



Theatre lighting technician's handbook

Name:



Association of Lighting Designers'

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Lanterns/Luminaires in use at The Regal Theatre



Floodlights

These are the most basic of all theatre lanterns, and have only a **lamp** and a **reflector** mounted in a suitable metal housing. As such, you cannot focus a Flood [although some Floods may be fitted with a **barndoor** device, but that will only mask off some of the light output very roughly] other than up/down [**also known as Tilt**] or from side to side [**also known as Pan**]

The theatre has a mixture of **Coda 500W** and **Orion 1Kw** units – easily identifiable by their size. The **Orions** are groundrow units, and are two cells per unit. The only really bad design fault of these lanterns is the **Colour Frame** –A rectangular frame with no additional holding wires for the gel, and it fits into the lantern under pressure [i.e. it fits into curved slots either side of the front of the lantern] and is held in by a very thin lip of metal on one end of the lantern. *Great care has to be taken when cutting the gel, so that it fits exactly...* There are also two **Coda 4 Cell** units, which can be hung, or floor mounted



Orion 2 cell groundrow



Coda 4 cell batten/groundrow

The theatre has now purchased a flightcased set of 4 x Thomas 10 lamp M16 battens/groundrows – each unit is **115v** and as such, must only be used with the correct adaptor cables [these have a standard 15A duraplug and two tails, each with a 15A rubber 'in line' plug.

Profile Spots in use at The Regal Theatre



Cantata 11/26



Harmony 22/40



Prelude 16/30



Prelude 28/40



Source 4



Altman Lekos

Profile Spots

These are the longer, and more complex, lanterns and range from the **500W Minim** up to the **1200W Cantata** units. Profile spots are easy to distinguish as they have a **clear** lens, which is usually **convex** [*i.e. it curves outwards in the lens tube*] the 500W units, and some of the 1Kw units, are single lens lanterns and are just known as Profiles. [*the **Altman Lekos** are all single lens Profiles*] The beam can either be hard focused, or soft focused, and this is achieved by moving the LENS in relation to the lamp and reflector housing.

Profiles produce a clearly defined beam size, with little, or no spill, they are used mainly FOH for defining the stage areas. Profiles can also be used on the Perch Booms, the Suspended FOH Bar and onstage, although here they are mainly used as 'specials' or for **Gobo projection** over the stage.

One of the drawbacks with the Profile is that the size of the **Lens** determines the **beam angle** and therefore the size of the beam onstage. This is due to the Profile having a superior **optical system** for the collection of light. A simple way of remembering which does which; the **lower** the lens degree size, the further away from the stage it can be used, without the resultant beam size becoming too large. So, and **19 degree** lens works best further away from the stage, but too close to the stage will result in a very small beam size, with no discernable variation; a **40** or **50 degree** lens will work best onstage, or on the Perch or Suspended FOH Bar.

The **650W Prelude** and the **1Kw Harmony, Cantata** are all **Zoom Profiles**. They will have a double lens size as a reference i.e. **22/40, 16/30, 11/26**. This information gives the **narrowest** beam angle first, and the **widest** beam angle second. By moving the two lenses in relation to each other the beam can be widened and narrowed to a much greater degree than the single lens Profile. Sadly, our one **Source 4 Zoom** unit has a unique [if boring] system designed by ETC which moves both lenses in relation to each other at once! LD's are split as to whether this is a good idea, or not... All Profiles can have their beams shaped by the use of **shutters** between the lamp source and the lens – but do remember that, because of the optics involved, the **opposite shutter** shapes the edge of the beam; i.e. the **top shutter** affects the **bottom edge** etc. An **iris diaphragm** can also be inserted into the gate to reduce the beam size in a circular fashion.

Also, **gobos** can be inserted here as well – these can produce simple patterns [such as windows, leaves, shapes] or complex ones such as the full moon, various cloud formations; there are even **mesh gobos** which produce an almost 3D effect, and **glass gobos** which can produce coloured effects such as stained glass windows, flags etc. **Be aware though**, all gobos get **extremely HOT very quickly**. Gobos are always used within a gobo holder, sometimes these can be rotated slightly within the lantern [to align the picture, correct the angle of the gobo etc] and there is also a **gobo rotator** device which can be inserted into the gate, and the speed/direction of the rotation controlled through **DMX** to give animation to the gobo. [although these units only fit the standard Source 4 Profiles] MATA currently two of these, which take a B size gobo, and will fit the standard Source4 Profiles - but not the Junior...



Here are two examples of metal gobos – essentially, if you can translate an image into 2D, then a gobo can be etched of it!

Gobos can **ONLY** be used in a **PROFILE** lantern as these have proper optical mechanisms to project the image; Different profile lanterns take different sized gobos – from the very small M size to the largest A size. The data available on all lanterns gives the optimum sized gobo needed.

