the 'Diamond Vision' action replay scoreboard is clearly visible.

Acknowledgements

For the Hubert H. Humphrey Dome Stadium, Minneapolis
Architects: Skidmore Owings and Merill, Chicago
Engineers: Geiger Berger Associates, P.C., New York City
Lighting Consultants: Jules Fisher & Paul Marantz Inc., New York City

For Soldier Field, Chicago
Engineers: Chicago Park District
Electrical Contractor: G & M Electrical Contractors, Chicago

For Shea Stadium, New York City
Engineers: Geiger Berger Associates, P.C., New York City, and Department of Parks & Recreation, New York City
Electrical Contractor: A. I. Smith Electrical Contractors, Brooklyn, New York City

Detailed illumination engineering for all projects was by THORN EMI Lighting International Project Engineers, Romford, England.

One of the splendid cast-iron Victorian lamp standards in Trafalgar Square. This was converted from gas to electricity soon after the last war and now the 1,000W incandescent lamps have been replaced by 400W SON lamps.

Nigel E. Pollard

The Benefits of 'SON' in Road Lighting

Mr Pollard is Senior Public Lighting Engineer to Westminster City Council. His article is based on a paper he presented to the National Energy Management Conference in October 1982 highlighting the considerable benefits high pressure sodium lighting can bring to energy conservation in road lighting.

The introduction of the high pressure sodium (SON) lamp to the tool box of illuminating engineering has been one of the greatest benefits to public lighting engineers in recent years.

The City of Westminster, in common with its neighbouring authorities, the Corporation of the City of London and the Royal Borough of Kensington and Chelsea, has always tried to maintain certain standards of road lighting, one of which has been a policy of only using light sources of reasonably 'good' colour rendering. However, with ever rising energy costs, this has been difficult to keep up, until the introduction of the SON lamp went far to solve this problem.

Downward trend in energy consumption

In the late seventies there were 3500kW of lighting on the roads of Westminster. This has been reduced to date by 23% to 2700kW and is on its way to a target of around 2000kW. This downward trend in energy consumption has been achieved as far as Westminster City Council is concerned, in a most satisfactory way in that no standards have been lowered, public safety concerns and aesthetic considerations have been upheld and in many cases improved. As may be seen from the graph, over the last five years (1977-82) tungsten filament lighting has been reduced from 1040kW to 180kW, tubular fluorescent from 1220kW to 630kW, MBF from 850 to 530kW and low-pressure sodium from 320 to 270kW. The replacement source for all these has been the SON lamp, the usage of which has been increased from 70kW to 1070kW.

In monetary terms this has meant that the Council's energy bill of around £500,000 p.a. would, if the above conservation programmes had not been persued, have been approximately 30% higher at £650,000 per annum, giving a saving of £550,000 per annum.

Replacement of lamps and lanterns

In the main, the tungsten filament lamps in the ornate lanterns found within the prestigious City Centre locations such as Belgravia, the Strand, Trafalgar Square and Whitehall have been replaced by SON. In all these cases it was simply the lamp that was changed, usually from 1500W GLS to 400W SON, in lighting terms an increase in lumens from 27000 to 45000 but with an energy saving of about 1000 watts per point. In addition to this, maintenance costs have been lowered by using a lamp of over three years' life in place of one of three months. Over three hundred units have been converted in this way and these high wattage tungsten conversions have brought remarkable energy savings, literally paying off their capital costs in months. The first year's programme in 1980/81 cost £5000 and brought savings of 17,000 (Fig. 1).

This view of Parliament Square, with Big Ben in the background, shows the original gas lanterns, now converted to SON.

Fig. 1

City of Westminster – Energy Saving Road, Subway and Arcade Lighting

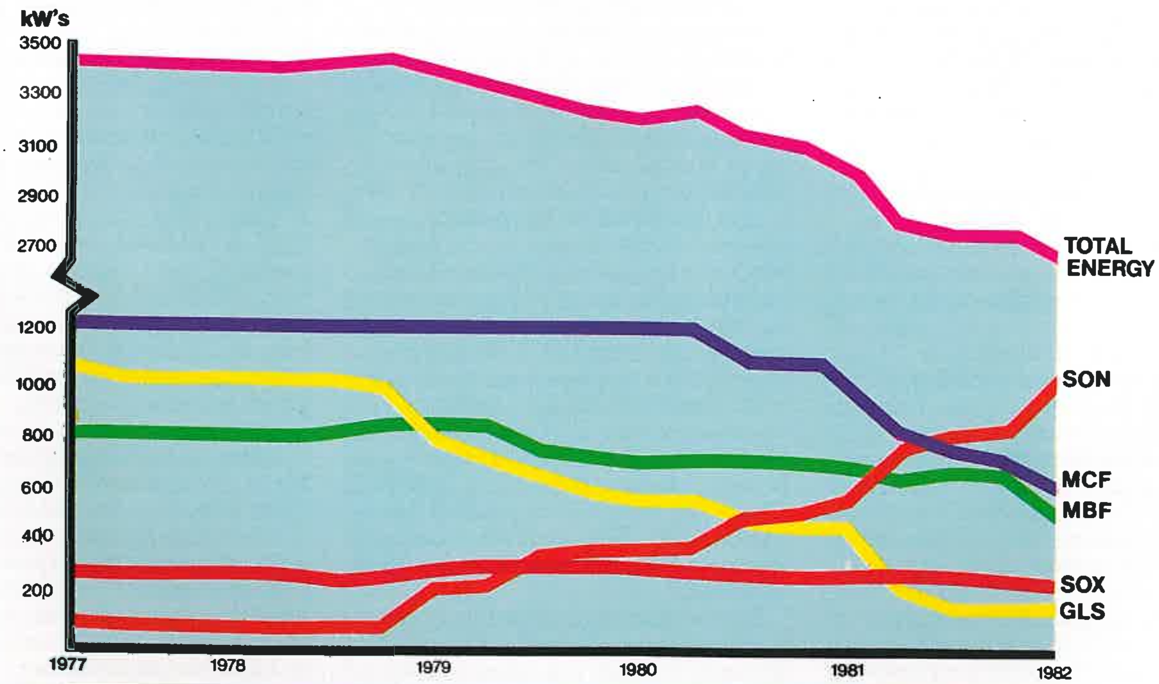


Fig. 2

Conversion of 4 × 80W MCF lamps and luminaire to 150W SON lamp and luminaire –

Cost of conversion

Equipment	£100
Installation	£15
	£115

Energy/maintenance
Savings per year £44

Pay back period — 2.6 years

Fig. 3

Conversion of 1500W GLS lamp to 400W SON lamp –

Cost of conversion

Equipment	£60
Installation	£15
	£75

Energy/maintenance
Savings per year £196

Pay back period — 4 months

The Benefits of 'SON' in Road Lighting

The second phase: converting from fluorescents

The second major conversion programme was considerably larger, involving many more units, and if not quite so cost-effective as the previous one, is in many ways just as impressive. Seven years was the original paying off period for the tubular fluorescent conversion programme at £30,000 p.a., but with still rising energy prices, it will undoubtedly be shorter. In this programme both lamps and luminaires have been changed, each of their modern replacements bringing substantial improvements in efficiency. This combination resulted in increased system efficiency and has brought about what appears at first sight to be simply a 'lighting improvement scheme', but for example the relighting of Harley Street was fundamentally an energy conservation scheme. The original luminaires contained three 80W tubular fluorescent lamps and in addition they were large, hard to seal and difficult to clean, all of which added up to poor optical efficiency. The replacement, a small easily gasketted lantern was easy to keep clean and only housed one lamp. The 150W SON lamp was used at the original mounting height of 8m, and gave 15000 lumens as compared with the 15600 lumen package of three fluorescent tubes.

System efficiency versus lamp efficacy

This is a clear indication of the importance of system efficiency over simply lamp efficacy and of the advantages of using a well designed optically efficient luminaire. Harley Street, together with all the other roads similarly converted from three or four-lamp tubular fluorescent lamps has less lamp units now than previously, but no one would argue against the superiority of the lighting effect.

On more important roads, such as Victoria Street, originally lighted by lanterns containing four 80W fluorescent tubes consuming about 400W, the mounting height has been increased from eight to ten metres by means of a simple extension shaft. The same luminaire has been used as in Harley Street but with a 250W SON lamp.

These £30,000 per year programmes allow for the conversion of approximately 250 units and achieve savings, dependant upon type, up to £10,000 per annum as can be seen in Fig. 2.

In Curzon Street, (below) existing lanterns originally housing 1,000W incandescent lamps were replaced by 400W SON, as were those outside the Horseguards in Whitehall shown above.

Replacing MBF lamps

In other areas, high pressure mercury (MBF) lamps have been replaced by SON bringing further energy savings. In some cases, this has been done, like the tungsten conversions by re-using existing luminaires, which although forfeiting the advantage of using modern high efficiency units helps to keep capital expenditure to a minimum, although one must be careful here of false economy. In the main, however, completely new lamp and luminaire combinations have been employed, an example being the Marylebone Road a conversion of 400W MBF to 250W SON. A variation of this can be seen in Park Lane where the original units, each housing three 400W MBF lamps have been replaced by a totally new luminaire utilising two 400W SON lamps. The result was a considerable improvement in lighting standards for two thirds the energy costs.

The Benefits of 'SON' in Road Lighting

SOX lamps gradually disappear

Finally, the City's small amount of low pressure sodium (SOX) lamps in the old boroughs of Paddington and St Marylebone are being converted to SON. The leafy roads of St John's Wood and Bayswater are again being brought back to their colourful beauty. It is worth noting here that in spite of the lower efficacy of the SON compared to the SOX lamps, not all of these conversions produce energy increases. Some, at 8m mounting height, are being increased from 90W SOX to 150W SON, but there are also considerable numbers of 90W SOX, mounted at 6m, which are being reduced to 70W SON with very good results. It appears that the good colour rendition of SON compared to the monochromatic light of the SOX is compensating for the loss of lumens. Further tests are continuing.

Choice of colour of light source

The above programme, if completely carried out, would leave the City of Westminster with only one coloured light-source, but while the SON lamp is the best and most efficient to date, no doubt it can be improved upon. It is to be hoped that the new 'SON Deluxe' lamp will prove such an improvement, which is why Westminster City Council is field testing some of them with the hope of introducing them at a later date in the City's leafy squares, where at present MBF lamps are used to provide contrast and variety. If successful these two SON sources should see us safely and efficiently through the 1980s and beyond.

Acknowledgements

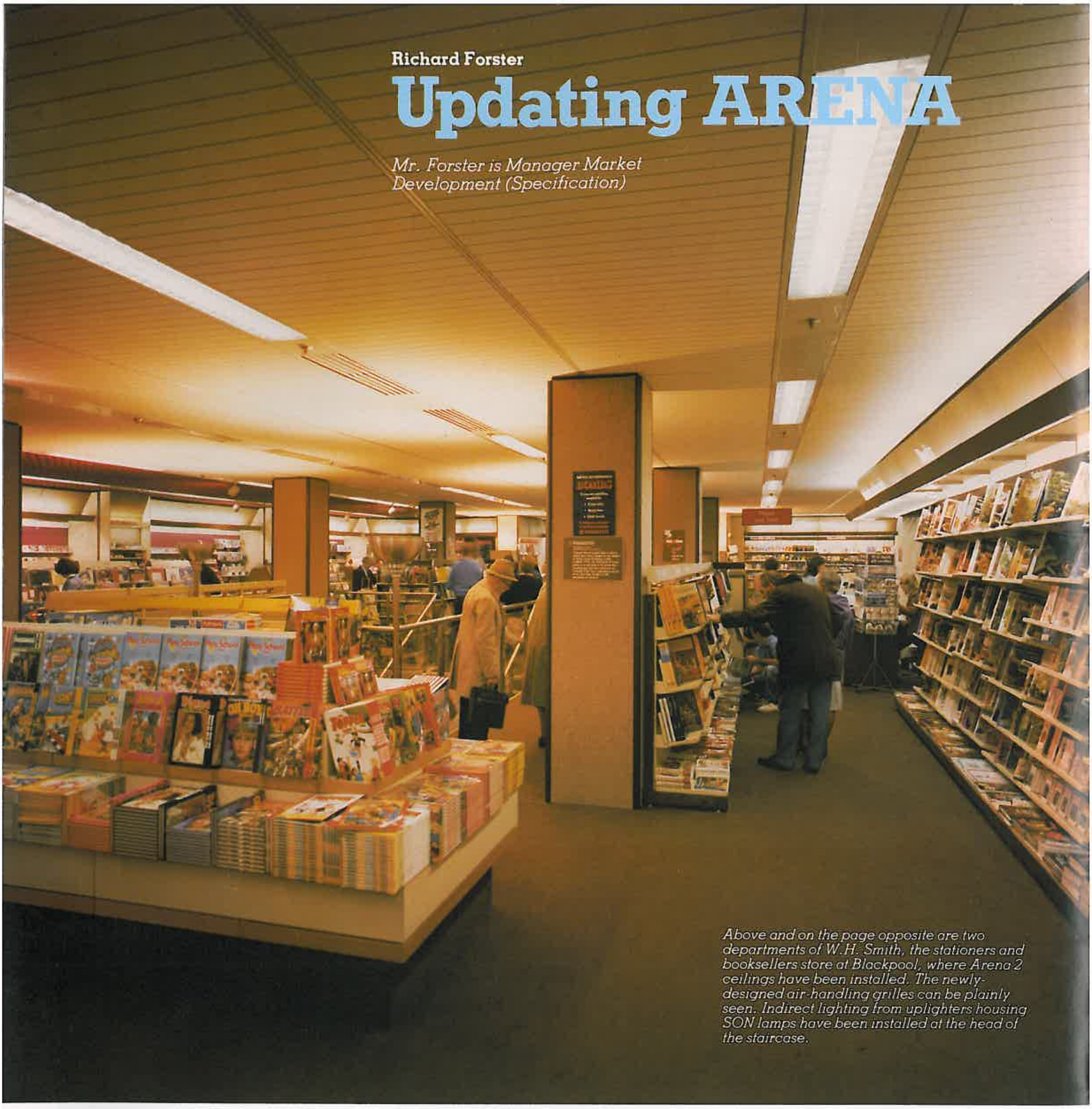
Little could have been carried out without the help of my colleagues at City Hall, particularly the Principal Engineer (Design), Mr Stratford, C.Eng., M.I.C.E., M.I.MunE., and the City Engineer, Mr Cryer, B.Sc., C.Eng., F.I.C.E., F.I.Mun.E, M.I.Mech. E., F.I.H.E. whom I thank also for permission to publish this paper.

