

LIGHTING

EQUIPMENT NEWS

OCTOBER 1990

Move to push energy saving lamps

Energy Secretary John Wakeham is being urged by LIF to launch a drive to promote the use of 'green' lamps in Britain.

Low energy compact fluorescents can easily achieve major cuts in average domestic and office energy bills. But the slow take-up by users is worrying the lighting industry. Because the initial outlay is high, people are reluctant to pay out for the new compact fluorescent bulbs from the weekly housekeeping.

The Lighting Industry Federation has suggested a working party, bringing together representatives of the electricity distribution boards, the Energy Efficiently Office and the three major manufacturers, to work out a solution.

According to Tony Armstrong, LIF president, "The Department of Energy's response has been very favourable. They have agreed to chair a working party and we have been working on a brief for it."

Encouraging consumers

Other countries have devised ways to encourage the consumer to make the changeover and these are making good progress. They include a number of schemes in other EC countries.

"Our experience has shown it is virtually impossible to sell low energy bulbs at £10 or more off the supermarket shelves," added Mr Armstrong. "People will not buy them like conventional replacement bulbs and the superstores will not find shelf space until they are convinced of a proven demand."

"We think people are more likely to make the right decision when they see what energy costs them."

LIF has studied schemes abroad where the new energy saving replacement bulbs are offered free to consumers by the distribution boards or where credit assistance is provided to help a householder completely re-equip a home in what is basically a capital outlay.

The same approach could apply in commerce and industry where the initial outlay may appear high but the longer term reduction in energy costs has a big potential.

GTE and Thorn: link-up is off

Discussions between Thorn EMI and GTE over the future of Thorn Lighting broke down because of a failure to agree on the terms of the transaction in an increasingly uncertain economic climate.

Financial experts expected Thorn EMI to realise £300-£500 million for its lighting business. Thorn is believed to have held out for the higher price.

Commenting on the breakdown, Colin Southgate, chairman and chief executive of Thorn EMI, said: "Whilst I'm naturally disappointed that this opportunity to create a new major force in the worldwide lighting industry has been lost, the way ahead is clear."

"We will now accelerate the recovery programme designed to address the deterioration in the results of our lighting business. Since the beginning of 1990 we have been implementing rationalisation programmes which have already reduced the number of employees in the UK by 800 (over 10%) and further cost saving actions are underway."

"The problems arising from the increasingly competitive price and performance conditions prevailing in the lighting market will need to be addressed by a fundamental restructuring of our business. The major issue centres on light

sources and is essentially a UK manufacturing problem.

"As I stated at our AGM in July this year, our sources business continues to suffer from lack of investment in plant and market development during the 1960s and 1970s."

"To compete in world markets from a single UK manufacturing base, and with relatively low overall market shares, is to struggle against the realities of an industry which is increasingly consolidating on a global scale."

Light sources

"Our cost structure, comparatively low plant efficiencies and restricted volumes make it difficult for us to produce an adequate return on the investment let alone the return which would be required to take the business forward. We will concentrate our limited resources on those light source products which, by virtue of their technological excellence or competitive market position, will allow us to produce satisfactory levels of profitability."

"This will necessitate withdrawing from the manufacture of some lamps, increasing our joint venture activities on others and building strong niche positions where appropriate."

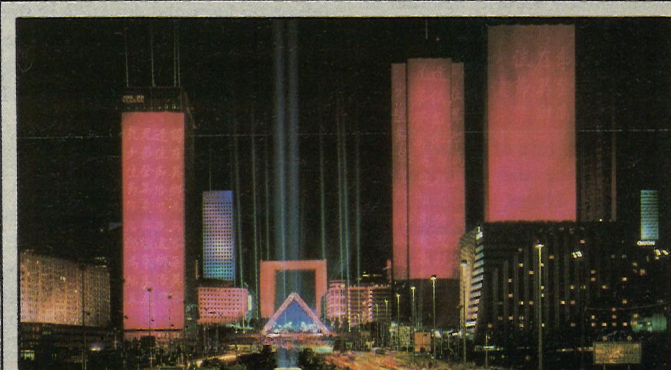
"Again, as previously stated, Thorn Lighting has a strong international position in fittings, traditionally a more fragmented market, and is one of the world's market leaders."

"This position has been achieved through organic growth and a selective programme of acquisitions, underpinned by excellence in product design, development and lighting engineering skills."

"The profitable fittings business which accounted for approximately two-thirds of Lighting's turnover in the year to 31 March 1990, has excellent potential for further development and is well placed to lead future trends towards Europeanisation and, ultimately, globalisation. Products will become international and we have organised and will continue to organise to take full advantage of these trends."

The reference to concentrating resources on technologically excellent light sources is taken to mean the 10W 2D lamp, just launched to consumers, with an investment of £3 million, and metal halide lamps.

During 1989/90 the lighting business made a £32.9 million trading profit on a turnover of £573.4 million.



Skyscrapers at La Défense, Paris, lit to celebrate Bastille Day. Arenavision luminaires give dramatic moving colour and picture effects. See article on pages 17 and 18.

Phoenix to open UK plant

Japanese lamp manufacturer Phoenix Electric, named in the recent EC anti-dumping levies decision, has purchased a factory in Leicestershire and is planning to commence lamp production in the UK later in 1990.

The initial factory unit, a building of nearly 3000 square metres, is sited at Coalville. Phoenix has also purchased 5 acres of land on an adjacent business park and has plans to build a second 4000 square metre unit on this site. Land will also be available to enable this factory to double in size within the next three years.

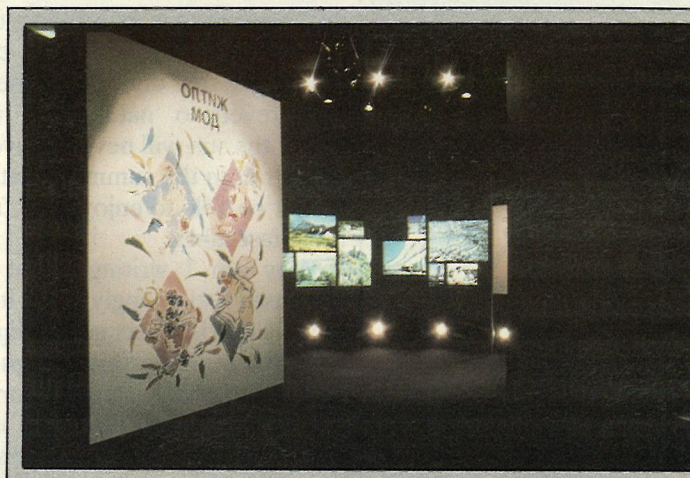
A fast build-up of production capacity is, projected, and the company expects to employ over 200 people in the area by the end of its first two trading years.

According to company president, Minoru Nishibori, Phoenix

chose Leicestershire because of the ready availability of skilled labour and because its central location and good communications make an excellent launching pad from which to penetrate the European market as a whole.

The company is the market leader in the Japanese halogen lamp industry and has built up this lead over the past 14 years. It currently employs some 540 staff at its two Japanese plants. Overseas expansion, to date, has included factories in South Korea and India. In 1989 worldwide sales amounted to some £40 million.

At its British plants Phoenix intends to manufacture a wide range of halogen lamps for use in the motor industry, domestic and industrial lighting, sports stadia, television and photographic studios, airports and shipping.



Some 12 000 Ukrainians per day queued for up to three hours to see how a typical British family live when Britain staged an exhibition in Kiev recently. More than 500 low voltage luminaires by Microlight lit the exhibition. Over half of these were Micropan recessed downlights with capsule lamps, some giving a 10° beam and others a 20° beam. Among the other fittings were Microfresnels with rotating barn doors, spotlights and an accent downlight called Twinkle.

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Osram and Wotan merge

It has been decided to merge Wotan Lamps and Osram from 1 October 1990 under the company name, Osram Ltd. From that date the brand name Wotan will be phased out as stocks are exhausted and replaced by the single brand name Osram.

In January of this year, Osram-GEC became a wholly owned subsidiary of Osram GmbH of Munich when the German com-

pany purchased the remaining 51% of the shares previously held by GEC. It was then renamed Osram Ltd. This effectively gave Osram GmbH two wholly owned subsidiaries in the UK.

The decision to phase out the Wotan name so quickly would seem to have originated from the German end of the company. In recent years Wotan has developed a high technology image in the

UK, while Osram continued to be identified with the mass production end of the market.

Both companies will retain their existing addresses and telephone numbers for the foreseeable future, although the merged company headquarters will be at Wembley. Osram has stated that, as far as possible, existing customers will continue to deal with staff who handled their accounts previously.

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DIARY

OCTOBER

1

Insight on-site security seminar at the Runcorn Crest Hotel, Runcorn. Organised by Philips Scientific Communications and Security Division. Details as before.

2

Insight on-site security seminar at Hinckley Island Hotel, Hinckley, Leicestershire. Details as before.

3

Lighting: the state of the art. One-day conference and exhibition at the Sachas Hotel, Manchester. Organised by Industrial Media Ltd. Details from Lyn Sangster 0732 770049.

4

Insight on-site security seminar at the Swallow Hotel, Waltham

Abbey. Details as before.

10

Communications standards for building and energy management systems. A one-day colloquium organised by the BEMS Centre of the BSRIA at the National Motor Cycle Centre in Solihull. Information from BEMS Centre 0344 426511.

Lighting Education Forum. Open debate on lighting education in the 90s. An afternoon event at the Building Services Engineering Centre, London. Details from Karl Pike, CIBSE, 081-675 5211.

16

Lighting in the electronic age. CIBSE Lighting Division, chairman's address, by Lou Bedocs. Evening meeting at the Institution of Structural Engineers, London. Details from Karl Pike, CIBSE, 081-675 5211.

Exhibition of lighting and asso-

ciated products. One-day event at the Bristol Exhibition Centre. Details from Institution of Lighting Engineers 0788 76492.

Lighting: the state of the art. One-day conference and exhibition at the Crest Hotel, Walsgrave, Coventry. Organised by Industrial Media Ltd. Details from Lyn Sangster 0732 770049.

19

The integrated office environment into the 90s. One-day conference in Nottingham organised by CIBSE East Midlands Region. Details from S Nicholson, 19 Greythorn Drive, West Bridgford, Nottingham NG2 7GG.

23-25

Sign '90 International. Exhibition at the Business Design Centre, London. Details from organisers Batiste, on 081-340 3291.

30

Lighting for VDTs. Evening meeting at British Gas, Manchester, arranged by CIBSE North West Region. Details from L Daniels, 061-228 2331.

31

Lighting for sports and leisure. An evening meeting arranged jointly by the Institution of Lighting Engineers and CIBSE West Midlands Region. To be held at Birmingham Chamber of Commerce. Details from A J Singleton, 9 Foley Road, Pedmore, Stourbridge, West Midlands DY9 0RT.

31 to 2 Nov

Hospital and Care Premises Management '90. Exhibition at

NEC Birmingham. Details from Paramount Exhibitions and Conferences 081-207 5599.

NOVEMBER

6

Daylighting and electrical lighting of hospital wards, John Claydon memorial lecture. An evening event at Trinity Maritime Museum, Newcastle upon Tyne, organised by CIBSE North East Region. Details from D B Buglass, 091-258 7003.

7

Hazardous area lighting. Evening meeting at British Gas, Manchester, held by CIBSE North West Region. Details from L Daniels 061-228 2331.

8

Uplighting: technique or gimmick? Evening meeting at the Institute of Engineers Club, Dublin. Details from Larry Kane, Irish Estates (Management) Ltd, Mespil Estate, Sussex Road, Dublin 4.

13

The application and installation of electrical equipment in major building projects. A one-day colloquium at the Institution of Electrical Engineers, London. Arranged jointly by the IEE, CIBSE, ILE and IMechE. Details of registration from IEE 071-240 1871 extension 294.



The Chartered Institution of Building Services Engineers

Do you know whether it is day or night?

Why do we have to change over our time to become European? It is a gimmick with which to lull the business community, both continental and British, into thinking it will release floodgates of communication and, of course, profits when it is put into effect. We have good business contacts with the USA and indeed the individual states do with each other, with much greater time differences. So what is the problem? The coveted hour could be spent working quietly in GMT generating ideas worth communicating across Europe!

For those of you in doubt about the changes which have been proposed, I shall describe them. Currently we use Greenwich Mean Time (GMT) from April to October, and British Summer Time (BST) which adds an hour on to GMT from November to March. The proposals are to have GMT + 2 hours from April to September and GMT + 1 hour from October to March — a procedure inelegantly termed Single Double Summer Time (SDST). Obvious effects would be lighter evenings in the summer and darker mornings in the winter. Although the Government has stated that no further work will be done on this bill until after a general election, I fear this is only a temporary reprieve.

I am essentially against the change to SDST because it is continuing a trend away from a natural life. Time and our relationship with the sun and daylight are, I believe, very fundamental to the human condition.

The fact that under SDST the sun will rise after 9am for a month or so may not perturb MPs and journalists who rise late and live in the South of England, but to members of the general public in much of the UK it could be of great concern. As could also be the prospect of a 'midnight sun' — a real possibility for part of mainland Scotland.

Such effects are relatively obvious. There are more subtle ones. Sun position and clock time will be substantially uncoordinated. The sun has been at its highest and in the south at noon for as long as noon had had a meaning. Although time is man-made, the simple relationship of 'sun overhead = noon' has a certain 'naturalness' to it. I appreciate that under BST there is an hour mismatch, but it does revert to 'naturalness' with GMT in winter. Under SDST the sun will never be overhead at mid-day. It will be 2 hours out in the summer; that could mean that you may no longer be able to enjoy your favourite seat in the sun at the breakfast table!

Why am I writing about this, here, you might ask? Because I feel strongly about it and hope to encourage others to feel likewise. Because daylight is one of the main concerns of lighting. I know this is *Lighting Equipment News* and the readership will be largely concerned with electric lighting, but I suggest that all visual experience and design derive from daylight. And, of course, the use of electric light is dependent to a varying extent upon the availability of daylight, so it could be your concern anyway.

One of the Government's arguments for SDST is that electric lighting energy will be saved, but a reliable source thinks savings will be marginal. Consideration of thermal energy used in buildings shows that more could easily be used because the coldest time on SDST winter days will be 9am, rather than 8am. People venturing outside at that very ordinary time will be exposed to the coldest part of the day.

Colder mornings, darker mornings, light midnights and the clock at odds with the sun exemplify an all too common state of affairs where people are forced to adopt modes of life alien to the natural world and also their own customs. We are currently becoming more and more aware of the consequences of the misuse of nature. Are we going to misuse our own lives further?

L Jean Heap Senior Lecturer, Birmingham Polytechnic

crescent

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Lightshow dates

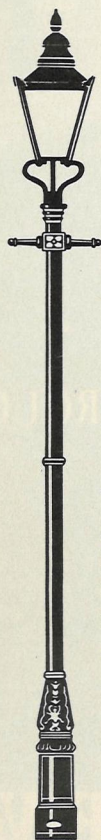
Lightshow '91, the decorative and contract lighting exhibition, will be held from Sunday 6 January to Thursday 10 January. The official opening will be on the Monday.

The venue will be the

National Hall, Olympia, London.

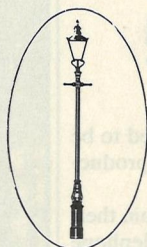
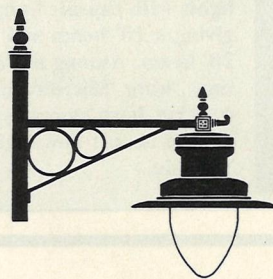
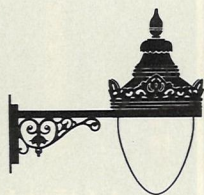
Further information can be obtained from the organisers: The Decorative Lighting Association, Bryn, Bishops Castle, Shropshire SY9 5LE.

An Assortment of Soft Centres.



D W Windsor's elegant, heritage-style lighting and street furniture will soften and enhance town centres, shopping malls and residential developments, alike.

Yet there are hard commercial and technical reasons for using it, as



these products combine the highest quality materials and craftsmanship with the most advanced lighting technology.

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D W Windsor Limited, Pindar Road, Hoddesdon, Hertfordshire EN11 0EZ. Tel: 0992 445666 Fax: 0992 440493





Keeping it flexible

Flexibility was the key requirement for lighting at the Acuma House office complex at Egham, Surrey.

So Continulite by RADA was specified as the most economical means of providing for future partitioning with minimal disruption of the lighting system.

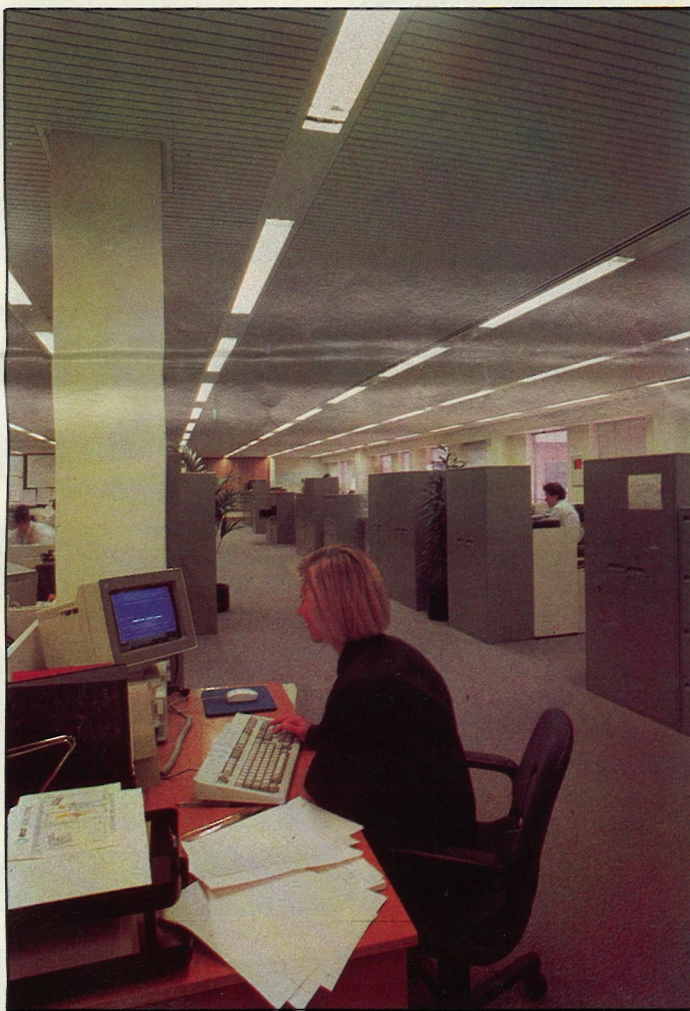
The system, comprising 1800mm, 70W, single lamp luminaires interspersed with snap-in infill panels, has been installed throughout all three wings of the new development.

It was originally developed to provide continuous lighting for any type of building as an economical, standard package.

For the Acuma House project, the system is installed in rows up to 35m long in a concealed grid ceiling, but it was fitted with a specially modified trim to accept a linear slot air diffuser providing conditioned air to the office spaces.

Return air is exhausted via the lamp compartment of the luminaires, directly into the negative plenum ceiling void.

The luminaires have high-efficiency louvres, low-energy, low-loss control gear and electronic starters. Some luminaires are also wired to remote emergency packs to power the mains lighting in the event of a power cut.



Sites containing dangerous substances

The Dangerous Substances (Notification and Marking of Sites) Regulations 1990 came into operation on 1 September 1990 and the Health and Safety Executive now have published practical guidance to site operators on how to comply with the regulations.

The regulations cover on-site storage of all dangerous substances, other than a few substances specified in the regulations which are totally exempted.

With the exception of petrol filling stations, operators of all sites having at any time a total aggregate quantity of dangerous sub-

stances of 25 tonnes or more need to erect suitable access warning signs before 1 September 1990.

By 1 October 1990 they should also have notified their enforcing authority under the Health and Safety at Work Act and the local fire authority, unless their activity is one which is specifically exempted from that requirement, for instance, because it is already subject to certain other licensing or notification requirements.

The booklet:

- ☐ contains the regulations in full and gives a commentary on each provision;

- ☐ gives full details of the exceptions from the regulations;
- ☐ covers the requirements for the erection of access signs and for notification in detail, including a suggested form of notification;
- ☐ gives information about the erection of additional warning signs on site (location signs) which are necessary if an inspector gives a direction requiring them;
- ☐ describes enforcement responsibilities.

Copies of the booklet HS (R) 29 are available from HMSO, price £3.50.

Guidance on lamps

Lamp Guide 1990 has just been published by the Lighting Industry Federation. This 27-page A4 booklet includes lamp prefixes and codes; lamp selection; lamp characteristics and applications; high frequency lamps; quality, standards, and a questions and answers section.

It has been compiled to help users to make initial decisions about choice of lamps; when more detailed information is required, the technical literature of manufacturers should be consulted.

Copies, price £2 including postage, can be ordered from the Lighting Industry Federation, Swan House, 207 Balham High Road, London SW17 7BQ.

Light order

The State Electricity Commission of Victoria, Australia, has ordered 30 000 energy-saving compact fluorescent lamps from Philips Lighting.

Packaged with an 'introductory offer' message, the PLC electronic lamps will be promoted and sold widely to the SEC's customers.

Most of Victoria's electricity is produced by burning brown coal which is a major cause of pollution. Environmental scientists have claimed that, for each 75W incandescent lamp replaced by a 15W compact fluorescent lamp, 200kg of coal can be saved from burning and half a tonne of carbon dioxide can be prevented from entering the atmosphere. These figures are claimed to be even higher from brown coal produced power.

Revised standard on luminaires

BSI has published BS4533 *Luminaires Part 101:1990 Specification for general requirements and tests*. This supersedes Part 101:1987.

It has been expanded to take in recent amendments to IEC publications 598-1 and is an English language version of EN60 590 Part 1: 1989.

It should be read in conjunction with the various sections of BS4533: Part 102, detailing requirements for specific types of luminaire, which are about to be published.

Copies of BS4533: Part 101:1990 are available price £80.50 (£40.25 to BSI subscribing members) from BSI Sales, Linford Wood, Milton Keynes, MK14 6LE.

Maintenance guide

CIBSE has published its latest technical memoranda — TM17: Building Services Maintenance Management.

The publication provides guidance for those involved in the design, installation, operation and maintenance of engineering services within a building. It looks at maintenance as a means of minimising risks to health and safety, avoiding environmental damage and reducing energy use.

TM17 costs £10 for members and £20 for non-members, and is available from the CIBSE Bookshop, 222 Balham High Road, London SW12 9BS tel. 081-675 5211.

COMMENT

State of the art

With the autumn now fully upon us and the drift back to work almost complete, the past month has been a very mixed one as far as the fortunes of the industry are concerned. Events of major importance have certainly occurred — witness the collapse of the discussions between Thorn Lighting and GTE.

Even more far-reaching, perhaps, is the opening of the first lamp factory of a Japanese manufacturer in the UK and the company's avowal to use this base as a springboard to approach the whole of the European market.

Obviously the firm — and Phoenix was one of those involved in the dumping of Japanese halogen lamps on the European market — had plans to begin manufacturing in Europe before the recent EC findings, but the Commission's decision must have added a certain urgency to the drive to set up over here.

The whole event was planned to be low key. And, once again, although jobs have been gained, the employment created seems to be industrial work of a relatively low calibre, as there would appear to be no plans to carry out research and development in Europe.

Luminaires have also been in the picture. That Euro luce was able to attract over 300 exhibitors from the lighting world says a lot for the state of the Italian lighting industry. In spite of being billed as an international event, the show reflects domestic rather than European taste in a way that Hanover has long ceased to do. There was a noticeable French presence, a handful of Northern European, mainly German, companies and the rest were Italian.

Exhibitors ranged from the traditional to the avant garde and, in some cases, frankly quirky. But, in all, the show did manage to reflect an admirable spread of products — and, hence, wide consumer choice — that the UK industry must well envy.

LIGHTING EQUIPMENT NEWS

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Concord **GTE**

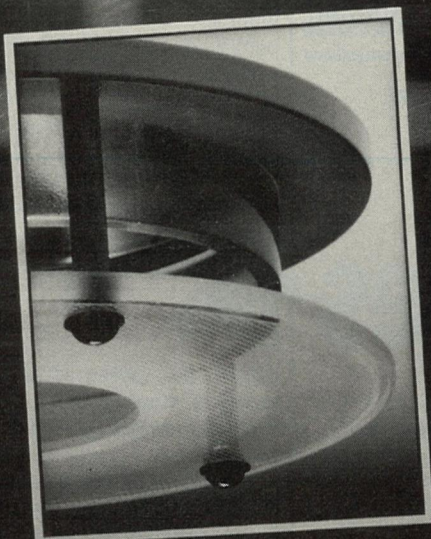
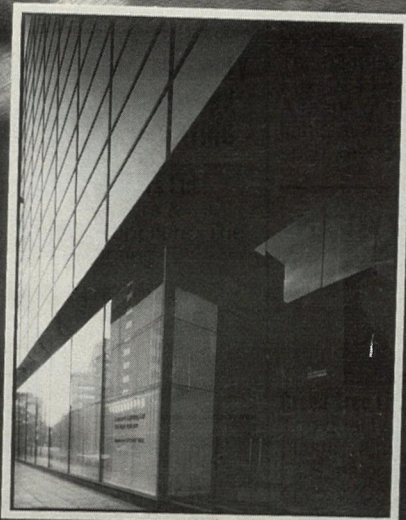
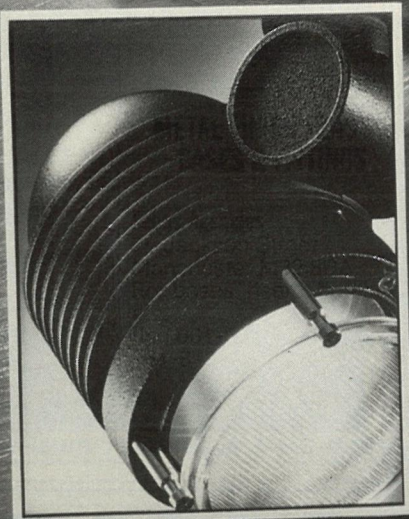
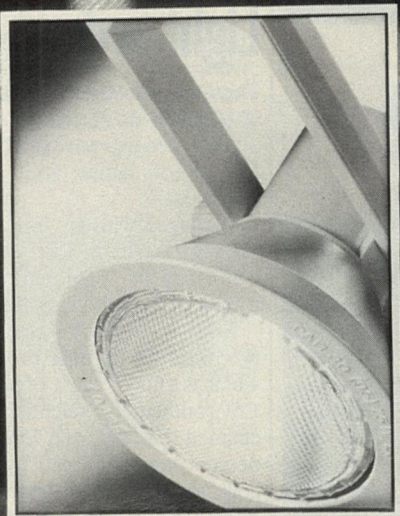
Reader Service No. 4



LIGHTING DESIGN.
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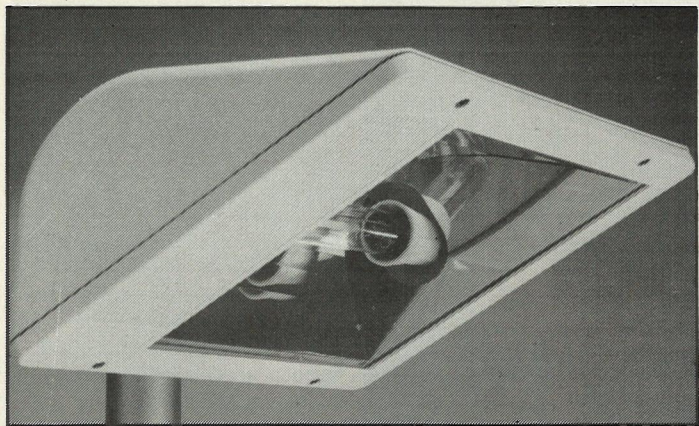
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SHOWROOM

NEW PRODUCTS



Redesigned floodlight

Thorn Lighting Ltd's project to produce an up-to-date range of floodlights for the 1990s has led to the introduction of a new version of its general purpose floodlight, the Areaflood.

The redesign has produced an improved fitting with excellent optical performance, increased flexibility of installation and enhanced body design.

The housing and frame are moulded from glass reinforced polyester. The fitting is sealed to IP65 standard and is lightweight and compact with low windage.

The reflector system, made of specular anodised aluminium, gives an asymmetric distribution.

Areaflood now accepts five lamp types rated from 150W to 400W, including the SON-XL, high output high pressure sodium lamp. In addition, the new floodlight is supplied with either a spigot or stirrup mounting, providing fixed or adjustable floodlighting for both wall and column mounting.

Prime applications are for security and amenity lighting, and decorative floodlighting.

Reader Service No. 151

Monitoring of emergency batteries

Wood Group Industrial Controls has introduced Datascan 800 series battery monitoring equipment which is suitable for use with emergency lighting central battery systems.

It is designed to provide complete battery information either under battery test conditions or

during an emergency discharge.

The microprocessor based system performs continuous monitoring of all battery parameters including individual cell voltages, string currents, ambient and cell temperatures plus system alarm settings, allowing in excess of 800 different channels to be recorded if required.

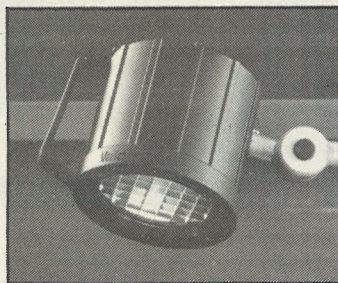
One of the unique features of Datascan is the ability to accurately predict battery performance without the need to carry out a full discharge test or the use of special load banks.

Reader Service No. 152

Glare free illumination for machine tools

A powerful tungsten halogen spotlight for machine tool work, available in Britain through Midland Machinery Services, has been fitted with a special anti-glare aluminised louvre. This limits the angle of light distribution but still gives illumination over a large working area.

The HGW70 model also has an ergonomically designed switch on



the lamphead and a heat insulating cover.

For extreme operating conditions, such as the presence of dust, lubricants or water jets, the unit is sealed to ingress protection standard IP65.

Reader Service No. 153

Emergency lights in brass

Ring Electronics Ltd has introduced a range of brass emergency lighting for the hotel market.

The range includes brass exit signs, decorative crystal units and semi-recessed trims for Ring's H and C series. There are self-contained and slave models in maintained, non-maintained and sustained versions.

Reader Service No. 154



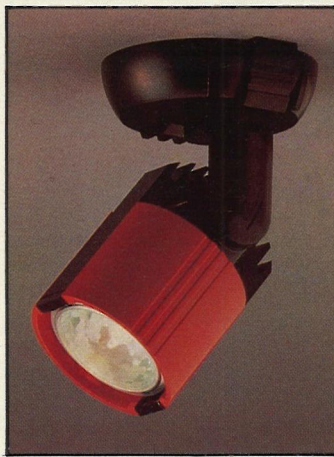
Variations on a theme

The Excel range of low voltage spotlights from Hitech Lighting plc has been designed to meet the display lighting requirements of shops and offices.

The range has interchangeable cowls which offer designers flexibility and the option of achieving variety within a lighting scheme while maintaining a design theme.

The fittings — for 50mm dichroic lamps — are available in either black or white; the cowls are either rectangular or cylindrical in a choice of white, black, gold or satin silver colour. For major projects non-standard colours can be supplied, as illustrated here.

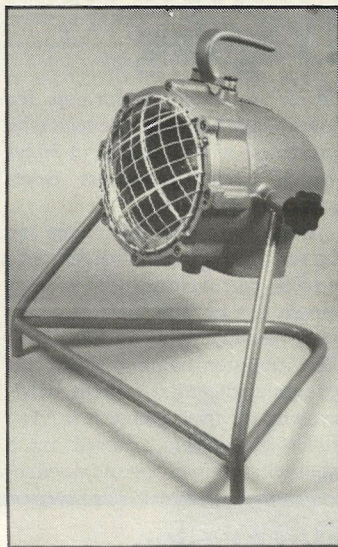
Pushing the cowl backwards operates a release mechanism for the lamp, making re-lamping particularly easy.



The housing has a heat sink to dispel unwanted heat. There is no visible cable and mounting screws are concealed by a clip-on cover.

Track mounting versions (mains and low voltage) and units for individual mounting are available.

Reader Service No. 155



Luminaire for zone 1 areas

Westair has new versions of its Q150 luminaire for use in zone 1 hazardous areas. They use a quartz halogen lamp rated at either 55W, for operation off a 12V supply, or 70W for use with a 24V supply.

These versions are stated to be particularly useful in minimising voltage drop on long cables from low voltage supplies.

The luminaires are available in both spot and flood types.

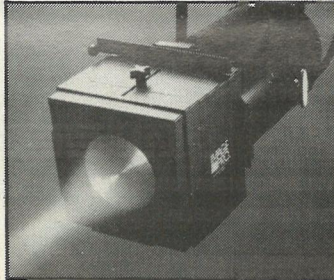
A tripod, extension piece, wish-bone bracket and floor stand are available as optional attachments.

Reader Service No. 156

Convert stage spotlights to projectors

Image Pro is an accessory that converts standard PAR64 Can, PAR56 Can and ellipsoidal stage lanterns into projectors that use high temperature full colour transparencies and gobos.

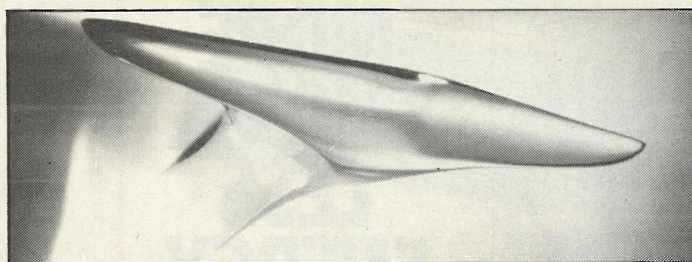
It has a computer designed, heat resistant, shatterproof, polycarbonate Fresnel lens and is designed for use with light sources up to 1kW.



Applications include rock concerts and theatres of various sizes.

Made by Image Pro Inc, USA, it is available in Europe through Optikinetics Ltd, which also supplies appropriate stock or custom made slides.

Reader Services No. 157



Wall light uses tungsten halogen

Manta is a tungsten halogen wall light with matching floor standard from Myddleton Hall Lighting.

The wall light uses a 150W lamp while the floor standard, which

incorporates a dimmer, uses a 300W lamp.

They are finished in either black or polished aluminium.

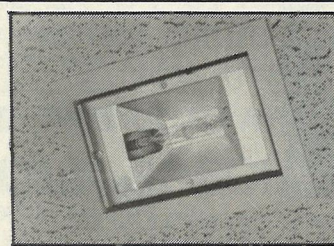
Reader Service No. 158

Metal halide display lighting

Tamstar is the name of three metal halide fittings for display lighting. They provide a bright daylight effect with good colour rendering.

The fittings, by Tamlite Fase, can be supplied as surface mounted or recessed models in three wattages, 70W, 150W or 250W using double-ended lamps.