Most of the **1Kw** units take the, the **A size**, the **Source 4**, **Leko**, **Prelude** and **Minim** range take the **B size**. The **Source 4 Junior** lanterns take the **M** There are also a number of different Gobo holders around to fit the various Profiles. All Profiles have a slot between the lamp and the lens tube where all manner of things can be slotted in – gobos, adjustable masks and iris diaphragms *[be warned – all the Source 4 lanterns have a small cover, which is used to minimise light leakage when no gobo is used. This cover is secured by two screws, and slides back and forth as needed]*

Source 4 Profile Spot – 19 degree lens

This is the newest lantern in the MATA Stock, and comes from the excellent ETC Source4 stable of theatre lanterns. Not only is the lantern light to handle, it also makes full use of the **axial mounted HPL lamp** which provides a light output from its 750W source comparable to 1000W lamps. Not only does this make for a cooler lamp-house, but a more efficient one; 750 watts draws approximately 35% **less** power than the 1000W one. The optics are further improved by the **axial** mounting – in a standard Profile/Fresnel/PC lantern, the lamp is mounted in a slot at the bottom of the reflector; with axial mounting, the lamp is in the **centre** of the reflector. This gives a much-improved collection of the light produced, and a more exact optical use of the light rays. This method of lamp mounting also makes for easier lamp replacement – a quick twist of the lamp holder, and the whole unit slides out

There are now also 8 x Source4 Junior luminaires – and these are excellent for use either in the Regal Bar, as well as the Main House, – however, they only take the smaller **M** size gobos. Recently purchased too, is a flightcase of assorted spare Source 4 lenses; these are a mix of 19 degree, 26 degree, one x 36 degree and 2 x 50 degree lens tubes for the standard Source4 profiles. This last pair are great for wider gobo projection from either onstage, the suspended Bar or the Perch Booms. There is also now a single Source4 Zoom Profile on the FOH Bar – a really good unit this is too... There are also now [at 2017] 4 Source 4 16/30 Zoom Profiles. And 2 x Source4 22/40 Zoom Profiles in the Theatre stock. The 15/30' are on the FOH Bar [in circuits 1+ 2 + 11 +12] and the 22/40's are at either ends of the Advance Bar.

In 2014, **Altman Lekos** were introduced to the Main House lantern stock, and there is a mixture of 11 degree, and 16 degree units. The longer the lantern, the smaller the lens degree size. Although they benefit from an axial lamphousing, they are single lens Profiles, and as such there isn't much variation in the size of the beam

Fresnels



Harmony F



Quartet F



Prelude F

These were a kind of hybrid of the Profile and Floodlight, and were 'high jacked' from the Film Industry. The Fresnel produces a soft light [as opposed to the sharper, Profile] and this is achieved by using a fixed, stepped, lens [now referred to as a Fresnel lens] with a fixed reflector and lamp tray, which can be moved.

Moving the lamp **closer** to the **lens** gives a wider beam spread, moving the lamp **away** from the **lens** narrows the beam. The actual beam size is determined by the diameter of the **lens**, and the wattage of the lamp; the smaller Fresnels are usually 4", with the larger ones going up to 10". Fresnels **cannot** be used for **gobo** projection as [a] the lens is flat, not curved [b] the lens is not clear, as it is a series of steps. The beam can be shaped to a degree by the use of **barndoors** fitted in the colour runners of the lantern; Fresnels also suffer from hideous amounts of **spill*** and **scatter*** from the lens – this, too, can be controlled to a degree by the barndoors. These barndoors are four leaves of black metal attached to the main frame of the unit, and the leaves can be closed or opened out as needed, as well as the whole fixture rotating 360 degrees.

The Fresnels in the Regal have their focus control on the **bottom** of the lantern, and it is a screwed knob which, when slightly unscrewed, slide backwards and forward about 4" – slide it forward, to widen the beam and back to narrow the beam. **Please note**, if the lantern has been on full for a few seconds, move this focus knob **gently** otherwise you run the risk of the lamp blowing [filament shake]

The **Fresnels** in the Regal are **Prelude F [500W or 650W]** **Quartet F [500W or 650W]** and **Harmony F [1Kw]**

Pebble Convex



Harmony PC



Minim PC

This is a further development from the Fresnel, and uses a **convex lens**, which has also been clouded during manufacture. These two changes give [a] a slightly sharper edge to the beam [b] greatly reduced spill and scatter*. As with the Fresnel, **Focusing** is achieved by moving the lamp and reflector in relation to the lens – although the actual focus control on the PC is usually a rotary knob at the rear of the lamp housing. Turn the knob **clockwise** to **widen** the beam, and **anticlockwise** to **narrow** the beam. Really expensive PC's have the focusing knob duplicated on the front on the lantern, below the colour runners. As with Fresnel lanterns; these also have a problem with Spill and Scatter

**Spill and scatter refer to light which is reflected by dust particles, and is noticeable close to the lens – this in turn causes the spill of unnecessary light close to the lantern*

Par Cans



Par 64



Shortnose Par 64



Aero



M16 'Birdie'

These were 'acquired' from the Rock Theatre Market, and are very simple to focus, as well as being a more robust lantern than the Profile, Fresnel or PC. The reason for this is quite simple – the ParCan is simply the generic name for the **housing**, for a **PAR Lamp**. This lamp is also known as a **sealed beam lamp**, which gives a clue as to its nature. This type of lamp is a combination of **lamp source**, **reflector** and **lens** in one robust structure.

Par Lamps come in a variety of wattages and sizes from the **M16 40W** up to the **CP60 – CP62 1000W**; voltages, too, range from the M16 which is 12V; the Par36, which is 50V, up to the 1000W which can be either 110V or 240V!

The different beam sizes are possible by using different lens fronts on the Par Lamp – although they are not changeable, to change the beam angle of a Par Can, you simply change the **lamp**. If we take the 240V 1000W range, then the following applies:- **CP 60 = Very Narrow Spot Pin** [i.e. the tightest beam] **CP61 = Narrow Flood** [wider beam] **CP 62 = medium flood** [wide beam] There is also a **CP95** which is a **really wide flood**. It's an easy matter, to, to identify these differing lamps: - the CP60 has a clear front, and you can see the lamp source itself; the CP61 has a cloudy lamp front, and the CP62/95 have a ribbed lamp front [rather like a car headlight]. All par lamp beams have a slightly elliptical centre 'hot spot' and this can be rotated by moving the actual lamp in the par can housing. This used to be a somewhat precarious affair, with the possibility of electric shock, but which has now been negated by a nifty, plastic, rotary knob affair which fits onto the back of the ceramic lamp holder.