New lanterns, each housing a 400W SON lamp replaced the three-lamp 400W MBF fittings in Park Lane, illustrated at the top of the page, while in Wigmore and Harley Street lanterns housing three 80W fluorescent tubes were replaced by single 150W SON lanterns.

Richard Forster

Updating ARENA

Mr. Forster is Manager Market Development (Specification)



Above and on the page opposite are two departments of W.H. Smith, the stationers and booksellers store at Blackpool, where Arena 2 ceilings have been installed. The newly-designed air-handling grilles can be plainly seen. Indirect lighting from uplighters housing SON lamps have been installed at the head of the staircase.

When the original Arena system was introduced some ten years ago, it broke new ground in the combined lighting and air-handling field. It was the first standard system of luminaires combining a recessed lighting system with air-handling which could be integrated with any type of suspended ceiling without modification, used standard parts.

Since then two things have happened. There has been an important advance in lighting technology due to the introduction of the new (T8) power-saving fluorescent tubes, and THORN EMI lighting has acquired a great deal of expertise in handling lighting-air conditioning systems. Practical experience in the use of the original Arena design and in its successor, Programme 2, has shown which design characteristics are most important to user and installer.

Perhaps the most important point about the new design is that it is simpler to install than the original one. The number of components has been much reduced, which incidentally improves stock availability and reduced costs, the provision of a sub-grid is no longer necessary and the system has been made a great deal more flexible, both in its lighting and its air handling capabilities.

All this has helped to improve the overall efficiency of the system both in the lighting and air-handling fields. With the newly designed optical system, an illuminance of 500 lux can be achieved with a lighting load of less than 15 watts per square metre of floor area, while the wide-spread grilles of the air supply units gives considerably improved mixing of conditioned with room air.

Some of the salient features of Arena Two are summarised as follows:

Continuous recessed lighting bodies give a 300mm module width. Fully interchangeable hinging, single or twin lamp gear trays take 1200mm, 1500mm or 1800mm lamps. Gear trays can be positioned anywhere along the run.

Two through wire-ways with optional covers are provided.

26mm diameter PLUSLUX and

POLYLUX power saving fluorescent lamps with their new electronic starting circuits are available with the option of 38mm diameter lamps when desired.

A range of high efficiency Batwing reflectors is optimised for the 26mm diameter new lamps, but with 38mm diameter lamps in mind. Alternative prismatic controllers are with or without air exhaust louvres.

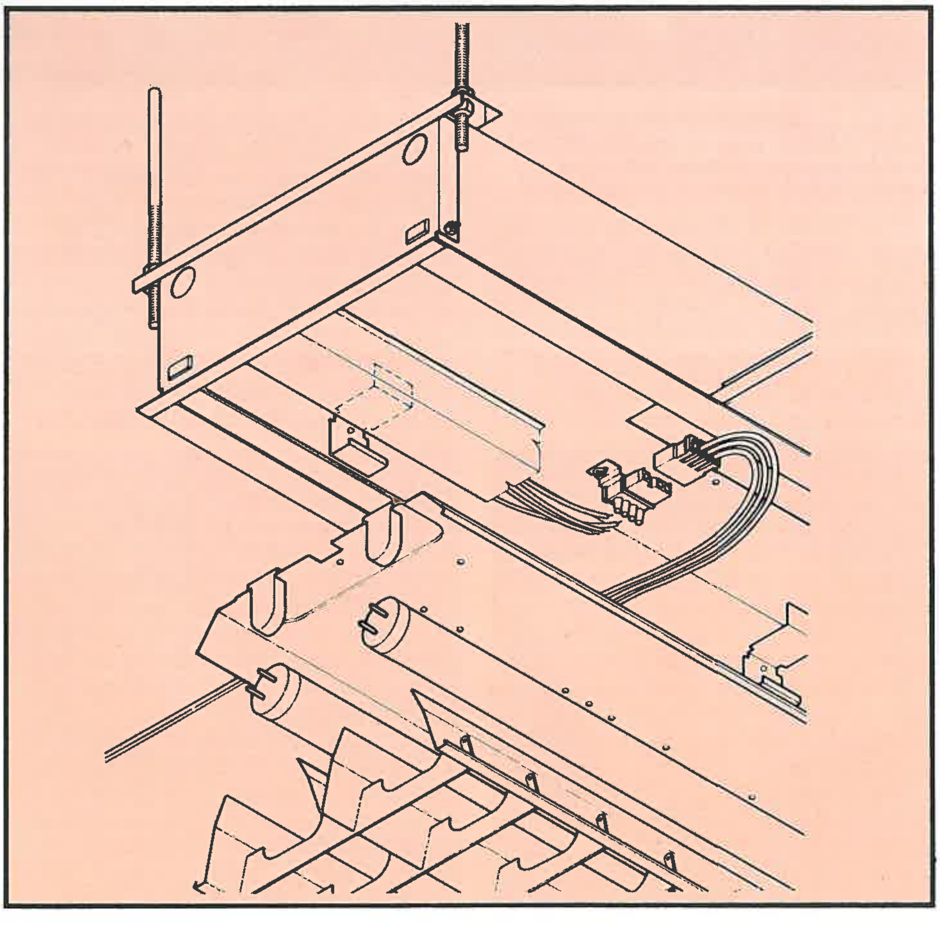
Lighting body support bridges facilitate quick erection and alignment and also impart rigidity to the system.

A range of air supply grilles was developed as an integral part of the system and has new wide spread characteristics to improve mixing of conditioned air with room air.

Special air deflectors and air straighteners can change supply air directions to avoid room obstacles. These can be fitted, transferred, reversed or removed at any time during or after installation.

Grille fixing by wishbone springs gives ease of access to optional dampers, deflectors and straighteners.

The in-line, fully integrated lighting, air exhaust and air supply facility system is designed for BS 4533/IEC 598 and full safety mark.



Harry Blackhurst

2D, The Lamp of the Future, Now

This 'monopump' machine in THORN EMI'S factory at Enfield turns out a million 2D lamps a year, but even so it is having difficulty in keeping up with the demand for these lamps.

Mr Blackhurst is Marketing Manager, Market Development for THORN EMI Lighting Ltd.

Just over a year ago two articles appeared in 'Lighting Journal' announcing the development of a new light-source, the 2D lamp, and discussing the likely effect it would have on domestic lighting and especially on the design of luminaires. The 2D lamp had then only just emerged from its laboratory stage and supplies were limited, but it aroused immediate and considerable interest; both users and fittings manufacturers saw great possibilities, particularly in the domestic market, but also for other applications, such as continuously operating situations like hotel corridors, where lamps are in constant use day and night. The short life of a filament lamp necessitates frequent replacements; indeed, in such conditions each lamp has to be replaced three times a year.

Today, new high speed manufacturing plant has been installed in the Thorn factory at Enfield and a regular supply of 2D lamps is assured. Many of the THORN EMI fittings that were in an early stage of development a year ago are now available and others have been added to the range. Also a number of other companies are making and selling fittings designed around the 2D lamp.

Why a new lamp?

The reasons for the development of the lamp were thoroughly discussed in the earlier articles, but it is not out of place to review them here. It has long been realised that the ordinary filament lamp, although it is easy to install and replace, and has colour-rendering properties which we are all used to, has a number of disadvantages. The most important of these are its short life compared to that of discharge sources and its low luminous efficiency (efficacy). It is well known that light only accounts for less than 6% of the total power consumed, all the rest is lost as heat, so that one might even consider the light as a by-product of what is in fact a heating device. One result of this is that the bulb itself gets very hot, as anyone who tries to handle a lamp that has just been switched off knows, and this poses problems for the fittings manufacturer, who has to use heat-resisting materials or else space his lampshades or diffusers a safe distance from the hot bulb.

Advantages of heat reduction

The 2D lamp is, in fact a type of discharge lamp and radiates about 20% of its total power in the form of light.

This means that not only is the 2D lamp more efficient than a filament lamp, but since far less heat is produced for a given amount of light, the 'bulb' runs cool; an enormous benefit to the fittings manufacturer who can now produce unusually compact and elegant designs, putting heat sensitive materials, if necessary, quite close to the lamp. In addition, a life of 5000 hours reduces the frequency of lamp replacement,

2D, The Lamp of the Future, Now

The top picture shows the THORN EMI range of fittings for 2D lamps while below is pictured the latest addition to the range, a dust and jet-proof vandal resisting fitting specially designed for local authority use.

which is always a nuisance even in domestic situations, and can be costly in a large commercial installation. The 2D lamp has come to stay and is, perhaps the first step in ousting the familiar filament lamp from its paramount place in domestic lighting.

Although the advantages listed above are common to all discharge lamps, the 2D lamp has special qualities that make it suitable for use in domestic commercial and hotel applications. These are its compact shape and the pleasant quality of the light it emits. Ordinary lamps especially fluorescent tubes can be an awkward shape for the situation and can be glaring and unpleasant unless they are built into a room. The great majority of people light their homes by means of lamps in pendant fittings, or floor or table standards. Built-in lighting is a luxury that necessitates designing the room around it.

Use in existing fittings

The small compact 2D lamp can be used in existing floor and table standards without altering their appearance as well as lending itself to the design of a whole new range of amazingly slender pendants, wall and ceiling mounted luminaires and floor and table standards. Although there are quite a number of quite acceptable fluorescent tubes today, giving colour rendering that it is difficult to distinguish from daylight on one hand and from filament lighting on the other, a number of people still think of this lighting as being somewhat harsh.

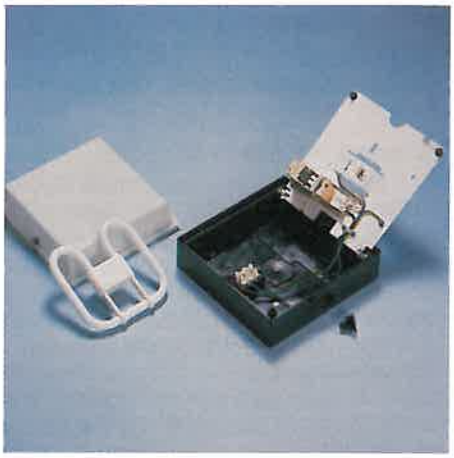
The phosphors used in the 2D lamp overcame this problem by producing a colour of light very close to that of a filament lamp and therefore one which because of its warmth, is very acceptable in home, hotel, club and commercial premises.

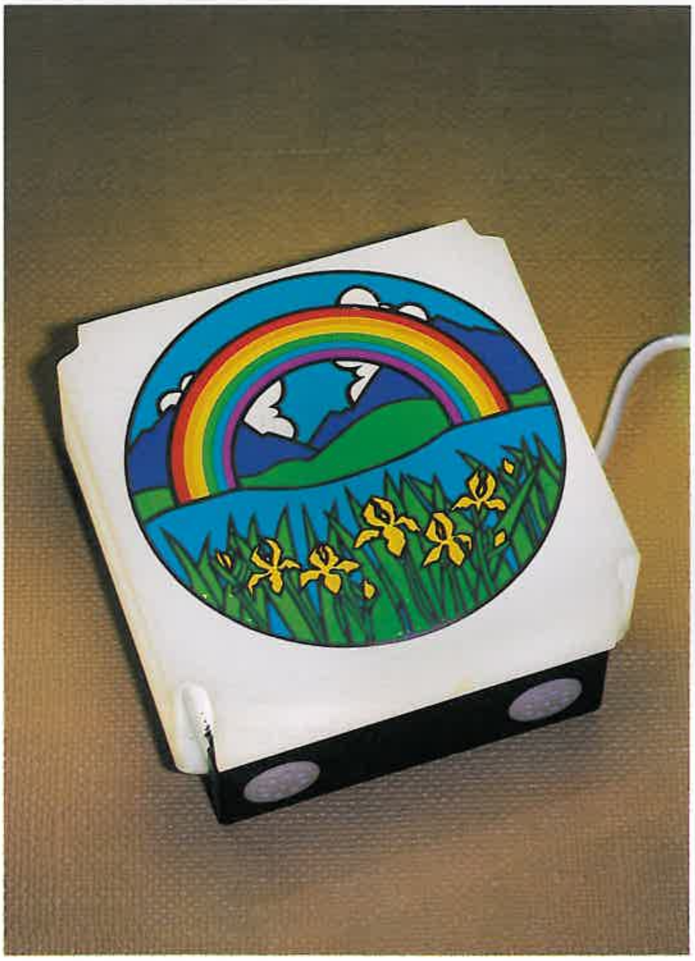
Advantages of the 2D shape

The 2D is not the only fluorescent tube specially designed for this market, but it is undoubtedly superior to most other manufacturers' products of this nature. This is almost entirely due to the shape into which the tube is bent giving it use benefits in luminaire design with the advantages detailed above. The technical difficulties of bending the tube were very considerable; for instance it has to be done with the phosphors already coating the inside of the tube. Only THORN EMI has attempted and succeeded in doing it in this form and the prospects for using the unique features of 2D lamps in future products are very exciting indeed, especially as, unlike those made by some other companies, they can be used in any position without loss of lumen output.

Designs by other fittings manufacturers

Perhaps the most convincing argument in favour of the 2D lamp is that other companies are making fittings to take it. some of these, as are the Company's own fittings, are very ingenious in design and make full use of the size and shape of the lamp and of its cool running properties. Some of them are illustrated as well as our own designs.





Four 2D luminaires designed by other manufacturers. At the top is a luminous sign by 'Crylic', beside it a desk-lamp by Anglepoise shown in three positions, and below left decorative acrylic fittings by Kappa Instruments. The surface-mounted fittings by Marlin, below them have the sophisticated simplicity associated with that Company's designs.

Choke, starter and adaptors

One of the problems when designing the lamp was to decide where the choke and starter switch should be put. It was a natural decision to house the starter and its radio suppressing capacitor in the lamp itself in the central contact assembly but it was realised that to build a choke into the lamp would not be a good idea, since this would result in a heavy and bulky device. Perhaps more importantly, the choke, which can be expected to have at least a ten year life, would be thrown away when the lamp came to the end of its own life, so that with continuous lamp operation this would mean disposing of a ten year component after only two years. As a result, the choke controller is supplied either embodied into a luminaire or in the convenient form of an adaptor which plugs readily into most table and floor standards. Other forms of adaptor are made which house the choke in the extended ceiling rose and one for the future is the so-called "chug" which combines the functions of a 13 amp plug and choke to control 2D lamps in specially constructed portable luminaires.

