Light-Control by Computer

Light@Night

Manual

Version 2

Copyright:

Railware
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Congratulation!

You have decided to purchase a modern unique system for generating various light effects on your model-railway layout.

The PC will not only control the ON- and OFF-periods of the illuminations but also the different light effects. This will give you the advantage of low pricing as well as the possibility of various expansions of the system.

The company Railware (`www.Railware.com`) is the manufacturer of the Light@Night Software.

For running the Light@Night software it is imperative to use a Light-Display and a Light-Interface manufactured and supplied by **L**ittfinski **D**aten**T**echnik (`www.LDT-Infocenter.com`).

All modules and extensions are available directly by the named manufacturers.

We are wishing you having a good time with your new light control!

New features within version 2

During the first years on the market Light@Night has found a considerable amount of prospective buyers. Out of this reason we decided not to publish an extension (comfort version) as initially intended but meet at first the requests received several times from the users.

The important issues:

- In future there will be only one software version which includes all available functions
- Remote control of light spots and switch-groups by keys by means of HSI-88 and s88 feedback modules
- Premise illumination with realistic day- and night transition
- Weather simulation including clouds, rain and thunder
- Support of the power- module
- Up to 7 light modules in arbitrary sequence
- Firework effects
- 3D- sound for rain, thunder and firework
- Searching of light spots

Light@Night runs still under Windows 95, 98 and Me. Please take into account that you need a PC with DirectX and sufficient capacity when using especially the 3D sound.

System Requirement

Light@Night runs on almost any PC with a Windows operating system of Windows 95 or higher. We recommend particularly modern operating systems such as e.g. Windows 2000, XP or upgrades.

Operating system	Windows 95, 98, Me, NT, 2000, XP or higher
CPU	Intel or AMD from 300Mhz clock frequency
Working memory	128 Mbyte RAM
Interface Light@Night	Printer connection port LPT (*)

If you want to run the Light@Night software together with model-railway control software on your PC you have to attend to some stringent requirements, because the control software as well as Light@Night need some system resources. In this case please find out the system requirements of your model railway control software and attend to the specific instruction for an optimal operation.
In a doubtful case you should consider to use a second, probably older PC exclusive for Light@Night.

In case of a common operation of Railware and a model-railway control software the following PC-system requirements are necessary:

Operating system	Windows 2000, XP or higher
CPU	Intel or AMD from 1200Mhz clock frequency
Working memory	1024 Mbyte RAM
Interface Light@Night	Printer connection port LPT (*)

(*) The connection via an USB- Adapter is technically not possible.
On some few Laptop computers it can be possible that the parallel interface will not comply with the actual standards. In this case Light@Night cannot be used on this Laptop.

It is possible to install a further parallel interface port (LPT) for the utilization of the print functions (the list of light-spots).

Hardware Installation

The light-display modules have to be connected to the parallel-interface port (LPT) of a PC via an interface-module (Light-Interface).
All programs have to be closed and the PC switched off before you connect the light interface module!

- Connect the interface-module to the first light-display module. Attend to equal position of the pin-bar to the socket bar.
- Screw on the modules onto a wooden plate or to the layout frame by using the attached set of screws.
- Connect the enclosed cable to the interface-module and to the printer interface port of the PC.
- Connect a customary model railway transformer (1) to the AC clamps of the light-display module.
- Connect up to 40 individual consumers onto each light-display module.

Connect or disconnect light display modules only during switched-off time of the system! Otherwise the modules can be destroyed!

The PC has to be switched off before connecting or disconnecting the connection cable! Danger, the system can be destroyed!

(1) By using small electric bulbs (e.g. Viessmann) for the illumination of streets it is recommended to use a customary 12V transformer for low-voltage illumination (halogen lamps), because a 16 Volt model railway transformer will reduce the lifetime of the bulbs considerable.

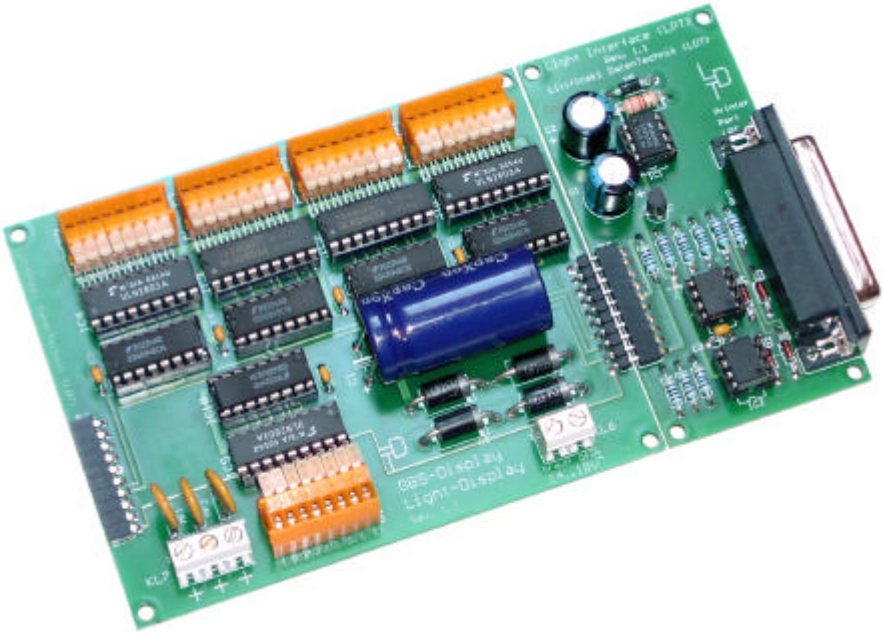


Figure 1: Light-Display with Light-Interface from LDT

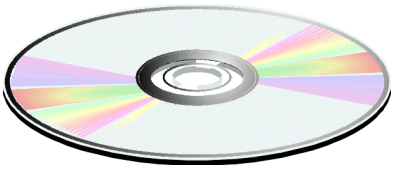
The above picture shows a Light-Interface and a Light-Display with 40 outputs. The Light-Interface shall be connected to the printer interface port (LPT) of the computer by use of the enclosed cable (25poles pin-pin). The maximum length of the cable should not exceed 3 meters. The Light-Interface takes over the conversion of the signals from the PC and assures the prescribed galvanic separation between PC and model railway layout. Up to 7 Light-Displays can be connected to each Light-Interface. The modules can be connected directly via the existent pin plugs. The modules have to be carefully screwed onto the base plate to prevent damages while press or depress the snap-in connections. The incandescent lamps and light emitting diodes have to be connected onto the outputs 1 to 40. These connections will switch against ground and can cover a load of 500mA each. For the voltage supply of the lamps and LEDs there are three outputs available at clamp 7. Each output is protected by a multifuse and can cover a load of max. 1 Ampere. Customary transformers suitable for halogen lamps with 12 Volt AC and about 50VA shall make the supply for modules, incandescent lamps and LEDs. By exclusive use of light emitting diodes is

it possible to use model railway transformers (e.g. Titan) with 16Volt AC. Each module should get the supply from a separate transformer.

During booting a PC some main-boards can induce a flickering of the connected lamps. To prevent this please switch-on the supply transformers not before the PC is ready to operate.

Software Installation from CD-ROM

Together with this manual you received a CD-ROM. The CD-Rom contains the software for the operation of the light-display modules. For the installation of the software is a license-key required. You can find the license-key on the backside of this manual.



- Please insert the CD-ROM into the CD-ROM disk drive.
- The installation program will start automatically. In case the function “Auto start“ has been set to “Off“ on your PC please start the program with “Execute…“ at the Windows start menu and enter the following line (without ` sign) : ‘`d:\setup.exe`’. Please replace the letter `d` with the letter-code of your CD-ROM drive.
- Now appears a menu for choosing the language for installation.
- Follow now the instruction of the installation program.
- Enter the directory where Light@Night shall be installed. Suggestion ‘`C:\Program\LightAtNight`’.
- The following installation will run automatically.
- Enter now your license-key. You will find the key on the backside of this manual.
- It is possible that a re-start of the PC will be required.

Light@Night is now ready to operate. For your first trials you can find a module including all sample setups on the screen after you started the program.

Installation of a further Light-Display Module

Connect or disconnect Light-Display-modules (LDT Light- or Power-Display) only during switched-off time of the PC! All transformers of connected light-display modules have to be switched off. Danger of destruction!

The extension with further light-display modules is very simple. It is possible to connect up to seven LDT Light-Display modules directly behind each other. Each module contains a socket for the connection of the next module. Connect extension modules onto the last existing module.

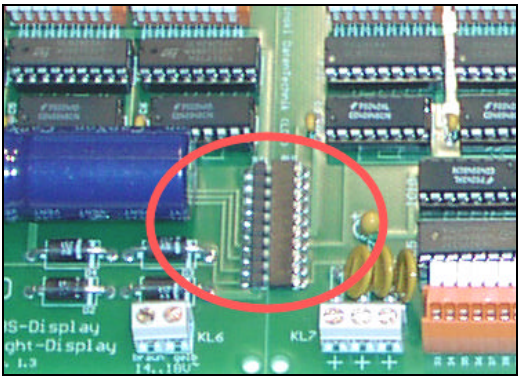


Figure 2: Pin bar connection

- At first switch off all light-display module transformers.
- Connect the new module to the pin bar of the last already attached module and fasten the module with screws onto a solid base plate.
- Connect a suitable transformer.
- The new LEDs and incandescent lamps can now be connected.
- Switch-on all transformers and activate the PC.
- The new module receives the next afferent module number (module numbers of 1 to 7 are possible).

- The module has to be announced with type at the dialog `Light Module` under `Options` and `Module`.

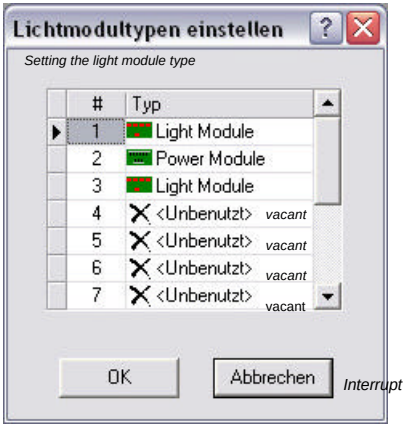


Figure 3: Type of Light Module

The transformers of all light modules have to be switched-off before connecting or disconnecting a light-display module. Danger of destruction!

Before connecting or disconnecting the connection cables or modules the pc has to be switched off! Danger of destruction!

The Power- Module

The new power- module contains 24 outputs which can be loaded with up to 2,5 Ampere each. Therefore it will be especially suitable for replacing existing relay-controlled model railway illumination and for the simultaneous control of many street illumination lamps and as well for 12 Volt Halogen lamps with up to 20 Watt.

It will be possible to mix it with the Light-Display-Modules in an arbitrary sequence. The module occupation and sequence has to be set within the software under `Options` and `Light Modules`. Up to 7 modules can be used in combination to your requirement.

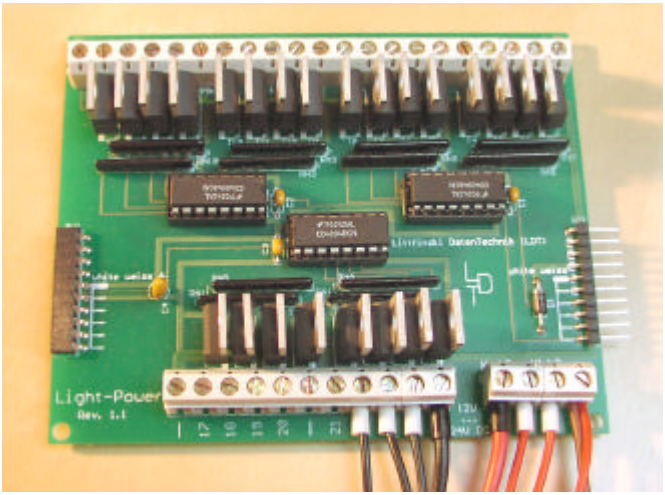


Figure 4: The LDT Light-Power-Module

The Light-Power-Module has to be supplied with direct current. Therefore is it required to use a direct-current power supply unit with 12 or 15 Volt dc output and sufficient capacity. The switched mode mains power supplies from e.g. manufacturer Reichelt or Conrad are especially recommended.

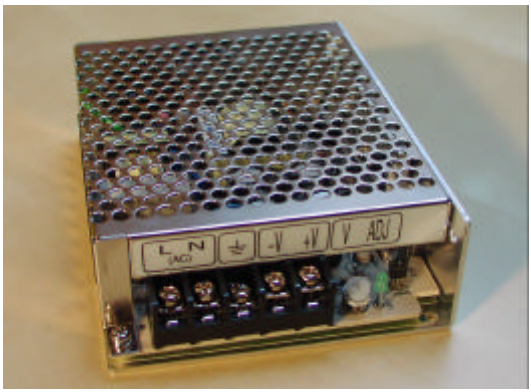


Figure 5: 40 Watt switched mode mains power supply (Reichelt)

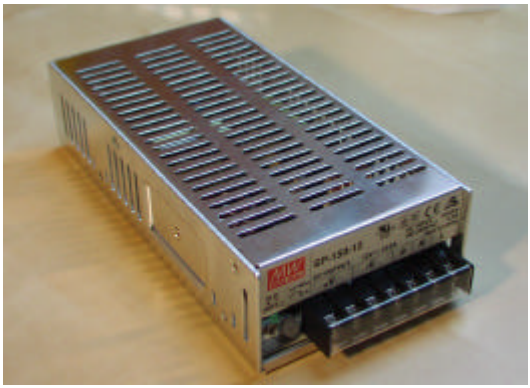


Figure 6: 150 Watt switched mode mains power supply (Reichelt)

Switched mode mains power supplies contain an electronic overload safety device for the protection of the power supply and the connected consumers. If the protection device has been triggered the power supply unit has just to be switched off for a short time.

If the Light-Power-Modules will be supplied by switched mode mains power supplies the first module at the Light-Interface should be normal Light-Display-Module because the Interface receives the power supply from the first module. If the first module would be a Light-Power-Module with a switched mode mains power supply it could be possible that during a network overload the complete light control will be switched off.

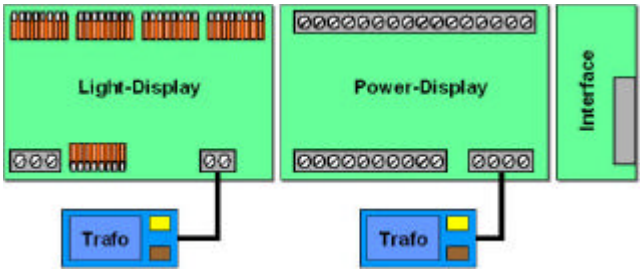


Figure 7: Correct Module Sequence

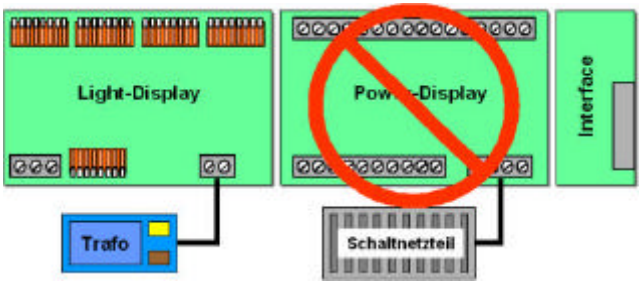


Figure 8: Incorrect Module Sequence

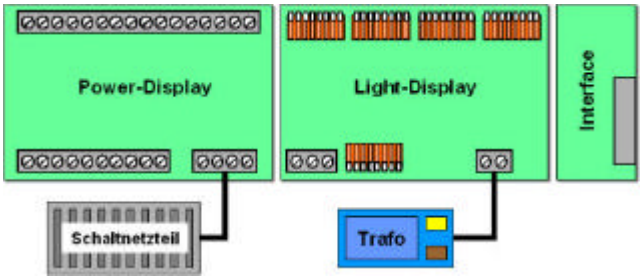


Figure 9: Correct Module Sequence

With reason to a temporary enlarged current consumption of cold incandescent lamps and by frequent switching intervals is it required to use an over dimensioned switched mode mains power supply. For example is a 100 Watt power supply required for a thunder lightning with three 20 Watt Halogen lamps despite only one lamp out of three will be switched-on at the time.

24 outputs with 2.5 Ampere each will add up to 60-Ampere total current. This will be 720 Watt by 12 Volt. If this theoretical load will be really required is a direct current power supply of this capacity required.