The 1Kw par cans come in two sizes, the normal can and the **shortnose** par can. In the shortnose, the 'can' part of the lamp housing ends a couple of centimetres in front of the front of the lamp [*just enough room for a colour frame, or scroller*] and there is also a version of the shortnose with a double yoke affair – this allows it to be placed on the floor, whilst remaining stable. Most Par Cans can come in **black** or **chrome** – and I've even seen gold and white ones...

Other Par Cans used in the Regal:

Par 36 [*also known as an Aero*] these are smallish units, and have their transformers built into the lamphouse, The Par 36 is a narrow pin spot, and is best used for putting light onto a Mirror Ball

M16 also known as **the Birdie** This is the smallest of the Par Can family, and is about 6" in length, and the ones in the Regal have an external transformer as they are 12V. Happily spare lamps can now be bought from places such as Tesccs, as the M16 is now a regular feature in domestic installations. There are, now, **240V mains** Birdies on the market.

Follow Spot

The Regal now has a new Follow Spot – a **Strand Solo CSI**



This unit uses a **CSI** lampsource, which cannot be dimmed by conventional means, also the lamp has to be **struck** prior to use. There is a button for this purpose on the **ballast unit** next to the follow spot; this is plugged into the mains, and then a lead from the ballast feeds into the Solo. Holding the **strike** button down for between **2 – 5 seconds** will cause the lamp to strike up. It then requires a few **minutes** before its full operating brightness is reached. The **blackout shutter** in the followspot can also be used to effect a **fade out**, **NOTE: If the lamp supply is switched OFF, it will be several minutes BEFORE you can attempt a re-strike.**

There is also an additional Patt **765 Follow Spot** to give the theatre a matched pair of Follow Spots. This was the direct pre-cursor of the **Solo** Follow Spot, but used an existing Strand Lamphouse [the old Patt 293 Follow Spot] as it was an initial foray in to a Discharge Lamp Source for Follow Spots, as opposed to a standard Tungsten one. When this CSI driven Follow Spot became popular in The West End and Major Regional Theatres, Strand re-designed the whole unit, keeping only the CSI lamp, optics and Ballast unit.



There is also available, the theatre's original Follow Spot –



Patt 818

This has a **2Kw** tungsten lamp source, which is controlled through a stand-alone **2Kw dimmer unit** plugged into a normal **13A socket**. The lantern is usually used in the Projection Box, but also in the Lighting/Sound Control Box, or just outside the Box.

The 818 follow spot is fitted with both an **iris diaphragm** and a **blackout shutter**, which is activated when the iris has reached its smallest aperture. There is also a separate **blackout shutter assembly** which consists of two metal plates, one comes down, and one goes up – the two then meet to form the blackout. This form of blackout shutter can also be used to generate a **letterbox** flood, when used with the **iris** and specific focusing of the **zoom lenses**. This is a similar technique to that found of the older carbon arc '**limes**' where the iris was opened right out, and with these horizontal shutters in place, a complete flood of the stage was possible in one move of the iris. Very useful for colour washing the whole stage.

The beam angle of the 818 is adjusted by a pair of **zoom lenses** operated from sliders at the top of the right hand side of the lantern. There is also a four colour, semaphore, colour magazine attached to the front of the lantern.

Preparing a lantern for rigging

If a lantern is to be hung from a lighting bar, then the following should be checked: -

The lantern should have a **hook clamp** fitted

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The hook clamp is attached by threading an **M10 bolt** up through the yoke of the lantern, with a washer before the yoke; the bolt then goes **through** a standard **hook clamp** [*also known as a G Clamp*] where there is a spring clip, followed by another washer and then a **wing nut** to tighten the whole thing together. There must also be a **butterfly bolt** on the side of the hook clamp – with which to tighten the clamp on to the Bar the lantern is to hang from. **Bolts, which require a spanner or an adjustable wrench**, are **not** to be used when hanging a lantern. Both the tightening of the hook clamp onto the lantern, as well as onto the Bar, **should be finger tight** – i.e. as tight as is possible using the thumb and forefinger.

There is a very obvious reason for this – the focusing session. It is no fun when you are stuck at the top of a ladder, or tallescope, unable to **move** said lantern to focus it! Of course, there can be a problem if the person hanging the lanterns has what can best be described as a 'gorilla grip' – i.e. **they** are able to tighten and loosen the nuts and bolts, but mortal men aren't

In addition to the hook clamp, all lanterns need a **safety chain** or **wire bond**. This threads round through the **yoke** and over the **Bar** and back under the **yoke**, to form a circle. Under **no circumstances** wind either the safety chain, or the wire bond, round and round the Bar. This **may** seem an additional means of safety – but all it means is that when you come to focus, again, you will not be able to pan the lantern around at all, without undoing the safety chain, or wire bond. Some lanterns have a special fitting either on the yoke, or the lamp itself, to attach the safety chain, or wire bond, to.

With regard to **Profile** spots, always check before you rig that [a] it has all its shutters [b] said shutters **move freely** – when Profiles [*with shutters*] are stored, the shutters should all be **in**, this lessens the possible damage to the little buggers..]

Unless there has been mischief, all the lanterns at the Regal were fitted correctly with hook clamps after the 2008 PAT Testing session...If there is a lantern in the Tech Cupboard without an up-to-date Pat Test label, it will have been deemed still safe to use, and has, probably, only just missed the annual Pat Test.