The 70W version is complete with protective lens, while the



150W and 250W units are supplied with an ultra-violet filter lens. Accessories include a base for rotational adjustment.

All fittings and accessories are white as standard.

Reader Service No. 159

LIF LINE

'Night out' - active participation beats crime

With the onset of winter, the nights will soon be darker for longer, and the inadequacy of public lighting in this country will cause fear and apprehension among many people.

The link between lighting and crime is not new. Women know what it is like to feel vulnerable — few do not worry about getting home after dark. This vulnerability affects the decisions we make every day, and causes us to change our travelling habits after 5pm in the winter months. But is it unacceptable that we should assume the role of a potential victim who is better off staying in than going out alone.

What are the facts? Only 5% of recorded crime is against people and seven out of ten violent assaults are on men. Also, two thirds of assaults on women are committed by people they know — so, statistically, the chances of a woman being attacked by a stranger are pretty slim.

On the other hand, Home Office research shows that recorded incidences of personal violence, rape, sexual assault and robbery have risen dramatically in the past ten years, and, in fact, crime figures overall have risen by 50% since 1979.

People's fear of crime, and their awareness of crime have risen too; we are becoming 'street wise'. Police advise us, especially, to avoid short cuts, dark alleys and roads where street lighting is poor or where there are few or no houses; to avoid isolated bus stops at night; to park in well-lit areas and avoid multi-storey car parks at night; to carry torches in our cars; and to install time switches and security lighting on our estates and in our houses.

These individual precautions are common sense, but the effect can be that badly lit streets become more isolated and potentially dangerous; more people stay at home and crime has an ideal culture in which to survive and thrive.

The residents of El Segundo, near Los Angeles, have an entirely different approach to the night-time 'frights'. They were urged to join more than 20 million Americans on 7 August in observing 'National Night Out' and turn their lights on for two hours.

According to Laurie Risk, El Segundo Police Department crime prevention specialist, this after-dark crime prevention event urged home owners, businesses and entire communities to turn their lights on between the hours of 8pm and 10 pm that night for security and spend a symbolic two hours outdoors demonstrating solidarity against crime.

"Take a flashlight and enjoy a walk through your neighbourhood," Risk said. "And by turning on our lights, let's turn the lights out on crime in El Segundo."

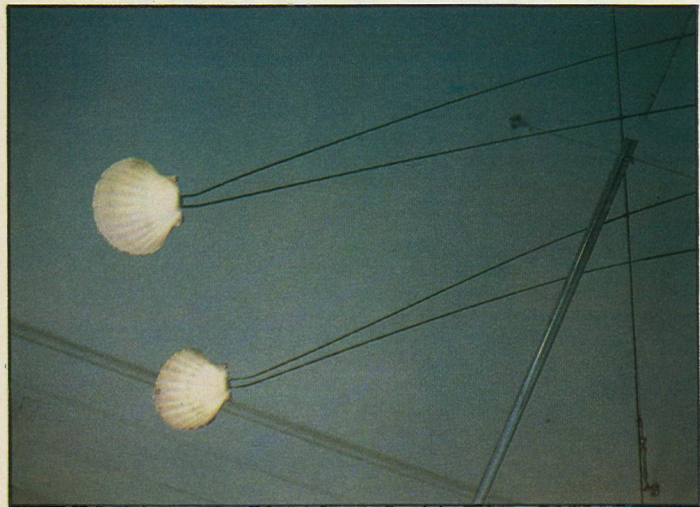
This event is not new. The first National Night Out took place in 1984. Since then, it has grown to a point where last year 19.5 million citizens in 6104 communities in all 50 states participated.

Sponsored by the National Association of Town Watch and Philips Lighting, National Night Out was photographed by the US Air Force by satellite.

The El Segundo police offer tips on lighting to protect homes or businesses against criminal activity — these include using exterior security lighting, and time switches — and recommend high pressure sodium, fluorescent or mercury vapour lighting as being the most economic and durable light sources.

It is in everyone's interest to make the streets, the workplace and the home a safer place. Protection is not just about individuals taking certain precautions but everyone taking action. So — take action. If lighting is poor in a particular area, contact your local council, write to your MP and make your views known in the local press and radio. Individuals must participate with police, the local council, industry and the rest of the community to raise awareness of the link between lighting and crime, and make our environment safer for everyone.

NEW PRODUCTS



Shell lights supported by bare wires

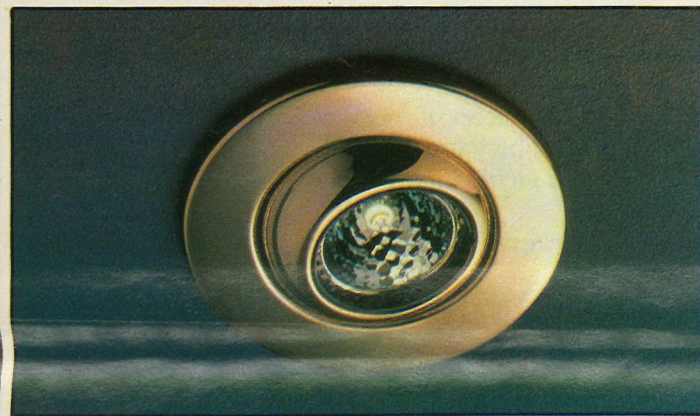
A low voltage, cantilevered light by Shiu-Kay Kan is called Scalopp. It uses a natural scallop shell to diffuse and reflect the light from a 20W 12V tungsten halogen capsule lamp.

The shell is held at the end of two stainless steel rods which are

cantilevered on two parallel bare cables positioned across a room 200-300mm apart and fed by a transformer.

Applications envisaged by the company include restaurants, shops and homes.

Reader Service No. 160



Low voltage luminaires

A range of low voltage luminaires for dichroic lamps has been launched by Chelsom in a product diversification to expand its contract lighting range.

The low voltage collection consists of square and round recessed downlights, an eyeball fitting and square and round surface mounted

directional spotlights.

The eyeball fitting is adjustable through 360° horizontally and 13.5° from the vertical. The surface mounted spotlights have diecast aluminium housings with injection moulded plastic fixing boxes which click together for easy assembly.

All models use either 20W, 35W or 50W lamps. The range comes in four finishes: 24ct gold plated, gunmetal, semi-matt black and gloss white.

Reader Service No. 161

Fluorescent luminaire for VDT areas

A new model in the Broadspread range of fluorescent luminaires from Moorlite Electrical is stated to meet fully the recommendations in CIBSE's *Lighting Guide 3* for effective control of glare and light distribution in category 1 offices having very high densities of VDTs with constant use.

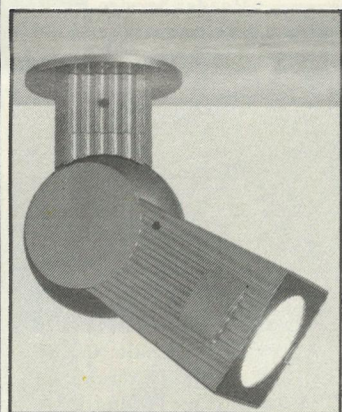
This distribution control has been achieved through minor modifications to the wedge shaped louvre configuration in the Broadspread luminaire. To order the category 1 model, specify W1 in the standard number ordering code.

Reader Service No. 162

Spotlight uses variety of track adaptors

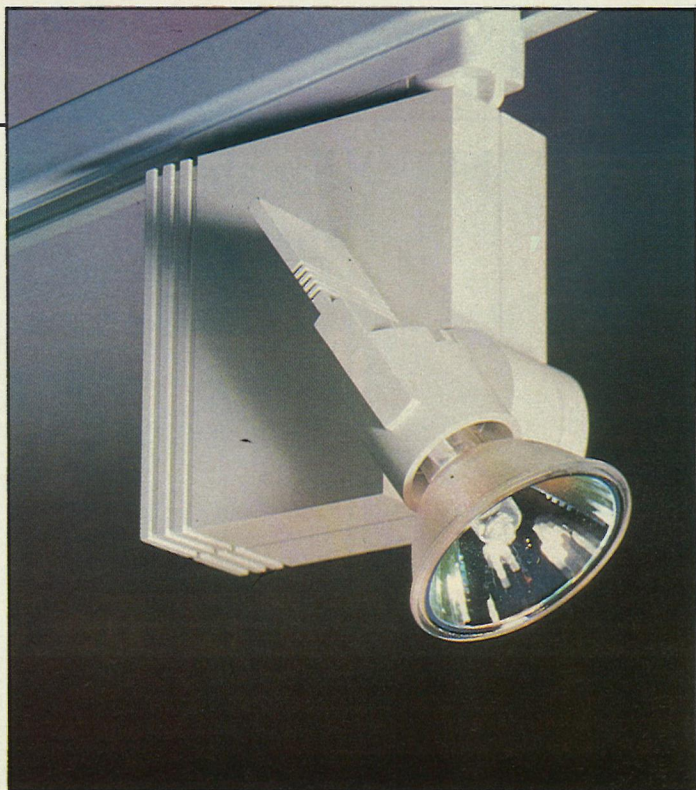
Choreograph is a range of spotlights from Artemide. They are designed to fit on a variety of manufacturers' lighting tracks by incorporating the appropriate adaptor within the spotlight housing. There is also a model for wall or ceiling mounting. Different versions accept linear metal halide, linear tungsten halogen and high pressure sodium lamps.

An aluminium reflector is used



and the housing is diecast aluminium finished either grey or black.

Reader Service No. 163



LV spotlight accepts many lamps

Lighting Workshop has launched a range of low voltage spotlights called Espia which accept Maxi-Spot, SuperSpot, capsule and dichroic lamps from 20W-50W.

There are two versions, one with an integral transformer.

Both units can be either track or surface mounted. The wide choice of lamps and mounting options gives designers flexibility while retaining the simplicity of working with one range.

Espia is available in either black or white.

Reader Service No. 164

Protection for LV lighting

Safety isolating transformers for low voltage lighting systems can be protected with a family of Polyswitch circuit protectors developed by Raychem.

Because several luminaires can be arranged in parallel on the same circuit, current drawn by a short circuit can be very high. In a cascade arrangement of four 20W 12V tungsten halogen lamps, for example, the total current delivered by the transformer is 6.7A.

Excess current, caused by a short circuit or a substantial reduc-

tion of the load, can lead to overheating, fire and burned wiring and connectors.

Raychem's RUE family of PTC (positive temperature coefficient) resistance devices have a hold current up to 8A and maximum voltage rating of 30V. Typically an RUE500 device offers protection for a 50W transformer for single spot, 12V lamps where the circuit current is about 4A.

Polyswitch circuit protectors undergo a large, abrupt change in resistance when an over-current or high temperature heat them above a specific point. Below the rated (hold) current they will not trip but remain in their very low resistance, conductive state. The voltage drop

across the device will, therefore, be minimal and the power lost negligible. This means that a special transformer is not required.

When tripped, a Polyswitch device limits the current to a very low value, thereby protecting the transformer against damaging or even dangerous overheating. As soon as the problem in the wiring has been fixed, it re-sets automatically. Raychem claims that its Polyswitch devices are the fastest acting PTC thermistors available.

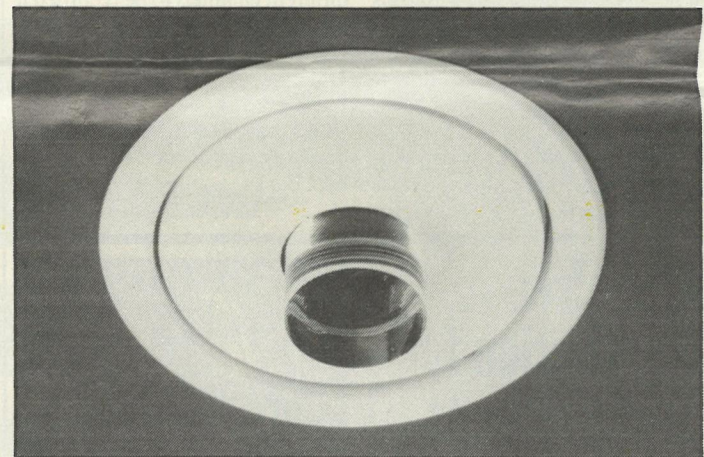
The new RUE family also has an improved endurance performance for protection over a week-end — they will remain tripped for 48 hours.

Reader Service No. 165

Decorative recessed downlight

A recessed, low voltage downlight from Lee Environmental Lighting has a decorative acrylic tube attachment either 30, 50 or 100mm long.

The fitting, which accepts either 20W, 50W or 75W tungsten halogen lamps, uses a remotely mounted transformer. When fitted with a 75W lamp, a dichroic reflector type is used to prevent damage to the acrylic attachment.



A magnetically held, decorative ceiling plate can be supplied if

it is required.

Reader Service No. 166

PALAZZO

MORE CHOICE. LESS ENERGY.

Palazzo is a complete lighting system. There's a choice of fixing options. A choice of eye-catching styles. A choice of switching options. A choice of lamp type from a range of energy-saving compact fluorescent sources. In short, a wide choice for commercial lighting needs. And all at a very competitive price.

IP44-rated and vandal-resistant, Palazzo is versatile in its use outdoors for schools, public houses, sports facilities and residential buildings. (And it can look good inside too!)

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Lumiance

THE SMART OPTION

Lumiance, Linolite Ltd, Malmesbury, Wiltshire, England SN16 9JX. Tel: Malmesbury (0666) 822001. Fax: (0666) 824954.



Security lighting options

Thorn Lighting has a range of three products using passive infra-red switching technology.

The Sentinel Security Lighting range consists of a stand-alone detector, a package consisting of a floodlight with detector, and the Sentinel bulkhead courtesy light.

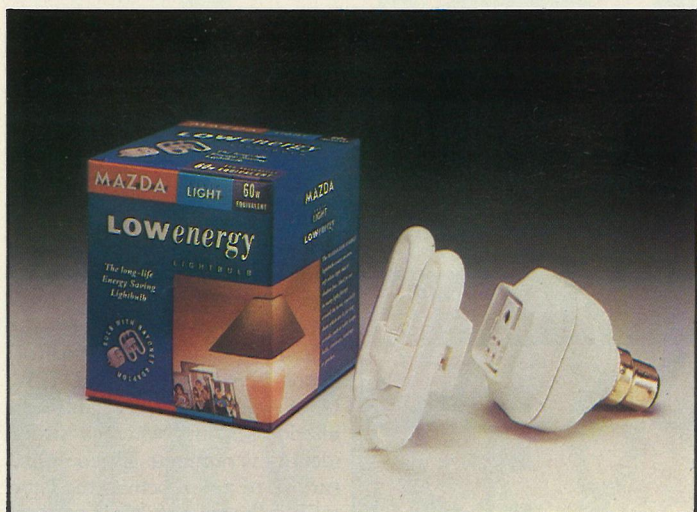
The detector can switch electrical loads of up to 2kW. It is

highly sensitive and can detect movement across a 15m range within an angle of 110°. The position of the head is also adjustable.

The floodlighting package offers a choice of linear tungsten halogen floodlights. The sensor can be positioned remotely and switches loads of up to 2kW.

Contractors working in the commercial and industrial security lighting field will find the range useful for garage forecourts, loading bays and car parks.

Reader Service No. 167



Tiny 2D for the home

Omega Lighting has now launched its 10W 2D compact fluorescent lamp together with an adaptor for BC lampholders.

It is being marketed for domestic use as a low energy replacement for 60W GLS lamps. The adaptor is reusable and has an electronic starter for instant flicker-free light. Total circuit watts used equals 14W.

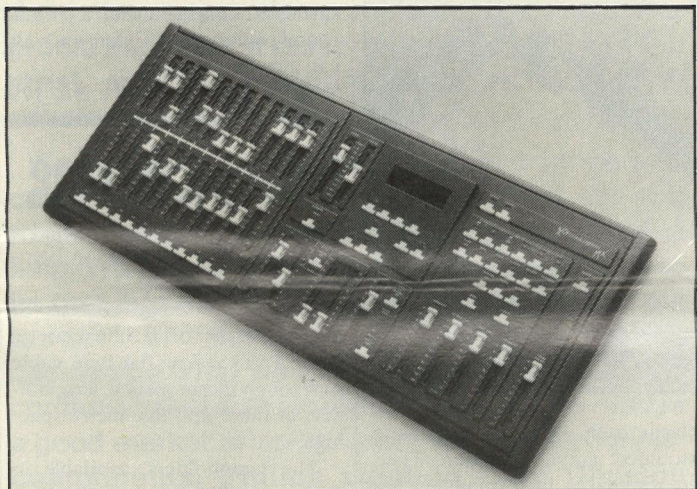
The lamp is stated to give a warm, shadow-free light. In addition to general domestic use, it is

particularly appropriate in hard to reach luminaires, such as over staircases, because of its long life.

Packaging is in an eye-catching carton made of 80% recycled cardboard. Product information, benefits and coloured illustrations of suggested applications are printed on the carton to encourage trial purchase. Consumer literature is also being prepared.

Trade price is £9.99 for lamp and adaptor.

Reader Service No. 170



Lighting control for pubs and clubs

Strand Lighting has introduced the MX range manual/memory lighting control system for pubs and clubs. MX is designed to meet increasing demand for reliability in control sys-

tems, particularly those operated by the non-professional user.

It has 12, 24 or 48 channels of two-scene preset faders; electronic patching for up to 512 dimmers, MIDI interface, allowing playback of lighting states and effects from musical instruments. It also features rapid recording of up to 192 memories in four pages for playback, and an optional 64K memory card for library storage.

Reader Service No. 171

Adjustable pendant

Flip is a swivel pendant on a telescopic arm from Forma Lighting

Ltd. It rotates through 360°.

Incandescent lamps up to 150W can be used.

Made of aluminium alloy and polycarbonate, Flip is finished in either satin aluminium or black. It is made in Italy by Lumina.

Reader Service No. 172



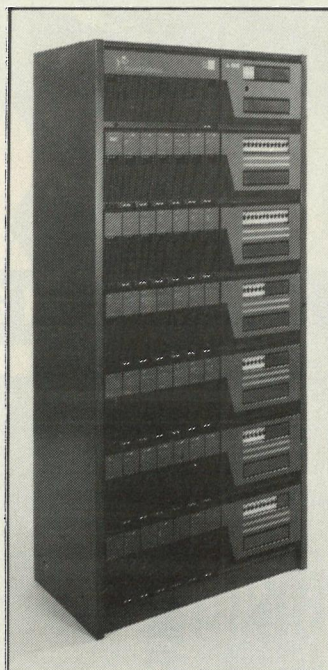
Better dimming for TV studios and theatres

Strand Lighting's EC90 dimming system for TV studios and theatres is a fully digital dimmer coupled with status and fault reporting features.

Digitally controlled thyristor firing ensures stability, precision and lack of drift. Internal microprocessor controls enable a range of features to be provided.

These include simultaneous input of digital and analogue multiplex protocols; selection of dimmer laws stored in the rack; creation of custom dimmer curves; electronic patching and storage of up to 32 backup states.

Key feature is that speed and stability has made a better dimmer; it offers software selectable



features and can be integrated fully with the lighting control system.

Reader Service No. 173

Commercial dimming system

Premiere is a programmable lighting control system by Strand Lighting for commercial installations.

It has 128 channels each with a possible 128 presets, controlling a maximum of 512 dimmers. With up to 64 control stations ranging

from a single push button to a sophisticated menu-driven command station with alpha numeric display, it can be custom designed to meet each user's needs.

Included in the features are a clock, disc storage, automatic events, up to 32 rooms per system, and local programming functions. The system also has an RS232 interface for building management systems.

Reader Service No. 174

Automatic safety testing

Clare Instruments Ltd has introduced an innovative automatic system for British Standard electrical safety testing of small appliances such as lighting.

It has a minimum of operator controls and is menu driven with clear, concise on-screen prompts.

A printed output is available. Disc-based data logging facilitates off-site statistical analysis for quality control purposes.

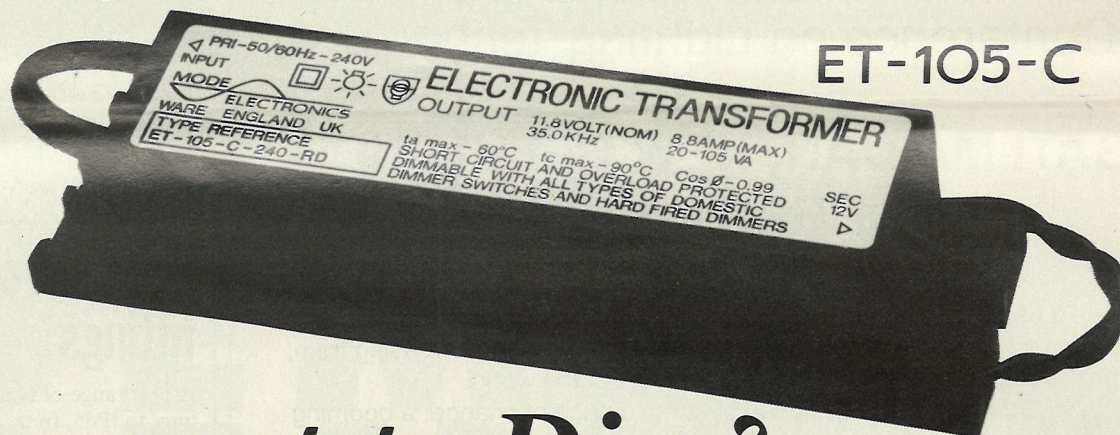
Tests include earth bond, flash tests, insulation, line and neutral polarity, temperature rise, etc.

Reader Service No. 175

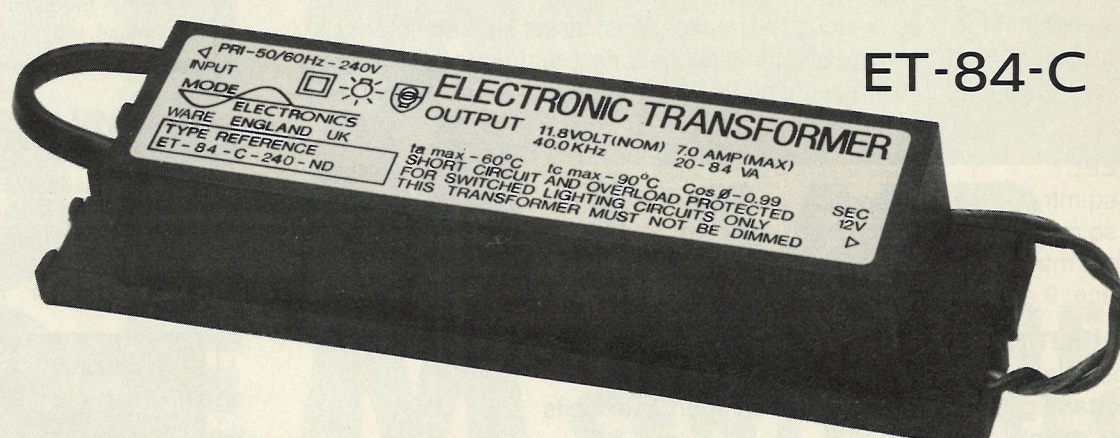
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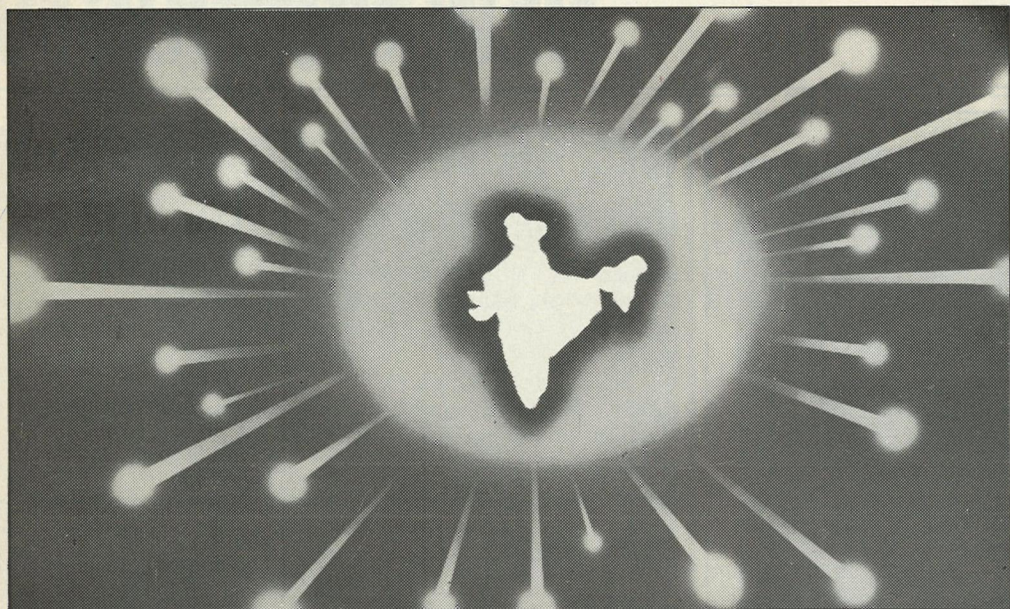
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US\$ 50 per sq.mtr. (non-air conditioned)
US\$ 25 per sq. mtr. (open paved area)

Minimum space: 9 sq.mtrs; additions in multiples of 9.

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- Waiver of bank guarantee for temporary import of exhibits
- Fair quota for sale of exhibits

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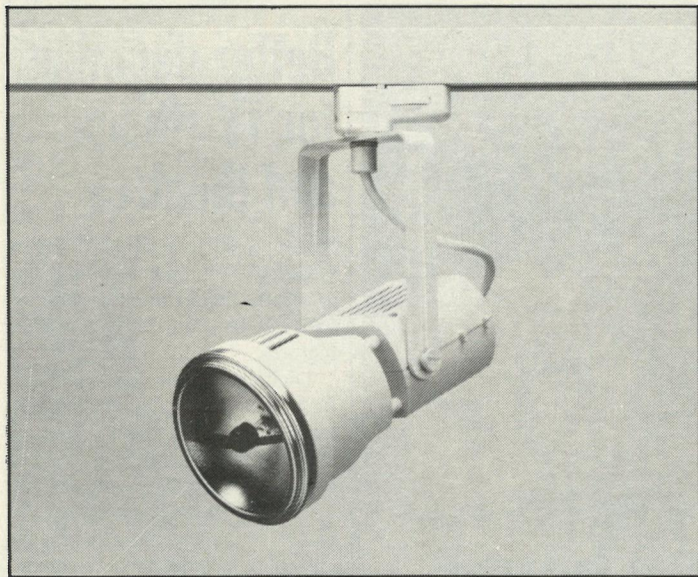
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NEW PRODUCTS

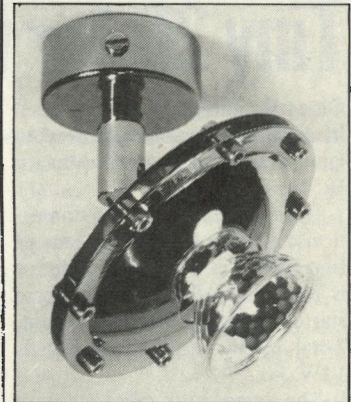


Luminaire comes in to land

Luna Lighting has launched UFO, a new range of individual designs of low voltage lighting.

Designed to capture the mystique of an unidentified flying object, the luminaires are available in either a chrome or gold finish.

Suitable for low voltage dichroic lamps between 20W and 75W, UFO will complement different interior schemes where a strong identity is required. The polished surface of a disc behind the lamp reflects the colourful light patterns



from the back of the dichroic lamp.

The luminaire is intended for surface mounting using a 50mm round ceiling plate. Extension rods can also be provided.

Reader Service No. 179

Halospot superspot

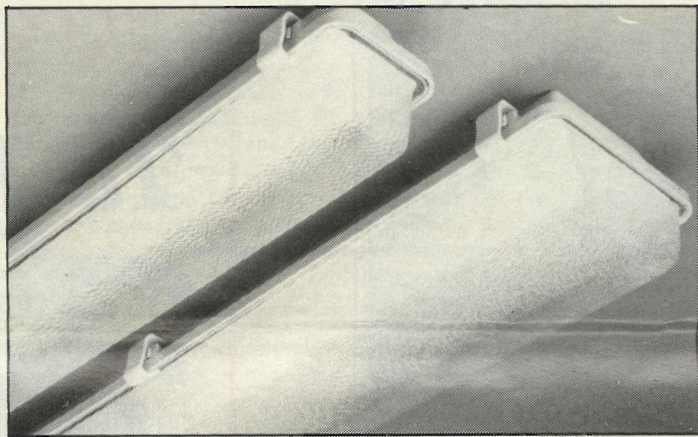
The new Superspot range of low voltage spotlights, from Program Lighting, incorporates the Halo-spot 111 range of tungsten halogen lamps.

The spotlight is compact and lightweight with an integrally mounted electronic transformer. It is suitable for track or surface

mounting.

Available in 50, 75 and 100W versions, there is a choice of beam angles from 5° narrow spot to 60° wide flood distribution. The standard fittings and electronic transformer allow lamp wattages to be interchanged.

Reader Service No. 176



Non-corrosive fittings

A new range of non-corrosive fittings to IP65, from Tamlite Lighting, is available in four sizes, for single or twin fluorescent lamps.

Fittings are manufactured from a moulded, tough, glass reinforced

plastic body with clear prismatic, moulded acrylic diffuser. There are dimmable, high frequency and emergency versions, while anti-vandal polycarbonate diffuser and tamperproof clips are available.

The fittings are suitable for use in damp and dusty conditions and special versions can be supplied for use in cold store installations.

Reader Service No. 177

A new planet

Electrolite has extended its Planet range with the launch of Saturn wall and floor fittings.

Designed to accept linear tungsten halogen or metal halide

lamps, the fittings are available in a wide range of plated or painted finishes.

The floor fittings incorporate dimmer switches, while borosilicate safety glass and isolated gear boxes are available.

Reader Service No. 178



Festoon lighting

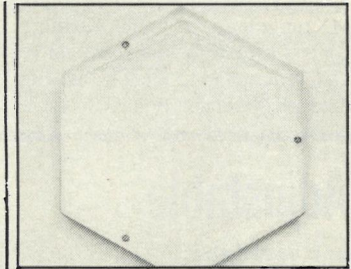
George Turnock has launched a new range of 110V festoon lighting for building sites.

The T8200 range consists of 100m lengths of 2.5mm² arctic grade PVC yellow flat twin cable with tough thermoplastic lampholders at three and five metre spacings.

The lampholders, available in B22 or E27 versions, are ultra-sonically welded to the cable giving an IP54 ingress protection rating and incorporate phosphor bronze springs and solid brass contacts.

Plastic coated wire lamp guards are also available.

Reader Service No. 180



Glass wall lights from Italy

Maggiore and Minore are wall or ceiling mounted luminaires which can be grouped together to form a variety of patterns. They are available in the UK from Lumino and are made in Florence by Ladue.

Maggiore is octagonal and has an opal glass diffuser with a raised centre section. It uses either two 9W PL compact fluorescent lamps or two 100W GLS lamps.

Minore is 230mm square and also has a white opal glass diffuser with a raised ridge. Either one 100W GLS or one 9W PL compact fluorescent lamp may be used.

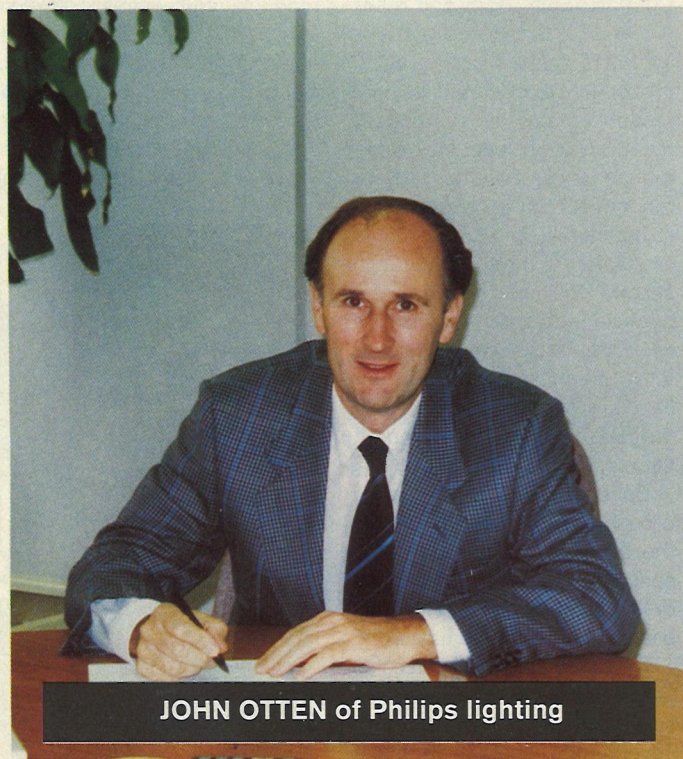
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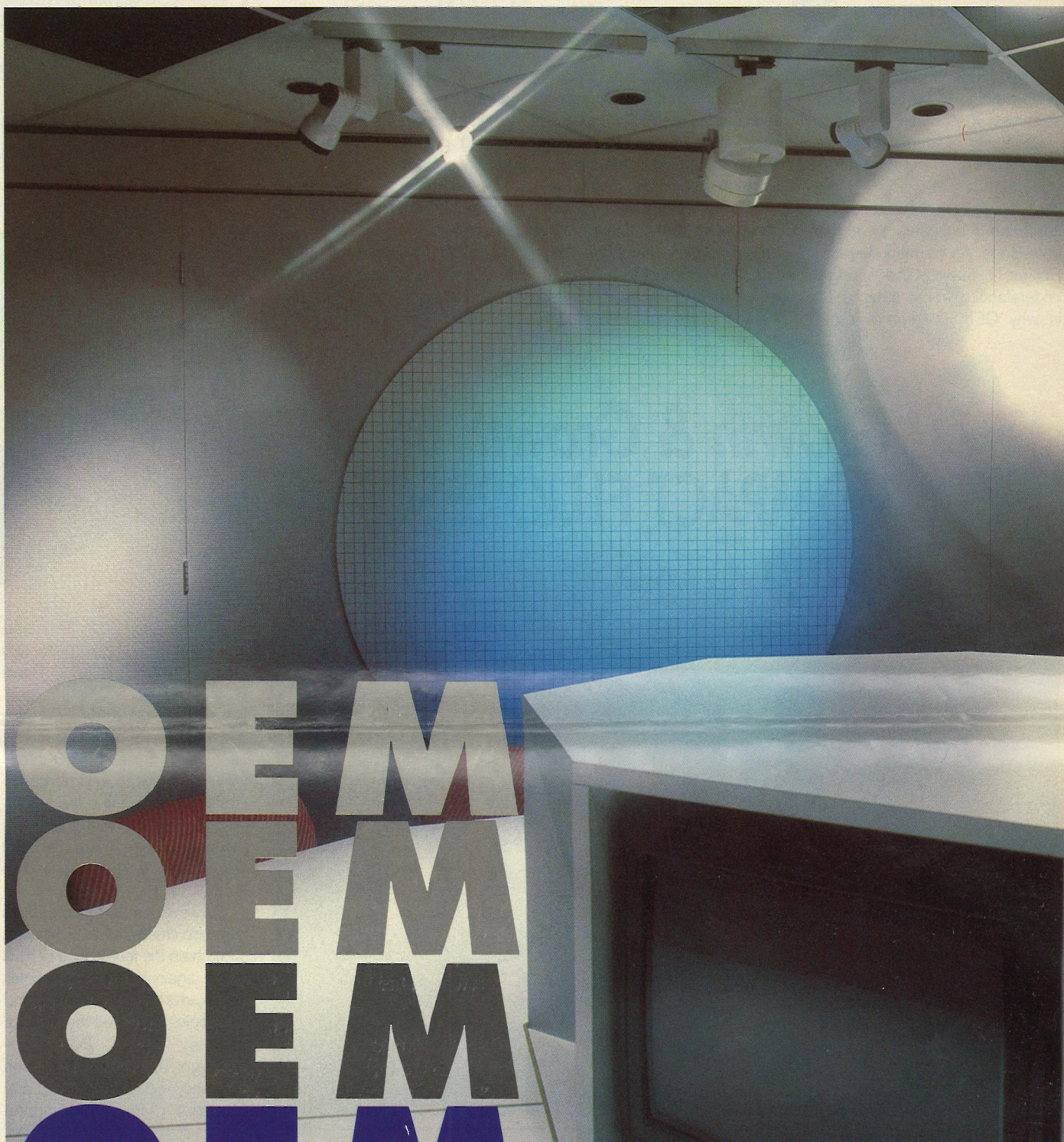
Issue No. 1

SERVICE & SUPPORT to OEMs

Let that support and service work for you. We have a strong OEM team with technical and market knowledge ready and able to support you.