Especially for this high current flow is it very important to attend to the wire diameters between power supply and Light-Power-Module. Also the diameters of cables between the outputs and the distribution to the current consumers should be suitable to the expected current flow. The following tables will give some suitable recommendation:

Power supply - Light-Power-Module	
Length	Wire cross section
Up to 2 meter	1,5 sq mm
Up to 5 meter	2,5 sq mm

Light-Power-Module – Consumer	
Length	Wire cross section
Up to 3 meter	0,75 sq mm
Up to 6 meter	1,5 sq mm

Options

There are numerous important settings available at the main menu under “Options“. Those settings will be described within the following sections.

Switch-Groups

Under the expression “Switch-Group” Light@Night understands the possibility to switch one or several light-spots on or off at particular times.

At first the required switch-group will be defined and assigned with switch times. For the setting-up of a new switch-group a new empty entry-line has to be created at the list with the “+” key.

The names of the switch-groups can be selected to your requirement. It is recommended to use meaningful names such as e.g. “Station Forecourt”, “Streets” or “Building Site Rear”. It is only required to use unique names. Each switch-group requires at least one on- and one off switching time.

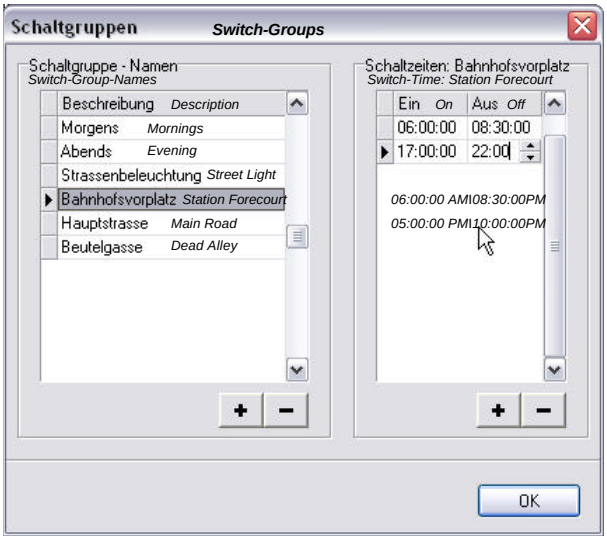


Figure 10: Dialog Switch-Group

To create a switching-time please click onto the right “+” key and enter the required times. With reason to the usually very short model time it is not required to enter seconds.

Note: Use as few Switch-Groups as possible to assure that you do not loose control.

The switch-groups “<Manual>” und “<Always>” are generally available and cannot be modified. Is a light spot of a switch-group assigned to “Manual” switching is only possible by a mouse click. Assigning to the switch-group “Always” will result that the light spot will be permanently active within the working mode.

Note: Switch not too many light-spots with complicated effects (e.g. Gas Street Lamp) at the same time. For this application please use separate switch-groups with 8 outputs each and an offset of about 20 seconds.

For the synchronization of the switch-groups serves the built-in clock. The time speed is adjustable.

Daytimes

The setting at the dialog daytime’s enables a coarse adjustment and is generally provided for future extensions. The current daytime will be shown in the working mode at the lower status line. Adjusting the beginning of dawn, daylight, dusk and night is possible.

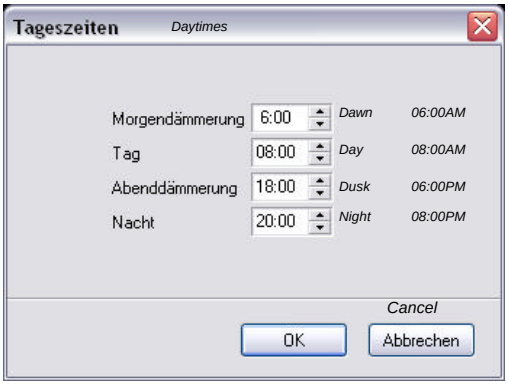


Figure 11: Dialog Daytime

This information's will be independently transmitted to a running Railware control system and will release there certain loc-functions (e.g. coach-light, loc-drivers cab illumination etc.).

Lamp Adjustments

With high effort Light@Night software takes care to create all light-effects as individual and realistic as possible.
With this reason is it possible to adjust numerous basic data up to a wide extend. These settings can be made at the lamp-adjustments. For example: it is possible to adjust an average time for a welding-arc. Additionally the minimum and maximum pause between two welding processes can be adjusted.

Lamp Adjustment

Gas Lamp I *Traffic Light Simple* I *Traffic Light Cross Road*
Neon Lamp / *Flashing* Light / Light Chain / House Light / Flash
Building Site I *Welding Arc* I *Dimmer* I *Random*

Average Time	2500	*microsec.*
Minimum Pause	10	*sec.*
Maximum Pause	20	*sec.*

Standard OK Cancel

Figure 12: Dialog Lamp Adjustment

All adjustments have been set already with practical values. Therefore we will not describe all this values in detail. If required you can call for further help directly at the dialog screen by clicking at first the right mouse button inside any input field and then clicking on the text “What is this?” with the left mouse button.

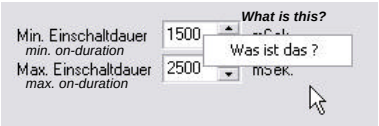


Figure 13: Help function with mouse-click right / left

Interface Hardware

At the time *Light@Night* supports three different types of hardware and interfaces for the control of light modules. But as a rule you should use the modules from LDT (www.LDT-infocenter.com).

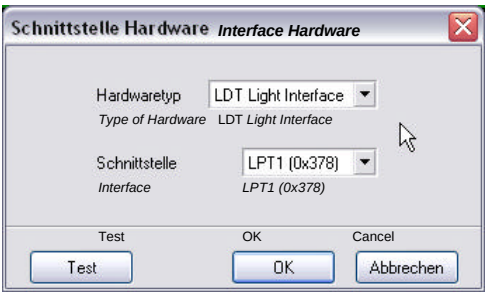


Figure 14: Dialog Interface

Hardware type	Interface	Description
LDT Light Interface	Printer Interface parallel LPT1 to LPT3 (*)	THE standard system for the Light@Night software.
Parallel 8255	PC mounting boards with 8255 modules	All known ISA- und PCI mounting boards with 8255 modules for self making projects will be supported.
Tams/Conrad	Printer Interface parallel LPT1 to LPT3 (*)	A simple module for the connection of up to 8 lamps. Suitable for testing purposes only.

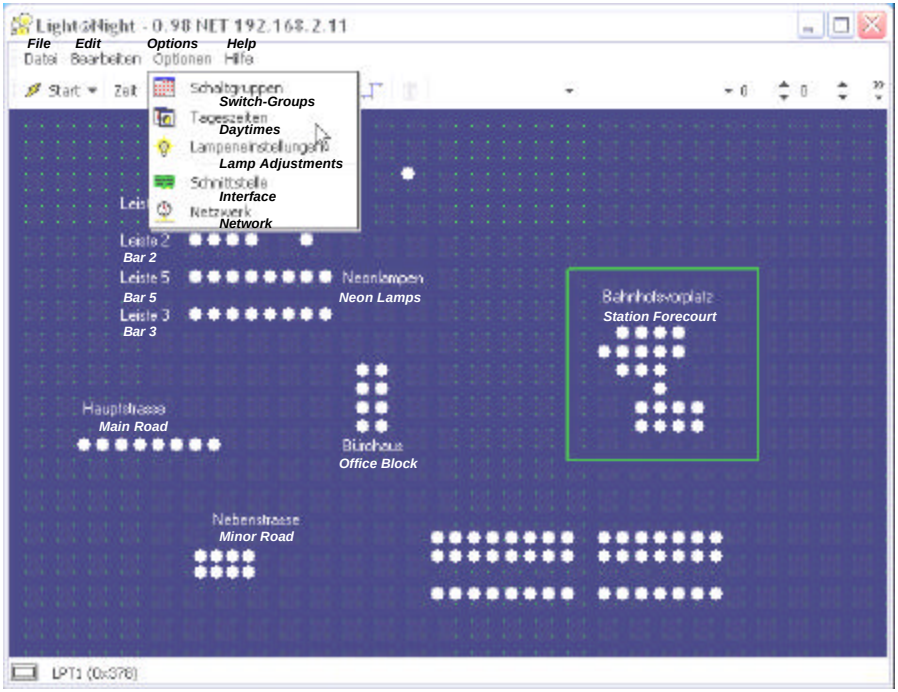
(*) The connection via an USB- Adapter is technically not possible. On some few laptop computers it can be possible that the parallel interface will not comply with the actual standards. In this case Light@Night cannot be used on this laptop.

System- and Lamp Tests

At the dialog screen for the hardware and the interface is a test button located. With this key you can release a simple lamp test of the connected modules and outputs.

After clicking on the button “Test” all outputs will be switched-on in succession for a short time in a manner of a running light-chain. After this all outputs will flash together a few times.

During the installation it can be helpful to make immediately a functional test after connecting a further LED or lamp. Therefore is it possible to keep any light-spot flashing within the edit-mode by holding the “Strg”-key and simultaneous clicking the mouse. You will leave this flashing mode as soon as you click onto any other area.



About electric, wiring and current consumption

To assure a correct function of the light control it is required to attend to particular electro technical basics. The following section will give you some information about the most important basic knowledge. Additionally you will receive some information about the connection of the various electric light bulbs and the basic for calculating the value of serial resistors for LEDs.

Transformers

Each Light-Display Module requires a separate transformer for the supply of the connected lamps and light emitting diodes. The rectifier on every Light-Display Module will multiply the voltage of the transformer by factor 1,4. Therefore, if possible, you should use customary transformers for low-voltage halogen lamps with 12 Volt output. Especially when incandescent lamps (e.g. street illumination) will be connected.

The transformers have to be able to supply a current of 3 to 3,5 Ampere.

Type	Capacity	Voltage	Voltage at output of Light-Display
Halogen transformer	about 42 VA	12 V ~	16 V -
Model railway transformer	about 52 VA	16 V ~	22 V -

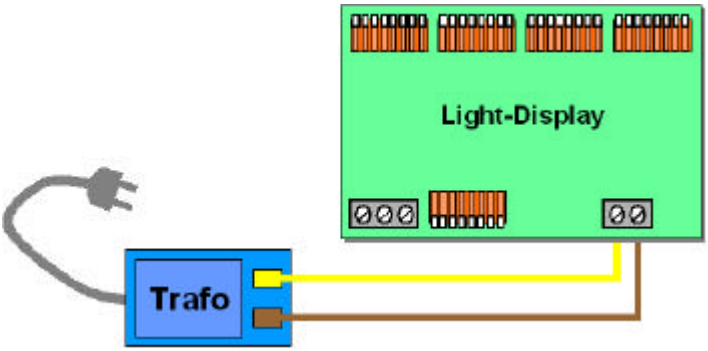


Figure 15: Transformer Connection

Use 12 Volt halogen transformers by application of incandescent lamps!

If you use several Light-Displays Modules with separate transformers you have to take care that all transformers are connected with the same phase-equality onto the main supply. In case the transformers have no phase markings you can check the phase relationship by using a small 16 Volt light bulb.

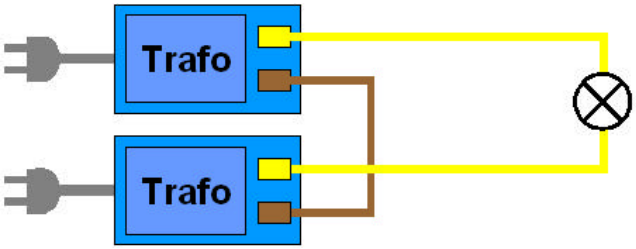


Figure 16: Checking the phase relationship

Connect the transformers without Light-Display Modules to a power supply distributor. Connect a cable between the two ground-terminals (marked with: brown, black, ^, -, etc.) of the transformers and connect an incandescent lamp to the two remaining terminals. The lamp should not glow. In case the lamp will glow the main plug of one transformer has to be turned around.

Switch never several transformers in parallel! There will be serious danger of life at the non-connected mains plug!!

Wiring-up

Take care that you use a sufficient cable diameter between transformer and Light-Display Module. Even for a short cable length you should not use cables with a cross section below 0,5 square mm. For higher cable length you can see the required cable cross-section at the following table. Indicated is the maximum length between power supply and consumer in

meters. For example: at a current of 3,5 Ampere and a cable cross-section of 0,5 square mm the length of the cable should not extend 2 meters.

		Cable cross section (square mm):					
		0,14	0,25	0,5	0,75	1,5	2,5
Current (Ampere)	1	2,0 m.	3,5 m.	7,0 m.	10,5 m.	21,0 m.	35,0 m.
	2	1,0 m.	1,8 m.	3,5 m.	5,3 m.	10,5 m.	17,5 m.
	3,5	0,6 m.	1,0 m.	2,0 m.	3,0 m.	6,0 m.	10,0 m.
	4	0,5 m.	0,9 m.	1,8 m.	2,6 m.	5,3 m.	8,8 m.
	5	0,4 m.	0,7 m.	1,4 m.	2,1 m.	4,2 m.	7,0 m.

If possible use stranded wire. This is more flexible and is easier to work with. Do not screw the end of a stranded wire directly into a clamp but use always wire-end sleeves. The soldering of the wire end is not suitable because the solder is quite soft and the screwed connection can become loose after a time.

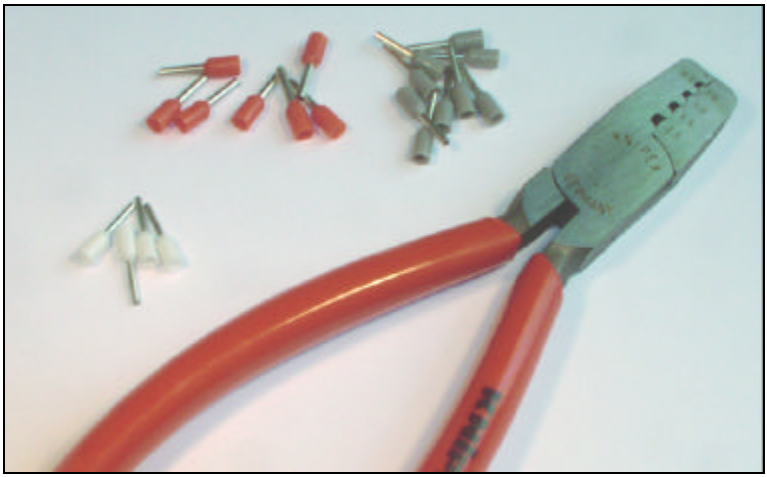


Figure 17: Wire-end sleeves with pliers

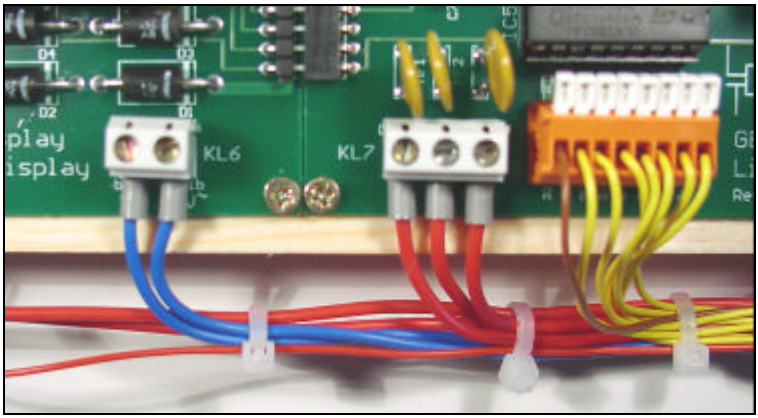


Figure 18: Assembly with wire-end sleeves

The cable square section between a Light-Display Module and an incandescent lamp or a light emitting diode is however not critical. You can use customary stranded wires with 0,14 or 0,25 square mm.

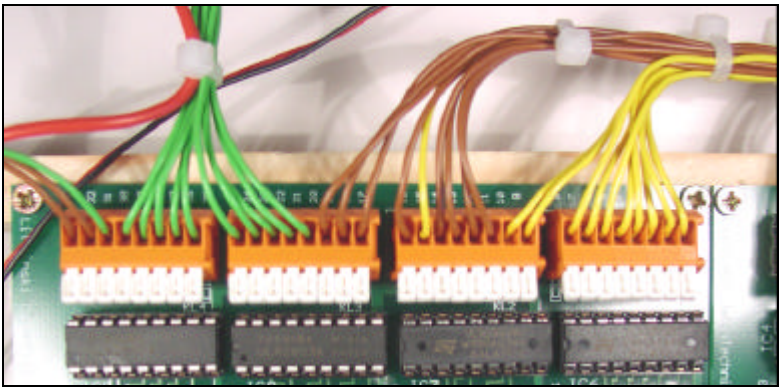


Figure 19: Connection of incandescent lamps and LED

Light-Display

With reason to the existing safety regulations for technical toys is the power supply to lamps and light-emitting diodes by one Light-Display Module restricted to a certain amount.