When you hang a lantern onto a Bar, fit the safety chain/wire rope bond before you tighten up the butterfly bolt on the hook clamp

If you are mounting a lantern onto a Stand, obviously the **hook clamp** needs to come off [*put it somewhere safe, maybe attach it to the stand?*] but the M10 bolt, washers, spring clip and wing nut need to stay if you are using a **T Bar**. The yoke of the lantern **needs** to be **under** the T Bar [*otherwise you will have problems panning the lantern*] and it is not uncommon to mount a second lantern [especially if they are Par Cans] above the T Bar and technically '**overhang**' the second lantern. The safety chains/wire bond still need to loop through the yoke and around the T Bar. **IF** you only want to mount **one** lantern, or it is a heavy lantern, then the hook clamp and the nuts and bolts come off of the lantern; you then detach the T Bar from it's black mounting shackle onto the stand, and use the **bolt** in the centre of the shackle to feed **through** then yoke to attach it to the shackle. Tighten the lantern properly, put the shackle back onto the stand, and use **that** to Pan the lantern.

The Regal Bar

The Regal Bar has a small stage area for use as a Drama space, small Concert space and the like. There are two IWB's mounted FOH of the stage, each IWB has 6 x 15A sockets fitted; there are also 2 s 15A sockets fitted on the back wall of the stage, and these are plugged into two of the sockets FOH. These 12 sockets are powered through a patch-bay in the Cleaners cupboard opposite the main doors into the Bar area. This patch-bay is the fed from a BetaPack2 6 channel rack in the cupboard. Control of these sockets is through a small *Lightsource* six-channel desk in the Bar [*located in the cupboard above the Bar Houselights control panel*] – this small desk also has a programmable chase sequencer, as well as a Grand Master fade, built into it. At 2018, the Bar Stage now has 4 x Strand Quartet lanterns [fitted with T/25 500W lamps] and 2 x CCT Minuette lanterns

The most suitable lanterns to use in this space are any of the smaller, 650W, units [the Prelude and Minim range] and even the 500W par cans could be used. Care should be used with regard to heat generated in the Bar Space [the Birdie's mounted in the ceiling generate a fair bit of heat in themselves] and so, the comfort of both Performers and Audience.

At present, this Rack is now, temporarily. Powered from the 13A socket above the stairs into the Cleaning Cupboard; this also means that only a maximum of 3K can be drawn at any one time. Plans are afoot to fit a new power feed into the cupboard so that the Rack will be able to be run at maximum of 12K

Working with ladders

Always use the correct ladder for the correct job – e.g. there is a specific ladder for the FOH Bar at the Regal, which is stored in the Tech cupboard at the rear of the Auditorium; it has a board at the top, which rests on the Auditorium wall, and it is the only ladder that **should** be used for this Bar.

When using ladders onstage, **always** either have someone 'footing' the ladder, or put appropriate weights at the foot of the ladder, to stop the ladder slipping. There are a couple of really heavy weights in the OP area for this purpose. **If** you have someone to foot the ladder for you, make sure they are at least **the same weight** as you, if not heavier.

Do not throw things down from a ladder – unless [a] you have shouted "*heads*" and [b] you have checked the area where you intend your thrown items is clear. As with the **tallescope**, it is always a good idea to take up a plastic carrier back up with you to put bits and pieces in as you collect them [*gel frames, bit of gel, nuts + bolts etc*]. Also, do get into the habit of keeping a roll or two of **PVC/LX tape** in your pocket – handy when tidying up cables and the like :o)

Never shake, or jog a ladder if someone is up it – neither should anyone else go up a ladder when there is already a person on it

Never overreach yourself, rather than move the ladder [*this also applies to tallescope work*] as this is the easiest way to a quick fall...

Remember, if you are carting a hefty lantern UP the ladder, do make sure of the weight of the person 'footing' the ladder for you – or that you have enough weight at the bottom of the ladder. Items do have a nasty habit of getting heavier the higher up the ladder they go

It is **not** advisable to climb onto the **perch booms**, even if you are a lightweight person; the perches may **look** safe and sturdy – looks can be deceptive...

Working with the Tallescope

Always make sure the Tallescope is level, before you attempt to climb it – there is a small spirit-level built into the base of the ladder section, to enable you to see this. The four wheel **breaks**, too, should be engaged prior to climbing up. Bearing in mind how un-level the Regal stage floor is, use the outriggers to support the Tallescope when needed. These outriggers **must** be used when using the Tallescope to access the suspended LX Bar over the apron – one of which should be on the floor of the auditorium. Also, check that the two locking feet on the bottom of the movable ladder section are fully engaged before climbing up to the cradle

Two people should be used to move the Tallescope when there is someone **in** the cradle – and under **no circumstances** should the Tallescope be moved when the cradle is occupied if the occupant does not consent to the movement; always tell the person in the cradle when either the brakes are being taken 'off' or put 'on' – these actions always cause a significant change in height. Always, too, tell the person in the cradle before moving the Tallescope – and move the 'scope slowly.

As with ladders, **never** jog or shake the Tallescope in any way when someone is in the cradle. Also, take a carrier bag up with you when going into the **cradle** to keep either the items you want to put **into** the lanterns [*gobos, gels, and barndoors*] or things you want to take **out** of a lantern. Neither should you **overreach** yourself by stretching out from the cradle just to save time. Lanterns/accessories needed in the cradle prior to rigging **should** be hauled up into the cradle using either **sash cord** or **heavier rope** [*dictated by the weight of the lantern*] it is **never** a good idea to try and go up the ladder with a lantern in your grasp – no matter **how** light the lantern is.