JOHN OTTEN of Philips lighting



**LAMP &
COMPONENT
CENTRE (LCC)**

Lighting, UV and IR discussions are often held with OEMs in the LCC. We proudly boast that OEM Division "Covers The Spectrum"

TOMORROW'S MARKET TODAY

WITH LIGHTING ELECTRONICS

Controlling our working environment is used increasingly and lighting is no exception. The use of high frequency lamps or standard lamps addressed by HF circuits is common. Even the second generation of HF, that is regulation using modified circuits, whether daylight-linked or time sequenced, has become almost the norm.

But for the end user there are two real needs: firstly is the HF system going to be reliable and secondly, what will be his payoff.

Reliability depends on component manufacturers understanding the limits of the lamp/electronics interface. Few component suppliers have this knowledge. As the market leader, Philips, have the prime understanding of this area, which is why OEM Division is often

specified by and to OEMs.

The payoff for the end user is not just energy saving, that pales into insignificance compared to improved productivity after using HF. The gains whether through higher lighting levels, better "flicker free" lighting, or better comfort factors for workers, or even less absenteeism are strong reasons themselves to expect improved productivity.

But the payoff relies on good component compatibility, from a good supplier, like Philips Lighting.

For the immediate future another lighting electronics revolution is beginning to emerge, thus "From the kitchen" we can already see cheap IR personal programmable switching and regulation controllers for lighting, in much the same way as we control TVs and VCRs, and with similar

looking control units. This will include incandescent as well as TL lamps.

The savings for OEM's customers here will be that there is no need for wall switches and the attendant wiring costs. These can be massive in some buildings. It also means more flexible use of space, with, say, cellular offices becoming open plan and vice versa. Certainly comfort and personal lighting needs can also be catered for.

And of course the "all singing all dancing" prestige office becomes a reality.

OEMs have already been sampled and are ready to produce luminaires.

Another example of OEM Division's collaboration with OEMs to help them to the market first.

31

THE Growth & Growth of COMPACT FLUORESCENT Lamp Types



First there were 2 pin PL lamps, now called PLS (S for small), with integral starter up to 11w. These were used for bulkheads, wall lights, conversions of GLS lamps and a plethora of other applications. Now there are also PLS lamps with 4 pins used in emergency lighting and all the PLS applications. But along with this there came 4 pin PLL (L for long) which has now been extended up to 55w.

However, market conditions have also created other PL shapes, so we have the four-legged or PLC lamps, again in 2 or 4 pin options. The advent of these and electronics advanced the case for another family, the PLC-E range (E for integral high frequency electronics) in BC and ES caps giving OEM market

opportunities. Added to the families are the various colour options varying between 2300°K and 4000°K.

Newest members to the PLL family are 40w and 55w which are dedicated to operation on electronic circuits. Both lamps have the same length and have 3500 and 4700 lumen packages respectively.

Whilst the 40w lamp has the same surface brightness of a 36w TLD lamp, the 55w surface brightness makes it more appropriate for indirect lighting.

In the PLC-E family, lamp lengths have been reduced making them even more compact, so that Decorative Lighting OEMs have opportunities to introduce modern lamp technology more easily into their range. PLC-E lamps come in

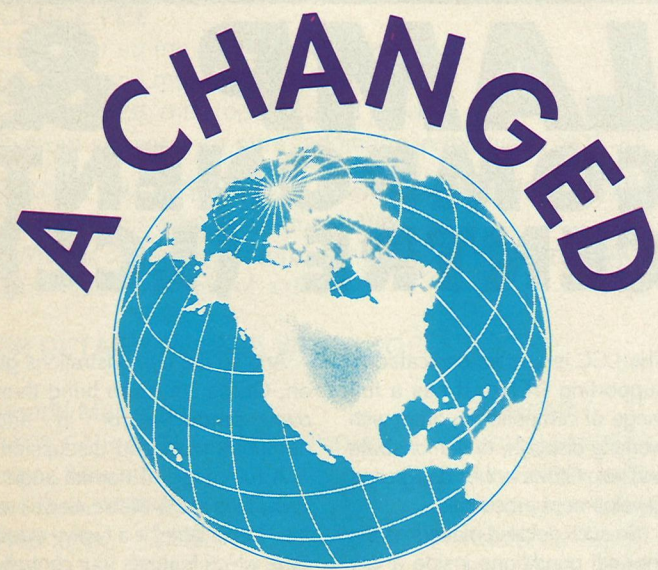
colour 82 to match incandescent sources.

Truly PL lamps have grown and grown and with them massive changes in OEM opportunities to design even more novel luminaires driven to (or up to) portable battery driven executions.

And the future holds out more surprises as the OEMs identify and collaborate with Philips to take advantage of opportunities.

It's just about 12 years ago that the 100 years of the electric light was celebrated, a mere 12 years and a total new lamp family has been created with massive tooling production and marketing commitment from OEMs and Philips Lighting. It's a remarkable story and does credit to OEM's rapid identification of market swings.

32



WORLD OF HID LAMPS

A scientist looking at the world's first SOX street lighting installation (using Philips lamps) on the Purley Way in Croydon in the 1930s wouldn't believe how HID lamps are being used today. Of course there is still street lighting but now in SOX-E, SON, SON S/T, HPL-N and still some TL. Added to this are a myriad of other applications going from heavy industry through light industry, workshops, warehouses, loading bays, petrol stations, sport, prestige buildings and constructions, even offices, prestige foyers, theatres, growing flowers, plants and vegetables and perhaps what would be the most surprising to the 1930s scientist, high fashion display and accent lighting.

How the world has changed and mainly with the market application explosion happening in the last five years. And it's not technology driven, you can't push water uphill, ask any marketer, it's what the market has wanted. So we had to try to anticipate this across a spectrum of companies with different market ideas.



Thank goodness we have the research facilities to know what happens when different filler gases are used and at different pressures, what happens when the sodium mercury ratio is charged, what happens to the colour appearance

with a fraction of a gram change in a metal halide lamp cocktail.

This is how WHITE SON, single ended metal halide lamps, SON Comfort, SON Agro and other lamps still in the kitchen are born, it's basic science scaled up to production reality. And volume production demands stringent quality control to meet the market requirements on life, colour rendering, colour appearance, colour stability and so on and so on. Here we have a reputation second to none - we know because we test competitors on a continuous basis. We are famous for it, the main landmark at our headquarters is a light tower with the HID lamp racks glowing all through the day and night.

But equally we have been wise enough to realise that with some of the new lamps, special optical control is needed to produce well defined high accent factor (AF) beams from discharge tubes.

These are not point sources so parabolic reflectors are not successful. We have been adventurous enough to make

reflectors and reflector profile coordinates available to help OEMs to the market rapidly.

It's why we know about today's products and we can develop tomorrow's. The HID lamp market has changed, ask for our advice. But also consider how to control the lamp properly. Lamp gear compatibility is important as we know....

33



All HID gear is the same?

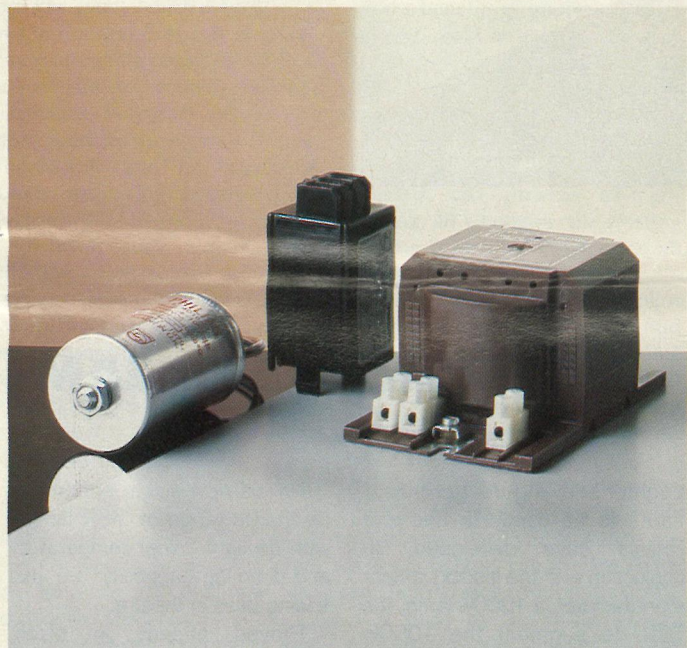
What rubbish, but it's heard. Quality matters in the market and to us, we want our lamps to operate properly and who can know more about that than us? We don't just manufacture to the standards, we beat them and that means BSI, VDE, NEMO, SEMO, KEMA etc etc etc.

Our quality is visible and measurable. Consider how many watts are dissipated that customers pay for in their electricity bills. Why should they pay extra? That's only part of the quality and service that we provide to OEMs.

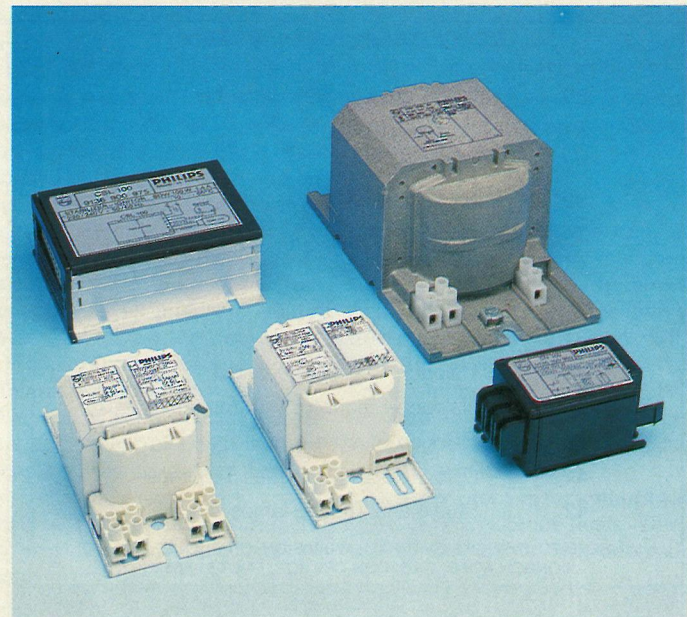
A Philips HID ballast is recognisable instantly, it's a clean cut, brown nylon encapsulation around an orthocyclic winding. But even that has been improved, we have moved to grey rynite encapsulation, which gives even better mechanical vibration and thermal insulation performance mechanical vibration is important in both industrial and street lighting. Gear moves, get into a tail lift vehicle and replace a floodlight or road lighting lamp to experience that sensation.

We also concentrate on producing low volume windings, hence orthocyclic, that's helpful to OEMs to enable them to produce less costly smaller housings.

And now we launch what we call our basic range. Really it's not basic, we still maintain the electrical and thermal characteristics of the rynite range. The real differences are what we call "wild windings" and a less stringent cosmetic finish. It's still quality, it beats the standards it has the same base plate dimensions as the orthocyclic range, but it's white and we offer a wider range of options per wattage and lamp type, but so far only up to 125w.



By the way, did you know that you can “dim” SON lamps? It’s possible (by using a special extra ballast), to half power a lamp. On the continent for instance, it’s not uncommon to have twin SON lanterns on a column, so with suitable addressing you can have full, 3/4, 1/2 or 1/4 power. Along with ballasts go ignitors, these too have been changed recently. Now the Tw is 90°C, that extra 10°C is critically important in gear box and luminaire design. It can save OEMs thousands of £s in development, tooling and production costs, low bays and display lighting fittings are just two examples.



Another simple feature of Philips ignitors are the twin flexible lugs at the ends, these allow the ignitors to be click-fitted into suitable location positions. This saves labour time at the OEM stage and if maintenance is needed. But as an alternative simple screw fixation is provided. 34



TAKING THE HEAT OUT OF D•E•S•I•G•N

Without doubt one of the most remarkable growth markets and hence product development is short wave infra red heating.

The most recent volume market examples are cooking by light and zone heating. Both are based on quartz linear halogen lamps and equally both are perfect examples of "co-makemanship" with the OEM and Philips OEM Division (including our factory and development laboratories)

collaborating to realise a market driven product. But these are only two examples of such “co-makership”, most IRK lamps have market driven “co-makerships” specification.

But not only can we help with lamp design, but also with reflector design. After all we do have excellent central development and application laboratories which are dedicated to IR support.

35

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FROM
SUNTANNING
TO
CHEMICAL
REACTIONS

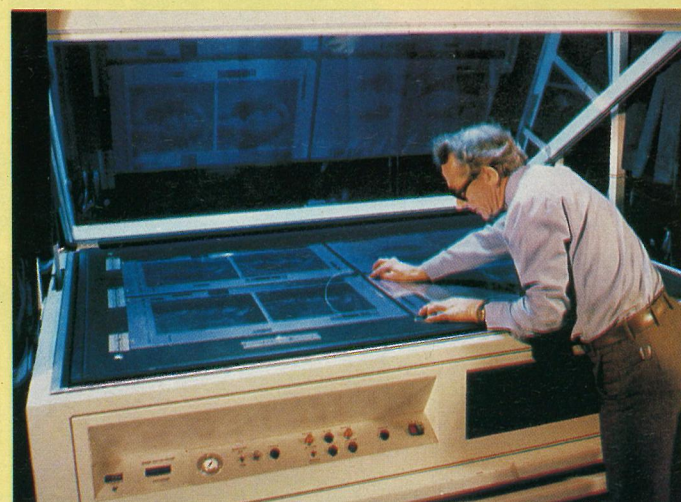
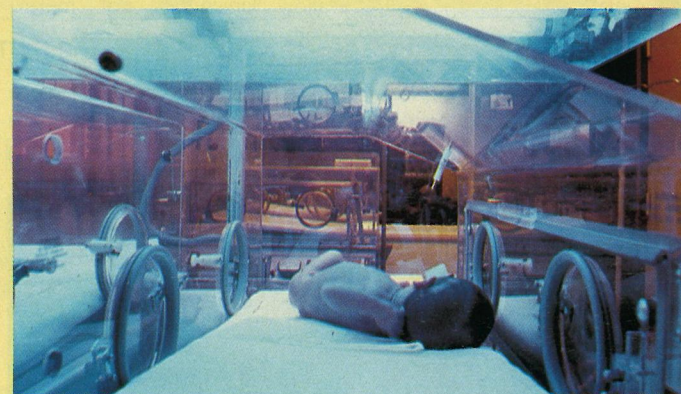
It has been known for decades that ultra-violet light induces many chemical reactions. At least one chemistry Nobel Prize has been awarded for the use of UV in determining what happens in certain chemical reactions in a micro-second.

At a more practical level, the markets are as diverse as discos, suntanning, coral growth, printing, lacquer curing, EPROM erasure, forgery detection, disinfection of air and liquids of all types and non-destructive testing (NDT) procedures to name only a few of the thousands of chemical reaction applications.

Again this is a market where OEM collaboration is a major feature of Philips Lighting's OEM Division operations. It's an area where the variety of lamps is enormous, from 3 pin BC to TL bi-pin, to special cap type lamps in a variety of shapes. So we cover a large number of lamp production techniques.

The variety of application also indicates the range of markets that we serve, from consumer goods to industrial each with their special needs and service levels. Again OEM Division is accustomed to a diverse range of customer needs ... including the end user.

We can help.



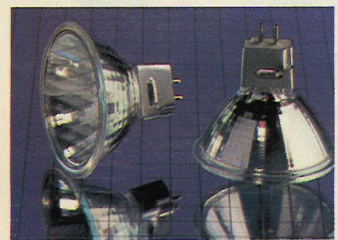
THE DEVELOPING WORLD OF HALOGEN LAMPS

Converting science to technology has continued apace in halogen lamps, and with it OEM Division have kept pace with the market and product developments. Different gas mixtures and pressures, improved burners, improved integral optics are some changes and the future holds out more promise.

Most recent among the market arrivals is Masterline, a third generation dichroic lamp. Masterline has integrated novelty in many ways. It uses:

- a high performance burner
- special gas filler
- computer designed reflector profiles
- clear flat optical quality front glass
- a new metal cased cap

Everything is aimed at quality so that the cut off is noticeably superior to standard lamps. Even the rear "twinkle" circle is more symmetrical.



MASTERline

With Masterline, OEMs can upgrade their fitting at a stroke, either for energy saving or improved sales display impact at user level.

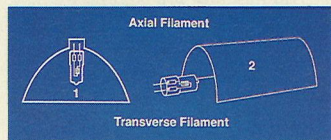
For energy saving, using Masterline at one wattage down from standard produces the same lighting result. In short 15 watts can be saved per point.

For improved impact, Masterline can give up to 72% more light for the same wattage, even with lesser light level improvements, the display accent factor (AF) is noticeably improved. For more information on Masterline see LEN August 1990.

37

In capsules Philips are leading the modern tendency towards axial filament lamps. This is because there are more applications which

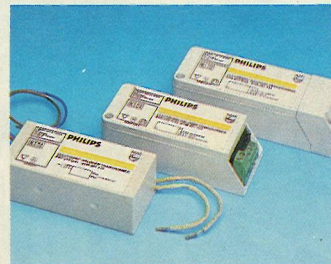
are better served by rotationally symmetrical reflectors for which axial filament lamps are the ideal solution, producing more intense narrower beams. Both clear quartz and silver (matt) quartz axials are available. For wall washing effects transverse filament lamps are available, these are best used in linear parabolic/elliptical reflectors.



Of course the choice is for the OEM to make and for them to design the reflector. Whatever their choice, the lamps are available.

38

New into our range for low voltage capsules and reflector lamps are Philips manufactured Electronic Transformers. Two types are available, the R and S series. The R series has built-in regulation of light, the S requires external dimmers to be used. Both transformers comply with all the applicable standards for safety, harmonic distortion and radio interference. Their small size and low heat dissipation make it easy for them to be designed into equipment or control boxes.



The transformers have been designed to overcome all of the historical problems of copper iron types, including well-controlled voltage and current outputs which help in lamp life.

So the design has been aimed at providing quality for OEM customers.

39

In the High voltage range comes Plusline, the new higher standard in double-ended halogen lamps. Plusline incorporates a new halogen compound, which allows the lamp to generate 20% more light than standard K lamps. The range is from 100w to 2KW with the popular 100w to 500w having extra properties of fuses in the pinch, to ensure safety in operation, and filament supports to allow universal, not merely horizontal burning.

The blue R7s caps make it easy to recognise Plusline and despite the added value the prices are highly competitive.

40

COLOUR RENDERING AND HIGH FREQUENCY - THE TL FUTURE



Despite the growth in PL Lamp types with their various triphosphor colour options, standard fluorescent lamp development has not stood still. Developments have been based on the quality end of the market, with high colour rendering lamps (the Ra8=95 colour 90 series) and dedicated Argon filled lamps for full (dimming) high frequency lighting in the well known colour 80 series.

Historically, equipment in the 90's Ra8=Sphere has always been an OEM operation, mainly through colour matching luminaires. But now the markets have expanded for quality colour rendering applications. Put simply, they help "move goods off the shelf" more rapidly and they give a better image to premises. The applications with these needs are obvious to any OEM.

But the OEM market is still dominated by well established colours which we can fulfill from our many factories. We have the latest technology including machines capable of making and automatically packaging 6000 lamps every hour.

Our mechanisation is second to none and so is our quality.

41

L

ighting the stage...

A DESIGNER'S DREAM

Lighting for the stage gives the lighting designer a freedom unknown to those who light conventional interiors.

Theatre Lighting is an art form in its own right, where the designer creates an image or illusion with light often using high contrast to help create a dramatic effect.

And to assist designers in their task, the manufacturers of theatre luminaires are constantly creating new hardware and in turn are demanding new lamps from the lamp companies.

The last 4-5 years has seen

programmable moving light sources which first applied movement, to give a new dimension to lighting but then adapted to allow one source to perform several roles during successive cues.

Added to this are automatic colour scrollers, which change from one end of the colour spectrum to the other in two seconds and can repeatedly stop accurately anywhere in between, allowing even further flexibility and thus quicker turn round between shows. To achieve even greater colour saturation, lamps are getting

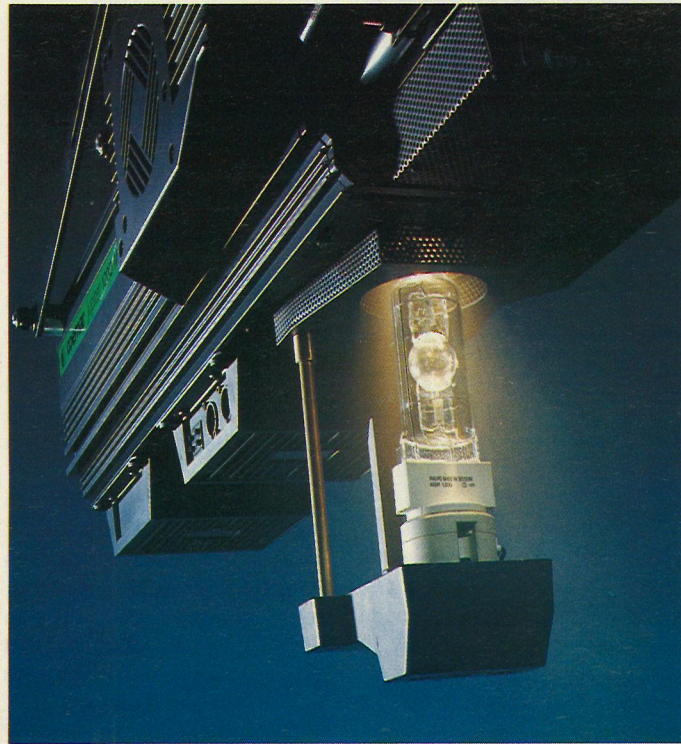
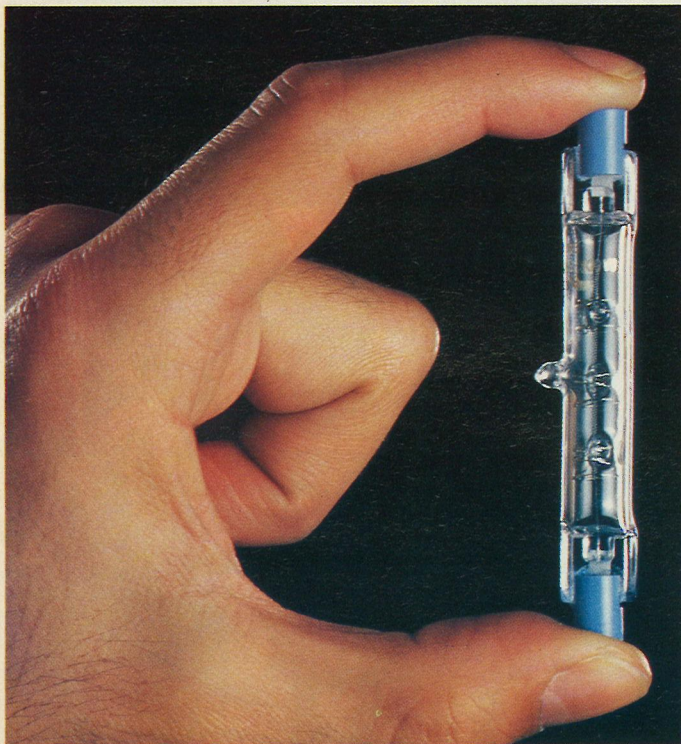
brighter allowing deeper colour filters to be used. To this end Philips have developed, in conjunction with the leading lantern manufacturer, a 1200w lamp, the T29, to augment the 1000w workhorse, the T11.

The range of lanterns built around the T29 have features which allow faster 'set ups'; also design changes included in the new lamps, along with the improved cooling of the lantern, mean a longer useful life, hence fewer breakdowns and dark spots on stage.

Philips new single-ended gas discharge range of MSR lamps, with daylight colour temperature and dimming capability, are also finding uses in theatre.

Proved already in disco, projection and now studio lighting, they are finding applications in short- and long-throw follow spots and effects projectors. Also new uses are being considered all the time, including fibre optics and even commercial display lighting to mention but two.

42



READER SERVICE NUMBERS

For further information on the following product ranges - please tick box

- | | | |
|----|--------------------------|----------------------------------|
| 30 | <input type="checkbox"/> | Lamp and component centre |
| 31 | <input type="checkbox"/> | High frequency |
| 32 | <input type="checkbox"/> | PL lamps |
| 33 | <input type="checkbox"/> | HID lamps |
| 34 | <input type="checkbox"/> | HID gear |
| 35 | <input type="checkbox"/> | Infra-red lamps |
| 36 | <input type="checkbox"/> | Ultra-violet lamps |
| 37 | <input type="checkbox"/> | Halogen-Masterline range |
| 38 | <input type="checkbox"/> | Halogen-Capsuleline lamps |
| 39 | <input type="checkbox"/> | Halogen-Electronic transformers |
| 40 | <input type="checkbox"/> | Halogen Plusline |
| 41 | <input type="checkbox"/> | Colour 80 and 90 series TL lamps |
| 42 | <input type="checkbox"/> | Studio and Theatre lamps |

SEND TO: PHILIPS LIGHTING OEM DIVISION, CITY HOUSE, 420-430 LONDON ROAD, CROYDON CR9 3QR. FAX: 081-665 5102

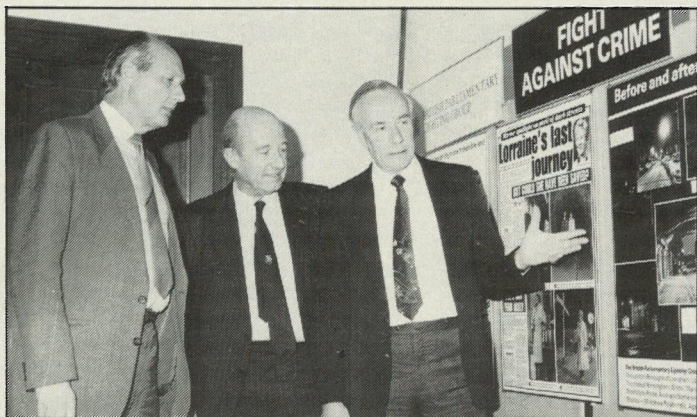
Philips Lighting



PHILIPS

Lighting fights against crime

An overview of progress and events in the campaign to fight crime by improved street lighting.



Kent County Council staff listen with interest as Norman Richardson of the British Parliamentary Lighting Group explains the display.

Criminologists from around the world will address a conference in London next month on global aspects of crime and policing. The event, which is being held by the London Borough of Islington, is attracting registrations from police officers, council officials, politicians, voluntary groups and other agencies throughout Britain. There will also be exhibition stands displaying relevant products.

Professor Jock Young, from Middlesex Polytechnic, will speak on crime prevention, including the role of lighting. Other subjects to be discussed during the two days (26 and 27 November) will include violence against women, policing post 1992, social causes of crime, and drug wars.

There will be speakers from Venezuela, the USA and the Netherlands. Captain of the Moscow vice squad, Natasha Averino, has been invited and may also address the conference.

This is just one example of how the message about the relationship between lighting and crime is being spread.

A few months ago, at a conference on crime and lighting held in Leeds, the keynote address was on *The scope for public lighting as a means of crime prevention*. It was given by Kate Painter who carried out major studies on outdoor lighting and crime while at the Middlesex Centre for Criminology.

Another of the speakers on that occasion was Joan Walley, MP, a member of the British Parliamentary Lighting Group (BPLG), who pointed out that despite urging on her part about the importance of lighting, she was not receiving a positive response from government and asked local councillors to continue to push and make their voices heard.

The London Borough of Hounslow is doing just that. The chairman of its transport committee has said, "Fear of crime restricts people's lives creating a 'fortress environment' after dark... We shall be pressing the government to provide a better allocation of funds from the Urban Renewal programme so that we can improve our lighting programme."

In Hounslow, the crime prevention officers in the local police force supply a regular print-out on local crime to the council. This is invaluable to the council in allocating priority to new lighting

schemes. Hounslow is also planning to set up a study of lighting and crime in the borough.

Kent County Council is half way through two studies to evaluate the benefits of improved street lighting. In Canterbury, 66 low pressure sodium lamps rated at 35W have been replaced by 90 high pressure sodium lamps rated at 70W. The new installations meet the recommendations of BS5489 and provide all-night lighting. In Chatham, the existing lighting is now being operated all night.

At Blantyre, Strathclyde, a pilot scheme is being conducted to find areas where there is a lot of crime coupled with poor street lighting. A high level of lighting will then be installed in a bid to deter criminals.

Northumbria Police are carrying out a lighting survey in Haltwhistle and the Tyne Valley to see if better lighting can combat crime and help to save lives on the roads.

A study by the Retail Group consultancy has concluded that inadequate lighting is one of the shortcomings of Ipswich town centre. The survey, commissioned by the borough council, calls for dramatic improvements before shoppers start to shop out of town.

The results of all these studies will add to the knowledge gained from surveys in Edmonton, Hammersmith and Fulham, Tower Hamlets and the Hilldrop Estate in Islington.

The Association of Metropolitan Authorities is also making a contribution. A report is being produced by its crime prevention working party.

Creative approach

Local authorities do not have a statutory obligation for crime prevention. The Labour Party, however, has committed itself to introducing a crime prevention bill imposing such a statutory duty. Local authorities would then be required to implement measures such as better street lighting and better design of estates.

A major problem for authorities is, of course, lack of funds. One authority, Oldham, has adopted an innovative approach to this problem. It is selling advertising space on its lighting columns to local companies and expects to raise £70 000 a year by this method, so giving a new meaning to the expression creative lighting!

The danger of old street lighting

installations was dramatically illustrated a few months ago in Sheffield when a piece of concrete from a crumbling lighting column hit a schoolboy on the head. Fortunately, he was not seriously injured, but council officers estimate that up to 12 000 columns in the city are disintegrating and dangerous. The difficulty is that it requires £2-£3 million to replace them.

People in towns and cities up and down the country are putting pressure on their local authorities because of worries about the effects of poor road lighting, such as lack of personal safety and accidents on footpaths at night.

In Nottingham, a petition calling for prompt action to improve lighting as a deterrent against vandalism is to be presented to the Lord Mayor.

A campaign to extend all-night lighting to the whole of Hertfordshire has been launched by county councillor Rod Fricker, who said, "All-night lighting not only reduces the risk of traffic accidents — research has shown clearly that crime levels drop when roads are well lit".

Hastings, in Sussex, showed this to be true in an experiment when three streets were given all-night lighting. Car crime fell by over 67% in a three month period — from 31 incidents in 1989 to 10 in the same months in 1990. What is more, over half the local people interviewed felt safer walking after dark. Fear of crime is another important factor in the overall situation.

Parliamentary campaign

The British Parliamentary Lighting Group, which is made up of over 100 MPs, is sustaining its campaign for better lighting.

Its display boards on the theme Fight against crime — light against crime, have just been updated and a new leaflet is being printed which highlights the problems and calls for more investment in lighting. This display is staged at events around the country, particularly local council meetings where a 20 minute "slot" is requested to address councillors. A video, *Out of darkness*, is also available.

Local authority decisions on lighting are monitored by the BPLG secretariat at the Lighting Industry Federation.

Following the showing of the display at a conference of the Association of Municipal Engineers, the Association expressed interest in a closer relationship with the BPLG.

The Association of Street Lighting Contractors is considering sponsoring and joining the steering committee of the campaign.

These developments have encouraged the BPLG to seek closer involvement of other bodies and it is going to explore this possibility.

Meanwhile, the Association of Metropolitan District Councils has circulated a questionnaire to its members about existing street lighting installations, with a view to building up its own parliamentary lobby to increase funding for street lighting.



The Hilldrop Estate: above, before relighting; below, afterwards.



On the government front, the Home Office is funding research into the effects of upgraded street lighting in the London Borough of Wandsworth.

The government has also invited chief police officers and local authorities to submit to the Home Office by 30 September 1990 reports on arrangements that have been made, or it is proposed to make, to strengthen crime prevention activities.

The BPLG feels that the Department of the Environment should build a provision specifically for lighting into the Urban Aid Programme.

It also maintains that public lighting engineers need a clear signal from the Home Office to councillors, engineers and architects that all street lighting should be brought up to the appropriate British Standard recommended level in a rolling programme over five years.

Design against crime

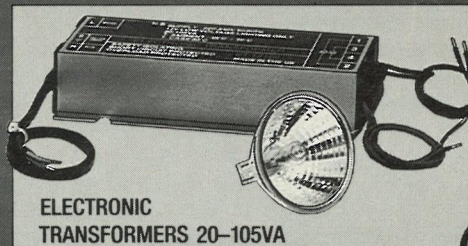
A welcome recent development is the move towards "designing out crime". *Secured by design*, for example, is an initiative to encourage home builders to conform to recommended standards of security, including exterior lighting.

In London, several boroughs have been nominated for Brightening up London Awards because of their improved street lighting. The possibility of having a special category for outdoor lighting next year is under discussion. These awards are organised by London Electricity and London Talkback Radio.

In short, the campaign for the recognition of the importance of good street lighting is still going strong. Let us hope there will be positive results to be reported at the 1991 National Crime Prevention Seminar.