An important 'breakthrough'

Tungsten filament lamps have changed very little since the '20s when the gas-filled lamp superceded the vacuum type with its long 'squirrel cage' filament. The 2D lamp is the first major breakthrough in the compact lamp field since that date and the relative improvements to both life and light output are far greater than any made to the filament lamp since then, not excepting the tungsten halogen types which seem to be the last word in filament lamps.

Certainly, with the immense potential open to the 2D lamp in innovative lighting in many use areas, it can truly be called the lamp of the future.

Paul Vine and Clive Walker

The Vivatronic Starter – reliable starting

Mr Vine is Product Manager, Fluorescent Lamps, and Mr Walker is Liaison Engineer at the company's Spennymoor Gear Factory.

The conventional choke and glow starter are shown at the top. Because of the possibility of overload due to sticking starter contacts the choke is bulkier than that used with a 'Vivatronic' starter designed specifically for T8 lamps shown with the slimmer and lighter choke that can be used with it.

For many years there have been two basic methods of starting fluorescent lamps, the well-known starter-switch and various 'quickstart' circuits. Over the years, the glow-starter was developed and improved so that it superseded all other types of starter switch, and today it is the most widely used method of starting. But it is not without its problems; if a lamp is faulty and will not strike, perhaps because it is at the end of its life, the starter switch will keep on trying to start it. The resultant flashing is not only annoying but also reduces the life of the control gear. If the starter operates too quickly (a common fault with starters at the end of their life) then, although the lamp operates and nothing seems to be amiss, the life of the lamp will be dramatically reduced.

Switchless starts

To overcome these and other problems, quickstart, semi-resistant start and similar circuits were introduced. These did away with the starter switch completely and hence eliminated the problems, but not without cost. The control gear became heavier, costlier and consumed slightly more electricity. Despite these minor disadvantages, industry and commerce were quick to adopt these new switchless start circuits. In a few years, the SRS (semi resonant start) circuit became synonymous with reliability and quality and was widely used in the UK, although less in other parts of the world.

A new range of fluorescent tubes

Technology does not, however, stand still and the last two years have seen the introduction of two new ranges of fluorescent lamp with improved performance. The new lamps have a smaller diameter (1" = 26mm) than standard fluorescent lamps (1½" = 38mm) and have a different gas filling of krypton rather than argon. The lighting industry refers to them as T8 lamps and the conventional type as T12. In addition to better colour-rendering and increased light-output, these tubes consume less energy than their fatter brothers of the same length, and they also permit designers to slim down the size of their luminaires.

The lengths of lamps available, and the pins at the end have been chosen so that they are identical to conventional lamps and can be used to replace them. But there is a snag. Whilst the new slim lamps will operate perfectly in switch start circuits, they will not do so in starterless circuits such as SRS.

The need for electronic starters

The best lamps could not be used with the best circuits; clearly something had to be done. What was needed was a switch-start device that had the reliability and performance of starterless circuits. The answer, as in many things these days, lay in electronics.

Most electronic "whizz-kids" could invent a device that would apparently start fluorescent lamps without trouble. The difficult part is to ensure that the starter will do its job reliably under a wide range of conditions without reducing the life of lamps or control gear. This demands considerable knowledge of lamp and gear characteristics and performance and must be backed up by extensive research and development. The final performance must then be confirmed by trials and life tests. This is, of course, what we have done, and it did not take long before a device was invented that overcame the need for earthed metalwork in close proximity to the lamp and that would reliably start all tubes from 600mm to 1800mm. That alone would have been

At the top of the page can be seen the familiar 'Clipper' and 'Pop Pack' fittings with both T12 and T8 lamps. While at the foot of the page is the new 'Formula 1' range, designed exclusively for T8 tubes and housing the slender choke and the new 'Vivatronic' starter.

excellent news, but better still, the new starter will operate both conventional T12 and the new T8 lamps.

The new starter, which is called the universal vivatronic, and has the catalogue number G 69577, will last the life of the fitting. It can be incorporated into the fitting, because it is so reliable there is no need to make it replaceable like an ordinary glow-starter. This has the further advantage that the control gear can be optimised to match the characteristics of the starter and hence bring further benefits to the user. It is enclosed in a rectangular polycarbonate box and can be mounted inside the luminaire with the choke.

Not surprisingly this new starter has so much to offer that it will feature in most of the fluorescent luminaires offered in our catalogue.

The advantage of the completely electronic starter can be illustrated by reference to the latest editions of British Standard specification BS4533: Part 101: 1981 'Luminaires and International Standard IEC598 Part 1 1979 'Luminaires' which recognise that 'starters with moving contacts' can give rise to abnormal (high current prestart) circuit conditions whereas, by inference, starters without moving contacts, e.g. Vivatronic, cannot.

How the Vivatronic Starter affects the user

Compared to conventional switch-start circuits the Vivatronic offers far greater reliability and life. The starter need not be replaced at every second or third lamp change. Because starter failures are eliminated, the life of lamps and control-gear is improved and the annoying flashing which occurs at the end of the lamp's life, with its destructive effect on control gear also vanishes, as well as the fault conditions consequent upon the contacts of a glow starter welding together.

These are the advantages to previous users of switch-start circuits. What about SRS and the other "quickstart" circuits normally chosen for their maintenance-free life and reliability? That has not changed; the new vivatronic circuit is ultra-reliable and requires no maintenance.

However, the control gear needed in the new circuit is simpler than that in "quickstart" circuits and it dissipates less energy. This makes the complete circuit more reliable and saves energy (and hence running cost). Furthermore, the weight of the control gear and the amount of heat generated are reduced. This helps to keep the size and weight of fittings down.

The new Vivatronic electronic starter is without doubt a major advance in fluorescent lamp technology. If you understand electronics, then the "How it Works" section in this article will impress you and convince you. If not, then all you need to know is that THORN-EMI Lighting has produced it after considerable research and development, and we would not be adopting it on such a massive scale unless we were 100% certain that it offered the best solution for our customers' needs.

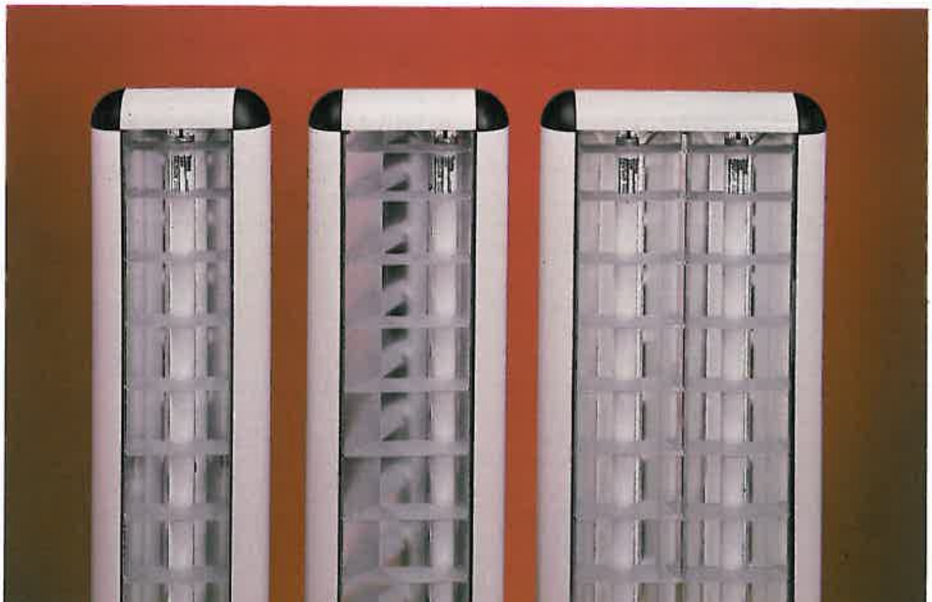
How it works

It is well known that a starter switch must first allow current to flow through the lamp cathodes in order to ionise the gas filling of the tube, and then, by interrupting the flow of current through the choke, to induce a high voltage to start the arc. The switch must then go out of circuit, leaving the choke to control the current in the arc. The design of the circuitry must ensure that the three events take place in the right manner and sequence and for the correct duration of time for each event.

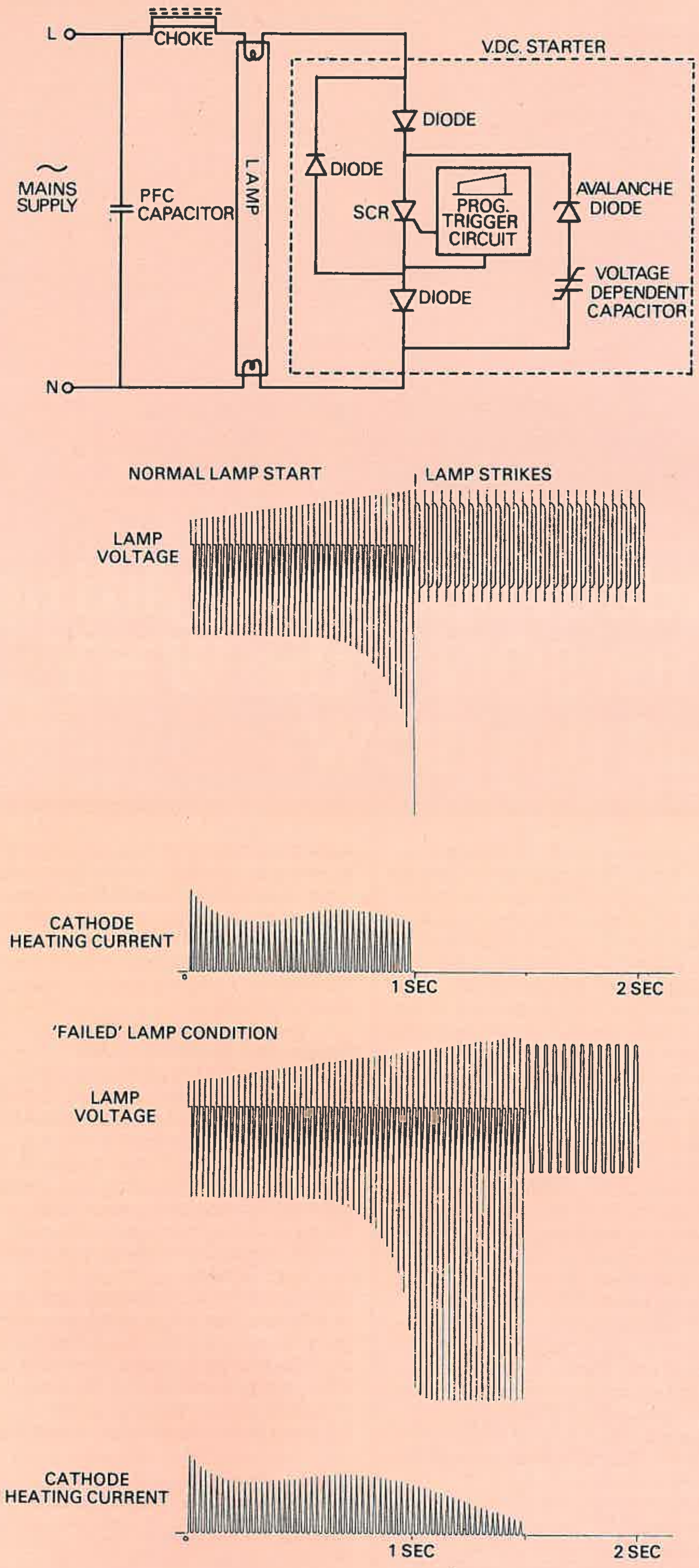
The use of a voltage dependant capacitor

The operation of the new starter is based on the properties of a voltage dependent capacitor (V.D.C.). This is a non-linear dielectric element and, as the voltage across it is increased, its capacitance changes from a high to a low value. This reduction in capacitance is accompanied by a rapid fall in current through the device and when it is connected in series with an inductor supplied from an alternating source, a high voltage pulse is generated.

This property may be used to advantage in inductively ballasted fluorescent lamp circuits, the mechanism of pulse production being similar to that of conventional glow switch starters. However, unlike the glow starter, the VDC alone does not provide sufficient cathode heating



The Vivatronic Starter — reliable starting



LAMP VOLTAGE AND CATHODE HEATING CURRENT FOR NORMAL START AND FAILED LAMP CONDITION — V.D.C. STARTER.

current. It suffers also from the disadvantages that the change in capacitance occurs at voltages below normal lamp burning levels and that the voltage applied to the VDC must be reversed in order to 'reset' the device.

Circuit details:

Circuits which resolve the problems associated with the practical application of VDC's are well known but in all previous examples the inclusion of two active switching devices has been necessary. The new Thorn circuit, however, utilises only one switching device, viz. an SCR, together with a diode steering network. The basic circuit is illustrated in Fig. 1 and is the subject of British Patent Application 8222651.

Briefly, on positive half cycles of the supply voltage, the VDC is connected in parallel with the SCR which provides a unidirectional cathode heating current and performs the resetting function. On negative half cycles, the VDC is connected in series with the SCR to produce a high voltage pulse during starting and inhibiting this effect when the lamp is running.