Focusing overview

Although I have dealt with focusing in the information about specific lanterns, here is a recap on it

Profile Spots: These are focused by moving the **lens** or **lenses** in relation to the lamp and reflector. The beam can be shaped by either **shutters** within the lamp housing, **or** by the use of **gobos** or an **iris diaphragm/mask** which drop into a slot between the lamp and the lens/es. **Zoom Profiles** give the greatest choice of beam speeds, but can take a bit of jiggerypokery to get it right

Fresnel Spots: These are focused by moving the **lamp** and **reflector** together in relation to the **lens**. Move the lamp **closer** to the lens gives a wider beam, move the lamp further **away** from the lens narrows the beam

Pebble Convex: As with the Fresnel and, like the Fresnel, **Barndoors** can also be used to help shape the beam

Par Cans There is not a lot you can do with a Par Can, save Pan and Tilt. The beam shape **can** be rotated using the back of the lamp itself – this is often used to line up the all beams for a better 'look'

Floodlight: As with the Par Can, there is little to be done other than Pan and Tilt – again, to line up the edges of the beams

When focusing, there is an *unwritten* rule whereby you should spend no longer than **1 ½** minutes per lantern. This is mainly because after that, the lantern gets too damned **HOT** to handle. There is also the other concern if you happen to have a large Rig; if you spend too much time on one lantern, your whole schedule goes out the proverbial window – far better to leave the odd stubborn lantern to the end, and go back to it

Rigging extension cables

Although the majority of the sockets in the Regal are on IWB's*. there will always be extra that cables that need to be run.

Always use the **15A TRS**** extension cables – these have been PAT Tested

If adding cables to any of the installed LX Bars, then the cables should be run along the Bar, taped at about 1m intervals with PVC/LX tape wound twice around the Bar. **Do Not** wind/rap the TRS cables around the Bar – [a] this looks very messy and [b] by winding the cable around the LX Bar you are creating an electromagnetic field, not good at all. By running the cables individually **along** the LX Bar, it will also be easier to trace any fault that may arise with the cables.

When the point is reached where the lantern to be powered is, loop the socket around in a single loop, tie it loosely and drop the socket down to the lantern tail. This will also give you enough room/cable slack when focusing the lantern.

Do not leave TRS cables coiled in very small loops – this will generate heat; if there is too much slack cable, then coil it in **large** loops and make sure there is a good airflow

Cables on the stage floor should be [a] neat [b] either gaffer-taped down, or there are pleasant little rubber mats designed to hide/protect the cables from heavy-footed actors and techies. The theatre now has two of these mats, and they also have a yellow/black hazard band around their edges

* IWB – Internally Wired Bar/Barrel i.e. the sockets are fitted onto the Bar at regular Intervals. They either go directly to the **Patch Bay**, or to a group of tails at the end of the Bar

** TRS – Toughened Rubber Sheath, a heavy duty rubber sheathed cable used for powering lanterns and the like

Calculating the LOAD on a dimmer channel

The formula for calculating the **load** on a cable/dimmer channel is quite easy:-

$$\frac{\text{WATTS}}{\text{VOLTS}} = \text{AMPS}$$

Although there **is** a rough guide, and that is **1Kw = 5amps**, this is based on the voltage being **240V**, which actually makes the ampere loading **4.16 amps**. As we are constantly being pressurised to drop our UK voltage to **230V** this will now equate to **4.34 amps**. Either way, sticking with the guideline of **1Kw = 5amps**, gives you a small leeway for error. The individual dimmers can handle **2.5Kw**, but it is safer all round to err on the side of caution!

Before you plug up lanterns which have been run from Grelcos, splitters or both, take a moment to write down all the wattages of the lanterns in the chain to make sure you are **not** overloading. Far better to lose a lamp out of the clutch, rather than lose a dimmer channel. *[which nearly happens once a Show is running, and access to the MCB for the channel[s] that have 'gone']*

The Colour Call

This is where all the gel for a Show is cut to size and labelled,

The Gel Number is written *[usually in white chinagraph]* in the top left hand corner of the gel, with the lantern type/number *[also in white chinagraph]* in the bottom right hand corner of the gel. This is to enable people who are not familiar with either gel numbers, or lantern frame sizes, to put the correct colour into the correct lantern

Some people draw round the colour frames, other use hardboard 'patterns' to do this

Chinagraph is a make of pencil which writes on glass/plastic, and is available from specialist Art Shops, or some Lighting Hire Firms

DMX [an overview]

This is a protocol system for communication between lighting desk and dimmers, developed in 1986 by **USITT** and utilises an electronic system called **multiplexing** to send multiple signals down one cable. **DMX 512** enables 512 different channels of information to be sent, and each channel has the capability of **259** steps. The protocols were improved in 1990, so that, as well as dimmers, other items could be controlled from the lighting desk – strobes, smoke machines, scrollers and moving/intelligent lights. The older, analogue, system was problematic in that it required a separate cable for each fader to dimmer control, Initially when analogue appeared, dimming systems of 120/240 channels were the largest used *[most theatres had between 40 and 80 channels]* As the number of channels grew, cable runs grew ever fatter!