RAM

ADVANCED DESIGN
TRANSFORMERS & DIMMERS
FOR LOW VOLTAGE LIGHTING



ELECTRONIC
TRANSFORMERS 20-105VA

TRANSFORMER FEATURES

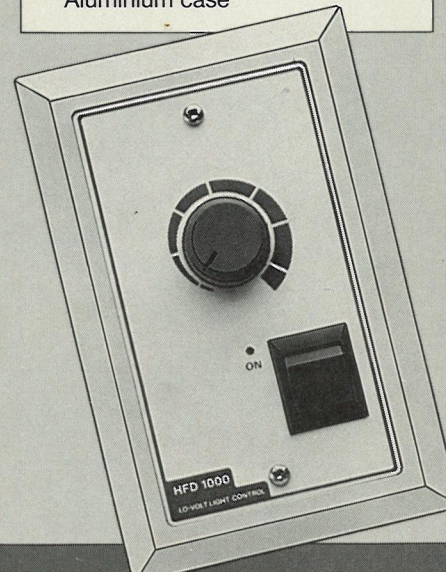
- Compact size
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- Safety isolated
- Anodised extruded Aluminium case



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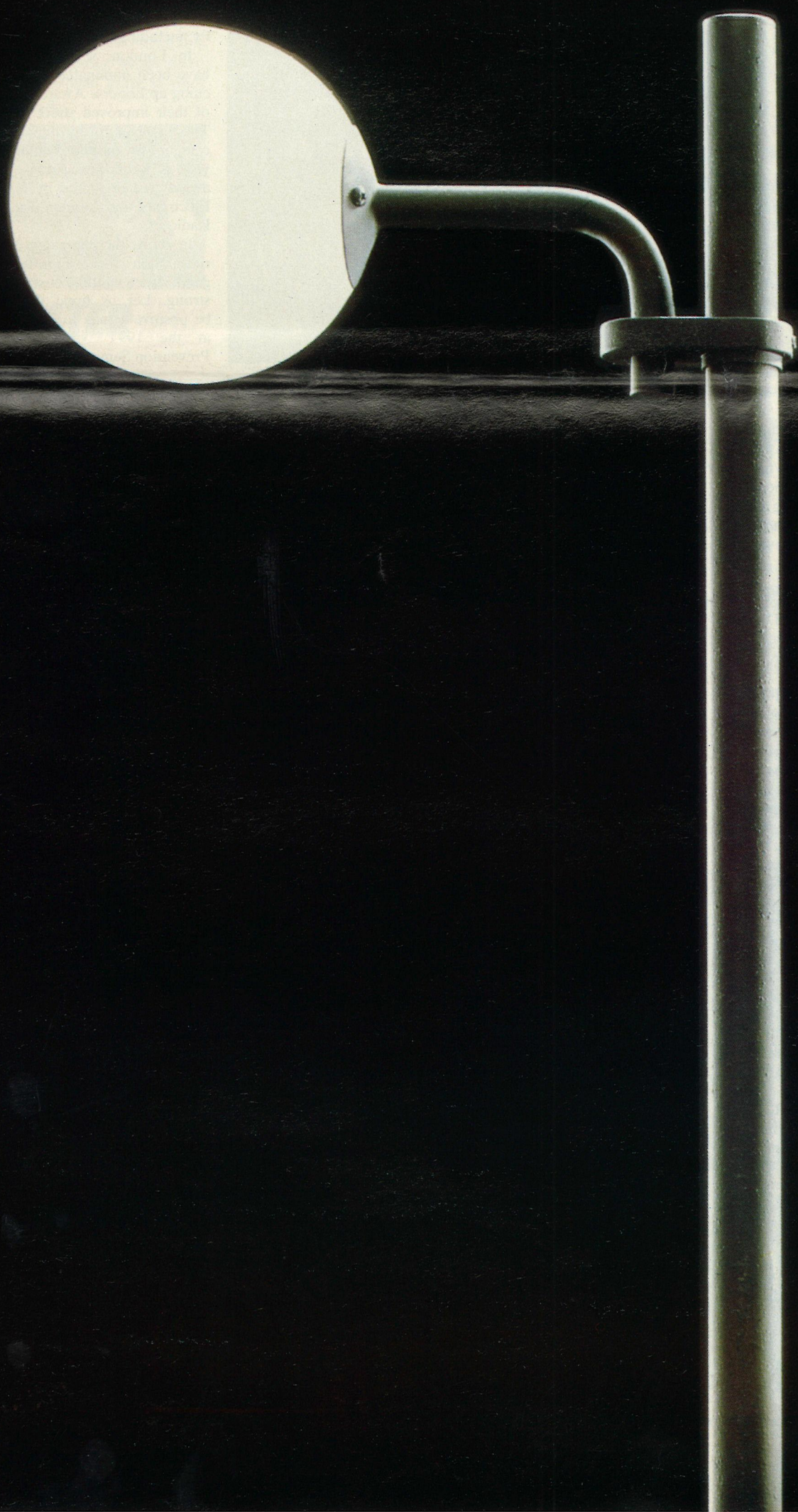


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A MEMBER OF THE AIR MOVEMENT GROUP

Since 1968 people have been taking to the streets to try and change the system.



The first demo took place exactly 20 years ago, in the old part of Pavia, northern Italy. It was during the XIV Triennale di Milano festival that public opinion was made aware of the need for a new public lighting system. That made the most of important inner - urban areas.

Today, to combat certain shady doings in some parts of the city, iGuzzini have created Public. An out-

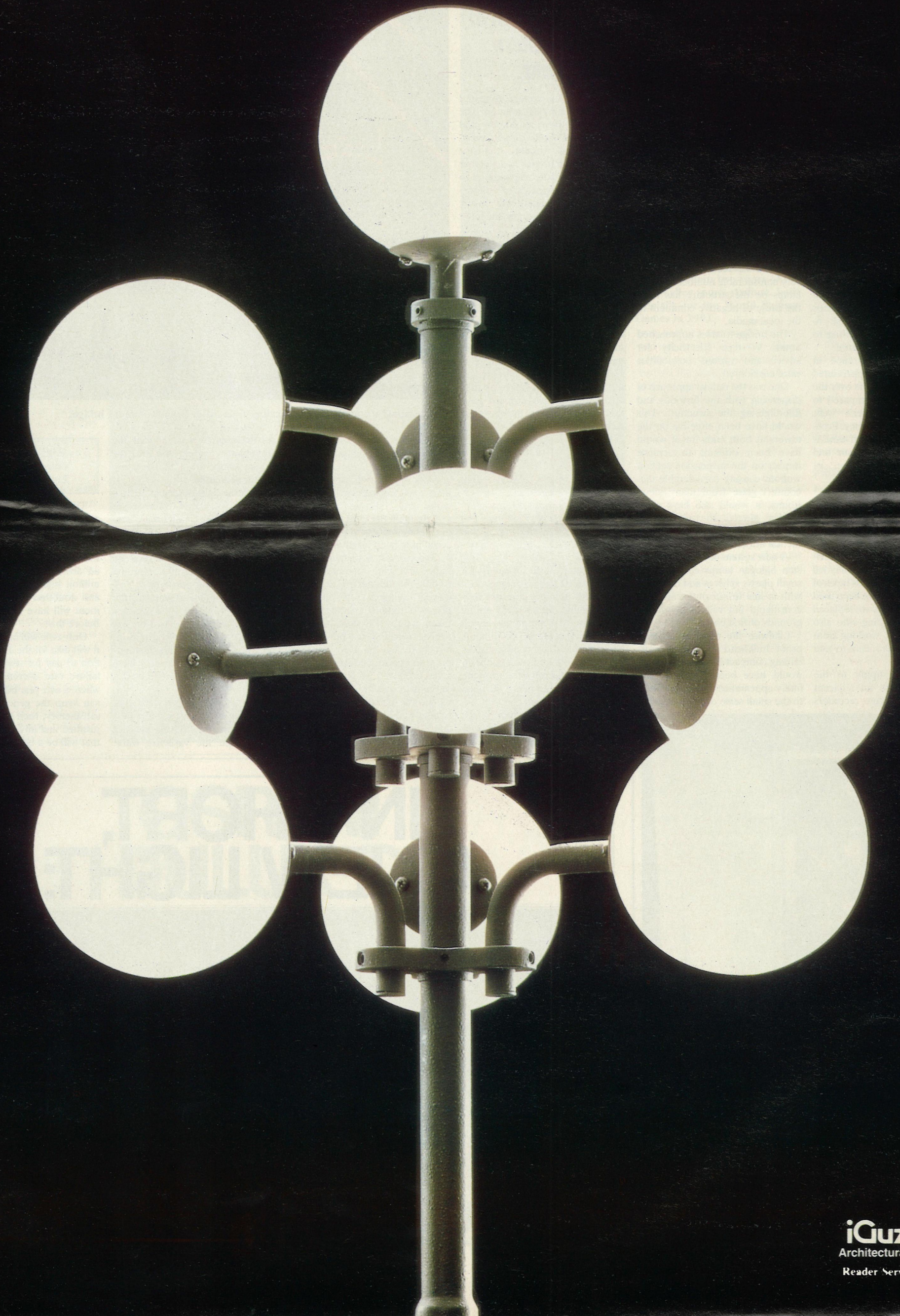
door illumination system for pedestrian and mixed-use zones: crossings, streets, parks and squares.

Public is a new way of managing urban design thanks to poles that allow the mounting of single, or bunches of lamps.

The light sources are fitted with adjustable, optical appliances. And their asymmetrical shades allow the light to be shone in any direction re-

quired. The materials, production technology and dimensions of Public make it all-weather resistant and vandal-proof.

So, if you would like to see some light shed on certain aspects of urban living, write to:
Forma Lighting Ltd, Units 310-311,
Business Design Centre,
52 Upper Street, London N1 0QH.
Tel. 01-2886025. Telex: 8812473.



Landmark in lighting

The Clifton Suspension Bridge is often used as a symbol of the City of Bristol. **Mark Wood-Robinson, South Western Electricity, discusses the new, more efficient lighting.**

The Clifton Suspension Bridge, designed by Isambard Kingdom Brunel, is Bristol's most prominent landmark. It was completed in 1864, some years after Brunel's death.

The dramatic location of the bridge in the Avon Gorge encouraged the trustees responsible for it to light it in a decorative manner to enhance the night scene.

For over 50 years this has been achieved with a festoon system, which has been renewed from time to time but now consists of about 3900 25W GLS lamps. The lamps are switched on from dusk to 1.00am every day, amounting to about 1825 hours per annum.

The resulting appearance at night has been much appreciated by Bristolians and visitors over the years and has been compared to dewdrops on a spider's web, among other flights of fancy. Prosaically, the late switch-off time is mainly to deter vandalism and lamp theft!

Vibration

The festoon wiring is strapped to the structure and the BC lamp-holders have a horizontal orientation. Constant vibration caused by traffic and wind, allied to the horizontal mounting, has naturally led to short lamp life. Various types of rough service lamp have been used in the past. The lamps are replaced by a maintenance gang who also paint the structure, working from cradles and by other means to gain access.

The electrical supply to the bridge comes from an adjacent substation and voltage recorders

have revealed that the supply is usually somewhat over 240V, which also contributes to reduced lamp life.

For some years a system of half-wave rectification was in use, reducing the RMS voltage to $1/\sqrt{2}$ or 70.7%. The resulting 50Hz flicker was not readily apparent to most people but for reasons that are not fully understood the anticipated increase in lamp life was not achieved.

Indeed in recent months the very considerable number of failed lamps on the structure has been the cause of negative comment in the local media.

The bridge trustees approached South Western Electricity for advice and various possibilities were considered.

One was the radical approach of dispensing with the festoons and floodlighting the structure. This would have been effective on the towers at both ends but it would have been difficult to achieve impact on the suspension section without causing considerable discomfort glare from many viewpoints. It would also have completely altered the appearance which now has an almost sentimental attraction for Bristolians.

A new system of 12V 5W tungsten halogen lamps contained in small plastic spheres and operated with in-line transformers was also considered but ruled out on the grounds of first cost.

Likewise the cost of weather-proof bulkhead luminaires containing compact fluorescent lamps would have been high and the bulky appearance not really suited to the small scale of the structure.

Reducing the voltage appeared to offer the simplest solution. The two alternatives considered and costed were fixed output transformers and variable thyristor dimmers. The former had a higher cost while the latter, in addition to the obvious advantage of adjustability, also avoided the heavy inrush current through the cold filaments at switch-on.

The supply to the decorative lighting comes from both towers and it was decided to install a 60kW dimmer bank in each one. Dimmers were supplied by R Hamilton & Co Ltd from the Mercury Litestat range. Each bank consists of 12 5kW dimmers which make use of hard fired triacs connected to a single controller.

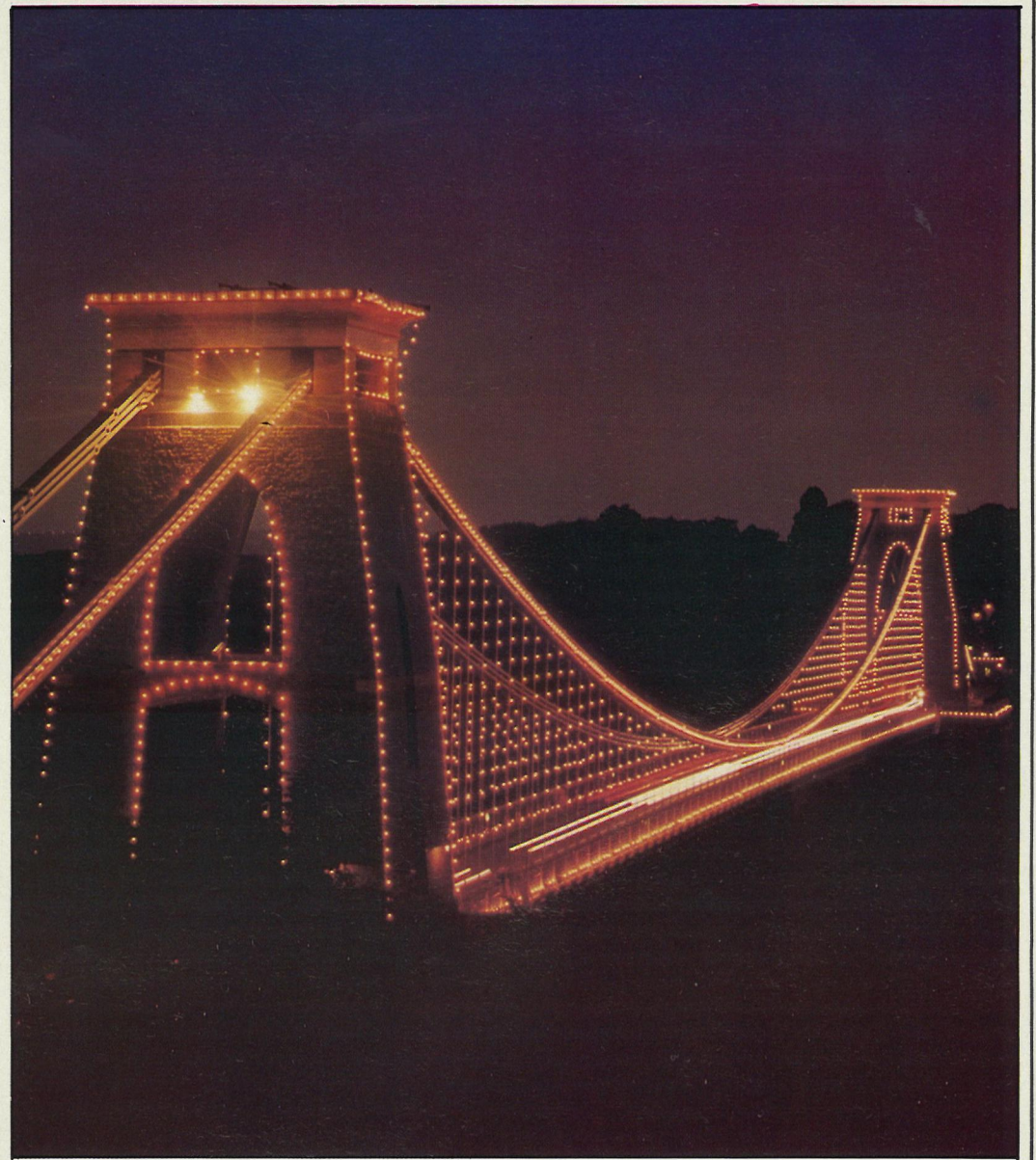
The dimmers are mounted in weatherproof steel boxes as they are in a somewhat exposed position halfway up the towers. They were installed by South Western Electricity.

Heavy duty

A new set of 4000, 25W Harlequin lamps was presented as a joint gesture of goodwill by the manufacturers, Crompton Lighting, and South Western Electricity and installed by the bridge maintenance staff.

The lamps are designed for rough service and have single coil filaments with nine supports. They are available with a 25W rating based on a 250V supply and have a rated average life of 2000 hours under standard test conditions. As already mentioned, conditions in this case are far removed from the ideal standard and hence the need for voltage reduction.

Incidentally, Harlequin lamps are normally only available with clear coloured lacquer coatings,



The installation complements the cable structure of Brunel's famous bridge.

but for this particular purpose a special batch was made without lacquer.

After installation of the dimmers and replacement of all the lamps an exercise was carried out to determine the minimum setting of the dimmers which still achieved acceptable lamp brightness.

Observers at a distance had a radio link with operators controlling the dimmers. Voltage and current readings on all three phases of the incoming main were taken with a Circutor harmonic analyser which gave a power readout. With the dimmers set at full-on power consumed was 84.3kW.

To achieve a rough assessment of the light output, an illuminance meter was placed on the bridge structure adjacent to a row of lamps and was moved to read 100 lux in the full-on condition.

As the voltage was reduced the illuminance reading and also the colour temperature of the lamp output decreased.

With the light output at 30%, a level still acceptable to the observers, the power consumption was down to 51.6kW, ie 61% of the full-on figure. The power consumed varies with the voltage raised to the power of 1.5 and the light output is proportional to $V^{3.5}$.

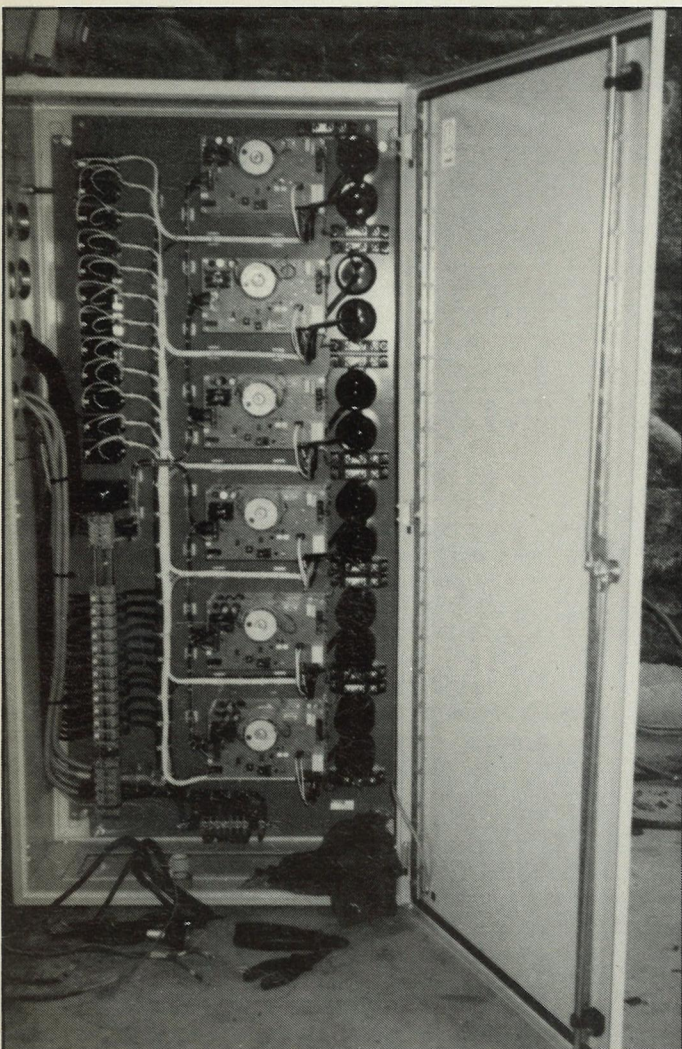
Research indicates that lamp life is proportional to the voltage raised to the power of -13 or -14, although it would not be reasonable to extrapolate this relationship to the wide departures from nominal voltage being used on this occasion.

The distant observers felt that an even further reduction was possible and the final setting was at a point when the variables were:

Voltage	64%
Power	51%
Light output	20%

These figures, expressed as a percentage of the full-on condition, fit closely with the theoretical ratios mentioned above. The theoretical increase in lamp life is an astronomical 500 fold, but a million hours is a very long time and doubtless tungsten embrittlement will have taken its toll long before this!

Only time will indicate how long it will take for the dimmer installation to pay for itself. But if lamp failure rate decreases to a point where a two-year bulk replacement can keep the general appearance satisfactory, then it will be amply justified and any improvement on that will be a bonus.



A 60kW dimmer bank is located in each tower.

IN SHORT, A NEW LIGHT:



Let there be light

The new floodlighting systems are not only powerful, they put light just where it is wanted, minimising light spill. As a result they are finding wider applications than the sports grounds for which they were originally designed. *LEN* visits some recent installations.

When Sheffield won the right to stage the World Student Games during the summer of 1991 the City Council commissioned the building of the Don Valley Stadium.

Apart from being one of the major construction projects in the north-east of England, the 25 000 capacity all-seater stadium is a flagship designed to attract world class sporting activities for many years to come.

As such, it will give Sheffield international status and be of considerable benefit to the local community.

So, a high quality floodlighting scheme was needed. Following the findings of the Taylor report on sports stadia, a vital consideration was safety, with lighting for safety evacuation, hazard warning lights and spectator areas of prime importance.

And to maximise the stadium's demand, the highest lighting levels were needed to facilitate excellent TV coverage.

The design brief also called for architectural lighting to reveal the contoured roof of the cantilever stand.

High illuminance

Lighting levels had to comply with all the major international sports codes of practice, including the requirements of the International Athletics Association, CIE 28, 67 and 83 and the CIBSE sports lighting guide. Recommendations were also taken from the European Football Union, UEFA, and BBC Television.

With the widespread use of cameras with zoom lenses, sited in many different positions, a level of 1500 lux average in each of four planes was chosen by Thorn Lighting, the designers of the lighting scheme.

Initial computer design indicated that the average values of 1500 lux would produce approxi-

mately 2000 lux horizontally. This value was used as a basis for the required switching levels, chosen as 1000, 500 and 250 lux.

To meet the illuminance criteria, including an overall uniformity of 0.6 for each grid, and to minimise the effects of spill light and glare, it would found that 612 floodlights would be needed, mounted on five columns and the stand roof.

Tall masts

To meet the requirements of CIE 28 — a 30° angle from Pitch centre to the towers — it was decided to use 42 metre columns on a raised embankment. As the stand lights were to be mounted lower than 18

metres, a fundamental requirement was for all floodlights to have a sharp 'run-back' to minimise glare.

Lighting on the stand roof was by specially designed lighting trusses, triangular in section.

The floodlight headframe was designed to allow full movement in both horizontal and vertical planes. To this end the frame was canted at 15°.

Colour appearance of the sources had to be between 4000K and 6000K to minimise apparent colour changes as daylight faded and was replaced by artificial light.

For filming it was desirable that surrounding spectator areas were illuminated to give adequate con-



Above and left: two views of the Don Valley sports stadium, built specially for the World Student Games in 1991.

trast between the sporting activity and its background. An illuminance level of 0.25 for the average vertical illuminance to that on the playing area was taken.

A balanced 3-phase circuit was used to ensure that each area of the playing service has equal quantities of light from each phase. The latest draft proposals, CIE TC 5-04, were used where a glare rating of 50 or lower was needed.

The highest illuminance level is only used for colour television broadcasting. There was a need, therefore, for lower switching levels. Flexibility of switching was of prime importance to reduce the maximum demand charge and overall running costs.

Emergency lighting was required for the safe evacuation of the spectator areas and stairway access. As the stadium could be in the flight path of a new airport, each structure also had to be lit accordingly.

The cantilevered stand — both main stand and side-wings — is of particular architectural merit. This was uplit to show the underside of the stand roof to best effect and produce illumination for spectators in the stand. A level of 100 lux was needed.

On the east side of the stadium an 'Olympic' style torch is planned. Lighting will be provided by very narrow beam CSI floodlights producing 400 lux.

For the sporting arena it was essential, for economy reasons, that the light sources were of the highest efficacy with good colour rendition and appearance, long life, good lumen maintenance, excellent glare control and, preferably, small in size to minimise the cost of lighting columns.

Two kilowatt linear metal halide lamps were selected. Their very high luminous output, together with a compact size allowed the provision of a precision reflector system to give good glare control.

To provide a contrast between the spectator and playing areas, and allow the spectators to feel comfortable, the warm colour of SON, ideal in winter, was chosen to illuminate the stand. 400W linear SON lamps were chosen to give the required 100 lux level to the spectator area by diffused indirect lighting, and illuminate the white curved canopy of the roof and the yellow painted structural elements.

Safety and access lighting is provided by 110V 500W tungsten

halogen floodlights for the stand areas and six supplementary 2kW floodlights to cover the stair access ways and a car park to the area opposite the main stand.

The electrical layout of the stadium had to allow full safe switching of the entire system without loss of light output and an overly excessive maximum demand charge. Primary control, for all columns, stand decorative lighting and safety/emergency systems, is by computer.

Flexibility

Four controllable switching levels offer the flexibility of levels from 250, 500, 1000 and 200 lux and keep the maximum demand charge to a minimum. An automatic time delay of 1½ minutes is built in for each switching level to enable the circuit current to reduce to its optimum value.

Lighting columns are provided with phase-failure relay to cut power in the event of a phase failure and prevent damage by resonance effects.

The electrical system allows 'power up' to individual columns or stands — full 'power up' for the whole system taking 23 minutes.

Each lighting position has its own individual ventilated control room, with control gear mounted in groups of three on custom designed gear trays to give automatic phase balancing.

Cabling to each luminaire was as long as 200 metres in some cases. To overcome problems of lamp ignition, the floodlights incorporate an ignitor within the floodlight wiring box.

Major events

The major achievement of the Don Valley Stadium project has been the harmonisation of illuminance requirements for major sporting events with the aesthetic design for an imaginative building construction.

The stadium is the first to take full regard of the Taylor report and great imagination has been shown on the switching permutations enabling economy, control and quality to be achieved in full measure.

The new floodlighting systems here originally developed for sports ground lighting. Two recent schemes have, however, seen this field of application considerably expanded.

A prestigious office tower in the busy commercial heart of Madrid now shines out like a huge beacon, thanks to Philip's Arenavision.

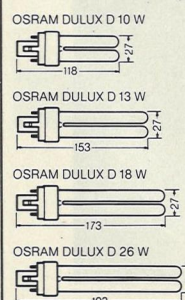
The 41-storey, Torre Picasso is Spain's tallest building and the

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and 26W, which are equivalent in brightness to 60, 75, 100 and 2 x 75 W incandescent lamps. In addition to being short, OSRAM DULUX D lamps, with a width of only 27 mm, are also much slimmer than conventional incandescents.

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Torre Picasso in Madrid.

second highest in Europe. Both the front and rear of the tower are lit by six groups of three luminaires and the sides by four groups each.

The 60 Arenavision floodlights have a total power consumption of 112kW and produce an average illuminance of 100 lux on each



One of the many colour and picture variations in the celebration lighting at La Défense, Paris.

side. In order to accentuate the fluting design of the building, the luminaires have been placed just nine metres from the building.

The narrow-beam version of Arenavision is ideal for illuminating tall buildings at close range. It uses long life metal halide MHD 1800W lamps with a high colour rendering of Ra92 and a colour temperature of 5066K. The lamp is housed in MVF 406 luminaires fitted with a built-in aluminium reflecting skirt to reduce glare and stray light.

More recently, on Bastille Day, 14 July, the same system was put to a rather different use in a spectacular son et lumière show staged by Jean-Michel Jarre in Paris. One hundred Arenavision luminaires played a key role in the event — the first time they have been used for such an application — and over one million people witnessed the spectacle.

Performed chiefly in the La Défense area of Paris, the show could be seen from many parts of the city. La Défense is characterised by its modernistic skyscrapers and it was these that were so spectacularly lit.

The luminaires, positioned at the foot of the buildings, were fitted with barn doors and ten colour filters for dramatic effects, and the entire installation was operated by remote control.

The event was to celebrate the futuristic nature of La Défense and

to present Paris as an highly ambitious and dynamic international city. It lasted several hours, during which time La Défense became a vast moving sculpture, to the accompaniment of Jarre's music, including a piece composed specially for the occasion.

The final installation featured here is very probably a first. Dramatic floodlighting of a French cliff face, known as the Rocks of the Penitents, has won a major competition for Thorn Euro-

phane.

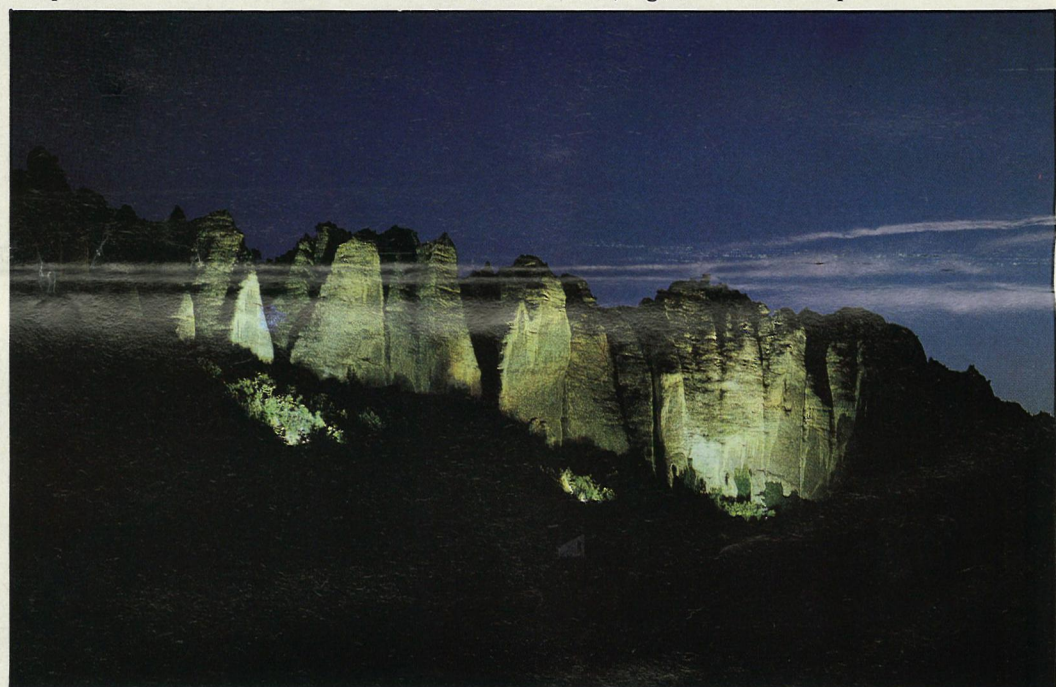
The lighting scheme, for the 90 metre high cliff formation at Mées in Haute Provence, wins the Lighting and Monuments competition held under the patronage of the French Ministry of Culture and Communication.

Lighting had to be balanced because different parts of the cliff face had very different levels of reflectivity. In addition, the cliff has been moulded by centuries of erosion and, in some areas, vegeta-

tion provides a contrast to the bare rock.

To achieve the optimum solution, spotlights were equipped with sophisticated cylindrical and parabolic optical systems, allowing the light beams to be adjusted to suit the cliff geometry.

In all, the project used 11 Europhane PRT 40 floodlights with reflectors and 2kW metal halide lamps and 5 Europhane PRT 37 floodlights with 1kW high pressure sodium lamps.



Lighting for the Rocks of the Penitents, a cliff face in France.

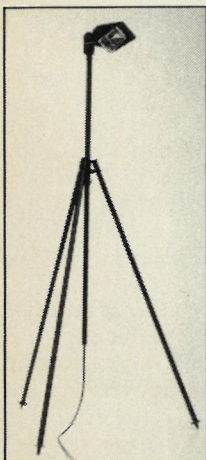
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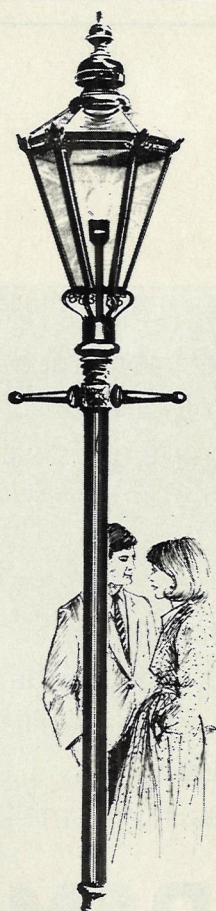
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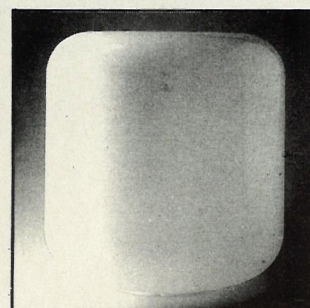
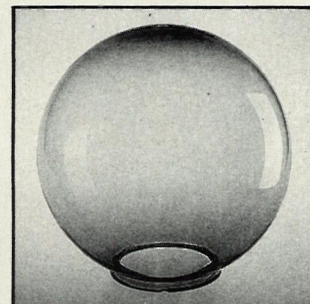
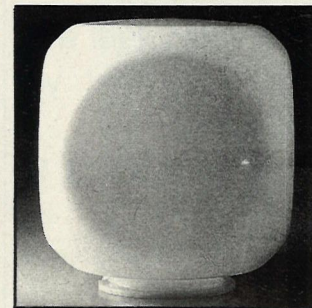
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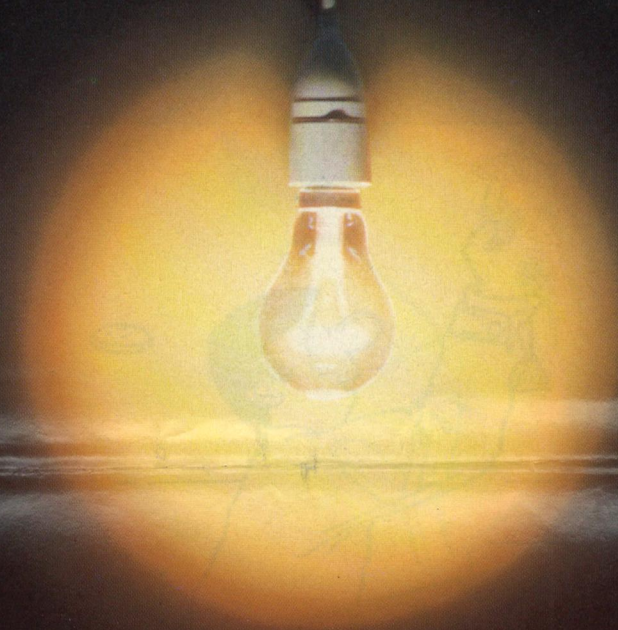
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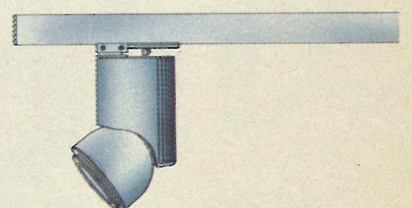
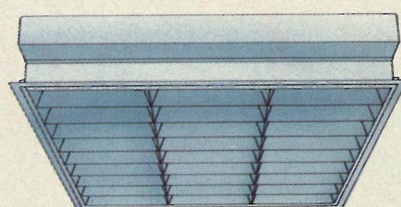
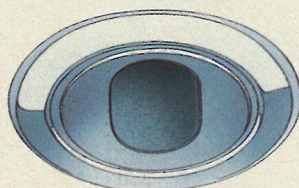
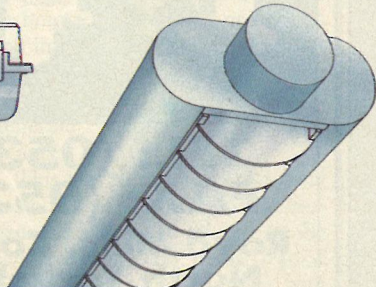
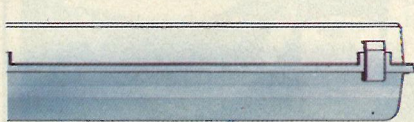
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HID lamps then and now

The range of application for HID lamps has increased dramatically over the past ten years. *Keith Neilson, of Philips Lighting, looks at developments in lamp and reflector technology.*

From about 1978 onwards HID lamps have experienced massive changes in their applications. If we ignore the specialised areas of theatre, studio and printing industry, at that time the main uses were flood, road, industrial and orientation lighting. Since then, not only the applications have changed, so also have the HID light sources for existing applica-

tions. This review will concentrate on the changes and some of the reasons for them.