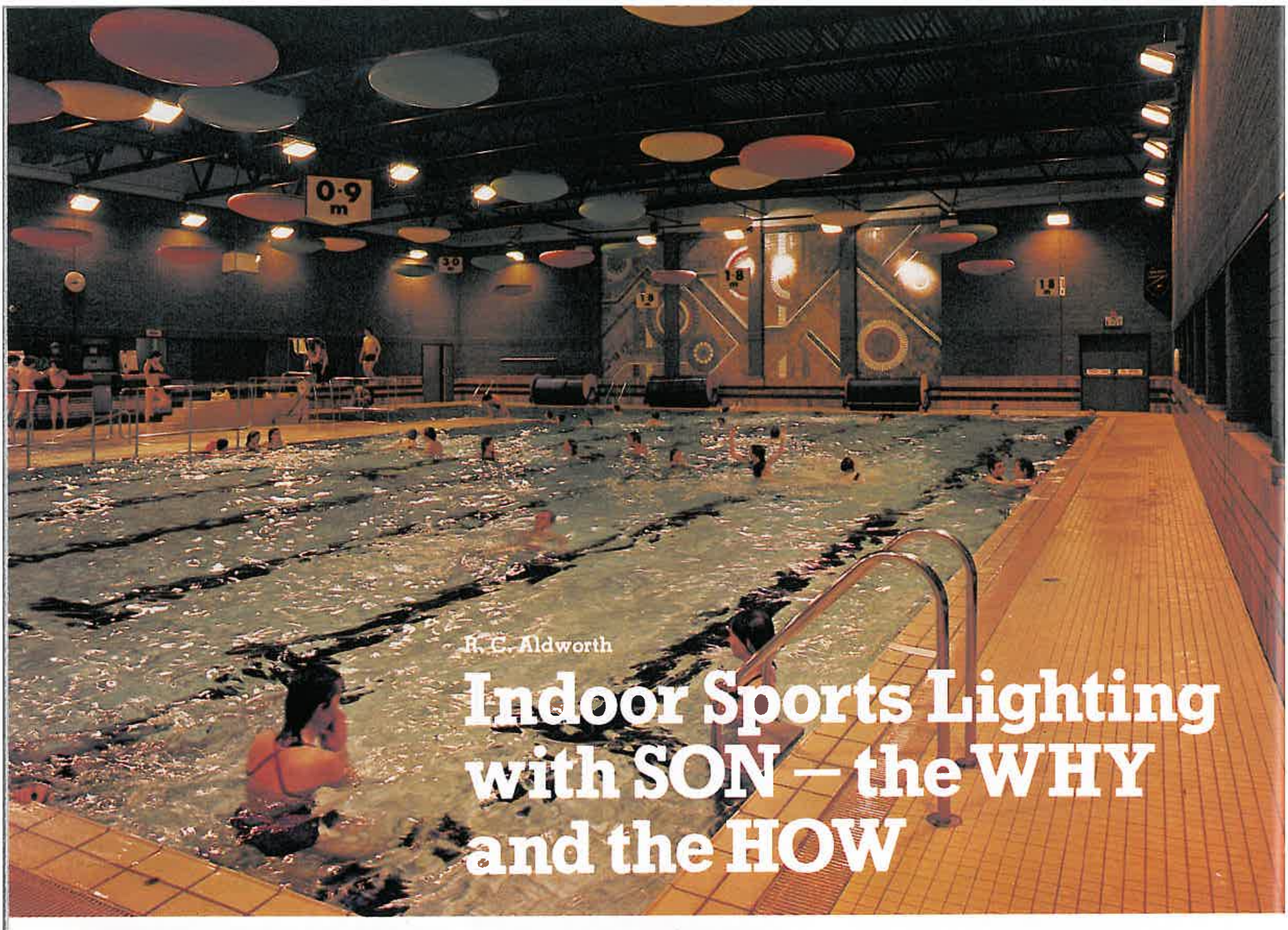
Suppression of initial starting voltage

A 'progressive' type of trigger circuit is employed, similar to that of the Vivatron 5 described in Lighting Journal 19 (Summer 1978).

By applying a progressively increasing reset voltage to the VDC, the trigger circuit allows the starting voltage envelope to be 'tailored' as illustrated. This feature eliminates cold starting (which causes end blackening and short lamp life) by suppressing the initial pulse voltage applied to the lamp for approximately one second. Thereafter, starting voltage pulses are generated at the rate of one per mains cycle and are terminated, together with the cathode heating current, when the lamp strikes or after approximately 1.5 seconds in the event of lamp failure.

Upon introduction of a new lamp, the starter will automatically repeat its ignition cycle.

The basic circuit of the 'Vivatronic' starter is shown at the top of this page. Voltage and current data appears below.



R. C. Aldworth

Indoor Sports Lighting with SON – the WHY and the HOW

Mr Aldworth is manager Lighting Research and Development at the THORN EMI Laboratories at Enfield.

WHY a particular lamp is selected in preference to other light sources has to do with its characteristics.

HOW it is used has to do with the lighting design problems posed, and the luminaire in which the lamp is placed. Good lamps only provide good lighting when the design of the installation receives the attention it deserves.

The High Pressure Sodium lamp was introduced more than sixteen years ago as an alternative to the colour-corrected High Pressure Mercury lamp for street lighting. The arc tube was enclosed in an outer bulb with a diffused coating in order to make the SON/E lamp photometrically compatible in street lighting lanterns originally designed for the MBF lamp.

The electrical characteristics of the SON lamp are quite different from those of the mercury lamp and although special versions of SON lamps were introduced to run at lower wattage on existing MBF control gear, it is fair to say that the lamp has shaken off the limitation of being a replacement for mercury lamps and is now firmly established as a major light source in its own right, giving high efficacy, long life and acceptable colour.

Not long after its street lighting début, the SON lamp was adopted for exterior floodlighting applications as well as for interior industrial lighting. Over the past ten years, there has hardly been a single issue of the Lighting Journal which has not chronicled the latest extension to the range, which now include lamps with clear tubular and reflector outer bulbs, and extensions to the range of wattages, which is now from 50W to 1000W ratings.

Latest developments include the SON/S type, which has been introduced in the 150W rating giving a 10% increase in efficacy. The only change required to operate the 'S' lamp on the standard SON circuit, is to replace the original ignitor. Then, of course, there is the improved colour 'De-luxe' (DL) version available in 150W to 400W with both elliptical and tubular outers, which runs on standard control gear, giving a colour rendering index of 70 (compared with a CRI of 30 for standard SON) with less than a 20% reduction in efficacy.

These developments are extending the range of lighting applications still further, and the object of this article is to show how the standard SON elliptical lamp has proved more than acceptable for indoor sports areas.

The Thornbury Sports Centre in Northavon which caters for a wide range of sports and social activities within the district is just one example of many successful installations of this type. Apart from specialised areas, such as squash courts and weight training rooms, the four main areas are the Sports and Projectile Halls, the Swimming Pools and the Indoor Bowling Green.

Sports and Projectile Halls

The main 700 sq. metre sports hall uses a conventional layout of Hi-pak industrial reflector fittings with 400W SON/E lamps. The mouth of the reflector, fitted with a wire-guard, is suspended level with the underside of the roof trusses, at 6m above the floor. At a spacing to mounting height ratio (S/Hm) of approximately 1:1, the installation provides an average horizontal plane illuminance of 600 lux. The hall is used as a multi-purpose sports hall, including such activities as Badminton, Basketball, Five-a-side Football and Hockey. Additional power points in the lighting trunking are also available

Even when the Thornbury swimming pool is in use and the water turbulent, it is possible to see the lines on the bottom, as can be seen above. Opposite, the pool is shown empty of people and in the still water the small areas of reflected light can be clearly seen. The graph below it shows how reflectance and penetration of the light into the water varies with the angle of incidence, while the drawing at the foot of the page shows the special louvres and stirrup attached to the standard THORN EMI Area Flood.

Indoor Sports Lighting with SON — the WHY and the HOW

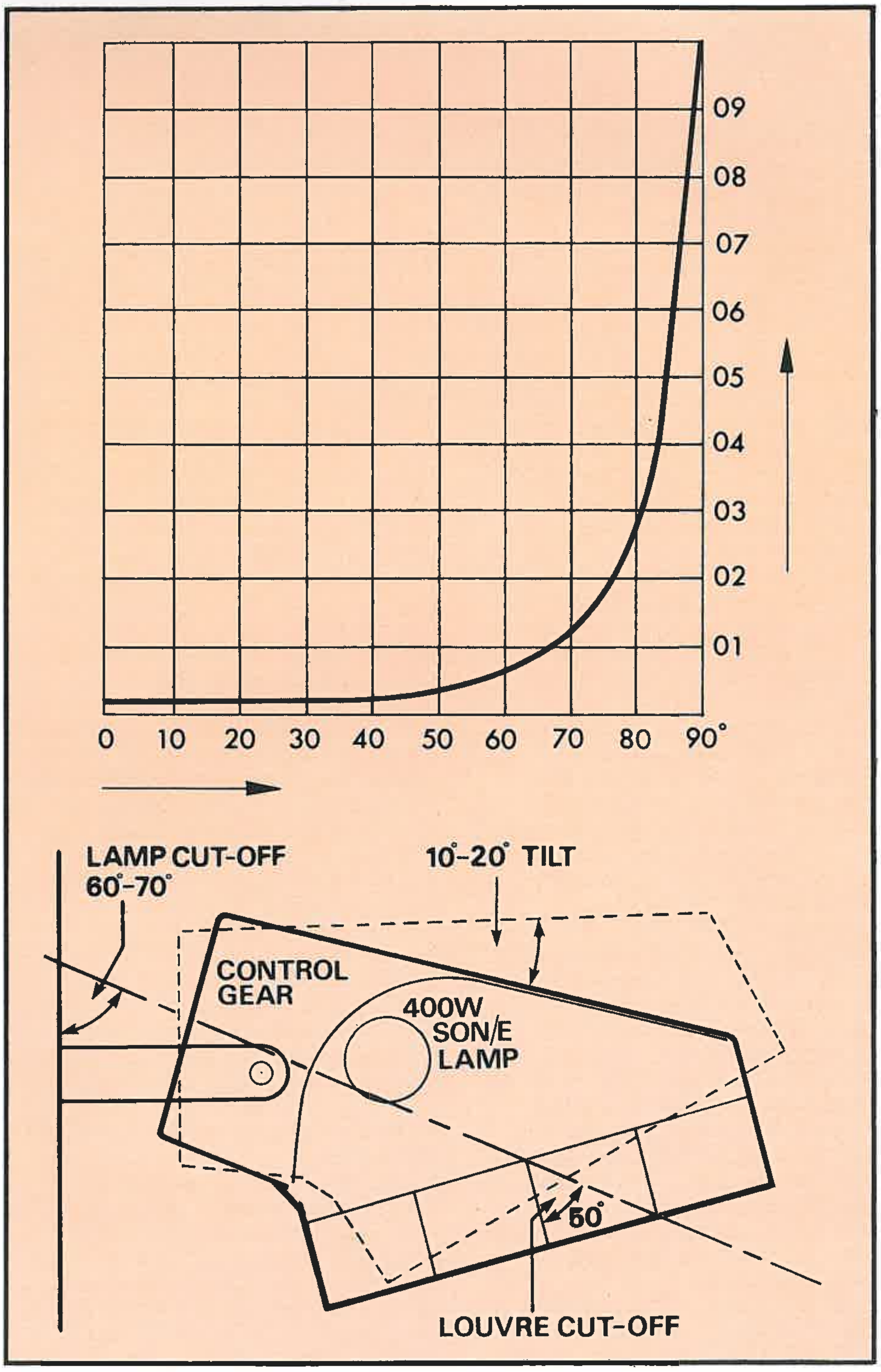
for special boxing ring lighting and temporary stage lighting. For these occasions, when the hall serves as an auditorium or as an exhibition area, "house lights" are provided by five 1,000W tungsten halogen floodlights on dimmer control, installed on the two outer runs of trunking. With this dual system, the benefits of high pressure sodium lighting are achieved for the majority of the time when the hall is used for sporting activities, and the less efficient, but more flexible, tungsten halogen system is available when special facilities are required.

The lighting of the 270 sq. metre Projectile Hall, which is used for gymnastics, archery, golf and cricket, is identical to the main installation in the adjoining sports hall. No special protection from impact damage is required for the lighting equipment, as golf and cricket practice areas are enclosed by netting.

Swimming Pool Hall

The available mounting height in this area at 5m is slightly lower than that in the sports halls. The 24m × 30m area includes three linked pools: a 25m × 6 lane competition pool, varying in depth from 0.9 to 1.8m, a 0.6m deep learners pool, and a 3m deep diving pool.

The primary objective of swimming pool hall lighting is safety; the pool attendant must be able to see a swimmer in difficulty clearly, and secondly, the lighting must provide a pleasant and visually comfortable environment for the swimmers, both in the water and when standing on the pool side. It is particularly difficult to achieve these aims when the mounting height is limited, particularly when access for maintenance purposes dictates that the luminaires cannot be mounted over the water. This means, in the case of the main pool, that rows of lighting equipment at a height of 5 metres will be 15m apart, i.e. a S/H ratio of 3:1. To achieve an average horizontal illuminance of 500 lux with acceptable uniformity, a directional floodlight must be used, but there is a risk that intensities at high angles will be reflected as high brightness images on the surface of the water. The graph shows the percentage of light reflected at the water surface with increasing angles of incidence and, as can be seen, at angles above 70°, the reflectance increases rapidly resulting in very high brightness of any reflected images of the lighting equipment. As more light is reflected



A game of hockey in progress in the main hall. It is just possible to see the auxiliary system of tungsten-halogen floods at the sides of the hall.

at the surface, so less light enters the water. This results in a combination of high water surface and low pool basin luminance which gives the worst possible viewing conditions for anyone on the pool side requiring to see a submerged swimmer in difficulties. The direct glare from the lighting fittings is less significant in this case as the observer tends to be looking below the horizontal, but direct glare can be a source of annoyance and discomfort to the swimmers.

The design solution in this hall was to use 400W SON/E lamps in adjustable Area Floodlights with fibreglass bodies to withstand the humid and corrosive atmosphere in the Pool Hall. The floodlight is fitted with integral control gear which simplifies both installation and maintenance. The standard floodlights were fitted with special 'Zintex' louvres, painted white, to control both the reflected and direct glare. As can be seen from the diagram, the louvre is designed to give total bare lamp cut-off at 50° but as the front glass of a horizontally mounted unit is at an angle of 30°, this cut-off would only be achieved at 80° above the downward vertical. From the graph this would give a water reflectance of 30%, which is too high, and therefore the Area Floodlights were mounted on adjustable stirrups allowing the unit to be tilted downwards by 10° to 20° so that the brightness of any object would be reduced to 7% at the lower aiming angle.

From the illustrations it can be seen that by using the compact High Pressure Sodium floodlight, the areas of water in which reflected images occur are small and the excellent light penetration into the water is indicated by the lane markings on the tiled pool basin being clearly visible over the entire area, even when disturbance of the surface spreads the area of reflections; the real test of the installation.

As far as direct glare is concerned, it could be argued that the use of high reflectance finishes on the walls and ceilings of the hall would improve visual comfort. However, high luminance of these surfaces would add to the veiling reflections in the water and would therefore be counter-productive. Part of the success of this installation is due to the choice of fairly dark finishes on the interior surfaces of the hall. The brightly coloured acoustic discs suspended over the water add visual interest to the interior without their area or luminance adding significantly to the problem of veiling reflections.