Although the USITT DMX Protocols were standardised, so that any dimmer could be used with any lighting desk, and any intelligent light could be used with any lighting desk – there are still individual lantern manufacturers who have their own coding. Thankfully, there is now sufficient information available on all equipment to enable a **competent** technician to re-assign this information; indeed many current generations of lighting desks have programs to convert their DMX channel allocation to those of individual fixtures, and constant online upgrades are available as newer, and newer, fixtures [lanterns] come into the market

For DMX cable runs of over **50 metres**, it is recommended that an appropriate **DMX amplifier** be installed. Under **no circumstances** should the DMX signal be split with something like a ‘Y’ connector. Also, it is not a good thing to repair a DMX cable, which has been damaged [even with an inline connector] as this can affect the signal, and cause spurious faults; always replace the entire run of cable. It is also recommended that the last unit in the DMX Daisy Chain should be connected back into the system via a ‘return’ cable. In this instance, the Daisy Chain refers to units such as Scrollers and Intelligent Lights, and there is usually a **Return DMX** socket in the PSU units for these devices. Alternatively, a **DMX Blocker** can be put into the DMX Out socket of the last unit in the chain.

Although DMX information is carried on only **3 pins** of an **XLR**, more often than not, **5 pin** plugs and sockets are used for improved stability of connection.

Patching with Grelcos

A **grelco** is the generic name for a toughened plastic adaptor which gives 2 c 15A sockets from one 15A socket. In this instance, the word 'grelco' was the manufacturer's trade name for this piece of equipment. It has since passed into LX history as such – there is also the **Trelco** which gives 3 x 15A sockets. Oddly enough, I have not come across a **rubber** grelco as yet, and as they are made of a toughened plastic, they are subject to cracking and breaking [*especially if dropped from a height*] so, **if** you come across such a grelco, it is safer to discard it rather than get an electric shock [*I speak from bitter experience*]

Another name for this kind of device is a **Splitter**, although [technically] here it consists of a **15A rubber plugtop** with **two tails** coming out of it – each tail having a **15A rubber socket**. They both serve the same purpose, and which you use is up to you and what space you have to work in.

This device enables you to run **two** [or *in the case of the trelco, three*] units from one power outlet. They are handy devices, as long as you do **not** overload the socket they are plugged into – only **one** grelco per socket should be used, **never** be tempted to put another grelco into an already used grelco – unless the loading is really small on each individual lantern

When plugging up, always leave the plugging **IN** of the grelco or splitter to the **dimmer channel** to the last action

GOBOS

Gobos can **ONLY** be used in a **PROFILE** lantern as these have proper optical mechanisms to project the image. Different profile lanterns take different sized gobos – from the very small M size to the largest A size. The data available on all lanterns gives the optimum sized gobo needed.

Most of the **1Kw** units take the, the **A size**, the **Source 4**, **Prelude** and **Minim** range take the **B size**. There are also a number of different Gobo holders around to fit the various Profiles. All Profiles have a slot between the lamp and the lens tube where all manner of things can be slotted in – gobos, adjustable masks and iris diaphragms

Fitting the barndoors

These devices normally slide into the **FRONT** colour runners, but in the **Harmony** range, the unit clips onto the front of the lantern, and then snaps into the front housing – NOT one of Strand Electric's better designs. Move the four leaves of the barndoor to mask what you wish to mask, and the whole assembly should be capable of 360 degree rotation as well

Lighting Control at the Regal Theatre

Currently, the Regal Theatre offers two forms of lighting control:-

The main desk now is...

ZERO88 48 CHANNEL SOLUTION DESK. With an additional ZEROS 24 Channel Fader Wing to control channels 49 - 68

THE FROG

The Regal Theatre also has a **Frog** lighting control. This is the ***basic level*** Frog – but it is currently configured to the **WIDE MODE** i.e. operating **48** channels, and this desk is now permanently housed in the Projection Box at the top of the Building, and is used to control the Stage Lighting for Film Shows



A recent acquisition to the theatre stock is a small, hand-held, unit – the **DMX 512- it** – which is designed as a remote control unit for the theatre's lighting channels. The advantage of this unit is that it is programmable for a whole range of DMX channels, in blocks of 12 faders. Group Masters can be set up, as can Houselights, onto the console; it can be battery operated, but there is also a Mains Power PSU as well [which is recommended for general use]



DIMMERS

At present, the dimmers in the Regal consist of an **ADB Europack** wall mounted, 24 channel, unit up in the Projection Suite. At present, only 12 channels are used [these correspond to the 12 circuits on the FOH Bar] the other 12 channels are destined to feed two additional Wall Bars towards the back of the Auditorium. Protection for these channels is via MCB's on the front of the Unit.

Onstage, at the Perch Level, there are **3 Betapack** wall mounted dimmers [2 x Betapack 3 and 1 x Betapack 2] and these are assigned from channel 13 through to channel 30. Both these and the Europack are powered up though a Biometric Unit in the Control Box, which only a limited number of Technical People are registered on

At stage level, below the Perch, are two more, temporary, Betapack units [which give additional channels 31 through to 42 – although channel 31 is currently designated as a DMX controlled switch for U/V lighting!] These racks are powered from the two 32A Ceeform sockets below the Distribution Boards. The single 16A Ceeform powers the theatre's Firecracker strobe on LX Bar 1, and the strobe is permanently wired into the theatre's DMX chain. and is controlled by channels 12 6 and 127.

Spare Fuses for the Betapack 2 units are kept up on the Perch. Although it is hoped in the near future to replace these with Betapack 3 units, which have channel protection via MCBs

There is also a small **Alpha Pack** which was purchased for small scale Touring. This portable rack was designed by Zero 88, and has three channels controlled from three faders, and runs off of a 13A power socket. This gives a maximum of 3K at any one time [providing there is enough power available]. This dimmer pack can also be patched into a standard DMX system, although at present it is set up to operate from DMX channels 28-30..