Looking back, the most significant early development was the rapid move from HPL-N lamps to SON in high bay. Between 1978 and 1988 energy cost effectiveness became the theme. This resulted in a notable increase in the number of new SON schemes. Simultaneously, HPL-N lamps were

replaced by metal halide lamps for more colour conscious users. The main thrust in the latter case was led by HPI-BUS self-starting lamps, which do not need an ignitor, which makes for a cheaper circuit. Along with the change in lamp emphasis came application changes, so that SON and HPI lamps moved into more commercial areas such as DIY, supermarkets and even offices.

In the mid 1980s other factors became influential. Certainly in road lighting, and still today, lamp life played a significant, if not the major role in the economic equation, real or imagined. Hence, the increasing use of SON, despite the real benefits of SOX-E with its improved efficacy.

In industrial lighting, larger lumen packages were demanded to reduce the number of high-bay and the increasingly popular low-bay luminaires. This brought forward the SON Plus range which uses higher pressure xenon gas to improve lamp efficacy (Figure 1). Another advantage of the lamp is longer life, which will influence its use in other applications in the future. However, users should be aware that some SON Plus lamps on the market do not comply with IEC regulations for ignition and require special ignitors.

Colour rendering

Known science also came to the front in the latter 80s when improved colour rendering was required with high lumen packages and the economics of SON life. Of course science, as usual, could

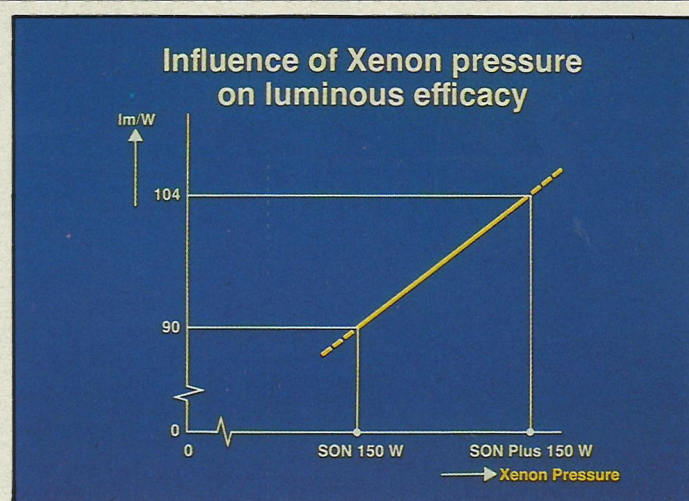


Figure 1.

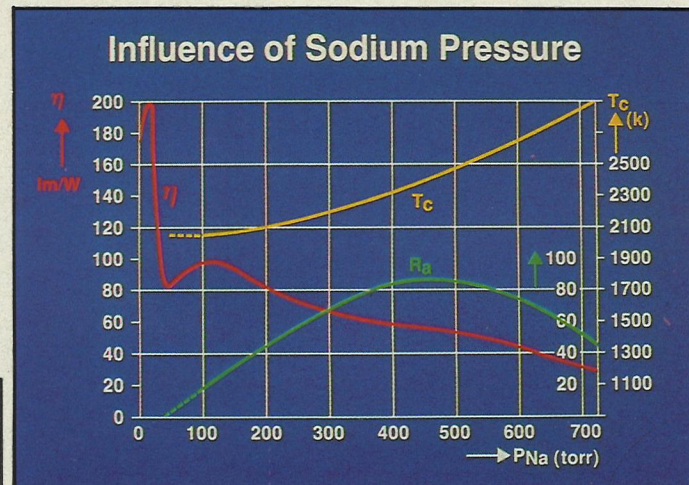


Figure 2.

only provide part of the answer. As Figure 2 shows, there is a trade-off of efficacy against Ra, and as while it is not shown here, effective or on target Ra life also reduces compared with standard SON. First to benefit were industrial lighting luminaires, in applications such as supermarkets (Figure 3) using the SON comfort range, although commercial offices and some industrial applications also required improved colour.

At this stage applications had begun to influence lamp introductions, that is market factors were becoming more dominant rather than technologically led products. This was true for all lamps, but was best epitomised by the rapid market growth of double ended metal halide lamps by high street retailers. This was an enormous breakthrough for HID lamps. The cool white light ($T_c = 4000K$), which was used to splash the goods, was found to be attractive to retailers in terms of consumer 'head turning' and, hence, purchasing potential.

In reality, the luminaires were — and are — only light smashers.

Their construction means that these double ended lamps are not capable of being controlled optically, other than to produce relatively wide beams. Good cut-off can be achieved, but in practice this was rarely needed by retailers who merely demanded lumens.

In these terms, the lamps and luminaires do an excellent job. From the retailers' viewpoint colour rendering is acceptable, as are colour appearance variations. Certainly, lamp life is markedly better than their experience of incandescent sources. And, while luminaires were more expensive, the fewer numbers and, more critically, the market impact was highly acceptable.

Market requirement

But the market demanded warmer colour appearance metal halide lamps of around 3000K. Unfortunately, with present technology the lamps available have notably less stable T_c s than their equivalent cooler (4000K) cousins (Figure 4). Additionally, the higher the T_c in the 3000K to 4000K range, the

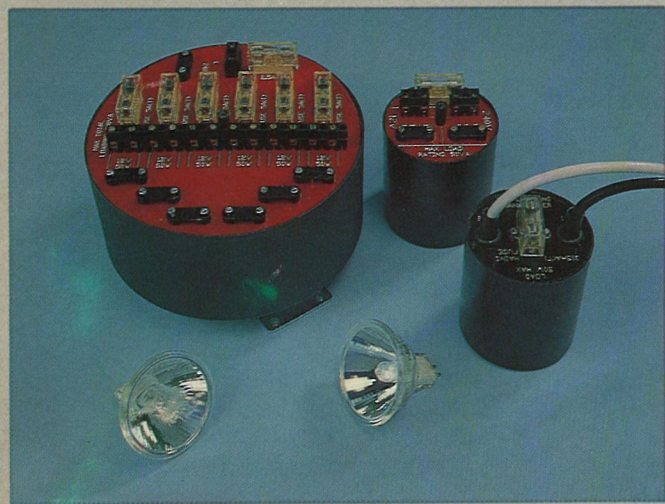
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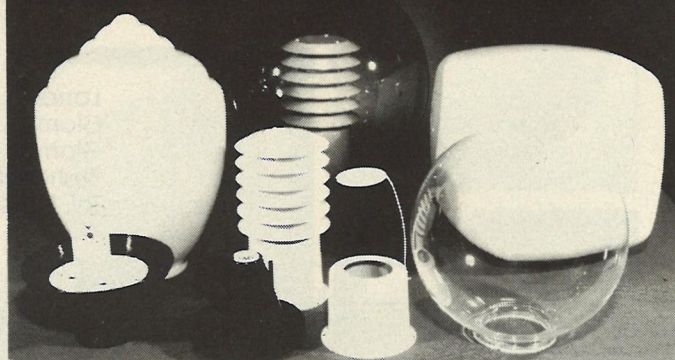


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Figure 3.

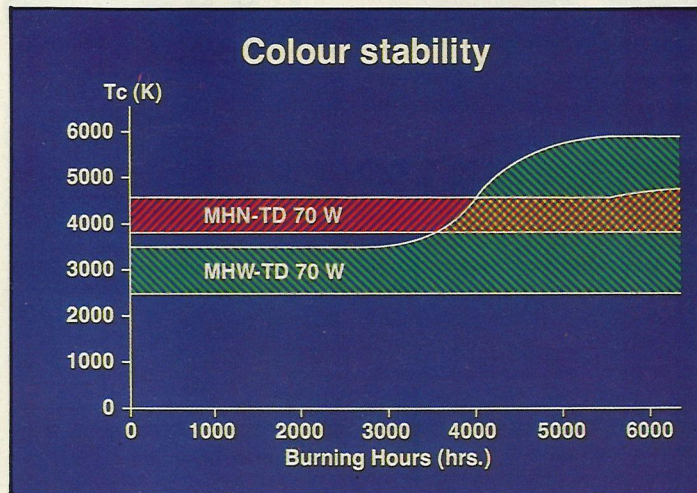


Figure 4.

higher the colour rendering index. Therefore, while the market demand exists for such smashers, it cannot be fulfilled as yet to the same extent as the cooler lamps.

Moving to the late 80s and early 90s, the market is still influencing lamp and luminaire development — and so it should, it pays the bills. Examining the current newer applications, the fastest growth rate for HID lamps and undoubtedly the largest total market is accent and display lighting. Therefore, to meet the demands of this market the industry has developed single ended lamps with the mandatory universal burning position characteristics. This allows OEMs to take advantage of the superior lumen package of HID lamps by enveloping them in rotationally symmetrical reflectors to produce higher accent factors than incandescent lamps. Hence, the development of white SON (SDW/T) lamps, with lumen packages up to 4800 and MHN/T lamps with packages up to 11 000 lumens.

But end users should be aware of the suitability of these lamps for their applications and take advantage of the strengths for maximum impact. It is false thinking to believe that the lamps are universally applicable. Obviously an MHN/T lamp creates a cool (4000K) appearance, while SDW/T lamps produce a warm (2500K) appearance. Each has its appropriate application depending on the ambience, or indeed the contrast, required and obtainable by mixing the sources.

Colour rendering

Another side of the accent lighting equation is to consider the colour rendering index or Ra. SDW/T lamps have an Ra of 83 whilst MHW/T is 80, hardly a noticeable difference. In reality each lamp has markedly different strengths not revealed by the Ra.

SDW/T lamps emphasise the warm end of the spectrum and are perhaps best used to display reds, oranges and yellows as can be seen by the vector arrows in the colour mismatch frame (Figure 5). By contrast, MHN/T lamps emphasise blues and yellows (Figure 6), but are weaker on reds.

Thus, HID lamps have reached the position of TL lamps in that, while colour appearance can be predicted easily by the Tk, the Ra has meaning only in a general

sense, and can be less than helpful in a particular case.

Having considered these properties, the market develops applications. For instance, in the case of the more established SDW/T range, uses have been established in bollards, as retrofits in modern and classical post tops, as indoor and outdoor 'wall washers' using linear parabolic reflectors in a floodlighting (horizontal discharge tube) mode, and even as under-canopy lighting to create extremely inviting effects. In short, the market has developed valid uses outside the original display lighting accent factor concept.

Reflector design

For true accent lighting, the secret lies in designing the correct reflector profile. It is certainly no answer to use the normal parabolic or elliptical spinning of incandescent lamps, as black holes would be produced because of the linear nature of the discharge tube (DT). This lamp form demands more complex shaped profiles in order to provide control.

In practice this has produced faceted reflectors with from 15 to 35 faces to produce wide to medium beams. Using the same profile narrow beams (2x2") can be produced from a smooth surface ie infinite number of faces. The profile or the reflectors themselves have been made available to OEMs to help them grasp the new market opportunities.

For down lighting a second faceted profile is needed to use the lumen package effectively and produce uniform lighting levels; again this is available to OEMs. In both cases the overall reflector dimensions are the same. Hence, a modular approach has also been developed to help OEMs create a strong family image.

These reflectors, in fact, represent a new design technique, which uses cylindrical curved segments for the facets. In developing the technique the designers provided a self imposed constraint, by adopting specular rather than 'orange peel' or hammered aluminium to generate medium and wider beams.

This was to provide a designed method of producing homogeneous colour re-mixing in the reflected beam and, hence, a good display result. This contrasts with the normal technique of 'defaced'

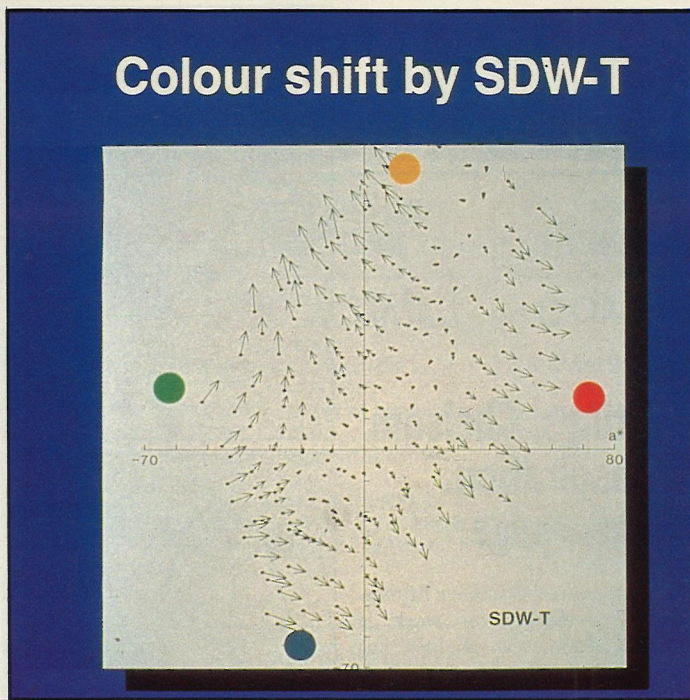


Figure 5.

aluminium, which is more often than not used in a corrective rather than a constructive manner.

Finally, taking a look towards the future, it can be expected that

HID lamps will continue to develop both in lamp technology and applications. The new reflector technology has already created opportunities for luminaire peri-

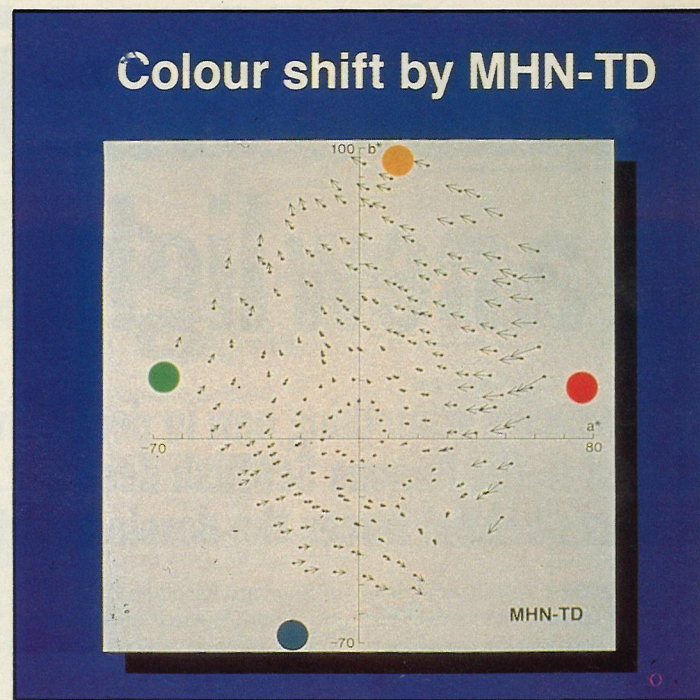


Figure 6.

meter accessories on downlighters to produce an attractive light halo on the ceiling; perhaps the most exciting market development will be decorative — but extremely

simple to manufacture — uplighters with no glare from a floor unit of less than 0.75m. Prototypes exist in both cases and OEMs have the designs.

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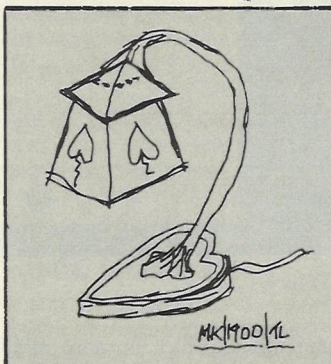
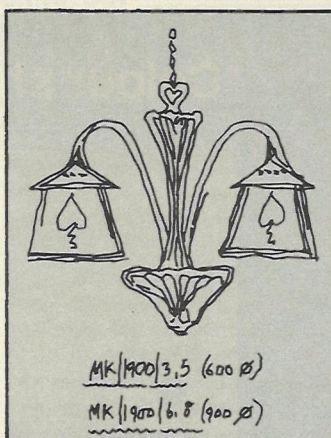
In producing something new in decorative fittings, Chelsom looked to the famous Scottish designer for inspiration. Robert Chelsom traces the development of this range.

When I foreswore architecture and decided to follow in the family footsteps and specialise in the design and manufacture of lighting and furniture, I had my gods, my inspirations. In our cabbage days, we all have them. My school friend, Alex, who took up the slide rule and calculator and plunged into engineering, worshipped at the cornucopian shrine

of Isambard Kingdom Brunel. For me, it was Charles Rennie Mackintosh. I admired, visited, sketched and generally adulated his buildings, the way in which he combined the aesthetic and visual with the mathematics of skilful functional building. But, for me, the most exciting contribution he made to Art Nouveau was his awareness of total design, embracing not just buildings but furniture, cutlery,

curtains, even the smaller fittings. My admiration of the work of Charles Rennie Mackintosh has not lessened with the years.

This may explain why this Glaswegian came to mind when I reviewed the pub, club and hotel scene, an important market for us. We had met just about every demand for variations of shade on the wide range of classic designs in our range, creating seemingly end-



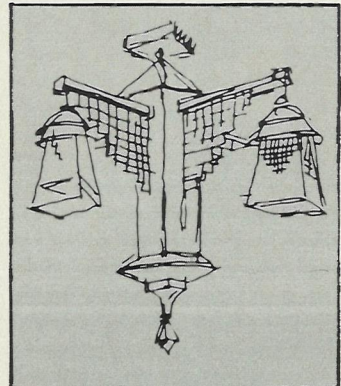
Initial sketches established the idea of brass shades perforated to give small points of light.



The completed range — traditional good looks and new light sources.

less computations to match more decor requirements. Despite the arrival of low voltage, however, there was clearly a need for something new and exciting in decorative fittings.

I was balancing my small son on my mountain bike and pondering how designs had changed since my youth when Mackintosh knocked on the door of my mind. How, I went on to ask myself, would he have tackled lighting had he had available modern materials and production methods?



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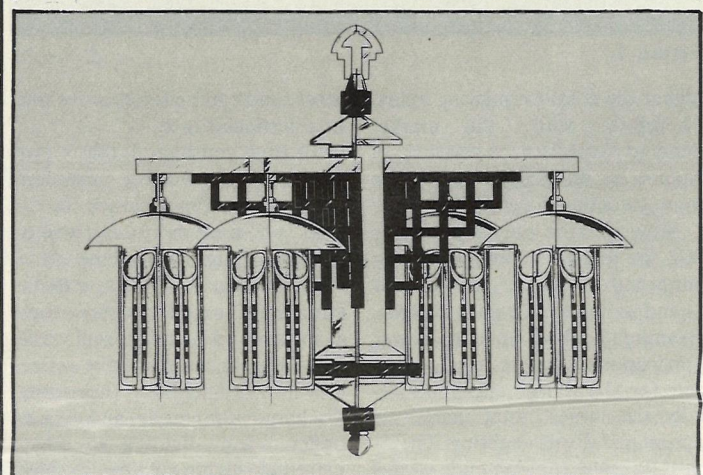
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Stages in the evolution of Mackintosh style.

I remembered his total design concept and delved into my library for everything I had on his art. I examined drawings and photographs of his new light fittings. There was a geometric precision, in keeping with the era, but this man was so much more complex than most of his fellow architects and designers and, as with all his work, one can detect his innate respect of classicism and the influences of Scottish baronial architecture, pre-Raphaelitism and aestheticism.

I next examined the needs of pubs and hotels. The absence they required places restrictions on decorative light sources. Clear lamps give too much glare; fluorescent are not too cold; and fabric shades are not always practical. This seemed to bring us back to glass shades and, casting a mental eye over our prodigious stocks, I asked myself whether there really any 'new' designs left to be created.

As lux levels are usually attained by concealed downlighters nowadays, decorative lighting can become more dramatic and produce more effect. My thinking turned to brass, a medium in which we have vast experience. A perforated brass shade giving a warm light downwards and attractive pin-points of light outwards seemed ideal. It was at this point that I passed my back-of-envelope scribbles to our new design and development department and research began in earnest.

Inspiration was taken not only from Mackintosh lighting but from his chairs, cabinets and interior schemes. The rejected ideas piled up until a style gradually evolved of embossed, square lantern boxes supported by geometric lattice arms.

Hypothesis is risky but I would back my hunch that Mackintosh

would have approved the embracing of the latest energy-saving light sources. We set about modifying the designs so that all fittings could use compact fluorescent lamps with ballasts concealed in back-plates, ceiling roses or the shades themselves.

The internal reflection from the brass shades would serve to 'warm' the colour of fluorescent light, achieving at one and the same time ambience and cost-cutting. Card-board prototypes were produced, developed in brass, and the full engineering drawings emerged.

Design brief

The final brief to our team was that the proposed Mackintosh collection should meet a variety of needs: low ceilings, high ceilings, bars, lounges, corridors and bedrooms. It had to satisfy the energy-conscious specifier without disappointing those who gave priority to atmosphere. The result was a collection of 15 different models: single pendants, multi-arm chandeliers, single and double wall lights, lanterns and wall lanterns, flush fittings, table lamps and floor standards. All the fittings can use tungsten, fluorescent or halogen light sources.

I am not advancing theories of reincarnation — although I should be delighted if Mackintosh did choose the Chelsom design and development department for his rebirth. Nor, for that matter, am I seeking to refute Ford's 'history is bunk' by pointing to how much of our future is built in our past. I am just hoping that, were Charles Rennie still around, he would be sufficiently pleased with our interpretation of his creative thinking to sign his name to the Chelsom Mackintosh Collection.

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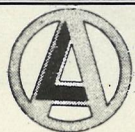
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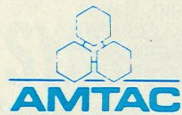
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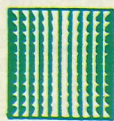
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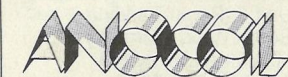
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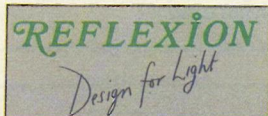


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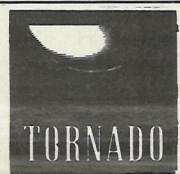
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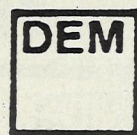


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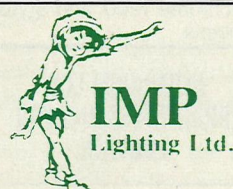
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We are seeking sales personnel who can sell technical and architectural lighting products to Architects, Consulting Engineers and large users.

If you cannot do a lighting scheme, are not happy to use a computer or you are used to being spoon-fed, do not bother to apply.

Otherwise, if you are looking for a move and think you have got what it takes to open up new territories for us, please send your CV to:

**Zumtobel Lighting Limited
Unit 5, The Argent Centre
Pump Lane, Hayes
Middlesex UB3 3BL**

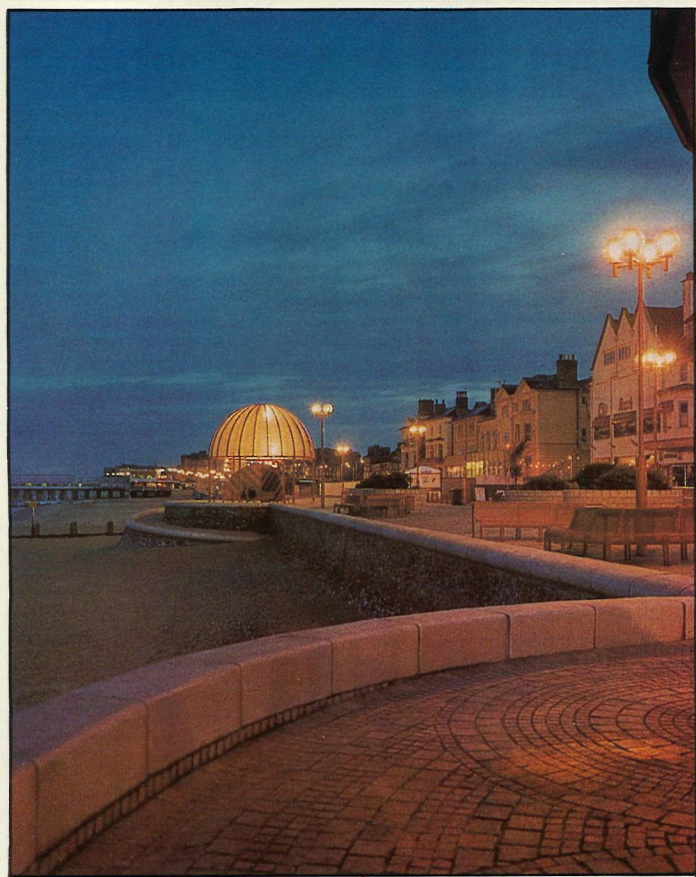
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Blue flag beach

A major urban refurbishment programme at Lowestoft, which led to the Suffolk holiday resort winning a European Blue Flag award for excellence, included amenity luminaires from Crompton Lighting.

A total of 96 four-arm Crompton Strada luminaires was installed over a one mile stretch of beach and promenade. Gantries, each supporting four 450mm diameter vandal resistant polycarbonate globes, are mounted on 4.8m steel columns.

Energy saving 70W SON discharge lamps provide a high lighting level after dark to ensure safety and security for pedestrians.



Companies on the move

Illuma opened new premises at Slipshed in Leicestershire. Phase one of the new factory building provides nearly 500 square metres of office space and 2800 square metres of factory and warehouse space. The production lines have a

capacity of several thousand units a day, and the company expects to employ a staff of 60 within 12 months.

Menvier-Amberlec Systems has moved to a new 2600 square metre factory in Swillington, Leeds. The

move enables the company to bring all its manufacturing activities together under one roof, while the addition of an in-house paint shop will mean more local employment. Sixty five employees are now based at Swillington.

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LIGHTING SERVICES

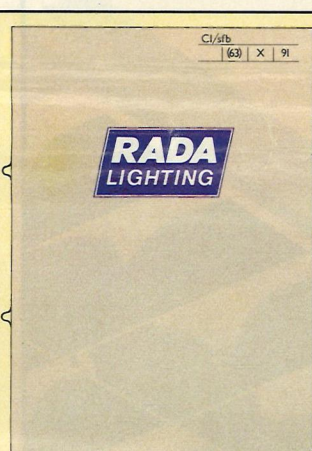


design.../...manufacture

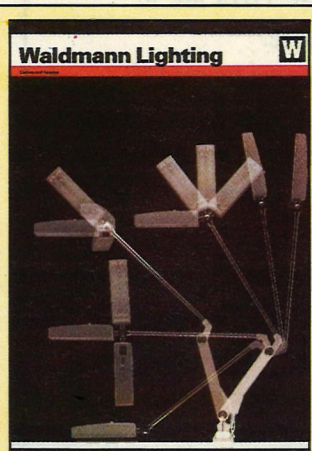
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HULL HU2 8QP

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CATALOGUE DIRECTORY



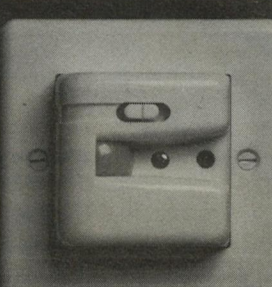
The 48 page RADA Lighting 1991 Catalogue covers top quality commercial luminaires for every ceiling system; air handling, continuous lighting, emergency, vandal resistant and compact fluorescent and LG3, Category 2 luminaires. Plus a specifiers guide to the luminaire appropriate to the ceiling system: circle 91



The new catalogue from Waldman Lighting is available through UK distributors Midland Machinery Services. It shows a comprehensive range of functional task lighting, workshop machinery lighting and specialist magnifier lamps: circle 90



INFRA SWITCH



THE REVOLUTIONARY FULLY AUTOMATIC LIGHT SWITCH

FEATURES

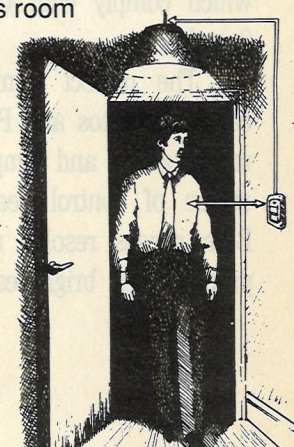
- Fully interchangeable with standard light switch
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For further information write or ring :

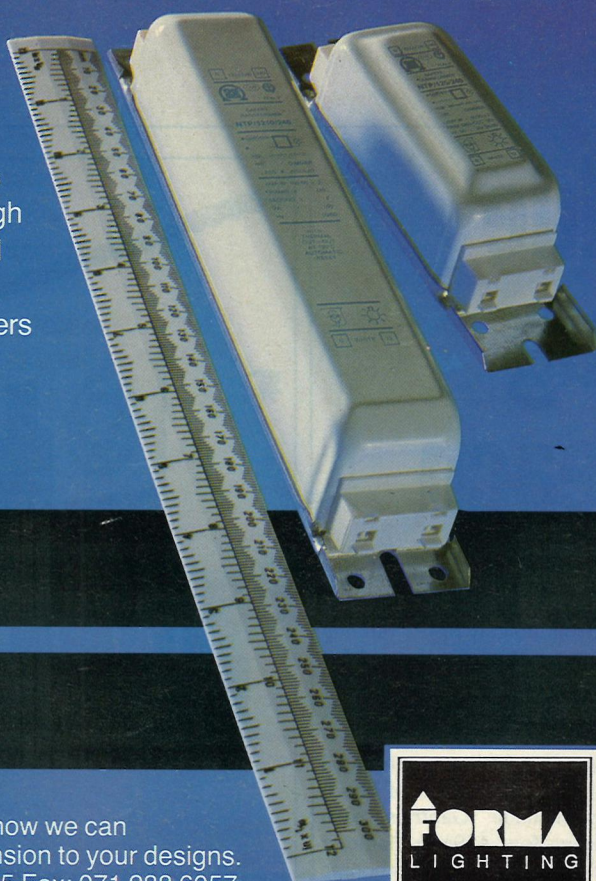


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LIGHTING EQUIPMENT NEWS

Given the green light

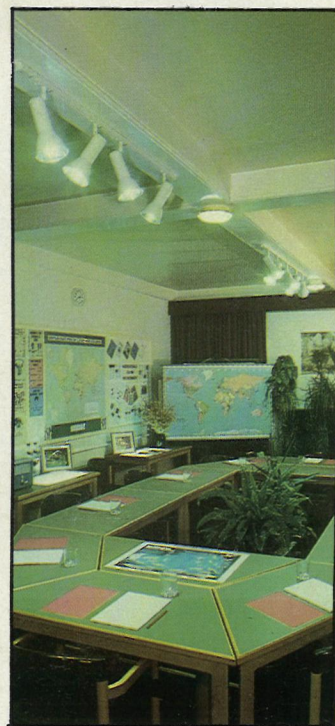
Practising what it preaches, the International Centre for Conservation Education has installed a new compact fluorescent lighting installation in its Gloucestershire headquarters.

Experts estimate there is 25% more carbon dioxide in the atmosphere, contributing to ozone damage, than 25 years ago. This present level is expected to double by the year 2050. The UK domestic lighting market alone is responsible for emitting 7 million tonnes of this gas into the atmosphere every year through burning the fuel used to create electricity. Influenced by these figures, ICCE installed Osram Dulux EL compact fluorescent lamps, which consume 80 per cent less energy, and Osram Dulux S lamps throughout the centre, as part of an overall refurbishment aimed at providing a modern working environment within the large Georgian house.

In the ICCE photo-library, Osram Dulux EL reflector lamps, adjustable on ceiling tracks, are arranged in sets of three, the EL lamp and reflector forming a photometrically optimised unit for floodlighting and downlighting. Some lamps are angled onto the large filing cabinets where thousands of colour transparencies are stored, others provide task lighting to work surfaces.

The multi-purpose conference room has Osram Delux EL reflector lamps illuminating the large conference table and providing general ambient lighting throughout the room. Several 15W Osram Dulux EL lamps highlight the reference area and large display boards at one end and the screen area used for projection at the other.

Compact fluorescent Osram Dulux S lamps in ceiling-mounted



circular fittings provide economical ambient lighting in the upper and lower hall areas. These lamps burn eight times longer than ordinary incandescents and combine high luminous efficacy with low power consumption.

"Our previous incandescent lighting system was inadequate and used an excessive amount of energy," says ICCE director Mark Boulton. "We calculated that if all the lamps in the building were switched on, running the old system would cost approximately 19p per hour. With these new lamps, estimated running costs are only about 6p per hour; even more important we are reducing our energy consumption. This may only be a drop in the ocean, but if everybody did this, cost savings to the environment could be incalculable."

Two for 'T'

Rada presents two important luminaires to meet the industry standards for exposed 'T' ceilings

Stratos Quasar

Deep wedge multicell low brightness louvre

Paralux

Deep wedge 16 cell low brightness louvre

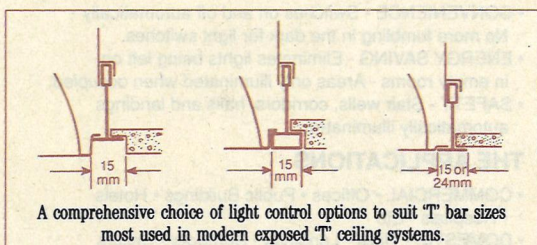
Now, from Rada, two ranges of luminaire to make the best of exposed 'T' ceiling grids and which comply with C.I.B.S.E. LG3, categories 2 and 3.