During the day large areas of glazing are a common source of veiling reflections in many indoor pools and the effect of these reflections cannot be reduced by the use of artificial lighting, either in the pool hall or under-water. At the Thornbury pool, the window size has been carefully designed to give the swimmers visual contact with the outdoor scene without admitting views of high sky brightness. In this way excessively high luminance reflections in the water are avoided.

Bowls Hall

The second phase of the sports centre development included the construction of an indoor six-lane bowling green of nearly 1000 sq. metres, which covers 85% of the total floor area. An average horizontal plane illuminance of 600 lux was required over the green with the highest possible degree of uniformity. The layout of the lighting had to be related to the six lanes so that the lighting could be switched in lanes if necessary, and the mounting height was fixed at 3.75m.

Neither the Hi-pak nor Area Flood used in the sports hall and swimming pool provides a suitable intensity distribution to meet these lighting design requirements, and therefore, the Lo-pak reflector was selected using the horizontally mounted 250W SON/E lamp. In its basic form, this luminaire provides a pronounced "batwing" distribution which is ideal for providing good uniformity of illuminance at wide spacings, and low mounting heights with S/Hm ratios approaching 2:1.

The lane widths and mounting height resulted in a S/Hm ratio of 1.14:1 which gave unacceptable diversity of illumination.

Once again, the answer was provided by fitting white painted louvres, not to control glare but to modify the intensity distribution to improve the uniformity. The final layout of six rows of twelve Lo-pak fittings, can be seen in the photograph, and achieved a mid-point ratio of 0.88. Maximum illuminance at the centre is only 20% above the average value and only within 1m of the extreme edges of the outer lanes does the illuminance fall below 80% of the average value. This variation is inevitable with a regular layout of lighting points where additional equipment cannot be placed outside the area over which a high degree of uniformity is required. In spite of these variations, the visual effect given by the installation is of very even illumination.

Conclusions

In all four installations, the High Pressure Sodium equipment has been connected over the three phases of the supply to reduce stroboscopic effects on moving objects.

For the users of these facilities, the SON lamps provide a warm golden white light, which provides a pleasant atmosphere throughout the activity areas and the selection of suitable luminaire types and layouts achieve a high degree of visual comfort, in spite of the use of high brightness, high efficacy discharge lamps.

For the Management of the centre, the use of the SON lamp has provided a cost effective installation with low energy and maintenance costs.

The lighting design was carried out by Module 2 Limited, design and management consultants for the Northavon District Council in collaboration with Tom Fairhurst of THORN EMI Lighting's Cardiff office.

The evenness of the lighting of the bowling green, achieved by the use of THORN 'Lo-Pak' fittings with special louvres to spread the light is clearly shown in this picture.

Dans cette édition

THORN ASSURE L'ECLAIRAGE DE TROIS STADES AUX ETATS-UNIS **3**
Peter Bleasby

Cet article décrit la réussite de l'éclairage de trois grands stades au moyen de projecteurs à haut rendement. Ces stades sont le Metrodrome Hubert H. Humphrey, à Minneapolis, le Soldier Field à Chicago et le Shea Stadium, à New York, le siège de l'équipe de baseball New York Mets. Chaque stade posait un problème différent, mais dans chaque cas, on a pu réaliser un éclairage meilleur et plus intense pour un coût réduit.

Le stade de Minneapolis est une enceinte offrant 63,000 places assises, recouverte d'une toiture à double paroi en toile gonflable, de 183 m de longueur sur 244 m de largeur et 58 m de hauteur. La structure solide la plus haute pour la pose des projecteurs est en haut du mur en béton qui supporte cette toiture, mais ceci est relativement bas et peut provoquer un éblouissement pour les spectateur, Il était impossible de monter les projecteurs sur la toiture de toile et, par conséquent, on a installé des cintres en treillis d'acier montés en haut du mur en béton. Quatre cintres de 22 m ont été utilisés de chaque côte du stade et deux de 17 m à l'extrémité opposée au tableau d'affichage des résultats, chacun supportant entre 40 et 80 projecteurs THORN ON 1500 abritant des lampes aux iodures métalliques à double extrémité MBIL de 1500 W. Des éclairements de 1600 à 2900 lux ont été obtenus.

Le stade de Soldier Field, à Chicago, est un stade de plein air construit de la manière classique avec colonnades de chaque côte. Il offre 65,000 places assises et, entre autres, est le siège de l'équipe de football Chicago Bears. L'installation d'origine se composait d'appareils à incandescence complétés par quelques projecteurs produisant 800 lux pour une puissance installée de 1000 kW. Les projecteurs devaient être montés sur les colonnades, à une hauteur de 32 m au lieu des 49 m recommandés normalement, de sorte que l'éblouissement pour les spectateurs posait un problème sérieux. On avait suggéré des projecteurs symétriques à faisceau étroit, mais le projet THORN, utilisant les projecteurs à iodures métalliques ONN 1500 W, offrait la meilleure solution à cause de la coupure marquée de leurs réflecteurs internes secondaires. Comme ceux-ci étaient montés sur la structure en acier existante, les frais d'installation et d'entretien étaient très raisonnables; on a pu obtenir des éclairements allant jusqu'à 1800 lux.

L'un des problèmes rencontrés au Shea Stadium de New York était dû aux chutes de tension d'alimentation qui se produisent à cause de l'utilisation de la climatisation en plein coeur de l'été coincidant avec les périodes de forte assistance aux matches de baseball. La lampe CSI à réamorçage à chaud offrait la réponse évidente à ce problème. Le stade semi-circulaire, de 213 m de diamètre a une capacité de 55,000 personnes. Sur la toiture, à 46 m au-dessus du niveau du sol, on a installé une passerelle continue pour les groupes de projecteurs. En plus de sa capacité de ré-amorçage immédiat, et non après plusieurs minutes, l'efficacité de la lampe CSI a rendu intéressant du point de vue financier le changement d'éclairage. L'installation précédente, une combinaison de projecteurs tungstène-halogène de 1500 W et de projecteurs au mercure de 1000 W consommait 2200 kW et était très coûteuse à entretenir, de sorte que l'éclairement sur le terrain était à peine supérieur à 1100 lux. La nouvelle installation de lampes CSI a permis une économie de plus de $200,000 par an et a multiplié par deux l'éclairement. elle est conforme au nouveau cahier des charges Nord-Américain IES pour la couverture des principaux sports par la télévision. On a bénéficié d'un avantage imprévu, en ce sens que les faisceaux concentrés avec précision des lampes CSI ont amélioré le contraste sur les écrans géants de télévision connus sous le nom de DiamondVision, caractéristique principale de tous les grands stades américains.

LA LAMPE SON DANS LA CITÉ DE WESTMINSTER **11**
Nigel E. Pollard

M. Pollard est l'ingénieur en chef de l'éclairage public pour le Conseil Municipal de la Cité de Westminster. La Cité de Westminster fait partie de la région du Grand Londres; on y trouve le Parlement, l'Abbaye de Westminster, le Palais de Buckingham et les Parcs royaux.

Les normes d'éclairage dans la Cité de Westminster sont très élevées. Elles comprennent l'emploi de sources lumineuses offrant des propriétés acceptables de rendement des couleurs. Jusqu'au lancement de la lampe SON, cette solution était de plus en plus coûteuse.

Vers la fin des années 1970, la quantité totale d'électricité utilisée sur la voie publique était d'environ 3,500 kW. Ceci a déjà été réduit à 2,700 kW et tombera finalement à 2,000 kW, sans aucune diminution des normes. En fait, dans certains cas, les améliorations se feront tant dans la qualité de l'éclairage que dans l'aspect esthétique et on pourra réaliser une économie financière de 150,000 £ par an.

Les lampes incandescentes dans les quartiers prestigieux comme Trafalgar Square, Whitehall et le Strand ont été remplacées par les lampes SON, une lampe à atmosphère gazeuse de 1,500 W cèdant généralement la place à une lampe SON de 400 W, ce qui représente une économie d'énergie de plus de 1,000 W par poste. Deux ans après, de nombreux appareils d'éclairage fluorescent ont été remplaces par des lampes SON individuelles, produisant non seulement une économie d'énergie, mais de plus améliorant l'éclairement grâce à l'emploi d'appareils d'éclairage plus efficaces qui, sont également plus faciles à nettoyer et à entretenir.

Dans certains quartiers, les lampes MBF ont été remplacées par des lampes SON et, dans les rues pleines d'arbres de Paddington et Marylebone, par des lampes au sodium basse pression (SOX), sans aucun inconvénient apparent, car le meilleur rendu des couleurs semble compenser une légère réduction de la lumière. L'emploi des lampes SON de Luxe est envisagé pour l'avenir dans les squares et les jardins publics de la municipalité.

LA LAMPE 2D, AUJOURD'HUI, LA LAMPE DU FUTUR **18**
H. G. Blackhurst

Il y a juste un peu plus d'un an, la lampe THORN 2D sortait à peine du laboratoire; aujourd'hui, elle est en pleine production et, on a créé pour elle un certain nombre d'appareils d'éclairage tant chez THORN que chez d'autres fabricants. Cette lampe a été conçue pour remplacer la lampe incandescente au tungstène dans les situations où cette dernière a régné sans concurrence. Grâce à sa durée de vie beaucoup plus longue et à sa plus grande efficacité, elle jouit d'un avantage initial partagé avec d'autres types de lampes à décharge, mais ses avantages principaux résident dans le fait que, contrairement à la lampe à incandescence, elle fonctionne "à froid", ce qui simplifie grandement la construction des dispositifs réflecteurs et diffuseurs, dans ses dimensions et sa forme de faible encombrement ainsi que dans le fait qu'elle puisse être utilisée dans n'importe quelle position, ce qui permet de l'utiliser sur le type d'appareils pour lampes incandescentes. On peut l'utiliser sur des lampadaires ou des lampes de table sans que ceci modifie leur aspect et la couleur de sa lumière est très proche de celle d'une lampe à incandescence. Bien que l'amorceur soit incorporé à la lampe, le ballast en est séparé; ceci offre deux avantages: on évite ainsi de rendre la lampe trop lourde et elle peut être suspendue à un luminaire. On peut récupérer le ballast après une durée de vie de dix ans, quand la lampe cesse de fonctionner. Le ballast est incorporé à l'appareil d'éclairage ou fait partie d'une adaptateur qui, dans le cas des luminaires suspendus, peut prendre la place d'une rosace de plafond. Un combiné de ballast et de fiche à 13 A portant le nom de "chug" est en cours de réalisation. La lampe 2D représente la première grande nouveauté dans le domaine des lampes simples de faible encombrement depuis le lancement de la lampe à atmosphère gazeuse pendant les années 1920. Elle a un potentiel considérable et peut véritablement être qualifiée de lampe de l'avenir.

UN AMORCEUR ÉLECTRONIQUE POUR LES LAMPES T8 **21**
P. Vine et C. Walker

Les lampes T8 de 26 mm de diamètre ont eu un effet considérable sur les marchés tant au Royaume Uni qu'ailleurs et tous les nouveaux appareils d'éclairage fabriqués au Royaume Uni sont maintenant construits pour les accepter. Malheureusement, elles peuvent seulement être utilisées sur les appareils d'éclairage existants avec circuits d'amorçage à interrupteur et, en conséquence, il y a un besoin pressant pour des amorceurs électroniques pour ces lampes.

Le nouvel amorceur THORN EMI 'Vivatronic' a été étudié pour commander les lampes T8 de 18W à 70W et T12 de 20W à 75W sans nécessité de structure métallique mise à la terre. Le chauffage de la cathode est monodirectionnel et est assuré pendant approximativement une seconde avant l'application des impulsions de tension d'amorçage au régime d'une par cycle de tension de secteur. Une panne de la lampe met immédiatement l'amorceur hors d'action jusqu'à ce qu'une nouvelle lampe soit mise en circuit. L'amorceur a été étudié pour se conformer aux nouveaux types minces de bobines d'arrêt et les centres de fixation sont tels qu'ils permettent l'acceptation immédiate dans les appareils d'éclairage existants, mais ils ne sont pas interchangeables avec les amorceurs à incandescence. Ces ensembles offrent un grand avantage, illustré par une référence à la norma BS4533 partie 1, 1979, en ce sens que, comme ils ne comportent pas de pièces mobiles, ils ne peuvent pas donner lieu à des conditions anormales de circuit de préamorçage.

LE CENTRE SPORTIF DE THORNBURY **24**
R. C. Aldworth

Peu après le lancement de la lampe au sodium à haute pression (SON), il y a seize ans, pour l'éclairage de la voie publique, cette lampe a été acceptée comme source idéale pour l'éclairage extérieur par projecteurs et pour les applications intérieures d'éclairage industriel.

Le centre sportif de Thornbury constitue un exemple récent de l'élargissement constamment croissant du domaine des applications d'éclairage pour la lampe au sodium à haute pression où elle s'avère hautement acceptable pour de nombreux autres types d'installations d'éclairage intérieur. Sa grande efficacité et sa longue durée utile la rendent évidemment attrayante, mais la chaude lumière blanche dorée produite par cette lampe crée aussi une atmosphère agréable dans les locaux publics de récréation comme ce centre sportif.

La piscine utilise des lampes de 400W dans des appareils d'éclairage Areaflood munis de jalousies de conception spéciale montés à 5 m pour produire 500 lux.

Des appareils d'éclairage à réflecteurs industriels Hi-Pak produisent 600 lux dans les salles de sports et les salles de jet et un autre ensemble de réfecteur industriel, l'ensemble Lo-Pak, a été utilisé à la hauteur de montage plus basse de 3,75 m dans les salles de boules. Là, le problème consistait à produire 600 lux avec une excellente uniformité. Ceci a été réalisé grâce à l'emploi de lampes SON de 250 W dans des appareils d'éclairage munis de jalousies en boîte à oeufs.

In dieser Ausgabe

THORN BELEUCHTET DREI STADIEN IN DEN USA **3**
Peter Bleasby
Dieser Artikel beschreibt die erfolgreiche Beleuchtung von drei größeren Stadien mit Flutleuchtenanlagen hohen Wirkungsgrads. Sie sind das Hubert H. Humphrey Metrodome in Minneapolis, das Soldier Field in Chicago und das Shea Stadium in New York City, das Heim der Baseball-Mannschaft New York Mets. Jedes Stadion bedingte andere Probleme, doch in jedem Falle wurde mehr und bessere Beleuchtung zu geringeren Kosten erzielt.