DMX Chain – at the Regal Theatre

The DMX chain is as follows:-

Lighting Desk **out** to the Houselights dimmer up in the Projection Suite. on to the Europack, then through the roof and down to the Perch, and the Betapacks and Strobe unit. There is a Terminator plug on the last Betapack at Stage level.

There is now a Second DMX Universe cable running through the roof and down to the Racks on the S/R Perch. Be warned though, this Universe does not run through the Europack Dimmer Unit, so will not control the first 24 channels!

CONDUCT FOR ALL TECHNICAL STAFF AT THE MATA REGAL THEATRE

Show Operation

- Be in the theatre **one hour** before Curtain Up to do a **Rig Check** and any **presetting** necessary
- All Technicians need to sign the 'Signing In' Book when they first come into the theatre, and again when they leave – this is a legal requirement for **Health & Safety**
- Wear **Full Blacks** from the **Half Hour Call**** [35 mins before Curtain Up] – Full Blacks consist of : **Plain** black shirt with long sleeves [a plain black T Shirt is acceptable in Hot weather]. **Plain** black trousers, or jeans; **soft shoes/plimsolls/trainers** *Plain means NO Logos, coloured flashes or pictures etc*
- **After** the Half Hour is called, be aware that the **Audience** may start to come into the Auditorium and behave appropriately/sensibly – even a humble Technician is a part of the Company and, as such, should have respect for all audience members who have paid for their seat[s] and should not be subjected to un-professional behaviour. If a Touring Company decides to behave inappropriately, that is their prerogative and they can always be taken to task by the Theatre Manager, or the Theatre's Stage Manager – don't be drawn into such a behaviour pattern
- Once the Half has been called, Technicians do **NOT** leave the Theatre **without** obtaining permission from the **Stage Manager/Theatre Manager**
- **Technically**, theatre technicians should not interact with audience members, except where this is an integral part of a Production; restraint should be practised where friends/family are in the Audience This can be a major problem when either the **Lighting** or **Sound** Desks are located in the Auditorium, rather than the Lighting/Sound Box. People should **not** be encouraged to congregate around the equipment, for obvious reasons, and some form of containment is desirable, but it is often not possible
- **FOOD and DRINK** is not to be encouraged in the Box after the Half has been called.
- **NO ALCOHOL** to be anywhere near the Box, inside or out.- Technicians should **NOT** be in the Bar after the Half has been called, nor during the Interval
- **At all times**, try and keep the Lighting/Sound Box **tidy**. This can be difficult during Rehearsals and Technicals, but there is no excuse when the General Public are present.
- **No one** should enter the Lighting/Sound Box once the Show has started – this even applies to Directors/Choreographers. If possible, the Door to the Box should be kept shut [as a hint]

****Note:** Half Hour Call is **35 mins** before Curtain Up; Fifteen Minute Call is **20mins** before Curtain Up; Five Minute Call is **10mins** before Curtain Up and Beginners is **5 mins** before Curtain Up

- **Also**, no one, other than the lighting/sound operators/follow spot operators, should be in the Lighting/Sound Box at any time before the Show starts, during the Interval and after the Show finishes, without **permission** from the Stage Manager
- **Only those Operating the equipment** should be in the Lighting/Sound Box whilst the Show is running – there is insufficient space for watching. If the Sound Desk or Follow Spot is **outside** the Lighting/Sound Box, then **permission** needs to be given by the Stage Manager for a Guest/Visitor, and it is assumed that such a person will know how to behave appropriately in this situation. If they don't, then they should be asked to leave the Box
- The Lighting/Sound Box is **not** soundproofed, even with the sliding windows and the door closed. **All conversations** should be kept to a minimum – from the moment the **first** member of the Audience is in the Auditorium, the **last** member of the Audience to leave the Auditorium
- During the running of the Show, the **CANS/HEADSETS** are to be used – but **ONLY** for the giving and receiving of **CUES**. The Cans are not there for idle banter and chit-chat – the members of the Audience have not paid to listen to Box chatter. This applies to all people using the headsets, including **Stage Management**
- If things do go wrong, then a note should be made for discussion in the Interval, or after the Show – **do not** enter into a debate about it over the Cans, that will only lead to further mistakes/missed Cues
- If a Technician needs to get **backstage** during the Performance, it is preferable that the Technician exits down the stairs leading down to The Bar, going through the Bar and through the corridor which leads to the exit near the Stage Door. This will minimise the distraction to the Audience. If urgent access onto the stage is required before the Show, or during the Interval, then this should be at the side of the Housetabs, **not** through the centre. The only time access through the centre of the Housetabs is permissible is if the **Stage Manager/Theatre Manager** needs to make an announcement to the Audience
- There is now an additional set of sodium lights in the Auditorium, for use in an **Emergency Exit** of the theatre. These can also be used during rigging and/or cleaning. These lanterns are activated by a 'push and turn' switch next to the Houselight dimmer
- **NB IMPORTANT –**
Always make sure that all the **SLIDERS/FADERS** are at **ZERO**

Correct sequence for turning **ON** the Stage Lighting is **RACKS ON** then **DESK ON** To switch **OFF** then **DESK OFF** followed by **RACKS OFF**