The perfect luminaires for exposed 'T' ceilings, Stratos and Paralux offer an extensive range of size and lampway options, with a wide choice of control gear. Both ranges resolve all problems of brightness

and glare; both vastly enhance environmental and working comfort, especially where VDTs are in constant use. Both are cost-effective.

With Stratos and Paralux, all your exposed 'T' requirements are met without paying a premium for specials. We meet your technical and aesthetic standards – and we meet delivery dates.

For full details of Rada's exposed 'T' ranges, please return the coupon.



A comprehensive choice of light control options to suit 'T' bar sizes most used in modern exposed 'T' ceiling systems.

A low voltage lighting luminaire, donated by Crompton Lighting has been used to light the Mappa Mundi currently on show at an exhibition taking place in Hereford Cathedral.

The Orbit Tronic spotlight from the Crompton Raak range is positioned on a stone archway opposite the ancient map. A wide-angled dichroic cool-beam lamp fitted with an ultra-violet filter provides a lighting level of 50 lux, the accepted maximum required to prevent any possible light damage.

Displayed alongside the Mappa Mundi, which is presumed to have been completed circa 1290, are many other unique antiquities including the Chained Library, King Stephen's Chair and St Thomas a Becket's reliquary.



Trade literature in brief...

● **Shiu-Kay Kan** has a 1990-91 catalogue of his innovative lighting (tel 071-434 4095).
● **Crabtree Electrical Industries** has published two technical manuals on circuit protection to help in selecting equipment: *Circuit protection manual* and *Polestar technical data* (tel 0922

721202).
● **Zumtobel's** 1990-91 catalogue of commercial and industrial lighting is now available (tel 0737 249826).
● **System Freestyle** has produced a catalogue detailing its Spacetrack display lighting system (tel 0480 65121).

IN YOUR NEXT ISSUE

The November issue of *Lighting Equipment News* includes the annual lamp review, containing an update of new light sources available on the market. As with lamps,

so with fittings. A major feature will look at the problems of luminaire safety. Finally, we hope to report on Euro luce, the Italian shop window on the lighting industry.

Rada Lighting Ltd., Hollies Way, High Street, Potters Bar, Herts, EN6 5BH.

Name _____ Company _____

Address _____

Post Code _____ Telephone _____

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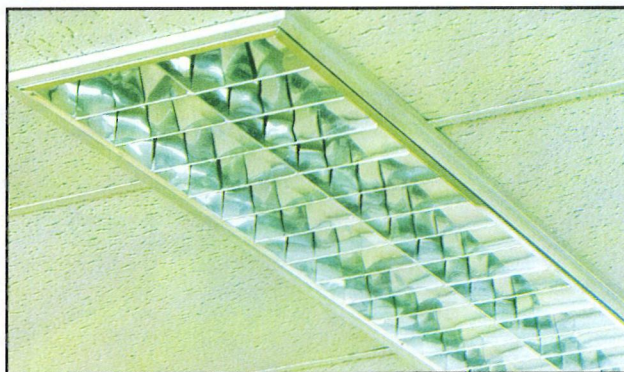
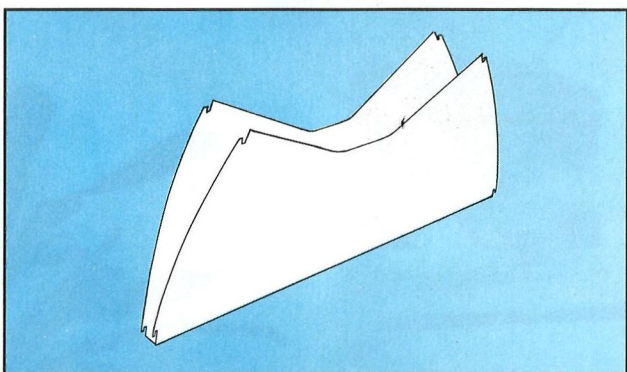
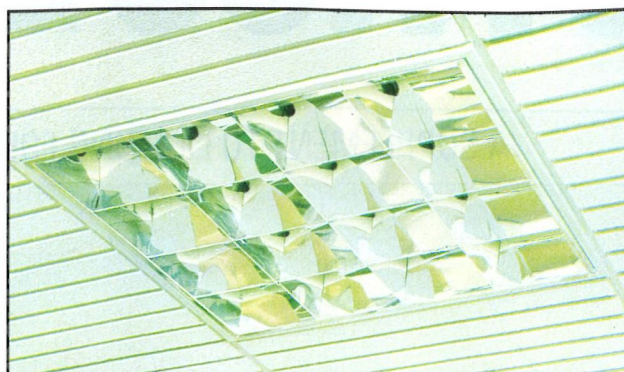
Office Lighting

A SUPPLEMENT TO LIGHTING EQUIPMENT NEWS OCTOBER 1990



LIGHTING FOR THE NINETIES

ALTERLUX®



Alterlux® is an innovative range of modular recessed luminaires for all commercial interiors, that meets all categories and requirements of the CIBSE Lighting Guide LG3, and is designed to fit most suspended ceiling systems,

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Office Lighting

A SUPPLEMENT TO LIGHTING EQUIPMENT NEWS OCTOBER 1990



LIGHTING FOR THE NINETIES

The front cover of this supplement features the Qantas Airways, Regent Street, London, reservation office, which is illuminated by a custom designed uplighter manufactured by Patrick Roberts Lighting. The luminaire comprises a glass fibre outer body shell incorporating high frequency fluorescent uplighting with additional low voltage dichroic 50W spots for accent lighting. For more information see page 12.

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 A Maclean Hunter Publication

Energy efficiency in office lighting

THE CURRENT POLITICAL CRISIS IN THE PERSIAN GULF HAS ONCE AGAIN BROUGHT THE QUESTION OF ENERGY EFFICIENCY TO THE FORE

A G BROWN SURVEYS GUIDELINES FOR THE DESIGN OF ENERGY EFFICIENT INSTALLATIONS

The scope for saving electrical energy in lighting is well illustrated each year when the results of the Energy Management in Lighting Awards Scheme (EMILAS) are announced. The awards, launched in 1974, are sponsored by the Lighting Industry Federation in conjunction with the Department of Energy, together with other professional and trade bodies.

Speaking at this year's Awards in June, Tony Armstrong the president of LIF, pointed out that some of the award winners had achieved energy savings as high as 67% with the introduction of modern, efficient lighting systems. He drew attention to the fact that not only are worthwhile cost saving benefits available to users, but the widespread introduction of energy efficient lighting could reduce Britain's electricity demand by some 8% and cut the emission of greenhouse gases by 5%.

In the UK lighting accounts for some 16% of electricity consumption — in offices however lighting frequently accounts for 40/50% of energy consumption.

Cost elements in lighting

The relationship between the various costs making up the total cost of lighting provision is frequently complex — analysis of cost incurred needs to include all cost elements, such as:

- ☐ capital cost of lighting equipment;
- ☐ installation cost (labour and materials);
- ☐ cost of replacement lamps;
- ☐ maintenance cost (cleaning, lamp changing labour, etc);
- ☐ electrical energy cost.

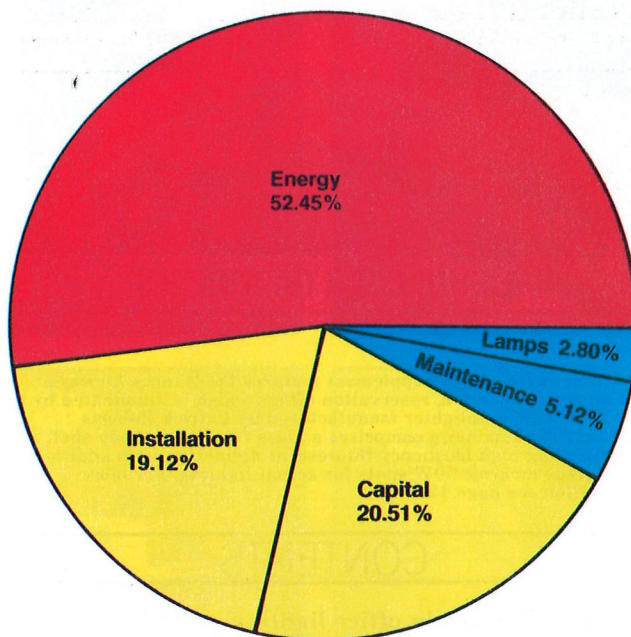
The first two items represent the total capital cost of the installation, the last three operating costs. The cost analysis of two typical alternative office lighting installations are shown in Figure 1. These analyses are calculated on an annual basis. The annual costs of electricity, replacement lamps and maintenance are shown together

Cost Elements: Office Lighting

Area: 10m x 20m

Operating Hours: 2500 p.a.

Design A



Design B

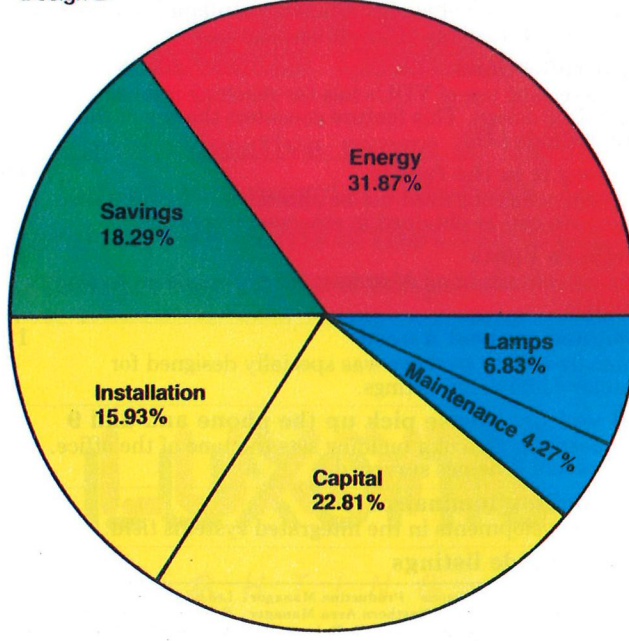


Figure 1. Two alternative scheme designs providing 500 lux. Scheme A costs 18% less than scheme B.

with an annual apportionment (20%) of the capital expenditure for equipment and installation.

Cost analyses of the great majority of lighting installations reveal that electrical energy is the major cost element. The objective of energy management in lighting, both in new design and in the refurbishment of existing installations, is to use more efficient equipment and practices to secure the same, or better, lighting result for a lower electrical energy consumption and lower total cost.

Technical development

The rate of technical development in terms of light sources, luminaires, control gear and control systems has been so rapid during the last 15 years that it is difficult for the user of lighting to fully exploit the performance benefits of new and improved products. Lamp developments have included 26mm diameter fluorescent tubes, lamps with reduced wattage rating but without a reduction in light output and the high frequency operation of fluorescent tubes.

Particularly notable, are the ranges of compact fluorescent lamps (CFL) introduced as alternatives to GLS tungsten filament lamps and giving some 75% energy saving. The larger ratings of CFL are finding particular application in office lighting.

Equally, much development has taken place with luminaires and control systems. The optical performance of luminaires has improved, control gear electrical losses have been reduced, and wide ranges of equipment are now available to control the switching and usage of lighting installations.

The consequence of these technical developments has been a progressive reduction in the installed electrical load required to achieve a given illuminance. In Figure 2, curve A indicates the approximate installed load (W/m²) required for general office lighting with the use of the most efficient equipment commercially available at that time.

ENERGY EFFICIENCY

Curve B indicates the average installed load used for lighting based on analysis of a large number of lighting installations where professional lighting scheme design had been undertaken.

An analysis of average installed load based on the mix of product types sold in any period strongly suggests that installed electrical loads far higher than those indicated in curve B are by no means uncommon. Interestingly, curve B shows increasing attention to securing higher standards of efficiency from the time of the 1973 energy crisis.

An article published in 1973¹ listed types of lamps/lighting equipment commonly regarded as 'acceptable solutions' for general office lighting. The installed loads required for a given illuminance of 100 lux varied from 31 W/m² to over 62 W/m².

Substantial scope for saving exists based on performance differences of equipment 'as new'. In practice, installations that have been in service for some years will have suffered from the deterioration in performance of elements such as controllers and reflectors.

Design guidelines

The basic rules for securing "energy efficient" lighting are shown in Table 1.

The application of these guidelines in the design process can do much to ensure the overall efficiency of lighting installations. Generally when considering the potential for cost saving of an existing lighting installation it is important to quantify the saving and investment cost arising from:

- Improving the fundamental efficiency of the installation by change/modification of lamp and luminaire types.
- Control of the use of the installation — giving required illuminance just when and where required.

As the fundamental efficiency of the installation improves in terms of the electrical power requirement for a given illuminance, the return on investment from the use of sophisticated control systems reduces.

For most general office lighting installations that are, say, 5 years old or more it is well worth making a check on installation efficiency. This may be undertaken by measuring the area (m²), measuring the illuminance and calculating the total installed load for lighting provision. The installed load per unit area (W/m²) may be calculated and considered against optimum performance data for the illuminance obtained.

In the case of large, complex

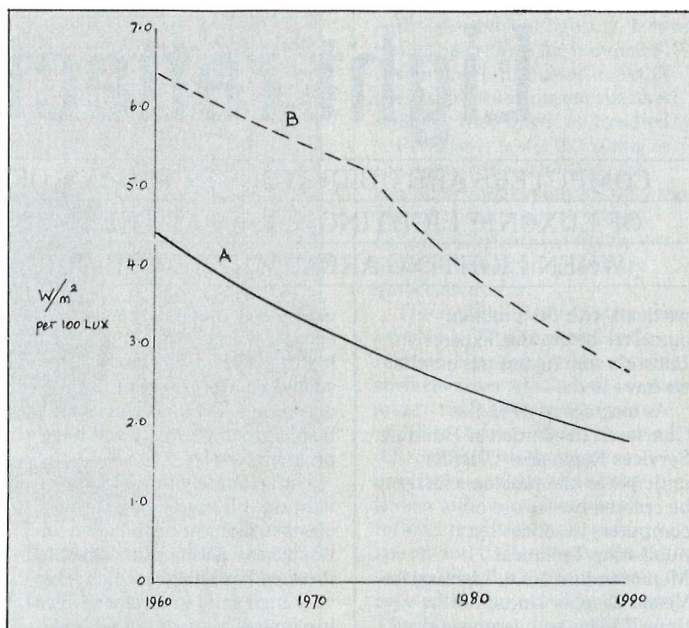
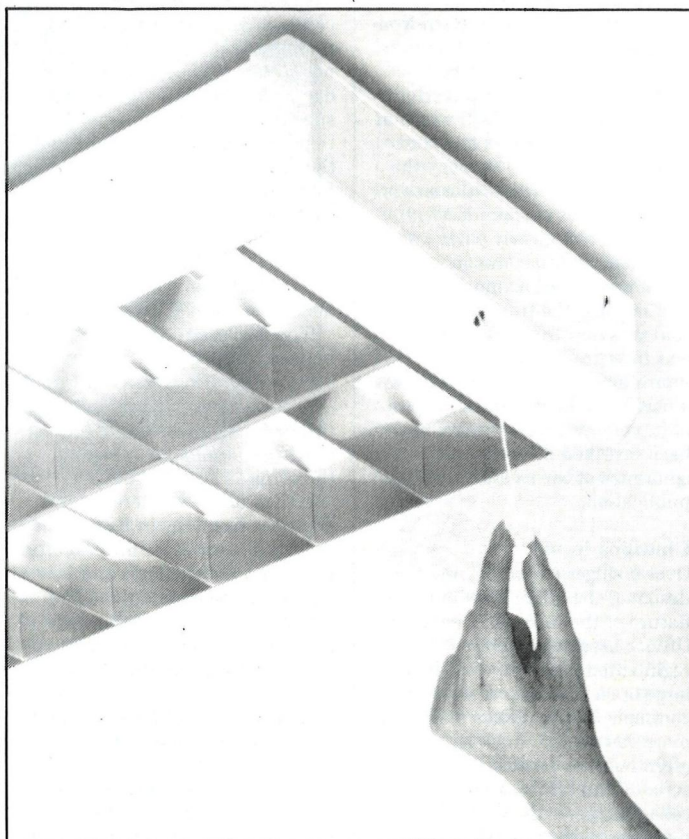


Figure 2. Installed electrical load requirements per 100 lux illuminance.

- | | |
|----------------|---|
| Rule 1. | Use the most efficient light source suitable. |
| Rule 2. | Use the lamp light output efficiently. |
| Rule 3. | Maintain lighting equipment in good order. |
| Rule 4. | Use well designed energy-effective lighting schemes. |
| Rule 5. | Control the switching operation and usage of the lighting installation. |
| Rule 6. | Consider the effect of surrounding decor. |

Table 1. The six basic rules for energy effective lighting.



Surface mounted luminaire with inbuilt pull switch offers low cost local control.

installations or groups of buildings it may be useful to make an analysis of purchasing records. If such an analysis reveals significant regular purchase of low efficiency or

obsolete lamp types (for instance, GLS tungsten filament lamps or 38mm diameter fluorescent tubes) then, clearly, cost/energy saving is possible by changing to more up-to-date types.

The users' needs

We are currently seeing a strong demand for 'better quality' lighting — improved visual environments in offices and a requirement for lighting to be tailored to the working needs of users.

Change in working tasks, particularly the introduction of VDUs in offices, imposes stringent requirements on the design of lighting installations. The light output distribution of luminaires and the alignment of lighting with respect to VDU locations are critical to ensure freedom from distracting reflections of lighting in the screen and satisfactory working conditions. In some cases, the use of uplighting installations where lighting is largely provided by reflection from the ceiling may be appropriate.

The overall economics

In seeking improvements to the energy efficiency of lighting installations the overall economic performance must be considered. Total lighting costs, expressed on an annual basis including 20% capital costs, is well within 1% of annual wages cost. Significant performance improvements (5%-30%) have been reported in various studies with improvements to lighting standards.

Clearly, it is well worth accepting small cost increases for lighting where working conditions and the general visual environment can be improved with a consequent improvement in staff productivity.

Energy saving measures implemented in the lighting installation may have an adverse effect in terms of energy required for heating. Equally, in situations where air conditioning systems are in use, then energy saving measures taken in respect of lighting may provide additional saving in air conditioning services.

Installation modifications that introduce wider ranges of lamp types may entail an increase in administrative cost associated with the purchase and stockholding of replacements or changes to the installation may entail changes of maintenance requirements in terms of frequency and accessibility.

Further information More detailed information on energy management in lighting is contained in: Energy Managers Lighting Handbook — Lighting Industry Federation; Looking at Lighting-Video — Dept of Energy, Information Division; Fuel Efficiency Booklet No 12, Lighting — Dept of Energy, Information Division
Reference: 1. Building Economics and Energy. Wyatt, TJ, International Lighting Review Vol XXXIV No 3.

Light reflections

COMPUTERS ARE UBIQUITOUS IN TODAY'S OFFICE. *BRIAN MORGAN*,
OF LUXONIC LIGHTING, LOOKS AT THE PROBLEMS ENCOUNTERED
WHEN LIGHTING AREAS WHERE VDUs ARE EXTENSIVELY USED.

A quiet revolution has taken place during the last ten years and today the desktop computer has transformed the way we work. It is perhaps not appreciated just what changes have taken place.

Word processors have replaced the typewriter and, because of the ease of forming and editing text, untrained staff are able to do creditable work and create output that is indistinguishable from that produced by trained secretarial staff.

Communication is more direct, either face to face, by telephone or increasingly by facsimile machine. Drafting work and graphics are increasingly being done by computer aided design on expensive dedicated machines, but now that the desktop PC has increased so dramatically in speed and storage capacity, the low cost software now available will ensure a fast growth in CAD and desktop publishing.

Bookwork, accounts and payroll are now universally handled by computer and, more recently, direct computer banking has been introduced to give instantaneous transfer to settle accounts. Information technology has transformed the way we handle information for travel, insurance, accounting and some retail purchasing, public records and data retrieval, finance and the stockmarket.

Diffuser fittings

Many of the smaller offices have yet to see this revolution, and have changed little over the years. While they still use diffuser fittings and occasionally bare battens, there have been significant changes in the lighting of the larger offices because of the installation of computers, through the influence of electrical consultants and architects.

The fact is that in the majority of cases the diffuser fitting including so called 'low brightness' luminaires is not suitable for lighting offices with computers and must be changed. Money it seems is no problem when it comes to buying the hardware, but most new computers are installed in existing offices with the existing lighting, with little thought as to the suitability of the space, the lighting and the visual environment.

This state of affairs is something that the industry and the professions should deal with, with some degree of urgency. There is already talk of a directive from Brussels on the suitability of lighting for computer rooms, although present information suggests that it is doubtful whether we will see much on that subject before about 1994. It would be better if

we dealt with the problem ourselves before the 'experts' in Brussels step in and tell us what we have to do.

As long ago as 1981 the Chartered Institution of Building Services Engineers (CIBSE) anticipated the problems likely to be created by the use of computers in offices by publishing Technical Memorandum No.6, Lighting for Visual Display Units. For its time, TM6 was a very useful document, but its simplicity may well have misled the designers and users to believe that a low brightness luminaire with a BZ classification of 1 or 2 and a cut off of 55° with a specular louvre or an uplighter, was the solution to all the problems of lighting offices using computers.

Certainly this simplistic approach made specification easy and, in effect, removed the responsibility of the problem from the specifier to the manufacturer. So long as the luminaire met TM6 the problem was solved.

The trouble with TM6 was that it treated all offices as one, and paid no attention to the way the computer was used, or the size of the space that surrounded it. It did not define clearly what was intended, and that the 55° cut off angle was for all azimuth planes and not just the transverse; but that was how the document was interpreted by most manufacturers. At the time it was a useful publication but, in spite of it, very many computers have been installed in complete ignorance of the existence of the publication.

Changes in work

Over a longer period of time the design of the office itself and the nature of the work have changed. Offices used to be fairly regimented places to work in and large open plan spaces were quite common. Today offices are much more casual and much smaller, often cubicles formed from screens and office cabinets into cells with perhaps two or three people working as a team.

Executive offices, however, are still largely individual and here little has changed. Certainly the really high illuminances of over 1000 lux have gone and in general surface finishes have higher reflectances and are more restful. There is, however, the beginning of a trend from America in the

use of very much darker executive style office furniture in highly polished finishes which we should do everything to discourage. If this becomes a fashion then we really will have a problem to solve.

Unfortunately much of the lighting still used today is the obsolete diffuser or so-called 'low brightness' fitting using extruded faceted crossblades which have very high axial luminance. These luminaires are just not suitable for computer areas and an effort really has to be made to get this message across before lighting is blamed for the sick building syndrome in modern offices, and we are all smitten with mad building disease.

New guide

The replacement for TM6, the new Lighting Guide, Areas for Visual Display Terminals, commonly called LG3, was published in November 1989. It is not such a straightforward document and is far from easy to specify from. It takes account of the work carried out in Germany that gave rise to the section in DIN 5035 on lighting for computer rooms and expands the many aspects discussed in TM6. Whereas the DIN 5035 is a typical German 'do it this way' document, LG3 is simply a guide.

The important difference between TM6 and LG3 is that cut off angle is no longer the criterion — luminance limits are. In fact the 200cd/m limit chosen for overhead luminaires is exactly the same as the DIN 5035 specification — so there is some degree of harmony in Europe on this issue, even if we differ on the application of the limit and how we design the installation. The Americans are taking the same road but the figures may differ a little when they are finally published.

It is important, therefore, that we first understand what LG3 is. It is not a code and there are no firm recommendations, except the strict specifications for luminaire manufacturers to work to. There is a good explanation of the problems created by computers and how they might be solved. Like all recent CIBSE guides, LG3 does not seek to impose just one solution but guides the designer through the problem and allows him to arrive at a solution for the particular

installation.

Unfortunately, LG3 does give the impression that the problem is much more involved than TM6 previously led one to believe, and arriving at a suitable specification is much more difficult.

The danger is that specifiers will either ignore it, or simply go for the easiest or most protective solution dependent on their point of view, adopting generalised statements that most computer installations can be lit with category 3 fittings, or always using category 1 to be sure of meeting all eventualities.

The point is that TM6 was written when computers were main frames or minis, before the advent of the PC. No one expected the enormous growth in computer power and storage. In the early days computers only had 32K memories and ran at very low speeds. Today speeds are 30 times faster with memories of 16 megabytes and disc storage of 300 megabytes. High resolution colour monitors of 1024 × 768 pixels are fast becoming the norm, and the software can do practically anything you think you might want to do and more, with possibilities for further expansion.

LG3 was a necessity, because the dramatic increase in the use of computers and the changes in working practice had to be recognised. Illuminance levels were too high and the world was constantly demanding better working environments.

Installations

What must be remembered is that there are many very fine installations of specular low brightness luminaires with wedge shaped crossblades, or uplighting installations in use today. Many would be outside category 2 classification or the ceiling luminance limits specified in LG3 and yet several of these installations won National Lighting Awards in recent years. They were, however, specially designed, and were under the guidance of an architect and a building services or electrical consultant.

If those installations were designed today there is no doubt that they would be improved upon, using the design criteria and the procedures outlined in LG3. Remember too, that no lighting installation is ever

LIGHTING FOR COMPUTERS



The effect of a downlighter reflection in a screen showing text (Photos from LG3, courtesy of CIBSE).

perfect. As experience is gathered from installations designed under LG3, modifications to LG3 will be necessary, to meet the findings and to accommodate further changes in computer design and working practice.

TM6 tended to be used by a very restricted few who in the main handled the large installations. It is doubtful whether even the ordinary electrical contractor knew of its existence; certainly many large users did not.

Today the computer is very widely used and lighting has not kept pace with it. LG3 has to

reach a much wider audience, not just the elite in industry and architects, electrical consultants and engineers. It is a guide for all to read whether the interest is for somebody who is empowered to install a suite of computers, or a contractor who is asked to provide the appropriate lighting, a union personality who is concerned about the welfare of the office worker or a student in architecture, building services or interior design. It is the responsibility of CIBSE to cater for the widest possible audience, and that is what LG3 sets out to do in what is actually quite a complex lighting task.

LG3 addresses four different types of lighting installation, the overhead luminaire, the uplighter, direct/indirect systems

and task/ambient lighting. It lays down the criteria for luminaire design and it discusses in detail the visual problems encountered and how they might be handled.

Perhaps it is worth looking at the main difficulties with the computer and explaining why the ubiquitous diffuser — the so-called low brightness fitting — and even some uplighters are quite unsuitable.

The main difficulty is the near vertical VDT screen and its relationship to the other working surfaces from which data is read, and to the background against which it is seen. There are also difficulties with the angle, curvature and the size of the screen and its surface which reflects bright objects in the space, and difficulties when the screen is of the high resolution type with many varying colours. The keyboards, digitiser tablets, printers and plotters are also sources of potential trouble.

Looking at these problems in turn, the first one which LG3 has little to say about, is the change of accommodation (change of focus) every time the eye moves from the screen to the data needed for input or to the keyboard. Unless the operator is a touch typist, and that is unlikely with the wide range of tasks that a computer can handle, the keyboard will be continually looked at during data input. It is, therefore, important to try to arrange that the distance from the eye when seated correctly is about the same to the keyboard, the screen and to any input data. If these distances vary widely, then the eye will have to reaccommodate each time, with consequent fatigue.

Special glasses

It is not often realised that normal reading glasses are not at all suitable for use with computers and that some operators who normally wear glasses and many more elderly people who do not, would be better having a special pair selected to focus at about 40 cm away, for without such glasses eye fatigue and headaches are a certainty.

Changes of eye sensitivity will also be necessary if the eye has continually to readjust because the relative brightnesses of the screen, the keyboard and the data widely differ. The relative brightness of the keyboard and the data can be dealt with by the general illuminance level so it is important that the screen brightness and the relative contrast between the script and the background can be adjusted by the operator to a comfortable level. This will be very difficult if the general illuminance is too high. In general, illuminance levels should be no higher than

350 lux — about half that provided by many modern installations.

The screen colour and the colour contrast with the script is also important. With many modern computers it is now possible to select practically any colour for the screen background with a range of colours for the script, during the process of configuring the system when it is first installed. It is very important that the operator is allowed to make the selection, rather than imposing some rigid office standard. For instance, having different colours for menu instructions and for headings in contrast to a different coloured screen background makes word processing a very much easier task, compared with a single colour screen.

The immediate surround to the screen should be a relatively light colour to provide an intermediate brightness between the screen and its background. The background must not be of high brightness, such as a window or blind or a wall surface highly illuminated by a lighting fitting. Both of these aspects are simply what LG3 calls static and dynamic imbalance; dreadful language for what is otherwise a very readable publication.

Balanced scheme

Summarising, one should try to arrange that the general room illuminance is not too high and at the lower end of the 350-500 lux range, so that the keyboard and data have a balanced and comfortable brightness relationship to the screen and its script. Make sure that the room background to the screen is not excessively bright and that the surface on which the computer stands (which forms the background to the keyboard and the data for input) is not too great a contrast and that both are generally light.

It is, however, assumed that the computer is a typical modern PC type and not one of the machines with dark keys, cases and screen surrounds, which are virtually impossible to balance correctly. If there are continual complaints with these types then be assured that it is the computer that probably needs changing and perhaps not the lighting.

Having sorted out the luminance balance then reflections in the screen is the other major and often very troublesome aspect to be dealt with. Being a glass surface, the screen will reflect any bright object in the space. If an operator can see the reflection of any bright object or surface in the screen then the contrast between the script and the screen background will be reduced, making it difficult to read that part of the screen image; this is what in technical terms is called a veiling ref-

lection.

The bright objects might well be ceiling mounted luminaires, a wall surface behind the operator illuminated by overhead lighting or by daylight, sky brightness through windows or thin blinds over windows, the operator's shirt or blouse or even illuminated papers on the desk. The reflection of any bright object will be most troublesome if the contrast between it and its immediate surround is sharp, as is the case with the prismatic modular recessed luminaire which is invariably seen against a dark ceiling background.

Digressing, this is the reason why uplighters work quite well with computer screens. The change of ceiling brightness is so gradual that while the screen will reflect the illuminated ceiling, because there are no sharp edges the reflection will not be that obvious. So long as the ceiling brightness is not too high then a small increase in script brightness is all that is required to counteract it.

However it should be pointed out that there are uplighters that work and uplighters that fail. The uplighter is perhaps the most over-rated luminaire on the market today in the sense that any fitting that uses the ceiling as a reflecting surface is called an uplighter, regardless of how it behaves and the luminance it succeeds in creating on the wall or ceiling. There is also a tendency to use too large a light source power to minimise the number used and to ensure reasonable installation efficiency, when, in fact, a larger number of lower powered units should be used for better visual comfort.

Uplighters

For uplighters to work effectively they should not be over powered and must have a very wide and controlled distribution that gives at the designed ceiling height an average luminance of the major reflecting surface of no higher than 500 cd/m, with a maximum of 1500 cd/m. Most wall-mounted units greatly exceed these figures on the wall surface immediately above the unit, so it is very important to ensure that this wall surface cannot be reflected in the screen, because there is a sharp edge between the unit and the very high wall luminance. It would, in fact, be better if the manufacturers of these dealt with the problem because in many cases this excessive wall brightness is a serious discomfort glare source.

Screen reflections are a most troublesome aspect to deal with but they can be generally eliminated at the design stage if one has sufficient information. It should be appreciated that not

only do screen reflections reduce the contrast with the script, they also confuse the accommodation function of the eye — the eye not being sure whether to focus on the script or the distant reflected image.

The extent of screen reflections depends in the first instance on the size of the space. If it is small or very enclosed then the computer can reflect only objects in the immediate vicinity and ceiling-mounted lighting fittings may create no problems at all. In these smaller spaces or where only one computer is used screen re-orientation is likely to solve the problem. Since modern screens do have rotation as well as vertical tilt adjustment, the operator may well have the means to solve the problem by locally re-positioning the screen.

Remove sources

In the larger spaces, where there are many screens in use and when there are many screen reflections then re-orientation will not help. The only solution is to remove the offending source and in lighting terms that means all large-area prismatic diffuser luminaires, batten fittings, and even continuous tubular systems that are so much in vogue these days. The problem will only be solved by relating the computer to the space and by the choice of properly designed luminaires.

There is one further problem with diffuser luminaires. Because of the dispersive nature of the distribution, light is emitted at very high angles and this light casts a thin veil across the whole screen reducing the general contrast of the image to its background. Strong daylight from one side will have the same effect and, while some correction can be made using the brightness and contrast controls, in most cases sufficient correction cannot be made and the only solution is to remove the offending source.

The same effect can be produced by any luminaire placed overhead and slightly behind the head where it casts direct light on to the screen. Such a luminaire will cause strong reflections from the keyboard or a digitiser tablet. Either the luminaire will have to be moved or the whole computer re-positioned. It is always preferable to have the computer between rows of overhead luminaires and best if the direction of view is parallel to the rows if linear luminaires are used.

Finally there is the problem of the printout from printers. Very often due to the cost or nuisance of changing ribbons the printout, particularly in draft, is of very low contrast. This may not be of much significance unless it is necessary to scan through sheets of printouts for data or other

information. Fortunately most papers used are matt so that veiling reflections will not be a problem. However there is nothing that the lighting can achieve and complaints from this cause can only be solved by the obvious course of changing the ribbon.

If the decision is made to use overhead luminaires then LG3 categorises three types. They are all judged by the same criterion of an average luminance limit of 200cd/m above one of three elevation angles, the limit applying to all angles in azimuth around the fitting. If the average luminance exceeds the limit at any angle around the fitting then the fitting fails in that category and falls back to the higher category or is claimed to meet the higher category but at a lower angle.

This is a very important point to appreciate and one all manufacturers must be clear about, since it is they who provide the certification in the first instance.

It is not a question of the luminaire passing at most angles but missing out on just a few, or passing on those where the check is first made, at 0°/30°/60°/90° while failing at some angle between. **If it does not meet the limit at all azimuth angles it fails that category.**

In addition, the manufacturer must ensure that any high brightness flashes immediately above the crossblades, termed ladder flash, must not exceed a luminance of 500cd/m as measured by the procedure in BS 5225. This is actually a very stringent requirement and one that a manufacturer would be advised not to ignore.

In all cases the manufacturer should provide the intensity distribution so that the designer can be satisfied that the luminance limits are not breached.

Luminaire selection

For overhead luminaires, the selection of the right luminaire can be made in one of two ways. The most popular is likely to be by choice of category. If, however, detailed information is available from the computer manufacturer so that one has the screen size, inclination angle and radius of curvature, and one can obtain information on the relative seating position and eye level then, by using the diagrams in Appendix 1, one can calculate the actual angle to which the 200cd/m limit must apply.