Die Stadion in Minneapolis ist eine großartige Anlage. Es Hat 63,000 Sitzplätze und ist von einem doppelschichtigen aufpumpbaren Gewebedach — Länge 183m, Breite 244m und Höhe 58m — überdeckt. Den Hlochsten festen Bereich, in dem Flutleuchten hätten angeordnet werden können, bildete der Oberrand der das Dach tragenden Betonmauer, doch war dieser nicht hoch genug, um Blenden der Zuschauer zu vermeiden. Es war unmöglich Scheinwerfer auf dem Gewebedach anzuordnen, und es wurden daher Stahlgitterträger oben an der Betonmauer errichtet. Entlang jeder Seite des Stadions wurden vier 22m lange Träger benutzt, und zwei 17m Träger an dem Ende gegenüber der Anzeigetafel. An jedem der Träger wurden 40 bis 80 Thorn ON 1500 Flutleuchten mit 1,500W MBIL Metall-Halogenlampen (doppelseitig) befestigt. Es wurden Beleuchtungsstärken von 1,600 bis 2,900 lx erzielt.

Das Soldier Field in Chicago ist ein Freiluftstadion im klassischen Stil mit Kononnaden zu beiden Seiten. Es hat 65,000 Sitzplätze und ist u.a. das Heim der Fußballmannschaft Chicago Bears. Die ursprüngliche Glühlampenanlage und die zusätzlichen Metall-Halogenflutleuchten lieferten bei einer Belastung von 1,000 kW nur 800 lx. Die Flutleuchten mußten auf den Kolonnaden angebracht werden, also in einer Höhe von nur 32m anstatt von 49m, was normalerweise ratsam ist, sa daß Blenden der Zuschauer ein ernstes Problem bildete. Es wurde herkömmliche symmetrische Flutleuchten mit engem Strahlenbündel empfohlen, doch der Thorn-Plan, der wiederum auf ONN 1,500W Metall-Halogenflutleuchten beruhte, bildete dank der scharfen Abdeckung der inneren Sekundärreflektoren die beste Lösung. Da diese Leuchten auf der bestehenden Stahlstruktur angeordnet wurden, waren die Errichtungs- und Wartungskosten sehr mäßig, und es wurden Beleuchtungsstärken bis 1,800 lx erzielt.

Eines der Probleme im New York Shea Stadium bestand darin, daß die Speisespannung im Hochsommer, also zu einer Zeit, wenn Baseball besonders populär ist, stark abnahm, was auf den hohen Einsatz von Klimaanlagen zurückzuführen war. Die Thorn CSI-Lampe für heißes Wiederzünden bildete die ideale Lösung. Das halbkreisförmige Stadion, dessen Durchmesser 213m beträgt, nimmt 55,000 Zuschauer auf. Auf dem Dach, 46m über dem Boden, befindet sich ein kontinuierlicher Laufsteg für Flutleuchten. Der hohe Wirkungsgrad der CSI-Lampen sowie der Umstand, daß sie sich unverzüglich und nicht erst nach mehreren Minuten wieder zünden lassen, gestattete es, die Stadionbeleuchtung zu wirtschaftlichen Kosten zu erneuern. Die ursprüngliche Anlage, eine Kombination von 1,500W Wolframhalogen- und 1,000W Quecksilberflutleuchten, verbrauchte 2,200kW und bedingte sehr hohe Wartungskosten. Die Beleuchtungsstärke des eigentlichen Spielfelds betrug daher wenig mehr also 1,100 lx. Die neue Anlage mit CSI-Lampen bedingte eine Einsparung von mehr also $200,000 pro Jahr und erhöhte die Beleuchtungsstärke auf das Doppelte. Sie entspricht der neuen nordamerikanischen IES-Vorschrift für Fernseherfassung bedeutender Sportveranstaltungen. Ein Vorteil, mit dem man nicht gerechnet hatte, besteht darin, daß die genau gezielten Strahlenbündel der CSI-Lampen den Kontrast auf den riesigen Fernsehschirmen — diese sind als DiamondVision bekannt und bilden ein Hauptmerkmal aller amerikanischen Stadien — verbessert wurde.

SON IN DER CITY OF WESTMINSTER **11**
Nigel E. Pollard
Mr. Pollard ist Oberingenieur für öffentlich Beleuchtung des Rates der City of Westminster. Die City of Westminster ist ein Bezirk von Großlondon, in dem sich die Parlamentsgebäude, Westminster Abbey, Buckingham Palace und die königlichen Parkanlagen befinden.

Die Beleuchtungsnormen der City of Westminster sind anspruchsvoll, und die Lichtquellen müssen u.a. annehmbare Farbwiedergabe gewährleisten. Vor der Einführung der SON-Lampe bedingte dies immer höher Kosten.

Gegen Ende der 70er Jahre betrug die gesamte Lichtnetzbelastung der Straßenbeleuchtung etwa 3,500 kW. Heute beträgt sie nur noch 2,700 kW und wird schließlich auf etwa 2,000 kW absinken. Dies wird keineswegs eine Minderung der Beleuchtungsgüte bedingen, vielmehr werden die Beleuchtungswerte und der ästhetische Eindruck in gewissen Fällen sogar besser sein. Gleichzeitig werden die Kosten um £150,000 pro Jahr abnehmen.

Die Glühlampen in prominenten Bereichen wie Trafalgar Square, Whitehall und auf dem Strand wurden durch SON-Lampen ersetzt. In der Regel ist eine 400W SON-Lampe anstelle einer 1,500W Lampe mit Gasfüllung getreten, was einer Energieeinsparung von mehr als 1,000W je Lampe entspricht. Im zweiten Jahr der Umstellung auf die neuen Lampen wurden zahlreiche Mehrrohr-Leuchtstofflampen durch einzelne SON-Lampen ersetzt. Damit wurde nicht nur eine Senkung des Energieverbrauchs erzielt, sondern auch die Beleuchtungsstärke erhöht, da die neuen Lampen leistungsfähiger sind und sich außerdem leichter reinigen und warten lassen.

In gewissen Bereichen wurden MBF-Lampen und in den baumreichen Straßen von Paddington und Marylebone Natrium-Niederdrucklampen (SIX) durch SON-Lampen ersetzt. Dies hat keine offensichtlichen Nachteile zur Folge gehabt, da die bessere Farbwiedergabe eine leichte Abnahme der Beleuchtungsstärke auszugleichen scheint. Man denkt daran, die Plätze und öffentlichen Grünanlagen der City in Zukunft mit Deluxe-SON-Lampen auszustatten.

2D DIE LAMPE DER ZUKINGT, SCHON HEUTE **18**
H. G. Blackhurst
Vor etwas weiniger als einem Jahr war die Thorn 2D gerade von dem Labor freigegeben worden; heute wird sie in vollem Maßstab produziert und sowohl Thorn als auch andere Hersteller haben dafür eine Reihe von Leichten entwickelt. Diese Lampe wurde von vornherein als Ersatz für die Wolframglühlampe entwickelt und ist für Anwendungen bestimmt, in denen die Glühlampe bisher unangefochten war. Dank der bedeutend längeren Lebensdauer und dem höheren Wirkungsgrad hat die 2D ebenso wie andere Entladungslampen an und für such einen Vorteil.

Ihre Hauptvorzüge bestehen jedoch darin, daß sie zum Unterschied von der Glühlampe "kühl brennt", was die Konstruktion von Reflexions- und Diffusionsvorrichtungen sehr vereinfacht, und daß sie in Form und Größe kompakt ist und in jeder Lage angeordnet werden kann, daher also für Fassungen der bei Glühlampen üblichen Art in Frage kommt. Sie kann in Steh- oder Tischlampen eingesetzt werden, ohne ihr Ausehen zu ändern, und die Farbe ihres Lichtes ist der einer Glühlampe sehr ähnlich. Obgleich der Starter in der Lampe eingebaut ist, ist die Drosselspule getrennt davon angeordnet. Dies bietet zwei Vorteile: Die Lampe wird für sicheres Hängen an einem Kabel nicht zu schwer, und bei Ausfall der Lampe wird die Drosselspule, deren Lebensdauer zehn Jahre beträgt, nicht verloren. Die Drosselspule wird in der Leuchte oder in einem Adaptor eingebaut, der bei Hängeleuchten anstelle einer Deckenkappe treten kann. Für zukünftige Anwendungen wird der sogenannte "Chug" entwickelt, der einen 13A Stecker mit einer Drosselspule verbindet. Die 2D ist der erste größere Vorstoß auf dem Sektor einfacher kompakter Lampen seit einführung der gasgefüllten Lampe in den 20er Jahren. Ihre Aussichten sind enorm und sie kann mit Recht als die Lampe der Zukunft bezeichnet werden.

EIN ELEKTRONISCHER STARTER FÜR T-8 LAMPEN **21**
P. Vine und C. Walker
Die T8-Lampen mit 26 mm Durchmesser haben auf Märkten in Großbritannien und anderen Ländern erheblichen Anklang gefunden, und alle neuen britischen Leuchten können nun mit ihnen bestückt werden. Leider kommen sie, nur in bestehenden Leuchten mit Starterbetrieb in Frage, da der Abstand zwischen der Lampe und der geerdeten Metallstruktur für leichtes Starten zu groß ist. Es besteht daher ein großer Bedarf an elektronischen Startern für diese Lampen.

Der neue "Vivatronic"-Starter von THORN EMI ist so beschaffen, daß den T8-Lampen von 18 W bis 70 W und T12-Lampen von 20 W bis 75 W betätigt, ohne daß eine geerdete Metallstruktur erforderlich wäre. Die Kathodenerhitzung findet etwa 1 Sekunde lang in einer Richtung statt, bevor die Startspannungsimpulse in Maße von 1 Impuls je Netzspannungszyklus angelegt werden. Ausfall der Lampe schaltet den Starter automatisch aus, bis eine neue Lampe an dem Stromkreis angeschlossen wird. Der Starter eignet sich für die neuen, schmalen Drosseltypen, und die Mittenabstände für die Anordnung wurden so gewählt, daß die Vorrichtung ohne weiteren Eingriff in bestehende Leuchten eingebaut werden kann. Sie sind aber mit Glimmzündern nicht austauschbar. Ein großer Vorteil der neuen Starter besteht darin, daß sie, wie dies aus der Norm BS4533 Teil 1 1979 hervorgeht, keine abnormalen Stromkreisbedingungen vor dem Starten bedingen können, da sie keine beweglichen Teile besitzen.

SPORTZENTRUM THORNBURY **24**
R. C. Aldworth
Kurz nachdem die Natriumhochdrucklampe (SON) vor 16 Jahren für Straßenbeleuchtung eingeführt wurde, gewann sie den allgemeinen Ruf, eine ideale Lichtquelle für externe Flutbeleuchtung und industrielle Innenbeleuchtung zu sein.

Das Sportzentrum Thornbury ist ein neues Beispiel für die Tatsache, daß die Natriumhochdrucklampe immer mehr Anwendungen findet, indem sie sich auch in zahlreichen anderen Innenbeleuchtungsanwendungen erstklassig bewährt. Ihr hoher Wirkungsgrad und ihre lange Lebensdauer fallen dabei natürlich schwer ins Gewicht, doch dazu kommt, daß das warme, goldweiße Licht dieser Lampe in öffentlichen Freizeitbereichen wie diesem Sportzentrum eine angenehme Stimmung bewirkt.

Über dem Schwimmbecken befinden sich "Areaflood"-Flächenleuchten mit speziell konstruierten Rastern in einer Höhe von 5 m. Diese Leuchten sind mit 400 W Lampen bestückt und liefern eine Beleuchtungsstärke von 500 lux.

In den Sport- und Schießhallen sind "Hi-Pak"-Reflektorleuchten für industrielle Anwendungen vorgesehen (Beleuchtungsstärke 600 lux, während in den Bowls-Hallen in der geringeren Höhe von 3,75 m "Low-Pak" -Lampen vorgesehen sind. In diesem Bereiche galt es 600 lux bei hochgradiger Gleichmäßigkeit der Beleuchtung zu erzielen. Es wurden daher 250 W SON- -Lampen vorgesehen, und die Leuchten **sind** mit weißen "Eierkisten"-Rastern ausgestattet.

En esta edición

LUCES THORN EN TRES ESTADIOS DE LOS ESTADOS UNIDOS 3
Peter Bleasby
Este artículo describe el alumbrado de tres grandes estadios empleando equipo de faros de alta eficiencia y gozando de gran éxito. Son el Hubert H. Humphrey Metrodome de Minneapolis, el Soldier Field de Chicago y el Shea Stadium de New York City, la morada del equipo de baseball New York Mets. Cada estadio tenía un problema diferente, pero en cada caso más y mejor alumbrado fue producida a coste reducido.
El estadio de Minneapolis es una estructura espectacular, con asientos para 63.000 personas y su corramiente es por medio de un techo de tela hinchable de dos envolturas midiendo 183 m de longitud x 244 m de anchura y 58 m de altura. El montante sólido más alto para los faros hallándose en la cumbre de la pared de hormigón soportando este techo, poro es suficientemente bajo para causar deslumbramiento a los espectadores. Fue imposible montar proyectores en el techo de tela, como consecuencia se instalaron vigas triangulares en celosía de acero montadas arriba de la pared de hormigón. Se emplearon cuatro vigas triangulares de 22 mm en cada costado del estadio y dos de 17 mm a través del extremo opuesto al marcador, cada una dotada de 40 a 80 faros Thorn ON 1500 alojando lámparas de haluro metálico de dos extremos MBIL de 1500W. Se lograron iluminancias de 1600 a 2900 lux.
El Soldier Field de Chicago es un estadio al aire libre construido de la manera clásica con columnatas en ambos costados. Su capacidad es de 65.000 personas sentadas y entre otros es la morada del equipo de futbol Chicago Bears. Le instalación de alumbrado incandescente original, suplementada por faros de haluro metálico producían únicamente 800 lux para una carga de 1000kW. Los faros tuvieron que montarse en las columnatas a la altura de sólo 32 m en vez de 49 que normalmente se recomiendan, de manera que el deslumbramiento de los espectadores era un problema serio. Se sugieron faros simétricos de haz estrecho convencionales, pero el esquema Thorn, también utilizando faros ONN de haluro metálico de 1500W brindó la mejor solución, debido al corte agudo de sus reflectores secundarios internos. Como sea que estos fueron montados en la carpintería de acero existente, sus costos de instalación y mantenimiento resultaron muy razonables y se legraron iluminancias de hasta 1800 lux.
Uno de los problemas en el Estadio Shea de Nueva York era los descensos de voltaje que ocurren en la carga punta del acondicionamiento de aire en verano, la cual coincide con las horas punta de visión del baseball. La lámpara CSI de redispara en caliente Thorn fue la completa solución del problema. El estadio semicircular de 213 m de diámetro es de 55.000 de capacidad. En el techo 46 m sobre el nivel de suelo hay una pasarela continua para el material de los faros. Además de su aptitud para redisparar inmediatemente, en vez de después de un rotardo de various minutos, la eficiencia de la lamparas CSI posibilita desde el punto de vista financiero el realumbrado del estadio. La instalación original, una combinación de faros de halógeno tungsteno de 1500W y de mercurio de 1000W consumia 2200kW y su mantenimiento era muy caro, pues la iluminancia en el campo interior era de poco más de 1100 lux. La nueve instalacion de lámparas CSI proporcionó un ahorro de más de 200.000 dólares por año y dobló la iluminancia. Cumple con la nueve especificación IES de América del Norte para cubrir por televisión las deportes más importantes. Una bonificación inesperada fueron los haces dirigidos con precisión de las lámparas CSI, mejorando el contrasto de las pantallas gigantes de televisión llamado Diamond Vision, una característica preeminente de todos los estadios americanos.