Each Light-Display Module is able to supply a total current of maximum 3 Ampere. All consumers have to be divided evenly onto the 3 clamps of KL7 related to their current consumption. Each clamp-terminal contains a multifuse and supplies a current up to 1 Ampere. The following table indicates the typical current consumption of the different kind of illumination and the maximum quantity of relative consumer on clamp KL7.

Kind of illumination	**Current consumption (typical)**	**Max. consumers on one terminal of KL7**	**Max. consumers on one Light-Display Module**
electric globe big (with socket for housings)	150 mA	6	18
incandescent lamp small (e.g. streetlamp)	40 mA	25	75
Light emitting diode	20 mA	50	150
Light emitting diode “low power”	2 mA	500	1500

The table shows that one Light-Display Module cannot be totally assembled with big electric globes at the switching side. This will not be a disadvantage because nowadays for most parts of the model illumination particularly house-illumination will be light emitting diodes used. These LEDs have not only a very low current consumption but they have a nearly unlimited lifetime.

You should never use the big electric globes with socket, which have been offered in the past from some accessories dealers (they had to be simply assembled in a round hole or bore inside the housings). The efficiency is bad because of the high current consumption. In addition is this kind of illumination rather nonrealistic.

A Light-Display Module supplies therefore up to 3 Ampere current. Each output can be loaded with up to 500 mAmpere. Each output clamp with 8 outputs can supply a total of 1 Ampere. Will be one of those values exceeded there is a possibility that single circuits or a total Light-Display Module will be destroyed.

One Light-Display Module cannot be totally assembled at the switching side with electric globes!

Incandescent Lamps

Although light emitting diodes contain a much better efficiency and a very long lifetime there are still many incandescent lamps used on model railway layouts. Particularly the large assortments of streetlamps e.g. from Viessmann are equipped with small incandescent lamps. Their current consumption amounts to 20 mA and up to 60 mA. For simplification we assume an average current consumption of about 40 mA.

These incandescent lamps are designed for a voltage of about 16 V DC. As the Light-Display Module supplies direct current the transformer should supply not more then 12 V AC. Otherwise the streetlamps will glow to bright and the lifetime will be reduced considerable.

Figure 20: Different style of lamps

Apart from street illumination, incandescent lamps can be used for several other applications. There is at first the illumination of houses. An easy access to the lamps has to make sure to be able to exchange burned-out lamps. Also for circular warning lights of fire engines or police cars small incandescent lamps will be used very often. Probably because some manufacturers supply ready assembled modules. They are also suitable for

the effective simulation of an open fire. Particularly if several lamps with different colors will be used.

Larger lamps (with socket) are used nowadays very seldom because of the relative high current consumption.

Use 12 Volt AC Halogen transformers of about 42 VA capacity for the voltage supply.

Light Emitting Diodes (LED)

Light emitting diodes (as well named as LED) are today generally used for illumination of model railways. They have a considerable high lifetime and require therefore no maintenance. They have a high efficiency by low current consumption and they are easy to assemble. A disadvantage is that they require normally a series resistor for the limitation of the current. On the other hand is it possible to assemble some light emitting diodes behind each other in series. A further disadvantage against an incandescent lamp can be the missing all around light irradiation. A light emitting diode contains mostly an irradiation angle between 30° und 160°.

Presently there are three different basic types of light emitting diodes available: the “normal” light emitting diode, the so called “low power” light emitting diode and the “super bright” light emitting diode. All this types are available in different design and different colors. They can be ordered by the electronic-parts store (e.g. Reichelt, Segor, Conrad etc.) at a various selection and at low cost.

Figure 21: Different LEDs

The following table summarizes the mentioned types. The values for voltage and current are average values. You should compare those values with the actual data of the supplier.

LED Type	Size (mm)	Color	Current (mA)
Normal	2, 3, 5, 10	red, green, yellow (orange) blue, white	10-30 mA
Low Power	3, 5	red, green, yellow	2 mA
Super Bright	3, 5	red, green, yellow, blue, white	20-30 mA

Additionally there are a variety of miniature-LEDs up to a minimum size of 1mm available. These are mostly designed at the so-called SMD-technique and provided for the automatic board assembly. With a little experience (and a suitable soldering iron) you could even assemble those parts manually. For a manual assembly mostly thin lacquered copper wire will be used for the connection.

Light emitting diodes are suitable for most kind of illumination and effects at a model railway layout. Particularly also for house illumination with the illumination of separate windows with one LED each, for flashing lights and light chains, for flashlights, welding arcs and other effects with the requirement of a fast flickering of lights. They are less appropriated for slow dimming functions such as floodlights or gas street lamps.

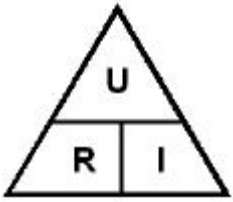
For house illumination are white LED`s unsuitable. During dark it would appear as a market in the neighborhood would be offer some solariums. Rather use the colors `Sunny White` or `Golden White`. These colors will rather represent the daylight- and artificial-white. A re-treatment of LEDs

with lamp-lacquer is possible or to combine a white and a yellow LED (using a serial resistor each).

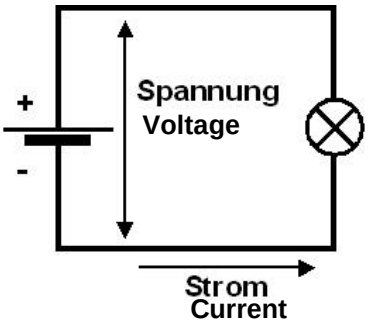
Attention by using super-bright white and blue LEDs: Do not look directly into the light because the partial laser-light can damage the eyesight.

Current, Voltage and Resistance

Not every model-rail-roader is familiar with the coherence between current, voltage and resistance as per the so-called “Ohm’s Law”. The measuring unit for current is the Ampere (A), for the voltage Volt (V) and for the resistance Ohm (Ω). The basic formula is U=R*I (Voltage=Resistance*Current). This formula can be clarified as triangle. If you cover the required result you can read the applicable formula.



Also U=R*I or I=U/R or R=U/I



You can compare the current-flow quite good with water inside a hose-system. The pressure at the water tap complies with the electric voltage and the amount of running water complies with the current. If you reduce

the diameter by a sharp bent the resistance will rise and the amount of running water (current) will be reduced. The water pressure (voltage) will be constant. As higher the resistance as lower the current. If you increase the voltage the current will increase as well. This can be done until the water hose will burst or the cable burns.

By the way: 1 mA accounts for one mill Ampere; that is one thousandth of an Ampere. One KΩ stays for one Kilo Ohm that is one thousand Ohm.

Calculation of Resistors

Light emitting diodes (LED) require a series resistor for the limitation of the current. For your convenience Light@Night offers a resistance calculator at the menu under “File“, “Current consumption” and “Calculate Resistor”. With this dialog is it possible to calculate the size of a serial resistor for a particular light emitting diode.

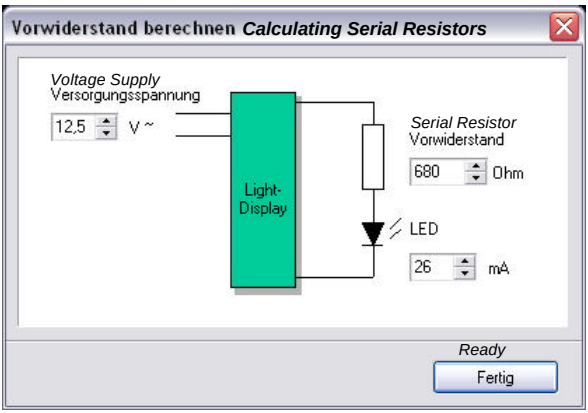


Figure 22: Dialog Calculate Resistor

At first enter the voltage of the used transformer. Then select the required current for the LED and you will receive the value of the required resistor. The value of the resistor will be rounded up respectively down to get a value within the international standard E6 or E12.

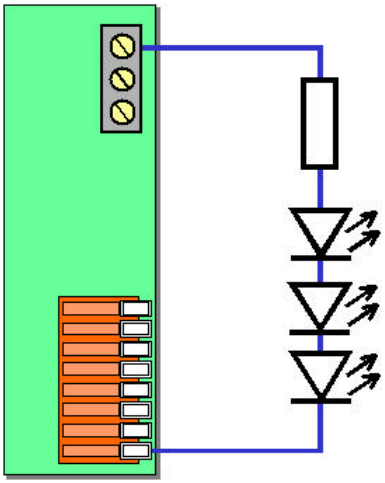


Figure 23: Three LEDs in series

Up to 4 light emitting diodes can be connected behind each other (in series) onto one output. The serial resistor has to be calculated accordingly. The below tables will give you the most important resistor values for light emitting diodes with 2 mA and 20 mA current consumption.

LED serial resistors 12V~ transformer		
qty. LED	"normal" 20 mA	"low power" 2 mA
1	470Ω	4,7KΩ
2	330Ω	3,3KΩ
3	220Ω	2,2KΩ
4	68Ω	680Ω

LED serial resistors 16V~ transformer		
qty. LED	"normal" 20 mA	"low power" 2 mA
1	620Ω	6,2KΩ
2	470Ω	4,7KΩ
3	270Ω	2,7KΩ
4	100Ω	1KΩ

Light emitting diodes, resistors and other components can be purchased at low prices by Reichelt (`www.Reichelt.de`), Segor (`www.Segor.de`) or Conrad (`www.Conrad.de`).

Several Consumers at one output

As described at the prior section is it possible to connect several light emitting diodes in series onto one output.

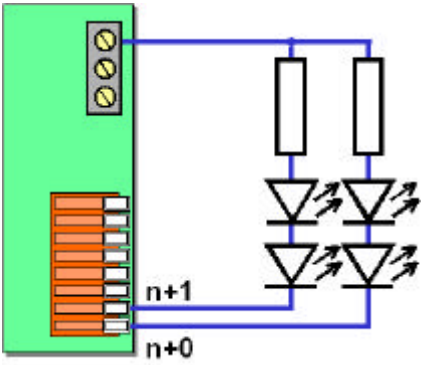


Figure 24: Several LEDs in series

It is also possible to connect several incandescent lamps onto one output up to the maximum permitted load. The technical limitation has been described above.

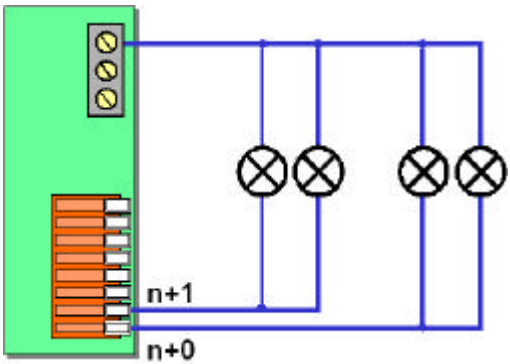


Figure 25: Incandescent lamps connected parallel

Nevertheless there are reasons to avoid the connection of several lights onto one output. The software of Light@Night takes very much care about the simulation of realistic light effects. Therefore the flickering of every

switched-on neon lamp is different. Every gas street lamp requires a different starting time, every welding arc is flickering a different time and varies in duration and even each simple flashing light works with a slight different speed. Only this effort provides a substantial realistic and real impression from the view of the observer. By connecting several lights together you will destroy a part of the realistic images.

Generally is the connection of several LEDs or incandescent lamps a non-realistic saving.

But there are still many possibilities to use connected lights without the notice of the observer. For example is it possible to connect a light at the front of a house to the corresponding light at the rear side. As an observer can only see the house from one side he will not notice the connection.

The same can be done with the street illumination. Whenever a second street can not be observed from one location it can be possible to connect the second street lamps in parallel to the first one.

Function and Mode of Operation

Light@Night knows an edit- and a working-mode. With the “Start” and “Stop” button you can switchover between the modes. Light-spots can be configured within the edit-mode only.

Light-spots:
The button with the yellow lamp serves for inserting light spots. During depressing this button is it possible to insert as many light spots as required by clicking into an empty space of the working area. They will be aligned automatically to the grid.

An already inserted light spot can be relocated by using the drag and drop function of the mouse. Has a light spot been marked (red frame) it can be deleted with the “Del”-button or with the “Trash-Can”-symbol.

Each light spot is representing an output with module-number and output-number of a Light-Display Module. It has to have a light-type (light-effect) and has to be assigned to a switch-group. These details can be entered at the upper menu-bar after clicking on a light spot (creating a red frame). For assigning switch-groups and light-types is it possible to mark several light-spots with the drag function of the mouse.

Address

Each light spot needs a definite module-number and an output number. The module-number is one sequential number of all connected modules. The first module at the Light-Interface has the module-number 1. The output numbers are clearly indicated on the Light-Display Modules. They start with number 1 right-hand top and continue up to number 40 anti-clockwise to right bottom.

Text

The button with the ABC-symbol is assigned for inserting text. By clicking onto a space at the working area empty text-frames can be created during the button is activated. They will be automatically orientated onto the grid. After inserting the frame the text can be modified by using a double-click.

Frame

For a better coordination some frames can be inserted. For this action the button indicating some lines has to be depressed. Then the start and the end of a line can be marked by a mouse-click. They will be automatically orientated onto the grid.

The Clock

A clock supplies the model-railway-time to all switch-groups. The actual time will be indicated at the upper status line. The speed of the running time can be adjusted. On this way you can adjust the speed of the day-night rhythm up to your convenience. The following table shows the possible total duration of a model-railway day.

Factor	**Duration day-night cycle**
1x	24 hours
3x	8 hours
6x	4 hours
20x	72 minutes
40x	36 minutes
60x	24 minutes
100x	14 minutes + 24seconds
200x	7 minutes + 12 seconds
300x	4 minutes + 48 seconds
400x	3 minutes + 36 seconds
500x	2 minutes + 53 seconds
600x	2 minutes + 24 seconds
Test	24 seconds

Apart from the time-speed factor also the actual time can be adjusted by actuating the clock-symbol. By direct entering of digits into the display of the clock is it possible to adjust any desired time.

Railware model-railway control:
Light@Night recognizes independently the presence of the control-system and synchronizes the known “central clock”. In addition the beginning of dusk and dawn will be transmitted to enable Railware (from version 5) to perform the self-acting loc-functions (coach-lights, headlights etc.), which are related to the daytime.

Twilight Times

Via the menu “Options” and “Daytimes” is it possible to adjust the beginning of the individual daytime. This time should be selected very carefully to assure that the times of the switch-groups would actually coincide with the desired twilight phases. This will get even more importance when at a later time suitable modules for dimming the room light will be supported by Light@Night.

Standard time	
Phase	**Start**
dawn	06:00am
day	08:00am
dusk	06:00pm
night	08:00pm

Switch-Groups

For limiting the configuration effort and prevent the requirement to configure each light spot a vast amount of on- and off-switching times, all light-spots are assigned to so-called switch-groups. The switch-group defines the on- and off-switching time of a light spot. This timing will be set at the menu “Options” and “Switch-Groups”. Each switch-group can contain several on- and off-switching times. For example can a switching-group “Residential Area” belong to the switching of the street illumination, which will be switched-on between 6:00 and 11:00 pm and between 5:00 and 7:00 am.

There are two special groups available "<Always>" and "<Manual>" which will either activate the light spot immediately after start or only manually by clicking with the mouse to switch on or off.

Special Switch-Groups:	
<Always>	Immediately after changing Light@Night into the start mode all assigned light-spots will be switched-on and switched-off with the stop-mode (edit).
<Manual>	Light-spots of this switch-group can only be switched on or off by mouse click.

The Light-Spots

Almost all typical light effects for model-railways can be adjusted. Some light-effects require several outputs on a Light-Display Module.

The amount of required outputs will be shown at the right column. In this case you have to configure the module and number of the first output only. Further required outputs will be automatically reserved in an afferent sequence even by passing on to the next module if required.