This procedure is particularly useful in fixed installations such as process control desks where the screen cannot be altered by the operator. Be careful where the operator inputs data and a person standing reads the results from the screen, for the solution has to suit two different eye levels.

The category system relates the usage of the computer to the application and briefly the categories are as follows.

Category 1, where the 200cd/m luminance limit applies at angles above 55° applies where there is a high density of screens and use of the computer is over sustained periods, or where errors, should they occur, are critical as would be the case in air traffic control or in dealing rooms.

Category 2, with a limit of 65°, is suggested where the computer use is fairly widespread and certainly one screen to a desk, or where just a few screens are in continual use but the space is well subdivided by vertical partitions which dramatically reduce the amount of ceiling reflected in the screen.

Category 3 is the least restrictive with the limit applying at 75°. This category would be chosen if the use was very casual or the screen density very low. If, however, the space is large, repositioning of the computer may be necessary to obtain a position where few if any reflections are seen. An example would perhaps be a design office where the computer is used to carry out routine calculations as part of the design process.

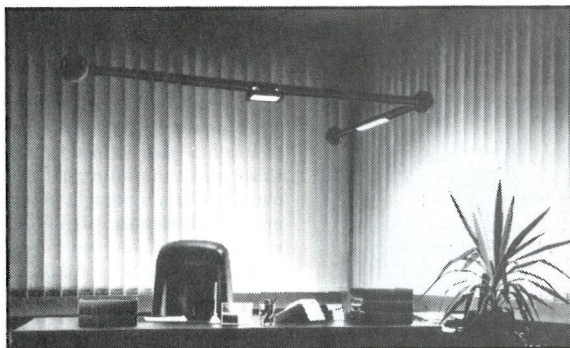
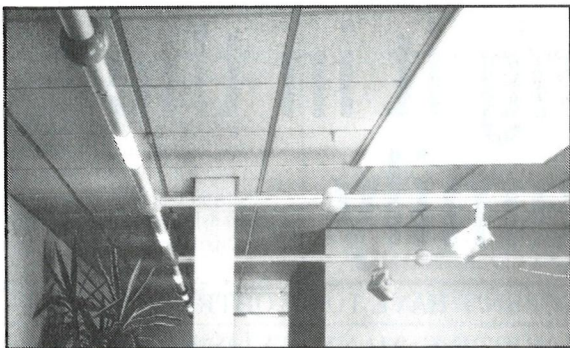
Rule of thumb

In all respects LG3 is a more helpful design document. But, because it is so much more difficult to specify from without some attempt at design, there is the danger that the document will be ignored and some simple rule of thumb introduced, like always specifying category 2 unless somebody says something different. It is a very readable document and, hopefully, this article has gone some way towards explaining the salient points and how to use it.

It is now for the manufacturers to come up with the hardware. Certainly that is the intention of my company.

What has to be said by this industry is that diffuser fittings are obsolete as far as computers are concerned and the space must be re-equipped with lighting that is properly designed to create the proper visual environment, using either overhead luminaires, properly designed uplighters or one of the other systems discussed in LG3.

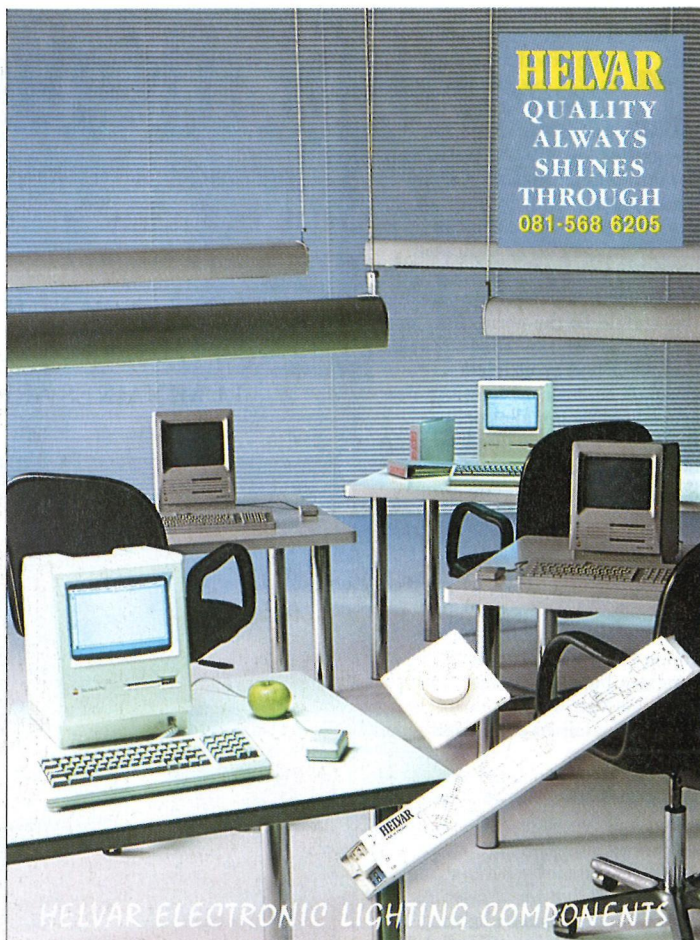
In many respects we in the UK are our own worst enemies since we wait for the users to come to us for advice. We should be out there offering advice, promoting LG3 and making sure that for every new computer installation there is a new lighting installation; and that for every existing computer where diffuser luminaires are still in use these are taken out and a more appropriate lighting installation installed.



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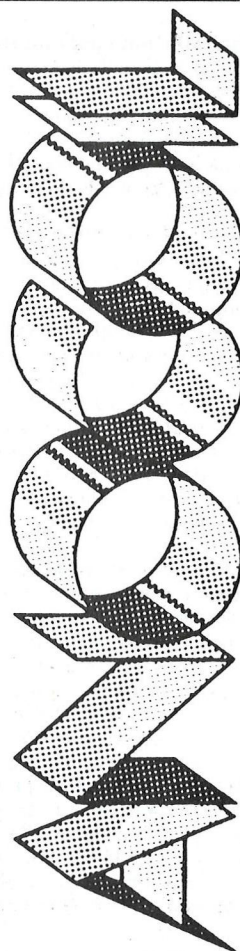
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Keeping it in the family

EMERGENCY LIGHTING DOESN'T HAVE TO BE OBTRUSIVE, SAYS
JOHN FOSTER OF MARLIN LIGHTING. MANY STYLISH RANGES OF
LUMINAIRES ARE NOW OFFERED IN EMERGENCY VERSIONS.

Emergency lighting in many modern offices makes use of a number of circular or square surface-mounted

luminaires — quite separate from the normal lighting installation — which remain unlit for most of the time except for a faint red glow from the charge indicator lamp.

But there is no real reason why this should be the norm, especially with the trend towards the use of energy-efficient compact fluorescent lamps in new office lighting installations. Emergency lighting facilities can be incorporated into the normal lighting scheme with one or more of the lamps in a luminaire operating at reduced output to provide maintained emergency lighting. Alternatively, where this is not possible — for example with metal halide or high pressure sodium fittings — a separate tungsten halogen capsule lamp built into the luminaire can provide sustained emergency lighting.

Some commercial lighting manufacturers now offer emergency versions as a standard option within their normal recessed and surface-mounting commercial lighting ranges. As a result, an architect or lighting engineer can design office lighting installation to incorporate emergency lighting within the overall scheme.

Installation considerations

As far as installation is concerned, the main requirement is essentially the same — provision of an unswitched supply to the emergency lighting circuit — and the integration of general lighting and emergency lighting can be cost-effective.

In the case of multi-lamp fluorescent fittings it will be normal to use one, or possibly two, of the lamps only for maintained emergency duty.

In some cases, for instance with shallow recessed fittings, it may not be possible to incorporate the emergency lighting batteries and inverter circuit into the luminaire itself, either because there is inadequate space or because the thermal effects on the inverter or battery cells would be unacceptable. In this case, a separate remote box may be installed close to the luminaire, preferably within the ceiling void.

A luminaire with a remote control box is regarded by ICEL 1001/2 as a self-contained unit, provided the length of the cable between the terminals of the remote control box and the luminaire is no greater than 1m. If this requirement is satisfied, normal wiring can be used between the remote box and the luminaire.

Problems experienced with



Orbit fitting provides ambient lighting and up to 3 hours' emergency lighting.

remote boxes are most commonly caused by this maximum interconnection length being exceeded. Voltage drop and capacitance in the interconnecting cables can prevent tubular fluorescent lamps from starting. With certain types of compact fluorescent lamps, an even shorter length may be necessary. It should also be borne in mind that if an interconnection greater than 1m is used, the combination is no longer to be regarded as a single self-contained fitting and should be treated as a central battery system in terms of wiring and other installation criteria.

Fibre-optics, for instance, is finding increasing applications in many fields and may prove useful for some forms of emergency lighting.

The use of emergency lighting mounted at a very low level might also be considered. Modern aircraft design, recognising the fact that smoke rises, provides lighting at floor level to enable people to crawl out of a smoke-filled cabin. The same principles might be applied to emergency lighting in commercial premises; low-level fittings could be mounted close to, or within, the

floor along an escape route.

The use of lights pulsed sequentially to indicate the direction of escape could be another valuable safety device.

Yet another possibility is to have an emergency lighting scheme which, when first activated, produces lighting levels approaching those of the normal lighting. This will assist speedy evacuation. The lighting level could then be decreased progressively over a period of 10-30 minutes to the normal level recommended in the British Standard Code of Practice for emergency lighting, BS 5266: Part 1.

Standards

BS 5266: Part 1 and the CIBSE Technical Memorandum TM12 tend to be very specific about the means of emergency lighting and so any innovations such as those suggested above, would need to be provided in addition to the requirements of the Code.

Not only should BS 5266 and TM12 be viewed in the light of new ideas in emergency lighting, but also their own recommendations, which are regarded as minima, should be reviewed.

The code calls for a minimum illuminance of 0.2 lux along the centre line of a defined escape route and a minimum of 0.1 lux over 50% of a route while, for areas such as open-plan offices with no clearly defined escape route, it prescribes a minimum average illuminance of 1 lux.

When it is considered that 0.2 lux is comparable with bright moonlight, and a person may be seeking to escape from an office that is normally lit to at least 500 lux, these requirements are far from adequate and a much higher level of emergency lighting should be considered.

It is generally preferable to work to the 1 lux figure for open-plan office areas. This is an average figure and the additional requirement that the uniformity ratio should be no greater than 1:40 ensures that this is achieved by an even distribution of emergency luminaires throughout the space. Manufacturers' photometric data will indicate appropriate axial and transverse spacings to achieve the required results.

The use of modern luminaires with a restricted beam angle, for example fluorescent luminaires with a low brightness louvre, may necessitate an increase in the number of emergency fittings to achieve the specified minimum uniformity ratio; this will mean that the average illuminance will be substantially higher than 1 lux.

Similarly, where recessed downlighters with a restricted beam angle are in use, the need to achieve a 40:1 minimum uniformity ratio may mean that the number of luminaires fitted with emergency supplies would be excessive. It may be possible to have a wider beam angle in the emergency fittings, provided there is no danger of their being replaced by narrow-angle lamps.

Lamps

Compact fluorescent lamps are ideally suited to emergency lighting due to their energy efficiency. The increasing use of the higher rate versions in some modern office lighting schemes is another incentive to integration of general lighting and emergency

Northern lights

A KEY REQUIREMENT OF OFFICES TODAY IS FOR FLEXIBLE SPACE THAT CAN ACCOMMODATE CHANGE. BY ELIMINATING MUCH HARD WIRING AND INSTALLING A COMPUTER-CONTROLLED INSTALLATION, LIGHTING CAN BE MADE AS FLEXIBLE AS THE BUILDING FABRIC. WE LOOK AT AN EXAMPLE IN ABERDEEN'S OIL INDUSTRY.

lighting. Only the four-pin compact fluorescents are suitable for this purpose. Two-pin lamps with integral starters are not suitable for emergency lighting.

In reception areas and conference rooms, modern low-voltage tungsten halogen lamps, as used in downlighters, also lend themselves to emergency lighting use. In this case there is no requirement for an inverter as the lamps operate on 12V dc.

However, a remote box may still be necessary to accommodate the batteries and automatic transfer device. In the case of the tungsten halogen lighting, it is not normally practical to operate at reduced lamp output for emergency because this would adversely affect the regenerative tungsten-halogen cycle and result in blackening of the lamp envelope.

Metal halide and high pressure sodium discharge lamps which are now used in some office lighting schemes especially in uplighters, are not suitable for emergency lighting, but a small tungsten halogen capsule lamp, typically 20W, can frequently be incorporated into the side of the luminaire to provide sustained emergency lighting.

Innovation in design

While the techniques for emergency lighting are fairly clearly defined, there is still considerable scope for innovation and experimentation. New materials, new light sources, and new techniques should be investigated for their suitability to emergency lighting.

In some cases it may be necessary to use separate emergency luminaires. But even here there is a wide range of fittings available today including recessed emergency luminaires and open-lamp downlighters to achieve a relatively unobtrusive result compared with the traditional surface-mounted emergency luminaire.

Conclusion

Emergency lighting does not have to be seen as a separate service from the normal lighting in a modern office. Selected lamps or luminaires within the general lighting scheme can be used as maintained emergency luminaires. In this way the appearance of the installation is not spoilt by surface-mounted emergency luminaires, the cost of the emergency lighting can be brought into the overall lighting scheme and a single supplier can provide both general lighting and emergency lighting.

So, when planning a new lighting installation, question the manufacturer on his ability to provide an integral emergency lighting scheme, complying with BS 4533 and ICEL 1001.

Market surveys have revealed that a growing proportion of new and retro-fitted office

buildings are being fitted with sophisticated lighting control or building management systems. More and more contractors will, therefore, be called upon to fit these systems which, although they seem complicated at first, are actually easier to install than conventional lighting systems.

AT BP Exploration's giant office complex at Dyce near Aberdeen in Scotland, Richard Irvine Combined Parkinson Services recently fitted a Philips IFS 800 system into a three story building. Joe Black, electrical engineer with RICP masterminded the introduction of the scheme, which offered a high degree of flexibility in lighting control, to cope with BP's continuous changes in office configuration.

In the fast moving oil business, project teams arrive and depart, and expand and decrease at Aberdeen with bewildering speed and irregularity. Furniture, equipment, partitions and hard core wiring must all be changed. The company, therefore, incurs the sizeable but unavoidable cost of constantly moving people and altering their office environment.

However, the flexibility of the system can significantly reduce the cost, time and trouble of office alterations if the need for switchboxes, hard wiring and switches is eliminated and the luminaires can be easily relocated. Over a lifetime of 20 years or more a computer controlled scheme that has a higher capital cost than conventional lighting may prove to be by far the cheapest solution.

In terms of installation, the system eliminated the need for costly and, time-consuming hard wiring. There was, in fact, very little electrical work.

Bill Brebner, the consulting engineer with Wallace Whittle and Partners who designed the IFS system, estimated that there was a 20% reduction in labour time — such was the ease of installation.

Instead, one bus line, or 2-core



A typical floor in BP Exploration's office complex.

low, was fitted into each ceiling area of the three floors in the building. A total of 144 local control units (LCU) were linked to the bus lines at set intervals, three Philips TBS300 luminaires equipped with four 16W colour 84HF lamps, were in turn connected to a local control unit with standard flexes and plugs. Every room was fitted with an infra-red receiver, and these were linked to the LCU controlling the room's luminaires.

Corridor lighting is controlled by passive infra-red occupancy sensors, six in total, located at either end of each floor, and these switch on the lighting as soon as an employee enters. The system was connected to an IBM compatible personal computer located in Joe Black's office via a central processor unit. Using the PC, Black wrote a master program to switch the system on and off at specified times, thus achieving maximum energy savings. Luminaires are turned off both at lunchtime and in the evening when, at hourly intervals after 6.00pm, an automatic sweep by the IFS switches off all the lamps still in use.

At a secondary command level, the IFS is programmed to switch off the row of luminaires next to the windows if daylight, measured by two photocells reaches a pre-set level. In every office there is a hand-held remote controller which can be used by

staff to override the main program whenever necessary, to suit individual requirements.

'Our basic rule in programming the IFS is to retain control over the 'off' switching', said Black, 'while office workers keep control of the 'on' switching to meet their personal needs'. Under this regime, no lighting is used unless required, and if any worker is away from the office for any reason the lighting remains switched off.

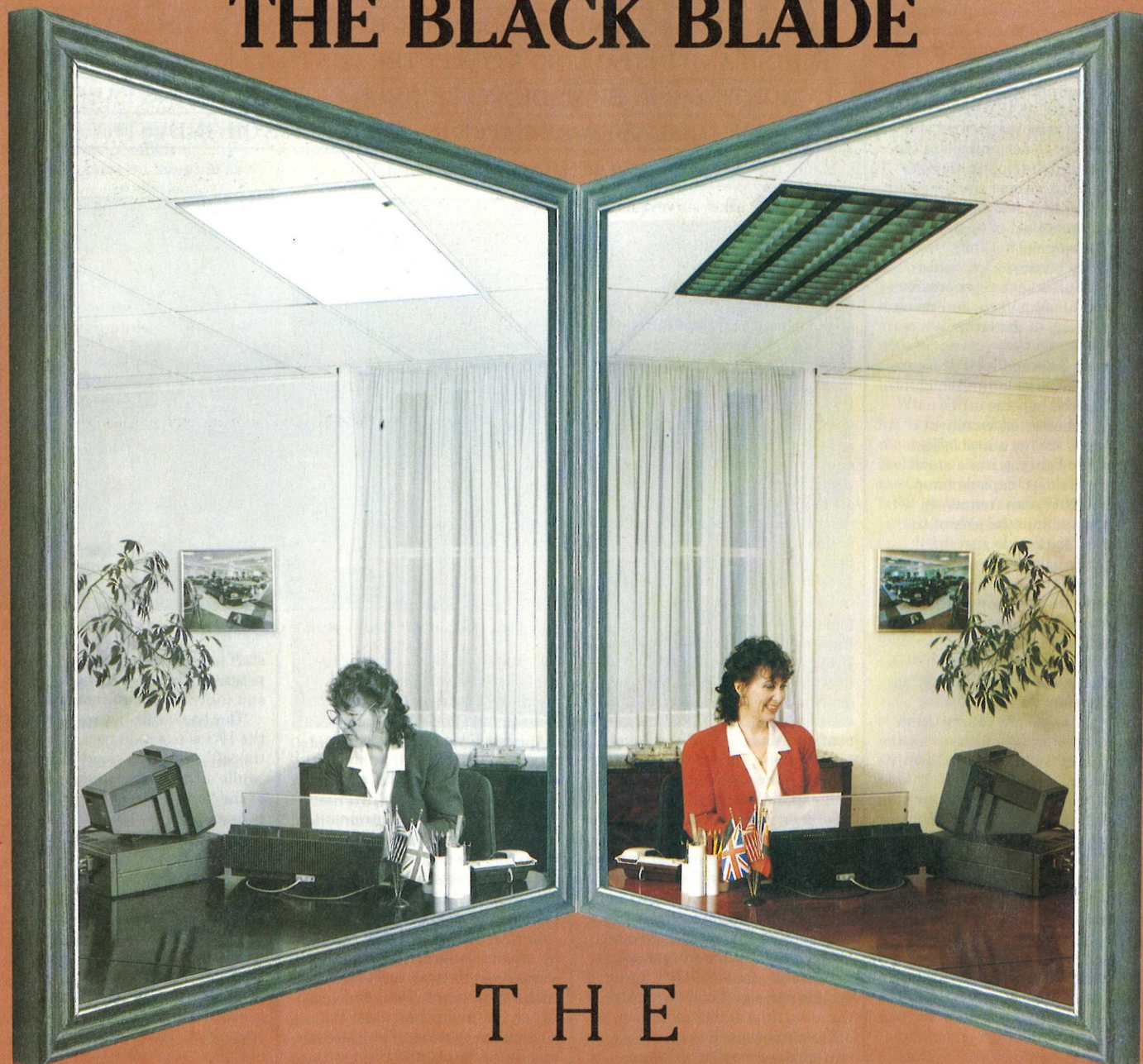
'With a drawing of the luminaire layout, you create the program room by room, incorporate management schedules and then test it', Black remarked. 'In all, it took me just one week to complete.

'The IFS system worked from day one without any teething troubles. 'Whenever we have office changes now, there is no need for extra switch drops — in fact there is no need to call in the electricians at all. We just swap the fittings with adjacent ceiling tiles to suit the new occupant — a 15 minute task — alter the program, and our task is complete. What could be simpler'.

The program offers maintenance staff other useful benefits. The operational hours of each luminaire can be logged, allowing a re-lamping plan to be drawn up, and the precise figures for energy consumption can be calculated.

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Designed to meet a need

THE 40W 2L FLUORESCENT LAMP WAS DESIGNED TO MAXIMISE THE PERFORMANCE OF MODULAR COMMERCIAL FITTINGS. *LOU BEDOCS, VIVIENNE CHARRETT AND MILROY ABEYWICKRAMA* OF THORN LIGHTING DESCRIBE THE DEVELOPMENT OF A HIGH FREQUENCY LIGHTING PACKAGE.

The next five years will show strong growth in the 600mm x 600mm commercial modular fittings market and the powerful linear compact fluorescent lamp operating on a high frequency ballast seems all set to become the preferred choice for installations where high-quality lighting and economic running costs are important. But how does the manufacturer first set about offering the customer the optimum lighting package of lamp, ballast and luminaires? Does the fitting necessarily always follow on from developments in light source technology?

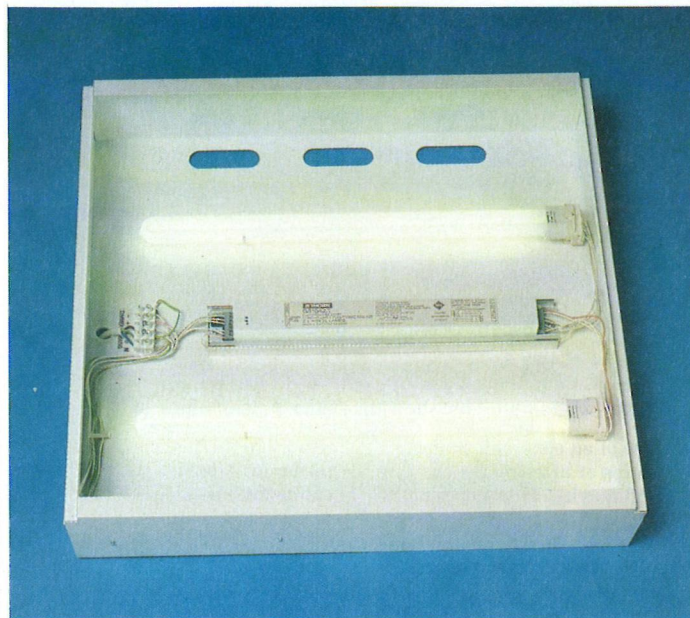
In this sense, the Thorn 40W 2L compact fluorescent lamp, developed in 1987 was different — a need was identified and then a lamp was developed to meet that need. First, customer analysis led to a brief for the ideal lighting package; then the lamp and control gear specialists were asked to meet that brief.

Optimum lighting package

In developing the ideal new commercial lighting package, the different variables that make up a typical lighting scheme were considered. These included trends in building design, the use of different modules for space planning, and preferred ceiling modules. From this it was apparent that a troffer that fitted the standard 600mm² ceiling module was the ideal. Agreements within the lighting industry had already established the need for a 25mm rim all round any such fitting to provide adequate facilities to support different types of ceiling tile. This indicated a practical lit area 550mm square.

The study also indicated that to meet the needs for flexible partitioning the optimum spacing to aim for would be a 3m spacing at 3m ceiling height, in other words a 1:3 spacing to mounting height ratio to the working plane.

Next the economic/lighting constraints were examined. Lighting schemes tend to be designed around a preferred series of levels, namely 300 lux, 500 lux, 750 lux, and 1000 lux — and so a multi-lamp package using one, two, three or four



Modular luminaire with two 2L 40W lamps and HF ballast.

lamps to achieve these levels at the 3m spacing would be the ideal.

The electrical loading and lighting level was considered next, and a target was set at around 10W/m² for 500 lux. This indicated a maximum of just over 50W per lampway, based on the use of one, two, three or four lamps to achieve the preferred lighting levels.

As a result of this exercise a family of lamp and fitting types was identified but this was then prioritised. The final specification presented to the fluorescent lamp development laboratory was:

Lamp length 525 mm
Optimum initial design lumens 3500 lumens (lm)
Maximum circuit power 51 W
Minimum circuit efficacy 69 lm/W

600mm x 600mm module

Of the existing lamp types, the 2ft 18W tri-phosphor lamp was the logical match to the dimensions of the 600mm x 600mm module and is often used but with a tube length of 600mm. This requires an end extension box to accommodate the end cap, making the module both ungainly and awkward to install. The initial light output of the 2ft 18W lamp is 1450 lumens, which is less than half of the ideal identified above, and total circuit power is 28W. Furthermore the endbox also wastes light, and circuit efficacy is only 52 lm/W, which is well short of the set target.

European lighting manufacturers had introduced 18W, 24W and 36W compact fluorescent lamps in 1986. The most suitable of these is the 36W

rating which is 415mm long but this is considerably shorter than the 600mm module, thus causing gaps and shadows at one or both ends on the lamp. At mains frequency the light output is 2900 lumens, which is also short of the ideal. Circuit power is 48W resulting in a circuit efficacy of 60 lm/W. This is still below the specified target.

40W 2L lamp

The solution proposed by the fluorescent lamp development laboratory was a 40W version of the compact fluorescent lamp with a length close to that specified by the Lighting Development Department. However, the longer arc tube called for a higher operating voltage than that available from either the British 240V or European 230V supplies. Consequently the use of a high-frequency ballast was proposed. This not only enabled the necessary voltage to be applied to the arc tube, but also exceeded specified efficacy criteria with a wide margin.

The essential parameters of the 40W 2L lamp are:

- ☐ Maximum lamp length 535mm
- ☐ Output 3500 lm
- ☐ Circuit power 46W
- ☐ Circuit efficacy for twin circuit of 81 lm/W (a single lamp circuit, 76 lm/W)
- ☐ Long life and good lumen maintenance.

The decision to launch a lamp intended for high-frequency operation only was based on the fact that the sector of the market for which it was intended — modern commercial premises with suspended ceilings — was one where the higher quality and long-term economies of high-frequency lighting would be accepted, in spite of the higher cost of the fitting.

For similar reasons, the lamp is offered in Polyflux versions only. These offer excellent colour rendering (Ra82) in three colour temperatures, 3000K (warm),

	Optimised design	1 x 36W compact fluorescent	2 x 18W linear fluorescent	1 x 40W 2L fluorescent
Length (mm)	525	415	2ft (600mm)	530
Initial lumens (100h)	3500	2900	2900	3500
Circuit power (watts)	<51	48	56	46
Circuit efficacy (lm/W)	69	60	52	76

Table. Possible options for the 600mm x 600mm module.

PRODUCT DEVELOPMENT

3500K (intermediate) and 4000K (cool). This choice of warm, neutral and cool temperatures enables the lighting designer to match the user's ability to accept cooler colour temperatures as levels of illumination increase. For instance employees in an office lit to 500 lux may be comfortable with the 3000k temperature, but in the same office lit to 750 lux, 4000K may be preferred. Polylux lamps also have excellent lumen maintenance characteristics: up to 94% at 2000 hours.

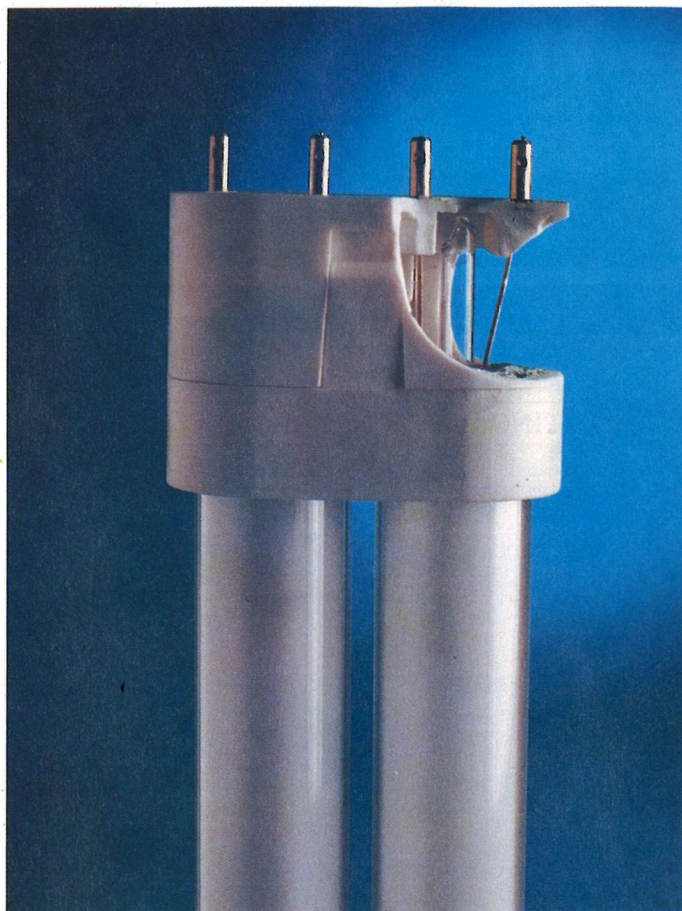
The use of high-frequency compared with 50Hz operation confers many benefits. These include approximately 5% higher light output, lower ballast losses and higher efficacy plus a high power factor. Other benefits include, instant start, and freedom from flicker, 100Hz stroboscopic effects, and 50Hz hum.

Lamp design

The lamp is formed into a tight U-shape. The curved end results in a fully-lit lamp length which is aesthetically pleasing and offers the luminaire designer excellent light control. Thorn's existing expertise in bending narrow tubes — perfected with the 2D lamp — was put to good effect.

The total arc tube length required to meet the brief meant that the tube voltage required could not be satisfied by the normal supply voltage of 230V in Europe and 240V in the UK. This problem could be overcome in two ways. One option was to replace the argon gas filling with krypton which would bring the tube voltage down so that the lamp could operate at mains voltage. The alternative was to step up the voltage supplied to the tube.

Unfortunately, krypton tends to produce a shimmering effect in tube diameters less than 25mm when first switched on and so the use of an increased supply voltage was preferred. This could be achieved using a transformer, but



Cut away 2L lampholder showing exhaust stem which acts as cool

the use of an electronic ballast operating at high frequency offered much greater benefits.

Because the lamp is of small diameter for its wattage the tube walls tend to run in hot comparison with a conventional fluorescent lamp. Under normal circumstances, this would result in reduced luminous efficacy but the 2L lamp has been designed to provide maximum output when the ambient temperature is 35°C by using a cool spot technique.

Cool spot technology

The luminous efficacy within the lamp is related to the mercury vapour pressure which is, in turn,

related to thermal conditions in the lamp. Mercury will condense out at the coolest spot in the lamp forming a mercury droplet. By designing a cool spot into the lamp the mercury vapour pressure can be controlled to reduce optimum efficacy at tube wall temperatures which would normally degrade the light output.

In the 2L lamp, the exhaust stem, which is used to evacuate the tube during manufacture, is extended to the end of the cap and thermally connected to a brass eyelet in the lamp cap, using a heat-sink compound. This produces a cool spot in the

exhaust stem. As a result, the overall operating characteristics of the 40W 2L lamp are shifted to achieve maximum light output when the ambient temperature around the lamp is about 35°C.

Electronic ballast

Two ballasts have been developed for use with the 40W 2L lamps; a twin-lamp ballast and a single-lamp ballast. The twin-tube ballast achieves a higher circuit efficacy (81 lm/W) than the single-lamp ballast (76 lm/W).

Thorn 40W 2L ballasts operate at a frequency of 30kHz. The choice of frequency is based on the desire to achieve optimum light output while operating at a frequency that is above the audible band but not so high as to produce radio frequency interference. The size of the control gear comes down as the frequency increases but losses also tend to increase. The choice of frequency is thus a balance between these characteristics.

The 2L ballast is a fully electronic unit which uses a charge pump technique to reduce harmonic effects in the waveform and achieve maximum ballast efficiency. The technique, which is unique to Thorn, also results in a lower component count and lighter overall ballast weight.

All ballasts are tested at the factory for several hours in order to eliminate premature failures. The ballast life is 45 000 hours based operation for 12 hours per day, equivalent to 10 years of operation.

Optical design

The actual tube diameter of the 2L lamp is only 18mm and the tight bend at the end enables the two limbs to run side by side to give a total width of only 38mm — the same as the diameter of the old 38mm T12 tubular fluorescent lamp. This offers the luminaire designer the choice of two different lamp arrangements — side by side or stacked.

In shallow fittings with prismatic or opal controllers the limbs will normally be side by side to achieve a slim fitting. In reflector fittings the shape of the lamp can be exploited to achieve different types of distribution. Side by side operation can give greater downward concentration while a stacked configuration can be used to produce a bat-wing or trouser-leg type distribution.

Reflector design has progressed in recent years with the emergence of specular and semi-specular reflectors as the preferred optical systems for fluorescent lamps to achieve the low-glare operation demanded in modern offices. These have been put to good use in modern 600mm × 600mm modular luminaires and are ideal for use with the 2L lamp.



The 2L 40W compact fluorescent lamp.

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At the new Fornebu Airport in Oslo the Skotlamp plays host to the stars by shining throughout the dark hours. Anywhere that people come and go, needing a safe footing and a lighted path, the Skotlamp becomes a dependable friend.