SON EN LA CITY DE WESTMINSTER 11
Nigel E. Pollard
El Sr. Pollard es Ingeniero Principal de Alumbrado Público del Concejo de la City de Westminster. La City de Westminster es parte del área metropolitana del Gran Londres y contiene las Cámaras del Parlamento, la Abadía de Westminster, el Palacio de Buckingham y los Parques Reales.
Las normas del alumbrado de la City de Westminster son elevadas e incluyen la necesidad de usar fuentes de luz con propiedades de prestación de colores aceptables. Hasta el advenimiento de la lámpara SON el costo del logro de este objetivo ha aumentado continuamente.
A finales de la década de los setenta la carga total del alumbrado de sus calles de unos 3.500 kW. Esta ya ha sido reducida a 2.700 kW y más tarde descenderá a unos 2.000 kW, sin reducción de las normas. Desde luego en algunos casos con mejoras tanto de los valores del alumbrado como del aspecto estético, deparando un ahorro financiero de 150.000 libras esterlinas por ano.
Las lámparas de filamento en los distritos de prestigio como por ejemplo, la plaza de Trafalgar, Whitehall y el Strand han sido reemplazadas por SON, en general una lámpara llena de gas de 1.500 cediendo el puesto a una lámpara SON de 400 W — un ahorro de energía de más de 1000 W por punto. En el curso del segundo ano de la conversión muchas linternas fluorescentes multitubo fueron reemplazadas por lámparas sencillas SON, no solamente efectuando un ahorro de energía, sino también mejorando la iluminación debido al empleo de luminarias más eficientes y también más fáciles de limpiar y mantener.
En algunas áreas les lámparas MBF han sido reemplazadas por SON y en las calles con gran cantidad de hojas de árboles de Paddington y Marylebone con lámparas (SOX) de sodio a presión baja, sin aparentes desventajas, pues según parece la prestación de mejor color compensa la ligera disminución de luz. Se contempla usar las lámparas 'deluxe' SON en el futuro en las plazas y jardines públicos del centro de la capital.

2D. LA LAMPARA DEL FUTURO, AHORA 18
H. G. Blackhurst
Hasta hace poco más de un ano la lámpara 2D apenas había superado la etapa de laboratorio; actualmente se halla en plena producción y se ha producido una cantidad de luminarias, por Thorn y por otros fabricantes, para acomodarla. Esta lámpara se ha disenado de propósito para suplantar' la lámpara de filamentos de tungsteno en situaciones en que anteriormente ha reinado sin oposición seria. Su duración mucho más prolongada y su alta eficiencia le confieren una ventaja inicial compartida con otros tipos de lámparas de descarga, pero sus méritos principales son que, contrario a la lámpara incandescente, 'functiona en frío', simplificando enormemente el diseno de los dispositivos de reflexión y difusión y su tamano y formato compacto y el hecho que puede operarse en cualquier posición, la hacen conveniente para uso en el tipo de montaje asociado con lámparas de filamento. Puede emplearse en montantes de suelo y de mesa sin alterar su aspecto y el color de su luz es muy parcecido al de una lámpara incandescente. Aunque el interruptor de arranque es de construcción integral con la lámpara, el choque está separado de la misma; esto brinda dos ventajas, evita que la lámpara sea demasiado pesada para poderse colgar con seguridad de un flexible y evita el desechado del choque, con su vida de dies anos, cuando falle la lámpara. El choque está incorporado en la luminaria o forma parte de un adaptador, que, en el caso de montajes suspendidos, puede emplearse en lugar de una mesa de techo. Para el futuro se está desarrollando una combinación de tapón de 13A y choque, el 'chug'. La lámpara 2D es el primer gran paso adelante en la enfera de lámparas simples y compactas desde que se introdujo la lámpara ileneda de gas en la decada de los viente. Su potencial es enormo y verdaderamente puede llamarse la lámpara del futuro.

UN ARRANCADOR ELECTRÓNICO PARA LÁMPARAS T8 21
P. Vine y C. Walker
Las lámparas T8 de 26 mm de diámetro han ocasionado considerable impacto en los mercados del Reino Unido y de otras partes, y actualmente todas las luminarias nuevas manufacturadas en el Reino Unido se disenan para incorporarlas. Lamentablemente, sólo pueden emplearse en luminarias existentes con circuitos de arranque por interruptor, como consecuencia existe una gran demanda de arrancadores electrónicos para estas lámparas.
El nuevo arrancador THORN EMI 'Vivatronic' ha sido disenado para operar lámparas T8 de 18W a 70W y T12 de 20W a 75W sin necesidad de metalistería puesta a tierra. El calentado catódico es unidireccional y fluye durante aproximadamente un segundo antes de la aplicación de los impulsos de la tensión de arranque al régimen de uno por ciclo de tensión de la red. El fallo de la lámpara automáticamente desactiva el arrancador hasta que se pone en circuito una lámpara nueva. El arrancador se ha diseñado para armonizar con nuevos tipos de choque más delgados y los centros de fijación están dispuestos para permitir la aceptación inmediata en luminarias existentes, pero no son intercambiables con arrancadores de resplandor. Ofrecen la gran ventaja, ilustrada por referencia a la Norma Británica BS4533 Parte 1 1979, que como sea que no tienen piezas móviles no pueden dar lugar a condiciones de circuito de prearranque anormales.

CENTRO DEPORTIVO DE THORNBURY (INGLATERRA) 24
R. C. Aldworth
Poco tiempo después de la introducción hace 16 años de la lámpara de sodio de alta presión (SON) para el alumbrado de calles, se estimó aceptable como fuente ideal para aplicaciones de iluminación de exteriores por proyectores y de alumbrado industrial de interiores.
El centro deportivo de Thornbury es un ejemplo reciente del campo continuamente en aumento de las aplicaciones de alumbrado para la lámpara de sodio de alta presión y es sumamente aceptada para muchos otros tipos de instalaciones de alumbrado interior. La elevada eficiencia y la larga vida son desde luego un attractivo importante, pero la luz blanca dorada y caliente producida por esta lámpara también crea una atmósfera agradable en áreas de recreo públicas como este centro deportivo.
La piscina emplea lámparas de 400W en luminarias Areaflood, dotadas de celosías especialmente diseñadas montadas a 5m para proporcionar 500 lux.
Las luminarias de reflector industriales Hi-Pak brindan 600 lux en las salas de deportes y proyectiles, y otro accesorio de reflector industrial, la unidad Lo-Pak, ha sido empleada en la altura de montura más baja de 3,75 m en las salas de bolos. Aquí, el problema era proporcionar 600 lux con uniformidad excelente. Esto se logró utilizando lámparas SON de 250W en luminarias provistas de celosías de jaula de huevo blanca.

Nel questa edizione

THORN ILLUMINA TRE STADI NEGLI STATI UNITI 3

Peter Bleasby

Questo articolo descrive come sia stato possibile illuminare con ottimi risultati tre grandi stadi sportivi usando apparecchiature di illuminazione con proiettori a largo fascio di altissima efficienza. Si tratta degli stadi Hubert H. Humphrey Metrodome di Minneapolis, del Soldier Field di Chicago e dello Shea Stadio di New York, dove gioca in casa la squadra di Baseball dei New York Mets. Ogni stadio presentava un problema diverso, ma in ciascun caso si è ottenuta una migliore illuminazione ad un costo ridotto.

Lo Stadio di Minneapolis è una struttura veramente spettacolare, con 63.000 posti a sedere e racchiusa da un tetto di tessuto gonfiabile a doppio strato, lungo 183 metri, largo 244 e alto 58 metri. Poichè il punto d'appoggio più alto della struttura per montare i proiettori era in cima al muro di cemento che sostiene il telone del tetto, l'altezza non era sufficiente ad evitare l'abbagliamento degli spettatori. D'altro canto era impossibile montare i proiettori sul telone del tetto, per cui vennero installati dei pali reticolari d'acciaio in cima al muro di cemento. Quattro pali da 22 m vennero usati su ambo i lati dello Stadio e due da 17 m sul lato opposto a quello del tabellone, portanti ciascuno da 40 ad 80 proiettori a largo fascio Thorn ON 1500 dotati di lampade di alogenuro metallico da 1500 W MBIL, ottenendo delle luminescenze da 1600 a 2900 lux.

Lo Stadio Soldier field di Chicago è invece una struttura scoperta di impostazione tradizionale con colonnate su ambo i lati. I posti a sedere sono 65.000 e lo Stadio ospita tra gli altri la squadra di calcio dei Chicago Bears. L'impianto originale di illuminazione ad incandescenza, supplementato da alcuni proiettori a largo fascio di alogenuro metallico produceva solamente 800 lux con un consumo di 1000 kW. I proiettori erano stati montati sulle colonnate, ad un'altezza di soli 32 m invece dei 49 normalmente consigliati, per cui si era creato un serio problema di abbagliamento degli spettatori. Venne proposto un sistema di illuminazione con proiettori simmetrici a raggio stretto, ma il progetto Thorn, che anche in questo caso ha fatto uso dei proiettori di alogenuro metallico da 1500 W, ha dato la miglior soluzione per via dello stacco netto dei loro riflettori interni secondari. Poichè questi furono montati sulla struttura d'acciaio esistente, sia i costi di impianto che quelli di manutenzione sono risultati molto ragionevoli, per un potere illuminante fino a 1800 lux.

Invece uno dei problemi riguardanti lo Shea Stadio di New York era quello delle improvvise cadute di tensione che si verificano d'estate nei momenti di massimo impiego degli impianti di aria condizionata, che coincidono con i momenti di maggior affluenza di pubblico alle partite di Baseball. Il problema fu risolto in pieno con l'uso della lampada Thorn CSI con reinnesco a caldo. Lo stadio semicircolare da 213 m di diametro ha una capacità di 55.000 posti a sedere. Sul tetto, a 46 m d'altezza dal campo di gioco, è stata realizzata una passerella continua per il montaggio delle apparecchiature di illuminazione. Oltre alla sua capacità specifica di riaccendersi immediatamente a caldo, senza bisogno di aspettare alcuni minuti, l'efficienza della lampada CSI ha permesso di ottenere un'illuminazione dello Stadio ad un costo finanziario accettabile. L'impianto originale che combinava proiettori a largo fascio con lampade alogene al tungsteno da 1500 Watt e lampade al mercurio da 1000 Watt consumava 2200 kW ed era pure molto costoso dal punto di vista della manutenzione, per una illuminazione complessiva dell'ordine di appena oltre 1100 Lux. Il nuovo impianto a lampade CSI ha permesso un risparmio di oltre 200.000 Dollari all'anno, raddoppiando l'illuminazione sul campo in conformità alle nuove norme IES Nord Americane che riguardano la ripresa televisiva dei maggiori avvenimenti sportivi. Un altro vantaggio inaspettato di questo impianto è il miglior contrasto che si ottiene sugli schermi televisivi giganti, denominati Diamond Vision, che costituiscono una caratteristica peculiare di tutti i principali stadi americani, grazie alla maggior precisione di puntamento del fascio luminoso delle lampade CSI.

SON NEL COMUNE DI WESTMINSTER 11

Nigel E. Pollard

Mr. Pollard è un tecnico esperto di illuminazione pubblica nel Comune di Westminster a Londra. Tale comune, propriamente City of Westminster, fa parte della Grande Londea metropolitana e vede nel suo ambito i Palazzi del Parlamento, l'Abbazia di Westminster, Buckingham Palace ed i Parchi Reali.

I criteri di illuminazione nel comune di Westminster sono molto rigorosi e prevedono l'impiego di fonti luminose dotate di caratteristiche accettabili di resa cromatica. Prima dell'avvento della lampada SON tale esigenza doveva essere soddisfatta con sistemi sempre più costosi.

Verso la fine degli anni '70, il potenziale totale di illuminazione stradale era di di circa 3500 kW. Tale carico è già stato ridotto a 2700 kW e potrà scendere col tempo a circa 2000 senza nessuna perdita di illuminazione, ma registrando anzi in certi casi un miglioramento sia nel valore di illuminazione che nell'aspetto estetico, con un corrispondente risparmio finanziario di circa 150.000 Sterline anno. Le lampade a filamento nelle zone di maggior prestigio, come Trafalgar Square, Whitehall e lo Strand, sono già state sostituite con le lampade SON, che normalmente rimpiazzano con una lampada da 400 Watt una lampada di tipo precedente da 1500 Watt, con un risparmio energetico di oltre 1000 Watt per punto di illuminazione. Durante il secondo anno della conversione, numerosi fanali dotati di più tubi fluorescenti sono stati sostituiti da un'unica lampada SON, ottenendo non solamente un risparmio energetico ma migliorando bensù l'illuminazione per via della maggior efficienza delle apparecchiature per illuminazione impiegate, che sono inoltre più facili da pulire e dal punto di vista della manutenzione.

In alcune zone le lampade MBF sono state sostituite dalle SON e nelle strade alberate delle zone di Paddington e Marylebone da lampade al sodio a bassa pressione (SOX) senza nessuno svantaggio apparente, in quanto la miglior resa cromatica rappresenta un'adeguata compensazione per il leggero calo di luce. Per il futuro, è previsto l'impiego di lampade SON "de lux" nelle piazze e nei giardini pubblici del comune di Westminster.