Rehearsals

- ❖ There is **no** need for Stage Lighting or Sound to be used in an ordinary rehearsal situation – there is sufficient light available from the onstage fluorescent tubes and the halogen floods mounted on the Perch Booms, and a stand alone cassette/CD Player will give sufficient volume for rehearsal purposes. Now there is a switch **outside** the Lighting/Sound Box to put on the Houselights, this will make rehearsals a lot easier
- ❖ If there IS a case for either Stage Lighting, or amplified sound, then this should be handled by a MATA Technician, who will be responsible for the switching on and off of the equipment. As with the SHOW situation, the door to the Lighting/Sound Box should be kept closed, and no one, who has not been trained, allowed in under any circumstances
- ❖ Ideally, there should be a log kept with details of which lighting/sound equipment is used for rehearsals, for whom and for how long. This enables a better check to be kept on lamp life etc
- ❖ Other than Company Members, Directors, Stage Management and Technicians – no one else should be in the building. The Theatre, both Front of House and Backstage, is not a playground. Theatres are, by nature, very dangerous places
- ❖ **Whoever is in charge** of the Rehearsal [usually the Director] must sign the **Signing In Book*** when they come into the building, and again when they leave at the end of the Session. This person to be responsible for keeping a list of everyone in for the Rehearsal – including any MATA Technician called. This is an important document in the case of a Fire on the premises
- ❖ If there **has** to be a Technician at the rehearsal[s], then it is important he/she respects the Company members need for quiet and does not cause any unnecessary noise during the Rehearsal process
- ❖ The person in charge of the Rehearsal [*or the Technician*] is responsible for leaving the building in a clean state, and that it is locked up securely. These duties could easily be shared between the technician and the person taking the rehearsal
- ❖ ** It might be easier to have a generated list, rather than the Fire Book, and is a daily Log of people coming and going in the theatre space. This is now a standard, and accepted, means of keeping track of people in the building, should a Fire occur*

Date	Name	Production	<u>Time</u> <u>IN</u>	<u>Time</u> <u>OUT</u>	<u>Time</u> <u>IN</u>	<u>Time</u> <u>OUT</u>

Technical Rehearsals

- ✓ As with ordinary Rehearsals, the persons taking the Technical [usually the Director] together with the Theatre Technician[s] are responsible for signing IN and OUT in the Fire Book, and the Director should have the responsibility of generating a list of all people in the *building* for the duration of the Technical
- ✓ As with ordinary Rehearsals, only people actually involved **IN** the Production should be in the building. Any other people must obtain permission from the Director and the Stage Manager before they can stay... Fire Doors, and the front door of the theatre, should be closed [and the front door to the theatre locked] to aid this. The practise of people just wandering into the theatre 'willy-nilly' should be discouraged – especially with current Fire Regulations
- ✓ The practise of Technical Rehearsals turning into Acting/Directing rehearsals should also be discouraged – a Technical Rehearsal is, as it says, a rehearsal for Technicians. It is a very stressful time for both Actors and Technicians, and there should be a fair amount of 'give and take' from both sides – there is no point in rushing matters, as this will only lead to mistakes during Dress Rehearsal
- ✓ **If** the Production is a Musical one, and there is a Band, the Stage Manager is responsible for the layout of the Pit/Band area, together with the M.D. {although most M.D's today are quite happy to undertake this themselves} with the Theatre Technician only being responsible for supplying any power requirements. Regarding Music Stands [lit, or not] this is a grey area – some M.Ds will supply their own lights, some will expect them to be supplied. This is a matter which should be discussed well in advance between the M.D., the Stage Manager and the Technician – although ALL lights must have a valid PAT Test Label/Certificate
- ✓ There should be a system in place where **all** technical requirements for an up-coming Production [*lighting, sound, music and special effects*] are discussed between the **Director, Stage Manager and MATA Technician** as soon as is practically feasible – information such as this must not be left until a Getting. This already applies to outside bookings, so it should be a simple matter to extend it to MATA Member's Productions

Any extra electrical equipment [*lit music stands; amplifiers; fans; hairdryers; heated rollers etc*] must have an valid **PAT Test Label/Certificate**, and if it does not, then it cannot be plugged in and used. Although, the ultimate ruling on this matter still resides with the resident **Technical Manager**

Acknowledgements:

*Photographs of Strand Lights [c] The Strand Archive
Photograph of Source 4 [c] ETC Lighting Ltd
Photographs of Par Cans [c] James Thomas Engineering Ltd
Photographs of Gobos [c] DHA Lighting Ltd
Photographs of the Frog series [c] Zero 88 Ltd
Photograph of Altman Lekos by Altman UK Ltd*

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About the Author:-

*Jim Woodley has been a professional theatre electrician for nearly 50 years, working in many Regional RepertoryTheatres as Chief Electrician, and one West End Theatre as Deputy/Acting Chief Electrician. He trained under **Bill Platt** at The London Palladium, whilst also attended as many of the Strand Electric Lectures on Stage Lighting and practices as he could. Jim was lucky enough to secure secondments with the likes of **Joe Davis, Michael Northen and Robert Nesbitt** during his time in London*

*His career as a Lighting Designer began with Floorshows in London's West End, before he moved out into Repertory at **The Palace Theatre** in Westcliff. Other **Reps** he has worked in either as the Chief Electrician, or Lighting Designer [and mostly both] include:- The Bolton Octagon; The Chester Gateway; Sheffield Crucible; Manchester Library Theatre and The Byre Theatre in St Andrews. He has worked the length and breadth of the UK as a Freelance Lighting Designer too. For the last ten years, or so, Jim has also worked as a Lecturer in F.E., with tenures at Bridgwater College, and West Cheshire College; he has also written many Btec and MOCN Courses in Stage Lighting and Technical Stage Management*

Jim has also been a Professional Member of The Association of Lighting Designers since 1986, and a Member of The Society of British Theatre Designers since 2001