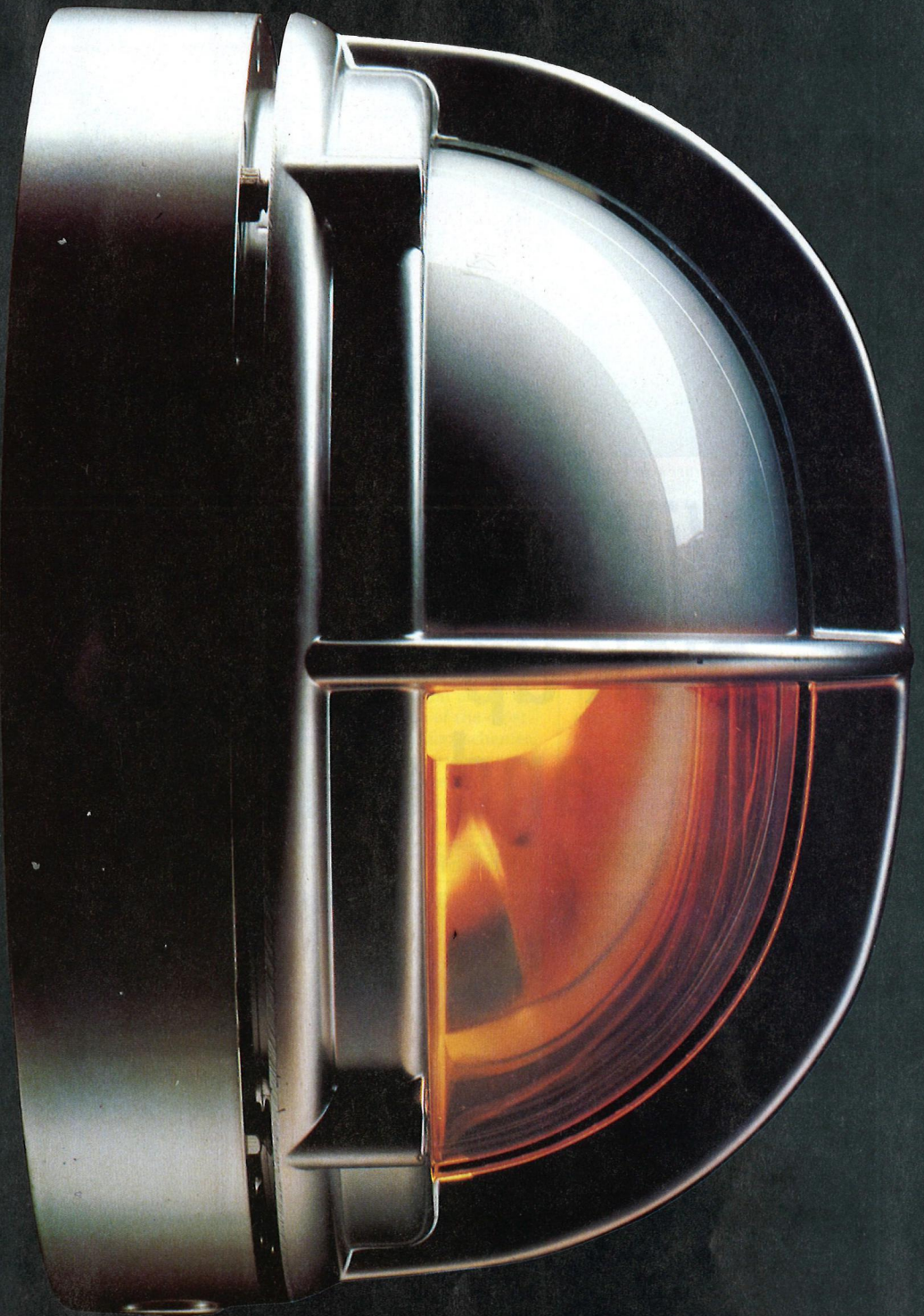
On the approaches to offices, on housing estates, by river paths, up and down stairways, along corridors, entrances and ramps. The Skotlamp lights the way.

General specification

The Skotlamp is made from die-cast hydronalium, a weather and corrosion resistant aluminium alloy, with a high magnesium content. The globe of the fitting is impact-resistant, UV stabilised polycarbonate with a temperature range of -30°C to $+130^{\circ}\text{C}$. The Skotlamp globe is additionally protected by a cast aluminium guard.

The Skotlamp is watertight (protection class IP66). The housing has five $\frac{1}{2}$ " (13mm) threaded holes with plugs and gaskets. The cover fixing screws are 6mm stainless steel Allen screws. Cable glands are mounted as required. The lamp base has four knock-outs. One is designed for an adaptor, while the others are for grommets.

The Skotlamp complies with the requirements of Demko, Nemko, Semko, FL VDE, UL and others.



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Reader Service No. 306



Figure 1. Entrance area to London bank, designed by Concord.

Will visitors please pick up the phone and dial 9

YOUR RECEPTION AREA SETS THE TONE OF THE COMPANY.

MIKE MORRISON, OF CRESCENT LIGHTING, LOOKS AT

TRENDS IN SOME RECENT SCHEMES.

We have all seen them. We have all waited in them for hours. The walls are probably covered in a plastic veneered hardboard with mock wood-pannelled effect. The old wall-mounted telephone has seen better days and is partly obscured by a dirty label telling you to dial 9. Immediately you comply with this impersonal directive, you will hear the ring of a phone in another room so close to the reception that, not only can you hear it ring at the other end, you can usually hear the muttered "Bloody Reception" before the employee barks "Yes" into the phone.

Luckily this kind of welcome is becoming a thing of the past. Companies are waking to the idea that first impressions count and that their public face must be presented in the best light. (Pun, of course, intended here). Some very unlikely companies are

smartening up their public areas to match their glossy brochures and adverts. Companies that have always been low profile (either by intent or default) are now spending large amounts of money in order to impress their visitors with the prestige of their premises.

The influence of the States is obvious in the large scale reception/atrium of the American Bank shown in Figure 1. This is lit using a mixture of HID and tungsten sources which provide both functional and decorative lighting. It is probably worth mentioning that the large plants and trees found in areas such as this need special attention. The obvious requirements of water and fertiliser are provided by specialist companies who contract to visit the site on a regular basis.

However, the lighting requirements are quite often forgotten or — more usually — underestimated. One scheme that comes to mind started out by detailing four 120 PAR38 lamps mounted in each upper corner of a sizeable atrium! The final scheme was a mixture of 1000W HID downlights mounted at high level and side mounted spotlights to provide essential side light. Lighting large (and small) plants without this side component causes the unfortunate victims to grow, not only rapidly, but to grow rapidly in one direction: upwards. This results in a tree that is referred to as 'leggy', a characteristic which, in plants at any rate, is not desirable.

Anyway, enough about saving the trees and back to the lighting of reception areas. The function of these spaces is usually a split between office and showroom and quite often the lighting is a mixture of functional fluorescent



Figure 3. Entrance to exhibition centre at Lyon, designed by Crescent.

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Figure 2. Reception area of a Rome office, designed by Crescent.

and display lighting.

Figure 2 shows a rather neat mixture of direct and indirect fluorescent enhanced by a few wall mounted HQI uplights. The resulting brightness of the walls and ceiling lends an open feeling to the space, and the ambience can be changed dramatically by switching various combinations of the wall and pendant uplights.

One problem that can face a lot of new and existing installations is the spectre of energy saving! Building managers — and quite often energy managers — can be responsible for the most horrendous changes in lighting schemes, mistakenly carried out as some kind of sacrifice to the god of low wattage. It is quite possible to save energy without sacrificing interesting and effective lighting. (Not a lot of people know that, to quote Michael Caine).

There is one particular installation that springs to mind. The original design used PAR38 150W lamps in an array of surface, black baffle downlights on a coffered precast concrete ceiling. (The clue to the age of this unfortunate installation is the reference to 150 PAR38s. A lamp now superceded by a baffling array of tungsten and tungsten halogen equivalents, all consuming less power). The brief must have been simple, 'reduce

the load — regardless!'

Regardless, obviously, of lighting performance and consequently visibility for visitors to this sorry place. The downlights are now fitted with SL fluorescent lamps (the ones that look rather like a prismatic jam-jar).

Despite producing light very efficiently, these lamps are struggling somewhat with the total lack of a reflector in these otherwise totally black fittings. The result, of course, is terrible. The atmosphere is dull in the extreme and so little light reaches the floor that the poor visitor can barely read the glossy brochures on display extolling the virtues of the company.

Morrison's law

This is not an isolated case. When you have finished reading this — or now, if you are bored — nip downstairs and look at your reception area. If energy has been saved after the original design, then the ghastliness of the final effect will be in direct proportion to the energy saved (Morrison's Law of diminishing niceness). This does not have to be the case, and it is quite possible to reduce consumption without destroying the appearance of an installation.

Luckily, more companies are becoming aware of their image and some even pay particular attention to exterior lighting of

lightboxes and 600 metres of fibre optic tubing. (One cannot help but wonder which is more unusual, the fibre optic installation or the fact that a wholesaler is leading the field with such a concept. Will we see this kind of thing here in 1992, and will it be an English or continental company?) Moving back again to reception areas, we come to perhaps one of the most interesting and complex schemes. Figure 4. has some very obvious feature lighting backed up by a range of other ingenious systems.

There are, in fact, seven separate systems including low voltage downlights, compact

come a long way to improve the lot of the visitor and to improve her view of the company in question. A surprising percentage of customers actually make the effort to visit the offices of companies that they deal with.

The reception area is important and first impressions do count. There are some very ingenious ways to improve the atmosphere with light and clever design.

Imagine that you have travelled for five hours (one and half spent on the M25 at Leatherhead) and then you are told to pick up the phone and dial 9! Would you be impressed?



Figure 4. Reception area of a London office, lit by Pinniger and Partners.

Air handling luminaires

THE INCREASING USE OF COMPUTER BASED SYSTEMS HAS PLACED EXACTING DEMANDS ON INTEGRATED LIGHTING AND AIR—CONDITIONING SYSTEMS. LOU BEDOCS OF THORN LIGHTING LOOKS AT RECENT DEVELOPMENTS IN THIS FIELD.

The integration of lighting and air-conditioning systems, using air-handling luminaires, is a well-established practice but the advent of more efficient lighting systems and the proliferation of modern office equipment has changed the scene.

The prime role of the air-handling luminaire, is to provide the right light while extracting the stale air from a room through the luminaire. This has a number of advantages over conventional practice.

- It performs an aesthetic function by eliminating the need for return air grills in the ceiling, thus reducing the number of bits and pieces in the ceiling.
- It enables lighting heat to be extracted at source before it enters the work space. As this heat can reach 70% of the total power output (ie lamp and gear) it represents a substantial advantage to the air-conditioning engineer because it allows a significant reduction in the amount of cooling needed in the room and the air flow rate can be reduced accordingly.
- With fluorescent lamps it can provide a useful increase in lighting efficiency by cooling the lamps.
- Finally, it assists in the cleaning of the luminaire, thus, reducing maintenance intervals.

Methods of operation

Two main types of return air handling luminaire are in general use: individual recessed modular fittings, and linear troffer systems. The latter allows installation designers to make up their own system from pre-engineered components. There are also other forms, such as integrated ceiling systems. Even uplights are feasible.

Although in some countries it is common practice for both the supply and return air systems to be fully ducted, in the US and UK it is more common to duct the supply air only and to extract the return air into a sealed cavity, or plenum, above the suspended ceiling from whence it is collected and returned to the main air-conditioning plant.

Air handling luminaires combined with the negative plenum exhaust method offer a very efficient but simple way of conserving energy and achieving optimum lamp efficiency while reducing capital and running costs.

The negative plenum exhaust method relies on making the space above a suspended ceiling air-tight, then using it as a collecting cavity for all of the air from each of the luminaires. (see Figure 1).

In well designed schemes the



This installation at Hewlett Packard's Queensferry offices combines good visual conditions with energy saving and air handling.

plenum is self balanced, ensuring that each luminaire handles the same air flow rate. The air can then be collected by a stub duct

and conveyed back to the air-conditioning plant.

To function properly, the void must be deep enough and

sufficiently clear of obstructions for the air to move across it slowly and easily. If the velocity pressure is equal to about one

AIR EXHAUST STUB DUCT

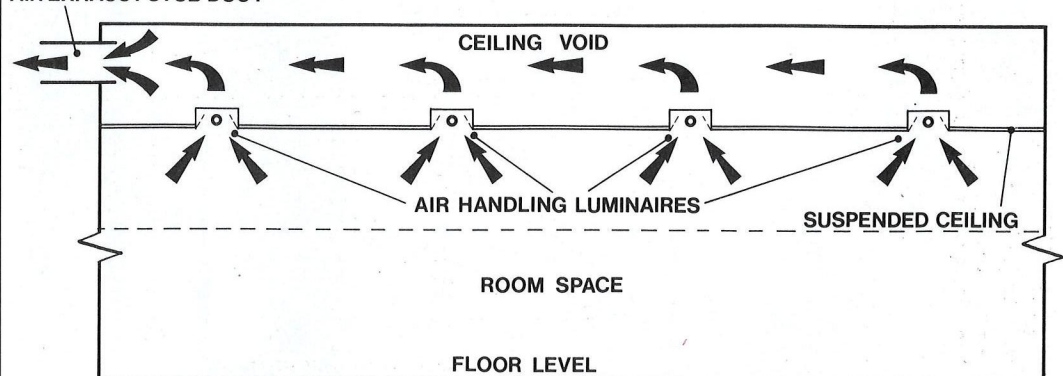


Figure 1. Negative plenum air exhaust method eliminates exhaust ducting in ceiling void.

AIR HANDLING LUMINAIRES

tenth of the pressure loss across the luminaires then near perfect self balancing will occur. The shape and size of the exhaust slots in the luminaire provide the pressure loss control. The two main advantages of this system are simplicity in design and very low cost in installation. But it is essential to remember that an airtight plenum is vital to satisfactory operation.

Lamp cooling

Lamp cooling is an advantage with all fluorescent lamps, including the increasingly popular compact versions. All fluorescent lamps are susceptible to surrounding air temperatures. They need the cool spot on the lamp wall to be maintained at optimum temperature — typically 40° C. Any notable change in this optimum will cause a loss in light output.

It is quite usual for a lamp wall temperature of 60° C to be reached in an enclosed luminaire which could lead to a 20% loss of light output. It, therefore, follows that efficient air handling could cool the lamp and restore the operation to its optimum and thus regain full output.

However, today's lighting systems are more efficient, and the improvement in lighting efficiency possible by cooling the lamps is not as great as it used to be. In fact, it can sometimes be a hindrance.

The benefits of the addition of krypton gas filling to the power reductions and efficiency of fluorescent tubes are well known. However, the effects of air flow around these tubes can easily cause over-cooling that is detrimental to light output. This is particularly true for the popular linear 1200mm T8 tube size. It has lower power loading per length than its 1500mm and 1800mm equivalents. It is, therefore, more sensitive to flow rates and the light output reduces with an exhaust rate of only 10 litres/sec (see Figures 2 and 3).

The situation is made more complex with the increasing use of highly efficient compact fluorescent lamps — of which there are so many shapes and sizes — as many of these have different loadings, producing differing thermal characteristics. Compact fluorescent lamps demand luminaires to be smaller, which adds further burden to the thermal considerations. Of course, these lamps are also temperature sensitive but the cool spot for controlling the vapour pressure may not be on the tube wall, it may be in the joints or the caps.

Today's efficient lighting systems are also using more and more electronics. These may be just to start the lamps or may extend to ballasting through high frequency control gear and

PERFORMANCE DATA - AIR HANDLING LUMINAIRE

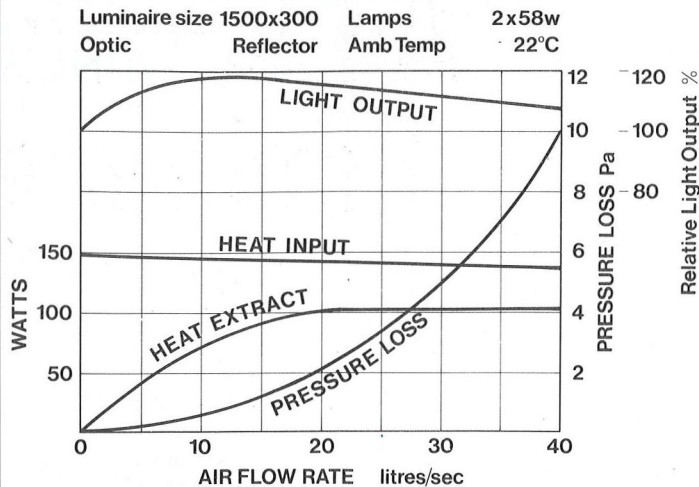


Figure 2. Performance data, air handling luminaire.

control by lighting management systems. HF gear maintains the lamp lumen output at reduced lamp power usage. Generally the lamps run cooler and — as electronic gear has low power losses — a cooler lamp and gear combination is encountered in the high frequency air handling luminaire.

Clearly, the effects of the air passing through such luminaires will have an effect on performance.

In short, where, due to high thermal loss in static mode, a substantial improvement in lighting performance was achieved with luminaires of the 1960s and 1970s, those improvements today are reduced, and could even be reversed simply because our static fittings are thermally more efficient.

A further conflict in today's modern office, however, arises from the fact that lighting no longer exists as the major heat load in many offices. Whereas lighting used to contribute 50% or more of the heat load on the air-conditioning or ventilation system, today's extensive use of modern computer terminals,

personal computers and other office equipment, has changed this balance so that lighting constitutes no more than 20-25%. Office equipment now provides the major load.

These casual interior heat gains can be well over 50W/m² and lead to substantial increases in the air flow rates that the air conditioning engineer must provide to remove it with air that does not have too high a temperature differential — 10° C is perhaps the maximum for comfort.

A decade ago, a maximum exhaust rate for air handling luminaire might have been 40 l/s. Today, specifications are received for exhaust rates which are double or treble this rate. Furthermore, such exhaust rates may be required from a 600mm square luminaire having just two compact fluorescent lamps. These compact fittings are beginning to replace the long troffs and introduce many new constraints in the design, particularly the need to avoid over-cooling and not to provide too high a resistance to airflow.

But luminaire manufacturers

have made great strides to reconcile this conflict and several novel designs which have been tested in calorimeters are now standard.

Many manufacturers publish performance data for their luminaires, such as Thorn Lighting's Photometric Data Books Vols 1-3. These data indicate relative light outputs and other factors for different air flow rates. They should also provide some indication of the maximum acceptable air flow rate.

Modern luminaires themselves have been designed to allow greater air flow rates without sacrificing luminaire efficiency and to ensure that the need for complex balancing of air flows through luminaires is largely eliminated. The result is a wide range of standard air-handling luminaires which are available ex-stock, supported by performance documentation to enable effective design of integrated lighting and air-conditioning systems.

Thorn was, of course, the first manufacturer to introduce the Arena system which integrated ceiling lighting and full air-handling facilities. Most of the standard recessed troffers such as the Quattro range are available with return air-handling facility.

From such information, therefore, the lighting designer can deal with possible over-cooling problems by assessing the extent of the loss of light output first. A check on the lighting design of the specified project should establish the design illuminance. This can be compared with the specified level. If there is an adequate margin above the specified lighting level then it may be decided to accept the air-handling condition and suffer the loss of light output.

It should also be noted that over-cooled lamps may have different colour appearances, a condition most noticeable when mixtures of lamp sizes are used on a ceiling. Such a design approach is practical, possibly wasteful, but cost effective as it may avoid the use of a special luminaire. It does mean, however, that the luminaire **must** be tested at the given condition to determine the **exact drop** in light output.

A more scientific approach when dealing with high air exhaust rates is to provide a by-pass. Careful luminaire design can ensure that just the right amount of air is drawn through the lamp compartment and over the control gear. The remainder is arranged to by-pass the lamps either inside or outside the luminaire casing as illustrated in Figure 4 (overleaf).

The simplest method is to have an external by-pass. This can be in the form of narrow air slots,

PERFORMANCE DATA - AIR HANDLING LUMINAIRE

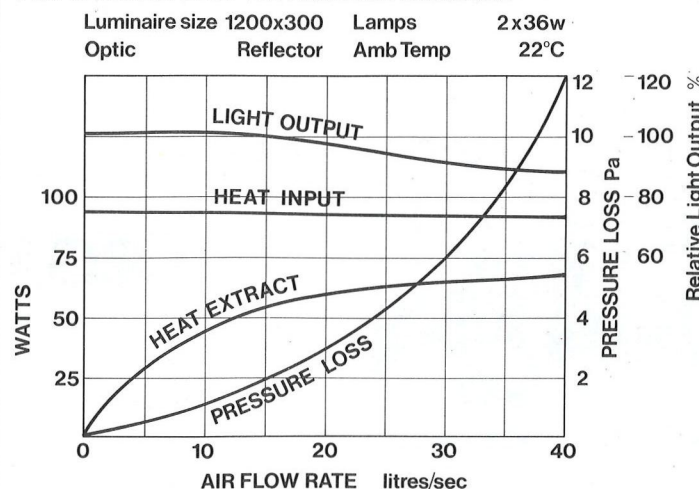
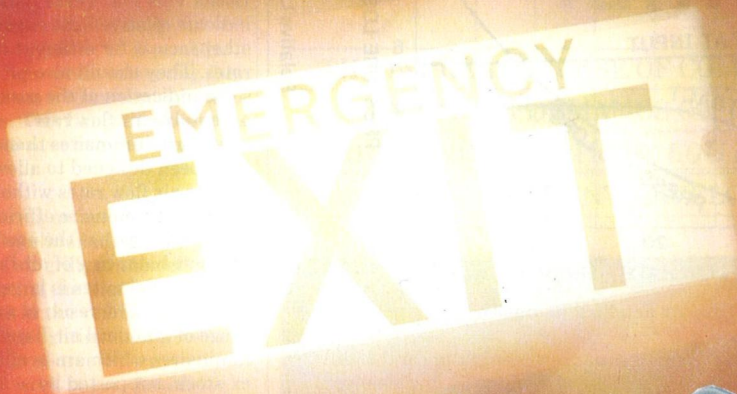


Figure 3. Performance data, air handling luminaire.

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Reader Service No. 308

AIR HANDLING LUMINAIRES

beside a linear luminaire or surrounding a compact square fitting. If carefully incorporated in the luminaire support trim, these can be relatively unobtrusive. At airflow rates in excess of 25 l/s the heat extracted will vary substantially.

Cross talk attenuation is a particular problem when an office is to be subdivided into private offices. These luminaires can offer up to 35dB sound insulation which is typical for mineral fibre ceilings.

In recent years there has been an increasing trend to uplighting, using luminaires which are not mounted in the ceiling but are freestanding or mounted on columns, walls or pillars. These produce glare-free lighting by reflection from the ceiling. Thorn Lighting has been one of the foremost advocates of this approach and demonstrated its viability some ten years ago.

Uplighters for handling supply or return air are quite feasible and their use can be beneficial in that all the services including air-conditioning and lighting supply can be provided through a raised

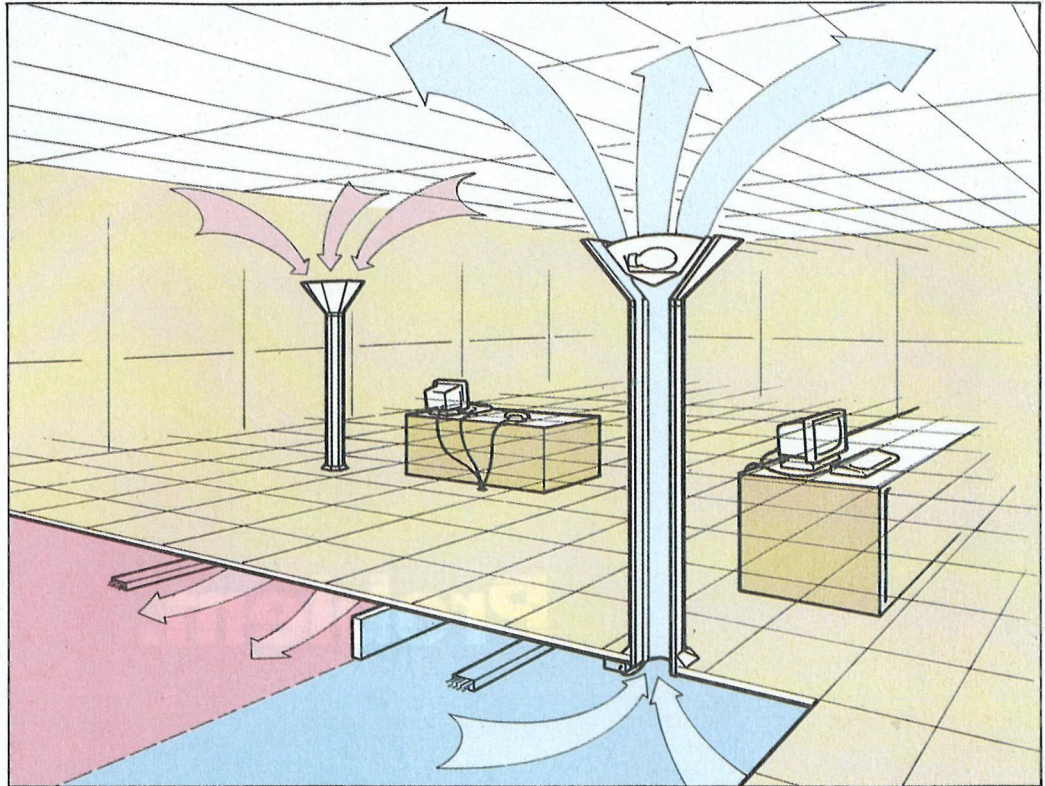


Figure 5. Free standing uplighters can also be used for air supply and exhaust.

floor. The use of raised computer floors for air-conditioning supply is nothing new and the heavy load-bearing floor tiles are better suited to producing an air-tight seal for a plenum than the lighter ceiling tiles.

Free-standing uplighters, the base of which are the same size and shape as the floor tiles, can be located at will. If necessary conditioned air can be supplied through some luminaires and stale air exhausted through others (see Figure 5). The floor void can be divided into separate supply and return air plenums for this purpose or, alternatively, it may be used as a supply air plenum only and return air ducted from the base of the exhaust fittings.

Designing a scheme

The design and installation of an air handling lighting system requires an exchange of information with other associates to make sure that the appropriate fittings are selected. The lighting scheme is designed employing normal lighting design principles, based on the preferred style of air handling luminaire chosen by the architect or lighting designer.

The air-conditioning engineer will design the air-conditioning scheme and estimate the total air flow rate for the area in question, based on solar gain, the lighting load, occupancy, electronic equipment and other sources of heat within the area for the chosen temperature differential.

The lighting designer should ask a few H and V questions of

the air-conditioning engineer:

- ☐ What air-flow rates does he require?
- ☐ What pressure loss can be tolerated?
- ☐ What are the tolerable noise levels?
- ☐ What is the method of air extraction — duct or plenum?
- ☐ What sound insulation is needed?

By dividing the total air flow rate by the number of air handling luminaires he plans to use in the area, the lighting designer arrives at an air flow rate through each luminaire. He must then check the published data for the chosen luminaire to confirm that the air flow rate is within the acceptable range for that luminaire, that noise levels are acceptable, and that the air-conditioning engineer's requirements for extract and, if necessary, supply air terminals are satisfied.

At the installation stage, the activities of the air-conditioning installer, the electrical/lighting contractor, and the ceiling contractor will inevitably have to be co-ordinated.

There is no reason today for compromising good lighting for good air-conditioning facilities, or vice versa. Well chosen equipment, correctly designed, installed and serviced regularly will provide an effective visual environment for the occupants and keep the office atmosphere pleasant.

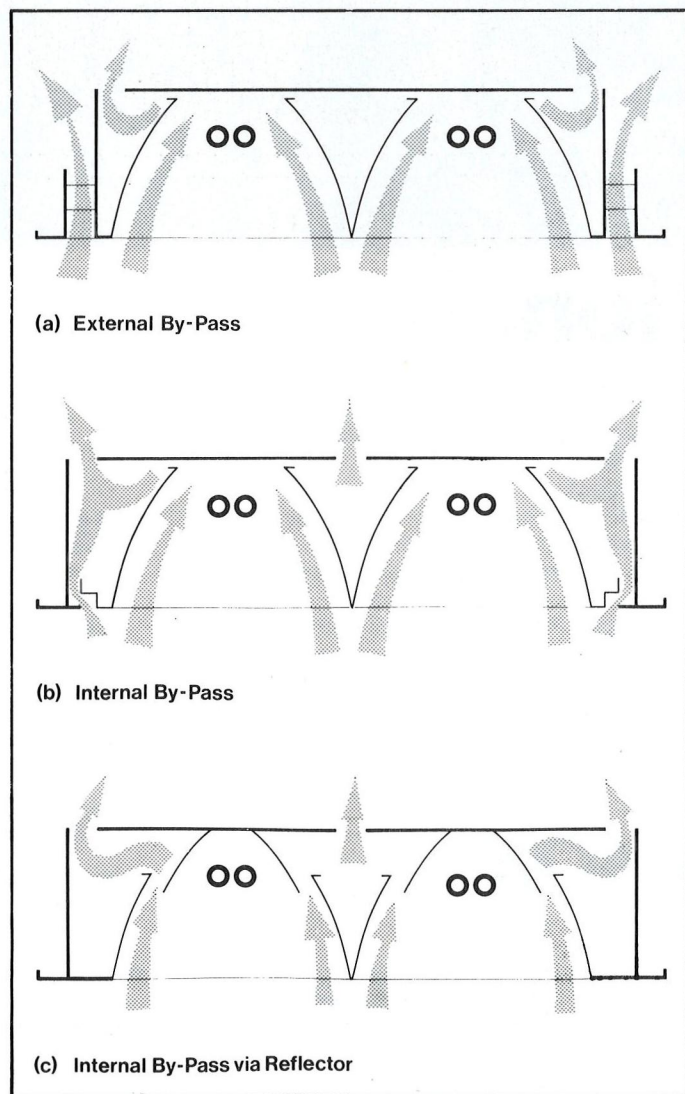


Figure 4. Methods of providing a by-pass to deal with high air exhaust rates.



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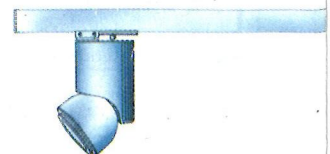
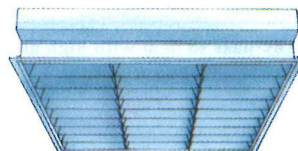
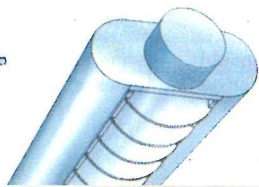
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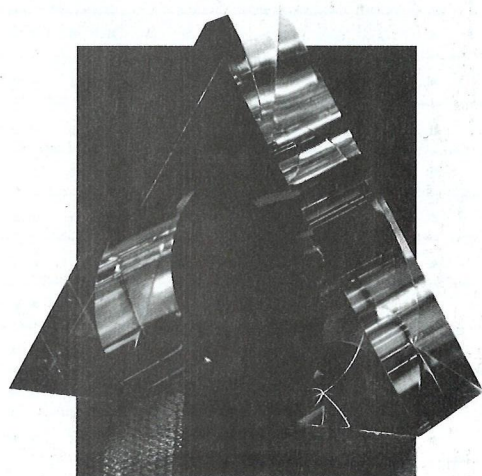
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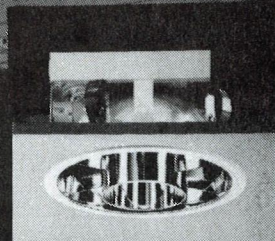
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Buyers' guide

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	Fluorescent										General lighting					Emphasis lighting					Recessed	Surface mounted	Uplights	Emergency lighting							
											Surface mounted	Recessed	Decorative	Downlights	Spotlights	Desk/task lamps	Surface mounted	Recessed	Uplights	Downlights					Spotlights	Surface mounted	Recessed	Uplights			
	Low voltage																														
Mains voltage																															
Uplights																															
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Luminaires for VDT areas																															
High frequency fluorescent																															
Linear (incl tubular) systems																															
Modular																															
Recessed																															
Surface mounted																															
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Fluorescent	Surface mounted	Recessed	Modular	Linear (incl tubular) systems	High frequency fluorescent	Luminaires for VDT areas	Special distributions eg battery, polarised	Air handling	Desk/task lamps				Suspended	Surface mounted	Recessed		Uplights	Downlights	Downlights	Spotlights																																																						
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Downlights	Spotlights	Desk/task lamps	Surface mounted	Recessed	Uplights																																																																					

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Luminaires

Fluorescent	General lighting				Emphasis lighting				Discharge			Other items																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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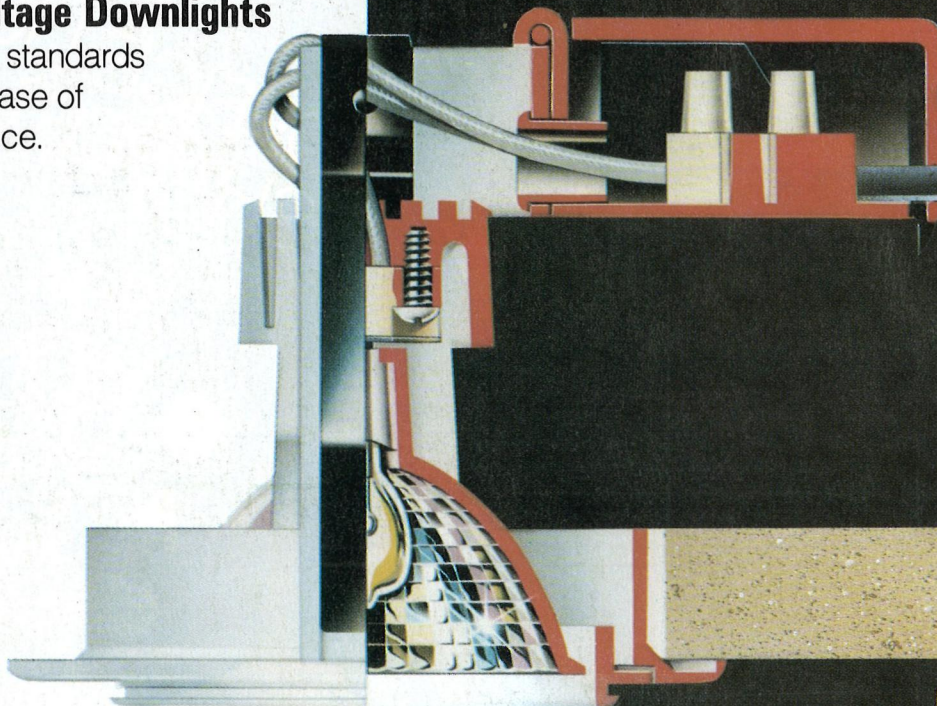
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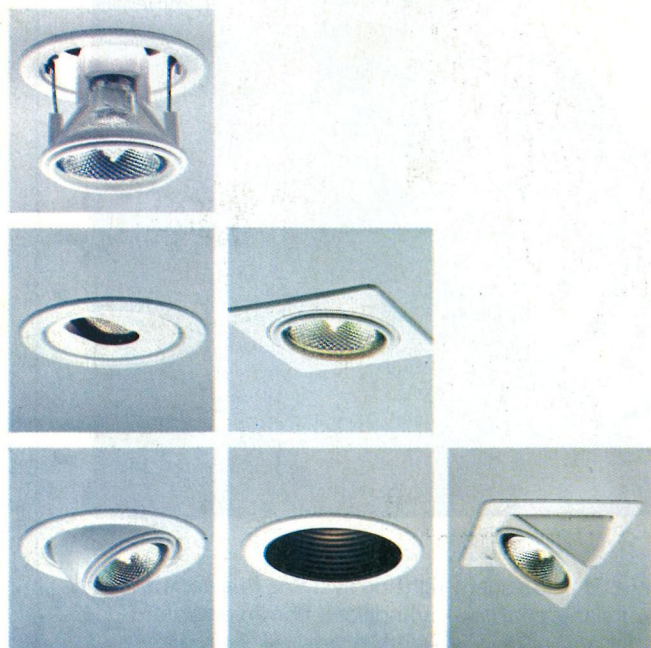
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