The standard software contains the following effects:

Light-type	**Mode of Operation**	**Type of lamp**	**Qty.**
incandescent lamp	simple switching on and off of one output	LED, Lamp	1
neon lamp	at first coincidental irregular flashing during switching-on; will remain switched-on	Lamp	1
house light	coincidental delay of switching for some seconds, despite of same adjustment of switching time e.g. the illumination of all housings of one street will be switched-on or off at different times	LED, Lamp	1
flashing light	produces on- and off-switching time of equal duration; the flashing frequency will differ slightly by every flashing light and every start	LED, Lamp	1
light chain	consist always of 4 outputs which will switch on in succession for an adjustable time	LED, Lamp	4
dimmed light	regulates an incandescent lamp within a few seconds up to full brightness and vice versa	LED, Lamp	1
function	as normal incandescent lamp, but with different color of the light-spot, marking of operation models such as a wind turbine etc.	LED, Lamp	1
operation light	for action vehicles, every light and each start with coincidental selected flashing time simulates the motor drive with different speed	LED, Lamp	1
operation flashlight	front flashlight for action vehicles, flashes two times shortly and makes then a little pause	LED	1
flashlight	photo-flashlight, is simulating a camera with an occasional flashlight, break time will be for every time coincidental	LED	1
building site	suitable for light chains on building sites, the switched-on time is very short and simulates flashlights, after each sequence there will be a short pause	LED, Lamp	5
welding arc	coincidental controlled flickering of a welding process, the duration of the welding with irregular flickering of the welding arc and with a following pause will be determined coincidentally for each sequence	LED	1

Light-type	Mode of Operation	Type of lamp	Qty.
fire	simulation of an open fire by producing irregular flickering	Lamp	1
gas street lamp	at first is it flickering some time, then is it dimmed up until full brightness with light regular flickering, during the normal lighting simulation influenced by occasional irregular and short interruptions caused by fluctuation of the gas supply	Lamp	1
gas compression street lamp	simulation of modern gas street lamps, produces at first flickering then a longer time dimmed and flickering brightness and then full brightness	Lamp	1
flood light	needs about half a second for persistence during on- and off-switching	Lamp	1
random	switching on and off by random control with adjusted minimum and maximum pauses	LED, Lamp	1
auto flashing light	produces typical flashing frequencies for direction indicator of motor cars, slight variation of flashing frequency at every start	LED, Lamp	1
traffic light simple	produces all phase sequences of a pedestrian traffic light with a three-color road traffic light and two color pedestrian traffic light with exemplary pauses, at switched-off state yellow light will flash, optional direct jump from red to green possible, manually switching is reacting with a delay in accordance to the status of the traffic light	LED, Lamp	5
traffic light demand driven	produces all phases sequences of a pedestrian traffic light with a three-color road traffic light and two color pedestrian traffic light with exemplary pauses, complete switching off of the traffic light, optional direct jump from red to green possible, manually switching is reacting with a delay in accordance to the status of the traffic light	LED, Lamp	5
traffic light crossroad/ intersection	for crossroads and intersections, produces all necessary light positions with exemplary and adjustable pause timings, after switching off a permanent night connection with flashing yellow light at the minor road, optional direct jump from red to green possible, manually switching off is reacting with a delay in accordance to the status of the traffic light	LED, Lamp	10
signal post	one output each for the control of LEDs or incandescent lamps at red, yellow and green, will produce light effects as on a control desk of a signal post	LED	3
television set	three outputs for red, green and blue produces coincidental and permanent changing color-, flash- and flickering effects as on a TV-set	LED	3
radio tower	produces flash effects as used by radio- and TV-towers and other high buildings, each time a single short flash with following longer pause	LED, Lamp	1
chimney	produces flashlights as used on chimneys with short dual flash-effect and then a longer pause	LED, Lamp	1

Light-type	Mode of Operation	Type of lamp	Qty.
rail crossing	typical flashing of lights at rail crossings with two contrary switched outputs	LED, Lamp	2
Thunder strike	all three outputs will flicker for about 1 sec. and will create therefore a thunder strike. This can be used if there is no room-light-control available. Suitable for the Light-Power-Module	Halogen-lamps	3
firework1	the first output switches-on continuously for a short time. Then the second output will flicker. The timing will vary and overlap	LED, lamps	2
firework2	the first output will flicker for a short time. Then the second output will switch-on continuously. The timing will vary and overlap	LED, lamps	2
firework3	at first the first output will flicker for a certain time. Then the second output will flicker. The timing will vary and overlap	LED, lamps	2

The described types of light-spots are not only suitable for the mentioned operating features but are as well usable for many other meaningful effects. Further information regarding possible application will be described within the following chapters.

A summary about the light effects and the simulations can be found at the web page:

`www.light-at-night.com/effekte.html`

Connecting LEDs and Incandescent Lamps

If there are several outputs for one light spot required only the first output with module- and output-number will be registered. This output will be marked with `n` or `n+0` at the following drafts and tables. The further outputs for the light spot will be automatically occupied and marked with `n+1` up to `n+9` if required.

LEDs, resistors and other components can be purchased at low prices by Reichelt (`www.Reichelt.de`), Segor (`www.Segor.de`) or Conrad (`www.Conrad.de`).

Single Light-Spots

The following drafts show the principle connection of light-spots to one output.

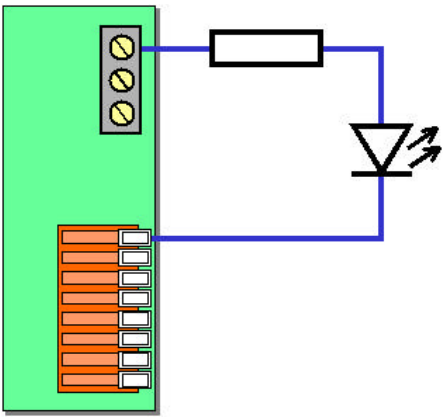


Figure 26: Connection Light Spot with LED

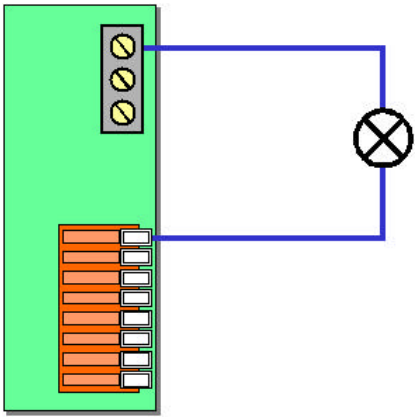


Figure 27: Connection Light Spot with incandescent lamp

Light Chain

Each light chain works with 4 outputs in succession. For the light spot only the first output has to be indicated.
As only one LED will be switched-on at the time only one serial resistor will be required for all four LEDs.

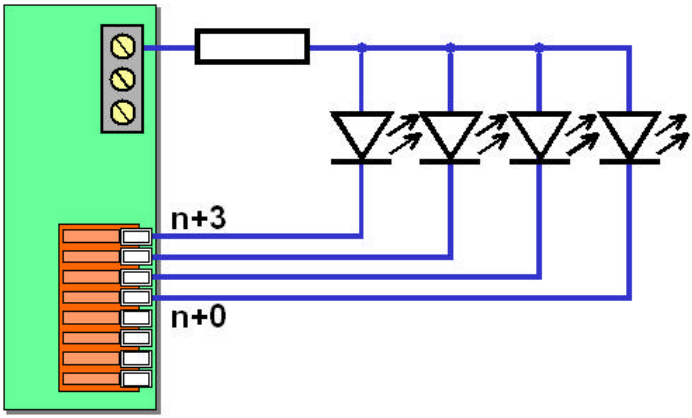


Figure 28: Connection Light Chains with LEDs

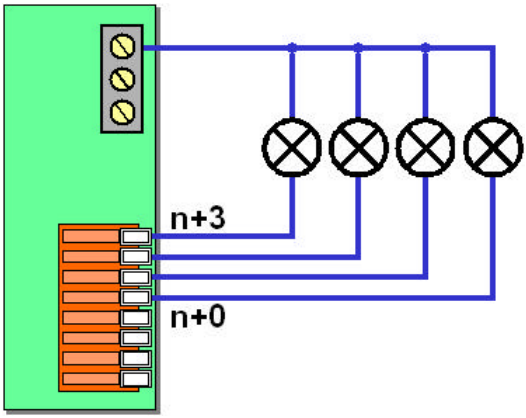


Figure 29: Connection Light Chain with incandescent lamps

Building Site

Each light chain works with 5 outputs in succession. For the light spot only the first output has to be indicated.
As only one LED will be switched-on at the time only one serial resistor will be required for all five LEDs.

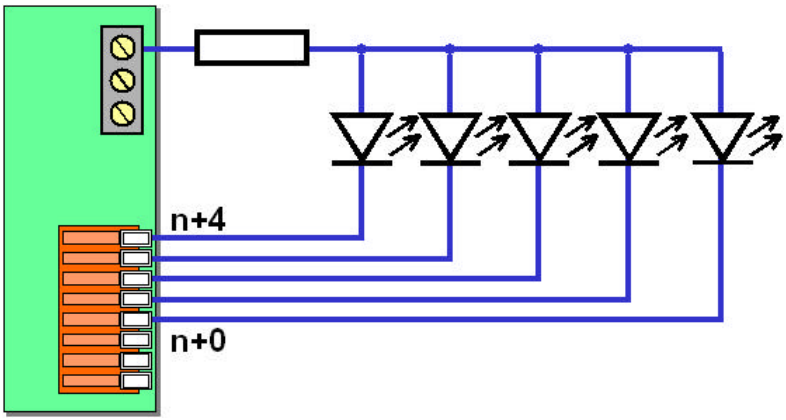


Figure 30: Connection Building Site with LEDs

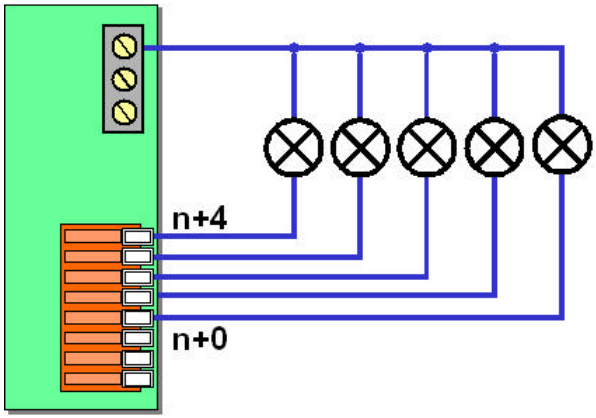


Figure 31: Connection Building Site with incandescent lamps

Traffic Light simple and pedestrians

The simple pedestrian traffic light (traffic light simple) and the traffic light on demand (traffic light pedestrian) require three outputs for the road traffic light and two outputs for pedestrians. As each traffic light exists mostly two times the traffic lights with identical switching can be switched together.

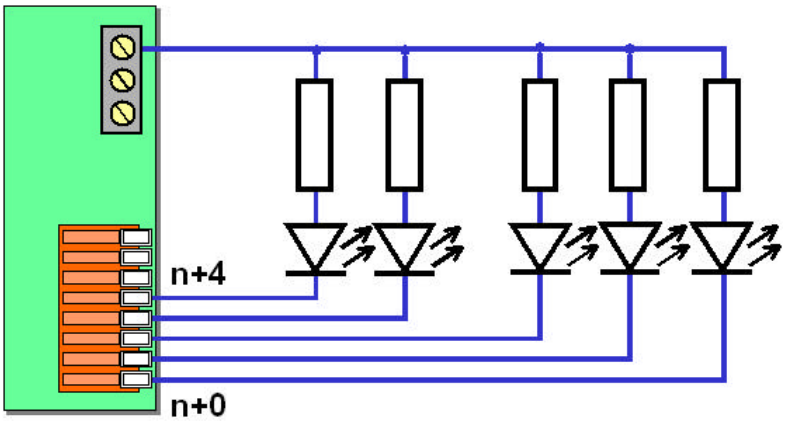


Figure 32: Simple Traffic Light with LEDs

If there are several traffic lights existing at one crossing (mostly two) the particular light emitting diodes of the two traffic lights can be connected in series. The value of the series resistors has to be calculated as per page 40.

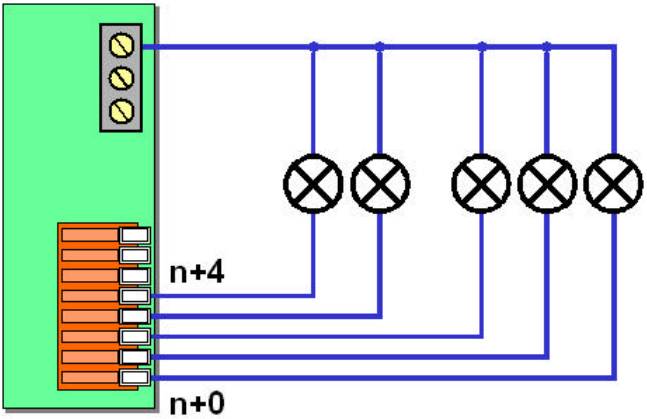


Figure 33: Simple Traffic Light with incandescent lamps

If there are several traffic lights existing at one crossing (mostly two) the particular incandescent lamps of the two traffic lights can be connected parallel. Please attend to page 42.

Output	Function	Color
n+0	road red	red
n+1	road yellow	yellow
n+2	road green	green
n+3	pedestrian red	red
n+4	pedestrian green	green

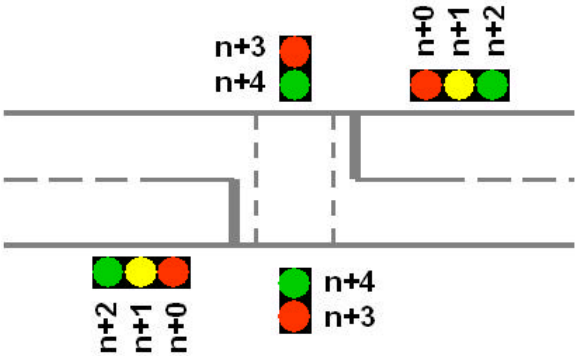


Figure 34: Allocation of traffic lights

Traffic Light crossroad / intersection

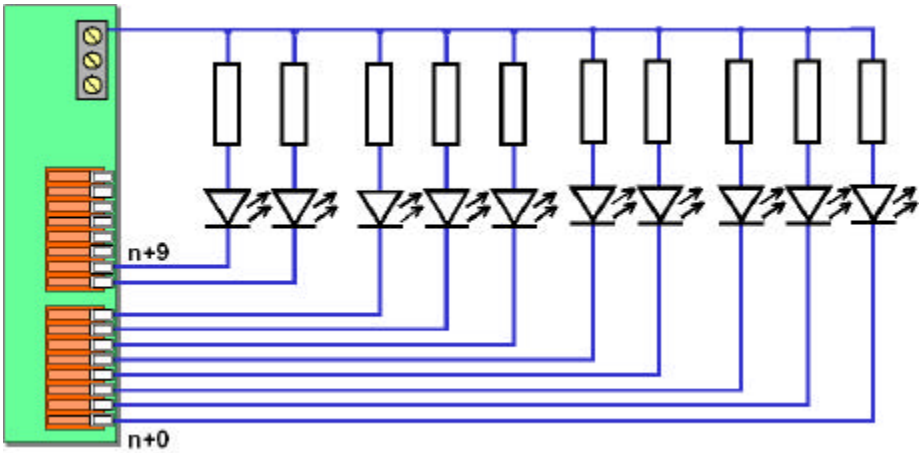


Figure 35: Connection Cross Road with LEDs

If there are several traffic lights existing at one crossing (mostly up to four) the particular light emitting diodes of the traffic lights can be connected in series. The value of the series resistors has to be calculated as per page 40.

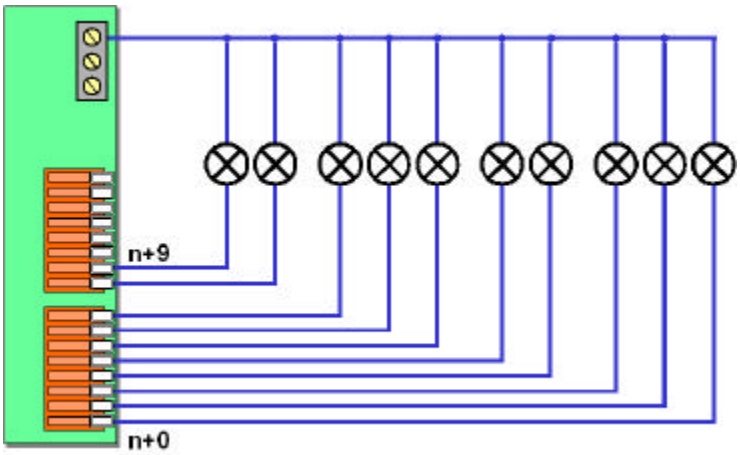


Figure 36: Connection Cross Road with incandescent lamps

If there are several traffic lights existing at one crossing (mostly up to four) the particular incandescent lamps of the traffic lights can be connected parallel. Please attend to page 42.