2D, LA LAMPADA DEL FUTURO, OGGI 18

H. G. Blackhurst

Poco più di un anno fa la lampada Thorn 2D era appena uscita dalla fase di laboratorio: oggi la produzione è ormai avviata e sono già state realizzate numerose apparecchiature per illuminazione, sia dalla Thorn che da altri fabbricanti, atte ad accoglierla. Questa lampada è stata appositamente progettata in sostituzione della lampada al filamento di tungsteno nelle situazioni in cui quest'ultima aveva regnato incontrastata per moltissimo tempo. La sua durata assai maggiore e la più elevata efficienza le conferiscono un vantaggio iniziale, condiviso peraltro da altre tipi di lampade a scarica, ma il suo merito principale sta nel fatto che al contrario delle lampade ad incadescenza "lavora" a freddo, semplificando notevolmente la realizzazione dei dispositivi riflettenti e di diffusione, mentre la sua forma compatta e razionale, unitamente al fatto che può lavorare in qualsiasi posizione, la rendono particolarmente idonea all'impiego con gli attacchi normalmente utilizzati per le lampade a filamento. Puó essere utilizzata nelle lampade a stelo a pavimento o da tavolo senza variarne l'aspetto, ed il colore della sua luce assomiglia moltissimo a quello di una lampada ad incandescenza. Benchè l'interruttore di accensione sia incorporato nella lampada, la bobina di arresto è separata da essa e ciò presenta du vantaggi: non appesantisce troppo la lampada per cui è possibile appenderla da un cavo flessibile e si evita inoltre di gettare via la bobine di arresto, che dura una diecina dranni, quando la lampada si brucia. La bobina di arresto è incorporata nell'apparecchiatura per iluminazione oppure fa parte integrale di un raccordo che, nel caso di una lampada sospesa dal soffitto, puó sostituire la normale rosa della plafoneria. In un secondo tempo sarà pronta la spina da 13 A con la obina incorporata. La lampada 2D è il primo vero passo aventi nel campo delle lampade semplici e compatte dopo l'introduzione della lampadina con ampolla riempita di gas che risale agli anni '20. Poichè le sue possibilità potenziali sono enormi, possiamo chiamarla veramente la lampada del futuro.

UNO STARTER ELETTRONICO PER LE LAMPADE T8 21

P. Vine e C. Walker

Le lampade T8 con diametro di 26mm hanno avuto considerevole successo sui mercati britannico e in altre parti del mondo e tutte le nuove apparecchiature da illuminazione fabbricate nella Gran Bretagna sono concepite per ammettere tali lampade. Purtroppo, queste lampade sono solo adatte per apparecchiature esistenti dotate di circuiti di commutazione-avvio, pertanto queste lampade richiedono di starter elettronici speciali.

Il nuovo starter 'Vivatronic' della THORN EMI è stato concepito per attivare lampade T8 da 18 a 70W e lampade T12 da 20 a 75W senza la necessità di parti metalliche a massa. Il riscaldamento del catodo è unidirezionale e giunge per circa un secondo prima dell'applicazione degli impulsi di tensione di avviamento alla velocità di uno per ogni ciclo di tensione di rete. Il guasto della lampada disattiva automaticamente lo starter sino a che una nuovo lampada non sia introdotta nel circuito. Lo starter è concepito per conformarsi ai nuovi tipi meno ingombranti di bobine e gli interassi di fissaggio sono tali da consentirne il montaggio immediato nelle esistenti apparecchiature di illuminazione ma questi non sono intercambiabili con gli starter a incandescenza. Questi presentano anche il grande vantaggio — comprensibile facendo riferimento al BS4533 Part 1 1979 — di non possedere parti di movimento e quindi di non dar luogo a condizioni di preavvio circuito anormali.

THORNBURY SPORTS CENTRE 24

R. C. Aldworth

Subito dopo l'introduzione sedici anni fa della lampada al sodio ad alta pressione per l'illuminazione stradale, questa lampada fu accettata quale mezzo ideale per l'illuminazione esterna a proiettori e l'illuminazione interna industriale.

Il Thornbury Sports Centre è un esempio recente del sempre crescente campo applicativo della lampada al sodio ad alta pressione in cui si dimostra altamente accettabile per numerosi altri tipi di installazioni da illuminazione interna. Ovviamente l'elevata efficacia e la lunga durata rappresentano un'attrattiva importante ma la soffice luce bianca dorata generata da questa lampada produce pure un'atmosfera piacevole in aree ricreative pubbliche come questo centro sportivo.

La piscina impiega lampade da 400W in apparecchiature da illuminazione provviste di speciali persianine e montate a 5 m. d'altezza per procurare 500 lux.

Le apparecchiature da illuminazione a riflettore industriali Hi-Pak generano 600 lux nelle sale sportive e da 'proiettili' e un'altra luce a riflettore — l'unità Lo-Pak — è stata impiegata ad un'altezza inferiore di 3,75m nelle sale delle bocce. Qui si richiedeva di generare 600 lux con eccellente uniformità. Il requisito fu soddisfatto con l'uso di lampade tipo SON da 250W in apparecchiature da illuminazione provviste di persianine con palette a 90 gradi.

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THORN BELYSER TRE STADION I USA 3

Peter Bleasby

Denna artikel beskriver den framgangsrika belysningen av tre större stadion med hjälp av högeffektiv strålkastarutrustning. De är Hubert H. Humphrey Metrodome i Minneapolis, Soldier Field i Chicago och Shea Stadium i New York, basebollslaget New York Mets hemmastadion. Varje stadion var ett problem för sig, men i varje fall producerades mer och bättre belysning till en reducerad kostnad.

Stadion i Minneapolis är ett imponerande byggnadsverk med plats för 6300 åskådare och inbyggt med ett dubbelt, uppblåsbart tygtak 183 m långt, 244 m brett och 58 m högt. Den högsta solida monteringspunkten för strålkastare är längst upp på betongväggen som håller upp taket, men denna punkt är låg nog att blända åskådarna. Det var omöjligt att montera projektorer på tygtaket, så balkförband av stål monterades längst upp på betongväggen. Fyra 22 m balkförband användes på stadions båda långsidor och två 17 m långa över kortsidan mitt emot markeringstavlan. På varje balkförband monterades mellan 40 och 80 Thorn ON1500 strålkastare med inbyggda 1500 W MBIL dubbelsidiga halidlampor av metall. Resultatet var belysning från 1600 till 2900 lux.

Solder Field i Chicago är en öppen stadion byggd på klassiskt sätt med kolonnader på båda sidor. Den tar 65000 personer och är bl.a. fotbollslaget Chicago Bears hemmastadion. Den ursprungliga glödlampsinstallationen, förstärkt med några halidstrålkastare av metall, producerade endast 800 lux för en belastning av 1000 kW. Strålkastarna måste monteras på kolonnaderna på en jöjd av endast 32 m i stället för de 49 m som normalt rekommenderas, så bländning av åskådare var ett allvarligt problem. Konventionella smalstråliga symmetriska strålkastare föreslogs, men Thorn, igen med hjälp av ON1500 W halidstrålkastare av metall, kom upp med den bästa lösningen p.g.a. den skarpa brytningen i deras interna sekundära reflektorer. Eftersom dessa var monterade på det existerande stålverket var båd installations- och underhållskostnader mycket rimliga, och belysning upp till 1800 lux uppnåddes.

Ett av problemen med New York Shea-stadion var den spänningsförsvagning som inträffade under sommarens högsäsongs luftkonditioneringsbelastning som sammanfaller med baseballsäsongen. Thorns CSI-lampa för återtändningsspänning löste detta problem. Den halvcirkelformiga stadion, 213 m i diameter, har en kapacitet av 55000 personer. På taket 46 m över golfnivån finns ett kontinuerligt gångbord för strålkastarmaterial. Förutom dess omedelbara återtändningsförmåga gjorde CSI-lampornas effektivitet att, i stället för ett avbrott på flera minuter, återbelysning av stadion blev en ekonomisk eventualitet. Den ursprungliga installationen, en kombination av 1500 W volfram och 1000 W kvicksilverstrålkastare, konsumerade 2200 W och var mycket dyr att underhålla, så att belysningen på fältet var lite över 1100 lux. Den nya installeringen av CSI-lampor gav en besparing av över $200,000 per år och fördubblade belysningen. Den överensstämmer med den nya nordamerikanska IES-specifikationen för TV-reportage från viktiga sportevenemang. Ett oväntat bonus var att de valriktade strålarna från CSI-lamporna förbättrade kontrasten på de gigantiska TV-skärmarna, kallade Diamond Vision, som finns på alla amerikanska stadion.

SON I CITY OF WESTMINSTER 11

Nigel E. Pollard

Herr Pollard är belysningsingenjör på Westminster City Council (ung. kommun). City of Westminster är en del av området Greater London och innefattar Houses of Parliament (parlamentshuset), Westminster Abbey, Buckingham Palace (slottet) och de kungliga parkerna.

Belysningsstandarden i City of Westminster är hög och innefattar behovet av ljuskällor med godtagbara färg-återgivande egenskaper. Innan SON-lampan fanns var detta dyrare och dyrare att åstadkomma.

Under slutet av 70-talet var den totala belastningen av gatubelysningen omkr. 3500 kW. Detta har redan reducerats till 2700 kW och kommer slutligen att falla till omkr. 2000, utan att standarden försämras, t.o.m. i vissa fall med förbättringar både av belysningsvärden och estetiskt utseende, och en kostnadsbesparing av £150.000 per år.

Glödlamporna inom prestigebetonade områden såsom Trafalgar Square, Whitehall och The Strand har ersatts med SON, vanligtvis en 1500 W gasfylld lampa ersatt med en 400 W SON-lampa — en energibesparing av över 1000 W per punkt. Under det andra året efter ändringen ersattes många flerrörslanternor med enkla SON-lampor. Detta sparade inte bara kraft utan förbättrade belysningen p.g.a. de effektivare lamporna som dessutom är lättare att göra rena och underhålla.

I vissa områden har MBF-lampor ersatts med SON och, på de grönskande gatorna i Paddington och Marylebone, lågtrycksnatriumlampor (SOX), utan påtagliga nackdelar, eftersom förbättrad färgåtergivning verkar kompensera för en viss försvagning av ljuset. Deluxe SON-lampor väntas användas i framtiden på stadens torg och i offentliga parker.

2D, FRAMTIDENS LAMPA, NU 18

H. G. Blackhurst

För ett år sedan hade Thorns 2D-lampa nästan inte lämnat laboratoriestadiet. Nu är den i full produktion och många armaturer har producerats, både av Thorn och andra tillverkare, för att hålla den. Denna lampa är medvetet utformad att ersätta volframlampan på de platser där den tidigare använts. Dess mycket längre livslängd och högre ljusutbyte gör den fördelaktig i likhet med andra typer av urladdningslampor, men dess främsta meriter är att den förblir kall, till skillnad från glödlampan, vilket i hög grad förenklar konstruktion av reflekterande och diffusionsanordningar. Lampans kompakta form och storlek och det faktum, att den kan placeras i alla lägen, gör den lämplig för användning i den typ av armatur som associeras med glödlampans. Pådraget är inbyggt i lampan, men spärrspolen är separat. Detta ger två fördelar, lampan är lätt nog att hängas i en fast sladd, och spärrspolen som varar i tio år kan sparas när lampan går. Spärrspolen är inbäddad i armaturen eller en del av en adapter som när det gäller upphängda armaturer kan ersätta en takrosett. En kombinerad 13A stickpropp och spärrspole kallad 'chug' utvecklas för framtiden. 2D-lampan är det första viktiga genombrottet på det enkla kompakta lampområdet sedan den gasfyllda lampan introducerades på 1920-talet. Den har enorma möjligheter och kan med rätta kallas för framtidens lampa.

ELEKTRONISKT STARTDON FÖR 26mm LYSRÖR 21

Paul Vine, C. Walker

T8-lysrör d v s lysrör med 26mm diameter blir allt vanligare på marknaden både i Storbritannien och övriga länder i Västeuropa. Alla nya armaturer konstrueras för att användas med T8-lysrör. Tyvärr, kan dessa endast användas i existerande armaturer med glimtändare, eftersom avståndet mellan lysrör och jordad metallstomme är för stort för att röret annars säkert skulle kunna tändas. Behovet av elektroniska startdon för T8-lysrör är därför stort.

Det nya startdonet THORN EMI "Vivatronic" har konstruerats att kunna starta T8-rör från 18W till 58W och T12 (38mm rör) från 20W till 65W utan närhet till jordad metallstomme. Katoderna uppvärms under ung. en sekund, varefter startspänningen pulserar med nätspänningens frekvens.

Om lysröret är trasigt slutar startdonet automatiskt att arbeta tills ett nytt kopplas in i kretsen. Startdonet är konstruerat i format lika de nya smala reaktorerna och passar nuvarande armaturer. De passar däremot inte i glimtändarens sockel. Fördelarna med Vivatronic är alltså att den har inga rörliga delar och försöker ej starta lysröret så länge kretsen är behäftad med något fel.

THORNBURY SPORTHALL 24

R. C. Aldworth

Kort efter introduceringen av högtrycksnatriumlampan (SON) för sexton år sedan som gatubelysning, accepterades lampan även som en idealisk ljuskälla för extern strålkastarbelysning och intern industriell belysning.

Thornbury sporthall är ett nytt exempel på det ständigt expanderande användningsområdet för högtrycksnatriumlampan. Den visar sig vara lämplig för många typer av belysningsinstallationer inomhus. Lampans viktigaste egenskaper är naturligtvis det höga ljusutbytet och den långa livslängden. Det varma gulvita ljuset som produceras av SON-lampan skapar också en fin miljö i offentliga idrottsanläggningar såsom i denna sporthall.

Simhallen har 400W lampor i Areaflood-armaturer, utrustade med specialkonstruerade bländskydd. Armaturerna är monterade på 5m höjd och ger 500 lux i bassängnivå.

Industriarmaturen Hi-Pak ger 600 lux i sporthallarna och en annan industriarmatur, Lopak, har använts på den låga monteringshöjden 3,75m i bowlinghallarna. Problemet var här att ge en jämn belysningsstyrka på 600 lux. Detta uppnåddes genom att förse armaturerna med vitlackerade rutraster. Ljuskällan är 250W SON lampor.

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