Output	Function	Color
n+0	minor road red	red
n+1	minor road yellow	yellow
n+2	minor road green	green
n+3	pedestrians minor road red	red
n+4	pedestrians minor road green	green
n+5	main road red	red
n+6	main road yellow	yellow
n+7	main road green	green
n+8	pedestrians main road red	red
n+9	pedestrians main road green	green

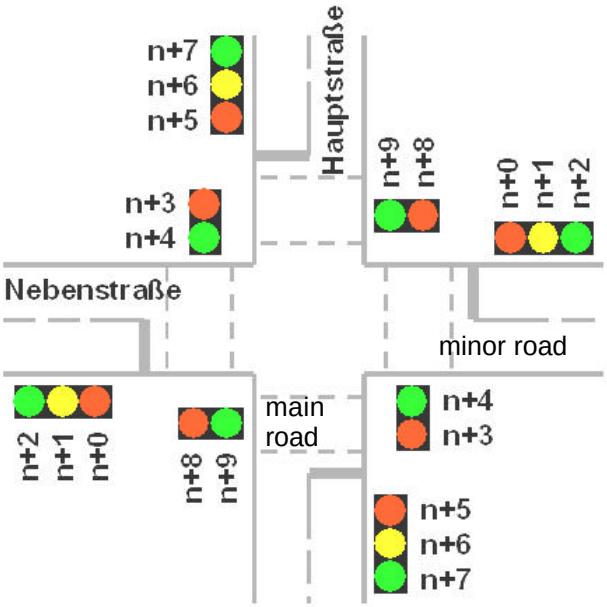


Figure 37: Allocation of traffic lights

Signal Post

There are three LEDs or incandescent lamps required. They have to be assembled inside the signal post and shall simulate occupied track sections, circulated or switched driveways as well as signals at proceed positions.

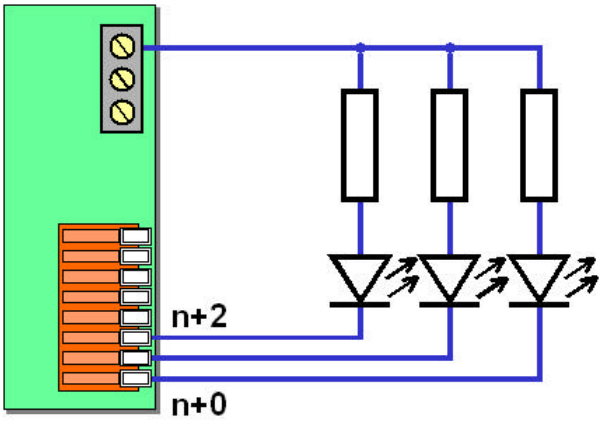


Figure 38: Connection Signal Post with LEDs

Each LED requires an own serial resistor.

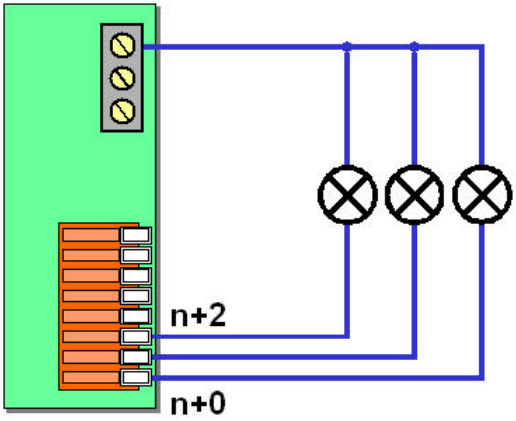


Figure 39: Connection Signal Post with incandescent lamps

Output	Function	color
n+0	signal post occupied	red
n+1	signal post signal	green
n+2	signal post drive way	yellow

Television Set

The colors red, green and blue can create further mixed colors. A realistic effect can be created whenever the LEDs or incandescent lamps cannot be seen directly but only their indirect light.

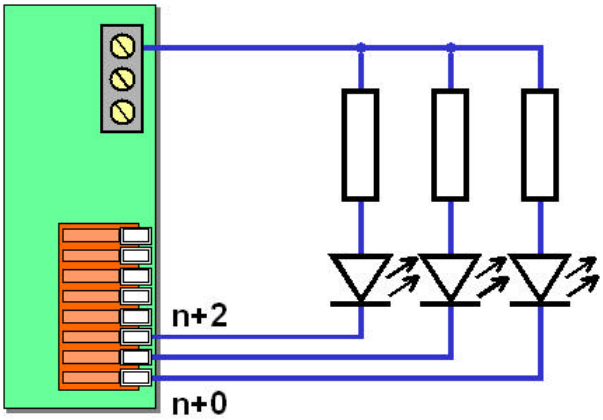


Figure 40: Connection TV-set with LEDs

Each LED requires an own serial resistor.

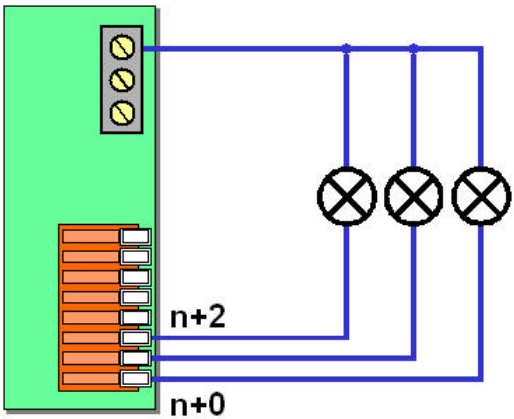


Figure 41: Connection TV-set with incandescent lamps

Output	Function	Color
n+0	TV-Set red	red
n+1	TV-Set green	green
n+2	TV-Set blue	blue

Rail Crossing

At a rail crossing is normally one light on each side of the road. Therefore are totally four LEDs or incandescent lamps required.

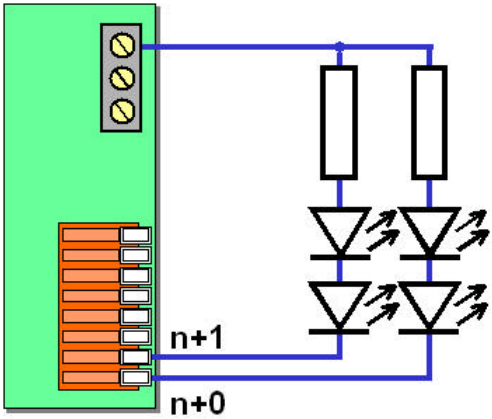


Figure 42: Connection Rail Crossing with LEDs

Each group of LEDs requires an own serial resistor.

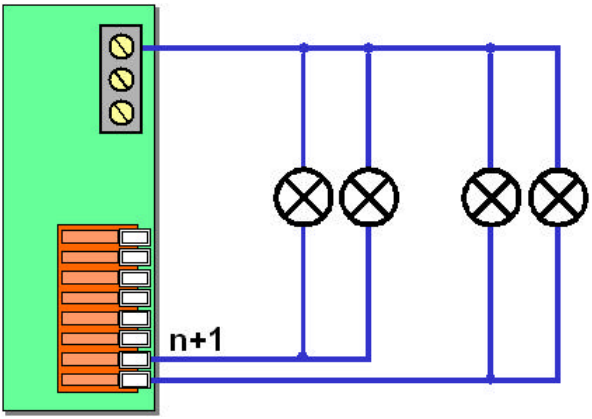


Figure 43: Connection Rail Crossing with incandescent lamps

Output	Function	color
n+0	rail crossing left	red
n+1	rail crossing right	red

Gas Street Lamp

The effect of a gas street lamp belongs to the software with the uppermost effort. In some exceptional cases whenever many gas street lamps are switched-on at the same time it can happen that an aged slow computer will cause a considerable flickering of the dimmed light. Reason for this effect is probably a slow graphics card at the PC.

A simple measure will solve the problem: reduce the size of the Light@Night main window into the task bar. Now no graphic software will be required and the PC works faster.

Firework Effects

There are three different firework effects available. Each of them occupies 2 outputs. After switching-on either one or both outputs will flicker for a short period. This process will recur after a coincidental pause time until switching-off.

If there is DirectX installed on the PC and a sound card with suitable speakers available then a 3D surround firework will be started independently. The sound will continue a couple of seconds after switching off the last light-spot.

The light together with the sound will initiate a perfect simulation.

Light Spot	Description	Light Type	Qty.
firework1	first output switches-on continuously for a short duration. Then the second output will start flickering. The timing will vary and eventually overlap	LED, incandescent lamp	2
firework2	first output will flicker for a short duration. Then the second output will switch-on continuously. The timing will vary and eventually overlap	LED, incandescent lamp	2
firework3	first output will flicker for a short duration. Then the second output will start flickering. The timing will vary and eventually overlap	LED, incandescent lamp	2

For the effects can be either LEDs or incandescent lamps connected.

For the background of a firework is it possible to use an indirect illumination or an artificial sky. For this effect is it rather recommended to use colored halogen lamps, which can be connected to a Light-Power-Module. Or you can make on your own out of plastic some small optical fiber bundles, which shall get a LED at bundled area. The LED will initiate a firework impression.

Practical improved configurations consist out of 6 light spots, which will be switched by 2 switch-groups. The first switch-group will be active during the complete firework and will switch the first three light spots. The second switch-group will control the further three points until the end of the firework.

Schwitch group	Time
firework1	10:00pm - 10:30pm
firework2	10:15pm - 10:30pm

Light Spot	Output	Type	Schwitch-Group
1	1 to 2	firework1	firework1
2	3 to 4	firework2	firework1
3	5 to 6	firework3	firework1
4	7 to 8	firework1	firework2
5	9 to 10	firework2	firework2
6	11 to 12	firework3	firework2

The mentioned times are suitable for a time ratio of 60x or 100x.

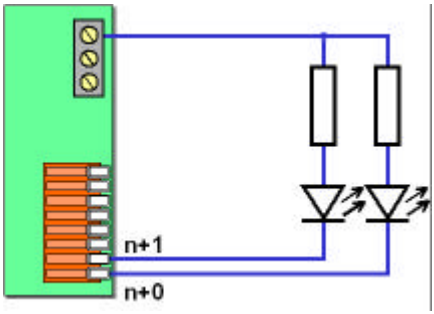


Figure 44: Firework with LED

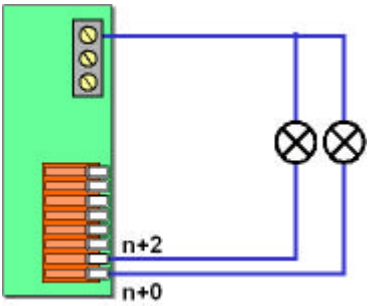


Figure 45: Firework with incandescent lamps

Realistic Illumination at the Model-Railway Layout

As mentioned at another chapter of this handbook a realistic illumination of houses does not relay only to the technical point of view. Probably is it worthwhile to have a night-walk through a residential area and observe the illumination of individual houses. This will need not much time but the observations will help considerable to receive a realistic general impression of the light control.
Somebody did this already many times because he had to have a walk with his dog every night or is interested to study relevant photographs in books or magazines. Everybody who has not, should read and attend to these chapters very carefully.

Only on very seldom occasions a constant light will burn all night long inside a building. Exceptions could be e.g. a porterhouse, a signal post or a dispatch-control. At a city mostly the police station or the rescue center will be occupied during the night and therefore always be illuminated. But at a factory even with a night shift there is probably no work at every manufacturing hall. Also the offices will be dark during the night. Exceptional of nightly forgers of balance sheets – but those should not be at present on our model-railway layout.
Even thinking a little bit about these samples it shows that we could come up to a correct solution for the illumination. Just transfer yourself into the dimension of your miniature population and everything will go right.

House Illuminations

The first windows at a residential area will be lightened already before dusk. Related to the shadows of trees or buildings in the neighborhood it can be already dark in some rooms at an early time. Time after time other member of the families will switch lights on. From the beginning of dusk until the time of darkness at about 11pm the apartments and houses should be illuminated. But naturally not on all windows because a house consist of several rooms and not every room will be illuminated. At first the light will be switched-on at the living room, at the kitchen, the corridors and the child's room. At a normal residential building, no matter if it is a detached house or a multistory apartment building there will be about 20 to 70% of all windows illuminated at a time. When it will become sleeping time more and more windows will be getting dark except the bedrooms for a certain time. It

will be a question where the people will have their bedrooms? To the side of the street? Within a certain direction?

After 11 pm it will be getting slowly dark at a residential street. It does no matter if it will be at the countryside or in a city. Only at the weekend it should be expected that some city-dwellers would enjoy the nightlife for a certain time.

Between 2 and 5am nearly all houses will be dark. Only a few “night-shift-worker” will come home from a party, from a visit or from work. They will not use much light. From 5am but at least before dawn there will be life again inside the houses. The first miniature people have to get up and go to work. Their owner is awaiting certainly fresh croissants and the morning newspaper…..

Already from this explanation you will now be sure that you cannot just simply push an electric bulb” into a house. In case the base plate of your miniature houses contain already a practical hole for an electric bulb with plastic socket - forget about this!!!

For a fair realistic impression you have to implement some more effort. At first you have to take care that no light shows from the inside through plastic parts or adhesive joints. There are three possibilities to prevent this:

- installation of an inside cover made from seamless glued black carton
- painting the inside with a black bituminous paint (paint shop, motor car accessory)
- installation of small cases directly inside in front of the illuminated windows

Certainly you should check the success of the measures before you complete the assembly.

For multistorey houses sometimes somebody intends to divide the story’s by inserting a carton on every storey. This will not be sufficient for residential buildings, as not all windows will be illuminated at the same time. And if they would be, you could see from the outside that there are no walls inside. Never illuminated windows should better be darkened and for a realistic impression equipped with curtains. As at the countryside always

curtains will be used, within the city the use of curtains is depending on the interior furnishing of the apartment. Therefore you will find in the city often windows without visible curtains. But be careful: without curtains the observer of your layout can look inside of the house. In this case the house needs floors, walls and eventually furniture and people.

Certainly you have made some personal observations or you have some other wishes for the house illumination. Just carry on. The only importance is to receive a fair realistic.

For a single situated detached house the light-spots will add-up between 2 and 10. At a multistorey building it can come up easily to a sum of 10 to 40 light-spots. Please resist the temptation to connect several light-spots of one house to one common output of a light control module. In reality it will be very, very seldom that by random the light of the first and the second floor will be switched on at the same time – except probably the stairwell. Such an irregularity will be immediately registered at the subconscious, because this is not realistic. If you connect some light-spots you should do it with houses in the neighborhood or with not simultaneous visible windows. More information can be found at the chapter about `Several Consumers at one output ` on page 42.

Although there will be at least one TV-set on each household available the perfectionist should prevent the temptation to install the required light-spots on full-coverage of the area. The overall picture will be disturbed. If you walk at night through a residential area you will notice the flickering of TV-sets only from time to time.

Which type of light is suitable for house illumination?

At first there are the most used types of “electric light bulbs” and “house light”. The light bulbs will be simply switched on or off at configured switching times. The house light will be different: the on- and the off-switching times of a light-spot will be delayed at random by 5 to 20 seconds. This will make the configuration of switching times at residential buildings quite easy. Although you have set the switching time for all residential buildings of one street with one switch-group the lights will be switched on and off at different times. Just as in reality.

Furthermore there will be the light type “neon lamp” used. Not everyone likes a comfortable illumination. Therefore you can find quite often neon lamps in kitchens, corridors and other rooms. At least a neon lamp will regularly illuminate the garage.

Very suitable is the type “random”. This type will switch the light at random within certain variable switching times. Therefore is it possible to set the light-spots of a part of the house-illuminations onto “random” for switching the lights from dusk to dawn with only one switch-group. Nevertheless there will be a continuous irregular change of lights happen.

There are still the sporadic and the specific light effects missing. To this effect belongs surely the “TV-set”. It contains 3 outputs. Therefore are 3 different lamps required for one television set. Normally there will be lamps with the color red, green and blue used. Instead of green or blue it will be possible to use yellow or white as well. Because of the nightly artificial light with low frequency a TV-screen will appear rather blue. Therefore you should use blue respectively white if possible. LEDs will give you a more realistic effect then incandescent lamps.

At one or two areas on your layout there will be probably just now a party going on. Therefore is it possible that you can see occasionally a flashlight of a camera in one of the houses”. But take care: less is much more (effect). Unless there is a crowd of super stars with lots of photographers or probably there will be a fashion show or a professional movie recorded inside the bedroom of a house in the neighborhood or …….

At least it should be mentioned that some people are used to handle with open fire inside their living room. That will be certainly no pyromaniac but an owner of a comfortable open fireplace. Also this effect should be used on very few locations. The type
“fire” uses one light spot. For a realistic open fireplace you should use 2 colored incandescent lamps (red and yellow) connected to two module outputs.

Light-type	Mode of Operation	Output
incandescent lamp	simple switching on and off of one output	1
house light	coincidental delay of switching for some seconds, despite of same adjustment of switching time e.g. the illumination of all housings of one street will be switched-on or off at different times	1
neon lamp	at first coincidental irregular flashing during switching-on. Will remain switched-on; suitable for kitchens or garages	1
random	switching on and off by random-control with adjusted minimum and maximum pauses	1
Television set	three outputs for red, green and blue produces coincidental and permanent changing color-, flash- and flickering effects as on a TV-set; light should be indirect visible	3
flashlight	photo-flashlight, is simulating a camera with an occasional flashlight, break time will be for every time coincidental	1
fire	simulation of an open fire by producing irregular flickering; use two outputs with incandescent lamps for best results	1

Typical Switch-Groups

Name	Times	Mode of Application
house1	06:00pm-11:00pm	lights inside houses
house2	09:00pm-01:00am	lights inside houses
stair well	07:00pm-11:00pm	temporary light at stair-wells; most effective with light-type `random`
during the day	09:00am-05:00pm	switching e.g. light at random or flashlight
TV-set	08:00pm-11:30pm	simulation of a switched-on TV-set

At the Road

Such as the various ness in life can be the scenes on the roads of your model railway layout as well. At many (much warmer) regions most of the life will be lived on and at the roads.

Relating to the light control we will start at first with the road illuminations. At small side roads or on pedestrian ways usually “normal electric globes” will be used for the lamps. The lamps are often situated at very dark areas and on longer ways (for midnight walks not suitable) at larger distances. On the entranceways to residential buildings at larger properties there will be mostly more lamps at closer distances installed.

Such lamps will be switched simply on and off. At an exclusive residential district there will be probably the one or the other house illuminated by floodlights.
But now again to the roads....

The three mostly used lamps for road illumination (not the style and kind of pylon) is the neon lamp, the gas street lamp and the gas compression street lamp. The first one will be used mostly at villages and small townships. The roads are probably small and there is not much traffic. At the evening hours there are not many people outside. Even at residential areas in larger towns they use neon lamps for the street illumination.

A special feature is certainly the illumination with gas street lamps at some larger towns. Particularly in Berlin you can find many `real gas street lamps` caused by special circumstances of the long time separation of this town. Whenever the gas supply will be turned-on at night at first the gas mantle has to be heated. This will cause an irregular flickering. Then the flickering will stop and the lamp will burn slowly brighter until the full brightness will be obtained. Whoever walked at night on a street, which has been illuminated by gas lamps, has certainly noticed the warm and comfortable light radiation. And something else: the light seems to flicker slightly from time to time. This will be caused by a little fluctuation of the gas pressure. This will naturally be simulated from Light@Night as well.

Under the expression of `high pressure gas lamps, gas pressure lamps, xenon lamps` and others you can find various modern street illuminations with extremely high light radiation. Those high efficiency lamps are used often on roads with a high motorcar frequency and highway connections as well as on large parking lots and railway station forecourts. This kind of lamps requires a certain starting time until they get their full brightness.

An important note: just for street lamps it is easy to decide to connect several lamps onto one output. Please resist this temptation because with large effort Light@Night supplies an individual light effect to each output. Particular this feature will give the light effects on your layout a special exemplary image. For explanation: have you ever seen 10 neon lamps flickering simultaneous during switching on?

Also on the roads are many actions. Not only motorcars are traveling but also it should be impressive to illuminate the standing cars. It is possible to switch sporadic the direction indicator lamps on some cars. At dusk there should be the headlights and back lights switched on. For this purpose is a large assortment of light emitting diodes available and can be purchased by mail order by Reichelt or Conrad. For backlights and flashing lights the use of red or yellow miniature light emitting diodes is recommended. The light-spot" should be set to flashing light. From time to time it has to be switched on or off from one or two switch-groups. Time setting could be about 10 to 20 minutes.

White light emitting diodes with high light output would be suitable for the front headlights. Only one switch group will switch-on all motorcar headlights at dusk and off at beginning of dawn. To prevent that all cars will switch the lights on at the same time the light type should be set to "random". This setting will delay the time of switching the lights on as well as the time of switching off. Therefore is a switching sequence at random assured.

To connect the thin lacquered copper wire to the little light emitting diodes needs a little care but the result will be excellent. (do not forget the matching serial resistors for light emitting diodes)

Operation vehicles (e.g. police, fire brigade etc.) or the garbage collector vehicle will carry certainly an orange or blue operation light on top. These circulating lights have mostly a motor driven mirror inside. Therefore the speed of the motor initiates the frequency of the on- and off-switching. As the frequency is not equal, the operation lights will flash sometimes synchronous and sometimes not. This will be exemplary simulated. Many vehicles of the fire brigade or the ambulance carry additionally a flashlight at the front. They will flash once followed by a little longer pause. Very similar to a stroboscopic light. The operation lights of a police car require therefore two outputs with light-spots as "operation light". Eventually is a further output required for the front flashlight.

Sometimes the inside lights of parked motorcars or trucks will be switched on. Probably the driver has a look at the street-map or he is making a break and has a snack. Perhaps he just wants to leave the car or somebody will get into the car at a disreputed road. The light type "random" is particularly suitable for the occasional switching of the inside lights of a vehicle.

As more life will be on the roads of a model railway layout as sooner will be a regulation of the traffic required. Therefore we need traffic lights! Light@Night knows two different basic types (type of traffic lights with some further variations. At first are there the simple pedestrian traffic lights: ”traffic light simple”). It requires three outputs for the traffic light control and two outputs for the pedestrian lights. The duration for the red- and green-phases can be adjusted. After shifting the pedestrian lights to red there is certainly a pause before the motorcars get green for the start.

As second light type is the “traffic light cross road“ available. It controls the traffic at a cross road including the pedestrian lights. This light type can control a junction road as well. This light type requires in total 6 outputs each for the roads and further 4 outputs for the pedestrian lights. That adds up to a requirement of 10 outputs. The wiring can be found on page 58.

If you want to use Light@Night together with the model railway control **Railware,** a motorcar control or other electronic systems, you can certainly synchronize the traffic lights with the motor car-, tram- or railway traffic as well.

Some times there are vehicles (or other equipment) at the roadside indicated by a short red flashlight. The light type “flashlight“ produces exact this effect.

With a little imagination it should be certain to find many other scenes for the application of light types from Light@Night. It could be a burning garbage tray or a burning motorcar, a pedestrian gives somebody light for his cigarette or many, or many others.

Type of Lights for Street Illumination

Type of Light	Mode of Operation	Outputs
incandescent lamp	simple switching on and off of one output	1
neon lamp	at first coincidental irregular flashing during switching-on; will remain switched-on	1
gas compression street lamp	simulation of modern street lamps, produces at first flickering then a longer time dimmed and flickering brightness and then full brightness	1
gas street lamp	at first is it flickering some time, then is it dimmed up until full brightness with slight regular flickering, during the normal lighting simulation influenced by occasional irregular and short interruptions caused by fluctuation of the gas	1
random	switching on and off by random control with adjusted minimum and maximum	1

Type of Lights at the Road Side and at the Car Traffic

Type of Light	Mode of Operation	Outputs
flashing light	produces on- and off-switching time of equal duration; the flashing frequency will differ slightly by every flashing light and every start	1
operation light, operation flashlight	for action vehicles; every light at each start with coincidental selected flashing time simulates the motor drive with different speed"; also for front flashlights: two times a short flash and then a pause	1
welding arc	coincidental controlled flickering of a welding process, the duration of the welding with irregular flickering of the welding arc and with a following pause will be determined coincidentally for each sequence	1
random	switching on and off by random with adjusted minimum and maximum pauses	1
automatic flashing light	produces typical flashing frequencies for direction indicators of motor cars, slight variation of flashing frequency at every start	1
rail crossing	typical flashing of lights at rail crossings with two contrary switched outputs	2
traffic light simple, traffic light on demand, traffic light road crossing/intersection	produces all phases with exemplary pauses and option of "sleeper position"; also for cross roads and junctions; permanent night light with flashing yellow light for the minor road; optional direct jump from red to green	5 5 10

Type of Light for other purposes

Type of Light	Mode of Operation	Outputs
function	switches on and off; suitable for wind turbines, mills, motors foreign light modules, smoke generators, sound modules or MP3 players	1
building site	suitable for light chains on building sites, the switched-on time is very short and simulates flashlights, after each sequence there will be a short pause	5
light chain	consists always of 4 outputs which will be switched on in succession for an adjustable time	4
flashing light	produces on- and off-switching time of equal duration; the flashing frequency will differ slightly by every flashing light and every start	1
radio tower	produces flash effects as used by radio- and TV-towers and other high buildings, each time a single short flash with following longer pause	1
chimney	produces flashlights as used by chimneys with short dual flash-effect and then a longer pause	1
fire	simulation of an open fire by producing irregular flickering	1

Typical Switch-Groups

Name	Times	Application
main road 1	06:00pm-08:00am	switching the lights at a main road
main road 2	06:00pm-01:00am 05:00am-08:00am	switching light at the important night times only
minor road	07:00pm-01:00am	lights at the minor roads
building site	08:00am-05:00pm	lights and working equipment at a building site.
operation	09:00am-10:00am 12:00am-01:00pm 07:00pm-08:00pm	operation of fire brigade, police or emergency ambulance
working	07:00pm-11:00pm	temporary light at stair wells; best effects with light type “Random”
motorcar	07:00pm-11:00pm 07:00am-09:00am	switching e.g. head lights or inside illumination

Day of an open door at our industrial area:

Every year our big industrial factories open their facilities during one-day for public visitors. In this case I think we should discuss about our automobile- and our sugar manufacturer.

I was very curious about all the changes! Therefore I intended to see personally the alterations! I decided to go to the automobile manufacturer right away in the morning because I expected there many visitors. At the afternoon I planned to go to the manufacturer of sugar from sugar beet.

Arriving at the automobile manufacturer I noticed the automatic crossing barriers with light signs at the entrance. Everything worked automatically by push buttons from the entrance. At the production line I saw a plant loc with flashing lights on top carrying some wagons and collecting wagons loaded with automobiles. Interesting was that the loc carried not only one flashlight on top but also several flashlights around. Additionally a warning signal sounded during driving at the facility.

Next to the show-hall I could see some forklifts equipped with flashlights hooting once every time they drove in- or outside of the hall.

Some robots doing some difficult and heavy work just on their own where particular interesting. They cutted metal parts with a laser and welded complete motorcar chassis together. They carried heavy burden metal parts around! Good heaven that the machines do this work.

At the afternoon I arrived at the sugar manufacturing plant. In difference to the automobile manufacturing plant I was fascinating about the modern delivery of sugar beets by rail. At half hour intervals the trains arrived. The plant-locs, as well as DB locs of BR 211 and 212, carried many wagons to the station and carried them unloaded back. Naturally nearly everything works fully automatically. Wagon after wagon traveled via an automatic weighting scale up to the unloading silo. There a water jet or a claw-arm opened the bar-locks of the doors. Then a water jet has unloaded all sugar beets and at the same time the wagon has been cleaned. The same happened parallel with truck deliveries.

At every event or at every new clearance action there started warning lights or flashing lights. Additionally they're where loudspeakers released by accidental contacting the light/laser barriers by a person. Strong light beams to illuminate the area by night and day had illuminated the plant. The chimney of the sugar manufacturing plant smoked and over the whole roof there where several pipes releasing much vapor and smoke. This is a brilliant expression for a model-railway layout.

Type of Lights for Industrial Purposes

Type of Light	Mode of Operation	Outputs
incandescent lamp	simple switching on and off	1
function	switches on and off; suitable for wind turbines, mills, motors foreign light modules, smoke generators, sound modules or MP3 players	1
random	switching on and off by random control with adjusted minimum and maximum pauses	1
building site	suitable for light chains on building sites, the switched-on time is very short and simulates flashlights, after each sequence there will be a short pause	5
light chain	consists always of 4 outputs which will be switched on in succession for an adjustable time	4
flashing light	produces on- and off-switching time of equal duration; the flashing frequency will differ slightly by every flashing light and every start	1
radio tower	produces flash effects as used by radio- and TV-towers and other high buildings, each time a single short flash with following longer pause	1
chimney	produces flashlights as used by chimneys with short dual flash-effect and then a longer pause	1
fire	simulation of an open fire by producing irregular flickering	1
welding arc	coincidental controlled flickering of a welding process, the duration of the welding with irregular flickering of the welding arc and with a following pause will be determined coincidentally for each sequence	1
flashlight	photo-flashlight, is simulating a camera with an occasional flashlight, break time will be for every time coincidental	1
floodlight	needs about half a second for persistence during on- and off-switching	1

Typical Switch-Groups

Name	Time	Application
office1	07:00am-09:00am 05:00pm-09:00pm	switching lights on at offices
office2	06:30am-08:00am 04:00pm-07:30pm	switching lights on at offices at different times
factory1	05:00am-11:00pm	various lights at a factory
factory2	06:00pm-09:00pm	various lights at a factory (day time)
welding	09:00am-09:30am 10:00am-11:00am 02:00pm-02:30pm 04:00pm-05:30pm	welding work at day time
working	07:00am-07:30am	temporary lights on operation machines, flashing and other effects
street	06:00am-09:00pm	switching road illumination of an industrial area

At the Railway Station

Once I had a meeting at a far distance and I preferred that time to travel by railway because the Inter-City train would be much faster. In the morning at 4:50 I drove to the railway station and discovered again many actions, which could make sense for using them within the light-control of my model-railway layout.

At our small township the streets had been slightly illuminated by neon street lamps because of heavy fog. One lamp just flickered, as if it would be switch-on just in the next moment. The new gaslights give a better light. This light is white and much brighter and details can be much better seen during fog. A most striking light illuminated particularly a pedestrian crosswalk. Lamps with orange gaslight assured the best sight. For the upper-most attention two orange warning lights flashed.

At the secondary road some motor cars and trucks passed me. From time to time I was disturbed because of the very late dimmed headlights of the passing vehicles. Fortunately the vehicles have direction indicators. This assured me to recognize who will drive where.

Just now the automatic window shutters went up at a small snack bar. The owner switched-on the lightened advertising signs at the wall outside the snack bar showing doner kebab and French fries with mayonnaise.

At a distance I could recognize the railway station with the bright illuminated station forecourt and the platform hall. Now quickly through the heavy traffic: direction flashing and flashing warning lights from motor cars just stopping at the side of the road, pedestrians with some funny looking flashing shoes or flashing caps or coats with warning lights. Some skateboarder where crossing the street with having `neon-lights` at the rollers.

Finally I found a parking lot for my motorcar and switched-off all lights. Our old railway station looked very pretty as it was illuminated by some floodlights. The station looked very big after the renovation and the nightly illumination. I went quickly to the ticket automat which had a colored display and illuminated keys. I got my ticket and went to the train already standing at the platform. The BR 143 with a red taillight pushed our bright illuminated double-decker coach out of the station.

Type of Light at the Railway Station

Type of Light	Mode of Operation	Outputs
incandescent lamp	simple switching on and off	1
house light	coincidental delay of switching for some seconds, despite of same adjustment of switching time e.g. the illumination of all housings of one street will be switched-on or off at different times	1
neon lamp	at first coincidental irregular flashing during switching-on; will remain switched-on; suitable for kitchens or garages	1
random	switching on and off by random-control with adjusted minimum and maximum pauses	1
gas compression street lamp	simulation of modern street lamps, produces at first flickering then a longer time dimmed and flickering brightness and then full brightness	1
flashing light	produces on- and off-switching time of equal duration; the flashing frequency will differ slightly by every flashing light and every start	1
fire	simulation of an open fire by producing irregular flickering	1
welding arc	coincidental controlled flickering of a welding process, the duration of the welding with irregular flickering of the welding arc and with a following pause will be determined coincidentally for each sequence	1

Typical Switch-Groups

Name	Times	Application
station forecourt	07:00am-09:00am 05:00pm-09:00pm	switching the lights at the station square
building	06:30am-10:00am 04:00pm-01:30am	switching of lights inside the railway station
shops	05:00pm-11:00pm	lights at shop windows at the station
factory2	09:00am-05:00pm	various lights at a factory (during the day)
station hall	05:00am-09:00am 04:00pm-01:00pm	switching the light at the station hall
platform	05:00am-01:00am	for the illuminations at the platform.
working	09:00am-09:30am 10:00am-11:00am 02:00pm-02:30pm 04:00pm-05:30pm	for e.g. temporary working machines
slow drive section	10:00am-10:30am 02:00pm-05:00pm	switching occasionally the flashing lights at a slow proceeding area; but better controlled with Railware released by traveling trains

At the Railroad Embankment

Just imagine we would travel with a slow train, this is naturally a regional train, and very relaxed we are looking out of the window enjoying the pretty sight. Certainly we would concentrate this time onto the illuminations to observe the various different light effects at the embankment.

Immediately after the departure from the railway station I saw that we passed the flashing monitoring signal" with a white and yellow lamp. This should give the train driver the signal that the rail crossing ahead works correct. Just then I saw already the flashing lights of the diagonal crosses (Andreas-crosses) at the rail crossing.

During the train journey through the countryside everything was quiet peaceful. Only at a far distance some lights from motorcars and suddenly a flashing blue light from a police car could be seen.

After a time we passed some villages without a railway station where I could notice the well-known lights at the houses and the street illumination. Decorated by some nicely illuminated advertising signs as well as the big `M` of the restaurant with the golden archways and other factory illuminations.

Now it became more interesting! We came into the city and to the central railway station. Just at the entrance-turnouts there flickered a neon lamp supposed to illuminate the station name sign, which refused to lighten up followed by various neon lamps at the operation facility and at the station front-end.

At a little distance inside an operation facility with open doors some repair work on locs and coaches with some welding processes could be seen. Next to the working area was a fire burning or something heated in an old metal barrel. At the outside area some workers controlled with lamps something below a passenger car. A man gave some red and green light signals to the train driver of a shunter.

Behind the operation facility where the platforms. Now all lights had been switched on. Some lightened platform cabins and other rooms could be seen. Some of them probably not used any more and therefore not illuminated. Many signs where illuminated. As the train stopped I could see some train information boards with changing illuminated information. At the opposite platform gave an area manager with his signaling disc green light for dispatch. His signaling disc was illuminated which is rather a rare gadget. This seemed to me very effective at my model railroad if a miniature railroad official keeps a signal disc with a little light emitting diode in his hands.

At the departure from the central railway station you could see a fair ground at a distance. There you could see lights sparkle and flashing! Someplace you could see already some shiny and flashing Christmas decoration. That made up a pleasant feeling.

Passing all this sea of lights I could see now a gigantic flame. It seemed to be that gas from a sewage plant has been burned off. Following I saw a pithead and a tower of a mine with countless lights. Some flickering and on top a red warning light flashing.

Then we passed the big signal post. At the lower part one room was illuminated. Inside the signal post some screens flickered and a sea of little light spots indicated positions on the large control board at the wall. You could easily imagine how many train performances would be controlled from this place. Incredible what can be seen at night !

Before I had to leave the train at the next railway station we had to pass a slow-drive section because of a building site. Yellow circular lights had been installed at regular distances directly next to rail embankment. These lights would be switched on during a train performance. They warn the worker about the approaching trains. In the past some guards warned the workers with compressed-air horns.

Type of Lights at the Railroad Embankment

Type of Light	Mode of Operation	Outputs
incandescent lamp	simple switching on and off	1
house light	coincidental delay of switching for some seconds, despite of same adjustment of switching time e.g. the illumination of all housings of one street will be switched-on or off at different times	1
neon lamp	at first coincidental irregular flashing during switching-on; will remain switched-on; suitable for kitchens or garages	1
random	switching on and off by random-control with adjusted minimum and maximum pauses	1
rail crossing	typical flashing of lights at rail crossings with two contrary switched outputs	2
flashing light	produces on- and off-switching time of equal duration; the flashing frequency will differ slightly by every flashing light and every start	1
signal post	one output each in red, yellow and green for the control of LEDs or incandescent lamps which will produce light effects as on a control desk of a signal post	3
welding arc	coincidental controlled flickering of a welding process, the duration of the welding with irregular flickering of the welding arc and with a following pause will be determined coincidentally for each sequence	1

Typical Switch-Groups

Name	Times	Application
building	06:30am-10:00am 04:00pm-01:30am	switching of lights at offices
workshop	05:00am-09:00am 05:00pm-11:00pm	light at the inside of an operation area
working	09:00am-09:30am 10:00am-11:00am 02:00pm-02:30pm 04:00pm-05:30pm	for e.g. temporary working machines
slow drive section	10:00am-10:30am 02:00pm-05:00pm	switching occasionally the flashing lights at a slow proceeding area; but better controlled with Railware by traveling trains

Building Site

At a building site there are mostly many actions going on. And by so many actions there is certainly light required.

Let us start again with the illumination of a building site . Besides the typical single incandescent and neon lamps (light type incandescent lamp and neon lamp) there are often large floodlights. Light@Night produces a dimmed-on and off switching effect. The building site illumination will be switched-on where and when it will be getting dark or dim. This will be certainly between the usual working hours only. This will be mostly between 5am and 9am as well as between 4pm and 7pm. This depends of the season and the size of the building site. Sometimes there will be work at night. As larger the building site as higher the probability that work will done at night. For this circumstance the corresponding switching times have to be configured. At many building sites there are some lights switched-on during the whole night. This should possibly prevent that somebody `will bring` his tools or material to the building site.

At some places there will be welded. Fortunately Light@Night offers this effect as a light type. Also here applies: one welding arc on each building site is sufficient.

At many building sites and particularly at road building sites we find illuminated barriers as protection. The lamps are flashing individual or they are connected to light chains. For the individual flashing building site light you will need one output from the Light-Interface, which has been assigned to the light type „flashing light“. If there are several lamps on one protection barrier you could e.g. control them with the light type “light chain”. This type requires always 4 outputs, which will be switched-on in succession. Much better is it to use the type “building site”. This type requires 5 outputs and will switch regular and in succession as a flash. This creates a stroboscopic effect as used at a road detour at a high way.

And how are the lights on the vehicles? Many typical building site vehicles have circular lights, which can be very good controlled with the light type “operation light”. For each incandescent lamp or LED a separate output has to be used to receive the typical asynchronous flashing effect of the irregular running motor driven circular lights. Many vehicles contain bright floodlights for the site illumination. If several vehicles carry floodlights those can be controlled in pairs and per vehicle by the light type “house light”.

Then only one switch-group will be required for all building sites. Nevertheless the floodlights will never be switched simultaneous on or off but with a coincidental delay .

Also cranes will be at a building site. At night they require a red permanent light for identification. It is only required to configure the light type “incandescent lamp” for switching.

Type of Light for Building Sites

Type of Light	Mode of Operation	Outputs
incandescent lamp	simple switching on and off	1
neon lamp	at first coincidental irregular flashing during switching-on; will remain switched-on; suitable for kitchens or garages	1
floodlight	needs about half a second for persistence during on- and off-switching	1
welding arc	coincidental controlled flickering of a welding process, the duration of the welding with irregular flickering of the welding arc and with a following pause will be determined coincidentally for each sequence	1
flashing light	produces on- and off-switching time of equal duration; the flashing frequency will differ slightly by every flashing light and every start	1
light chain	consists always of 4 outputs which will be switched on in succession for an adjustable time	4
building site	suitable for light chains on building sites, the switched-on time is very short and simulates flashlights, after each sequence there will be a short pause	5
house light	coincidental delay of switching for some seconds, despite of same adjustment of switching time e.g. the illumination of all housings of one street will be switched-on or off at different times	1
operation light	for action vehicles; every light at each start with coincidental selected flashing time simulates the motor drive with different speed	1

Typical Switch-Groups

Name	Times	Application
building site1	07:00am-09:00am 05:00pm-07:00pm	switching some lights at building sites
building site2	06:30am-08:30am 02:00pm-04:00pm 07:00pm-08:00pm	switching further lights on building sites but a different times
work1	10:00am-05:00pm	various lights and working machines
work2	12:00am-02:00pm 04:00pm-07:00pm	lights and working machines at different times
welding	09:00am-09:30am 10:00am-11:00am 02:00pm-02:30pm 04:00pm-05:30pm	welding work at daylight
vehicles	06:00am-09:30am 04:30pm-07:00pm	temporary light on operation machines, floodlights, flashing and other effects
street	06:00am-10:00am 04:00pm-08:00pm	illumination of building sites

Remote Control with HSI-88

Each single light spot of each switching-group can now be optional switched-on or off by contact, push-button or switch. For this option is it required to connect a RM-DEC-88 Module (or 100% compatible). Up to 4 modules can be connected with the s88 bus cable to the HSI-88 interface for the connection to the PC via a serial interface. In total is it possible to connect up to 64 push-buttons or switches.

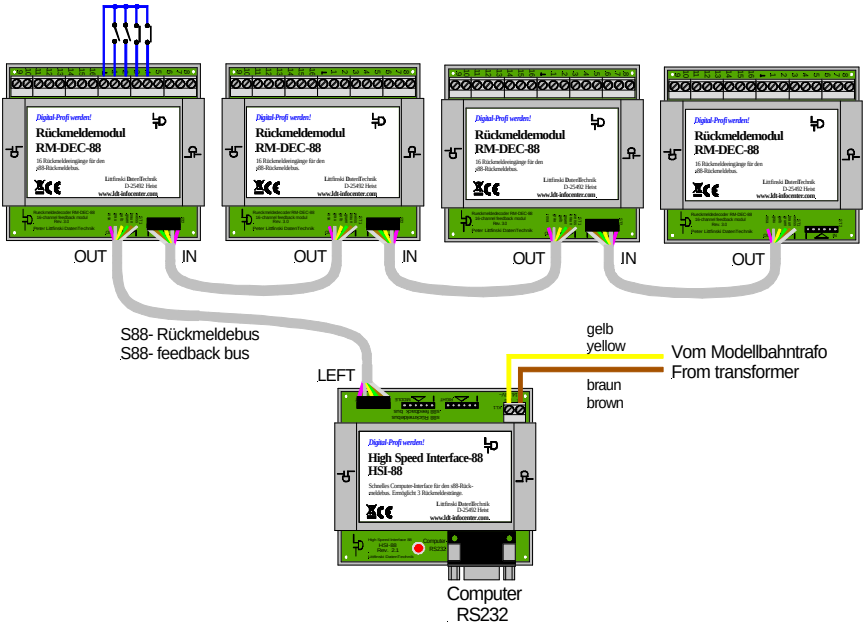


Figure 46: Connection of switches and push-buttons

All RM-DEC-88 have to be connected to the socket `left`of the HSI-88.

To enable Light@Night to execute the require action is it required to enter the addresses of the push buttons at the software. An address consists of a module- and an address number. The first module directly connected to the HSI-88 receives the number 1 and the next the number 2 and so on. The connection numbers are always 1 to 16.

For `Options` and `Interface` has at first the Com- port of the HSI-88 to be indicated. Otherwise are the adjustments for the addresses of the push buttons not visible.

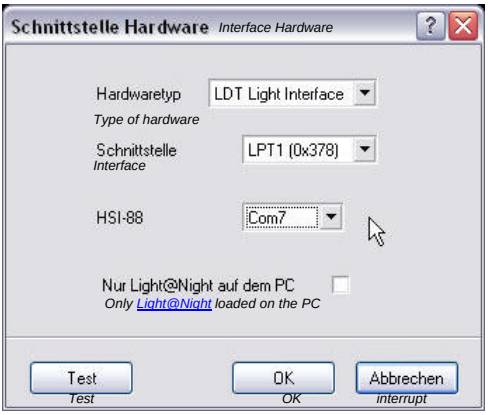


Figure 47: Configuration of the HSI-88 Interface

If a push button shall switch single light-spots is it required to enter its address at the configuration adjustments. For this adjustment click on the required light spot and enter the address.

Figure 48: Push button address for light spots (at the right edge)

If a switch-group shall be remote controlled is it required to enter the address of the release push button at the dialog for switch groups at the right side next to the name.

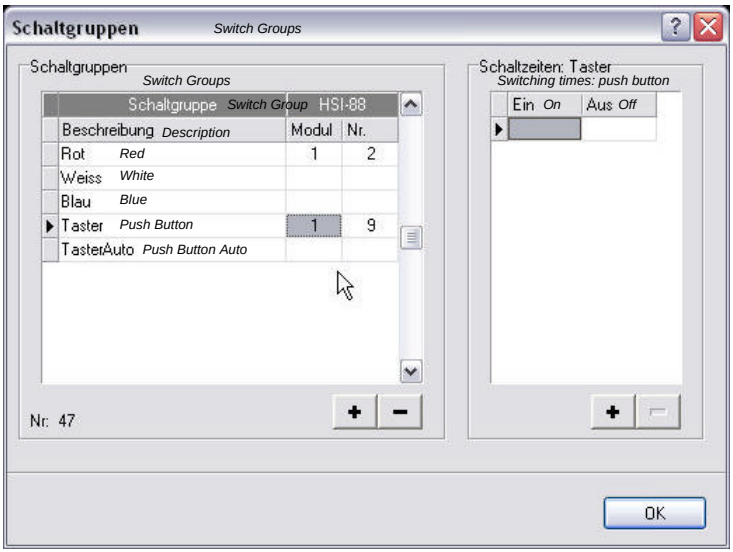


Figure 49: Push button address for switch groups

Light@Night identifies on its own if it is a quick-action switch or a switch with continuous contact. If a contact will be activated for a shorter duration as 3 seconds this contact will be identified as quick-action switch. For a switched duration of 3 seconds or longer the identification will be as continuous contact. Therefore are all kind of contacts are suitable for Light@Night.

The quick-action switch will switchover the status of a switch-group by each switching contact. Therefore from `On` to `Off` or vice versa. During a continuous contact the light spot will be switched-on as long as the contact will be closed. Therefore `On` by contact closing and `Off` by contact opening.

Example:

- You can speficically switch the illumination of single housings, factory sites or streets without make use of the PC.
- A traveling train can release a grade-crossing gate or switch-on a building-site illumination (by using Railware this effects can be switched by the software).
- You can switch specific functional models.

- Traveling cars (Faller Car-System) can switch traffic lights or release a radar flash.
- You can switchover from daylight to night (suitable switch groups will be required).
- And many others ...

Railware 5 customers will probably use the available possibilities for a remote control of Light@Night. By using the automatic help-functions will it be possible to use various feedback reports and track symbols for the operation.

Premises Illumination

On many model railway layouts is it presently a common status to use a premise illumination. The layout is easier and cheaper to realize as expected.

With the premise light control of Light@Night is it possible to imitate a natural change between daylight and night. A day-night change will be executed between dusk and night as well as between dawn and day. Those times could already be adjusted under `Options` and `Day-time`. At a maximum expansion will be white, blue and red light supported. During daytime will be the white light switched-on and slowly dimmed down or up during the twilight time. The blue light will be switched-on the night time and dimmed down during the twilight time. The red light is switched-on during morning- and evening twilight only.

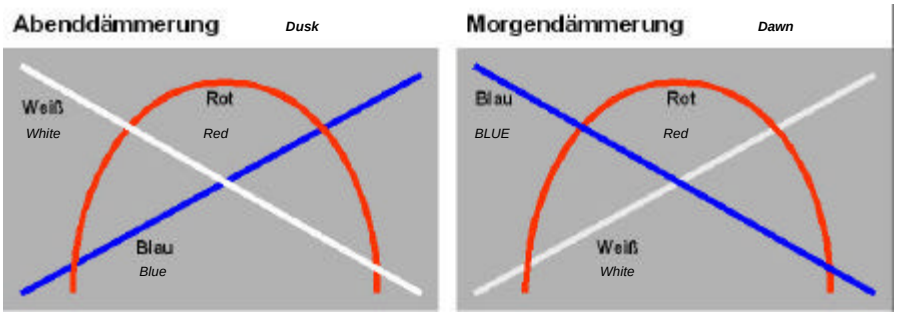


Figure 50: Twilight phases

It is possible to work with white light only or with white and red light. This is possible by leaving out the respective addresses.

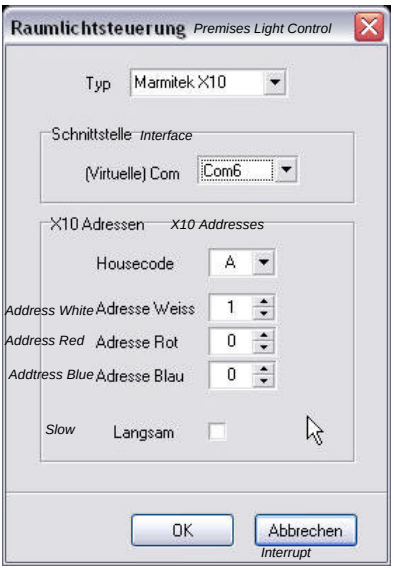


Figure 51: Configuration of premise light

Light@Night supports both standards X10 and DMX for the control of remote dimmers and switches.

The configuration is considerable simple. At first the used system has to be indicated: either Marmitek X10 or for DMX the variances DMX4all or DMX USB. For DMX4all is it required to enter the USB-interface as DMX4all. For X10 and DMX4all is it required to enter a serial Com-interface even when using USB. You can find this information (Com1 to Com16) at the Windows device manager. For Windows-XP under `System control`, `System`, `Hardware`, `Device manager` and `Connections`. Further information can be found at the installation instruction of the manufacturer of the interface.

At last you have to the addresses of the used dimmers. As a minimum the address for the color white has to be entered. If no red or blue lights will be used the respective addresses have to be set to `0`.

By X10 is it possible to enter the addresses 1 to 16. Additional is a house-code between A and P required. All dimmers have to use the same house-code. By interferences e.g. reported by neighbors is it recommended to change the house-code. For this process all components have to be separated from the power supply. The option `Slow` should only be used

when white light will be used only. The changeover effect will be carried out within 90 seconds and will be free from any steps.

By DMX is it possible to enter addresses from 1 to 512. If possible use low numbered coherent addresses. This will accelerate the data transfer.

If there is no dimmer independent illumination at the model railway layout room available you should get some independent control units e.g. wall push buttons, control keyboard or infrared- remote control, which should be suitable to the system and additionally to Light@Night. Otherwise you have to have to switch-on your PC probably in the dark.

Marmitek X10

X10 is a common semiautomatic standard mainly used in the US. The company Marmitek is producing and selling X10 products for the European market. The most advantage of this system is the simplicity and the low cost and availability of the components. The basic of this system consist of a dimmer and a PC-interface. The PC-interface and the dimmer communicate without cable connection via the power supply system. There are dimmer with 300 Watt and 700 Watt and 22 respectively 120-brightness steps available.

Figure 52: Marmitek USB-Interface CM11

Figure 53: Marmitek Dimmer LM12

Only a certain slowliness should be mentioned as disadvantage. Therefore is it possible to notice little brightness jumps during switching from day- to night-light. This effect is not noticeable by a dimmer with white light.

The dimmer LD11 with 700 Watt is restricted suitable for using it with halogen-transformers (non electronic switchgear). Please attend to the product information of the manufacturer.

The switch AM12 should only be used for an additional flash within the weather simulation.

Together with the PC- Interface will be an USB- Interface supplied. Please attend to the installation instruction and load-up at first the driver software and after that connect the USB cable. Except the driver-software is no other software required. The program `Home Control` will not be required by Light@Night. By a parallel operation is no communication between Light@Night and X10 interface possible.

Technical information to X10:
X10 recognizes no absolute brightness instructions but dimming values in percent. Therefore is the initializing of the X10 dimmers during the start of Light@Night required. This process needs about 30 seconds. Please wait until the right light emitting diode at the status line will indicate with `green` that the initiatlizing process has been completed.

The status of the dimmers can be in definable if a running event between day and night will be interrupted or manipulated by remote control. In this case you have to take care to get the basic adjustment of the dimmers.

One command needs about 1 second with reason to the X10 slowness. The finest change of brightness will be 1/120. From a certain time factor has the next-lower value of 1/22 to be selected. As this follows mostly to 15 to 20 steps only this will result into considerable visible brightness jumps. As slower the timing runs and as longer the daylight transition has been adjusted (about 2 hours) as less jumps will be visible.

> By one color (white) and adjustment `slow` with 120 steps will the duration of the transition require about 120 seconds.
>
> By three colors and 22 steps will be as well 120 seconds required.
>
> The twilight time (within the daylight time) can be 2 hours and the time factor at most 100x. For shorter time factors has to be the twilight phase extended.

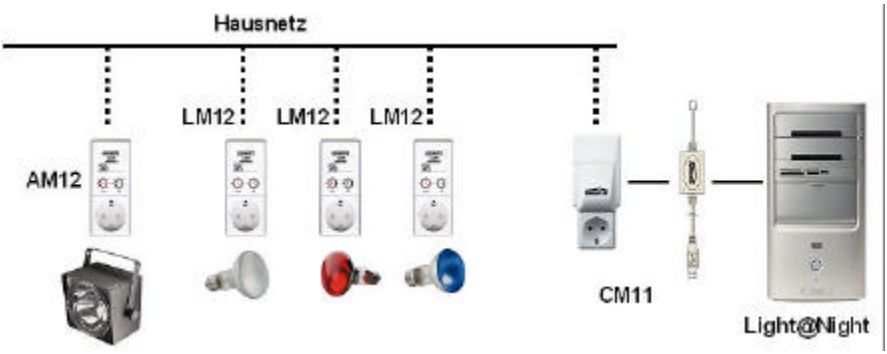


Figure 54: Example Marmitek

DMX

This standard bus-system will often be called `Theater-Bus` because it has been developed for the control of stage technique of all kind. Nowadays will be the variance DMX512 used only. There are many manufacturers of dimmer for lamps, neon lamps, halogen-lamps and interfaces for the PC available. DMX is fast, rugged and reliable. Though it is some technical knowledge required as the instructions are rather written for stage technicians than for model railroader. There are generally 255 brightness steps for dimmers available.

Figure 55: USB-Interface from DMX4all

The Mini-USB-DMX from manufacturer DMX4All, the USB2DMX from oKsidiZer or the USB-Interface from Sunlite are suitable PC-Interfaces with USB-connection. DMX4All supplies kits and finished modules for a 6-channel dimmer. For the kits will be extensive electronic knowledge required. For unpracticed model railroader is it recommended to purchase rather the dimmer-pack DDP-405 from Geo Technik or the EDX4 from Conrad. Many further manufacturer supply products for any mode of application at a price range between hundred and some thousand Euro. Please get some relevant information from the Internet.

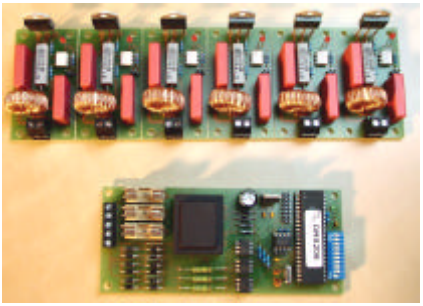


Figure 56: 6 Channel Dimmer Module from DMX4All

Figure 57: Dimmerpack DDP-405 from Geo Technik

Figure 58: Dimmerpack from Conrad

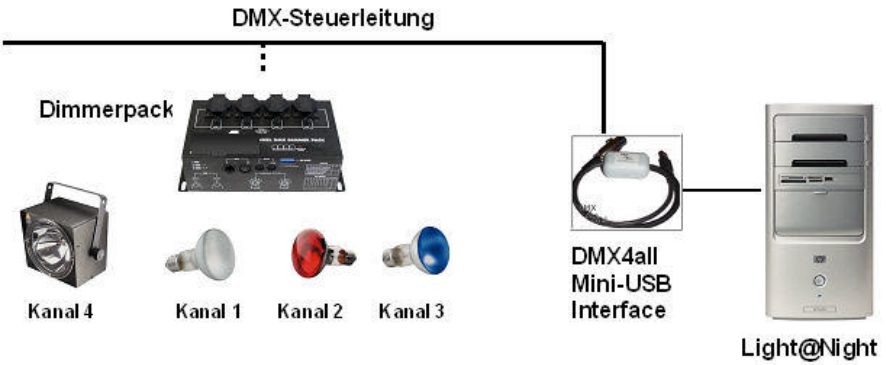


Figure 59: Example DMX

Other Systems

Further components are known in accordance to the EIB and DALI standards. Those standards are used mostly for extended building installations. For both standards are converters to DMX available. Therefore is it possible to control DALI or EIB dimmers with a simple DMX-USB interface and a suitable converter.

Some information and sources of supply:

Manufacturer	Products	Internet
Marmitek	X10 Products	www.marmitek.de
DMX4all	DMX-Interface, Module	www.dmx4all.de
Geo Technik	DMX Dimmer-Packs	www.dimmer.de
Sunlite	DMX-Interface	-
SoundLight	Various DMX Products	-
Conrad	EDX4 Dimmer Pack	www.conrad.de

DMX has no restriction about the speed of the twilight phases

Practical Notes

- With reason to speed, quality and efficiency is it recommended to use the DMX system.
- As DMX-Interface we recommend the Mini-USB-Interface from DMX4all.

- Use low and successive addresses.
- Set the clock speed onto a matching value. A factor 50x or 100x would be suitable. A very fast running clock will initiate non-realistic twilight phases or the rain or thunderstorm will be released to often.
- The twilight phases of X10 are optimized for a time factor of 60x or 100x.
- There will be a slight difference of the minimum brightness values by dimmers of various manufacturers and the connected lamps. Eventually is it required to match the day times and the switch groups to adapt the premise-illumination to the switching times. Keep to the once adjusted time factor.
- For rain or thunderstorm is are minimum values of 0 or 1 and maximum values of 1 recommended.
- At Windows 95 or 98 is often DirectX not installed. In this case will the sound output not work. DirectX can be loaded-up at the Internet for free. Please attend to the terms that over aged operation systems will probably not official supported any more.
- Some systems will set all outputs to zero during the start. If it will be the only light source within the model railway premises the PC with Light@Night should be started at first. You should establish an external possibility to switch the light.
- A very fast switching from daylight to night as well as short start-stop changes can mix-up the system functions. Rather wait until the selected operation has been completed.
- It is recommended to start Light@Night directly during daylight or at the nighttime. If required should be the premise illumination set manually at first.

Attention Main Voltage! Serious Danger for Life!

Installation work at the main voltage shall be carried out from authorized personal only.

Weather Simulation

The requirement to get an exemplary and alternated weather simulation on a model railway layout is a premise light control, a sound card for the 5.1 surround system at the PC and a suitable loudspeaker system including a big sub-woofer. Then will it be possible to initiate with Light@Night to cover the sunlight with clouds and darken down the premises lights. Sometimes should fall some rain, which can be heared over the loudspeaker system. From time to time should come up a thunderstorm with a considerable darkening of the sunlight and loud thunder and bright thunder strikes.

Every day and every thunderstorm will be different because time, sound and light effects will vary.
But take attention: not only the miniature people at the model railway will be frightened but probably your neighbors as well.

You can set the required options at the menu options at the weather simulation. You can decide if you wish clouds, rain or thunder storm. For rain and thunder storm you can optional switch the sound on or off.

Figure 60: Configuration of Weather Simulation

Suitable to a thunderstorm is it possible to create thunder lightening. For these effects are two possibilities available which will be supported at the same time as well.

A light spot will be set as a lightening flash. It will occupy always 3 outputs of a light-module. For a short time those outputs will flicker fast and irregular and create therefore a flash-like effect. As always only the first output will be set and all three outputs have to be controlled by one module. It is recommended to use a Light-Power-Module and connect three 12 Volt halogen lamps with 20 Watt each. Attend to a sufficient power supply. Light@Night will find those light spots and will control them independently.

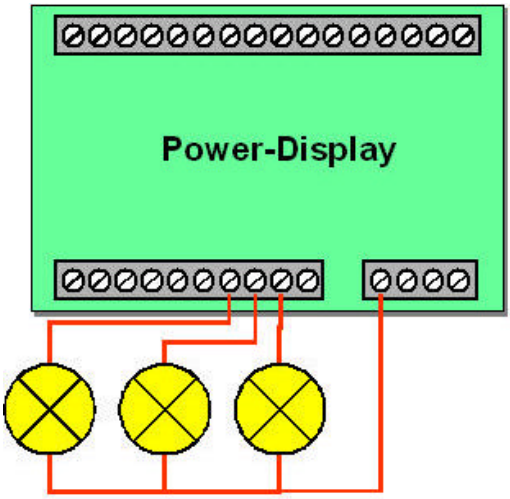


Figure 61: Creating a Flash with a Power-Module

For a X10 premise light control can be a 230 Volt switch module (no dimmer) used for switching-on a stroboscope (to be purchased at low price at mail order firms for electronic components) for about one second.

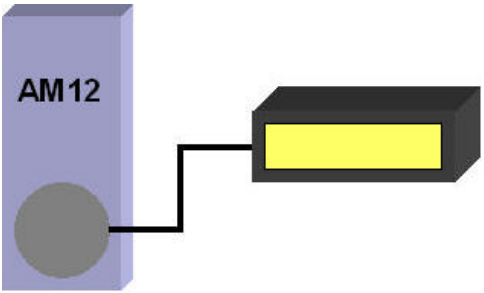


Figure 62: Creating a Flash with a X10 Switch

By using a DMX- basic premises light control will be three consecutive DMX-addresses used as by a light spot. With a fast and irregular switching-on you will create a flash-like effect of high quality. Suitable are dimmer- or switch modules with DMX connection and various capacity.

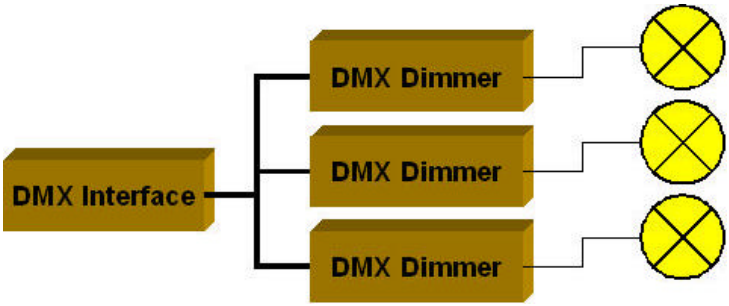


Figure 63: Creating a Flash with DMX Dimmer

The `Finder`

Mostly will be a description of the light spot and the location registered at the comment field. For example: `Bakery 1.Floor` or `Bag-Road 13`.

The finder permits to search for single light spots. Either you will enter a partly text of the comments or an output with the format 1.1, 1,1 or 1-1. If one of the three hyphen will be recognized the system will search for an output, otherwise at the comment field.

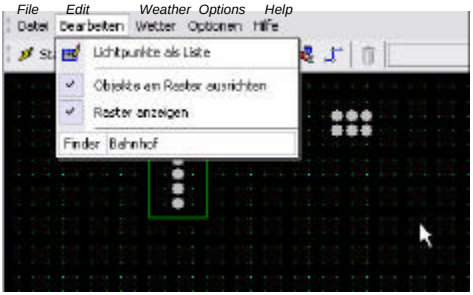


Figure 64: The Finder in Action

The search will be finalized after finding the first matching light spot.

Interface for other Software (API)

Single light spots can be switched-on or off from other programs. In addition Light@Night can be started, stopped or transferred into one of the four daytimes.

Basic of the communication is a network interface. Light@Night keeps open the `UDP-Port 11099` during the whole starting time of the application. If there is an own application running on the same computer the local `IP-Address 127.0.0.1` has to be used. Otherwise of course the real address of the computer has to be used where Light@Night works.

The following datagram's can be transmitted:

Port	Cmd	Data	Description
11099	s		setting into Edit-Mode
11099	g		setting into Run-Mode
11099	t	X	setting the daytime. The data cell X indicates: M=dawn T=day A=dusk N=night
11099			
11099	p	MMMPPPS	switching–on or off a configured light spot. Indication for data: MMM = three-digit, indication of the module PPP = three digit, port number at the module S = E=switching-on, A=switching-off at MMM and PPP with leading `0`or fill up

Example for valid datagram's:

`,s'` = Edit Mode
`,g'` = Run Mode
`,p002017E'` = Light Spot 2,17 switching-on
`,p001040E'` = Light Spot 1,40 switching-off
`,tA'` = Dusk starting and if necessary change into RunMode

All commands and data are ASCII-Bytes. An ASCII-Byte sequence without further schedule or length indicator has to be transmitted.

There will be no confirmations or other information's returned. Nevertheless for setting back the buffer memory it is required to read and react to datagram's received on this port. However their content shall be ignored.

In case you transmit faulty or herewith not-defined datagram's an unexpected result can occur. There will be no checks for incorrect data performed. Normally faulty data will be refused without comments.

In case you require further interfaces or additional functions of Light@Night please contact us (`lightatnight@railware.com`). Apart from the described interface there are further proven modules available particularly for the professional range without model railways as e.g. a Light@Night-Engine including several further settings as well as macro-, network- and synchronization functions.

Operating with Railware

If Light@Night will be used together with Railware Release 5 many different possibilities can be used. For example is it possible to switch any light spots or switch-groups on or off by means of the known auxiliary automatic in Railware. All time settings will run independent and synchronized and the automatic functions (e.g. coach light) will be controlled by Light@Night. Details for the configuration can be found at the Web site for Railware 5.

For an adaptation with Railware the version 5 is required

New Railware versions from 5.10 will support the illumination of dispatch tables with Light@Night Modules.

Future Extensions

The present edition of Light@Night is the beginning of a new world with beautiful light effects at your model-railway layout. Some extensions of the software and supplementary packages for many further light effects will be available soon.

For the hardware range we plan to offer further modules and functions.

On this way Light@Night will become a modular upgradable system.

You can get actual information about all innovations by calling regularly our Web-site: `www.Light-at-Night.com`.

Figure Directory

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